Fortify® SCA
User Guide

Fortify 360, Version 2.6
May 2010

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Part Number: 1-113-2010-05-20-26-1

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Preface

This guide describes how to use Fortify® Source Code Analyzer.

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About the Fortify 360 Documentation Set

The Fortify 360 documentation set contains installation, user, and deployment guides for various 360 components, including Fortify 360 Server and analyzers, as well as other documentation pertaining to the use of Fortify 360.

Updated versions of the documentation and release notes that describe new features and known issues are also available on the Fortify Customer Portal.

Introduction

This chapter contains the following sections:

- Overview of Fortify SCA
- Overview of the Analyzers
- Overview of the Analysis Phases

Overview of Fortify SCA

Fortify Source Code Analyzer (SCA) is a set of software security analyzers that search for violations of security-specific coding rules and guidelines in a variety of languages. The rich data provided by Fortify SCA language technology enables the analyzers to pinpoint and prioritize violations so that fixes can be fast and accurate. The analysis information produced by SCA helps you deliver more secure software, as well as making security code reviews more efficient, consistent, and complete. This is especially advantageous when large code bases are involved. The modular architecture of SCA allows you to quickly upload new, third party, and customer-specific security rules.

At the highest level, using Fortify SCA involves:

1. Choosing to run SCA as a stand-alone process or integrating Fortify SCA as part of the build tool
2. Translating the source code into an intermediate translated format, preparing the code base for scanning by the different analyzers
3. Scanning the translated code, producing security vulnerability reports
4. Auditing the results of the scan, either by transferring the resulting FPR file to Audit Workbench or Fortify 360 Server for analysis, or directly with the results displayed onscreen

Note: For information on transferring results to Audit Workbench and creating customer-specific security rules, see the *Audit Workbench User's Guide*.

Overview of the Analyzers

Fortify SCA comprises five distinct analyzers: data flow, control flow, semantic, structural, and configuration. Each analyzer accepts a different type of rule specifically tailored to provide the information necessary for the corresponding type of analysis performed. Rules are definitions that identify elements in the source code that may result in security vulnerabilities or are otherwise unsafe.

Rules are organized according to the analyzer that uses them, resulting in rules that are specific to the data flow, control flow, semantic, structural, and configuration analyzers. These rule categories are further divided to reflect the category of the issue or type of information represented by the rule.

The installation process downloads and updates the set of rules used by SCA on your system. Fortify updates the specific rules contained within the Fortify Secure Code Rulepack on a regular basis. The Fortify Customer Portal offers updated rulepacks.

The following table lists and describes each Fortify source code analyzer.

Table 1: Fortify Source Code Analyzers

Analyzer	Description
Data Flow	The data flow analyzer detects potential vulnerabilities that involve tainted data (user-controlled input) put to potentially dangerous use. The data flow analyzer uses global, inter-procedural taint propagation analysis to detect the flow of data between a source (site of user input) and a sink (dangerous function call or operation). For example, the data flow analyzer detects whether a user-controlled input string of unbounded length is being copied into a statically-sized buffer, and detects whether a user controlled string is being used to construct SQL query text.
Control Flow	The control flow analyzer detects potentially dangerous sequences of operations. By analyzing control flow paths in a program, the control flow analyzer determines whether a set of operations are executed in a certain order. For example, the control flow analyzer detects time of check/time of use issues and uninitialized variables, and checks whether utilities, such as XML readers, are configured properly before being used.
Semantic	The semantic analyzer detects potentially dangerous uses of functions and APIs at the intra-procedural level. Its specialized logic searches for buffer overflow, format string, and execution path issues, but is not limited to these categories. A call to any potentially dangerous function can be flagged by the semantic analyzer. For example, the semantic analyzer detects deprecated functions in Java and unsafe functions in C/C++, such as `gets()`.
Structural	The structural analyzer detects potentially dangerous flaws in the structure or definition of the program. By understanding the way programs are structured, the structural analyzer identifies violations of secure programming practices and techniques that are often difficult to detect through inspection because they encompass a wide scope involving both the declaration and use of variables and functions. For example, the structural analyzer detects assignment to member variables in Java servlets, identifies the use of loggers that are not declared static final, and flags instances of dead code that will never be executed because of a predicate that is always false.
Configuration	The configuration analyzer searches for mistakes, weaknesses, and policy violations in an application's deployment configuration files. For example, the configuration analyzer checks for reasonable timeouts in user sessions in a web application.

Overview of the Analysis Phases

Fortify SCA performs source code analysis

- **Build Integration:** The first phase of source code analysis involves making a decision whether to integrate SCA into the build compiler system.
- **Translation:** Source code gathered using a series of commands is translated into an intermediate format which is associated with a build ID. The build ID is usually the name of the project being scanned.
- **Analysis:** Source files identified during the translation phase are scanned and an analysis results file, typically in the Fortify project (FPR) format, is generated. FPR files are indicated by the `.fpr` file extension.
- **Verification of the translation and analysis**: Ensure that the source files were scanned using the correct rulepacks and that no significant errors were reported.

Example of Analysis Commands

The following is an example of the sequence of commands you use to analyze code:

```
> sourceanalyzer -b <build_id> -clean
> sourceanalyzer -b <build_id> ...
> sourceanalyzer -b <build_id> -scan -f results.fpr
```

Additional Confirmation for Fortify SCA Per Use

The following shows the additional sequence of commands when using Fortify SCA with a per use license to analyze code:

```
 Running this scan will deduct <number-of-lines> scan lines from
your account. Would you like to proceed? [y/n] y
<number-of-lines> scan lines deducted. <number-of-lines> remaining
```

Note: You can run the scan in silent mode, which suppresses the prompt and automatically deducts lines, by using the command line option, `-auth-silent`, or by setting the `com.fortify.sca.PPSSilent` property to true.

Memory Considerations

By default, Fortify SCA uses up to 600 MB of memory. If this is not sufficient to analyze a particular code base, you might have to provide more memory in the scan phase. This can be done by passing the `-Xmx` option to the `sourceanalyzer` command.

For example, to make 1000 MB available to Fortify SCA, include the option `-Xmx1000M`.

You can also use the SCA_VM_OPTS environment variable to set the memory allocation.

Note: Do not allocate more memory for Fortify SCA than the machine has available, because this will degrade performance. As a guideline, assuming that no other memory-intensive processes are running, do not allocate more than 2/3 of the available physical memory.

Translation Phase

The basic command line syntax for performing the first analysis phase, translating the files, is:

```
sourceanalyzer -b <build_id> ...
```

The translation phase consists of one or more invocations of Fortify SCA using the `sourceanalyzer` command. A build ID (`-b <build_id>`) is used to tie together the invocations.

Subsequent invocations of `sourceanalyzer` add any newly-specified source or configuration files to the file list associated with the build ID.

At the end of translation, you can use `-show-build-warnings` to list all warnings and errors that were encountered during the translation process:

```
sourceanalyzer -b <build_id> -show-build-warnings
```

To view all of the files associated with a particular build ID, use the `-show-files` directive:

```
sourceanalyzer -b <build_id> -show-files
```

The following chapters describe how to translate different types of source code:

- Translating Java Code
- Translating .NET Source Code
- Translating C/C++ Code
- Translating Other Languages, such as ColdFusion, Classic ASP and JavaScript

Fortify SCA Per Use License Only, Verifying Available Lines

When using Fortify SCA with a per use license, the basic command line syntax to display the number of available lines is:

```
sourceanalyzer -auth-query
```

For translated projects, display the total number of lines required to analyze the project using the `-show-loc` option. Fortify SCA counts lines of code (LOC) in a project that are executable, and excludes lines such as comments and blank lines. The command to display the number of lines is:

```
sourceanalyzer -b <build_id> -show-loc
```

If the number of available lines is less than the amount required to analyze the project, request lines from the Per Use Portal account before continuing with the analysis phase. See "Managing Per Use Accounts" on page 30 for details.

Analysis Phase

This topic describes the syntax for the analysis phase: scanning the intermediate files created during the translation and creating the analysis results file. The phase consists of one invocation of sourceanalyzer. You specify the build ID and include the `-scan` directive and any required analysis or output options.

Note: By default, Fortify SCA includes the source code in the FPR.

The basic command line syntax for the analysis phase is:

```
sourceanalyzer -b <build_id> -scan -f results.fpr
```

The command line syntax to silently analyze a project for Fortify SCA with a per use license is:

```
sourceanalyzer -b <build-id> -auth-silent -scan -f results.fpr
```

This runs the scan without the prompt to deduct the lines. For more information about the command line options, see "Command Line Interface" on page 34.

Additional Steps for Fortify SCA Per Use

If you are using Fortify SCA with a per use license, Fortify SCA displays the number of lines required to scan the project and prompts you before deducting the lines.

Enter `y` (yes) to continue with the scan as follows:

```
Running this scan will deduct <number-of-lines> scan lines from
your account. Would you like to proceed? [y/n] y
<number-of-lines> scan lines deducted. <number-of-lines> remaining
```

Note: You can re-scan a set of translated files. This allows you to scan the same project with different rules, updated rulepacks, and/or scan settings without using additional scan lines.

Verification of the Translation and Analysis Phase

The Result Certification feature of Audit Workbench verifies that the analysis is complete. results certificationResult certification shows specific information about the code scanned by Fortify SCA, including:

- List of files scanned, with file sizes and timestamps
- Java classpath used for the translation
- List of rulepacks used for the analysis
- List of Fortify SCA runtime settings and command line arguments
- List of errors or warnings encountered during translation or analysis
- Machine/platform information

To view result certification information, open the FPR file in Audit Workbench and select **Tools - Project Summary - Certification**.

Translating Java Code

This chapter describes how to translate Java source code for analysis with Fortify SCA.

The following topics are included:

- Java Command Line Syntax
- Java Command Line Examples
- Integrating with Ant using the Fortify Ant Compiler Adapter
- Translating J2EE Applications
- Using FindBugs

Java Command Line Syntax

This topic describes the Fortify SCA command syntax for translating Java source code.

The basic command line syntax for Java is:

```
sourceanalyzer -b <build_id> -cp <classpath> <file_list>
```

With Java code, Fortify SCA can either emulate the compiler, which may be convenient for build integration, or accept source files directly, which is more convenient for command line scans.

Note: For a description of all the options you can use with the `sourceanalyzer` command, see "Command Line Interface" on page 34.

To have Fortify SCA emulate the compiler, enter:

```
sourceanalyzer -b <build_id> javac [<translation options>]
```

To pass files directly to Fortify SCA, enter:

```
sourceanalyzer -b <build_id> -cp <classpath> [<translation options>]
<files>|<file specifiers>
```

where:

```
<translation options>
```

are options passed to the compiler.

```
-cp <classpath>
```

specifies the classpath to be used for the Java source code. A classpath is a list of build directories and jar files. The format is the same as expected by javac (colon or semicolon-separated list of paths). You can use Fortify SCA file specifiers.

```
-cp "build/classes:lib/*.jar"
```

Note: If you do not specify the classpath with this option, the CLASSPATH environment variable is used.

For more information, see "Java/J2EE Options" on page 37. For information about file specifiers, see "Specifying Files" on page 41.

Java Command Line Examples

To translate a single file named `MyServlet.java` with `j2ee.jar` on the classpath, enter:

```
sourceanalyzer -b MyServlet -cp lib/j2ee.jar MyServlet.java
```

To translate all `.java` files in the `src` directory using all jar files in the `lib` directory as a classpath:

```
sourceanalyzer -b MyProject -cp "lib/*.jar" "src/**/*.java"
```

To translate and compile the `MyCode.java` file while using the javac compiler:

```
sourceanalyzer -b mybuild javac -classpath libs.jar MyCode.java
```

Integrating with Ant using the Fortify Ant Compiler Adapter

Fortify SCA provides an Ant Compiler Adapter that you can use as an easy way to translate Java source files if your project uses an Ant build file. This integration requires setting only two Ant properties, and can be done on the command line without modifying the Ant `build.xml` file. When the build runs, Fortify SCA intercepts all javac task invocations and translates the Java source files as they are compiled. Note that any JSP files, configuration files, or any other non-Java source files that are part of the application need to be translated in a separate step.

The following steps must be taken to use the Compiler Adapter:

- The `sourceanalyzer` executable must be on the system PATH.
- `sourceanalyzer.jar` (located in `Core/lib`) must be on Ant's classpath.
- The `build.compiler` property must be set to `com.fortify.dev.ant.SCACompiler`.
- The `sourceanalyzer.buildid` property must be set to the build ID.

The following examples show how to run an Ant build using the Compiler Adapter without modifying the build file:

```
ant -Dbuild.compiler=com.fortify.dev.ant.SCACompiler
   -Dsourceanalyzer.buildid=MyBuild
   -lib <install_dir>/Core/lib/sourceanalyzer.jar
```

The `-lib` option is only available in Ant version 1.6 or higher. In older versions you must set the CLASSPATH environment variable or copy `sourceanalyzer.jar` to Ant's lib directory.

Alternatively, with Ant 1.6 or newer, the following shorthand can be used to run Ant with the compiler adapter:

```
sourceanalyzer -b <build-id> ant [ant-options]
```

By default, 600 MB of memory is allocated to Fortify SCA for translation. Increase the memory allocation when using the Ant Compiler Adapter using the `-Dsourceanalyzer.maxHeap` option as follows:

```
ant -Dbuild.compiler=com.fortify.dev.ant.SCACompiler
-Dsourceanalyzer.buildid=MyBuild
-lib <install_directory>/Core/lib/sourceanalyzer.jar
-Dsourceanalyzer.maxHeap=1000M
```

Translating J2EE Applications

Translating J2EE applications involves processing Java source files, J2EE components such as JSP files, deployment descriptors such as `web.xml`, and configuration files such as `struts-config.xml`.

The steps include:

1. Translating the Java files.

   Refer to the samples earlier in this chapter.
2. Translating the JSP files.

   Refer to the sample below.
3. Processing the configuration files.

   An example is:

   ```
   sourceanalyzer -b my_buildid "mydirectory/myfile.xml"
   ```

Working with JSP Projects

To translate JSP files, Fortify SCA requires that the JSP files are in a standard Web Application Archive (WAR) layout. If your source directory is already organized in a WAR layout, you can translate JSP files directly from the source directory. If this is not the case, you may need to deploy your application and translate the JSP files from the deployment directory.

If your JSP files use any tag libraries, such as JSTL, ensure that the libraries' jar files are in the `WEB-INF/lib` directory. Otherwise, the JSP compiler will not resolve the tag libraries and could produce incorrect results.

By default, Fortify SCA uses a version of the Jasper JSP compiler to compile JSP files into Java files during the translation phase. However, if your web application is developed specifically for an application server, you must use the JSP compiler for that application server when performing the translation.

To support this, Fortify SCA provides the following command line options:

- `-appserver` supported values: `weblogic/websphere`
- `-appserver-home`

  For Weblogic, the path to the directory containing the `server/lib` directory

  For WebSphere, the path to the directory containing the `bin/JspBatchCompiler` script
- `-appserver-version` supported values:

  Weblogic versions 7, 8, 9, and 10

  WebSphere version 6

If you are using an application server that is not listed, use the default internal Fortify JSP compiler.

For example:

```
sourceanalyzer -b my_buildid -cp "WEB-INF/lib/*.jar" "WEB-INF/**/*.jsp"
```

XML Configuration Files

Fortify SCA uses the `web.xml` configuration file during the project scan for the following information:

- servlet tags
- servlet-mapping tags
- filter tags
- filter-mapping tags
- error-page tags

These tags are used to determine how the servlets and filers defined in the `.java` and `.jsp` files are connected.

If a struts servlet is detected, Fortify SCA extracts the configuration file to process the following top-level tags:

- form-beans
- global forwards
- action mappings

This data connects struts actions to follow how taint may propagate through an application.

Call Graph

Using data from the XML and struts configuration files, Fortify SCA builds a call graph to track potential taint from servlet to servlet and to struts actions. For information about what is extracted from the configuration files, see XML Configuration Files.

Handling Resolution Warnings

To see all warnings that were generated during your build, enter the following command before you start the scan phase:

```
sourceanalyzer -b <build_id> -show-build-warnings
```

Java Warnings

You may see the following warnings for Java:

```
Unable to resolve type...

Unable to resolve function...

Unable to resolve field...

Unable to locate import...

Unable to resolve symbol...

Multiple definitions found for function...

Multiple definitions found for class...
```

These warnings are typically caused by missing resources. For example, some of the `.jar` and class files required to build the application have not been specified. To resolve the warnings, make sure that you have included all of the required files that your application uses.

J2EE Warnings

You may see the following warnings for J2EE applications:

```
Could not locate the root (WEB-INF) of the web application. Please build your web
application and try again. Failed to parse the following jsp files:

<list of .jsp file names>
```

This warning displays because your Web application is not deployed in the standard WAR directory format or does not contain the full set of required libraries. To resolve the warning, ensure that your web application is in an exploded WAR directory format with the correct `WEB-INF/lib` and `WEB-INF/classes` directories containing all of the `.jar` and `.class` files required for your application. You should also verify that you have all of the `TLD` files for all of the tags that you have and the corresponding `.jar` files with their tag implementations.

Using FindBugs

FindBugs (http://findbugs.sourceforge.net) is a static analysis tool that detects quality issues in Java code. You can run FindBugs with Fortify SCA and the results will be integrated into the analysis results file. Unlike Fortify SCA, which runs on Java source files, FindBugs runs on Java bytecode. Therefore, before running an analysis on your project, you should first compile the project and produce the class files.

To demonstrate how to run FindBugs automatically with Fortify SCA, compile the sample code, `Warning.java`, as follows:

1. Go to the following directory:

   ```
   <install_directory>/Samples/advanced/findbugs
   ```

2. Enter the following command to compile the sample:

   ```
   mkdir build
   javac -d build Warning.java
   ```

3. Scan the sample with FindBugs and Fortify SCA as follows:

   ```
   sourceanalyzer -b findbugs_sample -java-build-dir build Warning.java
   sourceanalyzer -b findbugs_sample -scan -findbugs -f findbugs_sample.fpr
   ```

4. Examine the analysis results in Audit Workbench:

   ```
   auditworkbench findbugs_sample.fpr
   ```

The output contains the following issue categories:

- Bad casts of Object References (1)
- Dead local store (2)
- Equal objects must have equal hashcodes (1)
- Object model violation (1)
- Unwritten field (2)
- Useless self-assignment (2)

If you group by Analyzer, you can see that the Fortify SCA Structural analyzer produced one warning and FindBugs produced eight. The `Object model violation` warning produced by Fortify SCA on line 25 is similar to the `Equal objects must have equal hash codes` warning produced by FindBugs. In addition, FindBugs produces two sets of warnings (`Useless self-assignment` and `Dead local store`) about the same issues on lines 6 and 7. To avoid overlapping results, apply the `filter.txt` filter file by using the `-filter` option during the scan. Note that the filtering is not complete because each tool filters at a different level of granularity. To demonstrate how to avoid overlapping results, scan the sample code using `filter.txt` as follows:

```
sourceanalyzer -b findbugs_sample -scan -findbugs -filter filter.txt
-f findbugs_sample.fpr
```

Translating .NET Source Code

This chapter describes how to use Fortify SCA to translate Microsoft Visual Studio .NET and ASP.NET applications built with:

- .NET Versions 1.1 and 2.0
- Visual Studio .NET version 2003
- Visual Studio .NET version 2005

Fortify SCA works on the Common Intermediate Language (CIL), and therefore supports all of the .NET languages that compile to CIL, including C# and VB .NET.

The following topics are included:

- Visual Studio .NET
- Translating Simple .NET Applications
- Translating ASP.NET 1.1 (Visual Studio Version 2003) Projects

Note: The easiest way to analyze a .NET application is to use a Fortify Secure Coding Plug-in for Visual Studio, which automates the process of gathering information about the project.

Visual Studio .NET

If you perform command line builds with Visual Studio .NET, you can easily integrate static analysis by wrapping the build command line with an invocation of `sourceanalyzer`. For this to work, you must have the Secure Coding Package for your version of Visual Studio installed.

The following example demonstrates the command line syntax for Visual Studio .NET:

```
sourceanalyzer -b my_buildid devenv Sample1.sln /REBUILD debug
```

This performs the translation phase on all files built by Visual Studio. Be sure to do a clean or a rebuild so that all files are included. You can then perform the analysis phase, as in the following example:

```
sourceanalyzer -b my_buildid -scan -f results.fpr
```

Note: If your classic ASP/VBScript application uses *virtual* includes, for example,

```
<!--include virtual="/myweb/foo.inc">
```

then you should specify the physical location of the `myweb` application by passing the following property value:

```
com.fortify.sca.ASPVirtualRoots=<semicoloon separated list of full paths to virtual
roots used>
```

For example, if the IIS virtual root `/myweb` is located at `C:\webapps\myweb-folder`, then your property value should be:

```
-Dcom.fortify.sca.ASPVirtualRoots=c:\webapps\myweb-folder
```

If you add this line to the fortify-sca.properties file, you must escape the `\` character, as in the following:

```
com.fortify.sca.ASPVirtualRoots=c:\\webapps\\myweb-folder
```

Translating Simple .NET Applications

You can also use Fortify SCA command line interface for processing .NET applications.

Prepare your application for analysis using one of the following methods:

- Perform a complete rebuild of your project with the "debug" configuration enabled. Compiling your project with debug enabled provides information that Fortify SCA uses for presenting the results.
- Obtain all of the third party `.dll` files, project output `.dll` files, and corresponding `.pdb` files for your projects. Note that Fortify SCA ignores any `.dll` file passed as an input argument if the corresponding `.pdb` file does not exist in the same folder. It is therefore imperative that you include all of the `.pdb` files for all your project `.dll` files.

  Note: `.pdb` files are not required for third party libraries.

Run Fortify SCA to analyze the .NET application from the command line as follows:

- For Visual Studio .NET Version 2003, enter:

  ```
  sourceanalyzer -vsversion 7.1 -b MyBuild
  -libdirs ProjOne/Lib;ProjTwo/Lib ProjOne/bin/Debug ProjTwo/bin/Debug
  ```

  where:

  - `MyBuild` is the build identifier
  - `ProjOne/Lib;ProjTwo/Lib` is a semicolon-separated list of paths to folders or DLLs with third party DLLs
  - `ProjOne/bin/Debug ProjTwo/bin/Debug` are the output folders
- For Visual Studio .NET Version 2005, enter:

  ```
  sourceanalyzer -vsversion 8.0 -b MyBuild
  -libdirs ProjOne/Lib;ProjTwo/Lib ProjOne/bin/Debug ProjTwo/bin/Debug
  ```

  where:

  - `MyBuild` is the build identifier
  - `ProjOne/Lib;ProjTwo/Lib` is a semicolon-separated list of paths to folders or DLLs with third party DLLs
  - `ProjOne/bin/Debug ProjTwo/bin/Debug` are the output folders

  Note: Standard .NET DLLs used in your project are automatically picked up by Fortify SCA, so you do not need to include them in the command line.

  If your project is large, you can perform the translation phase separately for each output folder using the same build ID, as follows:

  ```
  sourceanalyzer -vsversion <version_number> -b <build_id>
  -libdirs <paths> <folder_1>
  ...
  sourceanalyzer -vsversion <version_number> -b <build_id>
  -libdirs <paths> <folder_n>
  ```

  where:

  - `<version_number>` is either 7.1, 8.0, or 9.0
  - `<build_id>` is the build ID
  - `<paths>` is a semicolon-separated list of paths to folders or DLLs with third party DLLs
  - `<folder_1>` and `<folder_n>` are the output folders

Note: Fortify SCA requires the appropriate version of Visual Studio, even if you are using the command line interface.

Translating ASP.NET 1.1 (Visual Studio Version 2003) Projects

As discussed previously, Fortify SCA works on CIL generated by the .NET compilers. For ASP.NET projects, web components such as `.aspx` files need to be compiled before they can be analyzed. However, there is no standard

compiler for `.aspx` files. The .NET 1.1 runtime automatically compiles them when they are accessed from a browser.

To facilitate the `.aspx` compilation phase, Fortify Software provides a simple tool that compiles all of the `.aspx` files in your project. The tool is located in the Fortify installation directory at:

```
\Tools\fortify_aspnet_compiler\fortify_aspnet_compiler.exe
```

To analyze ASP.NET 1.1 solutions:

1. Perform a complete rebuild of the solution.
2. For each of the web projects in the solution, delete the following folder:

   ```
   %SYSTEMROOT%\Microsoft.NET\Framework\v1.1.4322\Temporary ASP.NET
   Files\<web_application_name>
   ```
3. For each of the web projects in the solution, run the following command:

   ```
   fortify_aspnet_compiler <url_to_the_web_site> <source_root_of_the_web_project>
   ```

   where:

   `<url_to_the_web_site>` is the URL for your web site, such as `http://localhost/WebApp`

   `<source_root_of_the_web_project>` is the source location of your web project, such as `<VS_project_location>\WebApp`
4. Perform the translation phase for the DLLs built in Step 1. Enter the following command using the same build ID as in the following steps:

   ```
   sourceanalyzer -b <build_id> "<VS_project_location>\**\*.dll"
   ```
5. Perform the translation phase for the web components. For each of the web projects in the solution, enter the following when you invoke `sourceanalyzer`:

   ```
   sourceanalyzer -b <build_id>
   %SYSTEMROOT%\Microsoft.NET\Framework\v1.1.4322\Temporary ASP.NET
   Files\<web_application_name>
   ```
6. Include the configuration files and any Microsoft T-SQL source files that you have:

   ```
   sourceanalyzer -b <build_id> "<solution_root>\**\*.config"
   <"t-sql_src>\**\*.sql">
   ```

   Note: These steps are all automated if you use the Fortify 360 Package for Visual Studio.

Handling Resolution Warnings

To see all warnings that were generated during your build, enter the following command before you start the scan phase:

```
sourceanalyzer -b <build_id> -show-build-warnings
```

.NET Warnings

You may see the following warnings for .NET:

```
Cannot locate class... in the given search path and the Microsoft .NET Framework
libraries.
```

These warnings are typically caused by missing resources. For example, some of the `.DLL` files required to build the application have not been specified. To resolve the warnings, make sure that you have included all of the required files that your application uses. If you still see a warning and the classes it lists are empty interfaces with no members, you can ignore the warning. If the interface is not empty, contact Technical Support.

ASP.NET Warnings

You may see the following warnings for ASP.NET applications:

```
Failed to parse the following aspx files:

<list of .aspx file names>
```

This warning displays because your Web application is not deployed correctly or does not contain the full set of required libraries, or it uses the Global Access Cache (GAC). If your application is a .NET version 1.1 application, you may also have access issues from Microsoft IIS. Verify that you can access the application from a browser without authentication or access errors. If your web application uses the GAC, you must add the `.DLL` files to the project separately to ensure a successful scan. Fortify SCA does not load `.DLL` files from the GAC.

Translating C/C++ Code

This chapter describes how to translate C and C++ source code for analysis with Fortify SCA.

C and C++ Command Line Syntax

The basic command line syntax for translating a single file is:

```
sourceanalyzer -b <build_id> <compiler> [<compiler options>]
```

where:

- `<compiler>` is the name of the compiler you want to use during a project build scan, such as `gcc` or `cl`.
- `<compiler options>` are options passed to the compiler that are typically used to compile the file.

C and C++ Command Line Examples

The following is a simple usage example:

To translate a file named `helloworld.c` using the gcc compiler, enter:

```
sourceanalyzer -b my_buildid gcc helloworld.c
```

Note: This also compiles the file.

Integrating with Make

You can use either of the following methods to use Fortify SCA with Make:

- Using the Fortify Touchless Build Adapter
- Modifying a Makefile to Invoke Fortify SCA

Using the Fortify Touchless Build Adapter

The following section descibes the different methods for using the touchless build adaptor.

Using the sourceanalyzer Build Adaptor Command

To use the Fortify touchless build adapter to integrate with makefiles, run the following command:

```
sourceanalyzer -b <build_id> touchless make
```

Fortify SCA runs the `make` command. When make invokes any command that Fortify SCA determines is a compiler, the command is processed by Fortify SCA. Note that the `makefile` is not modified.

For information about informing Fortify SCA about specially-named compilers, see the `com.fortify.sca.compilers.*` property in “Using Properties to Control Runtime Options” on page 52.

This method of build integration is not limited to make. Any build command that executes a compiler process can be used with this system; just replace the 'make' section of the above command with the command used to run a build.

Note: The Fortify touchless build adapter does not function correctly if:

- The build script invokes the compiler with an absolute path or if the build script overrides the executable search path.
- The build script does not create a new process to run the compiler. Many Java build tools, including Ant, operate this way.

Using the fortify Build Adaptor Command

Fortify 360 offers a convenient command that bundles together the translation and scan steps when you are using touchless integration to analyze a C/C++ project. The command is as follows:

```
fortify [-b my_build_id] [-noscan] [-f my_fpr_name.fpr] build_command
```

The command `fortify build_command` serves as an equivalent to running the following commands:

```
sourceanalyzer -b my_build_id -clean
sourceanalyzer -b my_build_id touchless build_command
sourceanalyzer -b my_build_id -scan -f cwd.fpr
```

If `-f` is not used, the name of the current working directory is used in naming the FPR, i.e. `cwd.fpr`.

If additional options are required for either the translation or analysis step (as described in Ch. 1), a couple of environment variables are available:

```
FORTIFY_BUILD_OPTS
FORTIFY_SCAN_OPTS
```

For example, in a Bash shell, you would set these to the following values in order to acquire the information needed byFortify Technical Support when they are helping you with an SCA-related ticket.

```
export FORTIFY_BUILD_OPTS=-debug\ -logfile\ translation.log
export FORTIFY_SCAN_OPTS=-debug\ -logfile\ scan.log
```

This would cause two additional files to be created, translation.log and scan.log, after the following is run:

```
fortify make
```

Modifying a Makefile to Invoke Fortify SCA

To modify a makefile to invoke Fortify SCA, replace any calls to the compiler, archiver, or linker in the makefile with calls to Fortify SCA. These tools are typically specified in a special variable in the makefile, as in the following example:

```
CC=gcc
CXX=g++
AR=ar
```

The step can be as simple as prepending these tool references in the makefile with Fortify SCA and the appropriate options:

```
CC=sourceanalyzer -b mybuild gcc
CXX=sourceanalyzer -b mybuild g++
AR=sourceanalyzer -b mybuild ar
```

Using Fortify Build Monitor

This section describes how to use Fortify Build Monitor to scan C/C++ projects automatically during a build on Windows and view the results. It includes examples that use sample projects provided with Fortify SCA.

This section covers the following topics:

- Fortify Build Monitor Overview
- Configuring Fortify Build Monitor
- Monitoring Builds
- Example of Monitoring a Project

Fortify Build Monitor Overview

The following options are available from the Fortify Build Monitor menu:

Table 2: Fortify Build Monitor Options

Option	Description
Monitor	Enables the monitoring. Build Monitor intercepts and translate the next build on the machine.
Build Done	Stops the monitor after the build is complete.
Scan	Scans the code that was monitored during the build.
Scan Settings	Controls the rulepacks and memory settings.
Set Results Folder	Controls where Fortify SCA outputs the results.
Stay on Top	Keeps the Fortify Build Monitor window on top of other windows.
Minimize to Tray	Shows the Fortify Build Monitor as an icon in the task bar.
Exit	Closes the Fortify Build Monitor.
Show Messages	Shows or hides the messages in the lower area of the window. Messages include Scan Messages, Errors, and Monitor Driver information. You can click **Detailed Messages** at the bottom of the window.
Help	Displays online help.
Reset	Resets the Fortify Build Monitor to its beginning state.

Configuring Fortify Build Monitor

This section covers the following topics:

- Setting Up the Results Folder
- Setting Fortify SCA Scan Options

Setting Up the Results Folder

Fortify Build Monitor outputs results in FPR format to a local folder. You can change the output folder. Fortify Build Monitor replaces the results each time a scan is performed. Results are not archived.

To change the results folder:

1. Select **Action - Set Results Folder**.

   The Browse for Folder dialog displays.
2. Select a folder and click **OK**.

Fortify Build Monitor will output the results to the selected folder.

Setting Fortify SCA Scan Options

Fortify Build Monitor scans the project using Fortify SCA. You can adjust the following scan settings:

- **Allocate memory:** Increase or decrease the amount of memory allocated to Fortify SCA
- Fortify Secure Coding Rulepacks **and custom rulepacks:** Change which rulepacks Fortify SCA uses to analyze the source code
- **User:** Only monitor builds run by the current user

To change the scan options:

1. Select **Action - Scan Settings**.

   The Fortify Build Monitor: Scan Settings dialog displays.
2. To change the memory allocation, select a value.

   Note: Entering an invalid option sets the memory to unlimited.
3. To add or remove rulepacks, click **Rulepacks**.
4. To view the Fortify SCA command line options, click **Preview**.
5. Click **Done**.

The Fortify SCA scan options are changed.

Monitoring Builds

For C/C++ projects and solutions on Windows, Fortify SCA includes the Fortify Build Monitor, which is a graphical user interface tool that automates analysis during builds.

To analyze C/C++ source code builds on Windows:

1. Select **Start - Program Files - Fortify Software - Fortify SCA - Build Monitor**.
2. Click **Monitor**.

   After the monitor initiates a green light icon displays.
3. Create a complete build of your project in your build environment.
4. Check that the build has finished successfully.
5. Return to the Fortify Build Monitor window and click **Build Done**.
6. Fortify SCA outputs the results to a subfolder, specify a name for the folder for the output. If the folder already exists, Fortify SCA cleans the folder before starting the scan.
7. Click **Scan**.

Fortify SCA displays the results and saves an FPR file in the folder you specified.

Note: To view the results, open the FPR file in Audit Workbench or using the Secure Coding Package for Microsoft Visual Studio.

Example of Monitoring a Project

This example for Windows users analyzes the sample C++ code project named `qwik-smtpd`. It uses Microsoft Visual Studio and the Fortify Build Monitor.

To analyze the `qwik-smtpd` project:

1. Using Microsoft Visual Studio, open and build the `qwik-smtpd` project located in the `Tutorial/C/source` directory.
2. Select **Start - Program Files - Fortify Software - Fortify SCA - Build Monitor**.
3. Click **Monitor**.
4. Minimize the window.
5. In Microsoft Visual Studio, rebuild the project.

   Note: Since nothing in the project changed, you must use the rebuild option.
6. Check that build has finished successfully.
7. Return to the Fortify Build Monitor window and click **Build Done**.
8. Specify the location of the build output.
9. Click **Scan**.

Fortify SCA saves an FPR file in the folder you specified.

Note: To view the results, open the FPR file in Audit Workbench or using the Secure Coding Package for Microsoft Visual Studio.

Visual Studio .NET

If you perform command line builds with Visual Studio .NET, you can easily integrate static analysis by simply wrapping the build command line with an invocation of `sourceanalyzer`. For this to work, you must have the Fortify Secure Coding Plug-in for your version of Visual Studio installed.

Consider the following example

```
sourceanalyzer -b my_buildid devenv MyProject.sln /REBUILD
```

This performs the translation phase on all files built by Visual Studio. Be sure to do a clean or a rebuild so that all files are included.

Visual Studio 6.0

If you perform command line builds with Visual Studio 6.0, you can integrate static analysis by wrapping the build command line with an invocation of `sourceanalyzer`.

Consider the following example:

```
sourceanalyzer -b my_buildid msdev MyProject.dsp /MAKE "MyProject DEBUG" /REBUILD
```

This performs the translation phase on all files built by the Visual Studio. Be sure to do a clean or a rebuild so that all files are included, as described in your Visual Studio documentation.

Translating Other Languages

This chapter describes how to translate other programming languages for analysis with Fortify SCA.

This section includes the following topics:

- Command Line Syntax for Other Languages
- Configuration Considerations

Command Line Syntax for Other Languages

This topic describes the Fortify SCA command syntax for translating other languages.

The basic command line syntax for other languages is:

```
sourceanalyzer -b <build_id> <file_list>
```

SQL Note: By default, files with the extension `.sql` are assumed to be T-SQL rather than PL/SQL on Windows platforms. If you are using Windows and have PL/SQL files with the `.sql` extension, you should configure Fortify SCA to treat them as PL/SQL. To change the default behavior, set the `com.fortify.sca.fileextensions.sql` property in `fortify-sca.properties` to "TSQL" or "PLSQL".

Enter the following to perform translation on ColdFusion source code:

```
sourceanalyzer -b <build -id> -source-base-dir <dir> <files|file specifiers>
```

where:

- `<build_id>` specifies the build ID for the project
- `<dir>` specifies the root directory of the web application
- `<files|file specifiers>` specifies the CFML source code files

ColdFusion Note: Fortify SCA calculates the relative path to each CFML source file by using the `-source-base-dir` directory as the starting point, then uses these relative paths when generating instance IDs. If the entire application source tree is moved to a different directory, the instance IDs generated by a security analysis should remain the same if you specify an appropriate value for `-source-base-dir`.

For a description of all the options you can use with the `sourceanalyzer` command, see "Command Line Interface" on page 34.

File specifiers are shown in the following table:

Table 3: File Specifiers

File Specifier	Description
`<dirname>`	All files found under the named directory or any subdirectories
`<dirname>/**/Example.js`	Any file named `Example.js` found under the named directory or any subdirectories
`<dirname>/*.js`	Any file with the extension `.js` found in the named directory
`<dirname>/**/*.js`	Any file with the extension `.js` found under the named directory or any subdirectories
`<dirname>/**/*`	All files found under the named directory or any subdirectories (same as `<dirname>`)

Note: Windows and many Unix shells automatically try to expand arguments containing the '*' character, so file-specifier expressions should be quoted. Also, on Windows, enter the backslash (\) instead of the forward slash (/).

Configuration Considerations

This section covers the following topics:

- Configuring Python
- Configuring ColdFusion
- Configuring the SQL Extension
- Configuring ASP/VBScript Virtual Roots

Configuring Python

Fortify SCA translates Python applications, and treats files with the extension `.py` as Python source code. In order for SCA to translate Python applications and prepare the application for a scan, SCA searches any import files for the application. SCA does not respect the PYTHONPATH environment variable which the Python runtime system uses to find imported files, so this information should be given directly to SCA using the `-python-path` argument. In addition, some applications add additional import directories during runtime initialization.

To add paths for additional import directories, use the sourceanalyzer command line option:

```
-python-path pathname
```

Note: SCA translates Python applications using all import files located in the directory path defined by the `-python-path pathname` option. Subsequently, translation may take a significant amount of time to complete.

Configuring ColdFusion

In order to treat undefined variables in a CFML page as tainted, uncomment the following line in sca_install_dir\Core\config\fortify-sca.properties:
`#com.fortify.sca.CfmlUndefinedVariablesAreTainted=true`

Doing so serves as a hint to the data flow analyzer to watch out for register-globals-style vulnerabilities. However, enabling this property interferes with data flow findings in which a variable in an included page is initialized to a tainted value in an earlier-occurring included page.

Configuring the SQL Extension

By default, files with the extension `.sql` are assumed to be T-SQL rather than PL/SQL on Windows platforms. If you are using Windows and have PL/SQL files with the `.sql` extension, you should configure Fortify SCA to treat them as PL/SQL. To change the default behavior, set the `com.fortify.sca.fileextensions.sql` property in `fortify-sca.properties` to "TSQL" or "PLSQL".

Note: Fortify 360 v2.5 updates the PL/SQL parser to improve translation of PL/SQL source code. However, the existence of two different parsers can make merging results from pre-v2.5 and post-v2.5 difficult.

To revert to the older version of the PL/SQL parser, add the following property to the `fortify-sca.properties` file:

```
com.fortify.sca.UseOldPlsql=true
```

Configuring ASP/VBScript Virtual Roots

Fortify SCA allows you to handle ASP virtual roots. For web servers that use virtual directories as aliases that map to physical directories, SCA allows you to use alias.

For instance, you may have virtual directories named `Include` and `Library` which refer to the physical directories `C:\WebServer\CustomerOne\inc` and `C:\WebServer\CustomerTwo\Stuff` respectively.

As an example, the ASP/VBScript code for an application using *virtual* includes, as follows:

```
<!--#include virtual="Include/Task1/foo.inc"-->
```

The above ASP code refers to the actual directory, as follows:

```
C:\Webserver\CustomerOne\inc\Task1\foo.inc
```

The real directory replaces the virtual directory name `Include` in that instance.

Accommodating Virtual Roots

In order to indicate to SCA what each virtual directory is an alias for, you must set a property of the form `com.fortify.sca.ASPVirtualRoots.name_of_virtual_directory` as part of your commandline invocation of SCA in the following manner:

```
sourceanalyzer -Dcom.fortify.sca.ASPVirtualRoots.name_of_virtual_directory=<full path
to corresponding physical directory>
```

Note: On Windows, if the physical path has spaces in it, you must include the property setting in double-quotes:

```
sourceanalyzer "-Dcom.fortify.sca.ASPVirtualRoots.name_of_virtual_directory=<full path
to corresponding *physical* directory>"
```

To expand upon the example in the previous section, the property value that you must pass along should be:

```
-Dcom.fortify.sca.ASPVirtualRoots.Include="C:\WebServer\CustomerOne\inc"
```

```
-Dcom.fortify.sca.ASPVirtualRoots.Library="C:\WebServer\CustomerTwo\Stuff
```

Doing so causes the mapping of `Include` to its directory and `Library` to its directory.

When SCA encounters the include directive:

```
<!-- #include virtual="Include/Task1/foo.inc" -->
```

SCA will first check to see if your project contains a physical directory named Include. If there is no such physical directory, SCA looks through its own run-time properties and sees that:

```
-Dcom.fortify.sca.ASPVirtualRoots.Include="C:\WebServer\CustomerOne\inc"
```

This tells SCA that virtual directory `Include` is actually the directory:

```
C:\WebServer\CustomerOne\inc
```

This will cause SCA to look for the file:

```
C:\WebServer\CustomerOne\inc\Task1\foo.inc
```

Alternately, if you choose to set this property in the `fortify-sca.properties` file, which is located in `<sca_install_dir>\Core\config`, you must escape the \ character, as well as any spaces that appear in the path of the physical directory:

```
com.fortify.sca.ASPVirtualRoots.Library=c:\\WebServer\\CustomerTwo\Stuff
```

```
com.fortify.sca.ASPVirtualRoots.Include=c:\\WebServer\\CustomerOne\inc
```

Note: The previous version of the ASPVirtualRoot property is still valid, which you may use on the SCA commandline as follows:

```
-Dcom.fortify.sca.ASPVirtualRoots=C:\WebServer\
CustomerTwo\Stuff;C:\WebServer\CustomerOne\inc
```

This prompts SCA to search through the listed directories in the order specified when it is resolving a virtual include directive.

Example: Using Virtual Roots

You have a file as follows:

```
C:\files\foo\bar.asp
```

You can specify this file by using the following include:

```
<!-- #include virtual="/foo/bar.asp">
```

Then you should set the virtual root as:

```
-Dcom.fortify.sca.ASPVirtualRoots=C:\files\foo
```

This will strip the `/foo` from the front of the virtual root. If you do not specify `foo` in the `ASPVirtualRoots` property, SCA will look in `C:\files\bar.asp`, and will fail.

The sequence for specifying virtual roots are as follows:

1. Remove the first part of the path in the source
2. Replace the first parth of the path with the virtual root as specified on the command line.

Other Language Command Line Examples

This section includes the following examples:

- Example of Translating PL/SQL
- Example of Translating T-SQL
- Example of Translating PHP
- Example of Translating Classic ASP written with VBScript
- Example of Translating JavaScript
- Example of Translating VB Script File

Example of Translating PL/SQL

The following example demonstrates syntax for translating two PL/SQL files:

```
sourceanalyzer -b MyProject x.pks y.pks
```

The following example demonstrates how to translate all PL/SQL files under the `sources` directory:

```
sourceanalyzer -b MyProject "sources/**/*.pks"
```

Example of Translating T-SQL

The following example demonstrates syntax for translating two T-SQL files:

```
sourceanalyzer -b MyProject x.sql y.sql
```

The following example demonstrates how to translate all T-SQL files under the `sources` directory:

```
sourceanalyzer -b MyProject "sources\**\*.sql"
```

Note: This example assumes the `com.fortify.sca.fileextensions.sql` property in `fortify-sca.properties` is set to "TSQL".

Example of Translating PHP

To translate a single file named `MyPHP.php`, enter:

```
sourceanalyzer -b mybuild "MyPHP.php"
```

Example of Translating Classic ASP written with VBScript

To translate a single file named `MyASP.asp`, enter:

```
sourceanalyzer -b mybuild "MyASP.asp"
```

Example of Translating JavaScript

To translate all JavaScript files under the `scripts` directory, enter:

```
sourceanalyzer -b mybuild "scripts/*.js"
```

Example of Translating VB Script File

To translate a VB file named `myApp.vb`, enter:

```
sourceanalyzer -b mybuild "myApp.vb"
```

Translating COBOL Code

This section contains the following topics:

- Supported Technologies
- Preparing COBOL Source Files for Translation
- COBOL Command Line Syntax
- Auditing a COBOL Scan

Note: In order to use SCA to scan COBOL, you must have a specialized Fortify License specific for COBOL scanning capabilities. Contact Fortify for more information about scanning COBOL and the necessary license required.

Supported Technologies

Fortify SCA supports IBM Enterprise COBOL for IBM z/OS and is compatible with the following systems:

- CICS
- IMS
- DB/2 embedded SQL
- IBM WebSphere MQ

Preparing COBOL Source Files for Translation

Fortify SCA runs only on the supported systems listed in the Fortify System Requirements data sheet, not on mainframe computers. This means that before you can scan a COBOL program, you must copy the following program components to the system running Fortify SCA:

- The COBOL source code
- All copybook files used by the COBOL source code
- All SQL INCLUDE files referenced by the COBOL source code

Preparing COBOL Source Code Files

If you are retrieving COBOL source files from a mainframe without .COB or .CBL file extensions (which is usually the case for COBOL filenames), then you must use the following command line:

```
-noextension-type COBOL <directory-file-path>
```

Specify the directory and folder with all COBOL files as the argument to SCA, and SCA will process all the files in that directory and folder without any need for COBOL file extensions.

Preparing COBOL Copybook Files

Fortify SCA does not identify copybooks by extension. All copybook files should therefore retain the names used in the COBOL source code COPY statements.

COBOL Command Line Syntax

Free-format COBOL is the default translation and scanning mode for Fortify SCA. The basic syntax for translating a single free-format COBOL source code file is:

```
sourceanalyzer -b <build-id>
```

The basic syntax for scanning a translated free-format COBOL program is:

```
sourceanalyzer -b <build-id> -scan -f <FPR file name>
```

Working with Fixed-Format COBOL

Fortify SCA also supports fixed-format COBOL. When translating and scanning fixed-format COBOL, both the translation and scanning command lines must include the `-fixed-format` command line option. For example, the translation line syntax would look like:

```
sourceanalyzer -b <build-id> -fixed-format
```

And the scanning line syntax would look like:

```
sourceanalyzer -b <build-id> -scan -fixed-format -f <FPR file name>
```

If your COBOL code is IBM Enterprise COBOL, then it is most likely fixed format. If the COBOL translation command appears to hang indefinitely, terminate the translation by typing Ctrl-C several times, and repeat the translation command with the "-fixed-format" parameter.

Searching for COBOL Copybooks

Use the `copydirs` command line option to direct Fortify SCA to search a list of paths for copybooks and `SQL INCLUDE` files. For example, the command line syntax would look like the following:

```
sourceanalyzer -b coboltest -copydirs c:\cobol\copybooks
```

Auditing a COBOL Scan

After using the command line to scan the application, you can upload the resulting FPR file to Audit Workbench or Fortify 360 Server and audit the application's issues.

Fortify SCA does not currently support custom rules for COBOL applications.

Troubleshooting and Support

This chapter contains the following topics:

- Troubleshooting
- Reporting Bugs and Requesting Enhancements

Troubleshooting

This section contains the following troubleshooting topics:

- Using the Log File to Debug Problems
- Translation Failed Message
- JSP Translation Problems
- ASPX Translation Problems
- C/C++ Precompiled Header Files

Using the Log File to Debug Problems

If you encounter warnings and problems when you run Fortify SCA, re-run Fortify SCA using the `-debug` option. This generates a file named `sca.log` in the following directory:

- On Windows: `C:\Documents and Settings\<username>\Local Settings\Application Data\Fortify\sca5.0\log`
- On other platforms: `$HOME/.fortify/sca5.0/log`

Email the `sca.log` file as a zip file to techsupport@fortify.com for further investigation.

Translation Failed Message

If your C/C++ application builds successfully but you see one or more "translation failed" messages when building with Fortify SCA, edit the `<install_directory>/Core/config/fortify-sca.properties` file to change the following line:

```
com.fortify.sca.cpfe.options= --remove_unneeded_entities --suppress_vtbl
```

to

```
com.fortify.sca.cpfe.options=-w --remove_unneeded_entities --suppress_vtbl
```

Re-run the build to print the errors encountered by the translator. If the output indicates an incompatibility between your compiler and the Fortify translator, send your output to Fortify Technical Support for further investigation.

JSP Translation Problems

Fortify SCA uses either the built-in or your specific application server's JSP compiler to translate JSP files into Java files for analysis.

If the JSP parser encounters problems when Fortify SCA is converting JSP files to Java files for analysis, you will see a message similar to the following:

```
Failed to translate the following jsps into analysis model. Please see the log file for
any errors from the jsp parser and the user manual for hints on fixing those
<List of JSP file names>
```

This typically happens due to one or more of the following reasons:

- The web application is not laid out in a proper deployable WAR directory format
- You are missing some JAR files or classes required for the application
- Some tag libraries or their definitions (TLD) are missing from your application

To obtain more information about the problem, perform the following steps:

1. Open the Fortify SCA log file in an editor.
2. Search for the strings `Jsp parser stdout:` and `Jsp parser stderr:`.

These errors are generated by the JSP parser that was used. Resolve the errors and rerun Fortify SCA.

For more information about scanning J2EE applications, see "Translating J2EE Applications" on page 8.

ASPX Translation Problems

Fortify SCA compiles ASPX files to DLLs for analysis as follows:

- If you are using .NET 2.0 or later and Visual Studio 2005, using the Microsoft aspnet_compile compiler
- If you are using .NET 1.1 and Visual Studio 2003, trying to fetch ASPX files one at a time from the web site

The compilation step can fail if:

- You have access or authentication problems with accessing the web application
- You are missing some required DLLs

In either case, you will see a message similar to the following:

```
Failed to translate the following aspx files into analysis model. Please see the log
file for any errors from the aspx precompiler and the user manual for hints on fixing
those.
<List of ASPX file names>
```

If you are using the plug-in, enable plug-in debugging and examine the plug-in log file for any errors generated by the ASPX precompiler.

If you are using the command line tool, `fortify_aspnet_compiler`, you should see the error messages on the console.

If you still cannot determine the cause of the problem, try to access some of the failed ASPX files from your browser and see what kind of errors display. If you see messages such as `cannot locate assembly`, ensure that you have the missing DLLs and rerun Fortify SCA.

If you can access the failed ASPX files from the browser, but Fortify SCA still fails to scan it, contact Fortify Technical Support for additional help.

For more information about scanning ASP.NET applications, see "Translating ASP.NET 1.1 (Visual Studio Version 2003) Projects" on page 12.

C/C++ Precompiled Header Files

Some C/C++ compilers support a feature termed “precompiled header files,” which can speed up compilation. Some compilers' implementations of this feature have subtle side-effects. When the feature is enabled, the compiler may accept erroneous source code without warnings or errors. This can result in a discrepancy where Fortify SCA reports translation errors even when your compiler does not.

If you use the precompiled header feature of your compiler, make sure your source code compiles cleanly by disabling precompiled headers and doing a full build.

Reporting Bugs and Requesting Enhancements

Feedback is critical to the success of this product. To request enhancements or patches, or to report bugs, send an email to Technical Support at:

```
techsupport@fortify.com
```

Be sure to include the following information in the email body:

- Product: Fortify SCA
- Version Number: To determine the version number, run the following:

  ```
  sourceanalyzer -version
  ```
- Platform: (such as PC)
- OS: (such as Windows 2000)

When requesting enhancements, include a description of the feature enhancement.

When reporting bugs, provide enough details for the issue to be duplicated. The more descriptive you are, the faster we can analyze and fix the issue. Also include the log files, or the relevant portions of them, from when the issue occurred.

Appendix: Managing Per Use Accounts

This chapter covers the following topics:

- About the Fortify SCA Per Use Edition
- Managing Your Portal User Account
- Transferring Lines

About the Fortify SCA Per Use Edition

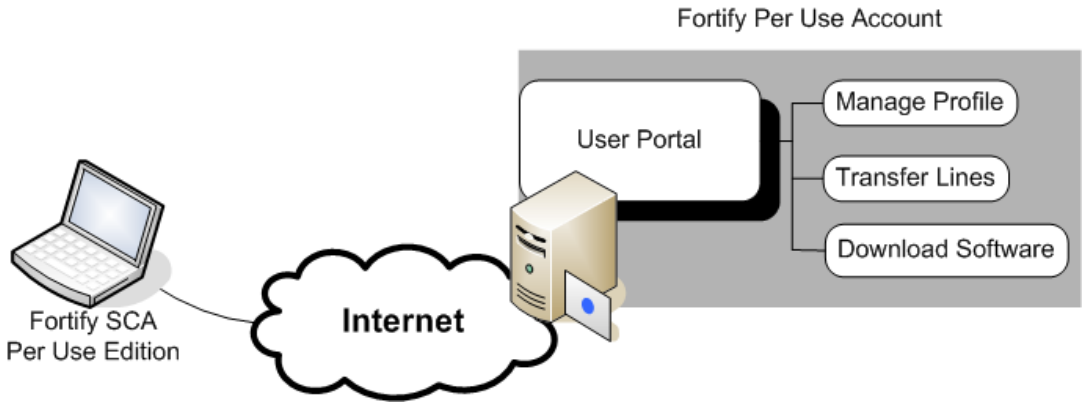
The Fortify SCA Per Use edition analyzes source code by the number of source code lines in a project. Your company purchases lines of code (LOC) packs from Fortify Software. The lines are stored in an account on the Per Use Portal. When you want to use Fortify SCA to analyze source code, you transfer lines from the online account to your local instance. Once transferred those lines are unlocked and appear as "available lines". Transferred lines can only be used by the instance of Fortify SCA that requested them.

Fortify SCA deducts lines for each project you analyze. When you run out of lines, you must get additional lines before you can scan another project. Transferring lines and creating a request file for transfers requires the following:

- Company account on the Per Use Portal with available LOCs
- User name and password for the Per Use Portal
- Internet access
- A Fortify SCA Per Use edition installed on your build machine

Note: Transfer lines from the Per Use Portal to an instance of Fortify SCA only. Transferring unused lines back to the Per Use Portal or between Fortify SCA instances is not supported.

Figure 1: Per Use Portal



Managing Your Portal User Account

To use the Fortify SCA Per Use edition you must have a user account on the Fortify Per Use Portal. This account allows you to request lines.

The Per User Portal administrator configures the user accounts and provides the Fortify SCA Per Use edition license key. When the administrator sets up an account, the default password is automatically emailed to you.

Your user profile includes:

- Your username (email address) and password
- Contact information, such as your telephone number
- Record of lines allocated to your user account

Changing your Password

When the administrator sets up your account, the Fortify Software portal sends you an email that contains a default password and a link to the Fortify Per Use Portal. This section explains how to log into the site and update your password.

To change your password:

1. Open the link in the email or enter the following URL:

   `https://per-use.fortify.com`
2. Enter your username, which is your email address where you received a default password, and the password.
3. Click **Customer Detail**.
4. Enter a new password.
5. Confirm new password.
6. Click **Save**.

Purchasing Additional Lines

Fortify Software technical support representative can add lines to an existing account. Under some circumstances the technical support representative can also transfer lines back into the main account.

A technical support representative can only add lines if:

- You are a licensed user of Fortify SCA Per Use edition
- Your company has an account on the Fortify Per Use Portal
- You have a user account
- You are authorized to add lines to the account

Transferring Lines

This section explains how to transfer lines from the Per Use Portal account to Fortify SCA. The following is required to transfer lines:

- Fortify SCA Per Use edition is installed on a build machine
- You have an account on the Per Use Portal, `http://per-use.fortify.com`.
- Your company has scan lines available in the account

  Note: To purchase lines, contact a Fortify Software technical support.

Transfer lines using one of the following methods:

- Transferring Lines to a Machine with Internet Access
- Transferring Lines to a Machine without Internet Access

Transferring Lines to a Machine with Internet Access

Users with Fortify SCA Per Use edition clients that have internet access can send requests to transfer lines from the per use account to their local client. If the lines are available, the lines are deducted from the account and transferred directly to the client.

After the transfer, the per use account shows the lines allocated. The local client shows the lines as available.

To request lines:

1. Enter the `sourceanalyzer` command with the following option:

   ```
   sourceanalyzer -auth-request
   ```

2. Enter the information, including the number of lines, per user account user name, and password.

If the lines you requested are available, they are automatically transferred to your client.

Transferring Lines to a Machine without Internet Access

Users of offline Fortify SCA instances must manually generate a request file, transfer the file to a computer with Internet access, log into the portal, and upload the request file. They must then download and install the corresponding response file to transfer lines from the account to Fortify SCA.

After the response file is created, the account shows the lines as allocated. However the lines are not available on Fortify SCA until after the response file is downloaded and installed.

To transfer lines manually:

1. Generating a Request for Lines
2. Uploading the Request for Lines
3. Installing the Line Certificate

Generating a Request for Lines

For users of Fortify SCA that do not have internet access, generate a request file that contains the number of lines that you want to allocate.

To generate a request file:

1. Enter the `sourceanalyzer` command with the following option:

   ```
   sourceanalyzer -auth-gen-request <request-file-name>
   ```

2. Follow the prompts to enter the request information.

   A request file is created in the directory where you ran the command.

Uploading the Request for Lines

When you upload a request file and the account has the lines available, a certificate file is created. The requested number of lines are deducted from the account. To complete the transfer the user downloads the certificate and installs it.

To generate a line response file:

1. Copy the request file to a computer with internet access.
2. Log in to the Per Use Portal, http://per-use.fortify.com.

   Note: Your user name is your email address.

3. Click **Request Lines**.

4. Click **Browse** and locate the request file.
5. Click **Upload**.
   After the request file is processed, a transaction ID (Txn ID) displays.
6. Click the transaction ID to download the certificate file to your local host.

Installing the Line Certificate

For offline Fortify SCA instances, manually install the certificate to add lines.

To transfer lines using the certificate file:

1. Copy the certificate to the machine where Fortify SCA is installed.
2. Enter the `sourceanalyzer` command with the following option:
   ```
   sourceanalyzer -auth-import-response <response-file-name>
   ```
   When the process completes a message displays the number of lines available.

Appendix: Command Line Interface

This appendix describes the Command Line options available for Fortify Source Code Analyzer (Fortify SCA).

Command Line Options

This section lists and describes Fortify SCA command line options:

- Output Options
- Analysis Options
- Python Option
- ColdFusion Options
- Java/J2EE Options
- .NET Options
- Build Integration Options
- Runtime Options
- Line Transfer Options
- Other Options

Output Options

The following table describes the output options.

Table 4: Output Options

Output Option	Description
`-append`	Appends results to the file specified with `-f`. If this option is not specified, Fortify SCA adds the new findings to the FPR file, and labels the older result as `previous` findings. To use this option, the output file format must be `.fpr` or `.fvdl`. For information on the `-format` output option, see the description in this table. **Note:** When `-append` is passed to SCA and the output file specified with the `-f` option contains the results of an earlier scan, the resulting FPR contains the issues from the earlier scan as well as issues from the current scan. The build information and program data (lists of sources and sinks) sections are also merged. The engine data section, which includes rule pack information, command line options, system properties, warnings and errors, and other information about the execution of `sourceanalyzer` (as opposed to information about the program being analyzed), is not merged, in part because there is no way to meaningfully merge this data from multiple scans. Because engine data is not merged with `-append`, Fortify does not certify results generated with `-append`. In general, `-append` should only be used when it is not possible to analyze an entire application at once.

Table 4: Output Options

Output Option	Description
`-build-label <label>`	The label of the project being scanned. The label is not used by Fortify SCA but is included in the analysis results.
`-build-project <project>`	The name of the project being scanned. The name is not used by Fortify SCA but is included in the analysis results.
`-build-version <version>`	The version of the project being scanned. The version is not used by Fortify SCA but is included in the analysis results.
`-f <file>`	The file to which results are written. If you do not specify an output file, the output is written to the terminal.
`-format <format>`	Controls the output format. Valid options are `fpr`, `fvdl`, `text`, and `auto`. The default is `auto`, which selects the output format based on the file extension. **Note:** If you are using result certification, you must specify the `fpr` format. See the Audit Workbench User's Guide for information on result certification.
`-html-report`	Creates an HTML summary of the results produced. The output format must be `.fpr`. The report file is given the same base name as the results output file. **Note**: The HTML summary and the summary through Audit Workbench display differing number of issues. This is in part due to differing methodology for categorizing `HIGH` and `LOW` issues between the two types of reports. For a more detailed summary report of issues, use the `ReportGenerator` utility in the SCA bin directory.

Analysis Options

The following table describes the analysis options.

Table 5: Analysis Options

Analysis Option	Description
`-disable-default-rule-type <type>`	Disables all rules of the specified type in the default rulepacks.Can be used multiple times to specify multiple rule types. Where the value of type is the XML tag minus the suffix "Rule". For example, use DataflowSource for DataflowSourceRule elements. You can also specify specific sections of characterization rules, such as Characterization:Controlflow, Characterization:Issue, and Characterization:Generic. Type is case-insensitive.
`-encoding`	Specifies the encoding. SCA allows scanning a project that contains different encoded source files. To work with a multi-encoded project, you must specify the `-encoding` option at the translation step, when SCA first reads the source code file. This encoding is remembered in the build session, and is propagated into the FVDL file.
`-filter <file_name>`	Specifies a results filter file. For information about filter files, see "Creating a Filter File" on page 49.
`-findbugs`	Enables FindBugs analysis for Java code. The Java class directories must have been specified with the `-java-build-dir` option, described in "Java/J2EE Options" on page 37.
`-no-default-issue-rules`	Disables rules in default rulepacks that lead directly to issues. Still loads rules that characterize the behavior of functions. **Note:** This equivalent to disabling the following rule types: DataflowSink, Semantic, Controlflow, Structural, Configuration, Content, Statistical, Internal, and Characterization:Issue.
`-no-default-rules`	Specifies not to load rules from the default rulepacks. Fortify SCA processes the rulepacks for description elements and language libraries, but no rules are processed.
`-no-default-source-rules`	Disables source rules in the default rulepacks. **Note:** Characterization source rules are not disabled.
`-no-default-sink-rules`	Disables sink rules in the default rulepacks. **Note:** Characterization sink rules are not disabled.
`-disable-source-rendering`	Source files are not included in the FPR file.
`-quick`	Scans the project in Quick Scan Mode, using the `fortify-sca-quickscan.properties` file. By default, this scan searches for high-confidence, high-severity issues. For more information about Quick Scan Mode, see the Audit Workbench User's Guide.
`-rules [<file>|<directory>]`	Specifies a custom rulepack or directory. Can be used multiple times to specify multiple rulepack files. If you specify a directory, all of the files in the directory with the `.bin` and `.xml` extensions are included.

Table 5: Analysis Options

Analysis Option	Description
`-scan`	Causes Fortify SCA to perform analysis for the specified build ID.

Python Option

The following table describes the ColdFusion option.

Table 6: ColdFusion Options

Python Option	Description
`-python-path <path name>`	Specifies the path for additional import directories. By default, SCA uses the default `PYTHONPATH` variable on your system when searching for Python import files. However, some applications add additional import directories during runtime initialization. Use this option to specify additional import directories.

ColdFusion Options

The following table describes the ColdFusion option.

Table 7: ColdFusion Options

ColdFusion Option	Description
`-source-base-dir`	The web application's root directory.
`-source-archive`	The application's source archive repository. You must include the -scan and -f options to use this option.

Java/J2EE Options

The following table describes the Java/J2EE options.

Table 8: Java/J2EE Options

Java/J2EE Options	Description
`-appserver`	Specifies the application server for processing JSP files: `weblogic` or `websphere`.
`-appserver-home`	Specifies the application server's home. For Weblogic, this is the path to the directory containing the `server/lib` directory. For WebSphere, this is the path to the directory containing the `JspBatchCompiler` script.
`-appserver-version`	Specifies the version of the application server. For Weblogic, valid values are `7`, `8`, `9`, and `10`. For WebSphere, the valid value is `6`.

Table 8: Java/J2EE Options

Java/J2EE Options	Description
`-cp <classpath>`, `-classpath <classpath>`	Specifies the classpath to use for analyzing Java source code. The format is same as javac: a colon or semicolon-separated list of paths. You can use Fortify SCA file specifiers. **Note:** If you do not specify the classpath with this option, the CLASSPATH environment variable is used.
`-extdirs <dirs>`	Similar to the javac `extdirs` option, accepts a colon or semicolon-separated list of directories. Any jar files found in these directories are included implicitly on the classpath.
`-java-build-dir`	Specifies one or more directories to which Java sources have been compiled. Must be specified for FindBugs results, as described in "Analysis Options" on page 36.
`-source <version>`	Indicates which version of the JDK the Java code is written for. Valid values for `version` are `1.3`, `1.4`, `1.5`, and `1.6`. The default is `1.4`.
`-sourcepath`	Specifies the location of source files which will not be included in the scan but will be used for name resolution. The sourcepath is like classpath, except it uses source files rather than class files for resolution.

.NET Options

The following table describes the .NET options.

Table 9: .NET Options

.NET Options	Description
`-libdirs <dirs>`	Accepts a colon or semicolon-separated list of directories where system DLLs are located.
`-dotnet-sources <directory name>`	Specifies where to look for source files for additional information. This option is automatically passed from the Fortify SCA plug-ins and Audit Workbench but when you are running SCA manually, you must provide it yourself. This option causes SCA to attempt to find any .NET classes, enums, or interfaces that are not explicitly declared in the compiled project.
`-vsversion <version>`	Specifies Visual Studio version. Valid values for `version` are `7.1` for Visual Studio Version 2003 and `8.0` for Visual Studio Version 2005, and the default value is `7.1`.

Build Integration Options

The following table describes the build integration options.

Table 10: Build Integration Options

Build Integration Options	Description
`-b <build_id>`	Specifies the build ID. The build ID is used to track which files are compiled and combined to be part of a build and later to scan those files.
`-bin <binary>`	Used with `-scan` to specify a subset of source files to scan. Only the source files that were linked in the named binary at build time are included in the scan. Can be used multiple times to specify the inclusion of multiple binaries in the scan.
`-exclude <file_pattern>`	Removes files from the list of files to translate. For example: `sourceanalyzer -cp "**/*.jar" "**/*" -exclude "**/Test.java"` **Note:** The `-exclude` option works when input files are specified on the command line; it does not work with compiler integration.
`-nc`	When specified before a compiler command line, Fortify SCA processes the source file but does not run the compiler.

Directives

The following directives can be used to list information about translation steps that have been taken. Only one directive can be used at a time and cannot be used in conjunction with normal translation or analysis steps.

Table 11:

Directives	Description
`-clean`	Deletes all Fortify SCA intermediate files and build records. When a build ID is also specified, only files and build records relating to that build ID are deleted.
`-show-binaries`	Displays all objects that were created but not used in the production of any other binaries. If fully integrated into the build, it lists all of the binaries produced.
`-show-build-ids`	Displays a list of all known build IDs. **Note:** This option may erase build IDs generated by previous versions of Fortify SCA.
`-show-build-tree`	Displays all files used to create `binary` and all files used to create those files in a tree layout. If the `-bin binary` option is not present, the tree is displayed for each binary. **Note:** This option can generate an extensive amount of information.
`-show-files`	Lists the files in the specified build ID. When the `-bin` option is present, displays only the source files that went into the binary.
`-show-build-warnings`	Use with `-b <build_id>` to show all errors and warnings from the translation phase on the console. **Note**: These errors and warnings display in the results certification panel of Audit Workbench.

Runtime Options

The following table describes the runtime options.

Table 12: Runtime Options

Runtime Options	Description
`-auth-silent`	Available on Fortify SCA Per Use edition only. Suppresses the prompt that displays the number of lines the scan requires to analyze the source code. With this option, the lines are automatically deducted. **Note**: If the scan requires more lines than are available, the scan fails with an error indicating how many additional lines are required.
`-64`	Runs Fortify SCA under the 64-bit JRE. If no 64-bit JRE is available, Fortify SCA fails.
`-logfile <file_name>`	Specifies the log file that is produced by Fortify SCA.
`-quiet`	Disables the command line progress bar.
`-verbose`	Sends verbose status messages to the console.
`-Xmx <size>`	Specifies the maximum amount of memory used by Fortify SCA. By default, it uses up to 600 MB of memory (`-Xmx600M`), which can be insufficient for large code bases. When specifying this option, ensure that you do not allocate more memory than is physically available, because this degrades performance. As a guideline, assuming no other memory intensive processes are running, do not allocate more than 2/3 of the available memory.

Line Transfer Options

The Fortify SCA Per Use edition has the following line transfer options. Table 13 describes the options to show the number of available lines and to transfer lines from the Per Use Portal account to a local instance of Fortify SCA.

Table 13: Line Transfer Options

Option	Description
`-auth-gen-request <request-file-name>`	Creates a file that contains a request for lines. **Note**: You must manually upload the request file to the Per Use Portal to receive a response file that allocates lines to the Fortify SCA instance.
`-auth-query`	Shows the number of lines available.
`-auth-request`	Sends a request to transfer lines from Per Use Portal account to the Fortify SCA instance. This option requires internet access. **Note**: If the account has insufficient lines, the request fails.
`-auth-import-response <response-file-name>`	Installs a response file that allocates lines to the Fortify SCA instance. **Note**: The file can only be installed on the instance that generated the request.

Table 13: Line Transfer Options

Option	Description
`-show-loc`	Use with `-b` *build_id* to determine how many lines of code were translated. This option returns the total number of lines required to analyze the project.

Other Options

The following table describes other options.

Table 14: Other Options

Other Options	Description
`@<filename>`	Reads command line options from the specified file.
`-encoding <encoding_name>`	Specifies the source file encoding type. This option is the same as the javac encoding option.
`-h, -?, -help`	Prints this summary of command line options.
`-version`	Displays the version number.
`-debug`	Enables debug mode which is useful during troubleshooting.
`-build-migration-map <old_fpr_file>`	Runs the InstanceID mapper at the end of a scan.

Specifying Files

File specifiers are expressions that allow you to easily pass a long list of files to Fortify SCA using wildcard characters. Fortify SCA recognizes two types of wildcard characters: '`*`' matches part of a filename, and '`**`' recursively matches directories. You can specify one or more files, one or more file specifiers, or a combination of files and file specifiers.

```
<files> | <file specifiers>
```

File specifiers can take the following forms:

Table 15: File Specifiers

File Specifier	Description
`<dirname>`	All files found under the named directory or any subdirectories
`<dirname>`/**/Example.java	Any file named `Example.java` found under the named directory or any subdirectories
`<dirname>`/*.java	Any file with the extension `.java` found in the named directory
`<dirname>`/**/*.java	Any file with the extension `.java` found under the named directory or any subdirectories
`<dirname>`/**/*	All files found under the named directory or any subdirectories (same as `dirname`)

Note: Windows and many Unix shells automatically try to expand arguments containing the '*' character, so file-specifier expressions should be quoted. Also, on Windows, the backslash character (\) may be used as the directory separator instead of the forward slash (/).

File specifiers do not apply to C or C++ languages.

Appendix: Using the sourceanalyzer Ant Task

The `sourceanalyzer` Ant task provides a convenient way to integrate Fortify SCA into your Ant build. As discussed in Translating Java Code, translation of Java source files that are part of an Ant build is most easily accomplished using the SCA Compiler Adapter, which automatically captures input to javac task invocations. The `sourceanalyzer` task provides a convenient and flexible way to accomplish other translation tasks and to run analysis.

This section describes how to use the `sourceanalyzer` Ant task and provides an example of a sample build file with a self-contained `analysis target.rs`. It contains the following topics:

- Using the Ant sourceanalyzer Task
- Ant properties
- sourceanalyzer Task Options

Using the Ant sourceanalyzer Task

As with the SCA Compiler Adapter, using the `sourceanalyzer` task requires `sourceanalyzer.jar` to be on Ant's classpath, and the `sourceanalyzer` executable to be on the PATH.

The first step to using the `sourceanalyzer` task is to include a `typedef` in the `build.xml` file as follows:

```
<typedef name="sourceanalyzer" classname="com.fortify.dev.ant.SourceanalyzerTask"/>
```

Note: Only Ant 1.6 and higher supports top-level `typedef` of the sourceanalyzer task. For Ant 1.5 and lower, include the `typedef` in the target where the sourceanalyzer task is used.

Once this `typedef` is included, targets can be defined that invoke the `sourceanalyzer` task to perform translation and analysis operations exactly as if running `sourceanalyzer` from the command line. The `sourceanalyzer` task syntax is similar to that of the command line interface, but Ant fileset and path primitives can be leveraged.

The following is an example of a snippet from an Ant `build.xml` file which provides a target users can call to generate Fortify SCA results for the project. This snippet assumes that the targets `clean` and `compile` and the path `jsp.classpath` are defined elsewhere in the file. It also uses verbose and log to create a separate Fortify SCA log file for the build.

```
<available classname="com.fortify.dev.ant.SourceanalyzerTask"
           property="fortify.present"/>
<property name="sourceanalyzer.buildid" value="mybuild"/>
<!-- For debugging in a separate Fortify SCA log file -->
<property name="fortify.debug" value="false" />
<property name="fortify.verbose" value="false" />
 <mkdir dir="${code.build}/log" />
 <mkdir dir="${code.build}/audit" />
<tstamp/>
<target name="fortify" if="fortify.present">
           <typedef name="sourceanalyzer"
           classname="com.fortify.dev.ant.SourceanalyzerTask"/>
           <!-- call clean to ensure that all source files are recompiled -->
           <antcall target="clean"/>
           <!-- call the compile target using the SCA Compiler Adapter to -->
           <!-- translate all source files-->
```

```
            <antcall target="compile">
            <!-- Log SCA in separate file -->
            <param name="com.fortify.sca.Debug" value="${fortify.debug}" />
            <param name="com.fortify.sca.Verbose" value="${fortify.verbose}" />
            <param name="com.fortify.sca.LogFile"
            value="${code.build}/log/${sourceanalyzer.buildid}-${DSTAMP}-
            ${TSTAMP}.log" />
            <param name="build.compiler"
            value="com.fortify.dev.ant.SCACompiler" />

            </antcall>
            <!-- capture all configuration files in WEB-INF directory -->
            <echo>sourceanalyzer ${web-inf}</echo>
            <sourceanalyzer buildid="${sourceanalyzer.buildid}">
            <fileset dir="${web-inf}">
                                    <include name="**/*.properties"/>
                                    <include name="**/*.xml"/>
            </fileset>
            </sourceanalyzer>
            <!-- translate all jsp files-->
            <echo>sourceanalyzer ${basedir} jsp</echo>
            <sourceanalyzer buildid="${sourceanalyzer.buildid}">
            <fileset dir="${basedir}">
                                    <include name="**/*.jsp"/>
            </fileset>
            <classpath refid="jsp.classpath"/>
            </sourceanalyzer>
            <!-- run analysis -->
            <echo>sourceanalyzer scan</echo>
            <sourceanalyzer buildid="${sourceanalyzer.buildid}"
            scan="true"
            resultsfile="issues.fpr"
            / >
</target>
```

Ant properties

Any Ant property that begins with `com.fortify` is relayed to the `sourceanalyzer` task via `-D`. For example, setting the `com.fortify.sca.ProjectRoot` property results in `-Dcom.fortify.sca.ProjectRoot=<value>` being passed to the `sourceanalyzer` task. This is also used for the SCACompiler adapter. These properties can be set either in the build file, using the `<property>` task for example, or on the Ant command line using the `-D<property=<value>` syntax.

When using the SCACompiler adapter via the `build.compiler` setting, the `sourceanalyzer.build` Ant property is equivalent to the `buildID` attribute of the `sourceanalyzer` task, and the `sourceanalyzer.maxHeap` is equivalent to `maxHeap`. You can use either the command line or your build script to set these properties.

sourceanalyzer Task Options

The following table contains the command line options for the `sourceanalyzer` task. Path values use colon (`:`) or semi-colon (`;`) delimited lists of file names.

Table 16: Sourceanalyzer Task Command Line Options

Attribute	Command Line Option	Description
`append`	`-append`	Appends results to the file specified with the `-f` option. If this option is not specified, Fortify SCA overwrites the file. **Note:** To use this option, the output file format must be `.fpr` or `.fvdl`. For information on the `-format` output option, see the description in this table.
`appserver`	`-appserver <appserver>`	Specifies the application server: Valid options are `weblogic` or `websphere`
`appserverHome`	`-apperserver-home <directory>`	Specifies the application server's home directory. For Weblogic, this is the path to the directory containing `server/lib` directory. For WebSphere, this is the path to the directory containing the `bin/JspBatchCompiler` script.
`appserverVersion`	`-apperserver-version <version_number>`	Specifies the version of the application server. For Weblogic: versions `7`, `8`, `9`, and `10` For WebSphere: version `6`
`bootclasspath`	`-bootclasspath <classpath>`	Specifies the JDK bootclasspath.
`buildID`	`-b <build_ID>`	Specifies the build ID. The build ID is used to track which files are compiled and linked as part of a build and later to scan those files.
`buildLabel`	`-build-label <build_label>`	Specifies the label of the project being scanned. The label is not used by Fortify SCA but is included in the analysis results.
`buildProject`	`-build-project <project_name>`	Specifies the name of the project being scanned. The name is not used by Fortify SCA but is included in the analysis results.
`buildVersion`	`-build-version <version>`	The version of the project being scanned. The version is not used by Fortify SCA but is included in the analysis results.
`classpath`	`-cp <classpath>`	Specifies the classpath to be used for Java source code. Format is same as javac (colon or semicolon-separated list of paths).
`clean`	`-clean`	This option resets the build ID. The default value is false.

Table 16: Sourceanalyzer Task Command Line Options

Attribute	Command Line Option	Description
`debug`	`-debug`	This option enables the debug mode, which is useful during troubleshooting.
`disableAnalyzers`	`-disable-analyzer <list_of_analyzers>`	This option takes a colon-delimited list of analyzers so that you can disable multiple analyzers at once if necessary.
`enableAnalyzers`	`-enable-analyzer <list_of_analyzers>`	This option takes a colon-delimited list of analyzers so that you can enable multiple analyzers at once if necessary.
`encoding`	`-encoding <encoding_type>`	Specifies the source file encoding type. This option is the same as the javac encoding option.
`extdirs`	`-extdirs <list_of_dirs>`	Similar to the javac `extdirs` option, accepts a colon or semicolon separated list of directories. Any jar files found in these directories are included implicitly on the classpath.
`filter`	`-filter <file_name>`	Specifies the filter file.
`findbugs`	`-findbugs`	Setting this to true enables FindBugs analysis. The default value is false.
`format`	`-format <format_type>`	Controls the output format. Valid options are `fpr`, `fvdl`, `text`, and `auto`. The default is `auto`, which selects the output format based on the file extension. **Note:** If you are using results certification, you must specify the `fpr` format. See the Audit Workbench User's Guide for information on results certification.
`htmlReport`	`-html-report`	Specifies the creation of an HTML summary of the results produced. The output format must be `fpr` or `fvdl`. The report file will be given the same base name as the results output file. The default value is false. **Note**: The HTML summary and the summary through Audit Workbench display differing number of issues. This is in part due to differing methodology for categorizing `HIGH` and `LOW` issues between the two types of reports. For a more detailed summary report of issues, use the `\AWB\FPRUtility` tool.
`javaBuildDir`	`-java-build-dir <directory>`	Specifies one or more directors to which Java sources have been compiled. Must be specified for the `findbugs` option, as described above.

Table 16: Sourceanalyzer Task Command Line Options

Attribute	Command Line Option	Description
`jdk`	`-source <value>`	Indicates which version of the JDK the Java code is written for. Valid values for this option are `1.3`, `1.4`, `1.5`, and `1.6`. The default is `1.4`.. **Note:** The `source` and `JDK` options are the same. If both options are specified, the option that is specified last will take precedence.
`jdkBootclasspath`	`-jdk-bootclasspath <classpath>`	Specifies the JDK bootclasspath.
`logfile`	`-logfile <file_name>`	Specifies the log file that is produced by Fortify SCA.
`maxHeap`	`-Xmx <size>`	Specifies the maximum amount of memory used by Fortify SCA. By default, it uses up to 600 MB of memory (600M), which can be insufficient for large code bases. When specifying this option, ensure that you do not allocate more memory than is physically available, because this will degrade performance. As a guideline, assuming no other memory intensive processes are running, do not allocate more than 2/3 of the available memory.
`noDefaultRules`	`-no-default-rules`	Setting this option specifies that Fortify SCA should not apply default rules when scanning.
`quick`	`-quick-scan`	Launches an SCA quick scan instead of a regular scan. Set value to `true` to launch a quick scan.
`resultsfile`	`-f <absolute_path_file name>`	The file to which the results are written.
`rules`	`-rules <delimited_rules_list>`	The rules option takes a list of rules files, delimited by the path separator (this is a semi-colon (`;`) on Windows, and a colon (`:`) on other platforms. For each element in this list, SCA is passed the `-rules <file>` command.
`scan`	`-scan`	Setting this option determines whether Fortify SCA should perform analysis on the provided build ID. The default value is false.
`source`	`-source <value>`	Indicates which version of the JDK the Java code is written for. Valid values for this option are `1.3`, `1.4`, `1.5`, and `1.6`. The default is `1.4`.. **Note:** The `source` and `JDK` options are the same. If both options are specified, the option that is specified last will take precedence.

Table 16: Sourceanalyzer Task Command Line Options

Attribute	Command Line Option	Description
`sourcepath`	`-sourcepath <directory>`	Specifies the location of source files which will not be included in the scan but will be used for resolution.
`use64bit`	`-64`	Runs Fortify SCA under the 64-bit JRE. If no 64-bit JRE is available, Fortify SCA fails.
`verbose`	`-verbose`	Setting this option sends verbose status messages to the console.

The `bootclasspath`, `classpath`, `extdirs`, and options may also be specified as nested elements, as with the Ant javac task. Source files can be specified via nested `<fileset>` elements.

The following table includes sourceanalyzer elements.

Table 17: Sourceanalyzer Task Nested Elements

Element	Ant Type	Description
`fileset`	Fileset	Specifies the files to pass to Fortify SCA.
`classpath`	Path	Specifies the classpath to be used for Java source code.
`bootclasspath`	Path	Specifies the JDK bootclasspath.
`extdirs`	Path	Similar to the javac `extdirs` option. Any jar files found in these directories are included implicitly on the classpath.
`sourcepath`	Path	Specifies the location of source files which will not be included in the scan but will be used for resolution.

Appendix: Advanced Options

This chapter describes the following advanced options:

- Creating a Filter File
- Using Properties to Control Runtime Options

Creating a Filter File

You can create a text file for filtering out particular vulnerability instances, rules, and vulnerability categories when you run the `sourceanalyzer` command. The file is specified by the `-filter` analysis option.

Note: Fortify Software recommends that you only use this feature if you are an advanced user, and that you do not use this feature during standard audits, because auditors should be able to see and evaluate all issues found by Fortify SCA.

A filter file is a flat text file that can be created with any text editor. The file functions as a blacklist, such that only the filter items you do not want are specified one per line. The following filter types can be entered on a line:

- Category
- Instance ID
- Rule ID

The filters are applied at different times in the analysis process, according to the type of filter. Category and rule ID filters are applied during the initialization phase before any scans have taken place, whereas an instance ID filter is applied after the analysis phase.

As an example, the following output resulted from a scan of the `EightBall.java`, located in the `/Samples/basic/eightball` directory in your Fortify installation directory.

The following command is executed to produce the analysis results:

```
>sourceanalyzer -b eightball Eightball.java
>sourceanalyzer -b eightball -scan
```

The following result set displays, showing 12 detected issues.

```
[F7A138CDE5235351F6A4405BA4AD7C54 : low : Unchecked Return Value : semantic ]
Fortify SCA 360 v2.1/Samples/basic/eightball/EightBall.java(12) : Reader.read()


[F7A138CDE5235351F6A4405BA4AD7C53 : low : Unchecked Return Value : semantic ]
Fortify SCA 5.2/Samples/basic/eightball/EightBall.java(12) : Reader.read()


[EFE997D3683DC384056FA40F6C7BD0E9 : medium : Path Manipulation : dataflow ]
Fortify SCA 5.2/Samples/basic/eightball/EightBall.java(12) :  ->new FileReader(0)
Fortify SCA 5.2/Samples/basic/eightball/EightBall.java(6) : <=> (filename)
    Fortify SCA 5.2/Samples/basic/eightball/EightBall.java(4) :  ->EightBall.main(0)


[EFE997D3683DC384056FA40F6C7BD0E8 : medium : Path Manipulation : dataflow ]
Fortify SCA 360 v2.1/Samples/basic/eightball/EightBall.java(12) :  ->new
FileReader(0)
    Fortify SCA 360 v2.1/Samples/basic/eightball/EightBall.java(6) : <=> (filename)
```

```
    Fortify SCA 360 v2.1/Samples/basic/eightball/EightBall.java(4) :  -
>EightBall.main(0)


[60AC727CCEEDE041DE984E7CE6836177 : medium : Unreleased Resource : Streams :
controlflow ]
Fortify SCA 360 v2.1/Samples/basic/eightball/EightBall.java(12) : start
-> loaded : new FileReader(...)
Fortify SCA 360 v2.1/Samples/basic/eightball/EightBall.java(12) : loaded
 -> loaded : <inline expression> refers to an allocated resource
Fortify SCA 360 v2.1/Samples/basic/eightball/EightBall.java(12) :
java.io.IOException thrown
Fortify SCA 360 v2.1/Samples/basic/eightball/EightBall.java(12) : loaded
 -> loaded : throw
Fortify SCA 360 v2.1/Samples/basic/eightball/EightBall.java(12) : loaded
-> loaded : <inline expression> no longer refers to an allocated resource
Fortify SCA 360 v2.1/Samples/basic/eightball/EightBall.java(12) : loaded
-> end_of_scope : end scope : Resource leaked : java.io.IOException thrown
Fortify SCA 360 v2.1/Samples/basic/eightball/EightBall.java(12) : start
-> loaded : new FileReader(...)
Fortify SCA 360 v2.1/Samples/basic/eightball/EightBall.java(12) : loaded
-> loaded : <inline expression> refers to an allocated resource
Fortify SCA 360 v2.1/Samples/basic/eightball/EightBall.java(14) : loaded
-> loaded : <inline expression> no longer refers to an allocated resource
Fortify SCA 360 v2.1/Samples/basic/eightball/EightBall.java(14) : loaded
-> end_of_scope : end scope : Resource leaked


[60AC727CCEEDE041DE984E7CE6836178 : medium : Unreleased Resource : Streams :
controlflow ]
Fortify SCA 5.2/Samples/basic/eightball/EightBall.java(12) : start -> loaded
: new FileReader(...)
Fortify SCA 5.2/Samples/basic/eightball/EightBall.java(12) : loaded -> loaded :
<inline expression> refers to an allocated resource
Fortify SCA 5.2/Samples/basic/eightball/EightBall.java(12) : java.io.IOException
thrown
Fortify SCA 5.2/Samples/basic/eightball/EightBall.java(12) : loaded -> loaded :
throw
Fortify SCA 5.2/Samples/basic/eightball/EightBall.java(12) : loaded -> loaded :
<inline expression> no longer refers to an allocated resource
Fortify SCA 5.2/Samples/basic/eightball/EightBall.java(12) : loaded -> end_of_scope
: end scope : Resource leaked : java.io.IOException thrown
Fortify SCA 5.2/Samples/basic/eightball/EightBall.java(12) : start -> loaded : new
FileReader(...)
Fortify SCA 5.2/Samples/basic/eightball/EightBall.java(12) : loaded -> loaded :
<inline expression> refers to an allocated resource
Fortify SCA 5.2/Samples/basic/eightball/EightBall.java(14) : loaded -> loaded :
<inline expression> no longer refers to an allocated resource
```

```
Fortify SCA 5.2/Samples/basic/eightball/EightBall.java(14) : loaded -> end_of_scope
: end scope : Resource leaked


[BB9F74FFA0FF75C9921D0093A0665BEB : low : J2EE Bad Practices : Leftover Debug Code :
structural ]
Fortify SCA 360 v2.1/Samples/basic/eightball/EightBall.java(4)


[FF0D787110C7AD2F3ACFA5BEB6E951C3 : low : Poor Logging Practice : Use of a System
Output Stream : structural ]
Fortify SCA 360 v2.1/Samples/basic/eightball/EightBall.java(10)


[FF0D787110C7AD2F3ACFA5BEB6E951C4 : low : Poor Logging Practice : Use of a System
Output Stream : structural ]
Fortify SCA 360 v2.1/Samples/basic/eightball/EightBall.java(13)


[BB9F74FFA0FF75C9921D0093A0665BEC : low : J2EE Bad Practices : Leftover Debug Code :
structural ]
Fortify SCA 5.2/Samples/basic/eightball/EightBall.java(4)


[FF0D787110C7AD2F3ACFA5BEB6E951C5 : low : Poor Logging Practice : Use of a System
Output Stream : structural ]
Fortify SCA 5.2/Samples/basic/eightball/EightBall.java(10)


[FF0D787110C7AD2F3ACFA5BEB6E951C6 : low : Poor Logging Practice : Use of a System
Output Stream : structural ]
Fortify SCA 5.2/Samples/basic/eightball/EightBall.java(13)
```

The sample filter file, `test_filter.txt` does the following:

- Removes all results related to the Poor Logging Practice category
- Removes the Unreleased Resource based on its instance ID
- Removes any data flow issues that were generated from a specific rule ID

The `test_filter.txt` file used in this example contains the following text:

```
#This is a category that will be filtered from scan output
Poor Logging Practice

#This is an instance ID of a specific issue to be filtered from scan #output
60AC727CCEEDE041DE984E7CE6836177

#This is a specific Rule ID that leads to the reporting of a specific #issue in
#the scan output: in this case the data flow sink for a Path Manipulation #issue.
823FE039-A7FE-4AAD-B976-9EC53FFE4A59
```

You can create a file to test the filtered output by copying the above text into a file.

The following command is executed using the `-filter` option to specify the `test_filter.txt`:

```
[C:\Program Files\Fortify Software\Fortify SCA 5.0\Samples\basic\
eightball]>sourceanalyzer -b eightball -scan -filter test_filter.txt
```

The following result set displays:

```
[F7A138CDE5235351F6A4405BA4AD7C53 : low : Unchecked Return Value : semantic]
EightBall.java(12) : Reader.read()

[BB9F74FFA0FF75C9921D0093A0665BEB : low : J2EE Bad Practices : Leftover Debug Code :
structural]

EightBall.java(4)
```

Using Properties to Control Runtime Options

You can use properties to define runtime options for Fortify SCA, including analysis, output, and performance tuning options. These properties can be set in four different places:

- `fortify-sca.properties` contains the global set of default properties
- `fortify-sca.properties` (for Windows installations) or `.fortify-sca.properties` (for non-Windows installations) contains your locally defined properties
- On the command line by specifying `-D<property_name>=<property_value>`
- `fortify-sca-quickscan.properties` contains the set of properties that are used when SCA runs in Quick Scan mode.

The `fortify-sca.properties` and `fortify-sca-quickscan.properties` files are located in the `<install_directory>/Core/config` directory. The `fortify.properties` file is located in either your Windows user directory or your Unix home directory.

You can edit all properties files directly.

Specifying the Order of Properties

Fortify SCA processes properties in a specific order, using this order to override any previously-set properties with the values that you specify. You should keep this processing order in mind when making changes to the properties files.

Property definitions are processed in the following order:

- Properties specified on the command line have the highest precedence and can be specified during any scan.
- Properties specified in the `fortify-sca-quickscan.properties` file are processed second, but only when the `-quick` option is used to operate in Quick Scan mode. If Quick Scan is not invoked, this file is ignored.
- Properties specified in the local `fortify.properties` file are processed third. Change values in this file on a scan-by-scan basis to fine-tune your installation.
- Properties specified in the global `fortify-sca.properties` file are processed last. You should edit this file if you want to change the property values on a more permanent basis for all scans.

Fortify SCA also relies on some properties that have internally-defined default values.

The following table lists properties that can be defined. The default values are listed. If you want to use Quick Scan Mode, or want to tune your application, you can make the changes as described in Table 18: Tuning Performance Properties.

Table 18: Fortify Properties

Property Name	
Default Value	**Description**
`com.fortify.sca.AbortedScanOverwritesOutput`	
false	By default, if a scan is interrupted, the partial results are written to a different output file: `<output>.partial.fpr` instead of `<output>.fpr`. If this property is set to true, the interrupted result are written to the normal outfile (`<output>.fpr`), which overwrites any full-scan results that may be present in that file.
`com.fortify.sca.Appserver`	
(none)	Specifies the application server for processing JSP files: `weblogic` or `websphere`
`com.fortify.sca.Appserver.Home`	
(none)	Specifies the application server's home. For Weblogic, this is the path to the directory containing `server/lib` directory. For WebSphere, this is the path to the directory containing the `bin/JspBatchCompiler` script.
`com.fortify.sca.Appserver.Version`	
(none)	Specifies the version of the application server. For Weblogic, valid values are `7`, `8`, `9`, and `10`. For WebSphere, the valid value is `6`.
`com.fortify.sca.fileextensions.*`	
(none)	Controls how Fortify SCA handles files with given extensions. See `fortify-sca.properties` for examples.
`com.fortify.sca.FPRDisableSrcHtml`	
(none)	If true, disables source code rendering into the FPR file.
`com.fortify.sca.NoDefaultRules`	
(none)	If true, rules from the default rulepacks are not loaded. Fortify SCA processes the rulepacks for description elements and language libraries, but no rules are processed.
`com.fortify.sca.NoDefaultIssueRules`	
(none)	If true, disables rules in default rulepacks that lead directly to issues. Still loads rules that characterize the behavior of functions. **Note:** This equivalent to disabling the following rule types: DataflowSink, Semantic, Controlflow, Structural, Configuration, Content, Statistical, Internal, and Characterization:Issue.
`com.fortify.sca.DisableDefaultRuleTypes`	

Table 18: Fortify Properties

Property Name	
Default Value	**Description**
(none)	Disables the specified type of rule in the default rulepacks; where type is the XML tag minus the suffix "Rule". For example, use DataflowSource for DataflowSourceRule elements. You can also specify specific sections of characterization rules, such as Characterization:Controlflow, Characterization:Issue, and Characterization:Generic. Type is case-insensitive. Use a colon delimited list to specify multiple types of rules.
`com.fortify.sca.NoDefaultSinkRules`	
(none)	If true, disables sink rules in the default rulepacks. **Note:** Characterization sink rules are not disabled.
`com.fortify.sca.NoDefaultSourceRules`	
(none)	If true, disables source rules in the default rulepacks. **Note:** Characterization source rules are not disabled.
`com.fortify.sca.ProjectRoot`	
(platform dependent)	Directory used by Fortify SCA to store intermediate files generated during scans.
`com.fortify.sca.ASPVirtualRoots.<virtual path>=<physical path>`	
false	If true, enables support for virtual roots. This property associates virtual path names with physical path names.
`com.fortify.sca.DefaultFileTypes`	
java,jsp,sql,pks,pkh,pkb,xml,properties,config,dll,exe	Comma-separated list of file extensions that are picked up by default by Fortify SCA.
`com.fortify.sca.compilers.*`	
(none)	Can be used to inform Fortify SCA about specially-named compilers. See `fortify-sca.properties` for examples.
`com.fortify.sca.CfmlUndefinedVariablesAreTainted`	
false	If true, treats undefined variables in a CFML page as tainted. Doing so serves as a hint to the data flow analyzer to watch out for register-globals-style vulnerabilities. However, enabling this property interferes with data flow findings in which a variable in an included page is initialized to a tainted value in an earlier-occurring included page.
`com.fortify.sca.FVDLDisableProgramData`	
false	If true, causes the `ProgramData` section to be excluded from the analysis results (FVDL output).
`com.fortify.sca.FVDLDisableSnippets`	
false	If true, code snippets are not included in the analysis results (FVDL output).
`com.fortify.sca.LogFile`	

Table 18: Fortify Properties

Property Name	
Default Value	**Description**
`${com.fortify.sca.ProjectRoot}/log/sca.log`	The default location for the Fortify SCA log file.
`com.fortify.sca.LogMaxSize`	
(none)	When this property is set, it enables log rotation for the Fortify SCA log. The value is the number bytes that can be written to the log file before it is rotated. Must be used with `com.fortify.sca.LogMaxFiles`.
`com.fortify.sca.LogMaxFiles`	
(none)	The number of log files to include in the log file rotation set. When all files are filled, the first file in the rotation is overwritten. The value must be at least 1. Must be used with `com.fortify.sca.LogMaxSize`.
`com.fortify.sca.Debug`	
false	Produces a debug log file. This log file is for Technical Support purposes.
`com.fortify.sca.PPSSilent`	
false	Prompts the user with the number of lines the scan requires to analyze the source code. Set to true to suppress the prompt and automatically deduct the lines. **Note**: If the scan requires more lines than are available, the scan fails with an error indicating how many additional lines are required.
`com.fortify.sca.UnicodeInputFile`	
(none)	When set to true, this property indicates that the input file is UTF-8 based and begins with a byte-order mark (BOM). Typically, you should only set this property if you see a lexical error at Line 1, Column 1, indicating that the BOM is present.
`com.fortify.rules.SkipRulePacks`	
(none)	Semicolon-delimited list of rulepacks to exclude from the default set. This property controls which rulepacks are used by Fortify SCA by default. All rulepacks installed in `<install_directory>/Core/config/rules` are used by default unless they are on this list.
`com.fortify.sca.limiters.MaxChainDepth`	
5	Controls the maximum call depth through which the data flow analyzer tracks tainted data. Increasing this value increases the coverage of data flow analysis, and results in longer analysis times. This property can be changed if you are using Quick Scan Mode: see the following table for the suggested value to use. **Note:** In this case, call depth refers to the maximum call depth on a data flow path between a taint source and sink, rather than call depth from the program entry point, such as `main()`.
`com.fortify.sca.limiters.MaxFieldDepth`	

Table 18: Fortify Properties

Property Name	
Default Value	**Description**
4	Controls the maximum granularity of taint tracking through data structure member fields. This value is the number of nested fields through which taint will be tracked before the entire structure is considered tainted. Increasing this value improves the accuracy of analysis by reducing false positives, and normally increases analysis time.
`com.fortify.sca.limiters.MaxPaths`	
5	Controls the maximum number of paths to report for a single data flow vulnerability. Changing this value does not change the results that are found, only the number of data flow paths displayed for an individual result.
`com.fortify.sca.limiters.MaxIndirectResolutionsForCall`	
128	Controls the maximum number of virtual functions that are followed at a given call site.
`com.fortify.sca.jspparserusesclasspath`	
false	Allows the user to specify the classpath to the Weblogic parser. This is for Weblogic 9 and 10 only.

The following table describes the properties that can be used to tune default scanning performance. They have different defaults for Quick Scan mode, which can be adjusted by editing the `fortify-sca-quickscan.properties` file. If you want to use the recommended tuning parameters, you do not need to edit this file; however, you may find that you want to experiment with other settings to fine-tune your specific application.

Remember that properties in this file are processed only if you specify the `-quick` option on the command line when invoking your scan.

Table 19: Performance Tuning Properties

Property Name	
Values	**Description**
`com.fortify.sca.FilterSet`	
Default value is not set. Quick Scan value: `Targeted`.	When set to `targeted`, this property runs rules only for the targeted filter set. Running only a subset of the defined rules allows the Fortify SCA scan to complete more quickly. This causes SCA to run only those rules that can cause issues identified in the named filter set, as defined by the default project template for your application. For more information about project templates, see the *Audit Workbench User's Guide.*
`com.fortify.sca.FPRDisableSrcHtml`	
Default value: `False`. Quick Scan value: `True`.	When set to `true`, this property prevents the generation of marked-up source files. If you plan to upload FPRs that are generated as a result of a quick scan, you must set this property to false.

Table 19: Performance Tuning Properties

Property Name	
Values	**Description**
`com.fortify.sca.limiters.ConstraintPredicateSize`	
Default value: `50000`. Quick Scan value: `10000`.	Skips calculations defined as very complex in the buffer analyzer to improve scanning time.
`com.fortify.sca.limiters.BufferConfidenceInconclusiveOnTimeout`	
Default value: `true`. Quick Scan value: `false`.	Skips calculations defined as very complex in the buffer analyzer to improve scanning time.
`com.fortify.sca.limiters.MaxChainDepth`	
Default value: `5`. Quick Scan value: `4`.	Controls the maximum call depth through which the data flow analyzer tracks tainted data. Increasing this value increases the coverage of data flow analysis, and results in longer analysis times. **Note:** In this case, call depth refers to the maximum call depth on a data flow path between a taint source and sink, rather than call depth from the program entry point, such as `main()`.
`com.fortify.sca.limiters.MaxTaintDefForVar`	
Default value: `1000`. Quick Scan value: `500`.	This property sets the complexity limit for data flow precision backoff. Data flow incrementally decreases precision of analysis for functions that exceed this complexity metric for a given precision level.
`com.fortify.sca.limiters.MaxTaintDefForVarAbort`	
Default value: `4000`. Quick Scan value: `1000`.	This property sets a hard limit for function complexity. If complexity of a function exceeds this limit at the lowest precision level, the analyzer will not analyze that function.
`com.fortify.sca.DisableGlobals`	
Default value: `false`. Quick Scan value: `false`.	This property prevents the tracking of tainted data through global variables to allow faster scanning.
`com.fortify.sca.CtrlflowSkipJSPs`	
Default value: `false`. Quick Scan value: `false`.	This property skips control flow analysis of JSPs in your project.
`com.fortify.sca.NullPtrMaxFunctionTime`	
Default value: `300000`. Quick Scan value: `30000`.	This property sets a time limit, in milliseconds, for Null Pointer analysis for a single function. The default is five minutes. Setting it to a shorter limit decreases overall scanning time.
`com.fortify.sca.CtrlflowMaxFunctionTime`	
Default value: `600000`. Quick Scan value: `30000`.	This property sets a time limit, in milliseconds, for control flow analysis for a single function. The default is 10 minutes.

Table 19: Performance Tuning Properties

Property Name	
Values	**Description**
`com.fortify.sca.TrackPaths`	
By default, this property is not set. Quick Scan value: `NoJSP`.	This property disables path tracking for control flow analysis. Path tracking provides more detailed reporting for issues, but requires more scanning time. You can disable this for JSP only by setting it to `NoJSP`, or for all functions by setting it to `None`.
`com.fortify.sca.JdkVersion`	
Default value: 1.4	This property specifies the JDK version.

Appendix: Fortify SCA Memory Tuning

Fortify Source Code Analyzer can report OutOfMemory errors during an Fortify SCA scan. These errors are the result of Java heap exhaustion, Java permanent generation exhaustion, or native heap exhaustion.

Use the following sections to identify these errors and resolve them:

- Java Heap Exhaustion
- Java Permanent Generation Exhaustion
- Native Heap Exhaustion

Java Heap Exhaustion

Java heap exhaustion is the most common type of memory problem that occurs during Fortify SCA scans. It happens when the Java virtual machine that Fortify SCA is using for a scan has been started with an insufficiently large value for maximum heap size.

Error Message

You can identify a Java heap exhaustion by the following error messages, which Fortify SCA displays in the log file and command line output:

Listing 1: Java Heap Exhaustion Messages

```
There is not enough memory available to complete analysis. For details
on making more memory available, please consult the user manual.

java.lang.OutOfMemoryError: Java heap space

java.lang.OutOfMemoryError: GC overhead limit exceeded
```

Resolution

You can resolve a Java heap exhaustion problem by allocating more heap space to the virtual machine that Fortify SCA is using while starting the scan. By default, Fortify SCA runs with a maximum heap value of 600MB. Increase this value by using the `-Xmx` command line argument when running a Fortify SCA scan.

Before adjusting this parameter, determine the maximum allowable value for the Java heap space. This value depends on the following factors:

- Available physical memory
- Virtual address space limitations

Each of these can limit the amount of space that you can allocate to the Java heap for Fortify SCA. Use the lower of the two limiting values as the upper bound for a `-Xmx` argument. The following example will run a Fortify SCA scan with 1300MB available for the Java heap:

Listing 2: Java Heap Exhaustion Example 1

```

```

The following example will run an Fortify SCA scan with 1GB available for the Java heap:

Listing 3: Java Heap Exhaustion Example 2

```
> sourceanalyzer -Xmx1G …
```

Physical Memory

Do not allow Fortify SCA to use more memory than is physically available in the environment. Doing so will lead to disk swapping and significantly degrade Fortify SCA performance.

To determine available physical memory, start by determining how much total physical memory (RAM) is installed on the system. Subtract from this value an allowance for the operating system (200M is a good guess, although it varies by OS). If the system will be dedicated to running SCA, you are done. If the system resources will be shared with other memory-intensive processes, an al-lowance should also be subtracted for those other processes. Note that other processes that are resident but not active while SCA is running can be swapped to disk by the operating system and do not need to be accounted for.

Virtual Address Space

By default, Fortify SCA runs as a 32-bit process. All 32-bit processes are subject to virtual address space limitations, the specifics of which depend on the underlying operating system.

You can run Fortify SCA in 64-bit mode on 64-bit-capable hardware. In 64-bit mode, virtual address space limitations are not a factor and java heap space is limited only by available physical memory. Although it is slightly more memory efficient to run Fortify SCA in 32-bit mode, you should activate 64-bit mode if a large heap is required for a scan.

Activate 64-bit mode by passing the `-64` argument to Fortify SCA on the command line:

Listing 4: 64-bit Mode Argument

```
> sourceanalyzer -64 …
```

In 32-bit mode the size of the java heap is constrained by the amount of contiguous virtual address space that can be reserved.

On modern Linux systems, this limit is usually near 3 GB.

On Windows systems, address space fragmentation due to the way DLLs are loaded means the limit is typically between 1200 MB and 1600 MB. This value will vary among systems due to different DLLs being loaded into the java process (virus scanning software is one example).

If Fortify SCA does not start when given a large value for `-Xmx`, it might be because virtual address space limits have been exceeded. In this case, Fortify SCA will display an error on the command line similar to the following:

Listing 5: Java Heap Exhaustion Example

```
Error occurred during initialization of VM
Could not reserve enough space for object heap
```

Java Permanent Generation Exhaustion

Java maintains a separate memory region from the main heap which is called the permanent generation. In rare cases, this memory region gets filled up during a scan, causing an OutOfMemory error.

Error Message

You can identify permanent generation exhaustion by the following error message, which Fortify SCA displays in the log file and command line output:

Listing 6: Java Permanent Exhaustion Error Message

```
java.lang.OutOfMemoryError: PermGen space
```

Resolution

Permanent generation exhaustion is resolved by increasing the maximum size of the permanent generation. You can tune the permanent generation size by passing to `-XX:MaxPermSize` argument to the Fortify SCA command line, as in the following example:

Listing 7: Java Permanent Exhaustion Error Message

```
> sourceanalyzer -XX:MaxPermSize=128M …
```

The default maximum value for the permanent generation is 64 MB. Note that the permanent generation is allocated as a separate memory region from the java heap, so increasing the permanent generation will increase the overall memory requirements for the process. See the discussion of virtual address space and physical memory limitations in the previous section for determining overall limits.

Native Heap Exhaustion

Native heap exhaustion is a very rare scenario in which the java virtual machine is able to allocate the java memory regions on startup, but is left with so few resources (either virtual address space or physical memory) for its native operations (such as garbage collection) that it eventually encounters a fatal memory allocation failure that immediately terminates the process.

Error Message

You can identify native heap exhaustion by an abnormal termination of the Fortify SCA process, which Fortify SCA displays in the command line output:

Listing 8: Native Heap Exhaustion Error Messages

```
# A fatal error has been detected by the Java Runtime Environment:
#
# java.lang.OutOfMemoryError: requested ... bytes for GrET ...
```

Because this is a fatal java virtual machine error, it will usually be accompanied by an error log created in the working directory, named as follows: hs_err_pidNNN.log.

Resolution

The resolution to this type of problem is slightly counterintuitive. Because the problem is a result of overcrowding within the process, the resolution is to reduce the amount of memory used for the Java memory regions (Java heap and Java permanent generation). Reducing either of these values should reduce the crowding problem and enable the scan to be completed successfully.

Appendix: Acknowledgements

Fortify Software acknowledges the following:

- Java RunTime Environment

Java RunTime Environment

The Fortify Source Code Analyzer distribution CD-ROM media includes the Sun Java RunTime Environment (JRE). The following statements are included to comply with the terms of JRE distribution.

This product includes code licensed from RSA Security, Inc.

Some portions licensed from IBM are available at `http://oss.software.ibm.com/icu4j/`.

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