SmartBear Software

AQtrace

User Manual

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Introduction

Introducing AQtrace

AQtrace is an error reporting and resolution system that provides an easy way for software developers to find the cause of an error that occurs in their applications running on end-user computers. AQtrace includes special modules and components that trace the application execution, generate a detailed report about the application's and CPU's state when an error occurs, and then sends this report to the developer. The AQtrace package also includes a special application to perform in-depth analysis of the received error reports.

Why use AQtrace?

Software products become more and more complex. A modern application may include dozens and even hundreds of dynamically linked libraries, third-party component packages and special modules for interacting with drivers and services running on the operating system. Since the number of modules is large and they are supplied by different vendors, it may be rather difficult to find the cause of an error or exception when it occurs.

The situation becomes more complicated if an error occurs on an end-user's computer, because in this case, the developer cannot debug the application. End-users report symptoms of the problem and these symptoms may have different potential causes, so, quite often the information provided by end-users is not enough to find the cause of the error. To determine the cause, programmers resort to a trial-and-error procedure, which is time-consuming and inefficient.

To simplify the search and understand what is going wrong, developers use special error reports that are generated when an exception occurs. These reports include memory dumps, information about modules, threads, call stacks and the contents of CPU registers when an exception occurs. Having the reports in hand, developers can find the cause of an error much faster.

It would be nice if an application could generate error reports when exceptions occur and send these reports to you. This will help you resolve customers' problems faster and improve the quality of your products. This is what AQtrace does. It is a ready-made error reporting and processing system that includes all of the modules and components needed to generate, process and analyze error reports' information.

AQtrace provides a special component that is integrated into your application and monitors the application execution. When an exception occurs, the component performs the following actions:

- Automatically generates an error report.
- Automatically displays a notification window on screen.
- Automatically sends the report and user comments to your server.

The report is sent to the server that receives this report, performs the initial processing and saves it to a centralized storage for further analysis. The developers can then retrieve the report from the storage, investigate the problem and fix it. AQtrace also includes special server-side plug-ins that create work items on the base of the received error reports and save these items to issue-tracking systems like Visual Studio Team System, Bugzilla, ALMComplete or JIRA. So, you can be sure that no error report will be lost or forgotten.

Features

- AQtrace saves the time and energy needed to add the report generating functionality to your products and to implement the desired reporting and error processing policies. AQtrace includes special features for tracing application execution, generating error reports, sending theses reports to developers, receiving the reports and analyzing them.

  Without AQtrace you have to write code that will perform these actions. No need to say that writing this code requires specific knowledge and programming experience. With AQtrace things become much easier. It helps developers resolve customers' problems faster and improve the quality of your products.
- AQtrace is a well-organized automated approach to reporting and fixing bugs. This makes the business process clearer and gives your company benefits relative to competitors.
- AQtrace can be easily integrated into the bug resolution system adopted in your company. It includes special plug-ins that store the received error reports to issue-tracking systems like Visual Studio Team System, Bugzilla, ALMComplete or JIRA. You can also create custom plug-ins that will support the desired issue-tracking products. All of these features free you from manually adding bug reports to the issue-tracking database and guarantee that reports will not be forgotten.
- AQtrace supports a wide range of modern compilers including C#, Visual Basic .NET, J# and other .NET tools, Visual C++, Visual Basic, Delphi, C++Builder and Intel C++. It can also be used in 64-bit applications.
- AQtrace can trace *any exceptions* that occur in your application whether they are raised within try-except blocks or outside of them. AQtrace can detect both hardware and software specific exceptions, that is, it can trace exceptions generated by the CPU (like division by zero) as well as exceptions defined in your applications with the help of special exception classes.
- AQtrace supports filters that let you specify the exceptions to be traced and the modules that will be traced for exceptions. This feature lets you automatically exclude errors that occur in third-party packages and that cannot be changed by you.
- AQtrace includes special features for filtering duplicated error reports. So, you do not have to analyze the same reports over and over again.
- AQtrace offers a rich set of settings that specify information to be included into the generated reports. For instance, information about the operating system, service packs and .NET Framework versions, information about the processes, hard-disk space and memory, and so on. You can also include custom information, such as the internal state of your applications' subsystems or internal applications' flags.
- You can use AQtrace as a watchdog to prevent the injection of certain DLLs into the address space of your process.

Detailed Information on Using AQtrace

In order to implement the error reporting policy with AQtrace, you should perform a number of actions:

- Change your application's build settings to build your modules with debug information and version information.
- Organize and maintain the storage of debug information for different builds.
- Add the AQtrace Reporter initialization code to your application.
- Install AQtrace's Server-Side components and tune their functionality.

For detailed information on how to perform these steps, see the topics of the *Using AQtrace* section. For a step-by-step tutorial, see *Getting Started Tutorial*.

System Requirements

The AQtrace package includes several components, and each of them has its own requirements.

AQtrace Reporter and AQtrace Report Monitor

These components must meet the following system requirements:

- Intel Pentium III 800 MHz or higher.
- Microsoft Windows 7 (both 32-bit and 64-bit editions), Windows Server 2008 (both 32-bit and 64-bit editions), Microsoft Windows Vista (both 32-bit and 64-bit editions), Windows Server 2003 (both 32-bit and 64-bit editions), Windows XP (both 32-bit and 64-bit editions), Windows 2000 or Windows NT 4.0 with Service Pack 6 or later.

  Note: AQtrace cannot be installed on Microsoft Windows NT. However, AQtrace Reporter applied to a user application and AQtrace Report Monitor can work on Microsoft Windows NT. That is, the Reporter and Report Monitor can trace exceptions, generate and send error reports while working on this operating system.

- 2 MB hard-disk space.

AQtrace Server-Side Components

The following requirements concern Report Collector, AQtrace Service, issue-tracking plug-ins, AQtrace Module Store Agent and AQtrace Server Config:

- Intel Pentium III 800 MHz or higher.
- Microsoft Windows 7 (both 32-bit and 64-bit editions), Windows Server 2008 (both 32-bit and 64-bit editions), Microsoft Windows Vista (both 32-bit and 64-bit editions), Windows Server 2003 (both 32-bit and 64-bit editions), Windows XP (both 32-bit and 64-bit editions) or Windows 2000.
- Microsoft Internet Information Services ver. 5.0 - 7.5.
- Microsoft Internet Explorer 6.0 or later.
- Memory: 512 MB of RAM.

Notes:

- To install AQtrace Server-Side Components, administrator permissions are needed.
- To install the Report Collector (.asp page) component, the installation program must be running under a user account that has administrator privileges in Internet Information Services (IIS).
- To install the Microsoft Visual Studio Team System Support component, you must have Microsoft Visual Studio 2005 or 2008 with Team Explorer. If both are installed, Visual Studio 2008 Team Explorer will be used.

AQtrace Viewer, AQtrace Packager and AQtrace Module Store

These utilities must match the following requirements:

- Intel Pentium III 800 MHz or higher.
- Microsoft Windows 7 (both 32-bit and 64-bit editions), Windows Server 2008 (both 32-bit and 64-bit editions), Microsoft Windows Vista (both 32-bit and 64-bit editions), Windows Server 2003 (both 32-bit and 64-bit editions), Windows XP (both 32-bit and 64-bit editions) or Windows 2000.
- Microsoft Internet Explorer 6.0 or later.

- Memory: 512 MB of RAM.
- 50 MB hard-disk space.
- 800 × 600 or higher resolution monitor.
- Mouse or other pointing device.

Additional Requirements

Microsoft Source Server Support

To use Microsoft Source Server with AQtrace Viewer, you must have the following software installed on your computer:

- Microsoft Debugging Tools for Windows.
- Perl 5.6 or later.

Additionally, Automated Build Studio 5 or later is recommended to automate source indexing of your applications.

SmartBear Source Server Support

To use SmartBear Source Server with AQtrace Viewer, Automated Build Studio 6 or later is required to perform source indexing of your applications.

Supported Applications

AQtrace supports any .NET, Win32 or Win64 application that can use *AQtrace Reporter* and that has debug information in a supported format.

.NET (Managed) Applications

The *AQtrace Reporter* functionality that is used by .NET code is implemented in a special assembly, and can be used in **any .NET application**, including those created with the following development tools:

- Microsoft Visual C# 7.x, 2005, 2008 and 2010
- Microsoft Visual Basic .NET 7.x, 2005, 2008 and 2010
- Microsoft Visual C++ 7.x, 2005, 2008 and 2010 (managed code)
- Microsoft Visual J# 7.x, 2005
- CodeGear Delphi 2007 and 2009 for .NET
- Borland Delphi 2005 and 2006 for .NET
- Borland C#Builder

Native (Unmanaged) Applications

The *AQtrace Reporter* functionality that is used by unmanaged Win32 and Win64 applications is implemented in a special dynamic link library, and can be used in **any application that supports loading of DLLs and working with interfaces**.

As for debug information, currently AQtrace supports the following formats:

- PDB
- Sym

- TDS
- TD32

These two conditions are met in applications created with the most popular modern compilers. AQtrace supports applications created with the following development tools:

- Microsoft Visual C++ ver. 6, 7.x, 2005, 2008 and 2010 (unmanaged code)
- Microsoft Visual Basic ver. 6
- Embarcadero Delphi 2010 and XE
- CodeGear Delphi 2007 and 2009 for Win32
- Borland Delphi 2005 and 2006 for Win32
- Borland Delphi ver. 3 – 7
- Embarcadero C++Builder 2010 and XE
- CodeGear C++Builder 2007 and 2009
- Borland C++Builder 2006
- Borland C++Builder ver. 3 - 6
- Intel C++ ver. 7

Other applications that meet the above-mentioned conditions are also supported by AQtrace.

Java

Java applications are not currently supported.

Traced Exceptions

The AQtrace component that monitors your application execution and traces exceptions is called *AQtrace Reporter*. It can detect **any exceptions** that occur in your application. It intercepts exceptions on a low level and can handle them regardless of whether they are included in the `try-catch` blocks or not.

You can command AQtrace Reporter to only handle specific types of exceptions (for instance, only division by zero) and ignore other exceptions. You do this by defining the exception filter. For detailed information about the filter and traced exceptions, see *Specifying Exceptions to Be Traced*.

You can *disable the Reporter temporarily*, so the Reporter will handle those exceptions that occur when it is enabled and skip those exceptions that occur when it is disabled. This way, the exceptions will be processed in a way that is defined in your code (for instance, these exceptions can be handled with the `try-catch` statements). For information on disabling and enabling the Reporter, see *Enabling and Disabling AQtrace Reporter*.

There are some exception that AQtrace Reporter *always* ignores. These are exceptions that are raised by the following Windows API functions during their work:

- IsBadCodePtr
- IsBadHugeReadPtr
- IsBadHugeWritePtr
- IsBadReadPtr
- IsBadStringPtrA
- IsBadStringPtrW

- IsBadWritePtr

AQtrace Reporter traces these exceptions, but neither generates error reports, nor processes them, since these exceptions are part of normal function execution, and they do not mean the function performs an erroneous action. In other words, these exceptions are always ignored regardless of the exception filters you use.

Technical Support and Resources

If you have questions, problems or just need help with AQtrace, you can either contact our **support team** or try to search for the needed information using the help resources located on our web site (forums, blogs, technical papers).

To submit your question to the support team

1. Select **Help | Contact Support Team** from AQtrace Viewer's main menu. This will invoke the *Contact Support Team* dialog.
2. (Optional) In the dialog, select the **Attach system information to my support request** check box if you want AQtrace to collect some system information and attach it to your request. To preview the collected system information and make a decision whether you want to send it to our support team, click the **View the system information file contents** link at the bottom of the dialog. This will invoke the **System Information** dialog, in which you can preview the information to be attached to the request.

   If you do not want to attach this information to your request, clear the check box. However, we recommend that you attach this information since it can help our support team solve your problem quicker.
3. Click the **Continue** button in the Contact Support Team dialog. AQtrace Viewer will load the web page with the Contact Support Form from our web site to your web browser:

   - **http://smartbear.com/support/message/?prod=AQtrace**

   Fill in the required fields in this web form. Note that your contact information, the product name and version are specified automatically in the appropriate fields when you proceed to this web page from the Contact Support Team dialog. You only need to describe your problem in the appropriate fields.
4. Click **Submit** in the Contact Support Form to submit the request.

The support team will answer you via e-mail and all further communication will be made via e-mail. However, to start the conversation, please use the Contact Support Team dialog in AQtrace Viewer and the Contact Support Form on our web site.

For information on our support policies, please visit our web site **http://smartbear.com/support**.

More support resources

You can also ask questions, search for answers, exchange comments and suggestions on our **forums**:

- **http://smartbear.com/forums**

You can find answers to your question in the list of the **frequently asked questions** which is available at:

- **http://smartbear.com/support/faq/?product=AQtrace**

Learn more about using AQtrace from **technical papers** and **blogs** published at:

- **http://smartbear.com/support/articles**
- **http://blog.smartbear.com**

Make sure you regularly visit the SmartBear Web site:

- **http://smartbear.com**

Sample Applications

The AQtrace package includes a number of sample applications and configuration projects that demonstrate how you can use AQtrace. The samples are copied to your computer if you select the *"Analyze received error reports"* or *"Prepare your modules for AQtrace"* option on the **Select AQtrace Components** page of the AQtrace installation wizard. The samples include Visual C++, Visual C#, Visual Basic 6 and Delphi applications.

On Windows 7, Windows Vista and Windows Server 2008, AQtrace samples are located in the *<Users>\Public\Documents\AQtrace Files\Samples* folder. On other operating systems, the samples reside in the *<Documents and Settings>\All Users\Documents\AQtrace Files\Samples* folder. Hereinafter, the folder containing samples will be denoted as <AQtrace Samples>.

Few notes:

- All samples include source code files and compiled modules of sample applications which you can use if for some reason you cannot compile the source files. You can find the source code files in the *<AQtrace Samples>\Sources* folder, and the compiled modules reside in the *<AQtrace Samples>\CompiledSamples* folder.
- The compiled modules were processed with *AQtrace Packager*, that is, they already have *AQtrace Reporter* applied to them. Also, the folders with the sample executables already include the *aqReporter.dll* and *DbgHelp.dll* modules that implement the Reporter's functionality. So, you can launch these samples as they are. You can use them to generate error reports and explore the reports.
- All samples include the AQtrace Packager projects that were used to apply AQtrace Reporter to the compiled modules. You can find these projects in the folders with the source code files.

Visual C++ Sample

The Visual C++ sample demonstrates how you can use AQtrace with applications created with Visual C++ 6, 7.x, 2005, 2008 and 2010. You can find the source code files of the sample in the following folder and its subfolders:

- *<AQtrace Samples>\Sources\CPP*

The sample contains the 32- and 64-bit versions of the sample executable and the sample dynamic link library. You can find the compiled modules in the following folders:

- *<AQtrace Samples>\CompiledSamples\CPP\x86* - Contains the compiled modules of the 32-bit Visual C++ sample application and the 32-bit versions of the aqReporter.dll and DbgHlp.dll libraries.
- *<AQtrace Samples>\CompiledSamples\CPP\x64* - Contains the compiled modules of the 64-bit

Visual C++ sample application and the 64-bit versions of the aqReporter.dll and DbgHlp.dll libraries.

The *<AQtrace Samples>\Sources\CPP* folder contains the *Samples.sln* solution file that is used to compile the sample modules.

Other sample files are organized into a number of subfolders:

- *AQtracePackagerProject* - Contains two configuration project files that let you apply *AQtrace Reporter* to the 32- or 64-bit sample application. You use these configuration projects with the *AQtrace Packager* utility.
- *Bmp* - Contains images used by the sample applications.
- *Common* - Contains the source files that are common for the sample executable and sample DLL.
- *SampleApp* - Contains the source files of the sample executable.
- *SampleDll* - Contains the source files of the sample DLL.

Visual C# Sample

The Visual C# sample demonstrates how you can use AQtrace with applications created with Visual C# 7.x, 2005, 2008 and 2010. You can find the source code files of the sample in the following folder and its subfolders:

- *<AQtrace Samples>\Sources\C#*

The sample contains the sample executable and the sample dynamic link library. You can find the compiled modules in the following folder:

- *<AQtrace Samples>\CompiledSamples\C#* - Contains the compiled modules of the Visual C# sample application, the 32-bit versions of the aqReporter.dll and DbgHlp.dll libraries, and the aqReporterInterop.dll helper assembly that was generated by AQtrace Packager in order for the .NET sample application to be able to use AQtrace Reporter (for more information on this assembly, see *Using AQtrace With .NET Applications - Overview*).

The *<AQtrace Samples>\Sources\C#* folder contains the *Samples.sln* solution file that is used to compile the sample modules.

Other sample files are organized into the following subfolders:

- *AQtracePackagerProject* - Contains the configuration project file that lets you apply *AQtrace Reporter* to the sample Visual C# application. You use this configuration project with the *AQtrace Packager* utility.
- *SampleApp* - Contains the source files of the sample executable.
- *SampleDll* - Contains the source files of the sample DLL.

Delphi Sample

The Delphi sample demonstrates how you can use AQtrace with applications created with Delphi 7, 2006, 2007, 2009, 2010 and XE. You can find the source code files of the sample in the following folder and its subfolders:

- *<AQtrace Samples>\Sources\Delphi*

The sample contains the sample executable and the sample dynamic link library. You can find the compiled modules in the following folder:

- *<AQtrace Samples>\CompiledSamples\Delphi* - Contains the compiled modules of the Delphi sample application and the 32-bit versions of the aqReporter.dll and DbgHlp.dll libraries.

The *<AQtrace Samples>\Sources\Delphi* folder contains the *Samples.bpg* project group file that is used

to compile the sample modules.

Other sample files are organized into the following subfolders:

- *AQtracePackagerProject* - Contains the configuration project file that lets you apply *AQtrace Reporter* to the sample Delphi application. You use this configuration project with the *AQtrace Packager* utility.
- *Common* - Contains the files that are common for the sample executable and sample DLL.
- *SampleApp* - Contains the source files of the sample executable.
- *SampleDll* - Contains the source files of the sample DLL.

Visual Basic 6 Sample

The Visual Basic sample demonstrates how you can use AQtrace with Visual Basic 6 applications. You can find the source code files of the sample in the following folder:

- *<AQtrace Samples>\Sources\VB6*

The sample contains the compiled sample executable that resides in the following folder:

- *<AQtrace Samples>\CompiledSamples\VB6* - Contains the compiled *SampleApp.exe* sample executable and the 32-bit versions of the aqReporter.dll and DbgHlp.dll libraries.

The *<AQtrace Samples>\Sources\VB6* folder contains the source files that are organized into the following subfolders:

- *AQtracePackagerProject* - Contains the configuration project file that lets you apply *AQtrace Reporter* to the sample Visual Basic 6 application. You use this configuration project with the *AQtrace Packager* utility.
- *SampleApp* - Contains the source files of the sample executable.

Getting Started Tutorial

This section comprises of three tutorials each describing different aspects of using AQtrace. The section contains the following topics:

- *Basic Concepts*
  - *AQtrace Components, Terms and Concepts*
  - *How AQtrace Works for End Users*
- *Getting Started - Important Notes on the Tutorial*
- *Getting Started: Lesson 1 - Analyzing Error Reports*
  - *Specifying AQtrace Viewer's Settings*
  - *Analyzing Sample Report*
- *Getting Started: Lesson 2 - Applying AQtrace Reporter*
  - *Setting Version Number*
  - *Generating Debug Information*
  - *Compiling Application*
  - *Applying AQtrace Reporter to Your Application*
  - *Running Sample Application and Generating Error Reports*
- *Getting Started: Lesson 3 - Using Build Storage and Server-Side Components*
  - *Preparing Application for AQtrace - Key Points*
  - *Adding Modules to Build Storage*
  - *Organizing Report Storages*
  - *Configuring Server-Side Components*
  - *Configuring AQtrace Viewer*
  - *Running Sample Application and Generating Error Reports*
- *Getting Started - What's Next?*

Basic Concepts

AQtrace is a set of libraries and components that automatically generate error reports and transfer them to developers for processing and analysis. It includes a specific component that is built into your application and monitors the application execution. When an exception occurs, the component automatically generates an error report and sends it to the server that receives the report and saves it for further processing and analysis. Topis of this section provide a brief overview of AQtrace components and explain how they work.

- *AQtrace Components*
- *How AQtrace Works for End Users*

AQtrace Components, Terms and Concepts

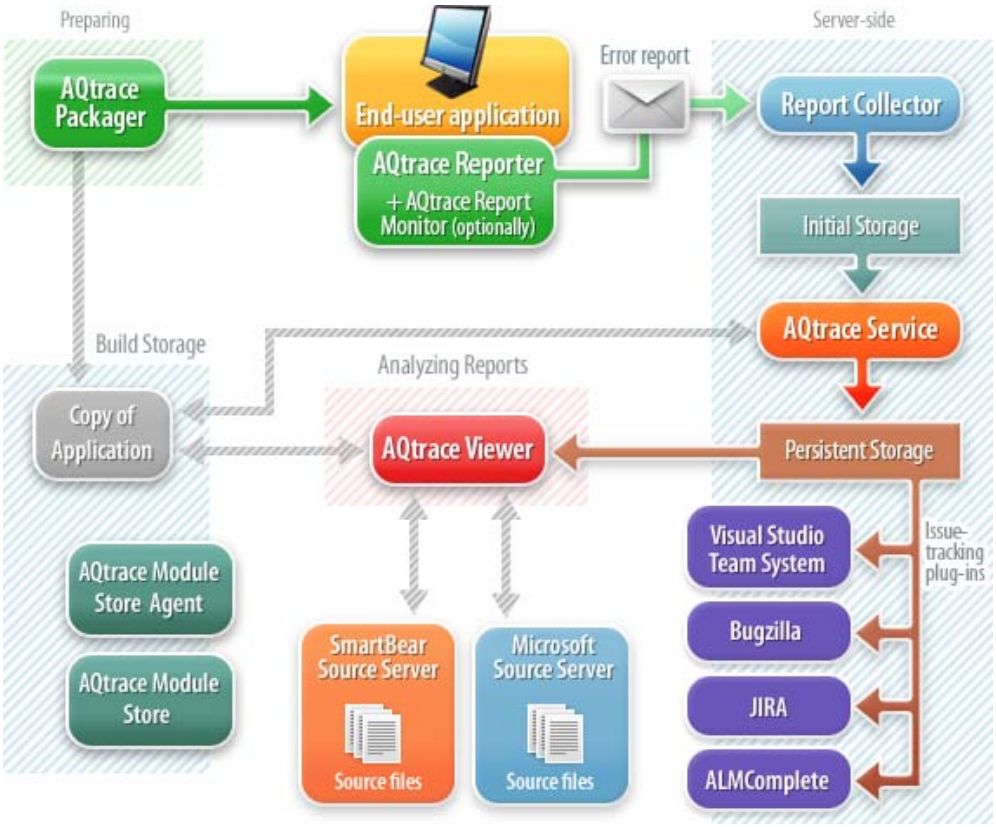
This topic provides a brief overview of AQtrace components:

Error-Reporting Process With AQtrace

The error-reporting and resolving process with AQtrace includes several steps:

1. You prepare your application for error reporting with AQtrace.
2. You ship your application to end users with a special redistributable module - AQtrace Reporter (see below). It monitors your application execution, and if an exception occurs, it generates an error report and sends it to you.
3. The reports are received by AQtrace server-side components and saved to the report storage.
4. You then examine the report's data and find the cause of the problem.

The AQtrace software package includes special modules and components for each of the steps described above. These components typically function on different computers and solve tasks that are specific to a particular step. The general concept of using AQtrace components looks like:



Below is a detailed description of AQtrace components and libraries.

AQtrace Reporter

AQtrace Reporter is a subsystem that traces exceptions, generates error reports and sends them to your server. The AQtrace Reporter functionality is implemented by special dynamic link library - aqReporter.dll - and a number of helper DLLs. All of these libraries are redistributable and you must ship them along with your application. The number of helper DLLs to be used depends on your application type. For complete information on this, see *Distributing AQtrace Reporter Libraries*.

When your application starts, it loads the aqReporter library and initializes AQtrace Reporter. After that, the Reporter starts monitoring the application execution. If an exception occurs, it displays a notification window, generates an error report and sends this report to you.

AQtrace Reporter may send reports via one or several transfer protocols. For more information on this, see *Transferring Reports*.

You can use AQtrace Reporter's program interface in the Reporter and perform specific tasks like enabling or disabling the reporting functionality, including, but not limited to, adding custom data into reports or generating reports on demand. For more information about this, see *AQtrace Reporter Programming*.

AQtrace Report Monitor

AQtrace Report Monitor is a special redistributable utility that runs as a service on end-user computers and sends reports to your server. It should be used only with those applications for which AQtrace Reporter cannot display a *notification window* and send generated error reports. A typical example of such an application is an executable running as a service. Using AQtrace Report Monitor solves the problem with transferring reports to your server. See *AQtrace Report Monitor* for complete information.

AQtrace Packager

AQtrace Packager is a utility that is used for configuring AQtrace Reporter settings and applying them to your executables. With AQtrace Packager you can tune almost any aspect of AQtrace Reporter's functionality. You can specify --

- The type of exceptions to be traced or to be ignored.
- The modules whose code will be traced for exceptions.
- Information that will be included in the reports (OS data, information on free memory and disk space).
- The text to be displayed in the notification window.
- The address to which reports will be sent and the protocol that will be used for the transfer.
- And so on.

For complete information on working with the Reporter, see the *AQtrace Reporter description.*

Report Collector, AQtrace Service, Initial and Persistent Storages

Error reports are sent to the server that receives and processes them. *Report Collector* is an .asp page that functions on the server side and receives the error reports that are sent via HTTP and HTTPS protocols. Report Collector saves these reports to a temporary folder. If the Report Collector's settings specify it should relay reports to another URL, the Collector sends the received reports to another URL (see *Report Relaying*). If the Collector's settings specify it should store reports, the Collector saves the report to a folder called **initial storage folder**.

AQtrace Service is another server-side component of AQtrace. It runs as a service and monitors the initial storage folder. Once a new report arrives, AQtrace Service performs the initial processing of this report and then moves it to a **persistent storage folder**. After this, you can analyze the report or process it in any other way.

Notes:

- Report Collector is used only for those reports that are sent via the HTTP and HTTPS protocols. If AQtrace Reporter uses other protocols, you should configure its settings in such a way that the Reporter sends reports directly to the initial storage folder.
- You can specify the initial storage folder and persistent storage folder during the AQtrace installation or you can do this any time later by using the *AQtrace Server Config* utility.
- The initial and persistent storage folders may reside on the server computer or in any other place in your local network. That is, **you can use network paths** to specify them.
- It is recommended that you **share the persistent storage folder** so that other developers and the plug-ins can work with the report files.

Issue-Tracking Plug-Ins

The AQtrace software package includes a number of **issue-tracking plug-ins** that work on the server side. These plug-ins automatically append work items to issue-tracking systems like Visual Studio Team System, Bugzilla, ALMComplete or JIRA on the base of the received error reports. AQtrace also includes a special utility that lets you configure the plug-ins, settings and implement the desired bug-processing scheme. For more information, see *Issue-Tracking Plug-Ins*.

AQtrace Viewer

AQtrace Viewer is a special utility that is included into the AQtrace package and is used for analyzing error reports. It allows you to view and explore call stacks and disassembly code and view data included into the report. For detailed information on how to work with the Viewer, see *AQtrace Viewer description*.

In order for AQtrace Viewer to be able to parse the call stack data, it must have access to binary code and debug information of modules that are mentioned in the error report and to their source codes.

SmartBear and Microsoft Source Servers

Source servers are needed when you are analyzing received error reports with AQtrace Viewer. The source servers help you see the exact version of a source unit that was used to compile the application's build in which an exception occurred.

AQtrace supports two source servers: Microsoft Source Server and SmartBear Source Server. The Microsoft Source Server support is needed only when you are analyzing error reports. The SmartBear Source Server modules are used on both report analysis and application preparation steps.

Build Storage, AQtrace Module Store and AQtrace Module Store Agent

AQtrace Service and *AQtrace Viewer* analyze call stack data that were saved to an error report by AQtrace Reporter. In order for these tools to be able to parse the call stack data, **they must have access to binary code and debug information of modules mentioned in the report**.

The binary code and debug information are not included in the report. You should store them somewhere and specify their location by using the Viewer's and Service's settings.

End-users can work with different versions of your application and most likely you will receive error reports generated for different versions. So, you should store binary modules and debug information for all

versions of your application that were shipped to end-users. That is, you should create **build storage** for the modules of your applications. In order for AQtrace Viewer and Service to be able to parse the reports, you should specify the path to the build storage.

AQtrace Viewer and Service are typically installed on different workstations and most likely they will be installed on other computers like the computer where the build storage resides. So, you should **share the build storage's folder** for network access in order for AQtrace Viewer and Service to be able to connect to it.

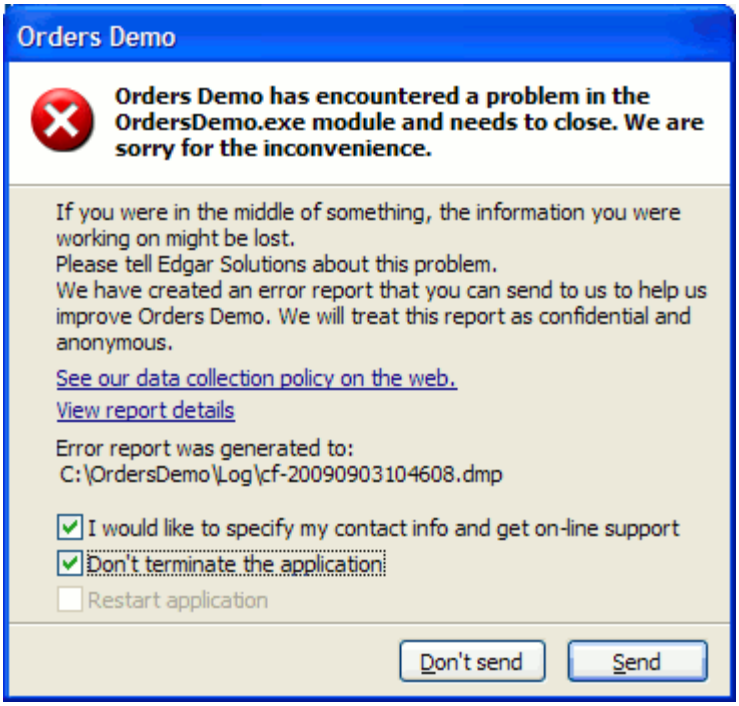
For more information on creating and maintaining build storages, see *Organizing Build Storage*.

Server-Side Components

In the AQtrace documentation we use the term **server-side components**. It unites AQtrace components and modules that function on the server side: Report Collector, AQtrace Service, issue-tracking plug-ins and AQtrace Module Store Agent. The latter is included in this group because build storages typically reside on servers.

How AQtrace Works for End Users

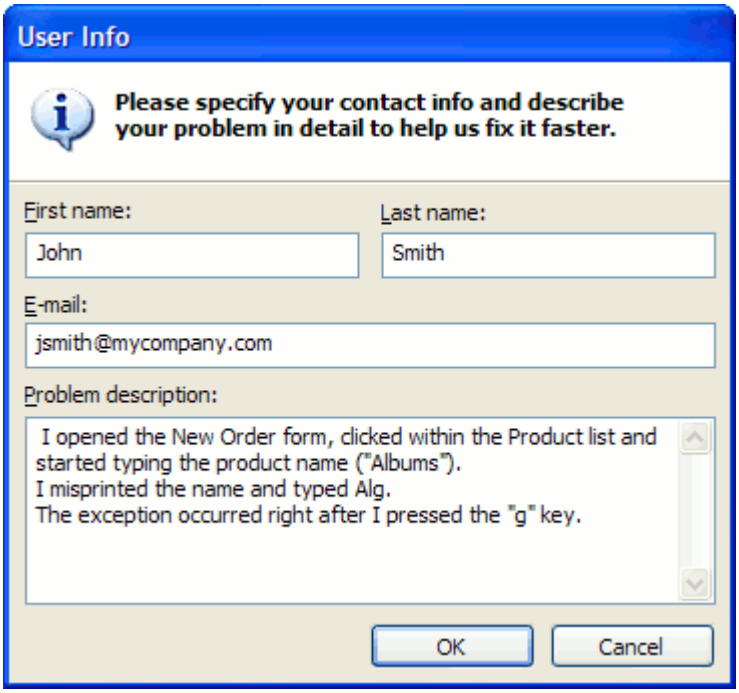
AQtrace is completely transparent for end-users. Typically, they don't even know that your application uses AQtrace. They run your application and work with it as usual. However, if an exception occurs during the run, they see a notification window on screen:



This window informs the user about the problem and suggests that the user sends an error report to the application developer (that is, to you). If the user presses **Send**, the generated error report is sent.

By selecting or clearing the check boxes in the notification window, the end-user can also control further actions. For instance, if the **I would like to specify my contact info...** check box is selected, then after pressing the Send button, AQtrace displays the User Info dialog where the end-user can enter their name, e-

mail and an additional description of the problem:



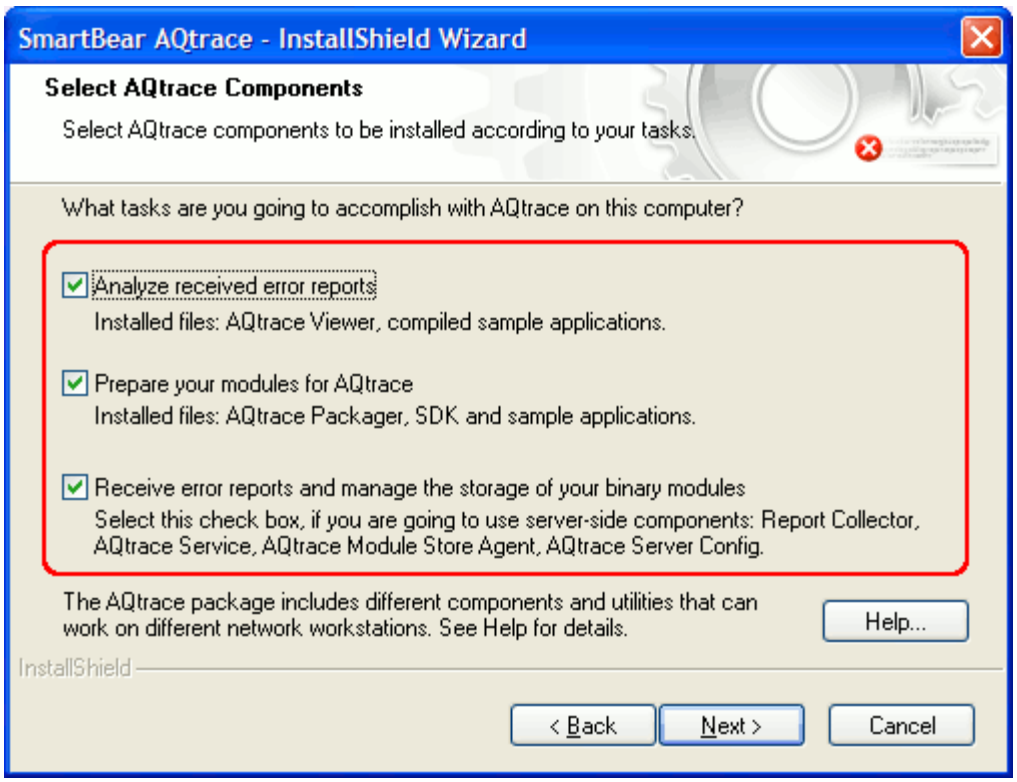
After the notification window is closed, the application may be closed or restarted (according to the window's check boxes) and the end-user can continue to work with your application.

Getting Started - Important Notes on the Tutorial

To demonstrate the main features of the error reporting system we will skip a number of operations and assume some alleviations from the real-world situation. Namely:

- The tutorial needs that you install all the AQtrace components and that they are installed on the same computer.

  To install all the components, select all the three check boxes during AQtrace installation:



The situation when all AQtrace components are installed on the same computer is contrary to real-world situation when, as a matter of fact, different AQtrace components work on different machines:

- *AQtrace Reporter* is shipped along with your application and functions on end-users' computers.
- *Report Collector* and *AQtrace Service* work on your server that receives error reports and performs the initial processing of these reports. In general, the Collector and Service may work on different computers.
- Finally, *AQtrace Viewer* runs on developers' workstations.

Using several computers can be difficult in the initial stage when you have just started using the product. That is why we will assume that all AQtrace components are installed on the same computer.

- The computer, on which you install AQtrace, must have Internet Information Services (IIS) installed. We will use HTTP protocol to transfer error reports from the sample application to server-side components. In order for the *Report Collector* to function properly, IIS is required.

  We assume that you use default Report Collector settings. That is:

  URL: /AQtrace/bugreport.asp

  Port: 80

- In our explanations we will use a Visual C++ sample application that is shipped with AQtrace. All AQtrace sample applications raise different types of exceptions that may occur in your applications. Working with other sample applications is similar, so you can apply the same logic to any of the sample applications.

  You can find AQtrace samples in the *<Users>\Public\Documents\AQtrace Files\Samples* folder on Windows 7, Windows Vista and Windows Server 2008 and in the *<Documents and*

Settings>\All Users\Documents\AQtrace Files\Samples folder on other operating systems. See *Sample Applications*.

- The pre-compiled samples shipped with AQtrace already have the error-reporting functionality embedded into them. However, your applications should be processed in a special manner to provide this functionality. That is why in this tutorial we will repeat the sequence of preparing the application for AQtrace over the sample once again.
- AQtrace is able to deal with both native-code (non-.NET) and managed (.NET) applications. Most of the techniques are similar for both types of applications, yet certain aspects differ (especially the phase of applying *AQtrace Reporter*). The Visual C++ sample application that we will use during the tutorial is a native code application, so the tutorial descriptions are relate to native-code applications. To learn how to process managed applications, see *Using AQtrace Packager With .NET Applications* topic.
- When *specifying a source code path*, we assume that there is only one version of the application's source files.

  However, in general, each application version that was shipped to the end users has their own set of sources. It is evident that to analyze the error report generated by some particular version (say, version 1.2) the developer should observe the synchronous version of source files (not those of version 1.0 or 1.5).

  Typically, different versions of source files are maintained using especial source control systems. AQtrace supports the most popular source control systems: Visual SourceSafe, Perforce, Subversion, CVS. So you can configure AQtrace Viewer so that it automatically obtains the sources synchronous to the examined error report. Read *Source Server Support* for detailed information.

Getting Started: Lesson 1 - Analyzing Error Reports

The main purpose of AQtrace is to obtain the error report and to find out the reason of that error quickly. We will start working with AQtrace by exploring a sample error report with the *AQtrace Viewer* utility. This utility is your workspace for examining an error report's data and searching for the cause of an error.

Before an error report gets to your computer and can be explored with AQtrace Viewer, the report is generated on the end-user's computer, transmitted to your server, processed there and saved to a report storage. We will explain all these operations a bit later, in the third part of this tutorial: *Getting Started: Lesson 3 - Using Build Storage and Server-Side Components*. Right now we would like to show you how you search for the cause of exceptions with AQtrace Viewer, because this utility that will be used more frequently and by more users than any other component of the AQtrace package.

In order for AQtrace Viewer to be able to parse the report's data, it must have access to the binary code and debug information of your application's modules. So, before analyzing the report, you should verify whether the Viewer's settings specify the path to the binary modules and debug information file. The following topics describe the settings that you need to specify and explain how you can analyze error reports with AQtrace Viewer.

Specifying AQtrace Viewer's Settings

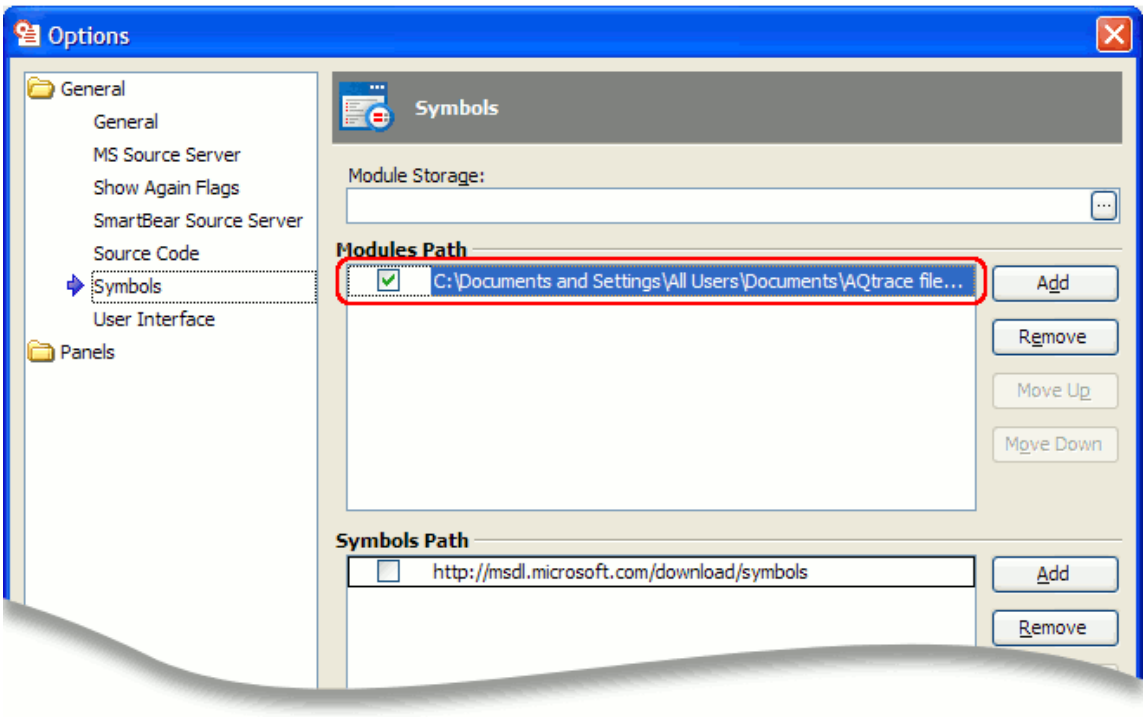
To provide the developer with more detailed information about the occurred exception, the *AQtrace Viewer* need access to binary code, debug information and source code of the module or modules for which error reports are generated. You specify the folders, in which the Viewer will look for the modules, debug information and source code, in the *Options* dialog of AQtrace Viewer. Let's modify these settings in order for the Viewer to be able to parse the data of our sample report:

1. Open the Options Dialog

- Launch AQtrace Viewer (the file name is *<AQtrace>\Bin\AQtraceViewer.exe*).
- Select **Options | Options** from the main menu of AQtrace Viewer. This will invoke the Options dialog. Use this dialog to configure AQtrace Viewer.

2. Specify path to binary modules and their debug information

- Select the **General | Symbols** category from the tree view on the left of the Options dialog. This will display the *Symbols Options* page on the right of the dialog:



This page contains three setting that define the module locations: *Module Storage*, *Modules Path* and *Symbols Path*. They complement one another. For more information on them, see *AQtrace Viewer - Specifying Path to Modules*.

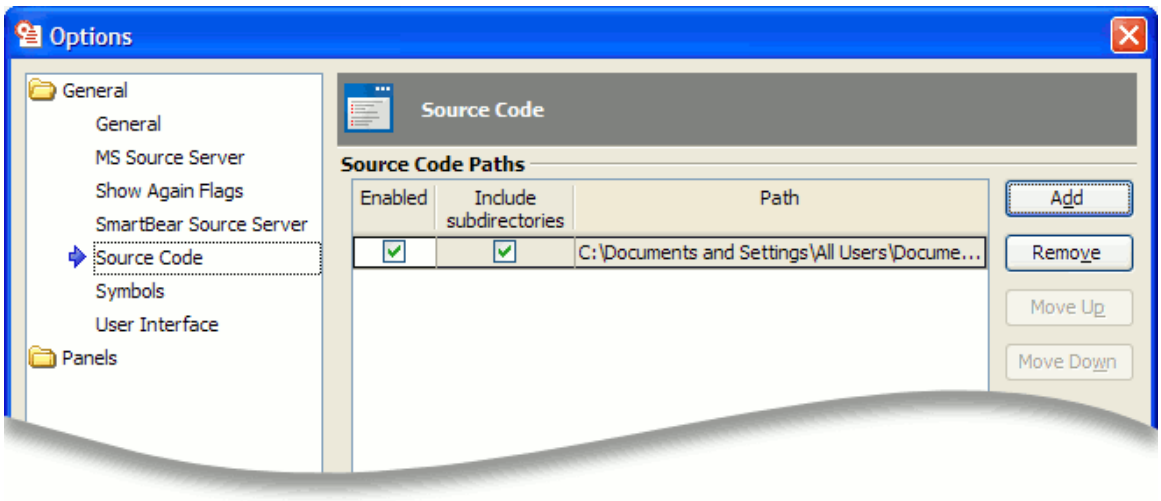
In general case, it is recommended to *organize a build storage* and specify the build storage configuration file to the **Module Storage** setting as a primary source of modules location. However, in this sample we use only one version of the application, and therefore will not create build storage. Instead we specify the full path to the binary and debug information files to the **Modules Path** list. To do this:

- Press **Add** to append a new row to the **Modules Path** list. A new empty row will be added.
- Click within the in-place editor and press the ellipses button. This will display the standard Browse for Folder dialog.
- In the dialog, choose the folder that contains the binary files of your application. In our case, this is <AQtrace Samples>\CompiledSamples\CPP\x86. This folder contains the binary modules of a 32-bit Visual C++ sample application.
- Click **OK** to return back to the Options dialog.

The settings of the Symbols Options group are critical for AQtrace Viewer. Without them it will not be able to parse the call stack data.

3. Specify path to the source files of your application

- Choose the **General | Source Code** category in the Options dialog. This will activate the *Source Code* page on the right of the dialog.

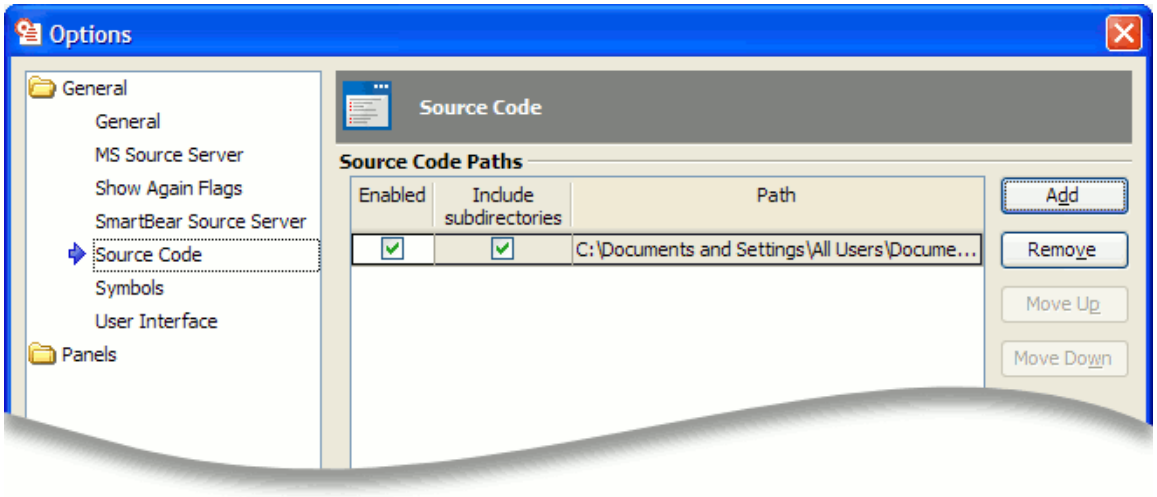


- Press **Add** to append a new row to the **Source Code Paths** list. AQtrace Viewer will add a new empty row to the list.
- Click within the **Path** cell of the new row. Then click the ellipsis button that is displayed within this cell. This will display the standard Browse for Folder dialog.
- In the dialog, select the folder that contains the source files of our sample application:
  - On Windows 7, Windows Vista or Windows Server 2008, select this folder:

    <Users>\Public\Documents\AQtrace Files\Samples
  - On other operating systems, select this folder:

    <Documents and Settings>\All Users\Documents\AQtrace Files\Samples

  Press **OK** to confirm your choice. You will return back to the Source Code page of the Options dialog.
- Select the **Include subdirectories** check box for the added row. When this check box is selected, then AQtrace Viewer will automatically search for the source files in subfolders of the specified folder.



Notes:

- Besides the path to the source files of your application, it is also recommended to specify the search paths for the source files of MFC, VCL or any other library that was used to create your application. Having this information, AQtrace Viewer is able to display source code for the MFC, VCL or other library routines. Otherwise, the source code for these routines will not be shown in the Disassembly and Code Viewer panels.
- In this tutorial, we have only one version of application and consequently only one version of source code files. That is why we have specified only one *AQtrace Samples* folder in the **Source Code Paths** list.

  However, generally the end-users have several different versions of your application. Therefore you should be able to access different versions of source code files as well. A typical solution is to apply some kind of source control system. Read *Source Server Support* topic to learn how to obtain the sources synchronous to the examined error report.

4. Save the settings

When all the needed settings are specified, press **OK** to close the Options dialog and to save the changes.

Now we are ready to explore a sample error report in AQtrace Viewer.

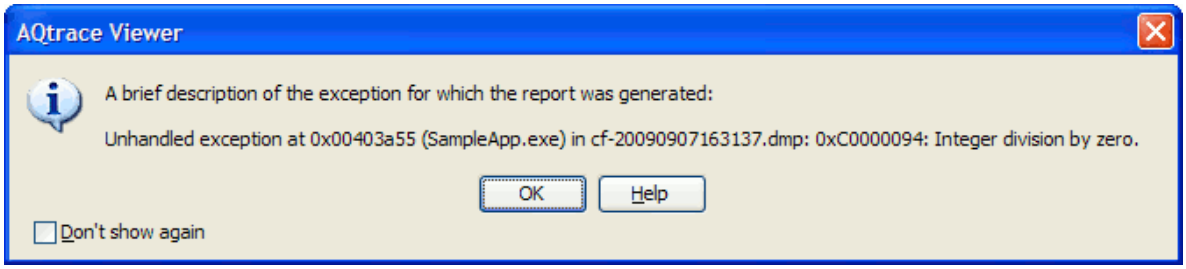
Analyzing Sample Report

Let's explore a sample error report in *AQtrace Viewer*:

- Choose **File | Open** from the AQtrace Viewer's main menu. This will invoke the standard Open File dialog.
- In the dialog, navigate to the <AQtrace Samples>\CompiledSamples\CPP\x86\Log folder. This folder contains sample report files.

  The file names have the following format: cf-*YYYYMMDDhhmmss*, where *YYYYMMDD* stands for the creation date of the error report (year, month, day) and *hhmmss* - for the creation time (hour, minute, second).
- Select the earliest available report and press **Open** button.

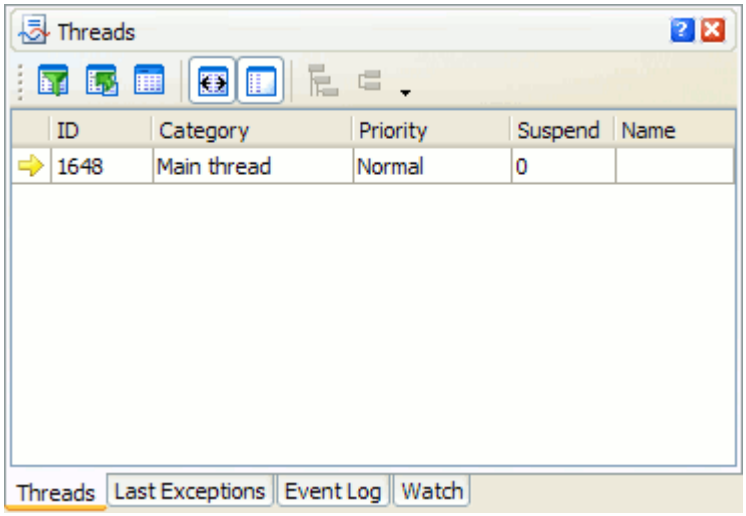
Upon loading the report, AQtrace Viewer displays a message box with a brief description of the exception for which the report was generated:



Note: This message box may state that a report does not contain information about exceptions. This happens if the error report was generated "on demand" rather than when an exception occurred. See *Generating Error Reports on Demand*.

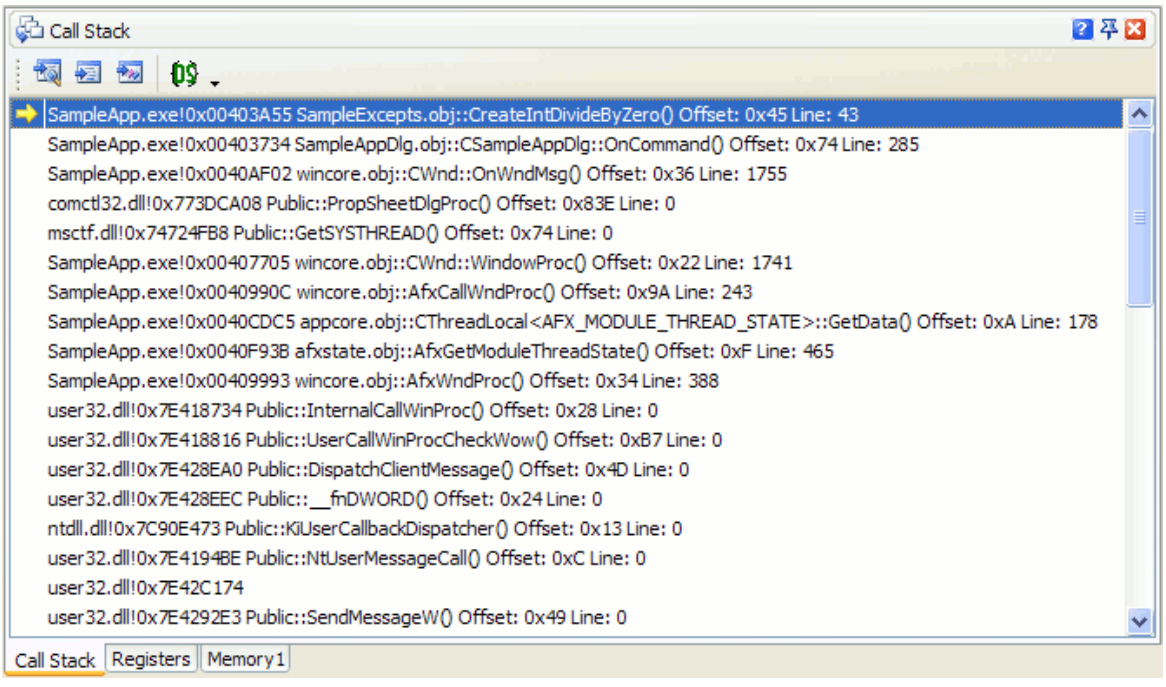
Let's now explore the report contents:

- Switch to the *Threads* panel. It lists all of the threads that existed in the process of our sample application when the exception occurred.



If several exceptions occurred during the application run, (see *Running Sample Application and Generating Error Reports*), the Threads panel will display information about the threads that existed in the application when the last exception occurred (that is, the exception, for which the report was sent).

- Double-click a thread in the thread panel and switch to the *Call Stack* panel:

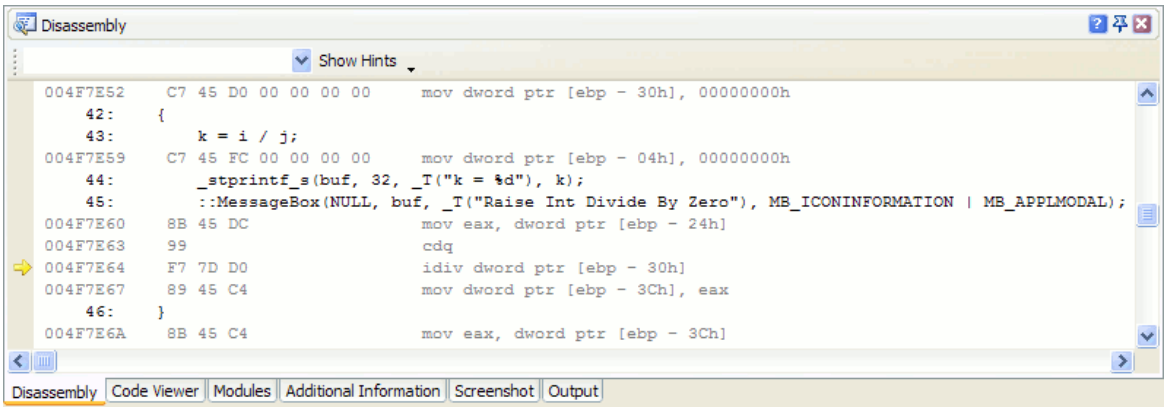


This panel displays the sequence of function calls that led to the exception. For each call the panel shows the module name, the call address, the function name and other information (see *description of the Call Stack panel*).

The topmost function in the panel is the function, in which the exception occurred.

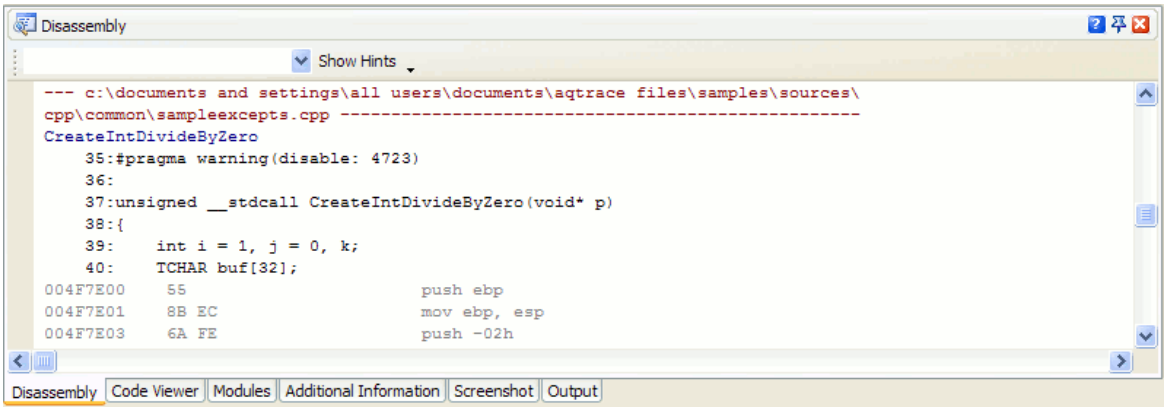
As you can see, in our example the exception occurred in the `CreateIntDivideByZero` function (at line 43 of the SampleExcepts file, if you use Visual C++ sample).

- Right-click the topmost routine and choose **Go to Disassembly** from the context menu. AQtrace Viewer will activate the *Disassembly* panel and set the cursor to the instruction, at which the exception occurred:

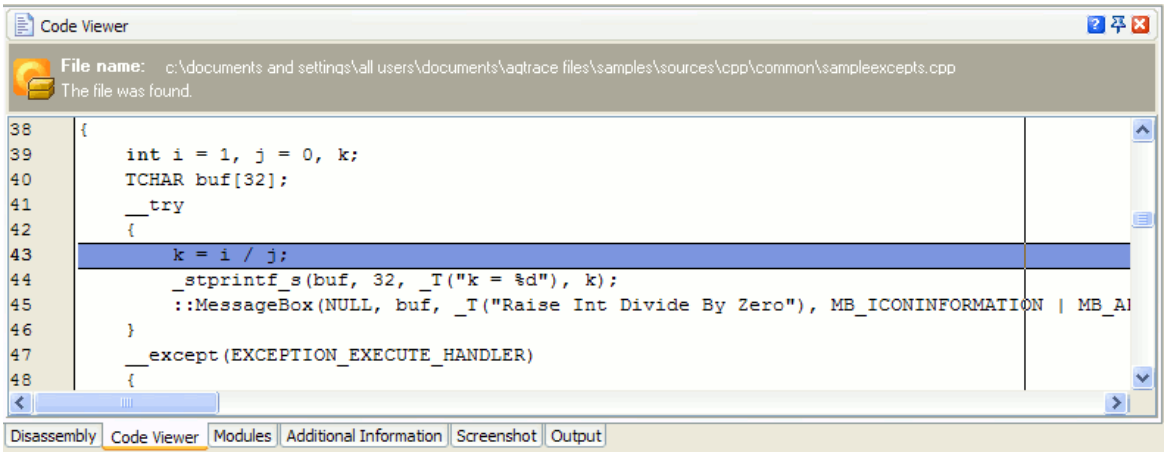


As you can observe, the exception occurred while performing the division operation.

If you scroll the binary code up, you will see the function's title:

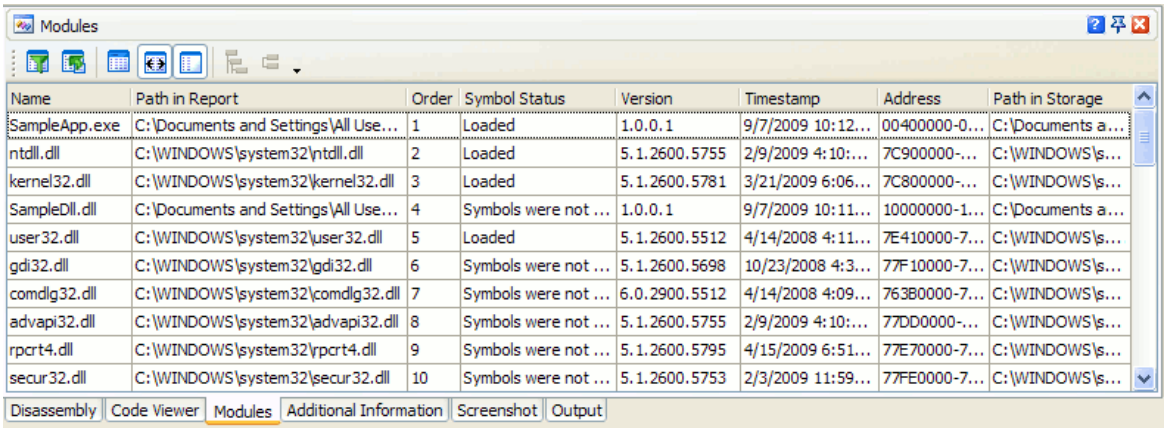


The source code is also displayed in the *Code Viewer* panel:

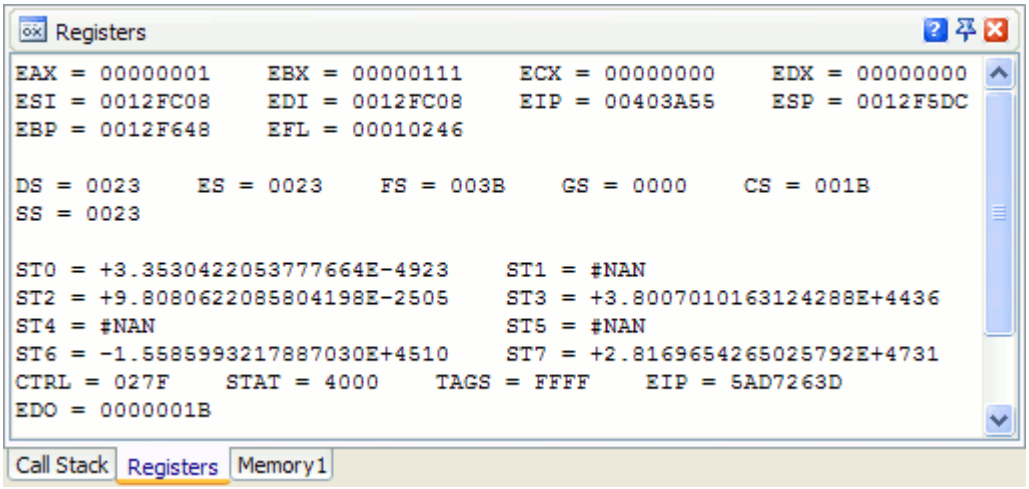


AQtrace Viewer contains some other panels that help you analyze the conditions and understand why the exception occurred:

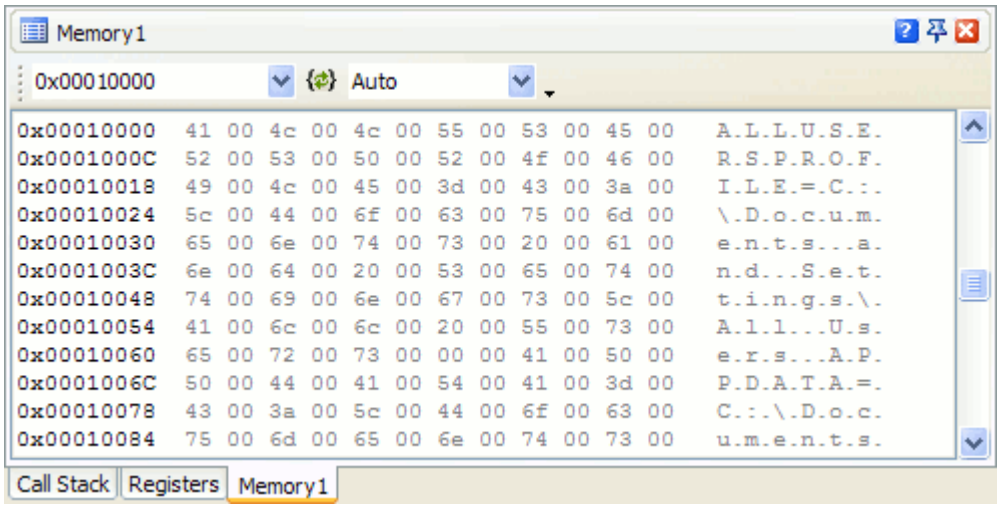
- The *Modules* panel contains information about the modules that were loaded into the address space of your application's process.



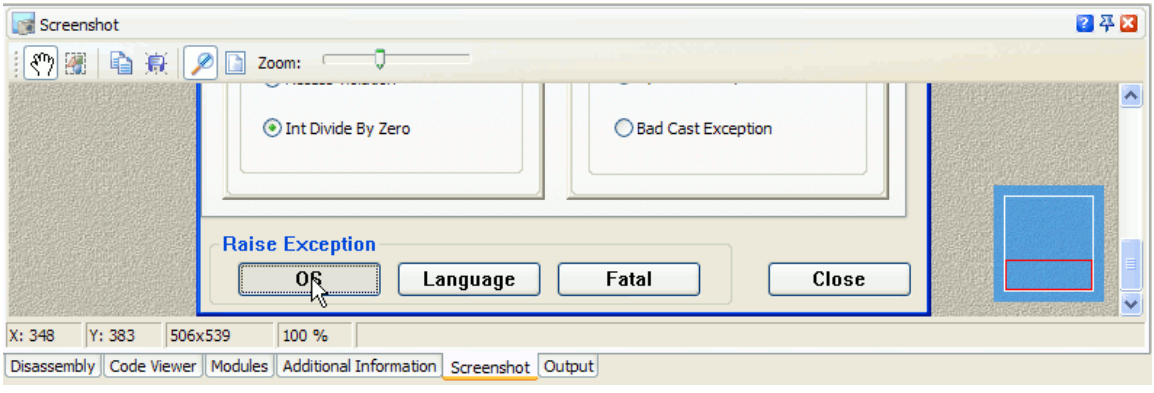
- Using the *Registers* panel you can explore the contents of CPU registers when the exception occurred.



- With the *Memory 1*, *Memory 2* and *Memory 3* panels you can explore memory contents.

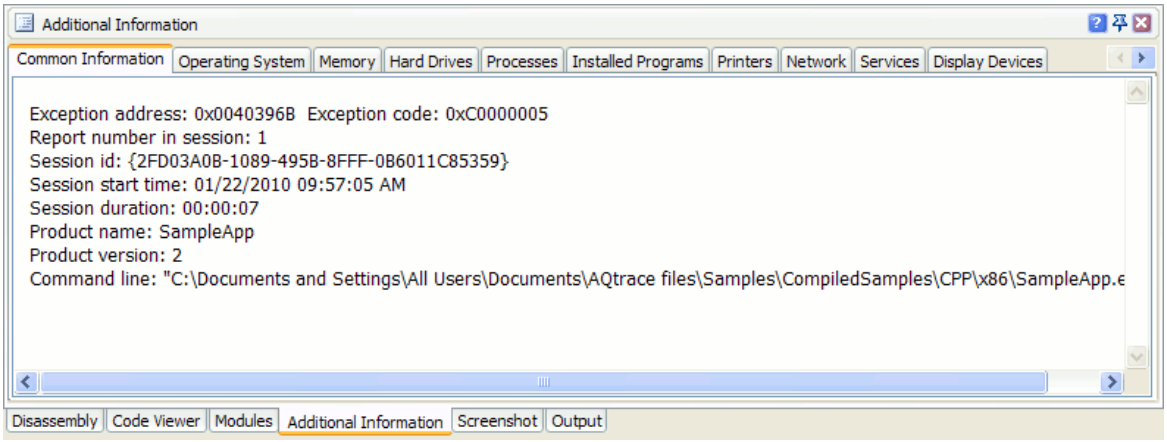


- The *Screenshot* panel displays the image of the application's window or the image of the desktop when the exception occurred. (To specify if the image is included in the report or not, use the **Screenshot** setting on the *Additional Reported Data* page of *AQtrace Packager*).

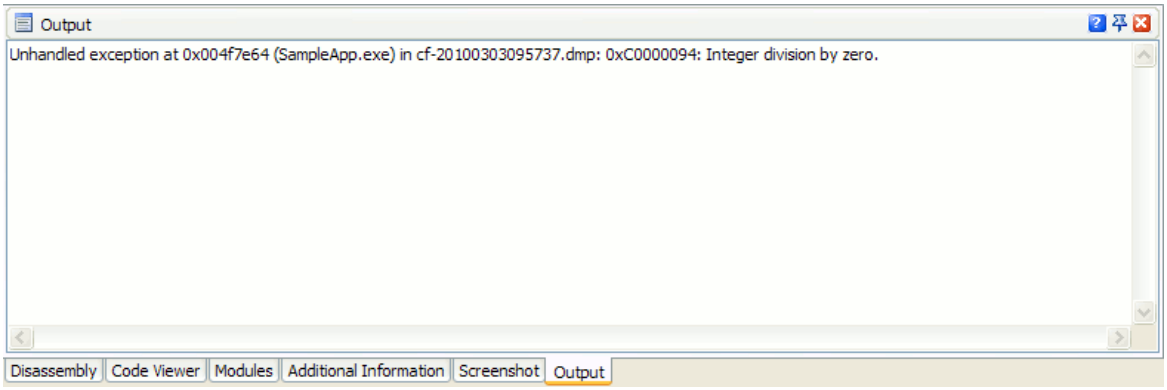


- The *Additional Information* panel provides information about the memory, hard-disk space,

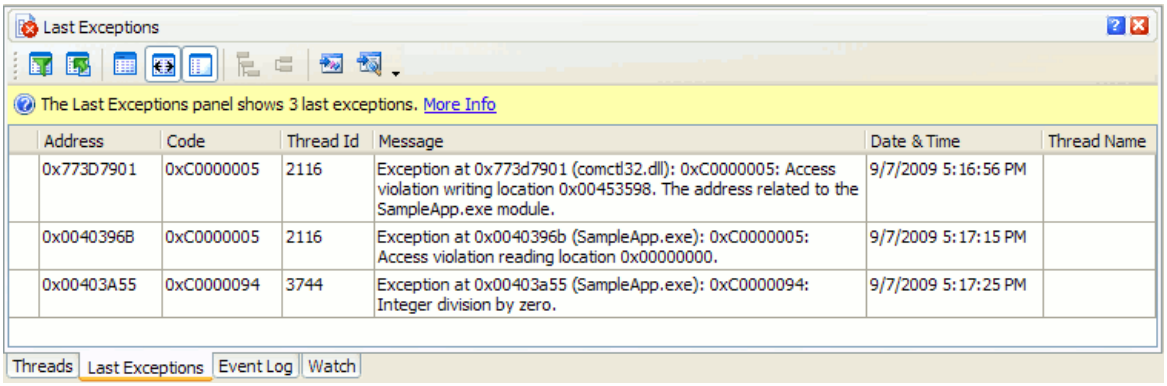
processes running in the operating system, display devices and network configuration.



- The *Output* panel contains brief description of the exception (the same description that is displayed when a report is opened). The panel also shows information that the end-user specified in the *User Info* dialog when sending the error report to you. This information may help you understand what happened wrong on the end-user's side.

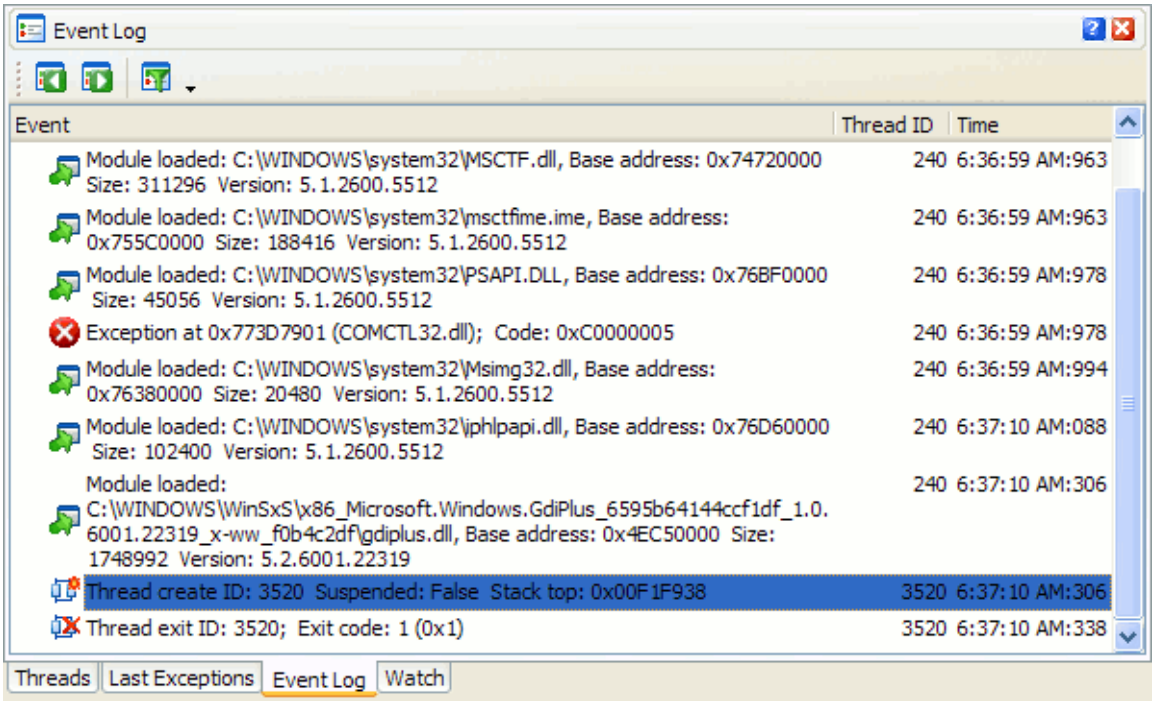


- The *Last Exceptions* panel lists the exceptions that occurred before the exception, for which the error report was generated. These exceptions were traced by AQtrace Reporter, but the end-user has not sent the error reports for them (that is, the user selected the **Don't terminate the application** check box in the notification window and pressed **Don't Send**).

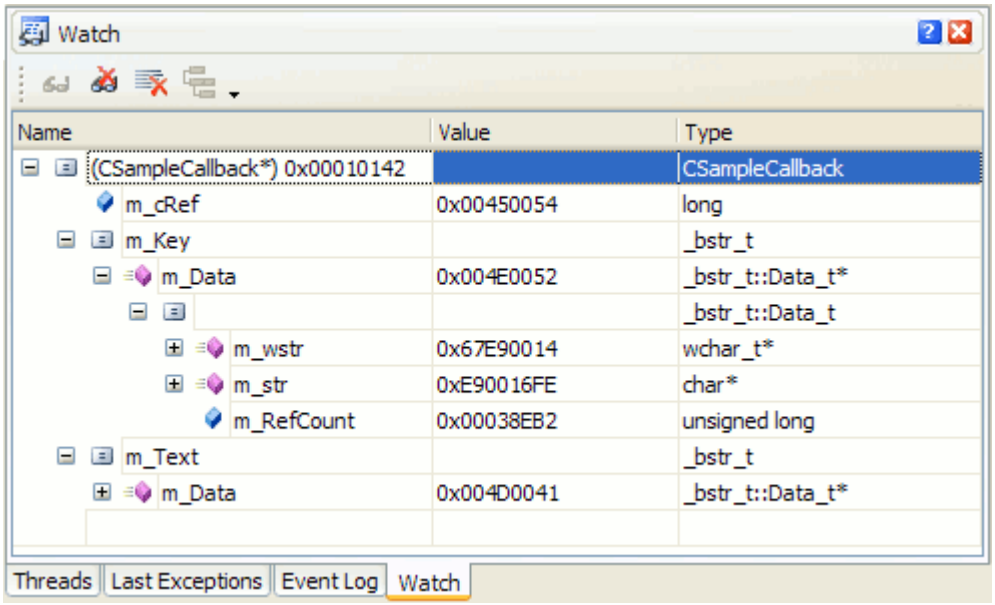


To determine why an exception occurred, double-click it in the Last Exceptions panel and then explore the contents of the Call Stack and Disassembly panels (for these exceptions the report contains only the Call Stack data).

- The *Event Log* panel displays the log that contains information on events of certain types raised in the application before the exception occurred. For instance, from this log you can find out when threads were created, suspended, resumed or terminated, when application modules were loaded or unloaded, when AQtrace Reporter's functionality was temporarily disabled and enabled for the entire application or for certain threads, and so on.



- The *Watch* panel allows creating "watches" for complex variables (structures and objects) declared in the application and exploring the values assigned to these variables before the exception occurred.



You have now finished the first part of the Getting Started tutorial.

Getting Started: Lesson 2 - Applying AQtrace Reporter

This part of the tutorial provides step-by-step instructions of how to prepare your application for AQtrace. The way you do this depends on the application type and your development tool. In this tutorial we work with a native-code Visual C++ sample that is compiled with Microsoft Visual Studio. We will get an EXE module that is able to trace exceptions with AQtrace and generate and send error reports.

The section includes the following topics:

- *Setting Version Number*
- *Generating Debug Information*
- *Compiling the Application*
- *Copying the AQtrace Reporter Libraries*
- *Applying AQtrace Reporter to Your Application*
- *Running Sample Application and Generating Error Reports*

Note: AQtrace *sample executables and DLLs* were compiled with debug information and have version numbers specified. You can use these compiled modules if for some reasons you cannot compile the source files.

Setting Version Number

End-users may work with different versions of your application, so you may receive error reports that were generated for different versions. The version information included in your modules help the *AQtrace Service* and *AQtrace Viewer* determine the application version for an error report and parse the call stack data correctly.

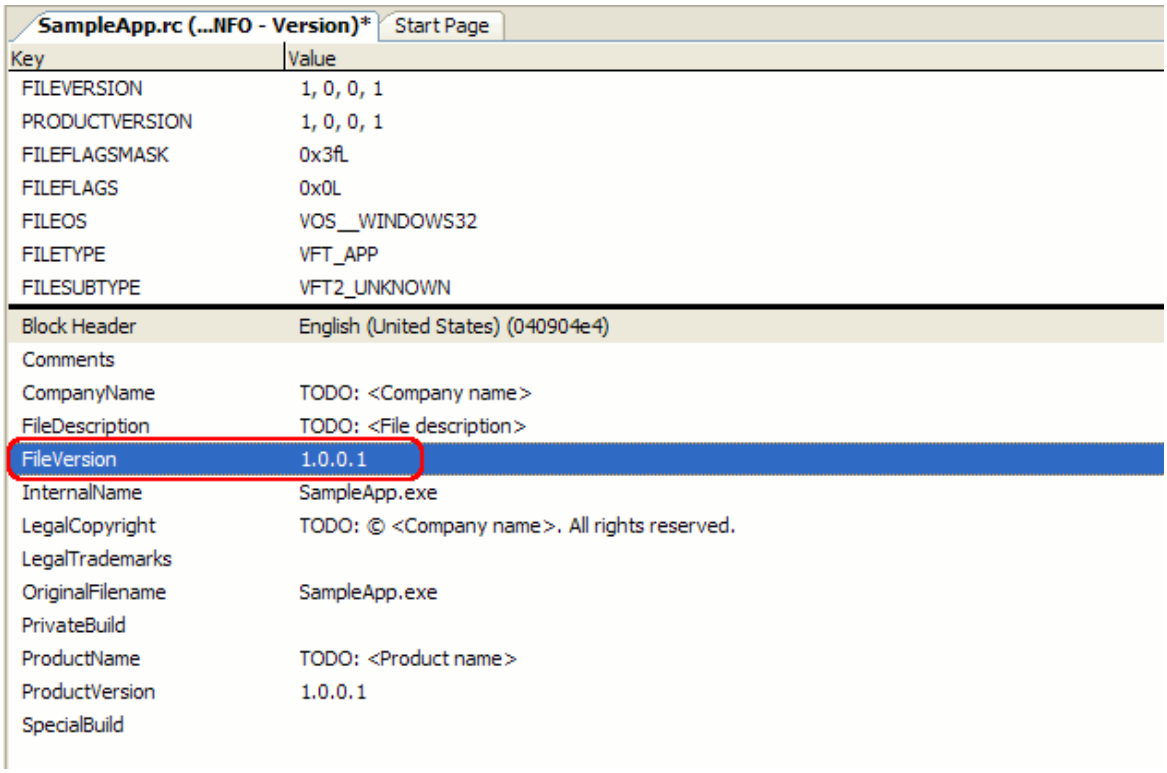
You can specify version information before or after compiling your application:

- To specify the version information before compiling your application, you should either modify your project settings, or change resource files. For more information on how to do this, see your development tool's documentation.The following section describes how you can set version info in the most popular development tools:
  - *Setting Build Number*
- To specify version information after your application is compiled, you use special tools that can modify version information of binary modules. An example of such a tool is *Automated Build Studio*.

In this tutorial we will set the version number by modifying the project of our Visual C++ sample application. You can find the step-by-step instructions below.

Note: The compiled sample applications that are shipped with AQtrace already have the version information specified. So, if you use a compiled sample, you can switch to the *next topic*.

- Open the <AQtrace Samples>\Sources\CPP\SampleApp\SampleApp.vcproj project in Visual Studio.
- Activate the **Resource View** window.
- In the Resource View, double-click **SampleApp | SampleApp.rc | Version | VS_VERSION_INFO** node. This will open the version information's editor in Visual Studio.
- In the editor, specify **`1.0.0.1`** in the **FileVersion** field:



- Select **File | Save SampleApp.rc** from Visual Studio's main menu to save the changes.
- Similarly, you can set the version information for the SampleDll project that is part of AQtrace's Visual C++ sample.
- Do not compile any modules now. We will do this later.

Generating Debug Information

The debug information is needed for *AQtrace Service* and *AQtrace Viewer* to parse received error reports. The Service and Viewer use debug information to determine the functions' locations in the application's binary code and to unwind the call stack.

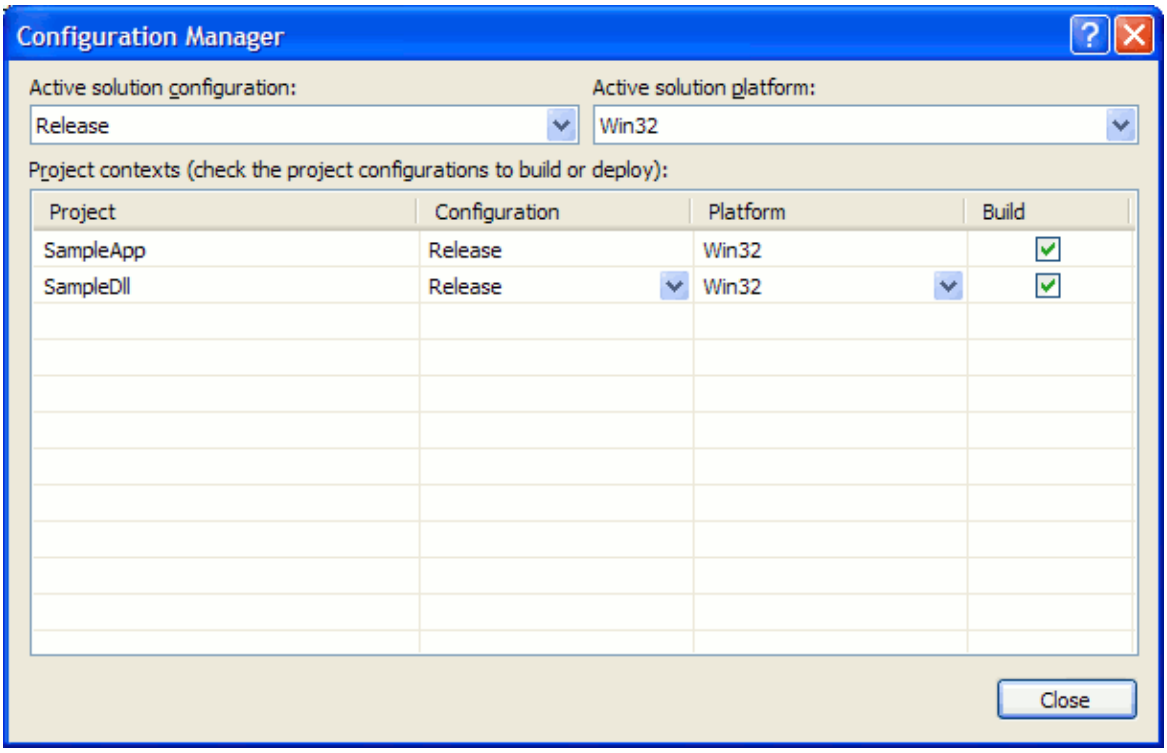
Compilers can either include debug information into the compiled executable, or generate it as an external file. The way the debug information is generated depends on the compiler settings. Since debug information is not used on end-users' computers, it is recommended that you generate debug information into an external file. This will decrease the overall size of your modules shipped to end-users. For detailed information on how to modify the compiler settings, see your compiler's documentation. The topics of the following section explain how you can do this in the most popular development tools:

- *Compiling Applications With Debug Information*

Now, let's modify the compiler settings for the sample Visual C++ application.

1. Open the sample project (<AQtrace Samples>\Sources\CPP\SampleApp\SampleApp.vcproj) in Visual Studio.
2. Select **Build | Configuration Manager** from the main menu. This will open the **Configuration Manager** dialog.

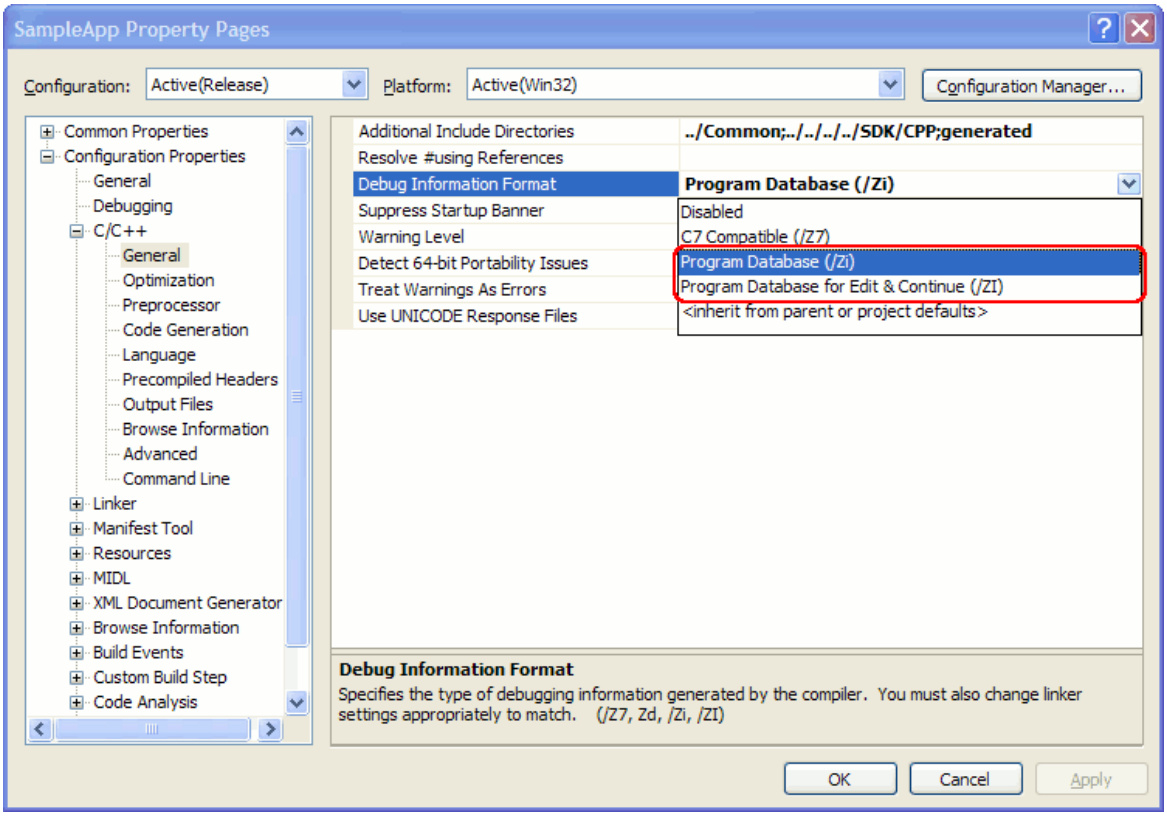
   In the dialog, select the *Release* configuration (that is, the configuration that is used to build the release version of your product):



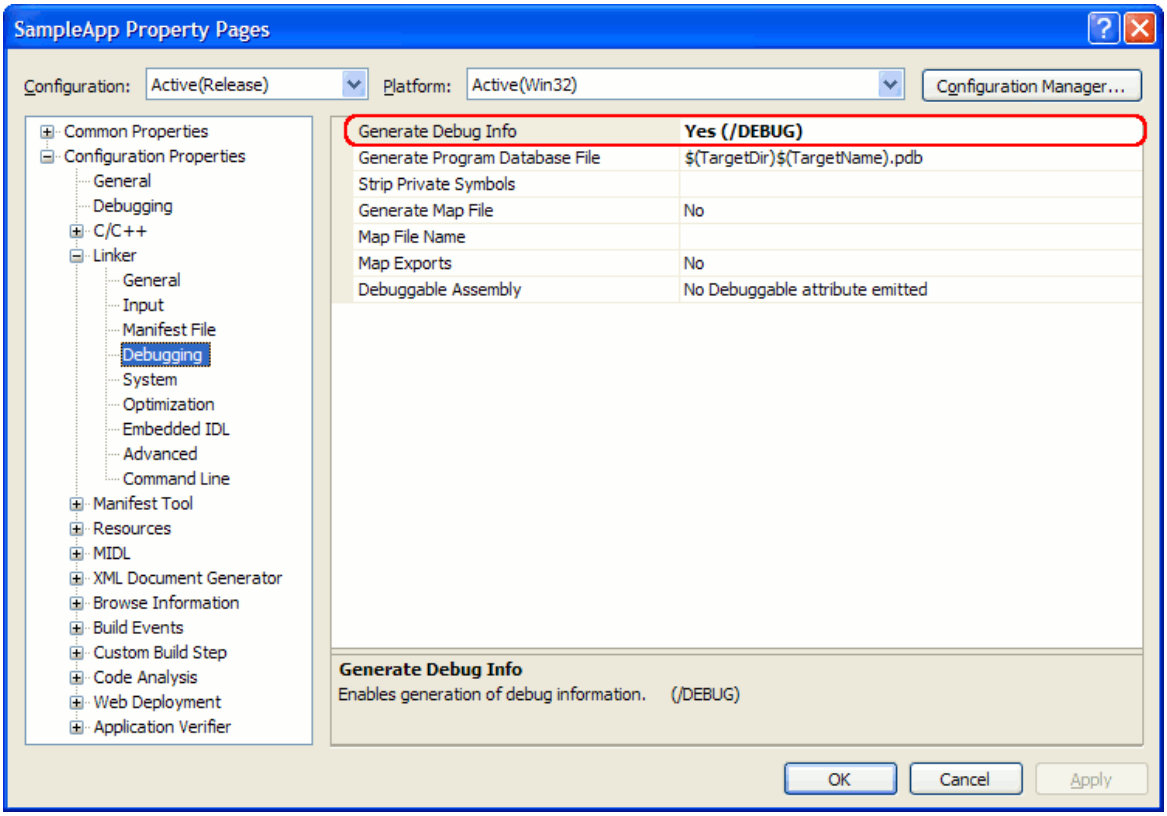
   Close the dialog.

   Note: The debug information will be generated as an external PDB file, so it will not increase the size of your executable module.

3. Right-click the project in the **Solution Explorer** and select **Properties** from the context menu. This will call the **Property Pages** dialog.
4. In the dialog:
   a. From the **Configuration** dropdown list, select the configuration that you will use to build the final version of your application (typically, this is the *Release* configuration).
   b. Switch to the **Configuration Properties | C/C++ | General** page and set **Debug Information Format** to *Program Database (/Zi)* or to *Program Database for Edit & Continue (/ZI).*



c. Open the **Configuration Properties | Linker | Debugging** property page and set the **Generate Debug Info** option to *Yes (/DEBUG)*.



5. Click **OK** to save the settings and to close the dialog.
6. Similarly, you can generate information for the SampleDll project that is already part of AQtrace's Visual C++ sample.
7. Do not compile the application now. We will do this later.

There is no need to distribute the generated PDB files with your application. However, you should place these files along with the compiled executable modules in the build storage. For more information on this, see *Organizing Build Storage*.

Compiling Application

Before compiling your application, make sure that you have completed the following steps:

- Set the compiler settings to enable the generation of debug information (see *Generating Debug Information*).

-- and --

- Modified the application's version number (see *Setting Version Number*).

Now you can compile your application:

- Select **Build | Rebuild Solution** from Visual Studio's main menu.

Visual Studio will compile the sample application and place the binary modules along with the debug information files in the <AQtrace Samples>\CompiledSamples\CPP\x86 folder, if you compile a 32-bit sample, or in the <AQtrace Samples>\CompiledSamples\CPP\x64 folder, if you compile a 64-bit sample.

Copying AQtrace Reporter Libraries

After you compiled your application, you need to copy some libraries to the folder in which the application is located. This step is optional for AQtrace sample applications (see below), but is mandatory and important for your applications:

After you compiled your application, **copy the aqReporter.dll library to the folder, in which your executable resides**. You can find this library in the following folder:

- *<AQtrace SDK>\Modules\x86* - for 32-bit applications
- *<AQtrace SDK>\Modules\x64* - for 64-bit applications

This library contains the implementation of *AQtrace Reporter*. It must be shipped along with your application and the application should be able to load this library at startup. So, when building the installation for your application, do not forget to include this DLL into your installation package. The installation wizard should add it to the folder, from which your application will be able to load it. The easiest way to achieve this is to place the DLL in the folder where the application is located. See *Distributing AQtrace Reporter Libraries*.

If you use a sample application from the AQtrace package, then there is no need to copy the library, because the AQtrace installation wizard has already added it to the appropriate folder.

If your application runs on **Window 98, NT or Windows 2000**, then in addition to the aqReporter library you should also distribute *dbghelp.dll* along with your application. You can find this library in the *<AQtrace>\SDK\Modules\x86* folder. See *Distributing AQtrace Reporter Libraries*.

For .NET users: If you work with a managed code application, then you should also generate the *aqReporterInterop.dll* library and distribute it along with the two libraries mentioned above. See *Deploying .NET Applications*.

Applying AQtrace Reporter to Your Application

After you set the version number and compiled your application with debug information, you should apply *AQtrace Reporter* to your module. To do this, use the *AQtrace Packager* utility that is part of the AQtrace installation. It can process both native code and managed code applications. This utility is copied to your computer if you select the **Prepare your applications for AQtrace** check box during AQtrace installation (see *Getting Started - Important Notes on the Tutorial*).

Using AQtrace Packager you can specify various settings of AQtrace Reporter, for instance, you can define --

- The product identifier.
- The addressee where the error reports will be sent and the transfer protocol(s) to be used.
- The exceptions to be traced and the modules in which the exceptions to be traced.
- The data to be collected and included into the generated error reports.
- The data to be displayed in the *notification window*.
- And other settings.

For some settings you can use default values. For some other you must specify values in order for AQtrace Reporter to function properly. For complete information on setting AQtrace Reporter's options, see *Using AQtrace Packager With Native Applications* and *Using AQtrace Packager With .NET Applications*.

Note: The *compiled sample applications* that are shipped with AQtrace have already been processed with AQtrace Packager, that is, they have AQtrace Reporter applied to them. The samples include the AQtrace Packager projects that were used to process the compiled sample modules (see *Sample Applications*). So, if you use these applications to go through the Getting Started tutorial, then you can skip this topic and switch to the next one.

Let's now specify settings and apply AQtrace Reporter to our sample application. This process typically includes the following steps:

1. Specifying the module to be processed.
2. Specifying product information.
3. Specifying the mode of sending the error reports and transfer protocol settings.
4. Specifying reporter behavior.
5. Specifying additional data to be included in error reports.
6. Specifying the exceptions and modules to be traced.
7. Specifying the notification window settings.
8. Processing the module.

Note: Before we proceed, we would like to explain which modules to be processed by AQtrace Packager:

Modern applications typically include several modules: the main executable, a number of helper dynamic link libraries, services, ActiveX modules and so on. Quite often, there is no need to process all the modules with AQtrace Packager. You do this only for executables that are included in your product. When an executable is loaded in memory, it will initialize AQtrace Reporter so that the Reporter will handle exceptions that occur in the process created for the executable. The Reporter will also detect and handle exceptions that occur in the DLLs that are loaded by the executable, so, there is no need to process these DLLs with AQtrace Packager.

However, if your DLL will be used by the application that does not contain AQtrace Reporter then you should process this DLL with the Packager. Else, the Reporter will not handle the exceptions that occur during execution of the DLL's routines.

1. Specifying the module to be processed

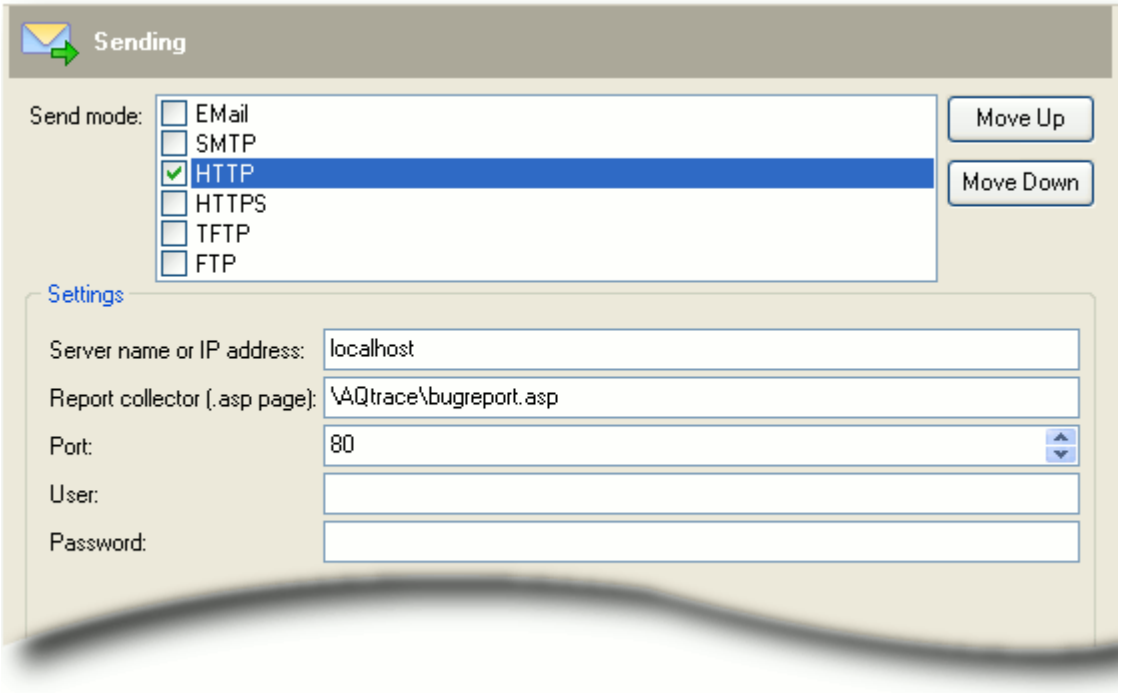
- Launch *AQtrace Packager* (the file name is *<AQtrace>\Bin\AQtracePackager.exe*).
- Select **File | New | Native Project** from the main menu of AQtrace Packager to create a new configuration project (the settings pages of AQtrace Packager are disabled until you create a new or open an existing project).
- Activate the *Module | Module Information* page.
- In the page:
  - Click the ellipsis button of the **File Name** box. This will invoke the standard Open File dialog.
  - In the dialog, choose the executable that we compiled in the previous step (<AQtrace Samples>\CompiledSamples\CPP\x86\SampleApp.exe) and press **Open**. AQtrace Packager will display the fully-qualified name of the executable in the File Name box and will display the file properties in the Module Information page.

We have specified the executable for processing. Now we have to deal with AQtrace Reporter's settings.

2. Specifying where to send the reports

Using *AQtrace Reporter* you specify the address to which AQtrace Reporter will send error reports, the transfer protocol and parameters for the sending (see *Transferring Reports* for details.) In this part of the tutorial we will not send the reports anywhere, but in the *next* part we will. We will use the Hyper-Text Transfer Protocol (HTTP). The transfer parameters for this protocol include the address of the web server, to which AQtrace Reporter will send error reports and on which reports will be received and processed by the special .asp page, (*Report Collector*). Let's specify these parameters for our sample application:

- Activate the *Reporter Settings* | *Sending* page of AQtrace Packager.
- In the **Send mode** list select the *HTTP* check box.
- Specify *localhost* in the **Server name or IP address** box. (In our tutorial we assume that all AQtrace components are installed on the same computer.)
- The **Report Collector (.asp page)** box specifies the address of the .asp page that receives error reports on the server side. By default, this address is *\AQtrace\bugreport.asp*. Make sure that the edit box contains this default value.
- The **Port** box specifies the number of the port that will be used for the transfer. The default port number for the HTTP protocol is *80*. Make sure the Port text box contains this default value.
- Leave the **User** and **Password** fields unspecified.



3. Specifying product information

Now we will specify the product and company names and the product identifier and version. You do this on the *Reporter Settings* | *Product Information* page of AQtrace Packager:

Before we continue, let us briefly explain why these settings are needed.

The **product and company names** will be shown in the notification window that AQtrace Reporter displays when handling an exception. These settings identify the application vendor to end-users.

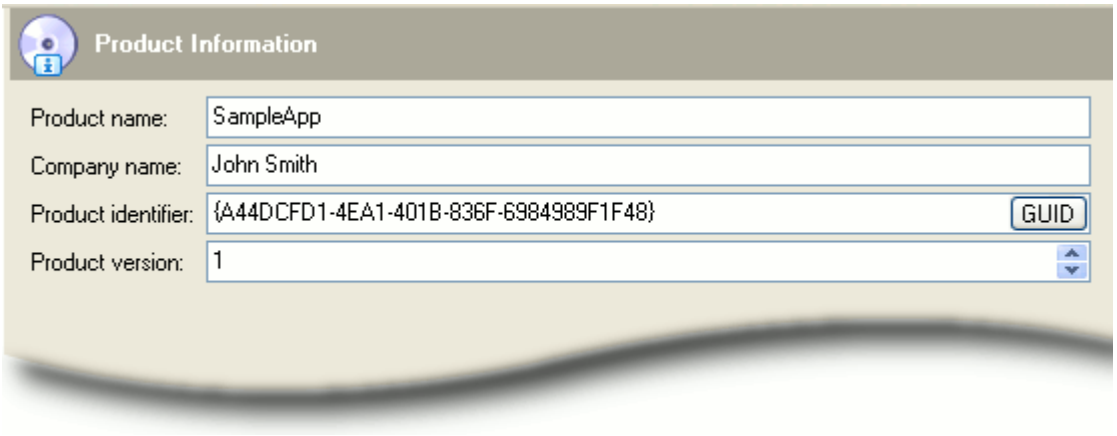
As for the **product identifier and version**, they are used by *AQtrace Service* and *issue-tracking plug-ins* to determine the product build, for which an error report was generated. The problem is that most companies ship several products and have clients that use different versions of the same product (1.0, 2.0 and so on). So, most likely you will receive error reports generated for different versions of different products. You may want to organize error reports into different projects of your issue-tracking database. The identifier and version number let the AQtrace components to determine to which issue-tracking project an error report will be added.

To specify the product's information:

- Activate the *Reporter Settings* | *Product Information* page of AQtrace Reporter.
- Into the **Product name** box enter *SampleApp*.
- Into the **Company name** box enter your name.
- The product identifier can be any string that uniquely identifies your product. Quite often it is convenient to use a GUID value for this purpose. Press the **GUID** button of the **Project identifier** box to generate a new GUID.

  Note: You can generate GUID when you are applying AQtrace Reporter to your application for the first time. For the next application versions, you should use the same GUID value.

- The **Product version** box specifies the major version of your product (typically, the major version is enough to determine the issue-tracking project). The major version of our sample application is 1, so, specify **1** in the **Product version** box.



4. Specifying reporter behavior

When AQtrace Report generates an error report, then in addition to sending this report it may also keep the report copy on the end-user's computer. Let's enable this behavior of AQtrace Reporter. To do this:

- Switch to the *Reporter Settings* | *Reporter Behavior* page of AQtrace Packager.
- Select the **Store reports** check box and enter *Log* in the **Folder** field. This will make the Reporter store the error reports in the Log subfolder of the application's folder.

5. Specifying additional data to be included in error reports

The error reports generated by *AQtrace Reporter* typically contain some additional data which help developers to find the cause of an exception faster: information about processes and services, about printing and display devices, about operating system and security privileges and so on. Additional information increases the size of report files but it may invaluable in searching for the reason of a bug.

To specify what additional data AQtrace Reporter will collect and save to the generated error reports, use check boxes on the *Reporter Settings* | *Additional Reported Data* page. In this example we will not change any values, so leave the settings as they are. In real life projects you can modify the settings to control which data will be included into error reports.

6. Specifying exceptions and modules to be traced

Using *AQtrace Reporter* settings, you can specify the exceptions, which the Reporter will trace, and the modules, whose execution the Reporter will trace. You do this by defining the exception filter and the module filter. AQtrace Reporter will generate error reports only for those exceptions that match both the exception and module filters. For more information on this, see *Specifying Exceptions to Be Traced* and *Specifying Modules to Be Traced*.

Let's now specify the filter settings.

Exception Filter

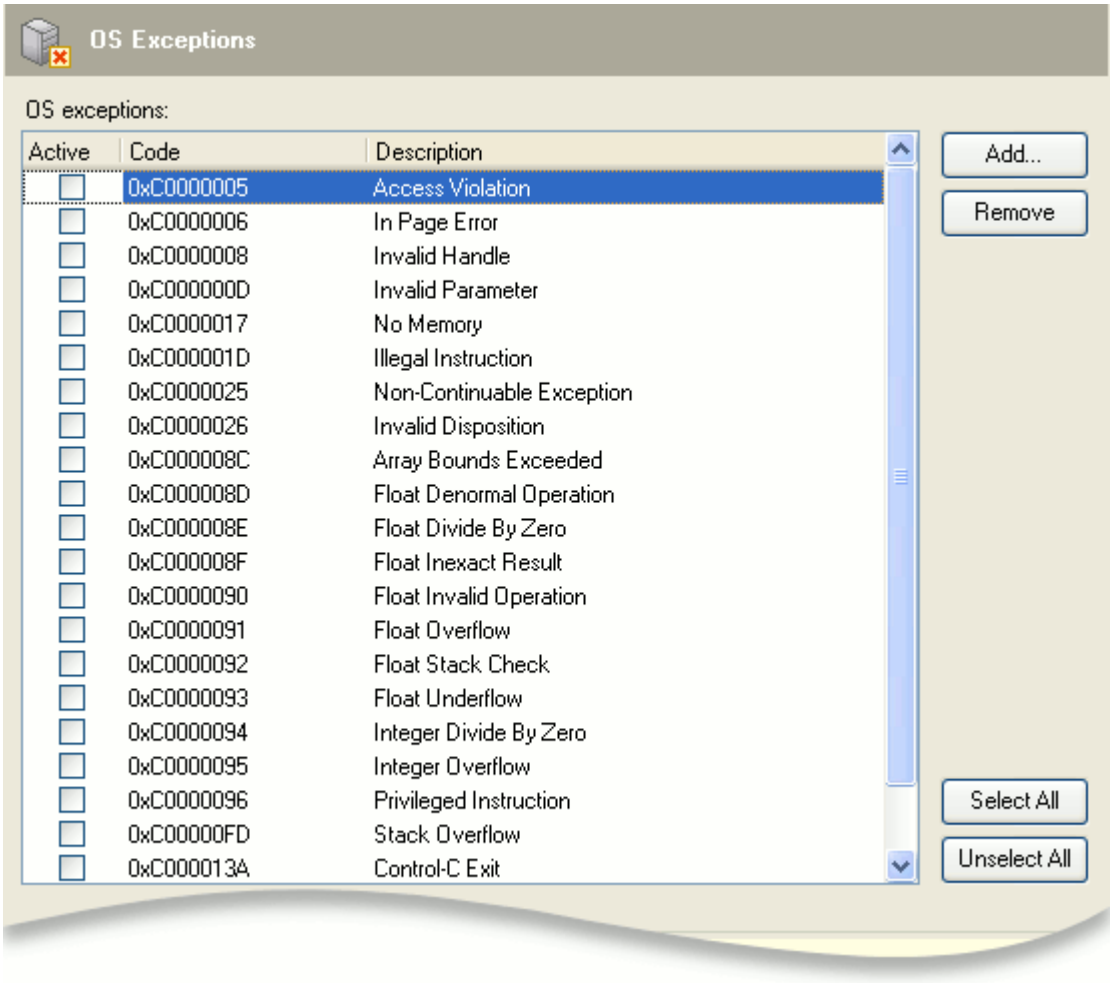
To pinpoint the exceptions to be traced, use the setting pages of the **Exception Filter** section. These pages specify the exceptions to be traced. All the exceptions are divided into two large groups: OS exceptions and language exceptions. OS exceptions are generated as system level (access violation, division by zero and so on). They are specified by their code. Language exceptions are those that are generated by application code. They are specified by their class names like Exception in Delphi. See *Specifying Exceptions to Be Traced* for complete information on the exception types.

The pages of the Exception Filter section contain settings that let you specify both OS and language exceptions to be processed. Currently, AQtrace can handle language exceptions that occur in .NET, Visual C++, Delphi and C++Builder applications. Visual Basic language exceptions are not supported.

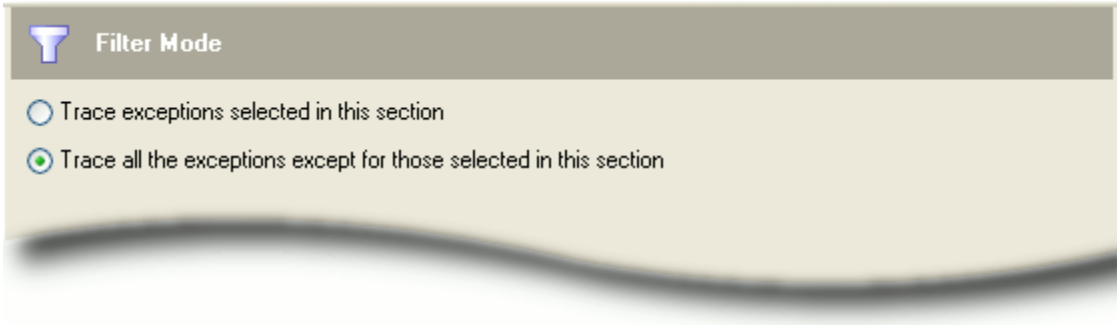
The exception filter can work in normal or inverted mode. In normal mode, AQtrace Reporter traces only those exceptions that are selected in the settings pages. When inverted mode is active, AQtrace Reporter traces only those exceptions that are not selected on the pages.

In our case we will not create a list of the exceptions to be traced. We will trace all the exceptions. To do this:

- Activate the *Exception Filter* | *OS Exceptions* page of AQtrace Packager.
- Make sure that the check boxes of the **Active** column. You can do this by pressing **Unselect All**.



- Make sure that no language exception is included in the filter:
  - If you are using a Visual C++ sample application, switch to the *Exception Filter* | *Visual C++ Exceptions* page and ensure that no exceptions are specified there.
  - If you are using a Delphi sample application, switch to the *Exception Filter* | *Delphi Exceptions* page and ensure that no exceptions are specified there.
- Activate the *Exception Filter* | *Filter Mode* page and select the **Trace all the exceptions except for those selected in this section** option.



This will command AQtrace Reporter to use the exception filter in inverted mode, that is, this will command the Reporter to trace the exceptions that are not included in the filter. In our case the filter is empty, so this command will mean that AQtrace Reporter should trace all the exceptions.

Note: AQtrace samples include the AQtrace Packager projects that can be applied to sample applications. The exception filter settings of these projects differ from the settings that we have described. Our settings let you catch any exception, while the sample projects' settings define the list of OS and language exceptions to be traced. However, this difference will not affect the result. In both cases you will be able to catch all of the exceptions that occur in the sample applications.

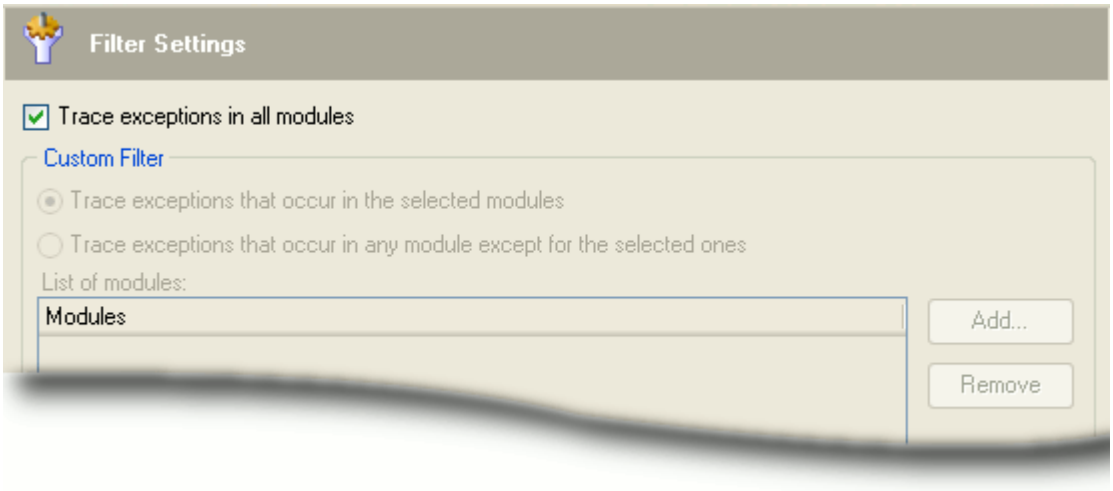
Module Filter

To specify the modules to be traced, you create and use the module filter. It defines the modules whose execution AQtrace Reporter will trace for exceptions. When normal mode is active, AQtrace Reporter traces the exceptions that occur in the modules included in the filter and all other exceptions are ignored. When inverted mode is active, AQtrace Reporter traces exceptions that occur in any other modules except for those that are included in the filter. Of course, in both cases the Reporter traces only those exceptions that match the exception filter.

Note: When AQtrace Reporter determines whether to ignore or process an exception, it checks the module names of two topmost functions in the exception's call stack. If any of these modules was included in the filter, then according to the filter mode, the Reporter either skips the exception or generates an error report for it. See *Specifying Modules to Be Traced*.

In our example, we will not specify the modules to be traced. We will command AQtrace Reporter to trace the execution of all modules that are loaded into the address space of our application's process. To do this:

- Open the *Module Filter* | *Filter Settings* page. This page contains the list of modules to be included into the module filter and the check box and two radio buttons that define the filter mode.
- Select the **Trace exceptions in all modules** check box.



7. Specifying notification window settings

You can specify the text to be displayed in the notification window that *AQtrace Reporter* shows when an exception occurs:

- Open the *Notification Window | Notification Settings* page.
- Make sure the **Show notification window** check box is selected. This will command AQtrace Reporter to display the notification window when an exception is detected. If the check box is clear, AQtrace Reporter sends the generated error report without notification. Also, note that if the **Postpone sending reports** option is active (it becomes available only when **Show notification window** is inactive), AQtrace Reporter does not send the error report automatically without displaying the notification window. It suggests sending the report next time the user runs the application.
- Using other controls of the page you can specify text to be displayed within the notification window. We will not change this text in our example, so leave the default value in all the controls.

  In real life projects, you will have to enter a value for the **Error reports policy link, URL** setting. It specifies the web page, on which end-users can ready about the error reporting policy adopted in your company.

8. Processing the module

To apply AQtrace Reporter to our sample executable, click **Process Module** on the AQtrace Packager's toolbar. This is an **important step**. Without it, the changes will not be applied to your executable.

Note: Before applying AQtrace Reporter to your module, AQtrace Packager creates a backup copy of the module. So that you can restore the original copy of our module from it.

Currently, you can process a module with AQtrace Packager only once. If you need to re-apply the Reporter to your module, then you can either apply it to the backup copy of the module or recompile the module.

Tip: Alternatively, you can process the module from the command-line. This ability is helpful when you use various tools that automate software builds. See *AQtrace Packager Command Line* for more information.

We have specified AQtrace Reporter's settings and applied them to our sample execution. Now we may close AQtrace Packager. Before closing you can save the configuration project to a file. To do this, select **File | Save** or **File | Save As** from the Packager's main menu and specify the desired file name in the ensuing Save File dialog.

Running Sample Application and Generating Error Reports

We have prepared the sample application for AQtace:

- We compiled the application with debug information and set the version number (see *Generating Debug Information* and *Setting Version Number*).
- We copied the AQtrace Reporter libraries to the folder in which the application is located (see *Copying AQtrace Reporter Libraries*).

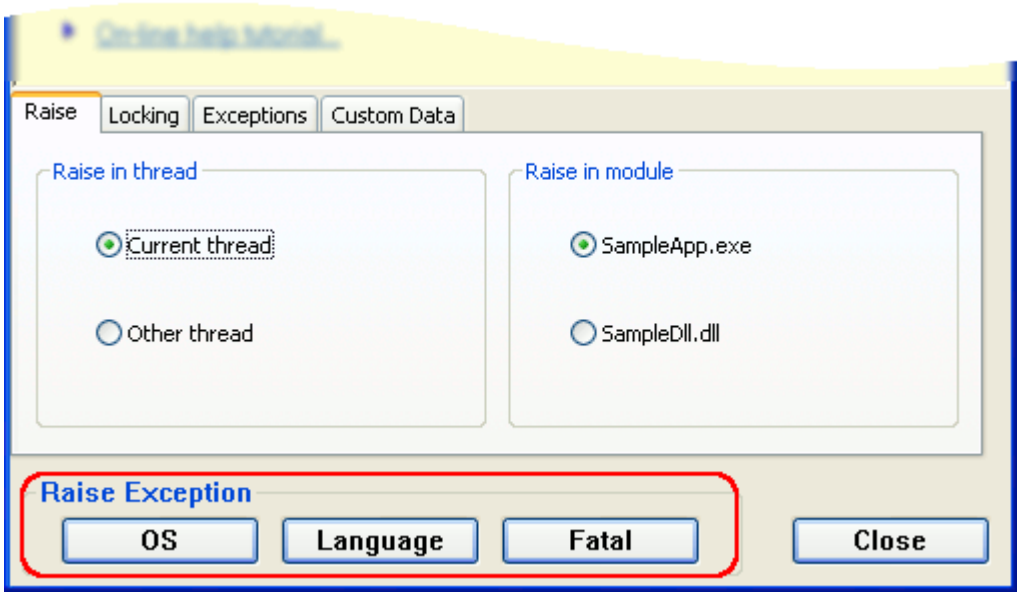
- We processed the application's executable with AQtrace Packager (see *Applying AQtrace Reporter to Your Application*).

Now we are ready to run our sample application and see how AQtrace Reporter generates error reports.

- Start our sample application. Wait until the application's window appears on screen.

  The application's main form contains three buttons that raise exceptions and a number of controls that let you specify various aspects of the exception functions.

  The buttons that raise exceptions reside at the bottom of the application's window:



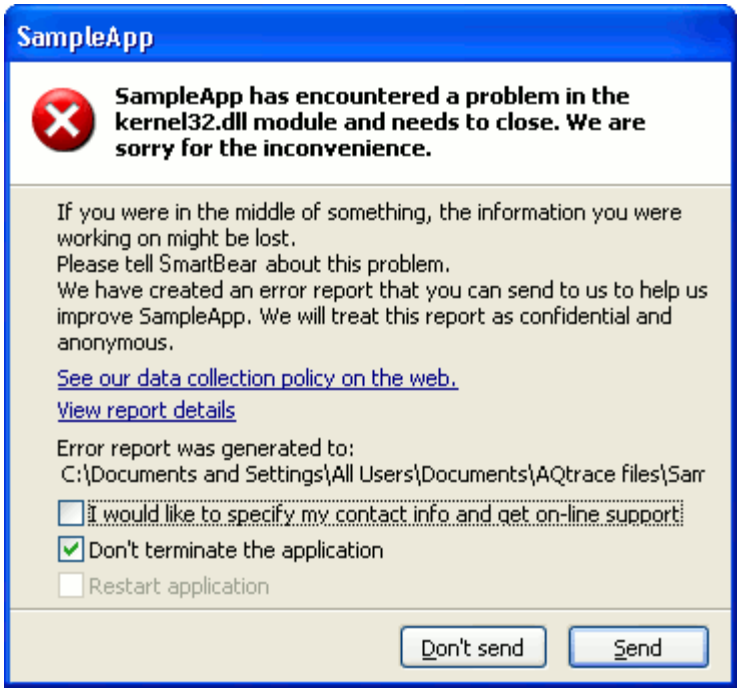
  The **OS** and **Language** buttons raise the *OS* and *language* exceptions correspondingly. AQtrace Reporter catches these exceptions, generates error reports and displays notification windows.

  The Visual Basic sample application does not contain the OS and Language buttons, because AQtrace Reporter does not catch language exceptions in VB applications. Instead of these buttons, the VB sample has two other buttons that raise different OS exceptions.

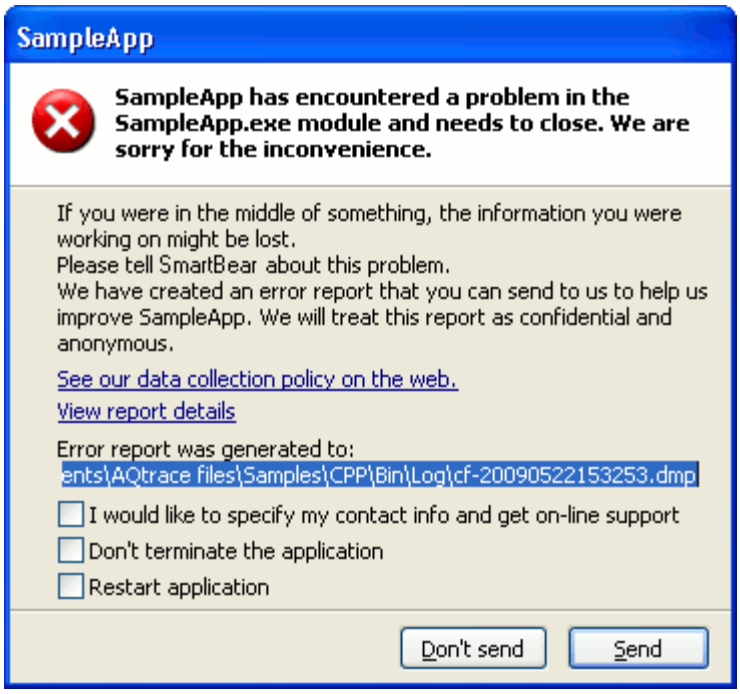
  The **Fatal** button is used to demonstrate how to generate an error report on demand. Its event handler does not raise any exception. It gets program access to AQtrace Reporter and commands it to generate an error report. This report contains all of the information that would be included in it, if an exception occurred (see *Generating Error Reports on Demand*).

Let's now play with the application, raise exceptions and see how AQtrace Reporter handles them.

- In the main window of the sample application, switch to the **Exceptions** tab, select the *Int Divide By Zero* type in the **OS Exceptions** group.
- Press the **OS** button. If you use the Visual Basic sample just press the **Int Divide By Zero** button. The sample application will execute a division by zero and an exception will occur. AQtrace Reporter will trace this exception, generate an error report and display the notification window on screen.



- In the window:
  - Clear the **Don't terminate the application** and **Restart application** check boxes.
  - Select the local path of the generated error report with the mouse, right-click it and choose **Copy**. This will copy the path of the most recent report to the clipboard. It will afterwards be used to open the report in AQtrace Viewer.



  - Press **Don't Send**.

Since we have cleared the “Don't terminate the application” option then the sample application will be closed automatically.

That is it. We have simulated an abnormal behavior of the application and raised an exception. This exception was intercepted by AQtrace Reporter and the corresponding error report has been created.

After we generated an error report, we can open and explore it in *AQtrace Viewer*. You can read more about this in the previous part of the tutorial. Don’t forget to specify path to binary module in AQtrace Viewer settings.

Getting Started: Lesson 3 - Using Server-Side Components

In previous sections of the Getting Started tutorial we described how to analyze error reports and how to prepare your application for AQtrace. We launched our sample application and generated error reports. In this section we would like to show how to bind AQtrace components together and use them to automate the entire error-reporting process.

The section contains the following topics:

- *Preparing Application for AQtrace - Key Points*
- *Adding Modules to Build Storage*
- *Organizing Report Storages*
- *Configuring Server-Side Components*
- *Configuring AQtrace Viewer*
- *Running Sample Application and Generating Error Reports*

Preparing Application for AQtrace - Key Points

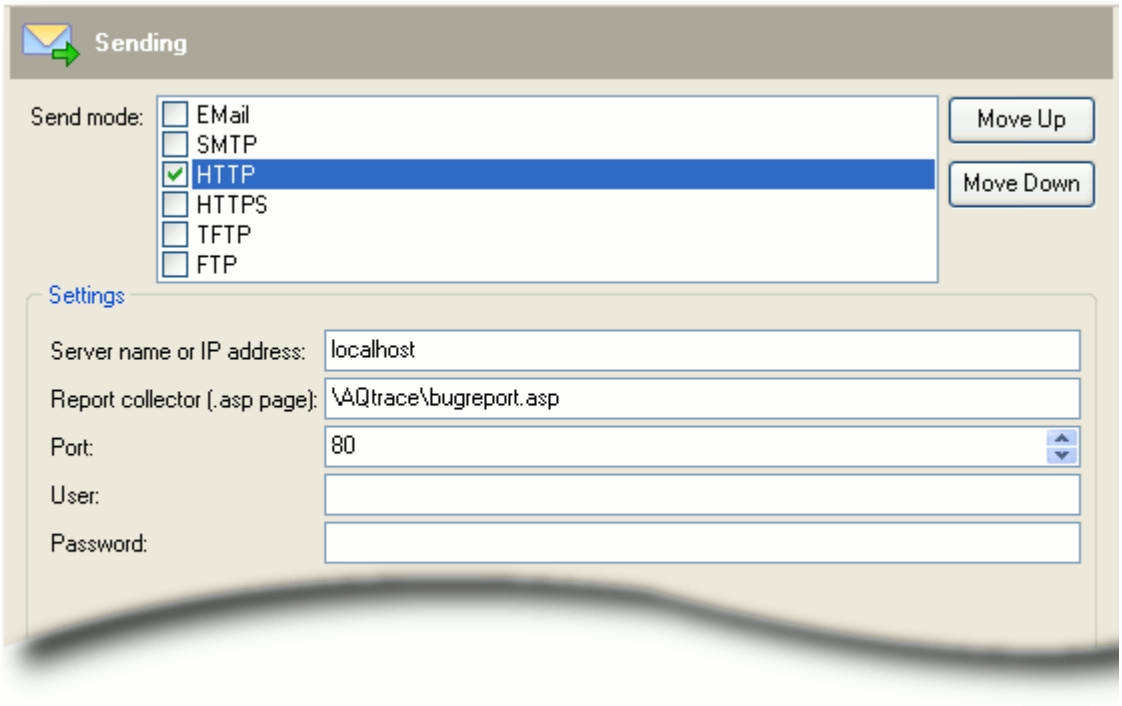
In the *previous section* of the Getting Started tutorial we described how to compile your application for AQtrace. In this topic we would like point out key aspects of compiling and the settings that make AQtrace components work as a whole.

1. Compile your application with debug information. Debug information is needed to analyze error reports. For information on how to compile applications with debug info in popular compilers, see *Compiling Applications with Debug Information*.
2. Specify version number for each build of your application. See *Setting Version Number*.
3. When using AQtrace Packager to specify the AQtrace Reporter parameters, pay attention to the following settings:
   - On the *Reporter Settings* | *Sending* page, select the protocol that AQtrace Reporter will use to send error reports to your server and the protocol settings. These settings must corresponds to the settings that you specify on the server side.

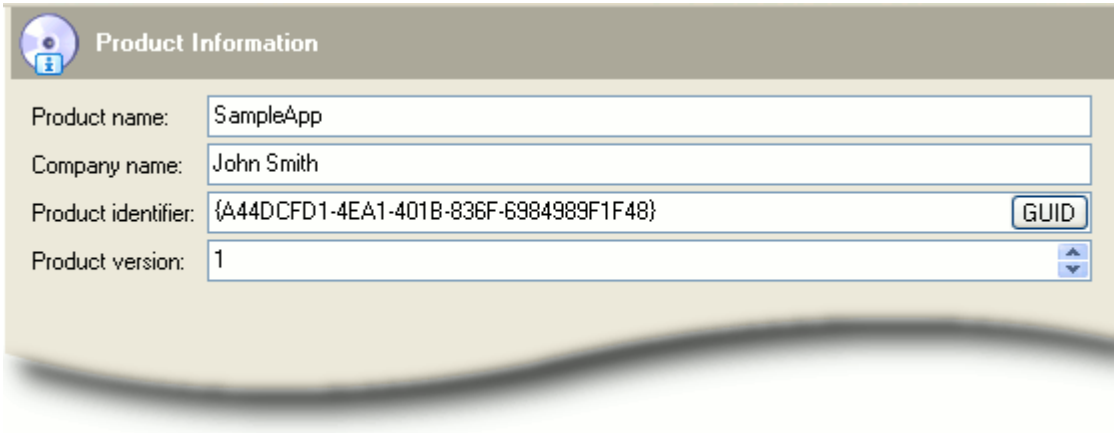
     In our sample we use the following settings:

Setting	Value	Description
Send mode	HTTP	
Server name or IP address	localhost	We specify use value because we installed all AQtrace components on one computer.
Report Collector	\AQtrace\bugreport.asp	This is the address of the Report Collector's .asp page on the server side.
Port	80	Default port value used by the HTTP protocol.

Setting	Value	Description
User and **Password**	(empty)	We assume that the server does not require authentication.



- On the *Reporter Settings* | *Product Information* page specify the product and company name and the product identifier and version:



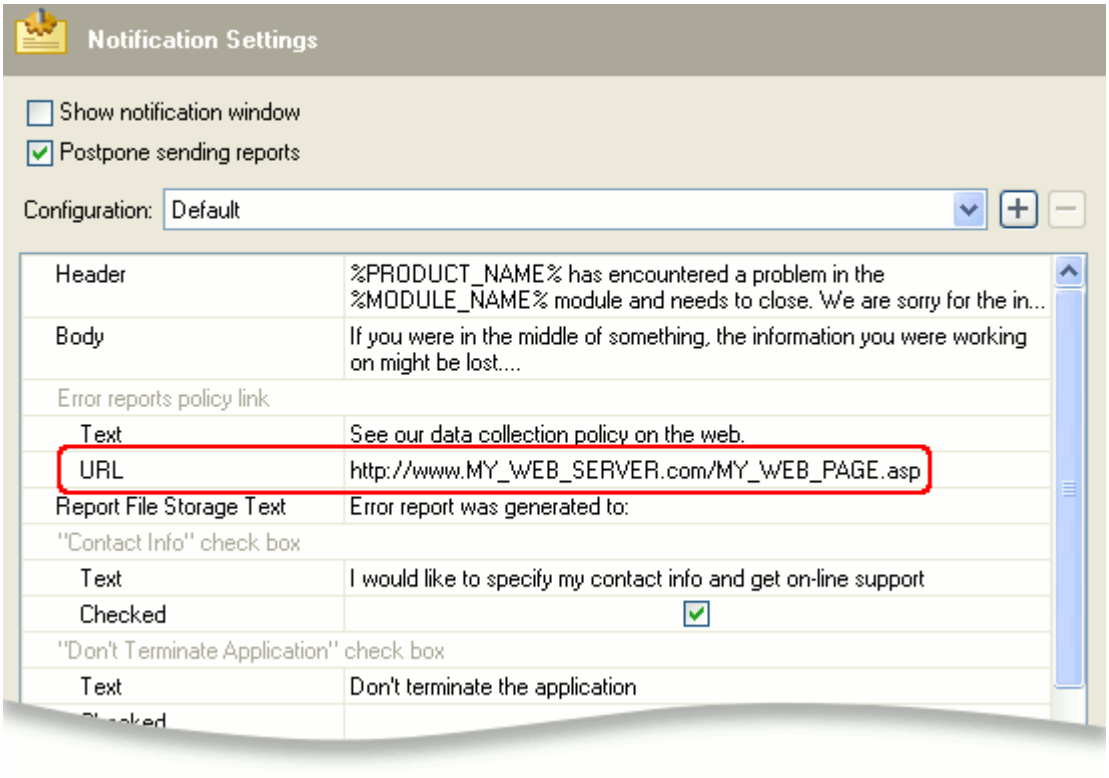
The **Product name** and **Company name** values are displayed by *AQtrace Reporter* in a notification window. They identify the application vendor to end-users.

The **Product identifier** and **Product version** values are used for automatic posting of error reports to issue-tracking systems. The Getting Started tutorial does not cover this functionality. For complete information, please refer to the *Issue-Tracking Plug-Ins* and *Mapping Products*

to Issue-Tracking Projects topics.

Note: Use the same product identifier for all versions of your application.

- Pay attention to the *Error report policy link* | *URL* setting on the *Notification Window* | *Notification Settings* page:



It specifies the URL of a web page that resides on your web site and that informs your customers on the error-reporting policy adopted by your company. You should publish this page on your web site. An example of this page is http://smartbear.com/error-reports-policy/.

After you compiled your application and applied AQtrace Reporter to it, you should add application modules to your build storage. The next topic explains how to do this.

Adding Modules to Build Storage

After compiling your application and building the installation, you should place the binary files and debug information of your modules in the *build storage*.

The **build storage** is just a folder that contains the compiled modules and debug information files. The modules and debug information is needed by *AQtrace Service* and *AQtrace Viewer* to analyze the received error reports. Without these files, the Service and Viewer will not be able to parse the call stack data properly. The reports do not contain the binary code of application modules, so the Service (or Viewer) retrieves the binary code from the build storage. The presence of modules in the build storage and knowing the build storage path are critical for AQtrace Service and Viewer.

Your customers may use different versions of your application (ver. 1.0, 1.1, 2.10 and so on), so most

likely you will receive error reports that were generated for different versions. **The storage must contain the modules for all versions that are shipped to end users.**

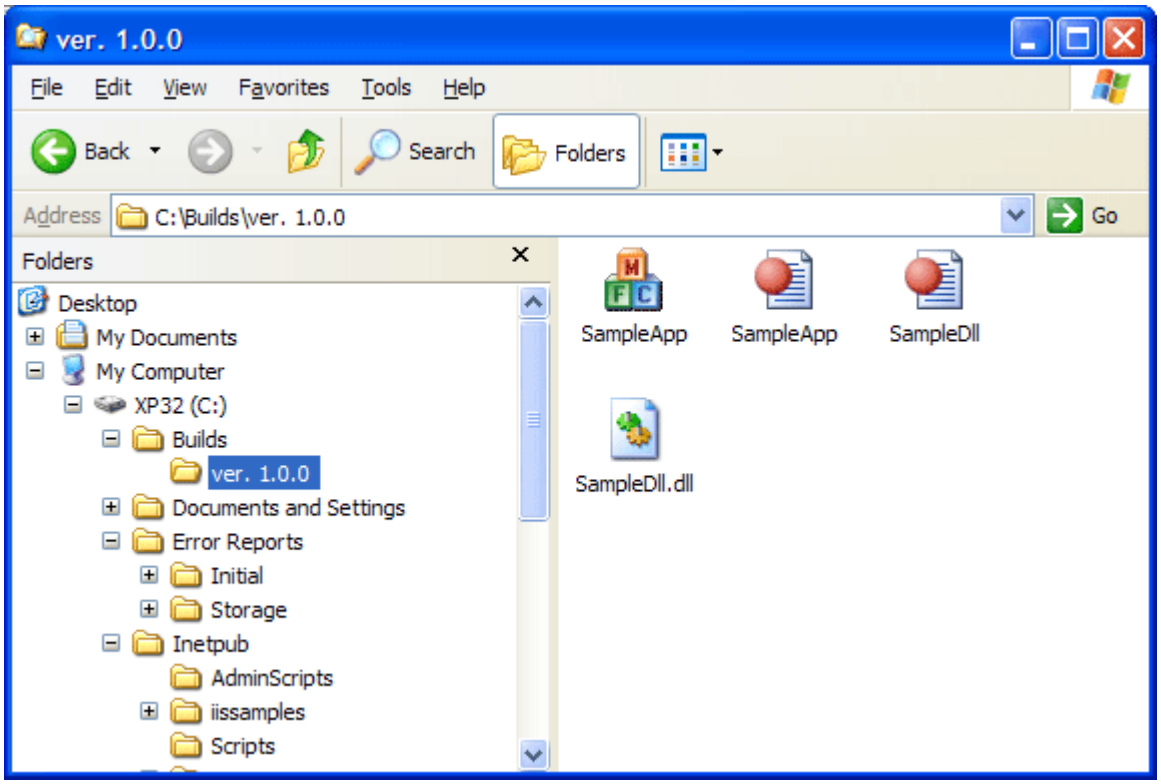
Also, you should **place all the modules that are included in the installation, to the build storage**. For instance, if your application uses a DLL, add both the executable and the DLL.

To search for a module in the build storage, AQtrace Service and AQtrace Viewer use the module's file name (file name and extension) and the version number.

You use the *AQtrace Module Store* utility to create a configuration file that contains information about the file names, the modules' versions and their location in the storage (see below). You can then specify the file's name and path to AQtrace Service and AQtrace Viewer and they use the information included in the file to find the needed module.

Let's create the build storage and the configuration file for our sample application:

- Launch Windows Explorer.
- Create a new **C:\Builds** folder.
- Open this folder in the Windows Explorer.
- Create a new **ver. 1.0.0** subfolder in this folder.
- Copy compiled binary modules and debug information files to the *C:\Builds\ver. 1.0.0* folder. For instance, for our sample Visual C++ application, copy the *SampleApp.exe*, *SampleApp.pdb*, *SampleDll.dll* and *SampleDll.pdb* files. They reside in the *<Users>\Public\Documents\AQtrace Files\Samples\CompiledSamples\CPP\x86* folder on Windows 7, Windows Vista and Windows Server 2008 and in *<Documents and Settings>\All Users\Documents\AQtrace Files\Samples\CompiledSamples\CPP\x86* on other operating systems.

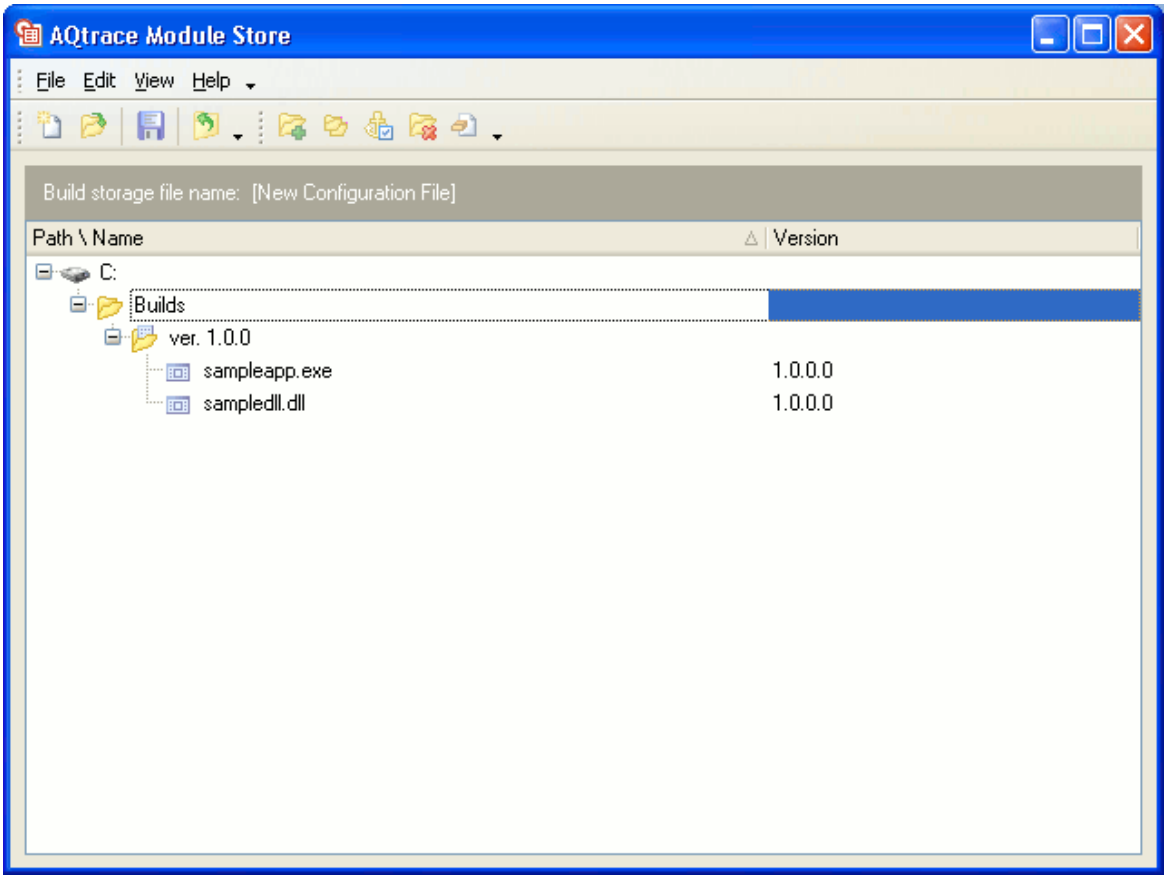


Note: We copied the debug information files (*.pdb) along with the appropriate binary modules. When searching for a module in the build storage, AQtrace Service and Viewer assumes that debug information is either included in the executables or that the debug information files reside in the same folder, in which the appropriate .exe or .dll module is located.

Now we should create the configuration file for the storage:

- Launch the *AQtrace Module Store* utility. It is located in the *<AQtrace>\Bin* folder.
- In the utility, select **File | New** from the main menu or click the **New** button to create a new configuration file.
- To add information about modules to the file:
  - Select **Edit | Add Folder** from the main menu or click the **Add Folder** button on the **Edit** toolbar. This will invoke the standard Browse for Folder dialog.
  - In the dialog, select the **Recurse subdirectories** check box, choose the **C:\Builds** folder and click **OK**.

    AQtrace Module Store will scan the *C:\Builds* folder and its subfolders and save information about all of the found binary modules (.exe, dll, .ocx, .bpl and so on) to the configuration file.



- After you added information to the configuration file, select **File | Save** or click the **Save** button to save the changes. Since we created a new file, it has no name, so the utility will display the standard Save File dialog to let you specify the file's name. Save the file as

C:\Builds\BuildConfig.xml.

- Close AQtrace Module Store utility.

Note: Keep in mind that in real-world situations you should update the build storage and configuration file for each build shipped to end-users. Otherwise, AQtrace Service and Viewer will not be able to parse the received error reports.

To automate the updating you can use *AQtrace Module Store Agent*. It monitors the build storage and updates the configuration file upon changes.

Organizing Report Storages

AQtrace server-side components processes error reports in two steps:

1. The reports are received by Reporter Collector and saved to some folder that serves for temporary storage. This folder is called **initial storage**.
2. Then, AQtrace Service checks the reports's data and moves the reports to another folder where they are stored permanently. This folder is called **persistent storage**.

Let's create the folders for report storages:

- Launch Windows Explorer or any other file manager.
- Create the following folders for the initial and persistent storages:

  Initial storage: *C:\Error Reports\Initial*

  Persistent storage: *C:\Error Reports\Storage*

In the next topic we will specify these folders in the Report Collector and AQtrace Service settings.

Configuring Server-Side Components

You can specify the settings of server-side components either during the AQtrace installation by using special pages of the installation wizard, or you can do this later by using the *AQtrace Server Config* utility. In our tutorial, we have already installed server-side components, but have not configured and used them before. Let's configure them now.

1. Launch the *AQtrace Server Config* utility (you can find it in the *<AQtrace>\Bin* folder).
2. Choose **Common Settings** from the menu on the left of the AQtrace Server Config window.
3. In the **Initial storage folder** field specify *C:\Error Reports\Initial* as initial storage path. The Report Collector will store received error reports to this folder.
4. Press the ellipsis button on the right of the **Build storage file name** field and choose the *C:\Build\BuildConfig.xml* build storage configuration file that we have created *earlier*.

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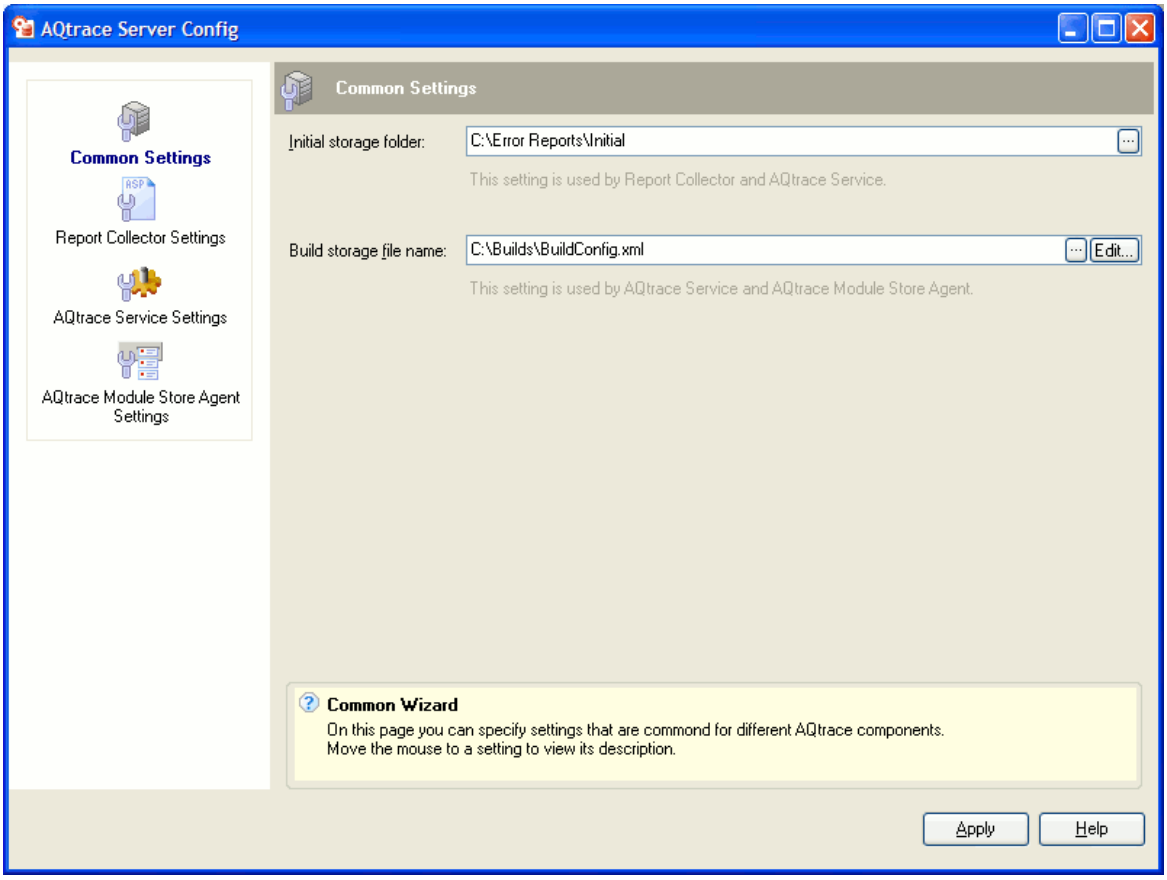
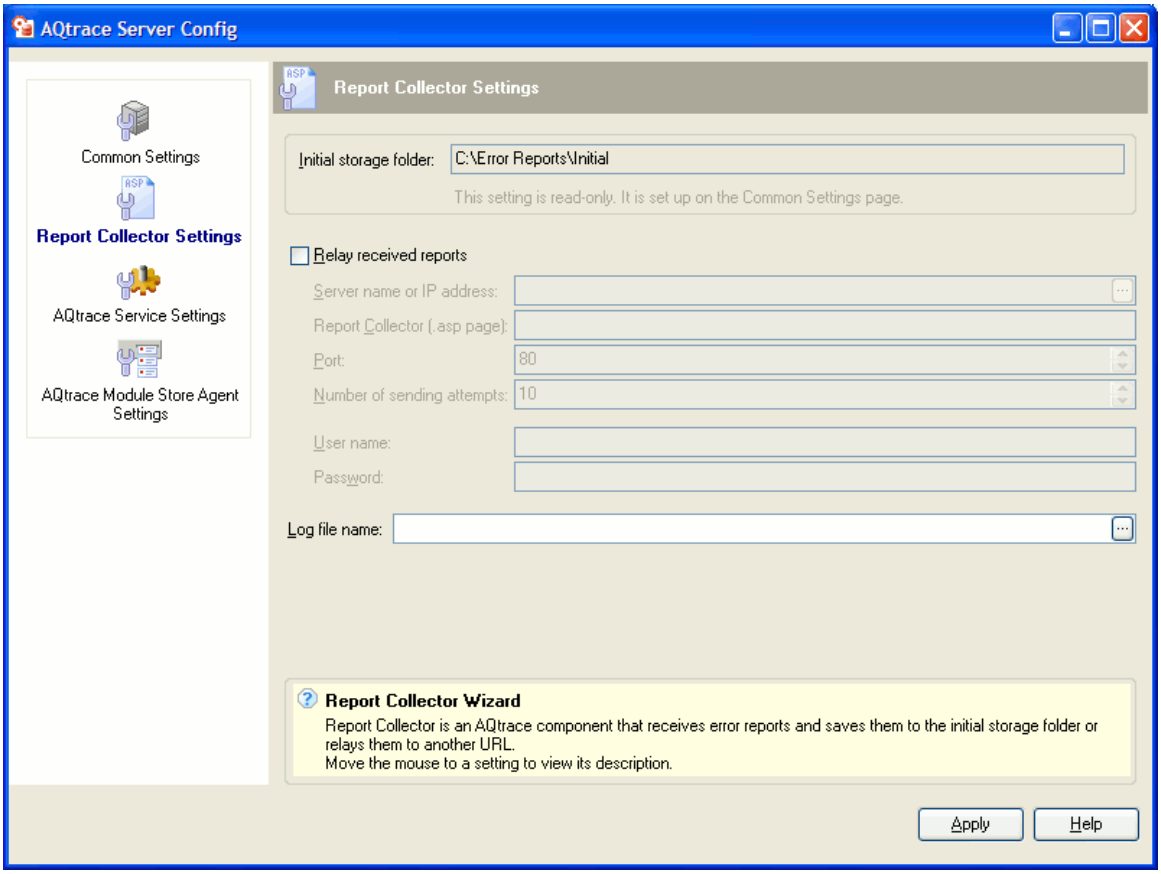


5. Press **Apply** button to save the changes.
6. Switch to **Report Collector Settings** in the menu on the left. These settings define *Report Collector's* options and functioning mode (the Collector can either relay the received error reports, or save them to the initial storage. See *Report Relaying*).

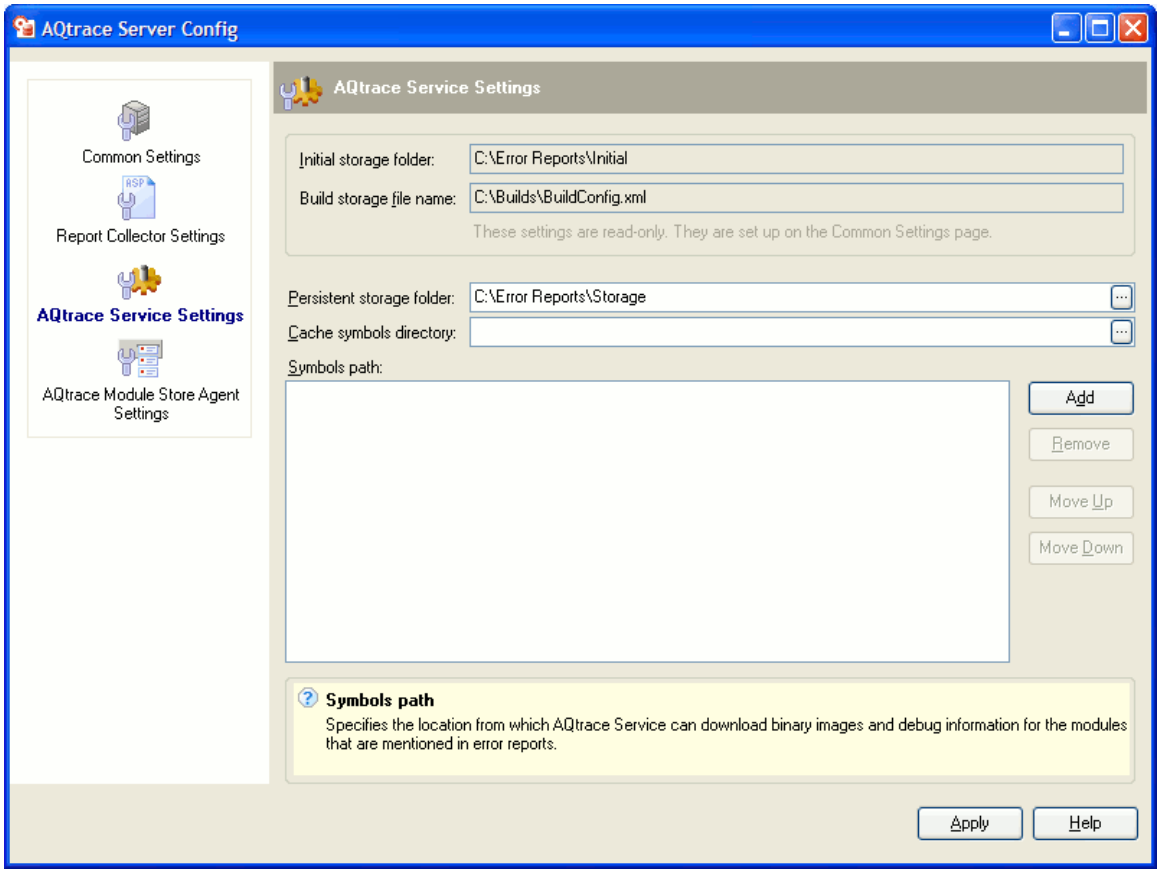
   In our tutorial, we will not use report relaying. So, clear the **Relay received reports** check box:



Leave the other settings unchanged and press **Apply**.

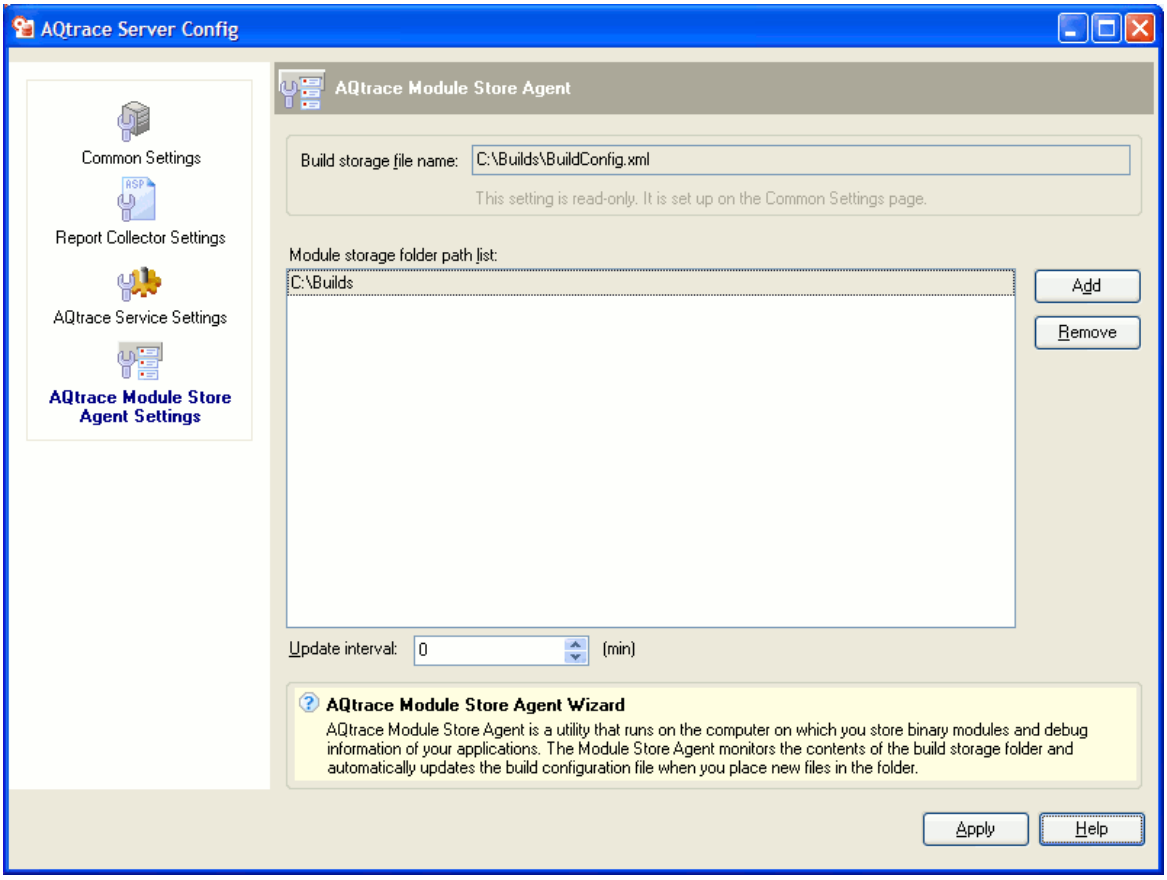
7. Switch to **AQtrace Service Settings** from the menu on the left of the AQtrace Server Config window. This page defines the settings of *AQtrace Service* that processes the received reports.

   Specify the *C:\Error Reports\Storage* path into its **Persistent storage folder** edit box. This is the name of the *persistent storage folder*, in which the received reports will be located.



8. Switch to **AQtrace Module Store Agent Settings** in the menu on the left. This page specifies the parameters of *AQtrace Module Store Agent*.

   Press **Add** button to add a new item to the **Module storage folder path list**, and specify *C:\Builds* as a module storage folder. Now the Agent will monitor this folder and automatically update the file list in the configuration file.



9. That is the last option page in the utility. Press **Apply** button and close AQtrace Server Config.

Configuring AQtrace Viewer

AQtrace Viewer has a special *Storage View* panel that lists all the reports that reside in the *persistent report storage*. The Viewer regularly checks the report storage for new reports and automatically updates the list displayed in the Storage View panel. In this topic we will describe how to setup and use this functionality:

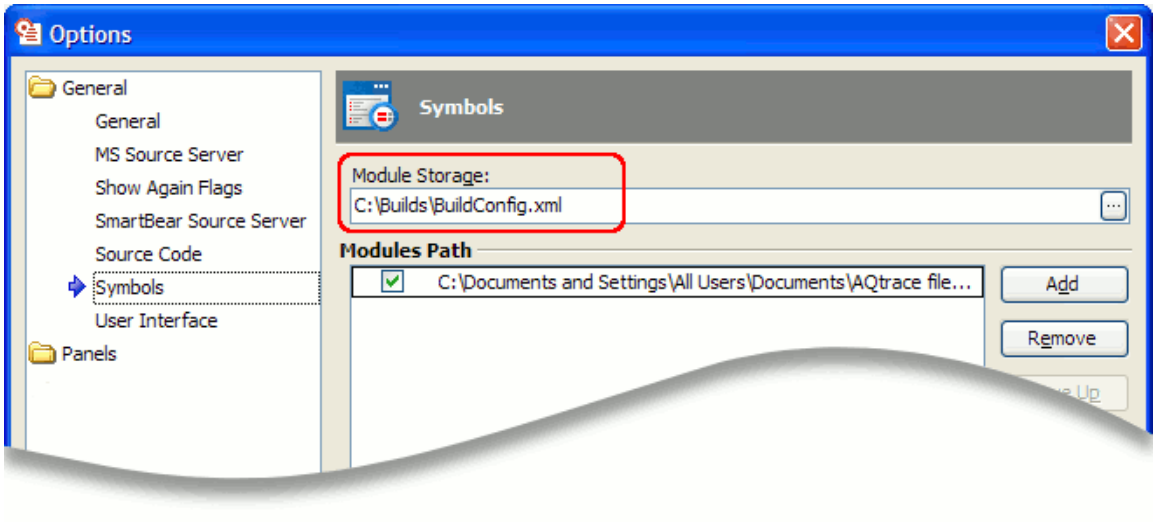
- *Specifying Storage Settings*
- *Obtaining Reports From Storage*

Specifying Storage Settings

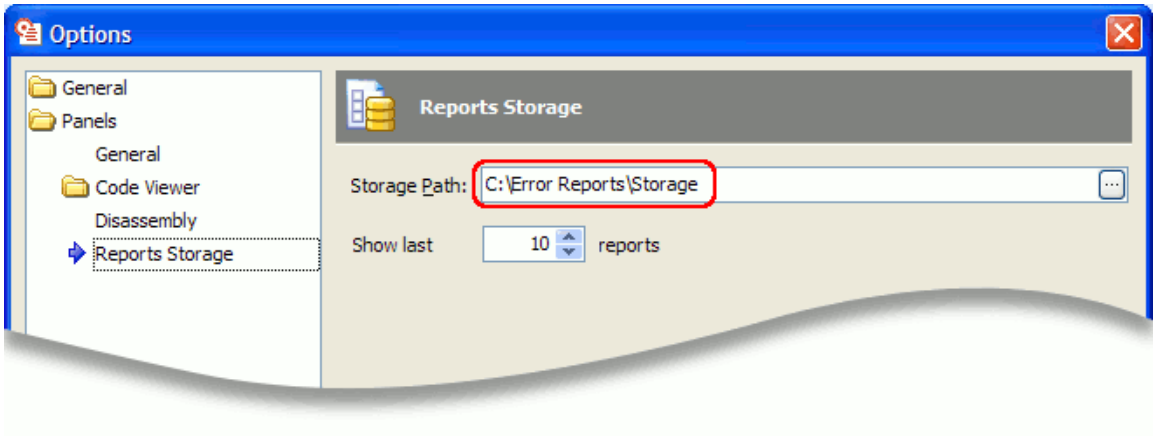
To view and process received error reports, we need to specify several more settings of AQtrace Viewer. Namely, we should provide it with the build storage configuration data and the location of persistent error report storage.

- Launch AQtrace Viewer, its executable is *<AQtrace>\Bin\AQtraceViewer.exe*.
- Select **Options | Options** from the main menu. An *Options* dialog will be invoked.
- Choose **General | Symbols** setting category. This will display the *Symbols Options* page on the right of the dialog.
- In the **Module Storage** field enter *C:\Builds\BuildConfig.xml*. That is the name of the build

storage configuration file that we have created while *organizing a build storage*.



- Choose **Panels | Reports Storage** setting category. This will display the *Reports Storage* page on the right of the dialog.
- Specify the *C:\Error Reports\Storage* folder In the **Storage Path** box of this page. This is the name of the persistent storage folder, which we use.

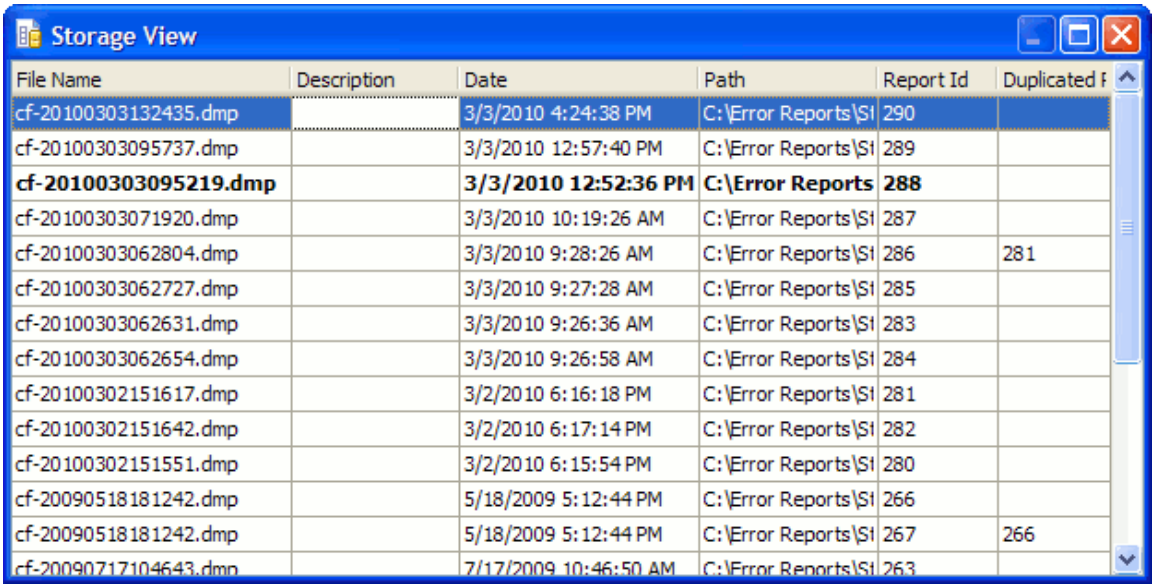


- Press **OK** to close the Options dialog and to save the changes.

Obtaining Reports From Storage

- Open the *Storage View* panel. By default this panel is hidden. To open it, select **View | Select Panel** from the main menu and then choose **Storage View** in the ensuing *Select Panel* dialog.

  This panel lists the reports that are in the storage:



- If the report storage was empty before you run the sample application, then it will only contain one error report - the report that was created when you pressed **Send** in the notification window.

  However, usually, the storage contains a lot of error reports, so you have to find the desired report. To locate the report in the panel, you can sort the panel contents on the **Date** column. To do this, click the column's title. The arrow that is displayed in the title will indicate the sort order (see the image above).

  For complete information on sorting and grouping, see *Arranging Columns, Lines and Panels*.

- After finding the desired error report in the Storage View panel, double-click it in the panel. AQtrace Viewer will parse the report and update its panels with the information that was read from the report.

Once the Viewer panels are populated with reported data, you can use them to find the reason of the error. The further analysis does not depend on whether the error report was opened locally or it was retrieved from the report storage. Some of the analysis techniques are described in the *Analyzing Error Reports With AQtrace Viewer* topic.

Running Sample Application and Generating Error Reports

Now we are ready to run our sample application:

- Launch the sample application.
- Click **OS Exception** to generate an exception. AQtrace Reporter will detect an exception and display a notification window on screen.
- In the notification window:
  - Clear the **Don't terminate the application** check box.
  - Click **Send**.

AQtrace Reporter will generate an error report and send it via the HTTP protocol to the *http://localhost/AQtrace/bugreport.asp* page. If all settings were specified correctly, the Report Collector will receive the report and AQtrace Service will process it and move to the persistent storage folder (in our case it is *C:\Error Reports\Storage*).

You can then launch AQtrace Viewer and then either open the report as a file from this folder, or load the report with the *Storage View* panel.

Getting Started - What's Next?

You have just finished the Getting Started Tutorial. The Getting Started tutorial described the general structure of AQtrace components, explained how to apply AQtrace to your application, receive error reports from it and analyze these reports. Note, however, that the tutorial does not highlight all of the aspects of using the product. For instance, it does not demonstrate how to tune the issue-tracking server-side plug-ins, or how to retrieve different versions of source files from the source control systems.

To get more information about using AQtrace components and modules, see the topics and subsections of the following section:

- ***Using AQtrace***

If you have questions about AQtrace or need help with the product, send a message to SmartBear's Support Team. You can also find answers to your questions on our web site or AQtrace forum. The following topic provides information about additional resources and support services provided by SmartBear Software:

- ***Technical Support and Resources***

Using AQtrace

AQtrace Utilities

The AQtrace package includes several utilities, that when used, allow you to customize settings of the AQtrace components. All of these utilities are important and you should use them to provide the appropriate functionality for all of the AQtrace components. You can launch these utilities from the operating system's Start menu after AQtrace is installed:

AQtrace Viewer

AQtrace Viewer is used to view and analyze the received error reports.

AQtrace Packager

You use *AQtrace Packager* to apply *AQtrace Reporter* to your modules and specify various aspects of AQtrace Reporter's functionality. For example, you can --

- Specify the server, port and .asp page to which reports will be sent.
- Specify data to be included into generated error reports.
- Specify the exceptions and modules to be traced.
- Specify the contents of the notification window.
- And much more.

AQtrace Module Store

AQtrace Module Store is used to create configuration files that contain information about the file names, versions and paths to binary modules of your products and their debug information files. This data is needed by *AQtrace Viewer* and *AQtrace Service* to parse the call stacks of the received error reports.

Report to Issue

The *Report to Issue* utility implements the *issue-tracking plug-ins* that provide support for issue-tracking systems. It is also used to modify the plug-ins' settings and specify the issue-tracking project to which a report should be added.

AQtrace Server Config

You use the *AQtrace Server Config* utility to modify settings of the following server-side components:

- *Report Collector* - The application that receives error reports.
- *AQtrace Service* - The service that performs the initial processing and saves the received reports to the *persistent storage*.
- *AQtrace Module Store Agent* - The service that automatically updates the configuration files created with the AQtrace Module Store.

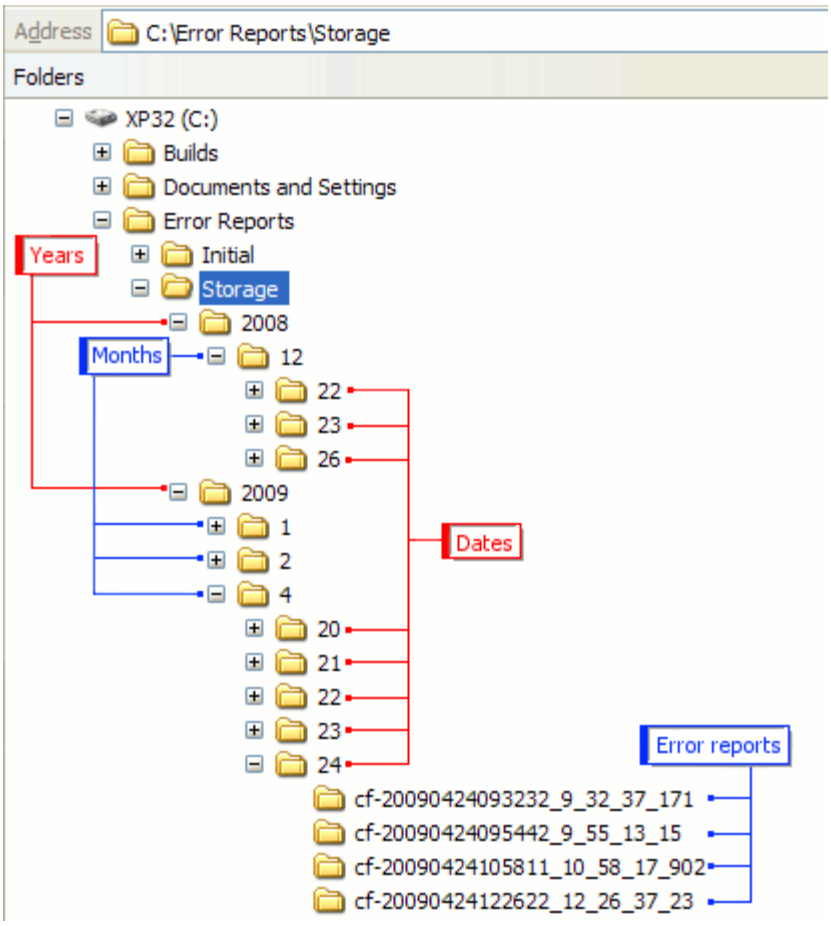
About Persistent Report Storage

This topic contains information about the structure of the *persistent report storage*, the files that are used to store report information and describes how to remove reports from the storage.

Report Storage Structure

AQtrace Service places the received error reports to the persistent report storage. The report storage is just a folder that contains report files. To search for reports faster, AQtrace organizes report files into specific subfolders and uses specific files.

The structure of subfolders corresponds to the dates when error reports were received:



As you can see, subfolders of the top level correspond to years; subfolders of the next levels - to months and dates. Information about each report is saved to a separate subfolder, whose name has the following format:

```
cf-DateTimePart_hh_mm_ss_ms
```

The *DateTimePart* corresponds to the string that contain the date and time when the error report was generated on the end-user computer. The *hh_mm_ss_ms* part specifies the time when the report was added by AQtrace Service to the storage on the server side.

Note: The time values are specified in the UTC format, regardless of the local time settings of the end-user computer and of the computer where AQtrace Service is running.

The persistent storage folder contains the *storage.dat* file. The file has an .xml format and stores information about the location of error reports in the storage. Also, the persistent storage folder contains the *duplicatestorage.dat* file that stores information about duplicated error reports.

Error Report Files

Information about each error report is stored into several files. All of these files have the same name of the format *bug*`DateTimePart`, but have file extensions that are different:

File	Description
.dmp	The "main" file of the error report. Contains the error report data (memory dump, information about threads, CPU registers, modules and so on.)
.dmpx	Contains information that the user specified in the *User Info* dialog when sending an error report.
.desc	Contains a text description of the error report. This description includes the report's file name, exception's code and address, call stack data in the text form and other information.
.info	Contains helper information about report transferring.

Removing Reports from the Storage

Error reports are added to the persistent storage by AQtrace Service. Currently, AQtrace does not offer special features for removing the reports from the storage. That is, we recommend that you store all of the received error reports.

If you want to delete some old reports (for instance, to clean up disk space), you can remove these reports' files. For example, you can delete the folder that contains the reports that were received over two years ago.

However, it is not recommended to remove the reports, because AQtrace Service will not be able to detect duplicated reports in this case. If you need to start a new storage, specify the name of a new storage folder in the *Persistent storage folder* setting of AQtrace Service. You can do this on the *AQtrace Service Settings* page of the *AQtrace Server Config* utility.

Testing AQtrace

Before releasing your application, you may need to check whether all of the AQtrace components function properly. To do this, you perform the following steps:

1. Install all the AQtrace components on the desired computer(s) and modify their settings in the appropriate way.
2. Prepare your application for AQtrace:
   - Modify the compiler settings so that the application is compiled with debug information and has the version information specified.
   - Add special code that will generate error reports. The easiest way to do this is to obtain a reference to the AQtrace Reporter program object and call its `ShowFatalErrorWithMessage` method (see *Generating Error Reports on Demand*).

This method commands the Reporter to generate an error report. You may call this method within a routine that is used as a menu item event handler or that is called when you press a certain key combination in the main window of your application.

- Compile your application.
- Use *AQtrace Packager* to specify the Reporter's settings and apply them to your application.

  If you are going to launch your application under a debugger, then enable the *Ignore debugger* setting on the *Reporter Behavior* page of AQtrace Packager. If this setting is disabled, AQtrace Reporter will not function when the application is running under a debugger. See also *Working Under a Debugger*.

3. Install your application on the test computer and launch it there. In the application, perform the actions that will lead to the generation of an error report (for instance, press certain key combination that will lead to the call of the `ShowFatalErrorWithMessage` method). Press **Send** in the notification window to send the generated report to the server.
4. Check whether the report is received and processed in the desired manner.

Using AQtrace With Visual Basic Applications

Additional Redistributable Module

AQtrace Reporter is implemented by two dynamic link libraries: aqReporter and dbghelp. These DLLs are redistributable and you should ship them along with your application.

If you are going to control AQtrace Reporter from your VB code, then in addition to these two libraries, you should also redistribute the **aqtSupportVB.dll** module. It contains functions that provide program access to AQtrace Reporter.

You can find this module in the *<Users>\Public\Documents\AQtrace Files\SDK\VB* folder on Windows 7, Windows Vista and Windows Server 2008 and in the *<Documents and Settings>\All Users\Documents\AQtrace Files\SDK\VB* folder on other operating systems.

In order for the module to be able to function properly, it must be available to your application and it must have access to the aqReporter library. The easiest way to achieve this is to place your executable, aqReporter and aqtSupportVB libraries into the same folder. Alternatively, you can place aqReporter.dll and aqtSupportVB.dll in the *Windows\System32* folder or specify the path to them in the PATH environment variable.

See also *AQtrace Reporter Programming* and *Getting Reference to AQtrace Reporter*.

Limitations

- Due to some specifics of Visual Basic 6 applications, a sequence of function calls displayed in the *Call Stack* panel of *AQtrace Viewer* cannot contain calls to Visual Basic functions. Only calls to functions located in modules containing non-Visual Basic code (if any) are displayed in the Call Stack panel of AQtrace Viewer when you open an error report generated for your Visual Basic 6 application.
- The *Code Viewer* panel of AQtrace Viewer does not show source code of Visual Basic 6 modules when you are analyzing an error report generated for your Visual Basic 6 application.
- Currently, there is a number of programming limitations on controlling AQtrace Reporter from your Visual Basic 6 code:
  - AQtrace does not support the *insertion of custom data* into the error reports generated for

Visual Basic applications.

- AQtrace does not support *performing of specific actions* upon closing the notification window in Visual Basic applications.
- AQtrace does not support *custom exception filters* in Visual Basic applications.
- AQtrace does not support setting names for threads created in Visual Basic applications. In Delphi, C++Builder, Visual C++ and .NET applications you can do it by using the `SetThreadName` method.
- AQtrace does not allow loading an error report programmatically from a dump file and displaying its contents in Visual Basic applications. In Delphi, C++Builder, Visual C++ and .NET applications you can do it by using the `ShowReportContents` method.
- AQtrace does not support saving programmatically additional information about a Visual Basic application and the end-user computer, on which this application is running, in a separate dump file. In Delphi, C++Builder, Visual C++ and .NET applications you can do it by using the `SaveAddInfoAsDump` method.
- AQtrace does not allow adding user messages to the *event log* included in an error report in Visual Basic applications. In Delphi, C++Builder, VisualC++ and .NET applications you can do this by using the *AddMessageToLog* method.
- Also, to disable and enable the AQtrace Reporter functionality for a thread, use the `LockForThread` and `UnlockForThread` methods, rather than `Lock` and `Unlock`. See *Enabling and Disabling AQtrace Reporter*.

- AQtrace Reporter does not catch *language exceptions* in Visual Basic 6 applications. Only OS exceptions are supported.

Tracing Multithreaded Applications

Visual Basic does not include built-in means to create multithreaded applications. But you can create a new thread by calling the Windows API `CreateThread` function from your code.

However, the error handling statements (like `On Error Go To`) will not work in this thread and if an exception occurs, the application terminates. AQtrace Reporter will catch these exceptions, generate error reports for them and display the notification window. However, after this the application will be terminated. This will happen even though the end-user selects the **Don't terminate the application** check box in the notification window.

The fact is that when AQtrace Reporter closes the window and this check box is selected, the Reporter "forwards" the exception to the exception handling function (or code) that is used by your application. When there is a new thread in a Visual Basic application, AQtrace Reporter will not be able to forward the exception and the application will close. The application will close even if the end-user selects the "Don't terminate…" check box in the notification window.

Using AQtrace With .NET Applications

Using AQtrace With .NET Applications - Overview

You can use AQtrace to trace exceptions in your .NET applications and to find the cause of their occurrence. This topic provides an overview of using AQtrace utilities with .NET applications and contains links to more detailed descriptions.

Supported Applications

You can use AQtrace with .NET applications compiled for .NET Framework version 1.0, 1.1, 2.0, 3.0 or 3.5.

AQtrace can work with any .NET application, regardless of the compiler that was used to build this application. It supports all the existing .NET compilers:

- Microsoft Visual C# 7.x, 2005 and 2008
- Microsoft Visual Basic .NET 7.x, 2005 and 2008
- Microsoft Visual C++ 7.x, 2005 and 2008 (managed code)
- Microsoft Visual J# 7.x, 2005
- CodeGear Delphi 2007 and 2009 for .NET
- Borland Delphi 2005 and 2006 for .NET
- Borland C#Builder

Basic Concepts

The way in which AQtrace components work with .NET and native (unmanaged) modules are very similar:

1. *AQtrace Reporter* monitors the application execution and generates and sends error reports when an exception occurs.
2. The *server-side components* receive the reports and save them to a persistent report storage.
3. *AQtrace Viewer* helps you analyze the reports and find the cause of the problem.

These operations are common for both .NET and unmanaged modules. However, the way AQtrace Reporter is applied to managed modules and the way you compile these modules for AQtrace differ from the way you prepare unmanaged modules for AQtrace.

Applying AQtrace Reporter to Managed Modules

The difference in support for native and .NET applications is the way in which AQtrace Reporter is applied to unmanaged modules and to .NET assemblies. To apply the Reporter to a native module, you simply process this module with *AQtrace Packager*. The Packager adds special code to the module that loads the aqReporter dynamic link library and enables the Reporter functionality when the unmanaged module is loaded to memory. This code also contains initializing data that configures the Reporter and the notification window.

As for .NET modules, you should write special code that will initialize AQtrace Reporter. To do this, you create a special assembly, **aqReporterInterop.dll**, that serves as a bridge between your assembly and the aqReporter dynamic link library. This assembly provides program interfaces and a special class that help you to initialize the Reporter’s functionality for managed applications and to control its behavior at run time. aqReporterInterop.dll also contains AQtrace Reporter's configuration that specifies what exceptions should be traced, the information to be included in error reports, the address to which the reports will be sent, and so on.

So, to create AQtrace Reporter and use it with .NET applications, you should perform the following operations:

1. Create the aqReporterInterop assembly.

   You create the aqReporterInterop assembly with the AQtrace Packager utility. For detailed information on this, see *Creating the aqReporterInterop Assembly*.
2. Include the aqReporterInterop assembly in your .NET project and write code that will initialize the

Reporter functionality by using aqReporterInterop.

For more information about this, see *Initializing AQtrace Reporter in .NET Applications*.

Compiling .NET Applications for AQtrace

In order for AQtrace components to be able to work with your .NET applications and process error reports correctly, you need to compile these applications in a special way:

- Compile your application with the aqReporterInterop assembly.

  In order for AQtrace Reporter to be able to monitor execution of your application, you must create an aqReporterInterop assembly, include it in your .NET project and then compile your project (see above).

- Compile your application with debug information to be able to use *source servers*.

  To parse error reports, AQtrace Viewer and server-side components do not need specific debug information. They use metadata that are included in .NET assemblies by default. However, if you want to use source servers, you should compile your .NET modules with debug information. See *Compiling Applications With Debug Information* for detailed information on compiler settings.

- Specify version information for assemblies to be compiled.

  You need to modify the compiler settings so that they specify version information for each build of your application. See *Setting Build Number* for details.

Which Exceptions AQtrace Can Catch

AQtrace Reporter can catch and handle any exception that occurs in managed code. Normally, it does not generate error reports for all the exceptions. It displays the *notification window* and generates reports only for those exceptions that you specified in your AQtrace Packager .NET project or that meet the conditions defined in *custom exception filters* in your code.

Unlike AQtrace Packager native projects, .NET projects allow you to specify only **.NET exception class names** as the exceptions to be handled by the Reporter. You cannot specify **OS exceptions** for .NET modules. However, when an OS exception, which is generated at the system level, occurs, it is mapped to the corresponding .NET exception class and the Reporter handles it as a .NET exception. For instance, when an `EXCEPTION_INT_DIVIDE_BY_ZERO` exception occurs as a result of integer division by zero in your managed code, AQtrace Reporter interprets and handles it as a `DivideByZeroException` .NET exception. For more information on this, see *Specifying Exceptions to Be Traced*.

Note that if AQtrace Reporter is initialized in managed code and the settings specified in an AQtrace Packager .NET project are applied to the Reporter, only those exceptions that are raised in a .NET (managed) module of the application can be handled by the Reporter. If you use **mixed code** in your .NET application (that is, if you use both managed and unmanaged code) and the Reporter is initialized in managed code, then exceptions that occur in native (unmanaged) code cannot be traced. Similarly, if you apply AQtrace Reporter to a native module and this module calls functions from a .NET assembly with managed code, then the Reporter can trace exceptions only in unmanaged code of the native module, and all the exceptions raised in managed code are ignored. See the *Specifying Exceptions to Be Traced* help topic for more information.

Deploying .NET Applications

In order for your .NET application to be monitored successfully by AQtrace Reporter on end-user computers, you must include aqReporter.dll and aqReporterInterop.dll in the installation package and ship them to users along with the application. These modules must be accessible to your .NET executable that will be monitored by the Reporter. So, aqReporter.dll and aqReporterInterop.dll should be placed in the folder in which the executable is located. For more information on deploying .NET applications that use

AQtrace Reporter, see *Deploying .NET Applications*.

Creating aqReporterInterop Assembly

The aqReporterInterop assembly contains code that enables the *AQtrace Reporter* functionality in managed applications and allows you to control the Reporter at run time. The assembly serves as a bridge between your managed modules and the unmanaged aqReporter dynamic link library that implements the Reporter functionality. The assembly also contains the Reporter settings specified with *AQtrace Packager*. These settings specify which exceptions should be traced, to what server error reports will be sent and what transfer protocol will be used for that, what information should be displayed in the *notification window*, and so on.

You create the aqReporterInterop assembly with AQtrace Packager:

1. Launch AQtrace Packager.
2. Select **File | New | .NET Project** from the menu or use the **Create .NET Project** command from AQtrace Packager's Start Page. This will create a new AQtrace Packager project for .NET applications.
3. Switch to the **Reporter Assembly | Reporter Assembly Information** page.
4. In the **Output folder** box, specify the folder in which the aqReporterInterop assembly will be created.

   Note: You can specify only the output folder. The file name is always *aqReporterInterop.dll*, it cannot be changed.

5. To generate an assembly, AQtrace Packager uses the ilasm.exe utility that is part of Microsoft .NET Framework. AQtrace Packager finds this utility automatically on your hard drives. If you have several versions of .NET Framework installed, then, by default, AQtrace Packager will use the ilasm.exe utility of the earliest version found. You may want to use ilasm of a specific .NET Framework version. In this case, specify the path to the ilasm.exe utility and the utility's command-line arguments in the **ilasm location** and **ilasm parameters** edit boxes.
6. Use the other *pages of AQtrace Packager* to specify the desired settings of AQtrace Reporter. For instance, on the *Reporter Settings* | *Sending* page, you can specify the protocol(s) that will be used to send error reports to the developer team and the destination addresses. On the *Exception Filter* | *.NET Exceptions* page, you can specify class names of specific .NET exceptions that you want to trace or exclude from tracing. On the *Reporter Settings* | *Additional Reported Data* page, you can specify what additional information will be included into error reports (for example, information about the operating system, hardware, running processes, software installed on the computer, and so on). Use the *Notification Window* | *Notification Settings* page to specify data and controls to be displayed in the notification window when an error occurs.
7. After you set all the desired values, press **Generate Assembly** on the toolbar. AQtrace Packager will generate the aqReporterInterop assembly. It will be stored to the folder that you specified on the *Reporter Assembly Information* page.

Initializing AQtrace Reporter in .NET Applications

To use *AQtrace Reporter* with your .NET application, you should add the aqReporterInterop assembly to your project and then write code that will initialize AQtrace Reporter.

1. Add aqReporterInterop to Your .NET Project

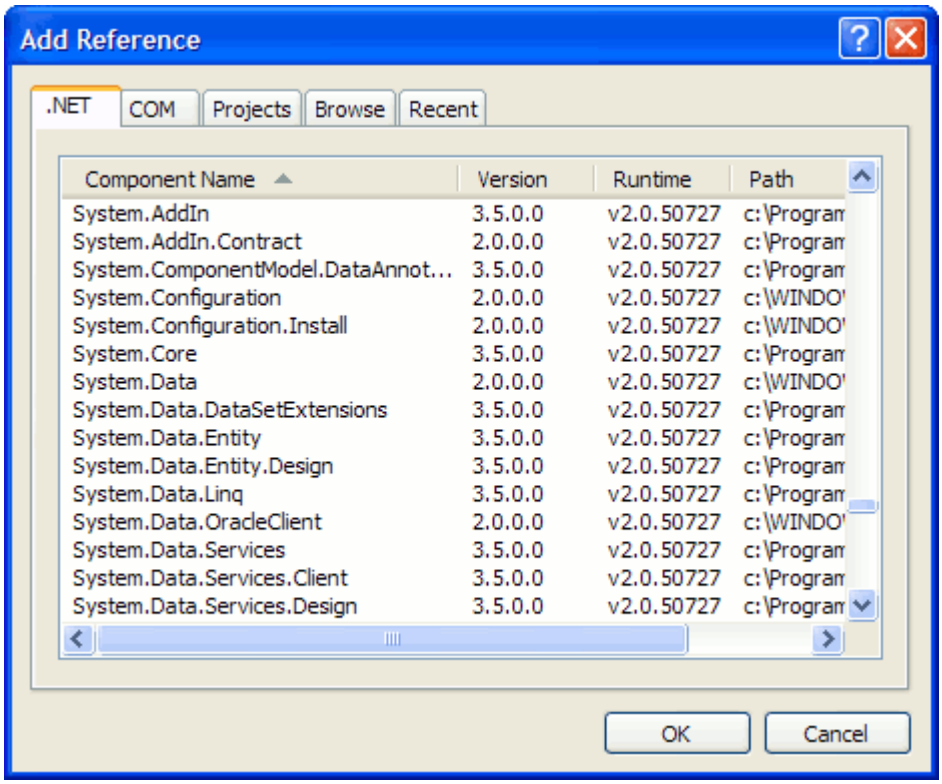
The way you do this depends on the program language you use. Below are instructions for C# and Visual Basic .NET projects:

- Launch Microsoft Visual Studio and open your .NET project in it.
- Select **Project | Add Reference** from Visual Studio's main menu.

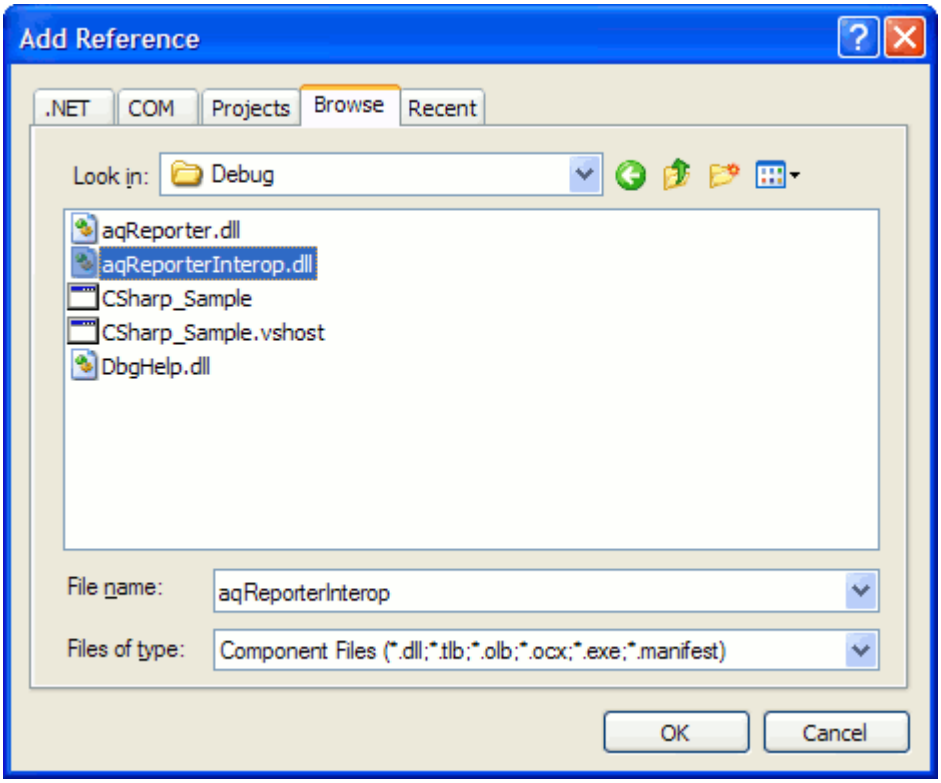
  -- or --

  Right-click the project's node in the Solution Explorer panel and select **Add Reference** from the ensuing context menu.

  This will invoke the **Add Reference** dialog:

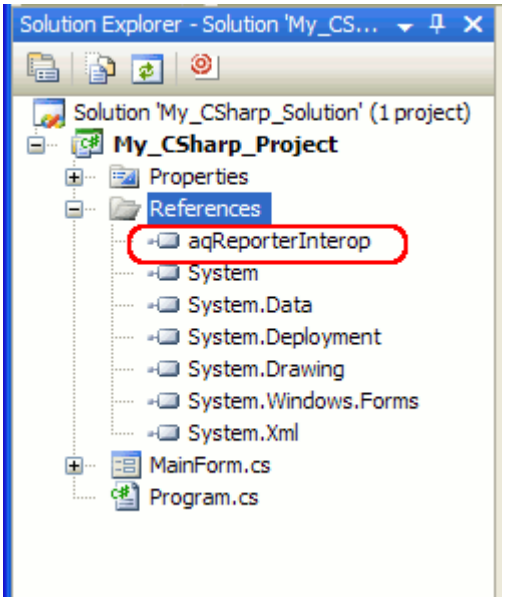


- In the dialog:
  - Switch to the **Browse** page.



- On the page, choose the aqReporterInterop.dll assembly that you generated with *AQtrace Packager* for your application (see *Creating the aqReporterInterop Assembly*).
- Click **OK**.

The aqReporterInterop assembly will be added to your project and will be shown under the References node in the **Solution Explorer**:



VB.NET projects: By default, the References node is hidden in the Solution Explorer panel for Visual Basic .NET projects. To display it, select **Project | Show All Files** from Visual Studio's main menu.

2. Add AQtrace Reporter Initialization Code

In order for AQtrace Reporter to be able to monitor execution of your application and handle exceptions, you must call the *`aqReporterInterop.Initializer.InitReporter()`* method in your code. This method enables AQtrace Reporter and initializes it using the settings stored in the aqReporterInterop assembly and specified with AQtrace Packager.

Generally speaking, you can add an initialization call to the `InitReporter` method to any place of your code. However, AQtrace Reporter will trace exceptions only after it is initialized. To trace exceptions during the whole application run, it is recommended to initialize AQtrace Reporter at the beginning of the application run, for instance, within the `Main` routine. The way in which you call the method depends on the project type. Below are instructions for C# and VB.NET projects.

Note: The aqReporterInterop.dll assembly must be accessible to your executable. It must be in the folder in which the executable is located, or it must be in the Global Assembly Cache (GAC).

The aqReporterInterop assembly serves as a bridge between your application and the aqReporter.dll library that contains the AQtrace Reporter implementation. The aqReporter dynamic link library must be accessible to the assembly. The easiest way to achieve this is to place them in the same folder.

C# Projects

- Open the source file that contains the `Main` routine. Typically, in C# projects, it is Program.cs.
- Insert a call to the the `aqReporterInterop.Initializer.InitReporter()` method into the `Main` function. To handle exceptions during the whole application run, add this call as the first statement of the `Main` function:

```
[C#]
static void Main()
 {
     aqReporterInterop.Initializer.InitReporter();  // <- Add this line

     Application.EnableVisualStyles();
     Application.SetCompatibleTextRenderingDefault(false);
     Application.Run(new Form1());
 }
```

Visual Basic .NET Projects

If your VB.NET application is a Windows Forms application, it may have no `Main` routine. In this case, you can either create the `Main` procedure or initialize AQtrace Reporter within the `OnLoad` event handler of the application's main form.

Using the OnLoad Event Handler

- Open the main form for editing and click somewhere within the form.
- Switch to the **Properties** panel.
- Activate the **Events** tab of the Properties panel.
- Find the Load event and create an event handler for it.
- Add the AQtrace Reporter initialization code to the OnLoad event handler:

```
[Visual Basic .NET]
Private Sub Form1_Load(ByVal sender As System.Object, ByVal e As
System.EventArgs) Handles MyBase.Load
     aqReporterInterop.Initializer.InitReporter()
End Sub
```

Creating the Main Routine

- Add the following code to one of the classes of your application:

```
[Visual Basic .NET]
<STAThread()> _
Shared Sub Main()
    Dim frm1 As Form1

    aqReporterInterop.Initializer.InitReporter()

    ' We assume that the main form of your application is called
Form1
    frm1 = New Form1()
    Application.Run(frm1)
End Sub
```

  Save the changes made to the code.
- Select **Project | <Project_Name> Properties** from Visual Studio's main menu. This will open the project settings for editing.
- Switch to the **Application** tab.
- Clear the **Enable application framework** check box.
- Choose **Sub Main** from the **Startup object** drop-down list.
- Save the settings.

Deploying .NET Applications

In order for your .NET application that uses *AQtrace Reporter* to be able to start and run successfully on end-user computers, you must include the following two modules into your installation package:

- **aqReporter.dll**

  aqReporter.dll is an unmanaged (native) dynamic link library that contains the AQtrace Reporter implementation. It contains code that monitors execution of your application, generates error reports, displays notification windows and sends the reports to developers.

  If AQtrace is installed on Windows 7, Windows Vista or Windows Server 2008, you can find

aqReporter.dll in the *<Users>\Public\Documents\AQtrace Files\SDK\Modules\x86* or *<Users>\Public\Documents\AQtrace Files\SDK\Modules\x64* folder. On other Windows operating systems, the library resides in the *<Documents and Settings>\All Users\Documents\AQtrace Files\SDK\Modules\x86* or *<Documents and Settings>\All Users\Documents\AQtrace Files\SDK\Modules\x64* folder. The *\x86* and *\x64* folders contain the appropriate versions of the library for x86 and x64 Windows operating systems, respectively.

- **aqReporterInterop.dll**

  aqReporterInterop.dll is an assembly that serves as a bridge between your managed code and the unmanaged aqReporter library. The assembly contains a declaration of a special class and program interfaces that allow you to connect to AQtrace Reporter, implemented in the unmanaged aqReporter library, from within managed code. The assembly also contains the Reporter's settings and the information to be displayed in the *notification window*.

  You create the aqReporterInterop assembly with the *AQtrace Packager* utility. For detailed information about this, see *Creating the aqReporterInterop Assembly*.

Methods defined in the aqReporterInterop assembly are called from your managed application. So, this assembly must be accessible to your executable (or DLL) after your application is installed on the computer. To achieve this, the installation program should install the assembly into the folder, in which the executable is installed, or to the Global Assembly Cache (GAC).

The aqReporterInterop assembly loads the aqReporter library and calls the functions that are defined in it, so the library must be accessible to the assembly. To search for the library and load it, the assembly uses typical searching approaches: it searches for the library in the folder in which the assembly is located, in system folders and in the folders that are specified by the PATH environment variable.

To avoid any confusion, make sure the installation program of your application installs all three modules -- your executable, aqReporterInterop.dll and aqReporter.dll -- into the same folder.

Using AQtrace Reporter in .NET Applications

AQtrace Reporter is implemented in the aqReporter dynamic link library that contains unmanaged code. In order for .NET applications to be able to use the Reporter functionality, the aqReporterInterop assembly is generated by AQtrace Packager and then it is used as a bridge between .NET assemblies and the aqReporter native module. To learn how you can generate the aqReporterInterop assembly, see *Creating the aqReporterInterop Assembly*.

aqReporterInterop.dll contains code that enables the AQtrace Reporter functionality for managed applications and controls the Reporter at run time. Also, this assembly includes the Reporter settings specified with *AQtrace Packager* (for information on specifying the Reporter settings, see *Using AQtrace Packager With .NET Applications*). In order for the Reporter to monitor your .NET application, these settings must be applied to the Reporter. To load and initialize AQtrace Reporter in your .NET application, you should use the `aqReporterInterop.Initializer` class and its `InitReporter` method implemented in the aqReporterInterop assembly. For more information on this, see *Initializing AQtrace Reporter in .NET Applications*.

After the Reporter was loaded and initialized in your managed application, you can use its functionality at run time through the program interfaces provided by the `aqReporterInterop` namespace. This namespace is declared in the aqReporterInterop assembly. To control the Reporter from your .NET code, you should obtain a program reference to the Reporter object implemented in the aqReporter library. To learn how you can obtain this reference in your managed code, see *Getting Reference to AQtrace Reporter in .NET Applications*.

After the Reporter has been prepared for monitoring your .NET application, you can control it from your managed code like you do this in unmanaged (native) applications. The difference is that in native applications you use a program interfaces defined in the aqReporter library, while in managed code you must use the same interfaces from the `aqReporterInterop` namespace declared in the aqReporterInterop assembly. These interfaces allow you to control the Reporter and perform various actions with it in your .NET assemblies.

You can disable or enable the Reporter from your managed code at run time by using the `Lock`, `Unlock`, `GlobalLock` and `GlobalUnlock` methods from the `IaqReporterIntf` interface. To learn how you can do this, see *Enabling and Disabling AQtrace Reporter*.

You can create and use objects that implement the `IaqReporterCallback` and `IaqReporterCallback2` interfaces to generate custom textual and binary data and include it into error reports while your .NET application is running. For more information on custom data in error reports, see *Inserting Custom Data Into Reports*.

Using the `IaqCustomExceptionFilter` interface, you can create *custom exception filters* - the objects that allow you to implement your own algorithm of exception filtering and to define for what exceptions the Reporter should generate reports, and what exceptions should be ignored. For more information, see *Creating Custom Exception Filters*.

In some cases, you may want to generate an error report programmatically, without waiting until an exception is raised. Use the `ShowFatalErrorWithMessage` method for this purpose. For more information on this, see *Generating Error Reports on Demand*.

Using the `IaqReporterCallback.OnCloseReporter` or `IaqReporterCallback2.OnCloseReporter2` method, you can perform specific actions upon closing the *notification window*. See *Performing Specific Actions Upon Closing the Notification Window* for a detailed description.

You can call the `IaqReporterIntf2.SaveAddInfoAsDump` method to save additional information about the end-user's computer and its system as a separate dump file.

Using the `IaqReporterIntf2.ShowReportContents` method, you can load information from an error report file and preview it in the *Report Information* dialog.

When creating a thread in your .NET application, you can specify a name for it by using the `IaqReporterIntf2.SetThreadName` method. Such names can help developers distinguish threads when analyzing error reports.

Using AQtrace With Non-Interactive Processes

This topic provides information on using AQtrace with applications running in non-interactive mode. A typical example of such applications is services that are mostly launched under non-interactive accounts, such as SYSTEM, LOCAL SERVICE, NETWORK SERVICE and so on. According to their name, non-interactive processes cannot interact with the user.

The initial steps of embedding *AQtrace Reporter* into a non-interactive application are the same as those you perform when working with any other application. You launch *AQtrace Packager*, specify Reporter settings and apply them to the executable or DLL. See *Using AQtrace Reporter - Basic Concepts* for details.

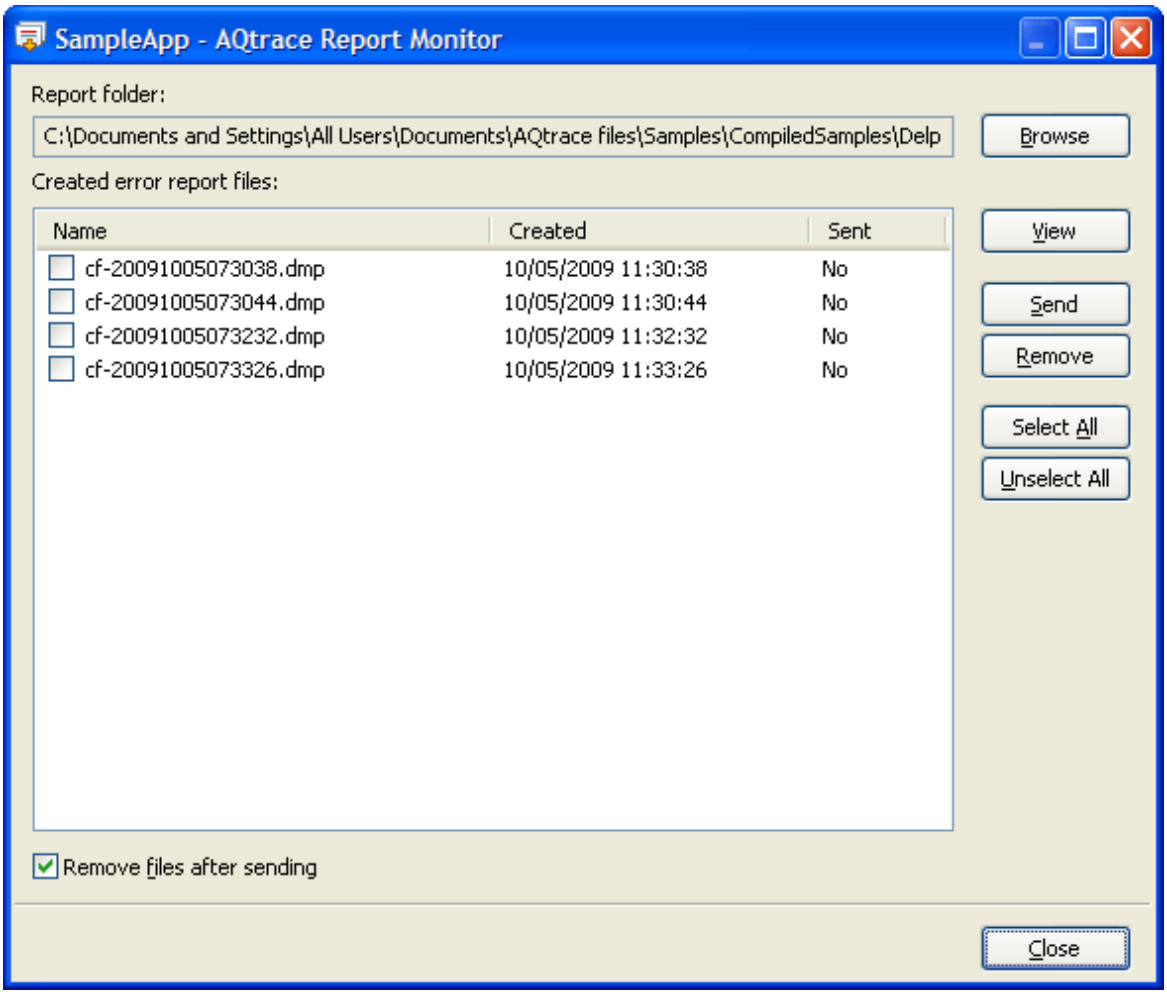
Once the Reporter is attached to a non-interactive process, it can react to exceptions, generate error reports and save them to disk. However, the Reporter neither displays the error notification window (since this implies a user response), nor sends a report to the developer (since sending a report requires the user's consent, which was not given).

Therefore, in order to obtain error reports from an end-user, you can do the following:

- Tell the user where error reports can be found, and ask him (her) to send them via e-mail.
- Provide the user with a redistributable helper tool named *AQtrace Report Monitor*. It works under a user account and can retrieve error reports and send them to you.

If you choose the second option, you can do this in the following way: You should ship Report Monitor's executable along with the *ReportMonitorSettings.xml* file (this file is part of *AQtrace SDK* and resides in the *<Users>\Public\Documents\AQtrace Files\SDK\Modules\Common* folder on Windows 7, Windows Vista and Windows Server 2008 and in the *<Documents and Settings>\All Users\Documents\AQtrace Files\SDK\Modules\Common* folder on other operating systems.) In the *ReportMonitorSettings.xml* file, you should specify the folder where error reports will be placed by AQtrace Reporter and a number of parameters that define how the reports will be sent to you. See *Configuring AQtrace Report Monitor*.

The end-user should start AQtrace Report Monitor manually. Upon starting, the utility will run in the background and monitor the contents of the folder that you specified in the *ReportMonitorSettings.xml* file. When an exception occurs in your application and AQtrace Reporter silently generates an error report, a new dump file will appear. This new file will be tracked by AQtrace Report Monitor. It will display a popup notification in the Windows system tray. By clicking on the Monitor's icon in the tray, the end-user will call the main window of AQtrace Report Monitor.



In this window, the user can select one of more error reports from the list and send them to you. At that,

the user will not be bothered by technical details of the sending procedure, as the Monitor will read this data from the *ReportMonitorSettings.xml* file you provided. After sending the report(s), the user may exit the Monitor or leave it running in the background.

Transferring Data

Transfer Protocols' Settings

AQtrace Reporter allows you to use several supported transfer protocols for sending error reports. To use each of these protocols, you should specify some special settings.

To receive the reports via different transfer protocols, the server computer should comply with the requirements listed in the *Transfer Protocols' Requirements* topic.

HTTPS Settings

AQtrace Reporter supports several transfer protocols that can be used for sending error reports. By default, *AQtrace Packager* offers the *HTTP* protocol (Hypertext Transfer Protocol) for transmitting error reports. And there is also another alternative for this default transfer protocol - HTTPS (Secure Hypertext Transfer Protocol). This is a combination of the HTTP protocol with an encrypted SSL (Secured Sockets Layer) or TLS (Transport Layer Security) connection.

When you choose the HTTPS protocol for transmitting error reports, your application on the end-user computer, similarly to the case of using the HTTP protocol, generates a report and sends it to the web server where this error report will be received and processed by the special .asp page. The settings needed for the use of the HTTPS protocol are very similar to the ones used for the HTTP protocol.

To make your application send error reports via the HTTPS protocol, make sure that the **HTTPS send mode** is selected in the appropriate drop-down list on the ***Sending*** page of AQtrace Packager. After selecting the HTTPS protocol for sending error reports you should specify the other necessary settings on the Sending page. The page contains the following edit boxes if you select the HTTPS protocol:

- **Server name or IP address** - Specifies the domain name or IP address of the web server, on which the *Report Collector* is running and to which error reports will be sent.

  Do not specify the protocol part of the server's URL, that is, **do not enter the *https://* prefix**:

  ```
  www.mycompany.com         <-- Correct
  https://www.mycompany.com  <-- Incorrect
  ```

  By default, the AQtrace installation program runs the Report Collector on the local IIS server and specifies the `localhost` value for the *Server name or IP address* setting.

- **Report collector (.asp page)** - Specifies the name and path of the .asp page that will receive error reports. The page's path includes the virtual directory (or directories) that contains the page and should be relative to the server's root directory.

By default, the AQtrace installation program creates virtual directory with the .asp page on the local IIS server and specifies the following location for the *Report Collector (.asp page)* setting:

```
/AQtrace/bugreport.asp
```

AQtrace is the virtual folder that is used by default, and *bugreport.asp* is the page's default name.

- **Port Number** - Specifies the TCP port that will be used for transmitting. Default value is 443. The end-user computer must allow your application to send data via the HTTPS protocol and the specified port.
- **User** - Specifies the user account that is used to access the Report Collector's server and virtual directory. This parameter is not required and it can be omitted if the specified virtual directory on the server allows anonymous access.
- **Password** - Specifies the password for the user account that is used to access the Report Collector's server and virtual directory. This parameter is not required and it can be omitted if the specified virtual directory on the server allows anonymous access.

If you specify the settings described above and apply them to your application by using AQtrace Packager, the application will automatically send generated error reports to the specified web server.

HTTP Settings

AQtrace Reporter supports several transfer protocols that can be used for sending error reports. You should select the protocol that will be used by your application for sending reports on the ***Sending*** page of *AQtrace Packager*. By default, the Packager offers the HTTP protocol (Hypertext Transfer Protocol).

If you choose the HTTP protocol for transmitting error reports, your application on the end-user computer generates a report and sends it via the HTTP protocol to the web server where this error report will be received and processed by the special .asp page.

To make your application send error reports via the HTTP protocol, make sure that the **HTTP send mode** is selected in the appropriate drop-down list on the ***Sending*** page of AQtrace Packager. After selecting the HTTP protocol for sending error reports you should specify the other necessary settings on the Sending page. The page contains the following edit boxes if you select the HTTP protocol:

- **Server name or IP address** - Specifies the domain name or IP address of the web server, on which the *Report Collector* is running and to which error reports will be sent.

  Do not specify the protocol part of the server's URL, that is, **do not enter the *http://* prefix**:

  ```
  www.mycompany.com          <-- Correct
  http://www.mycompany.com   <-- Incorrect
  ```

  By default, the AQtrace installation program runs the Report Collector on the local IIS server and specifies the `localhost` value for the *Server name or IP address* setting.

- **Report collector (.asp page)** - Specifies the name and path of the .asp page that will receive error reports. The page's path includes the virtual directory (or directories) that contains the page and should be relative to the server's root directory.

  By default, the AQtrace installation program creates virtual directory with the .asp page on the local IIS server and specifies the following location for the *Report Collector (.asp page)* setting:

```
/AQtrace/bugreport.asp
```

AQtrace is the virtual folder that is used by default, and *bugreport.asp* is the page's default name.

- **Port Number** - Specifies the TCP port that will be used for transmitting. Default value is 80. The end-user computer must allow your application to send data via the HTTP protocol and the specified port.
- **User** - Specifies the user account that is used to access the Report Collector's server and virtual directory. This parameter is not required and it can be omitted if the specified virtual directory on the server allows anonymous access.
- **Password** - Specifies the password for the user account that is used to access the Report Collector's server and virtual directory. This parameter is not required and it can be omitted if the specified virtual directory on the server allows anonymous access.

If you specify the settings described above and apply them to your application by using AQtrace Packager, the application will automatically send generated error reports to the specified web server.

E-mail Settings

AQtrace Reporter can send error reports via an e-mail client that is used as the default client in the system. This is not a specific transfer protocol like others provided by AQtrace. It is just a way to send error reports that uses the default e-mail client. In this case, the application generates an error report and launches the default e-mail client (for instance, Outlook Express) that will send an e-mail message with the attached error report. Using this method users send error reports manually and can control the sending process: they can change some parameters of the e-mail message and e-mail client settings before the error report will be sent or they can cancel sending process at all.

To make your application be capable of sending error reports via the default e-mail client, you should specify the **EMail send mode** on the ***Sending*** page of *AQtrace Packager*. After selecting the Email send mode you should specify some additional settings on this page of AQtrace Packager. When you select **EMail** from the **Send mode** drop-down list, the following edit boxes appear on the Sending page:

- **Address** - Specifies the destination e-mail address to which the message with the attached error report will be sent.
- **Subject** - Specifies the Subject field of the e-mail message that will be sent. It can be an arbitrary string, but it should be informative (for instance, "The MyAplication's error report").
- **Message** - Specifies the body of the e-mail message. This is the main text of the message. You can type an arbitrary text for this parameter that could be informative and useful for the further error report analysis or you can leave this field empty.

If you specify these and the other necessary settings in AQtrace Packager and apply them to your application, it runs the default e-mail client on the end-user computer when a traced exception occurs during the application's execution. The Address, Subject and Message fields of a new e-mail message generated by AQtrace Reporter are already filled with the appropriate values that have been specified on the Sending page of AQtrace Reporter.

TFTP Settings

AQtrace Reporter can send error reports via several transfer protocols. One of them is TFTP (Trivial File Transfer Protocol). Using this protocol, the Reporter can send generated error reports to a remote directory on a TFTP server.

To make your application be capable of sending error reports via the TFTP protocol, you should specify the **TFTP send mode** on the ***Sending*** page of *AQtrace Packager*. After selecting the TFTP protocol as the send mode you should specify the other necessary parameters on the Sending page of AQtrace Packager. This protocol is a very basic form of the FTP protocol. So, the settings needed for the use of TFTP are similar to the *ones used for the FTP protocol*. The Sending page contains the following settings for the TFTP send mode:

- **Server name or IP address** - Specifies the domain name or IP address of the server, to which error reports will be sent.

  Do not specify the protocol part of the server's URL, that is, **do not enter the *tftp://* prefix**:

  ```
  www.mycompany.com          <-- Correct
  tftp://www.mycompany.com   <-- Incorrect
  ```

  By default, the `localhost` value is specified for the *Server name or IP address* setting.
- **Port Number** - Specifies the port that will be used for transmitting error reports to the TFTP server. By default, it is UDP port number 69. The end-user computer must allow your application to send data via the TFTP protocol and the specified port. Note that the TFTP protocol uses UDP unlike the FTP protocol that utilizes TCP.
- **Remote Directory** - Specifies the directory on the TFTP server, to which error reports will be placed. The path to this remote directory should be relative to the server's root directory.

When you specify the settings described above and apply them to your application by using AQtrace Packager, the application will send generated error reports to the specified directory on the TFTP server.

The reports received via TFTP cannot be automatically processed by AQtrace Service. Read *Using Multiple Protocols* for details.

SMTP Settings

AQtrace Reporter can send error reports via several transfer protocols. One of them is SMTP (Simple Mail Transfer Protocol). Using this protocol, the Reporter can send generated error reports with e-mail messages. In contrast to *EMail* send mode, usage of the SMTP protocol allows your application to send message directly to mail server without use of a mail client.

To make your application be capable of sending error reports via the SMTP protocol, you should specify the **SMTP send mode** on the ***Sending*** page of *AQtrace Packager*. After selecting the SMTP protocol as the send mode you should specify the necessary settings on the Sending page of AQtrace Packager:

- **Address** - Specifies the destination e-mail address to which the message with the attached error report will be sent.
- **Subject** - Specifies the Subject field of the e-mail message that will be sent. It can be an arbitrary string, but it should be informative.
- **Message** - Specifies the body of the e-mail message. This is the main text of the message. You can type an arbitrary text for this parameter that could be informative and useful for the further error report analysis or you can leave this field empty.

- **From** - Specifies the From field of the e-mail message. This setting is used to identify the sender of the message.
- **Host** - Specifies the domain name or IP address of the outgoing SMTP server from which the e-mail message should be sent. For example, it might look like this:

```
smtp.mycompany.com
```

- **Port Number** - Specifies the TCP port number that will be used for the SMTP protocol transmitting. By default, port number 25 is designated for SMTP and this value is specified in the Port Number box on the Sending page. The end-user computer must allow your application to send data via the SMTP protocol and the specified port.
- **User** - Specifies the name of the user registered on the specified SMTP server and from whose account (mail box) the Reporter will send messages with error reports. This name is the prefix of the e-mail address used for sending messages, it is the first part before @ symbol in the full e-mail address. For instance:

```
jsmith@mycompany.com  <-- e-mail address
jsmith                <-- user name
```

  Note that the *User* setting can be omitted if the specified SMTP server does not require authentication and you want to use anonymous access to the server.
- **Password** - Specifies the password of the e-mail account that was specified for the *User* setting. This setting can also be omitted if the server does not require authentication.

If you specify the described above settings on the Sending page of AQtrace Packager and apply them to your application, it will automatically send generated error reports to the specified e-mail address via the specified SMTP server's account without use of e-mail clients on the end-user computer.

FTP Settings

AQtrace Reporter can send error reports via several transfer protocols. One of them is FTP (File Transfer Protocol). Using this protocol, the Reporter can send generated error reports to a remote directory on some FTP server.

To make your application be capable of sending error reports via the FTP protocol, you should specify the **FTP send mode** on the ***Sending*** page of *AQtrace Packager*. After selecting the FTP protocol as the send mode you should specify the other necessary parameters on the Sending page of AQtrace Packager. This page contains the following settings for the FTP send mode:

- **Server name or IP address** - Specifies the domain name or IP address of the FTP server, to which error reports will be sent.

  Do not specify the protocol part of the server's URL, that is, **do not enter the *ftp://* prefix**:

```
www.mycompany.com        <-- Correct
ftp://www.mycompany.com  <-- Incorrect
```

  By default, the `localhost` value is specified for the *Server name or IP address* setting.
- **Port Number** - Specifies the port that will be used for transmitting error reports to the FTP server. By default, it is TCP port number 21. The end-user computer must allow your application to send

data via the FTP protocol and the specified port.

- **Remote Directory** - Specifies the directory on the FTP server, to which error reports will be placed. The path to this remote directory should be relative to the server's root directory. If no directory is specified, error reports are placed in the root directory of the FTP server.
- **User** - Specifies the user account that is used to access the server. This parameter is not required and it can be omitted if the server allows anonymous access.
- **Password** - Specifies the password for the user account that is used to access the server. This parameter is not required and it can be omitted if the server allows anonymous access.

If you specify the settings described above and apply them to your application by using AQtrace Packager, the application will send generated error reports to the specified directory on the FTP server.

Transferring Data - Basic Concepts

AQtrace Reporter generates error reports when any traced exception occurs and then sends them to the server where all the reports are collected. The Reporter supports several transfer protocols that can be used for sending reports to the server:

- HTTP
- HTTPS
- FTP
- TFTP
- SMTP

Different protocols use different kinds of servers for report collecting and provide different modes of report transmitting with various special features. Your application can send error reports within e-mail messages, via HTTP (HTTPS) to the web server on which the reports will be processed by the *Report Collector*, via FTP (TFTP) to the file server where all the reports will be collected. Moreover, AQtrace Reporter can try over several sending modes in a turn. That is, if the Reporter fails to send the report using the first of the chosen sending modes, then it tries another sending mode and so forth.

AQtrace Reporter contains all the necessary functionality to send the generated reports to the server. There is no need to create any special code for this. All you have to do is to specify which of the sending modes to apply and the parameters for the selected modes. You do this on the *Sending* page of *AQtrace Packager*.

The most important transferring mode in AQtrace is the error reports sending via the HTTP/HTTPS protocols. This is a default send mode used by *AQtrace Packager*. In this case, the error reports sending, receiving and processing on the server side is fully-automated. The Reporter generates error reports and sends them to the server. On the server side, the reports are received by the *Report Collector*. The Report Collector is a simple application made of an .asp page that saves the reports to the *initial storage folder* or *relays them to another server* (see the *Report Collector* description).

By default, the port number used for the HTTP protocol is 80. The .asp page (Report Collector) is specified by its virtual folder and the name. By default, the page's name is */AQtrace/bugreport.asp*. You can change it as your needs dictate (see *HTTP Settings*).

In order for the reports to be reported successfully via HTTP/HTTPS, the following two conditions should met:

- The end-user computer must allow your application to send data via this protocol and port specified on the Sending page of AQtrace Packager. This condition is also relevant

to other transfer protocols.

- As AQtrace Reporter sends data directly to the web server via HTTP/HTTPS, the server computer must be on and the Internet Information Services (IIS) must be running on it at the moment of the sending (in order for the .asp page can receive the report).

Note that the .asp page (Report Collector) can either save the reports to the storage on the server or relay them to another server. For more information on this, see *Report Relaying*.

There is a known problem of sending reports via HTTP: the reports cannot be sent to the *http://localhost/AQtrace/bugreport.asp* page if VMWare is installed on your computer. In other words, they cannot be sent to the page that resides on the computer that has VMWare installed.

If you want to use another transfer mode instead of the default HTTP protocol, the *Selecting Transfer Protocol* topic will help you to choose the appropriate protocol.

Transfer Protocols' Requirements

AQtrace can use several transfer protocols to deliver an error report from the end-user to the developer. This topic lists the requirements of each transfer protocol and describes how to configure the error reports' server in order to receive the reports via different transfer protocols.

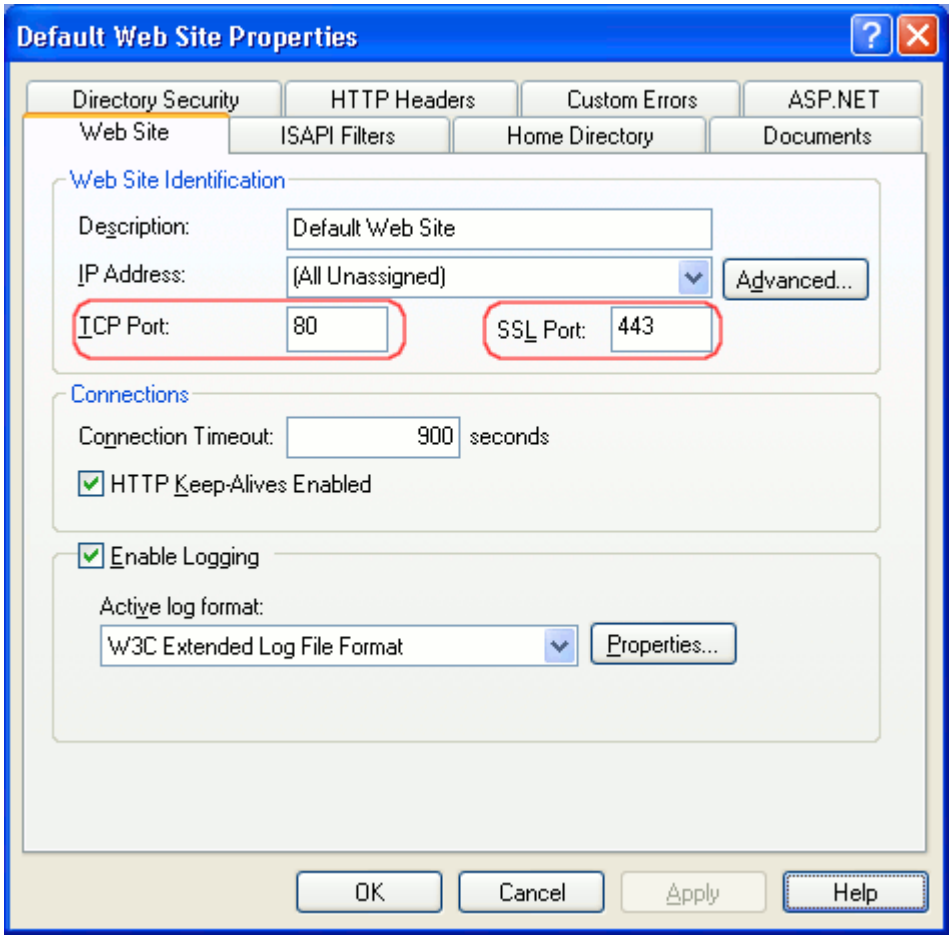
HTTP Protocol

The Hypertext Transfer Protocol is a primary mean of sending and receiving reports. It provides a full automation (such as report relaying, or searching for duplicated reports) of the sending and receiving processes. To receive the reports via HTTP the following conditions should comply:

- The server must be connected to Internet: either directly or via gateway computer if DMZ[1] security zones are applied.
- The Internet Information Services ver. 5.0 - 7.5 must be installed. The HTTP protocol requires the World Wide Web Service component to be installed and be running.
- The protocol communication port should be opened. By default, the HTTP transfer protocol uses the TCP port number 80 and HTTPS transfer protocol uses SSL port number 443.

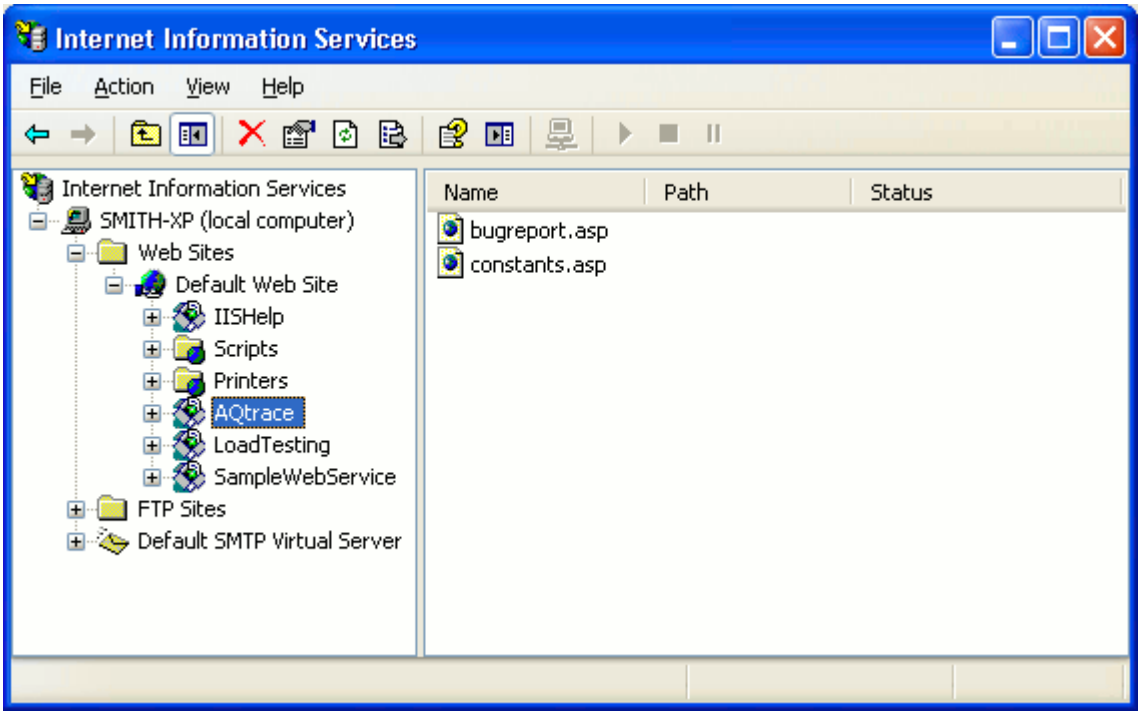
  The communication port numbers are set or changed via Internet Information Services Manager. To invoke it open the Control Panel, choose **Administrative Tools** and then **Internet Information Services**. In the Manager right-click the desired web site and choose **Properties** from the context menu. In the ensuing Properties dialog, switch to the **Web Site** tabbed page:

[1]DMZ zone is a short name for **demilitarized zone** (also known as **demarcation zone** or **perimeter network**). To defend local networks from outside attacks, some organizations separate the servers that work with global networks from the local network. Employees do not connect to global servers directly from a local network. They do this through a special gateway. So, only the gateway computer can exchange data with an “external” server.



- The *Report Collector* should be available.

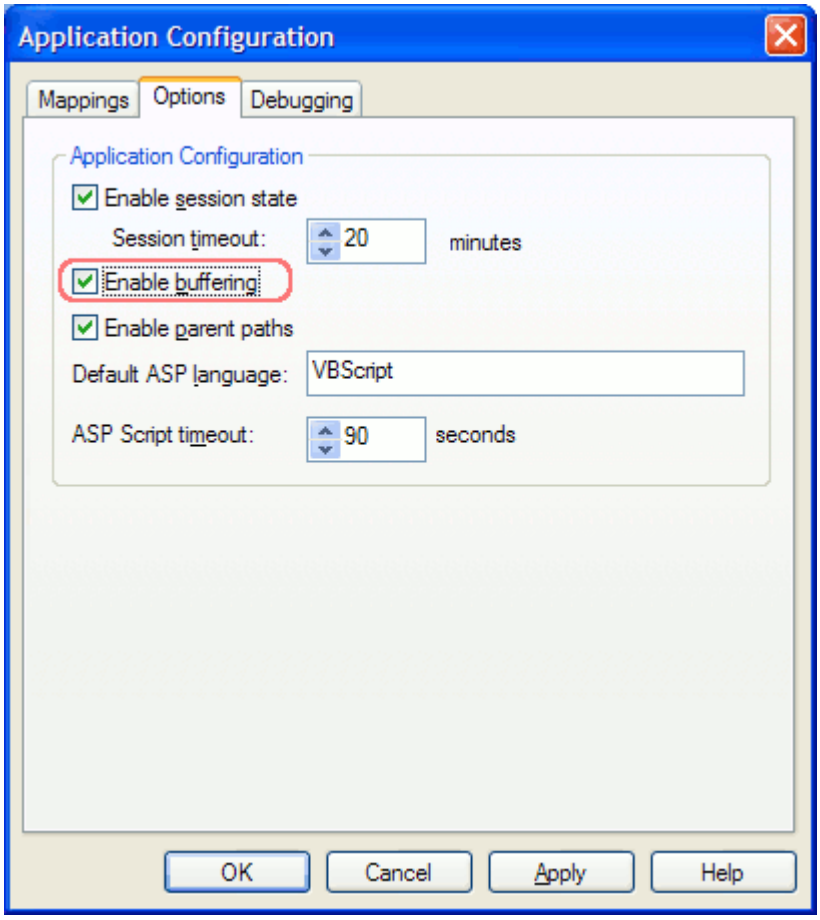
  The Report Collector is a set of Active Server Pages (ASP) that reside at predefined IIS virtual directory. During AQtrace installation, the wizard creates the *\AQtrace* virtual directory within the default web site and maps the physical *<AQtrace>\Bin\ASP* folder to it. (These associations can latter be changed from the Internet Information Services Manager.)



- Buffering must be enabled for the virtual directory, in which the Report Collector resides.

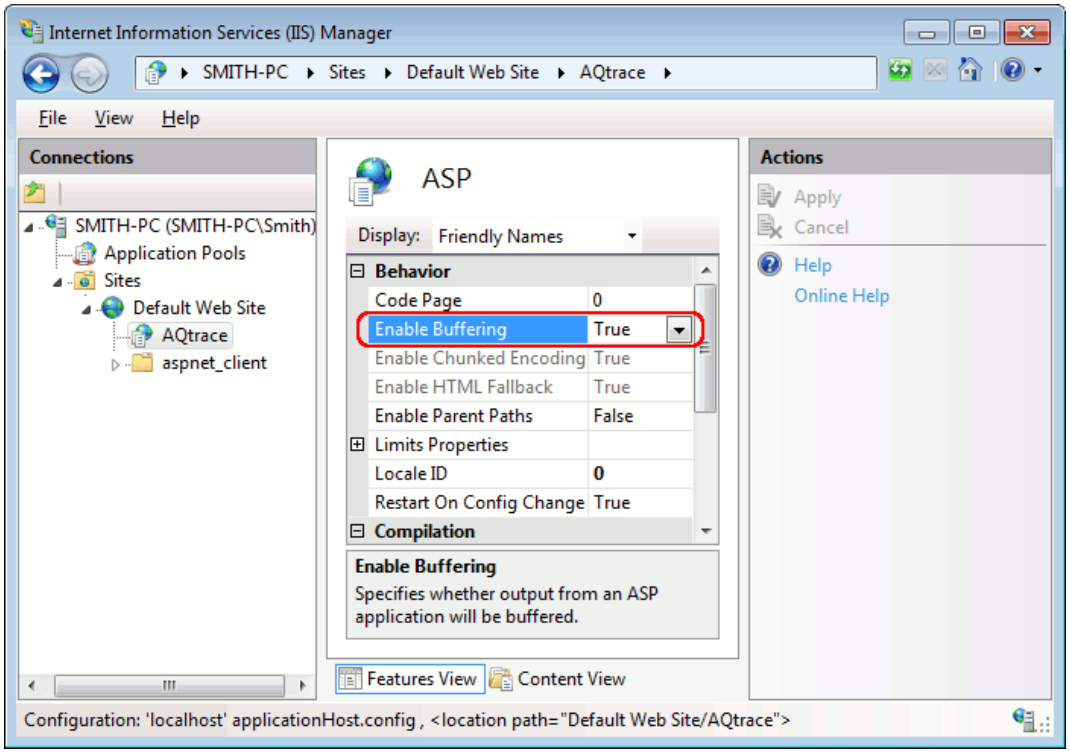
  To enable buffering in IIS 5.0 - 6.0:

  - Open Internet Information Services Manager.
  - Right-click the desired virtual directory (by default it is the *\AQtrace* virtual directory) and select **Properties** from the popup menu.
  - In the ensuing Properties dialog, switch to the **Virtual Directory** tabbed page and click **Configuration**.
  - In the ensuing dialog, switch to the **Options** tabbed page and select the **Enable buffering** check box, then click OK.



To enable buffering in IIS 7.0 - 7.5:

- Open Internet Information Services Manager.
- Select the desired virtual directory in the tree on the left of the Manager and then double-click the **ASP** feature in the right part of the Manager (you can find it in the **IIS** area if features are grouped).
- On the ensuing settings page, set the **Enable Buffering** option to True (you can find this option in the **Behavior** settings group).



- The *initial storage* and *persistent storage* folders should be specified. You can specify the folder paths either during installation or later using *AQtrace Server Config* utility.
- The Report Collector must have read and write permissions for the initial storage folder.
- The VMWare tool should **not** be installed on the server computer.
- The *AQtrace Service* should be running. The service does not start unless the initial and persistent and modules storage folders are specified. See *Configuring AQtrace Service* for detailed instructions. AQtrace Service is not required to receive reports, yet it performs the further processing of received reports.

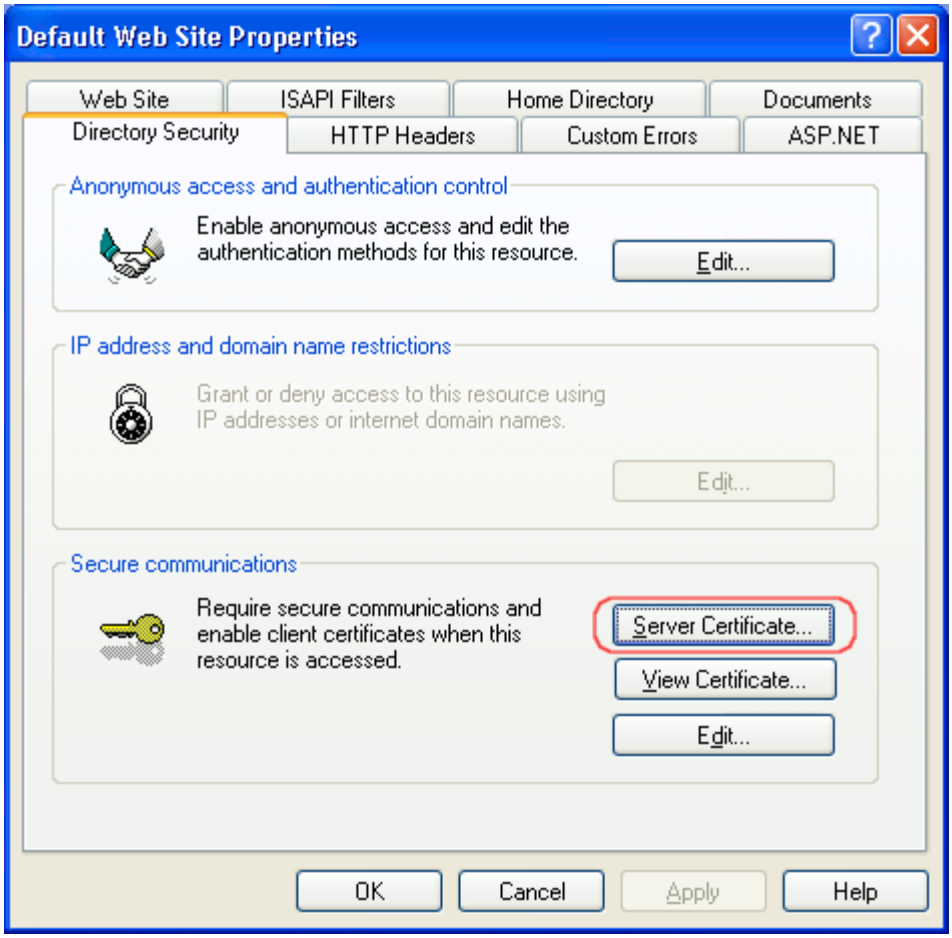
HTTPS Protocol

The Secure Hypertext Transfer Protocol is a combination of the Hypertext Transfer Protocol and a cryptographic protocol based on public key certificates. When an HTTPS transfer protocol is applied by AQtrace, the error reports are encrypted and transmitted over a secure channel. Since this protocol is based on HTTP, then the server should meet all the requirements of HTTP protocol. See a list of HTTP requirements *above*.

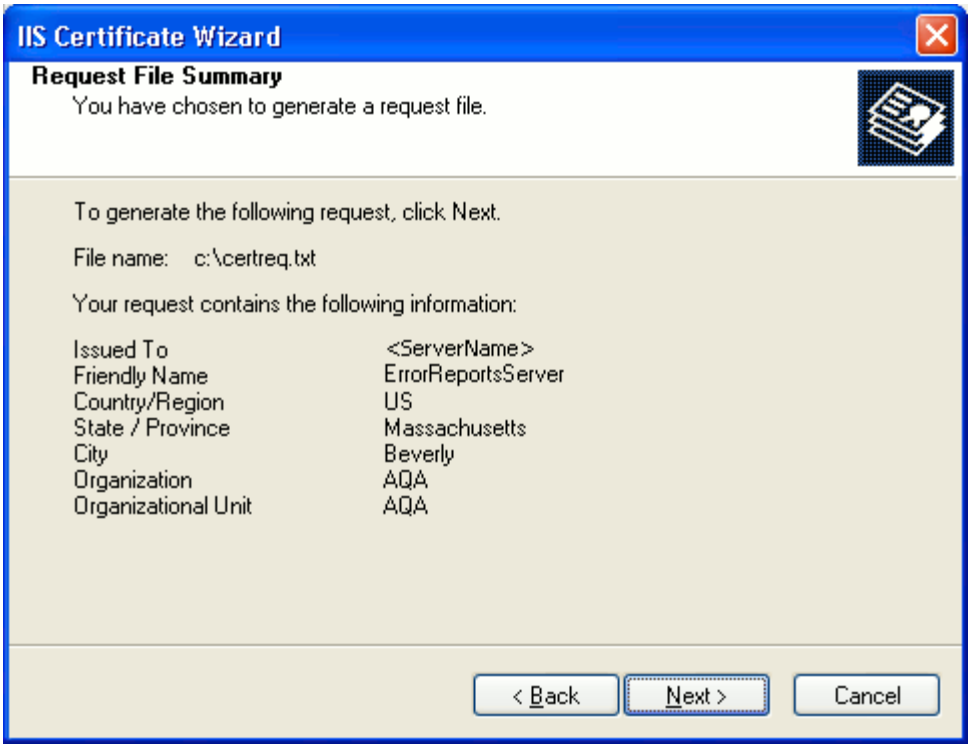
Additionally a public key certificate for HTTPS messaging must be issued to and be installed on a server.

To request a certificate from your Certificate Authority, perform the following steps:

- Open Internet Information Services Manager (**Control Panel | Administrative Tools | Internet Information Services**).
- Expand the *Web sites* node, right-click the Web site for which you want to request a certificate (the site containing the *\AQtrace* virtual directory), and click **Properties**.
- Click the **Directory Security** tab.
- In the *Secure communications* section, click **Server Certificate**.



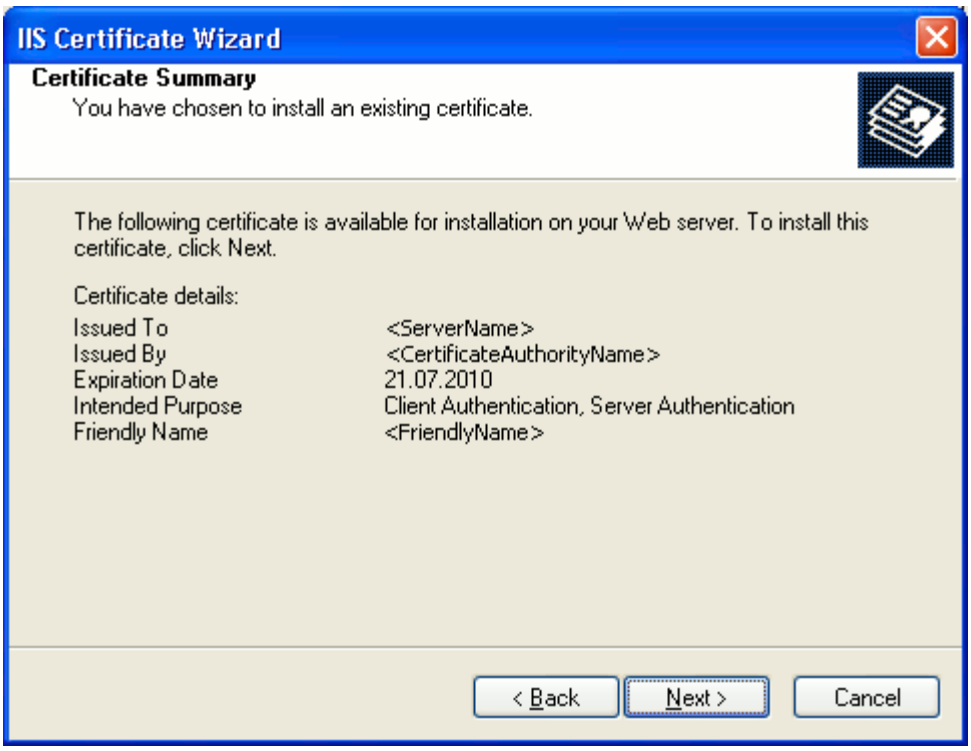
- In the Web Server Certificate Wizard, click **Next**.
- Select the **Create a new certificate** option and click **Next**.
- Fill in the necessary details to request a certificate.
- Read the summary screen to make sure that you have specified all the data, and then click **Next**.



- Click **Finish** to close the Wizard.

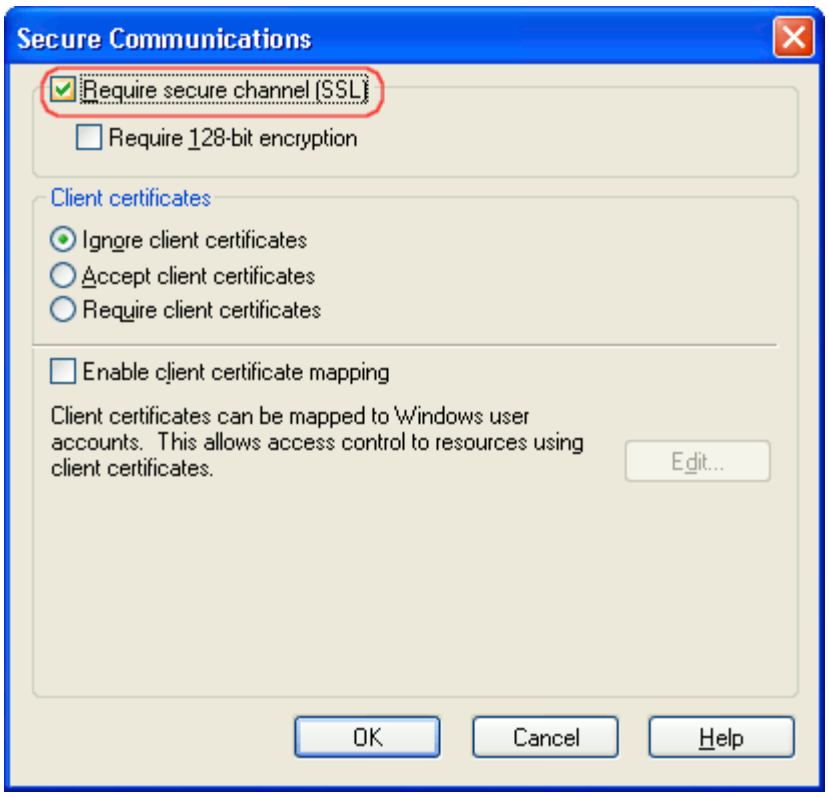
When you receive your response file from the Certificate Authority, you will need to install this on the Web server. To install a certificate, perform the following steps:

- Open Internet Information Services Manager (**Control Panel | Administrative Tools | Internet Information Services**).
- Expand Internet Information Services (if needed) and browse to the Web site you have requested a certificate for.
- Right-click on the site and then click **Properties**.
- Click the **Directory Security** tab.
- Under the *Secure communications* section, click **Server Certificate**.
- On the Web Site Certificate Wizard, click **Next**.
- Select the **Assign an existing certificate** option and click **Next**.
- Choose the appropriate certificate within a list, and then click **Next**.
- Read the summary screen to be sure that you are processing the correct certificate, and then click **Next**.



- You will see a confirmation screen. When you have read this information, click **Finish**

If you want to receive error reports only through HTTPS protocol, then enable the *Require secure channel (SSL)* property for the entire web site or for the *\AQtrace* virtual directory:

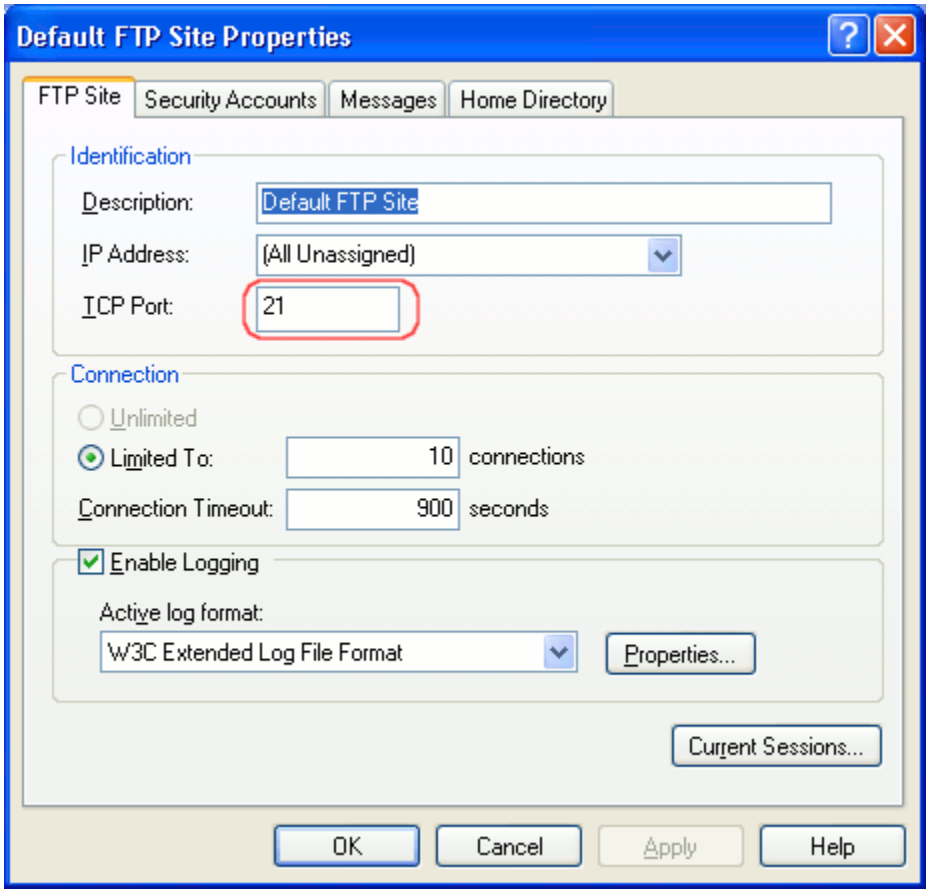


FTP Protocol

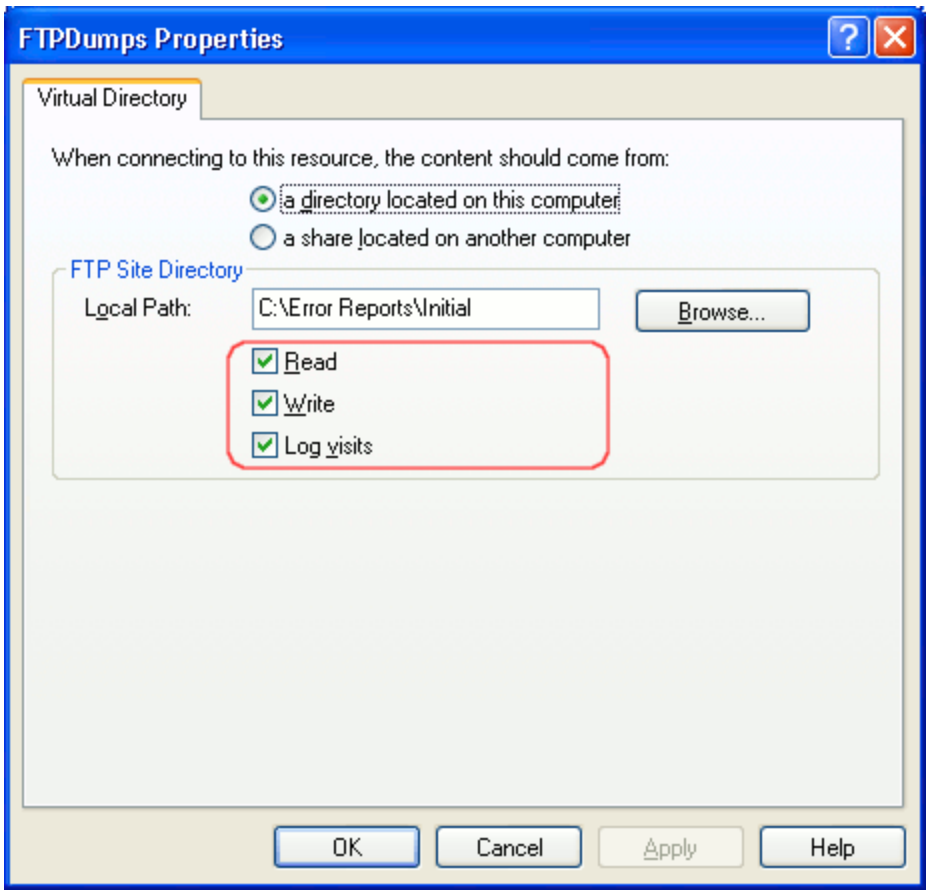
As the error reports are physically stored as one or more files, you can apply File Transfer Protocol to transmit them to a server. In order to receive the reports via FTP the following requirements should be fulfilled:

- The server must be connected to Internet.
- The Internet Information Services ver. 5.0 - 7.5 must be installed. The FTP protocol requires the File Transfer Protocol Service to be installed and be running.
- The protocol communication port should be opened. By default, the FTP transfer protocol uses the TCP port number 21.

  The communication port numbers are set on the *FTP Site* tabbed page of the FTP Site Properties dialog. To call the dialog right-click the desired FTP site in the Internet Information Services Manager and choose Properties from the context menu.



- The physical folder to which a virtual FTP directory is mapped should have read and write permissions. The access permissions are set via the Directory Properties dialog:



Tip: It is recommended to map a virtual FTP directory to the folder that is used as the *initial report storage* in the HTTP/HTTPS transfer protocol. Thus, the reports delivered via the FTP protocol will also be processed by *AQtrace Service*.

TFTP Protocol

The Trivial File Transfer Protocol (TFTP) is quite similar to File Transfer Protocol. The difference is that TFTP is maintained by third-party server software (not by Microsoft Internet Information Services), and that UDP ports are applied rather than TCP ports. Therefore the conditions required to get the reports via TFTP vary from those of FTP transfer protocol:

- The server must be connected to Internet.
- The TFTP Server software should be installed and running. There is a great number of tools (both commercial and free ones) that are used to organize a TFTP server: WinAgents TFTP Server, Innerdive TFTP Server, TFTPD32 and others.
- The communication port should be opened. By default, the TFTP transfer protocol uses the UDP port number 69.
- The physical folder to which a virtual TFTP directory is mapped should have read and write permissions.

SMTP Protocol and E-Mail Send Mode

When a Simple Mail Transfer Protocol (SMTP) is used AQtrace Reporter creates an e-mail, attaches the report files to it and automatically sends it to the developers. When the E-Mail send mode is used, the Reporter also creates an e-mail and attaches report files to it, but does not send the e-mail - it suggests the end-user to send the e-mail manually. Thus to get the reports via those two modes, the following conditions should comply:

- The server must be connected to Internet.
- The SMTP Server software should be installed and running. There is a great number of tools (both commercial and free ones) that are used to organize an SMTP server: SMTP Service component of Internet Information Services, Sendmail, Postfix and others.
- The communication port should be opened. By default, the SMTP server uses the TCP port number 25.

Selecting Transfer Protocol

To transmit error reports generated by *AQtrace Reporter* to the error reports' server, your application can use one or more of the supported transfer protocols and send modes. See *Using Multiple Protocols* topic to learn how to combine several transfer protocols. Each of these protocols has its own specific features that could be useful in different situations. This topic provides a brief overview of the supported protocols.

The information provided below can be helpful for you to select the appropriate send modes for your application's error reports. To learn how to configure the server in order to receive the reports via the chosen protocol(s) see the *Transfer Protocols' Requirements* topic.

HTTP Protocol

The HTTP (Hypertext Transfer Protocol) protocol is used by *AQtrace Packager* by default. It is a principal send mode in AQtrace that provides a full automation of the sending and receiving processes. On the server side, the reports are received by the *Report Collector* and are automatically allocated in the *initial storage folder* or *relayed to another server*. The received and placed into the initial storage folder error reports are processed by the *AQtrace Service*.

The Report Collector is a simple application made of an .asp page that is deployed on the local IIS server during the installation of AQtrace. By default, the page's name is */AQtrace/bugreport.asp*.

To use the HTTP protocol as send mode for error reports, all you have to do is to specify the port to be used for HTTP and the Report Collector's server and .asp page. For information on how you can specify the HTTP protocol as the send mode for your application's error reports, see *HTTP Settings*.

Although the maximum automation of error reports' transmitting, the use of the HTTP protocol has one imperfection: in order for the .asp page can receive a report, the server computer must be on and IIS must be running on it at the moment of the sending. Also, error reports cannot be sent to the page that resides on the server that has the VMWare tool installed.

If you do not have a reliable web server or do not want for some other reasons to use the HTTP protocol, you can use one of other transfer protocols supported by the Reporter.

HTTPS Protocol

Using of the HTTPS (Secure Hypertext Transfer Protocol) protocol by the Reporter is very similar to the HTTP protocol. The only difference is that the HTTPS protocol is a secured version of the HTTP protocol. If you want to send encrypted error reports and enhance safety of data transfer, you can select the HTTPS protocol for error reports transferring.

The *HTTPS settings*, that you should specify on the *Sending* page of AQtrace Packager, are similar to

the settings needed for the use of the HTTP protocol.

E-mail Send Mode

It is not a transfer protocol like the others, it is just a way to send error reports that uses the default e-mail client installed on the end-user computer. When AQtrace Reporter generates an error report, it launches the default e-mail client (for instance, Microsoft Outlook Express) and creates an e-mail message with the attached error report. The required fields (like *Address*, *Subject*) of this message are filled by the Reporter with the values that have been specified in the *E-mail settings* on the *Sending* page of AQtrace Packager. All the user has to do is to send manually this message to the target mail box.

This send mode can be useful if you want to give the users of your application the capability of controlling the error report's sending. For instance, users can change some fields of the generated message like the *Address* field. The sending of the created message can also be cancelled at all by the user. So, this send mode provides more control of the sending of error reports. But at the same time, it is maximum manual process, because users have to send manually messages with error reports from the default e-mail client and the received messages have to be collected from the target mail box manually, too.

SMTP Protocol

Using of the SMTP (Simple Mail Transfer Protocol) protocol by the Reporter is similar to the E-mail send mode (see above). In this case, the Reporter also generates an e-mail message and sends it to the target mail box. But the message is sent automatically, directly via the specified SMTP server. For information on how you can specify the SMTP protocol as the send mode for your application's error reports, see *SMTP Settings*.

The main disadvantage of this send mode is the necessity of manual collecting of error reports from the mail box intended for error reports.

FTP Protocol

The FTP (File Transfer Protocol) protocol allows AQtrace Reporter to send error reports to a remote directory on the FTP server. This makes possible to collect all the error reports in one directory on the server. The transferring process is also automatic unlike the E-mail send mode (see above). If you do not have a reliable HTTP server or do not want to use any of the send modes described above for some reasons, you can use an FTP server for collecting of error reports and transfer them by using the FTP protocol.

To know how you can specify the FTP protocol as the send mode for your application's error reports and what settings you should specify, see *FTP Settings*.

TFTP Protocol

The TFTP (Trivial File Transfer Protocol) protocol is a very basic form of FTP. It has no authentication or encryption mechanisms unlike the FTP protocol, so, its security level is low. TFTP requires a very small amount of memory and is used to transfer small amounts of data. Unlike FTP, this protocol utilizes the UDP transport protocol.

The *TFTP settings* that you should specify to use this protocol for error reports' transferring are similar to the settings of the FTP protocol. The main difference is that you do not specify the user's name and password for the TFTP server.

The reports received via TFTP cannot be automatically processed by AQtrace Service. Read *Using Multiple Protocols* for details.

Using Multiple Protocols

This topic describes how to organize the processing of error reports received via different transmitting protocols. Different sending modes demand different conditions from a server - a number of communication ports to be opened; certain software components to be installed and be running, and so forth. Yet it is quite possible to configure the server so that it will receive the reports from every of the available sending modes. Read the *Transfer Protocols' Requirements* to learn the detailed list of conditions for each of the protocols.

The full sequence of processing of error reports includes the following stages:

1. Receiving error reports.
2. Placing the reports to initial storage.
3. Searching for duplicated reports and marking them.
4. Moving the reports from initial to persistent folder.

Unfortunately, not all of available transmitting modes can perform all these steps automatically. The further sections describe the abilities of each of the available modes.

HTTP and HTTPS Sending Modes

These sending modes provide full automation of receiving and processing reports. The incoming reports are received by *Report Collector* which can either relay them to another server or transfer them to initial storage. While placing the reports to initial storage, the Collector creates a new folder (having the GUID-like name) and moves the report files to it. The folder creation event is a trigger for another AQtrace component - AQtrace Service. It scans the newly created folder for applicable files (those having the *.dmp and *.dmpx extensions). If such files do reside in the folder, then the Service examines whether the report describes a new error case or it duplicates some known error case. After that the Service moves the report to *persistent folder*.

As you can see, processing of reports received via HTTP and HTTPS does not require any human intervention. Therefore we recommend to use these two modes as principal ways of transmitting error reports, especially if you expect massive feedback from your application's end-users.

FTP Sending Mode

In this mode, reports are transferred like any other files and are stored to the **Root folder** or to its subfolder. Which folder should be treated as the **Root folder** is defined by the FTP server software. The exact location where reports will be stored is specified by the *Remote Directory* setting - if the setting is empty, then the reports are saved to the Root folder, otherwise, the reports are stored to a subfolder with the specified name.

To automate processing of reports received via this protocol, you should specify the path to the *initial storage folder* in the *Remote Directory* setting. In this case, for each report a separate folder will be created in the initial storage folder and thus the reports received through FTP will also be processed by AQtrace Service.

TFTP Sending Mode

This mode is much alike FTP mode, yet the processing of reports received via TFTP cannot be fully automated. This is because the TFTP servers are unable to create subfolders within their root folder and, consequently, AQtrace Service will not notice the reports received via TFTP (since it tracks folder changes but not file changes).

To impel AQtrace Service to process the reports received via TFTP you should perform the following

actions manually:

- Create an empty temporary folder at an arbitrary location
- Move reports to this folder
- Copy or move the folder to initial storage folder

SMTP and E-Mail Sending Modes

These modes provide the least degree of automation. We recommend to use these modes only if you expect a minimal amount of responses.

In these modes the error reports are received as e-mail file attachments. You can open the report file(s) directly from the e-mail client, or save the file(s) to an arbitrary external folder. Opening the files directly frees you from organizing initial and persistent storage folders at the expense of poor structure. When saving the report file(s) to a folder, you can specify the path to a subfolder within the initial storage folder and thus yield the further processing of the report by AQtrace Service.

Preparing Applications for AQtrace

Compiling Applications With Debug Information

Each error report contains information about the binary code that contains the exception. In order for *AQtrace Service* and *AQtrace Viewer* to be able to trace this code, the application must be compiled with debug information. The debug information tells the Service and Viewer where a function starts and ends in memory, how many bytes the function's code occupies, where each routine is located in the executable's memory and so on. Having the debug information, these utilities are able to determine the functions and source code lines, to which binary instructions belong, parse the call stacks and perform other analysis actions.

AQtrace supports the following formats of debug information:

- PDB - This format is used by Microsoft and some other compilers.
- TD32 - This format is used by Borland and CodeGear Delphi compilers.
- TDS - This format is used by Borland C++Builder compiler and by Borland and CodeGear Delphi compilers (with some preprocessing).
- SYM - This format is used by Borland and CodeGear Delphi compilers.

Debug information can be compiled into executable modules, or it can be generated as a separate file. AQtrace can work with both types of debug information. However, when you build release versions of your products, it is recommended to generate debug information in separate files to decrease the overall size of your binary modules.

There is no need to ship debug information files along with your application's modules. However, these files are needed for analysis of the received error reports, so they must reside in build storage and be accessible for AQtrace Service and AQtrace Viewer (see *Organizing Build Storage*).

To include debug information into your executable, you should specify certain compiler settings. Which settings to be changed depend on the compiler you use. For detailed information, please see documentation on your development tool. The following topics explain how to modify the settings for most popular compilers:

Native-code compilers:

- *Microsoft Visual C++ 2005, 2008 and 2010*
- *Microsoft Visual C++ 7.x*
- *Microsoft Visual C++ 6.0*
- *Microsoft Visual Basic 6.0*
- *Embarcadero Delphi XE*
- *Embarcadero Delphi 2010*
- *CodeGear Delphi 2009 for Win32*

- *CodeGear Delphi 2007 for Win32*
- *Borland Delphi 2005 and 2006 for Win32*
- *Borland Delphi 3 - 7*
- *Embarcadero C++Builder XE*
- *Embarcadero C++Builder 2010*
- *CodeGear C++Builder 2009*
- *CodeGear C++Builder 2007*
- *Borland C++Builder 2006*
- *Borland C++Builder 3 - 6*
- *Intel C++*

.NET compilers:

- *Microsoft Visual C# 2005, 2008 and 2010*
- *Microsoft Visual C# 7.x*
- *Microsoft Visual C++ 2005, 2008 and 2010*
- *Microsoft Visual C++ 7.x*
- *Microsoft Visual Basic 2005, 2008 and 2010*
- *Microsoft Visual Basic 7.x*
- *CodeGear Delphi 2009 for .NET*
- *CodeGear Delphi 2007 for .NET*
- *Borland Delphi 2005 and 2006 for .NET*

Native-Code Compilers

Compiling Microsoft Visual C++ 2005, 2008 and 2010 Applications With Debug Information

This topic explains how to compile Visual C++ 2005, 2008 and 2010 applications with debug information for AQtrace. To learn how to prepare applications created with Visual C++ 7.x, see *Compiling Microsoft Visual C++ 7.x Applications With Debug Information*. To learn how to prepare applications created with Visual C++ 6.0 or earlier, see *Compiling Microsoft Visual C++ 6.0 Applications With Debug Information*.

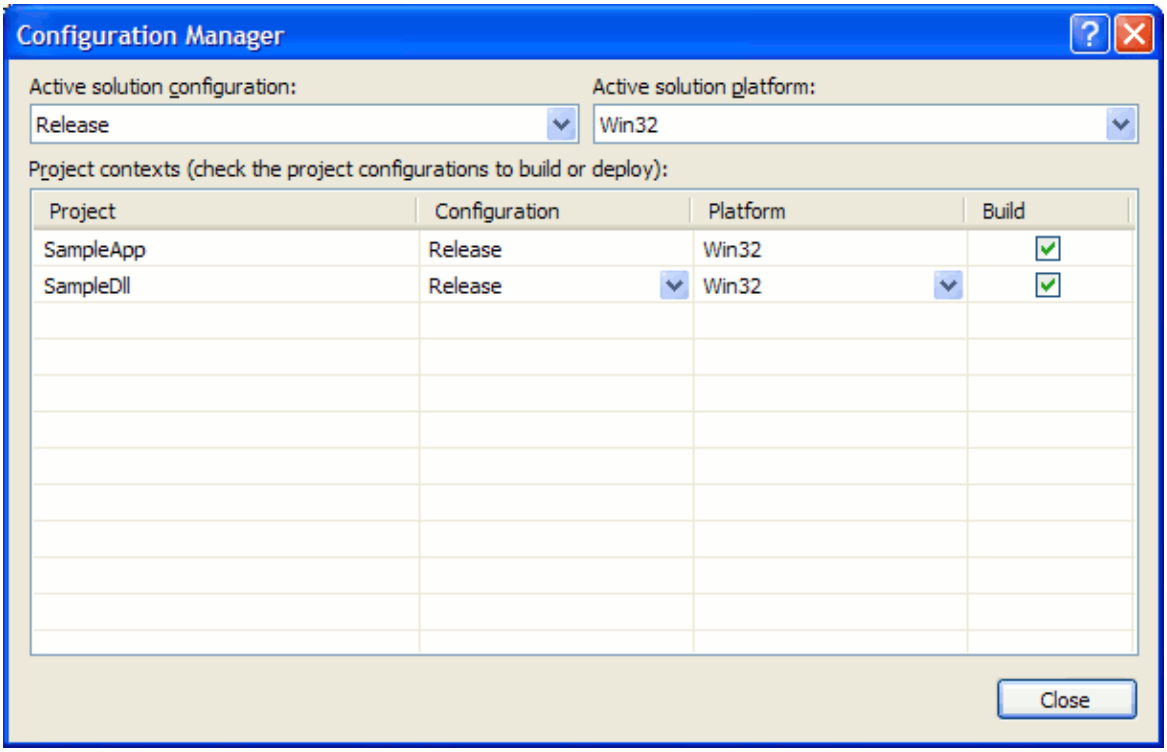
Default settings created by Microsoft Visual Studio 2005, Visual Studio 2008 or Visual Studio 2010 for a new Visual C++ 2005, 2008 or 2010 application already contain all necessary information for generating debug information. So, if you do not change the compiler settings, you can compile and profile your Visual C++ 2005, 2008 or 2010 application as is. However, we recommend that you change the active configuration to *Release* because this configuration is used to build the final version of an application.

If you are not sure whether your application's compiler settings were changed, you can follow these steps to make sure that your application is compiled with debug information:

1. Open your project in Visual Studio 2005, Visual Studio 2008 or Visual Studio 2010.

2. Select **Build | Configuration Manager** from the main menu. This will open the **Configuration Manager** dialog.

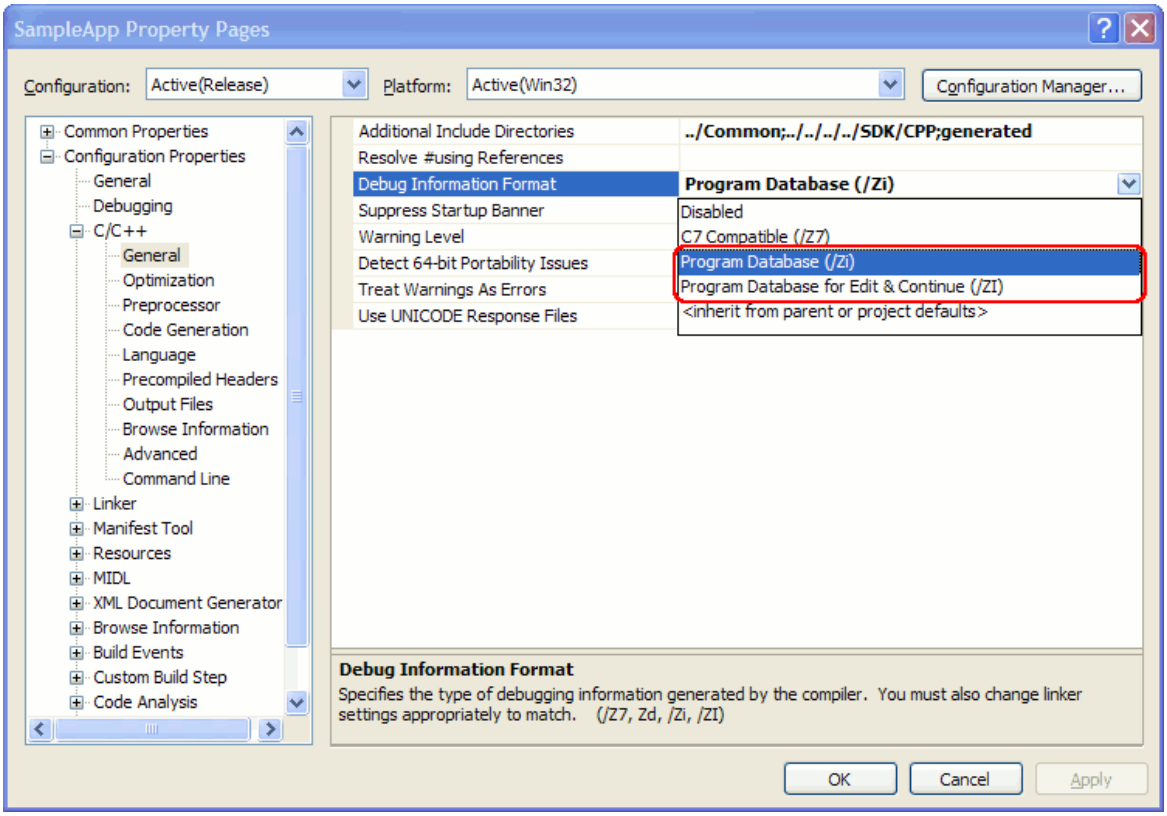
   In the dialog, select the *Release* configuration (that is, the configuration that is used to build the release version of your product):



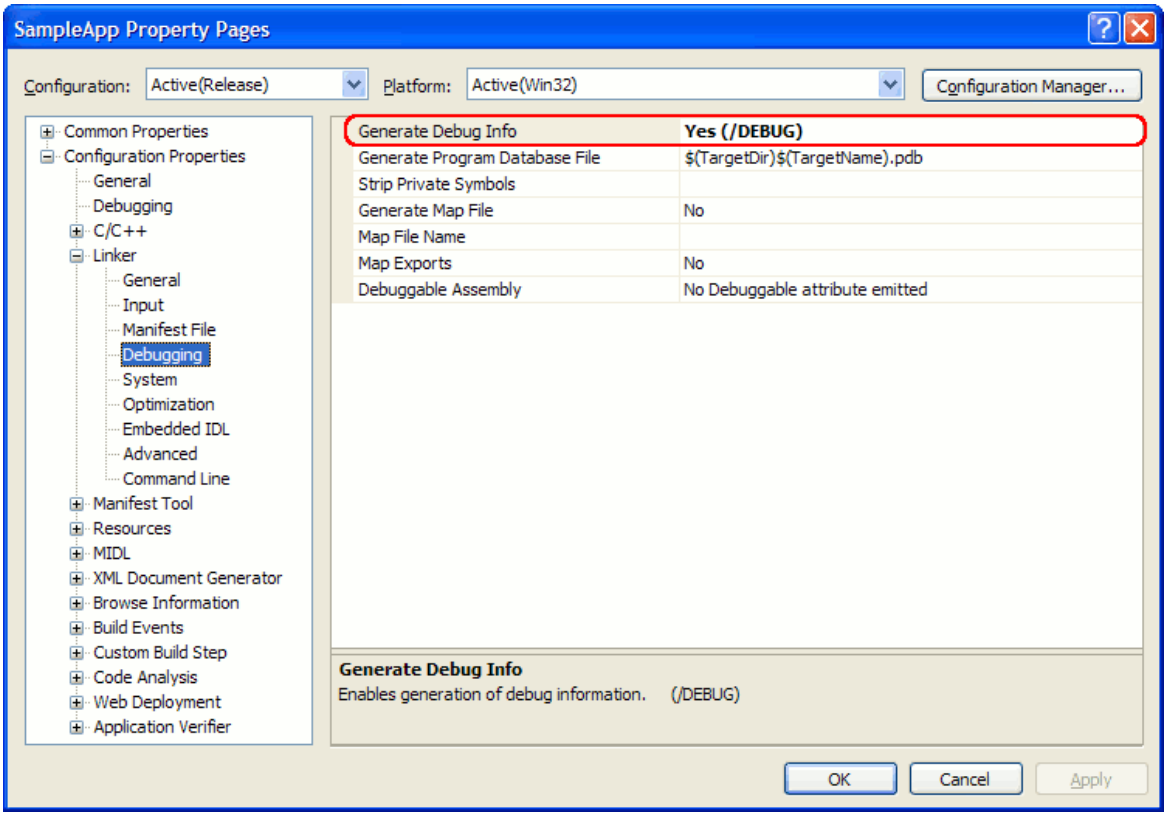
   Close the dialog.

   Note: The debug information will be generated as an external PDB file, so it will not increase the size of your executable module.

3. Right-click the project in the **Solution Explorer** and select **Properties** from the context menu. This will call the **Property Pages** dialog.
4. In the dialog:
   a. From the **Configuration** dropdown list, select the configuration that you will use to build the final version of your application (typically, this is the *Release* configuration).
   b. Switch to the **Configuration Properties | C/C++ | General** page and set **Debug Information Format** to *Program Database (/Zi)* or to *Program Database for Edit & Continue (/ZI)*. For more information on these options, review the Visual Studio documentation.



c. Open the **Configuration Properties | Linker | Debugging** property page and set the **Generate Debug Info** option to *Yes (/DEBUG)*.



5. Click **OK** to save the settings and to close the dialog.
6. Rebuild your application. The compiler will generate debug information as an external PDB file and save this file to the folder in which the compiled executable resides.

There is no need to distribute the generated PDB files with your application. However, you should place these files along with the compiled executable modules in the build storage. For more information on this, see *Organizing Build Storage*.

Compiling Microsoft Visual C++ 7.x Applications With Debug Information

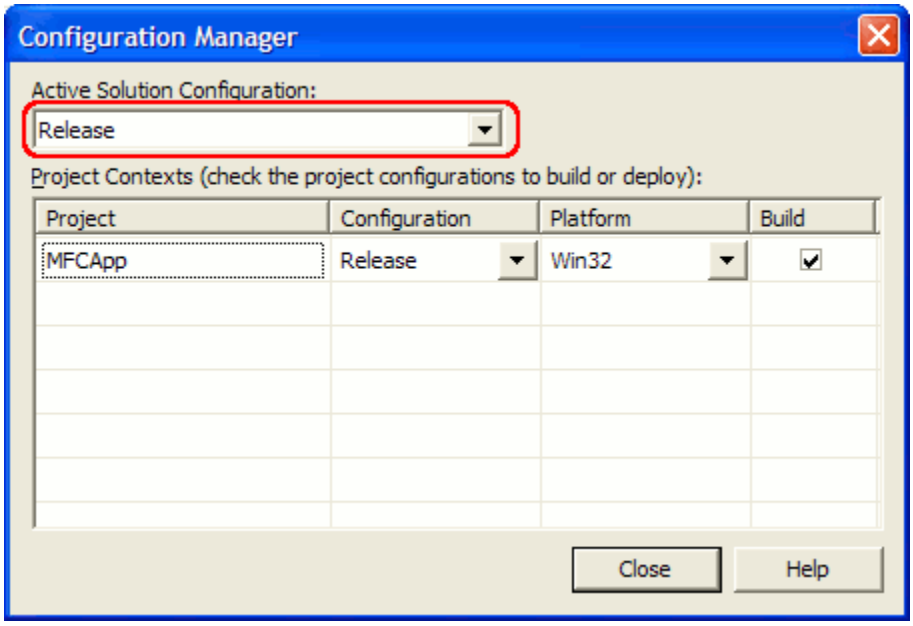
This topic explains how to compile Visual C++ 7.x applications with debug information for AQtrace. To learn how to prepare applications created with Visual C++ 2005 (8.0), 2008 (9.0) or 2010 (10.0), see *Compiling Microsoft Visual C++ 2005, 2008 and 2010 Applications With Debug Information*. To learn how to prepare applications created with Visual C++ 6.0 or earlier, see *Compiling Microsoft Visual C++ 6.0 Applications With Debug Information*.

Default settings created by Microsoft Visual Studio for a new Visual C++ .NET application already hold all necessary information for generating debug information. So, if you do not change the compiler settings, you can compile and profile your Visual C++ .NET application as is. The only thing we would recommend is to change the active configuration to *Release*, because the *Release* configuration is typically used to build the final version of the application.

If you are not sure whether your application's compiler settings were changed, you can follow the steps described in this topic to make certain that your application is compiled with debug information:

1. Open your project in Visual Studio .NET.
2. Select **Build | Configuration Manager** from the main menu. This will open the **Configuration**

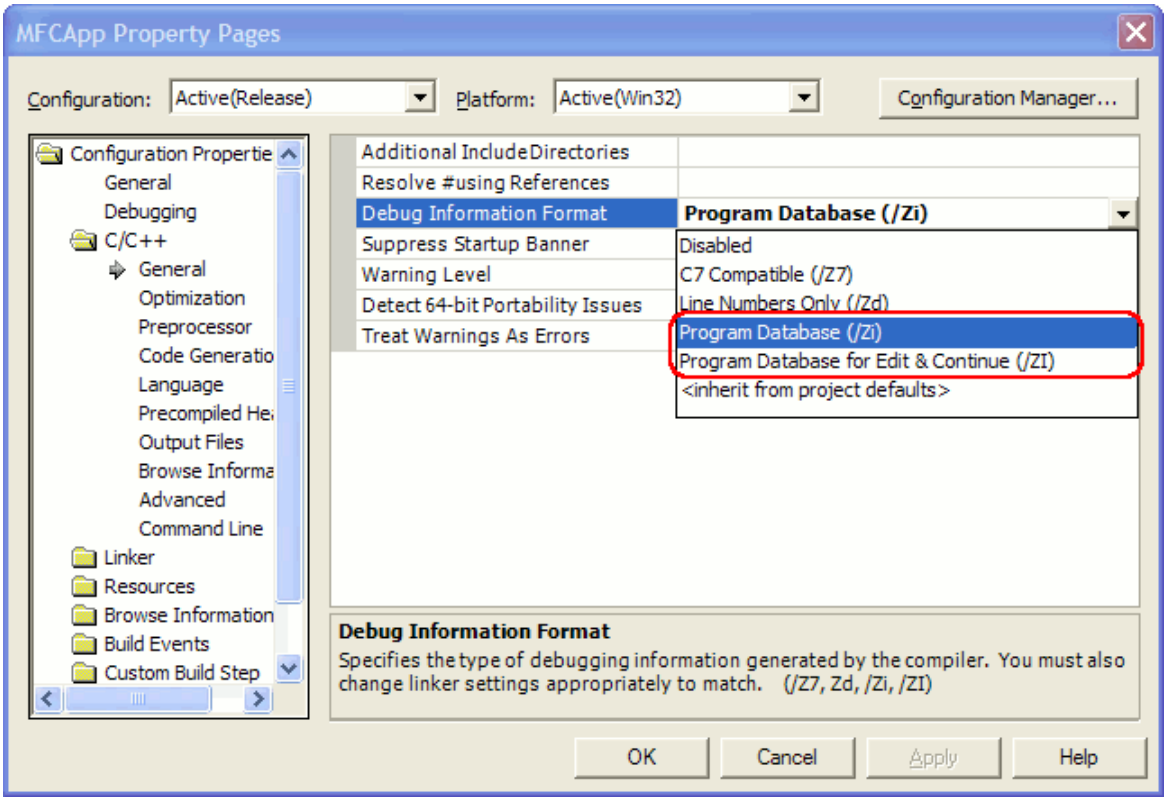
Manager dialog. Select the *Release* configuration for your project:



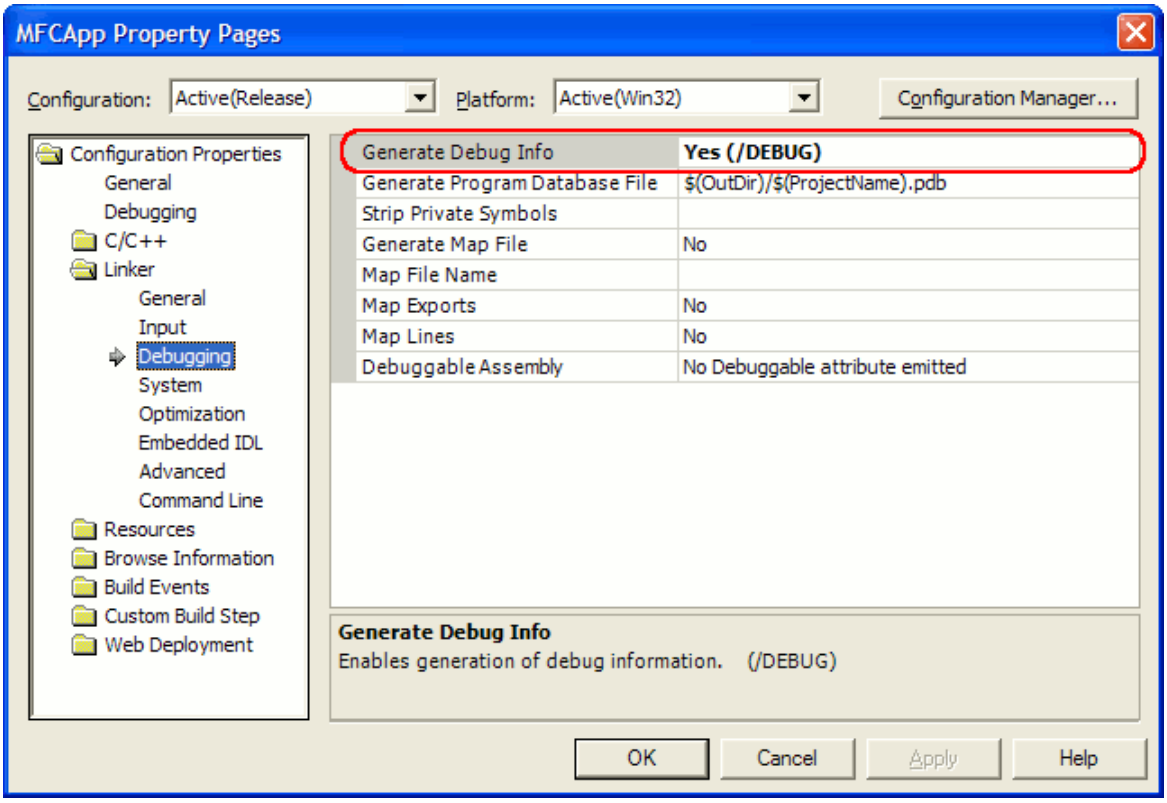
Close the dialog.

> **Note:** The debug information will be generated as an external PDB file, so it will not increase the size of your executable.

3. Right-click the project in the **Solution Explorer** and select **Properties** from the context menu. This will call the **Property Pages** dialog.
4. In the dialog,
   a. In the **Configuration** box, specify the configuration, which you will use to compile the release version of your application.
   b. Switch to the **Configuration Properties | C/C++ | General** page and set the **Debug Information Format** option either to **Program Database (/Zi)** or to **Program Database for Edit & Continue (/ZI)**. For more information on these options, see Visual Studio .NET documentation.



c. Open the **Configuration Properties | Linker | Debug** property page and set the **Generate Debug Info** option to *Yes (/DEBUG)*.



5. Click **OK** to save the settings and to close the dialog.
6. Recompile your application. The Visual C++ compiler will generate debug information as external PDB files and save them to the folder in which the compiled executable resides.

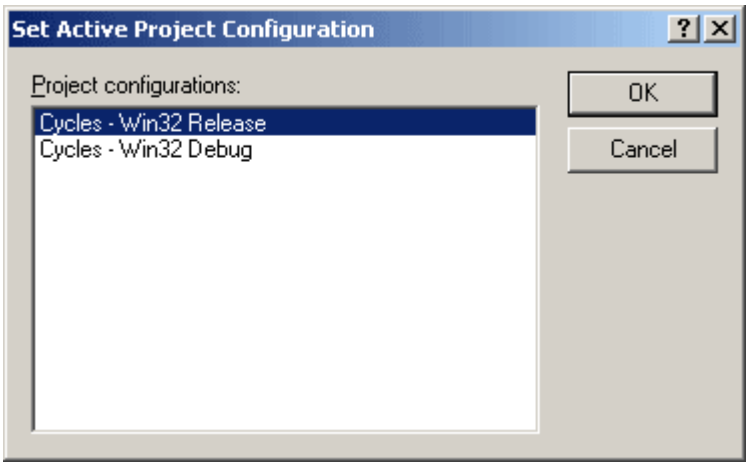
There is no need to ship the compiled PDB files with your application. However, you should add them along with the executable modules to your build storage. For more information on this, see *Organizing Build Storage*.

Compiling Microsoft Visual C++ 6.0 Applications With Debug Information

This topic explains how to compile Microsoft Visual C++ 6.0 applications with debug information for AQtrace. To learn how to compiler applications created with Visual C++ 7.x, see *Compiling Microsoft Visual C++ 7.x Applications With Debug Information*. To learn how to prepare applications created with Visual C++ 2005 (8.0), 2008 (9.0) or 2010 (10.0), see *Compiling Microsoft Visual C++ 2005, 2008 and 2010 Applications With Debug Information*.

The Visual C++ compiler generates debug information that has the PDB format and is stored as a separate file along with the compiled executable module. To compile your Visual C++ application with PDB debug info, you should set specific compiler options:

1. Open your project in Visual Studio.
2. Select the configuration that you will use to build the release version of your application. To specify the configuration, select **Build | Set Active Configuration** from Visual C++'s menu and then choose the desired configuration in the ensuing dialog:

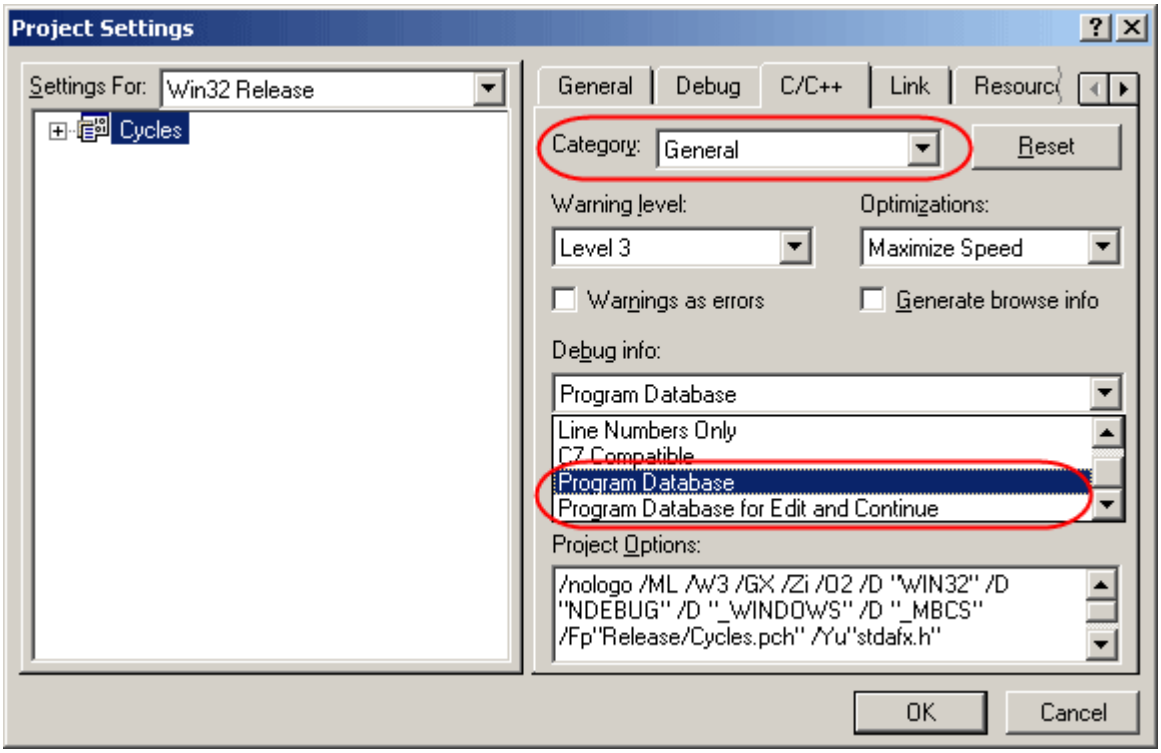


Note: The release version should be compiled with debug information in order for AQtrace Viewer to be able to process the generated error report.

The debug information will be compiled into separate files, so it will not increase the overall size of your executable modules. There is no need to ship the debug information files with your application. However, you should save them to the build storage (see *Organizing Build Storage*).

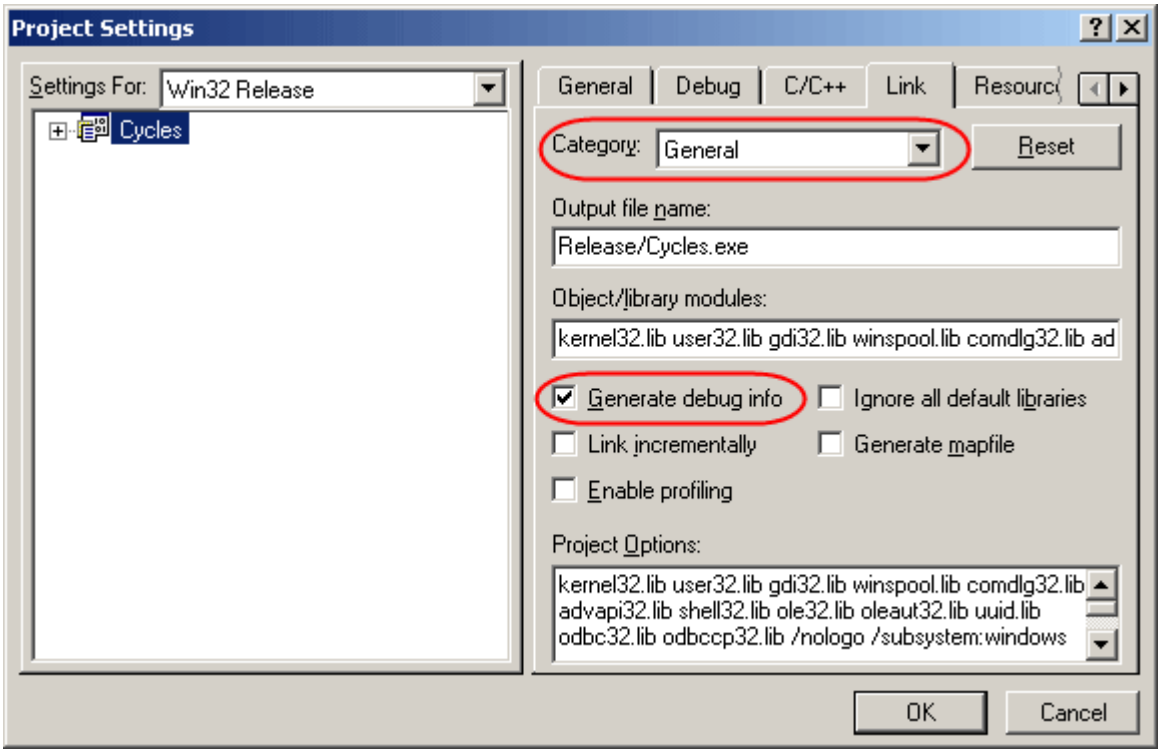
3. Select **Project | Settings** from Visual Studio's main menu to open the **Project Settings** dialog.
4. In the dialog, open the **C/C++** page and make sure that **Debug Info** is set either to *Program*

Database or to *Program Database for Edit and Continue*:



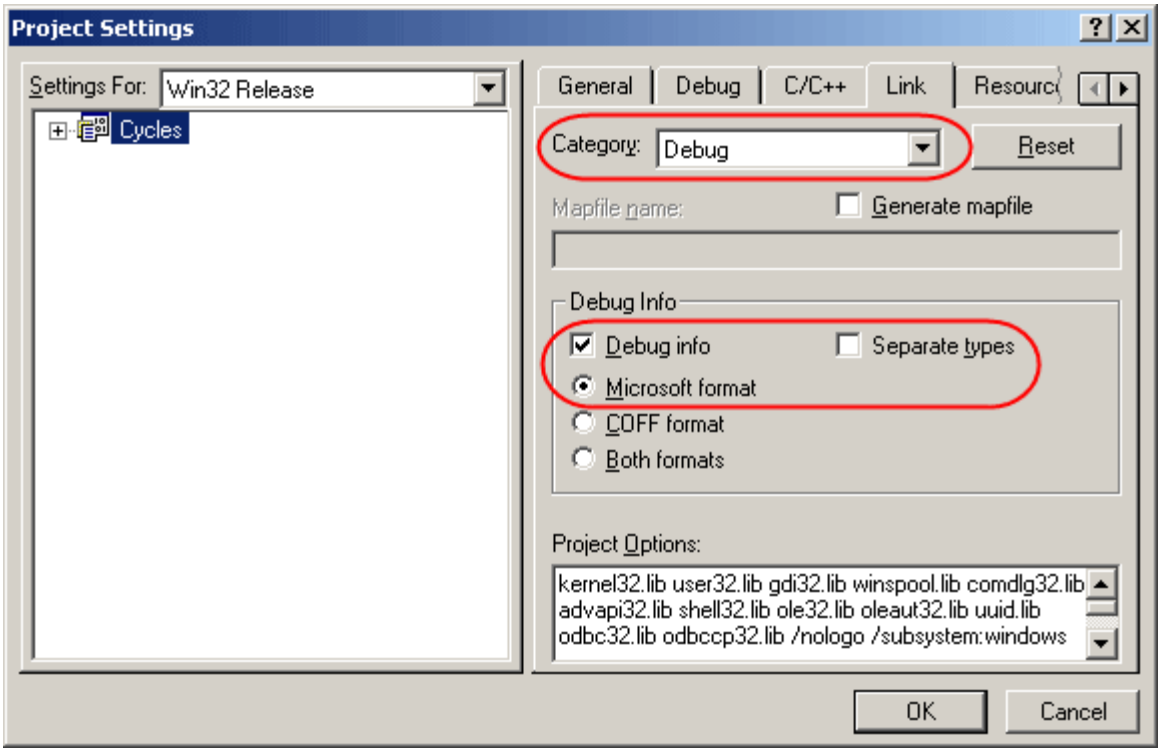
For more information on these options, review Microsoft Visual C++ Help.

5. You have set your project to generate debug information when compiling. Now, you must ensure that the linker saves it. From Project | Settings select the **Link** page. On this page, first set the **Category** to *General*, then check **Generate debug info**:

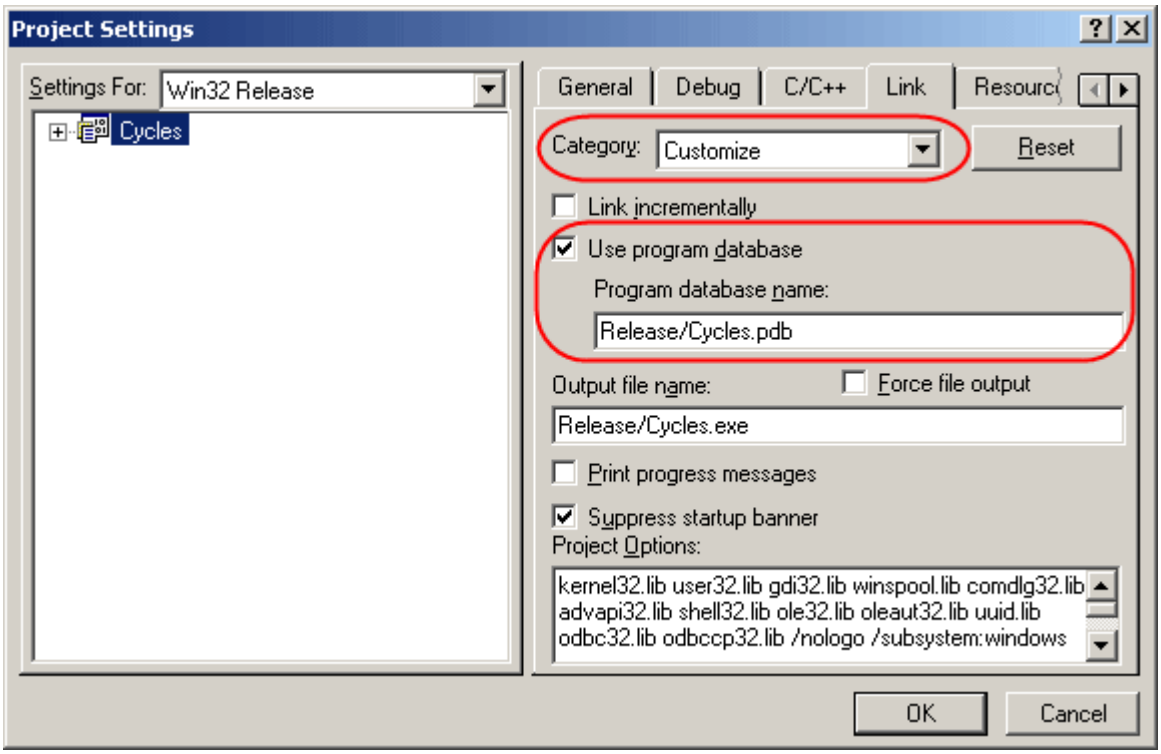


On the **Link** page, select *Debug* in the **Category** box and then do the following:

- Select the **Debug info** check box.
- Clear the **Separate type** check box.
- Select the **Microsoft format** option button.



6. The last step is to set how the linker will save the debug information. The debug information should be saved as an external PDB file (the PDB format). To set linker options:
   - Switch to the **Link** page of the Project Settings dialog:
   - Set the **Category** to *Customize*.
   - Check **Use program database**.
   - Enter the PDB file name you want in the **Program database name** edit field.



7. Rebuild your application. The compiler will generate debug information as an external PDB file and save this file to the folder, in which the compiled executable resides.

There is no need to ship the generated PDB files along with your application. However, you should place the debug information files along with executable modules in the build storage. For more information on this, see *Organizing Build Storage*.

Compiling Microsoft Visual Basic 6.0 Applications With Debug Information

This topic explains how to compile Microsoft Visual Basic 6.0 applications with debug information for AQtrace. To learn how to prepare applications created with Visual Basic .NET, see *Compiling Microsoft Visual Basic 7.x Applications With Debug Information* and *Compiling Microsoft Visual Basic 2005 and 2008 Applications With Debug Information*.

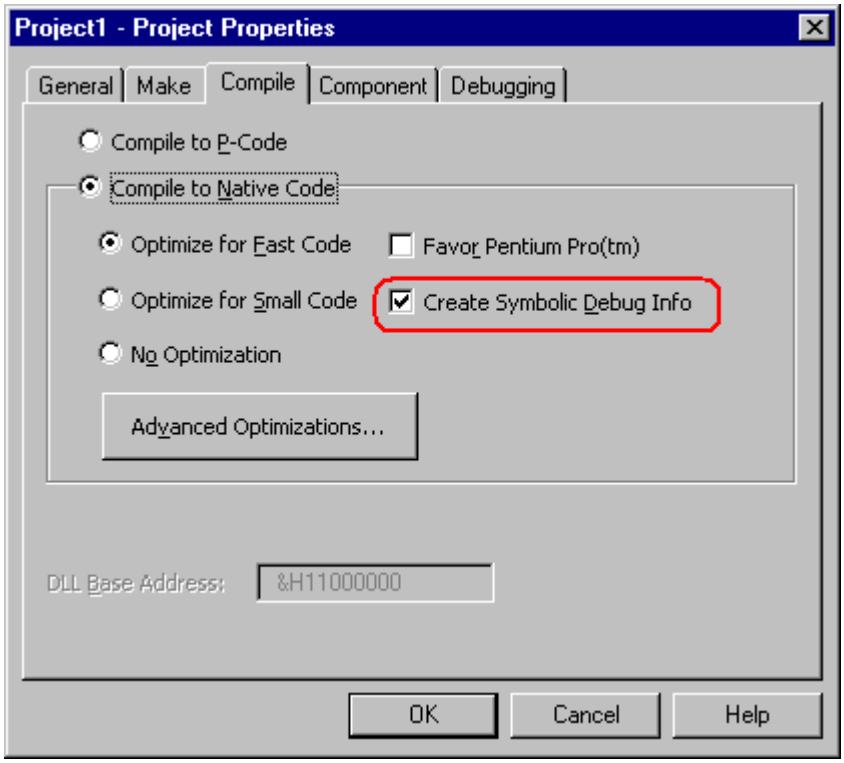
Visual Basic may include debug information in the executable file, or add debug info to an external PDB file. AQtrace can work with both types of debug information. However, if you compile a release version of your product, it is recommended to generate debug information as an external file. This will decrease the overall size of your executable.

To specify the way in which debug information will be generated, use the Link environment variable. If

this variable is not defined, Visual Basic will generate an external PDB file. Else, the compiler will include the debug information in the executable. For more information on this, see Visual Basic documentation.

To compile your Visual Basic application for AQtrace, follow these steps:

1. If you compile a release version of your product, make certain that the `Link` environment variable is not defined. If this environment variable exists, Visual Basic will embed debug information in the executable and thus the overall size of your application will increase.
2. Open your project in Microsoft Visual Basic.
3. Select **Project | Project Properties** from Visual Basic's main menu. This will open the **Project Properties** dialog.
4. Move to the **Compile** tabbed page and select the **Create Symbolic Debug Info** check box:



5. Press **OK** to close the dialog.
6. Recompile your application.

There is no need to ship the generated PDB files along with your application. However, you should place the debug information files along with executable modules in the build storage. For more information on this, see *Organizing Build Storage*.

Compiling Embarcadero Delphi XE Applications With Debug Information

This topic explains how you can compile Embarcadero Delphi XE applications with debug information for AQtrace. To learn how to prepare applications created with other Delphi versions, see *Compiling Applications With Debug Information*.

The Delphi compiler generates debug information in the *TD32 format*. Debug info of this type is compiled into your executables. Besides TD32, Delphi can generate .map files that can then be converted to

.sym files that store information on the application's functions. In addition, using special utilities (***StripTDS.exe*** or TDstrp32.exe) you can extract TD32 debug information from binary modules and store it to external *.tds files*.

AQtrace can work with all of these formats. However, we recommend that you use external .tds or .sym files for release builds of your products. This will decrease the overall size of your executables. The TD32 format of debug information compiled into executables can be used for intermediate or special builds. Below is a detailed description of how to change compiler options to use the desired format of debug information.

AQtrace is not compatible with third-party tools that modify the binary code of your application, for example, to include a custom exception handling mechanism. An example of such a tool is EurekaLog v. 4.5.4 and earlier. We recommend that you generate the debug information for your application before processing it with such tools.

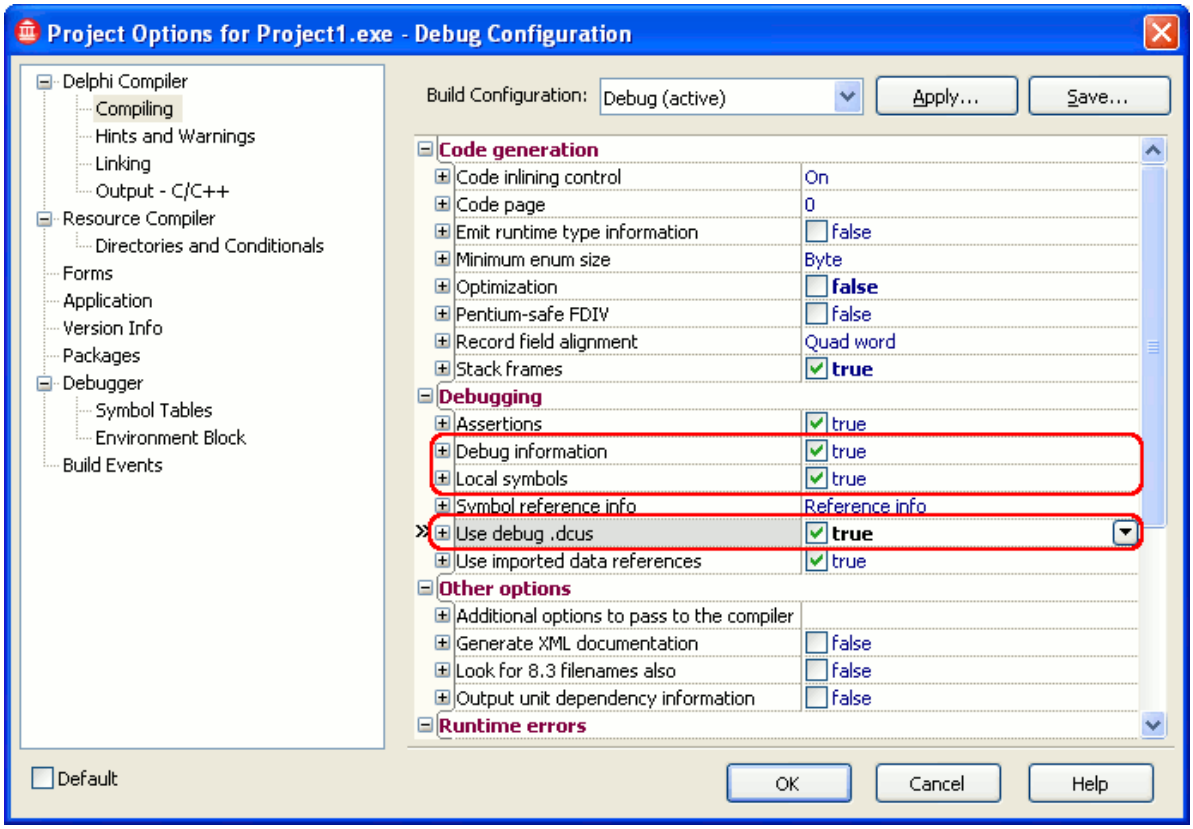
Internal Debug Information (TD32)

To compile a Win32 Delphi application with TD32 debug information, follow these steps:

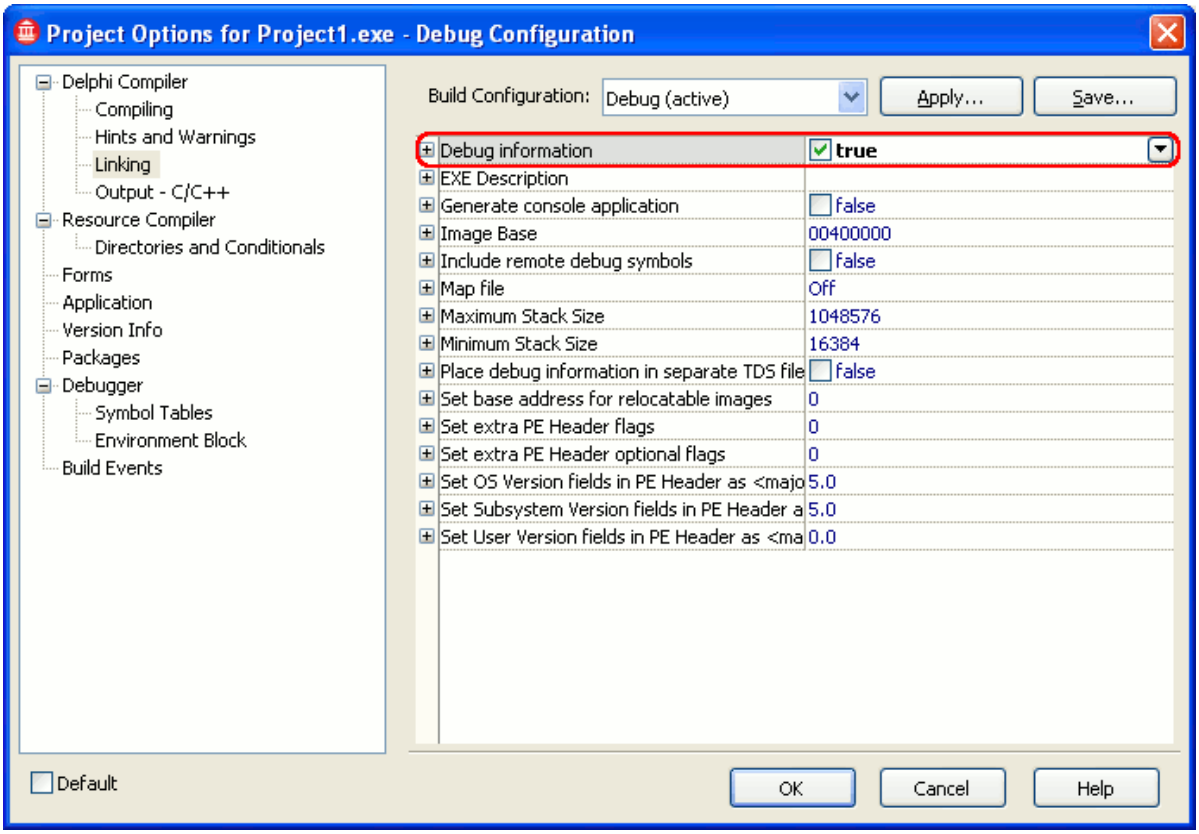
1. Open your project in Embarcadero Delphi XE.
2. Right-click the **Project_Name | Build Configurations | Debug** node in the **Project Manager** panel and select **Activate** from the context menu. This will activate the Debug configuration that will be used to build the debug version of your application.

   Note: You can compile your application in any configuration, not just in the Debug one. We chose the Debug configuration to make sure the changes that will be made to compiler settings will not affect the Release configuration, which is typically used to build the final version of applications.

3. Select **Project | Options** from the main menu.
4. In the resulting **Project Options** dialog, select your debug configuration in the **Build Configuration** combo box. This will load the settings used for debug builds.
5. Select the **Delphi Compiler | Compiling** category from the tree view on the left of the Project Options dialog and do the following:
   a. In the **Debugging** group, set the **Debug information** and **Local symbols** options to *True*.
   b. To trace VCL routines, set the **Use debug .dcus** option to *True*. If you set this option to *False*, AQtrace will be able to trace only those classes that are defined in your application.



6. Select the **Delphi Compiler | Linking** category from the tree on the left of the Project Options dialog and set the **Debug information** option to *True*:

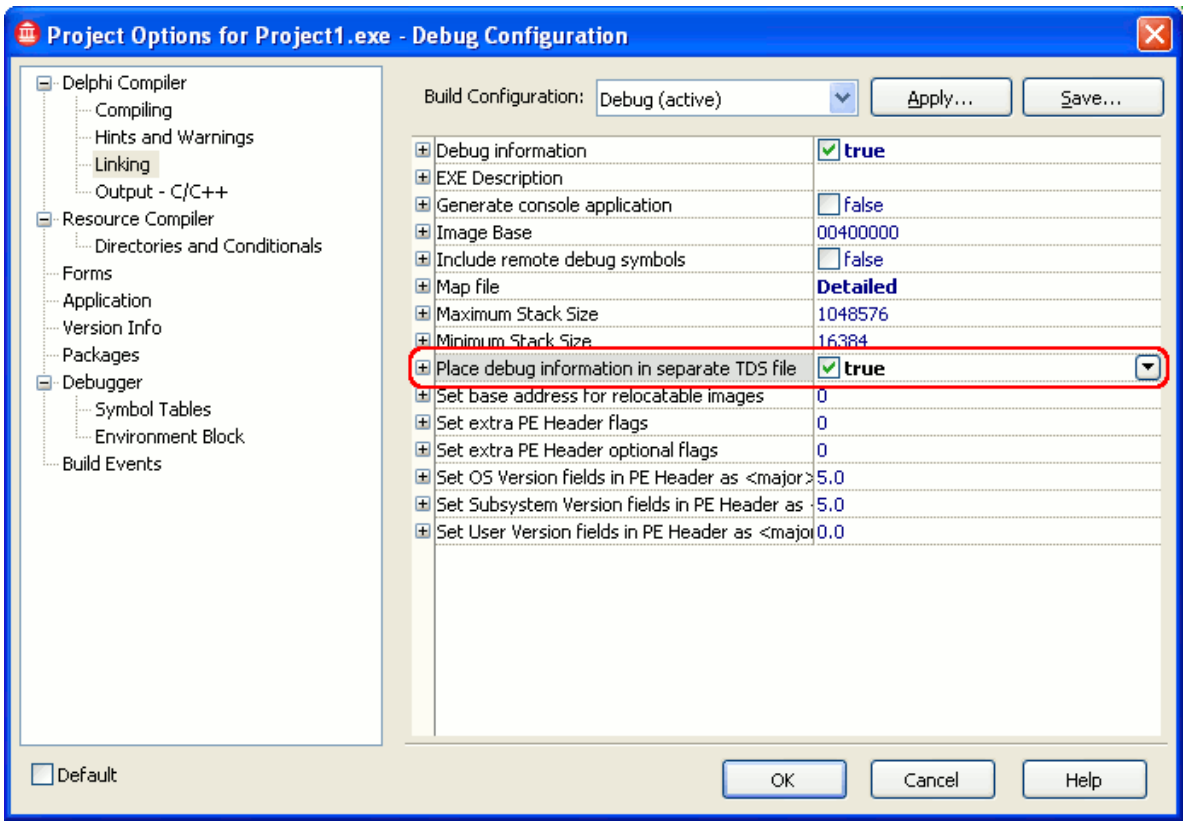


7. Press **OK** to save the changes and to close the dialog.
8. Rebuild your application.

After you compile your modules, you should place them in the build storage (see *Organizing Build Storage*).

External Debug Information (TDS Files)

To generate debug information for your Delphi XE application as an external .tds file, you can just perform the same actions needed for compiling Delphi XE applications with internal TD32 debug information (see above) and change one additional project option before compiling the application: On the Delphi Compiler | Linking page of the Project Options dialog, set the Place debug information in separate TDS file option to *True*.



After you recompile your application with this option enabled, the application's debug information will be generated as an external .tds file.

If you have already compiled your application with internal TD32 debug information, you can also extract debug information from the application's executable file by using either SmartBear's StripTDS utility or the Turbo Debugger 32-bit Symbol Table Stripper utility. These two utilities perform the same actions - remove debug information from the binary files and save it to separate .tds files. However, TDstrp32 utility can only process one file at a time whereas StripTDS utility supports file masks and recursive processing.

Note: Both utilities only work with those sections in the binary files that contain debug information. They do not change the code and data sections, so your modules will still work as designed.

The StripTDS utility is shipped along with AQtrace, its executable is *<AQtrace>\Bin\StripTDS.exe*. The Turbo Debugger 32-bit Symbol Table Stripper utility is supplied with Embarcadero RAD Studio XE (the utility is installed with Embarcadero C++Builder XE and has the following path: *<Program Files>\Embarcadero\RAD Studio\8.0\bin\TDstrp32.exe*).

To create external .tds files for the modules of your Win32 Delphi application, do the following:

1. Compile your application with TD32 debug information as described above.
2. Apply the StripTDS or TDstrp32 utility to each compiled executable and DLL.

   To process all EXE and DLL files in the desired folder and its subfolders using the StripTDS utility, use the following command:

```
StripTDS.exe -r -w C:\MyApp\*.exe;C:\MyApp\*.dll
```

   To do this using the TDstrp32 utility, run the following command:

```
for /r "C:\MyApp" %f in (*.exe *.dll) do TDstrp32.exe -s "%~ff"
```

or this one if processing is done from a batch file:

```
for /r "C:\MyApp" %%f in (*.exe *.dll) do (
  TDstrp32.exe -s "%%~ff"
)
```

There is no need to ship the generated .tds files along with the release version of your application to users. Just copy them along with the appropriate binary modules into the build storage (that is, each .tds file should reside in the folder in which its executable file is). For more information on creating build storages, see *Organizing Build Storage*.

External Debug Information (SYM Files)

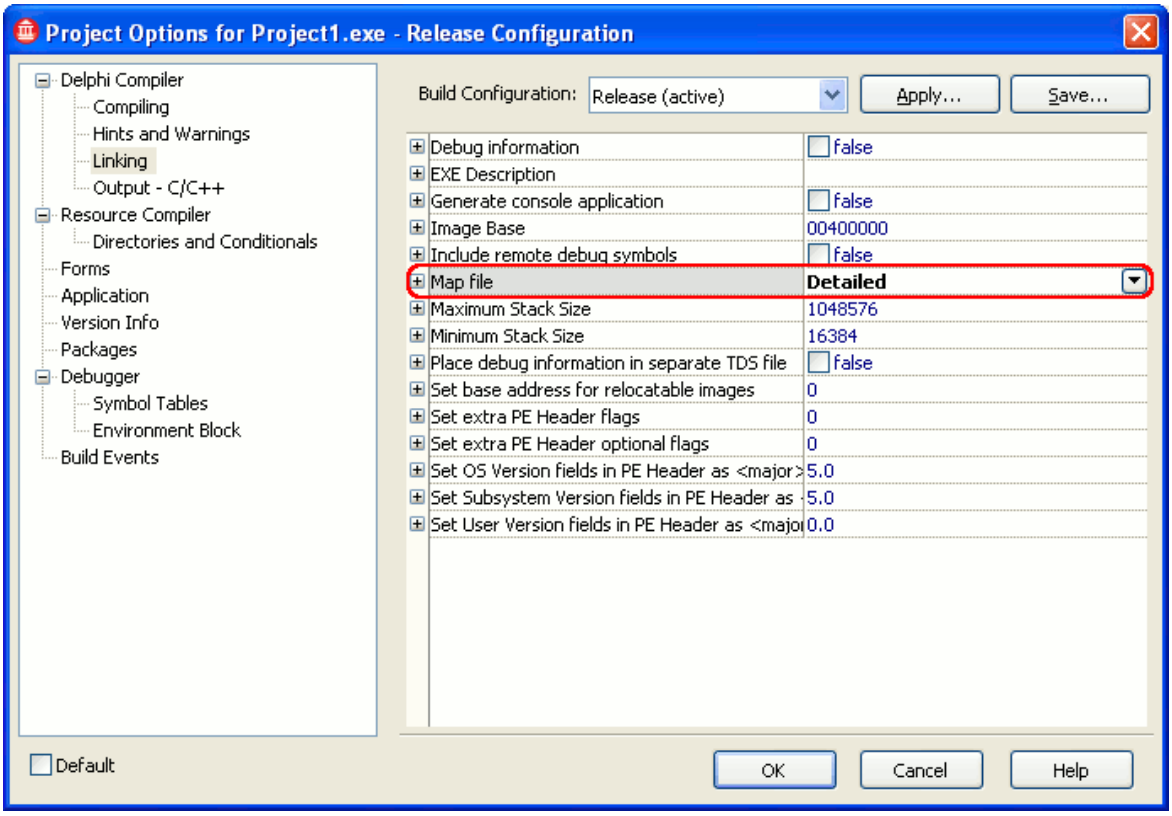
.Sym files are generated from .map files, which are created by the Delphi compiler. You should then convert each .map file to a .sym file by using the MapSym utility that is included in Windows SDK or Microsoft Visual Studio 2005:

- You can download the Windows SDK package from Microsoft's web site (http://www.microsoft.com/downloads).
- If you have Visual Studio 2005, you can find this utility in the following folder:

  <Program Files>\Microsoft Visual Studio 8\Common7\Tools\Bin\MapSym.Exe

So, to create .sym files, you should first compile your Delphi application for .map files and then convert these files to the .sym format. Below is a detailed description:

1. Change your Delphi project's settings to create .map files:
   a. Open your project in Delphi XE.
   b. Right-click the **Project_Name | Build Configurations | Release** node in the **Project Manager** panel and select **Activate** from the context menu. This will activate the *Release* configuration that will be used to build the debug version of your application.
   c. Select **Project | Options** from Delphi's main menu. This will open the **Project Options** dialog.
   d. Select the **Delphi Compiler | Linking** category in the tree view on the left of the Project Options dialog, and then select **Detailed** for the **Map file** option:



e. Press **OK** to save the changes and to close the dialog.

f. Recompile your application.

Delphi will create the .map files during application compilation.

2. Apply MapSym.exe to each generated .map file. To convert a .map file to the appropriate .sym file, use the following command line:

```
MapSym.exe -o MyFile.sym MyFile.map
  -- or --
MapSym.exe MyFile.map
```

After you create a .sym file, put it along with the appropriate executable or DLL into the build storage (that is, each .sym file should reside in the folder in which its executable file is). For more information on creating build storages, see *Organizing Build Storage*. Note, there is no need to distribute the generated .map or .sym files with your application.

Compiling Embarcadero Delphi 2010 Applications With Debug Information

This topic explains how you can compile Embarcadero Delphi 2010 applications with debug information for AQtrace. To learn how to prepare applications created with other Delphi versions, see *Compiling Applications With Debug Information*.

The Delphi compiler generates debug information in the *TD32 format*. Debug info of this type is compiled into your executables. Besides TD32, Delphi can generate .map files that can then be converted to *.sym files* that store information on the application's functions. In addition, using special utilities (***StripTDS.exe*** or TDstrp32.exe) you can extract TD32 debug information from binary modules and store it

to external *.tds files*.

AQtrace can work with all of these formats. However, we recommend that you use external .tds or .sym files for release builds of your products. This will decrease the overall size of your executables. The TD32 format of debug information compiled into executables can be used for intermediate or special builds. Below is a detailed description of how to change compiler options to use the desired format of debug information.

AQtrace is not compatible with third-party tools that modify the binary code of your application, for example, to include a custom exception handling mechanism. An example of such a tool is EurekaLog v. 4.5.4 and earlier. We recommend that you generate the debug information for your application before processing it with such tools.

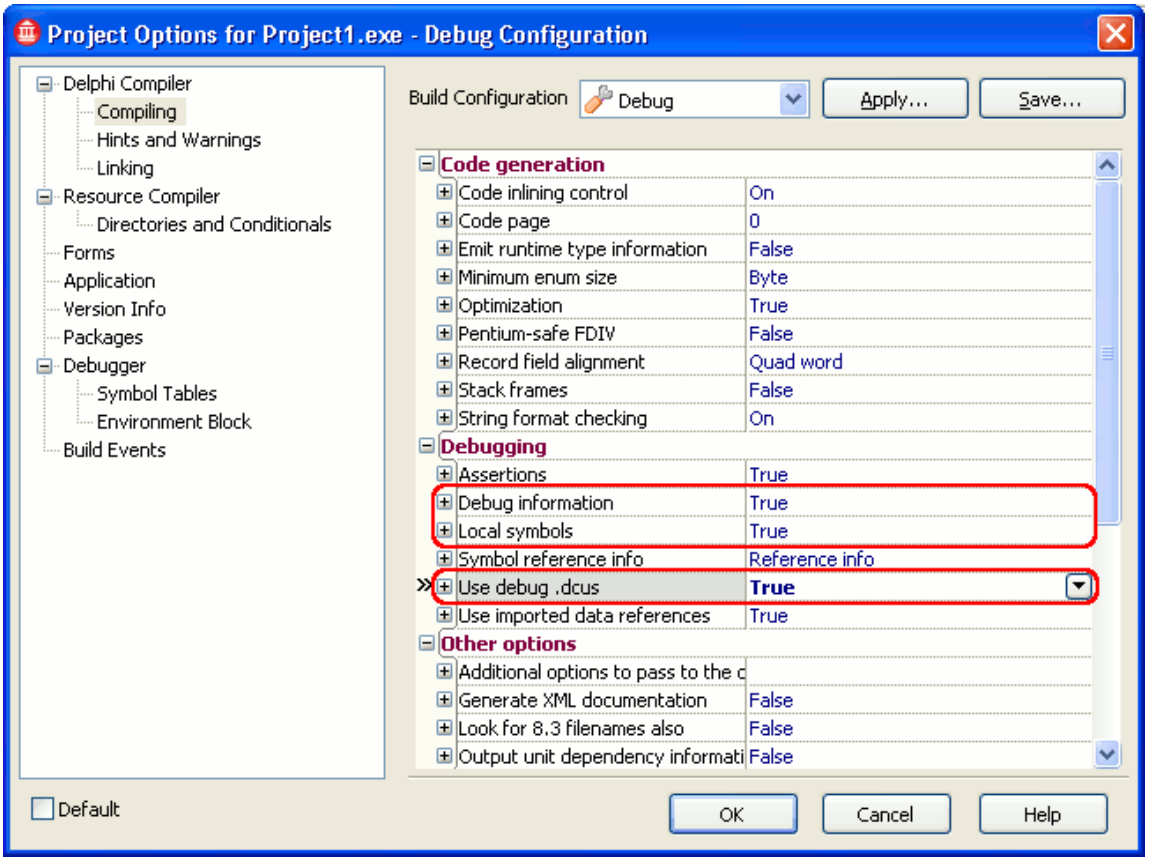
Internal Debug Information (TD32)

To compile a Win32 Delphi application with TD32 debug information, follow these steps:

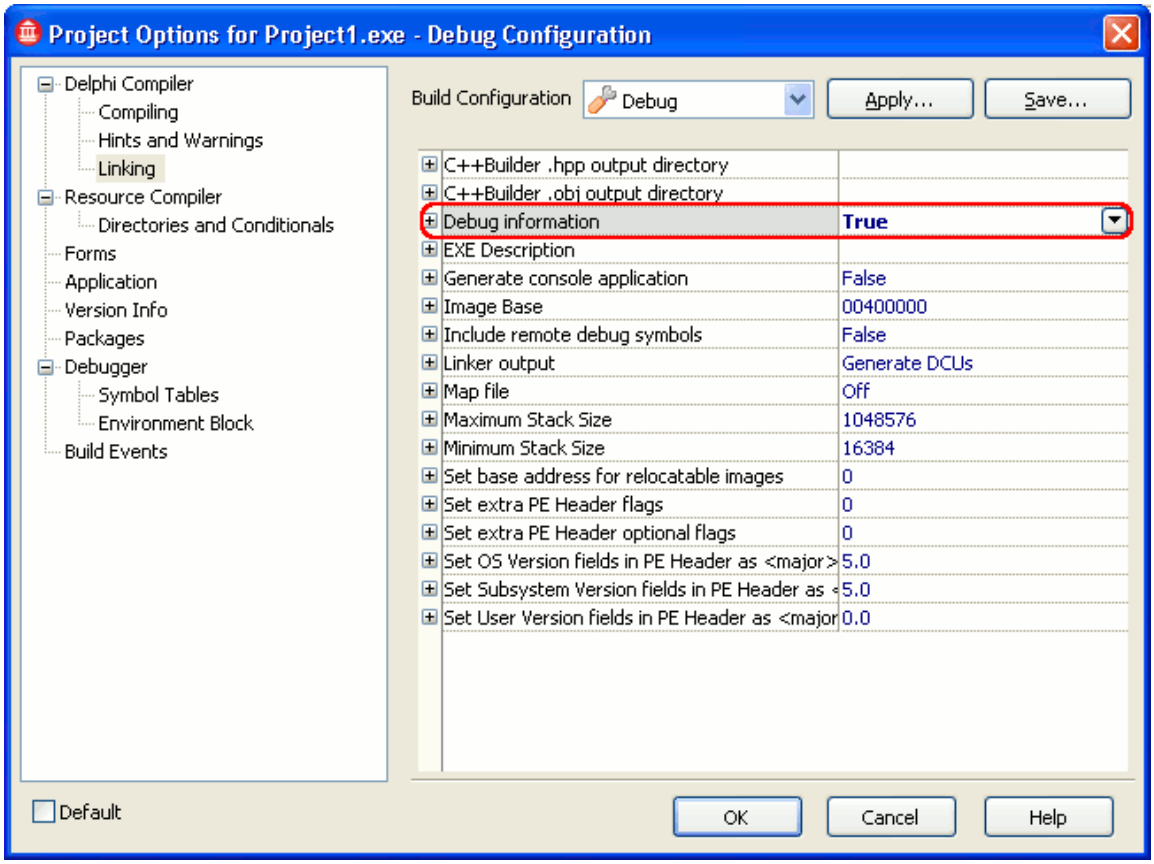
1. Open your project in Embarcadero Delphi XE.
2. Right-click the **Project_Name | Build Configurations | Debug** node in the **Project Manager** panel and select **Activate** from the context menu. This will activate the Debug configuration that will be used to build the debug version of your application.

   Note: You can compile your application in any configuration, not just in the Debug one. We chose the Debug configuration to make sure the changes that will be made to compiler settings will not affect the Release configuration, which is typically used to build the final version of applications.

3. Select **Project | Options** from the main menu.
4. In the resulting **Project Options** dialog, select your debug configuration in the **Build Configuration** combo box. This will load the settings used for debug builds.
5. Select the **Delphi Compiler | Compiling** category from the tree view on the left of the Project Options dialog and do the following:
   a. In the **Debugging** group, set the **Debug information** and **Local symbols** options to *True*.
   b. To trace VCL routines, set the **Use debug .dcus** option to *True*. If you set this option to *False*, AQtrace will be able to trace only those classes that are defined in your application.



6. Select the **Delphi Compiler | Linking** category from the tree on the left of the Project Options dialog and set the **Debug information** option to *True*:



7. Press **OK** to save the changes and to close the dialog.
8. Rebuild your application.

After you compile your modules, you should place them in the build storage (see *Organizing Build Storage*).

External Debug Information (TDS Files)

To generate .tds files you can apply either SmartBear's *StripTDS* utility or Turbo Debugger 32-bit Symbol Table Stripper utility. These two utilities perform the same actions - remove debug information from the binary files and save it to separate .tds files. However, TDstrp32 utility can only process one file at a time whereas StripTDS utility supports file masks and recursive processing.

Note: Both utilities only work with those sections in the binary files that contain debug information. They do not change the code and data sections, so your modules will still work as designed.

The StripTDS utility is shipped along with AQtrace, its executable is *<AQtrace>\Bin\StripTDS.exe*. The Turbo Debugger 32-bit Symbol Table Stripper utility is supplied with Embarcadero RAD Studio 2010 (the utility is installed with Embarcadero C++Builder 2010 and has the following path: *<Program Files>\CodeGear\RAD Studio\7.0\Bin\TDstrp32.exe*).

To create external .tds files for the modules of your Win32 Delphi application, do the following:

1. Compile your application with TD32 debug information as described *above*.
2. Apply the StripTDS or TDstrp32 utility to each compiled executable and DLL.

   To process all EXE and DLL files in the desired folder and its subfolders using the StripTDS

utility, use the following command:

```
StripTDS.exe -r -w C:\MyApp\*.exe;C:\MyApp\*.dll
```

To do this using the TDstrp32 utility, run the following command:

```
for /r "C:\MyApp" %f in (*.exe *.dll) do TDstrp32.exe -s "%~ff"
```

or this one if processing is done from a batch file:

```
for /r "C:\MyApp" %%f in (*.exe *.dll) do (
  TDstrp32.exe -s "%%~ff"
)
```

There is no need to ship the generated .tds files along with the release version of your application to users. Just copy them along with the appropriate binary modules into the build storage (that is, each .tds file should reside in the folder in which its executable file is). For more information on creating build storages, see *Organizing Build Storage*.

External Debug Information (SYM Files)

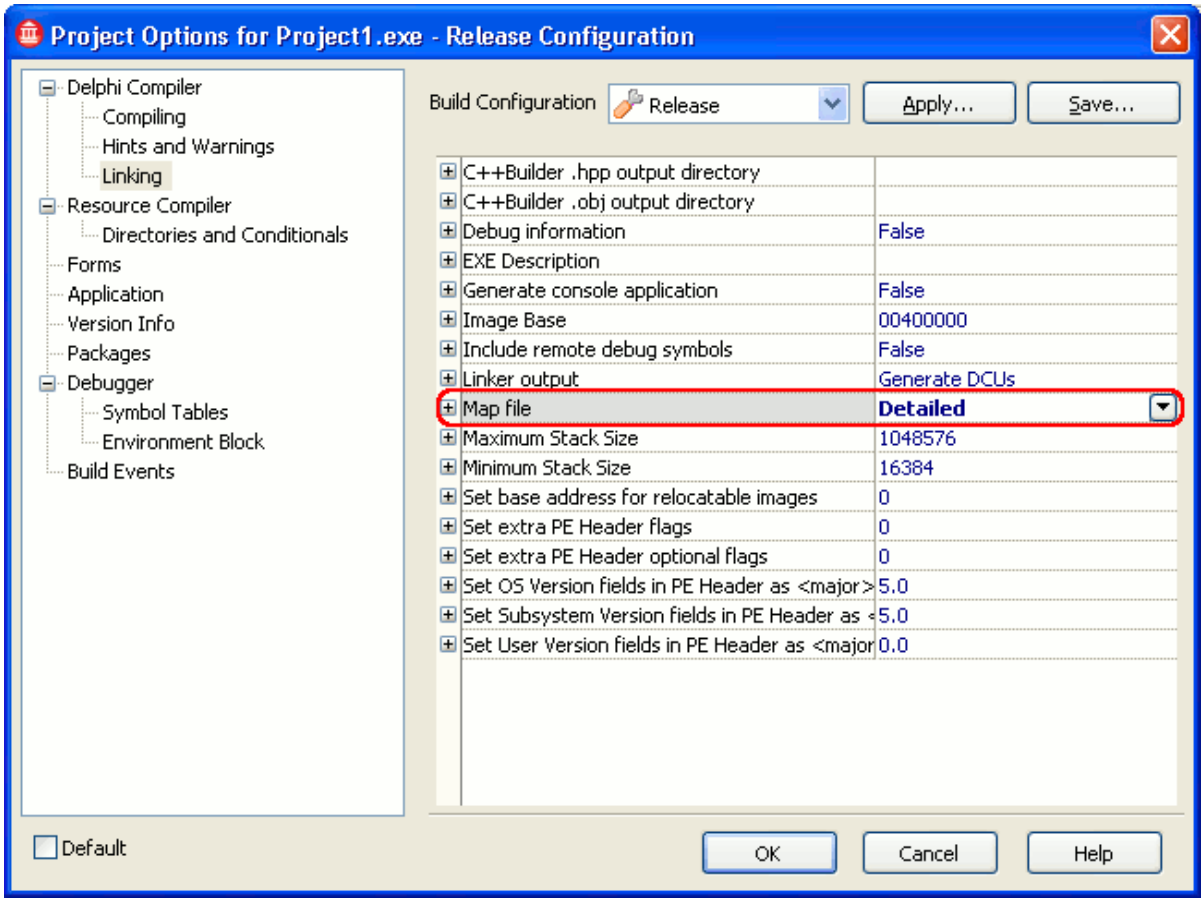
.Sym files are generated from .map files, which are created by the Delphi compiler. You should then convert each .map file to a .sym file by using the MapSym utility that is included in Windows SDK or Microsoft Visual Studio 2005:

- You can download the Windows SDK package from Microsoft's web site (http://www.microsoft.com/downloads).
- If you have Visual Studio 2005, you can find this utility in the following folder:

  <Program Files>\Microsoft Visual Studio 8\Common7\Tools\Bin\MapSym.Exe

So, to create .sym files, you should first compile your Delphi application for .map files and then convert these files to the .sym format. Below is a detailed description:

1. Change your Delphi project's settings to create .map files:
   a. Open your project in Delphi 2010.
   b. Right-click the **Project_Name | Build Configurations | Release** node in the **Project Manager** panel and select **Activate** from the context menu. This will activate the *Release* configuration that will be used to build the debug version of your application.
   c. Select **Project | Options** from Delphi's main menu. This will open the **Project Options** dialog.
   d. Select the **Delphi Compiler | Linking** category in the tree view on the left of the Project Options dialog, and then select **Detailed** for the **Map file** option:



e. Press **OK** to save the changes and to close the dialog.

f. Recompile your application.

Delphi will create the .map files during application compilation.

2. Apply MapSym.exe to each generated .map file. To convert a .map file to the appropriate .sym file, use the following command line:

```
MapSym.exe -o MyFile.sym MyFile.map
  -- or --
MapSym.exe MyFile.map
```

After you create a .sym file, put it along with the appropriate executable or DLL into the build storage (that is, each .sym file should reside in the folder in which its executable file is). For more information on creating build storages, see *Organizing Build Storage*. Note, there is no need to distribute the generated .map or .sym files with your application.

Compiling CodeGear Delphi 2009 for Win32 Applications With Debug Information

This topic explains how you can compile CodeGear Delphi 2009 for Win32 applications with debug information for AQtrace. To learn how to prepare applications created with other Delphi versions, see *Compiling Applications With Debug Information*.

The Delphi compiler generates debug information in the *TD32 format*. Debug info of this type is compiled into your executables. Besides TD32, Delphi can generate .map files that can then be converted to *.sym files* that store information on the application's functions. In addition, using special utilities

(*StripTDS.exe* or TDstrp32.exe) you can extract TD32 debug information from binary modules and store it to external *.tds files*.

AQtrace can work with all of these formats. However, we recommend that you use external .tds or .sym files for release builds of your products. This will decrease the overall size of your executables. The TD32 format of debug information compiled into executables can be used for intermediate or special builds. Below is a detailed description of how to change compiler options to use the desired format of debug information.

AQtrace is not compatible with third-party tools that modify the binary code of your application, for example, to include a custom exception handling mechanism. An example of such a tool is EurekaLog v. 4.5.4 and earlier. We recommend that you generate the debug information for your application before processing it with such tools.

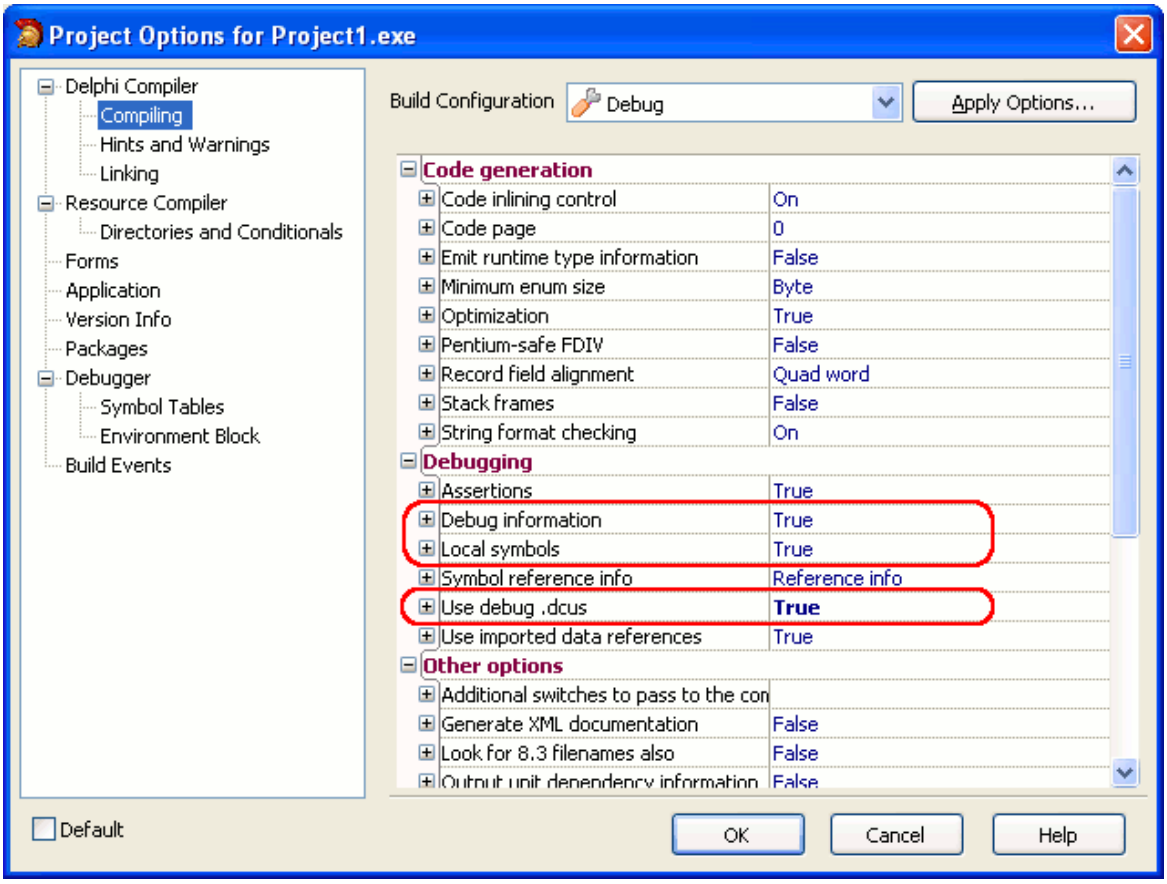
Internal Debug Information (TD32)

To compile a Win32 Delphi application with TD32 debug information, follow these steps:

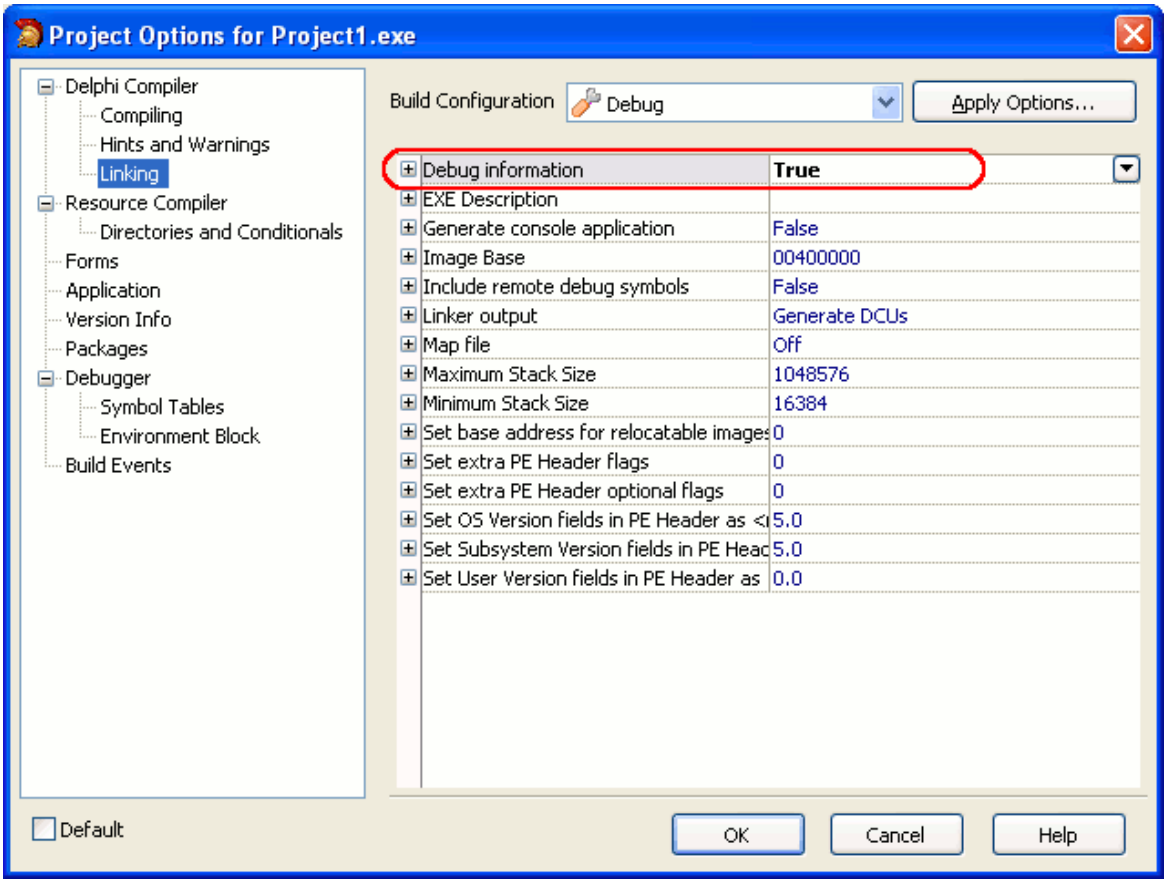
1. Open your project in Delphi 2009.
2. Right-click the ***Project_Name*** **| Build Configurations | Debug** node in the **Project Manager** panel and select **Activate** from the context menu. This will activate the *Debug* configuration that will be used to build the debug version of your application.

   Note: You can compile your application in any configuration, not just in the *Debug* one. We chose the *Debug* configuration to make sure the changes that will be made to compiler settings will not affect the *Release* configuration, which is typically used to build the final version of applications.

3. Select **Project | Options** from the main menu.
4. In the resulting **Project Options** dialog, select your debug configuration in the **Build Configuration** combo box. This will load the settings used for debug builds.
5. Select the **Delphi Compiler | Compiling** category from the tree view on the left of the Project Options dialog and do the following:
   - In the **Debugging** group, set the **Debug information** and **Local symbols** options to *True*.
   - To trace VCL routines, set the **Use debug .dcus** option to *True*. If you set this option to *False*, AQtrace will be able to trace only those classes that are defined in your application.



6. Select the **Delphi Compiler | Linking** category from the tree on the left of the Project Options dialog and set the **Debug information** option to *True*:



7. Press **OK** to save the changes and to close the dialog.
8. Rebuild your application.

After you compile your modules, you should place them in the build storage (see *Organizing Build Storage*).

External Debug Information (TDS Files)

To generate .tds files you can apply either SmartBear's *StripTDS* utility or Turbo Debugger 32-bit Symbol Table Stripper utility. These two utilities perform the same actions - remove debug information from the binary files and save it to separate .tds files. However, TDstrp32 utility can only process one file at a time whereas StripTDS utility supports file masks and recursive processing.

Note: Both utilities only work with those sections in the binary files that contain debug information. They do not change the code and data sections, so your modules will still work as designed.

The StripTDS utility is shipped along with AQtrace, its executable is *<AQtrace>\Bin\StripTDS.exe*. The Turbo Debugger 32-bit Symbol Table Stripper utility is supplied with CodeGear RAD Studio 2009 (the utility is installed with CodeGear C++Builder 2009 and has the following path: *<Program Files>\CodeGear\RAD Studio\6.0\Bin\TDstrp32.exe*).

To create external .tds files for the modules of your Win32 Delphi application, do the following:

1. Compile your application with TD32 debug information as described *above*.
2. Apply the StripTDS or TDstrp32 utility to each compiled executable and DLL.

To process all EXE and DLL files in the desired folder and its subfolders using the StripTDS utility, use the following command:

```
StripTDS.exe -r -w C:\MyApp\*.exe;C:\MyApp\*.dll
```

To do this using the TDstrp32 utility, run the following command:

```
for /r "C:\MyApp" %f in (*.exe *.dll) do TDstrp32.exe -s "%~ff"
```

or this one if processing is done from a batch file:

```
for /r "C:\MyApp" %%f in (*.exe *.dll) do (
  TDstrp32.exe -s "%%~ff"
)
```

There is no need to ship the generated .tds files along with the release version of your application to users. Just copy them along with the appropriate binary modules into the build storage (that is, each .tds file should reside in the folder in which its executable file is). For more information on creating build storages, see *Organizing Build Storage*.

External Debug Information (SYM Files)

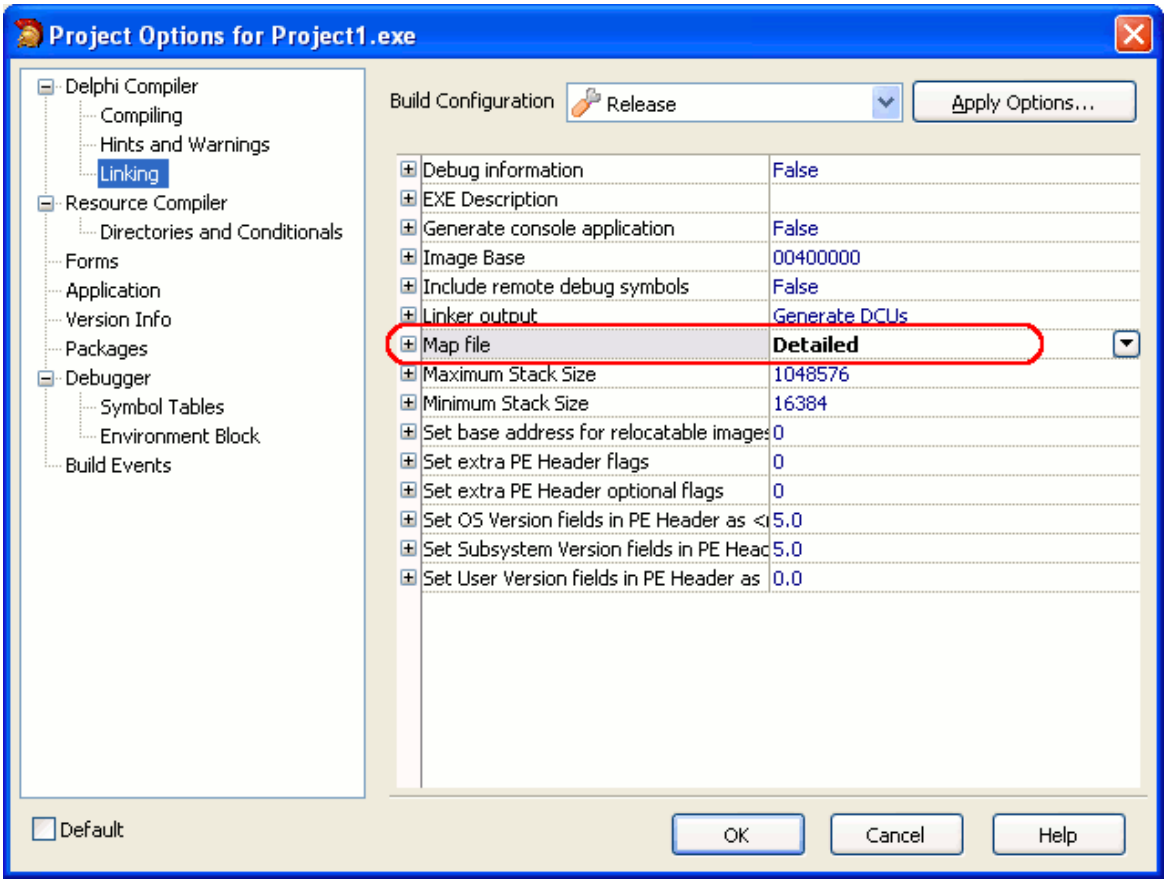
.Sym files are generated from .map files, which are created by the Delphi compiler. You should then convert each .map file to a .sym file by using the MapSym utility that is included in Windows SDK or Microsoft Visual Studio 2005:

- You can download the Windows SDK package from Microsoft's web site (http://www.microsoft.com/downloads).
- If you have Visual Studio 2005, you can find this utility in the following folder:

  <Program Files>\Microsoft Visual Studio 8\Common7\Tools\Bin\MapSym.Exe

So, to create .sym files, you should first compile your Delphi application for .map files and then convert these files to the .sym format. Below is a detailed description:

1. Change your Delphi project's settings to create .map files:
   a. Open your Win32 project in Delphi 2009.
   b. Right-click the ***Project_Name*** **| Build Configurations | Release** node in the **Project Manager** panel and select **Activate** from the context menu. This will activate the *Release* configuration that will be used to build the debug version of your application.
   c. Select **Project | Options** from Delphi's main menu. This will open the **Project Options** dialog.
   d. Select the **Delphi Compiler | Linking** category in the tree view on the left of the Project Options dialog, and then select **Detailed** for the **Map file** option:



e. Press **OK** to save the changes and to close the dialog.

f. Recompile your application.

Delphi will create the .map files during application compilation.

2. Apply MapSym.exe to each generated .map file. To convert a .map file to the appropriate .sym file, use the following command line:

```
MapSym.exe -o MyFile.sym MyFile.map
-- or --
MapSym.exe MyFile.map
```

After you create a .sym file, put it along with the appropriate executable or DLL into the build storage (that is, each .sym file should reside in the folder in which its executable file is). For more information on creating build storages, see *Organizing Build Storage*. Note, there is no need to distribute the generated .map or .sym files with your application.

Compiling CodeGear Delphi 2007 for Win32 Applications With Debug Information

This topic explains how you can compile CodeGear Delphi 2007 for Win32 applications with debug information for AQtrace. To learn how to prepare applications created with other Delphi versions, see *Compiling Applications With Debug Information*.

The Delphi compiler generates debug information in the *TD32 format*. Debug info of this type is compiled into your executables. Besides TD32, Delphi can generate .map files that can then be converted to

.sym files that store information on the application's functions. In addition, using special utilities (*StripTDS.exe* or TDstrp32.exe) you can extract TD32 debug information from binary modules and store it to external *.tds files*.

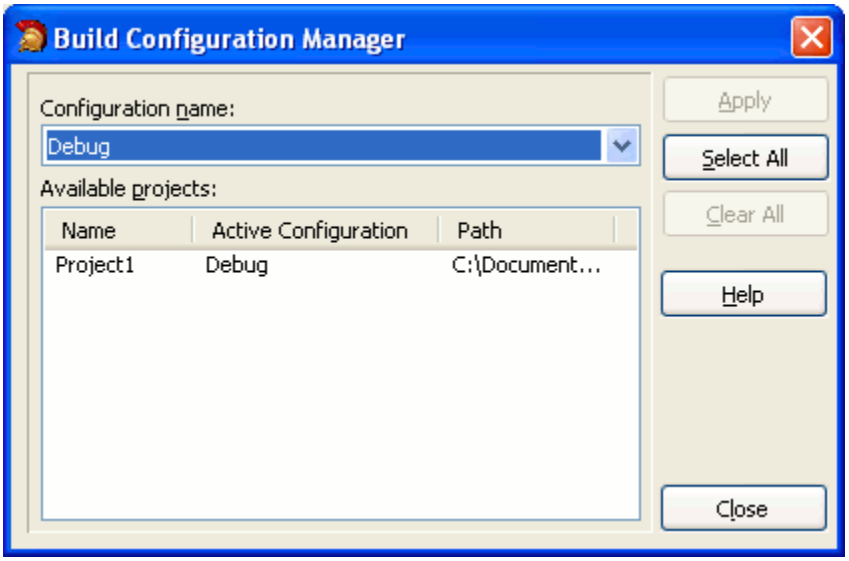
AQtrace can work with all of these formats. However, we recommend that you use external .tds or .sym files for release builds of your products. This will decrease the overall size of your executables. The TD32 format of debug information compiled into executables can be used for intermediate or special builds. Below is a detailed description of how to change compiler options to use the desired format of debug information.

AQtrace is not compatible with third-party tools that modify the binary code of your application, for example, to include a custom exception handling mechanism. An example of such a tool is EurekaLog v. 4.5.4 and earlier. We recommend that you generate the debug information for your application before processing it with such tools.

Internal Debug Information (TD32)

To compile a Win32 Delphi application with TD32 debug information, follow these steps:

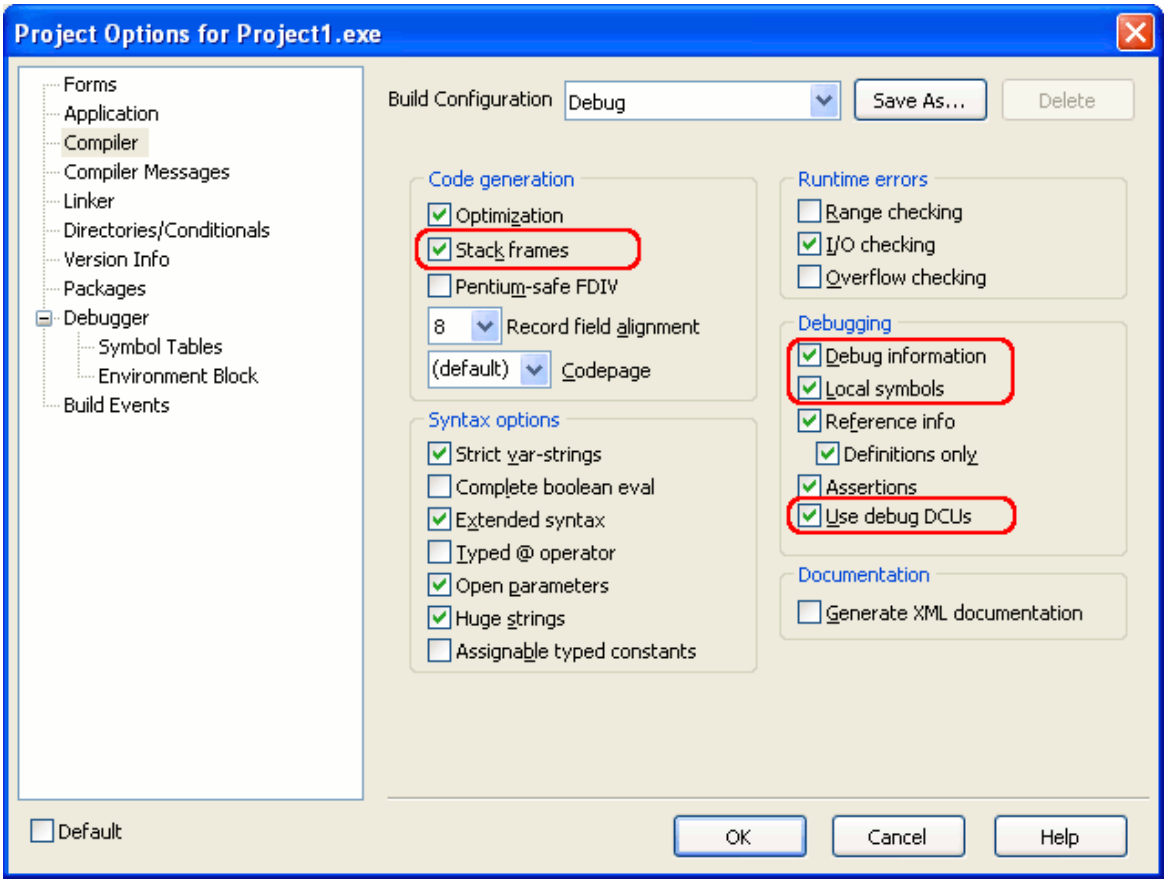
1. Open your project in Delphi 2007.
2. Select **Project | Configuration Manager** from the main menu. In the ensuing **Build Configuration Manager** dialog, choose the *Debug* configuration for your project:



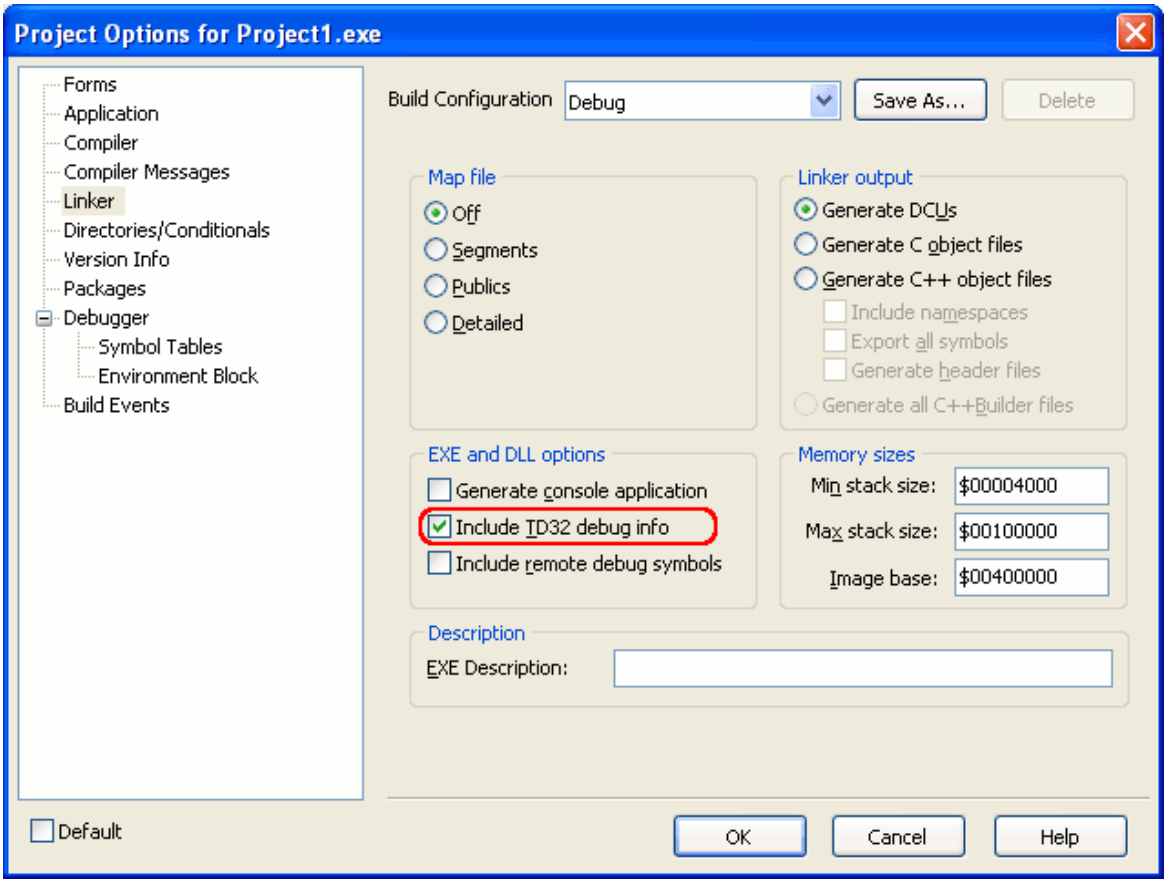
Note: You can compile your application in any configuration, not just in the *Debug* one. We chose the *Debug* configuration to make sure the changes that will be made to compiler settings will not affect the *Release* configuration, which is typically used to build the final version of applications.

3. Select **Project | Options** from the main menu.
4. In the resulting **Project Options** dialog, select the **Compiler** category from the tree view on the left.
5. Select the **Debug information** and **Local symbols** check boxes in the **Debugging** section.
6. To trace VCL routines, select the **Use Debug DCUs** check box in the Debugging section. If you

leave this option unchecked, AQtrace will be able to trace only those classes that are defined in your application.



7. Select the **Linker** category from the tree on the left of the Project Options dialog.
8. In the **EXE and DLL options** section, select the **Include TD32 debug info** check box:



9. Press **OK** to save the changes and to close the dialog.
10. Rebuild your application.

After you compile your modules, you should place them in the build storage (see *Organizing Build Storage*).

External Debug Information (TDS Files)

To generate .tds files you can apply either SmartBear's *StripTDS* utility or Turbo Debugger 32-bit Symbol Table Stripper utility. These two utilities perform the same actions - remove debug information from the binary files and save it to separate .tds files. However, TDstrp32 utility can only process one file at a time whereas StripTDS utility supports file masks and recursive processing.

Note: Both utilities only work with those sections in the binary files that contain debug information. They do not change the code and data sections, so your modules will still work as designed.

The StripTDS utility is shipped along with AQtrace, its executable is *<AQtrace>\Bin\StripTDS.exe*. The Turbo Debugger 32-bit Symbol Table Stripper utility is supplied with CodeGear RAD Studio 2007 (the utility is installed with CodeGear C++Builder 2007 and has the following path: *<Program Files>\CodeGear\RAD Studio\5.0\Bin\TDstrp32.exe*).

To create external .tds files for the modules of your Win32 Delphi application, do the following:

1. Compile your application with TD32 debug information as described *above*.
2. Apply the StripTDS or TDstrp32 utility to each compiled executable and DLL.

To process all EXE and DLL files in the desired folder and its subfolders using the StripTDS utility, use the following command:

```
StripTDS.exe -r -w C:\MyApp\*.exe;C:\MyApp\*.dll
```

To do this using the TDstrp32 utility, run the following command:

```
for /r "C:\MyApp" %f in (*.exe *.dll) do TDstrp32.exe -s "%~ff"
```

or this one if processing is done from a batch file:

```
for /r "C:\MyApp" %%f in (*.exe *.dll) do (
  TDstrp32.exe -s "%%~ff"
)
```

There is no need to ship the generated .tds files along with the release version of your application to users. Just copy them along with the appropriate binary modules into the build storage (that is, each .tds file should reside in the folder in which its executable file is). For more information on creating build storages, see *Organizing Build Storage*.

External Debug Information (SYM Files)

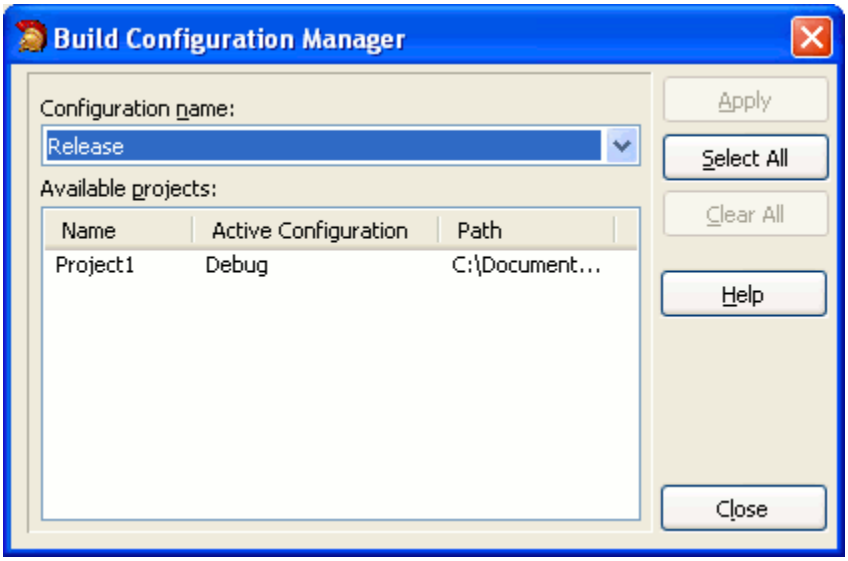
.Sym files are generated from .map files, which are created by the Delphi compiler. You should then convert each .map file to a .sym file by using the MapSym utility that is included in Windows SDK or Microsoft Visual Studio 2005:

- You can download the Windows SDK package from Microsoft's web site (http://www.microsoft.com/downloads).
- If you have Visual Studio 2005, you can find this utility in the following folder:

  <Program Files>\Microsoft Visual Studio 8\Common7\Tools\Bin\MapSym.Exe

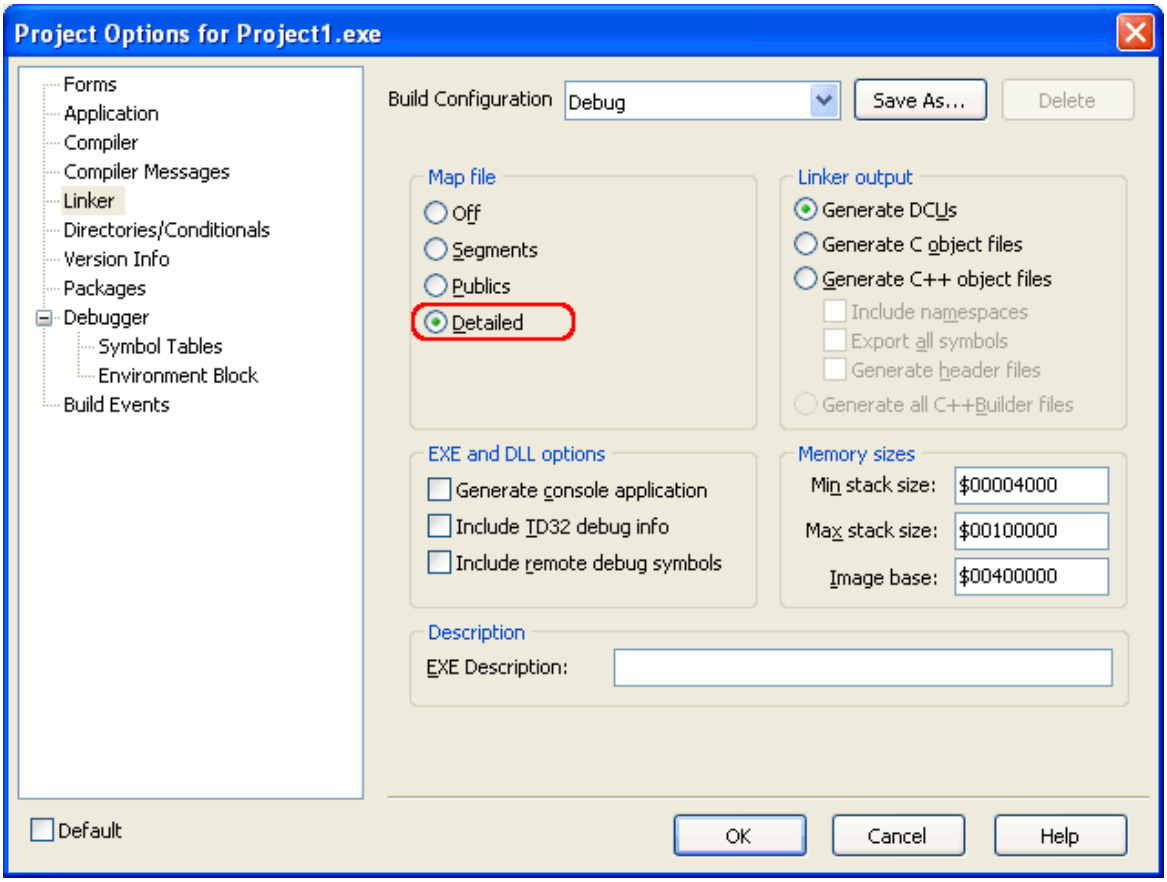
So, to create .sym files, you should first compile your Delphi application for .map files and then convert these files to the .sym format. Below is a detailed description:

1. Change your Delphi project's settings to create .map files:
   a. Open your Win32 project in Delphi 2007.
   b. Select **Project | Configuration Manager** from the main menu. In the ensuing **Build Configuration Manager** dialog, choose the configuration that you will use to build the release version of your application:



c. Select **Project | Options** from Delphi's main menu. This will open the **Project Options** dialog.

d. Select the **Linker** category in the tree view on the left, and then select **Detailed** in the **Map file** section:



e. Press **OK** to save the changes and to close the dialog.

f. Recompile your application.

Delphi will create the .map files during application compilation.

2. Apply MapSym.exe to each generated .map file. To convert a .map file to the appropriate .sym file, use the following command line:

```
MapSym.exe -o MyFile.sym MyFile.map
-- or --
MapSym.exe MyFile.map
```

After you create a .sym file, put it along with the appropriate executable or DLL into the build storage (that is, each .sym file should reside in the folder in which its executable file is). For more information on creating build storages, see *Organizing Build Storage*. Note, there is no need to distribute the generated .map or .sym files with your application.

Compiling Borland Delphi 2005 and 2006 for Win32 Applications With Debug Information

This topic explains how you can compile a Delphi application with debug information for AQtrace. The topic concerns applications created in Borland Delphi 2005 and 2006 for Win32. To learn how to prepare applications created with other Delphi versions, see *Compiling Applications With Debug Information*.

The Delphi compiler generates debug information in the *TD32 format*. Debug info of this type is compiled into your executables. Besides TD32, Delphi can generate .map files that can then be converted to *.sym files* that store information on the application's functions. In addition, using special utilities (*StripTDS.exe* or TDstrp32.exe) you can extract TD32 debug information from binary modules and store it to external *.tds files*.

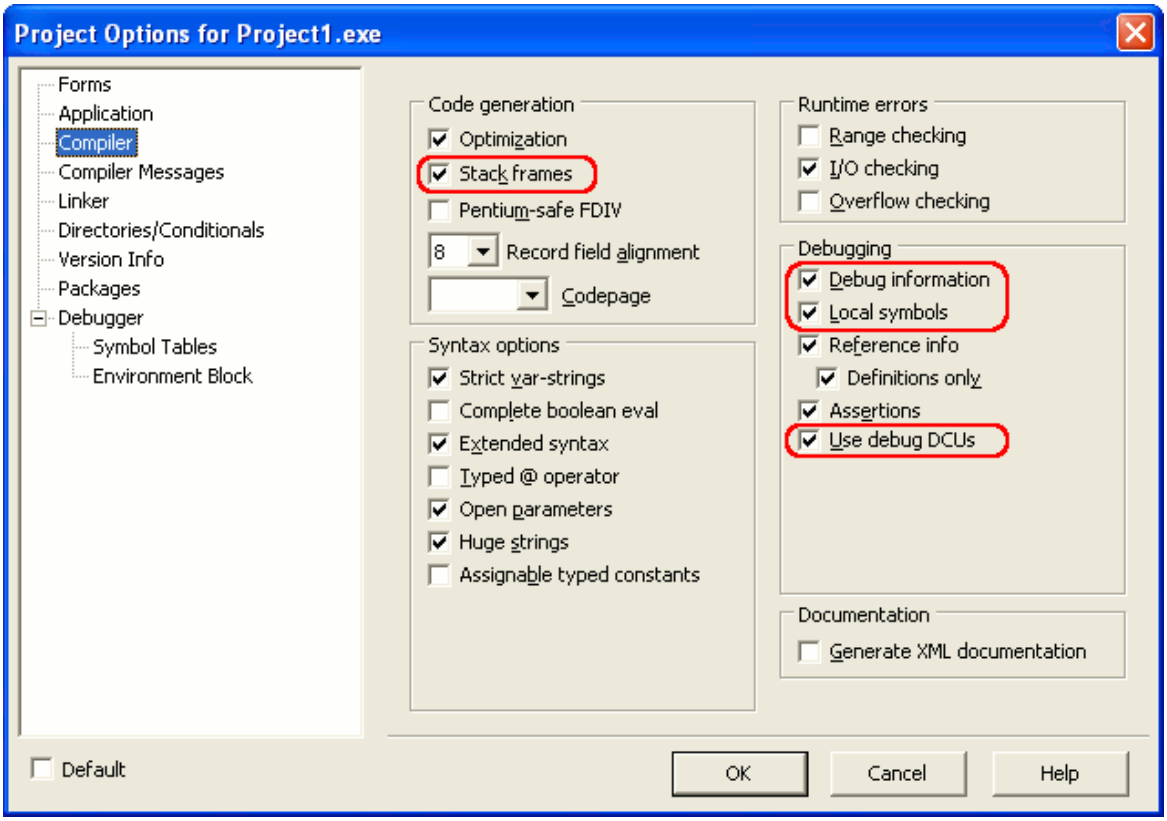
AQtrace can work with all of these formats. However, we recommend that you use external .tds or .sym files for release builds of your products. This will decrease the overall size of your executables. The TD32 format of debug information compiled into executables can be used for intermediate or special builds. Below is a detailed description of how to change compiler options to use the desired format of debug information.

AQtrace is not compatible with third-party tools that modify the binary code of your application, for example, to include a custom exception handling mechanism. An example of such a tool is EurekaLog. We recommend that you generate the debug information for your application before processing it with such tools.

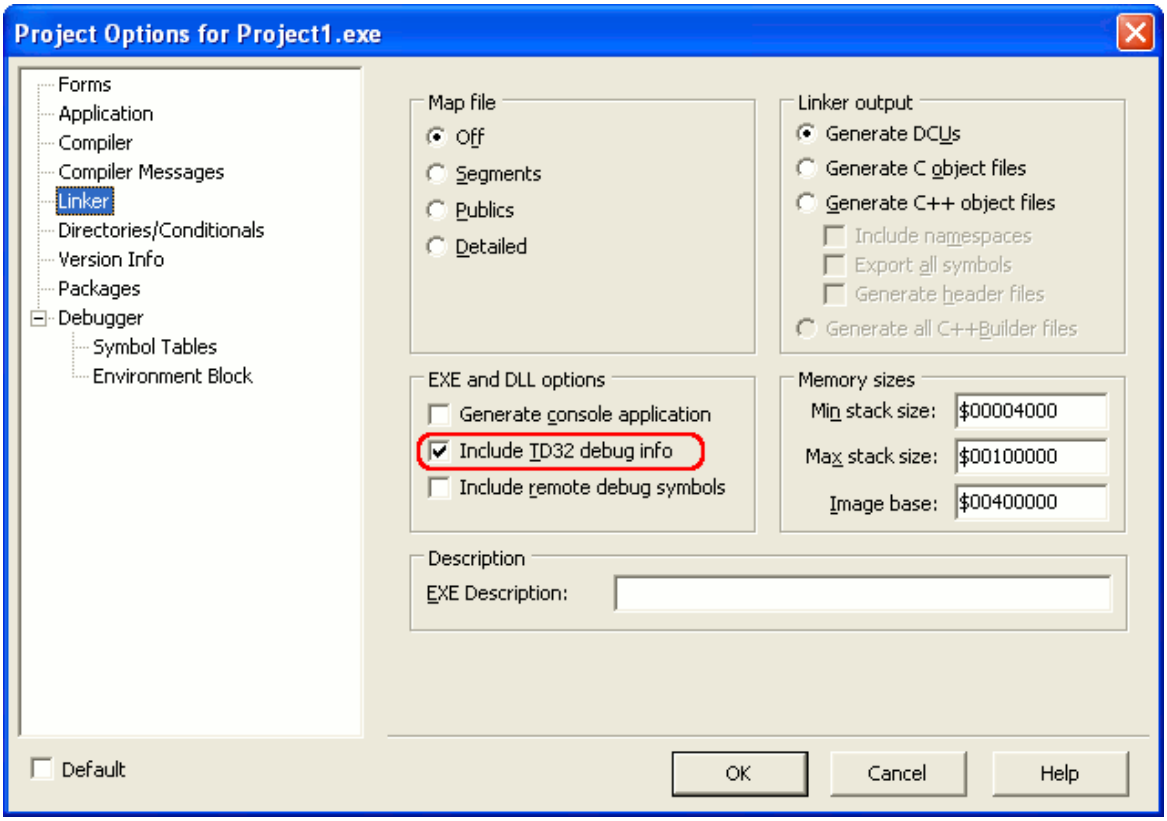
Internal Debug Information (TD32)

To compile your Win32 Delphi application with TD32 debug information:

1. Open your project in Borland Delphi IDE.
2. Select **Project | Options** from the main menu.
3. In the resulting **Project Options** dialog, select the **Compiler** category from the tree view on the left.
4. Select the **Debug information** and **Local symbols** check boxes in the **Debugging** section.
5. To trace VCL routines, select the **Use Debug DCUs** check box in the Debugging section. If you leave this option unchecked, AQtrace will be able to trace only those classes that are defined in your application.



6. Select the **Linker** category from the tree on the left of the Project Options dialog.
7. In the **EXE and DLL options** section, select the **Include TD32 debug info** check box:



8. Press **OK** to save the changes and to close the dialog.
9. Rebuild your application.

After you compile your modules, you should place them in the build storage (see *Organizing Build Storage*). Remember to recompile the release version of your application without TD32 debug information in order to reduce the application size.

External Debug Information (TDS Files)

To generate .tds files you can apply either SmartBear's *StripTDS* utility or Turbo Debugger 32-bit Symbol Table Stripper utility. These two utilities perform the same actions - remove debug information from the binary files and save it to separate .tds files. However, TDstrp32 utility can only process one file at a time whereas StripTDS utility supports file masks and recursive processing.

Note: Both utilities only work with those sections in the binary files that contain debug information. They do not change the code and data sections, so your modules will still work as designed.

The StripTDS utility is shipped along with AQtrace, its executable is *<AQtrace>\Bin\StripTDS.exe*. The Turbo Debugger 32-bit Symbol Table Stripper utility is supplied with Borland Developer Studio 2006 (the utility is installed with Borland C++Builder 2006 and has the following path: *<Program Files>\Borland\BDS\4.0\Bin\TDstrp32.exe*).

To create external .tds files for the modules of your Win32 Delphi application, do the following:

1. Compile your application with TD32 debug information as described *above*.
2. Apply the StripTDS or TDstrp32 utility to each compiled executable and DLL.

   To process all EXE and DLL files in the desired folder and its subfolders using the StripTDS

utility, use the following command:

```
StripTDS.exe -r -w C:\MyApp\*.exe;C:\MyApp\*.dll
```

To do this using the TDstrp32 utility, run the following command:

```
for /r "C:\MyApp" %f in (*.exe *.dll) do TDstrp32.exe -s "%~ff"
```

or this one if processing is done from a batch file:

```
for /r "C:\MyApp" %%f in (*.exe *.dll) do (
  TDstrp32.exe -s "%%~ff"
)
```

There is no need to ship the generated .tds files along with the release version of your application to users. Just copy them along with the appropriate binary modules into the build storage (that is, each .tds file should reside in the folder in which its executable file is). For more information on creating build storages, see *Organizing Build Storage*.

External Debug Information (SYM Files)

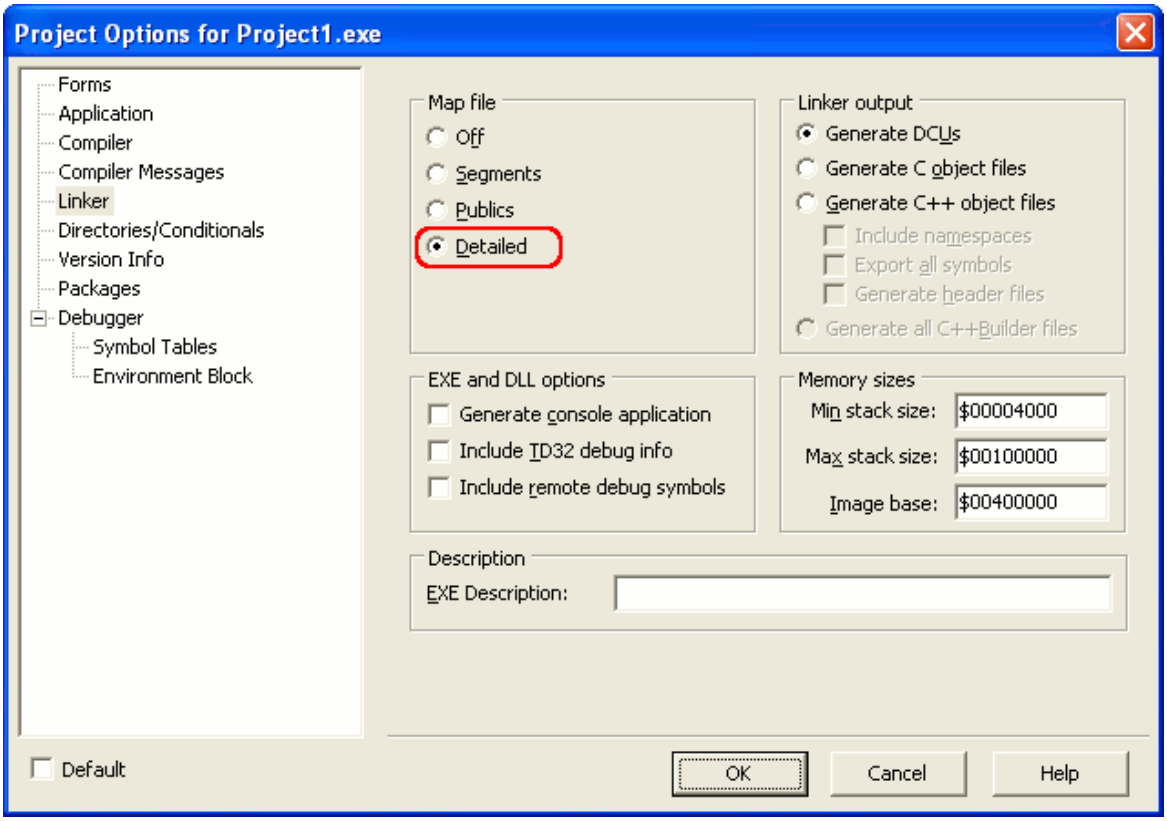
.Sym files are generated from .map files, which are created by the Delphi compiler. You should then convert each .map file to a .sym file by using the MapSym utility that is included in Windows SDK or Microsoft Visual Studio 2005:

- You can download the Windows SDK package from Microsoft's web site (http://www.microsoft.com/downloads).
- If you have Visual Studio 2005, you can find this utility in the following folder:

  <Program Files>\Microsoft Visual Studio 8\Common7\Tools\Bin\MapSym.Exe

So, to create .sym files, you should first compile your Delphi application for .map files and then convert these files to the .sym format. Below is a detailed description:

1. Change your Delphi project's settings to create .map files:
   a. Open your project in Borland Delphi IDE.
   b. Select **Project | Options** from Delphi's main menu. This will open the **Project Options** dialog.
   c. Select the **Linker** category in the tree view on the left, and then select **Detailed** in the **Map file** section:



d. Press **OK** to save the changes and to close the dialog.

e. Recompile your application.

Delphi will create the .map files during application compilation.

2. Apply MapSym.exe to each generated .map file. To convert a .map file to the appropriate .sym file, use the following command line:

```
MapSym.exe -o MyFile.sym MyFile.map
-- or --
MapSym.exe MyFile.map
```

After you create a .sym file, put it along with the appropriate executable or DLL into the build storage (that is, each .sym file should reside in the folder in which its executable file is). For more information on creating build storages, see *Organizing Build Storage*. Note, there is no need to distribute the generated .map or .sym files with your application.

Compiling Borland Delphi Applications With Debug Information

This topic explains how to generate a Delphi application with debug information for AQtrace. The topic concerns Borland Delphi ver. 3.0 - 7.0. To learn how to prepare applications created with other Delphi versions, see *Compiling Applications With Debug Information*.

The Delphi compiler generates debug information in the *TD32 format*. Debug info of this type is compiled into your executables. Besides TD32, Delphi can generate .map files that can then be converted to *.sym files* that store information on the application's functions. In addition, using a special utility (*StripTDS.exe*) you can extract TD32 debug information from binary modules and store it to external *.tds*

files.

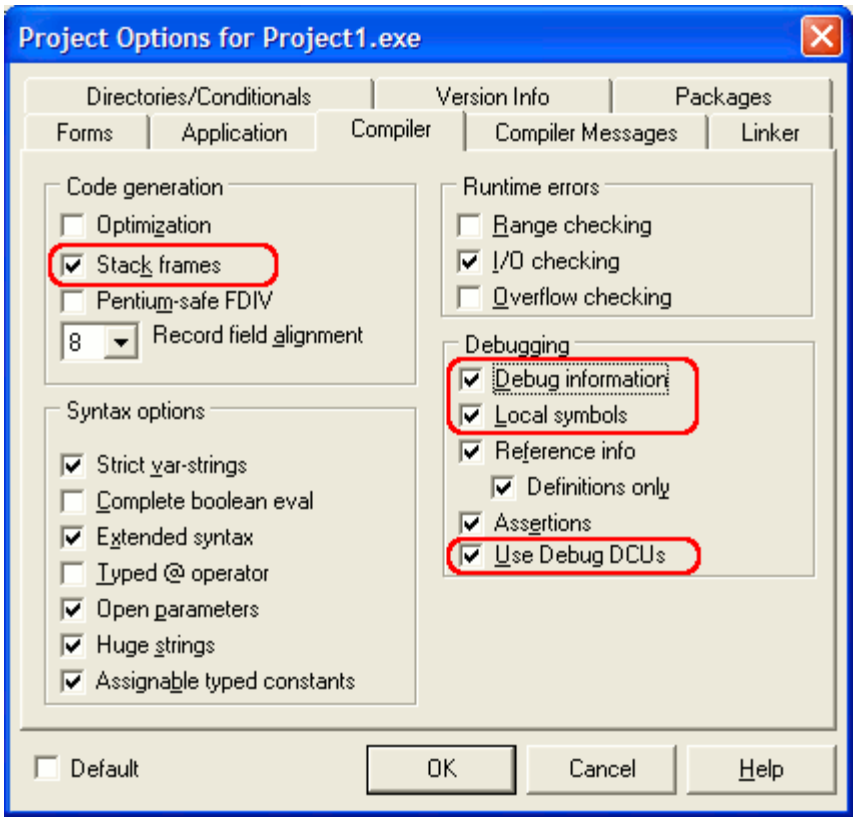
AQtrace can work with all of these formats. However, we recommend that you use external .tds or .sym files for release builds of your products. This will decrease the overall size of your executables. The TD32 format of debug information compiled into executables can be used for intermediate or special builds. Below is a detailed description of how to change compiler options to use the desired format of debug information.

AQtrace is not compatible with third-party tools that modify the binary code of your application, for example, to include a custom exception handling mechanism. An example of such a tool is EurekaLog. We recommend that you generate the debug information for your application before processing it with such tools.

Internal Debug Information (TD32)

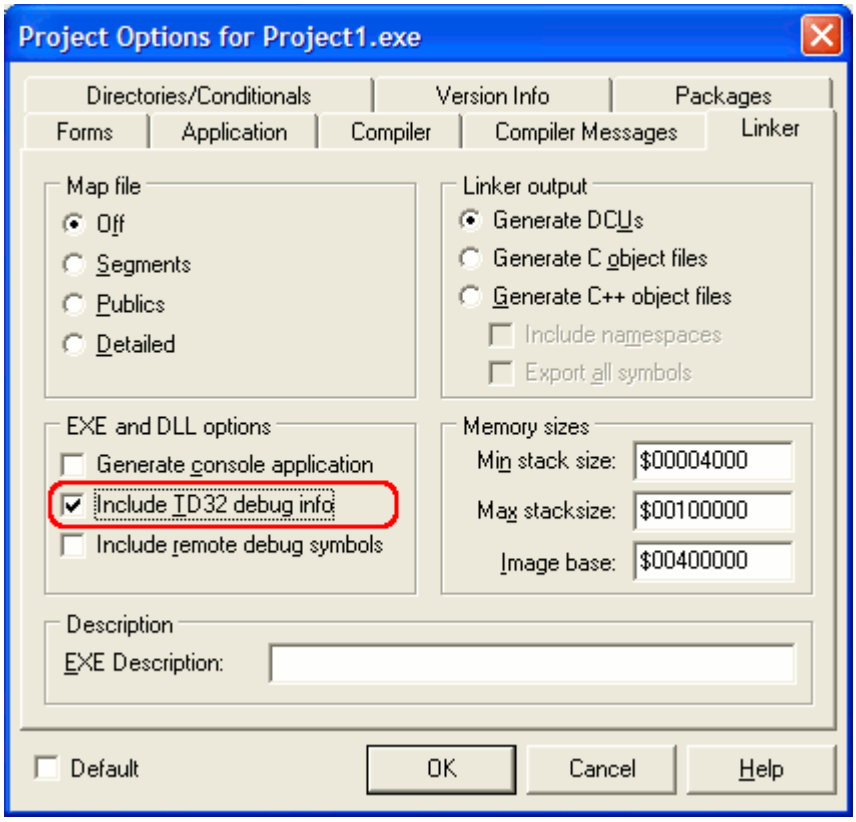
To compile an application with TD32 debug information:

1. Open your project in Borland Delphi.
2. Choose **Project | Options** from Delphi's main menu and select the **Compiler** tabbed page.
3. Select the **Debug information** check box in the **Debugging** section of the Compiler page.
4. Select the **Local Symbols** check box in the Debugging section.
5. To trace VCL functions, select the **Use Debug DCUs** check box in the Debugging section (this check box is available in Delphi 5 or later). Otherwise, AQtrace will be able to profile only those classes that are defined in your application.



6. Switch to the **Linker** tabbed page. In the **EXE and DLL options** section, select the **Include TD32**

debug info check box:



7. Rebuild your application.

After you compile your modules, you should place them in the build storage. For more information on this, see *Organizing Build Storage*.

External Debug Information (TDS Files)

To generate .tds files you can apply SmartBear's *StripTDS* utility. This utility removes debug information from the binary files and saves it to separate .tds files.

Note: The utility only works with those sections in the binary files that contain debug information. It does not change the code and data sections, so your modules will still work as designed.

The StripTDS utility is shipped along with AQtrace, its executable is *<AQtrace>\Bin\StripTDS.exe*.

To create external .tds files for the modules of your Win32 Delphi application, do the following:

1. Compile your application with TD32 debug information as described *above*.
2. Apply the StripTDS utility to each compiled executable and DLL.

   To process all EXE and DLL files in the desired folder and its subfolders using the StripTDS utility, use the following command:

```
StripTDS.exe -r -w C:\MyApp\*.exe;C:\MyApp\*.dll
```

There is no need to ship the generated .tds files along with the release version of your application to users. Just copy them along with the appropriate binary modules into the build storage (that is, each .tds file

should reside in the folder in which its executable file is). For more information on creating build storages, see *Organizing Build Storage*.

External Debug Information (SYM Files)

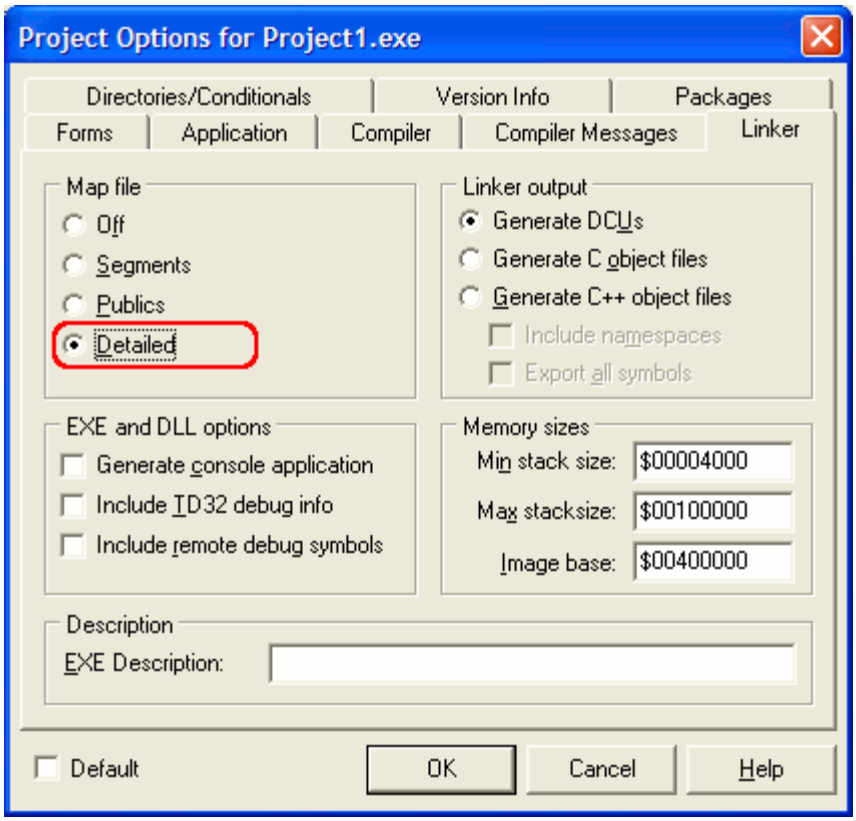
.Sym files are generated from .map files, which are created by the Delphi compiler. You should then convert each .map file to a .sym file by using the MapSym utility that is included in Windows SDK or Microsoft Visual Studio 2005:

- You can download the Windows SDK package from Microsoft's web site (http://www.microsoft.com/downloads).
- If you have Visual Studio 2005, you can find this utility in the following folder:

  <Program Files>\Microsoft Visual Studio 8\Common7\Tools\Bin\MapSym.Exe

So, to create .sym files, you should first compile your Delphi application for .map files and then convert these files to the .sym format. Below is a detailed description:

1. Change your Delphi project's settings to create .map files:
   - Open your application in Borland Delphi.
   - Choose **Project | Options** from Delphi's main menu and select the **Linker** tabbed page.
   - On the Linker page, select **Detailed** in the **Map file** section.



   - Press **OK** to save the changes and to close the dialog.
   - Recompile your application.

   Delphi will create the .map files during application compilation.
2. Apply MapSym.exe to each generated .map file. To convert a .map file to the appropriate .sym

file, use the following command line:

```
MapSym.exe -o MyFile.sym MyFile.map
-- or --
MapSym.exe MyFile.map
```

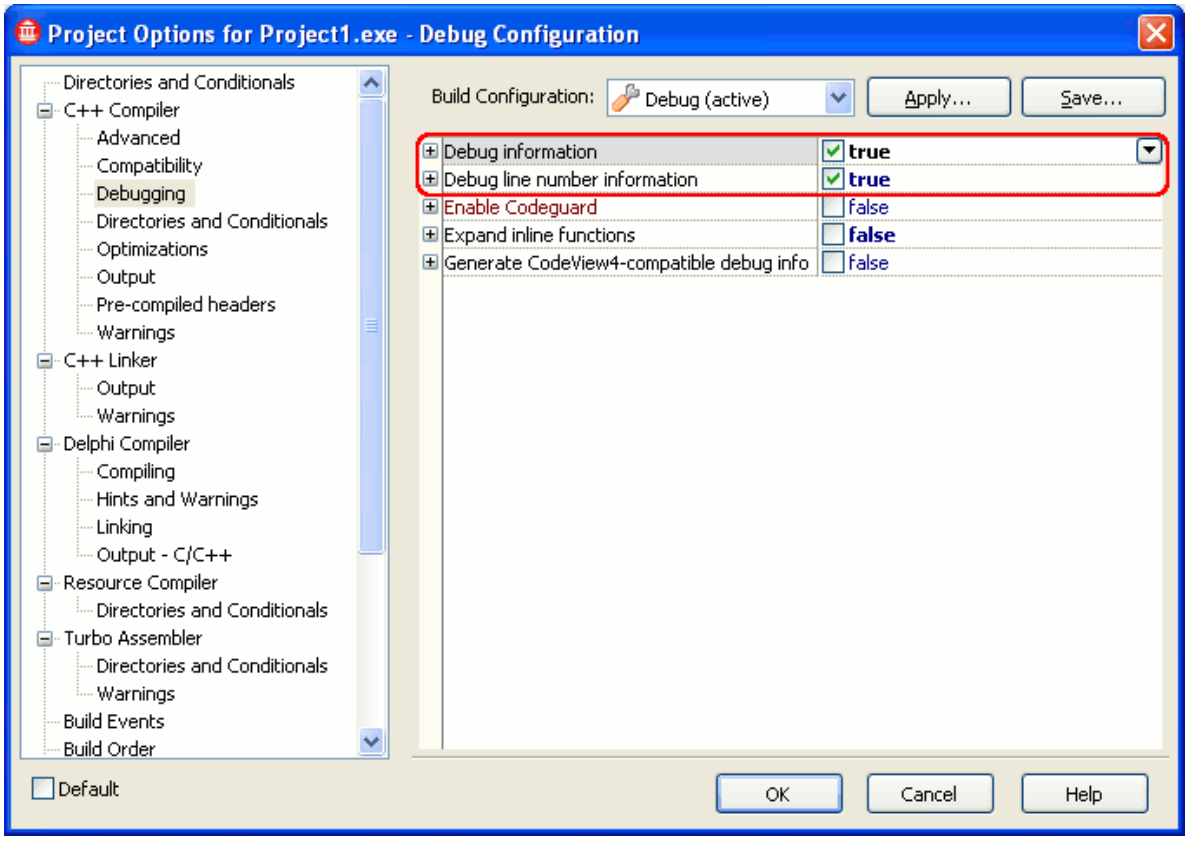
After you create a .sym file, put it along with the appropriate executable or DLL into the build storage (that is, each .sym file should reside in the folder in which its executable file is). For more information on creating build storages, see *Organizing Build Storage*.

Compiling Embarcadero C++Builder XE Applications With Debug Information

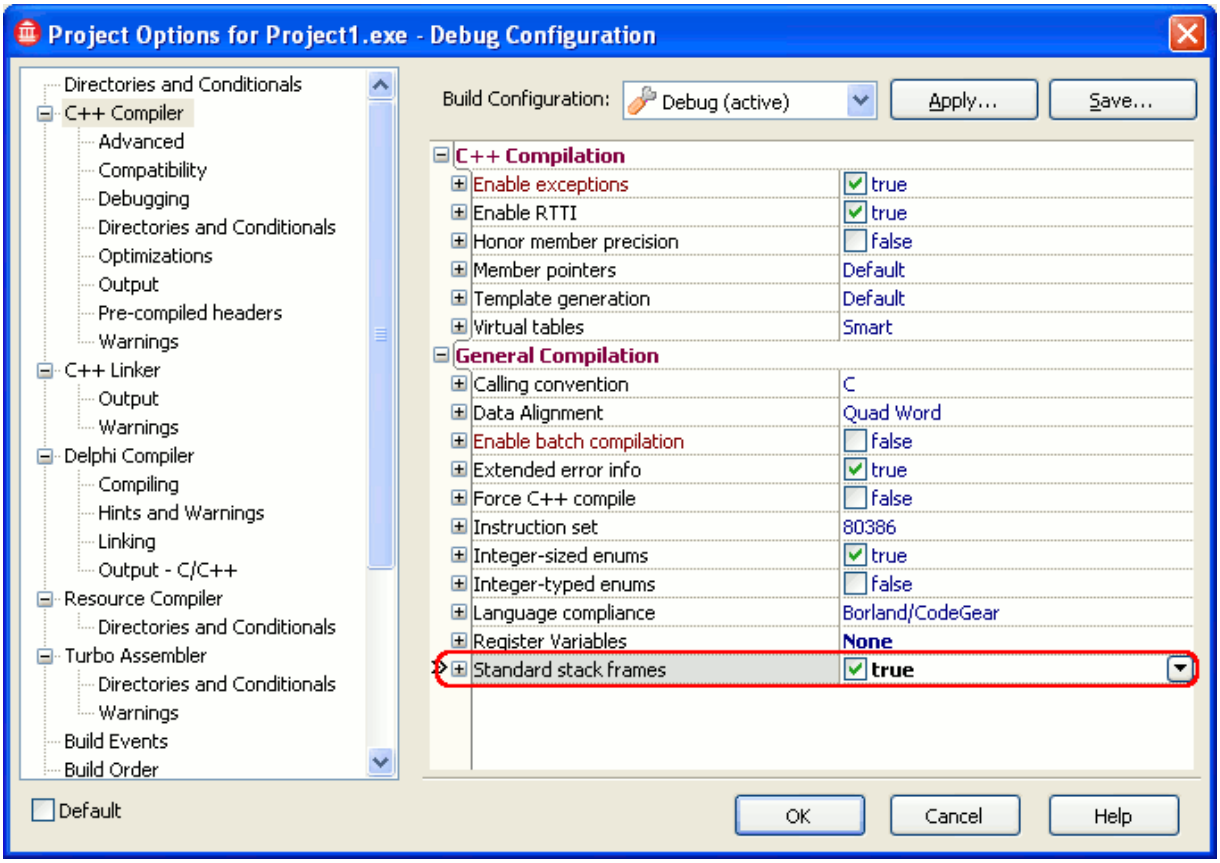
This topic explains how to include debug information in applications created with Embarcadero C++Builder XE and compile these applications for AQtrace. To learn how to prepare applications created with other C++Builder versions, see *Compiling Applications With Debug Information*.

To prepare an Embarcadero C++Builder XE application for AQtrace, you must first ensure that it includes debug info. Follow these steps:

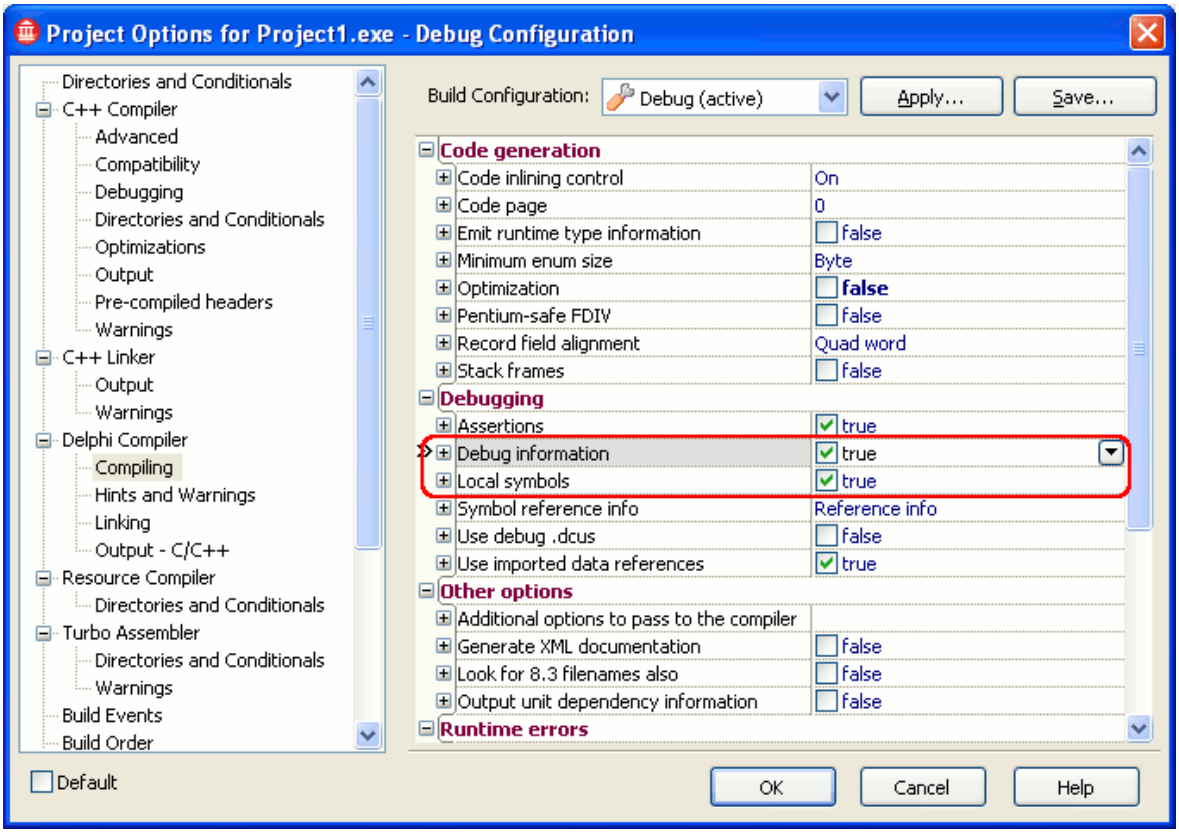
1. Open your project in Embarcadero C++Builder XE.
2. Select **Project | Options** from the main menu. This will open the **Project Options** dialog.
3. To set the C++ compiler options, select the **C++ Compiler | Debugging** category from the tree view on the left of the dialog.
4. To include symbolic debug information, set the **Debug information** option to **True**. In addition, to refer this information to source line numbers, set the **Debug line number information** option to **True**.



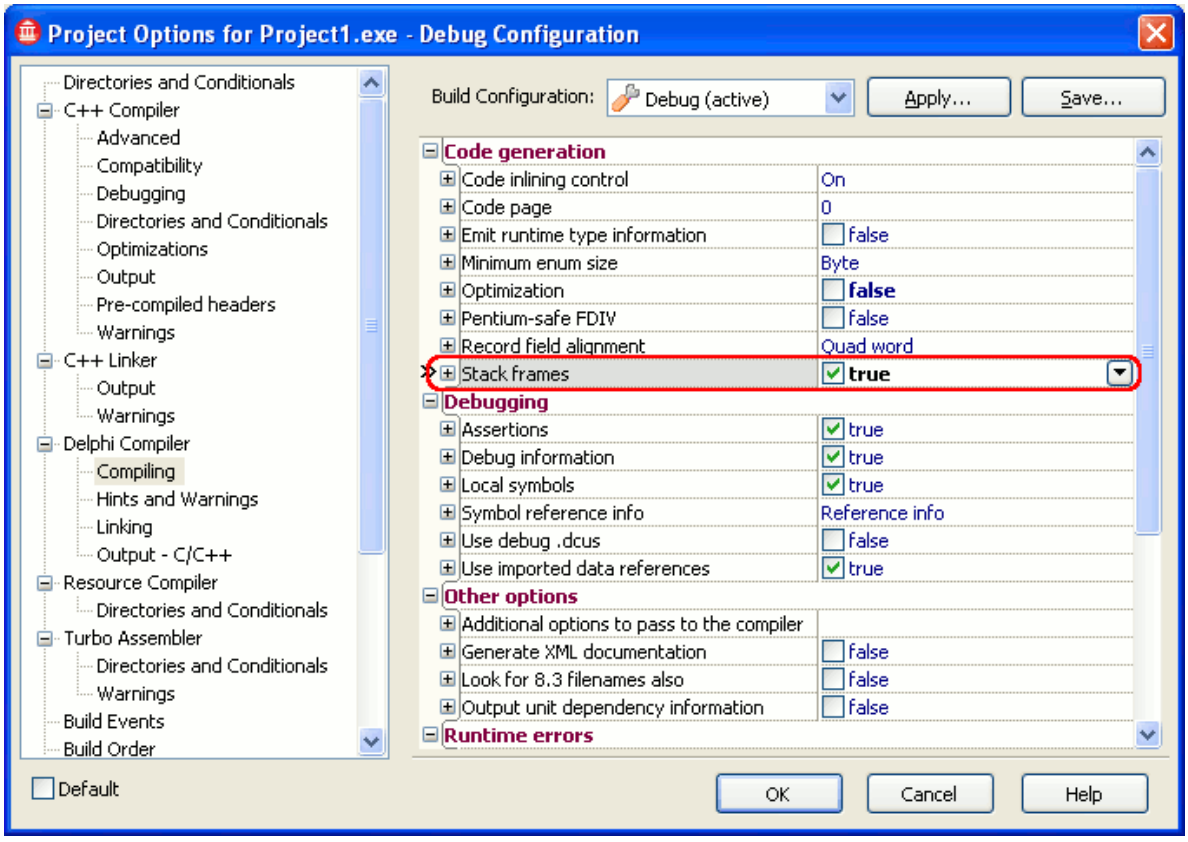
5. (Optional.) To generate stack frames when using the C++ compiler, switch to the **C++ Compiler** category and set the **Standard stack frames** option to **True**.



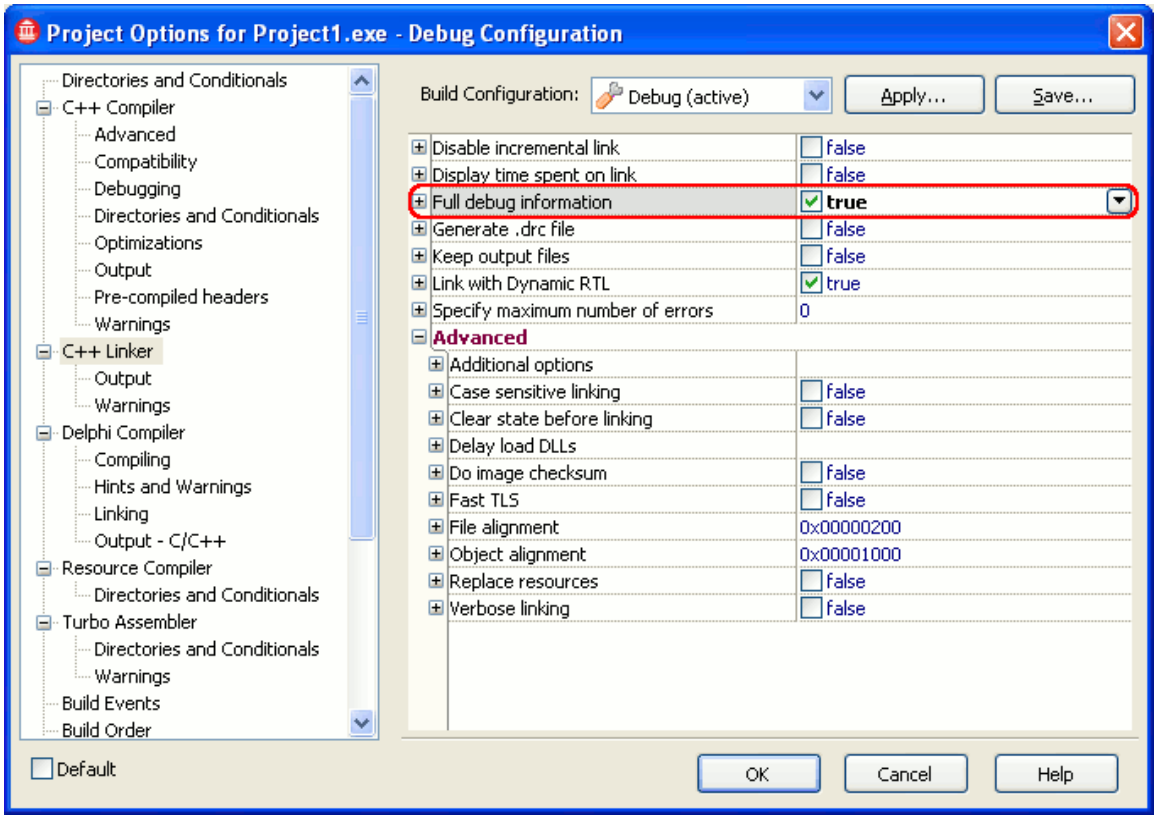
6. To set the Delphi compiler options, select the **Delphi Compiler | Compiling** category from the tree view on the left of the dialog.
7. To include symbolic debug information, set the **Debug information** option to **True**. In addition, to refer this information to source line numbers, set the **Local symbols** option to **True**.



8. (Optional.) To generate stack frames when using the Delphi compiler, switch to the **Delphi Compiler | Compiling** category and set the **Stack frames** to **True**.



9. To set the linker options, switch to the **C++ Linker** category and set the **Full debug information** option to **True**.



10. Once you have set the compiler and linker options correctly, rebuild your application.

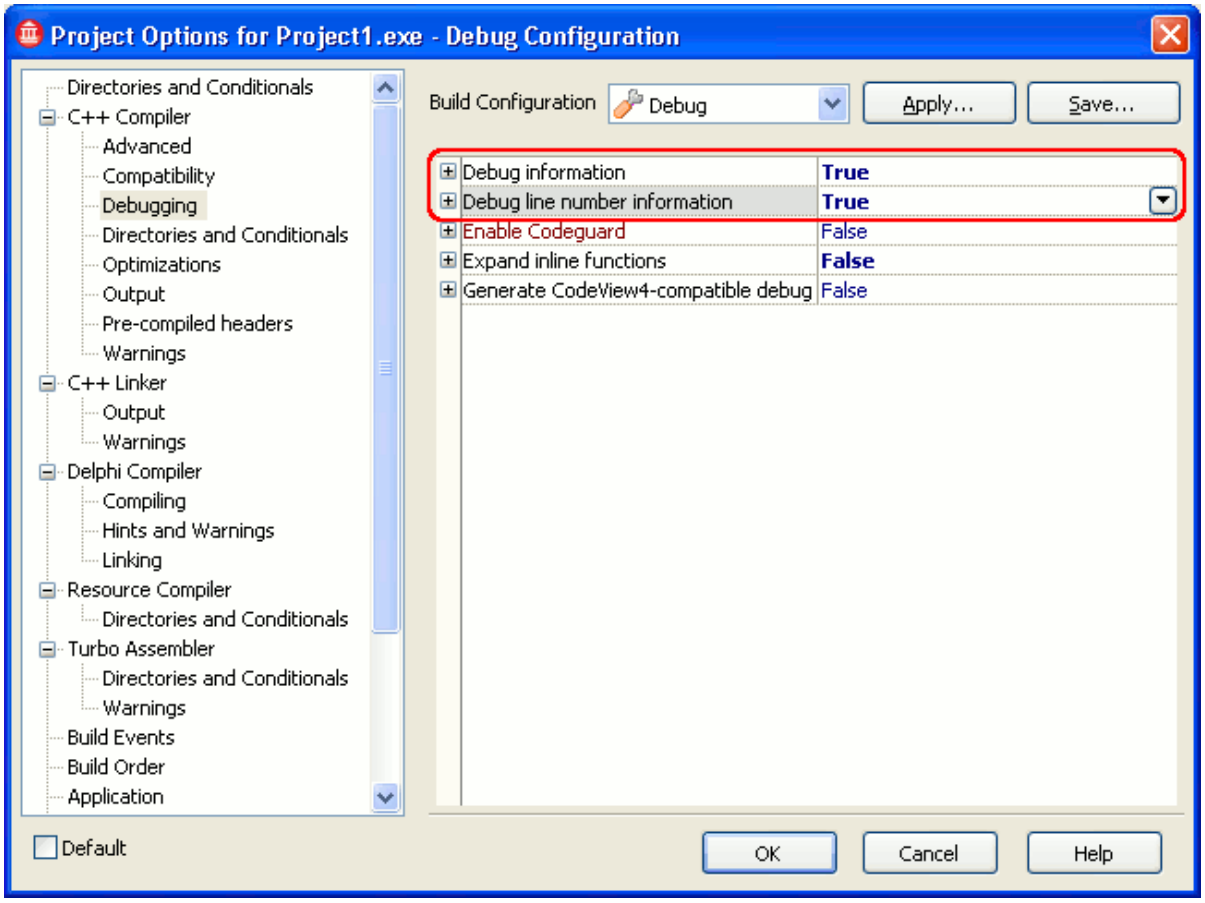
When your application is ready for release, remember to recompile it without debug information to reduce the application size.

Compiling Embarcadero C++Builder 2010 Applications With Debug Information

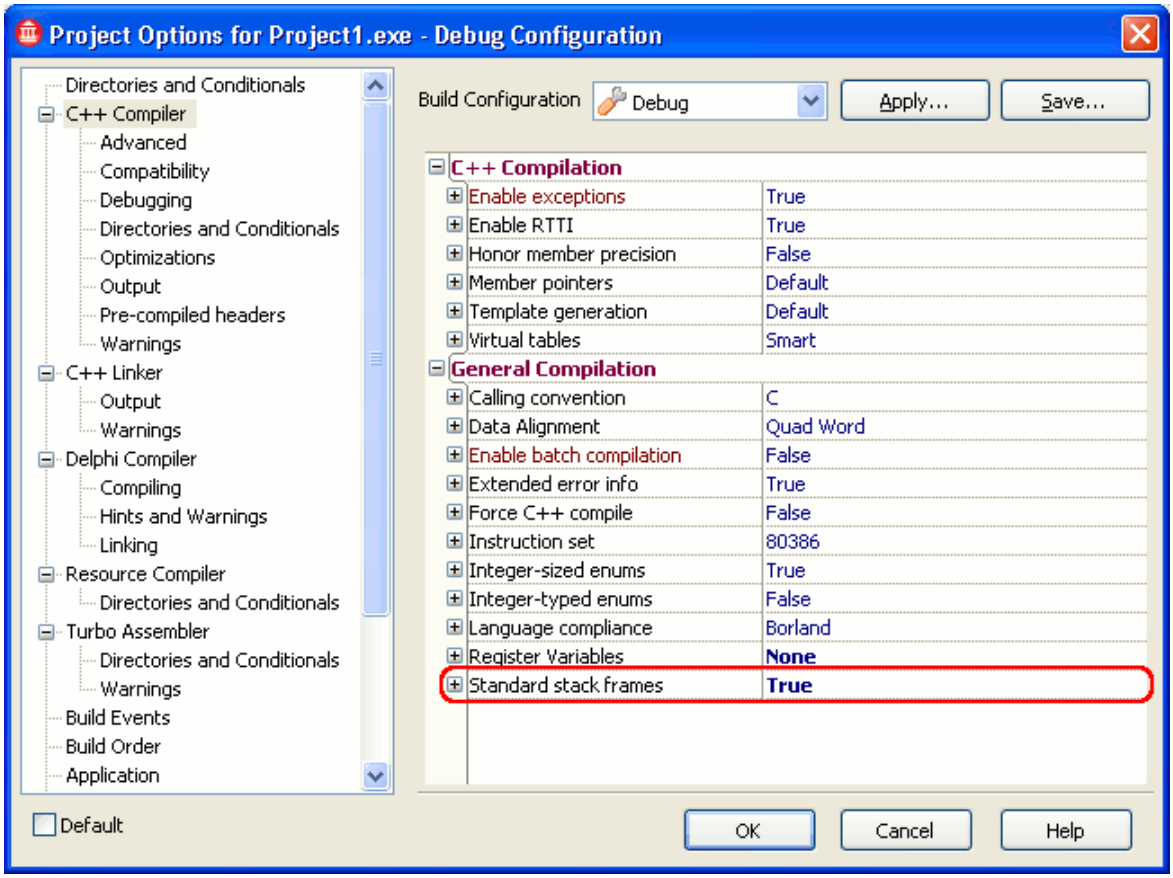
This topic explains how to include debug information in applications created with Embarcadero C++Builder 2010 and compile these applications for AQtrace. To learn how to prepare applications created with other C++Builder versions, see *Compiling Applications With Debug Information*.

To prepare an Embarcadero C++Builder 2010 application for AQtrace, you must first ensure that it includes debug info. Follow these steps:

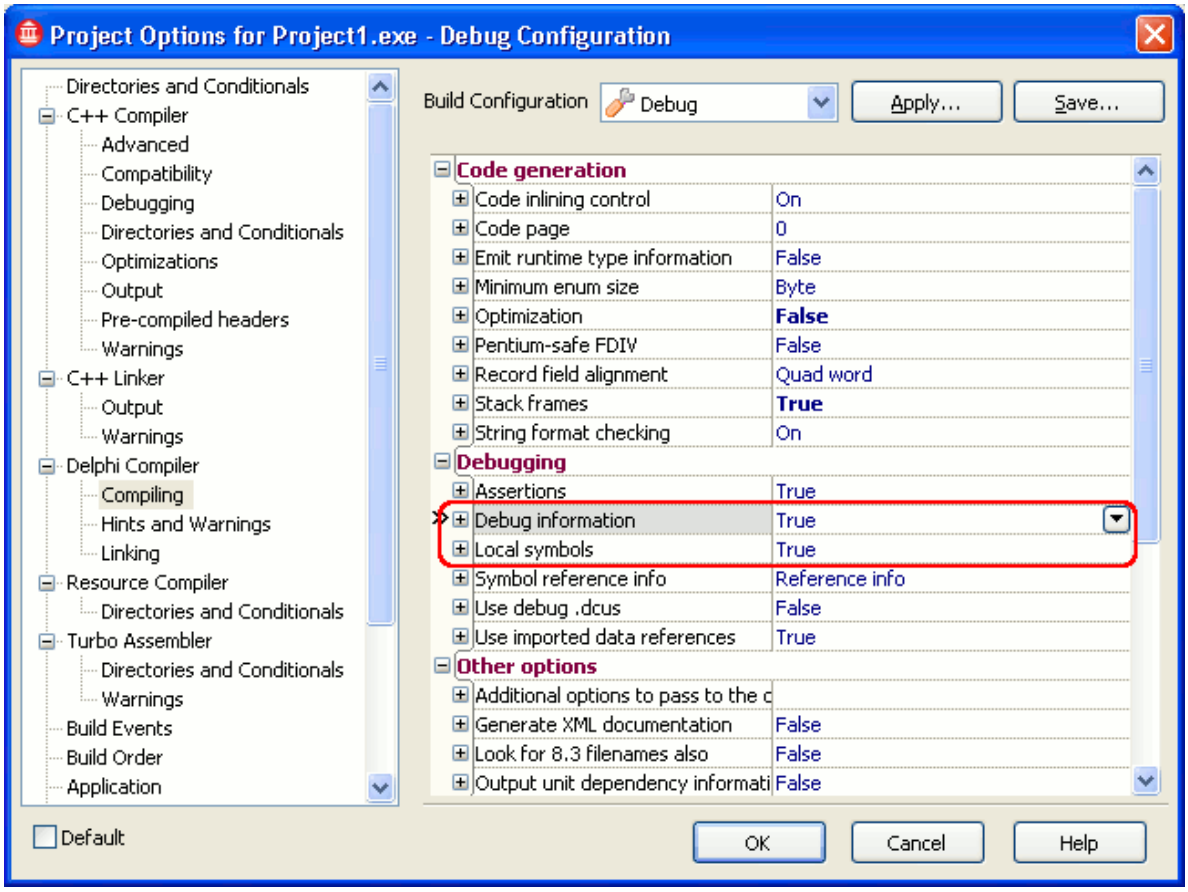
1. Open your project in Embarcadero C++Builder 2010.
2. Select **Project | Options** from the main menu. This will open the **Project Options** dialog.
3. To set the C++ compiler options, select the **C++ Compiler | Debugging** category from the tree view on the left of the dialog.
4. To include symbolic debug information, set the **Debug information** option to **True**. In addition, to refer this information to source line numbers, set the **Debug line number information** option to **True**.



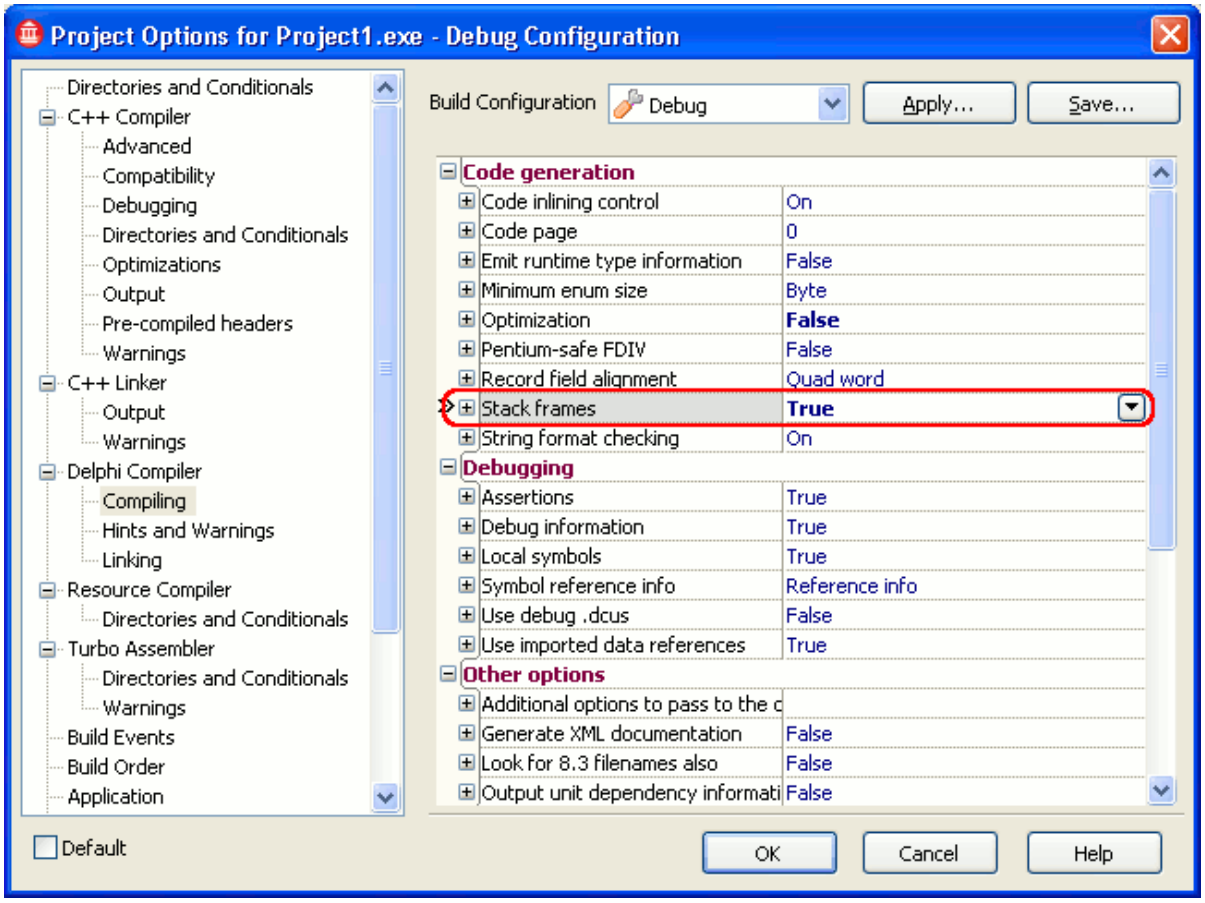
5. (Optional.) To generate stack frames when using the C++ compiler, switch to the **C++ Compiler** category and set the **Standard stack frames** option to **True**.



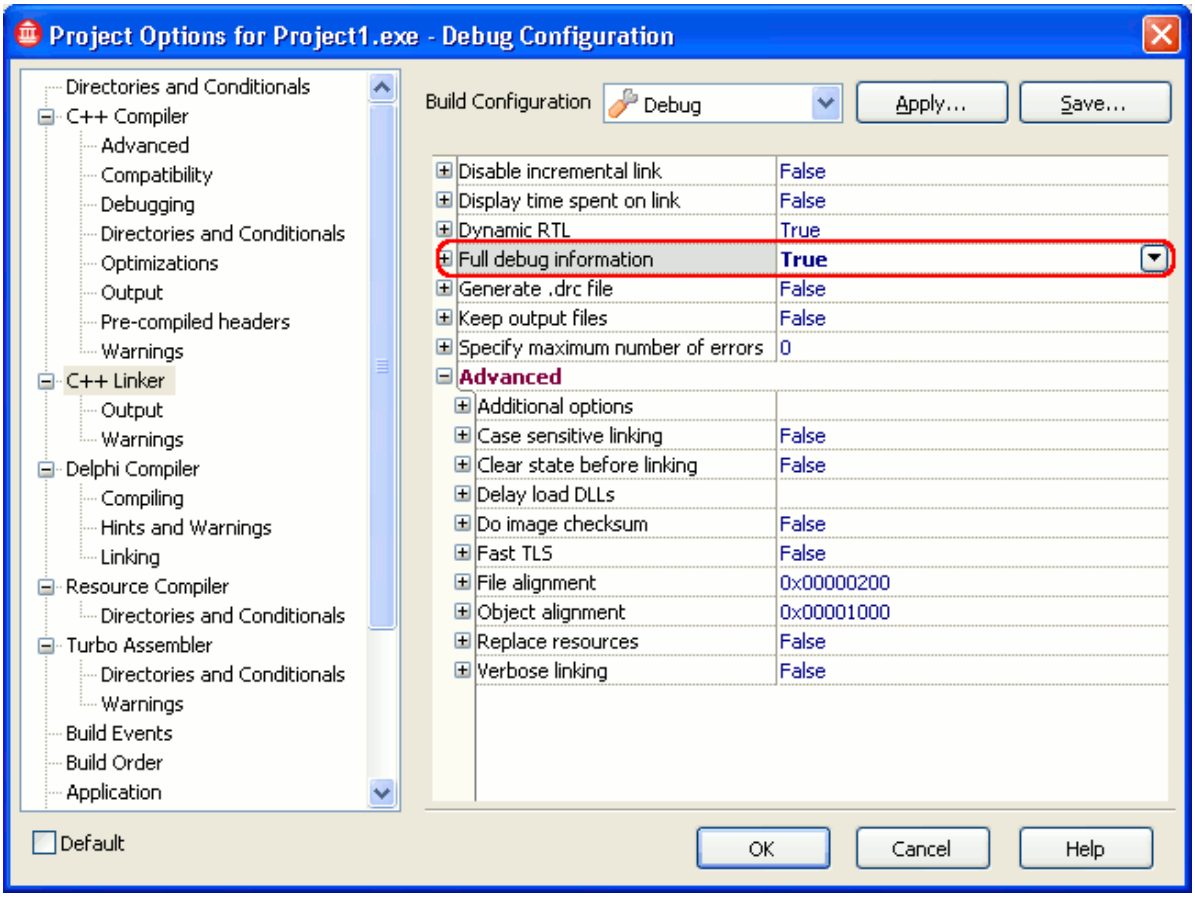
6. To set the Delphi compiler options, select the **Delphi Compiler | Compiling** category from the tree view on the left of the dialog.
7. To include symbolic debug information, set the **Debug information** option to **True**. In addition, to refer this information to source line numbers, set the **Local symbols** option to **True**.



8. (Optional.) To generate stack frames when using the Delphi compiler, switch to the **Delphi Compiler | Compiling** category and set the **Stack frames** to **True**.



9. To set the linker options, switch to the **C++ Linker** category and set the **Full debug information** option to **True**.



10. Once you have set the compiler and linker options correctly, rebuild your application.

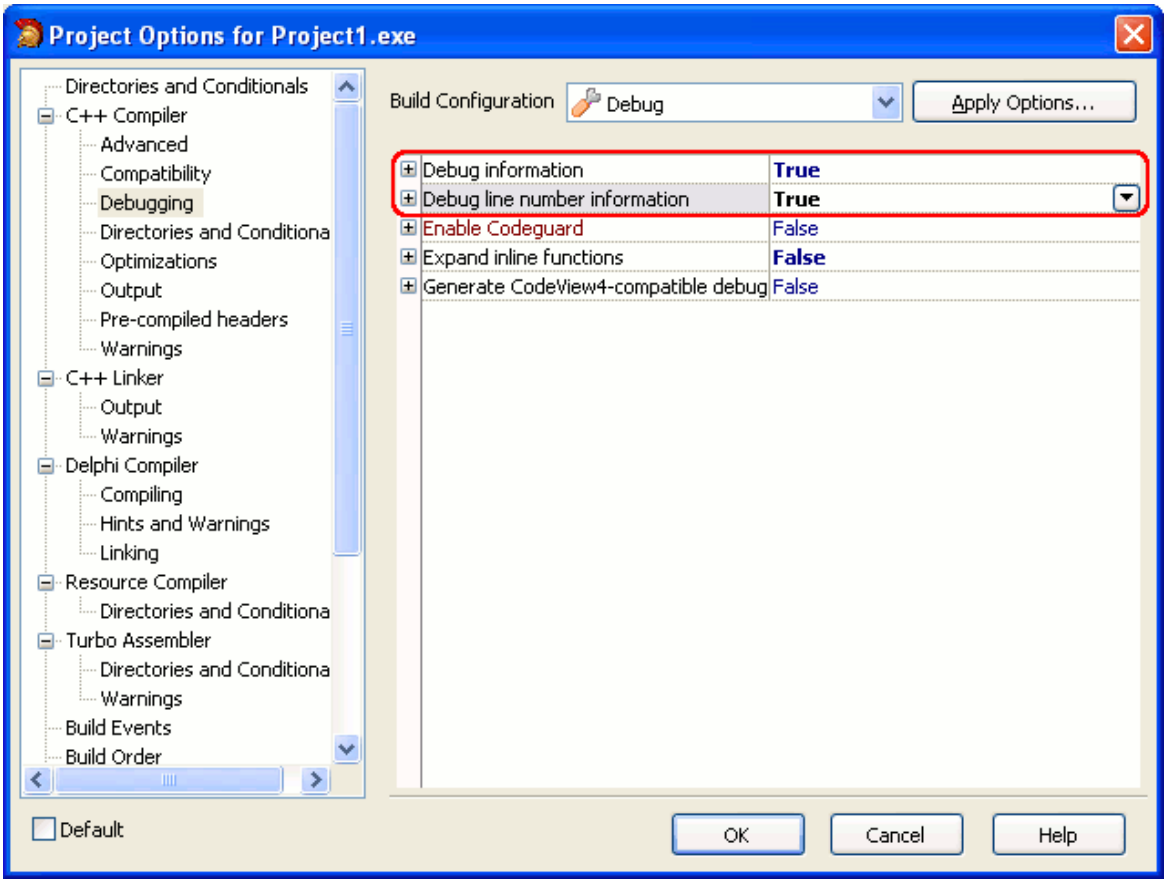
When your application is ready for release, remember to recompile it without debug information to reduce the application size.

Compiling CodeGear C++Builder 2009 Applications With Debug Information

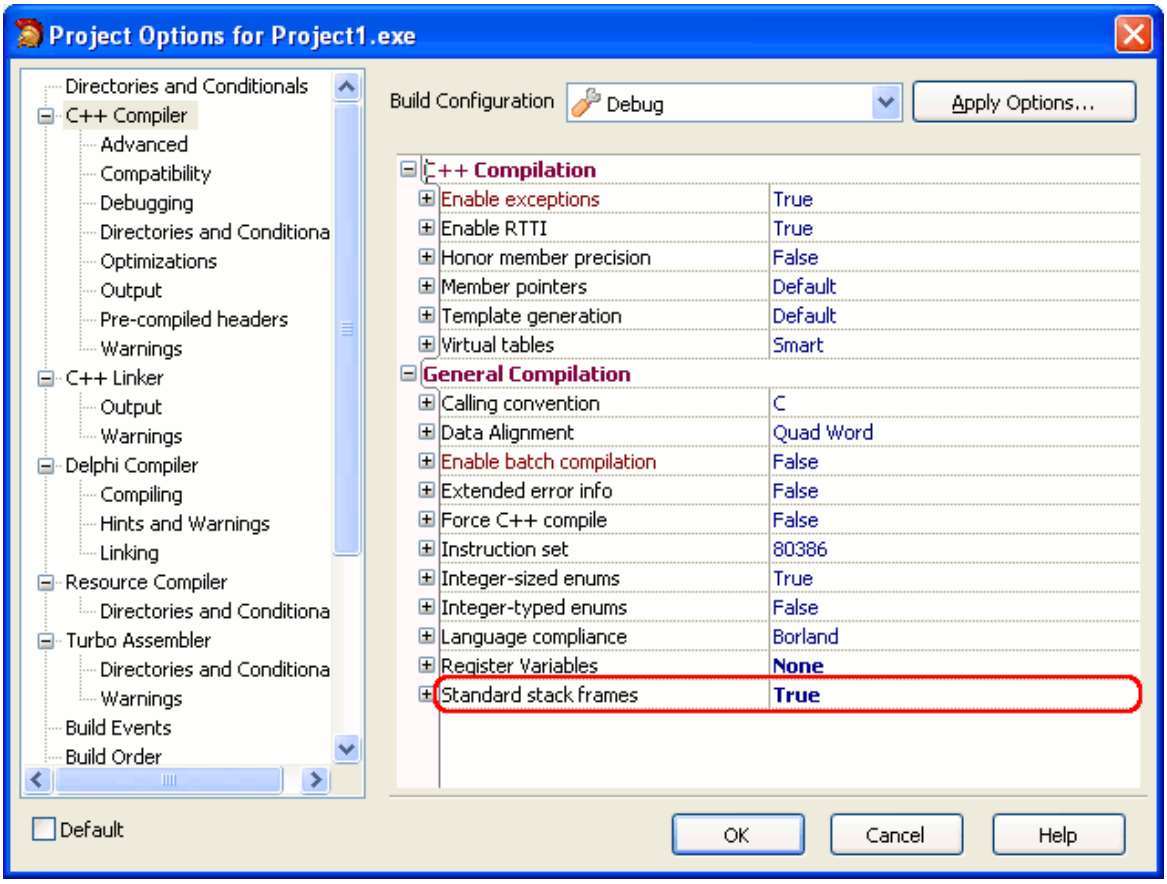
This topic explains how to include debug information in applications created with CodeGear C++Builder 2009 and compile these applications for AQtrace. To learn how to prepare applications created with other C++Builder versions, see *Compiling Applications With Debug Information*.

To prepare a CodeGear C++Builder 2009 application for AQtrace, you must first ensure that it includes debug info. Follow these steps:

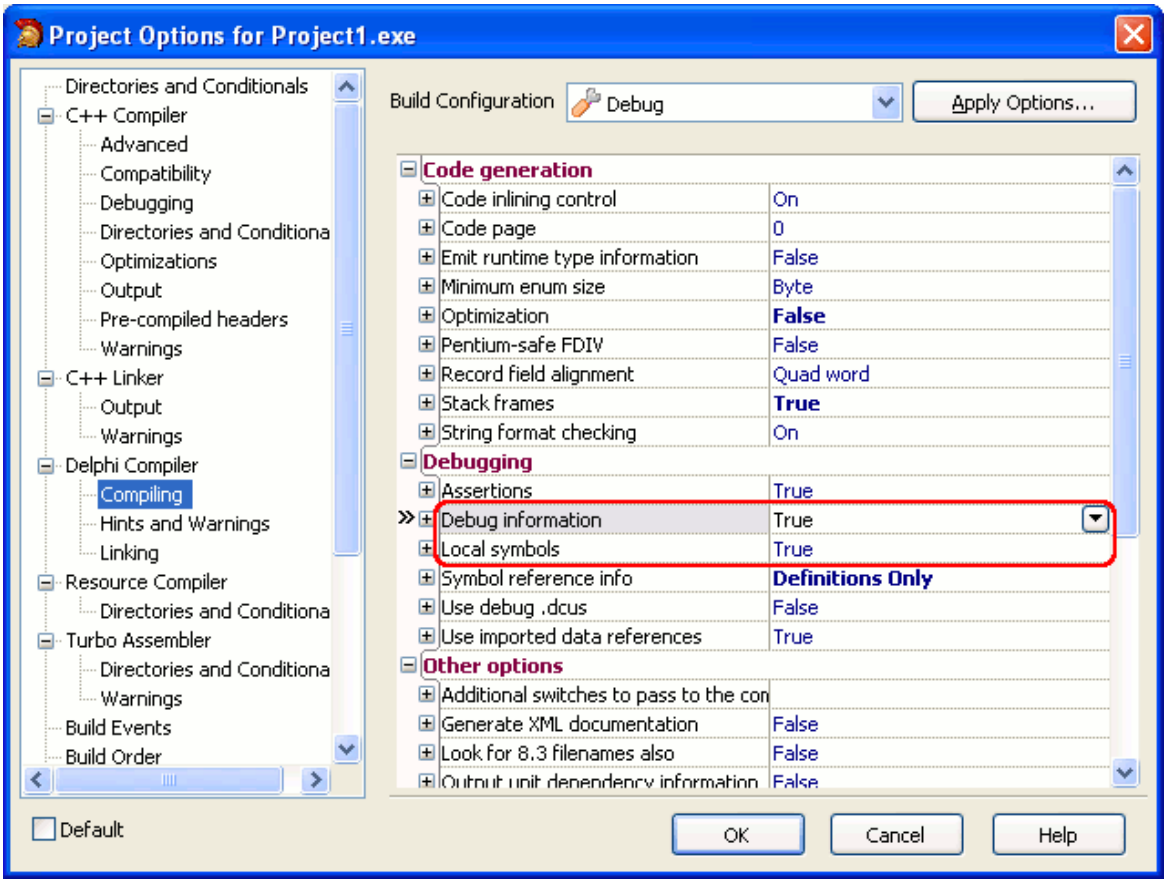
1. Open your project in CodeGear C++Builder 2009.
2. Select **Project | Options** from the main menu. This will open the **Project Options** dialog.
3. To set the C++ compiler options, select the **C++ Compiler | Debugging** category from the tree view on the left of the dialog.
4. To include symbolic debug information, set the **Debug information** option to **True**. In addition, to refer this information to source line numbers, set the **Debug line number information** option to **True**.



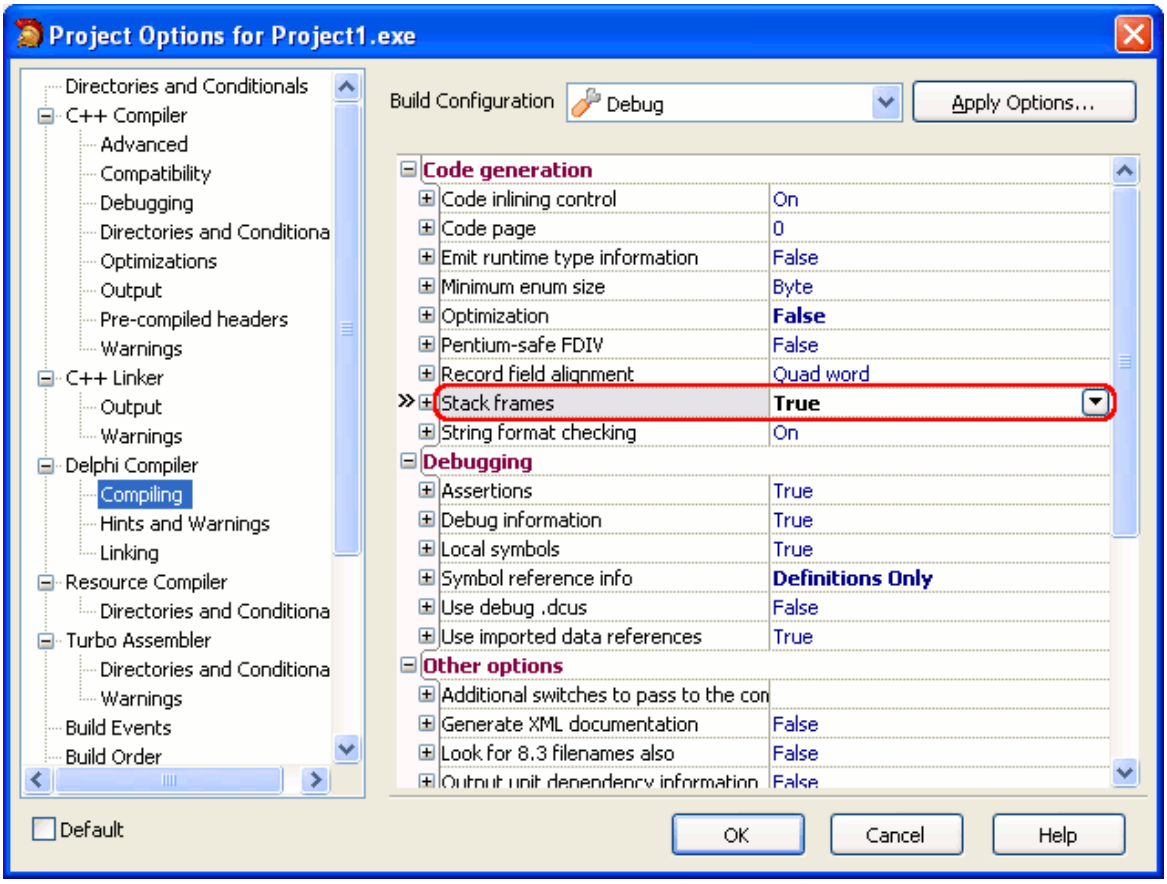
5. (Optional.) To generate stack frames when using the C++ compiler, switch to the **C++ Compiler** category and set the **Standard stack frames** option to **True**.



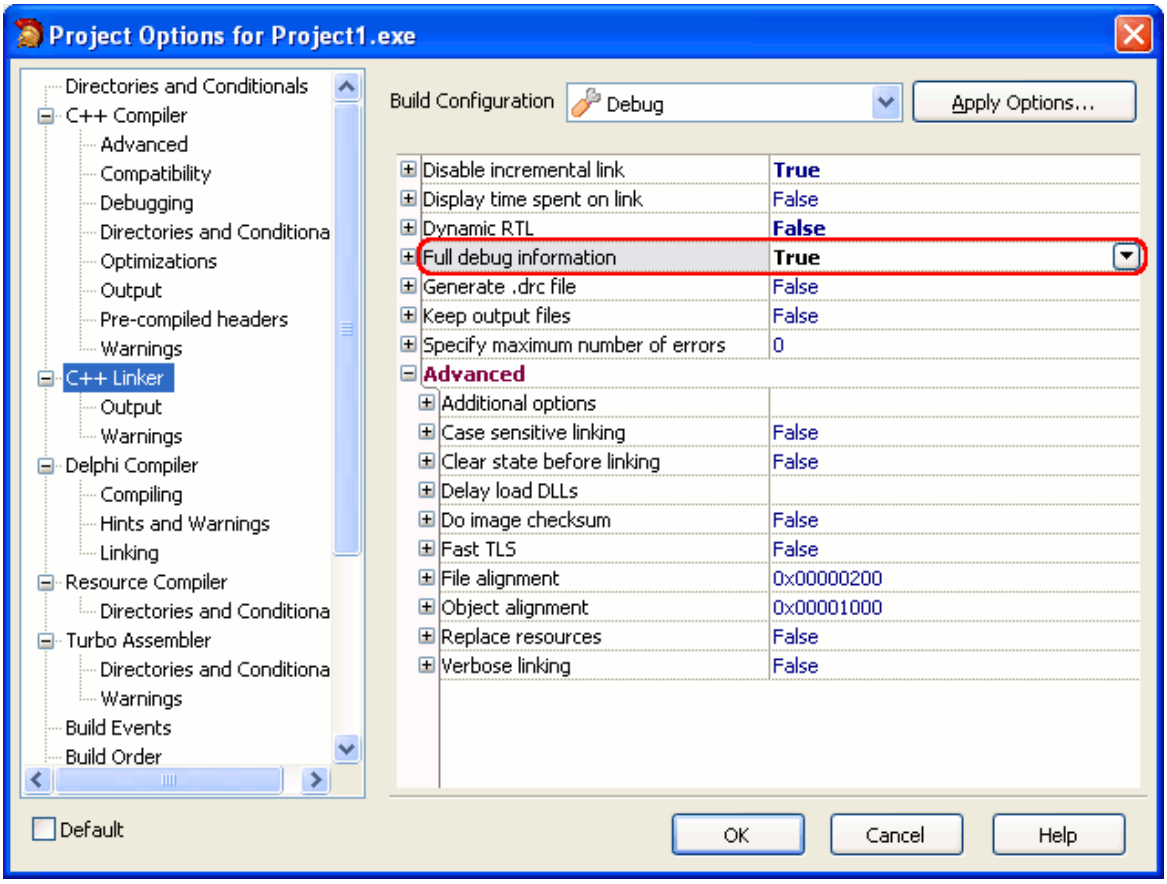
6. To set the Delphi compiler options, select the **Delphi Compiler | Compiling** category from the tree view on the left of the dialog.
7. To include symbolic debug information, set the **Debug information** option to **True**. In addition, to refer this information to source line numbers, set the **Local symbols** option to **True**.



8. (Optional.) To generate stack frames when using the Delphi compiler, switch to the **Delphi Compiler | Compiling** category and set the **Stack frames** to **True**.



9. To set the linker options, switch to the **C++ Linker** category and set the **Full debug information** option to **True**.



10. Once you have set the compiler and linker options correctly, rebuild your application.

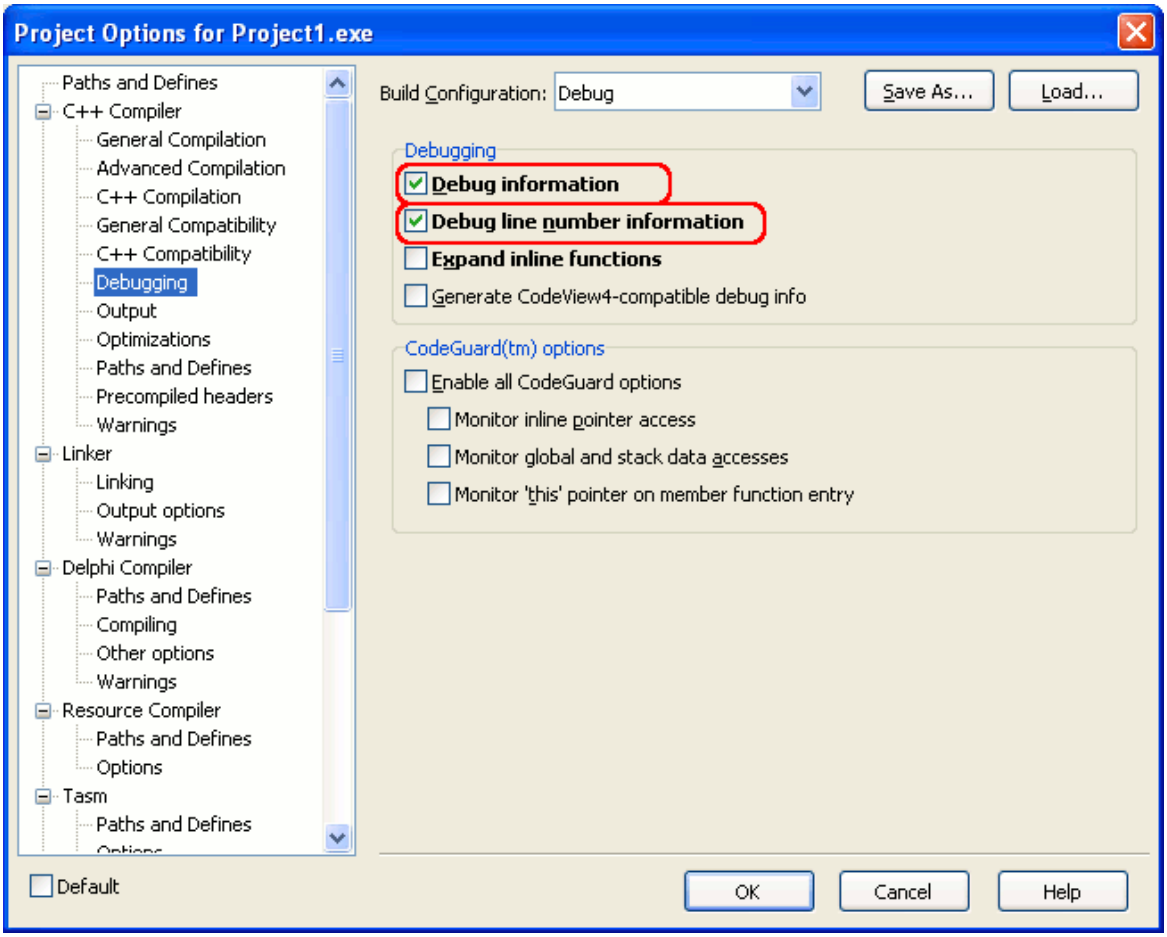
When your application is ready for release, remember to recompile it without debug information to reduce the application size.

Compiling CodeGear C++Builder 2007 Applications With Debug Information

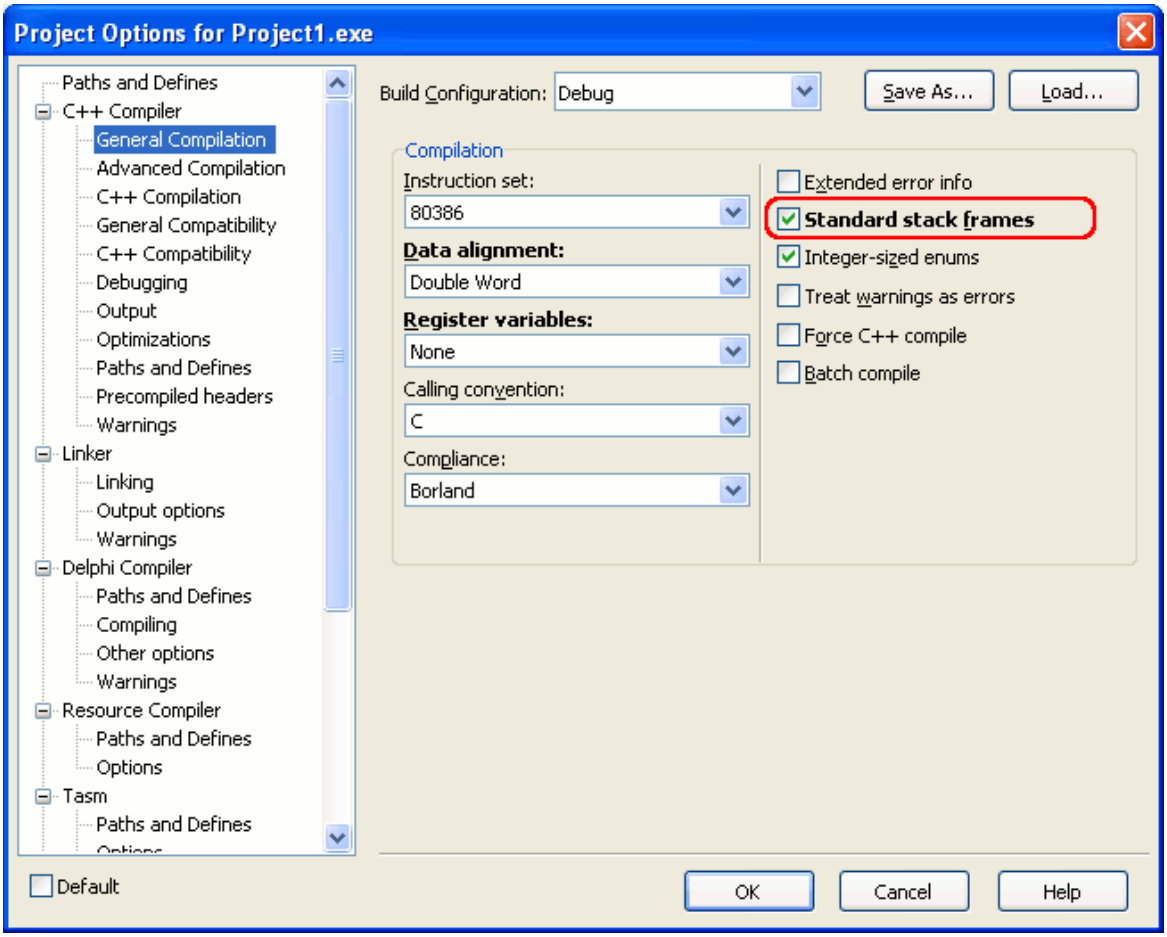
This topic explains how to include debug information in applications created with CodeGear C++Builder 2007 and compile these applications for AQtrace. To learn how to prepare applications created with other C++Builder versions, see *Compiling Applications With Debug Information*.

To prepare a CodeGear C++Builder 2007 application for AQtrace, you must first ensure that it includes debug info. Follow these steps:

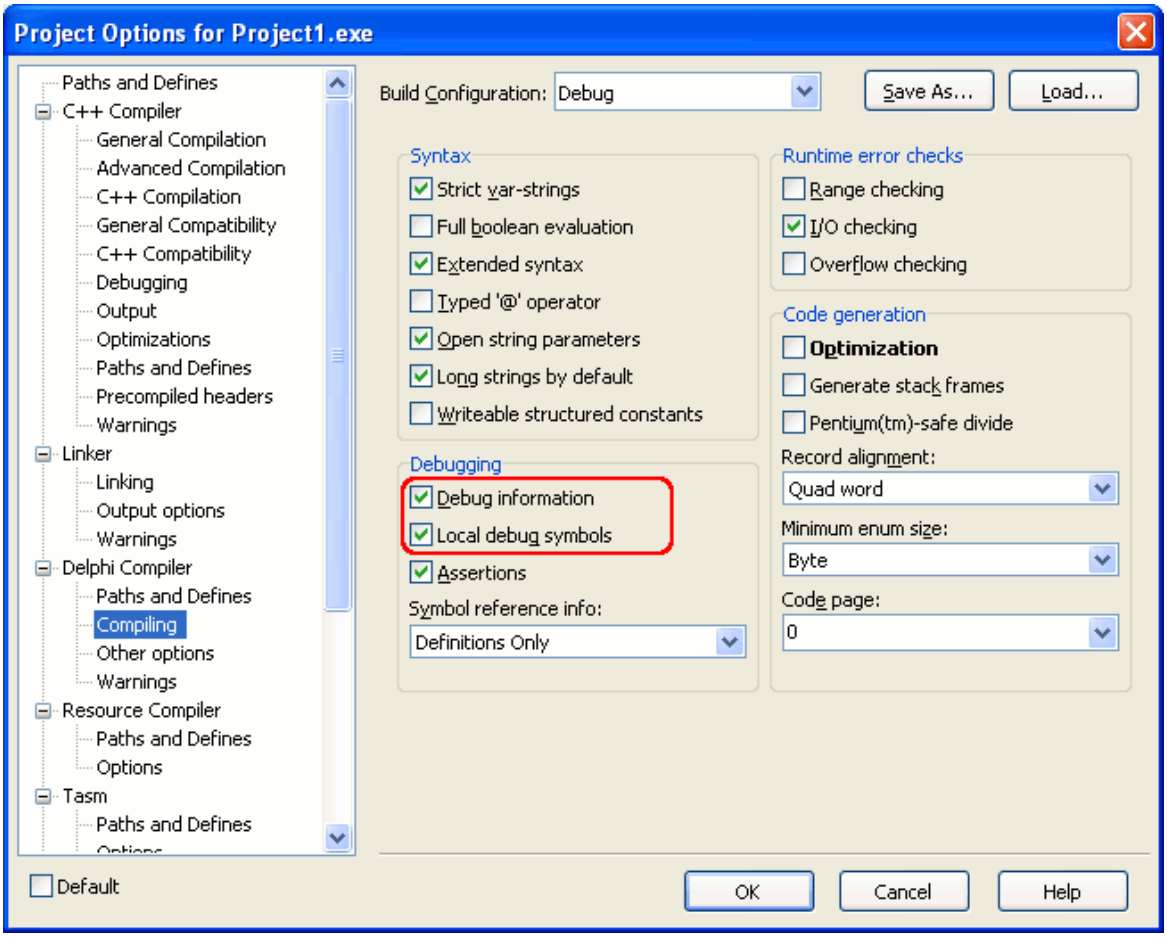
1. Open your project in CodeGear C++Builder 2007.
2. Select **Project | Options** from the main menu. This will open the **Project Options** dialog.
3. To set the C++ compiler options, select the **C++ Compiler | Debugging** category from the tree view on the left of the dialog.
4. To include symbolic debug information, check **Debug information**. In addition, to refer this information to source line numbers, check **Debug line number information**.



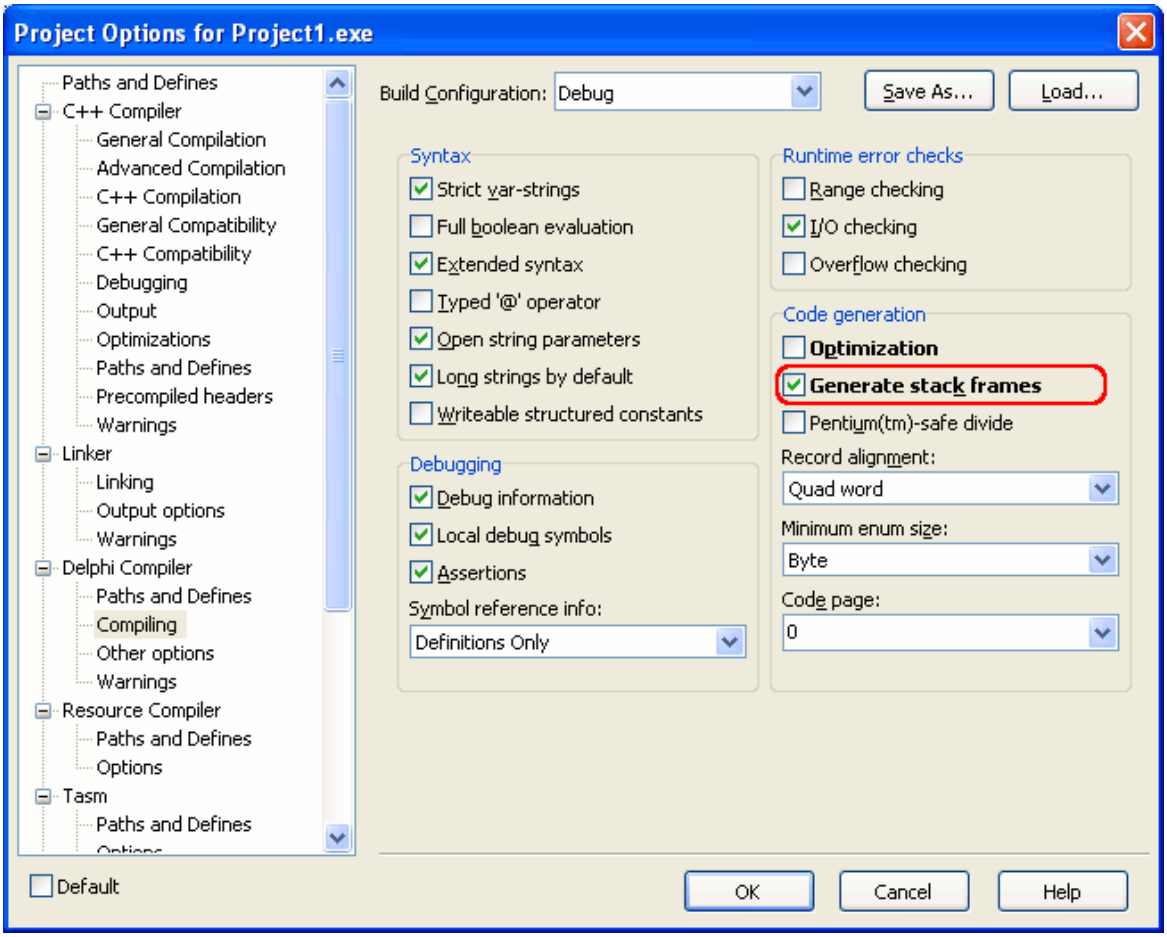
5. (Optional.) To generate stack frames when using the C++ compiler, switch to the **C++ Compiler | General Compilation** category and check **Standard stack frames**.



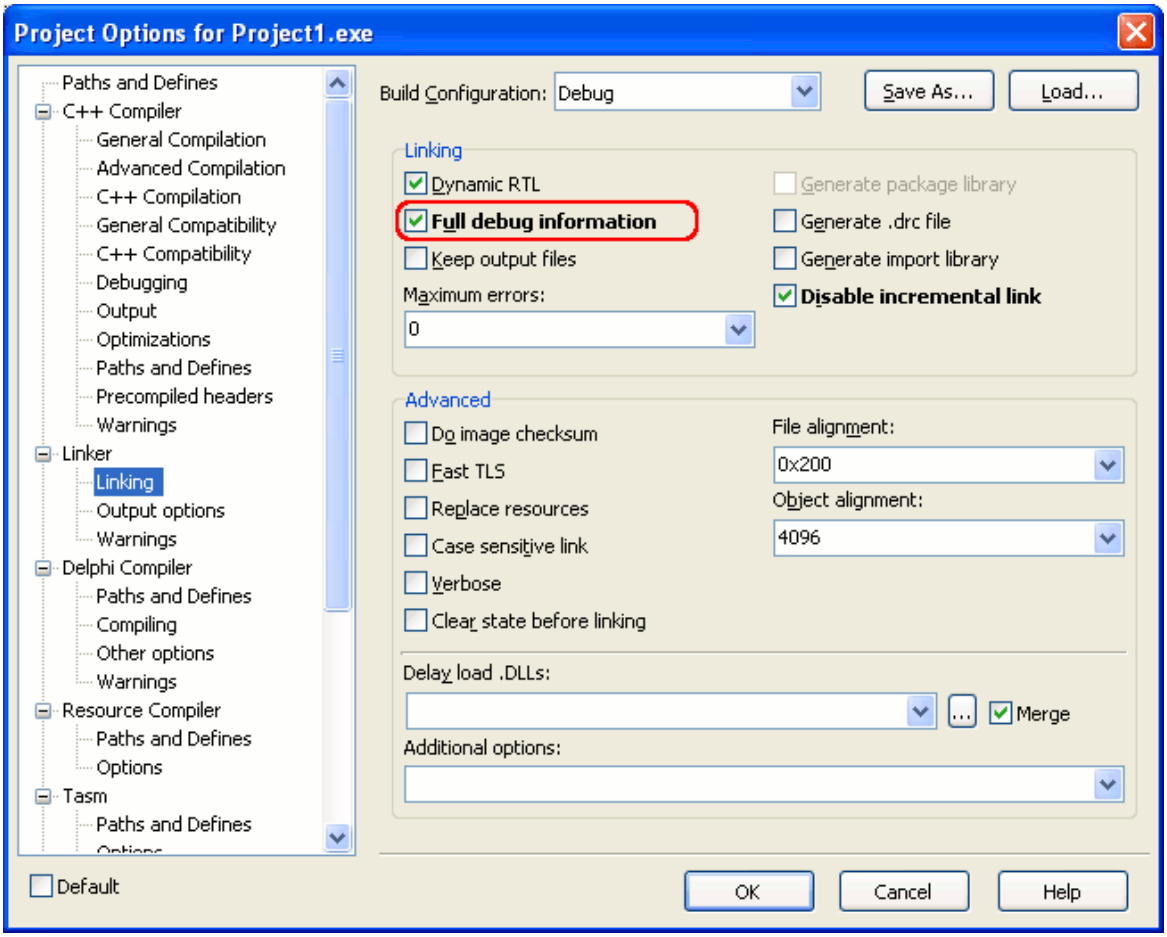
6. To set the Delphi compiler options, select the **Delphi Compiler | Compiling** category from the tree view on the left of the dialog.
7. To include symbolic debug information, check **Debug information** in the **Delphi Compiler | Compiling** category. In addition, to refer this information to source line numbers, check **Local debug symbols**.



8. (Optional.) To generate stack frames when using the Delphi compiler, switch to the **Delphi Compiler | Compiling** category and check **Generate stack frames**.



9. To set the linker options, switch to the **Linker | Linking** category and check **Full debug information**.



10. Once you have set the compiler and linker options correctly, rebuild your application.

When your application is ready for release, remember to recompile it without debug information to reduce the application size.

Compiling Borland C++Builder 2006 Applications With Debug Information

This topic explains how to include debug information in applications created with Borland C++Builder 2006 and compile these applications for AQtrace. To learn how to prepare applications created with other C++Builder versions, see *Compiling Applications With Debug Information*.

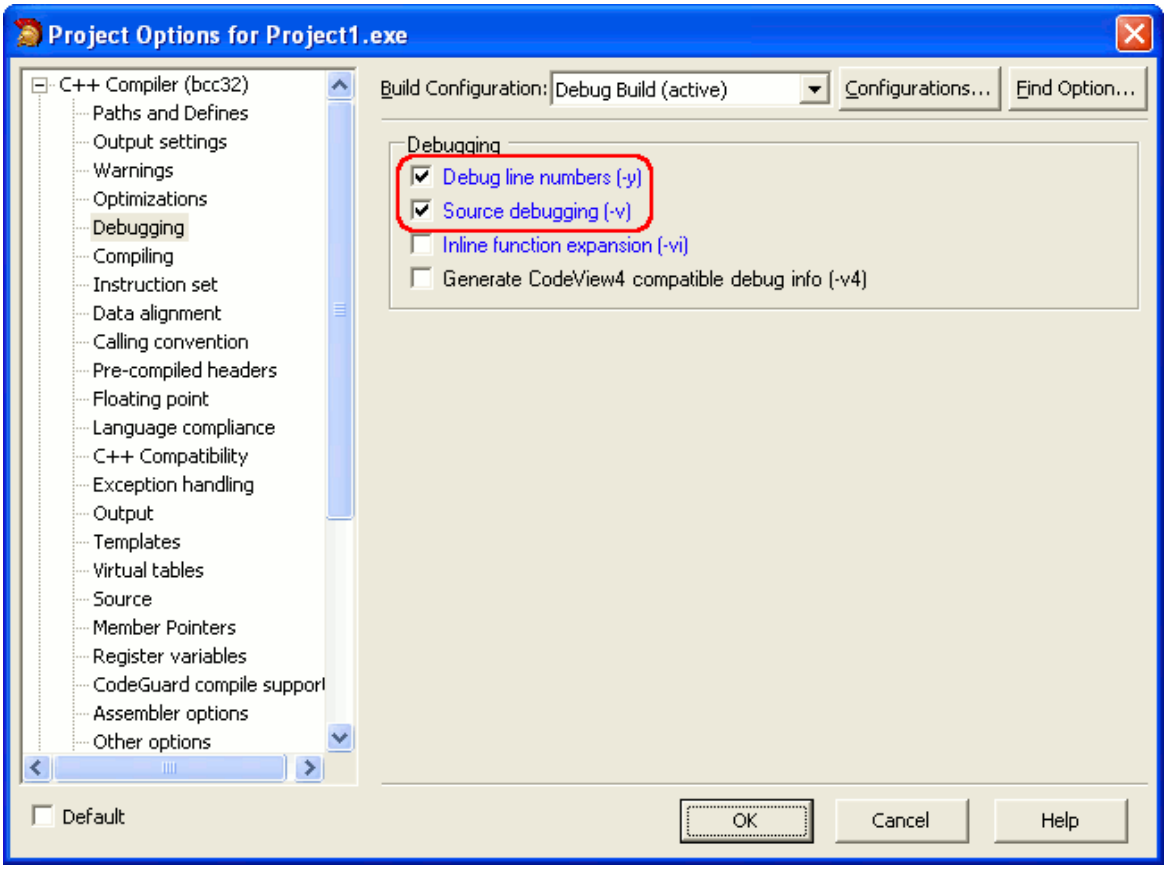
Borland C++Builder can generate debug information as an external .TDS file. This is one of the debug information formats supported by AQtrace.

Below is a detailed description of how to change compiler options to use the TDS format of debug information.

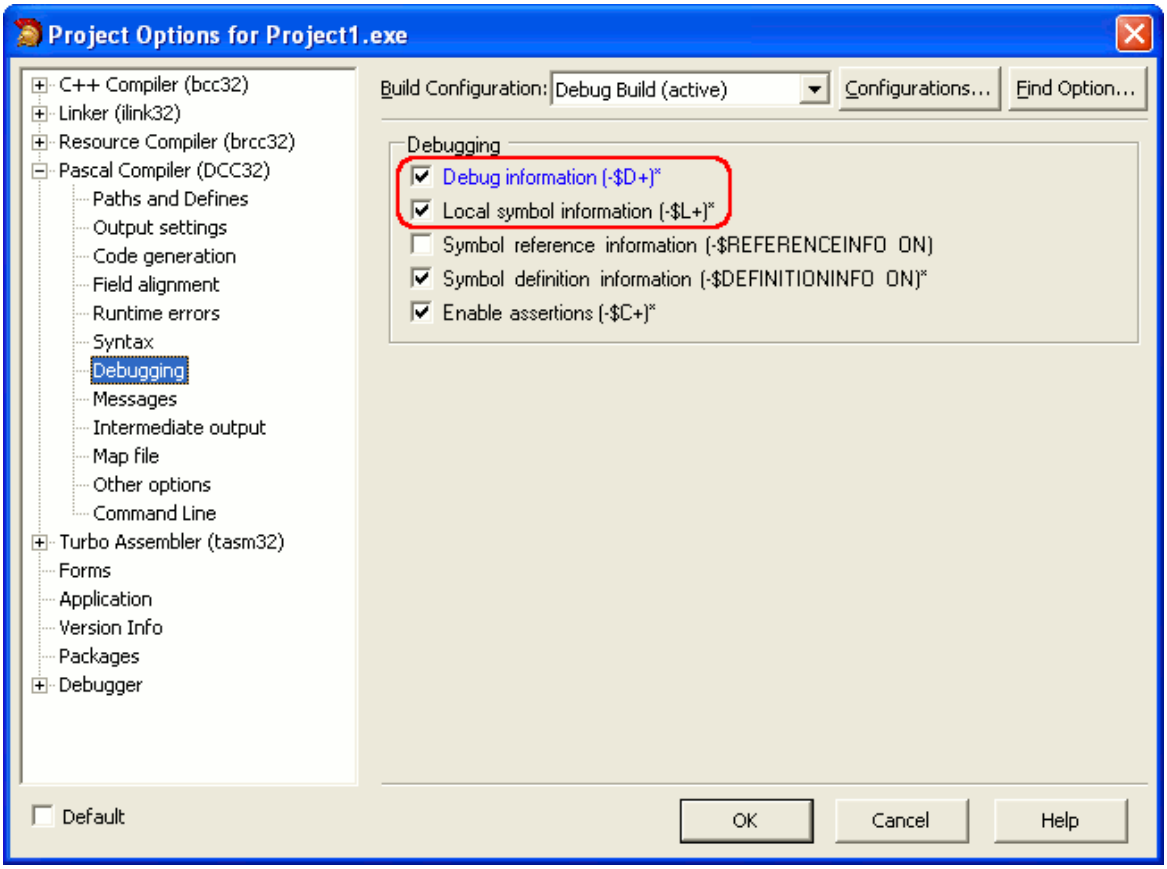
Note: AQtrace is not compatible with third-party tools that modify the binary code of your application, for example, to include a custom exception handling mechanism. An example of such a tool is EurekaLog. We recommend that you generate the debug information for your application before processing it with such tools.

To compile your C++Builder 2006 application with TDS debug information, follow these steps:

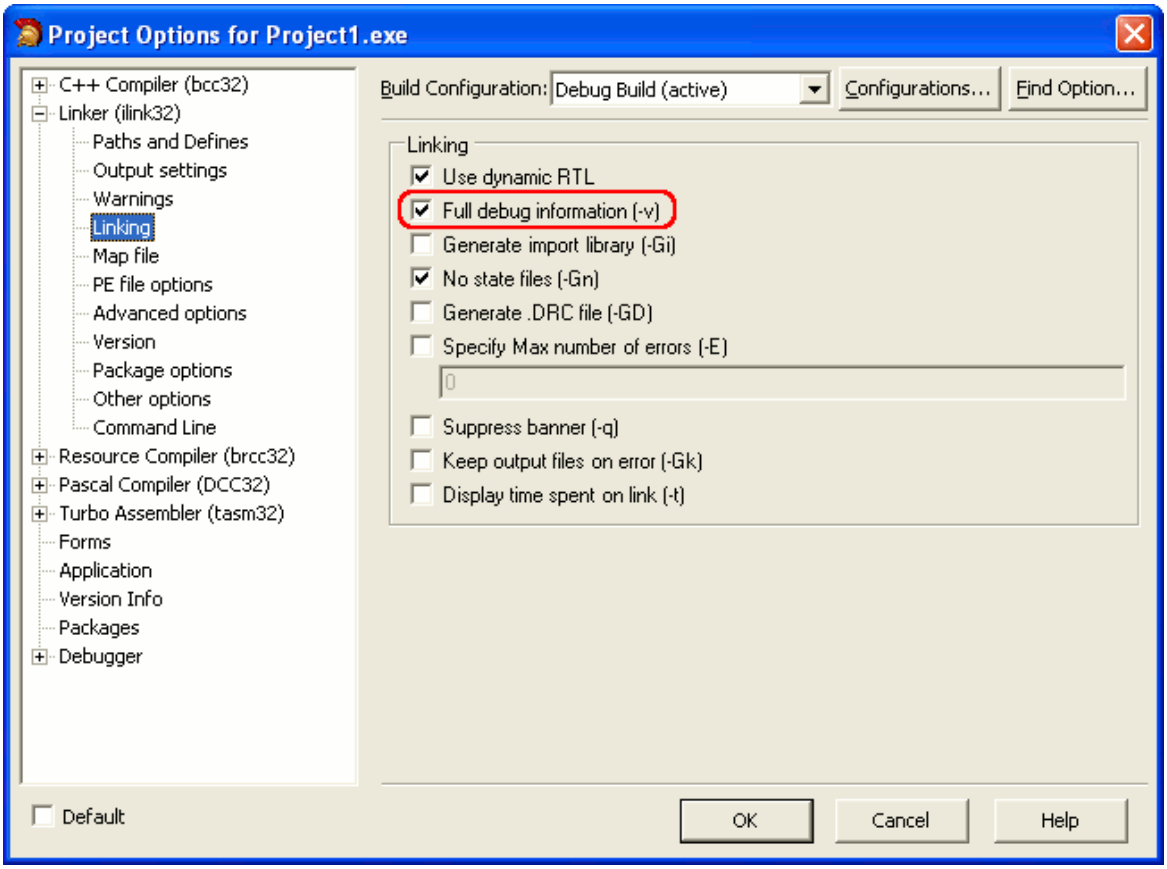
1. Open your project in Borland C++Builder 2006.
2. Select **Project | Options** from the main menu. This will open the **Project Options** dialog.
3. To set the C++ compiler options, select the **C++ Compiler (bcc32) | Debugging** category from the tree view on the left of the dialog.
4. To include symbolic debug information, check **Source debugging**. In addition, to refer this information to source line numbers, check **Debug line numbers**:



5. To set the Pascal compiler options, select the **Pascal Compiler (DCC32) | Debugging** category from the tree view on the left of the dialog.
6. To include symbolic debug information, check **Debug information**. In addition, to refer this information to source line numbers, check **Local symbol information**:



7. To set the linker options, switch to the **Linker (ilink32) | Linking** category and select **Full debug information**:



8. Press **OK** to save the changes and close the dialog.
9. Rebuild your application.

During compilation, C++Builder will generate the .TDS file containing debug information and save it in the folder where the compiled executable will reside.

There is no need to ship the generated .TDS files with your application. However, you should place these files along with the executable modules in the build storage. For more information on this, see *Organizing Build Storage*.

Compiling Borland C++Builder Applications With Debug Information

This topic explains how to include debug information in applications created with Borland C++Builder ver. 3 - 6 and compile these applications for AQtrace. To learn how to prepare applications created with other C++Builder versions, see *Compiling Applications With Debug Information*.

Borland C++Builder can generate debug information as an external .TDS file. This is one of the debug information formats supported by AQtrace.

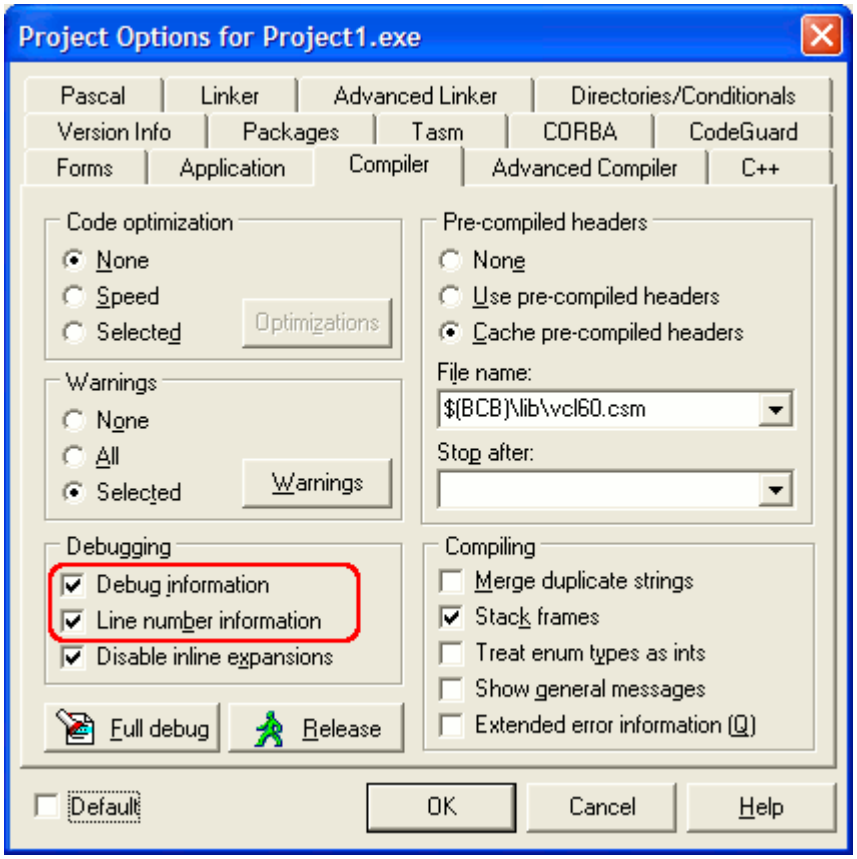
Below is a detailed description of how to change compiler options to use the TDS format of debug information.

Note: AQtrace is not compatible with third-party tools that modify the binary code of your application, for example, to include a custom exception handling mechanism. An example of such a tool is EurekaLog. We recommend that you generate the debug information for your application before

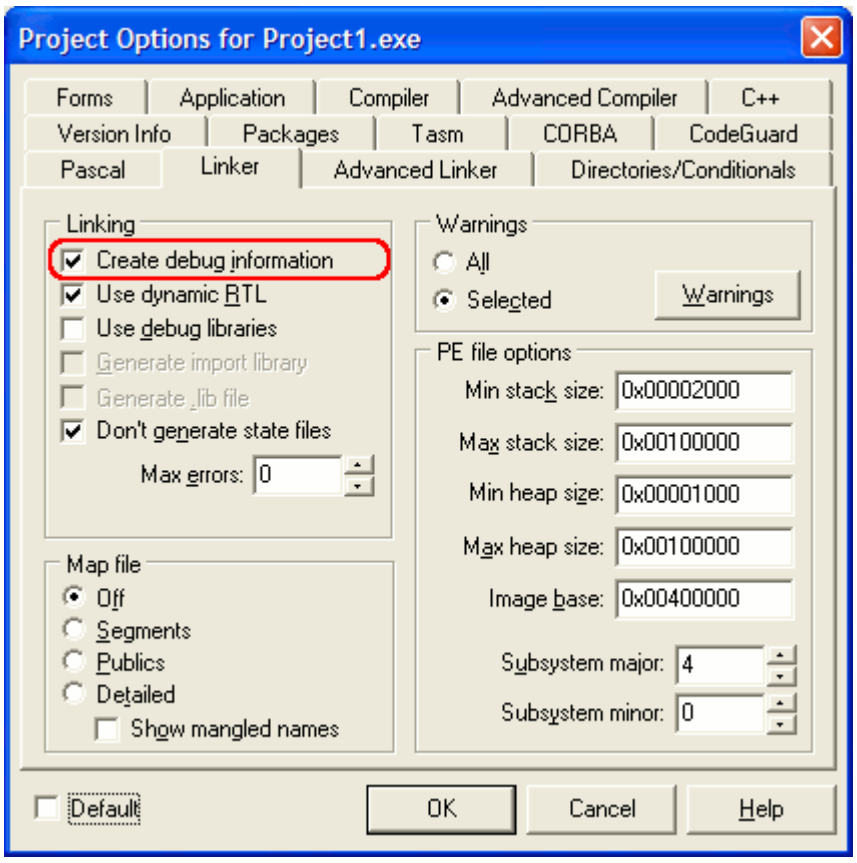
processing it with such tools.

To compile your application with TDS debug information:

1. Open your project in Borland C++Builder.
2. Choose **Project | Options** from C++Builder's main menu. This will invoke the **Project Options** dialog.
3. In the dialog, switch to the **Compiler** tabbed page.
4. To include symbolic debug information, in the **Debugging** section of the **Compiler** page, select the **Debug information** check box. In addition, to refer this information to source line numbers, select the **Line Information** check box.



5. To set the linker options, switch to the **Linker** tabbed page.
6. In the **Linking options** group, select the **Create Debug Information** box.



7. Press **OK** to save your changes and to close the dialog.
8. Recompile your application. During compilation C++Builder will generate the .TDS file with debug information in the folder where the compiled executable will reside.

There is no need to ship the generated .TDS files with your application. However, you should place these files along with the executable modules in the build storage. For more information on this, see *Organizing Build Storage*.

Compiling Intel C++ Applications With Debug Information

The Intel C++ 7.0 compiler is tightly integrated with Microsoft Visual Studio. To prepare an Intel C++ application for AQtrace, you should perform the same actions, which you perform to prepare a Visual C++ application. For complete information, review the following topics:

- *Compiling Microsoft Visual C++ 6.0 Applications With Debug Information*
- *Compiling Microsoft Visual C++ 7.x Applications With Debug Information*

After you compiled your application with debug information, you should place the debug information files along with executable modules in the build storage. For more information on this, see *Organizing Build Storage*.

About StripTDS

This topic provides an overview of the StripTDS utility, explains how it works and describes its

command line and exit codes.

StripTDS - Overview

StripTDS is a simple command-line utility that strips TD32 debug information from executables and libraries created with the Delphi compiler and saves it in separate TDS files. Thus, it enables you to create **release builds of Delphi applications with external debug information**. The utility is shipped with AQtrace and can be found in the *<AQtrace>\Bin* folder.

The Delphi compiler uses the TD32 format of debug information, which is compiled directly in the executable modules and libraries. This makes the resulting executable significantly (up to several megabytes) larger in size than those without embedded debbug information. The StripTDS utility overrides this inconvenience. It lets you strip debug information from compiled modules and save it to external TDS files. In this way, you can create release builds of Delphi applications with debug information kept in separate files.

We recommend that you run the StripTDS utility as a part of the application's build process. For example, if you use CodeGear Delphi 2007 or 2009, you could invoke StripTDS from the post-build event of your project. If you use an automated build tool such as *Automated Build Studio*, you could run StripTDS right after the build step that performs the application's compilation.

The .tds files generated by StripTDS must reside in the same folders as the application's binary files. However, there is no need to distribute them with your application. Yet, you should copy both the binary files and .tds files to the *build storage*.

How StripTDS Modifies Binary Modules

Likewise *AQtrace Packager*, the StripTDS utility also modifies binary modules. StripTDS changes binary modules by removing debug information from them, it does not change binary code. Let's see how this is done.

Each executable module - EXE, DLL or any other binary module (*PE file* in Windows terminology) - consists of sections. The sections contain various information and are used for various purposes. Some of the sections contain binary code generated by the compiler, this code is executed when the section is loaded in memory. Some other sections contain data (like string constants or integer values) that are used by the binary code. One more section type holds helper information and is used for helper purposes.

Delphi compiler generates debug information in TD32 format and stores it to special sections within the resulting PE file. Delphi places debug information into the sections that are located at the end of the file. StripTDS reads debug information from these sections and saves it into a separate .tds file. Then it removes the debug information sections from the PE module and corrects the module's headers so that they contain the appropriate info. That is, StripTDS only works with sections that store debug info. It does not touch the code and data sections, so your application will work the way it was programmed.

StripTDS Command Line

The command line of the StripTDS utility is as follows:

```
StripTDS.exe [-r] [-w] module [TDS_file]
```

module

The name of the compiled module that contains TD32 debug information to be stripped off. If you need to process several modules, use wildcards (* and ?) to specify a mask. For example, the **.exe* mask matches all EXE files. To match all files, use the * mask.

TDS_file

This argument is only used if *module* holds a single file name. It specifies the name of the TDS file

to which the extracted debug information should be saved. The destination folder for the TDS file must exist on the disk.

If you do not specify this parameter, the debug information will be saved to a file with the same name as *module* but with the .tds extension.

This argument is ignored if *module* specifies a file mask or the *–r* argument is used.

You can specify both absolute file paths (starting with the drive letter) and paths that are relative to the current working folder (not necessarily the StripTDS folder). Using absolute paths is recommended.

If a file path includes spaces, it must be enclosed in quotes, for example, *"C:\My App\MyApp.exe"*.

*-r (*or */r)*

If this argument is specified, StripTDS will process the files specified by the *module* argument as well as the appropriate files in all subfolders of the folder that contains the *module* file(s).

*-w (*or */w)*

If this argument is specified, StripTDS will overwrite existing TDS file(s).

Here are some examples of running the StripTDS utility:

- The following command removes the debug information from the *C:\MyApp\MyApp.exe* file and saves it to the TDS file of the same name. If the TDS file already exists, it is overwritten:

```
"C:\Program Files\SmartBear\AQtrace\Bin\StripTDS.exe" /w
C:\MyApp\MyApp.exe
```

- The following command removes the debug information from the *C:\MyApp\MyApp.exe* file and saves it to the *C:\DebugInfo\MyApp\MyApp.tds* file. If the TDS file already exists, it is left unchanged:

```
"C:\Program Files\SmartBear\AQtrace\Bin\StripTDS.exe"
C:\MyApp\MyApp.exe C:\DebugInfo\MyApp\MyApp.tds
```

- The following command removes the debug information from all EXE and DLL files in the *C:\MyApp* folder and all its subfolders and saves it to the TDS files of the same name in the appropriate folders. Existing TDS files are overwritten:

```
"C:\Program Files\SmartBear\AQtrace\Bin\StripTDS.exe" /r /w
C:\MyApp\*.exe;C:\MyApp\*.dll
```

StripTDS Exit Codes

StripTDS uses the following exit codes:

Code	Description
0	The debug information was stripped off successfully.
Non-zero	An error occurred during debug information extraction. For example, the specified module does not contain TD32 debug information or contains invalid or unknown debug information.

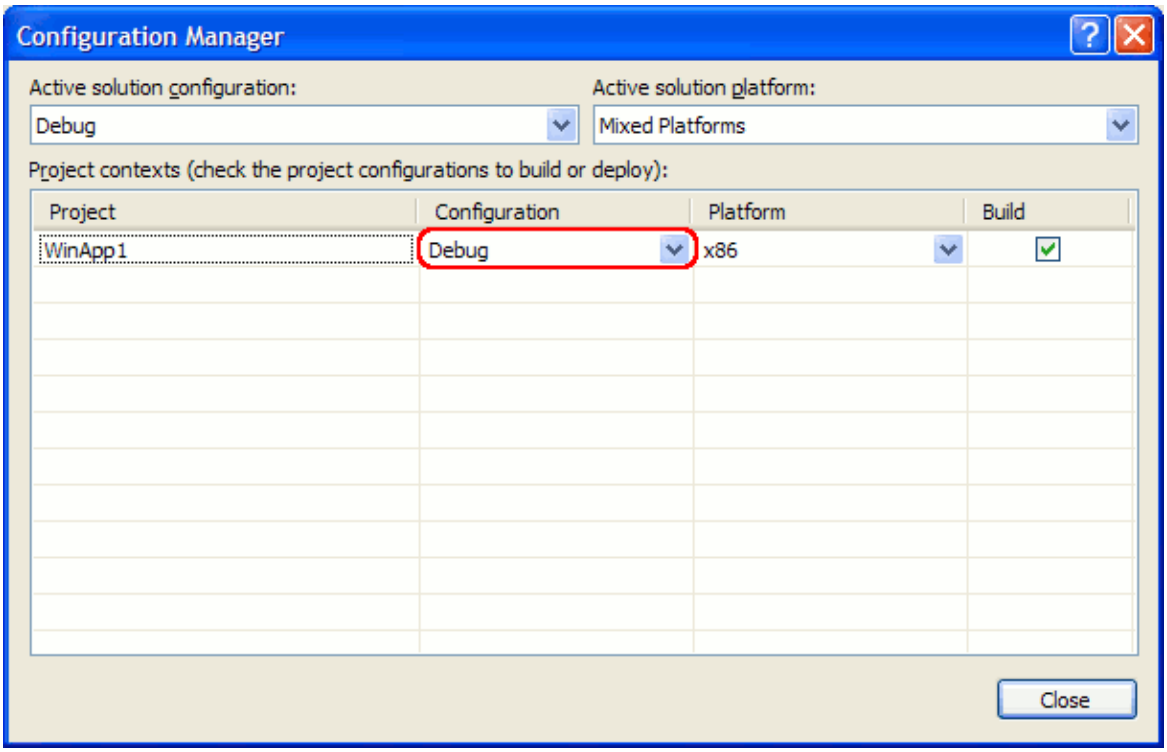
.NET Compilers

Compiling Microsoft Visual C# 2005, 2008 and 2010 Applications With Debug Information

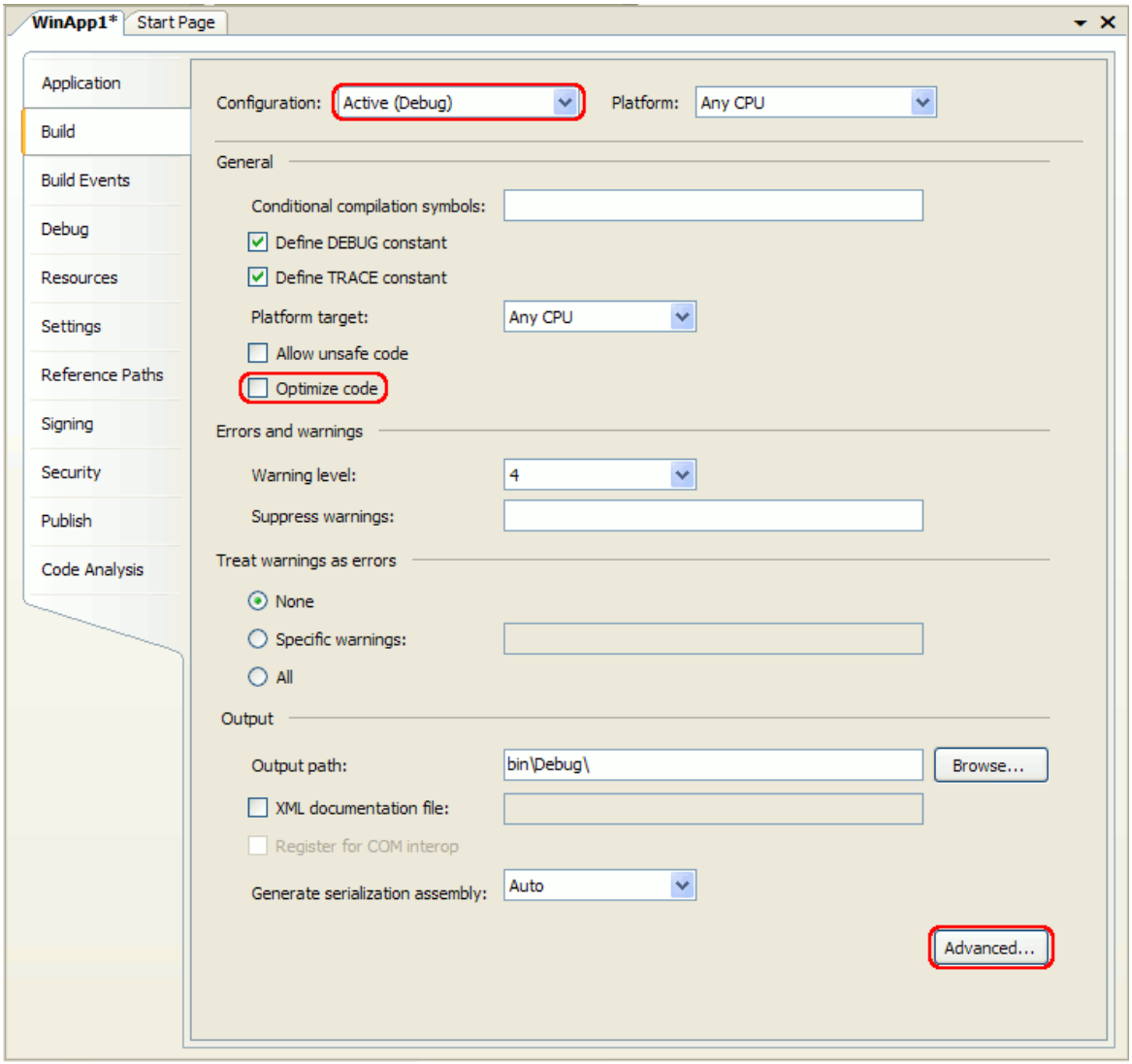
This topic explains how to compile Microsoft Visual C# 2005б 2008 and 2010 applications with debug information for AQtrace. To learn how to prepare applications created with Visual C# 7.x, see *Compiling Microsoft Visual C# 7.x Applications With Debug Information*.

To add debug information to your Visual C# 2005, Visual C# 2008 or Visual C# 2010 application, follow these steps:

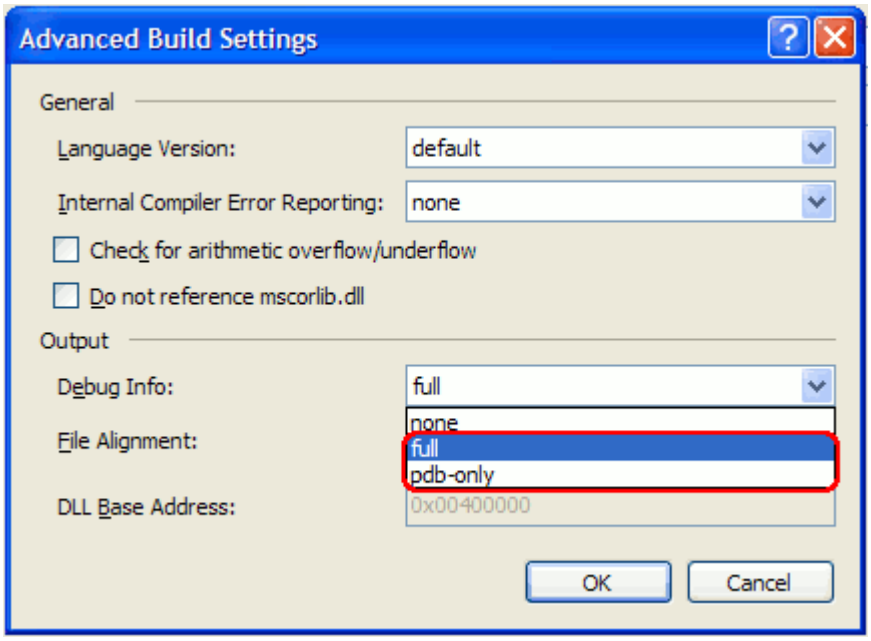
1. Open your project in Visual Studio 2005, Visual Studio 2008 or Visual Studio 2010.
2. Select **Build | Configuration Manager** from the main menu. This will open the **Configuration Manager** dialog. Select the *Debug* configuration for your project:



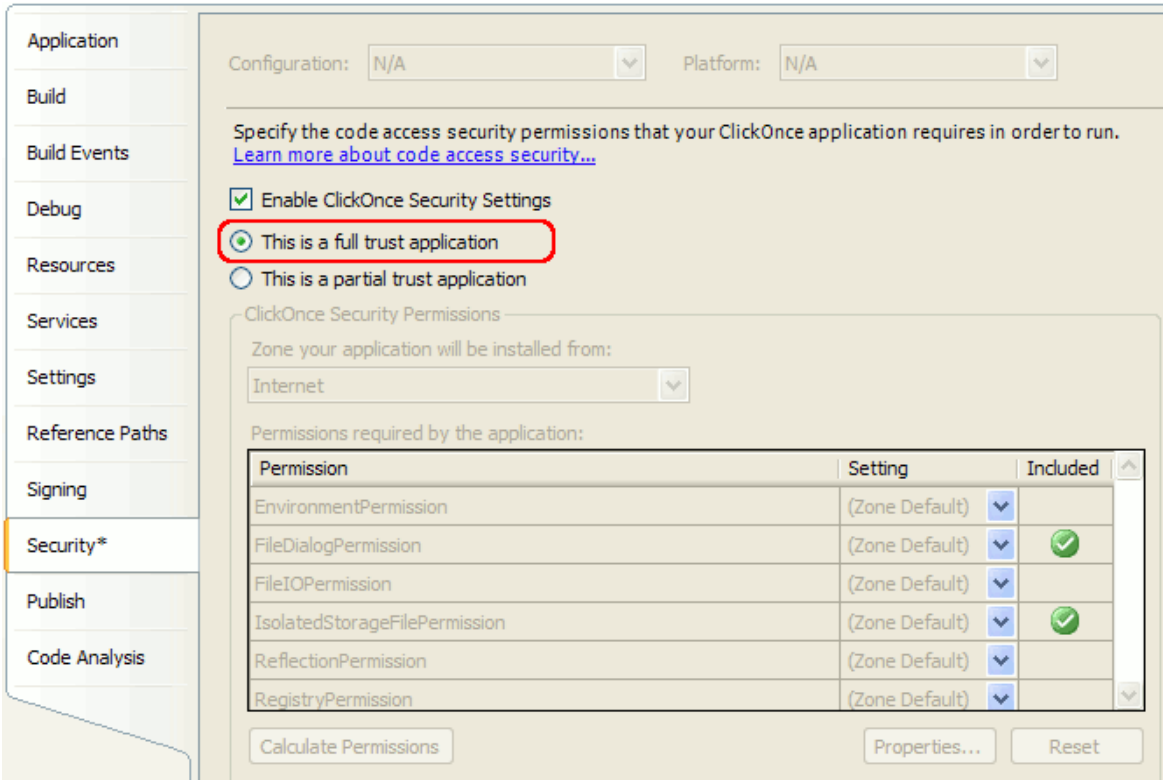
   Close the dialog.
3. Right-click the project in the **Solution Explorer** and select **Properties** from the context menu. This will open the **Property Pages** dialog.
4. In this dialog, open the **Build** page and select *Active (Debug)* from the **Configuration** dropdown list at the top of the dialog. Then, on the same **Build** page, disable the *Optimize code* checkbox and click the **Advanced** button.



5. In the resulting **Advanced Build Settings** dialog, select either *full* or *pdb-only* in the **Debug Info** dropdown list box.



6. Click **OK** to close the dialog.
7. If your application is a WPF Browser application (XBAP), then you should change the security settings: switch to the **Security** page and enable the **This is a full trust application** setting:



8. Save the changes in the project. Recompile the application.

When your application is ready for final delivery, remember to compile it without debug information to

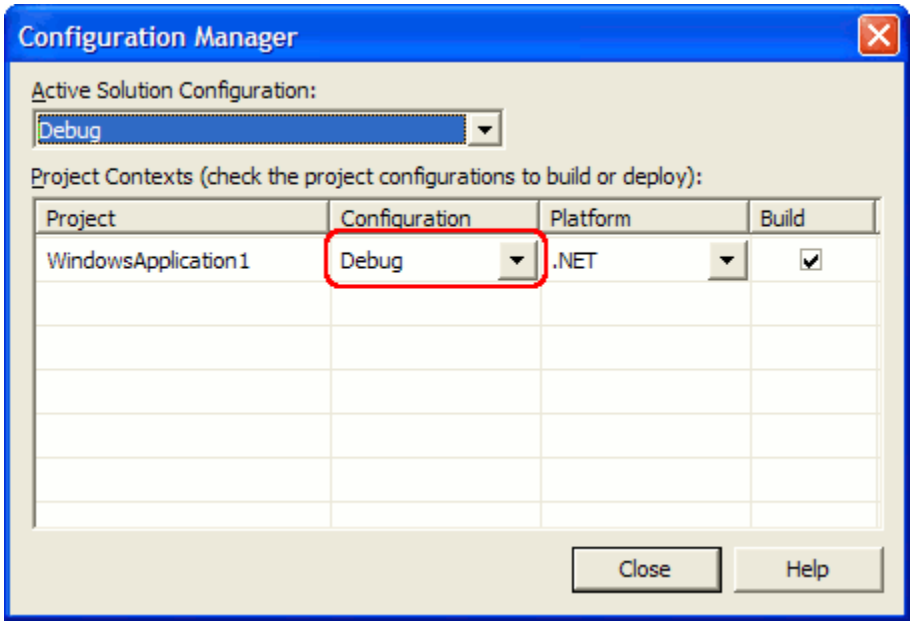
reduce the overall size of the application.

Compiling Microsoft Visual C# 7.x Applications With Debug Information

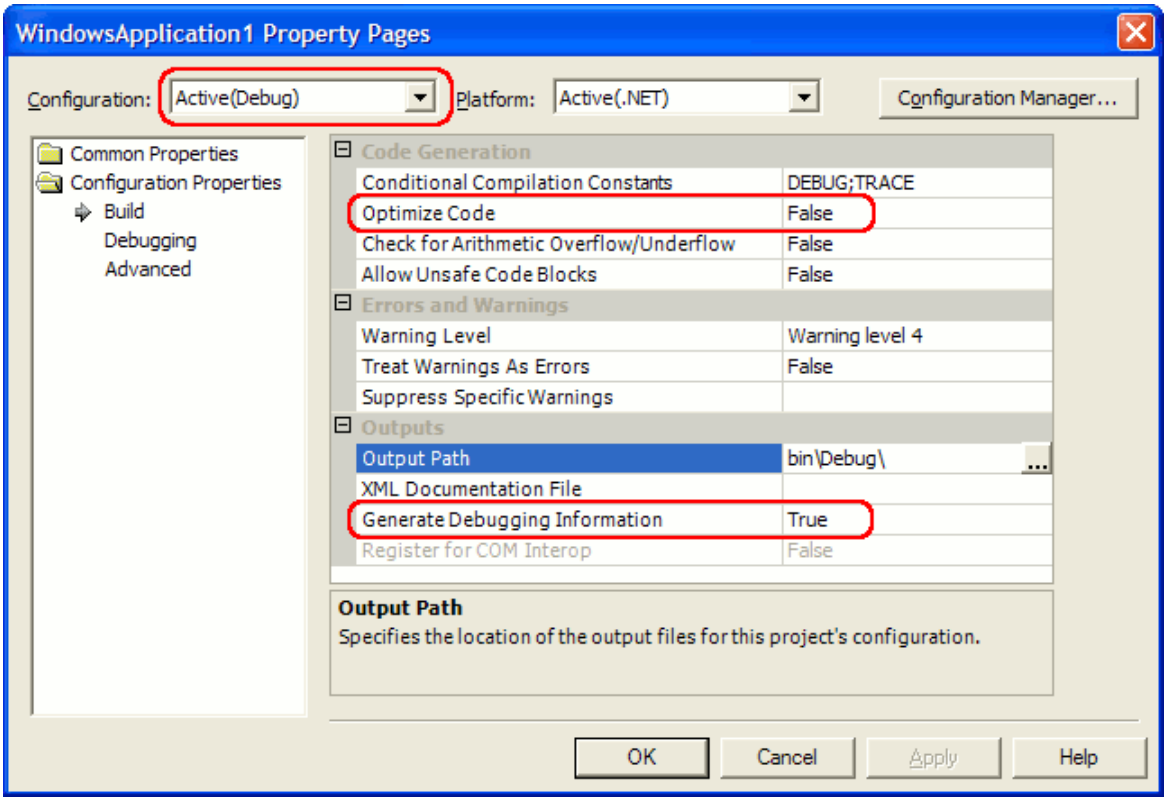
This topic explains how to compile Visual C# 7.x applications with debug information for AQtrace. To learn how to prepare applications created with Visual C# 2005, 2008 or 2010, see *Compiling Microsoft Visual C# 2005, 2008 and 2010 Applications With Debug Information*.

To add debug information to your Visual C# 7.x application, follow these steps:

1. Open your project in Visual Studio 7.x.
2. Select **Build | Configuration Manager** from the main menu. This will open the **Configuration Manager** dialog. Select the *Debug configuration* for your project:



   Close the dialog.
3. Right-click the project in the **Solution Explorer** and select **Properties** from the context menu. This will open the **Property Pages** dialog.
4. In the dialog, open the **Configuration Properties | Build** page and select *Active (Debug)* from the **Configuration** dropdown list at the top of the dialog. Then, in the **Configuration Properties | Build** page, turn on the *Generate debugging information* option and disable *Optimize Code*.



5. Press **OK** to save settings. Recompile the application.

When your application is ready for final delivery, remember to compile it without debug information to reduce overall application size.

Compiling Microsoft Visual C++ 2005, 2008 and 2010 Applications With Debug Information

This topic explains how to compile Visual C++ 2005, 2008 and 2010 applications with debug information for AQtrace. To learn how to prepare applications created with Visual C++ 7.x, see *Compiling Microsoft Visual C++ 7.x Applications With Debug Information*. To learn how to prepare applications created with Visual C++ 6.0 or earlier, see *Compiling Microsoft Visual C++ 6.0 Applications With Debug Information*.

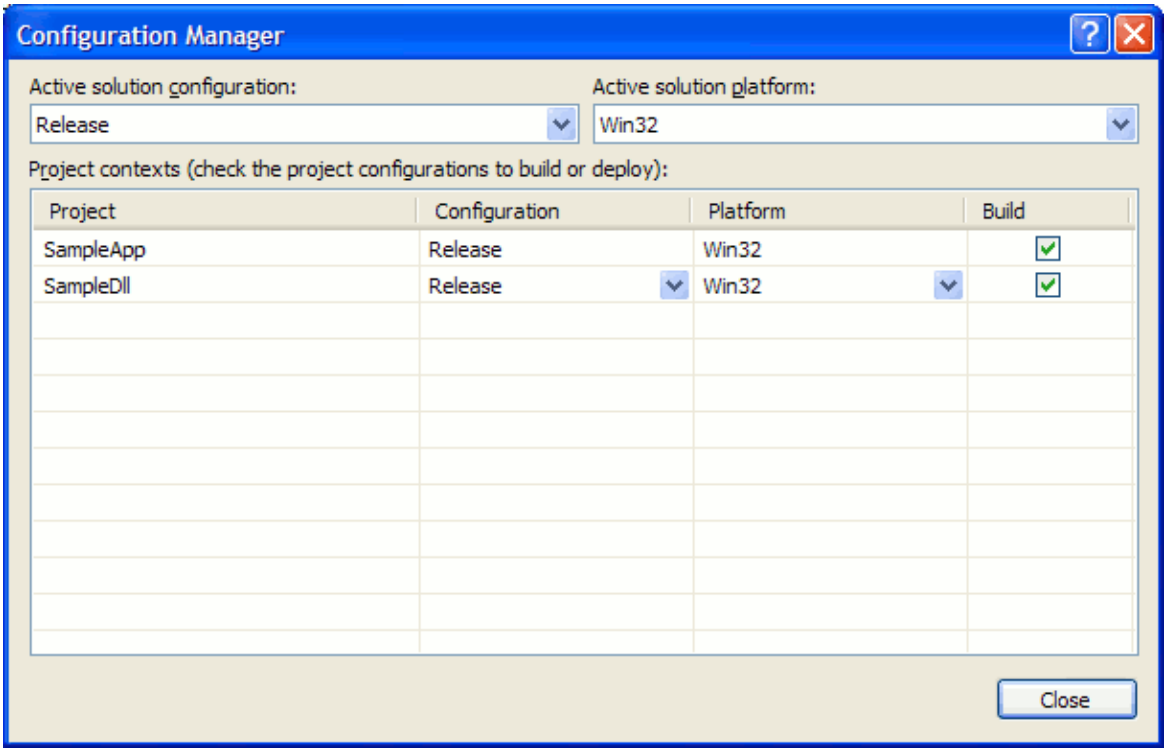
Default settings created by Microsoft Visual Studio 2005, Visual Studio 2008 or Visual Studio 2010 for a new Visual C++ 2005, 2008 or 2010 application already contain all necessary information for generating debug information. So, if you do not change the compiler settings, you can compile and profile your Visual C++ 2005 or 2008 application as is. However, we recommend that you change the active configuration to *Release* because this configuration is used to build the final version of an application.

If you are not sure whether your application's compiler settings were changed, you can follow these steps to make sure that your application is compiled with debug information:

1. Open your project in Visual Studio 2005 Visual Studio 2008 or Visual Studio 2010.
2. Select **Build | Configuration Manager** from the main menu. This will open the **Configuration Manager** dialog.

   In the dialog, select the *Release* configuration (that is, the configuration that is used to build the

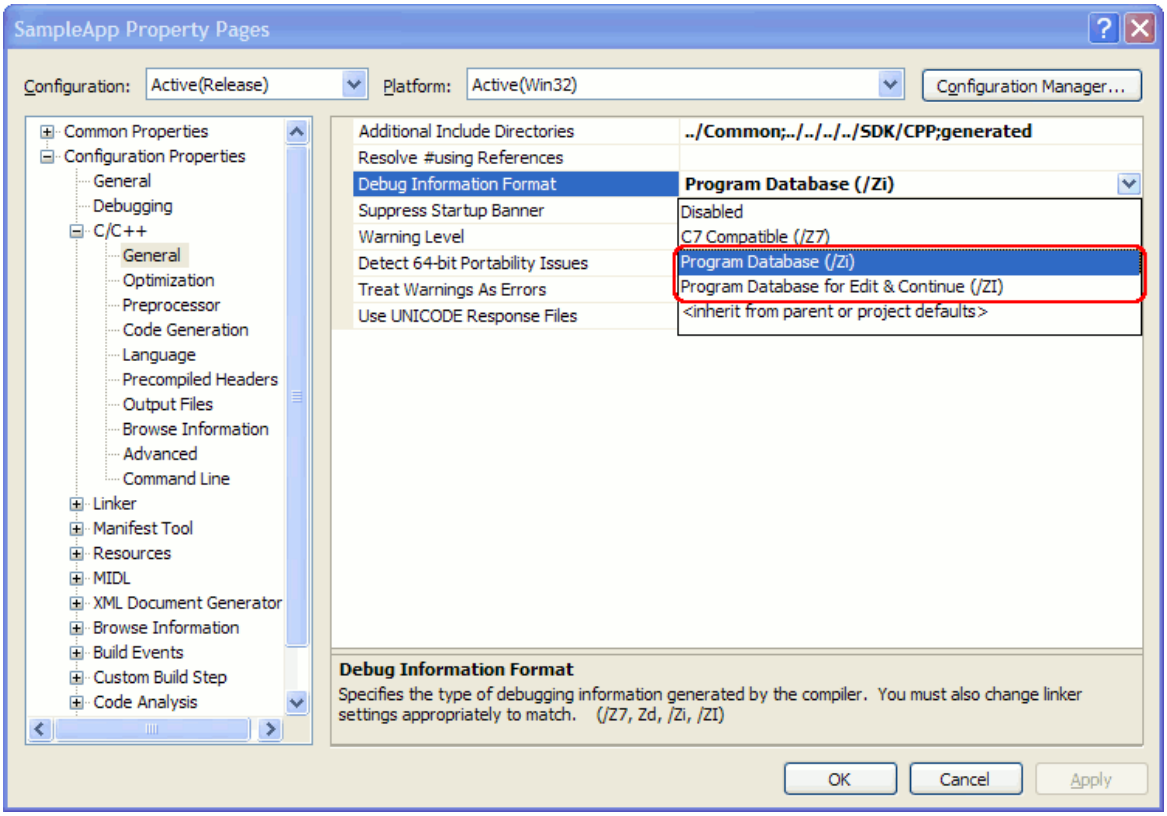
release version of your product):



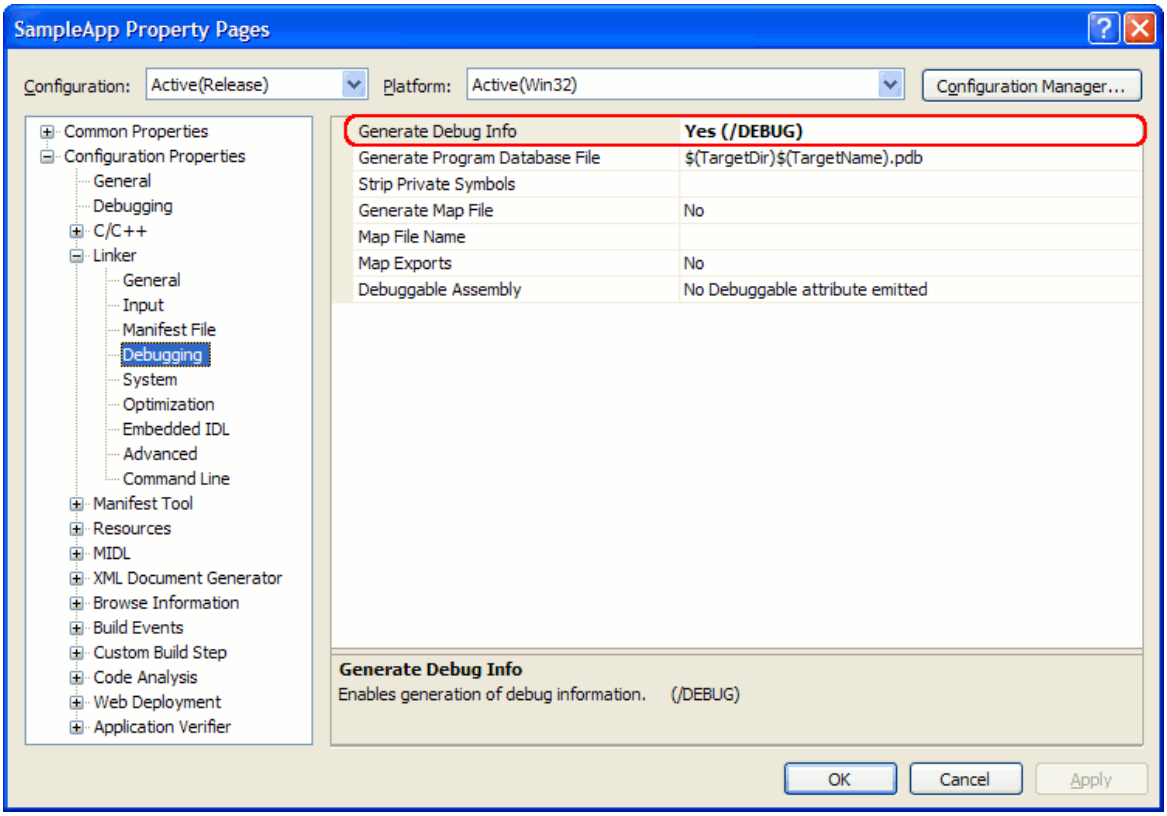
Close the dialog.

> **Note:** The debug information will be generated as an external PDB file, so it will not increase the size of your executable module.

3. Right-click the project in the **Solution Explorer** and select **Properties** from the context menu. This will call the **Property Pages** dialog.
4. In the dialog:
   a. From the **Configuration** dropdown list, select the configuration that you will use to build the final version of your application (typically, this is the *Release* configuration).
   b. Switch to the **Configuration Properties | C/C++ | General** page and set **Debug Information Format** to *Program Database (/Zi)* or to *Program Database for Edit & Continue (/ZI)*. For more information on these options, review the Visual Studio documentation.



c. Open the **Configuration Properties | Linker | Debugging** property page and set the **Generate Debug Info** option to *Yes (/DEBUG)*.



5. Click **OK** to save the settings and to close the dialog.
6. Rebuild your application. The compiler will generate debug information as an external PDB file and save this file to the folder in which the compiled executable resides.

There is no need to distribute the generated PDB files with your application. However, you should place these files along with the compiled executable modules in the build storage. For more information on this, see *Organizing Build Storage*.

Compiling Microsoft Visual C++ 7.x Applications With Debug Information

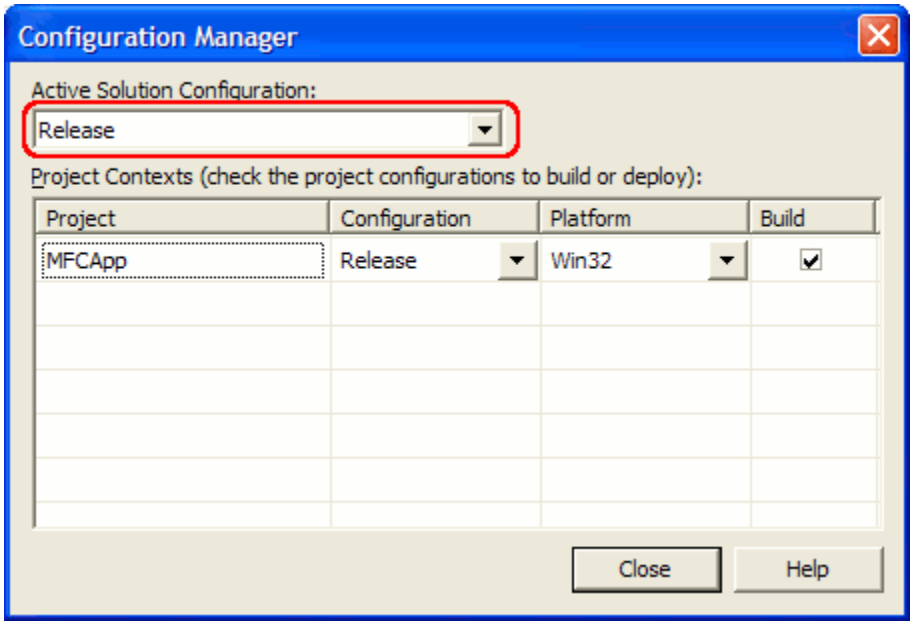
This topic explains how to compile Visual C++ 7.x applications with debug information for AQtrace. To learn how to prepare applications created with Visual C++ 2005 (8.0), 2008 (9.0) or 2010 (10.0), see *Compiling Microsoft Visual C++ 2005, 2008 and 2010 Applications With Debug Information*. To learn how to prepare applications created with Visual C++ 6.0 or earlier, see *Compiling Microsoft Visual C++ 6.0 Applications With Debug Information*.

Default settings created by Microsoft Visual Studio for a new Visual C++ .NET application already hold all necessary information for generating debug information. So, if you do not change the compiler settings, you can compile and profile your Visual C++ .NET application as is. The only thing we would recommend is to change the active configuration to *Release*, because the *Release* configuration is typically used to build the final version of the application.

If you are not sure whether your application's compiler settings were changed, you can follow the steps described in this topic to make certain that your application is compiled with debug information:

1. Open your project in Visual Studio .NET.
2. Select **Build | Configuration Manager** from the main menu. This will open the **Configuration**

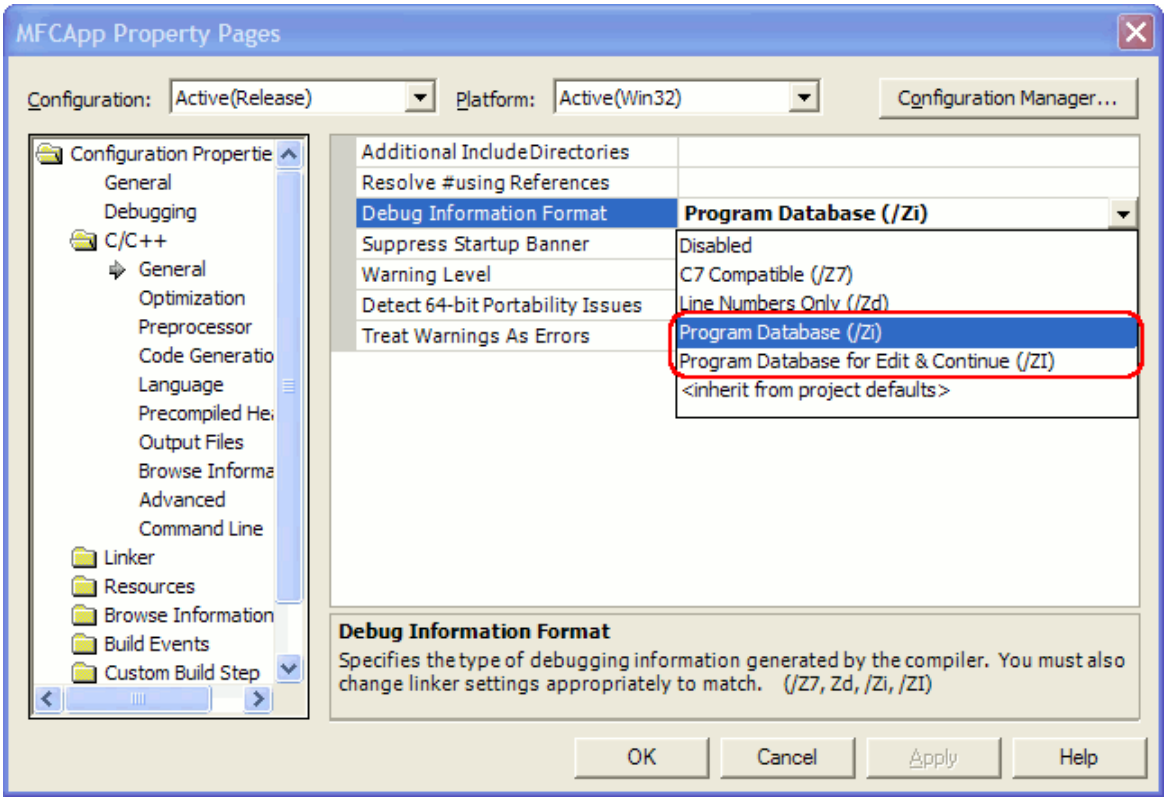
Manager dialog. Select the *Release* configuration for your project:



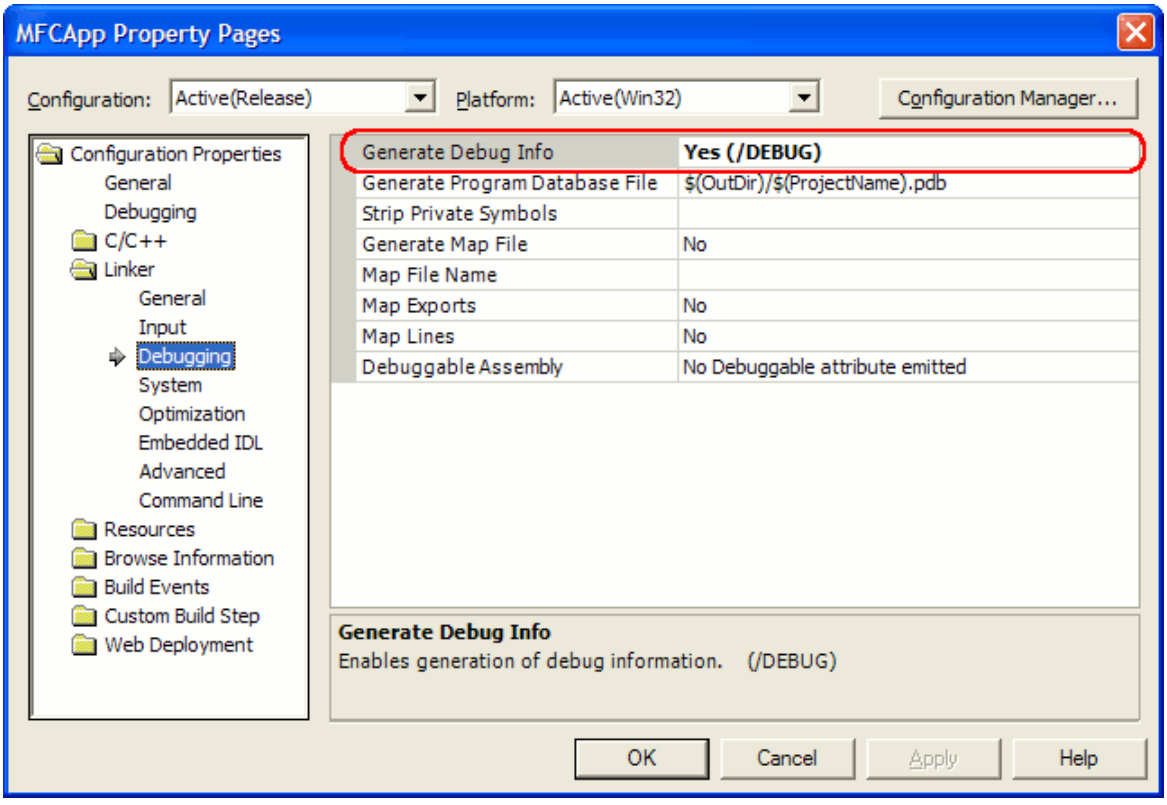
Close the dialog.

> **Note:** The debug information will be generated as an external PDB file, so it will not increase the size of your executable.

3. Right-click the project in the **Solution Explorer** and select **Properties** from the context menu. This will call the **Property Pages** dialog.
4. In the dialog,
   a. In the **Configuration** box, specify the configuration, which you will use to compile the release version of your application.
   b. Switch to the **Configuration Properties | C/C++ | General** page and set the **Debug Information Format** option either to **Program Database (/Zi)** or to **Program Database for Edit & Continue (/ZI)**. For more information on these options, see Visual Studio .NET documentation.



c. Open the **Configuration Properties | Linker | Debug** property page and set the **Generate Debug Info** option to *Yes (/DEBUG)*.



5. Click **OK** to save the settings and to close the dialog.
6. Recompile your application. The Visual C++ compiler will generate debug information as external PDB files and save them to the folder in which the compiled executable resides.

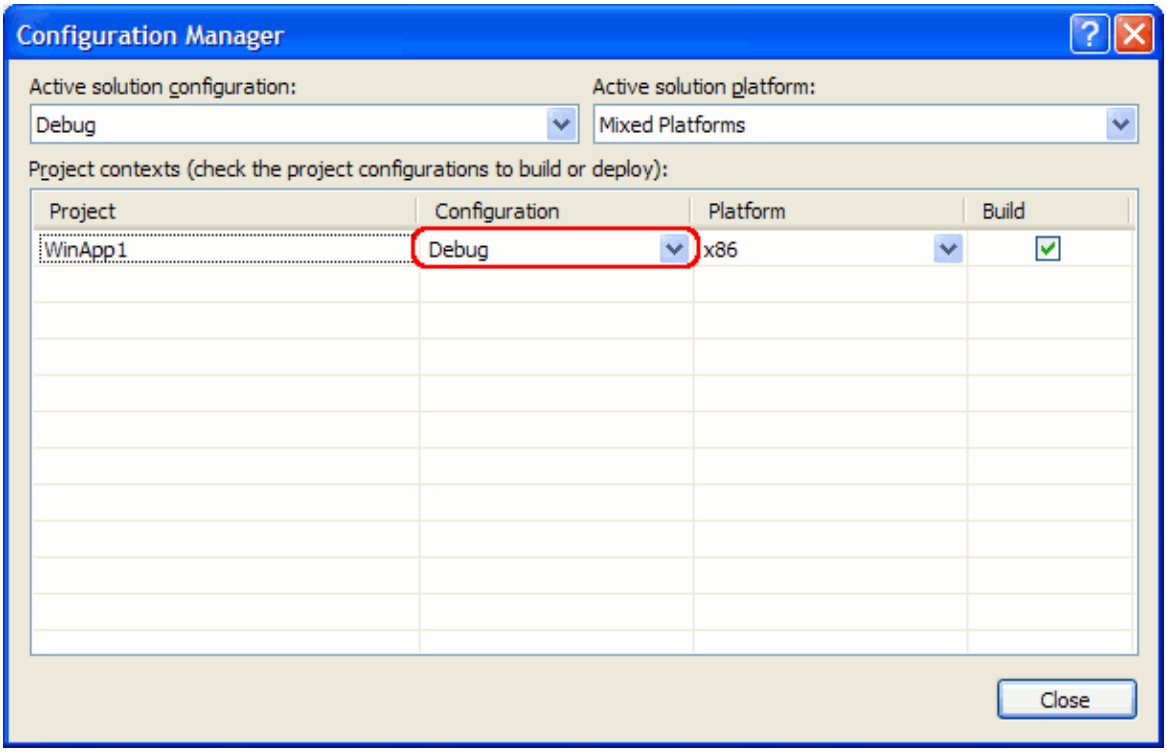
There is no need to ship the compiled PDB files with your application. However, you should add them along with the executable modules to your build storage. For more information on this, see *Organizing Build Storage*.

Compiling Microsoft Visual Basic 2005, 2008 and 2010 Applications With Debug Information

This topic explains how to compile Microsoft Visual Basic 2005, 2008 and 2010 applications with debug information for AQtrace. To learn how to prepare applications created with Visual Basic 6.0, see *Compiling Microsoft Visual Basic 6.0 Applications With Debug Information*. To learn how to prepare applications created with Visual Basic 7.x, see *Compiling Microsoft Visual Basic 7.x Applications With Debug Information*.

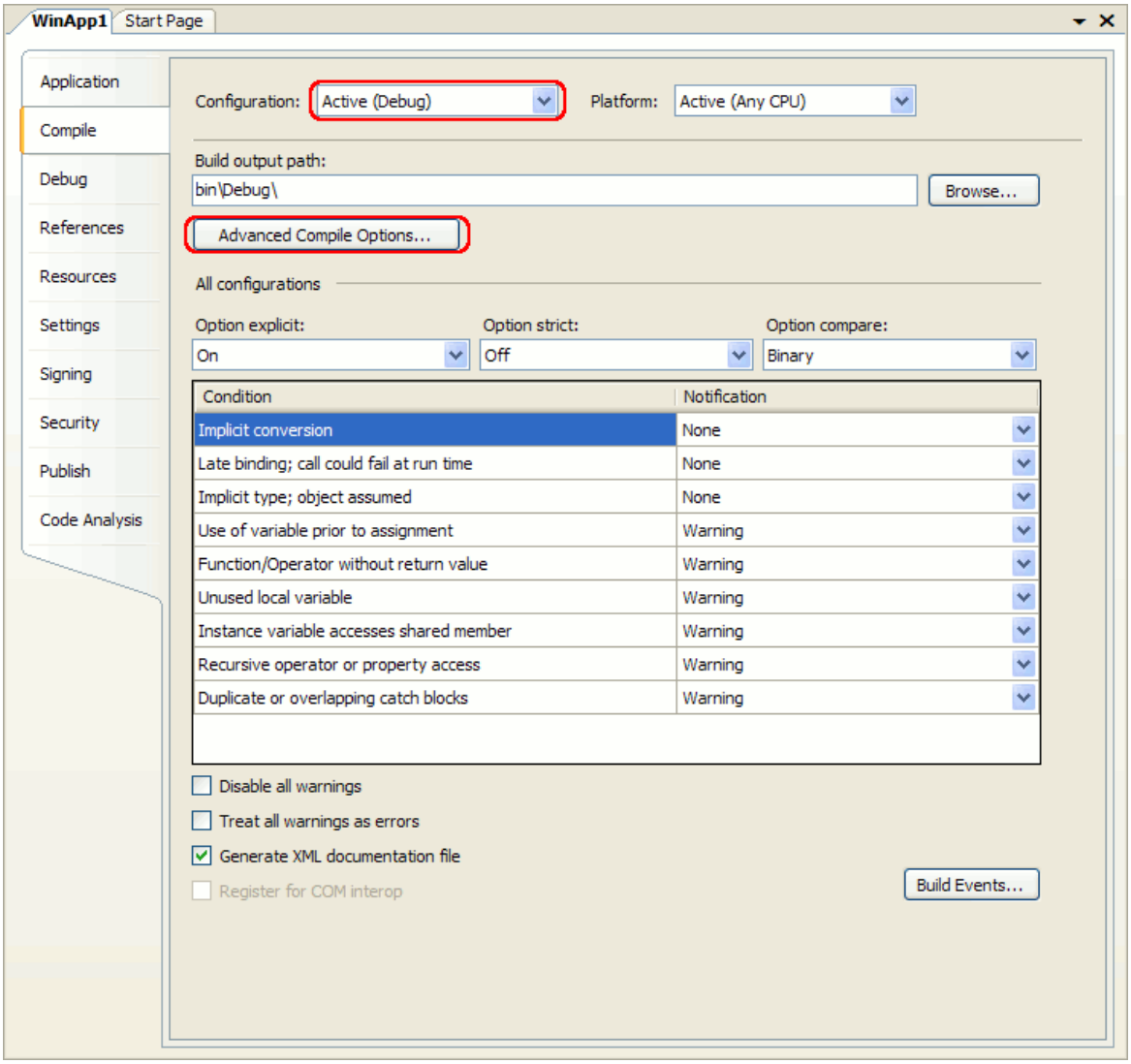
To add debug information to your Visual Basic 2005, Visual Basic 2008 or Visual Basic 2010 application, follow these steps:

1. Open your project in Visual Studio 2005, Visual Studio 2008 or Visual Studio 2010.
2. Select **Build | Configuration Manager** from the main menu. This will open the **Configuration Manager** dialog. Select the *Debug* configuration for your project:

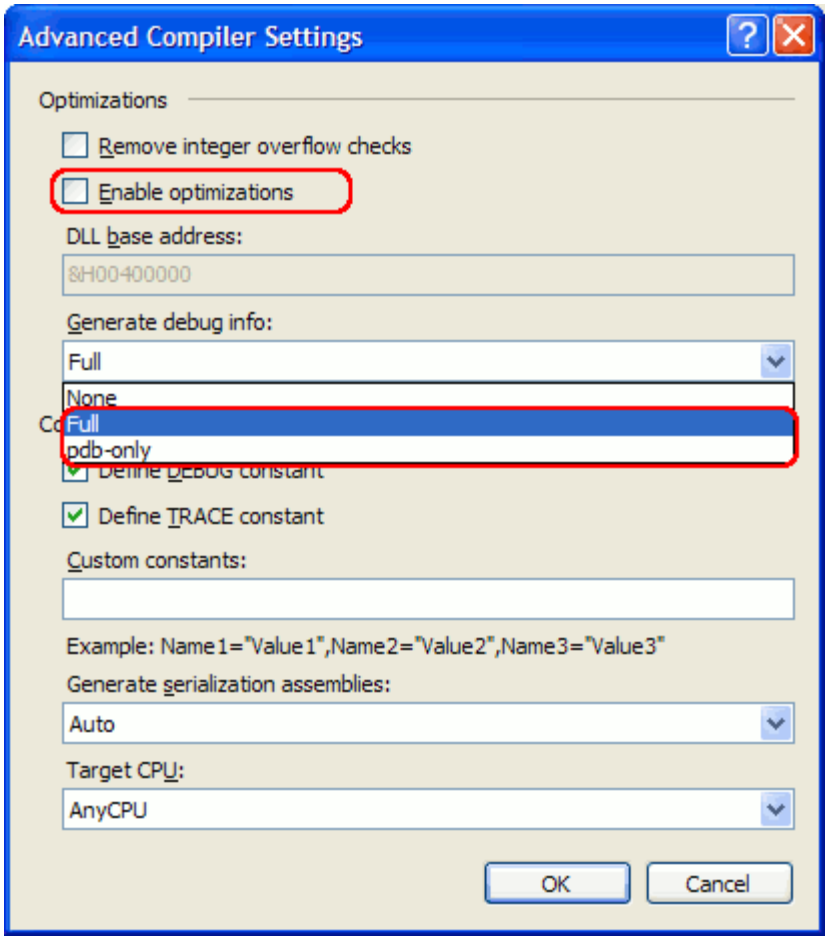


   Close the dialog.
3. Right-click the project in the **Solution Explorer** and select **Properties** from the context menu. This will open the **Property Pages** dialog.

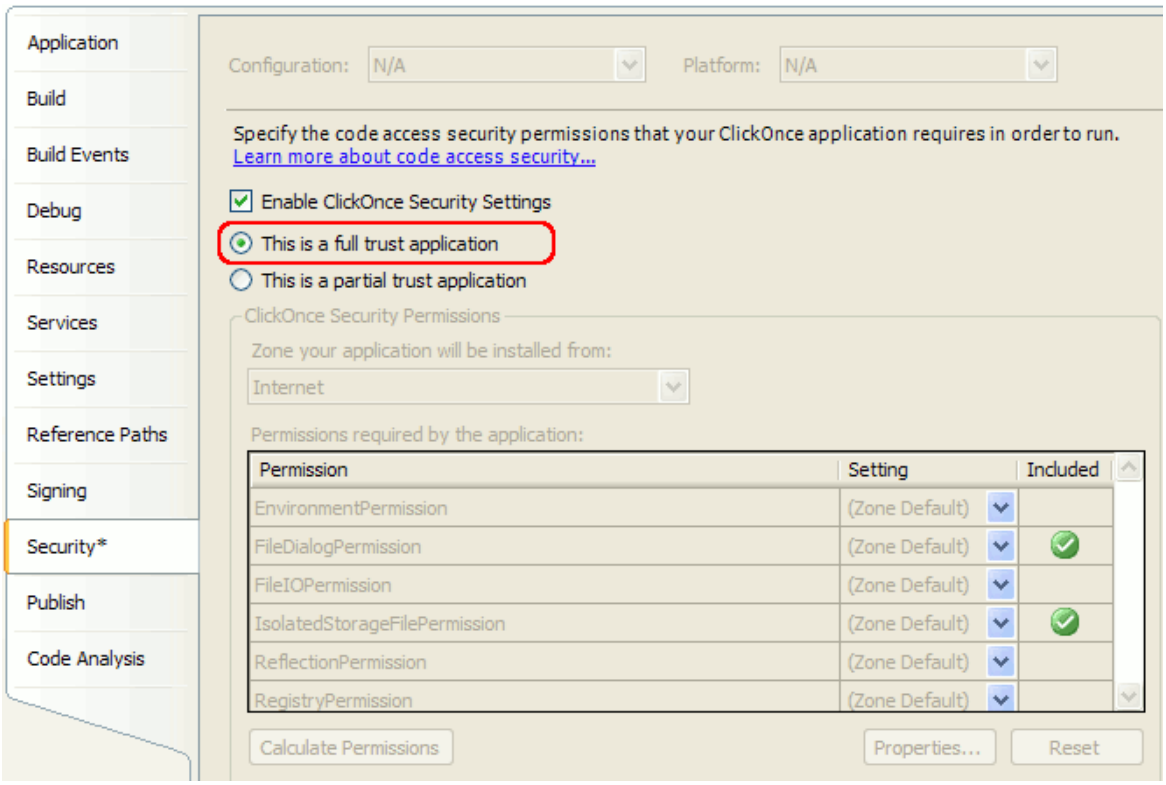
4. In the dialog, open the **Build** page and select *Active (Debug)* from the **Configuration** dropdown list at the top of the dialog. Then on the same Build page, click the **Advanced Compile Options** button.



5. In the resulting **Advanced Build Settings** dialog, select either *Full* or *pdb-only* in the **Generate debug info** dropdown list box and clear the *Enable optimizations* checkbox.



6. If your application is a WPF Browser application (XBAP), then you should change the security settings: switch to the **Security** page and enable the **This is a full trust application** setting:



7. Click **OK** to close the dialog.
8. Save the changes in the project and recompile the application.

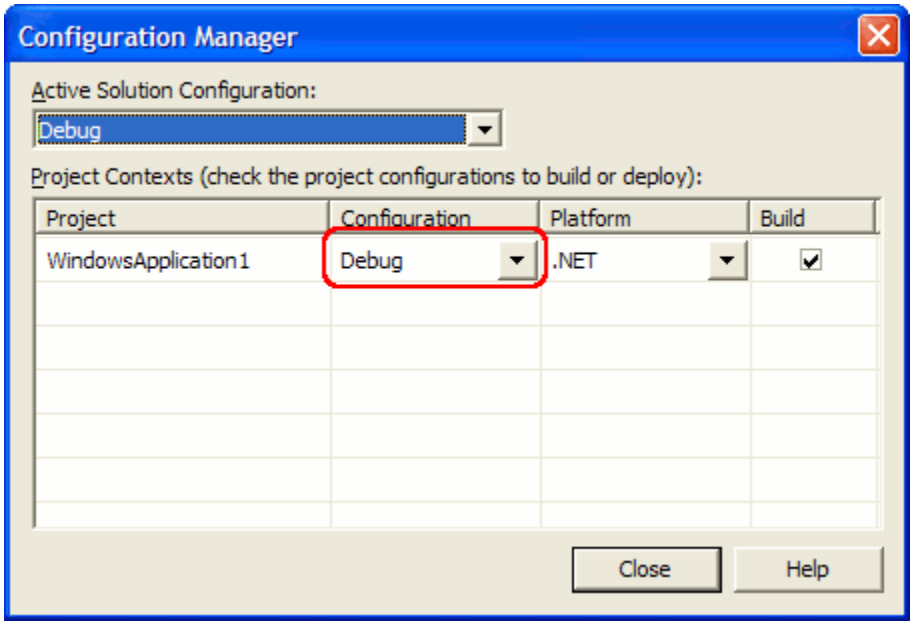
When your application is ready for final delivery, remember to compile it without debug information to reduce the overall size of the application.

Compiling Microsoft Visual Basic 7.x Applications With Debug Information

This topic explains how to compile Visual Basic 7.x applications with debug information for AQtrace. To learn how to prepare applications created with Visual Basic 6.0, see *Compiling Microsoft Visual Basic 6.0 Applications With Debug Information*. To learn how to prepare applications created with Visual Basic 2005, 2008 or 2010, see *Compiling Microsoft Visual Basic 2005, 2008 and 2010 Applications With Debug Information*.

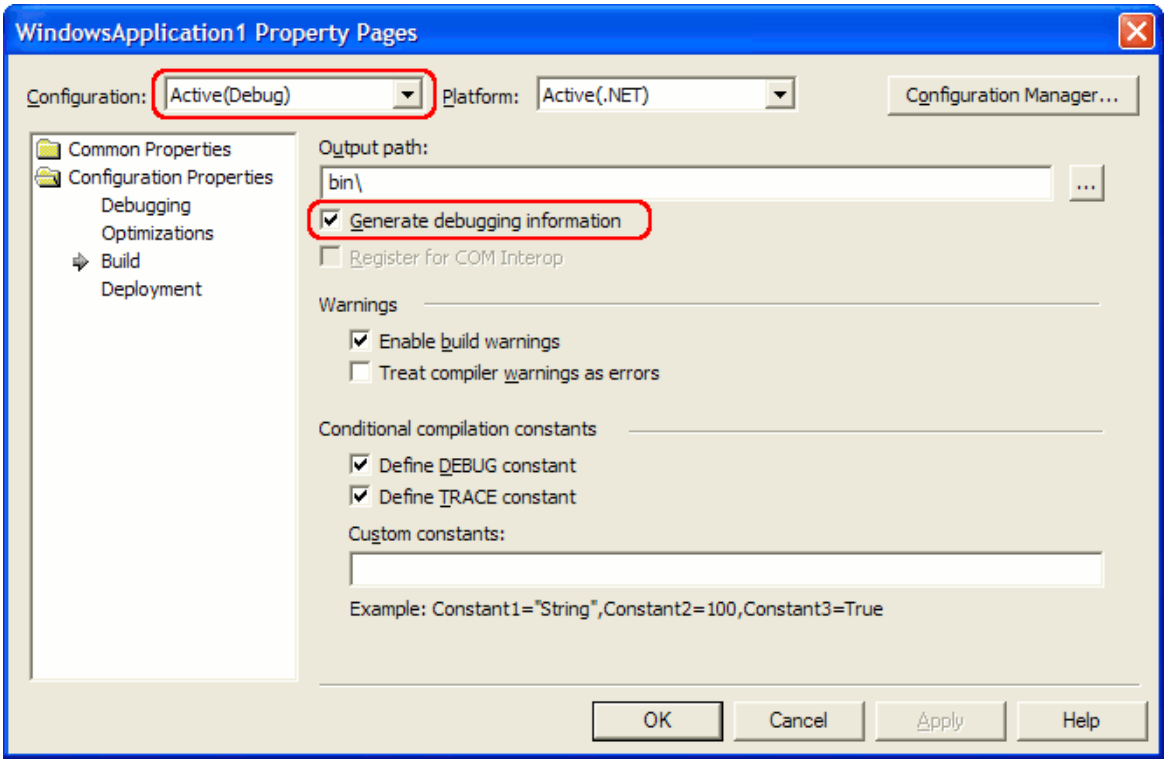
To add debug information to your Visual Basic 7.x application, follow these steps:

1. Open your project in Visual Studio 7.x.
2. Select **Build | Configuration Manager** from the main menu. This will open the **Configuration Manager** dialog. Select the *Debug configuration* for your project:

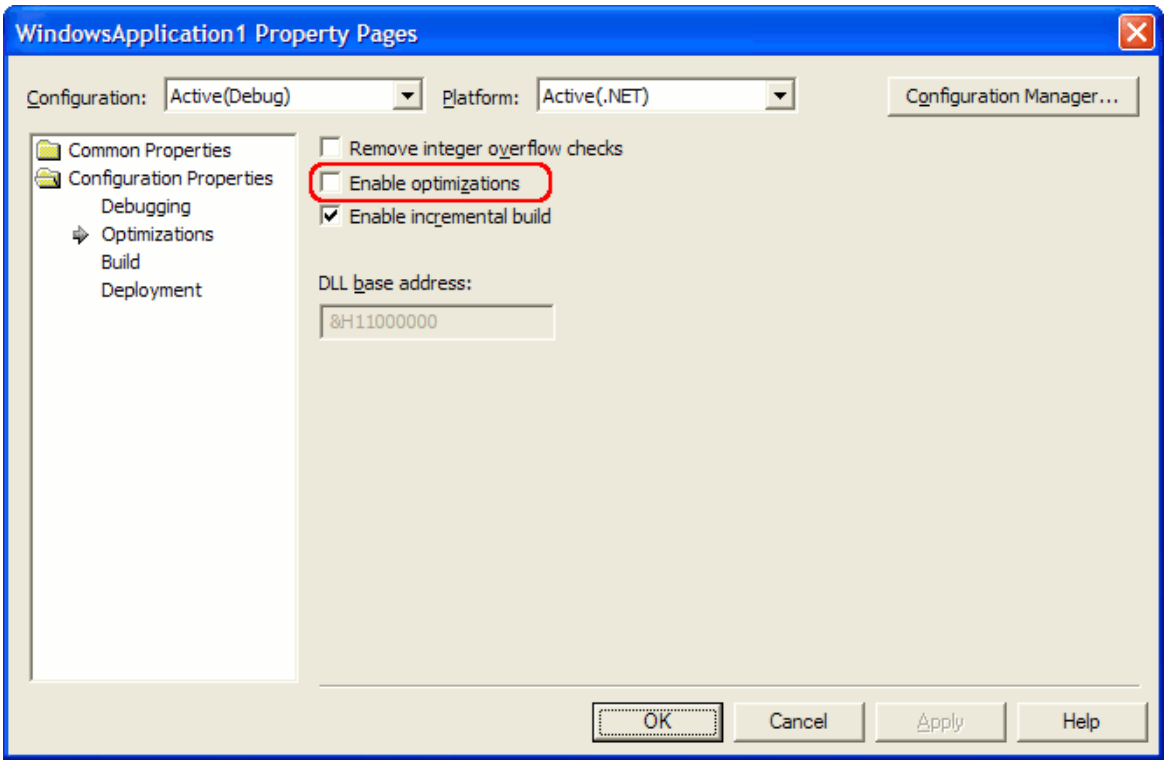


Close the dialog.

3. Right-click the project in the **Solution Explorer** and select **Properties** from the context menu. This will open the **Property Pages** dialog.
4. In the dialog,
   a. Open the **Configuration Properties | Build** page and select *Active (Debug)* from the **Configuration** dropdown list at the top of the dialog.
   b. In the **Configuration Properties | Build** page enable the *Generate debugging information* option.



c. Switch to the **Configuration Properties | Optimizations** page and turn off the *Enable Optimizations* option.



5. Press **OK** to save settings and recompile the application.

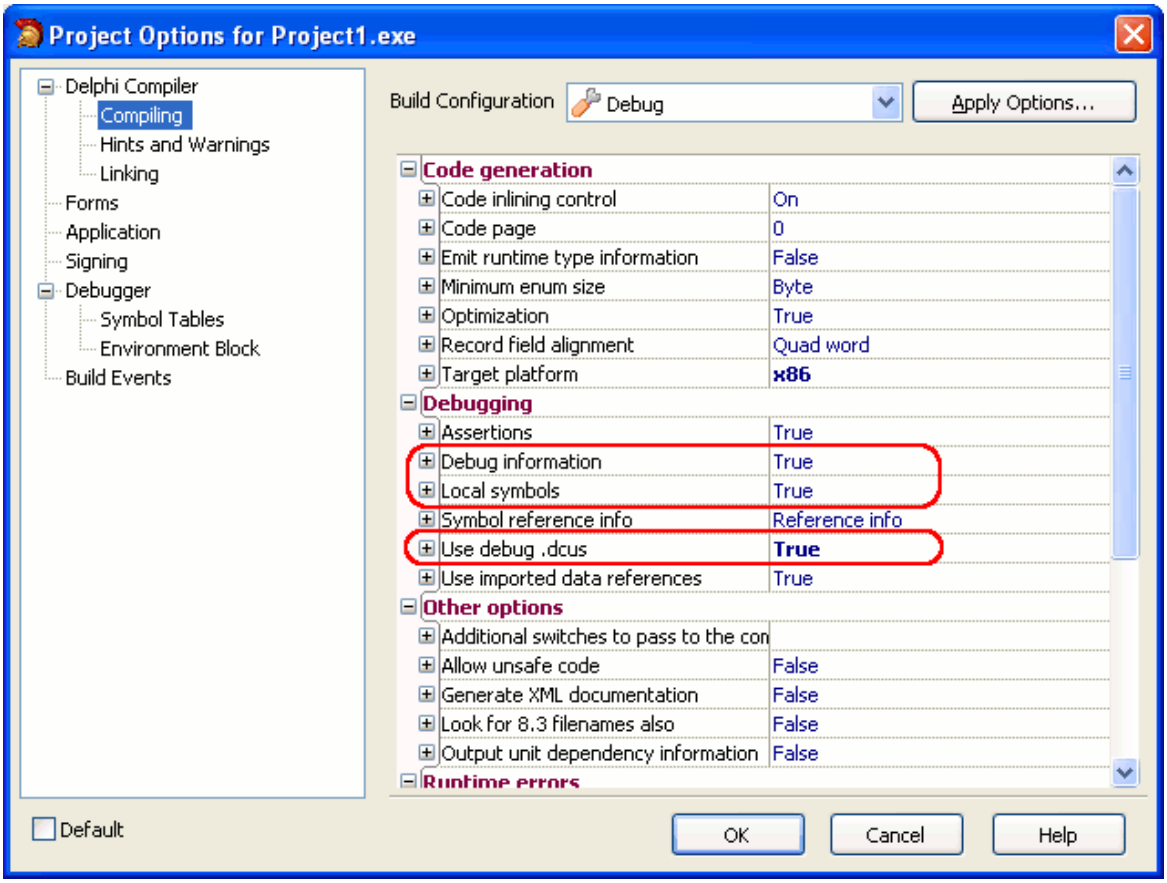
When your application is ready for final delivery, remember to compile it without debug information to reduce overall application size.

Compiling CodeGear Delphi 2009 for .NET Applications With Debug Information

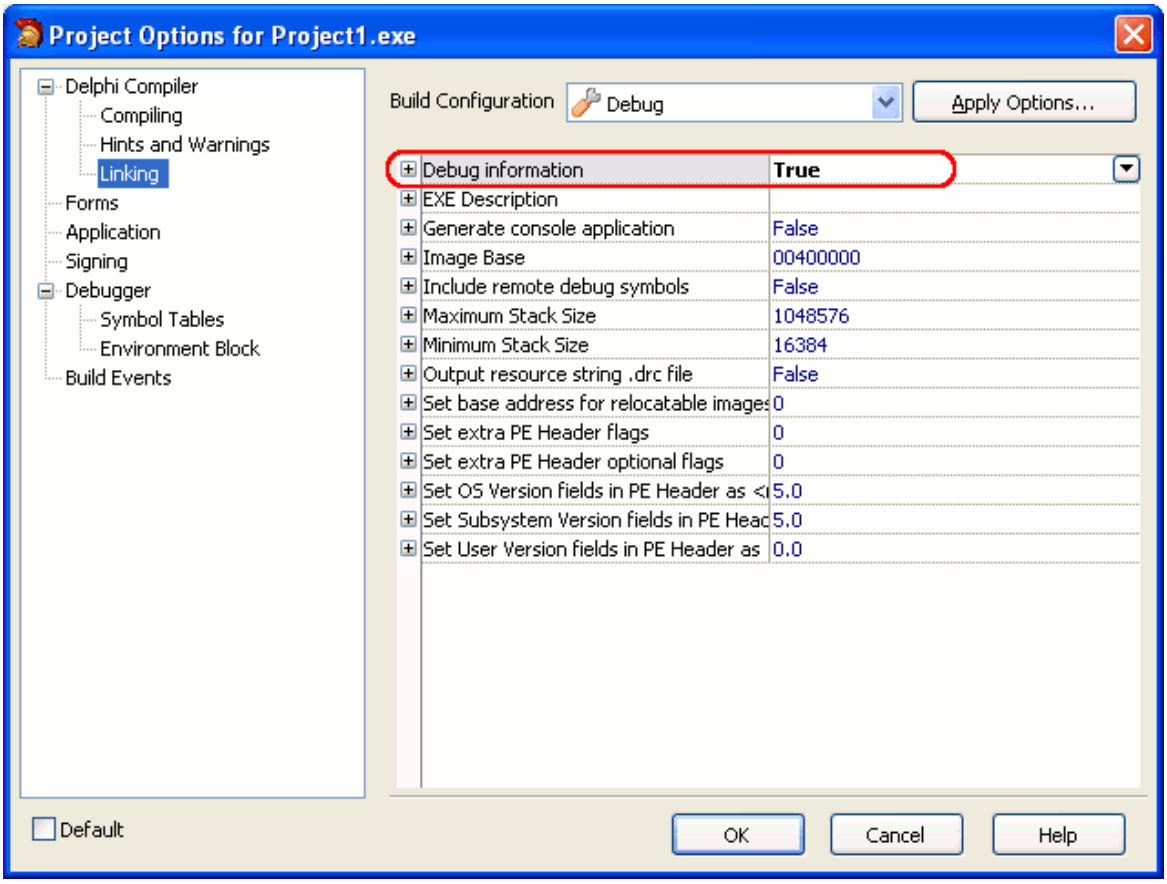
This topic explains how you can compile CodeGear Delphi 2009 for .NET applications with debug information for AQtrace. To learn how to prepare applications created with other Delphi versions, see *Compiling Applications With Debug Information*.

To add debug information to your Delphi 2009 for .NET application, do the following:

1. Open your project in CodeGear Delphi 2009 for .NET.
2. Select **Project | Options** from the main menu to display the **Project Options** dialog.
3. In the resulting Project Options dialog, select **Debug** in the **Build Configuration** combo box. This will load the settings used for debug builds.
4. Select the **Delphi Compiler | Compiling** category from the tree view on the left of the dialog.
5. In the **Debugging** group, set the **Debug information** and **Local symbols** options to *True*.
6. To trace VCL routines, set the **Use debug .dcus** option to *True*. If you set this option to *False*, AQtrace will be able to trace only those classes that are defined in your application.



7. Select the **Delphi Compiler | Linking** category in the tree on the left of the Project Options dialog and set the **Debug information** option to *True*:



8. Click **OK** to close the dialog.
9. Rebuild your application.

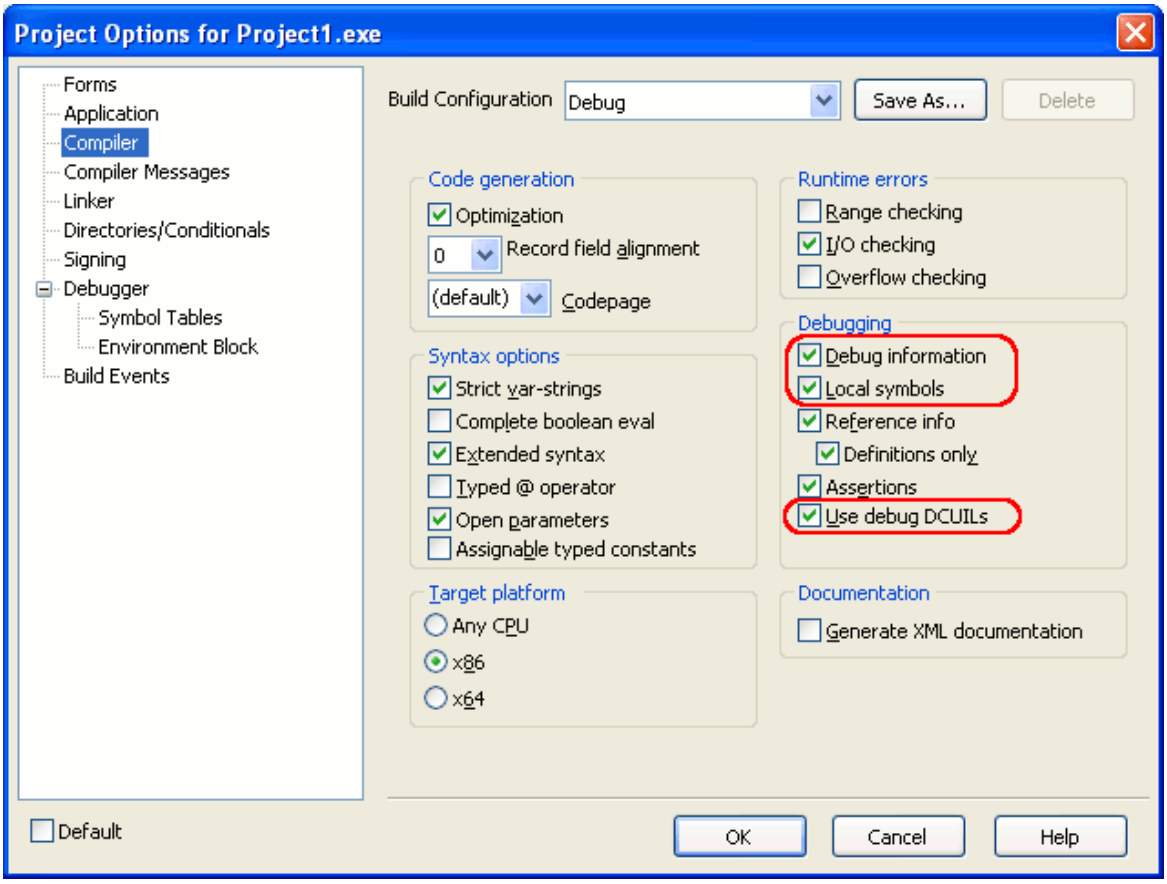
When your application is ready for final delivery, do not forget to recompile it without debug information to reduce the overall application size.

Compiling CodeGear Delphi 2007 for .NET Applications With Debug Information

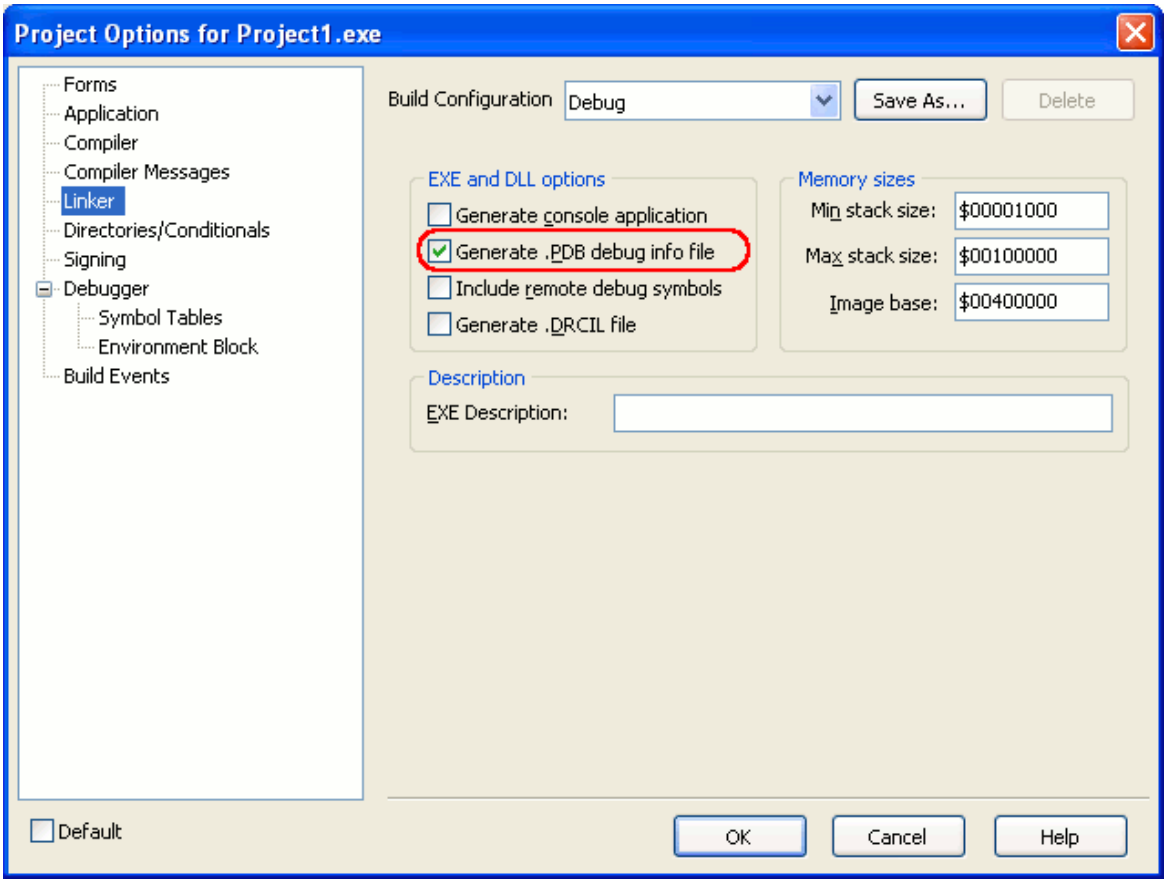
This topic explains how you can compile CodeGear Delphi 2007 for .NET applications with debug information for AQtrace. To learn how to prepare applications created with other Delphi versions, see *Compiling Applications With Debug Information*.

To add debug information to your Delphi 2007 for .NET application, do the following:

1. Open your project in CodeGear Delphi 2007 for .NET.
2. Select **Project | Options** from the main menu to display the **Project Options** dialog.
3. Select the **Compiler** category from the tree view on the left of the dialog.
4. In the **Debugging** section, select the **Debug information** and **Local symbols** check boxes.
5. To trace VCL routines, select the **Use debug DCUILs** check box in the Debugging section. If you clear this check box, AQtrace will be able to trace only those classes that are defined in your application.



6. Select the **Linker** category in the tree view on the left of the Project Options dialog and enable the **Generate .PDB debug info file** option:



7. Click **OK** to close the dialog.
8. Rebuild your application.

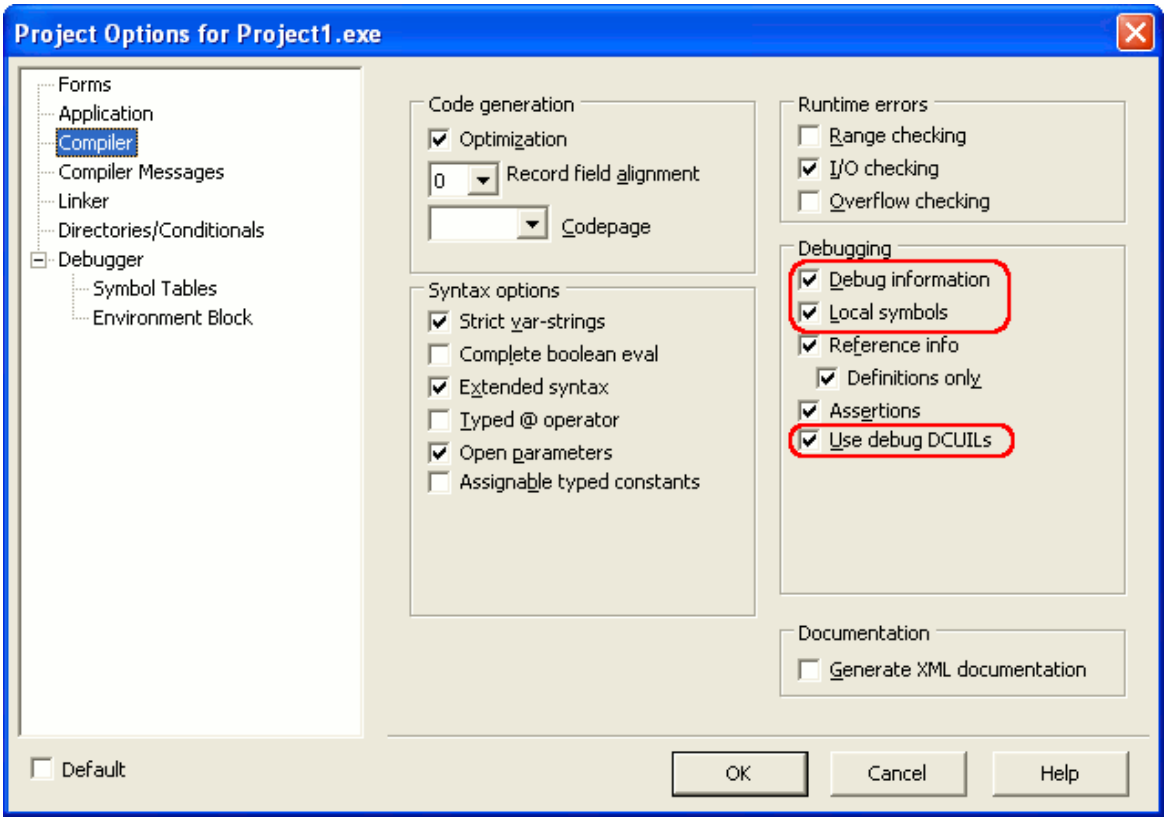
When your application is ready for final delivery, do not forget to recompile it without debug information to reduce the overall application size.

Compiling Borland Delphi 2005 and 2006 for .NET Applications With Debug Information

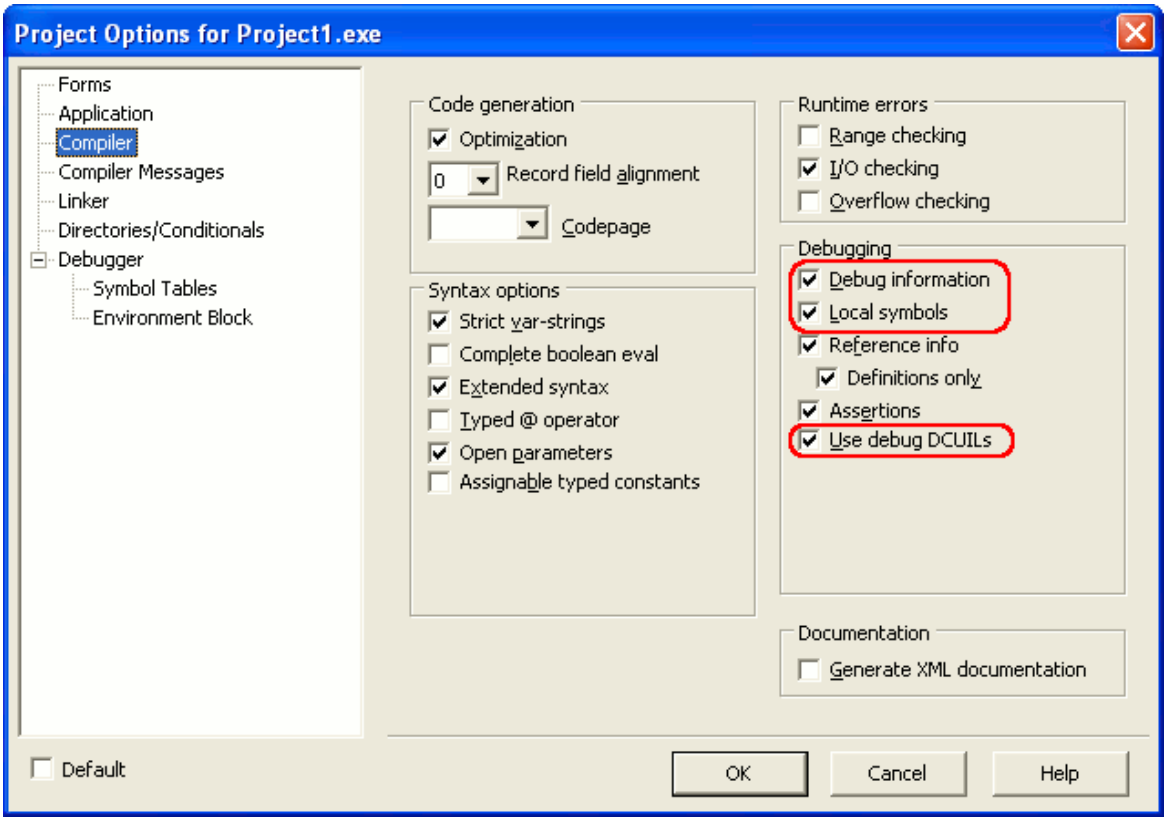
This topic explains how you can compile Borland Delphi 2005 and 2006 for .NET applications with debug information for AQtrace. To learn how to prepare applications created with other Delphi versions, see *Compiling Applications With Debug Information*.

To add debug information to your Delphi 2005 or 2006 for .NET application, do the following:

1. Open your project in Delphi 2005 or 2006 for .NET.
2. Select **Project | Options** from the main menu. This will open the **Project Options** dialog.
3. Select the **Compiler** category from the tree view on the left of the dialog and enable the following options:
   - **Debug information**
   - **Local Symbols**
   - **Use Debug DCUILs**



4. Select the **Linker** category and enable the **Generate .PDB debug info file** option:



5. Click **OK** to close the dialog. Recompile your application.

When your application is ready for final delivery, do not forget to compile it without debug information to reduce the overall application size.

Setting Build Number

Error reports contain information on modules and stacks of function calls. In order for *AQtrace Viewer*, *AQtrace Service* or other report analyzers to be able to parse call stack data, they must have access to the module's debug information and binary code. To provide this data, you place the compiled modules and debug info file to a *build storage* and specify the storage path in the AQtrace Viewer's and Service's settings.

The report contains the modules' file names and *build numbers*. When parsing a report, AQtrace Viewer (or Service) uses the file name and build number to search for an appropriate module in the build storage. Once the module is found, the Viewer (Service) loads it to memory and used to parse the report. The build number is important as it lets the Viewer (or Service) to distinguish modules that have the same name, but are used by different versions of your application.

The build number is part of version information that is defined in resource files included in executable modules. The build number includes four digits separated by periods, for instance:

```
Version: 3.12.138.0
```

The first two numbers are the major and minor versions. The third number is the build version and the fourth number is called a private part. It is used by software developers for various reasons. In our example, the major version is 3, the minor version - 12, the build part is 138 and the private part is 0.

You can specify a build number in two following ways:

- You can use special tools that modify data within compiled executables.
- You can use the means provided by your compiler, that is, you can modify compiler settings, resources or source files before building your modules.

An example of a tool that can modify version information within a compiled executable is *Automated Build Studio*. It is a build and release management system by SmartBear Software. It helps you automate all the steps of building an application: from getting source files from a source code control to uploading compiled installation packages to a web site or recording them on a CD. Automated Build Studio includes a special operation that lets you easily specify the desired build number for all the executable modules and libraries that reside in a folder.

If you do not have a special tool, then you can specify the desired build number by using the means offered by your compiler. The way you do this depends on the compiler: for some compilers you modify the compiler settings, for other compilers you modify source files or resources. For detailed information on setting the build number, see documentation on your development tool. The following topics explain how to specify build numbers for the most popular compilers:

- *Microsoft Visual C++ 6.0, 7.x, 2005, 2008 and 2010*
- *Microsoft Visual Basic 2005, 2008 and 2010*
- *Microsoft Visual Basic 7.x*
- *Microsoft Visual Basic 6.0*
- *Microsoft Visual C# 2005, 2008 and 2010*
- *Microsoft Visual C# 7.x*
- *Embarcadero Delphi 2010, XE*
- *CodeGear Delphi 2007, 2009 for Win32*

- *CodeGear Delphi 2007, 2009 for .NET*
- *Borland Delphi 2005, 2006 for Win32*
- *Borland Delphi 2005, 2006 for .NET*
- *Borland Delphi 3 - 7*
- *Embarcadero C++Builder 2010, XE*
- *CodeGear C++Builder 2007, 2009*
- *Borland C++Builder 2006*
- *Borland C++Builder 3 - 6*

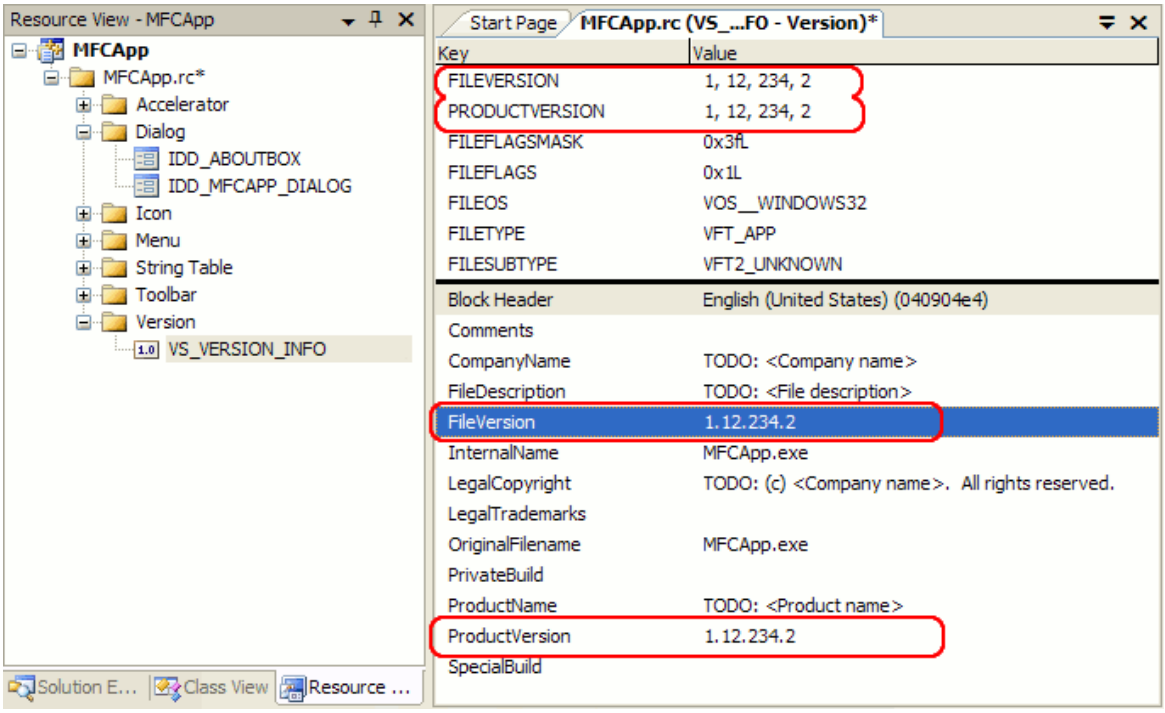
Setting Build Number for Microsoft Visual C++ Applications

This topic explains how to modify compiler settings to specify the build number for applications created with Microsoft Visual C++.

Note that setting the build number via compiler settings is just one of possible ways to specify the build number. Another way is to use special tools that can modify compiled executables (see *Setting Build Number*).

To specify the build number for a Visual C++ you should modify the application's resources. The way you do this is common for Visual Studio 6, 7.x, 2005, 2008 and 2010:

- Open your Visual C++ project in Visual Studio IDE.
- Open the **Resource View** window.
- In the window, double-click the **<resource file> | Version | VS_VERSION_INFO** node. This will open the resource editor.
- Specify the desired numbers in the **File Version** and **Product Version** fields that reside in the upper and lower parts of the editor:



- Save the changes and close the editor.

Now, after you compile the application, the module will contain the specified build number.

For **managed** Visual C++ 7.x, 2005, 2008 and 2010 applications (Visual C++ CLR projects) you can specify the build number in the following way:

- Open your managed Visual C++ project in Visual Studio IDE.
- Open the AssemblyInfo.cpp file (you can find it in the **<Solution_Name> | <Project_Name> | Source Files** node of the tree in the **Solution Explorer** window). This file contains some .NET attributes that specify various parameters of the .NET assembly.
- Specify the desired build number in the `[assembly:AssemblyVersionAttribute]` attribute. For instance:

```
[Visual C++]
[assembly:AssemblyVersionAttribute("1.20.375.0")];
```

- Save the changes in the AssemblyInfo.cpp file and close the editor.
- Recompile your application.

Setting Build Number for Microsoft Visual Basic 2005, 2008 and 2010 Applications

This topic explains how to modify compiler settings to specify the build number for Microsoft Visual Basic 2005, 2008 and 2010 applications.

Note that setting the build number via compiler settings is just one of possible ways to specify the build number. Another way is to use special tools that can modify compiled executables (see *Setting Build Number*).

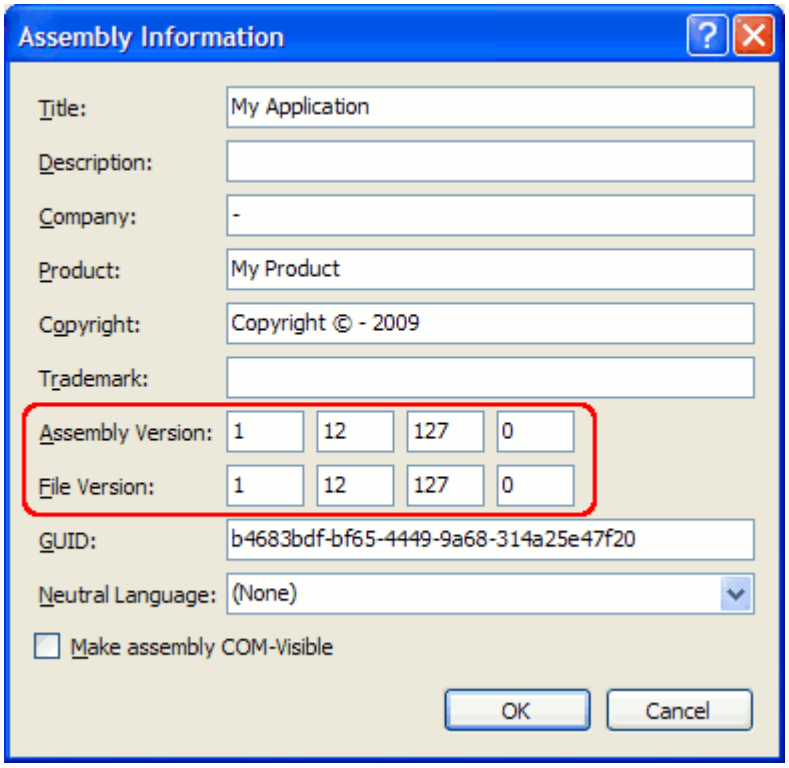
To specify the build number:

- Open your Visual Basic .NET project in Microsoft Visual Studio 2005, 2008 or 2010.
- Select **Project | <Project_Name> Properties** from Visual Studio's main menu.

  -- or --

  Right-click the project node in the **Solution Explorer** window and select **Properties** from the ensuing context menu.

  This will display the **Project Properties** dialog.
- In the dialog, move to the **Application** tabbed page and press the **Assembly Information** button.
- In the ensuing **Assembly Information** dialog, specify the desired build number in the **Assembly Version** and **File Version** fields:



- Click **OK** to close the dialog.
- Save the changes in the project and close the Project Properties dialog.
- Compile your application.

The build number specified in the Assembly Information dialog is stored in the AssemblyInfo.vb file that contains various parameters of the assembly. You can also specify the version number by editing directly this file in the following way:

- Open your Visual Basic .NET project in Microsoft Visual Studio 2005, 2008 or 2010.
- Select the project in the **Solution Explorer** window and select **Project | Show All Files** from the main menu. This is necessary to display AssemblyInfo.vb in the Solution Explorer, because by default this file is hidden.
- Double-click the **<Project_Name> | My Project | AssemblyInfo.vb** node in the tree of Solution Explorer to open the file for editing.
- Use the `<Assembly: AssemblyVersion>` and `<Assembly: AssemblyFileVersion>` .NET attributes in the AssemblyInfo.vb file to specify the desired build number. For instance:

```
[Visual Basic]
<Assembly: AssemblyVersion("1.12.127.0")>
<Assembly: AssemblyFileVersion("1.12.127.0")>
```

- Save the changes and close the editor window.
- Compile the application.

Now, after you compile the application, the module will contain the specified build number.

Setting Build Number for Microsoft Visual Basic 7.x Applications

This topic explains how to modify compiler settings to specify the build number for applications created in Microsoft Visual Basic 7.x.

Note that setting the build number via compiler settings is just one of the possible ways to specify the build number. Another way is to use special tools that can modify compiled executables (see *Setting Build Number*).

To specify the build number:

- Open your Visual Basic .NET project in Microsoft Visual Studio 7.x.
- Double-click the **<Solution_Name> | <Project_Name> | AssemblyInfo.vb** node in the **Solution Explorer** window. This will display the AssemblyInfo.vb file that contains various parameters of the assembly to be compiled.
- In the AssemblyInfo.vb file, use the `<Assembly: AssemblyVersion>` .NET attribute to specify the desired build number. For instance:

```
[Visual Basic]
<Assembly: AssemblyVersion("1.20.375.0")>
```

- Save the changes in the AssemblyInfo.vb file and close the editor.
- Compile your Visual Basic .NET application.

Now, after you compile the application, the module will contain the specified build number.

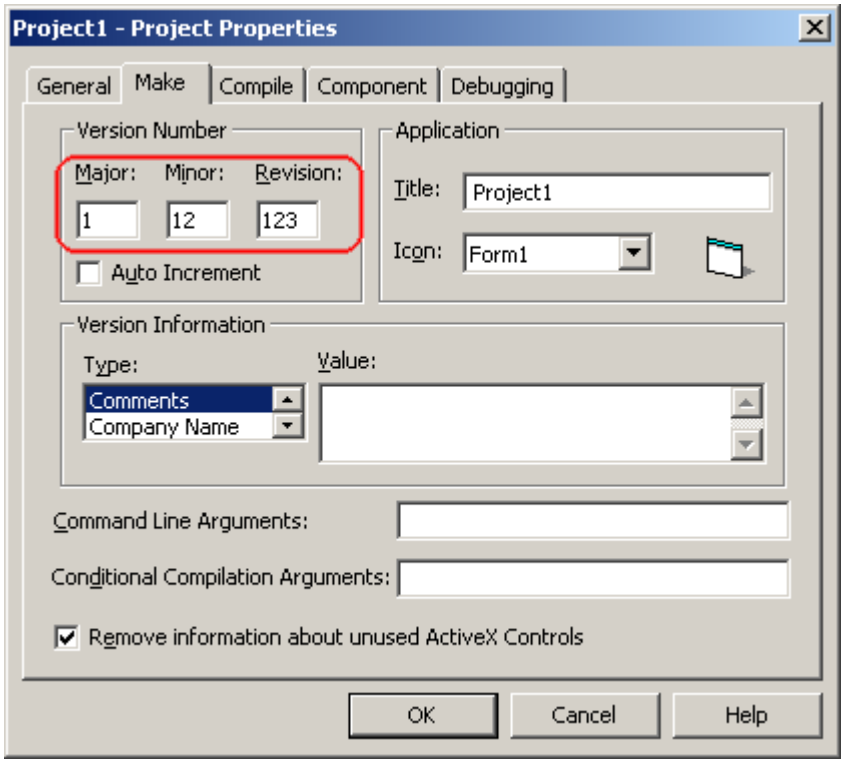
Setting Build Number for Microsoft Visual Basic 6.0 Applications

This topic explains how to modify compiler settings to specify the build number for applications created in Microsoft Visual Basic 6.

Note that setting the build number via compiler settings is just one of possible ways to specify the build number. Another way is to use special tools that can modify compiled executables (see *Setting Build Number*).

To specify the build number:

- Open your project in Visual Basic IDE.
- Select **Project | <Your_Project_Name> Properties** from the main menu. This will invoke the **Project Properties** dialog.
- In the dialog, switch to the **Make** tabbed page.
- Specify the desired numbers in the **Major**, **Minor** and **Revision** edit boxes of the **Version number** section:



- Click **OK** to save the changes and to close the dialog.

Now, after you compile the application, the compiled module will contain the specified build number.

Setting Build Number for Microsoft Visual C# 2005, 2008 and 2010 Applications

This topic explains how you can modify compiler settings to specify the build number for Microsoft Visual C# 2005, 2008 and 2010 applications.

Note that setting the build number via compiler settings is just one of possible ways to specify the build number. Another way is to use special tools that can modify compiled executables (see *Setting Build Number*).

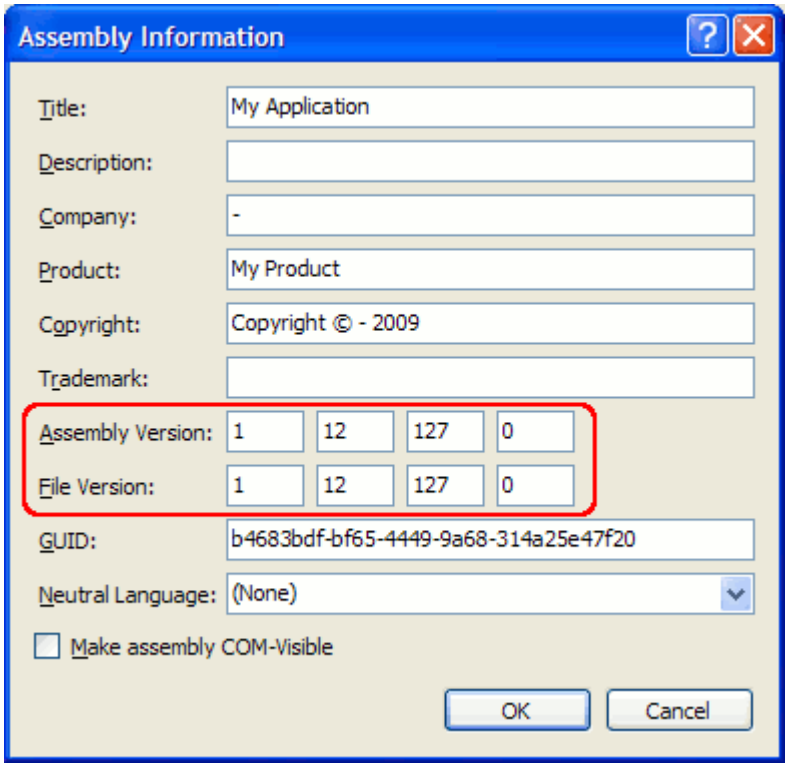
To specify the build number:

- Open your Visual C# project in Microsoft Visual Studio 2005, 2008 or 2010.
- Select **Project | <Project_Name> Properties** from Visual Studio's main menu.

  -- or --

  Right-click the project node in the **Solution Explorer** window and select **Properties** from the ensuing context menu.

  This will display the **Project Properties** dialog.
- In the dialog, move to the **Application** tabbed page and press the **Assembly Information** button.
- In the ensuing **Assembly Information** dialog, specify the desired build number in the **Assembly Version** and **File Version** fields:



- Click **OK** to close the dialog.
- Save the changes in the project and close the Project Properties dialog.
- Compile your application.

The build number specified in the Assembly Information dialog is stored in the AssemblyInfo.cs file that contains various parameters of the assembly. You can also specify the version number by editing directly this file in the following way:

- Open your Visual C# project in Microsoft Visual Studio 2005, 2008 or 2010.
- Double-click the **<Project_Name> | Properties | AssemblyInfo.cs** node in the tree of Solution Explorer to open the file for editing.
- Use the `[assembly: AssemblyVersion]` and `[assembly: AssemblyFileVersion]` .NET attributes in the AssemblyInfo.cs file to specify the desired build number. For instance:

```
[C#]
[assembly: AssemblyVersion("1.12.127.0")]
[assembly: AssemblyFileVersion("1.12.127.0")]
```

- Save the changes and close the editor window.
- Compile the application.

Now, after you compile the application, the module will contain the specified build number.

Setting Build Number for Microsoft Visual C# 7.x Applications

This topic explains how to modify compiler settings to specify the build number for Microsoft Visual C#

7.x applications.

Note that setting the build number via compiler settings is just one of the possible ways to specify the build number. Another way is to use special tools that can modify compiled executables (see *Setting Build Number*).

To specify the build number:

- Open your Visual C# project in Microsoft Visual Studio 7.x.
- Double-click the **<Solution_Name> | <Project_Name> | AssemblyInfo.cs** node in the **Solution Explorer** window. This will open the AssemblyInfo.cs file that contains various parameters of the assembly to be compiled.
- In the AssemblyInfo.cs file, use the `[assembly: AssemblyVersion]` .NET attribute to specify the desired build number. For instance:

```
[C#]
[assembly: AssemblyVersion("1.20.375.0")]
```

- Save the changes in the AssemblyInfo.cs file and close the editor.
- Compile your Visual C# application.

Now, after you compile the application, the assembly will contain the specified build number.

Setting Build Number for Delphi 2005 - 2007, 2009 - 2010 and XE Win32 Applications

This topic explains how to modify compiler settings to specify the build number for applications created in Borland Delphi 2005 and 2006 for Win32, in CodeGear Delphi 2007 and 2009 for Win32 and in Embarcadero Delphi 2010 and XE. To learn how to set the build number for applications created in Borland Delphi v. 3 - 7, see *Setting Build Number for Borland Delphi Applications*. For information about build number settings in Delphi 2005, 2006, 2007 and 2009 for .NET, see *Setting Build Number for Delphi 2005, 2006, 2007 and 2009 .NET Applications*.

Note that setting the build number via compiler settings is just one of possible ways to specify the build number. Another way is to use special tools that can modify compiled executables (see *Setting Build Number*).

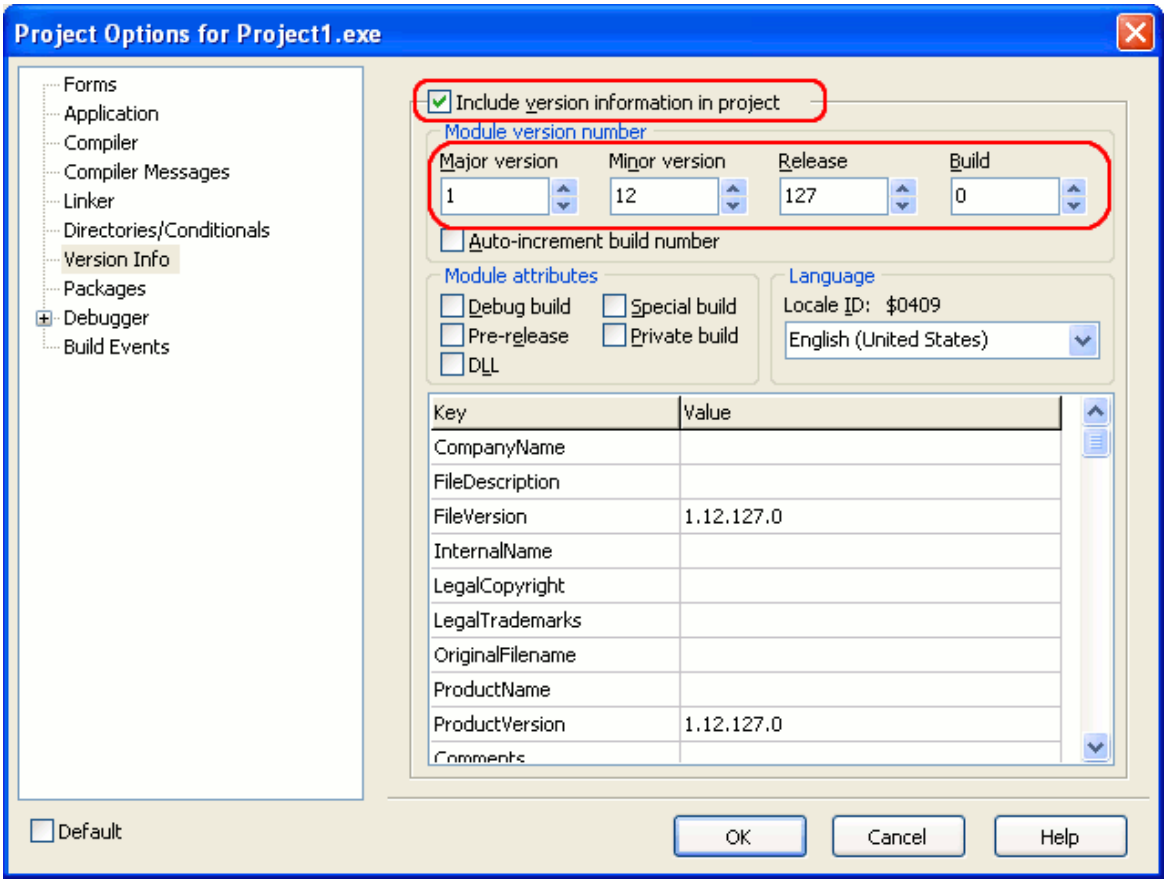
To specify the build number:

- Open your Delphi for Win32 project in Delphi IDE.
- Select **Project | Options** from Delphi's main menu.

  -- or --

  Right-click the project node in the **Project Manager** and select **Options** from the context menu.

  This will open the **Project Options** dialog.
- Select **Version Info** from the tree on the left of the dialog.
- Select the **Include version information in project** check box and specify the desired build numbers in the **Major version**, **Minor version**, **Release** and **Build** edit boxes:



- Click **OK** to save the changes and to close the dialog.

Now, after you compile the application, the module will contain the specified build number.

Setting Build Number for Delphi 2005, 2006, 2007 and 2009 for .NET Applications

This topic explains how to modify compiler settings to specify the build number for applications created in Borland Delphi 2005 and 2006 for .NET and CodeGear Delphi 2007 and 2009 for .NET. To learn how to set the build number for applications created in Borland Delphi v. 3 - 7, see *Setting Build Number for Borland Delphi Applications*. For information about build number settings in Delphi 2005 – 2007, 2009 – 2010 and XE for Win32, see *Setting Build Number for Delphi 2005 – 2007, 2009 – 2010 and XE Win32 Applications*.

Note that setting the build number via compiler settings is just one of the possible ways to specify the build number. Another way is to use special tools that can modify compiled executables (see *Setting Build Number*).

To specify the build number:

- Open your Delphi for .NET project in Delphi IDE.
- Right-click the project node in the **Project Manager** and select **View Source** from the context menu. This will open the .dpr file with the project settings for editing.
- In the project file, use the `[assembly: AssemblyVersion]` .NET attribute to specify the

desired build number. For instance:

```
[Delphi]
[assembly: AssemblyVersion('1.12.127.0')]
```

- Save the changes in the project file and close the editor.
- Compile your application.

Now, after you compile the application, the module will contain the specified build number.

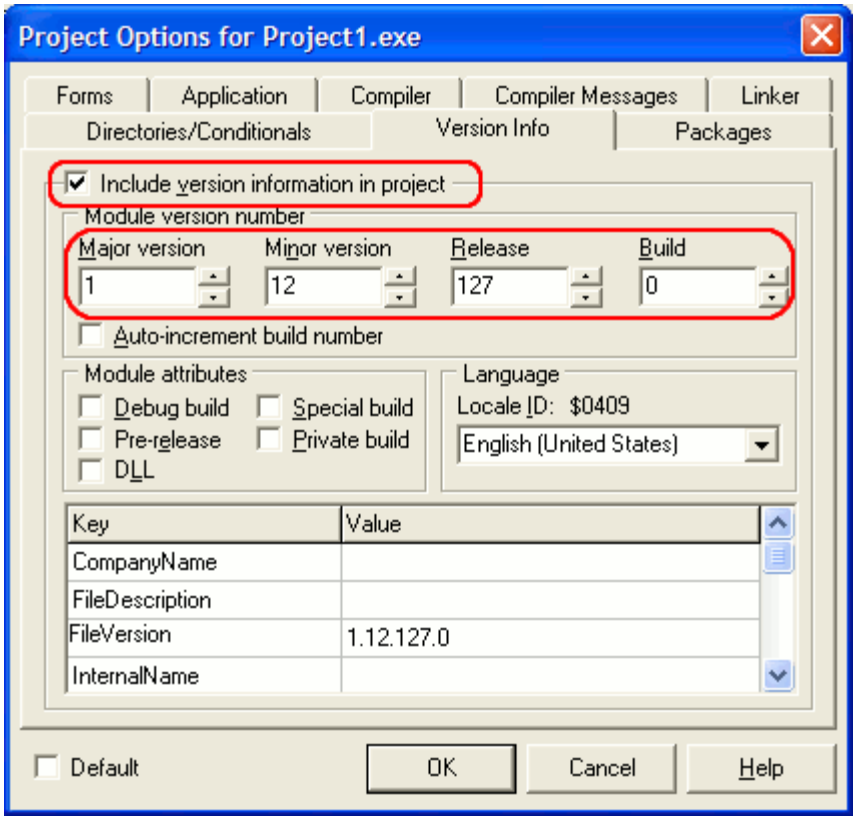
Setting Build Number for Borland Delphi Applications

This topic explains how to modify compiler settings to specify the build number for applications created in Borland Delphi ver. 3 - 7. To learn how you can set the build number for applications created in Delphi 2005 – 2007, 2009 – 2010 and XE, see *Setting Build Number for Delphi 2005 – 2007, 2009 - 2010 and XE Win32 Applications*.

Note that setting the build number via compiler settings is just one of possible ways to specify the build number. Another way is to use special tools that can modify compiled executables (see *Setting Build Number*).

To specify the build number:

- Open your project in Borland Delphi.
- Select **Project | Options** from the main menu. This will invoke the **Project Options** dialog.
- In the dialog, switch to the **Version Info** page.
- Select the **Include version information in project** check box and specify the desired build numbers in the **Major version**, **Minor version**, **Release** and **Build** edit boxes:



- Click **OK** to save the changes and to close the dialog.

Now, after you compile the application, the compiled module will contain the specified build number.

Setting Build Number for C++Builder 2006, 2007, 2009, 2010 and XE Applications

This topic explains how to modify compiler settings to specify the build number for applications created in Borland C++Builder 2006, in CodeGear C++Builder 2007 and 2009, or in Embarcadero C++Builder 2010 or XE. To learn how to set the build number for applications created in C++Builder v. 3-6, see *Setting Build Number for Borland C++Builder Applications*.

Note that setting the build number via compiler settings is just one of possible ways to specify the build number. Another way is to use special tools that can modify compiled executables (see *Setting Build Number*).

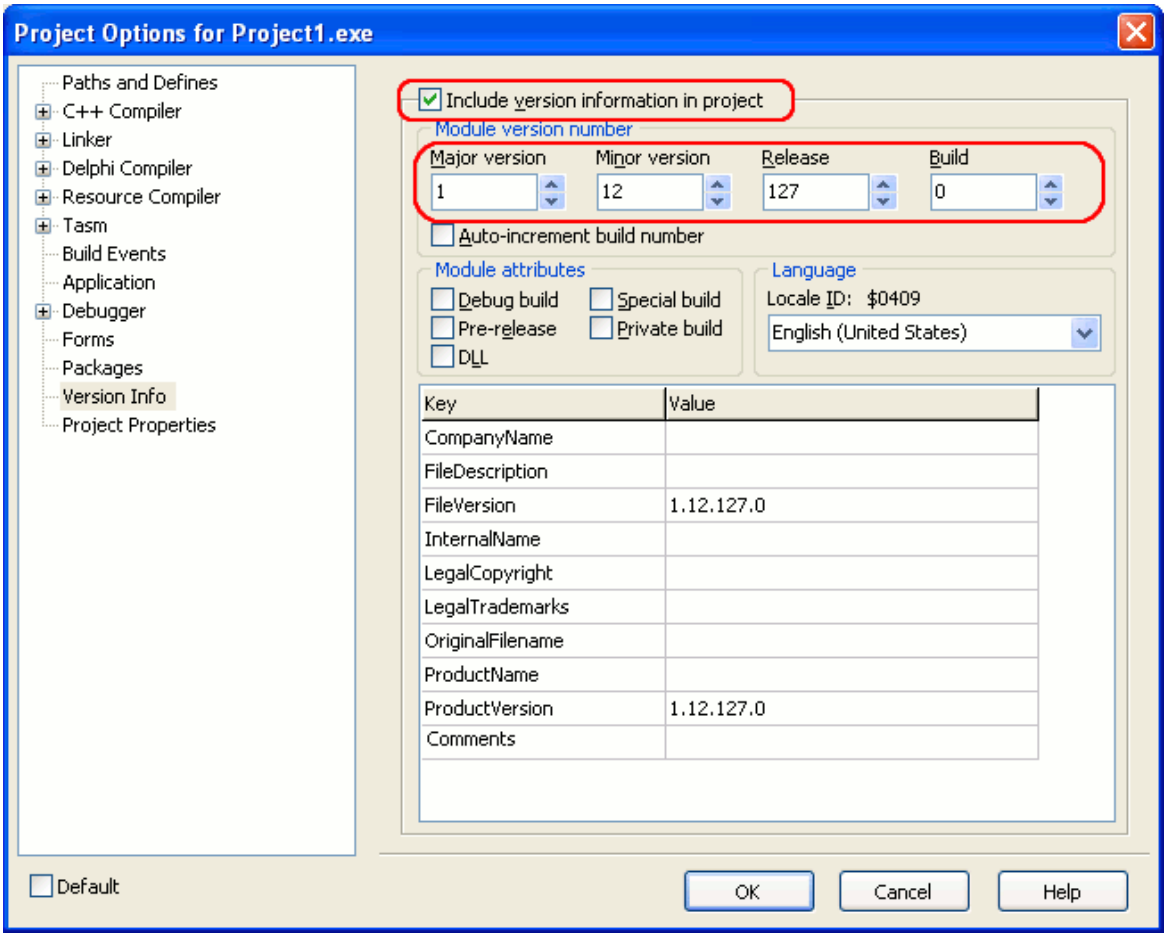
To specify the build number:

- Open your project in C++Builder IDE.
- Select **Project | Options** from C++Builder main menu.

  -- or --

  Right-click the project node in the **Project Manager** and select **Options** from the context menu. This will open the **Project Options** dialog.
- Select **Version Info** from the tree on the left of the dialog.
- Select the **Include version information in project** check box and specify the desired build

numbers in the **Major version**, **Minor version**, **Release** and **Build** edit boxes:



- Click **OK** to save the changes and to close the dialog.

Now, after you compile the application, the compiled module will contain the specified build number.

Setting Build Number for Borland C++Builder Applications

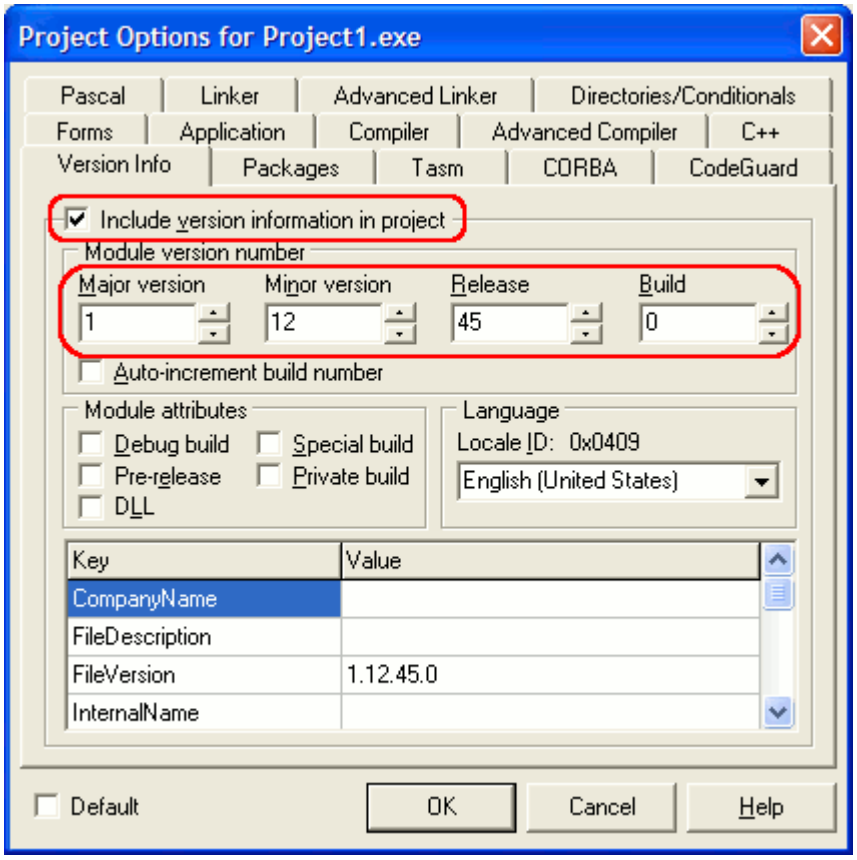
This topic explains how to modify compiler settings to specify the build number for applications created in Borland C++ Builder ver. 3 - 6. To learn how you can set the build number for applications created with other C++Builder versions, see *Setting Build Number for C++Builder 2006, 2007, 2009, 2010 and XE Applications*.

Note that setting the build number via compiler settings is just one of possible ways to specify the build number. Another way is to use special tools that can modify compiled executables (see *Setting Build Number*).

To specify the build number:

- Open your project in Borland C++Builder.
- Select **Project | Options** from the main menu. This will invoke the **Project Options** dialog.
- In the dialog, switch to the **Version Info** page.
- Select the **Include version information in project** check box and specify the desired build

numbers in the **Major version**, **Minor version**, **Release** and **Build** edit boxes:



- Click **OK** to save the changes and to close the dialog.

Now, after you compile the application, the compiled module will contain the specified build number.

Organizing Build Storage

Organizing Build Storage - Basic Concepts

Error reports contain information on call stacks for each thread that existed in the traced application. The call stack data contains information about functions' addresses and the modules that contain these functions. In order for *AQtrace Viewer* and *AQtrace Service* to be able to parse the call stacks, they need access to the binary code and debug information of the modules that are mentioned in the report.

Typically, end-users work with different versions of your application. For instance, some users can work with version 1.8 while some others use the version 2.0 or 2.1. So, most likely you will receive error reports that were generated for various versions of your application. In order for AQtrace Viewer and Service to be able to parse these reports, you should provide access to the binary code and debug information for the modules that belong to different versions of your application.

You do this by creating a **build storage** that contains modules and debug information files for each version of your application that is shipped to end-users. When parsing reports, AQtrace Viewer and Service search for the needed modules in the storage and use them to parse call stack data. If a module or debug information is not found, the call stack will not be parsed. So, specifying correct paths to the build storage is critical for the functioning of the Viewer and Service. For detailed information on specifying the path, see below.

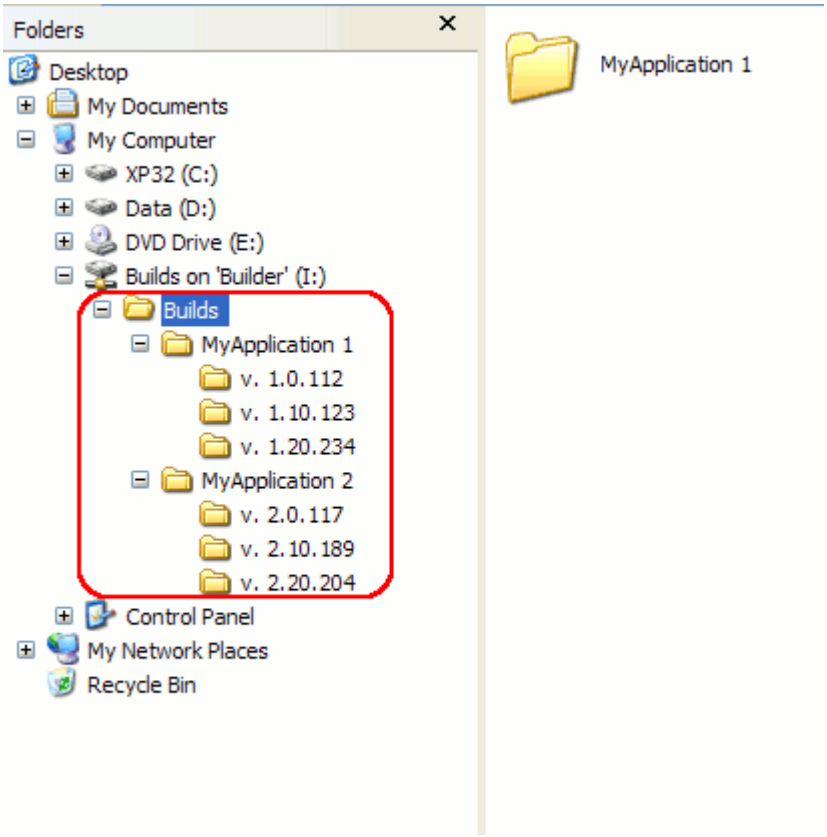
To create a storage, you should perform the following operations:

1. Define the storage structure
2. Compile your modules with debug information and specify version information for them
3. Place the files to the build storage
4. Specify the build storage location for AQtrace Viewer and AQtrace Service

The following sections explain how to perform these tasks. In the end, we will also describe *key points* to which you should pay attention when creating the build storage.

1. Defining the Storage Structure

A build storage is just a folder (or folders) that contains executable modules and debug info files. Since end-users can work with several versions of your application, the build storage must contain binary modules and debug info files for each version of your application that were shipped to end-users. So, it is recommended to organize the stored files into subfolders each of which will contain files that correspond to this or that version. A subfolder name can match a build number. You can use, for example, the following folder structure:



Here, *Builds* is the root folder of the storage. *MyApplication 1* and *MyApplication 2* are folders that contain subfolders corresponding to versions of the MyApplication program. Subfolders of the next level correspond to application versions (builds) that were shipped to end-users. Each of these subfolders contains the modules that were included in the appropriate build.

The access to compiled modules is required by the AQtrace Service that runs on the computer (server) and by the AQtrace Viewer instances running by members of your development team. So, **it is recommended to share the build storage folder** for network access, so that the compiled modules and debug info files can be accessed by all needed applications and developers.

After you define the storage structure, you add the files to the storage and then specify the storage location for AQtrace Viewer and AQtrace Service (see below).

Note that the suggested storage structure is not the only possible way to organize the storage. It is possible, for example, to store files of different builds on different computers, but not in one folder. In this case, you will have to "inform" AQtrace Viewer and Service about all possible folders.

2. Compiling Modules

The modules to be included into the build storage must match two requirements:

- They must be compiled with debug information.
- They must have version information specified.

Both these requirements are critical. Debug information is needed to parse the call stack data. AQtrace is unable to perform this task without debug info. For information on how to compile your modules with debug information, see *Compiling Applications With Debug Information*.

Each executable or DLL module in the storage is identified by its module name and version number (a

module name includes the file name and extension, but not the path). The version number lets AQtrace distinguish different versions of the module that is included in several application versions. Without this information it would be impossible, for instance, to distinguish MyHelper.DLL that is included in ver. 1.10.123 and 1.20.234. For information on how to specify the version number for modules, see *Setting Build Number*.

3. Placing Files to Build Storage

The build storage is just a folder (or folders) and placing files and modules to the storage means no more than moving the files to the desired folder.

Compilers can generate debug information as external files, or they can include it in the compiled executables. If debug information is generated as an external file, this file must reside in the same storage folder, in which the appropriate module is located.

After you add new files to the build storage, you may need to update the settings of AQtrace Viewer and AQtrace Service so that they are able to find the new files.

4. Specifying the Storage Location for AQtrace Viewer and AQtrace Service

In order for the AQtrace Viewer and Service utilities to be able to find binary modules and debug information files, you should specify the storage location for them. The following topics provide complete information on changing the settings of these utilities:

- *AQtrace Viewer - Specifying Path to Modules*
- *Configuring AQtrace Service*

The AQtrace Viewer and AQtrace Service settings are similar to each other. They let you specify the storage location in several ways:

- You can specify the location by using the **build storage configuration file**. The file contains information about module names, their versions and module location in the storage. You create this file with the *AQtrace Module Store* utility.

  Note: You should update the contents of the configuration file so that it holds information about each version of your application that is shipped to end-users. This can be done in two ways:

  - Manually - by using the *AQtrace Module Store* utility you used to create the configuration file.
  - Automatically - by using the dedicated *AQtrace Module Store Agent* service running in the background.

- You can specify the location of binary modules and debug info file by using the **symbols path** settings. These settings specify the folders and URLs, in which the Viewer and Service will search for binary modules and debug information files.

  If the desired module is found on a remote computer, it is downloaded to the computer, on which the Viewer or Service is running, and then the Viewer (or Service) uses the downloaded copy.

  The symbols path settings are typically uses to specify location of debug info files (these files are also called symbol files).

AQtrace Viewer also has one more type of settings - **modules path** - that specify additional search paths.

You can use these additional settings to specify the search paths, which you typically do not use.

The Viewer and Service use the storage location settings in the following order:

1. Module storage file
2. Symbols path
3. Modules path (AQtrace Viewer only)

Once the desired module is found, the search is stopped.

5. Key Points

- The build storage is used to store modules and debug information for each release of your application.
- Files added to the storage must be compiled with debug information. Also, you must specify version information for binary modules.
- The storage must contain compiled modules along with debug information files. If debug info is generated as an external file, this file should reside in the folder where the compiled module is.
- It is recommended to share the storage folder, so that AQtrace Service and all the developers of your team have access to the same compiled modules and debug info files.
- Each module in the storage is identified by its file name and version information. File paths are not used.
- You specify the storage location for AQtrace Viewer on the *Symbols* page of its *Options* dialog. You specify the storage location for AQtrace Service during AQtrace installation or later, by using the *AQtrace Server Config* utility.
- After you release a new version, you should add the compiled modules and debug info files to it. You should also update the storage configuration file (if you use it) or those settings of AQtrace Viewer and AQtrace Service that specify the build storage location.

AQtrace Module Store

The **AQtrace Module Store** utility is used to create and maintain *build storage configuration files* that describe the contents of the *build storage*. These files contain information about the names, versions and paths of executable modules added to the build storage. The configuration files are used by *AQtrace Viewer* and *AQtrace Service* to parse received error reports. When parsing a report, AQtrace Viewer and Service use this file to find information for a module that is met in the report. Using this information, they read debug info for the module and unwind the call stacks.

You can find the AQtrace Module Store utility in the *<AQtrace>\Bin* folder. The file name is *AQtraceModuleStore.exe*.

AQtrace Module Store can function as a visual tool or as a command-line utility.

To maintain the configuration file, you can also use the *AQtrace Module Store Agent*. It is a service that automatically updates build storage configuration files.

AQtrace Module Store - User Interface

The *AQtrace Module Store* utility is intended to create, view and modify the contents of the build storage configuration files. These files contain information about binary modules that are added to the *build storage.* This topic describes the user interface of the utility. For information on using the utility, see *Using AQtrace Module Store*.

The most part of the utility's window is occupied by the tree-like list that displays the contents of the configuration file that is being edited. The file name is displayed above the list. You open, modify, save and close configuration files by using toolbar buttons or items of the utility's menu (see below).

The list contains two columns: **Path\Name** and **Version** that display correspondingly the module's path and file name and its version number. The data in the list is not editable. AQtrace Module Store automatically fills the column values when you add new modules to the configuration file (see *Using AQtrace Module Store*).

By default, the tree's nodes are grouped by the path (see the image below). That is, the tree represents the structure of the build storage in the file system context: leaf nodes represent binary modules that are added to the build storage, all other nodes represent the folders that make up the full paths to the modules:

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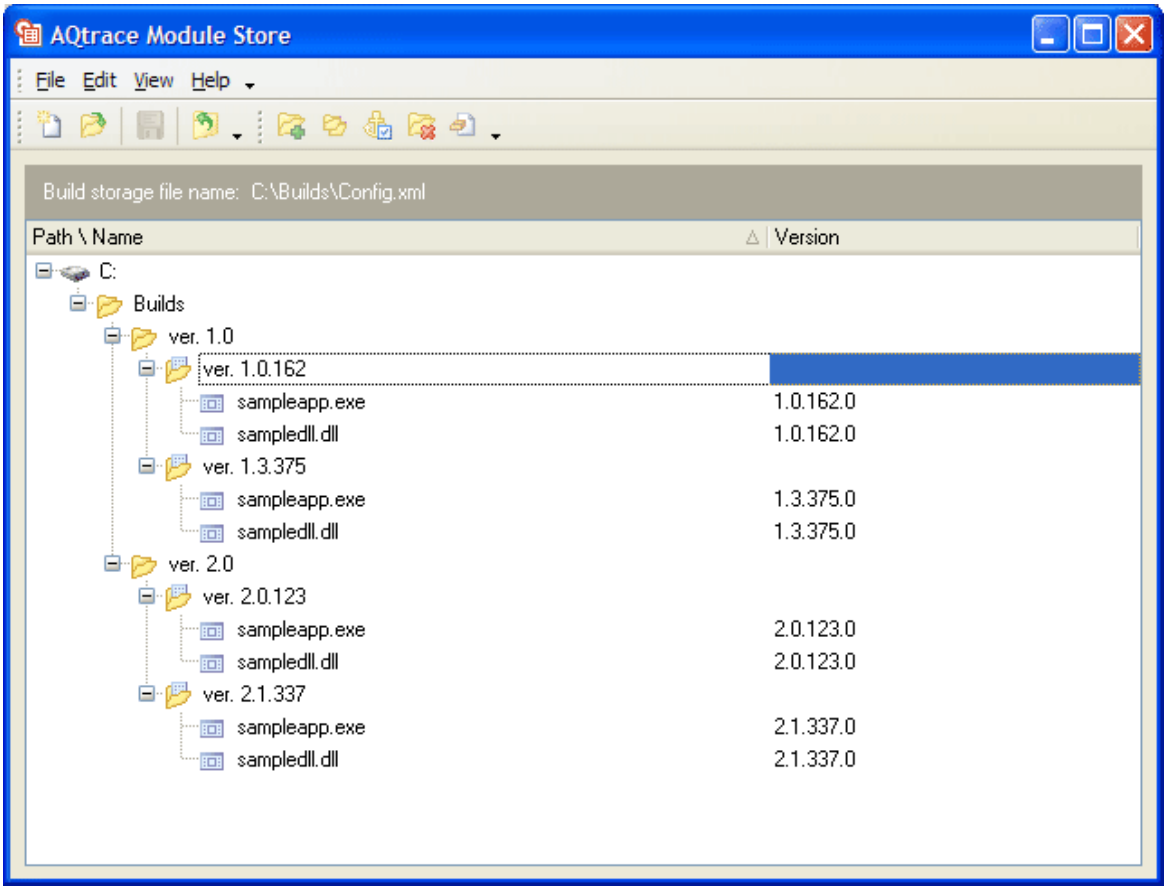


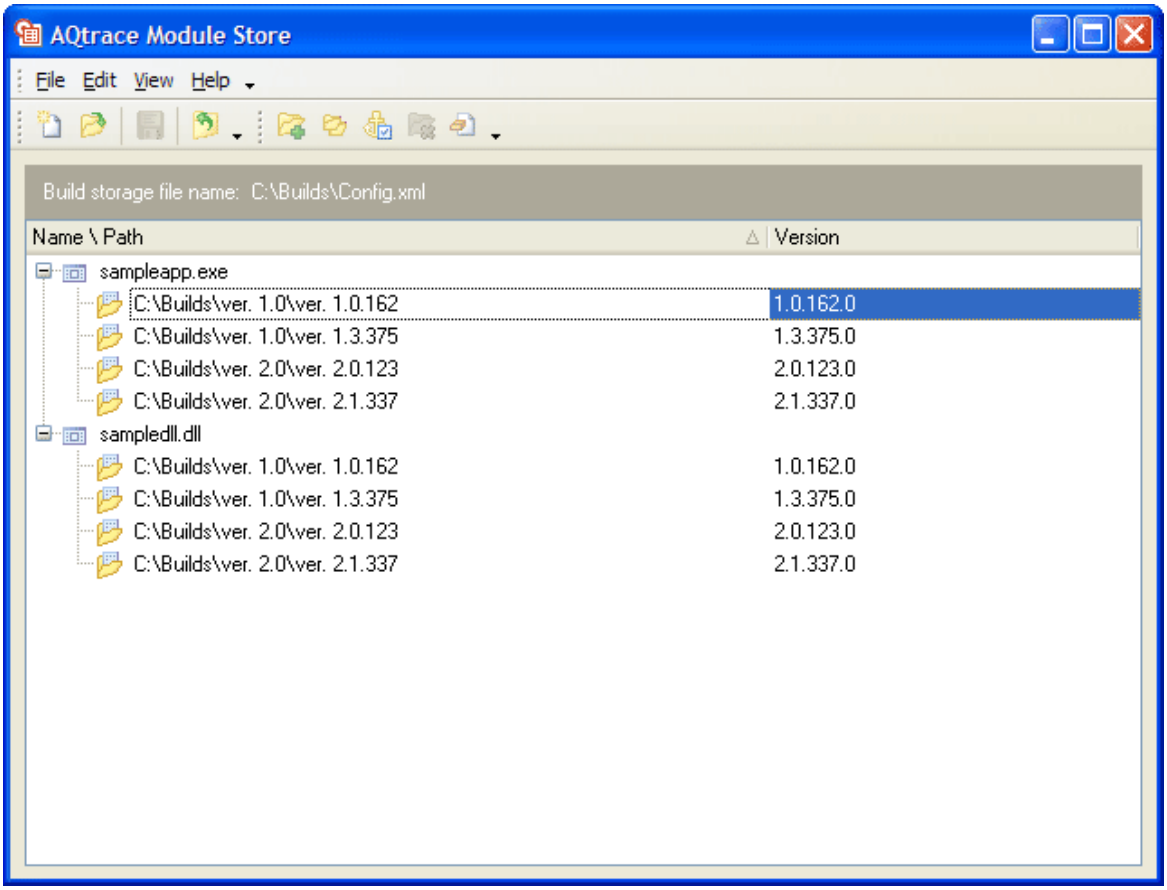
Also, you can group the data by the name:

- On the **View** menu, select **Group by Name**.

  -- or --

- Right-click within the tree area and select **Group by Name** on the ensuing context menu.

  To change the grouping to the default mode (by the path), click **Group by Name** once again.

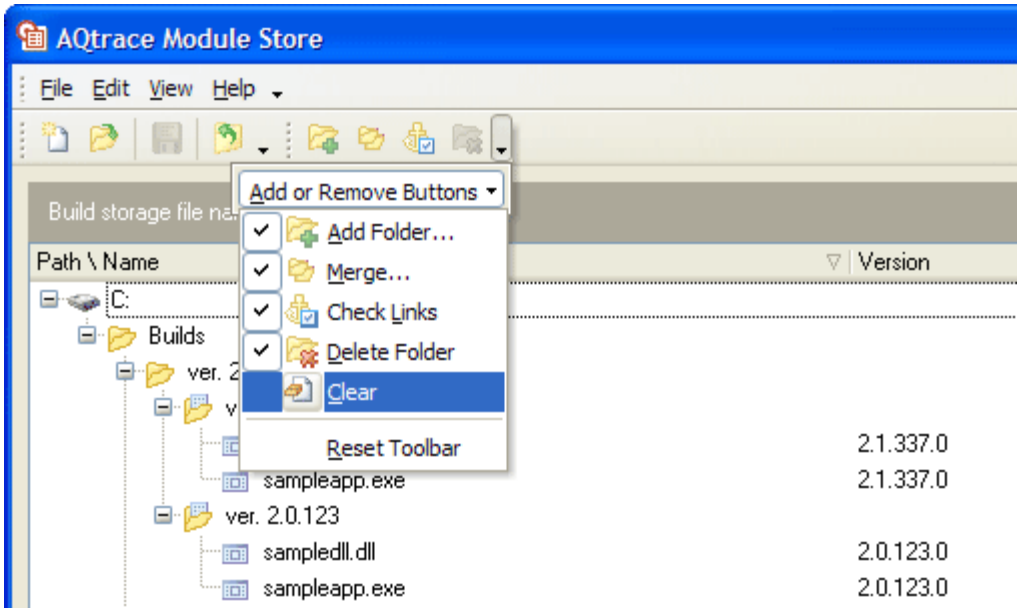


Grouping is just one of the features that you may customize the data appearance in the tree list. You can change the column layout as your needs dictate:

- You may change the column's width by dragging the column's border.
- You can sort data on the **Path\Name** column (or the **Name\Path** column, its name depends on the grouping mode) by clicking the column's header. To change the sorting order, click the header again. See *Sorting*.

The menus and toolbars of AQtrace Module Store are similar to menus and toolbars of Microsoft Visual Studio or other Microsoft products. And you can customize them in a similar way:

- You can hide or show toolbar or menu items by clicking the drop-down button at the bottom-right corner of a toolbar or a menu, clicking **Add or Remove Buttons** and selecting the desired items from the ensuing menu:



- You can hide and display toolbars by right-clicking the toolbar area and checking or unchecking the toolbar name in the ensuing context menu.

For complete information on working with menus and toolbars, see *Toolbar Customization*.

For information on how to use the menu and toolbar items to work with configuration files, see *Using AQtrace Module Store*.

Using AQtrace Module Store

AQtrace Module Store is used to create and modify configuration files that contain information about binary modules added to the *build storage*. This topic explains how you can do this via the utilities UI. But note that you also use AQtrace Module Store as a command-line utility. For more information about this, see *AQtrace Module Store - Command Line*.

To modify a configuration files, perform three steps:

- Open an existing or create a new file in AQtrace Module Store.
- Use items of the Edit menu or of the Edit toolbar to perform the desired actions.
- Save the changes and close the file.

1. Create or Open a File

To create a new configuration file, select **File | New** from the main menu of AQtrace Module Store or click the **New** button.

To open an existing file, choose **File | Open** or click the **Open** button and then select the desired file in the ensuing standard Open File dialog (configuration files have an .xml extension).

After you opened the file, the utility will display the file's name and contents in the window. To modify the file's content use items of the Edit menu (see below).

2. Change the File

To modify the build storage configuration files, use items of the **Edit** menu or **Edit** toolbar. These items

let you perform the following actions:

- Add information about modules to the file
- Merge two configuration files
- Check links and remove information about non-existent modules
- Remove data from the file

To add information about modules to the file

The build storage configuration files are used by *AQtrace Service* and *AQtrace Viewer* to obtain access to binary modules and their debug information and use them to parse the call stack data that are included into received error reports. The files contain information about the module's location. You should update the file configuration file (or files) for each new major or minor version of your product that you ship to end-users. If the configuration file does not contain information for this version, AQtrace Server and Viewer will not be able to parse error reports that will be generated for this version.

To add information about modules to the file:

- Place your binary modules and their debug information files to the build storage.
- Open your configuration file for editing.
- Select **Edit | Add Folder** from the main menu of AQtrace Module Store or click the **Add Folder** button on the **Edit** toolbar. This will invoke the standard Browse for Folder dialog.
- In the dialog, choose the folder that contains your modules and press **OK**.

  AQtrace Module Store will scan all of the binary modules found in the folder and add information about these modules to the configuration file.

Notes:

- If you want AQtrace Module Store to scan the specified folder with all of its subfolders, select the **Recurse subdirectories** check box in the Browse for Folder dialog. If you want to process files that are located only in a certain folder without recursive scanning, clear this check box.
- You cannot add individual modules to the configuration file. You may add only folders.
- Before adding information about a module to the configuration file, the utility checks whether the file already contains a reference to the module that has the same name and version number (all four parts of the version number are checked). If the configuration file already contains the reference, a reference to the new module is not added even though the module paths differ.

  For instance, if you add a module *C:\Storage\Ver. 1.3\MyHelperModule.dll* to the configuration file and this configuration file already contains a reference to the module *C:\Storage\Ver. 1.2\MyHelperModule.dll*, and both modules have the same version number (for instance, 1.0.0.0), the module *C:\Storage\Ver. 1.3\MyHelperModule.dll* will not be added to the configuration file.
- Instead of updating the configuration file manually, you can set up the *AQtrace Module Store Agent* to perform automatically update it. Read *Using AQtrace Module Store Agent* for instructions on how to do that.

To merge configuration files

To merge two configuration files:

- Open one of the files for editing in AQtrace Module Store.
- Select **Edit | Merge** from the main menu of the utility or click the **Merge** button on the **Edit** toolbar. This will invoke the standard Open File dialog.
- Choose the other configuration file in the dialog and press **Open**.

The AQtrace Module Store utility will combine the contents of two files and display the results in its window.

The resultant file will contain information from both configuration files. Note, however, that when merging the configuration files, AQtrace Module Store checks the modules' names and versions. For instance, if the files refer to two modules that have the same name and version information, but reside in different folders, only link to one of these modules will be added (the links that exists in the currently open configuration file).

For instance, if your configuration file contains information about the module *C:\Storage\Ver. 1.0\MyHelperModule.dll* and you merge this configuration file with another file that refers to the module *C:\Storage\Ver. 1.10\MyModule.dll*, and both the modules have the same version number (for instance, 1.0.0.0), the module *C:\Storage\Ver. 1.10\MyModule.dll* will not be added to the resultant configuration file.

To check links to modules

Build storage is just a folder or folders that contain binary modules and debug information files. The configuration files contain links to the binary modules. If you delete a module from the storage folder, the configuration file will still contain a link to this module. These links increases the size of the configuration file and increases the report analysis time. To clean up the links to non-existent files:

- Open your configuration file in the AQtrace Module Store utility.
- Select **Edit | Check Links** from the main menu or click the **Check Links** button on the **Edit** toolbar.

AQtrace Module Store will iterate through all the links and remove the links to non-existent files.

To delete information about modules

You may want to delete information about some binary modules from the configuration file. To do this:

- Open your configuration file in the AQtrace Module Store utility.
- In the main window of the utility choose the row that contains the desired folder name.
- Select **Edit | Delete Folder** from the main menu or click the **Delete Folder** button on the **Edit** toolbar.

  AQtrace Module Store will remove information about all of the modules that are located in the selected folder and its subfolders from the configuration file.

Notes:

- You cannot delete individual files. You may remove only folders.
- To remove all the links from the configuration file, select **Edit | Clear** from the utilities main menu or click the **Clear** button on the **Edit** toolbar.

3. Save the Changes and Close File

To save the changes made to the configuration file, select **File | Save** from the main menu or click the **Save** button.

To save the file under another name, choose **File | Save As** and then specify the new file name in the ensuing Save File dialog.

To close the file, select **File | Close**. If the file has unsaved changes, AQtrace Module Store will ask whether you want to save them.

AQtrace Module Store - Command Line

You can use *AQtrace Module Store* as a command-line utility. Using this functionality you can update the build configuration files automatically from .bat files or various automated build tools like *Automated Build Studio*.

The utility uses the following command-line arguments:

```
AQtraceModuleStore.exe [config_file[(-a:folder_name[-r])| -
m:config_file2| -cl] ]
```

Here braces means a group of parameters, square brackets means optional parameters and vertical pipes means “OR”.

config_file

The fully-qualified name of the file, to which AQtrace Module Store will store information about module names, versions and file paths. The resultant file has the XML format. If the file does not exist, the utility will create it.

-a:folder_name [-r]

Append information about binary modules to the configuration file.

folder_name specifies the folder, in which the utility will search for binary modules. AQtrace Module Store will analyze all the EXE, DLL and other executable files in this folder and save information about the file names and versions to the configuration file. If the folder name contains spaces, enclose it in quotes.

If the *-r* argument is used, the utility searches for binary modules in the specified folder and its subfolders. Else, the utility does not search in the subfolders.

-m:config_file2

Merge configuration files. AQtrace Module Store will merge the configuration file that is specified by the *config_file* argument with other configuration file, which is specified by the *config_file2* argument. If the file name contains spaces, enclose it in quotes.

-cl

Check links in the configuration file. If this argument is used, AQtrace Module Store will analyze the file contents and remove the links to those binary modules that do not exist.

The examples below demonstrate how to use the utility:

```
AQtraceModuleStore.exe C:\MyBuildsConfig.xml -a:"C:\MyBuilds\My App
1\1.0.123.2" -r
AQtraceModuleStore.exe C:\MyBuildsConfig.xml -
m:C:\MyBuilds2\ConfigFile2.xml
AQtraceModuleStore.exe C:\MyBuildsConfig.xml -cl
```

Notes:

- If *config_file* is only used and other arguments are skipped, the AQtrace Module Store utility opens the specified configuration file for editing and displays the utility’ window on screen.

  If any other argument is added to *config_file*, then AQtrace Module Store does not display its window on screen and works as a command-line utility.
- If the processing was successful, the utility exits with code 0. If an error occurs, the exit code is 1.
- After you create the configuration file, you can specify the file location for *AQtrace Viewer* and *AQtrace Service*. You specify the file location for AQtrace Viewer by using the Viewer’s *Modules*

Storage setting in the *Symbols Options* dialog. To specify the file for AQtrace Service, use the *Build storage file name* setting on the *AQtrace Service Settings* page of the *AQtrace Server Config* utility. For more information, see *AQtrace Viewer - Specifying Path to Modules* and *Configuring AQtrace Service*.

AQtrace Module Store Agent

AQtrace Module Store Agent - Overview

AQtrace Module Store Agent is a server-side utility that automatically updates the build storage configuration file. The Agent operates as follows:

It runs as a service on the server computer and regularly monitors one or more folders that make up a **build storage** (that is, the folders that contain binary modules and debug information for each version of your application shipped to end-users). The Agent traces the creation of a new binary or debug info file in those folders, and then appends a new item to the build storage configuration file. Upon deleting a binary or debug info file, the Agent removes the corresponding item from the configuration file. Thus, there is no need to edit the configuration file manually (yet this still can be done with the *AQtrace Module Store* utility).

To learn how to set up automatic updating, read the *Using AQtrace Module Store Agent* topic.

Service File Name

The service's file name is *AQtraceModuleStoreAgent.exe*. The installation program copies this file to the *<AQtrace>\Bin* folder.

Starting, Stopping and Pausing the Service

The AQtraceModuleStoreAgent executable works as the operating system's service. It is configured to start automatically when the computer starts.

You can control the Module Store Agent, that is, to stop, start, pause and resume it, by using the operating system's **Control Panel | Administrative Tools | Services** window.

Module Store Agent Settings

In order for Module Store Agent to function properly, you need to define which folders it should monitor and what configuration file it should update. These settings are specified on the *Module Store Agent Settings* page of the *AQtrace Server Config* utility.

You must specify these settings before Module Store Agent starts. If neither the configuration file nor the build folders are specified, the Agent does not start.

Note: Module Store Agent must have read permissions for the build storage folders and read-write permission for the build storage configuration file.

Using AQtrace Module Store Agent

AQtrace Module Store Agent is a server-side service used to maintain build storage configuration files. These configuration files contain information about binary modules added to the *build storage*. The configuration files are created with the *AQtrace Module Store* utility and can be modified using the same utility. However, it is more convenient to set up the Module Store Agent in order to update the configuration file automatically.

To set up automatic updating of configuration files, you need to do the following:

- *Register the AQtrace Module Store Agent as a service on the server.*
- *(Optionally) Create a new build storage configuration file with AQtrace Module Store.*
- *Configure AQtrace Module Store Agent.*

The sections below describe these steps in details.

1. Registering AQtrace Module Store Agent as a service.

To register the Module Store Agent as a service, you simply need to launch its executable on the server. The Agent's executable is located in the *<AQtrace>\Bin* folder. After the first launch, AQtrace Module Store Agent will appear in the list of the operating system's services (**Control Panel | Administrative Tools | Services**). The Agent will now start automatically (however, if the input parameters are specified, the Agent will stop itself.).

2. Creating a build storage configuration file

A build storage configuration file lists all binary and debug info files included in the build storage. The purpose of the Module Store Agent is to ensure that the configuration file contains the most recent list of files.

Build storage configuration files are created via the *AQtrace Module Store*utility. If you have already created such a file, then you may skip this step and proceed to the next one.

To create a new configuration file:

1. Launch the AQtrace Module Store utility that resides in the *<AQtrace>\Bin* folder.
2. Select **File | New** from the main menu of AQtrace Module Store or click the **New** button.

   You may add information about module storage folders to the configuration file (see *Using AQtrace Module Store*), yet it is not necessary, because the required information will be appended automatically later.
3. Select **File | Save** from the main menu or click the **Save** button. Specify the location and name of the newly created file in the ensuing Save File dialog.
4. Close the AQtrace Module Store utility.

3. Configuring AQtrace Module Store Agent parameters

The parameters of the Agent are set via another utility - *AQtrace Server Config*. It also resides in the *<AQtrace>\Bin* folder.

1. Launch the AQtrace Server Config tool and switch to the *Module Store Agent Settings* page.
2. In the **Build storage file name** field, specify the path to the build storage configuration file to be processed by the Agent.
3. In the **Module storage folder path list**, specify the folders that contain binary and debug info files for your builds. The changes made to these folders will be monitored by the Agent. The chosen folders are processed recursively, that is, if the given folder contains some subfolders, they will be monitored as well.
4. Besides, you can specify the update frequency in the **Update interval** field. It defines how often the Agent will check the listed folders for changes and update the configuration file. The default value for this field is 0, which means that the changes are reflected immediately.
5. Press **Apply** to pass the parameters to the Agent.

Note: The Module Store Agent must have read permissions for the build storage folders and read-write permission for the build storage configuration file.

After AQtrace Module Store Agent gets the above-mentioned parameters, it will run as a service in the background and keep track of changes in the build storage.

Note: The Agent gains exclusive access to the specified configuration file, therefore the attempts to modify the same configuration file manually (using the AQtrace Module Store utility) will fail unless the Agent is stopped.

AQtrace Reporter

Using AQtrace Reporter - Basic Concepts

The AQtrace installation package includes the **AQtrace Reporter**, which is a special component that is used in your applications. The Reporter traces the execution flow of your application and, if an exception occurs, it generates detailed error reports, displays a notification window and sends the report to the AQtrace server. AQtrace also provides a program interface to AQtrace Reporter, so you can control the Reporter's settings and modify various aspects of its behavior during your application run.

This topic describes how you can initialize and use the *AQtrace Reporter* in your applications.

Applying AQtrace Reporter to Native Applications

AQtrace Reporter includes a lot of settings that let you customize various aspects of the Reporter's behavior and specify the data to be included in the generated error report. To specify the Reporter's settings and apply them to your native (unmanaged) application, use the *AQtrace Packager* utility. This utility is included into the AQtrace installation package. By default it is installed in the *<AQtrace>\Bin* folder.

To process your unmanaged module:

1. Launch AQtrace Packager and select **File | New | Native Project** from its main menu or select **Create Native Project** from the Packager's Start Page to create a new native project.
2. Select **Module | Module Information** from the list of settings pages on the left of the Packager's window.
3. In the **File Name** edit box of the Module Information page, specify the name of your module (for information on what modules to be processed, see below).
4. Specify the desired settings on other pages of AQtrace Packager. For more information, see *AQtrace Packager Settings Pages*.

   The following settings are important. Make sure they have correct values:

   - Settings of the *Reporter Settings* | *Sending* page. These settings specify the transfer protocol(s) and destination server(s) that will be used for sending the generated error reports.
   - The *Product identifier* and *Product version* settings on the *Reporter Settings* | *Product Information* page. These settings specify the identifier of your application and the version number to be included into the generated reports. These values will be used to determine the product version, for which the reports will be generated.
5. After you specify the path and name of your executable in the Module Information page and define the Reporter settings, press **Process Module** on AQtrace Packager's toolbar. This way you command the Packager to apply the settings to your executable.

   It is important that you press Process Module. If you skip this step, the settings will be saved to your AQtrace Packager project, but will not be applied to your executable.

For more information on using AQtrace Packager, see *Using AQtrace Packager With Native*

Applications.

Applying AQtrace Reporter to .NET Applications

In order for .NET applications to interact with AQtrace Reporter, *AQtrace Packager* generates the aqReporterInterop.dll assembly and does not add automatically special code to your executable that loads the aqReporter dynamic link library and enables the Reporter functionality. You should write the code that will initialize AQtrace Reporter by yourself. To initialize the Reporter implemented in the aqReporter unmanaged library from your managed .NET code, you should use the program interfaces provided by the aqReporterInterop assembly. In addition, the generated aqReporterInterop assembly also contains the data that you specified in the Packager's .NET project for configuring AQtrace Reporter. For more information about how you can initialize the Reporter in .NET applications by using aqReporterInterop, see *Initializing AQtrace Reporter in .NET Applications*.

To generate the aqReporterInterop assembly:

1. Launch AQtrace Packager and select **File | New | .NET Project** from its main menu or select **Create .NET Project** from the Packager's Start Page to create a new .NET project.
2. Select **Reporter Assembly | Reporter Assembly Information** from the list of settings pages on the left of the Packager's window.
3. In the **Output Folder** edit box of the Reporter Assembly Information page, specify the path to the folder where the aqReporterInterop assembly will be placed. If you leave this edit box empty, AQtrace Packager generates the assembly and places it to the folder in which the AQtrace Packager configuration project is located.

   > AQtrace Packager uses the ilasm utility to compile the assembly, so, you need this utility to be installed on your computer. The ilasm utility is a part of Microsoft .NET Framework and is installed along with this platform.

4. Specify the desired settings on other pages of AQtrace Packager. For more information, see *AQtrace Packager Settings Pages*.

   The following settings are important. Make sure they have correct values:

   - Settings of the *Reporter Settings* | *Sending* page. These settings specify the transfer protocol(s) and destination server(s) that will be used for sending the generated error reports.
   - The *Product identifier* and *Product version* settings on the *Reporter Settings* | *Product Information* page. These settings specify the identifier of your application and the version number to be included into the generated reports. These values will be used to determine the product version, for which the reports will be generated.

5. After you specify the path to the folder, in which the aqReporterInterop assembly should be generated, and define the Reporter settings, press **Generate Assembly** on AQtrace Packager's toolbar. This way you command the Packager to generate the assembly applying the specified settings to it.

   > It is important that you press Generate Assembly. If you skip this step, the settings will be saved to your AQtrace Packager project, but the assembly will not be generated and the settings will not be applied to it.

For more information on generating the aqReporterInterop assembly, see *Creating the aqReporterInterop Assembly*.

Defining Which Modules to Process

In order for AQtrace Reporter to be able to monitor the execution of all of your code, it should be loaded to all processes, in which your modules are executed. It is possible for the process to contain two or more modules that contain the Reporter. That is, your EXE that contains AQtrace Reporter may load one or more DLLs that also contain the Reporter. But usually there is no need to apply the Reporter to all of the modules of your product:

- A typical product consists of an EXE (which acts as a main module) and a number of helper DLLs. There is no need to add AQtrace to all of these modules. Usually, you can just apply it to the main EXE. It will load AQtrace Reporter in memory, so the Reporter will monitor the execution of the EXE and the DLLs loaded by the EXE.
- If your product includes several EXEs, then apply AQtrace Reporter to each EXE. This way AQtrace Reporter will trace the execution of all of your modules.
- If your product is a DLL or OCX module, then apply AQtrace Reporter to this module. If the executable that will load this DLL or OCX does not contain the Reporter, your module will "load" the Reporter into the process.

Distributing AQtrace Reporter Modules

AQtrace Reporter monitors your application's execution on end-user computers. That is, you must ship it along with your application to these computers.

AQtrace Reporter is implemented by a number of redistributable modules. Depending on your application type and the operating system on which it will work, you need to include one or more of these modules into the installation package of your application. For complete information on the redistributable modules and recommended installation folder, see *Distributing AQtrace Reporter Libraries*.

Using AQtrace Reporter

AQtrace Reporter includes a lot of settings that allow you to tune almost any aspect of the Reporter's behavior. You specify these settings with *AQtrace Packager* and then apply them to your module or generate the aqReporterInterop.dll assembly using these settings for .NET applications. That is, you specify the settings at design time, before the application is executed.

AQtrace Reporter provides a program interface, so your application may connect to the Reporter and modify its behavior during the application execution, at run time.

Design Time

The following actions are performed at design time with the AQtrace Reporter Packager:

Action	Description
To specify the exceptions to be traced...	Use the pages of the **Exception Filter** group in AQtrace Packager. See *Specifying Exceptions to Be Traced*.
To specify the modules to be traced...	Use the **Module Filter Settings** page of AQtrace Packager. See *Specifying Modules to Be Traced*.
To include specific information in the error report...	To specify which information to be included in reports, enable certain settings on the *Additional Reported Data* page of the AQtrace Packager. See *Specifying Data to Be Included in Reports*.You can also include custom data

Action	Description
	in generated reports. This requires that you create specific code that will work with the Reporter through its programming interface (see below).
To specify whether AQtrace Reporter will display a notification window...	Use the *Show notification window* setting on the *Notification Settings* page of AQtrace Packager. See *Displaying a Notification Window*.
To specify the data to be displayed in the notification window...	Use the settings displayed on the *Notification Settings* page of AQtrace Packager. See *Displaying a Notification Window*.
To prevent loading of certain DLLs...	Use the settings displayed on the *Control DLL Loading* page of AQtrace Packager. See *Controlling DLL Loading*.

Run Time

The following actions are performed at run time by using AQtrace Reporter's programming interface:

Action	Description
To disable and enable the Reporter...	Use the `Lock` (or `LockForThread`), `Unlock` (or `UnlockForThread`), `GlobalLock` and `GlobalUnlock` methods. See *Enabling and Disabling AQtrace Reporter*.
To include custom information in reports...	For inserting textual custom data, create an object that implements the `IaqReporterCallback` interface and register this object in the `IaqReporterIntf` object with the `AddCallback` method. Add code that generates custom textual information to the `OnGenerateReport` method of the `IaqReporterCallback` object. See *Custom Textual Data in Reports* for a detailed description. For inserting binary custom files, you should create an object that implements the `IaqReporterCallback2` interface and register this object in the `IaqReporterIntf2` object with the `AddCallback2` method. Add code that generates custom binary data to the `OnGenerateReport2` method of the `IaqReporterCallback2` object. You can also use the `OnGenerateReportWithFile2` method of the `IaqReporterCallback2` object to add external files to reports. For more information, see *Custom Binary Data in Reports*. This functionality is not supported for Visual Basic applications.
To create a custom exception filter...	Create an object that implements the `IaqCustomExceptionFilter` interface and register this object in the `IaqReporterIntf2` object with the `AddCustomExceptionFilter` method. Add code that handles SEH exceptions to the `CheckSEHException` method of the `IaqCustomExceptionFilter` object and code that handles CLR

Action	Description
	exceptions to the *CheckDotNetException* method of this object, respectively. See *Creating Custom Exception Filters* for a detailed description. This functionality is not supported in Visual Basic applications.
To generate a report programmatically...	Use the *ShowFatalErrorWithMessage* method. See *Generating Error Reports on Demand*. In Visual Basic applications, use the *ShowFatalErrorWithMessage* method of the *IaqReporterIntf* class.
To perform specific actions upon closing the notification window...	Create an object that implements the *IaqReporterCallback* interface and register this object in the IaqReporterIntf object with the *AddCallback* method. Add code that performs specific actions to the *OnCloseReporter* method of the IaqReporterCallback object. Also, to perform specific actions upon closing the notification window, you can use the *OnCloseReporter2* method of the *IaqReporterCallback2* object that can be registered in the *IaqReporterIntf2* object by using its *AddCallback2* method. See *Performing Specific Actions Upon Closing the Notification Window* for a detailed description. This functionality is not supported for Visual Basic applications.
To save additional information in a separate dump file...	Use the *SaveAdditionalInfoAsDump* method of the IaqReporterIntf2 interface. This functionality is not supported in Visual Basic applications.
To load an error report from a dump file and display its contents...	Use the *ShowReportContents* method of the IaqReporterIntf2 interface. The method invokes the *Report Information* dialog to display the error report information in it. This functionality is not supported in Visual Basic applications.
To set a name for a thread...	Use the *SetThreadName* method of the IaqReporterIntf2 interface. The specified name of the thread is displayed in the *Threads* panel of *AQtrace Viewer* when an error report is opened with this tool. This functionality is not supported in Visual Basic applications.

Distributing AQtrace Reporter Libraries

The functionality of AQtrace Reporter is implemented by a number of modules. All of them are **redistributable**. You must ship them along with your application to end-user computers. This topic explains which modules you should distribute.

AQtrace Reporter Modules

Depending your application's type and its requirements to end-user computers, you may need to

distribute one or more of AQtrace Reporter modules:

- **AQtrace Reporter engine:** The core module of AQtrace Reporter is aqReporter.dll. You can find it in the *<AQtrace SDK>\Modules* folder. If your module is 32-bit, then use 32-bit version of aqReporter.dll; if your module is 64-bit, use 64-bit version.

  You should **always ship this module along with your application** to end users.
- **Windows 2000 and earlier operating systems**: If AQtrace Reporter will work on Windows 2000 or an earlier operating system, then in addition to aqReporter.dll you also distribute the DbgHelp.dll module from the *<AQtrace SDK>\Modules\x86* folder (see below). This library is needed to generate error reports.
- **.NET applications:** if you are going to use AQtrace Reporter with your .NET application, you should generate the aqReporterInterop.dll assembly with the use of *AQtrace Packager* and distribute this assembly along with aqReporter.dll and your application. The assembly serves as a bridge between your .NET modules and the native (unmanaged) aqReporter dynamic link library. To learn how you can generate the aqReporterInterop assembly, see *Creating the aqReporterInterop Assembly*.
- **Visual Basic applications:** if you are going to control AQtrace Reporter from your VB code, then you should distribute the aqtSupportVB.dll module along with the aqReporter and (if needed) DbgHelp libraries. This module provides program access to AQtrace Reporter from VB applications. You can find it in the *<AQtrace SDK>\VB* folder (see below).
- **Non-interactive applications (like services):** if you are going to use AQtrace Reporter with a non-interactive application, for example, a service, then you must also ship the *AQtrace Reporter Monitor* files with it in addition to other AQtrace Reporter modules. You must ship the Report Monitor' executable (AQtraceReportModule.exe) and settings file (ReportMonitorSettings.xml). You can find both in the *<AQtrace SDK>\Modules\Common* folder (see below).

  Note: It is important that you modify the settings file and specify the appropriate values in it before distributing this file to end users. You can use the SDK version of this file as a termplate for your settings file. For more information on the settings, see *Configuring AQtrace Report Monitor*.

Module Location

The AQtrace Reporter modules are part of AQtrace SDK. To install them on your computer, choose the *"Prepare your modules for AQtrace"* option on the Select AQtrace Components page of the AQtrace installation wizard. The SDK files are copied to the following folders:

- On Windows 7, Windows Vista and Windows Server 2008:

  <Users>\Public\Documents\AQtrace Files\SDK
- On Windows XP, Windows Server 2003 or Windows 2000:

  <Documents and Settings>\All Users\Documents\AQtrace Files\SDK

The SDK folder contains the following subfolders for 32- and 64-bit AQtrace modules:

- *<SDK>\Modules\x86* - 32-bit version of the modules
- *<SDK>\Modules\x64* - 64-bit version of the modules

The AQtrace Report Monitor executable and a template of the Report Monitor's settings file can be found in the *<SDK>\Modules\Common* folder.

Installation Folder

The installation package of your product must include AQtrace Reporter modules and the installation wizard must copy them to the end-users computer to the folder, from which your application will be able to load them during the run.

It is recommended to **install AQtrace Reporter's modules into the folder of your application's executable**. This is the easiest way to make the modules available to your executable. This approach will also help you avoid possible compatibility problems in case that later versions of your application use a later version of AQtrace.

If you ship several AQtrace Reporter libraries, then they must be able to load each other. The easiest way to match this requirement is to place these modules into the same folder. Alternatively, you can place the libraries into the *Windows\System32* folder or add their paths to the `PATH` environment variable. But we recommend that you **install all AQtrace Reporter modules and your executable into the same folder** for the higher reliability.

Working Under a Debugger

AQtrace Reporter contains special code that intercepts exceptions when they occur and handles them in an appropriate manner. Since the Reporter intercepts exceptions, the debugger does not get notifications about them. This makes AQtrace Reporter incompatible with debuggers.

To avoid problems during Reporter initialization, the Reporter checks whether the application is running under a debugger, and if it is found, by default, the Reporter disables itself and remains disabled until the application execution is over. Attempts to enable the Reporter by calling the `Unlock` or `GlobalUnlock` methods have no effect.

You can change this default behavior by enabling the *Ignore debugger* Reporter setting. If this setting is used, AQtrace Reporter will not be disabled when the application is running under a debugger:

- Launch *AQtrace Packager* and load your project in it.
- Open the *Reporter Settings* | *Reporter Behavior* page.
- Select the **Ignore debugger** check box of the page.
- Press **Process Module** on the AQtrace Packager's toolbar to apply the changes to the executable of your native (unmanaged) application, if you work with a native AQtrace Packager project, or press **Generate Assembly** to create the *aqReporterInterop.dll* assembly applying the changes to it, if you work with a .NET project.

Specifying Exceptions to Be Traced

AQtrace Reporter monitors the application execution and, if an exception occurs, it generates an error report, displays a notification window and sends the report to the server. You can specify the type of exceptions for which the Reporter will generate and send reports. You do this by defining **exception filters**. If you set an exception filter, AQtrace Reporter will handle only those exceptions that match the filter condition. Other exceptions will be handled in the way defined in your application. The following sections provide a complete description of which exceptions are traced and how to define an exception filter.

About Exception Filters

To specify exceptions to be handled by AQtrace Reporter, you define exception filters. AQtrace Reporter provides two types of exception filters:

- **Packager-defined exception filters** that are specified by using *AQtrace Packager*.
- **Custom exception filters** that are implemented programmatically in your applications by using *AQtrace Reporter's program interfaces*.

Defining exception filters with AQtrace Packager, you can specify types of exceptions to be handled by AQtrace Reporter and for which of them error reports should be generated. As for Packager-defined filters, all the exceptions can be organized into the **OS exceptions** and **language exceptions** categories (see below). You can define exception filters on the setting pages of the **Exception Filter** group in AQtrace Packager (see below).

Using custom exception filters, you can create a more flexible and powerful filtering mechanism and implement your own algorithm for handling exceptions. You can analyze more information which is relevant to an exception and make a decision whether to generate an error report in this or that case. AQtrace Reporter allows you to define several custom filters that can work one by one checking different conditions and filtering various exceptions in your application. However, in most cases, you can use just Packager-defined filters that are much easier to create and use. Exception filters defined with AQtrace Packager allow you to achieve most goals of exception filtering.

Custom exception filters are optional and you can use either only Packager-defined filters, or combine them with custom filters. However, if you implement custom filters in your code, you should keep in mind that they will have a higher precedence than Packager-defined filters.

A typical handling of an exception with filters looks like this:

1. When an exception occurs, the first registered custom filter starts handling it, as custom exception filters have a higher precedence than Packager-defined filters.
2. Depending on the criteria specified in the current custom exception filter, one of the following actions can be performed by the filter:
   - The filter can skip the exception without generating an error report and without further handling of it by the other exception filters.
   - The filter can stop filtering and generate an error report immediately.
   - The current filter can pass the exception to the next filter for handling.
3. If all the custom filters pass the exception for further handling and do not generate an error report, the exception is processed by the filter defined with AQtrace Packager. Depending on the settings that were specified in AQtrace Packager, this filter can either generate an error report or ignore the exception.

Exception Categories

Exceptions can be organized into two categories: **OS exceptions** and **language exceptions**. OS and language exceptions differ in the way they are raised. OS exceptions are raised by certain operating system functions, while language exceptions are raised by the functions provided by the libraries that were used to create the application. This division of exceptions is logical and is applied only to Packager-defined filters due to the specifics of their definition. This classification of exceptions is meaningless for custom exception filters, because they handle both OS and language exceptions.

- **OS exceptions** - This category includes exceptions that are generated at system level. The codes of these exceptions are hardware-generated. These are exceptions like access violation, stack overflow, division by zero, illegal instruction and so on.

  Each **OS exception is identified by its code**. Below are constants that correspond to the most frequent exceptions. For detailed information about these constants, see the description of the `EXCEPTION_RECORD` structure in the MSDN Library (http://msdn.microsoft.com):

  - EXCEPTION_ACCESS_VIOLATION

- EXCEPTION_ARRAY_BOUNDS_EXCEEDED
- EXCEPTION_BREAKPOINT
- EXCEPTION_DATATYPE_MISALIGNMENT
- EXCEPTION_FLT_DENORMAL_OPERAND
- EXCEPTION_FLT_DIVIDE_BY_ZERO
- EXCEPTION_FLT_INEXACT_RESULT
- EXCEPTION_FLT_INVALID_OPERATION
- EXCEPTION_FLT_OVERFLOW
- EXCEPTION_FLT_STACK_CHECK
- EXCEPTION_FLT_UNDERFLOW
- EXCEPTION_ILLEGAL_INSTRUCTION
- EXCEPTION_IN_PAGE_ERROR
- EXCEPTION_INT_DIVIDE_BY_ZERO
- EXCEPTION_INT_OVERFLOW
- EXCEPTION_INVALID_DISPOSITION
- EXCEPTION_NONCONTINUABLE_EXCEPTION
- EXCEPTION_PRIV_INSTRUCTION
- EXCEPTION_SINGLE_STEP
- EXCEPTION_STACK_OVERFLOW

By default, AQtrace Reporter handles all of these exceptions. You can add new exceptions to or remove existing exceptions from the list in the *OS Exceptions* page of *AQtrace Packager*.

The OS exceptions category is meaningful only for native applications. When a system exception occurs in a .NET (managed) application, it is mapped to the corresponding .NET exception class and the Reporter handles it as a .NET exception. For instance, when an `EXCEPTION_INT_DIVIDE_BY_ZERO` exception occurs as a result of integer division by zero in your managed code, AQtrace Reporter interprets and handles it as a `System.DivideByZeroException` .NET exception.

- **Language exceptions** - This category includes software-generated exceptions. These are exceptions defined in your application and in third-party libraries and components that are used by your code. They are **identified by class name**. For instance, in Delphi you can define an `EMyCustomException` class that is inherited from the `TException` class (which is a base class for exceptions in the VCL library). You can then raise `EMyCustomException` from your code whenever it is needed.AQtrace is able to detect these exceptions and handle them by generating reports and sending them to the server.

  Note: AQtrace supports language exceptions in Visual C++, Delphi, C++Builder and .NET applications.

Exceptions That are Excluded Automatically

Some Windows API functions raise exceptions during their work and handle them properly. AQtrace Reporter traces these exceptions, but neither generates error reports, nor processes them, since these exceptions are part of normal function execution, and they do not mean the function performs an erroneous action. In other words, these exceptions are automatically ignored. It applies equally to Packager-defined and custom exception filters.

Below is a list of Windows API functions that raise exceptions that are ignored by AQtrace Reporter:

- IsBadCodePtr
- IsBadHugeReadPtr
- IsBadHugeWritePtr
- IsBadReadPtr
- IsBadStringPtrA
- IsBadStringPtrW
- IsBadWritePtr

Defining Exception Filters by AQtrace Packager

To define exception filters, use pages of the **Exception Filter** group in *AQtrace Packager*.

To define the OS exceptions filter:

- Launch AQtrace Packager and load your project in it.
- Open the **Exception Filter | OS Exceptions** page. It contains a list of OS exceptions that can be handled.
- Select the **Active** check box for the exceptions to be included in the filter.

As all the exceptions in .NET applications are interpreted by the Reporter as .NET exception classes, the **Exception Filter | OS Exceptions** page is not displayed in .NET AQtrace Packager projects. For .NET applications, you should specify the desired system exceptions as corresponding .NET exception class names on the **Exception Filter | .NET Exceptions** setting page. For instance, add the `System.DivideByZeroException` class name to the list of exceptions to be filtered if you want to trace integer divizion by zero. The **.NET Exceptions** page is visible only in .NET configuration projects.

To define the language exception filter:

- Open the **.NET Exceptions**, **Visual C++ Exceptions**, **Delphi Exceptions** or **C++Builder Exceptions** page. They list exception classes defined in your application's code.

  Note: The **Visual C++ Exceptions**, **Delphi Exceptions** and **C++Builder Exceptions** pages are visible in AQtrace Packager only if a native configuration project is open. For .NET configuration projects, only the **.NET Exceptions** page is displayed. All the exceptions are specified on this page.

- Append the desired exception class to the list. To do this:
  - Click **Add**.
  - Specify the desired class name in the in-place editor and press Enter to confirm the change.

    When entering a class name for a native language exception, enter only a class name, do

not enter a unit name or namespace.

In case of .NET exceptions, specify both the exception's class name and the namespace in which this class is declared. For instance, the class name of the `DivideByZeroException` exception should be specified along with the `System` .NET namespace, that is: `System.DivideByZeroException`.

Note for Visual C++ and C++Builder users: if the exception type is a pointer, use the asterisk (`*`) after the class name. For instance, **`char`** and **`char *`** are treated as different class names.

- Select the **Active** check box for those exceptions, which you want to include into the filter.
- Switch to the **Exception Filter | Filter Mode** page and select the desired filter mode (for more information on filter modes, see below).
- After specifying the exception and filter mode, press **Process Module** on the Packager's toolbar to apply the settings to the executable of your native (unmanaged) application, if you work with a native AQtrace Packager project, or press **Generate Assembly** to create the *aqReporterInterop.dll* assembly applying the settings to it, if you work with a .NET project in AQtrace Packager and use AQtrace with your .NET application.

Exceptions in Mixed Code

To trace exceptions in a native application, you need to create a native configuration project in *AQtrace Packager* and apply the settings specified in the project to the application's executable or to a native dynamic link library. In case of a .NET application, you need to use a .NET configuration project in AQtrace Packager. As it has been said above, in native projects you can specify system exceptions and native language exceptions to be traced by the Reporter. In .NET projects you specify .NET exception classes that correspond to the exceptions to be traced in managed code.

An application to be monitored by the Reporter can contain **mixed code**, that is, the application includes both .NET (managed) and native (unmanaged) code. For instance, some managed code from a .NET executable loads a helper library with native code and calls some function from it. The library, in its turn, may use code from another library, either native or managed. AQtrace Reporter can trace exceptions either in managed or in unmanaged code of such applications with mixed code. Both managed and unmanaged code cannot be monitored simultaneously. This means that **the Reporter will monitor only managed or unmanaged code in one application** depending on where AQtrace Reporter was initialized. If the Reporter was initialized in managed code and the settings specified in a .NET configuration project were applied to it, exceptions are traced only in managed code. If the Reporter was initialized in a native module and the settings specified in an AQtrace Packager native configuration project were applied to the Reporter, then it monitors only unmanaged code.

For example, if an exception occurs in a .NET module that initialized AQtrace Reporter for tracing exceptions in managed code, the exception can be handled by the Reporter. If this module with managed code loads a native library to call some routine from it and an exception occurs in this native library, then AQtrace Reporter cannot catch such an exception. However, if this native library, in its turn, calls some managed code from another .NET assembly and an exception occurs in this assembly, then AQtrace Reporter can handle this exception. Similarly, if you applied the Reporter to a native module, then only exceptions in native modules of the application can be traced by the Reporter, and exceptions in managed code are ignored.

Filter Modes for Packager-Defined Filters

Exception filters defined in AQtrace Packager can work in normal or inverted mode:

- When the filters work in **normal mode**, AQtrace Reporter handles only those exceptions that are

included in the filters, that is, it handles only those exceptions that are selected in the *OS Exceptions*, *.NET Exceptions*, *Visual C++ Exceptions*, *Delphi Exceptions* and *C++Builder Exceptions* pages.

- When the filters work in **inverted mode**, AQtrace Reporter handles *all* exceptions that match the *module filter* and that are *not* selected in the setting pages.

You specify the active filter mode on the *Exception Filter Mode* page.

Note: The filter mode applies to all of the settings made on all setting pages of the Exception Filter group in AQtrace Packager.

Custom Exception Filters

In addition to exception filters that are defined with *AQtrace Packager*, AQtrace Reporter allows you to create **custom exception filters**. These filters extend the filtering mechanism defined with AQtrace Packager and let you implement your own algorithm of exception filtering. With the use of custom exception filters, AQtrace Reporter can handle exceptions in a more flexible way, analyze errors using various criteria and make a decision whether to generate an error report for an exception.

For instance, custom exception filters allow you to trace a certain exception and generate an error report when the exception occurs in a certain module of your application, and ignore it in the other modules. You can also use custom filters to detect, for example, execution of some important code section in your application, in which an exception occurs, and ignore the exception to let the code section to be executed completely.

A few notes on custom exception filters:

- Custom exception filters are created programmatically in the source code of your application with the use of objects that implement the `IaqCustomExceptionFilter` program interface.
- Custom exception filters are not supported for Visual Basic applications.
- AQtrace Reporter allows creating several custom filters in one application.
- Custom exception filters handle both OS and language exceptions.

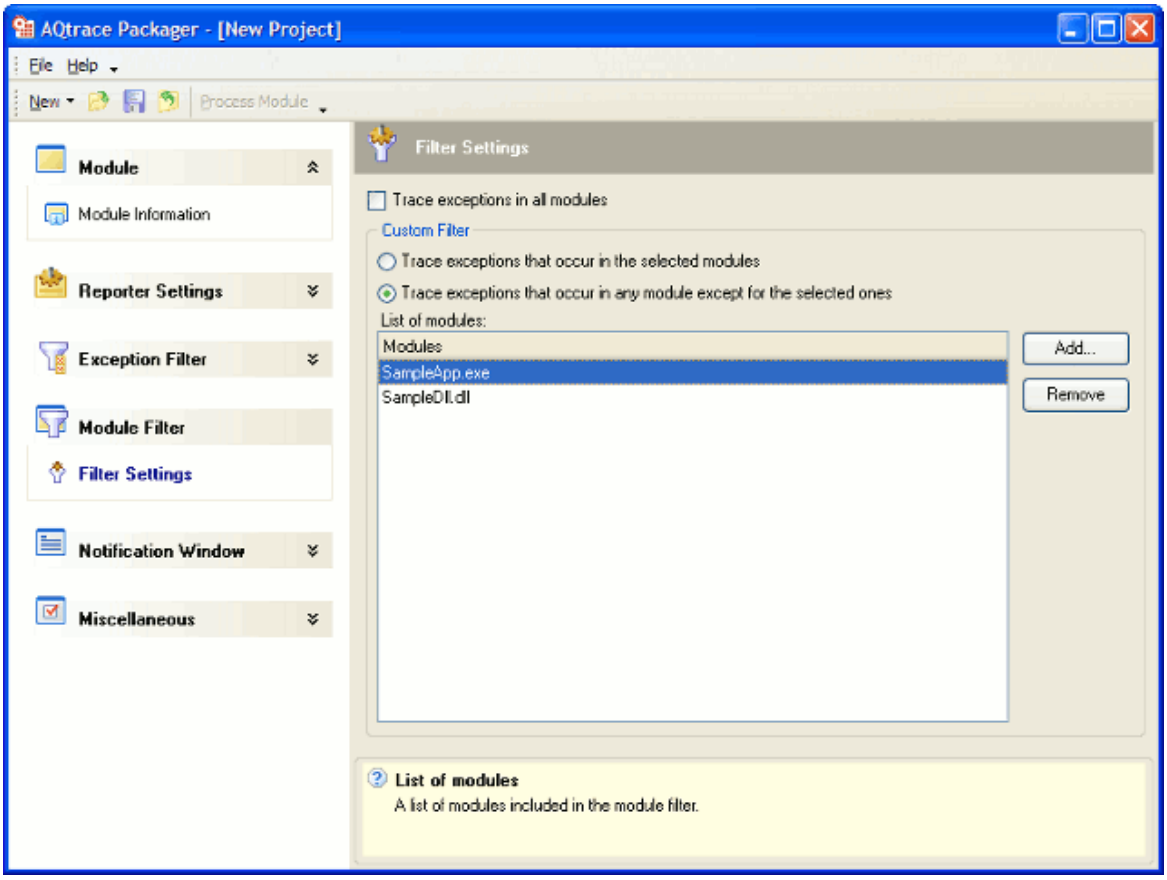
For detailed information on how to create custom exception filters, see *Creating Custom Exception Filters*.

Specifying Modules to Be Traced

A typical application uses several modules. When the application starts running, it typically loads additional modules and DLLs. These can be various third-party libraries, components and operating system modules (like user32.dll).

You may want to specify the modules, in which *AQtrace Reporter* will trace exceptions. This will help you concentrate on your modules and skip exceptions that occur in other modules (for example, in third-party libraries) which you cannot recompile.

You specify the modules by defining and using a **module filter**. By default, the filter is off and AQtrace Reporter traces exceptions that occur in all modules loaded into the address space of your process. You can modify the default behavior and specify the filter conditions on the *Module Filter Settings* page of *AQtrace Packager*:



The **Trace exceptions in all modules** check box specifies whether the module filter is active or not. To specify the filter, clear this check box. This will enable controls of the **Custom Filter** section. This section contains the list of modules and two radio buttons. The list contains the modules to be affected by the filter. Using this radio buttons you can set whether the filter will work in normal, or in inverted mode:

- If the filter functions in **normal mode**, the Reporter handles exceptions that match the *exception filters* and that occur only in those modules that are included in the filter.
- When filter works in **inverted mode**, the Reporter does not generate error reports for exceptions that occur in the modules that are included in the filter. These modules are excluded. That is, the Reporter handles those exceptions that match the *exception filters* and that occur in any modules except for those that are included into the list.

To determine whether to handle or skip the exception, **AQtrace Reporter checks the module names of the two topmost functions in the exception's call stack** (that is, the module name of the topmost function and the function that follows it). If any of these modules was added to the Module Filter Settings page, then according to the filter settings, AQtrace Reporter will either continue or stop processing the exception. In other words, AQtrace Reporter checks not only the module name of the topmost function, but also the module name of the function that called the topmost function.

This functionality provides better control over exceptions that are caused by errors in third-party DLLs. Suppose, some third-party library, for example *LibA*, is loaded to the address space of your process and then calls a function of the operating system's user32.dll with invalid parameters. Now suppose that this call causes an exception in the code of user32.dll. So, your application will display a notification window and you will receive an error report for the exception that is caused by invalid code of LibA. The problem is that you might not be able to fix this exception. To avoid the problem, you can include user32.dll in the module filter. However, in this case, you will not receive error reports for those exceptions that occur within this

DLL and that are caused by invalid function calls made from your code. Since AQtrace Reporter checks the module names of the two topmost call stack entries, you can add the *LibA* library to the filter and thus ignore undesirable exceptions.

To define the module filter:

- Launch AQtace Packager, load your project in it and open the **Module Filter | Filter Settings** page.
- By default, the **Trace exceptions in all modules** check box is selected. Clear this check box to define specific filter conditions. This will enable the **Custom Filter** section.
- To append a module to the list, press **Add**. This will call the standard Open File dialog.
- In the dialog, select the desired module (you can use Ctrl- or Shift- click for multiselection) and press **Open**.

  If you do not have the desired module on your computer, you can type the module's name in the **File Name** edit box of the dialog.

  Note: When entering the module name, specify only the file name and extension. Do not specify the path.

- After adding the module, select the desired **filter mode** using the radio buttons of the Custom Filter section (for more information on filter modes, see above).
- Press **Process Module** on AQtrace Packager's toolbar to apply the changes to your executable if you work with a native AQtrace Packager project. For a .NET project, press **Generate Assembly** to create the *aqReporterInterop.dll* assembly and apply the specified filter settings to it.

Specifying Data to Be Included in Reports

Error reports generated by *AQtrace Reporter* contain six portions of data:

1. Information that relates to the exception for which the report is generated (information about the modules loaded by the application, information about the application's threads, the values of CPU registers, call stack and memory data).
2. (Optionally) Additional information about processes, services, memory, hard disk space, OS and its components, network interface card, display and printing devices, installed programs, and process privileges.
3. (Optionally) Information about exceptions that occurred earlier (that is, before the given exception occurred). These exceptions are called **last-raised exceptions**.
4. (Optionally) Information about events raised during the application run before the error occurred.
5. (Optionally) Screenshot of the application's window or the whole screen.
6. (Optionally) Any custom data (textual or binary) like internal flags, the state of the application's subsystems or even various binary files.

Only the first item is always included in error reports. The other items are optional. You can command AQtrace Reporter to include them by using the *AQtrace Packager* utility or by *programming the Reporter*. The following sections provide a detailed explanation.

1. Information that relates to the exception for which the report was generated

Each error report contains information that relates to the exception for which the report was generated. This information includes the following parts:

- Information about the application's threads.
- A list of modules that were loaded to the address space of your application's process.
- Information about the stack of function calls for each thread.
- Information about CPU registers' values for each thread.
- Memory dump of your application.

The described data is always included in the error reports. The other data is optional. It is included in reports according to the Reporter's settings.

2. Additional information about processes, memory, OS, installed programs and devices

In addition to the information about threads, modules, CPU registers and call stacks that are always included in error reports, the reports may also contain information about processes, memory, the operating system, installed programs and hardware used on the end-user's computer.

To command AQtrace Reporter to include this additional information in reports, you use the settings that reside on the *Additional Reported Data* page of the *AQtrace Packager* utility:

- Launch AQtrace Packager and load your project in it.
- Open the **Reporter Settings | Additional Reported Data** page.
- Use the check boxes on this page to specify additional data that you would like the Reporter to include in the generated reports.

For detailed information on the settings that reside on this page, see the *page description*.

3. Information about last-raised exceptions

AQtrace Reporter can collect information about *last-raised exceptions* and add this information into the generated reports. This additional information may help you find the cause of the exception for which the report was generated.

To command AQtrace Reporter to save information about last-raised exceptions to generated reports, select the **Last exceptions data** check box on the *Additional Reported Data* page of AQtrace Packager. If the check box is cleared, reports will only contain information about those exceptions for which these reports were generated.

On the *Additional Reported Data* page of AQtrace Packager you can also specify the number of last exceptions to be included into the reports and the amount of stack data that will be saved for each exception. The more this value is, the more entries the call stacks will contain, but the larger the report files will be.

AQtrace Viewer displays the list of recently-raised exceptions in the *Last Exceptions* panel. When you select an exception in this panel, the Viewer displays the exception's call stack in the *Call Stack* panel. You can then analyze the call stack and application code using other panels of the Viewer (see *Analyzing Error Reports With AQtrace Viewer*).

4. Information about events

AQtrace Reporter can trace events of certain types during the application run, collect information about these events and include it into the generated reports. For each event, AQtrace reporter logs its type, the identifier of the thread in which the event occurred, the time of raising and some specific details dependent on the event's type. The following events are traced by the Reporter when it monitors the application:

- Raising of an exception.

- Creation of a user-defined debug message by calling the `OutputDebugString` Windows API function.
- Loading and unloading of an application module.
- Creation, closing and termination of an application thread.
- Suspending and resuming of an application thread.
- Locking and unlocking of the AQtrace Reporter's functionality for one application thread.
- Locking and unlocking of the AQtrace Reporter's functionality for all threads in the application.

For more information on types of events traced by AQtrace Reporter, see the *Event Log Panel* help topic.

To command AQtrace Reporter to save information about events to the generated reports, select the **Event log** check box on the *Additional Reported Data* page of *AQtrace Packager*. If the check box is cleared, AQtrace Reporter traces events but does not include information about these events into the generated error reports.

In the *Event Log* panel, *AQtrace Viewer* displays a log that contains information about events occurred during the application run. Also, it is possible to preview such a log on the **Event Log** tab in the *Report Information* dialog before sending an error report.

5. Screenshot

AQtrace Reporter can capture the image of the application's window or of the whole screen and include it into the generated error report. The image can be useful, when you are searching for the cause of the problem. You can see this image in the *Screenshot* panel of *AQtrace Viewer*.

To command AQtrace Reporter to capture and include the image to generated reports, do the following:

- Launch AQtrace Packager and load you project in it.
- Open the **Reporter Settings | Additional Reported Data** page.
- On the page, select the **Screenshot** check box and then select the desired image type: **Application window** or **Whole screen**.

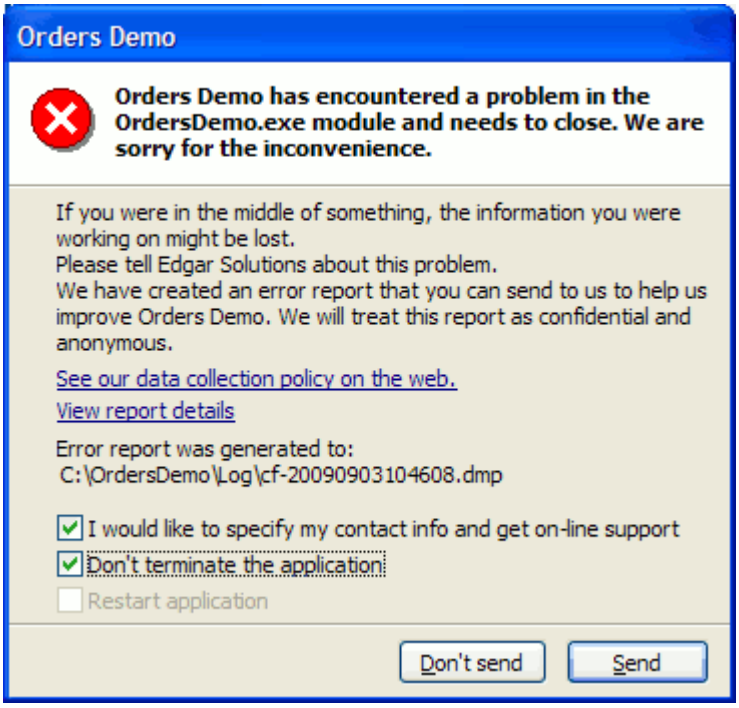
The captured screenshot contains the image of the mouse pointer, so you can determine which button was clicked or which check box was selected when the exception occurred.

6. Custom Data

You can also command AQtrace Reporter to add custom data to generated reports. This data can contain, for example, information about subsystems of your application or information on certain internal flags. Also, you can include binary files into generated reports. To include custom data, you should create an object implementing the *`IaqReporterCallback`* interface for custom textual data or the *`IaqReporterCallback2`* interface for binary data and files and register this object in the AQtrace Reporter object. For more information on this, see *Inserting Custom Data Into Reports*.

Displaying a Notification Window

When *AQtrace Reporter* handles an exception, it generates an error report and displays a window that notifies the user about the exception and suggests that the user sends the report to the developers. Below is a sample image of the window:



To specify whether AQtrace Reporter will display the notification window during application execution, use *AQtrace Packager*:

- Open your configuration project in AQtrace Packager.
- Open the **Notification Window | Notification Settings** page.
- The page contains the **Show notification window** check box. Select this check box to specify that AQtrace Reporter should display the notification window when an exception occurs during application execution.

  If the check box is clear, AQtrace Reporter does not display the notification window when an error occurs. However, in this case, the **Postpone sending reports** check box becomes available. If this check box is selected, AQtrace Reporter does not send an error report automatically right after an error occurs. It suggests sending the report when the application is run next time. If both the *Postpone sending reports* and *Show notification window* check boxes are clear, AQtrace Reporter automatically sends error reports to the developers right after an error occurs, without any notification.
- Press **Process Module** on AQtrace Packager's toolbar to apply the settings to the executable of your native (unmanaged) application or press **Generate Assembly** to create the *aqReporterInterop.dll* assembly applying the settings to it, if you use AQtrace with your .NET application and work with a .NET project in AQtrace Packager.

Using the *Notification Settings* page of AQtrace Packager you can also specify text to be displayed within the notification window. For instance:

- Text to be displayed in the header of the window.
- Text to be used as the window's "body text".
- The titles and initial state of check boxes that are displayed within the notification window.
- The captions of the buttons displayed within the window.

Please pay attention to the *Error reports policy link* settings. By using these settings, you can specify the web page that describes the data collection policy adopted by your company. Typically, this page contains the following information:

- Description of why error reports are collected.
- Explanation of how data is sent and stored.
- Explanation of what data is collected.
- Description of who has access to reported data.

You can find an example of this type of page on SmartBear's web site: http://www.smartbear.com/error-reports-policy.

The *Text* setting of the *Error reports policy link* group specifies the text that will suggest end-users to read about your error-reporting policy. This text will be a link that opens the web page that is specified by the *URL* setting.

Note: By default, the settings displayed on the Notification Settings page contain default values. The only exclusion is the *URL* setting of the *Error reports policy link* group. You should specify the URL of your web page in this setting.

The settings on the Notification Settings page are organized into categories. A category is a set of values that are displayed in the Notification Settings window under the **Configuration** box. By selecting a category from this box you can change the values of all settings. This feature helps you create a set of values for multi-language applications.

Note: After specifying the desired settings, do not forget to click the **Process Module** toolbar item, if you use a native AQtrace Packager project, or press **Generate Assembly**, if you work with a .NET project in AQtrace Packager. This will apply your changes to your native (unmanaged) executable or generate the aqReporterInterop.dll assembly using the specified settings, respectively.

For detailed information on the settings that are available for editing on the Notification Settings page, see the *page description*.

When an exception occurs during your application execution and the notification window is displayed, users can preview the data to be included into the error report before they decide to send it to the developers. This information is displayed in the *Report Information* dialog that is shown after clicking the **View report details** link in the notification window. The text of this link can also be specified on the Notification Settings page of AQtrace Packager.

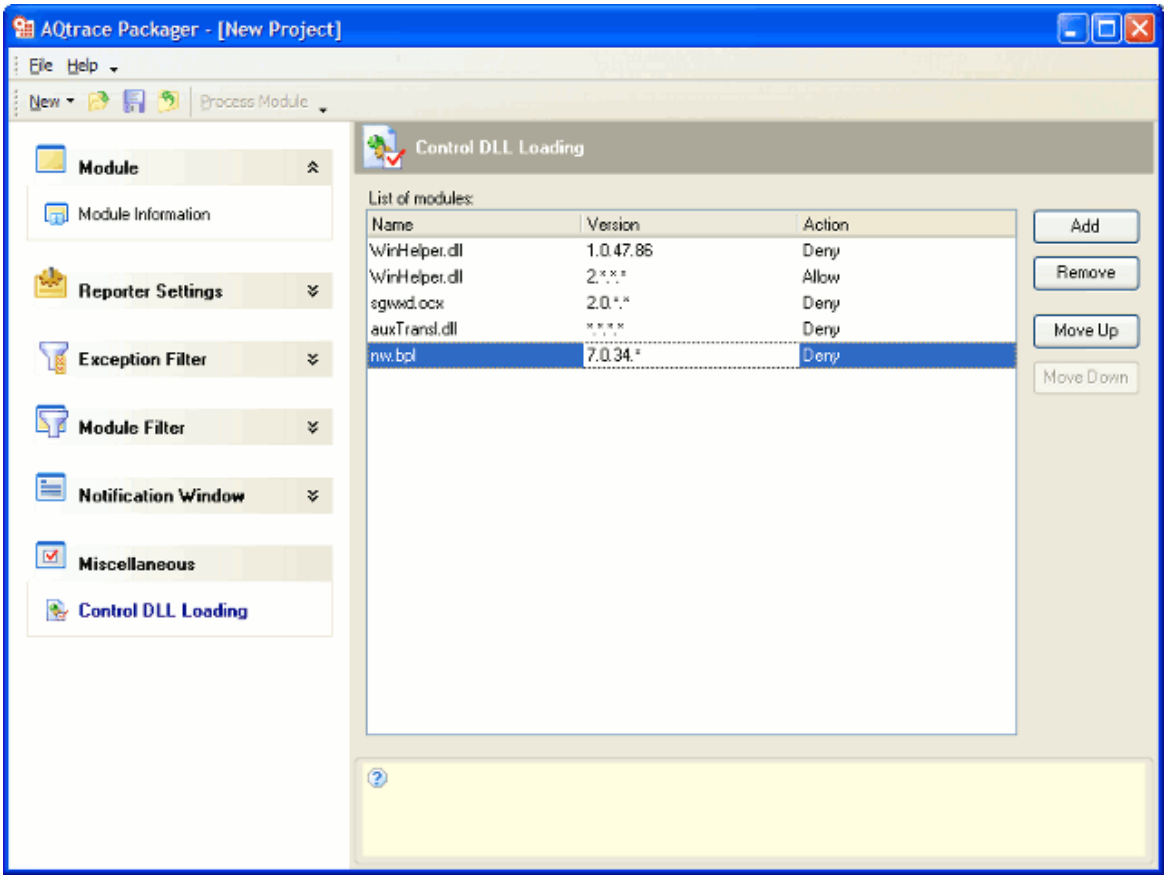
If the **I would like to specify my contact info and get on-line support** check box is selected in the notification window before sending an error report, the *User Info* dialog is invoked after clicking the **Send** button. This dialog allows specifying the end-user's contact information and the description of the problem. Note that the User Info dialog can also be customized by using the settings from the *"User Info" dialog* group displayed on the Notification Settings page of AQtrace Packager. You can specify text to be displayed as the title of the dialog, text for the dialog's header, text for the labels of edit boxes and for the captions of the buttons displayed within the User Info dialog.

You can attach to AQtrace Reporter from your application and perform specific actions upon closing the notification window. For example, you can release some allocated resources. For more information on this, see *AQtrace Reporter Programming* and *Performing Specific Actions Upon Closing the Notification Window*.

Controlling DLL Loading

Some applications inject their dynamic link libraries into the address space of other processes. In certain cases, the injection may cause errors and you may want to disable injection of DLLs into your process.

AQtrace Reporter detects the attempts to inject dynamic link libraries and lets you control the injection of DLLs into the address space of your process. So, you can prevent certain DLLs from loading or, on the contrary, allow the DLLs to be injected into the address space of your process. You define the list of blocked or allowed DLLs on the *Control DLL Loading* page of *AQtrace Packager*:



The page contains a list of modules, whose load AQtrace Reporter will control. If the module is not included in the list then AQtrace Reporter will not trace its loading, that is, the module can be injected into the address space of your process.

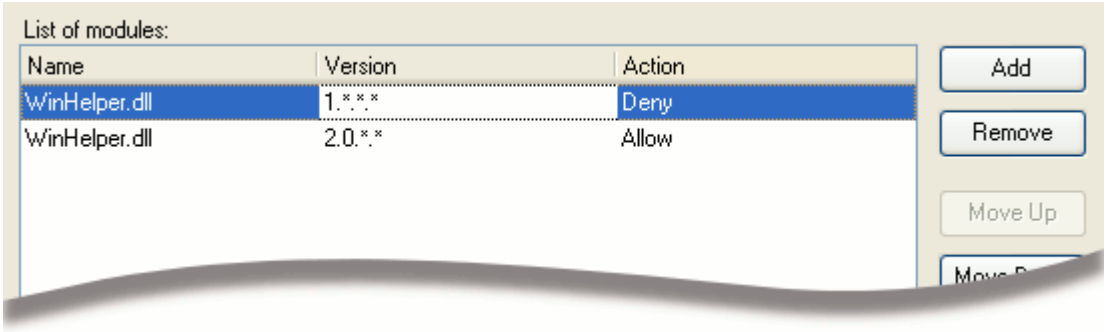
Each module in the list is specified by its file name (name and extension) and the version number. The Action column specifies whether AQtrace Reporter will forbid or permit the loading of a module. These features let you create specific conditions and block only certain versions of some modules (see below).

Note that you should specify all the parts of the version number: major, minor, build and private. Also, you can use the * wildcard in any part of the version information. The wildcard means “this part can be any number”. Below are examples of some valid version numbers:

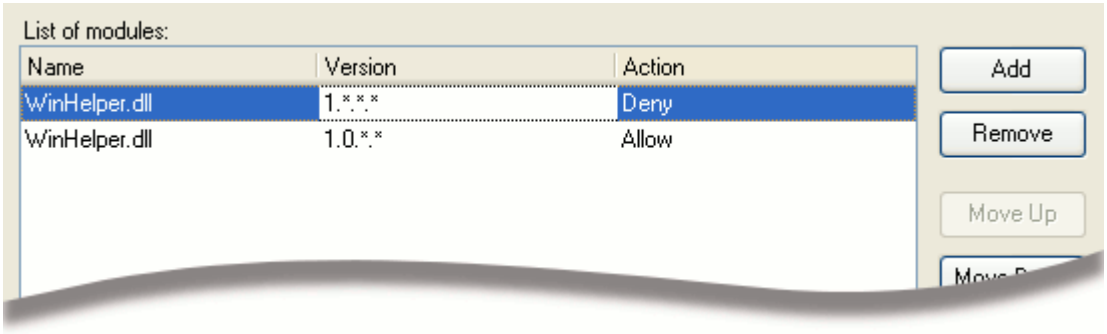
- 1.0.*.* - means any build of the version 1.0.
- 2.*.*.* - means any build or minor version of the version 2.
- *.*.*.* - means any version of the specified module.

The settings displayed on the following figure prevent the loading of the WinHelper.dll ver. 1.x and

allow the loading of the version 2.0.1 of this library:



The order of the items in the list is important. When AQtrace Reporter detects that a module is loaded into the address space of your application, it retrieves the version information from the module and then searches for the module and its version number in the list. The search is performed in the order of items appearance in the list. Once the item that corresponds to the module and version is found, AQtrace Reporter stops to search and performs the action that is specified by the Action value. So, for instance, if you specified the following conditions --



-- the module WinHelper.dll ver. 1.0.47 will not be loaded into your application's process despite the fact that the second condition permits the loading.

To add a module to the list:

- Launch AQtrace Packager, load your configuration project in it and open the **Miscellaneous | Control DLL Loading** page.
- Press **Add** to add a new module to the list. This will invoke the standard Open File dialog.
- In the dialog, select the desired module or modules (you can use Ctrl- or Shift- click for multiselection) and press **Open**.

  Note: If you do not have the desired module on your computer, you can enter its file name and extension in the **File Name** edit box of the Open File dialog.

  Enter only the file name and extension. Do not enter the path.

  After you press **Open** in the Open File dialog, the module name will be added to the list (only the file name and extension will be added, the path will be ignored).
- If you specified an existing module in the Open File dialog, AQtrace Packager will read this version information from the module and display it in the Version column. If you specified a non-existing module, the Packager will use the version *.*.*.*. To change the version information,

click within the **Version** cell and enter the version number of the added module. Press Enter to confirm the change or Esc to cancel it.

We would like to note once again that you should enter all the parts of the version number: major, minor, build and private. You can also use the * wildcard in any part of the version information.

- Click within the **Action** cell and specify the action to be applied to the DLL:
  - **Allow** - The specified version of the specified DLL can be loaded into your process.
  - **Deny** - AQtrace Reporter will block the load of the specified module into the address space of your process.

  Press Enter to confirm the change.
- Press **Move Up** or **Move Down** to modify the module's position in the list.

After changing the list of modules, press **Process Module** to apply the changes to your executable or DLL, if you use a native AQtrace Packager project, or press **Generate Assembly** to generate the *aqReporterInterop.dll* assembly applying the changes to it, if you work with a .NET configuration project for your .NET application. Otherwise, the changes will be saved to the configuration project, but not applied to your module or the aqReporterInterop.dll assembly.

Including Debug Messages Into Error Reports

Using the `OutputDebugString` Windows API function in your application's code, you can insert messages, that can be useful for debugging of the application, in error reports (for more information on this function, see the MSDN Library). This function generates an event that is interpreted by *AQtrace Reporter* as an exception with the 0x40010006 code. The information about this exception along with the user-defined debug message, specified as the parameter of the `OutputDebugString` function, is included by the Reporter in the error report as *last-raised exception* information.

Note: In .NET applications, use the `System.Diagnostics.Debugger.Log` method to insert debug messages into error reports. For detailed information on this method, see the MSDN Library.

You can view such user-defined debug messages in the *Last Exceptions* panel of *AQtrace Viewer*. And this can be helpful for analyzing error reports.

To highlight user-defined debug messages among the other last exceptions, the Last Exceptions panel can display them using a certain highlighting color. You can specify the color that will be used to display messages of the `OutputDebugString` function in the *OutputDebugString* setting of the AQtrace Viewer's options. To view or change this setting:

- Select **Options | Options** from AQtrace Viewer's main menu.
- Choose the **Panels | General** category in the tree on the left of the ensuing *Options* dialog.
- Expand the **Colors | Last Exceptions** setting group on the ensuing *General Panels Options* page.

Also, an event generated by the `OutputDebugString` function is traced and logged by AQtrace Reporter as the *Debug String* event. You can see the event log, included into an error report, in the *Event Log* panel of AQtrace Viewer where you can find messages corresponding to the Debug String events with the specified debug strings. Such events are marked with the icon in the panel.

To include helper user messages into error reports, you can also call the *`IaqReporterIntf2.AddMessageToLog`* method of AQtrace Reporter. This method adds a user

message, passed through the method's parameter, to an event log. The log is displayed in the Event Log panel of AQtrace Viewer and you can find there user-defined messages when you analyze error reports. User messages are displayed in the event log as the *User Message* events and are marked with the icon.

AQtrace Reporter Programming

AQtrace Reporter Programming - Overview

The *AQtrace Reporter* functionality is implemented by the aqReporter.dll and dbghelp.dll modules (see *Using AQtrace Reporter - Basic Concepts*). The whole procedure of controlling AQtrace Reporter from your application includes the following steps:

- Load the Reporter's libraries into your application.
- Connect to the AQtrace Reporter object.
- Call the Reporter's methods and properties to perform the desired action.

Loading Libraries

AQtrace Reporter is implemented in two dynamic link libraries: aqReporter.dll and dbghelp.dll modules (see *Using AQtrace Reporter - Basic Concepts*). The aqReporter library is the "main" library and dbghelp.dll is a helper module.

The code that loads these libraries into memory is generated and added to your native (unmanaged) application automatically by the *AQtrace Packager* utility, which is used to specify AQtrace Reporter's settings and apply them to your native application. This code is executed when the application starts. It loads the libraries and initializes AQtrace Reporter. So, you do not have to write any lines of code to load the Reporter's DLLs into your native application (for detailed information, see *Using AQtrace Packager With Native Applications*).

AQtrace Packager does not generate and add such code for .NET applications. In order for .NET applications to use AQtrace Reporter implemented in the aqReporter.dll and dbghelp.dll native libraries, AQtrace Packager generates the specific aqReporterInterop.dll assembly. This assembly serves as a bridge between your .NET application and the Reporter's native DLLs. The aqReporterInterop.dll assembly contains the `Initializer` helper class that provides the `InitReporter` method for loading and initialization of the Reporter. You should write code that loads the Reporter's DLLs into your .NET application and initializes the Reporter by using the `Initializer` class. For more information, see *Initializing AQtrace Reporter in .NET Applications*.

Obtaining Program Interface to AQtrace Reporter

To control the Reporter from your application, you should connect to the aqReporter library and obtain a program reference to the Reporter object through the `IaqReporterIntf` or `IaqReporterIntf2` interface. The `IaqReporterIntf` and `IaqReporterIntf2` interfaces are implemented by the AQtrace Reporter object (in Visual Basic applications, `IaqReporterIntf` is a class that provides program access to AQtrace Reporter). For detailed information on connecting to the Reporter, see *Getting Reference to AQtrace Reporter*.

The AQtrace installation package also includes special modules that make the connection easier. For more information on them, see the section *SDK Files* below.

Calling AQtrace Reporter's Methods

After you obtain a program reference to the AQtrace Reporter object, you call the object's methods to perform the desired actions. The following table briefly describes which methods you can use to perform this or that task:

Action	Description
To disable or enable AQtrace Reporter...	Use the *GlobalLock*, *GlobalUnlock*, *Lock* and *Unlock*, methods (in Visual Basic applications you use *LockForThread* and *UnlockForThread* rather than Lock and Unlock). See *Enabling and Disabling AQtrace Reporter*.
To include custom textual information in reports...	Create an object that implements the *IaqReporterCallback* interface and register this object in the IaqReporterIntf object with the *AddCallback* method. Add code that generates custom textual information to the *OnGenerateReport* method of the IaqReporterCallback object. See *Custom Textual Data in Reports* for a detailed description.This functionality is not supported in Visual Basic applications.
To include custom binary data in reports...	Create an object that implements the *IaqReporterCallback2* interface and register this object in the *IaqReporterIntf2* object with the *AddCallback2* method. Add code that generates custom binary data to the *OnGenerateReport2* method of the IaqReporterCallback2 object or use the *OnGenerateReportWithFile2* method of this object to include external files to reports. See *Custom Binary Data in Reports* for a detailed description. This functionality is not supported in Visual Basic applications.
To create a custom exception filter...	Create an object that implements the *IaqCustomExceptionFilter* interface and register this object in the *IaqReporterIntf2* object with the *AddCustomExceptionFilter* method. Add code that handles SEH exceptions to the *CheckSEHException* method of the IaqCustomExceptionFilter object and code that handles CLR exceptions to the *CheckDotNetException* method of this object, respectively. See *Creating Custom Exception Filters* for a detailed description. This functionality is not supported in Visual Basic applications.
To generate a report programmatically...	Use the *ShowFatalErrorWithMessage* method of the IaqReporterIntf2 interface. See *Generating Error Reports on Demand*. In Visual Basic applications, use the *ShowFatalErrorWithMessage* method of the *IaqReporterIntf* class.
To perform specific actions upon closing the notification window...	Create an object that implements the *IaqReporterCallback* interface and register this object in the IaqReporterIntf object with the *AddCallback* method. Also, you can create an object that implements the

Action	Description
	IaqReporterCallback2 interface and register this object in the IaqReporterIntf2 object with the *AddCallback2* method. Add code that performs specific actions to the *OnCloseReporter* method of the IaqReporterCallback object or to the *OnCloseReporter2* method of the IaqReporterCallback2 object, respectively. See *Performing Specific Actions Upon Closing the Notification Window* for a detailed description. This functionality is not supported in Visual Basic applications.
To save additional information in a separate dump file...	Use the *SaveAdditionalInfoAsDump* method of the IaqReporterIntf2 interface. This functionality is not supported in Visual Basic applications.
To load an error report from a dump file and display its contents...	Use the *ShowReportContents* method of the IaqReporterIntf2 interface. The method invokes the *Report Information* dialog to display the error report information in it. This functionality is not supported in Visual Basic applications.
To set a name for a thread...	Use the *SetThreadName* method of the IaqReporterIntf2 interface. The specified name of the thread is displayed in the *Threads* panel of *AQtrace Viewer* when an error report is opened with this tool. This functionality is not supported in Visual Basic applications.

SDK Files

The AQtrace package includes specific source files that simplify the work with AQtrace Reporter from application code. You can find these files in the *<Users>\Public\Documents\AQtrace Files\SDK* folder on Windows 7, Windows Vista and Windows Server 2008 and in the *<Documents and Settings>\All Users\Documents\AQtrace Files\SDK* folder on other operating systems. The files are copied to your computer if you selected the *"Prepare your modules for AQtrace"* option on the **Select AQtrace Components** page of the AQtrace installation wizard.

These files contain the declarations of AQtrace Reporter's interfaces and source code of the **aqReporterDLL** function, that lets you easily get a program reference to AQtrace Reporter in native applications, and the code of the **CaqReporterIntf** class, that helps to initialize the Reporter and to obtain a reference to it in Visual C# applications (see *Getting Reference to AQtrace Reporter*).

For description of the files that are included in AQtrace SDK, see *SDK Files*.

SDK Files

The AQtrace package includes specific files that simplify the work with *AQtrace Reporter* from application code. These files contain declarations of AQtrace interfaces, methods and properties. They also contain the code of the **aqReporterDLL** function, that lets you easily obtain a program reference to AQtrace Reporter in native applications, and the source code of the **CaqReporterIntf** class, that helps to initialize the Reporter and to get a program reference to it in Visual C# applications (see *Getting Reference to AQtrace Reporter*).

The SDK files are copied to your computer if you select the *"Prepare your modules for AQtrace"* option on the **Select AQtrace Components** page of the AQtrace installation wizard.

On Windows 7, Windows Vista and Windows Server 2008, SDK files are located in the *<Users>\Public\Documents\AQtrace Files\SDK* folder. On other operating systems, the files reside in the *<Documents and Settings>\All Users\Documents\AQtrace Files\SDK* folder. Hereinafter, the folder containing SDK files will be denoted as <SDK>.

The SDK files are organized into the following folders:

- <SDK>\Interfaces - IDL files
- <SDK>\CPP - C++ files
- <SDK>\C# - Visual C# files
- <SDK>\Delphi - Delphi units
- <SDK>\VB - Visual Basic 6 files
- <SDK>\Modules - AQtrace Reporter libraries

IDL Files

The *<SDK>\Interfaces* folder contains the following IDL file:

- aqReporter.idl

This file contains IDL declarations of AQtrace Reporter interfaces.

C++ Files

AQtrace SDK includes the following C++ files:

- aqReporter.h - Contains C++ definitions of AQtrace Reporter's interfaces.
- aqReporter_EXP.h - Contains the declaration of the `aqReporterDLL` function.
- aqReporter_EXP.cpp - Contains source code of the `aqReporterDLL` function and a helper class.

You can find these files in the *<SDK>\CPP* folder.

Visual C# Files

AQtrace SDK includes the following C# file:

- aqReporter_EXP.cs - Contains source code of the `CaqReporterIntf` helper class.

You can find this file in the *<SDK>\C#* folder.

Delphi Files

AQtrace SDK includes the following Delphi units:

- aqReporter_TLB.pas - Contains Delphi definitions of AQtrace Reporter's interfaces.
- aqReporter_EXP.pas - Contains source code of the `aqReporterDLL` function.

You can find these files in the *<SDK>\Delphi* folder.

Visual Basic 6 Files

AQtrace SDK includes the following files that let you control AQtrace Reporter from your Visual Basic 6 application:

- aqReporter_EXP.bas - Contains the source code of the `aqReporterDLL` function.
- IaqReporterIntf.cls - Contains the source code of a helper class that provides program access to AQtrace Reporter.
- aqtSupportVB.dll - Special module that provides program access to AQtrace Reporter.

  This module is redistributable and you must ship it along with your application. See *Distributing AQtrace Reporter Libraries*.

You can find these files in the *<SDK>\VB* folder.

Modules

The *<SDK>\Modules* folder contains the dynamic link libraries that implement the AQtrace Reporter functionality:

- *aqReporter.dll* and
- *dbghelp.dll*

There are 32- and 64-bit versions of these modules. You can find them in the following subfolders:

- *<SDK>\Modules\x86*
- *<SDK>\Modules\x64*

The *<SDK>\Modules\Common* subfolder holds the *AQtrace Report Monitor* utility. This utility monitors the predefined folder where error reports are placed. When a new dump file appears in this folder, the Report Monitor displays a notification in the Windows system tray and suggests the user sends the error report to the developer. The utility is useful when there is a need to process errors that occur in processes running under non-interactive user accounts. Read *Using AQtrace With Non-Interactive Processes* for details.

Getting Reference to AQtrace Reporter

AQtrace Reporter is implemented in the aqReporter.dll module. The Reporter object implements the `IaqReporterIntf` and `IaqReporterIntf2` program interfaces. Using these interfaces, you can control the Reporter's behavior and perform various specific actions at run time. To control the Reporter from your code, you need to obtain a program reference to it.

The way you get a reference to the Reporter object depends on whether you develop a native (unmanaged) or .NET application. The following topics describe how you can obtain a program reference to AQtrace Reporter through the `IaqReporterIntf` and `IaqReporterIntf2` interfaces in native and .NET applications.

Getting Reference to AQtrace Reporter in Native Applications

AQtrace Reporter is implemented in the aqReporter.dll module. For native (unmanaged) applications, the code that loads this module into your application and that initializes AQtrace Reporter is added to your executable automatically by the *AQtrace Packager* utility.

The way you obtain a reference to AQtrace Reporter from your code depends on the development tool that was used to create your application.

To simplify the process of getting the reference, you can use helper code from the AQtrace SDK files (see below).

On Windows 7, Windows Vista and Windows Server 2008, SDK files are located in the *<Users>\Public\Documents\AQtrace Files\SDK* folder. On other operating systems, the files reside in the *<Documents and Settings>\All Users\Documents\AQtrace Files\SDK* folder. Hereinafter, a folder containing SDK files will be denoted as <SDK>.

Basic Concepts

To obtain program access to AQtrace Reporter in native applications, call the `GetModuleIntf` function exported by the aqReporter library. This routine returns a program reference to the Reporter object through the *`IaqReporterIntf`* interface. Here is its declaration:

```
[C++]
HRESULT __stdcall GetModuleIntf(IaqReporterIntf**);
```

```
[Delphi]
function GetModuleIntf(out Intf: IUnknown): HResult; stdcall;
```

The whole procedure includes the following steps:

- Call the Windows API `GetModuleHandle` function to obtain a handler of the aqReporter.dll module. This module is already in memory, so you do not need to call `LoadLibrary` to load it.
- Call the Windows API `GetProcAddress` function to obtain the address of the exported `GetModuleIntf` function.
- Call `GetModuleIntf` to obtain the AQtrace Reporter reference.

The AQtrace Reporter object also implements the *`IaqReporterIntf2`* interface that lets to perform some useful actions with the Reporter object. As the `GetModuleIntf` function returns a pointer to the `IaqReporterIntf` interface on the Reporter object, you can get a pointer to the `IaqReporterIntf2` interface by casting the `IaqReporterIntf` pointer. Use the `QueryInterface` method to get access to the `IaqReporterIntf2` interface through the pointer to the `IaqReporterIntf` interface.

The following code snippets demonstrate how you can obtain references to AQtrace Reporter through the `IaqReporterIntf` and `IaqReporterIntf2` interfaces:

Visual C++ Example

In order for the following code to execute successfully, specify the path to the *aqReporter.h* header file in the *Additional Including Directories* setting of your Visual C++ project. You can find this file in the *<SDK>\CPP* folder.

For simplicity, the sample code does not contain statements that check the function results for errors.

```
[Visual C++]
#include <aqReporter.h>

...

typedef HRESULT (__stdcall *GETINTFPROC)(IaqReporterIntf**);

IaqReporterIntf* GetReporter()
```

```
{
    CComPtr<IaqReporterIntf> intf;
    HMODULE libHandle;
    GETINTFPROC GetModuleIntfProc;

    // Obtain the library's handle
    libHandle = LoadLibrary(L"aqReporter.dll");

    // Get function address
    GetModuleIntfProc = (GETINTFPROC)GetProcAddress(libHandle,
"GetModuleIntf");

    // Obtain the reference
    HRESULT hr = GetModuleIntfProc(&intf);

    // Return the result
    return intf;
}

IaqReporterIntf2* GetReporter2()
{
    CComPtr<IaqReporterIntf> intf;
    CComPtr<IaqReporterIntf2> intf2;

    // Obtain the pointer to the IaqReporterIntf interface
    intf = GetReporter();

    // Obtain the pointer to the IaqReporterIntf2 interface
    HRESULT hr = intf->QueryInterface(__uuidof(IaqReporterIntf2),
(void**)&intf2);

    // Return the result
    return intf2;
}
```

Delphi Example

In order for the following code to execute successfully, add the *aqReporter_TLB.pas* unit to your Delphi project. You can find this unit in the *<SDK>\Delphi* folder.

For simplicity, the sample code does not contain statements that check the function results for errors.

```
[Delphi]
uses aqReporter_TLB;
```

```
 ...
function GetReporter : IaqReporterIntf;
 ...
type
   GetModuleIntfType = function(out Intf: IUnknown): HResult; stdcall;
var
   LibHandle : DWORD;
   Intf : IUnknown;
   GetModuleIntfProc : GetModuleIntfType;
begin
   // Obtain the library's handle
   LibHandle := GetModuleHandle('aqReporter.dll');

   // Get procedure address
   GetModuleIntfProc := GetProcAddress(LibHandle, 'GetModuleIntf');

   // Obtain the reference
   GetModuleIntfProc(Intf);

   // Return the result
   Result := Intf as IaqReporterIntf;
end;
 ...
function GetReporter2 : IaqReporterIntf2;
var
   Intf : IaqReporterIntf;
   Intf2 : IUnknown;
begin
   // Obtain the IaqReporterIntf reference
   Intf := GetReporter();

   // Obtain the IaqReporterIntf2 reference
   Intf.QueryInterface(IaqReporterIntf2, Intf2);

   // Return the result
   Result := Intf2 as IaqReporterIntf2;
end;
```

Using SDK Files for Visual C++ and Delphi Applications

The AQtrace *SDK files* include special code that simplifies the process of getting the reference to AQtrace Reporter. These files contain the declaration and source code of the **`aqReporterDLL`** function

that performs the steps *described above* and returns a program reference to the `IaqReportIntf` object (that is, a reference to AQtrace Reporter). Once you have this reference, you may call methods of the `IaqReportIntf` object to perform the desired actions (see *AQtrace Reporter Programming - Overview*).

To use the functions, add the following source files to your application:

- C++ files: *<SDK>\CPP\aqReporter_EXP.h, <SDK>\CPP\aqReporter_EXP.cpp*
- Delphi files: *<SDK>\Delphi\aqReporter_EXP.pas*

The `aqReporterDLL` function returns the `IaqReportIntf` reference. To obtain a reference to the AQtrace Reporter object through the `IaqReportIntf2` program interface, use the `QueryInterface` method and the `IaqReportIntf` reference returned by the `aqReporterDLL` routine.

The following examples demonstrate how you can get references to the AQtrace Reporter object by using the `aqReporterDLL` function:

```
[Visual C++]
#include <aqReporter_EXP.h>


 ...

void my_func()
 {
     ...
     // Getting the IaqReporterIntf program interface to AQtrace
Reporter
     CComPtr<IaqReporterIntf> intf = aqReporterDLL();
     ...
     // Getting the IaqReporterIntf2 program interface to AQtrace
Reporter
     CComPtr<IaqReporterIntf2> intf2;
     intf->QueryInterface(__uuidoff(IaqReporterIntf2), (void**)&intf2);
     intf2->ShowFatalErrorWithMessage("A fatal error has occured...");
     ...
 }
```

```
 [Delphi]
uses aqReporter_TLB, aqReporter_EXP;


 ...

var
   Reporter : IaqReporterIntf;
   Reporter2 : IaqReporterIntf2;
begin
   ...
   // Obtain the IaqReporterIntf reference
   Reporter := aqReporterDll();
```

```
   ...
   // Obtain the IaqReporterIntf2 reference
   Reporter.QueryInterface(IaqReporterIntf2, Reporter2);
   Reporter2.ShowFatalErrorWithMessage('A fatal error has occured...');
   ...
end;
```

Controlling AQtrace Reporter from Visual Basic Applications

The way you obtain an AQtrace Reporter reference in your Visual Basic application differs from the way you do this in other applications. For Visual Basic applications you must use the AQtrace SDK files. You only work with AQtrace Reporter by using the functionality provided by these files. You can find these files in the *<SDK>\VB* folder:

- **aqtSupportVB.dll** - A helper DLL that serves as a "bridge" between your VB code and AQtrace Reporter DLLs. aqtSupport.VB.dll is a redistributable module. You must ship it along with your application.
- **IaqReporterIntf.cls** - The file that contains the source code of a helper `IaqReporterIntf` class. This class contains methods that let you control AQtrace Reporter from your code. In other words, these methods provide a program interface to AQtrace Reporter.
- **aqReporter_EXP.bas** - This file contains source code of the **`aqReporterDLL`** function that returns a reference to the `IaqReporterIntf` class.

The general procedure includes the following steps:

- Add the aqReporter_EXP.bas and IaqReporterIntf.cls from the *<SDK>\VB* folder to your Visual Basic folder.
- Call the `aqReporterDLL` routine to obtain a reference to the `IaqReporterIntf` object.
- Use the methods of this object to control the Reporter.

```
[Visual Basic]
Dim Reporter As IaqReporterIntf
 ...
Set Reporter = aqReporterDLL()
 ...
' Call methods to control AQtrace Reporter
 Reporter.ShowFatalErrorWithMessage("A fatal error has occured...")
 ...
```

In order for this code to function properly, your application must be able to load the aqtSupportVB.dll and this DLL must be able to load aqReporter.dll. The easiest way to meet this requirement is to place all three modules into the same folder. Alternatively, you can place aqtSupportVB.dll and aqReporter.dll into the *Windows\System32* folder or specify the location of these libraries in the `PATH` environment variable.

Getting Reference to AQtrace Reporter in .NET Applications

AQtrace Reporter is implemented in the aqReporter.dll unmanaged module. In order for .NET applications to operate with this native library and the Reporter object, you should use the

aqReporterInterop.dll assembly. This assembly is generated by *AQtrace Packager* for .NET applications and is used as a "bridge" between .NET modules and the aqReporter.dll native library. Furthermore, AQtrace Packager does not add to your .NET modules the code that loads and initializes the Reporter. To initialize the Reporter in a .NET application, you should write initialization code by yourself (use the `InitReporter` method of the `Initializer` class declared in the aqReporterInterop.dll assembly). For more information on this, see *Initializing AQtrace Reporter in .NET Applications*.

The `Initializer` class is used also for getting references to the Reporter in .NET applications. To simplify the process of getting the reference in Visual C# applications, you can also use helper code from the AQtrace SDK files (see below).

On Windows 7, Windows Vista and Windows Server 2008, SDK files are located in the *<Users>\Public\Documents\AQtrace Files\SDK* folder. On other operating systems, the files reside in the *<Documents and Settings>\All Users\Documents\AQtrace Files\SDK* folder. Hereinafter, a folder containing SDK files will be denoted as <SDK>.

Basic Concepts

To obtain program access to AQtrace Reporter in .NET applications, call the `GetModuleIntf` method of the `Initializer` class implemented in the aqReporterInterop.dll assembly. This routine returns a program reference to the Reporter object through the `IaqReporterIntf` interface. Here is its declaration:

```
[C#]
public static extern HRESULT GetModuleIntf(out
aqReporterInterop.IaqReporterIntf intf);
```

`GetModuleIntf` is declared as a static method of the `Initializer` class, so, you do not have to create an `Initializer` object to call this method and obtain a reference to the Reporter. Note that the `Initializer` class is declared in the `aqReporterInterop` namespace. Keep in mind this when you use this class.

To be able to use the `Initializer` class and program interfaces declared in the aqReporterInterop.dll assembly, you should add a reference to the assembly in your .NET project.

The AQtrace Reporter object also implements the `IaqReporterIntf2` interface that lets to perform some useful actions with the Reporter object. As the `GetModuleIntf` method returns the `IaqReporterIntf` reference, you can get the `IaqReporterIntf2` reference to the Reporter object by casting the `IaqReporterIntf` one. In Visual C# code, for instance, use the **`as`** conversion operator to cast the `IaqReporterIntf` interface reference to the `IaqReporterIntf2` one.

The following code snippet demonstrates how you can obtain references to AQtrace Reporter through the `IaqReporterIntf` and `IaqReporterIntf2` interfaces in Visual C#.

In order for the following code to execute successfully, add a reference to the aqReporterInterop.dll assembly to your Visual C# project. You create this assembly with AQtrace Packager.

For simplicity, the sample code does not contain statements that check the function results for errors.

```
[C#]
using aqReporterInterop;

...

public IaqReporterIntf GetReporter()
```

```
{
    IaqReporterIntf intf;

    //Obtain the reference
    Initializer.GetModuleIntf(out intf);

    //return the result
    return intf;
}

public IaqReporterIntf2 GetReporter2()
{
    IaqReporterIntf intf;
    IaqReporterIntf2 intf2;

    //Obtain the IaqReporterIntf reference
    intf = GetReporter();

    //Convert the reference to the IaqReporterIntf2 type
    intf2 = intf as IaqReporterIntf2;

    //return the result
    return intf2;
}
```

Using SDK Files for Visual C# Applications

The AQtrace *SDK* includes the `CaqReporterIntf` helper class that simplifies the process of getting the reference to AQtrace Reporter in Visual C# applications. The *<SDK>\C#\aqReporter_EXP.cs* file contains the source code of this class. To obtain a program reference to the `IaqReportIntf` object (that is, a reference to AQtrace Reporter), you can use the `GetModuleIntf` method of the `CaqReporterIntf` class. This method and class are declared as static, so, there is no need to create an instance of this class to call the method and obtain the `IaqReporterIntf` reference. Once you have this reference, you may call methods of the `IaqReportIntf` interface to perform the desired actions (see *AQtrace Reporter Programming - Overview*). If you need a reference to the Reporter through the `IaqReporterIntf2` interface, you can cast the obtained `IaqReporterIntf` interface reference to the `IaqReporterIntf2` type using the **`as`** operator.

Also, the `CaqReporterIntf` class provides the `Initialize` method that initializes the Reporter object.

To be able to use the `CaqReporterIntf` class and its methods, add the *<SDK>\C#\aqReporter_EXP.cs* source file to your Visual C# project.

The following example demonstrates how you can get references to the AQtrace Reporter object by using the `GetModuleIntf` method of the `CaqReporterIntf` helper class.

Note that the `CaqReporterIntf` class is declared in the `aqReporter` namespace. Specify this namespace at the beginning of your code with the **`using`** C# directive to shorten your code.

```
[C#]
using aqReporterInterop;
using aqReporter;

...

void my_proc()
{
    ...
    // Getting the IaqReporterIntf program reference to AQtrace Reporter
    IaqReporterIntf intf = CaqReporterIntf.GetModuleIntf();
    ...
    // Getting the IaqReporterIntf2 program reference to AQtrace
Reporter
    IaqReporterIntf2 intf2 = intf as IaqReporterIntf2;
    ...
}
```

Creating Custom Exception Filters

Custom exception filters are created in addition to the exception filters defined with *AQtrace Packager*. These filters let you programmatically implement your own algorithm of exception filtering. Using custom exception filters, *AQtrace Reporter* can handle exceptions in a more flexible way.

To create a custom exception filter, you should create and use an object that implements the *`IaqCustomExceptionFilter`* program interface.

Custom exception filters are not supported in Visual Basic applications.

To create a custom exception filter in your application, follow these steps:

1. Create an object that implements the *`IaqCustomExceptionFilter`* interface (this object will be used as the custom exception filter).
2. Obtain a reference to the AQtrace Reporter object through the *`IaqReporterIntf2`* interface (for more information, see *Getting Reference to AQtrace Reporter*).
3. Register the created `IaqCustomExceptionFilter` object in the Reporter by calling the *`AddCustomExceptionFilter`* method implemented in the `IaqReporterIntf2` interface. `AddCustomExceptionFilter` returns an integer that identifies the `IaqCustomExceptionFilter` object. You can use this identifier to unregister the `IaqCustomExceptionFilter` object later, when it is not needed anymore, by calling the *`RemoveCustomExceptionFilter`* method implemented in the `IaqReporterIntf2` interface.

4. Use the *CheckSEHException* or *CheckDotNetException* callback method to implement the desired filtering algorithm for handling SEH and CLR exceptions, respectively. In the CheckSEHException method, you should write code for handling native exceptions, and in the CheckDotNetException method, you should define a filtering mechanism for .NET managed exceptions. These callback methods of the registered IaqCustomExceptionFilter object will be called by AQtrace Reporter when a native or .NET exception occurs. The information about raised exceptions is passed to these methods through their parameters (see *CheckSEHException* and *CheckDotNetException*). Use this information to analyze a situation and make a decision whether to generate an error report for an exception or ignore it.

The AddCustomExceptionFilter method appends the IaqCustomExceptionFilter object to the Reporter's internal list of callback objects. If you want to use several custom exception filters, you can create and register more than one IaqCustomExceptionFilter object in the Reporter's internal list of callbacks (one callback object for each custom filter).

When an exception occurs, the Reporter calls the appropriate method of the IaqCustomExceptionFilter object that was registered first.This filter object handles the exception and can generate an error report for it, skip it without generating any reports, or pass it for handling to the next custom filter. The next filter object can pass the exception further, too, and so on. If the exception is passed by the last custom exception filter, it is handled by the *Packager-defined exception filter*.

Enabling and Disabling AQtrace Reporter

This topic describes how you can enable or disable *AQtrace Reporter* and provides some important notes on locking the functionality that is used by the Reporter.

Why Lock AQtrace Reporter

In some cases, you may want to disable *AQtrace Reporter* during the application run. For instance, you may want to disable AQtrace Reporter, execute some code and then enable the Reporter. This may happen, for instance, if your application executes some code that generates an exception, but you expect this exception and handle it in an appropriate manner. So, to prevent handling the exception with AQtrace Reporter, you may want to disable AQtrace Reporter before executing your specific code and enable the Reporter after this code is executed.

How to Enable and Disable AQtrace Reporter

To disable *AQtrace Reporter*, use the *Lock* and *GlobalLock* methods of the *IaqReporterIntf* object (in Visual Basic applications use the *LockForThread* method rather than Lock). For information on how to obtain the object, see *Getting Reference to AQtrace Reporter*). Lock (or LockForThread) disables the Reporter only for one thread. It is actually for the thread that calls the method. GlobalLock disables the Reporter for all application threads.

To undo the lock (that is, to enable AQtrace Reporter), use the *Unlock* and *GlobalUnlock* methods (in Visual Basic applications use the *UnlockForThread* method rather than Unlock). Unlock (or UnlockForThread) works for the thread in which the method is called. GlobalUnlock works for all application threads.

None of these methods uses parameters:

```
[Visual C++]
// Getting reference to AQtrace Reporter
```

```
CComPtr<IaqReporterIntf> Reporter = GetReporter();

// Disabling AQtrace Reporter
Reporter->Lock(); // or Reporter->GlobalLock()

try{

... // Execute some code here

}
finally
{

  // Enabling AQtrace Reporter
  Reporter->Unlock(); // or Reporter->GlobalUnlock()

}
```

```
[Delphi]
var
Reporter : IaqReporterIntf;

begin

// Getting reference to AQtrace Reporter
Reporter := GetReporter();

// Disabling AQtrace Reporter
Reporter.Lock(); // or Reporter.GlobalLock()

try

... // Execute some code here

finally

  // Enabling AQtrace Reporter
  Reporter.Unlock(); // or Reporter.GlobalUnlock()

end;

end;
```

```
[C#]
// Getting reference to AQtrace Reporter
IaqReporterIntf Reporter = GetReporter();

// Disabling AQtrace Reporter
Reporter.Lock(); // or Reporter.GlobalLock()

try{

... // Execute some code here
}
finally{

  // Enabling AQtrace Reporter
  Reporter.Unlock(); // or Reporter.GlobalUnlock()

}
```

How the Locking Mechanism Works

When disabling and enabling *AQtrace Reporter*, keep in mind the following specifics of the locking mechanism:

- **Important note:** The "global" and "local" locking methods are two independent filters. They use different internal counters and do not interfere with each other. That is, a call to `GlobalUnlock` does not cancel the "local" lock made for a thread by the `Lock` method, as well as the `Unlock` method does not cancel the "global" lock made by `GlobalLock`. Both "global" and "local" locking filters specify whether AQtrace Reporter is enabled or disabled for a certain thread. The Reporter can monitor a thread only if the Reporter's functionality is enabled both "globally" and "locally" for this thread.
- Each call to a locking method (that is, to `GlobalLock`, `Lock` or `LockForThread`) must have an appropriate call to the unlocking method (that is, to `GlobalUnlock`, `Unlock` or `UnlockForThread`). For example, if you call the `Lock` method three times, you must also call `Unlock` three times. Otherwise, the Reporter will remain disabled for the thread, in which you call these functions.

Generating Error Reports on Demand

Error reports contain information on loaded modules, threads, call stacks and values of CPU registers at the moment when an exception occurred. This information helps developers find specific conditions of application functioning. Suppose, one of your functions uses an integer parameter that should not normally be 0. However, if your code detects that for some reason this parameter is 0, then your application may command *AQtrace Reporter* to generate an error report and send this report to your development team. The developers can then analyze this report and use information about CPU registers and call stacks to find the cause of the problem.

To command *AQtrace Reporter* to generate an error report, call the `ShowFatalErrorWithMessage` method of the `IaqReporterIntf2` object. This object provides program access to AQtrace Reporter. For information on how to obtain this object, see *Getting Reference to AQtrace Reporter*.

The `ShowFatalErrorWithMessage` method initiates the normal handling procedure, that is, it commands the Reporter to generate an error report and to display a notification window. This method provides the ability to display an informative message in the notification window. The message is specified as the method's parameter.

You may want to include some specific information in the generated reports. To do this, you should create an object implementing the `IaqReporterCallback` interface (if you want to include *custom textual data*) or the `IaqReporterCallback2` interface (if you want to add some *custom binary data*), register this object in AQtrace Reporter and write code for the object's `OnGenerateReport` method (or for the `OnGenerateReport2` method if the object implements the `IaqReporterCallback2` interface). For a detailed description of these steps, see *Inserting Custom Data Into Reports*.

Performing Specific Actions Upon Closing the Notification Window

If the user clears the "Don't terminate the application" check box and closes the notification window, the application will be terminated. *AQtrace Reporter* gives your application the possibility to perform specific actions upon closing the notification window. For instance, the application may release specific resources or references.

This topic describes how you can handle the closing of a window, create an object implementing the `IaqReporterCallback` interface and register this object in AQtrace Reporter.

The described functionality is not supported in Visual Basic applications.

To perform specific actions upon closing the notification window:

1. Create an object that implements the `IaqReporterCallback` interface.
2. Obtain a reference to the AQtrace Reporter object (for more information on this, see *Getting Reference to AQtrace Reporter*).
3. Register the `IaqReporterCallback` object in the Reporter by calling the `AddCallback` method of the AQtrace Reporter object (this method is provided by the `IaqReporterIntf` interface).

   The `AddCallback` method returns an integer number that identifies the `IaqReporterCallback` object. You can use this identifier to unregister the object.

   After you register the `IaqReporterCallback` object, the Reporter will call the object's `OnCloseReporter` method when the notification window is closed.
4. When AQtrace Reporter is finalized or when additional information is not needed anymore, unregister the `IaqReporterCallback` object by calling the `IaqReporterIntf.RemoveCallback` method. This method has only one parameter that specifies the object's identifier that was returned by the `AddCallback` method.

The `OnCloseReporter` method of the `IaqReporterCallback` object is called after the notification window is closed. You can use this method to perform specific actions upon closing the window. The method has the following syntax:

```
[IDL]
HRESULT OnCloseReporter(VARIANT_BOOL Terminate);
```

The *Terminate* parameter specifies whether the application will be closed. You can use this parameter to decide which actions the application should perform.

Note: To perform specific actions upon closing the notification window, you can also use the *OnCloseReporter2* method of the *IaqReporterCallback2* interface. For this purpose, you need to perform actions similar to those described above. The difference is that the IaqReporterCallback2 interface is used, and the objects that implement this interface are registered in the Reporter by calling the *AddCallback2* method of the *IaqReporterIntf2* interface.

Inserting Custom Data Into Reports

Generated error reports contain information about threads, CPU registers, call stack and memory data. You can also modify certain settings of *AQtrace Reporter* so that the reports include additional information about the operating system, processes running in the operating system, services, installed programs, network, display devices, printers, physical and virtual memory and hard-disk space (see *Specifying Data to Be Included in Reports*).

You can also include custom data into reports if needed. For instance, you may want to include information on your application's subsystem or information about certain internal flags. Also, you may want to include some binary files that can help to analyze bug reports.

The following topics describe how you can insert various custom data into generated error reports.

Custom Binary Data in Reports

You can add custom binary data into error reports, that is, *AQtrace Reporter* includes in a dump one or more files with various binary data. For instance, you may need to send with a bug report some specific files with custom data that may be useful for the report analysis and search for the reason of the exception. These files are included in the dump file, but with *AQtrace Viewer* you can view their contents and save them as separate files. The list of the included binary files is shown on the **Binary Data** tab of the *Additional Information* panel in AQtrace Viewer.

The insertion of custom binary data into error reports like the insertion of textual custom data is possible only with the use of the Reporter's programming interfaces. You cannot specify custom data to be included in reports by using the *AQtrace Packager* utility.

To include a custom binary file into the error report, you should create and use an object implementing the *IaqReporterCallback2* interface (see below).

The insertion of custom binary data by AQtrace Reporter is not supported for Visual Basic applications.

To implement the IaqReporterCallback2 interface, follow these steps:

1. Create an object that implements the *IaqReporterCallback2* interface.
2. Obtain a reference to the AQtrace Reporter object (for more information on this, see *Getting*

Reference to AQtrace Reporter).

3. Register the created `IaqReporterCallback2` object in the Reporter by calling the *`AddCallback2`* method of the AQtrace Reporter object.

   The `AddCallback2` method returns an integer value that identifies the `IaqReporterCallback2` object. You can use this identifier to unregister the object.

   After you register the `IaqReporterCallback2` object, AQtrace Reporter will call the object's *`OnGenerateReport2`* and *`OnGenerateReportWithFile2`* methods on generating reports, thus, giving you a possibility to insert custom binary data into the report.

4. When AQtrace Reporter is finalized or when additional information is not needed anymore, unregister the `IaqReporterCallback2` object by calling the *`IaqReporterIntf2.RemoveCallback2`* method. This method has only one parameter that specifies the identifier of the object to be removed. This is the identifier that was returned by the `AddCallback2` method.

The `AddCallback2` method appends the `IaqReporterCallback2` object to the Reporter's internal list of callback objects. The Reporter calls the `OnGenerateReport2` and `OnGenerateReportWithFile2` methods of these objects when generating data to be included in the report. In these methods, you can write some code, which will specify the data to be inserted into the report.

Note: Both the `OnGenerateReport2` and `OnGenerateReportWithFile2` methods insert files in error reports. The difference between these methods is that the `OnGenerateReportWithFile2` method allows to insert an external file and you only need to specify the file name for it. Also, this method allows to remove the external file after inserting it, if you want. And the `OnGenerateReport2` method allows to insert custom binary data allocated in the memory. That is, using this method, your application can generate some binary data in the memory, save it into the error report as binary file and send to the developers team. You can also read and load the contents of some external file to the memory and then insert it in the report by using the `OnGenerateReport2` method, but using of the `OnGenerateReportWithFile2` method will be easier to do this. For more information, see the description of the *`OnGenerateReport2`* and *`OnGenerateReportWithFile2`* methods.

If you want to include into the error report more than one binary file, you should add several `IaqReporterCallback2` objects to the Reporter's internal list of callbacks (add one callback object for one file to be inserted). When AQtrace Reporter is generating data for the report, it calls the `OnGenerateReport2` and `OnGenerateReportWithFile2` methods for each of the registered `IaqReporterCallback2` objects. So, each execution of the `OnGenerateReport2` or `OnGenerateReportWithFile2` methods includes one binary file into the error report.

Note that you can view easily the contents of the included binary files while analyzing the error report with *AQtrace Viewer*. This utility displays the list of the included files on the Additional Information panel. And when you double-click the desired file in the list, AQtrace Viewer launches the corresponding application and opens the binary file with it (if the file's type is registered in the system). Also, you can save the attached file separately, as an external one (see *Additional Information Panel* for more information).

Custom Textual Data in Reports

In addition to general information included into reports (for instance, information about the operating system, threads, processes, CPU registers, call stack, memory data and so on) you can also insert custom textual data into error reports. For instance, you may want to include various textual information on your application's subsystem that can be helpful in bug report analysis. You can view the added custom data in the *Additional Information* panel of *AQtrace Viewer*.

To include custom textual data into the error report, you should create and use an object implementing the *IaqReporterCallback* interface (see below).

The insertion of custom data is not supported for Visual Basic applications.

To implement the IaqReporterCallback interface in your application, follow these steps:

1. Create an object that implements the *IaqReporterCallback* interface.
2. Obtain a reference to the AQtrace Reporter object (for more information on this, see *Getting Reference to AQtrace Reporter*).
3. Register the created IaqReporterCallback object in the Reporter by calling the *AddCallback* method of the AQtrace Reporter object.

   The AddCallback method returns an integer value that identifies the IaqReporterCallback object. You can use this identifier to unregister the object.

   After you register the IaqReporterCallback object, AQtrace Reporter will call the object's *OnGenerateReport* method on generating reports, thus, giving you a possibility to insert custom data into the report.
4. When AQtrace Reporter is finalized or when additional information is not needed anymore, unregister the IaqReporterCallback object by calling the *IaqReporterIntf.RemoveCallback* method. This method has only one parameter that specifies the identifier of the object to be removed. This is the identifier that was returned by the AddCallback method.

The AddCallback method appends the IaqReporterCallback object to the Reporter's internal list of callback objects. The Reporter calls the *OnGenerateReport* method of these objects when generating data to be included in the report. You can write code for this method to specify the data to be inserted into the report.

Custom textual data inserted with the OnGenerateReport method will be displayed in the **Additional Information** panel of AQtrace Viewer. You can specify the category name for the inserted data. For each category of custom data inserted into the report an individual tab will be created in the Additional Information panel. The specified category name will be used as the caption of the corresponding tab displayed in the Additional Information panel. The inserted textual data can have an arbitrary format.

You can include in reports more than one category of custom textual data. In that case you should use several IaqReporterCallback object. Append so many callback objects to the Reporter as many categories of custom textual data you want to insert into the error report.

AQtrace includes *sample projects* that demonstrate how you can create the IaqReporterCallback objects and insert custom textual data into reports:

- <AQtrace Samples>\Sources\CPP\SampleApp - source code files of Visual C++ sample
- <AQtrace Samples>\Sources\C#\SampleApp - source code files of Visual C# sample

- <AQtrace Samples>\Sources\Delphi\SampleApp - source code files of Delphi sample

AQtrace Packager

AQtrace Packager is a tool that is used to specify *AQtrace Reporter* settings and apply them to the unmanaged module, whose execution the Reporter will monitor, or generate the *aqReporterInterop.dll* assembly that will store these settings and serve as a bridge between the .NET application to be monitored and the Reporter that is implemented in the unmanaged aqReporter.dll library. The settings you specify in AQtrace Packager can be saved to a configuration project. AQtrace Packager provides two types of configuration projects:

- **Native projects** - allows you to specify the Reporter settings and apply them to a native (unmanaged) module.
- **.NET projects** - allows you to specify the Reporter settings and create the aqReporterInterop.dll assembly using these settings.

The Reporter settings stored in the Packager project are then applied to other modules or to the same module after it is built, for a native project, or can be used for generating other versions of the aqReporterInterop assembly, if you use the .NET project.

AQtrace Packager is installed if you select the *"Prepare your modules for AQtrace"* option on the **Select AQtrace Components** page of the AQtrace installation wizard. The utility's file name is *<AQtrace>\Bin\AQtracePackager.exe*.

The following topics provide detailed information on using AQtrace Packager.

Using AQtrace Packager With Native Applications

When you want to trace execution of your native (unmanaged) application with *AQtrace Reporter*, you should use *AQtrace Packager* to specify the Reporter's settings and apply them to the native executable.

Using AQtrace Reporter's settings you can control various aspects of the Reporter's behavior, specify exceptions and modules to be traced and specify data to be included in error reports. All of the settings are saved to a **configuration project**. For native applications, AQtrace Packager uses **native configuration projects**. By opening a native project in the Packager, you can quickly load the desired settings and then apply them to your unmanaged executable.

This topic provides information about using AQtrace Packager with native applications and creation of native configuration projects. To learn how to work with .NET projects and apply the Reporter's settings to .NET applications, see *Using AQtrace Packager With .NET Applications*.

A typical work session of preparing a native application for further tracing includes the following steps:

1. Creating a new or opening an existing native project.
2. Specifying the native executable, to which AQtrace Reporter will be applied.
3. Defining the Reporter's settings.
4. Processing the executable.
5. Saving and closing the project.

The following sections of this topic provide more information for each of these steps.

1. Creating or Opening a Native Project

The first step in using AQtrace Packager is creating (or opening) a project. Until the project is created (or opened) the Packager displays only its **Start Page**. This page provides commands that allow to create a new configuration project of one of the possible types (native or .NET), open an existing project or select one of the recently opened projects from the list.

To create a new native project:

- Select the **Create Native Project** command from the Packager's Start Page.

  -- or --

- Select **File | New | Native Project** from the main menu.

To open a project that you created earlier:

- Select the **Open Existing Project** command from the Packager's Start Page and choose the desired project file in the ensuing Open File dialog.

  -- or --

- Select **File | Open** from the main menu and then choose the desired project file in the ensuing Open File dialog.

To open a recently used project file:

- Select the desired file name from the **Recent Projects** list on the Packager's Start Page.

  -- or --

- Use the **File | Recent** command from the main menu and select the desired file name from the subsequent submenu.

2. Specifying the Executable

The native configuration project stores AQtrace Reporter's settings and the name of the unmanaged executable, to which the Reporter will be applied.

To specify the executable:

- Activate the *Module Information* page by selecting **Module | Module Information** from the list on the left of the Packager's window.
- Specify the fully-qualified name of the desired executable in the **File Name** box of the page. You can either type the file name, or press the ellipsis button and choose the desired module in the ensuing Open File dialog.

If the specified file exists, AQtrace Packager will display the file's attributes and version information on the Module Information page.

3. Specifying Reporter Settings

The Packager organizes the settings into a number of pages and lists the pages' titles on the left of the window. To modify settings, you select the desired item on the left and the Packager displays the appropriate settings page on the right of the window.

AQtrace Reporter includes a lot of settings, which you can use to customize almost any aspect of AQtrace Reporter's behavior. For instance:

- Using pages of the **Exception Filter** and **Module Filter** groups allows you to specify the exceptions and modules to be traced by the Reporter.
- By using the **Notification Settings** page you can define text to be displayed within the notification window and specify whether the Reporter will display this window or not.
- By using the **Additional Reported Data** page you can specify what extra information about the

exceptions and the end-user computer AQtrace Reporter will collect and include into the generated reports.

For detailed information on settings, see *AQtrace Packager Settings Pages*.

For some settings you can leave default values, but some others **require your attention**:

- ***Reporter Settings | Sending*** page

  Use this page to specify the transfer protocol(s) and the *settings* that are required to use the protocol(s) for sending error reports. These settings are critical. You must specify them in order for AQtrace Reporter to be able to send the reports. For more information, see the *description of the Sending page*.

- ***Reporter Settings | Product Information*** page

  This page contains the **Product identifier** and **Product version** settings, whose values are used to indicate the product, for which error reports will be generated. AQtrace Reporter will save these settings to each report it generates. *Issue-tracking plug-ins* use this string to determine the product and version for which the report was generated. So, these values are helpful, if you use AQtrace Reporter in several of your products or in several versions of the same product.

- ***Notification Window | Notification Settings*** page

  This page contains settings that specify whether AQtrace Reporter displays a notification window and defines the text to be displayed within the window. You can leave the default values in all settings, except for the **Error reports policy link, URL**. This setting does not have a default value. You should specify the URL in it. This is the URL of the web page that contains information corresponding to the displayed text. Typically, this page describes the data collection policy adopted in your company to end-users.

4. Processing the Native Executable

After specifying the desired settings, you should command AQtrace Packager to "apply" the settings and AQtrace Reporter to your unmanaged module. To do this, click the **Process Module** button on the AQtrace Packager's toolbar (this button is displayed only if you work with native configuration projects).

This step is important. If you skip it, the changes that you made to the settings will be saved to the project, but they will not be applied to the executable.

Note: Before applying AQtrace Reporter to your native module, AQtrace Packager creates a backup copy of the module so that you can restore the original copy of the module from it.

Currently, you can process a module with AQtrace Packager only once. If you need to re-apply the Reporter to your module, you can apply it to the backup copy of the module or you can recompile the module and then process it with the Packager.

5. Saving and Closing the Project

To save the changes made to the project, choose **File | Save** from the main menu of the Packager. Using the **File | Save As** menu item you can save the configuration project under a new name.

To close the project, choose **File | Close**. If the project has unsaved changes, the Packager will ask you whether you want to save the changes.

Command Line

AQtrace Packager can be used from the command line. This feature lets you launch the Packager with various tools that automate software builds. For more information on the command-line arguments, see *AQtrace Packager Command Line*.

Using AQtrace Packager With .NET Applications

When you want to trace execution of your .NET application with *AQtrace Reporter*, you should use *AQtrace Packager* to specify the Reporter's settings and generate the aqReporterInterop.dll assembly applying these settings to it. This assembly is used as a bridge between a managed assembly of your .NET application and the native aqReporter dynamic link library that implements the Reporter functionality. For more information on the aqReporterInterop assembly, see *Creating the aqReporterInterop Assembly*.

Using AQtrace Reporter's settings you can control various aspects of the Reporter's behavior, specify exceptions and modules to be traced and specify data to be included in error reports. All of the settings are saved to a **configuration project**. For .NET applications, AQtrace Packager uses **.NET configuration projects**. By opening a .NET project in the Packager, you can quickly load the desired settings and then generate the aqReporterInterop assembly applying these settings to it. Then you can use the generated assembly that contains the specified Reporter's settings with your .NET application.

This topic provides information about using AQtrace Packager with .NET applications and creation of .NET configuration projects. To learn how to work with native projects and apply the Reporter's settings to unmanaged applications, see *Using AQtrace Packager With Native Applications*.

A typical work session of preparing a .NET application for further tracing includes the following steps:

1. Creating a new or opening an existing .NET project.
2. Specifying the path to the folder, where the aqReporterInterop assembly should be created.
3. Defining the Reporter's settings.
4. Generating the aqReporterInterop assembly.
5. Initializing the Reporter from the .NET application using the generated assembly.
6. Saving and closing the project.

The following sections of this topic provide more information for each of these steps.

1. Creating or Opening a .NET Project

The first step in using AQtrace Packager is creating (or opening) a project. Until the project is created (or opened) the Packager displays only its **Start Page**. This page provides commands that allow to create a new configuration project of one of the possible types (native or .NET), open an existing project or select one of the recently opened projects from the list.

To create a new .NET project:

- Select the **Create .NET Project** command from the Packager's Start Page.

-- or --

- Select **File | New | .NET Project** from the main menu.

To open a project that you created earlier:

- Select the **Open Existing Project** command from the Packager's Start Page and choose the desired project file in the ensuing Open File dialog.

-- or --

- Select **File | Open** from the main menu and then choose the desired project file in the ensuing

Open File dialog.

To open a recently used project file:

- Select the desired file name from the **Recent Projects** list on the Packager's Start Page.

-- or --

- Use the **File | Recent** command from the main menu and select the desired file name from the subsequent submenu.

2. Specifying the Path to the Folder, Where aqReporterInterop Should be Created

The .NET configuration project stores AQtrace Reporter's settings and the path to the folder, where the aqReporterInterop assembly should be generated.

To specify the path to the destination folder:

- Activate the *Reporter Assembly Information* page by selecting **Reporter Assembly | Reporter Assembly Information** from the list on the left of the Packager's window.
- Specify the fully-qualified path and name of the destination folder in the **Output folder** box on the settings page. You can either type the path to the folder and its name, or press the ellipsis button and choose the desired folder in the ensuing Browse for Folder dialog.

3. Specifying Reporter Settings

The Packager organizes the settings into a number of pages and lists the pages' titles on the left of the window. To modify settings, you select the desired item on the left and the Packager displays the appropriate settings page on the right of the window.

AQtrace Reporter includes a lot of settings, which you can use to customize almost any aspect of AQtrace Reporter's behavior. For instance:

- Using pages of the **Exception Filter** and **Module Filter** groups allows you to specify the exceptions and modules to be traced by the Reporter.
- By using the **Notification Settings** page you can define text to be displayed within the notification window and specify whether the Reporter will display this window or not.
- By using the **Additional Reported Data** page you can specify what extra information about the exceptions and the end-user computer AQtrace Reporter will collect and include into the generated reports.

For detailed information on settings, see *AQtrace Packager Settings Pages*.

For some settings you can leave default values, but some others **require your attention**:

- ***Reporter Settings | Sending*** page

  Use this page to specify the transfer protocol(s) and the *settings* that are required to use the protocol(s) for sending error reports. These settings are critical. You must specify them in order for AQtrace Reporter to be able to send the reports. For more information, see the *description of the Sending page*.

- ***Reporter Settings | Product Information*** page

  This page contains the **Product identifier** and **Product version** settings, whose values are used to indicate the product, for which error reports will be generated. AQtrace Reporter will save these settings to each report it generates. *Issue-tracking plug-ins* use this string to determine the product and version for which the report was generated. So, these values are helpful, if you use AQtrace Reporter in several of your products or in several versions of the same product.

- ***Notification Window | Notification Settings*** page

This page contains settings that specify whether AQtrace Reporter displays a notification window and defines the text to be displayed within the window. You can leave the default values in all settings, except for the **Error reports policy link, URL**. This setting does not have a default value. You should specify the URL in it. This is the URL of the web page that contains information corresponding to the displayed text. Typically, this page describes the data collection policy adopted in your company to end-users.

4. Generating the aqReporterInterop Assembly

After specifying the desired settings, you should command AQtrace Packager to generate the aqReporterInterop assembly "applying" the settings to it. To do this, click the **Generate Assembly** button on the AQtrace Packager's toolbar (this button is displayed only if you work with .NET configuration projects).

This step is important. If you skip it, the changes that you made to the settings will be saved to the project, but the assembly storing these new Reporter's settings will not be generated.

If the aqReporterInterop assembly already exists in the specified folder, AQtrace Packager displays the appropriate informative message and suggests to replace the existed assembly with the generated one or cancel the creation of the assembly.

5. Initializing AQtrace Reporter from the .NET Application

As opposed to native executables, .NET modules are not modified by AQtrace Packager. When the Packager processes an unmanaged module, it injects special code that will initialize automatically AQtrace Reporter. As for .NET modules, you should write the initialization code by yourself.

To initialize the Reporter from your .NET module, you use the `InitReporter` method of the `Initializer` class implemented in the aqReporterInterop assembly. Note that you should add a reference to the aqReporterInterop assembly to your .NET application's project before using it. By calling the `InitReporter` method, your application initializes the Reporter implemented in the aqReporter.dll library and applies the specified settings to it. After initialization, you can use the program interfaces implemented in the aqReporterInterop managed assembly to control the Reporter implemented in the aqReporter unmanaged library (for more information on this, see *Using AQtrace Reporter in .NET Applications*).

Note that for the higher reliability we recommend you to place the aqReporterInterop.dll assembly to the same folder where your .NET executable resides. For detailed information on AQtrace Reporter initialization from .NET applications, see *Initializing AQtrace Reporter in .NET Applications*.

6. Saving and Closing the Project

To save the changes made to the project, choose **File | Save** from the main menu of the Packager. Using the **File | Save As** menu item you can save the configuration project under a new name.

To close the project, choose **File | Close**. If the project has unsaved changes, the Packager will ask you whether you want to save the changes.

Command Line

AQtrace Packager can be used from the command line. This feature lets you launch the Packager with various tools that automate software builds. For more information on the command-line arguments, see *AQtrace Packager Command Line*.

AQtrace Packager Command Line

AQtrace Packager uses the following command line:

```
AQtracePackager.exe  [Config_Project_File_Name[-p[-m:Module_File_Name]]]
```

The square brackets mean the argument is optional.

Below is the description of the command-line arguments that AQtrace Packager accepts:

- *Config_Project_File_Name* - Specifies the path and name of the configuration file to be opened in AQtrace Packager. If the file path or name contains spaces, enclose this parameter in quotes.

  If the command line contains only the project file name and other command line arguments are absent, then AQtrace Packager will load the specified project when starting.

- *-p* - This argument is meaningful only if the *Config_Project_File_Name* is used. If a native configuration project is specified, the *p* argument commands AQtrace Packager to apply the settings specified by the project to the native executable that is also specified by the project. If a .NET configuration project is specified, the *p* argument commands AQtrace Packager to create the aqReporterInterop.dll assembly in the folder specified in the project and apply the settings from the project to this assembly. Using the *p* argument has the same effect as pressing the **Process Module** toolbar item in AQtrace Packager in case of a native project or the **Generate Assembly** button in case of a .NET project (see the *Using AQtrace Packager With Native Applications* and *Using AQtrace Packager With .NET Applications* topics).

  Note: If the *p* argument is used, the Packager's window is not displayed on screen. After the processing is over, AQtrace Packager is closed automatically.

- *-m:Module_File_Name* - This argument is meaningful only if the *Config_Project_File_Name* and *-p* arguments are specified and *Config_Project_File_Name* is a file name of a native configuration project to be processed by AQtrace Packager. For .NET configuration projects this argument is ignored. The *m* argument "tells" the Packager that it should apply the project's settings to the native module that is specified by *Module_File_Name*, but not to the module that is specified by the project.

  Module_File_Name specifies the path and name of the desired module. If this path or name contains one or more spaces, enclose this parameter in quotes.

Below are several examples of AQtrace Packager's command line:

```
AQtracePackager.exe "C:\Work\My Projects\Proj1.aqtdc" -p -m:"C:\Work\My
Projects\My App.exe"
AQtracePackager.exe "C:\Work\My Projects\Proj2.aqtdc" -p
AQtracePackager.exe C:\Work\MyProj1.aqtdc
```

AQtrace Packager Exit Codes

AQtrace Packager can work in silent mode. The Packager provides the following exit codes, which report on the processing results:

Exit Code	Description

Exit Code	Description
0	The specified unmanaged module has been processed successfully if a native project was specified, or the aqReporterInterop.dll assembly has been generated successfully in case of a .NET configuration project.
-1	Wrong number of arguments or invalid order of arguments.
-2	Invalid project name.
-3	Erroneous format of the module name specified in the `-m` command-line argument.
-4	The module specified by the `-m` command-line argument does not exist.
-5	Unable to open the AQtrace Packager project.
-6	The specified module has already been processed with AQtrace Packager.
-7	Other error.

Normally, these codes are of use when AQtrace Packager is launched from a batch file:

```
REM Clears the screen
CLS
@ECHO OFF
REM Runs AQtrace Packager
"C:\Program Files\SmartBear\AQtrace\Bin\AQtracePackager.exe"
"C:\Work\My Projects\Proj1.aqtc" -p -m:"C:\Work\My Projects\My App.exe"
REM Verifies exit code.
IF ERRORLEVEL 0 GOTO Success
IF NOT ERRORLEVEL 0 GOTO Errors

:Errors
ECHO An error occurred
GOTO End

:Success
ECHO No errors
GOTO End

:End
```

AQtrace Packager Settings Pages

Module Information Page

The **Module Information** page of *AQtrace Packager* is used to specify the binary module (executable, dll, ocx and other) to which *AQtrace Reporter* will be applied. This settings page is displayed in the Packager window only if you work with a native configuration project.

You specify the module, to which the Reporter should be applied, in the **File Name** edit box. You can either type the fully-qualified file name in this box or press the ellipsis button and choose the desired file in the subsequent Open File dialog.

After selecting the module, AQtrace Packager displays the following file properties on the page:

- The size of the file (in kilobytes).
- The date and time of the module's creation.
- The date and time of the last modification of the file.
- The date and time when the module was accessed last time.
- The version number of the module (including the major, minor, build and private parts).
- The read-only file attribute.

If the specified file does not exist, the properties are not shown. To update information about the module, click within the File Name box.

Reporter Assembly Information Page

The **Reporter Assembly Information** page of *AQtrace Packager* is used to specify the parameters needed for creation of the auxiliary **aqReporterInterop.dll** assembly. This settings page is displayed in the Packager window only if you work with a .NET configuration project.

You can specify the following parameters on the Reporter Assembly Information page:

- **Output folder** - Specifies the folder in which the aqReporterInterop.dll assembly will be generated. This assembly is used as a bridge between .NET modules and the unmanaged aqReporter.dll library that implements the Reporter. Using the aqReporterInterop assembly, you can control the Reporter from your .NET assembly, generate and send error reports and perform other operations provided by the Reporter. For more information on this assembly, see *Using AQtrace Reporter in .NET Applications*.

  You can either type the path to the output folder or click the ellipsis button in the box and choose the destination folder in the ensuing Browse for Folder dialog. Note that the *Output folder* parameter is optional and you can omit it. In this case, the aqReporterInterop.dll assembly will be generated in the folder where the opened .NET configuration project resides.

- **ilasm location** - Specifies the folder that contains the ilasm.exe utility. This tool is part of Microsoft .NET Framework and it resides in the folder that contains other modules of Microsoft .NET Framework. AQtrace Packager uses this utility to compile the aqReporterInterop.dll assembly.

  You can either type the path to the ilasm.exe utility or click the ellipsis button in the box and choose the folder in the ensuing Browse for Folder dialog. Note that this parameter is optional and can be omitted. If you do not specify the ilasm.exe location, AQtrace Packager tries to locate automatically the folder with the utility.

  If you have more than one version of Microsoft .NET Framework installed on your computer and you do not specify the ilasm.exe location, AQtrace Packager uses the

ilasm.exe utility from the earliest version of Microsoft .NET Framework installed on the computer. If you want to use a certain version of ilasm.exe, you should specify its location in the **ilasm location** edit box.

- **ilasm parameters** - Specifies additional command-line parameters to be passed to ilasm.exe. For more information on possible command-line parameters of ilasm.exe, see MSDN Library (its on-line version is available at http://msdn.microsoft.com). Note that this setting is optional, too, and you can omit command-line parameters if you do not need them.

Sending Page

Use the **Sending** page of *AQtrace Packager* to specify the desired send mode(s) and parameters which will be used by *AQtrace Reporter* for transferring generated error reports to developers.

The page contains one permanent setting:

- **Send mode** - Specifies one or more transfer protocols for sending error reports. AQtrace Reporter supports several transfer protocols to transmit the error reports to developers. When several protocols are selected, Reporter attempts to use the first protocol in the list, on failure it tries the second and so on. To modify the order of sending modes use the **Move Up** and **Move Down** buttons.

Each of these protocols require some settings needed for transferring the reports. As the supported send modes require different settings, the set of edit boxes on the page which are designed for specifying of transfer protocols' settings are changeable and depend on the selected send mode. For more information on these settings, see *Transfer Protocols' Settings*.

For more information on the supported transfer protocols, see *Selecting Transfer Protocol*.

Product Information Page

Use the **Product Information** page of *AQtrace Packager* to specify information about your product. *AQtrace Reporter* will include this information into the generated error reports.

The page contains the following edit boxes:

- **Product name** - Name of the product, for which reports will be generated.
- **Company name** - Your company's name.
- **Product identifier** - A string that will is an identifier of the product. This value is used by plug-ins and utilities that work with error reports that reside in the report storage.

  To specify the identifier, you can use a GUID. To generate a new guid, press the GUID button.
- **Product version** - Specifies the version number of your product. AQtrace Service and server-side components will use this number along with the product identifier to determine the product version for which the report is generated.

  The version number lets the server-side components to apply different rules to the reports that were generated for different versions of the same project. For instance, you may save them to different folders in your issue-tracking system.

  Typically, you specify only the *major version* of your product in this field. In most cases, this is quite enough for separating the reports' flows. See also *Mapping Products to Issue-Tracking Projects.*

Reporter Behavior Page

Use the **Reporter Behavior** page of *AQtrace Packager* to specify certain aspects of how *AQtrace Reporter* works.

The page contains the following settings:

- **Store reports** - If this check box is selected, AQtrace Reporter will save generated error reports on the end-user's computer. The reports will be stored despite the fact that the end-users click the **Send** or **Don't Send** button in the notification window. The Reporter saves the reports to the folder that is specified by the *Folder* setting (see below).

  If the setting is disabled, the reports are not saved on end-users' computers, they are just sent to the server, if the end-user chooses **Send** in the notification window or they are lost if the user selects **Don't Send**.

- **Folder** - This setting is meaningful only if the **Store reports** check box is selected. It specifies the folder, to which AQtrace Reporter will save the generated report files. It is recommended that you use a relative path for this folder (relative to the module, to which AQtrace Reporter will be added). For instance, you can use the *./Log* string.

  You can either type the desired folder name, or press the ellipsis button and choose the desired folder in the ensuing Browse for Folder dialog.

  To specify the path, you can also use the following variables (the variable name must be enclosed in % symbols):

  - %CURRENT_USER% - A system folder that is used as a repository for current user's files and documents (typically, *C:\Documents and Settings_name*).
  - %CURRENT_USER_APP_DATA% - A system folder that serves as a repository for application data of the current user (typically, *C:\Documents and Settings_name\Application Data*).
  - %ALL_USERS% - A system folder that is used as a common storage for application data for all users (typically, *C:\Documents and Settings\All Users*).
  - %ALL_USERS_APP_DATA% - A system folder containing application data for all users (typically, *C:\Documents and Settings\All Users\Application Data*).
  - %APP_DIR% - Your application's folder.

  You can either type the variable name, or click the **Var** button and choose the desired variable in the subsequent *Select Environment Variable* dialog. Note that variable name must be enclosed in the % symbols.

- **Ignore debugger** - The Reporter "hides" exceptions from the debugger, and this may cause problems when debugging an application in your development tool. So, when AQtrace Reporter starts working, it checks whether the application is running under a debugger. If the debugger is found, then AQtrace Reporter disables itself and remains disabled until the application execution is over (see *Working Under a Debugger*).

  If the setting is disabled (default), then the Reporter will disable itself upon detecting a debugger. If this setting is enabled, AQtrace Reporter will ignore the debugger and will function as it normally would.

Additional Reported Data Page

AQtrace Reporter adds various information to the error reports that it generates: exception code and address, information about threads, call stack and registry data, information about modules and so on (see

Specifying Data to Be Included in Reports). Some of this data is always included in error reports while some of it is included if it is specified by the AQtrace Reporter settings. On the **Additional Reported Data** page of the *AQtrace Packager* you can specify which additional data the AQtrace Reporter will append into the generated error reports.

The page contains the following settings:

- **Last exceptions data** - Specifies whether AQtrace Reporter will collect and report information about exceptions, which occurred earlier in the run than the exception for which the given report was generated. When analyzing error reports with AQtrace Viewer, you can see information about these exceptions in the Viewer's *Last Exceptions* panel.

  AQtrace Reporter includes two more settings that specify how the Reporter collects information about last exceptions:

  - **Save ... last exceptions** - Specifies the number of last exceptions, the information to be saved to the report file. Default: 10. The greater this value, the more data the report file will contain.
  - **Stack size** - Specifies the amount of stack data (in bytes) that will be included into the report for each exception. The more the stack size, the more entries the call stack will contain, but the larger the report file will be. Default: 8192 bytes.

- **Processes information** - Specifies whether AQtrace Reporter will collect and report information about processes that existed in the operating system at the time the exception occurred. The following information is collected for each process:
  - ID of the process
  - The fully-qualified name of the process's executable
  - The name of the user who owns the process

  AQtrace Viewer displays this information on the **Processes** tab in the *Additional Information* panel.

- **Memory information** - Specifies whether AQtrace Reporter will collect and report information about the physical and virtual memory:
  - Memory load
  - Information on swap file size and its usage
  - Information about the total and free physical memory
  - Information about virtual memory
  - Information on the size of the page file and its usage
  - The number of user objects used by the application before the exception occurred
  - The number of GDI objects used by the application before the exception occurred
  - The number of handles used by the application before the exception occurred
  - Information about the amount of physical and virtual memory occupied by the application before the exception occurred

  AQtrace Viewer displays this information on the **Memory** tab in the *Additional Information* panel.

- **OS information** - Specifies whether error reports will contain information about the operating system and CPU(s):
  - Operating system's name
  - Service packs installed on the end-user's computer
  - Operating system's session identifier
  - Names of Windows, System32 and Temp folders

- Information about .NET Framework versions installed on the end-user's computer
- Information about CPU(s)
- Name of the end-user's computer
- Information about the user account, under which the application was executed
- Information about keyboard layouts and languages installed on the end-user's computer

AQtrace Viewer displays this information in the **Operating System** tab in the *Additional Information* panel.

- **Hard drives information** - Specifies whether error reports will contain information on the total and used hard-disk space. AQtrace Viewer displays this information on the **Hard Drives** tab in the *Additional Information* panel.
- **Services information** - Specifies whether AQtrace Reporter will collect information about services that are registered in the operating system. For each service AQtrace Reporter will gather the following data:
  - Service name (the name that identifies the service).
  - Service type: file system driver, driver, and so on. For information on the service type constants, see description of the `QUERY_SERVICE_CONFIG` structure in the MSDN library.
  - Current state of the service (running, paused, stopped and so on).
  - Control codes that service accepts and processes. For information on the service type constants, see description of the `SERVICE_STATUS` structure in the MSDN library.
  - Start type (manual, auto, disabled and so on).
  - Error control (the action which is taken when the service fails to start). For information on the service type constants, see description of the `QUERY_SERVICE_CONFIG` structure in the MSDN library.
  - Fully-qualified name of the service's executable module.
  - User account, under which the service is running.
  - Display name (the string that is displayed in the Services window of the Control Panel).

  AQtrace Viewer displays this information on the **Services** tab in the *Additional Information* panel.
- **Network information** - Specifies whether AQtrace Reporter will report information about the network card and the network settings that are used on the end-user's computer:
  - Host name
  - Domain name
  - DNS servers addresses
  - Information about network cards (name, driver, IP address and default gateway, subnet mask and so on)

  AQtrace Viewer will display this information on the **Network** tab in the *Additional Information* panel.

  Due to certain reasons, AQtrace Reporter cannot obtain this information on Windows NT 4.0 with Service Pack 6 or later. So, the information on the network will not be displayed in AQtrace Viewer if the Reporter generates error reports on this operating system.

- **Privileges information** - If this setting is active, the generated error reports will contain

information about privileges of the user account, under which your application is running when an exception occurs. AQtrace Viewer displays this information on the **Process Privileges** tab in the *Additional Information* panel.

- **Display devices information** - Specifies whether AQtrace Reporter will collect and report information about display devices (monitors) connected to the end-user's computer:
    - Name and description
    - Color resolution
    - Width and height (in pixels)
    - Display orientation
    - Frequency and other settings

  AQtrace Viewer displays this information on the **Display Devices** tab in the *Additional Information* panel.

  > Due to certain reasons, AQtrace Reporter cannot obtain this information on Windows NT 4.0 with Service Pack 6 or later. So, the information about display devices will not be displayed in AQtrace Viewer if the Reporter generates error reports on this operating system.

- **Printers information** - Specifies whether AQtrace Reporter will collect and report information about printers into the error reports. This information includes:
    - The printer's name and description
    - Port
    - Page size and orientation
    - Resolution (dots per inch)
    - Paper source and other settings

  AQtrace Viewer displays this information on the **Printers** tab in the *Additional Information* panel.
- **Installed programs information** - Specifies whether AQtrace Reporter will collect and report information about programs and software updates installed on the end-user's computer. For each program this information includes:
    - Program name
    - Software publisher
    - Version number

  AQtrace Viewer displays this information on the **Installed Programs** tab in the *Additional Information* panel.
- **Event log** - Specifies whether AQtrace Reporter will trace events that occur in the running application and include information about these events into the generated error reports. For each event, the collected information contains:
    - Event description (an event type and some other details specific for a certain event type). For information on the supported event types, see *Event Log Panel*.
    - Identifier of the thread in which the event occurred.
    - Date and time of event's occurrence.

  This information is displayed in the *Event Log* panel of AQtrace Viewer. You can also preview this information on the **Event Log** tab in the *Report Information* dialog that can be invoked from

the *notification window* before sending the report (this window is displayed when an error occurs in the application).

- **Screenshot** - Specifies whether AQtrace Reporter will capture the image of the application's window or the image of the whole screen and add this image to the report file. You can view this image in the *Screenshot* panel of the AQtrace Viewer.

  The captured screenshot contains the image of the mouse pointer, so you can determine which button was clicked or which check box was selected when the exception occurred.

For complete information on the data that is included in error reports, see *Specifying Data to Be Included in Reports*.

Exception Filter Mode Page

AQtrace Reporter detects any exception that occurs in your application, however, it generates error reports for only those exceptions that you select using the Exception Filter pages of *AQtrace Packager*:

- *OS Exceptions*
- *.NET Exceptions*
- *Visual C++ Exceptions*
- *Delphi Exceptions*
- *C++Builder Exceptions*

These pages define the exceptions to be included in the exceptions filter and by using the controls of the **Filter Mode** page you can specify the desired filter mode:

- Normal - In this mode, AQtrace reporter will generate error reports for those exceptions that are selected in the pages of the Exception Filter section.

-- or --

- Inverted - In this mode, AQtrace reporter will generate error reports for all exceptions except for those that are selected in the Exception Filter pages.

For more information on tracing exceptions, see *Specifying Exceptions to Be Traced*.

OS Exceptions Page

On the **OS Exceptions** page of *AQtrace Packager* you can specify the *OS exceptions* that will be included into the *exception filter*. Depending on its settings, *AQtrace Reporter* will trace only those exceptions that included into the filter, or only those exceptions that are not included into the filter (see *Specifying Exceptions to Be Traced*).

The page is visible only for native configuration projects.

The page contains the list of OS exceptions. By default, the list contains the most frequently used OS exceptions. To include a new exception in the list:

1. Press **Add**. This will invoke the **Add OS Exception** dialog.
2. In the dialog, specify the exception's code and description and press **OK**. The exception will be added to the list.
3. Select the **Active** check box for the added exception to indicate that the exception should be added

to the exception filter. AQtrace Reporter will add only those exceptions to the filter whose Active attribute is enabled.

To quickly select or clear the check boxes of all exceptions, press **Select All** or **Unselect All**.

To exclude an exception from the filter temporarily, simply clear the Active check box for this exception.

To delete an exception from the list, choose this exception in the list and press **Remove**.

For more information on tracing exceptions with AQtrace, see *Specifying Exceptions to Be Traced*.

.NET Exceptions Page

On the **.NET Exceptions** page of the *AQtrace Packager*, you can specify which *language exceptions*, defined in your .NET application, will be included into the *exception filter*. Depending on its settings, *AQtrace Reporter* will trace only those exceptions that included into the filter, or only those exceptions that are not included into the filter (see *Specifying Exceptions to Be Traced*).

The page is visible only for .NET configuration projects.

The page contains the list of exception classes. To add an exception class to the filter:

1. Press **Add**. This will display the **Add .NET Exception** dialog.
2. In the dialog, specify the desired class name and press **OK**. The exception class name will be added to the list.

   Note: When specifying the class, use only the class name, do not specify namespaces.

   If the exception type is a pointer, use the asterisk (`*`) after the name. For instance, **`char`** and **`char *`** are treated as different class names.

3. After the class name has been added to the list, select the **Active** check box for it. The Reporter will include only those exceptions into the filter, whose Active attribute is enabled.

To exclude an exception from the filter temporarily, clear the Active check box for this exception.

To remove an exception from the list, choose it in the list and then click **Remove**.

For more information on tracing exceptions with AQtrace, see *Specifying Exceptions to Be Traced*.

Visual C++ Exceptions Page

On the **Visual C++ Exceptions** page of the *AQtrace Packager*, you can specify which *language exceptions*, defined in your Visual C++ application, will be included into the *exception filter*. Depending on its settings, *AQtrace Reporter* will trace only those exceptions that included into the filter, or only those exceptions that are not included into the filter (see *Specifying Exceptions to Be Traced*).

The page is visible only for native configuration projects.

The page contains the list of exception classes. To add an exception class to the filter:

1. Press **Add**. This will display the **Add Visual C++ Exception** dialog.
2. In the dialog, specify the desired class name and press **OK**. The exception class name will be added to the list.

   Note: When specifying the class, use only the class name, do not specify namespaces.

   If the exception type is a pointer, use the asterisk (`*`) after the name. For instance, **`char`** and **`char *`** are treated as different class names.

3. After the class name has been added to the list, select the **Active** check box for it. The Reporter will include only those exceptions into the filter, whose Active attribute is enabled.

To exclude an exception from the filter temporarily, clear the Active check box for this exception.

To remove an exception from the list, choose it in the list and then click **Remove**.

For more information on tracing exceptions with AQtrace, see *Specifying Exceptions to Be Traced.*

Delphi Exceptions Page

On the **Delphi Exceptions** page of *AQtrace Packager*, you can specify which *language exceptions* that are defined in your Delphi application, will be included into the *exception filter*. Depending on its settings, *AQtrace Reporter* will trace only those exceptions that are included in the filter, or only those exceptions that are not included in the filter (see *Specifying Exceptions to Be Traced*).

The page is visible only for native configuration projects.

The page contains the list of exception classes. To add an exception class to the filter:

1. Press **Add**. This will invoke the **Add Delphi Exception** dialog.
2. In the dialog, specify the desired class name and press **OK** to confirm the input. The exception class will be added to the list.

   Note: When specifying the exception class name, only use the class name, do not specify unit names.

3. Select the **Active** check box for the added class. Only the selected exceptions will be included into the exception filter.

To exclude an exception from the filter temporarily, clear the Active check box for this exception.

To remove an exception from the list, choose it in the list and then click **Remove**.

For more information on tracing exceptions with AQtrace, see *Specifying Exceptions to Be Traced*.

C++Builder Exceptions Page

On the **C++Builder Exceptions** page of the *AQtrace Packager*, you can specify which *language exceptions*, defined in your C++Builder application, will be included into the *exception filter*. Depending on its settings, *AQtrace Reporter* will trace only those exceptions that included into the filter, or only those

exceptions that are not included into the filter (see *Specifying Exceptions to Be Traced*).

The page is visible only for native configuration projects.

The page contains the list of exception classes. To add an exception class to the filter:

1. Press **Add**. This will display the **Add C++Builder Exception** dialog.
2. In the dialog, specify the desired class name and press **OK**. The exception class name will be added to the list.

   Note: When specifying the class, use only the class name, do not specify namespaces or unit names.

   If the exception type is a pointer, use the asterisk (`*`) after the name. For instance, **`char`** and **`char *`** are treated as different class names.

3. After the class name has been added to the list, select the **Active** check box for it. The Reporter will include only those exceptions into the filter, whose Active attribute is enabled.

To exclude an exception from the filter temporarily, clear the Active check box for this exception.

To remove an exception from the list, choose it in the list and then click **Remove**.

For more information on tracing exceptions with AQtrace, see *Specifying Exceptions to Be Traced*.

Module Filter Settings Page

On the **Module Filter Settings** page of *AQtrace Packager* you can specify the modules, in which *AQtrace Reporter* will trace exceptions, that is, you can define the *module filter*.

If the **Trace exceptions in all modules** check box is selected, the module filter is off and AQtrace Reporter will trace exceptions in all modules that are loaded into the address space of your application’s process. If the check box is clean, the modules to be traced are defined by the filter.

Using the two radio buttons in the **Custom Filter** section allows you to define the mode, in which the filter functions:

- Normal - In this mode, AQtrace Reporter will generate error reports only for those exceptions that occur in the modules that are included into the list.

-- or --

- Inverted - In this mode, AQtrace Reporter will generate error reports for exceptions that occur in any modules except for those that are included in the list.

Below the radio buttons there is a list of the modules that will be affected by the filter.

Note: When AQtrace Reporter determines whether to handle or ignore the exception, it checks the module names of two topmost functions in the exception’s call stack, that is, the module name of the topmost function and the function that called it. If any of these modules was added to the Module Filter Settings page, then according to the filter mode, the Reporter either skips or processes the exception. For more information on this, see *Specifying Modules to Be Traced*.

To add a module to the list:

- Press **Add**. This will invoke the standard Open File dialog.
- In the dialog, choose the desired module and press **Open**. The module name will be added to the list.

  Note that only the module name is added. The path is ignored.

  Note: If the desired module is not available, type its name and extension into the **File name** box of the Open File dialog and press Open. The module name will be added to the list.

  Do not type the module's path, enter only the file name and extension.

To delete a module from the list, select it in the list and then press **Remove**.

Notification Settings Page

AQtrace Reporter monitors your application's execution on the end-user computer and if an exception occurs, it generates an error report and displays a notification window informing the end-user about the problem. On the **Notification Settings** page of *AQtrace Packager* you can specify whether the Reporter will display the notification window and specify the data and controls to be displayed in the window.

The page contains the following settings:

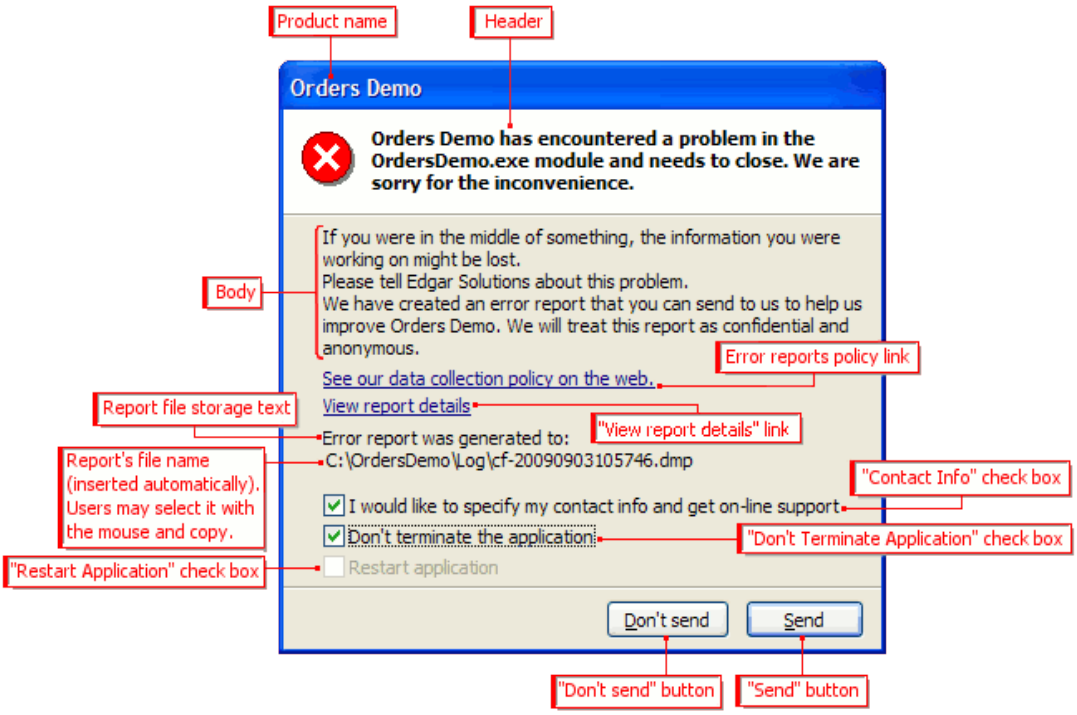
- **Show notification window** - Specifies whether AQtrace Reporter will display the notification window when an exception occurs. If this setting is inactive, the Reporter will send error reports without notifying end-users.
- **Postpone sending reports** - This check box is available only if the *Show notification window* setting is inactive, that is, the *Postpone sending reports* setting is meaningful only when error reports are sent by the Reporter without displaying the notification window. If the check box is selected, AQtrace Reporter does not send generated error reports automatically when an exception occurs. Instead of sending error reports automatically without notifying the user, AQtrace Reporter stores information about the generated report to the Registry and does not send it until the next application run. When the user runs the application next time, AQtrace Reporter shows a message box that informs that some error reports have not been sent to the developers and suggests that the user sends these reports. If the user presses **Yes** in the message box, AQtrace Reporter sends all the reports that have not been sent yet. Otherwise, if **No** is pressed, the reports are not sent and AQtrace Reporter suggests sending them next time the user runs the application.

  If both the *Postpone sending reports* and the *Show notification window* check boxes are clear, AQtrace Reporter sends the generated error report automatically right after an error occurs, without notifying the user.

Other settings specify text and data displayed within the notification window. The settings' values are stored into *configurations*. By selecting a configuration you can quickly modify the values of all the settings. This feature lets you create and quickly change configurations that are specific to certain languages (English, German, French and so on) or configurations that are specific to your products.

The **Configuration** box specifies the active configuration.

The following image illustrates which parts of the window various settings affect:



- **Header** - Specifies the text to be shown in the header part of the window.
- **Body** - Specifies the "body" part of the window's text.

Note: In the *Header*, *Body* and any other setting, you can use the following placeholders:

- **%PRODUCT_NAME%** - The placeholder for the *Product name* value that is specified on the *Product Information* page of AQtrace Packager.
- **%COMPANY_NAME%**- The placeholder for the *Company name* value that is specified on the *Product Information* page of AQtrace Packager.
- **%MODULE_NAME%** - The placeholder for the module name, in which an exception occurred.

- **Error reports policy link**

  Typically, this link opens a web page describing the error reporting policy adopted in your company. This page may contain the following information:

  - Description of why error reports are collected.
  - Explanation of how data is sent and stored.
  - Explanation of what data is collected.
  - Description of who has access to reported data.

  You can find an example of such a page at SmartBear's web site: http://www.smartbear.com/error-reports-policy.

  - **Text** - Specifies the text asking you to view information about the error-report policy. This

text will be displayed as a link that opens the web page specified by the *URL* setting.

  - **URL** - Specifies the URL of the page that is opened when the end-user clicks the link.

- **Report file storage text** - Specifies the text that is displayed one line above the report file name in the notification window.

  Note: The report file name and this text is shown only if the *Store report files* setting of AQtrace Reporter is enabled.

The following three groups are applied to the check boxes that are shown in the notification window:

- **"Contact Info" check box** - This group contains settings applied to the *I would like to specify my contact info…* check box.
- **"Don't Terminate Application" check box** - This group contains settings applied to the *Don't terminate the application* check box.
- **"Restart application" check box** - This group contains settings applied to the *Restart application* check box.

Each of these groups contain the following settings:

- **Text** - Specifies the caption of the check box.
- **Checked** - Specifies the initial state of the check box.

The following two groups are applied to the buttons that are shown at the bottom of the notification window:

- **"Send" button** - The button that "sends" generated reports to the server.
- **"Don't send" button** - The button that closes the notification window without sending any reports.

Both of these groups contain the **Text** setting that specifies the caption of the button. The default captions of these buttons are **Send** and **Don't Send**, respectively. If you do not specify this setting, the corresponding button in the notification window will have the default caption. To specify the accelerator key for the button, place the & symbol before the desired character. For instance, in this string *&Send* the accelerator symbol is *s*. To use the & symbol in the caption, duplicate it (&&).

The following two groups are related to the *Report Information* dialog that displays information to be included into the error report and sent to the developers:

- **"View report details" link** - This group is applied to the link in the notification window that opens the Report Information dialog. The group contains only the **Text** setting. It specifies the text to be displayed as the link in the notification window. The default text for this link is **View report details**, it will be displayed in the notification window if you do not specify this setting.
- **"Report Information" dialog** - This group is applied to the Report Information dialog that is displayed after clicking the **View report details** link in the notification window. The group contains only the **Header** setting that specifies the text to be shown in the header of the dialog. By default, the **Report Information** text is displayed in the header of the dialog. Note that you can use the mentioned above placeholders (`%PRODUCT_NAME%`, `%COMPANY_NAME%` and `%MODULE_NAME%`) to compose the desired text for the dialog's header.

Control DLL Loading Page

AQtrace Reporter can be used to prevent loading of dynamic link libraries and other modules into the

address space of your application (see *Controlling DLL Loading*). On the **Control DLL Loading** page of *AQtrace Packager* you can specify which modules can or should not be loaded into your process.

The list displays information about modules in the following columns:

Column	Description
Name	Specifies the file name and extension of the module.
Version	Specifies the version information of the module (see below).
Action	Specifies whether AQtrace Reporter will block or permit loading of the module.

To add a module to the list

- Press **Add**. This will invoke the standard Open File dialog.
- Select the desired module (or modules) in the dialog and press **Open**.

  Note: If the desired module is not available and you cannot choose it in the dialog, type the module's name in the **File name** edit box and then press Open.

  Only enter the module name and extension. Do not specify the path.

- After pressing Open, the specified module will be added to the list of modules. If you specified an existing module, the Packager will read version information from it and display it in the Version column. If you specified the module that is unavailable to you, the Version column will contain the mask * . * . * . *(see below for information about the masks).

To remove a module from the list

- Choose the desired module or modules in the list (you can use Ctrl- or Shift-click for multiselection).
- Press **Remove**.

To set the version number

If you added an existing module to the list, then AQtrace Packager will read version information from this module and display it in the Version column. If you specified the module that is not available to you, the Version column will contain the string * . * . * . *.

To modify the version number:

- Click the Version cell twice (not a double-click), or select the cell and press F2.
- Type the desired version number.
- Press Enter to confirm the change or Esc to cancel it.

Two notes:

- When typing the version, you must specify all parts of the version number: major, minor, build and private.
- You can use the * wildcard in any part of the version information (this wildcard means that the part corresponds to any number).

Below are examples of valid and invalid version numbers:

1.0.*.* - Valid. Means any build of the version 1.0.

2.*.*.* - Valid. Means any build or minor update of the version 2.

..*.* - Valid. Means any version.

1.5 - Invalid. The build and private parts of the version info are not specified.

2.0.* - Invalid. The fourth (private) part of the version info is not specified.

To change the action

- Click the Action cell twice (not a double-click) or select the cell and press F2.
- Choose the desired action (Allow or Deny) from the drop-down list.
- Press Enter to confirm the change or Esc to cancel it.

To change the module's order in the list

The order of the items in the list is important because it has effect on how AQtrace Reporter searches for the module (see *Controlling DLL Loading*). To change the order:

- Select the desired module in the list.
- Press **Move Up** or **Move Down** to specify the desired position of the module among other items of the list.

AQtrace Report Monitor

AQtrace Report Monitor is a helper utility for *AQtrace Reporter* when it is used with non-interactive processes. AQtrace Report Monitor works on end-user computers and sends error reports generated by the Reporter to your server. The following topics provide detailed information about this AQtrace component.

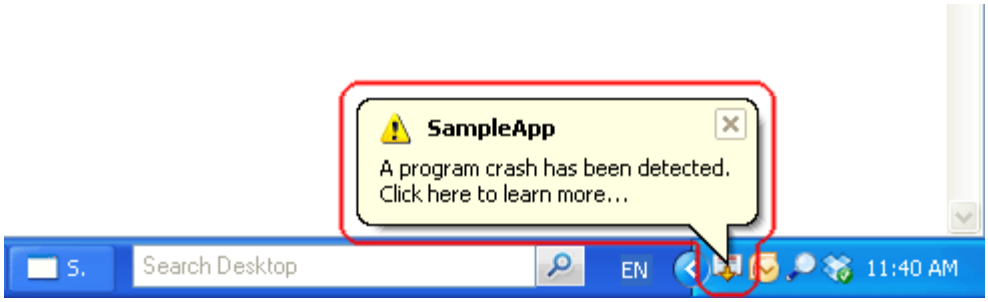
About AQtrace Report Monitor

The AQtrace installation package includes **AQtrace Report Monitor**, which is a helper tool designed to complement *AQtrace Reporter* when it is embedded in non-interactive processes. Such processes are designed to run locally without any human interference. Services are the most typical example of non-interactive processes. See *Using AQtrace With Non-Interactive Processes*.

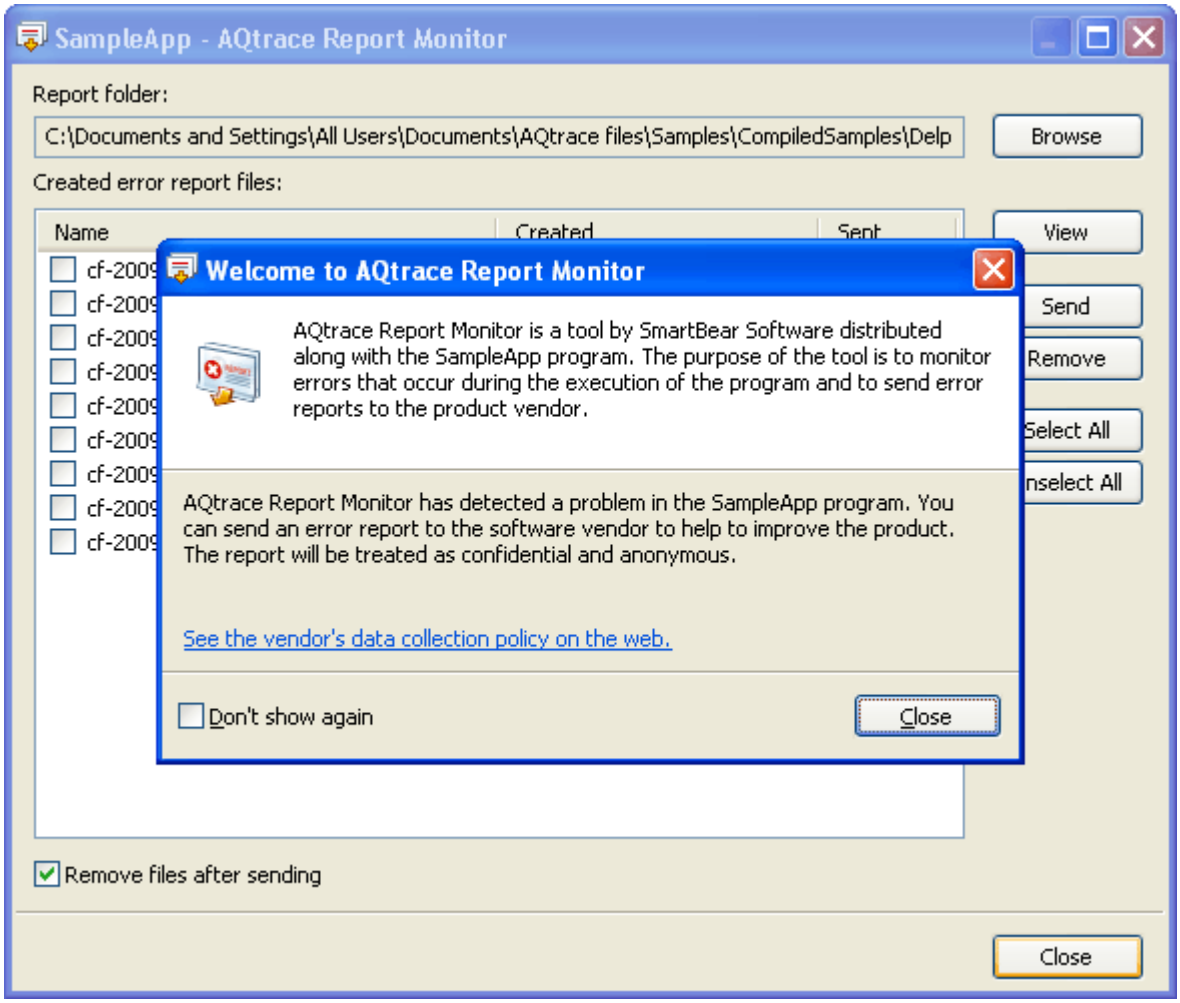
AQtrace Report Monitor is part of *AQtrace SDK*. You can find this utility in the *<AQtrace SDK>\Modules\Common* folder.

When the Reporter is applied to a non-interactive process, it can intercept exceptions and create error reports, but it cannot send these reports to the software developer, as this requires some user actions that are not allowed for non-interactive processes. AQtrace Report Monitor is used to accomplish this task.

AQtrace Report Monitor works on end-user computers along with your application and AQtrace Reporter. The Report Monitor monitors the folder that is specified by its settings. When AQtrace Reporter detects an exception in your application and stores a report file to this folder, the Monitor displays an icon and descriptive hint in the system tray:



By clicking the Monitor's icon, the end user invokes the main window of the utility. Depending on its settings, the utility may display a Welcome dialog that will inform the user that a crash occurred and display a link to a web page that describes the report collecting policy adopted by your company:



In the main window, the end user can view the list of generated reports and send them to you. For more information about this, see *AQtrace Report Monitor Window*.

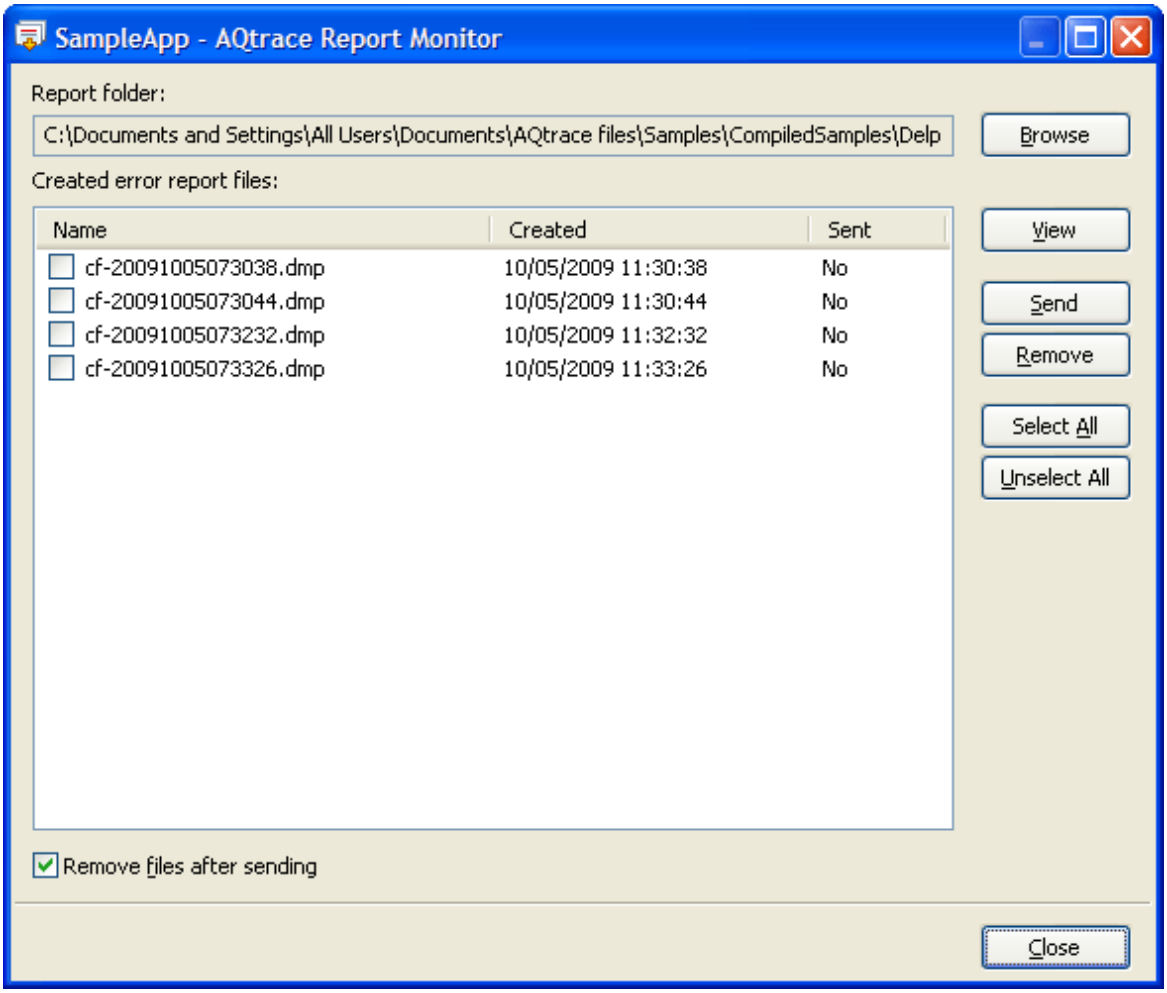
You can change the notification policy and make the Monitor to always display its icon in the tray. See *AQtrace Report Monitor Command Line*.

The AQtrace Report Manager utility is redistributable. You ship it along with the AQtrace Reporter libraries and your application to end users. For more information on this, see *Distributing AQtrace Reporter Libraries*.

You configure AQtrace Report Monitor with the **ReportMonitorSettings.xml** file that contains the Monitor's settings: monitored folder, transmitting protocol(s), report destination and so on. The utility loads this file on start. You must ship this file to end users along with the utility. Before shipping it, you should enter the appropriate settings into the file. For information on the settings, see *Configuring AQtrace Report Monitor*.

AQtrace Report Monitor Window

The *AQtrace Report Monitor* utility monitors error reports file in a folder specified by the utility's *settings*. When a new report file appears in this folder, the utility displays an icon with descriptive hint in the Windows system tray. Clicking the icon invokes the main window of the utility:



The main window shows which folder is currently monitored and lists the error reports that are already in that folder.

To view the contents of a report, choose the report in the list and then click **View**, or simply double-click the report.

The user can select one or more error reports and press the **Send** button to send these reports to the developer. Depending on the **Remove files after sending** option, the reports can either be deleted or left on disk after they are sent.

The **Select All** and **Unselect All** buttons select or deselect all the reports in the list.

The **Remove** button deletes the selected reports without sending.

The ellipses button on the right of the monitored folder's path opens this folder in Windows Explorer.

Pressing **Close** hides the main window of AQtrace Report Monitor, but does not terminate the application itself. To terminate AQtrace Report Monitor, the user should right-click the application's icon in the system tray and select **Exit** from the context menu.

Configuring AQtrace Report Monitor

You configure the behavior of the *AQtrace Report Monitor* by using the **ReportMonitorSettings.xml**

file. The utility loads settings from this file on start. It searches for the file file in two predefined locations: in the folder where the Report Monitor's executable is located and in the *%ALL_USERS_APP_DATA%\SmartBear\AQtrace\2.0* folder. You can also specify a custom path to the settings file with the `/Settings` command-line key. See *AQtrace Report Monitor Command Line* for details.

It is important to specify parameters in the *ReportMonitorSettings.xml* file. This should be done by software developers before the product is shipped to end users. Otherwise, AQtrace Report Monitor will not function properly.

Here is a typical structure of the settings file:

```
[XML]
<AQtraceReportMonitor>
    <Settings>
                        <Prp Name="ProductName" Value="MyProductName"/>
        <Prp Name="MonitoredFolder"
Value="C:\Work\Projects\SmartService\Log\"/>
        <Prp Name="RemoveAfterSending" Value="-1"/>
        <Prp Name="ReportPolicyUrl"
Value="www.MyCompany.com/error_reports_policy.asp"/>
        <Prp Name="ShowWelcomeDialog" Value="-1"/>
    </Settings>
    <Protocols>
        <Protocol Name="HTTP">
            <Prp Name="Server" Value="localhost"/>
            <Prp Name="Port" Value="80"/>
            <Prp Name="Page" Value="\AQtrace\bugreport.asp"/>
            <Prp Name="User" Value=""/>
            <Prp Name="Password" Value=""/>
        </Protocol>
        <Protocol Name="HTTPS">
            <Prp Name="Server" Value="localhost"/>
            <Prp Name="Port" Value="443"/>
            <Prp Name="Page" Value="\AQtrace\bugreport.asp"/>
            <Prp Name="User" Value=""/>
            <Prp Name="Password" Value=""/>
        </Protocol>
        <Protocol Name="TFTP">
            <Prp Name="Server" Value="localhost"/>
            <Prp Name="Port" Value="69"/>
            <Prp Name="Directory" Value="MyReports"/>
        </Protocol>
        <Protocol Name="FTP">
            <Prp Name="Server" Value="localhost"/>
```

```
            <Prp Name="Port" Value="21"/>
            <Prp Name="Directory" Value="MyReports"/>
            <Prp Name="User" Value=""/>
            <Prp Name="Password" Value=""/>
        </Protocol>
        <Protocol Name="EMAIL">
            <Prp Name="Subject" Value="Error report"/>
            <Prp Name="Body" Value="Hi! Your application has crashed.
See the error report in the attachment."/>
            <Prp Name="Address" Value="reports@mycompany.com"/>
        </Protocol>
        <Protocol Name="SMTP">
            <Prp Name="Subject" Value="Error report"/>
            <Prp Name="Body" Value="Hi! Your application has crashed.
See the error report in the attachment."/>
            <Prp Name="Address" Value="reports@mycompany.com"/>
            <Prp Name="From" Value="user@mycompany.com"/>
            <Prp Name="Server" Value="smtpserver"/>
            <Prp Name="Port" Value="25"/>
            <Prp Name="User" Value=""/>
            <Prp Name="Password" Value=""/>
        </Protocol>
    </Protocols>
    <Dumps>
        <Prp Name="cf-20090422180507.dmp" Value="0"/>
        <Prp Name="cf-20090423144423.dmp" Value="0"/>
        <Prp Name="cf-20090506172928.dmp" Value="0"/>
    </Dumps>
</AQtraceReportMonitor>
```

The root element of the description file is `AQtraceReportMonitor`. It serves as a package for the other parameters and contains three sections: `Settings`, `Protocols` and `Dumps`. Each individual setting is described by the `Prp` tag. It has the `Name` and `Value` attributes that hold the setting name and current value respectively.

Now we will describe each element of the section.

- **Settings**

  This section contains general parameters for AQtrace Report Monitor.

Name	Value	Description
ProductName	The name of your	This name is displayed in the title of the dialog

Name	Value	Description
	product.	window that is shown in AQtrace Report Monitor and in the hint that appear over the Report Monitor's icon in the system tray.
MonitoredFolder	The full path to a folder.	Denotes the path to the folder that should be monitored by the utility.
RemoveAfterSending	Either 0 or -1.	Specifies whether to retain error reports (0), or to delete them (-1) after sending.
ReportPolicyUrl	URL of the web page.	Specifies the address of the web page that describes the concepts of the error-reporting policy adopted by your company. This address is used for the link that is shown in the Welcome dialog of the utility.
ShowWelcomeDialog	Either 0 or -1.	Specifies whether the utility displays the Welcome dialog (-1) or not (0).

- **Protocols**

  This section describes the possible ways of sending reports to the developer. It contains from 1 to 6 `Protocol` subsections, each describing a separate transmission protocol to be used. The protocol settings are analogous to the properties of the Packager's *Sending Page* when the appropriate protocol is selected. Read *Transferring Reports* for more information.

  Note: The Report Monitor uses the transmission protocol settings defined in the *ReportMonitorSettings.xml* file. It ignores the transmission protocol settings embedded in the library or executable file by *AQtrace Packager*.

  When more than one protocol are given, the Report Monitor tries to send reports using the first protocol in the list, if it fails, then the utility tries to use the second protocol in the list and so on. Thus, you can define several alternative ways of sending data.

  HTTP

  Lists the settings to be used for sending error reports via Hypertext Transfer Protocol (HTTP). (See *HTTP Settings*.)

Name	Value	Description
Server	A server name or an IP address.	Specifies the domain name or IP address of the web server to which error reports will be sent.
Port	A port number. The default value is 80.	Specifies the TCP port number that will be used for transmission.
Page	A string with a page address.	Specifies the name and path of the .asp page that will receive error reports.

Name	Value	Description
User	A user account name.	Specifies the user account that is used to access the Report Collector's server and virtual directory. This parameter is not required and it can be omitted if the specified virtual directory on the server allows anonymous access.
Password	A password string.	Specifies the password for the user account that is used to access the Report Collector's server and virtual directory. This parameter is not required and it can be omitted if the specified virtual directory on the server allows anonymous access.

HTTPS

Lists the settings to be used for sending error reports via Secure Hypertext Transfer Protocol (HTTPS). (See *HTTPS Settings*.)

Name	Value	Description
Server	A server name or an IP address.	Specifies the domain name or IP address of the web server to which error reports will be sent.
Port	A port number. The default value is 443.	Specifies the TCP port number that will be used for transmission.
Page	A string with a page address.	Specifies the name and path of the .asp page that will receive error reports.
User	A user account name.	Specifies the user account that is used to access the Report Collector's server and virtual directory. This parameter is not required and it can be omitted if the specified virtual directory on the server allows anonymous access.
Password	A password string.	Specifies the password for the user account that is used to access the Report Collector's server and virtual directory. This parameter is not required and it can be omitted if the specified virtual directory on the server allows anonymous access.

TFTP

Lists the settings to be used for sending error reports via Trivial File Transfer Protocol (TFTP). (See *TFTP Settings*.)

Name	Value	Description
Server	A server name or an IP address.	Specifies the domain name or IP address of the TFTP server to which error reports will be sent.

Name	Value	Description
Port	A port number. The default value is 69.	Specifies the UDP port number that will be used for transmission.
Directory	A string with a directory address.	Specifies the directory on the TFTP server in which error reports will be placed.

FTP

Lists the settings to be used for sending error reports via File Transfer Protocol (FTP). (See *FTP Settings*.)

Name	Value	Description
Server	A server name or an IP address.	Specifies the domain name or IP address of the FTP server to which error reports will be sent.
Port	A port number. The default value is 21.	Specifies the TCP port number that will be used for transmission.
Directory	A string with a directory address.	Specifies the directory on the FTP server in which error reports will be placed.
User	A user account name.	Specifies the user account that is used to access the server. This parameter is not required and it can be omitted if the server allows anonymous access.
Password	A password string.	Specifies the password for the user account that is used to access the server. This parameter is not required and it can be omitted if the server allows anonymous access.

EMAIL

Lists the settings to be used for sending error reports via the default e-mail client. (See *E-mail Settings*.)

Name	Value	Description
Subject	Arbitrary string.	Specifies the Subject field of the e-mail message that will be sent.
Body	Arbitrary string.	Specifies the body of the e-mail message. This is the main text of the message.
Address	An e-mail address.	Specifies the destination e-mail address to which the message with the attached error report will be sent.

SMTP

Lists the settings to be used for sending error reports via Simple Mail Transfer Protocol (SMTP). (See *SMTP Settings*.)

Name	Value	Description
Subject	Arbitrary string.	Specifies the Subject field of the e-mail message that will be sent.
Body	Arbitrary string.	Specifies the body of the e-mail message. This is the main text of the message.
Address	An e-mail address.	Specifies the destination e-mail address to which the message with the attached error report will be sent.
From	An e-mail address.	Specifies the From field of the e-mail message.
Server	A server name or an IP address.	Specifies the domain name or IP address of the outgoing SMTP server from which the e-mail message should be sent.
Port	A port number. The default value is 25.	Specifies the TCP port number that will be used for the SMTP protocol transmission.
User	A user account name.	Specifies the user account name on the specified SMTP server. This name is the string before the @ symbol in the full e-mail address.
Password	A password string.	Specifies the e-mail account's password.

- **Dumps**

  This section lists the error reports that currently reside in the monitored folder. This section serves for helper purposes. The Report Monitor creates and maintains this section automatically. It is not recommended to modify it manually.

Thus, before shipping AQtrace Report Monitor and the *ReportMonitorSettings.xml* file to end users, the developer should specify a value in the `MonitoredFolder` property and specify at least one transmission protocol.

AQtrace Report Monitor Command Line

The executable file of *AQtrace Report Monitor* (*AQtraceReportMonitor.exe*) can accept two command-line arguments that affect its behavior on end-users' machines:

```
AQtraceReportMonitor.exe [/AlwaysShowIcon] [/Settings Path]
```

Both arguments are optional. Here are their meanings:

/AlwaysShowIcon

Makes the Report Monitor display its icon in the system tray even in the idle state. By default, the Monitor reveals its icon only when a new error report is created.

/Settings Path

Commands the Report Monitor to read the initial settings from the specified file rather than from the *ReportMonitorSettings.xml* file. The *Path* parameter specifies the fully-qualified name of the desired file. For example:

```
AQtraceReportMonitor.exe
/Settings"C:\MySettings\MyReportMonitorSettings.xml"
```

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Server-Side Components

Report Collector

Report Collector - Description

Report Collector is an AQtrace component that runs on the server and receives the error reports which are generated by *AQtrace Reporter* and sent via HTTP or HTTPS transfer protocols. The Collector can then either store received reports or re-send them to another server.

Report Collector is a simple application that consists of several .asp pages. One of these pages acts as the "main" page: it contains code that receives reports and either saves or re-sends them. Other pages perform helper tasks.

Report Collector is included into the AQtrace installation package. It is installed when you select the *"Receive error reports and manage the storage of your binary modules"* installation type and check the **Report Collector (.asp page)** item on the **Select Server-Side Components** page of the AQtrace installation wizard. By default, the pages are installed to the *<AQtrace>\Bin\ASP* folder.

To install the pages, Internet Information Services (IIS) ver. 5.0 - 7.5 must be installed on the server computer.

The name of the "main" page is *bugreport.asp*. During AQtrace installation you can specify the virtual folder, to which the page will be installed. By default, the virtual folder is *AQtrace*. So, by default the relative-to-server address of the Report Collector's .asp page is --

```
/AQtrace/bugreport.asp
```

You can change the page name as well as the virtual folder's name any time later by using the dialogs of Internet Information Services.

As we have said, Report Collector can process the received reports in one of the following ways:

- It can save reports to the initial storage for further processing and analysis.
- It can relay reports to another URL. For more information on this, see *Report Relaying*.

You specify the Collector's behavior and settings during the AQtrace installation. To modify them, you can either re-install AQtrace or use the *Report Collector Settings* page of the *AQtrace Server Config* utility. For detailed information on the settings, see *description of the Report Collector Settings page*.

The entire operation of receiving error reports includes the following steps:

1. The Collector receives report files and saves them to the *TEMP* subfolder of the folder specified by the Collector's *Initial storage folder* setting.
2. If the *Relay received reports* setting is disabled, the Collector creates a new subfolder having the GUID-like name and moves the report files from *TEMP* folder to that folder. Afterwards that

folder is processed by *AQtrace Service*.

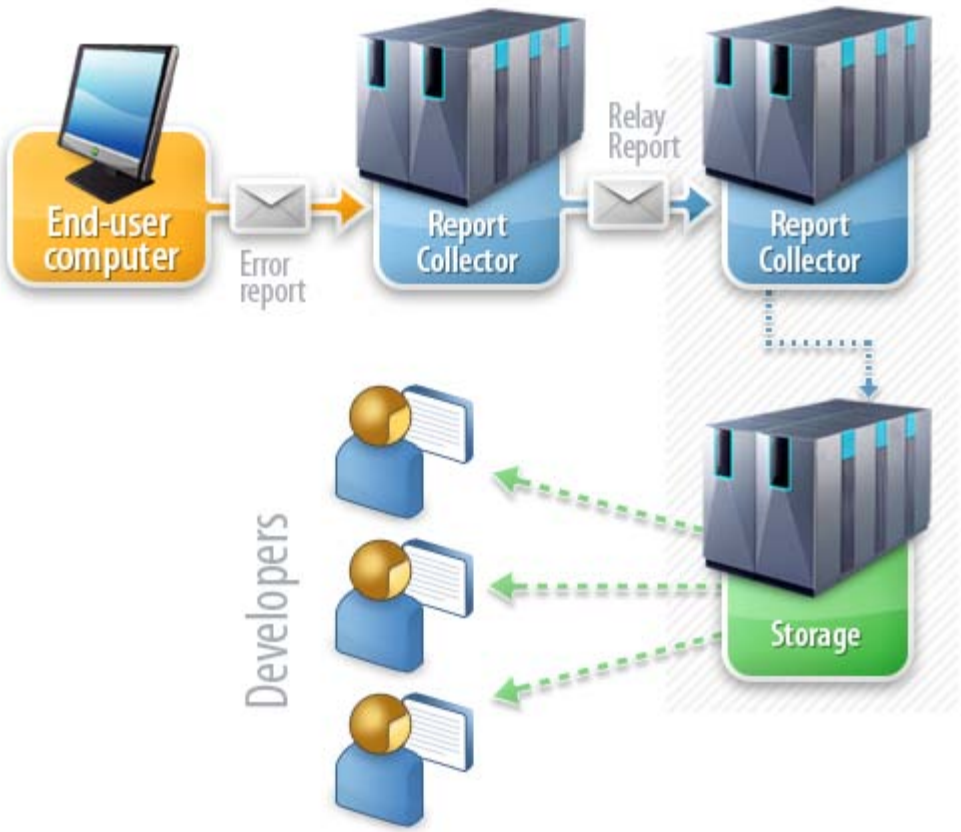
3. If *Relay received reports* setting is enabled, the Collector forwards the report to the address specified by the *Relay to URL* setting.
4. If the relaying fails, the Collector attempts to re-send the report. The number of attempts is specified by the *Number of sending attempts* setting (by default, 10).
5. If all re-sending attempts failed, the report is moved to the *TEMP\UnsentData* subfolder.

   The report will reside in this folder unless the Report Collector succeeds in forwarding any other report to the server. In this case it attempts to re-send all the reports from this folder. On success, the reports are moved to another server; on failure they remain in the *TEMP\UnsentData* folder.

Report Relaying

The *Report Collector* can either store error reports for processing and analysis, or it can relay them to another URL. Report relaying is useful if the developers do not have access to the server that receives the reports. This may happen, for instance, in organizations that use DMZ[2] zones for security. In this case, end-users send error reports to an external server that exchanges data with the local network computer, which the developers can access.

[2]DMZ zone is a short name for **demilitarized zone** (also known as **demarcation zone** or **perimeter network**). To defend local networks from outside attacks, some organizations separate the servers that work with global networks from the local network. Employees do not connect to global servers directly from a local network. They do this through a special gateway. So, only the gateway computer can exchange data with an “external” server.



You can use any number of relaying pages.

The Report Collector shipped with AQtrace can function in both ways. That is, it can both store and relay error reports. You can define the Collector's behavior during the AQtrace installation. You can also change the page's behavior any time later. To do this, use the settings displayed on the *Report Collector Settings* page of the *AQtrace Server Config* utility. To activate the relay mode:

- Launch AQtrace Server Config (the file *<AQtrace>\Bin\AQtraceServerConfig.exe*) and activate the **Report Collector | Report Collector Settings** page.
- Select the **Relay received reports** check box.
- Specify the name or IP address of the destination server in the **Server name or IP address** edit box.

  The server address should not contain the protocol name, that is, it should not contain the *http://* prefix.
- Specify the virtual directory and name of the .asp page, to which reports will be forwarded, in the **Report Collector (.asp page)** edit box.

  By default, the AQtrace installation program uses the */AQtrace/bugreport.asp* name for Report Collector, so you can enter this value into the **Report Collector (.asp page)** edit box.
- In the **Port** box specify the port on the destination computer, to which the reports will be relayed.

  By default, AQtrace uses the port 80 for sending reports. However, this port may be closed for some security reasons. So, by using the Port edit box, you may specify the other port that is open on the server computer for the incoming HTTP traffic.

- Specify the number of re-sending attempts in the **Number of sending attempts** box (see below). By default, it is 10.

After Report Collector receives an error report, it saves it to the *TEMP* subfolder of the folder that is specified by the **Initial storage folder** setting (for information about initial storage, see *AQtrace Components, Terms and Concepts*). Then, Report Collector attempts to relay the report to another URL. If the attempt fails, the Collector tries to re-send the report again. The number of attempts is specified by *Number of sending attempts* setting.

If all attempts failed, Report Collector moves the error report in the *TEMP\UnsentData* subfolder. The reports in this folder are stored unless the Report Collector forwards some other report successfully. In this case it also attempts to re-send all the reports from the *TEMP\UnsentData* subfolder.

AQtrace Service

AQtrace Service - Description

AQtrace Service is an executable that runs as an operating system service on the server computer. AQtrace Service monitors the folder changes in the ***initial storage folder*** and when a new report arrives, it analyzes it, marks as duplicated (if needed) and moves the report to the *persistent storage folder*. The initial storage folder is used to temporaly keep the received reports before they are sorted out. The reports received via HTTP and HTTPS are stored to this folder automatically. Besides, you can configure the FTP server to use the initial storage folder, too.

Some important notes on AQtrace service:

1. Emphasize the fact that the Service monitors folder changes rather than file changes. It will react on folder events (creation, renaming and others) but not on file events.
2. In order for AQtrace Service to be able to start and function properly, you must specify the initial and persistent storage paths in the Service's folder. If these folders are not specified, the Service does not start.
3. AQtrace Service must have read and write permissions for the folders.

Service File Name

The service file name is *AQtraceService.exe*. The installation program copies this file to the *<AQtrace>\Bin* folder.

Starting, Stopping and Pausing the Service

The AQtraceService executable works as an operating system's service. It is configured to start automatically when the computer starts.

You can control the Service, that is, stop, start, pause and resume it, by using the operating system's **Control Panel | Administrative Tools | Services** window.

Detecting Duplicated Reports

It is possible that you will receive error reports that were caused by the same error but on different end-

users' computers. These reports are called **duplicated**, because they were caused by the same error.

To determine whether the report is a duplicated one, AQtrace Service parses the call stack data included in this reports and checks the call addresses. If all the addresses coincide with the addresses of another report that was received earlier, AQtrace Service marks the recent error report as duplicated. Then the Service moves the report to the persistent storage (that is, the duplicated reports are not deleted or remain in the initial storage. They are moved to the persistent storage).

AQtrace Service Settings

In order for AQtrace Service to function properly, it needs access to the initial and persistent storage folders. You specify path to these folders using the *AQtrace Service Settings* page of the *AQtrace Server Config* utility.

You must specify these settings before AQtrace Service starts. If the folders are not specified, the Service does not start.

Besides access to the initial and persistent storage folders, the Service also needs access to the binary code of modules mentioned in the error report and to the debug information of these modules (AQtrace Service needs these modules to parse the call stack data properly). You specify the path to the modules and debug info in the *AQtrace Service Settings* of the AQtrace Server Config utility. See *Configuring AQtrace Service* for more information on this.

Configuring AQtrace Service

In order for *AQtrace Service* to be able to start and function properly, you should specify the initial and persistent storage folders for the Service. Also, the Service must know the path to the binary modules and debug information files of your application. You modify the Service's settings by using the *AQtrace Server Config* utility.

Initial and Persistent Storage Folders

To specify paths to the storage folders, you use the *Common Settings* and *AQtrace Service Settings* pages of the *AQtrace Server Config* utility:

- To specify the initial storage folder, use the **Initial storage folder** edit box on the *Common Settings* page.
- To specify the persistent storage folder, use the **Persistent storage folder** setting on *AQtrace Service Settings* page.

  The page is disabled until you specify the initial storage folder and the build storage file name on the Common Settings page and press **Apply** to commit the changes.

Note: AQtrace Service will not start if the initial and persistent storage folders are not specified.

AQtrace Service must have the read and write permissions for these folders.

Path to Binary Modules and Debug Information

When parsing the call stack data, AQtrace Service analyzes the binary code of modules mentioned in the report. The modules are not included in the report, so to perform the analysis, AQtrace Service searches for the module in your *build storage* that contains the binary modules and debug information files of your

application. So, specifying the path to these files and modules is important for the Service. Without this information, it will be unable to parse the call stack data and detect duplicated reports (see *Detecting Duplicated Reports*).

To search for a binary module, the Service uses the module's file name (file name and extension) and the version information mentioned in the report. The version information is important because it lets AQtrace Service distinguish the modules used in different builds of your application. The Service assumes that the debug information is either included into the binary module, or that the debug information file resides in the same folder, in which the binary module is located.

So, it is important to specify the path to the build storage for the AQtrace Service (that is, the path to the binary modules and debug information files). You do this on the *Common Settings* page of the *AQtrace Server Config* utility by using the following option:

- **Build storage file name** - The fully-qualified name of the configuration file that contains information about the modules added to the build storage. You create this file using special *AQtrace Module Store* utility. Later, the file should be updated every time a new build is shipped to end-users. You can update it manually via the *AQtrace Module Store* utility, or automaticaly via the *AQtrace Module Store Agent* service.

On the *AQtrace Service Settings* page of the *AQtrace Server Config* utility, you can find two additional settings that concern modules and debug information files used by AQtrace Service:

- **Symbols path** and **Cache symbols directory** - These settings specify location of those modules and debug info files that are not included in your build storage, but reside on some other computers or on the Web (for instance, debug information files for the operating system's libraries reside on Microsoft's Web site).

  Using the **Symbols path** list you specify the locations, in which AQtrace Service will search for the modules and debug information. To add a search location, click **Add** and then type the desired address into the ensuing in-place editor. Confirm the change with Enter.

  The **Cache symbols directory** setting specifies the folder on your computer, in which the downloaded modules and files will reside. AQtrace Service will search for the module in the cache folder first and if the module is not found there, it will download it from the locations specified in the Symbols path list.

AQtrace Server Config

AQtrace Server Config is a special utility that is used to configure settings of three AQtrace server-side components: *Report Collector*, *AQtrace Service* and *AQtrace Module Store Agent*.

The utility is installed if you select one of the following features on the **Select Server-Side Components** page in AQtrace's installation wizard (this page is displayed only if you select the *Receive error reports and manage the storage of your binary modules* option on the **Select AQtrace Components** page of the wizard):

- Report Collector (.asp page)
- AQtrace Service Files and Modules | AQtrace Service
- AQtrace Service Files and Modules | AQtrace Module Store Agent

The utility's file name is *AQtraceServerConfig.exe*. You can find it in the *<AQtrace>\Bin* folder.

The following topics provide detailed information on settings pages of AQtrace Server Config.

Note: The Report Collector Settings, AQtrace Service Settings and AQtrace Module Store Agent Settings pages become available after you specify an existing folder in the *Initial storage folder* edit box and an existing configuration file in the *Build storage file name* edit box on the Common Settings page and apply the changes.

Common Settings Page

Use the **Common Settings** page of the *AQtrace Server Config* utility to specify settings that are common for the server-side components. To display the page, select **Common Settings** from the menu on the left of the AQtrace Server Config window.

Currently, the page contains the following settings:

- **Initial storage folder** - The fully-qualified name of the folder that will be used as the *initial report storage*. The *Report Collector* saves the received error reports to this folder and then *AQtrace Service* analyzes these files and moves them to the *persistent storage folder*.

  You can either type the desired folder or press the ellipsis button and choose one in the ensuing Browse for Folder dialog.

- **Build storage file name** - The fully-qualified name of the file that contains information about binary modules and debug information files added to the *build storage*. The file contains the modules' names, fully-qualified paths and version numbers.

  You generate and modify this file by using the *AQtrace Module Store* utility that is shipped along with AQtrace. You can find the utility in the *<AQtrace>\Bin* folder. To call this utility directly from AQtrace Server Config, press the **Edit** button in the **Build storage file name** edit box.

  If the build storage configuration file already exists, you can either type its name in the **Build storage file name** edit box or press the ellipsis button and choose the file in the ensuing Open File dialog.

  For more information on specifying the path to the build storage, see *Configuring AQtrace Service*.

If the settings are invalid, you cannot switch to the Report Collector Settings, AQtrace Service Settings or AQtrace Module Store Agent Settings page of AQtrace Server Config. Specify the correct settings and press **Apply** to be able to specify other settings of the server-side components.

Notes:

- The *Initial storage folder* setting is critical for *Report Collector* and *AQtrace Service*. If this setting is empty or if the specified folder does not exist, the Collector and the Service will not function properly.
- The *Build storage file name* setting is critical for AQtrace Service, *AQtrace Module Store Agent* and *AQtrace Viewer*. Therefore, you must specify an existing file in this setting.
- The initial storage folder can reside on the computer where Report Collector or AQtrace Service is installed, or on any other workstation in the network. That is, you can specify both local and network paths (for instance, *C:\Error Reports\Initial* or *\\Server\Error Reports\InitialFolder*).
- The build storage configuration file can reside on the computer where AQtrace Service, AQtrace Module Store Agent or AQtrace Viewer are installed, or on any other workstation on the network. So, you can specify both local and network paths to the configuration file (for instance, *C:\Build Storage\Config.xml* or *\\Server\Build Storage\Config.xml*).
- Both Report Collector and AQtrace Service must have the read and write permissions for the

initial storage folder.

- The initial storage folder cannot coincide with the persistent storage folder.

Report Collector Settings Page

Use the **Report Collector Settings** page of the *AQtrace Server Config* utility to view and modify settings of AQtrace's *Report Collector* server-side component that receives error reports. To display the page, select **Report Collector Settings** from the menu on the left of the AQtrace Server Config window. Note that the page is disabled until you specify an existing folder in the *Initial storage folder* setting on the *Common Settings* page and apply your changes.

The Report Collector Settings page contains the following settings:

- **Initial storage folder** - Denotes the fully-qualified path to the *initial storage folder* to maintain. This path is specified on the *Common Settings* page of AQtrace Server Config. Report Collector receives error reports and saves them to the initial storage folder, no matter whether the reports will be stored or relayed (see below for more information on report relaying).

  Report Collector needs read and write permissions for the initial storage folder.

- **Relay received reports** - Report Collector can either store received error reports to the initial storage folder or re-send them to another URL. If this setting is enabled, the Collector will relay the received reports to the URL, specified by the following settings:

  - **Server name or IP address** - This setting is meaningful only if the *Relay received reports* setting is enabled. It specifies the name or IP address of the server to which error reports will be relayed.

    Note: The specified value must not contain the protocol name, that is, it must not contain the *http://* prefix.

  - **Report Collector (.asp page)** - This setting is meaningful only if the *Relay received reports* setting is enabled. It specifies the virtual directory and name of the .asp page, to which reports will be forwarded. By default, the AQtrace installation program uses the following directory and name:

    ```
    /AQtrace/bugreport.asp
    ```

    So, you can specify this string into the **Report Collector (.asp page)** field.

  - **Port** - This setting is meaningful only if the *Relay received reports* setting is enabled. It specifies the port on the destination computer, to which reports will be relayed.

  - **Number of sending attempts** - This setting is used only if Report Collector functions in relay mode. If the relay of a report fails, the Collector attempts to send the report once again. This setting specifies the number of *relaying attempts*. Default: 10.

  - **User name** - This setting is meaningful only if the *Relay received reports* setting is enabled. It specifies the user account that is used to access the server and virtual directory. This parameter is not required and it can be omitted if the specified virtual directory on the server allows anonymous access.

  - **Password** - This setting is used only if the *Relay received reports* setting is enabled. It specifies the password for the user account that is used to access the server and virtual directory. This parameter is not required and it can be omitted if the specified virtual directory on the server allows anonymous access.

- **Log file name** - Specifies the name of the file, to which Report Collector will save information about the processed reports.

To save your changes, press **Apply** at the bottom of the AQtrace Server Config window.

AQtrace Service Settings Page

Use the **AQtrace Service Settings** page of the *AQtrace Server Config* utility to view and modify settings of *AQtrace Service* (the AQtrace component that performs initial processing of received error reports).

To display the page, select **AQtrace Service Settings** from the menu on the left of AQtrace Server Config's window. Note that the page is disabled until you specify an existing folder in the *Initial storage folder* and *Build storage file name* settings on the *Common Settings* page and apply the changes.

The AQtrace Service Settings page contains the following settings:

- **Initial storage folder** - Denotes the fully-qualified path to the *initial storage folder* to maintain. This path is specified on the *Common Settings* page of AQtrace Server Config. AQtrace Service monitors the contents of the initial storage folder and when new reports, which are received by *Report Collector*, arrive in the folder, AQtrace Service moves them to the *persistent storage*.

  AQtrace Service needs read and write permissions for the initial storage folder.

- **Build storage file name** - Denotes the fully-qualified name of the *build storage* configuration file to maintain. This file name is specified on the *Common Settings* page of AQtrace Server Config. The build storage configuration file contains information about binary modules and debug information files added to the *build storage*, their paths and version numbers.

  This setting should point to an existing build storage configuration file. To create such a file, use the *AQtrace Module Store* utility.

- **Persistent storage folder** - The fully-qualified name of the *persistent storage folder*.

  Notes:

  - The persistent storage folder cannot coincide with the initial storage folder.
  - The persistent storage folder may reside on the computer where AQtrace Service is installed, or on any other workstation on the network. That is, you can specify both local and networks paths (for instance, *C:\Error Reports\Storage* or *\\Server\Error Reports\Store*).
  - AQtrace Service needs read and write permissions for the persistent storage folder.
  - It is recommended to share the persistent storage folder, so that your team members can access the folder and analyze error reports on other workstations.

- **Symbols path** and **Cache symbols directory** - Using the *Symbols path* setting you can specify path to the binary modules and debug information files that cannot be found in the build storage. These modules or files can be located on your computer or somewhere in local network or Web. In the last case, AQtrace Service will download the modules to the folder specified by the *Cache symbols directory* setting and then use the downloaded modules for work.

To save your changes, press **Apply** at the bottom of the AQtrace Server Config window.

AQtrace Module Store Agent Settings Page

Use the **AQtrace Module Store Agent Settings** page of the *AQtrace Server Config* utility to view and modify settings of the *AQtrace Module Store Agent*. The AQtrace Module Store Agent is a service that monitors adding and removing files to or from the *build storage* folder(s) and automatically updates the build

storage configuration file.

To display the page, select **AQtrace Module Store Agent Settings** from the menu on the left of AQtrace Server Config's window.

The AQtrace Module Store Agent Settings page contains the following settings:

- **Build storage file name** - Denotes the fully-qualified name of the build storage configuration file to maintain. This file name is specified on the *Common Settings* page of AQtrace Server Config. The build storage configuration file contains information about binary modules and debug information files added to the *build storage*, their paths and version numbers.

  This setting should point to an existing build storage configuration file. To create such a file, use the *AQtrace Module Store* utility.

  Note: The Agent gains exclusive access to the specified configuration file, therefore, the attempts to modify the same configuration file manually (using the AQtrace Module Store utility) will fail unless the Agent is stopped.

- **Module storage folder path list** - Lists one or more folders to be monitored by the Agent. If the specified folder contains subfolders, they are monitored as well.

  When a new binary module or debug information file appears in a listed folder, the Agent automatically appends a new item to the build storage configuration file. Likewise, when a binary module or debug information file is deleted from a listed folder, the appropriate item is automatically removed from the configuration file.

- **Update interval** - Defines the time interval (in minutes) in which the Agent will check the specified folders for changes. If the option is 0, the folders are being monitored permanently.

To save your changes, press **Apply** at the bottom of the AQtrace Server Config window.

Issue-Tracking Plug-Ins

About

The AQtrace installation package includes specific modules that add received error reports to issue-tracking systems. Currently, AQtrace supports the following issue trackers:

- Microsoft Visual Studio Team System
- Mozilla Foundation Bugzilla
- Atlassian JIRA
- SmartBear ALMComplete

Note: AQtrace also supports the AQdevTeam issue-tracking system. AQdevTeam is no longer developed by AutomatedQA. The integration with it is supported for backward compatibility.

How the Plug-Ins Work

The issue-tracking plug-ins **work on the computer, on which *AQtrace Service* is running**. The plug-ins connect to the Service and request information about error reports that have been received over a period of time. For each new report, the plug-ins automatically create a work item in the issue-tracking system, fill the item's fields and attach the report file to the item.

Bugzilla Support Plug-In

The AQtrace package includes the **Bugzilla Support** plug-in. This plug-in is installed on the computer, on which *AQtrace Service* resides.The plug-in monitors new error reports that arrive to the *persistent report storage* and creates new bug reports in a Bugzilla database on the base of these error reports.

The plug-in's file name is *<AQtrace>\Bin\Report2Issue.exe*. This file also contains the Team System Support, JIRA Support, ALMComplete Support and AQdevTeam Support plug-ins, and is used to configure the plug-ins.

Requirements

The plug-in must reside on the computer, on which *AQtrace Service* is located. Also, in order for the plug-in to be able to work with error reports, AQtrace Service must be running. No more additional software is required.

Supported Bugzilla Versions

The plug-in supports Bugzilla version 3.0.3 and 3.1.3.

Configuring the Plug-In

In order for the plug-in to function properly, you should configure its settings. This program functions as a wizard. Select **Bugzilla** on the first page and then specify the desired settings on the next wizard pages:

- Connection settings to the desired Bugzilla database.
- User name and password for the login.
- Item fields, to which the plug-in will save information retrieved from the error report.
- You should also define the Bugzilla projects that correspond to this or that your product. These settings will let the plug-in automatically organize the incoming error reports into the appropriate projects.

  You should update this setting for every new version of your products shipped to end-users, since the setting depends on the product version.

For complete information on the settings, see *description of the Report to Issue utility*.

Microsoft Team System Support Plug-In

The AQtrace package includes the **Microsoft Team System Support** plug-in. This plug-in is installed on the computer, on which *AQtrace Service* resides. The plug-in monitors new error reports that arrive to the *persistent report storage* and creates new work items in a Team System database on the base of these reports.

The plug-in's file name is *<AQtrace>\Bin\Report2Issue.exe*. This file also contains the Bugzilla Support, JIRA Support, ALMComplete Support and AQdevTeam Support plug-ins, and is used to configure the plug-ins.

Requirements

The plug-in must reside on the computer, on which *AQtrace Service* is located. The AQtrace Service must be running.

Also, this computer must have Microsoft Visual Studio 2005 or 2008 with Team Explorer. The plug-in

uses Team Explorer's functionality to add items to the Team System database. If both Visual Studio 2005 and 2008 are installed, Visual Studio 2008 Team Explorer is used.

Supported Team System Versions

Currently, the plug-in supports the following versions of Microsoft Visual Studio Team System:

- Microsoft Visual Studio 2005 Team System
- Microsoft Visual Studio 2008 Team System

Configuring the Plug-In

In order for the plug-in to function properly, you should configure its settings. This program functions as a wizard. Select **Team System** on the first page and then specify the desired settings on the next wizard pages:

- Connection settings to the desired Team System database.
- User name and password for the login.
- Item fields, to which the plug-in will save information retrieved from the error report.
- You should also define the Team System projects that correspond to your products. These settings will let the plug-in automatically organize the incoming error reports into the appropriate projects.

  You should update this setting for every new version of your products shipped to end-users, since the setting depends on the product version.

For complete information on the settings, see *description of the Report to Issue utility*.

JIRA Support Plug-In

The AQtrace package includes the **JIRA Support** plug-in. This plug-in is installed on the computer where *AQtrace Service* resides. The plug-in monitors new error reports that are placed in the *persistent report storage* and creates new bug reports in an Atlassian JIRA database on the basis of these error reports.

The plug-in's file name is *<AQtrace>\Bin\Report2Issue.exe*. This file also contains the Team System Support, Bugzilla Support, ALMComplete Support and AQdevTeam Support plug-ins, and is used to configure the plug-ins.

Requirements

The plug-in must reside on the computer where *AQtrace Service* is located. Also, in order for the plug-in to be able to work with error reports, AQtrace Service must be running. There is no need to have JIRA installed on this computer.

In order for the plug-in to interact with the JIRA database, JIRA must accept remote API calls. By default, this option is disabled after JIRA is installed. For more information on how to enable JIRA's API remote acceptance, see the documentation on this issue-tracking tool.

Supported JIRA Versions

The plug-in supports Atlassian JIRA version 3.10 or later.

Configuring the Plug-In

In order for the plug-in to function properly, you should configure its settings. Launch the *<AQtrace>\Bin\Report2Issue.exe* executable. This program functions as a wizard. Select **JIRA** on the first page and then specify the desired settings on the other wizard pages:

- The URL of the desired JIRA database.
- The user name and password that will be used to log in to the database.
- The item fields to which the plug-in will save information retrieved from error reports.
- The JIRA projects that correspond to your product. This will allow the plug-in to automatically place the incoming error reports in appropriate projects.

You should update this setting for each new version of your products shipped to end-users, since this setting depends on the product version.

For complete information on all of these settings, see *the description of the Report to Issue utility*.

ALMComplete Support Plug-In

The AQtrace package includes the **ALMComplete Support** plug-in. This plug-in is installed on the computer where *AQtrace Service* resides. The plug-in monitors new error reports that are placed in the *persistent report storage* and creates new bug reports in a SmartBear ALMComplete database on the basis of these error reports.

The plug-in's file name is *<AQtrace>\Bin\Report2Issue.exe*. This file also contains the Team System Support, Bugzilla Support, JIRA Support and AQdevTeam Support plug-ins, and is used to configure the plug-ins.

Requirements

The plug-in must reside on the computer where *AQtrace Service* is located. Also, in order for the plug-in to be able to work with error reports, AQtrace Service must be running. No more additional software is required.

Supported ALMComplete Versions

The plug-in supports SmartBear ALMComplete version 9.5.1 or later.

Configuring the Plug-In

In order for the plug-in to function properly, you should configure its settings. Launch the *<AQtrace>\Bin\Report2Issue.exe* executable. This program functions as a wizard. Select **ALMComplete** on the first page and then specify the desired settings on the other wizard pages:

- The URL of the ALMComplete web service used to work with the ALMComplete database.
- The login (e-mail address) and password that will be used to log in to the database.
- The item fields to which the plug-in will save information retrieved from error reports.
- The ALMComplete projects and their folders that correspond to your product. This will allow the plug-in to automatically add the incoming error reports to appropriate places.

You should update this setting for each new version of your products shipped to end-

users, since this setting depends on the product version.

For complete information on all of these settings, see the description of the Report to Issue utility.

AutomatedQA AQdevTeam Support Plug-In

The AQtrace package includes the **AutomatedQA AQdevTeam Support** plug-in. This plug-in is installed on the computer, on which *AQtrace Service* is located. The plug-in monitors new error reports that arrive to the *persistent report storage* and creates new work items in your AQdevTeam database on the base of these reports.

Note: Currently, AQdevTeam is no longer developed. However, the integration with this issue-tracking system is still available for AQtrace.

The plug-in's file name is *<AQtrace>\Bin\Report2Issue.exe*. This file also contains the Team System Support, Bugzilla Support, ALMComplete Support and JIRA Support plug-ins, and is used to configure the plug-ins.

Requirements

The plug-in must reside on the computer, on which *AQtrace Service* is located. Also, in order for the plug-in to be able to work with error reports, AQtrace Service must be running.

There is no need to have AQdevTeam installed on this computer.

Supported AQdevTeam Versions

The plug-in supports AQdevTeam version 1.8.

Configuring the Plug-In

To configure the plug-in, launch the *<AQtrace>\Bin\Report2Issue.exe* executable. This program functions as a wizard. Select **AQdevTeam** on the first page and then specify the desired settings on the next wizard pages:

- Connection settings to your AQdevTeam database.
- User name and password for the login.
- Item fields, to which the plug-in will store information retrieved from the error reports.
- You should define the AQdevTeam project that corresponds to this or that your product. These settings let the plug-in automatically add the incoming reports to the appropriate projects.

You should update this setting for every new version of your products shipped to end-users, since the setting depends on the product version.

If the error report, for which the plug-in creates a new item, is a *duplicated report*, then the plug-in automatically links the created item with the items that correspond to the duplicated reports.

For complete information on the settings, see *description of the Report to Issue utility*.

Report to Issue Utility

The **Report to Issue** utility performs two functions:

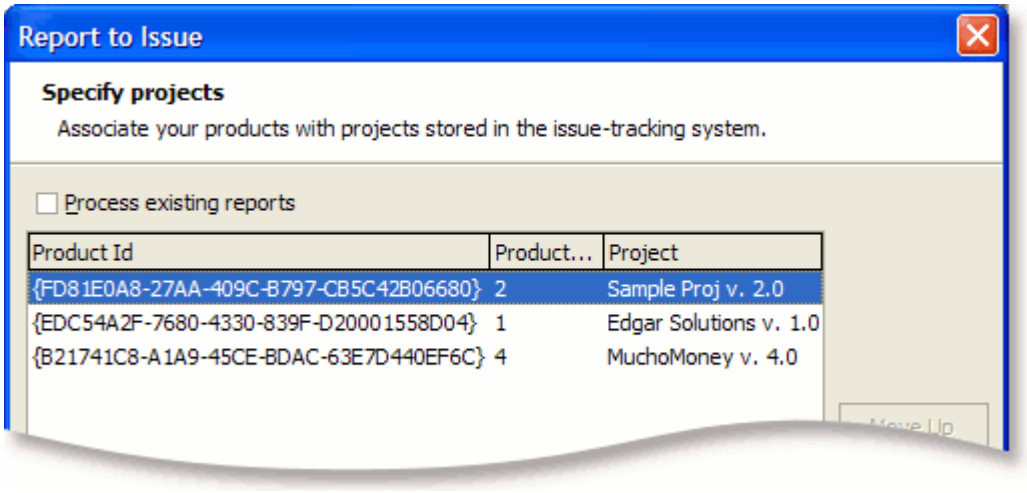
- It contains the implementation of the *issue-tracking plug-ins*, which connect to *AQtrace Service*, obtain information about error reports that have been received recently and add work items based on these reports to issue-tracking systems.
- It is used to configure the server-side plug-ins.

The utility is installed if you install at least one server-side plug-in during the AQtrace installation. You can find it in the *<AQtrace>\Bin* folder. The file name is *Report2Issue.exe*.

Mapping Products to Issue-Tracking Projects

Issue-tracking plug-ins create work items on the base of received error reports and add these items to issue-tracking databases. Typically, companies sell several products and each product has a number of versions (1.0, 2.0 and son on). So, most likely you will receive error reports that were generated for different products and for different versions of a product. Of course, it would be nice to organize these reports into the appropriate projects of your issue-tracking database. You can do this with AQtrace's *Report to Issue* utility.

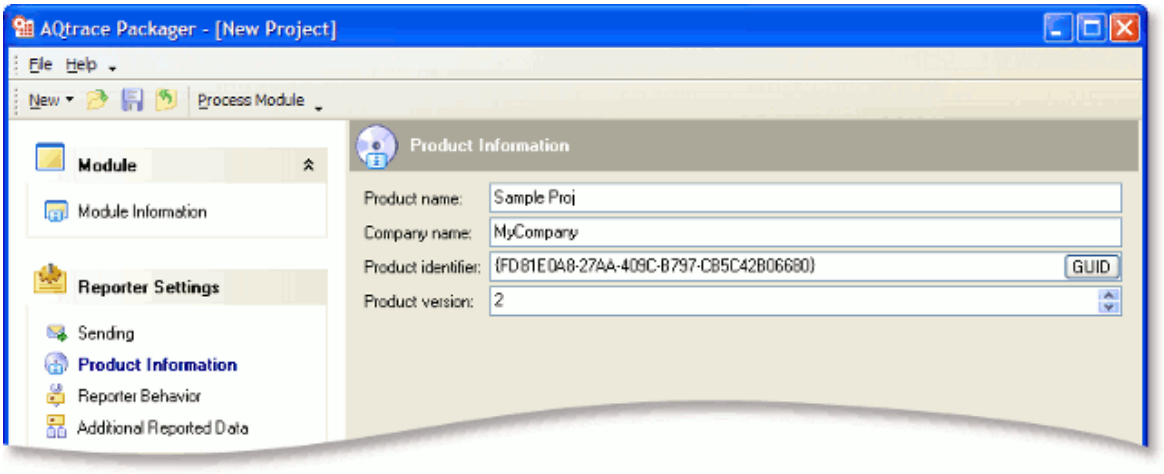
On the *Specify Projects* page of the utility you can set which versions of your products to which issue-tracking projects correspond, so the reports generated for these versions will be added into the appropriate project.



To map a product version to an issue-tracking project, you need to specify the attributes that define your product's version and define the issue-tracking project.

The issue-tracking project is specified by its name. Bugzilla users should also specify the value of the Component field. As for the software product, it is specified by the identifier and version. You should specify them in the *AQtrace Packager* and *Report to Issue* utilities. The whole procedure includes the following steps:

- Launch *AQtrace Packager*.
- Switch to the *Product Information* page and specify the desired product identifier and version in the **Product identifier** and **Product version** fields, respectively:



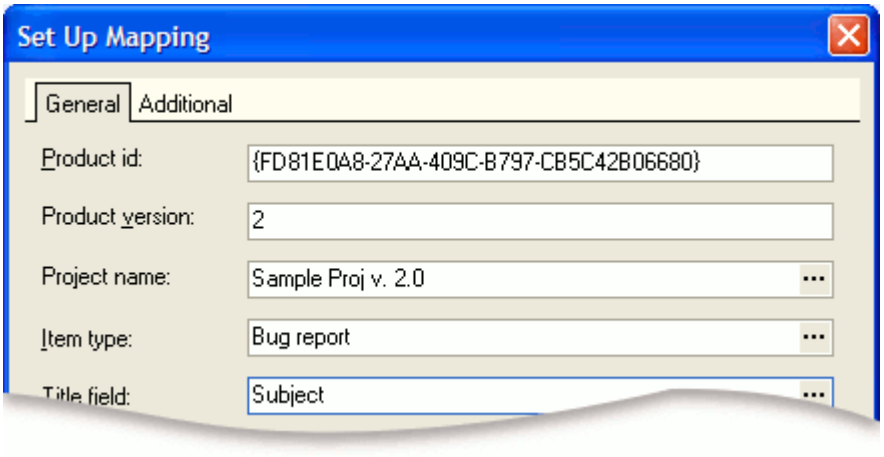
The identifier lets you distinguish one your product from another. The product version value lets you distinguish different versions of the same product from each other. Typically, it is recommended to specify major version in this field, but you can also use minor version and even build part (if you need to separate report flows for different minor versions or builds).

- Specify other settings in your AQtrace Packager project and click the **Process Module** toolbar item in case of a native project to apply the settings to your executable, or click the **Generate Assembly** toolbar item in case of a .NET project to generate the aqReporterInterop.dll assembly.
- Launch the *Report to Issue* utility.
- Go through its pages until the *Specify Projects* page is activated.
- On the page, click **Add**. This will invoke the *Set Up Mapping* dialog:
  - In the **Product id** and **Product version** edit boxes of the dialog, specify your product's identifier and version, respectively.

    Note: You should use the same values that you specified in AQtrace Packager.

    To specify the product identifier and version, you can use wildcards (? and *). Using this feature, you can create and use the same mapping rule for different products or different version of the same product.
  - In the **Project name** edit box specify the issue-tracking project, to which work items should be added.

    AQdevTeam users can specify top-level projects or child projects. If you specify a child project, you should use the full path to it. To separate the project names in the path, use the backslash character (\).
  - For Bugzilla users: Specify the value of the Component field.
- For ALMComplete users: In the **Folder** edit box, specify the desired folder located in the specified issue-tracking project to which work items should be added. If you want to add work items to the root of the specified project, you must specify the *(Project root folder)* value in the edit box.



- Specify other settings in the edit boxes of the Set Up Mapping dialog and close it (see the *dialog description* for more information about this).
- Click **Next** on the Specify Projects page of the utility to go to the **Final Step** page, then, close the utility's window.

The values you specify in AQtrace Packager will be saved to the generated error reports. When an issue-tracking plug-in analyzes received error reports it retrieves the product identifier and product version from the error report. Then, the plug-in searches for the identifier and version number in the mapping settings list, which you create in the Report to Issue utility. After the product and version is found, the plug-in obtains the name of the appropriate issue-tracking project and then adds a new work item to this project.

Note: The search in the mapping settings list depends on the order of the settings in the list. The plug-ins search from the top of the list to its bottom. Once the sought-for setting is found, the search is stopped.

Applying Settings to Existing Reports

Issue-tracking plug-ins process error reports according to the plug-ins' settings you specified in the *Report to Issue* utility. The plug-ins do not apply the settings immediately. They query the settings at certain periods of time, so the specified settings will be applied only to the next "portion" of received reports.

However, you can apply the settings to those reports that have already been saved to the persistent report storage. To do this:

- Launch the Report to Issue utility.
- Go through the settings pages to the *Specify Projects* page.
- On the Specify Projects page, select the **Process existing reports** check box.

Now, after you press **Next**, the utility will process all the reports that have been added to the storage using the new settings. The result of processing will be displayed on the *Final Step* page of the utility.

Report to Issue Utility - Pages

Select Issue-Tracking System Page

The **Select Issue-Tracking System** page is the first page of the *Report to Issue* utility. On this page, you can select the desired issue-tracking system and the connection that you want to configure. Note that the page lists only those issue-tracking systems, for which you installed the appropriate support plug-in when installing AQtrace. For instance, if you did not install the Microsoft Team System Support plug-in, you cannot configure a connection to a Visual Studio Team System database.

Select the desired issue-tracking system and click **Next** to continue.

Set up Connection to the AQdevTeam Database Page

On the **Set up connection to the AQdevTeam database** page of the *Report to Issue* wizard you can specify the parameters needed to connect to the AQdevTeam[3] database. Once you specified the parameters, click **Next** to test the connection.

Note: This page is available only if you install the *AQdevTeam Support* plug-in.

At the top of the page choose the connection type: DCOM, Sockets or HTTP. The page may display additional connection settings depending on the selected connection type:

- **DCOM**. The Distributed Component Object Model (DCOM) is a protocol that enables software components to communicate directly through the network. If you chose the DCOM connection

[3]**AQdevTeam** is an issue-tracking and project management system by AutomatedQA Corp. AQdevTeam is no longer developed. However, the integration with this issue-tracking system is still available for AQtrace.

type, you should enter the name of the computer, where the AQdevTeam Server is installed, into the **Computer name** edit box. You can either type the computer name, or press the ellipsis button and choose the desired computer from the ensuing Browse for Computer dialog.

- **Sockets**. The Sockets protocol is the Windows interface to TCP/IP. If you chose the Sockets connection type, you should specify the following connection settings:
  - **Host** - Either the name or IP address of the computer where the AQdevTeam Server is installed. You can either type the name (or address) or press the ellipsis button to select the computer via the standard Browse for Computer dialog.
  - **Port** - The port number used to gain access to the database. By default, AQdevTeam Server uses port 211.

    Note: Please contact your administrator to find out which computer name and port to specify.

  Note for administrators: If you want AQdevTeam Server to be available via Sockets, be sure that the AQdevTeam Socket Server (the Scktsrvr.exe application) is running on the computer where the AQdevTeam Server is installed. For complete information on AQdevTeam server settings, see AQdevTeam documentation.
- **HTTP**. If you chose the HTTP connection, specify the following connection parameters:
  - **URL** - The web page that holds httpsrvr.dll; for instance, *http://server.company.com/scripts/httpsrvr.dll*. (*httpsrvr.dll* is a dynamic link library that is used to connect to AQdevTeam Server via HTTP).
  - **Proxy** - Either the name or IP address of the proxy server used to gain access to the AQdevTeam Server database. You can leave this empty if you do not want to use a proxy server.
  - **Proxy login** - The user's name used for proxy authentication. You must populate this field if you have specified a proxy server address in the Proxy field.
  - **Proxy password** - The user's password used for proxy identification. You must populate this field if you have specified a proxy server address in the Proxy field.

    Note: Please contact your administrator to find out which values to specify for the HTTP connection.

  Note for administrators: To work with AQdevTeam via HTTP, the server computer must be properly configured. For complete information on this, see AQdevTeam documentation.

The connection parameters specify the AQdevTeam Server instance, to which the Report to Issue utility will connect. AQdevTeam Server may control one or several databases. Specify the name of the AQdevTeam database, with which the utility will work, in the **Database** edit box.

Other than connection properties, you should also specify the user name and password needed to connect to the selected AQdevTeam database. If you select the **Authenticate by OS** check box, the utility will use the user name and password you specify to log into your computer.

In order for Report to Issue to map products to issue-tracking projects and to add work items to the AQdevTeam database, the specified user account must have permissions to read field types and work item types, to get the list of existing projects, to create new work items, to attach files to work

items, and so on. Otherwise, if the specified AQdevTeam user does not have some required permissions, the Report to Issue utility may work with the AQdevTeam database incorrectly (some problems when mapping products to issue-tracking projects or adding work items to the AQdevTeam database may occur). We recommend that you use an administrator account that has all of the required permissions by default. If you do not want to use an administrator account, read the AQdevTeam documentation to get more information on permissions of AQdevTeam users and to learn how to configure user permissions in your issue-tracking system.

Note for administrators: Authentication by OS requires that the AQdevTeam Server is configured to support this feature. For more information, see *AQdevTeam documentation*.

Once you set up all connection parameters, click **Next**. This will activate the connection checking procedure.

Set up Connection to the Bugzilla Database Page

On the **Set up connection to the Bugzilla database** page of the *Report to Issue* utility you can specify the parameters needed to connect to the Bugzilla database.

Note: This page is available only if you install the *Bugzilla Support* plug-in.

You can set the following parameters:

- **URL** - Specifies the server name and folder of the desired Bugzilla database.
- **Login** - The user name that will be used to connect to the Bugzilla database.

  In order for Report to Issue to map products to issue-tracking projects and to add work items to the Bugzilla database, the specified user account must have permissions to read field types and work item types, to get the list of existing projects, to create new work items, to attach files to work items, and so on. Otherwise, if the specified Bugzilla user does not have some required permissions, the Report to Issue utility may work with the Bugzilla database incorrectly (some problems when mapping products to issue-tracking projects or adding work items to the Bugzilla database may occur). We recommend that you use an administrator account that has all of the required permissions by default. If you do not want to use an administrator account, read the Bugzilla documentation to get more information on permissions of Bugzilla users and to learn how to configure user permissions in your issue-tracking system.

- **Password** - Specifies the password that will be used to connect to the Bugzilla database.

Once you specify the connection parameters, click **Next**. This will activate the connection checking procedure.

Set up Connection to the Team System Database Page

On the **Set up connection to the Team System database** page of the *Report to Issue* utility, you can specify the parameters needed to connect to the issue-tracking database of Microsoft Visual Studio Team System.

Note: This page is available only if you install the *Microsoft Team System Support* plug-in.

You can set the following parameters:

- **URL or host name** - Specifies the server name and page of the desired Team System database.
- **Login** - The user name that will be used to connect to the Team System database.

  In order for Report to Issue to map products to issue-tracking projects and to add work items to the Team System database, the specified user account must have permissions to read field types and work item types, to get the list of existing projects, to create new work items, to attach files to work items, and so on. Otherwise, if the specified Team System user does not have some required permissions, the Report to Issue utility may work with the Team System database incorrectly (some problems when mapping products to issue-tracking projects or adding work items to the Team System database may occur). We recommend that you use an administrator account that has all of the required permissions by default. If you do not want to use an administrator account, read the Team System documentation to get more information on permissions of Team System users and to learn how to configure user permissions in your issue-tracking system.

- **Password** - Specifies the password that will be used to connect to the Team System database.

Once you specify the connection parameters, click **Next**. This will activate the connection checking procedure.

Set up Connection to the JIRA Database Page

On the **Set up connection to the JIRA database** page of the *Report to Issue* utility, you can specify parameters needed to connect to the JIRA database.

Note: This page is available only if you installed the *JIRA Support* plug-in.

You can set the following parameters:

- **URL** - Specifies the server name and folder of the desired JIRA database. You should also specify the port number (by default, JIRA uses port 8080).
- **Login** - Specifies the user name that will be used to connect to the JIRA database.

  In order for Report to Issue to map products to issue-tracking projects and to add work items to the JIRA database, the specified user account must have permissions to read field types and work item types, to get the list of existing projects, to create new work items, to attach files to work items, and so on. Otherwise, if the specified JIRA user does not have some required permissions, the Report to Issue utility may work with the JIRA database incorrectly (some problems when mapping products to issue-tracking projects or adding work items to the JIRA database may occur). We recommend that you use an administrator account that has all of the required permissions by default. If you do not want to use an administrator account, read the JIRA documentation to get more information on permissions of JIRA users and to learn how to configure user permissions

in your issue-tracking system.

- **Password** - Specifies the password that will be used to connect to the JIRA database.

After you specify the connection parameters, click **Next**. This will activate the connection checking procedure.

Set up Connection to the ALMComplete Database Page

On the **Set up connection to the ALMComplete database** page of the *Report to Issue* utility, you can specify parameters needed to connect to the ALMComplete database.

Note: This page is available only if you installed the *ALMComplete Support* plug-in.

You can set the following parameters:

- **URL** - Specifies the ALMComplete web service address. The value you specify in this parameter depends on how you use the ALMComplete issue-tracking system:
  - If you use ALMComplete as SaaS, you should specify the following address:

    http://ws.softwareplanner.com/psWS.asmx
  - If you have a perpetual ALMComplete license and ALMComplete is deployed on your own web server, then you should specify the address of the ALMComplete web service running on your web server. For example:

    http://[Your_Server_Name]/psws/psWS.asmx
- **Login** - Specifies the e-mail address (for instance, *jsmith@myserver.com*) that will be used to log in to your ALMComplete database.

  In order for Report to Issue to map products to issue-tracking projects and to add work items to the ALMComplete database, the specified user account must have permissions to read field types and work item types, to get the list of existing projects, to create new work items, to attach files to work items, and so on. Otherwise, if the specified ALMComplete user does not have some required permissions, the Report to Issue utility may work with the ALMComplete database incorrectly (some problems when mapping products to issue-tracking projects or adding work items to the ALMComplete database may occur). We recommend that you use an administrator account that has all of the required permissions by default. If you do not want to use an administrator account, read the ALMComplete documentation to get more information on permissions of ALMComplete users and to learn how to configure user permissions in your issue-tracking system.

- **Password** - Specifies the password that will be used to log in to the ALMComplete database.

After you specify the connection parameters, click **Next**. This will activate the connection checking procedure.

Verify Connection Page

The **Verify connection** page of the *Report to Issue* utility is displayed after you specify the connection

settings to the issue-tracking database. The utility displays this page to inform you that it checks the connection settings and let you view the results of the check.

If the test passed successfully, the **Next** button is enabled. Click it to configure the settings.

If the test failed, click **Back**, check the connection parameters and then try to connect to the database again.

Specify Projects Page

On the **Specify Projects** page of the *Report to Issue* utility, you can specify which issue-tracking projects the *AQtrace issue-tracking plug-ins* will add work items to based on the received error reports. In other words, you can map products to issue-tracking projects.

When modifying the mapping settings, you can also define the item type and field values to be used to create work items.

The page contains a table that lists the mapping settings and the **Process existing reports** check box that lets you apply the settings to received reports. If you select this check box and press **Next**, then the Report to Issue utility will apply the mapping settings to the reports that have already been received and saved to the persistent storage. The results will be displayed on the *Final Step* page of the Report to Issue utility.

The table displays the mapping settings between the product identifiers and versions that are specified in reports, and issue-tracking projects. The table has the following columns:

Column	Description
Product Id	Specifies the identifier of your product. This is the same value that you specified in the **Product identifier** edit box of the *Product Information* page of *AQtrace Packager*.
Product Version	Specifies your product's version, for which the report was generated. This should be the same value that you specified in the **Product version** edit box of the *Product Information* page of *AQtrace Packager*.
Project	Specifies the issue-tracking project, to which work items will be added.
Component	This column is visible only when you set up settings for the Bugzilla database. It specifies the value that will be assigned to the Component field of the bug report that is added to the database.

To add a new row to the table

- Press **Add**. This will invoke the *Set Up Mapping* dialog.
- In the dialog, specify the desired product name, version, issue-tracking project, item type and field values to be used to add work items. Press **OK** to save the settings.

To modify the mapping settings

- Double-click the desired row in the table.

-- or --

- Select the desired row in the table and press **Edit**.

This will invoke the *Set Up Mapping* dialog.

- In the dialog, modify the values and press **OK** to save the changes.

To change the order of mapping settings

The order of mapping settings is important because the issue-tracking plug-ins search for the product and version in the order of their appearance in the table (from top to bottom). Once the product and version is found, the search is stopped.

To change the order:

- Select the desired row in the table.
- Press **Move Up** or **Move Down** to specify the desired position of the row in the table.

To delete the mapping settings

- Select the desired row in the table.
- Press **Delete**.

After mapping your product to the desired issue-tracking project, click **Next** to go to the *Final Step* page. Then click **Finish** on this page to close the Report to Issue utility and to save the settings.

Final Step Page

The **Final Step** page is the last page of the *Report to Issue* utility. Its contents depends on the **Process existing reports** check box that is located on the previous page, *Specify Projects*. If this check box is selected, the utility applies the options, which you set on the Specify Projects page, to error reports that are located in the persistent storage. The processing results are displayed on the Final Step page. If the check box is clear, then the Final Step page does not display any results and simply informs you that the set up process is over.

Press **Finish** to save the settings and close the Report to Issue utility.

Press **Back** to return to the previous pages and modify your settings.

Report Storage Programming

The **persistent storage** is a folder that contains report files. We also call it **persistent storage folder**. You may want to create specific applications that would work with the persistent storage to perform some specific tasks. For instance, you may want to create an application that would automatically create work items in your issue-tracking system on the base of the received error reports.

Since the report storage is just a folder with subfolders and files, you may create an application that will check the files in the folder and perform the desired operations. Another approach is to use the functionality provided by *AQtrace Service*. The Service is a COM server, so you can connect to it, use its methods to obtain a collection of reports that have been received over a specified period of time and process these reports.

Report Storage Programming - Basics

To work with error reports that reside in the persistent report storage, you can use the functionality

provided by *AQtrace Service*. It implements a COM object, whose methods let you obtain a collection of reports that were saved to the report storage during certain time period, iterate through this collection and analyze the reports. This functionality is used by *AQtrace's issue-tracking plug-ins* that create items in issue-tracking systems. You can use the same functionality to perform the actions you need. For instance, you can create a utility that will support your issue-tracking system or send notifications about new reports to developers.

This topic provides basic information on using AQtrace Service and creating a sample utility that will retrieve reports from the storage and process them.

Working with AQtrace Service via COM

To work with error reports that reside in the *persistent report storage*, follow these steps:

1. **Connect to AQtrace Service.**

   AQtrace Service's COM object uses the ***AQtraceService.Engine*** program identifier. You can connect to it in the same way as you connect to other COM servers. In Visual Basic, for example, you do this by calling the `GetActiveObject` or `GetObject` functions. In Delphi, you do this by calling Delphi's `GetActiveOleObject` function.

   Note: In order for you to be able to connect and work with AQtrace Service, the Service must be properly configured. For more information on this, see *Configuring AQtrace Service*.

2. **Obtain a collection of error reports.**

   The AQtrace Service COM object implements the *`IEngine`* interface. You get a reference to this interface when connecting to the Service via COM.

   The `IEngine` interface contains a number of methods that let you work with error reports. For detailed information on them, see the *interface description*.

   We would like to pay your attention to one of the methods - *`EnumReports`*. This method returns an iterator that provides access to a collection of error reports that were received during the specified time period. The method has two parameters that specify the start and end date and time of the desired period. You use the resultant iterator to work with error reports that were received during the specified period of time.

   Another important and useful method of the `IEngine` interface is `EnumNotProcessedReports`. This method returns an iterator that provides access to a collection of error reports that reside in the persistent storage, but that have not been processed and submitted to an issue-tracking database yet.

3. **Iterate through the collection.**

   Both the `EnumReports` and `EnumNotProcessedReports` methods return an iterator object that provides access to a collection of error reports in the persistent storage. This iterator object implements the `IaqtReportsIterator` interface. You can use the interface's methods to go through the reports:

   - Initially, the iterator's position is before the first element of the collection. To obtain a reference to the first report in the collection, call the *`Next`* method of the `IaqtReportsIterator` object. This method returns a reference to the `IaqtReportInformation` object that provides information about the appropriate error report.

- You iterate through the collection by calling the `Next` method in a loop. To determine whether the iterator is on the last report or not, use the *`HasNext`* method.
- To set the iterator to the initial position, call *`Reset`*.

4. **Obtain error report information.**

   To obtain information about an error report, use properties and the *`GetValue`* method of the *`IaqtReportInformation`* object. You get a reference to this object by calling the *`IaqtReportsIterator.Next`* method (see above).

   For detailed information on properties and the `GetValue` method of the `IaqtReportInformation` object, see the *object's description*. We would like to pay your attention to the following properties:

   - *`Exists`* - AQtrace Service may return the `IaqtReportIntformation` objects for those reports that no longer exist. Use this property to determine whether the report file exists or not. For more information, see the *next section*.
   - *`ProductID`* and *`ProductVersion`* - Specifies the identifier and version of the product, for which the report was generated. If you use AQtrace in several products, then by using these properties you can determine to which product and version the report relates. Note that the properties return the same values that you specified in the **Product identifier** and **Product version** edit boxes on the *Product Information* page of *AQtrace Packager*.
   - *`DuplicatedID`* - Specifies the identifier of the other report, which the given report duplicates (AQtrace Service detects duplicated reports by analyzing the call stack data. See *Detecting Duplicated Reports*). If the report is a duplicate of another report, then you can process it in a different way.
   - *`Description`* - This property returns text that contains call stack and other data in text form. You can use this property to analyze the report's call stack.
   - *`ProcessedMark`* - When an error report is submitted to an issue-tracking database, it becomes marked as a processed report. Use this property to determine whether the error report is marked as processed and has been already submitted to the database or not.

   Note also that the information provided by these properties (except for the `Exists` and `ProcessedMark` properties) can be obtained using the *`IaqtReportInformation.GetValue`* method.

Working With Report Files

When AQtrace Service places a report to the persistent storage, it adds a record about this report to the persistent storage configuration file. The Service then uses this configuration file to operate with reports. For instance, the *`EnumReports`* and *`FindReportInformationByID`* methods of the *`IEngine`* object use the configuration data to return the appropriate results.

The report file can be deleted from hard disk. For instance, you can delete it by using Windows Explorer. However, the configuration file will not be updated in this case. It will contain a record for the report and AQtrace Service will "consider" the report still exists in the storage. So, for instance, a call to the `FindReportInformationByID` method will not fail.

To check whether the report file exists, use the *`Exists`* property of the *`IaqtReportInformation`* (this object is used to obtain error report's data).

To clear the report storage's configuration file and remove records about all the files that do not exist anymore, call the *`PurgeNonExistingReports`* method of the *`IEngine`* object.

To remove records about error reports that were received within a certain time period and to completely delete the appropriate report files from the disk (if needed), use the `PurgeReports` method of the `IEngine` object. This method helps you remove too old error reports from the storage and reduce the storage configuration file's size.

Creating a Utility that Processes Reports

AQtrace includes several *issue-tracking plug-ins* that use the described functionality to save error reports to issue-tracking systems like Visual Studio Team System, Bugzilla, JIRA or AQdevTeam[4].

You may create a utility that will perform specific operations over error reports that reside in the persistent report storage. This utility, for instance, can save error reports to the issue-tracking system that is used in your company (that items are created on the base of error report's information).

Below are general principles of the utility functioning:

- The utility periodically requests AQtrace Service for reports that are stored in the persistent storage, but have not been processed and submitted to an issue-tracking database yet. For this purpose, the utility connects to AQtrace Service and calls the `IEngine.EnumNotProcessedReports` method to obtain a collection of unprocessed error reports.
- After the collection of error reports is obtained, the utility iterates through it and gets the needed report information in the manner that was described *above*.
- After the processing of the current error report is over, the utility marks this report as processed. For

[4] **AQdevTeam** is an issue-tracking and project management system by AutomatedQA Corp. AQdevTeam is no longer developed. However, the integration with this issue-tracking system is still available for AQtrace.

this purpose, it obtains the report identifier by calling the `IaqtReportInformation.Id` property and then passes it to the `IEngine.SetProcessedMark` method.

Samples

The following samples demonstrate how you can work with AQtrace Service via COM and process the reports that were added to the persistent report storage. For simplicity, the sample function saves the description data of each report to a text file.

```
[Visual Basic]
Sub TestAQtraceService()

   Dim Service, Iterator, ReportInfo
   Dim F, s, ID

   ' Attach to AQtrace Service
   Set Service = GetObject(, "AQtraceService.Engine")

   ' Obtain a report collection
   Set Iterator = Service.EnumNotProcessedReports()

   ' Process the collection

   ' Open the output file
   Open "C:\Reports.txt" For Append Access Write Lock Write As #1

   On Error GoTo Close_File

   ' Iterate through the report collection
   While Iterator.HasNext()
     ' Obtain report information
     Set ReportInfo = Iterator.Next()
     ' Check whether the report file exists
     If ReportInfo.Exists Then
       ' Retrieve the report description
       s = ReportInfo.Description + Chr(13) + Chr(10) + Chr(13) +
Chr(10) + Chr(13) + Chr(10)
       ' Save data to the file
       Print #1, s
     End If

     ' Mark the report as processed
     ID = ReportInfo.ID
     Service.SetProcessedMark(ID, True)
   Wend
```

```
 Close_File:
    Close #1

End Sub
```

```
[Delphi]
uses ComObj;
 ...
procedure TestAQtraceService;
var
   Service, Iterator, ReportInfo : Variant;
   F : Text;
   S, ID : string;
begin
   // Attach to AQtrace Service
   Service := GetActiveOleObject('AQtraceService.Engine');

   // Obtain a report collection
   Iterator := Service.EnumNotProcessedReports();

   // Process the collection

   // Open the output file
   AssignFile(F, 'C:\Reports.txt');
   if (FileExists('C:\Reports.txt')) then
     Append(F)
   else
     Rewrite(F);

   try
     // Iterate through the report collection
     while Iterator.HasNext do
     begin
       // Obtain report information
       ReportInfo := Iterator.Next;
       // Check whether the report file exists
       if ReportInfo.Exists then
       begin
         // Retrieve the report description
         s := ReportInfo.Description + #13#10#13#10;
         // Save data to the file
```

```
        WriteLn(F, s);
      end;
      // Mark the report as processed
      ID := ReportInfo.ID;
      Service.SetProcessedMark(ID, true);
    end;
  finally
    // Close the file
    CloseFile(F);
  end;
end;
```

To work with AQtrace Service via COM in a C# application, add the AQtrace Service COM Object reference to your C# project. To do this:

- Select **Project | Add Reference** from Visual Studio's main menu. This will invoke the **Add Reference** dialog.
- In the dialog, switch to the **COM** tabbed page.
- In the page, find **AQtraceService 1.0 Type Library** and press **OK**. Visual Studio will close the dialog and add the reference to your project.

```
[C#]
using System.IO;
using System.Runtime.InteropServices;
using AQtraceServiceLib; // This namespace is available after you append
                         // the AQtrace Service reference to your project
 ...
private void TestAQtraceService()
 {
     AQtraceServiceLib.IEngine Service;
     AQtraceServiceLib.IaqtReportsIterator Iterator;
     AQtraceServiceLib.IaqtReportInformation ReportInfo;
     StreamWriter file;
     string s, ID;

     // Connect to AQtrace Service
     Service = Marshal.GetActiveObject("AQtraceService.Engine") as
AQtraceServiceLib.IEngine;

     // Obtain the collection of error reports
     Iterator = Service.EnumNotProcessedReports();

     // Open the output file
     file = File.AppendText("C:\\Reports.txt");
     try
```

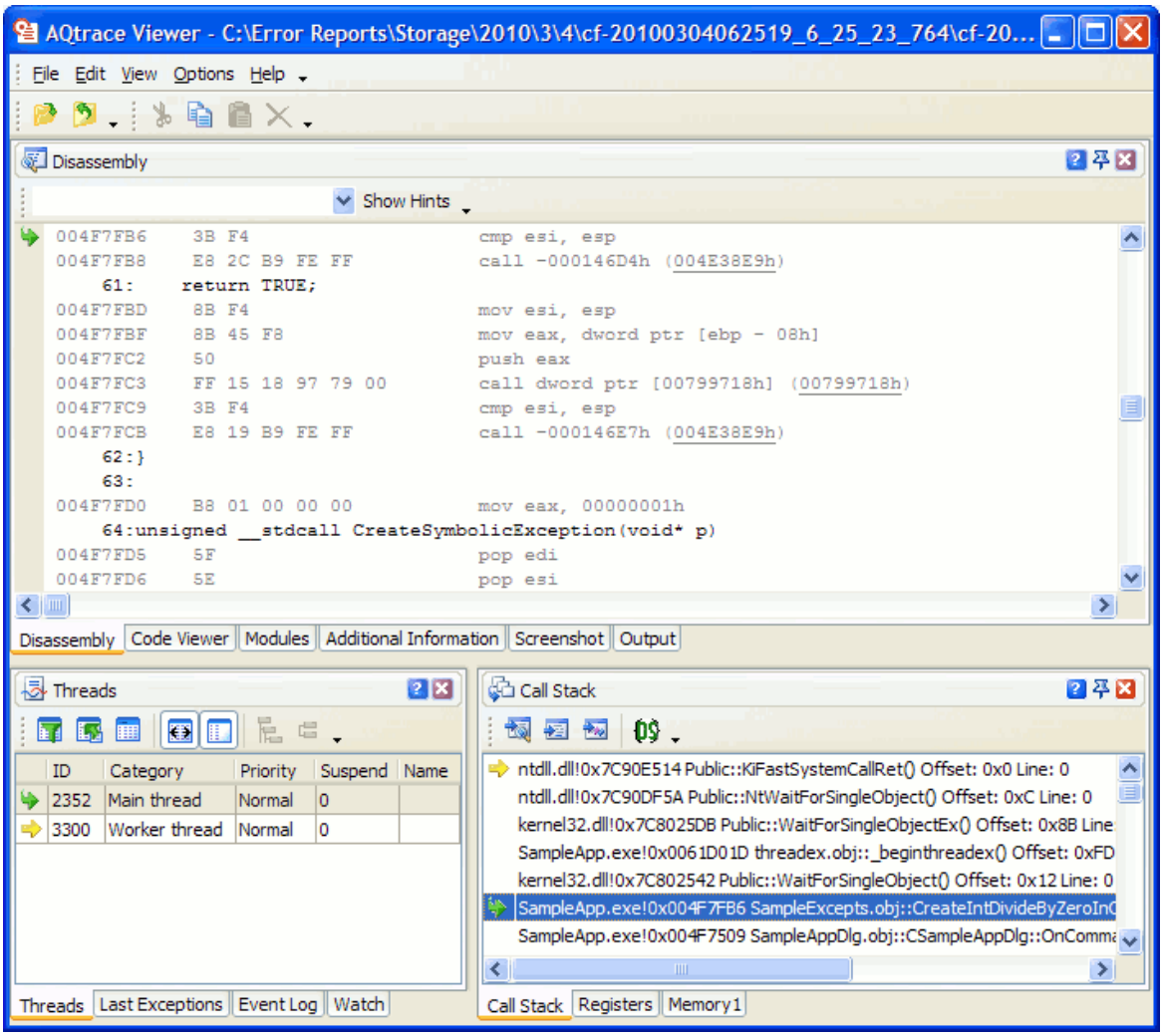
```
    {
        // Iterate through the report collection
        while (Iterator.HasNext())
        {
            // Obtain report information
            ReportInfo = Iterator.Next();
            // Check whether the report file exists
            if(ReportInfo.Exists)
            {
                // Retrieve the report description
                s = ReportInfo.Description + "\n\n";
                // Save data to the file
                file.WriteLine(s);
            }
            // Mark the report as processed
            ID = ReportInfo.ID;
            Service.SetProcessedMark(ID, true);
        }
    }
    finally
    {
        // Close the file
        file.Close();
    }
}
```

AQtrace Viewer

AQtrace Viewer is a special application that is used to view and analyze error reports generated by the *AQtrace Reporter*. It is installed if you select the *"Analyze received error reports"* option on the **Select AQtrace Components** page of the AQtrace installation wizard.

AQtrace Viewer - User Interface

The user interface of *AQtrace Viewer* consists of panels, the main menu and toolbars. The general layout is as follows:



Most of the Viewer's screen area is occupied by panels. Panels are where you do your actual work. For detailed information on AQtrace Viewer panels and on how to use them, see *AQtrace Viewer Panels* and

Analyzing Error Reports With AQtrace Viewer.

The size and layout of panels is not fixed. You can change panels' size by dragging the separator between them. However, the most important point about handling panels is how they can be moved around - *docking*. Docking is our way of providing you with the most flexible workspace for the particular task you are interested in. It means that the entire work area can be reconfigured as needed, even beyond what is possible with toolbars (moving, hiding an so on). Docking of panels in AQtrace Viewer is similar to docking windows in Microsoft Visual Studio or Borland Delphi. For more information, see *Docking*.

There are some common ways of arranging columns and lines in the panels. See *Arranging Columns, Lines and Panels*. In the *User Interface Options* dialog you can view and change general UI settings of AQtrace Viewer.

To save the current panel layout to a file, select **View | Desktop | Save Docking to File** from AQtrace Viewer's main menu (by default, these files have the .aqtDock extension). To load a panel layout from a file, select **View | Desktop | Load Docking from File**. To restore the default panel layout, select **View | Desktop | Restore Default Docking**. The **Save Desktop As** and **Load Desktop** items of the **View | Desktop** submenu will save and load the panel layout along with the toolbar settings.

AQtrace Viewer's interface receives commands in four ways:

- Through menus.
- Through popup menus (right-click, context-dependent).
- Through toolbars.
- Through keyboard shortcuts.

You can change the keyboard shortcuts with the *Customize Keyboard* dialog.

As in Microsoft Word or Excel, menus are a type of a toolbar, and both can be customized as needed. You can also create your own toolbars. By default, toolbars are docked at the top of the AQtrace Viewer window. You can easily dock them to any other edge by dragging them to the left, right or bottom edge of the window. Some toolbars, for instance, Disassembly, Memory1, Memory2 and Memory3 can be docked to the panels of the same name.

To remove buttons from or add them to the toolbars, you can either call the **Toolbar Customization** window or use the Quick Customization feature. For more information about this, see *Toolbars Customization*.

To save or load the current layout of toolbars and toolbar items, use the **View | Toolbars | Save Toolbars to File** and **View | Toolbars | Load Toolbars from File** menu items. To restore the default toolbar layout, select **View | Toolbars | Restore Default Toolbars**. To save and load the layout of panels, menus and toolbars, use the **View | Desktop | Save Desktop As** and **View | Desktop | Load Desktop** menu items.

Analyzing Error Reports With AQtrace Viewer

AQtrace Viewer contains various panels that let you explore the data included in an error report and find the cause of the exception. This topic describes how you can analyze reports with the AQtrace Viewer.

Requirements

In order for AQtrace Viewer to be able to parse error reports and display information included in them, it needs access to binary code and debug information of the modules mentioned in the error report. To display source code in the *Disassembly* and *Code Viewer* panels, AQtrace Viewer also needs access to the source files of your application.

You specify the search paths for binary modules and debug information in the *Symbols Options* dialog.

For more information about this, see ***Specifying Path to Modules***. As for the path to source files, you can specify it in the *Source Code Options* dialog.

Specifying path to binary modules and debug information is critical for parsing the call stack data. You must specify these paths before you open an error report in AQtrace Viewer. Without these settings, the Viewer will be unable to parse the call stack data.

Source code location is less important and it has no effect on parsing the call stacks.

Loading Error Reports

To open an error report file for analysis, choose **File | Open** from the main menu of AQtrace Viewer and then select the desired file in the ensuing Open File dialog.

AQtrace Viewer can also load reports directly from the *persistent report storage*. To do this, use the *Storage View* panel. It lists the reports that reside in the storage. To load a report, simply double-click it in the panel.

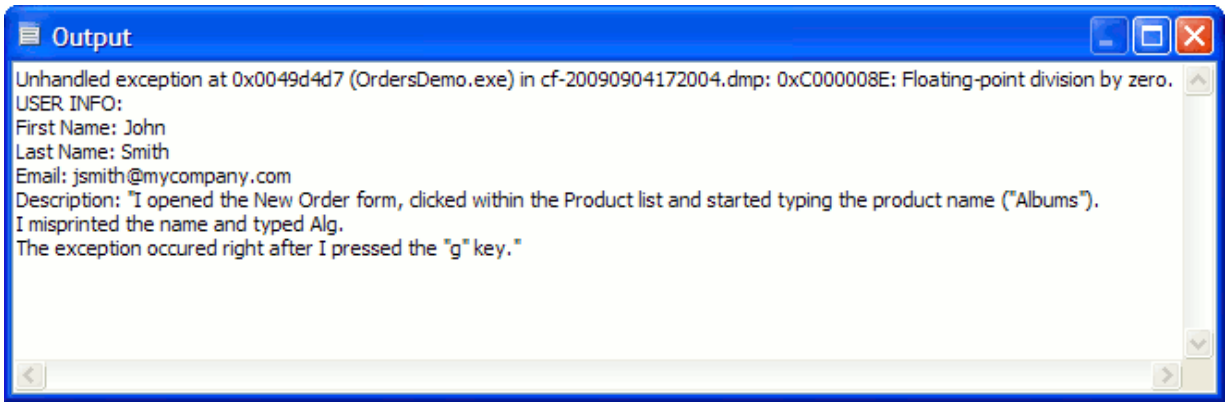
In order for the panel to be able to connect and load the reports from the storage, you should specify the path to the storage in the *Storage Path* setting (see the *Report Storage Options Dialog*).

Analyzing Error Reports

After you selected the error report for loading, AQtrace Viewer will read information from the report file and display it in its panels, so you can explore the report data and determine why the exception occurred.

Upon loading a report, AQtrace Viewer shows a message box with brief descriptions of the exception, for which the report was generated. If the exception was *generated on demand*, (that is, by using the `ShowFatalErrorWithMessage` method of *AQtrace Reporter*), the message box says that the report file does not contain information about the exception.

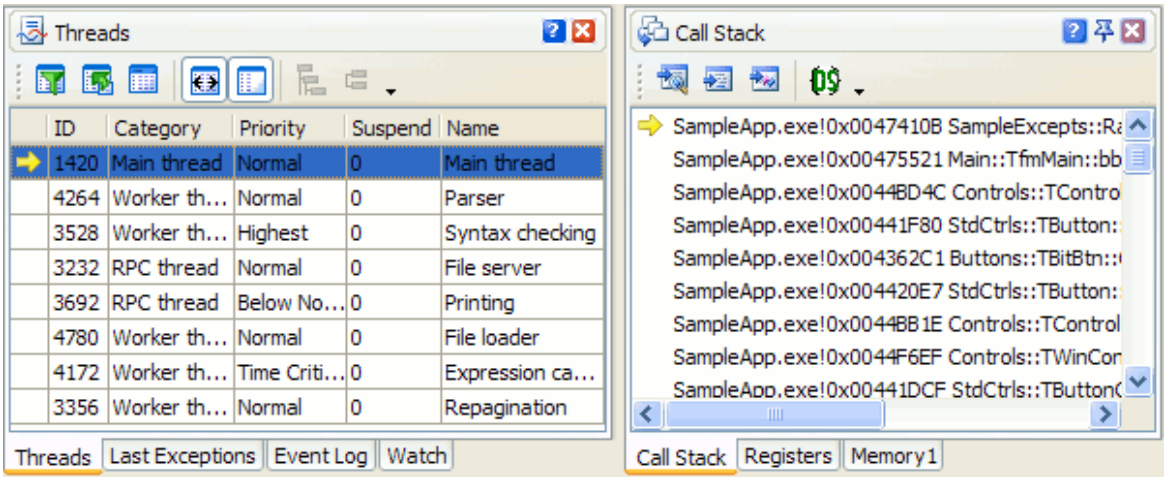
This brief description is also shown in the *Output* panel. This panel also contains data that the end-user specified in the *User Info* dialog when sending the error report to you. You may use this data to understand what happened on the end-user's computer.



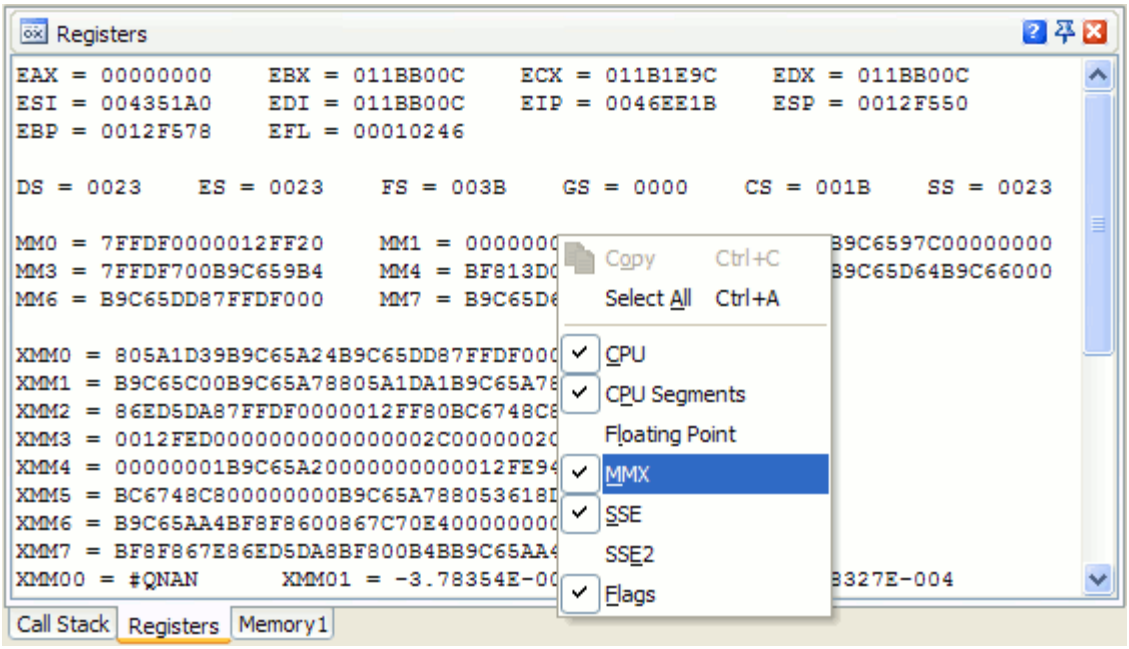
The "start point" of the analysis is the *Threads* panel. It lists the threads that existed in your application at the moment when the exception occurred. For each thread, the report stores information about the call stacks and values of CPU registers that were actual when the exception occurred.

To view this information for a thread, in the Threads panel, select the row that corresponds to the desired thread, press Enter (or simply double-click this row in the panel) and then switch to the *Call Stack* or

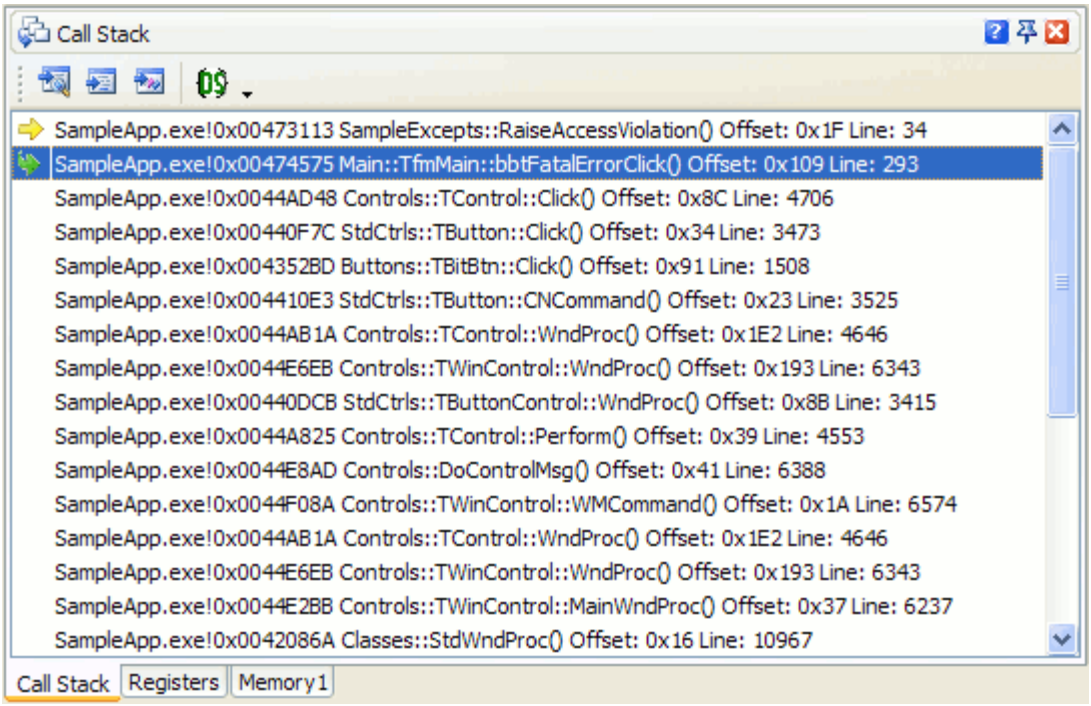
Registers panel.



The *Registers* panel displays values of the CPU registers for the selected thread. By default, the panel shows only standard registers like EAX, EBX, ECX or ESP. To view values of MMX, FPU, SSE and SSE2 registers and the values of the Flag register, select the appropriate item from the context menu of the Registers panel:



The topmost function in the *Call Stack* panel is the function, in which the exception occurred. Other items indicate the sequence of function calls that led to the call of the topmost function:



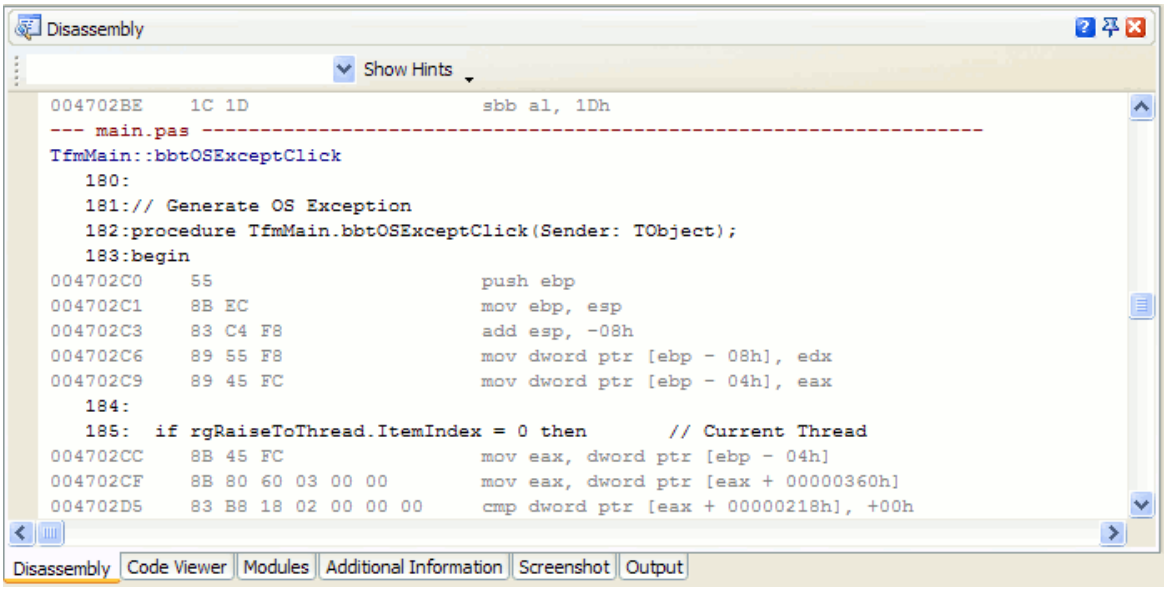
For each function in the stack, the panel displays the module name, call address, function name, parameters and their values, the offset of the instruction that called the next routine in the stack and the line number of this instruction. AQtrace Viewer displays the function names, line numbers and information about parameters only if it found debug information for the module that contains the function. The Viewer reads function names, line numbers and information about parameters from debug information. If debug information was not found, the function names, line numbers and parameters will not be displayed.

Currently, AQtrace Viewer cannot obtain and display information about function parameters for .NET (managed) call stacks. Only parameters of functions from native (unmanaged) call stacks can be displayed in the Call Stack panel.

To determine the call sequence, AQtrace Viewer checks the call stack data saved to the error reports and analyzes the module's binary code and debug information. When performing the analysis, AQtrace assumes that function calls follow certain rules. However, some calls can be absent in the reported stack. This happens due to certain specifics of functions' binary code.

To view these calls, right-click somewhere within the Call Stack panel and select **Show Dirty Stack** from the context menu, or press the button on the panel's toolbar. If this menu item is checked (or the button on the toolbar is pressed), AQtrace Viewer will treat any address found in the stack as a call address. This may help you find the missed calls. Note, however, that some of the calls shown in the "dirty" stack, are not the calls. These are just addresses that reside in the stack.

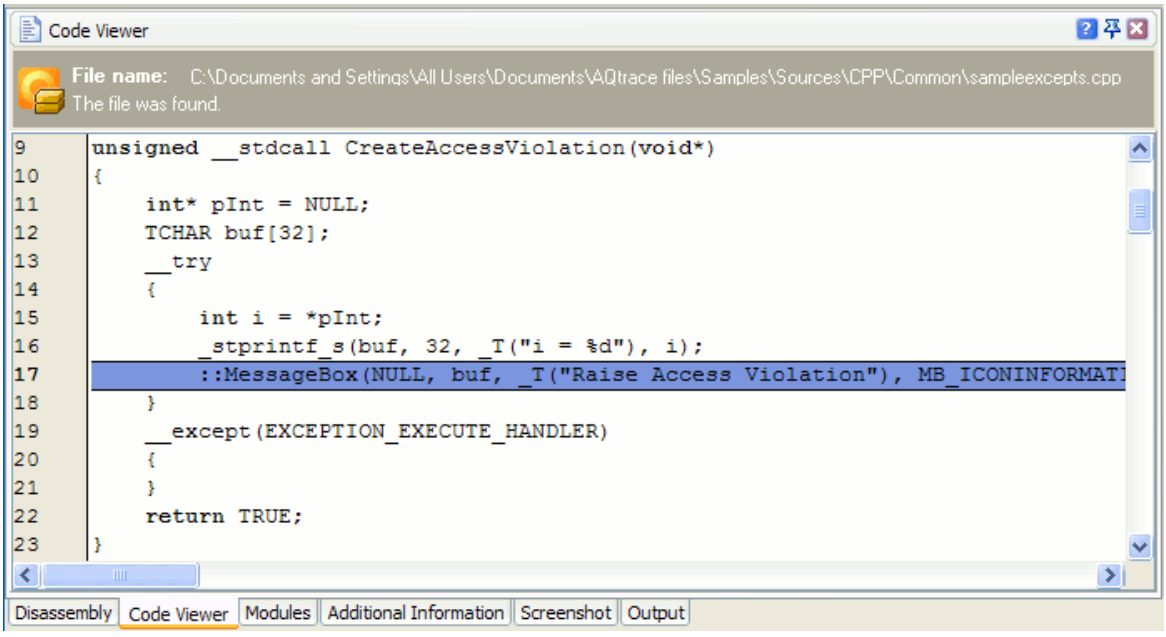
To view a routine's binary code, right-click this routine in the Call Stack panel and select **Go to Disassembly** from the context menu, or select the routine and click the **Go to Disassembly** button on the panel's toolbar. AQtrace Viewer will switch to the *Disassembly* panel and place the marker to the left of the code at the call address that you selected in the Call Stack panel.



To quickly view assembler instructions that reside at a certain address in memory, specify the desired address in the **Address** box of the Disassembly toolbar and press Enter. If you type a hexadecimal value, enter the `0x` prefix. You can either type the address, or drag it from the Disassembly or Memory panels and drop it in the Address box.

The Disassembly panel can display both binary and source code. In the panel you can easily see which binary code was generated for every source code line. In order for the panel to be able to do this, AQtrace Viewer's settings must specify path to binary modules and debug information in the *Symbols Options* dialog and specify path to source files in the *Source Code Options* dialog.

To view only the source code (without assembler instructions), switch to the *Code Viewer* panel:



The panel shows the source file that contains the source code of the routine that is selected in the Call Stack panel. When you double-click a routine in the Call Stack panel, AQtrace Viewer opens the appropriate

source file in the Code Viewer panel, scrolls to the source code of the selected routine and highlights the line that contains a call to the upper routine (the number of this line is displayed in the Call Stack panel). However, note that if you double-click the routine in the Call Stack panel, the Code Viewer panel will not become active. You can also right-click the desired routine in the stack and select **Go to Source Code** from the context menu, or select the routine and click the **Go to Source Code** button on the panel's toolbar. In this case, the Code Viewer panel becomes active and displays the routine's code, too.

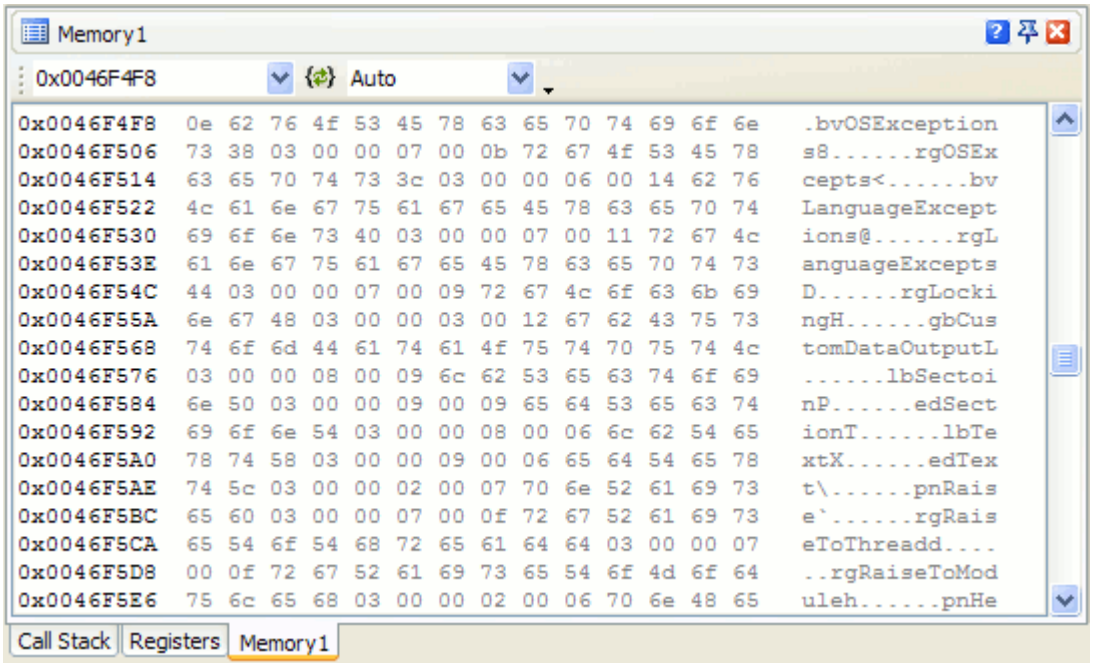
To find the source file, Code Viewer uses the search paths specified in the *Source Code Options* dialog or retrieves the appropriate version of the source file from a source control system by using a *source server*, if you use such a server with AQtrace and the modules of your application were indexed for it (for more information, see *Source Server Support*). Also, scrolling is performed only if the debug information contains information about routine's source lines. If the source file is not found or debug information does not contain data about source lines, the Code Viewer panel will be empty. This happens typically for Delphi applications, whose debug information was generated as .map files. These files do not contain information about source code, so Code Viewer does not "know" which file to display.

If Code Viewer displays a source code file retrieved from a source control system by *SmartBear Source Server*, you can compare the displayed version of the source code (that is, the version used for compilation of the application build being analyzed) with the latest one stored in the source control system. To view differences between the two file versions, right-click somewhere within Code Viewer and select **Show Difference** from the context menu. For more information, see *Comparing Versions of Source Code Files*.

You can easily view information about the binary module that contains the routine selected in the Call Stack panel. Right-click the desired routine in the stack and select **Go to Module** from the context menu, or select the routine and click the **Go to Module** button on the toolbar. AQtrace Viewer will switch to the *Modules* panel that contains information about the binary modules of the application. The focus in the panel will be set on the row that holds information about the module in which the selected routine is defined.

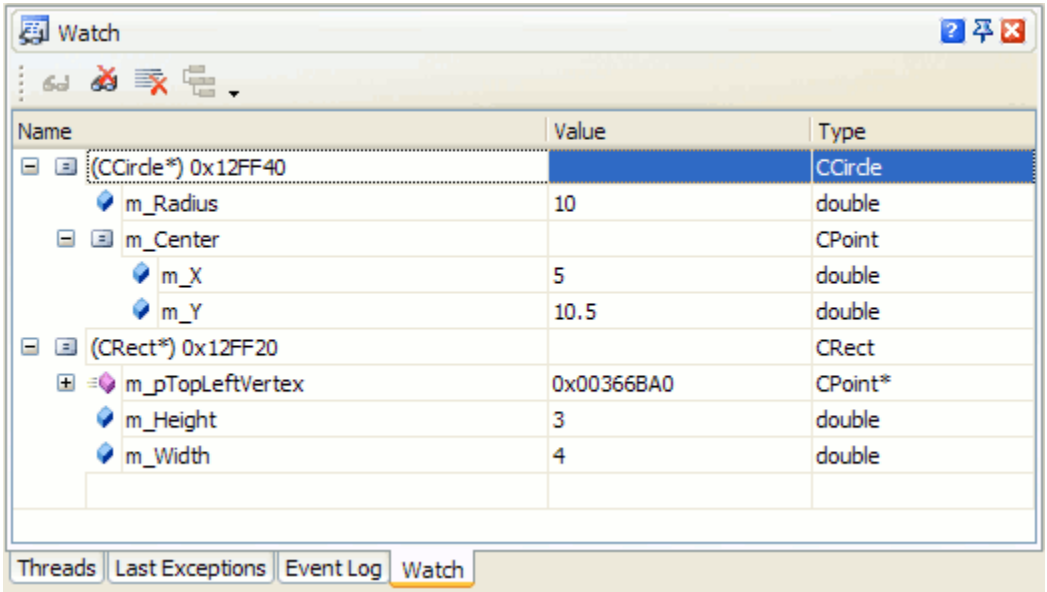
To view the memory data, use one or several *Memory* panels: **Memory1**, **Memory2** and **Memory3**.AQtrace Viewer also contains three toolbars -- Memory1, Memory2 and Memory3 -- that are intended for working with the appropriate Memory panel. You can dock these toolbars either to the main window of AQtrace Viewer, or to the appropriate Memory panel (see the image below).

To view the data stored at a certain address in memory, enter this address into the **Address** box of the Memory toolbar and press Enter. You can either type the desired address or drag it from the Memory panels or from the Disassembly panel. If you type the address in hexadecimal format, enter the `0x` prefix before the address:



AQtrace Reporter does not save all the memory used by the application to the reports. It saves only stack data. AQtrace Viewer "restores" the memory contents by using the stack data and binary code of modules mentioned in the report. So, specifying path to the binary code in the *Symbols Options* dialog is critical for parsing and analyzing the reports.

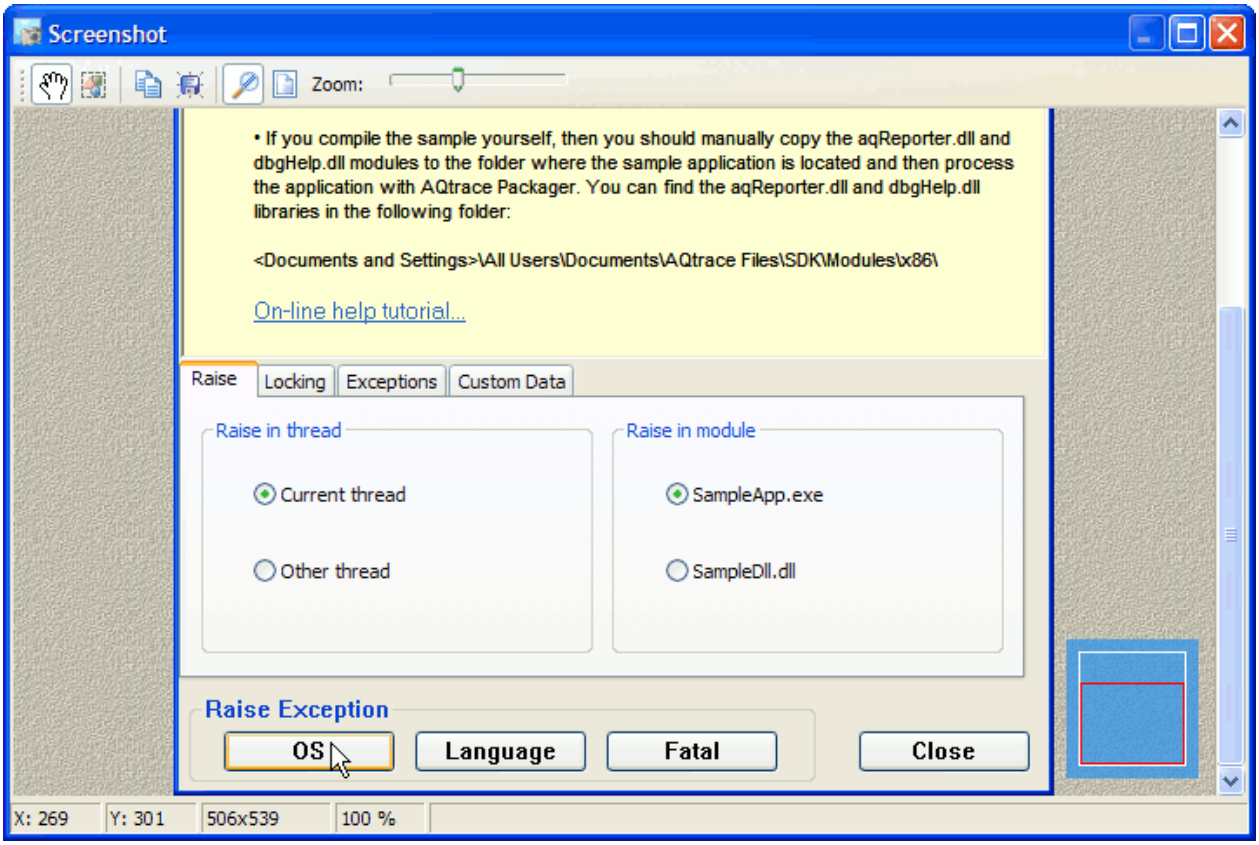
AQtrace Viewer allows you to inspect values of various complex variables (objects and structures) declared in the application. Using the *Watch* panel, you can view the values that had been assigned to members of a certain object (or structure) in the application before the exception occurred. In this panel, you can create a "watch" for the desired complex variable by specifying its data type and memory address at which the variable was allocated:



Note that AQtrace Viewer needs definition of the specified data type to properly read a variable's value

from the memory dump included in the error report. This definition is stored in debug information files, therefore, your application should be compiled with debug information, and AQtrace Viewer should have access to this information in order to read variable values. Also, AQtrace Reporter, as mentioned above, does not save all the memory used by the application, so, the specified variable may be stored in a memory area that was not included in the error report. In this case, the Watch panel cannot display the value of the variable.

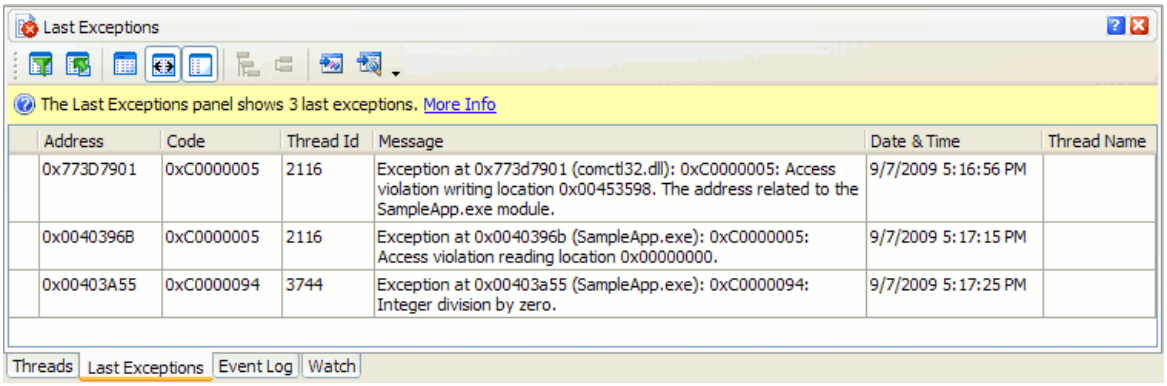
According to AQtrace Reporter's settings, the Reporter can also capture the image of the application window or of the whole desktop and include it in the error report. You can view the image in the *Screenshot* panel:



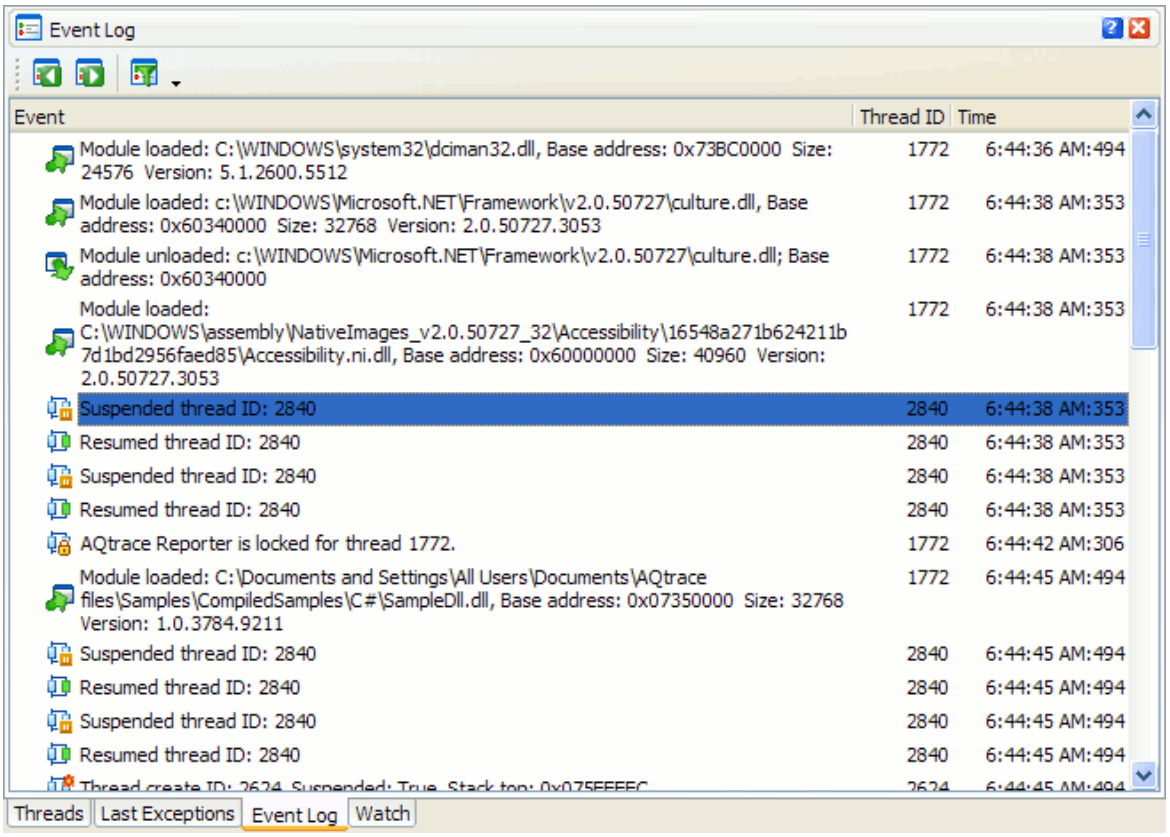
Error reports may also contain additional information about the processes running in the operating system, the OS version and service packs, memory and hard disk space (see *Specifying Data to Be Included in Reports*). You can view this information in the *Additional Information* panel.

Besides information about the exception, for which the report was generated, the error report may also contain information about exceptions that had occurred earlier during the application execution. These exceptions are called *last-raised exceptions* (see *About Last-Raised Exceptions*). For these exceptions, the reports contain the exception code, text, address and call stack data.

To view the last exceptions list saved to the report, use the *Last Exceptions* panel. This panel displays the exception code, message, address and id of the thread, in which the exception occurred. To explore the call stack for an exception, simply double-click it in the Last Exceptions panel. AQtrace Viewer will load the exception's call stack to the Call Stack panel. You can then continue the analysis with the Disassembly, Code Viewer and other panels.



AQtrace Reporter can trace certain events that occur during the application run and log information about these events. You can see various information logged for such events in the *Event Log* panel of AQtrace Viewer when you analyse an error report:



For instance, from the log displayed in the panel you can see when various modules were loaded to and unloaded from memory, when secondary threads were created, suspended and terminated, when exceptions occurred, when the AQtrace Reporter's functionality was locked and unlocked, and so on. For each event, the log contains the UTC time of the event's occurrence and the identifier of the thread in which the event raised. Also, you can find various helpful information depending on event types. For more information, see *Event Log Panel*.

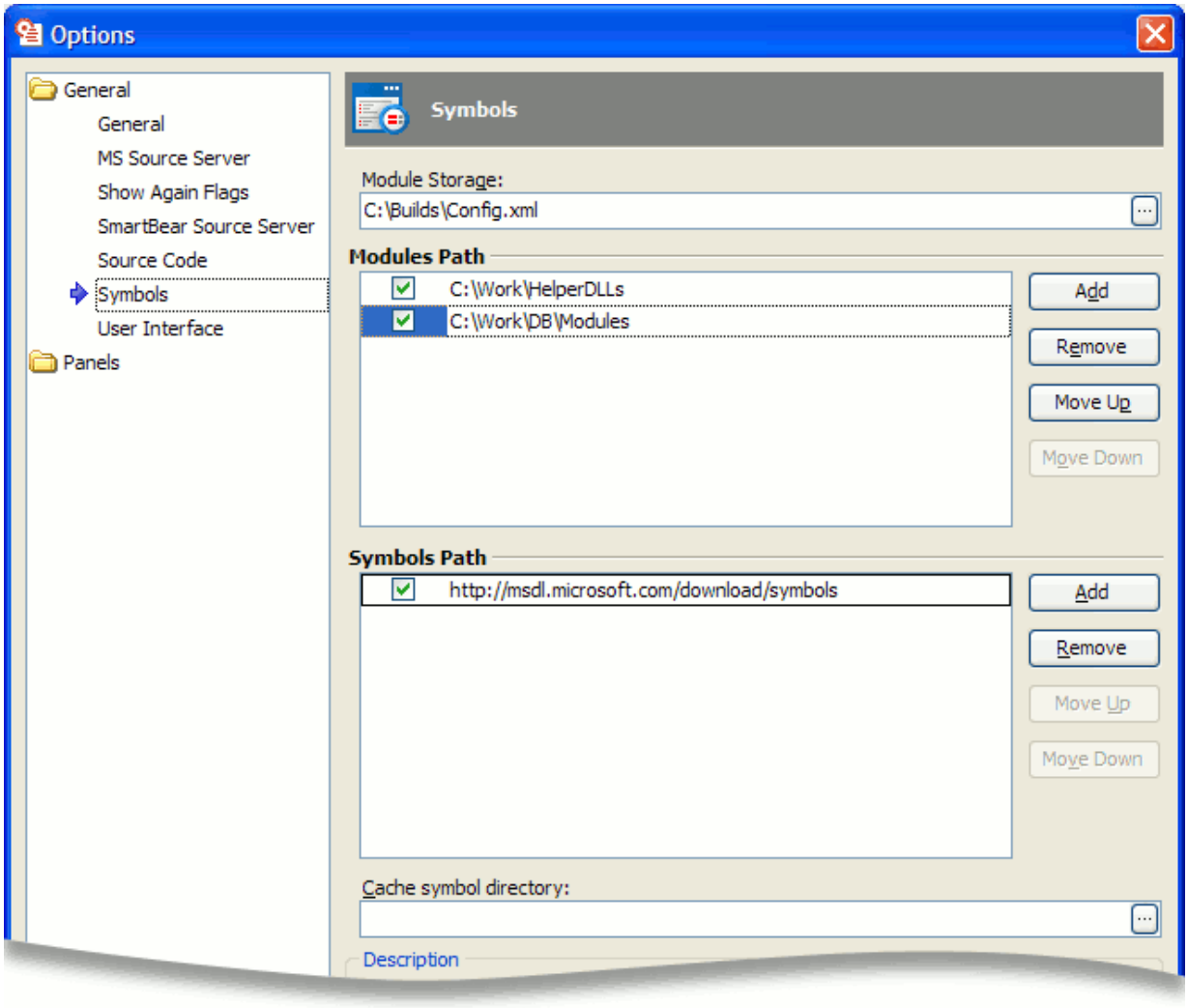
Specifying Path to Modules

In order for *AQtrace Viewer* to be able to parse error reports, you should specify a path to the binary modules and debug information files. This information is critical for the Viewer. Without it, it will be unable to parse the call stack data saved to the report.

To view source code along with binary instructions in the *Disassembly* and *Code Viewer* panels, you also need to specify the path to the source files. This topic explains how to specify the path to the binary modules, debug information and source code.

Path to Binary Modules and Debug Information

You specify the path to the binary modules and debug information files in the *Symbols Options* dialog. To invoke this dialog, select **Options | Options** from AQtrace Viewer's main menu and in the ensuing *Options* dialog choose the **General | Symbols** setting category:



As you can see, the dialog contains three setting groups: Module Storage, Modules Path and Symbols Path. You can use all of these groups to specify the path to the binary modules and debug info files. AQtrace Viewer uses all of these three groups to search for files, these settings work together and do not exclude each other.

When specifying the search paths, keep in mind the following principles:

- End-users can work with various versions (builds) of your application. For instance, some users can work with version 2.0 while others still use the version 1.9. So, you may receive error reports generated for different versions of your application.

  To analyze error reports, you should be able to provide binary modules and debug information for all application versions shipped to end-users. You do this by creating a build storage (see *Organizing Build Storage*).

- To search for a binary module, AQtrace Viewer uses the module's name (file name + extension) and the module's version information mentioned in the report. The version information is important because it lets the Viewer distinguish the modules used in the different builds of your application.

- AQtrace assumes that the debug information is either included into the binary module, or that the debug information file resides in the same folder, in which the binary module is located (see *AQtrace Viewer - Retrieving Debug Information*).

The Symbols Options dialog offers three ways to specify the search paths:

- **Module Storage**

  This setting specifies the name of the file that contains information about the module names, versions and path to the module's file in the build storage. When searching for a module, AQtrace Viewer parses this file and retrieves information about the needed binary module.

  You create this file with the *AQtrace Module Store* utility that resides in the *<AQtrace>\Bin* folder. The setting should specify the fully-qualified name of this file.

  Note that you should update the file every time you ship a new version to end-users. Otherwise, the file will not contain information for the new versions of modules and the report analysis will fail.

  The file can be updated either manually or automatically. For information on updating the file manually and on how to work with AQtrace Module Store, see the *Using AQtrace Module Store* topic. For information on updating the file automatically, see the *Using AQtrace Module Store Agent* topic.

- **Modules Path**

  The Modules Path box lists the folders, in which AQtrace Viewer will search for binary modules and debug information files. You can see these folders as additional search paths to the paths specified by the Module Storage file. For instance, you can use the Modules Path settings to enable certain search paths which you do not normally use.

  To add a path to the Modules path list, click **Add** and then specify the desired folder using the in-place editor. Confirm the input by pressing Enter. The Add button will remain disabled if the list Modules Path contains at least one empty row.

  Note that AQtrace Viewer will only search for the modules in the specified folders, subfolders will not be included in the search. Also, the Viewer will use only those search paths that are checked in the list.

- **Symbols Path**

  The Symbols Path box specifies the folders and URLs in which AQtrace Viewer will search for binary modules and debug info files. If the Viewer found a file on a URL, it will download it to the folder specified by the **Cache symbols directory** setting and will use the downloaded file copy for parsing the reports.

  In order for AQtrace Viewer to be able to use the search paths specified by the Symbols Path

settings, the SymSrv.dll module must be installed on your computer. This DLL is part of the Debugging Tools for Windows package. You can download it from Microsoft's web site.

Typically, Symbols Path settings are used to specify the search paths for the operating system's modules and their debug info.

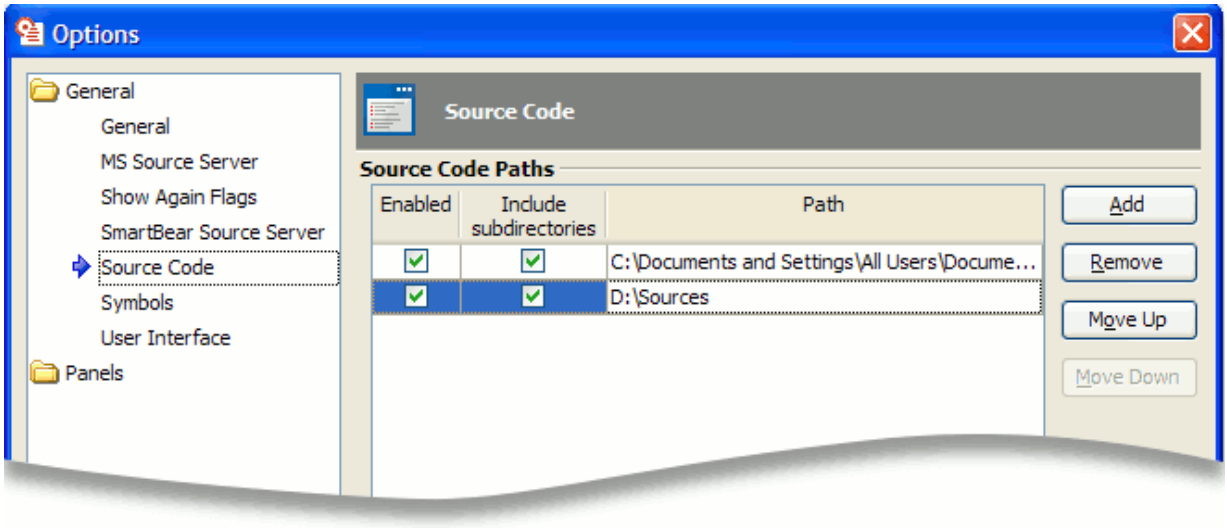
Note: AQtrace Viewer uses the search paths in the following order:

1. Module Storage setting
2. Symbols Path setting
3. Modules Path setting

Once the module with the specified name and version information is found, the search is stopped and the found module is used.

Path to Source Code

You specify the search paths for source code files in the *Source Code Options* dialog. To invoke the dialog, choose **Options | Options** from the main menu of AQtrace Viewer and in the ensuing Options dialog choose the **General | Source Code** settings category:



In the dialog, click **Add**. This will append a new item to the list. Specify the desired folder using the ensuing in-place editor. Confirm your change by pressing Enter. Note that you can specify only the topmost folder and select the **Include subdirectories** check box. In this case, AQtrace Viewer will automatically include subfolders of the specified folder into the search paths.

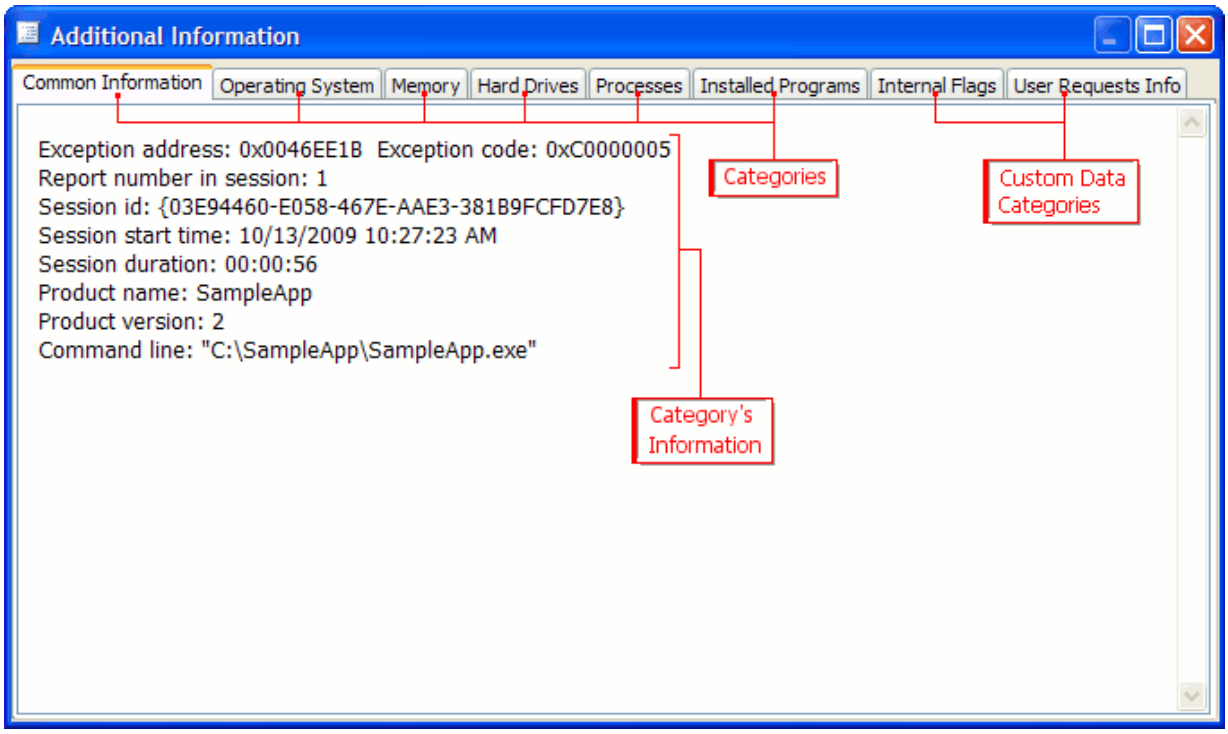
Besides the path to the source files of your application it is also recommended to specify the search paths for the source files of the MFC, VCL or any other library that was used to create your application. By providing this information, AQtrace Viewer will be able to display source code for the MFC, VCL and other library routines.

Panels

Additional Information Panel

The **Additional Information** panel of *AQtrace Viewer* displays additional data included in the error report by *AQtrace Reporter* (see *Specifying Data to Be Included in Reports*). If the panel is hidden, select **View | Select Panel** from AQtrace Viewer's main menu and then choose **Additional Information** in the ensuing *Select Panel* dialog.

Data within the panel are organized into several categories. Each category is displayed on an individual tab in the panel (see the image below). The categories are formed by AQtrace Reporter when it generates an error report, the panel displays the report's data.



The categories to be included in the report are specified by the AQtrace Reporter's settings (see *Specifying Data to Be Included in Reports*). These categories are listed below. The panel may also contain custom categories of data that are included in error reports by your application and for which the panel creates individual tabs (see *Inserting Custom Data Into Reports*). If a category is not included in the report, its tab is hidden from the panel.

The following table describes the categories that are included by the AQtrace Reporter's settings and displayed on appropriate tabs in the Additional Information panel:

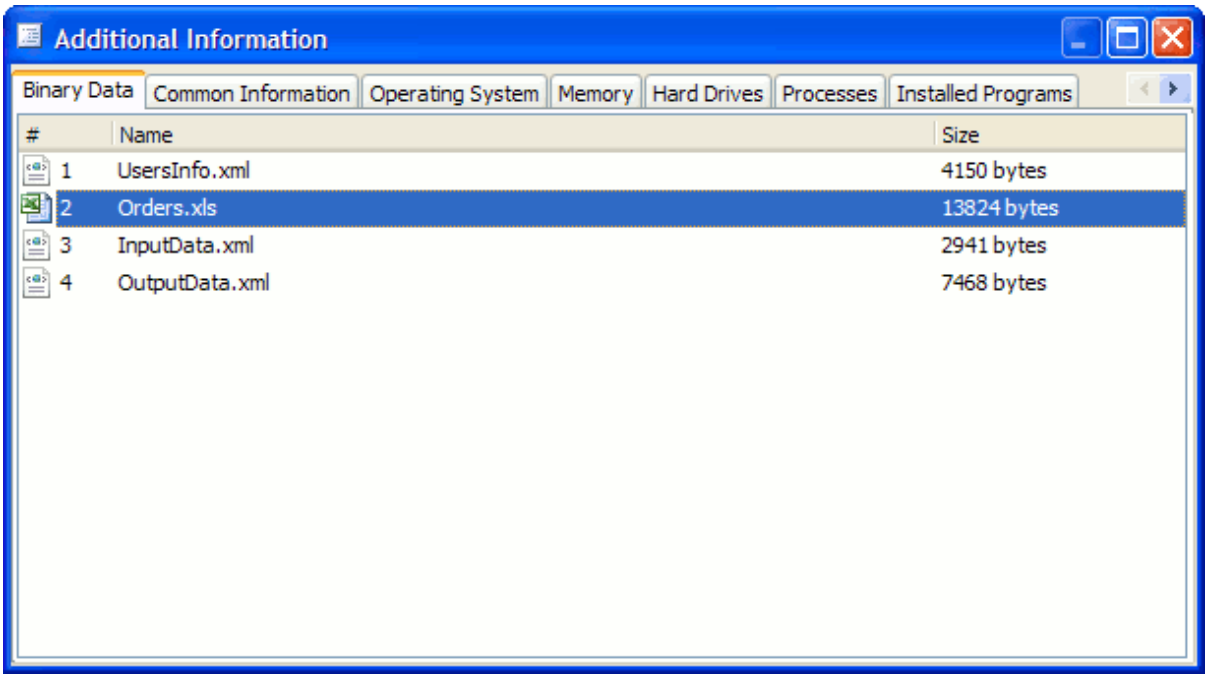
Category	Description
Common Information	Contains general information about the exception: • Exception code • Memory address, at which the exception occurred • Session start time in the UTC format (the time the application started on the end-user computer, regardless of the local time settings of this computer) • Session duration (the time period elapsed since the application start to the

Category	Description
	moment of report generation) • The exception's number during application execution (this number helps you determine whether other exceptions had occurred during the application run before the given exception occurred) • Product name and version • Command line used to run the application
Operating System	Contains information about the operating system, its components and CPU(s): • Operating system's name • Service packs installed on the end-user's computer • Operating system's session identifier • Names of Windows, System32 and Temp folders • Information about .NET Framework versions installed on the end-user's computer • Information about CPU(s) • Name of the end-user's computer • Information about the user account, under which the application was executed • Information about keyboard layouts and languages installed on the end-user's computer
Memory	Contains information about memory usage on the end-user's computer: • Memory load • Information on swap file size and its usage • Information about the total and free physical memory • Information about virtual memory • Information on the size of the page file and its usage • The number of user objects used by the application before the exception occurred • The number of GDI objects used by the application before the exception occurred • The number of handles used by the application before the exception occurred • Information about the amount of physical and virtual memory occupied by the application before the exception occurred
Hard Drives	Contains information about the hard drive(s) (logical drive letters, total and free space).
Processes	Lists the processes that were running in the operating system when the exception occurred. The following information is displayed for each process: • ID of the process • The fully-qualified name of the process's executable

Category	Description
	• The name of the user who owns the process
Installed Programs	Contains information about the programs and software updates installed on the end-user's computer: • Program name • Software publisher • Version number
Printers	Contains information about the printing devices connected to the end-user's computer: • The printer's name and description • Port • Page size and orientation • Resolution (dots per inch) • Paper source and other settings
Network	Contains information about the end-user computer's address, domain, DNS servers and other network settings and about network adapters installed on the computer. Due to certain reasons, AQtrace Reporter cannot obtain this information on the Windows NT operating system. So, the **Network** tab is not displayed in the Additional Information panel if the report was generated by the Reporter on Windows NT 4.0 with Service Pack 6 or later.
Services	Contains information about the services that were registered in the operating system when an exception occurred: • Service name (the name that identifies the service). • Service type: file system driver, driver, and so on. For information on the service type constants, see description of the `QUERY_SERVICE_CONFIG` structure in the MSDN library. • Current state of the service (running, paused, stopped and so on). • Control codes that service accepts and processes. For information on the service type constants, see description of the `SERVICE_STATUS` structure in the MSDN library. • Start type (manual, auto, disabled and so on). • Error control (the action which is taken when the service fails to start). For information on the service type constants, see description of the `QUERY_SERVICE_CONFIG` structure in the MSDN library. • Fully-qualified name of the service's executable module. • User account, under which the service is running. • Display name (the string that is displayed in the Services window of the Control Panel).
Display	Contains information about the monitor(s):

Category	Description
Devices	• Name and description • Color resolution • Width and height (in pixels) • Display orientation • Frequency and other settings Due to certain reasons, AQtrace Reporter cannot obtain this information on the Windows NT operating system. So, the **Display Devices** tab is not displayed in the Additional Information panel if the report was generated by the Reporter on Windows NT 4.0 with Service Pack 6 or later.
Process Privileges	Contains information about the security permissions of the user account, under which your application was running. For information about group flags, see the `TOKEN_GROUPS` structure description in the MSDN library. For information on constants that are used to specify privileges, see the *Authorization constants* topic of the *Platform SDK: Security* section in the MSDN library.

If some *custom binary files* are included in the report, they are listed on the **Binary Data** tab that becomes visible in the Additional Information panel (see the image below). You can see the name of each included file and its size in bytes in the list on this tab. Also, to the left of each file name, there is a small icon that corresponds to the type of the file (if this file type is registered in the system).



Most tabs in the Additional Information panel display data in a tabular form. All the tables on these tabs allow filtering and auto-filtering the displayed data (for more information on this, see *Filtering Data*).

Custom textual data are displayed in a non-tabular form on the tabs created for such data.

To copy data

To copy data displayed in a non-tabular form on the Common Information, Operating System, Memory, or Process Privileges tab or on a tab created for custom textual data in the **Additional Information** panel:

- Select the desired data by dragging the mouse.

  To select the whole text on the tab, choose **Select All** from the context menu.
- Select **Copy** from the context menu.

To copy data from a table displayed on one of the Additional Information panel's tabs (for instance, on the Processes or Installed Programs tab):

- Select the desired row in the table by left-clicking it.

  To select several table rows, press and hold Ctrl and left-click the desired rows. To select all the cells in the table, choose **Select All** from the context menu.
- Select **Copy** from the context menu. Note that the whole row(s) will be copied.

  To copy the contents of one cell, right-click the desired cell and select **Copy cell under cursor** from the context menu.

To export data

To save textual data displayed in a non-tabular form on some tabs of the **Additional Information** panel to an .xml file:

- Right-click within the desired tab and select **Save As** from the context menu.
- Specify the desired file name in the ensuing Save As dialog and click **Save**.

To save binary data of a report to any file:

- On the **Binary Data** tab, right-click the desired file name and select **Save As** from the context menu.
- Specify the desired file name in the ensuing Save File As dialog and click **Save**.

To print data

You can print textual data displayed in a non-tabular form on some of the Additional Information panel's tabs.

- Right-click within the desired tab and select **Print** from the context menu. This will invoke the standard Print dialog.
- In the dialog, specify the printer and various printing settings and then click **Print**.

To preview the data before printing, select **Print Preview** from the context menu.

To open a binary file

To open the desired file with the default application registered for the file's type in the system:

- On the **Binary Data** tab, right-click the desired file name and select **Open** from the context menu.
- Also, you can just double-click the desired file name.

If you want to open the file with another application or if there is no default application for its type:

- On the **Binary Data** tab, right-click the desired file name and select **Open With** from the context menu.

- Choose the desired program in the ensuing Open With dialog and click **OK**.

Call Stack Panel

The **Call Stack** panel of *AQtrace Viewer* displays information about the sequence of function calls for the thread that is selected in the *Threads* panel. If the panel is hidden, select **View | Select Panel** from AQtrace Viewer's main menu and then choose **Call Stack** in the ensuing *Select Panel* dialog.

Each row in the panel corresponds to a function call. The topmost row corresponds to the function in which the exception occurred. Other rows indicate the stack of function calls that led to the call of the topmost function.

AQtrace uses special algorithms to parse the call stack data and determine the sequence of function calls. These algorithms analyze the stack data, function addresses in memory and other information. Nevertheless, the resultant call sequence may miss some calls. This happens due to certain specifics of functions' binary code. In general, AQtrace is unaware of these specifics and can miss some calls when parsing the stack.

You may command AQtrace Viewer to determine these routines by checking the **Show Dirty Stack** item from the context menu of the Call Stack panel. If this menu item is selected, AQtrace Viewer treats any address on the stack as a function call address and adds the appropriate items to the calls stack.

In order for AQtrace Viewer to be able to parse error reports, you must specify the location of binary modules and debug information files for the Viewer. Without this information, the Viewer will be unable to parse the call stack data and the Call Stack panel will contain only the top-most routine. For more information on how to specify the location, see *Specifying Path to Modules*.

Information about each function call has the following format:

```
module_name ! address routine_name([param_type param_name = param_value,
…]) Offset:offset Line:source_line_info
```

Currently, AQtrace Viewer cannot obtain information about routine parameters while parsing .NET (managed) call stack data. So, parameters of .NET functions are not displayed in the panel.

For instance:

```
SampleApp.exe!0x004033FB SampleExcepts.obj::CreateAccessViolation(void*
arg0 = 0x00000000) Offset: 0x3B Line: 15
SampleApp.exe!0x0040F3C2 afxstate.obj::AfxGetModuleThreadState() Offset:
0xF Line: 465
SampleApp.exe!0x00405C84 winocc.obj::CWnd::IsDialogMessageW(tagMSG* arg0
= 0x001771D0) Offset: 0x2E Line: 197
SampleApp.exe!0x00407516 wincore.obj::CWnd::PreTranslateInput(tagMSG*
arg0 = 0x001771D0) Offset: 0x29 Line: 426
SampleApp.exe!0x0040891E wincore.obj::CWnd::RunModalLoop(unsigned long
arg0 = 0x00000004) Offset: 0xCA Line: 42
```

- **module_name** - Specifies the file name and extension of the module that contains the function's code.
- **address** - Specifies the address to which the application will return the execution flow after the function call is over. For the topmost function this address specifies the address at which the

exception occurred.

- **routine_name** - The function's name. If the **Show Full Routine Names** item of the context menu is checked, the panel displays the unit name along with the routine name.

  Note that the panel displays the routine and unit names only if the Viewer has found and loaded debug information for the module (see *Specifying Path to Modules*).

- **param_type** - Specifies the routine parameter's type. Note that the panel displays parameter types only if the Viewer has found and loaded debug information for the module. Currently, parameter types cannot be displayed for .NET routines.

- **param_name** - Displays the parameter's name. All function parameters displayed in the panel have the following name format: `argN`, where `N` specifies the number of the parameter among other parameters of the function (for instance, `arg0`, `arg1`, etc.). Note that currently, parameter names cannot be displayed for .NET routines.

- **param_value** - Specifies the value of the function's parameter that has been passed to the called routine.

  By default, a parameter's value is shown as a hexadecimal value. To view it in the decimal format, right-click somewhere within the panel and uncheck **Hexadecimal Display** in the context menu. Note that the values of pointer type parameters are always shown in the hexadecimal format.

  The panel displays parameter values only if the Viewer has found and loaded debug information for the module. Note that currently, parameter values cannot be displayed for .NET routines.

- **offset** - Specifies the offset of the `address` from the beginning of the caller routine.

- **source_line_info** - Displays the number of the source line that contains a call to the upper routine. For the topmost function, this value is the number of the source line at which the exception occurred.

  Note that the panel displays the source line number only if the Viewer has found and loaded debug information for the module and if the path to the module is specified.

Note: If a function has more than one parameter, they are enclosed in parenthesis and are listed after the function's name. Functions may also have no parameters. In this case, there are empty parenthesis after the routine's name.

To hide or display parts of the call information

To hide or show some parts of the function call information, use the panel's context menu. For instance, by checking or unchecking the **Show Byte Offset** item you can show or hide the address part; by using the **Show Routine Parameter Values** item, you can show or hide the values of the parameters passed to routines, and so on.

To view a function's binary code

- Select the desired function in the call stack.
- Click the **Go to Disassembly** button on the panel's toolbar.

-- or --

- Right-click the desired function in the call stack.
- Select **Go to Disassembly** from the context menu.

The Viewer will display the function's binary code in the *Disassembly* panel and set the focus on it.

You can also double-click the desired function in the call stack, or select it and press Enter. In this case, the **Disassembly** panel will contain the binary code of the selected function, but the focus will not be set on it and the panel will not become active.

To view a function's source code

- Select the desired function in the call stack.
- Click the **Go to Source Code** button on the panel's toolbar.

-- or --

- Right-click the desired function in the call stack.
- Select **Go to Source Code** from the context menu.

The Viewer will display the function's source code in the *Code Viewer* panel and set the focus on it. Note that the source code can be displayed in the panel only if you specified the path to the source files in the Viewer's options (see *Specifying Path to Modules*) or if you use a source server to get the source code files from a source control system (see *Source Server Support*).

You can also double-click the desired function in the call stack, or select it and press Enter. In this case, the **Code Viewer** panel will contain the source code of the selected function, but the focus will not be set on it and the panel will not become active.

To view information about modules

- Select the desired function in the call stack.
- Click the **Go to Module** button on the panel's toolbar.

-- or --

- Right-click the desired function in the call stack.
- Select **Go to Module** from the context menu.

The Viewer will set the focus on the *Modules* panel's row that contains information about the module in which the selected function is implemented.

You can also double-click the desired function in the call stack, or select it and press Enter. In this case, the focus will be set on the appropriate row of the **Modules** panel, but the panel will not become active.

To copy data

To copy data displayed in the Call Stack panel:

- Select the desired rows in the call stack (You can use Ctrl- and Shift- for multi-selection. To select the whole data, choose **Select All** from the context menu.)
- Choose **Copy** from the context menu.

Code Viewer Panel

The **Code Viewer** panel of *AQtrace Viewer* displays the source code of modules that is included into the analyzed error report. If the Code Viewer panel is hidden, select **View | Select Panel** from AQtrace Viewer's main menu and then choose **Code Viewer** in the ensuing *Select Panel* dialog.

The Code Viewer panel shows the source file that contains the routine that is selected in the *Call Stack* panel (see *Analyzing Error Reports With AQtrace Viewer*). The file name is shown at the top of the panel.

Features and Advantages of Code Viewer

The source code of application modules can change from one build to another, and users may purchase versions of the application whose source code was different during compilation. When developers receive an error report generated by the application and start analyzing this report, it is very important to take a look at the source code that was used during compilation of the application version that generated the report. In this case, the developers may face a problem, because it is not easy to determine the version of the source code of certain modules. The Code Viewer panel can solve this problem. It displays the exact source code of the routine selected in the Call Stack panel by using source servers. They can retrieve the exact version of the source code from a source control system. That is, the source code file used to compile the module can be displayed in the Code Viewer panel and this can be very useful when analyzing error reports. Currently, AQtrace Viewer supports *Microsoft Source Server* and *SmartBear Source Server*. For more information on this, see *Source Server Support*.

Furthermore, the Code Viewer panel can display source code by using local copies of source files without referring to source servers and source control systems. However, in this case, another version of the source code that was used for another build may be displayed in the Code Viewer panel, which may confuse you.

You can also select the source code file to be opened and displayed in the Code Viewer panel. This can be useful when you want to look into some source file that was used during application compiling, but its routines are not displayed in the Call Stack panel (for instance, some header file included in the application).

By using SmartBear Source Server with AQtrace Viewer, you can compare the version of the source code of certain application build with the actual version of the source code, that is with the latest version of the source code stored in your source control system. You can view the difference in the source files and analyze the changes. For more information on this, see *Comparing Versions of Source Code Files*.

Requirements for Displaying Source Code

The Code Viewer panel may be unable to display source code. This happens when one or more of the following conditions are not met. In order for the panel to be able to display a source file using SmartBear Source Server, all of these conditions should be met:

- The module that contains the routine must be compiled with debug information (see *Compiling Applications With Debug Information*) and AQtrace Viewer's settings must specify the path to debug info files, that is, AQtrace Viewer should be able to find debug info files (see *Specifying Path to Modules*).
- The debug information must contain information about source code lines.
- The modules of the application must be source indexed and the corresponding aqIndex.aqiss index file must be located in the folder where the modules of the application's build reside (see *Source Indexing for SmartBear Source Server*).

In order to display the source code in the panel using Microsoft Source Server, the following conditions should be met:

- The module that contains the routine selected in the Call Stack panel must be compiled with debug information and AQtrace Viewer's settings must specify the path to debug info files.
- The debug information must contain information about source code lines.
- The application's debug information files (.PDB) must be source indexed (see *Source Indexing for Microsoft Source Server*).

In order for the panel to be able to display a source file located on the local drive, all of these conditions should be met:

- You should specify the source file location in the *Source Code Options* dialog.

- The module that contains the routine must be compiled with debug information and AQtrace Viewer's settings specify the path to debug info files, that is, AQtrace Viewer should be able to find debug info files (see *Specifying Path to Modules*).
- The debug information must contain information about source code lines.

If these conditions are not met, the panel is empty. This typically happens for Delphi applications, whose debug information was generated as .map files. These files do not contain information about source code, so Code Viewer does not "know" what file to display.

Note that besides your routines, the call stack may also contain functions of the program libraries, which were used to create your application. For instance, the call stack generated for a Visual C++ or Delphi application typically contains the calls to methods of MFC or VCL classes. To view code of the MFC and VCL routines, you should specify the path to MFC (or VCL) source in the *Source Code Options* dialog. If this dialog does not contain a path to the MFC (or VCL) source, the Code Viewer panel does not display source files for MFC classes (or VCL classes, or classes of any other library that was used to create your application).

Working with Code Viewer

To view or set search paths

- Right-click somewhere within the Code Viewer panel and select **Set Source Code Paths** from the context menu. This will invoke the *Source Code Options* dialog.
- Use the dialog to view the search paths and to modify them. For more information about this, see the *dialog description*.

To modify panel's settings

The Code Viewer panel has a number of settings that define various aspects of the panel's behavior. To view or modify these settings, right-click somewhere within the panel, select **Panel Options** from the context menu and use the ensuing Options dialog. For more information about the panel's settings, see *Code Viewer - Settings*.

To search for text in the panel

- Select **Edit | Find** from the main menu of AQtrace Viewer. This will invoke the *Find* dialog.
- In the **Find what** box of the dialog, enter the text to be sought for.
- Use other edit boxes and check boxes to specify the search conditions (for instance, you may specify that you will use regular expressions or wildcards. See *the description of the Find dialog*).
- Press **Find** to initiate the search. If the search engine will find the specified text, it will highlight it in the Code Viewer panel.
- To continue the search, select **Find Next** in the Find dialog, or choose **Edit | Find Next** from the main menu of AQtrace Viewer, or press F3.

To find all of the occurrences for the desired text, press **Find All** in the Find dialog. AQtrace Viewer will mark the found occurrences in the panel.

To open a source file and display it in the panel

- Right-click somewhere within the Code Viewer panel and select **Open File** from the context menu.
- In the ensuing **Open File** dialog, select the source file that you want to be displayed and press

Open.

Displaying the difference in source code versions

This feature applies only to the source code that was retrieved from a source control system by using SmartBear Source Server. AQtrace Viewer allows displaying the difference between the latest version of the source code stored in your source control system and the version of the code that was used to compile the build being analyzed. To compare the two versions of a source code file and display the difference between them, AQtrace Viewer uses a third-party file comparison tool, which you specify in the *Comparison tools* setting group on the **Panels | Code Viewer | General** page of AQtrace Viewer's *Options* dialog. To display the difference between two versions of the source code, do the following:

- Right-click somewhere within the Code Viewer panel and select **Show Difference** from the context menu. AQtrace Viewer will launch the selected third-party comparison tool and command it to compare the two versions of the source code and display the difference between them.

To compare source files and display differences, you must specify the path to the needed comparison tool's executable file and its command-line arguments. See *Code Viewer - General Settings* for more information on this.

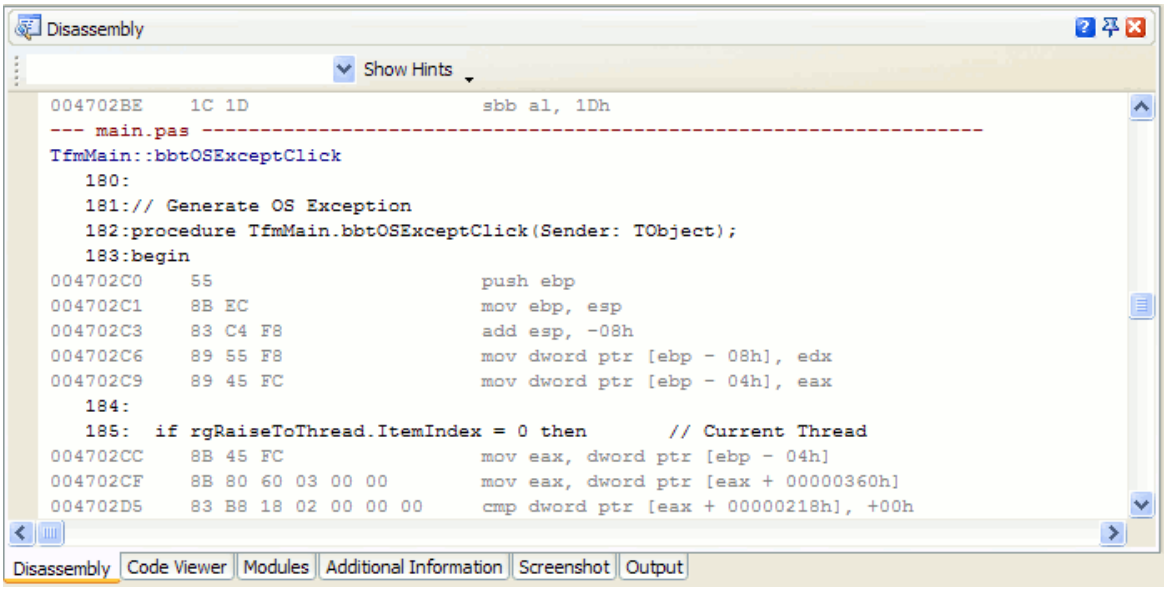
Disassembly Panel

The **Disassembly** panel of the *AQtrace Viewer* displays binary and source code of modules included in the application whose error report is being analyzed in the Viewer. If the Disassembly panel is hidden, select **View | Select Panel** from AQtrace Viewer's main menu and then choose **Disassembly** in the ensuing *Select Panel* dialog.

The Disassembly panel shows the code of the routine selected in the *Call Stack* panel (see *Analyzing Error Reports With AQtrace Viewer*).

In order for the Disassembly panel to be able to display the application's code, it must have access to the binary code of the modules included in the report. For information on how to specify the path to the binary code, see *AQtrace Viewer - Specifying Path to Modules*.

Below is a sample view of the Disassembly panel:



For each assembler instruction in native (unmanaged) modules, the panel displays the following information:

- The instruction's starting address in memory.
- The instruction's data (code bytes) in memory (in hexadecimal format).
- The assembler mnemonics for the instruction.

For each instruction in .NET assemblies, the panel displays the following information:

- The instruction's offset from the beginning of the routine's code.
- The instruction's data (code bytes) in memory (in hexadecimal format).
- The IL (intermediate language) instruction.

Using the **Show Address** and **Show Code Bytes** items of the panel's context menu you can hide or show instructions' starting addresses and binary data. Assembler mnemonics or IL instructions cannot be hidden. The number of code bytes displayed in a single line in the panel is specified by the *Code bytes in line* setting in the *Disassembly Options* dialog.

Using the **Show RVA** item of the panel's context menu, you can show or hide *relative virtual addresses* (RVA) of assembler instructions in native (unmanaged) modules. The relative virtual address of an instruction is equal to the instruction's offset relative to the base address of the module in which the instruction is located (that is, relative to the address where the module is loaded in memory). The full address of each assembler instruction (this address is shown in the panel if the Show Address context menu item is selected) is equal to the sum of the module's base address and the instruction's RVA. By default, the Disassembly panel does not show RVAs of assembler instructions. To display them, you need to select the Show RVA context menu item.

Note: The panel can show only RVAs of assembler instructions in native (unmanaged) modules. For .NET assemblies, such addresses are not shown regardless of the state of the Show RVA context menu item. Also, the panel does not show RVA values for those memory areas that do not contain instructions from a module.

If the Viewer's *Source Code Options* specify the path to source files of your modules, then the Disassembly panel also shows source code lines (they are interlaced with assembler instructions). This feature requires that the modules are compiled with debug information and the Viewer's settings specify the path to debug info files (see *AQtrace Viewer - Specifying Path to Modules*).

Besides the path to the source files of your application, it is also recommended that you specify the paths to the source files of MFC, VCL or any other library that was used to create your applicaiton. If this information is provided, the Disassembly panel is able to display the source code of MFC routines (or VCL routines, or routines of other libraries).

Using the **Show Source Code** and **Show Line Numbers** items of the context menu you can hide or show the source code or source line numbers.

The Disassembly panel uses specific markers to provide information about the code. For instance, these markers indicate the beginning of a source file, or the code areas that, according to debug information, do not belong to any routine (the *no routine* markers).You can hide or show these markers by using the **Show Bounds** item of the context menu.

To view assembler code that resides at a certain address, enter this address into the **Address** box of the Disassembly toolbar and press Enter. If you specify the address in the hexadecimal format, use the `0x` prefix. Note that you can either type the address, or drag it to the Address box from the Disassembly panel or from one of the *Memory* panels. The dragged values are always treated as hexadecimal.

Besides, you can easily switch to the code that resides at a certain address if you right-click the address value shown somewhere within the Disassembly panel and select **Follow** from the context menu. Also, you can right-click the name of a CPU register with the needed address value or select an expression with the CPU register name(s) somewhere within the assembler instructions in the panel and use the Follow context menu command. The panel switches then to the address stored in the CPU register or obtained as a result of evaluation of the selected expression (if any).

For each jump or call command in the binary code, the Disassembly panel shows a hyperlink that allows you to go to the destination address in the code upon clicking this hyperlink. Such hyperlinks are shown in parentheses next to the appropriate assembler mnemonics. The text of such a hyperlink is underlined and contains the hexadecimal value of the destination address. Also, for call commands, the panel can show the name of the called routine. Such a name is shown next to the hyperlink if the debug information containing symbols with this name is available for AQtrace Viewer.

In addition to the Address box, the Disassembly toolbar contains the **Show Hints** button. If this button is pressed, the Disassembly panel shows a hint with a value set to a certain CPU register when you hover the mouse pointer over the name of this register somewhere within the assembler code shown in the panel. Also, hints are shown in the Disassembly panel when you hover the mouse pointer over various numeric values displayed in the panel (for instance, over code bytes, starting addresses of assembler instructions or over some numeric values used in the code). However, for such numeric values, the hints just show the same hexadecimal numeric values as those over which you hover the mouse pointer. By default, the panel does not show any hints until you press the Show Hints button.

To copy data displayed in the panel to the clipboard, select the desired data by dragging the mouse and then choose **Copy** from the context menu.

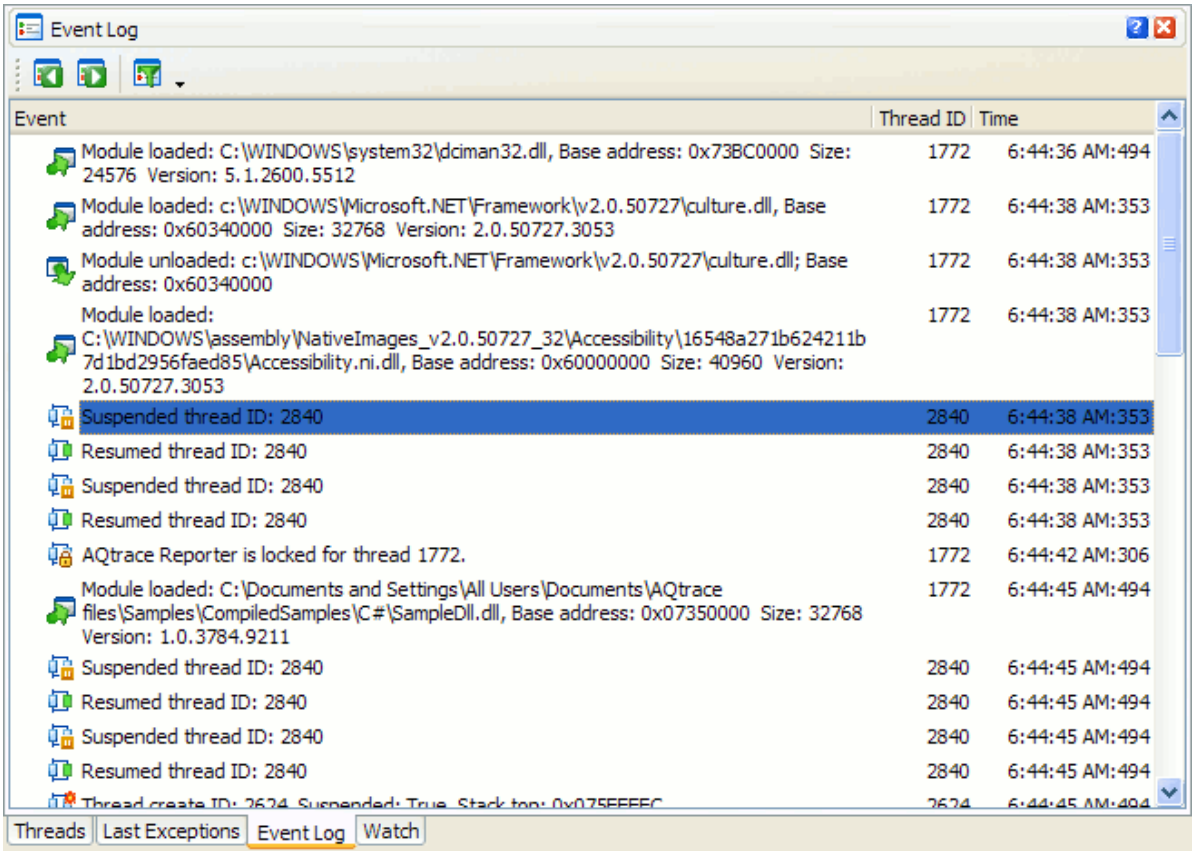
Event Log Panel

The **Event Log** panel of *AQtrace Viewer* displays information on events that occurred within the application monitored by *AQtrace Reporter* before generating the error report. In this panel you can see various information that can be helpful for analyzing an error report and for searching the reason of a bug. For instance, from the log you can find out when various modules were loaded to and unloaded from memory by the application, when secondary threads were created, suspended and terminated, when exceptions occurred, when the AQtrace Reporter's functionality was locked and unlocked, and so on. Also, various helpful details are displayed in the panel for each of the supported event types.

If the panel is hidden, select **View | Select Panel** from AQtrace Viewer's main menu and then choose

Event Log in the ensuing *Select Panel* dialog.

Here is a sample view of the panel:



For each event the panel displays information in the following three columns:

Column	Description
Event	The event's description (the event's type, indicated by an appropriate icon and text message, and some specific details on the event).
Thread ID	The identifier of the thread in which the event occurred.
Time	The time of the event's occurrence. The time is represented in the *hh:mm:ss:ms* format. Note that AQtrace Reporter collects time values as UTC time, regardless of the local time settings of the end-user computer where events occur.

To search for text in the panel, either select **Find** and **Find Next** from the **Edit** menu or use the Ctrl+F shortcut (this will invoke the *Find* dialog that is used for searching). To switch quickly to the desired text in the Event column, you can also simply start typing the text and the focus will be automatically set then to the first record started with the typed text and displayed below the current cursor position.

To browse through events of the same type, you can select one event of the desired type and use then the **Go to Previous Event** and **Go to Next Event** buttons on the Event Log toolbar.

To copy information on the selected events to the clipboard, select **Copy** from the panel's context menu or from the **Edit** menu.

To export information selected in the panel to an .html, .xml or .txt file, select **Save Selection** from the context menu. To export the whole event log, select **Save** from the context menu. Note that when the event log is exported to an .xml file, AQtrace Viewer creates also an .xsl file that defines how this information in the .xml file should be transformed to display it in a more convenient form.

As the events monitored by AQtrace Reporter occur very frequently, the Event Log panel contains usually a lot of information. To hide temporarily unnecessary information, you can filter it by choosing types of events for which you want to see information. Select **Filter Panel** from the panel's context menu or click the appropriate button on the Event Log toolbar. The **Filter** panel at the bottom of the Event Log panel will be displayed then (see the image above). Click the **Customize** button to invoke the *Message Filter* dialog in which you can specify event types to be displayed in the panel. The filter's value is displayed to the right of the check box in the Filter panel. The filter is active only if this check box is selected. If you want to disable temporarily the filter, clear the check box.

In addition, you can filter events in the Event Log panel by the thread in which they were raised. For this purpose, simply select the desired thread identifier in the **Thread** combo box that is displayed on the left of the Filter panel. If the *All Threads* value is selected in this combo box, Event Log will display events for all threads.

The supported types of events monitored by AQtrace Reporter and displayed in the Event Log table are listed in the table below.

Event	Description
aqReporter locked for all threads	Logs locking of the AQtrace Reporter's functionality for all threads in the monitored application. Locking of AQtrace Reporter is carried out by calling the `IaqReporterIntf.GlobalLock` method. For more information, see *Enabling and Disabling AQtrace Reporter*.
aqReporter unlocked for all threads	Logs unlocking of the AQtrace Reporter's functionality when it is disabled for all threads in the monitored application. Unlocking of AQtrace Reporter is carried out by calling the `IaqReporterIntf.GlobalUnlock` method. For more information, see *Enabling and Disabling AQtrace Reporter*.
aqReporter locked for thread	Logs locking of the AQtrace Reporter's functionality for one thread in the monitored application. For such events, the Event Log panel displays the identifier of the thread for which the Reporter's functionality has been locked. To disable AQtrace Reporter for the current thread (for instance, to execute some code that is not needed to be monitored by AQtrace Reporter), the `IaqReporterIntf.Lock` method is called. For more information, see *Enabling and Disabling AQtrace Reporter*.
aqReporter unlocked for thread	Logs unlocking of the AQtrace Reporter's functionality when it is disabled for one thread in the monitored application. For such events, the Event Log panel displays

Event	Description
	the identifier of the thread for which the Reporter's functionality has been unlocked. To enable AQtrace Reporter for the current thread, the `IaqReporterIntf.Unlock` method is called. For more information, see *Enabling and Disabling AQtrace Reporter*.
Debug string	Logs creation of a user-defined debug string by calling the `OutputDebugString` Windows API function. The debug string, passed through the function's parameter, is included into the error report and displayed then in the Event Log panel as the **Debug string** event. Such debug strings contain information that can be useful for analyzing error reports. For more information on user-defined debug messages, see *Including Debug Messages Into Error Reports*.
Exception	Logs exceptions raised in the monitored application. For each exception, the panel displays the exception code, the name of the module and memory address, at which the exception occurred. You can also see information on exceptions, raised in the application before generating the error report, in the *Last Exceptions* panel. But this panel displays information only for the certain number of *last-raised exceptions*, while the Event Log panel contains information about all the exceptions occurred during the application run before generating the report. Note that information about the very last exception, caused the application's failure and generating of the report, is not displayed neither in the Event Log panel, nor in the Last Exceptions panel.
Module loaded	Logs the loading of a module (dll, external executable, etc.) by the main application. For such an event the Event Log panel displays the module's name and path, the version of the module, the base address in memory at which the module was loaded and the size of the module (in bytes).
Module unloaded	Logs the release of a module by the main application. The panel displays the name and path of the module and the base address at which the module was loaded.
Thread created	Logs creation of a secondary thread in the monitored application. The thread's identifier, state (whether the thread was suspended on creation or not) and address of the thread's stack top are displayed in the Event Log panel for such an event.
Thread exit	Logs the normal closing of a secondary thread in the monitored application and gives the thread's identifier and

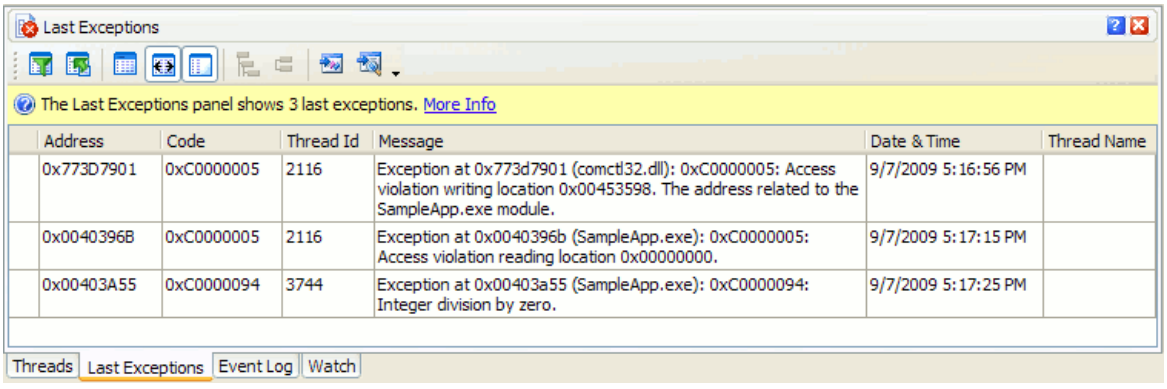
Event	Description
	exit code.
Thread resumed	Logs resuming of a secondary thread that has been suspended. The identifier of this thread is displayed in the Event Log panel.
Thread suspended	Logs suspending of a secondary thread. The identifier of this thread is displayed in the Event Log panel.
Thread terminated	Logs a forced termination of a secondary thread in the monitored application and gives the thread's identifier and exit code.
User message	Logs a message defined by calling the `IaqReporterIntf2.AddMessageToLog` method provided by AQtrace Reporter. For more information on user-defined messages added to the event log, see *Including Debug Messages Into Error Reports*.

Last Exceptions Panel

The **Last Exceptions** panel of *AQtrace Viewer* displays information about the exceptions that had occurred before the exception for which the error report was generated. These exceptions are called **last-raised exceptions**. The *AQtrace Reporter* collects information for these exceptions, since exceptions that occurred earlier may cause the exception, for which the report was generated (for more information, see *About Last-Raised Exceptions*).

Also, the panel can display *user-defined debug messages* that were generated by the application with the use of the `OutputDebugString` function, and highlight them with the desired color.

If the panel is hidden, select **View | Select Panel** from AQtrace Viewer's main menu and then choose **Last Exceptions** in the ensuing *Select Panel* dialog.



The panel uses the following columns to display information about exceptions:

Column	Description
Address	Specifies the address, at which the exception occurred.
Code	Specifies the exception's code.
Thread Id	The identifier of the thread, in which the exception occurred.
Message	The exception's text.
Date & Time	Specifies the date and time when the exception occurred. Note that AQtrace Reporter collects date and time values in the UTC format, regardless of the local time settings of the end-user computer.

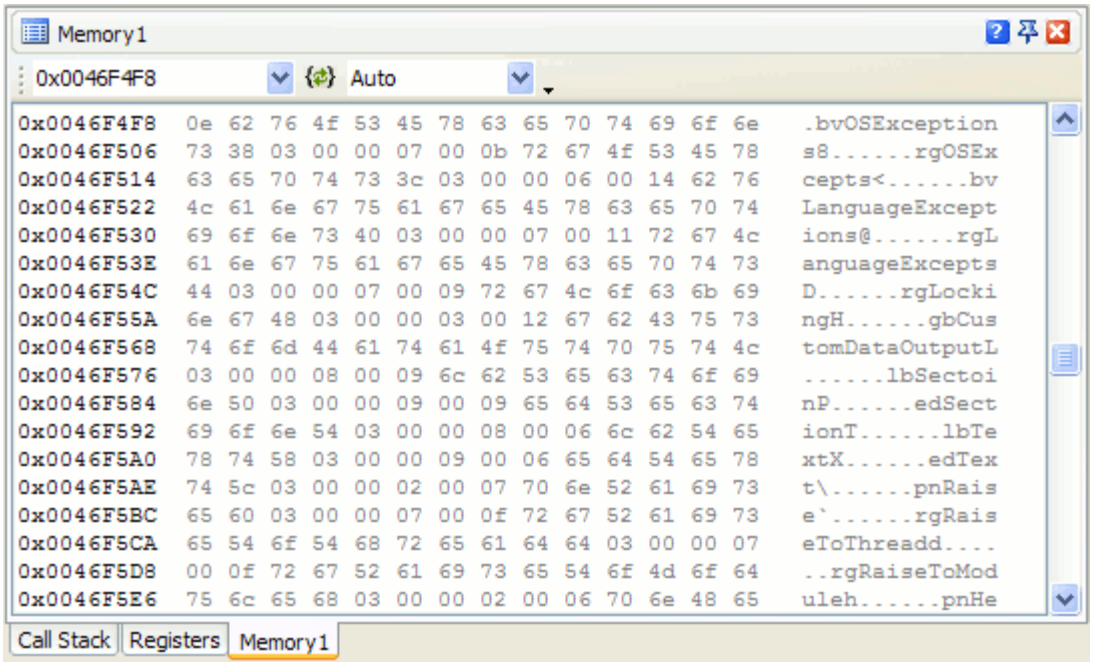
To explore the sequence of function calls that led to the exception, double-click the desired exception in the panel. AQtrace Viewer displays the sequence of function calls in the *Call Stack* panel. You can then choose the desired routine there and go to the *Disassembly* panel to view its code.

The currently analyzed exception is marked with the icon in the list.

Memory Panel

AQtrace Viewer includes three panels that display memory data. They are called **Memory1**, **Memory2** and **Memory3**. You use this panel to explore the memory contents when an exception occurred.

To display the memory panels, choose **View | Select Panel** from the main menu of the AQtrace Viewer and then choose the desired panel in the ensuing *Select Panel* dialog. Here is a sample view of the panel:



As you can see, the Memory panel displays memory addresses on the left. To the right of the addresses, the panel displays the corresponding memory contents as numbers and text.

Note: An error report does not contain all the memory data from the process address space. It contains only memory data that corresponds to the call stack data. AQtrace Viewer restores the memory data by using this stack data and the binary code of modules mentioned in the report. It obtains the binary code of these modules from the build storage (see *Organizing Build Storage* and *Specifying Path to Modules*).

If the Viewer is unable to restore memory data at some addresses, it displays question marks (??) and dots instead of displaying memory contents as numbers and text, respectively, in the Memory panel.

AQtrace Viewer also has the **Memory1**, **Memory2** and **Memory3** toolbars that let you control the data displayed in the appropriate panels. You can dock these toolbars to the toolbar area of AQtrace Viewer's main window, or you can dock these toolbars within the Memory panels. For instance, on the picture above the Memory1 toolbar is docked to the top edge of the Memory1 panel.

The toolbars contain the following items:

- The **Address** box (by default, it is the first item) specifies the start address from which the panel displays memory data.

  In this box, you can specify the needed address as a hexadecimal number starting with the 0x prefix or as an expression that returns an address value. Such expressions can contain, for instance, CPU register names or symbol names obtained from the application's debug information:

  ```
  ebp + 0x09
  eax + esi - 0x02
  GetDesktopName+0x1b
  ```

  When calculating such expressions with CPU register names, AQtrace Viewer uses values that were set for the corresponding registers at the moment when the procedure currently selected in the *Call Stack* panel was called (you can view these register values in the *Registers* panel).

  You can either type the needed address value or drag it from the Memory1, Memory2, Memory3 or *Disassembly* panels. The dragged values are often treated as hexadecimal values.

- The **Reevaluate Automatically** button allows updating the contents of the Memory panel automatically when an expression with a CPU register name is specified in the Address box. Since the values stored in CPU registers change upon calling different routines in the application, the address values returned by such expressions with CPU register names can also change when you select different routine calls in the Call Stack panel. Therefore, if the Reevaluate Automatically button is pressed, the start address from which the Memory panel displays memory data is automatically reevaluated and the contents of the panel is updated when you select different routine calls in the Call Stack panel. Otherwise, if you do not press the button, address values are not reevaluated and the contents of the panel are not automatically updated when you go through the sequence of routine calls in the Call Stack panel. By default, address reevaluation is disabled. To enable it, you need to press the Reevaluate Automatically button.

- The **Columns** box (by default, it is the third item on the Memory toolbar) specifies the number of columns in which the contents of memory data is organized when it is displayed as numbers in the panel.

You can control the data representation format using the items of the panel's context menu:

- **1-byte**, **2-byte**, **4-byte**, **8-byte Integer** - If one of these items is selected, the memory contents is displayed as a sequence of integer values that occupy 1, 2, 4 or 8 bytes in memory.
- **32-byte** and **64-byte Floating Point** - If one of these items is selected, the memory contents is

displayed as a sequence of 32- or 64-byte floating-point values.

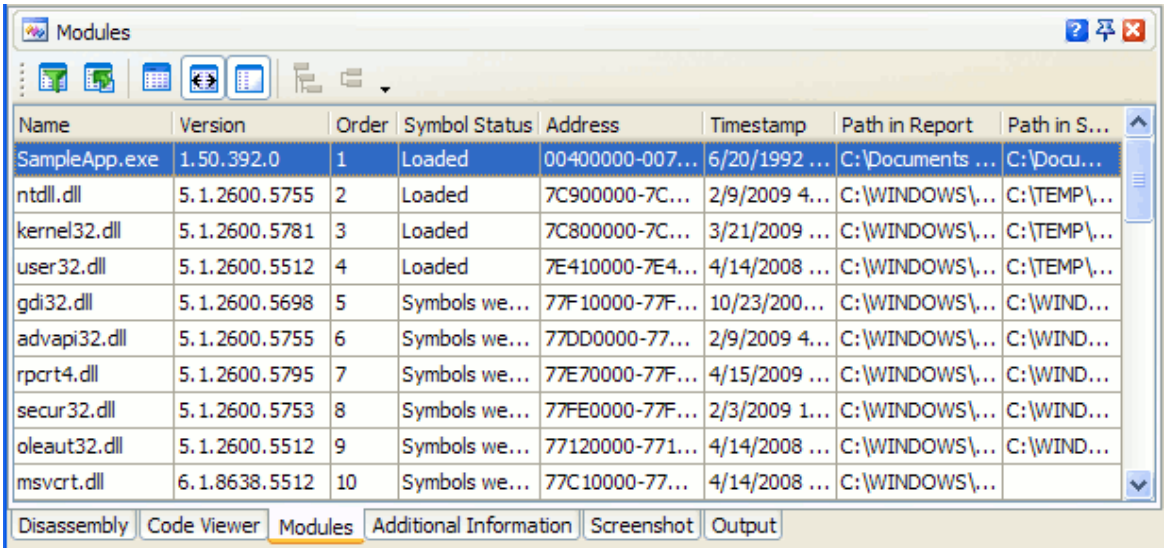
- **Hexadecimal**, **Signed** and **Unsigned Display** - If one of these items is selected, the data is shown as hexadecimal numbers, or as decimal signed or unsigned numbers.
- **Big Endian** - Specifies whether the data should be displayed as big endian values. The big endian format means the higher byte of a machine word precedes the lower byte in memory. This is the opposite of the little endian format that is used by Intel processors and that means the lower byte precedes the higher byte.
- **No data** - Specifies whether the panel displays memory data as numbers. If this menu item is selected, the Memory panel displays memory data as text only.

The context menu also contains the **ANSI Text** and **Unicode Text** items that specify the format of the text representing the memory contents on the right side of the panel. The **No Text** menu item specifies whether the text is visible or not.

To copy memory data from the panel, drag the mouse pointer to mark the desired values, right-click somewhere in the panel and then select **Copy** from the context menu.

Modules Panel

The **Modules** panel of the *AQtrace Viewer* displays information on modules that had been loaded by your application when an exception occurred. If the panel is hidden, select **View | Select Panel** from AQtrace Viewer's main menu and then choose **Modules** in the ensuing *Select Panel* dialog.



For each module, the panel displays the following information:

Column	Description
Address	Specifies the range of addresses that the module occupied in memory.
Name	The file name and extension of the module.
Order	The order of module loading.

Column	Description
Path in Report	The fully-qualified name of the module on the end-user's computer.
Path in Storage	The fully-qualified name of the module on the hard drive (that is, the path to the module's binary code, which AQtrace Viewer loaded to analyze the error report). If AQtrace Viewer cannot find the module in the paths specified by the *Symbols Options* dialog, the column is empty.
Symbol Status	Specifies whether AQtrace Viewer found and loaded debug information for the module. The cells of this column may have one of three possible states: • **Loaded** - The debug symbols for the module were found and retrieved. • **No symbols found** - The debug symbols cannot be found. • **Symbols were not loaded** - The debug symbols were not loaded, though the module's debug information might be available. See *AQtrace Viewer - Retrieving Debug Information* for details.
Timestamp	Specifies the date and time of the module's creation.
Version	The version number of the module. This information is used to identify the module in the *build storage*.

Output Panel

The **Output** panel of *AQtrace Viewer* displays the following information:

- Brief description of the exception, for which the error report was generated.

  Note: If the report was *generated on demand*, (that is, by using the `ShowFatalErrorWithMessage` method of AQtrace Reporter), then the panel informs that the report file does not contain information about the exception.

- Information (if any) that the end-user specified in the *User Info* dialog when sending the error report.
- Various additional data. For instance, if you open the .dmp file that was generated by some other tool rather than AQtrace Reporter, the panel will contain the information, which AQtrace Viewer is unable to display in other panels.

If the panel is hidden, select **View | Select Panel** from AQtrace Viewer's main menu and then choose **Output** in the ensuing *Select Panel* dialog.

To copy the data displayed in the panel:

- Select the desired data by dragging the mouse.

  To select the whole text in the panel, choose **Select All** from the context menu.
- Select **Copy** from the context menu.

Registers Panel

The **Registers** panel of *AQtrace Viewer* displays information on CPU registers' values for the function call that is selected in the *Call Stack* panel. If the panel is hidden, select **View | Select Panel** from AQtrace Viewer's main menu and then choose **Registers** in the ensuing *Select Panel* dialog.

The Registers panel displays the values of CPU registers only for calls to native (unmanaged) code functions. If a .NET (managed) function call is selected in the Call Stack panel, no information is displayed in the Registers panel.

The registers may contain integer and floating-point values. The panel displays integer values as hexadecimal numbers, and floating-point values as a value in scientific format, for instance, $\pm 1.2345 \times 10^{-9}$.

The panel organizes the registers into the following groups:

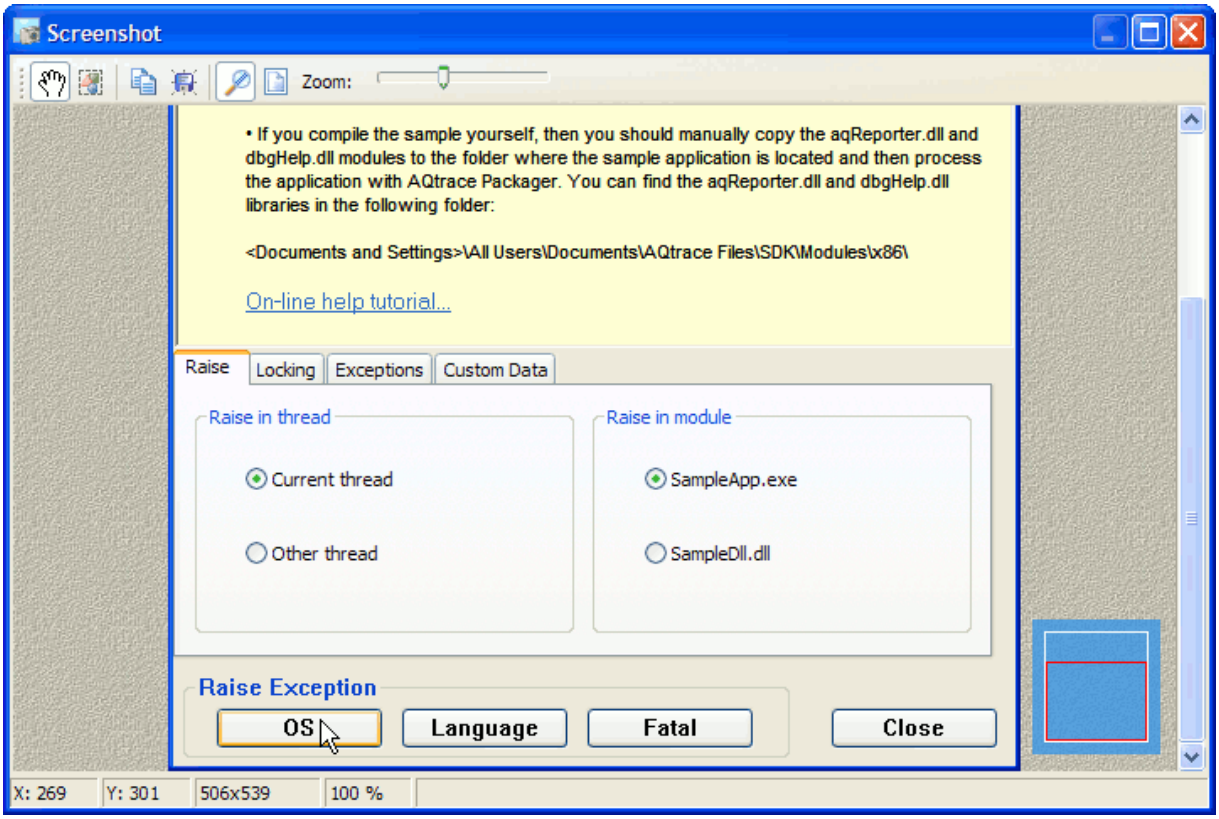
Item	Description
CPU (default)	Standard CPU registers like EAX, EBX, ESP, EBP and others.
CPU segments	The DS, ES, FS, GS, CS and SS registers.
Floating Point	FPU registers (ST0 - ST7, CTRL, STAT and others).
MMX	Registers supported by processors that implement MMX instructions.
SSE	Registers supported by processors that implement the SSE instructions.
SSE2	Registers supported by processors that implement the SSE2 technology.
Flags	Values of the Flag register.

By default, the panel displays registers of the CPU group only. To view information on other registers, right-click somewhere within the panel and select the appropriate group from the context menu.

To copy a register value, select it in the panel and then choose **Copy** from the context menu. You can then paste this value into other panels. For instance, if a register contains a memory address, you can copy it and then paste the copied value to the **Address** box on the *Memory* panel's toolbar to view the data stored by that address.

Screenshot Panel

The **Screenshot** panel of *AQtrace Viewer* displays an image of the application's window. If the panel is hidden, select **View | Select Panel** from AQtrace Viewer's main menu and then choose **Screenshot** in the ensuing *Select Panel* dialog.



On the status bar of the window, the **X** and **Y** sections indicate the current mouse coordinates relative to the picture, 0,0 at top left. Also, the status bar displays the width and height and the current display scale (in percent) of the picture.

All controls are grouped on the toolbar that is displayed by default at the top of the panel:

- When the **Scroll Mode** button is pressed, you can scroll the viewing area using the arrow buttons, the mouse scroll button or by dragging with the mouse inside this area.
- When the **Select Mode** button is pressed, you can select any rectangular region in the picture area by dragging with the mouse inside this area.
- The **Copy** button allows you to copy the selected rectangular region in the picture (see above) or the whole picture, if no region is currently selected, to the clipboard.
- The **Save To File** button allows you to save the whole picture displayed in the panel to a file.
- In order to zoom the picture in or out (increase or decrease the display scale), you can use the **Zoom** slider on the panel's toolbar. Pressing the + or - key or scrolling the mouse wheel with the CTRL key pressed does the same. The **Zoom Default** button restores the original picture scale. To fit the picture within the panel's borders, press the **Best Fit** button.

When you zoom in the picture so that it does not fit the panel's bounds, the panel displays an additional tool, **Navigation Frame**, that is used for quick navigation through the displayed picture. Navigation Frame is shown as a semi-transparent blue rectangle in the bottom right corner of the panel (see the image above). It contains a red rectangle indicating the location of the currently shown picture area within the whole picture whose outline is shown as a white rectangle in a larger size. To change the picture area shown in the panel and quickly navigate through the picture, you can either:

- Drag the red rectangle to the needed area within the white rectangle.

-- or --

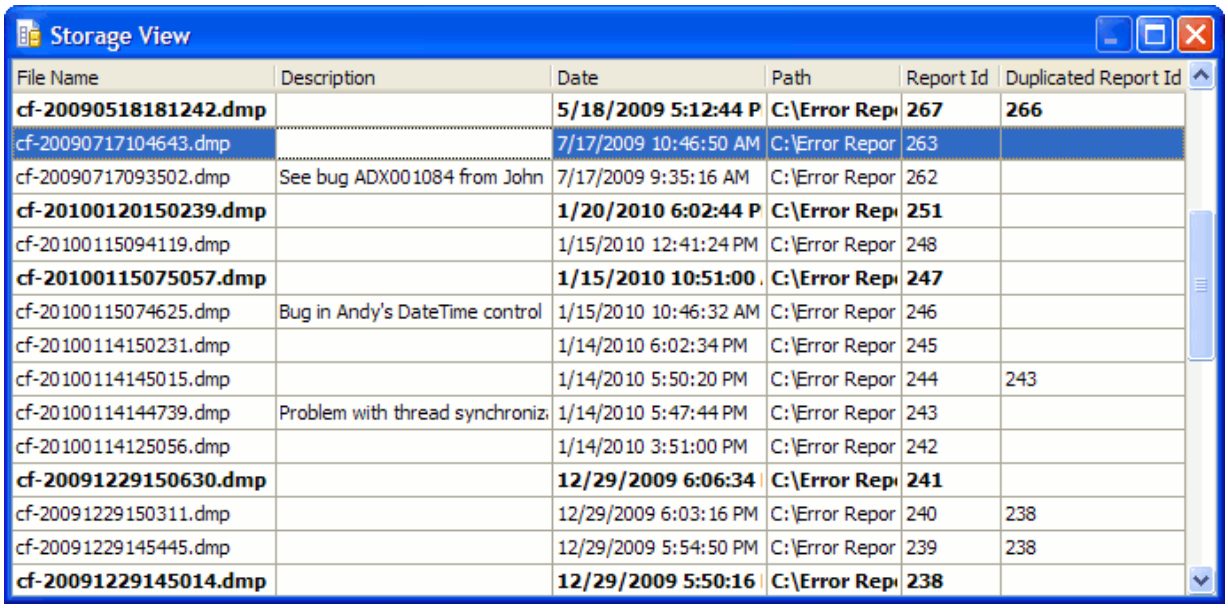
- Click the needed place within the white rectangle (the red rectangle will immediately move to that area).

After that, the panel will change its contents and display the appropriate segment of the picture. Note that when you zoom the picture in or out, the size of the red rectangle changes proportionally. When the display scale is set so that the panel shows the whole picture, the panel hides Navigation Frame.

Storage View Panel

Using the **Storage View** panel of *AQtrace Viewer* you can view the report files that reside in the *persistent report storage* and load these report files in AQtrace Viewer for analysis.

If the panel is hidden, select **View | Select Panel** from AQtrace Viewer's main menu and then choose **Storage View** in the ensuing *Select Panel* dialog.



Note: In order for the panel to be able to obtain access to the persistent report storage, you should specify the path to the storage in the *Storage path* setting of AQtrace Viewer (this setting is located on the *Reports Storage Options* dialog).

If the *Storage path* setting contains a valid folder path, then the Storage View panel displays recently received error reports. The number of shown reports is specified by the *Show last…reports* setting (you can change it in the *Reports Storage Options* dialog). If the setting is 0, the panel displays all of the reports that reside in the storage.

AQtrace Viewer automatically updates the Storage View panel every 30 seconds and adds information about recently received reports to it.

For each report, the panel displays the following information:

Column	Description

Column	Description
File Name	Name and extension of the report file.
Description	This column is editable. You can specify any text describing the report in it.
Date	The date and time of the file creation (that is, the date and time when the report was added to the storage). The column displays date and time values in the UTC format, regardless of the local time settings of the machine where error reports are processed before they are added to the storage.
Path	The file's path (includes the path of the storage folder).
Report Id	The error report's identifier (an integer value that is assigned to the report by *AQtrace Service* during the initial processing).
Duplicated Report Id	If the error report is a duplicated one (see *Detecting Duplicated Reports*), this field contains the identifier of the first report which was generated due to the same problem. If the report is not duplicated, the field is empty.

Two notes about the Report Id and Duplicated Report Id columns:

- These columns contain information only if *AQtrace Service* is running and the persistent storage folder used by the service is the same as that whose reports are listed in the Storage View panel (that is, if one and the same folder is specified in the *Persistent storage folder* setting of AQtrace Service and in the *Storage path* setting of AQtrace Viewer).
- AQtrace Viewer receives information for these columns from AQtrace Service, so filling in the columns may take some time after the Storage View panel is opened.

The size and location of the panel's column are not limited. For instance, you can change the column's width by dragging the columns header or hide columns from the panel. For more information on this, see *Arranging Columns, Lines and Panels*.

To open an error report for analysis

To load a report from the storage and open it for analysis in AQtrace Viewer, double-click the desired report in the Storage View panel.

To find the desired report

To find the desired bug quickly, you can sort, group or filter the panel's contents in the **Date** column:

- To sort the panel's contents, click the header of the Date column. The arrow that is drawn in the header will indicate the sort order. See *Sorting* for more information.
- To filter the panel' content, click the down arrow button that is drawn in the header of the Date column and then choose the desired date from the ensuing drop-down list (see *Filtering Data*).
- To group the panel's data:
  - Right-click somewhere within the panel and check **Show Group Pane** from the context menu. This will display the group area at the top of the panel.

- Drag the header of the Date column to the group area. The panel will group its data by the values shown in the Date column.

See *Grouping* for more information.

To copy data from the panel

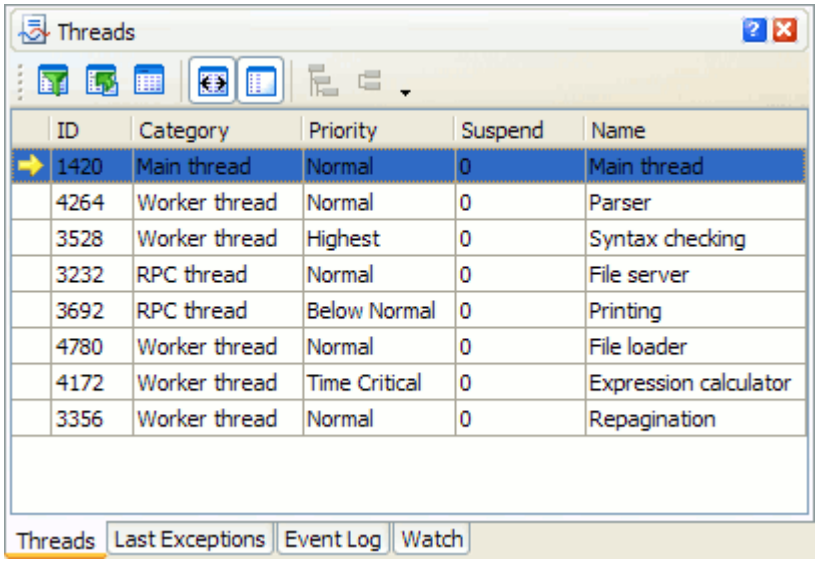
To copy data from the panel, choose the desired row, then right-click somewhere within the panel and select **Copy** from the context menu.

Threads Panel

The **Threads** panel of *AQtrace Viewer* displays information on threads that existed in your application when an exception occurred. The Threads panel defines the contents of the *Call Stack* and *Registers* panels. They display data for the thread that is selected in the Threads panel.

If the panel is hidden, select **View | Select Panel** from AQtrace Viewer's main menu and then choose **Threads** in the ensuing *Select Panel* dialog.

Here is a sample view of the panel:



For each thread the panel displays the following information:

Column	Description
ID	The thread's identifier.
Category	Specifies the thread's category. The following variants are possible: • Main thread - a primary thread that runs all other threads in the process. • Worker thread - a secondary thread that is used for auxiliary procedures and created by the main thread. • RPC thread - a thread that was created for RPC (Remote procedure call).

Column	Description
	AQtrace does not provide absolutely correct recognition of RPC threads (especially for 64-bit applications). If there is not enough information in a memory dump included in a bug report, it may be very difficult to determine correctly the thread's category. So, RPC threads may be determined as common worker threads.
Priority	The thread's priority (normal, critical and so on).
Suspend	Specifies whether the thread was suspended when an exception occurred.
Name	The thread's name that has been specified using the *IaqReporterIntf2.SetThreadName* method. This name can be helpful to distinguish easily one thread from another in the Threads panel. If the name for the thread has not been specified with this method, the Name field for this thread is empty.

You can arrange data within the panel as your needs dictate. For instance, you can change the column's size and position, hide or display columns, sort data in the table, filter or group them. See *Arranging Columns, Lines and Panels* for detailed information.

The thread that was active when an exception occurred is marked with the icon.

To explore the data that is included in the report for a thread, select this thread in the Threads panel and press Enter, or double-click the thread in the panel. AQtrace Viewer will update the Call Stack and Registers panels with data that was saved for the selected thread. You can then switch to these panels to perform further analysis (see *Analyzing Error Reports With AQtrace Viewer*).

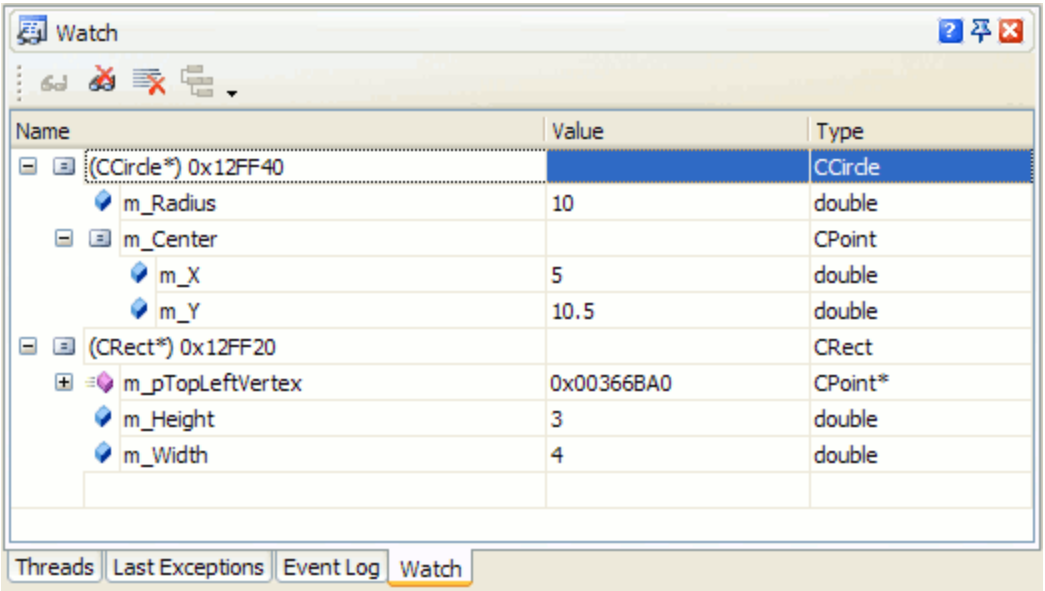
Watch Panel

Using the **Watch** panel of *AQtrace Viewer* you can create **watch expressions** ("watches") for various complex variables (structures and objects) declared in the application, for which the analyzed error report was generated. Using watch expressions added to the panel, you can view the values that were assigned to such variables when the exception occurred.

Note: Currently, the panel does not support watches for simple data types like integer or floating-point numbers, strings, and so on. You can create watch expressions only for complex variables like objects or structures.

If the panel is hidden, select **View | Select Panel** from AQtrace Viewer's main menu and then choose **Watch** in the ensuing *Select Panel* dialog.

For each complex variable, which you want to inspect, the panel displays a list of its members with their type names and values. The members' hierarchy is displayed in a tree-like form.



When viewing the tree of the complex variable being examined, you can expand and collapse the contents of the object's complex members (child objects and structures are displayed as expandable tree items) by clicking the "+" or "-" button displayed to the left of such members. Also, to collapse information of a complex variable (the whole watch or one of its complex members, if any), you can select one of its members and click the **Collapse Parent** button on the panel's toolbar or use the appropriate command from the panel's context menu.

In order to create a watch expression for an object or structure and view its contents, you need to specify the name of the variable's type and the memory address where the desired variable was located at the moment when the exception occurred. See below for detailed information on how to create a watch expression for a variable.

AQtrace Viewer obtains values of variables, for which you create watches, from the memory dump included in the analyzed error report. When the memory area with the specified address is found in the dump, AQtrace Viewer tries to parse the memory area in accordance with the specified data type. Definitions of data types used by the application are stored in debug information. Therefore, AQtrace Viewer needs the application's debug information files in order to "know" the definition of the specified data type and to properly parse the memory area where the variable was located.

Without debug information AQtrace Viewer cannot obtain variable values and display them in the Watch panel. So, you must compile your application with debug information and make sure that AQtrace Viewer has access to this debug information when you are analyzing an error report. For information on how you can compile your application with debug information, see *Compiling Applications With Debug Information*.

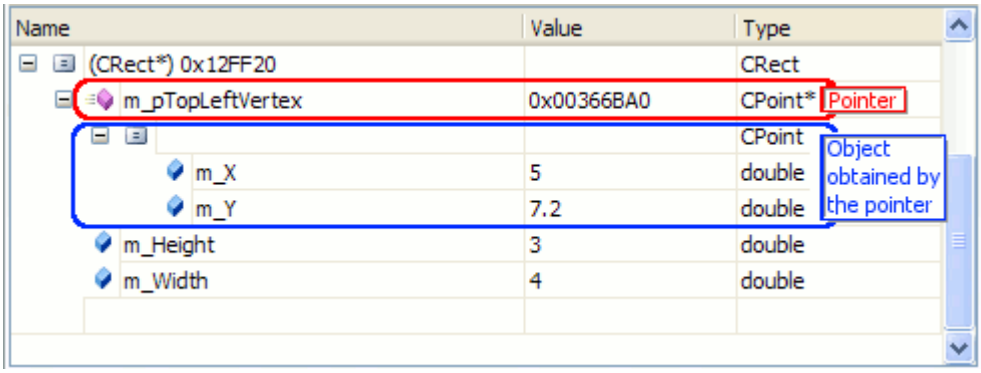
For each inspected variable and its members, the panel displays the following information in the table:

Column	Description
Name	The name of a variable. The panel displays names only for members of the variable for which the watch expression was created. In the row that corresponds to the whole watch, the Name column holds the variable's type name and memory address (see the *To add a new watch*

Column	Description
	expression section below).
Value	The value assigned to a variable before the exception occurred. Only rows that correspond to variables of simple data types contain values in this column. Rows that correspond to the whole watch and its complex members, if any, hold empty cells in the Value column. Integer values can be displayed in the Value column either in the hexadecimal or in the decimal format. You can switch the display format by checking and unchecking the **Hexadecimal Display** option in the panel's context menu (by default, it is checked and the panel displays integer values in the hexadecimal format). Fractional numbers are always displayed in the decimal format.
Type	The type name of a variable. Type names are displayed for all variables in the Watch panel, both for complex variables, for which you have created watch expressions, and for all their members.

To the left of each item in a watch tree, there is a helper icon that designates the kind of the corresponding variable and makes it easier to apprehend information displayed in the panel. You can see the following icons in the panel:

- - Complex variables that have children. You can see such icons to the left of rows that correspond to watches and their child structures and objects.
- - Simple object members that do not have children and that are not pointers to other variables. Such icons are displayed to the left of object properties or structure fields of simple data types, such as integer, Boolean, string variables, and so on.
- - Pointer-type variables. When an object or structure, which you specified in a watch expression, contains a pointer to another variable, the Watch panel displays the value of this pointer, that is, the address of the variable to which it points. Also, AQtrace Viewer tries to dereference the pointer, obtain the value of the variable to which the pointer points, and display it in the watch tree as a child of the pointer item:



If a pointer is invalid or the address to which it points is out of the memory area included as a memory dump in the error report, AQtrace Viewer cannot obtain the variable's value by such a pointer and the Watch panel displays only names and data types of such dereferenced variables. The Value column is empty in this case.

Note also that if the panel shows the *"Error: symbol … not found"* error message in the Value column after you specified the desired variable's type name and address, this means that the definition of the specified data type has not been found by AQtrace Viewer in the debug information files (or no debug information has been found) or the specified address is out of the memory area included in the memory dump. Make sure that you have specified the correct data type and address and that AQtrace Viewer has access to the application's debug information files.

To add a new watch expression

To add a new watch expression to the table displayed in the Watch panel:

- Click the **Name** cell of the empty row at the end of the table (this row is automatically appended to the table after you create a new watch expression).
- In the Name cell, specify the data type name and memory address of the variable whose value you want to inspect and press ENTER. Use the following syntax:

```
(DataTypeName*) Address
```

  You can specify the variable's address in the hexadecimal or decimal format. When you type a hexadecimal value, use the `0x` prefix. For instance:

```
(TfmMain*) 0x12F520
```

  Here, `TfmMain` is a class name and `0x12F520` is the memory address at which the examined object was located.

Once you enter the type name and address, the Watch panel creates a new watch expression and tries to obtain the value of the variable of the specified type from the specified address in memory.

If the complex variable, for which you are creating a watch, contains a pointer to another complex variable as a child member (pointers are marked with the icon in the Watch panel), you can easily create a new watch for the variable to which the pointer points:

- Select the row containing the desired pointer in the Watch panel.
- Click the **Add Watch** button on the panel's toolbar (this button becomes available only when you select a pointer in the Watch panel).

-- or --

- Right-click the row containing the desired pointer in the Watch panel.
- Select **Add Watch** from the panel's context menu (this menu item becomes available only when you select a pointer in the Watch panel).

A new watch expression corresponding to the variable to which the selected pointer points will be added to the Watch panel.

To delete a watch expression

To delete a watch expression from the table displayed in the Watch panel:

- Right-click the row containing the desired watch expression.
- Select **Delete Watch** from the context menu.

-- or --

- Select the row containing the desired watch expression.
- Click the **Delete Watch** button on the **Watch** toolbar.

If you want to delete all the watches displayed in the panel, right-click somewhere in the panel and select

Clear All from the ensuing context menu or click the appropriate button on the panel's toolbar.

To copy data

To copy data displayed in the Watch panel:

- Select the desired row(s) in the table displayed in the panel. You can use Ctrl- or Shift-click for multiselection. To select all the data displayed in the table, use the **Select All** command of the context menu.
- Select **Copy** from the context menu.

Miscellaneous

AQtrace Viewer Command Line

In general, the AQtrace Viewer command line is as follows:

```
AQtraceViewer.exe [file_name] [/SilentMode] [/ns]
```

Here the brackets mean the argument is optional. Below is the description of the command-line arguments that AQtrace Viewer accepts:

- ***file_name*** - Launches AQtrace Viewer and loads the specified report file into it.
- **/SilentMode** - If this argument is specified, AQtrace Viewer works in silent mode, that is, it neither displays dialogs, nor informs you about errors or warnings. The dialogs and messages to be displayed are handled as if you pressed the default button in them. Information about these dialogs and messages is posted to the *<AQtrace Viewer>\Bin\Silent.log* file (the file should not be read-only or locked by another application). The errors that occur during the test execution are posted to the test log.
- **/ns** - Opens AQtrace Viewer without displaying the splash screen.

Installing Extensions

AQtrace Viewer is built on an open, COM-based architecture, which allows you to write external plug-ins for it or install plug-ins from any source. By default, the plug-in files are copied to the *<AQtrace>\Bin\Extensions* folder. However, they can be located in any other folder.

All of the installed plug-ins are shown in the *Install Extensions* dialog. Here you can temporary disable or enable the plug-ins and check whether a plug-in conflicts with another plug-in. Conflicting plug-ins are automatically disabled. Using the dialog, you can also install third-party plug-ins.

To Disable a Plug-In

- Select **File | Install Extension** from AQtrace Viewer's main menu. This will call the Install Extensions dialog.
- In the dialog, uncheck the plug-ins you want to disable and click **OK**.

To Install a Third-Party Plug-In

- Open the Install Extensions dialog (to do this, choose **File | Install Extension** from AQtrace

Viewer's main menu).

- Press **Add** in the dialog.
- In the ensuing Open File dialog, select the plug-in file and click **Open**. AQtrace Viewer will add the plug-in to the plug-in list.

  Once the plug-in has been added, AQtrace Viewer will check whether this plug-in conflicts with any other plug-in and whether a newer version of the same plug-in is already installed. If any of these checks fail, the plug-in will be unchecked and will not be installed in AQtrace Viewer.
- To complete the installation, click **OK** in the Install Extensions dialog. This will install the plug-in in AQtrace Viewer.

If you do not need a third-party plug-in, you can disable it as described above.

Updating Menus and Toolbars

If a plug-in adds menu and toolbar items to AQtrace Viewer, you may need to make these items visible by hand. You add these items to AQtrace Viewer's menus and toolbars the same way you add other menu or toolbar items: by adding the items from the Customize dialog. See *Toolbar Customization*.

If you disabled an AQtrace Viewer plug-in and then enabled it, you can quickly update the menus and toolbars with the plug-in's commands by selecting **View | Toolbars | Restore Default Toolbar** from AQtrace Viewer's main menu.

Checking for Updates

Every time you launch AQtrace, it sends requests to the www.automatedqa.com web site to see if a newer version or a patch for the current version of the product is available. This feature allows you to be aware of AQtrace updates without visiting our web site.

The requests sent to this web site do not contain personal information. They only include information about the product version you own and registration information.

If a newer version is available, AQtrace displays a dialog box asking you to open a Web page where you can read more about the update and download the newer version.

If there is a patch available, AQtrace displays a dialog box asking you to download and install the patch. If you agree to install it, AQtrace will close itself, download new files and then install the patch.

If you already own the latest available version, AQtrace displays a message that informs you that no updates were found.

To disable the check for updates at startup, check the **Don't check at startup** box in the displayed dialog or disable the *Check for updates at startup* option in the *Show Again Flags* dialog.

You can also check for updates manually by selecting **Help | Check for Updates** from AQtrace's main menu.

Source Server Support

AQtrace supports different kinds of source servers that allow retrieving the exact version of source files from a source control system. The source code of application modules can change from one build to another, so, it is important to look into the source code that was used for building certain version of the application. Using a source server, *AQtrace Viewer* can extract the appropriate version of source code files from the source control and display the source code in the *Code Viewer* panel when an error report is opened.

The topics of this section provide information on the source servers supported by AQtrace and describe how to use them with AQtrace Viewer.

About Source Server Support

During the life cycle of an application, the source code of its modules can be changed from one version to another, because the developers improve the application, fix bugs, add new features, etc. So, the end-users may have application versions that have different source code. If an error occurs in the application on an end-user computer, *AQtrace Reporter* generates a dump report and sends it to the developers. When such a report is opened in *AQtrace Viewer*, the source code of the routines listed in the *Call Stack* panel is normally displayed in the *Code Viewer* panel of AQtrace Viewer (for the requirements needed to display the source code, see *Code Viewer Panel*). It is very important for the developers to take a look at the source code that corresponds to the application's build in which the error occurred.

Development teams usually use different source control systems to track versions of source files (for instance, Microsoft Visual SourceSafe, Perforce, Subversion, etc.). Such systems allow you to store all the versions of the source code and track all the changes in it. To automatically retrieve the actual version of the source files that were used to build the application, source servers are used. Source servers index the source files that correspond to a specific version of the application, and define the appropriate version of the source code files in the source control system. To index source code files, source servers use the application's debug information (for information on how to compile your application with debug information, see *Compiling Applications With Debug Information*).

AQtrace provides support for source servers. This functionality helps you solve the problem mentioned above. Using source servers, AQtrace Viewer can determine the version of the source code files of the application's build that generated the dump report and retrieve these files from the source control system. This functionality allows determining the exact version of the source code, which is then displayed in the Code Viewer panel of AQtrace Viewer. So, the developers can view the source code of the application while analyzing the dump report and look into the code snippet where the error occurred. This makes it easier to find the cause of the error in the application.

Supported Source Servers

Currently, AQtrace Viewer supports two types of source servers: *Microsoft Source Server* and *SmartBear Source Server*. Microsoft Source Server is a tool that is part of Microsoft Debugging Tools for Windows. It uses PDB debug information for source indexing, that is, **this source server can be used only with those applications that were developed with Microsoft Visual Studio and Delphi for .NET**. For more information on this tool, see *Using Microsoft Source Server*.

SmartBear Source Server is part of AQtrace that can be used by AQtrace Viewer for retrieving the exact

versions of source code files from a source control system. This tool was developed by SmartBear Software as an alternative to Microsoft Source Server. Unlike Microsoft Source Server, SmartBear Source Server supports various debug information formats, so it can also be used with Delphi and C++Builder applications. For more information on this tool, see *Using SmartBear Source Server*.

The supported source servers have a different priority in AQtrace Viewer for getting source code files and displaying them in the *Code Viewer* panel. AQtrace Viewer searches for source files in the following order:

1. First, AQtrace Viewer tries to use SmartBear Source Server that searches for *source index information* needed for SmartBear Source Server. If the application's modules have been indexed, and SmartBear Source Server finds the needed index information files, it tries to extract the actual version of the source files from the source control system using the index information.
2. If the modules have not been indexed for SmartBear Source Server, or the needed index information cannot be found, or the sources cannot be retrieved from the source control database for some reason, AQtrace Viewer commands Microsoft Source Server to search for source index information in the corresponding .PDB debug info files that reside in the *build storage* (this does not concern Delphi for Win32 and C++Builder applications). If Microsoft Source Server finds the needed source index information, it tries to use it for retrieving the actual source code files from the source control system.
3. Finally, if the source servers do not give positive results, AQtrace Viewer attempts to find the source code files using the paths specified on the *Source Code* page on AQtrace Viewer's options.

Both Microsoft Source Server and SmartBear Source Server support various source control systems that can store different versions of source code files. For more information on the supported source control systems, see *Using Source Control Systems Supported by Microsoft Source Server* and *Using Source Control Systems Supported by SmartBear Source Server*.

How AQtrace Viewer Works With Source Servers

To enable AQtrace Viewer to use a source server while analyzing your application's dump reports, you should prepare your application for this:

1. Compile your application with debug information (see *Compiling Applications With Debug Information*).
2. Check in the source code files that correspond to the current build of your application to your source control system.
3. Specify a label for the source files in your source control system so that it is easy to get the desired version of the source code that corresponds to the build. Most source control systems support file labeling.
4. To use source servers, your application must be source indexed. Source indexing is made to define which version of the source files stored in the source control system corresponds to a certain build of the application. Debug information of your application's modules contains the list of the source files that were used to build the application. So, this list is used to index the sources for a certain build. Generally, binaries are source indexed during the build process. The labels that were specified for the sources in the source control system are used for indexing. After the sources have been indexed, it is possible to determine the actual sources stored in the source control that were used to build the application. For more information on source indexing, see *Source Indexing for Microsoft Source Server* and *Source Indexing for SmartBear Source Server*.

If your application is source indexed, AQtrace Viewer can use a source server to retrieve the sources that were used to create a build. AQtrace Viewer gets the source code via a source server in the following way:

1. The user selects a routine in the *Call Stack* panel that displays a call stack for the dump report that

is open in AQtrace Viewer. Note that AQtrace Viewer can parse error reports and display their call stacks only if the application's binary modules and debug information files have been found.

2. Then AQtrace Viewer tries to find the source index information of the module in which the selected routine is declared.
3. If the sources are indexed, AQtrace Viewer requests the appropriate version of the source code for the selected routine (for information on the supported source servers and their priority for AQtrace Viewer, see above).
4. Using the source index information, the source server tries to extract the needed version of the source code file from the source control system and save it to a temporary folder on the hard drive.
5. If the source server retrieves the sources successfully, it displays the file with the code of the selected routine in the Code Viewer panel. Otherwise, AQtrace Viewer tries to find the source file in the local folders specified on the *Source Code* page of AQtrace Viewer options and displays this file. Note that in this case, the displayed code of the routine may be inappropriate, because the version of the file that was found in a local folder (not in the source control system) may differ from the version that was used during the build compilation.

Using SmartBear Source Server

Using SmartBear Source Server - Overview

This topic provides information about SmartBear Source Server and describes how you can use this tool with AQtrace Viewer to retrieve actual versions of source code files from the supported source control systems and view proper versions of the source code while analyzing error reports.

Using SmartBear Source Server With AQtrace Viewer

SmartBear Source Server was developed by SmartBear Software as an alternative to *Microsoft Source Server*. It is implemented in the aqAQASourceServer.dll library as part of AQtrace and is used to retrieve appropriate versions of source files from a source control system and to display them in the *Code Viewer* panel of *AQtrace Viewer*.

To be able to use the functionality of SmartBear Source Server while analyzing error reports in AQtrace Viewer, you should source index the modules of your application. When source indexing is being made, the versions of the source files stored in the source control repository are matched with your application's builds. SmartBear Source Server reads the contents of debug information files to get the list of the source files used for compilation of the application's modules, so, your application should be compiled with debug information (see *Compiling Applications With Debug Information*). After source indexing is done, SmartBear Source Server creates a special source index file (aqIndex.aqiss) that contains information about your source control system, the list of the application's modules and the list of appropriate source files in the repository along with the versions of these files that correspond to the indexed build of the application. This index file resides in the folder that contains the debug information files of your application's build. The information from the aqIndex.aqiss file is used by SmartBear Source Server for retrieving the appropriate source code files from the source control system. To distinguish different versions of source files in the source control repository and to get the desired version, SmartBear Source Server uses labels. For more information on source indexing of modules, see *Source Indexing for SmartBear Source Server*.

If you open an error report in AQtrace Viewer and double-click a routine name in the *Call Stack* panel, AQtrace Viewer will request the appropriate version of the source file that contains the declaration of the

selected routine from SmartBear Source Server. If the source file is found in the source control system and is retrieved from it, AQtrace Viewer displays the code of the corresponding routine in the Code Viewer panel. Note that SmartBear Source Server has the highest priority for retrieving source code files from a source control system. First, AQtrace Viewer tries to use SmartBear Source Server and then, if SmartBear Source Server cannot get the needed version of a source file for some reason, it refers to Microsoft Source Server or attempts to get a local copy of this source file.

To retrieve source files, SmartBear Source Server starts searching for the aqIndex.aqiss file in the folder containing the application's modules. If the module that contains the selected routine's declaration is source indexed, and SmartBear Source Server finds the source index file, SmartBear Source Server attempts to retrieve the needed source file of the appropriate version from the source control system. The source control version of the file that corresponds to the required build is stored in the aqIndex.aqiss file and is specified during indexing.

If SmartBear Source Server gets the desired version of the source file from the source control system successfully, it creates a local copy of the file on the hard disk in a temporary working folder (see below). For each retrieved version of the source code files, SmartBear Source Server creates a subfolder with a name that coincides with the appropriate label of the source files in the source control system. Note that the hierarchy of subfolders to which the source code files are stored repeats the tree of directories in the source control database (starting from the root directory of the database). The local copies of the files and the created subfolders will not be deleted after you close AQtrace Viewer.

One of the advantages SmartBear Source Server has compared to Microsoft Source Server is the ability to compare the retrieved version of a source file that was used for compilation of the corresponding build with the latest version of this source file. So, SmartBear Source Server gets the latest version of the file from the source control repository too. This file is also copied to the local working folder and placed in the *Latest* subfolder. See *Comparing Versions of Source Code Files* for more information on this functionality.

You can see the name and path of the source code file, which is currently displayed in the Code Viewer panel of AQtrace Viewer, at the top of this panel. To copy the path and name, select **Copy** from the panel's context menu.

Supported Application Types

Unlike Microsoft Source Server, SmartBear Source Server does not add source index information to debug information files and can use all the debug information types supported by AQtrace (see *Source Indexing for SmartBear Source Server*). So, SmartBear Source Server can equally process Microsoft Visual Studio, Delphi and C++Builder applications. This allows you to retrieve the exact versions of source code files and display them in AQtrace Viewer while analyzing error reports generated for C++Builder and Delphi applications.

Requirements

In order to use SmartBear Source Server with AQtrace Viewer, you need to have *Automated Build Studio* ver.6. This tool developed by SmartBear Software is required for source indexing of applications' modules. Automated Build Studio provides several macro operations that allow you to index the modules of your application for SmartBear Source Server. These operations let you index files so that they can be used with all the supported source control systems. Note that to index source files for SmartBear Source Server, you need to use only one tool - Automated Build Studio, while *Microsoft Source Server* requires additional tools for indexing source files.

AQtrace Viewer Settings

AQtrace Viewer's *Options* dialog contains the *SmartBear Source Server* page for SmartBear Source Server. On this page, you can specify the following setting:

- *Destination Folder* - Specifies the local folder in which SmartBear Source Server should place copies of source files upon retrieving them from a source control system. AQtrace Viewer loads the copies of the files from this destination folder to display them in the *Code Viewer* panel. If you do not specify this setting, SmartBear Source Server will place the copies in a temporary working folder. On the Microsoft Windows XP operating system, SmartBear Source Server uses the following default folder:

```
C:\Documents and Settings_name\Local
Settings\Temp\SmartBearSourceServer
```

To view or change the *Destination Folder* setting, select **Options | Options** from the main menu of AQtrace Viewer and move to the **General | SmartBear Source Server** page in the ensuing **Options** dialog.

Source Indexing for SmartBear Source Server

To be able to use SmartBear Source Server for retrieving appropriate versions of source files from a source control system, you should source index the modules of your application. This means that you should define which version of source code files corresponds to each build of your application.

SmartBear Source Server needs debug information files to source index your application, so, your application should be compiled with debug information (see *Compiling Applications With Debug Information*).

During source indexing, SmartBear Source Server reads the list of the source files, which were used during compilation of the application modules, from the corresponding debug information files and creates a special source index file (aqIndex.aqiss). This file has the .xml format and contains information needed to obtain these source files from a source control system, including connection parameters of the source control system, the list of these source files and their version that corresponds to the current build of the application. To distinguish versions of the source files in the source control system, SmartBear Source Server uses the labels from the source control repository.

To source index a build of your application, you should use *Automated Build Studio*, which is another tool developed by SmartBear Software. Automated Build Studio provides several operations that can be used to source index your application's modules for SmartBear Source Server. These operations are included in the **SmartBear & AutomatedQA Tools** category of Automated Build Studio's operations. Each operation is used for a certain source control system supported by SmartBear Source Server. So, you can use one of the following operations:

- AQtrace Index Modules for VSS
- AQtrace Index Modules for Subversion
- AQtrace Index Modules for Perforce

In order to use any of these operations, you must specify some required parameters. On the **Indexing Modules Details** page of the **Operation Properties** dialog, you need to specify the following properties (to display this dialog, double-click the operation in your Automated Build Studio macro):

- *Modules Directory* - Specifies the folder (on a local hard drive) that holds the modules to be indexed (the modules must contain debug information). For instance, *C:\Symbols*.
- *Sources Directory* - Specifies the folder (on a local hard drive) that holds a local copy of the source files. For instance, *C:\Sources*.

In addition to these common properties, you must specify the operation parameters needed to connect to your source control system (for instance, the user name and password) and the label of the source files that should be indexed. These parameters differ from one operation to another, depending on the type of the source control system. See *Using Source Control Systems Supported by SmartBear Source Server*, for more

information on how to use SmartBear Source Server with various supported source control systems and what parameters you should specify for these Automated Build Studio operations.

After you specify all the required parameters of the operation needed for your source control system, run the Automated Build Studio macro holding this operation. If the operation is executed successfully, the aqIndex.aqiss file containing the source index information will be created in the folder where the application's modules reside.

Note that Automated Build Studio is used to automate building of applications and to perform various operations during the build process. So, it is very convenient to automatically index every build of your application during the build process by using one of the operations mentioned above.

Using Source Control Systems Supported by SmartBear Source Server

Using Microsoft Visual SourceSafe With SmartBear Source Server

If you use Microsoft Visual SourceSafe as a source control system for storing the source files of your application, and you want to retrieve the actual version of these files while analyzing the application's dump reports, you should use the **AQtrace Index Modules for VSS** operation in *Automated Build Studio* to source index the application's modules. You can find this operation in the **SmartBear & AutomatedQA Tools** operation category on the **Operations** panel of Automated Build Studio.

The most important thing you need to do to retrieve source code files from a source control system via SmartBear Source Server is to source index the application's modules. You should index every build of your application if you want to view the exact version of the source code in *AQtrace Viewer*. Otherwise, if you do not index a build, AQtrace Viewer will get a local copy of the source files when it opens a dump generated by this build, and this copy may not correspond to the version of the files that were used during compilation of the build. This may confuse you when you are analyzing the report. To index a build of your application for Microsoft Visual SourceSafe, do the following:

1. Compile your application with debug information (to learn how to do this, see *Compiling Applications With Debug Information*).
2. Check in the source files of your application to the Visual SourceSafe database.
3. Specify a unique label for this version of the source files in your source control system (for instance, you can specify the *VERSION_1_10* label for the 1.10 build number of your application). This label will be used to retrieve this version from Visual SourceSafe via SmartBear Source Server.
4. In Automated Build Studio, create a new macro or open an existing one. Add the **AQtrace Index Modules for VSS** operation to the macro (you can find it in the **SmartBear & AutomatedQA Tools** operation category).
5. Double-click the operation in the macro. In the ensuing **Operation Properties** dialog, you should specify the properties required for source indexing. Go to the **Indexing Modules Details** tabbed page and specify the following options:
   - *Modules Directory* - Specifies the folder (on a local hard drive) that holds the modules to be indexed (the modules must contain debug information). For instance, *C:\Symbols*.
   - *Sources Directory* - Specifies the folder (on a local hard drive) that holds a local copy of the source files. For instance, *C:\Sources*.

   Go to the **VSS Options** tabbed page and specify the following parameters:

- *Database* - Specifies the path to the Microsoft Visual SourceSafe database.
- *Login* and *Password* - These parameters specify the user name and password used to connect to the VSS database. If both parameters are omitted, the operation will use the login and password of the user who is currently logged in to Windows.
- *Project* - Specifies the name and path to a project stored in the Visual SourceSafe database. For instance: *$/Sources/CppProject*.

  The database directory specified by this path must correspond hierarchically to the directory that contains the local copy of the sources that was specified in the *Sources Root* parameter of the operation.

- *Label* - Specifies a label for the files stored in the VSS database. This label should be used for indexing, and it must be the label that you specified for the source files in the VSS database (for instance, the *VERSION_1_10* label). After indexing, the version of the source files that have this label will correspond to the application build you are going to index.

These parameters are required for successful source indexing. There are also some other tabbed pages with other operation parameters in the **Operation Properties** dialog, but they optional. For more information on the operation, see Automated Build Studio's documentation.

6. After you have specified the parameters, run the macro.

If the operation is executed successfully, the aqIndex.aqiss source index file will be created in the directory specified by the *Modules Directory* parameter, and SmartBear Source Server will be able to use this file to retrieve the source files from your VSS database.

Using Subversion With SmartBear Source Server

If you use Subversion as a source control system to store the source files of your application, and you want to retrieve the actual versions of these files while analyzing the application's dump reports, you should use the **AQtrace Index Modules for Subversion** operation of *Automated Build Studio* to source index the application's modules. You can find this operation in the **SmartBear & AutomatedQA Tools** operation category on the **Operations** panel in Automated Build Studio.

In order to use this operation, you must specify the path to the Subversion client executable (svn.exe) in the **Tools** dialog of Automated Build Studio. To display this dialog, select **Options | Tools** from the main menu.

The most important thing that should be done to retrieve source code files from a source control system via of SmartBear Source Server is to source index the application's modules. You should index every build of your application if you want to view the exact versions of the source code in *AQtrace Viewer*. Otherwise, if you do not index a build, AQtrace Viewer will get a local copy of the source files when it opens a dump report generated by this build, and this copy may not correspond to the version of the files that were used during compilation of the build. This may confuse you when you are analyzing the dump report. To index a build of your application for Subversion, do the following:

1. Compile your application with debug information (to learn how to do this, see *Compiling Applications With Debug Information*).
2. Commit the changes you have made in the source files of your application to your Subversion repository.

3. In Automated Build Studio, create a new macro or open an existing one. Add the **AQtrace Index Modules for Subversion** operation to the macro (you can find it in the **SmartBear & AutomatedQA Tools** operation category).
4. Double-click the operation in the macro. In the ensuing **Operation Properties** dialog, you should specify the properties required for source indexing. Go to the **Indexing Modules Details** tabbed page and specify the following options:
   - *Modules Directory* - Specifies the folder (on a local hard drive) that holds the modules to be indexed (the modules must contain debug information). For instance, *C:\Symbols*.
   - *Sources Directory* - Specifies the folder (on a local hard drive) that holds a local copy of the source files. For instance, *C:\Sources*.

   Go to the **Subversion Options** tabbed page and specify the following parameters:
   - *User Name* and *Password* - These parameters specify the user name and password used to connect to the Subversion server. If your server allows anonymous access, you can omit these parameters.
   - *Working Copy* - Specifies the path to the Subversion repository. The format of the path depends on where your Subversion repository is located and what protocol is used to access it:
     - If you store the repository on your Apache-based Subversion server, you should use the following path format:

       http://svn_server/repository

       If you use a secured protocol (with the SSL encryption), the path is specified like this:

       https://svn_server/repository
     - If your repository is located on an Svnserve server, you access it via its custom svn protocol (its default port number is 3690), and you should specify the path like the following:

       svn://svn_server:3690/repository

       In addition, if you use a secure shell (SSH), you should use the following format:

       svn+ssh://svn_server:3690/repository
     - If you use direct access to the repository located on a local or network drive, the path can be specified like this:

       file:///C:/svn_repository

       Also, you can specify the path in the following way if you use a working copy of your repository on a local drive:

       C:\svn_repository
   - *Revision* - Specifies the revision of the files you want to index. If this parameter is omitted, the operation indexes the head revision of the files, that is, the latest version of the files stored in the repository.

     In the **AQtrace Index Modules for Subversion** operation, you can use only revision numbers to specify versions of the files located in the Subversion repository. Revision keywords and revision dates are not allowed for this operation.

   These parameters are required for successful source indexing. There are also other tabbed pages with additional operation parameters in the **Operation Properties** dialog, but they are optional. For more information on the operation, see Automated Build Studio's documentation.

5. After you have specified the parameters, run the macro.

If the operation is executed successfully, the aqIndex.aqiss source index file will be created in the directory specified by the *Modules Directory* parameter, and SmartBear Source Server will be able to use this file to retrieve the source files from your Subversion repository.

Using Perforce With SmartBear Source Server

If you use Perforce as a source control system to store the source files of your application, and you want to retrieve the actual versions of these files while analyzing the application's dump reports, you should use the **AQtrace Index Modules for Perforce** operation of *Automated Build Studio* to source index the application's modules. You can find this operation in the **SmartBear & AutomatedQA Tools** operation category on the **Operations** panel in Automated Build Studio.

In order to use this operation, you must specify the path to the Perforce client executable (P4.exe) in the **Tools** dialog of Automated Build Studio. To display this dialog, select **Options | Tools** from the main menu.

The most important thing that should be done to retrieve source code files from a source control system via of SmartBear Source Server is to source index the application's modules. You should index every build of your application if you want to view the exact versions of the source code in *AQtrace Viewer*. Otherwise, if you do not index a build, AQtrace Viewer will get a local copy of the source files when it opens a dump report generated by this build, and this copy may not correspond to the version of the files that were used during compilation of the build. This may confuse you when you are analyzing the dump report. To index a build of your application for Perforce, do the following:

1. Compile your application with debug information (to learn how to do this, see *Compiling Applications With Debug Information*).
2. Check in the source files of your application to your Perforce database.
3. Specify a unique label for this version of the source files in your source control system (for instance, you can specify the *VERSION_1_10* label for the 1.10 build number of your application). This label will be used to retrieve this version of the files from Perforce via SmartBear Source Server.
4. In Automated Build Studio, create a new macro or open an existing one. Add the **AQtrace Index Modules for Perforce** operation to the macro (you can find it in the **SmartBear & AutomatedQA Tools** operation category).
5. Double-click the operation in the macro. In the ensuing **Operation Properties** dialog, you should specify the properties required for source indexing. Go to the **Indexing Modules Details** tabbed page and specify the following options:
   - *Modules Directory* - Specifies the folder (on a local hard drive) that holds the modules to be indexed (the modules must contain debug information). For instance, *C:\Symbols*.
   - *Sources Directory* - Specifies the folder (on a local hard drive) that holds a local copy of source files. For instance, *C:\Sources*.

   Go to the **Perforce Options** tabbed page and specify the following parameters:
   - *Host* - The network name of the remote computer that hosts the target Perforce server.
   - *Port* - The port number used to connect to the Perforce server.
   - *User Name* and *Password* - These parameters specify the user name and password used to

connect to the Perforce server.

- *Project* - Specifies the name and path to a project stored in the Perforce repository.
- *Label* - Specifies a label for the files stored in the Perforce repository. This label should be used for indexing, and it must be the same label that you specified for the source files in the Perforce repository (for instance, *VERSION_1_10*). After indexing, the version of the source files that have this label will correspond to the application build you are going to index.

These parameters are required for successful source indexing. There are also other tabbed pages with additional parameters in the **Operation Properties** dialog, but they are optional. For more information on the operation, see Automated Build Studio's documentation.

6. After you have specified the parameters, run the macro.

If the operation is executed successfully, the aqIndex.aqiss source index file will be created in the directory specified by the *Modules Directory* parameter, and SmartBear Source Server will be able to use this file to retrieve the source files from your Perforce repository.

Comparing Versions of Source Code Files

Using SmartBear Source Server, *AQtrace Viewer* can retrieve appropriate versions of source code files from a source control system and display the files in the *Code Viewer* panel. With this functionality, you can view the exact version of the source code used to compile the application build whose error report is being analyzed.

If the source control system from which SmartBear Source Server retrieves a source code file contains later versions of the file, AQtrace Viewer notifies you about this displaying an appropriate informative message at the top of the Code Viewer panel where the file's name is displayed. SmartBear Source Server automatically retrieves the latest version of the file from the source control database when it gets the source file version used in the build being analyzed. After that, you can compare the latest version of the file with the version displayed in the Code Viewer panel and view differences between these file versions. To compare file versions, AQtrace Viewer uses a third-party file comparison tool which you specify on the *General* page of the *Code Viewer options*.

By comparing versions of a source code file, you can easily view changes that have been made in the code since the build whose error report you are analyzing was compiled. It can happen that the error which caused the report to be generated is already fixed in later versions of the source code, and you can see this by comparing the source files.

As we have already said above, AQtrace Viewer uses third-party tools to compare source code files. You choose the needed comparison tool and specify its settings on the **Panels | Code Viewer | General** page of AQtrace Viewer's *Options* dialog. For instance, you can use Microsoft WinDiff (it is distributed along with some versions of Microsoft Visual Studio and with the Microsoft Windows SDK package), Grig Software Compare It!, Araxis Merge and other comparison tools. In the **Comparison tools** group on the Code Viewer | General settings page, you specify the needed comparison tool, the path to its executable file and the required command-line arguments. You can specify several tools in the Comparison tools table, but AQtrace Viewer will use only one tool which you select in the table. Just click the row containing the needed tool's settings in the table (the row will become highlighted) and click OK in the Options dialog. Next time you open this settings page, the selected comparison tool will be still highlighted in the table. For more information on comparison tool settings, see *Code Viewer - General Settings*.

When the Code Viewer panel of AQtrace Viewer displays a source file retrieved by SmartBear Source Server from your source control system, right-click somewhere within the code and select **Show Difference** from the context menu. AQtrace Viewer will launch the selected file comparison tool and command it to compare the displayed version of the source file with its latest version. The launched comparison tool

displays differences between two versions of the source code file.

If AQtrace Viewer cannot launch the selected comparison tool (for example, if you have specified a wrong path to its executable file or incorrect command-line arguments), an appropriate error message is displayed by AQtrace Viewer. Make sure that you have specified the *comparison tool's settings* correctly.

Note that you can compare versions of source files and view their differences only when you use SmartBear Source Server. If *Microsoft Source Server* is used by AQtrace Viewer, you cannot compare source files by using file comparison tools.

Using Microsoft Source Server

One of the *source servers supported by AQtrace* is Microsoft Source Server. The topics of this section provide general information on this tool and explain how it is supported by *AQtrace Viewer*. Also, in this section, you can find an explanation of how to use Microsoft Source Server to get an appropriate version of source code files from a supported source control system to display your application's source code in AQtrace Viewer while analyzing error reports.

Microsoft Source Server supports only applications with debug information stored in .PDB files. Thus, you can only use this source server **with applications developed with Microsoft Visual Studio or Delphi for .NET**. To retrieve source code from your source control system while analyzing your Delphi for Win32 or C++Builder applications' dumps reports, use *SmartBear Source Server*.

Using Microsoft Source Server - Overview

This topic explains how AQtrace Viewer supports Microsoft Source Server and describes how you can use AQtrace Viewer to view actual versions of source code files while analyzing error reports.

Using Microsoft Source Server With AQtrace Viewer

AQtrace Viewer can use Microsoft Source Server to retrieve the exact version of source files from a source control system and display it in the *Code Viewer* panel.

To be able to use Microsoft Source Server, you should source index the modules of your application. When performing source indexing, you define which versions of the source files stored in the source control system correspond to a certain build of the application. Microsoft Source Server uses .PDB debug information files to get the list of the source files used for compilation of the application's modules. So, your application should be compiled with debug information (for more information, see *Compiling Applications With Debug Information*). After source indexing is done, Microsoft Source Server modifies the debug information files by adding a source index stream to them. So, each debug information file of the application's modules includes a list of appropriate source files along with the versions of these files in the source control system. The information added to the debug info files is used by Microsoft Source Server for retrieving the appropriate source code files from the source control database. To distinguish different versions of source files in the source control system, Microsoft Source Server uses labels. For more information on source indexing of modules, see *Source Indexing for Microsoft Source Server*.

When you open an error report in AQtrace Viewer and double-click a routine name in the *Call Stack* panel, AQtrace Viewer refers to Microsoft Source Server to get the appropriate version of the source file that contains the declaration of the selected routine. If the source file is retrieved from the source control system,

AQtrace Viewer displays the routine's code in the Code Viewer panel.

To retrieve a source file, first, the source server starts searching for the .PDB debug information file that corresponds to the module with the selected routine and resides in the *build storage*. If the module is source indexed and Microsoft Source Server finds the source index segment in the .PDB file, the source server attempts to retrieve the needed source file of the appropriate version from the source control database. The source control version of the file that corresponds to the needed application build is stored in the source index segment of the debug info file and is specified during the indexing process.

If the source server gets the desired version of the source file from the source control system successfully, it creates a local temporary copy of the file on the hard disk. The location of this copy depends on the operating system you are using. For instance, on the Microsoft Windows XP operating system, the retrieved copy of the file is saved to the following directory:

```
C:\Documents and Settings_name\Local Settings\Temp\{GUID}\src
```

Here, *{GUID}* means the name of the temporary directory, which AQtrace Viewer creates when Microsoft Source Server retrieves source files for an open error report. A randomly generated GUID is used as a unique name for such a directory. This directory will be deleted along with its subdirectories and files when you close AQtrace Viewer. Note that the hierarchy of subdirectories to which source code files are placed repeats the tree of directories in the source control database (starting from the root directory of the database).

The name and path of the source code file displayed in the Code Viewer panel of AQtrace Viewer is shown at the top of the panel. To copy the path and name, select **Copy** from the panel's context menu.

Supported Application Types

Microsoft Source Server supports only .PDB debug information files in which source index information is stored after module indexing (see *Source Indexing for Microsoft Source Server*). Thus, you can use Microsoft Source Server **only with applications developed with Microsoft Visual Studio or Delphi for .NET**. You cannot source index modules of Delphi for Win32 and C++Builder applications and retrieve their source code for AQtrace Viewer by using Microsoft Source Server. If you want to get the source code from your source control system while analyzing Delphi or C++Builder applications' dumps reports, use *SmartBear Source Server*.

Requirements

To use Microsoft Source Server with AQtrace Viewer, you need to have several tools in addition to AQtrace Viewer:

- **Microsoft Debugging Tools for Windows** - This collection of tools includes Microsoft Source Server. This tool consists of executable files and Perl scripts that are used both for retrieving source code files from source control systems and for source indexing of your application modules.
- **Perl** - To be able to run Perl scripts that are included in Debugging Tools for Windows, Perl 5.6 or later must be installed.

To source index the modules of your application for Microsoft Source Server, you can use the **ssindex.cmd** command file that is part of Microsoft Source Server and is shipped with the Microsoft Debugging Tools for Windows package. For information on how to use this command file and about its command line parameters, see MSDN Library (its on-line version is available at http://msdn.microsoft.com) and the Microsoft Debugging Tools for Windows documentation. However, it is a lot easier to source index your modules with another SmartBear's tool:

- **Automated Build Studio 5** or later - This tool provides a lot of operations that let you easily automate the build process of your application and perform many routine everyday tasks.

Automated Build Studio includes several operations that provide support for various source control systems and source servers. Among them you can find operations that let you easily perform module indexing for Microsoft Source Server. In order for these operations to work properly, you need Microsoft Debugging Tools for Windows and Perl to be installed on your computer as well.

In the *Source Indexing for Microsoft Source Server* help topic and the *Using Source Control Systems Supported by Microsoft Source Serve* section you can find information on how to perform source indexing of application modules for Microsoft Source Server and various source control systems using Automated Build Studio.

AQtrace Viewer Settings

If you use Microsoft Visual SourceSafe as your source control system, you should specify certain settings on the *MS Source Server* page of AQtrace Viewer's *Options* dialog. To change or view these settings, you should select **Options | Options** from the main menu of AQtrace Viewer and switch to the **General | MS Source Server** page in the ensuing **Options** dialog. On this page, in the **MS Visual SourceSafe** setting group, specify the following settings required for using Microsoft Visual SourceSafe:

- *User* - Specifies the user's login used to connect to the Visual SourceSafe database.
- *Password* - Specifies the user's password needed to connect to the database.

If you use some other supported source control system (for instance, Perforce), there is no need to specify any parameters in AQtrace Viewer options to connect to the repository. Connection information for other source control databases is included along with the source index information in .PDB files once they are indexed.

Source Indexing for Microsoft Source Server

To be able to use Microsoft Source Server for retrieving appropriate versions of source files, the modules of your application should be source indexed. This means that you should define which version of source code files corresponds to each build of your application.

Microsoft Source Server uses .PDB debug information files for module indexing. So, your application should be compiled with debug information (see *Compiling Applications With Debug Information*). Furthermore, Microsoft Source Server can index only .PDB debug information files, so, **you can use Microsoft Source Server only with those applications that were developed with Microsoft Visual Studio or Delphi for .NET**.

During source indexing, Microsoft Source Server reads the list of the source files that were used for compilation of the application's modules from the corresponding .PDB file and appends a special source index segment to this debug information file. This segment contains information needed to obtain these source files from the source control system, including the versions of the files that correspond to the current build of the application. To distinguish the versions of the source files in the source control system, Microsoft Source Server uses the labels from the source control database.

To source index your application's .PDB files, you can use the *Automated Build Studio* application by SmartBear Software. This is a build and release management system that lets you easily automate software builds and build-related tasks as well as routine everyday tasks. Automated Build Studio provides several operations used to source index .PDB files to be used by Microsoft Source Server. These operations are included in the **Microsoft Source Server** category of Automated Build Studio's operations. Each of the operations is used for a certain source control system supported by Microsoft Source Server. The operations are listed below:

- Index PDB Files for VSS

- Index PDB Files for Subversion
- Index PDB Files for Perforce
- Index PDB Files for CVS

In order to use any of these operations, you must specify certain parameters. On the **Index PDB Files For…Details** page of the **Operation Properties** dialog, you need to specify the following properties of the operation (to display this dialog, just double-click the operation in your Automated Build Studio macro):

- *INI File* - Specifies the path to the srcsrv.ini file. This file contains various settings for Microsoft Source Server. Usually, the sample srcsrv.ini file is installed along with Microsoft Source Server. The file resides in the directory along with the other source server tools (for instance, *<Debugging Tools for Windows>\srcsrv\srcsrv.ini*). In this file, you should specify the path to your source control database. For example:

```
MYSERVER=machine.corp.company.com:1666  -- for Perforce
-- or --
MYSERVER=\\sourceserver\sources         -- for Visual SourceSafe
```

  Different source control systems require different path formats (see the sample srcsrv.ini file, which is installed along with Microsoft Source Server).
- *Sources Root* - Specifies the folder (on a local hard drive) that holds a local copy of source files. For instance, *C:\Sources*.
- *Symbols Root* - Specifies the folder (on a local hard drive) that holds the .PDB files to be indexed. For instance, *C:\Symbols*.

In addition to these common properties, you must specify the parameters needed to connect to your source control system (for instance, the user name and password) and the label of the files that should be indexed. These parameters differ from each other depending on the type of the source control system. See *Using Source Control Systems Supported by Microsoft Source Server* for more information on how you can use Microsoft Source Server with the supported source control systems and what parameters you should specify for these Automated Build Studio operations.

In order to use these operations, you must specify the path to the Microsoft Source Server Indexing command file (ssindex.cmd) in the **Tools** dialog of Automated Build Studio. To open the dialog, select **Options | Tools** from the main menu of Automated Build Studio. The ssindex.cmd utility usually resides in the directory where Microsoft Source Server tools are installed (for instance, *<Debugging Tools for Windows>\srcsrv\ssindex.cmd*).

After you specify all the required parameters of the operation needed for your source control system, run the Automated Build Studio macro holding this operation. If the operation is executed successfully, the .PDB files will contain source index information.

Note that Automated Build Studio is used to automatically build applications and perform various operations during the build process. So, it is very convenient to automatically index every build of your application during the build process by using one of the operations mentioned above.

Using Source Control Systems Supported by Microsoft Source Server

Using Microsoft Visual SourceSafe With Microsoft Source Server

If you use Microsoft Visual SourceSafe as a source control system to store the source files of your application and you want to retrieve the actual versions of source files while analyzing the application's dump reports, you should use the **Index PDB Files for VSS** operation in *Automated Build Studio* for source indexing of .PDB files (see *Using Microsoft Source Server - Overview*). You can find this operation in the **Microsoft Source Server** operation category on the **Operations** panel of Automated Build Studio.

In order to use this operation, you should specify the path to the Microsoft Source Server Indexing command file (ssindex.cmd) in the **Tools** dialog of Automated Build Studio. To display this dialog, select **Options | Tools** from the main menu.

The most important thing that should be done to retrieve source code files from the source control system via Microsoft Source Server is to perform source indexing of .PDB files. You should index every build of your application if you want to view the exact versions of the source code in *AQtrace Viewer*. Otherwise, if you do not index a build, AQtrace Viewer will get a local copy of the source files when it opens a dump report generated by this build, and this local copy may not correspond to the version of the files that were used during compilation of the build. So, you may be confused when analyzing the report. To index a build of your application for Microsoft Visual SourceSafe, do the following:

1. Compile your application with debug information (to learn how to do this, see *Compiling Applications With Debug Information*).
2. Check in the source files of your application to the Visual SourceSafe database.
3. Specify a unique label for this version of the source files in the source control system (for instance, you can specify the *VERSION_1_10* label for the 1.10 build number of your application). This label will be used to retrieve this version of the files from Visual SourceSafe via Microsoft Source Server.
4. In Automated Build Studio, create a new macro or open an existing one. Add the **Index PDB Files for VSS** operation to the macro (you can find it in the **Microsoft Source Server** operation category).
5. Double-click the operation in the macro. In the ensuing **Operation Properties** dialog, you should specify the properties required for source indexing. Go to the **Index PDB Files for VSS Details** tabbed page and specify the following options:
   - *INI File* - Specifies the path to the srcsrv.ini file. This file contains various settings for Microsoft Source Server. Usually, the sample srcsrv.ini file is installed along with Microsoft Source Server. It resides in the directory containing the other source server tools (for instance, *<Debugging Tools for Windows>\srcsrv\srcsrv.ini*). In this file you should specify the path to your source control database. For example:

     ```
     MYSERVER=\\sourceserver\sources
     ```

   - *Sources Root* - Specifies the folder (on a local hard drive) that holds a local copy of the source files. For instance, *C:\Sources*.
   - *Symbols Root* - Specifies the folder (on a local hard drive) that holds the .PDB files to be indexed. For instance, *C:\Symbols*.

   Go to the **VSS Options** tabbed page and specify the following parameters:

   - *Database* - Specifies the path to the Microsoft Visual SourceSafe database.
   - *Login* and *Password* - These parameters specify the user name and password used to connect to the VSS database. If both parameters are omitted, the operation will use the login and password of the user who is currently logged in to Windows.
   - *Project* - The name and path to the project stored in the Visual SourceSafe database. For

instance: *$/Sources/CppProject*.

The database directory specified by this path must correspond hierarchically to the directory containing the local copy of the source files (you specified this directory in the *Sources Root* parameter of the operation).

- *Label* - Specifies the label of the files stored in the VSS database. This label should be used for indexing, and it must be the same label that you specified for the source files in the VSS database (for instance, the *VERSION_1_10* label). After indexing, the version of the source files that have this label will correspond to the build of the application that you are going to index.

These parameters are required for successful source indexing. There are also some other tabbed pages with other operation parameters in the **Operation Properties** dialog, but they are optional. For more information on the operation, see Automated Build Studio's documentation.

6. After you have specified the parameters, run the macro.

If the operation is executed successfully, the .PDB files located in the directory specified by the *Symbols Root* parameter will be source indexed and you will be able to use them with Microsoft Source Server to retrieve the source files from your VSS database.

Using Subversion With Microsoft Source Server

If you use Subversion as a source control system to store the source files of your application and you want to retrieve the actual versions of source files while analyzing the application's dump reports, you should use the **Index PDB Files for Subversion** operation in *Automated Build Studio* for source indexing of .PDB files (see *Using Microsoft Source Server - Overview*). You can find this operation in the **Microsoft Source Server** operation category on the **Operations** panel of Automated Build Studio.

In order to use this operation, you should specify the path to the Microsoft Source Server Indexing command file (ssindex.cmd) and the path to the Subversion client executable (svn.exe) in the **Tools** dialog of Automated Build Studio. To display this dialog, select **Options | Tools** from the main menu.

The most important thing that should be done to retrieve source code files from the source control system via Microsoft Source Server is to perform source indexing of .PDB files. You should index every build of your application if you want to view the exact versions of the source code in *AQtrace Viewer*. Otherwise, if you do not index a build, AQtrace Viewer will get a local copy of the source files when it opens a dump report generated by this build, and this local copy may not correspond to the version of the files that were used during compilation of the build. So, you may be confused when analyzing the report. To index a build of your application for Subversion, do the following:

1. Compile your application with debug information (to learn how to do this, see *Compiling Applications With Debug Information*).
2. Commit the changes you have made in the source files of your application to your Subversion repository.
3. In Automated Build Studio, create a new macro or open an existing one. Add the **Index PDB Files for Subversion** operation to the macro (you can find it in the **Microsoft Source Server** operation category).
4. Double-click the operation in the macro. In the ensuing **Operation Properties** dialog, you should

specify the properties required for source indexing. Go to the **Index PDB Files for Subversion Details** tabbed page and specify the following options:

- *INI File* - Specifies the path to the srcsrv.ini file. This file contains various settings for Microsoft Source Server. Usually, the sample srcsrv.ini file is installed along with Microsoft Source Server and resides in the directory containing the other source server tools (for instance, *<Debugging Tools for Windows>\srcsrv\srcsrv.ini*).
- *Sources Root* - Specifies the folder (on a local hard drive) that holds a local copy of the source files. For instance, *C:\Sources*.
- *Symbols Root* - Specifies the folder (on a local hard drive) that holds the .PDB files to be indexed. For instance, *C:\Symbols*.

Go to the **Subversion Options** tabbed page and specify the following parameters:

- *User Name* and *Password* - These parameters specify the user name and password used to connect to the Subversion server. If your server allows anonymous access, you can omit these parameters.
- *Revision* - Specifies the revision of the files you want to index. If this parameter is omitted, the operation indexes the head revision of the files, that is, the latest version of the files stored in the repository.

> In the **Index PDB Files for Subversion** operation, you can use only revision numbers to specify file versions in the Subversion repository. Revision keywords and revision dates are not allowed for this operation.

These parameters are required for successful source indexing. There are also some other tabbed pages with other operation parameters in the **Operation Properties** dialog, but they are optional. For more information on the operation, see Automated Build Studio's documentation.

5. After you have specified the parameters, run the macro.

If the operation is executed successfully, the .PDB files located in the directory specified by the *Symbols Root* parameter will be source indexed, and you will be able to use them with Microsoft Source Server for retrieving the source files from your Subversion repository.

Using Perforce With Microsoft Source Server

If you use Perforce as a source control system to store the source files of your application and you want to retrieve the actual versions of source files while analyzing the application's dump reports, you should use the **Index PDB Files for Perforce** operation in *Automated Build Studio* for source indexing of .PDB files (see *Using Microsoft Source Server - Overview*). You can find this operation in the **Microsoft Source Server** operation category on the **Operations** panel of Automated Build Studio.

> In order to use this operation, you should specify the path to the Microsoft Source Server Indexing command file (ssindex.cmd) and the path to the Perforce client executable (P4.exe) in the **Tools** dialog of Automated Build Studio. To display this dialog, select **Options | Tools** from the main menu.

The most important thing that should be done to retrieve source code files from the source control system via Microsoft Source Server is to perform source indexing of .PDB files. You should index every build of your application if you want to view the exact versions of the source code in *AQtrace Viewer*. Otherwise, if

you do not index a build, AQtrace Viewer will get a local copy of the source files when it opens a dump report generated by this build, and this local copy may not correspond to the version of the files that were used during compilation of the build. So, you may be confused when analyzing the report. To index a build of your application for Perforce, do the following:

1. Compile your application with debug information (to learn how to do this, see *Compiling Applications With Debug Information*).
2. Check in the source files of your application to your Perforce database.
3. Specify a unique label for this version of the source files in your source control system (for instance, you can specify the *VERSION_1_10* label for the 1.10 build number of your application). This label will be used to retrieve this version of the files from Perforce via Microsoft Source Server.
4. In Automated Build Studio, create a new macro or open an existing one. Add the **Index PDB Files for Perforce** operation to the macro (you can find it in the **Microsoft Source Server** operation category).
5. Double-click the operation in the macro. In the ensuing **Operation Properties** dialog, you should specify the properties required for source indexing. Go to the **Index PDB Files for Perforce Details** tabbed page and specify the following options:
   - *INI File* - Specifies the path to the srcsrv.ini file. This file contains various settings for Microsoft Source Server. Usually, the sample srcsrv.ini file is installed along with Microsoft Source Server and resides in the directory containing the other source server tools (for instance, *<Debugging Tools for Windows>\srcsrv\srcsrv.ini*). In this file, you should specify the network path to your Perforce version control server and the port number it uses (by default, Perforce uses port 1666). For instance:

     ```
     MYSERVER=machine.mycorp.mycompany.com:1666
     ```

   - *Sources Root* - Specifies the folder (on a local hard drive) that holds a local copy of the source files. For instance, *C:\Sources*.
   - *Symbols Root* - Specifies the folder (on a local hard drive) that holds the .PDB files to be indexed. For instance, *C:\Symbols*.

   Go to the **Perforce Options** tabbed page and specify the following parameters:
   - *Host* - The network name of the remote computer that hosts the target Perforce server.
   - *Port* - The port number used to connect to the Perforce server (the default value is 1666).
   - *User Name* and *Password* - These parameters specify the user name and password used to connect to the Perforce server.
   - *Working Folder* - Specifies the local folder that holds the local copies of the files stored in the Perforce repository.
   - *Label* - Specifies the label of the files stored in the Perforce repository that should be used for file indexing. It must be the same label that you specified for the source files in the Perforce repository (for instance, the *VERSION_1_10* label). After indexing, the version of the source files that have this label in the repository will correspond to the build of the application that you are going to index.

   These parameters are required for successful source indexing. There are also some other tabbed pages with other operation parameters in the **Operation Properties** dialog, but they are optional. For more information on the operation, see Automated Build Studio's documentation.
6. After you have specified the parameters, run the macro.

If the operation is executed successfully, the .PDB files stored in the directory specified by the *Symbols*

Root parameter will be source indexed, and you will be able to use them with Microsoft Source Server for retrieving the source files from your Perforce repository.

Using CVS With Microsoft Source Server

If you use CVS as a source control system to store the source files of your application and you want to retrieve the actual versions of source files while analyzing the application's dump reports, you should use the **Index PDB Files for CVS** operation in *Automated Build Studio* for source indexing of .PDB files (see *Using Microsoft Source Server - Overview*). You can find this operation in the **Microsoft Source Server** operation category on the **Operations** panel of Automated Build Studio.

In order to use this operation, you should specify the path to the Microsoft Source Server Indexing command file (ssindex.cmd) and the path to the CVS client executable (cvs.exe) in the **Tools** dialog of Automated Build Studio. To display this dialog, select **Options | Tools** from the main menu.

The most important thing that should be done to retrieve source code files from the source control system via Microsoft Source Server is to perform source indexing of .PDB files. You should index every build of your application if you want to view the exact versions of the source code in *AQtrace Viewer*. Otherwise, if you do not index a build, AQtrace Viewer will get a local copy of the source files when it opens a dump report generated by this build, and this local copy may not correspond to the version of the files that were used during compilation of the build. So, you may be confused when analyzing the report. To index a build of your application for CVS, do the following:

1. Compile your application with debug information (to learn how to do this, see *Compiling Applications With Debug Information*).
2. Check in the source files of your application to the CVS repository.
3. Specify a unique tag (a label, in other words) for this version of the source files in your CVS repository (for instance, you can specify the *VERSION_1_10* tag for the 1.10 build number of your application). This label will be used to retrieve this version of the source files from your CVS repository via Microsoft Source Server.
4. In Automated Build Studio, create a new macro or open an existing one. Add the **Index PDB Files for CVS** operation to the macro (you can find it in the **Microsoft Source Server** operation category).
5. Double-click the operation in the macro to display the **Operation Properties** dialog. In this dialog, you should specify the properties required for source indexing. Go to the **Index PDB Files for CVS Details** tabbed page and specify the following options:
   - *INI File* - Specifies the path to the srcsrv.ini file. This file contains various settings for Microsoft Source Server. Usually, the sample srcsrv.ini file is installed along with Microsoft Source Server and resides in the directory containing the other source server tools (for instance, *<Debugging Tools for Windows>\srcsrv\srcsrv.ini*). In this file, you should specify an alias for your CVS repository. The alias will help you distinguish the repository among the other folders on your network.
   - *Sources Root* - Specifies the folder (on a local hard drive) that holds a local copy of the source files. For instance, *C:\Sources*.
   - *Symbols Root* - Specifies the folder (on a local hard drive) that holds the .PDB files to be source indexed. For instance, *C:\Symbols*.

   Go to the **CVS Options** tabbed page and specify the following parameters:

- *CVS Command* - Specifies the name of the client executable needed to send commands to the CVS server. By default, it is the cvs.exe utility. If you use another utility for this purpose, make sure it supports the same options as cvs.exe does. Otherwise, the operation will not work correctly.
- *CVS Root* - Specifies an alias for your CVS repository. The alias will help you identify the repository on your network.
- *Label* and *Date* - These properties specify the label (tag) or date of the files that correspond to the build you are source indexing. These are alternative properties: you can use either the *Label* or the *Date* property (not both). If you use the *Label* property, you should specify the same tag that you specified for the source files in the CVS repository (for instance, *VERSION_1_10*).

These parameters are required for successful source indexing. There are also some other tabbed pages with other operation parameters in the **Operation Properties** dialog, but they are optional. For more information on the operation, see Automated Build Studio's documentation.

6. After you have specified the parameters, run the macro.

If the operation is executed successfully, the .PDB files stored in the directory, which is specified by the *Symbols Root* parameter, will be source indexed, and you will be able to use them with Microsoft Source Server for retrieving the source files from your CVS repository.

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