



Enterprise Architect

User Guide Series

Profiling

Author: Sparx Systems

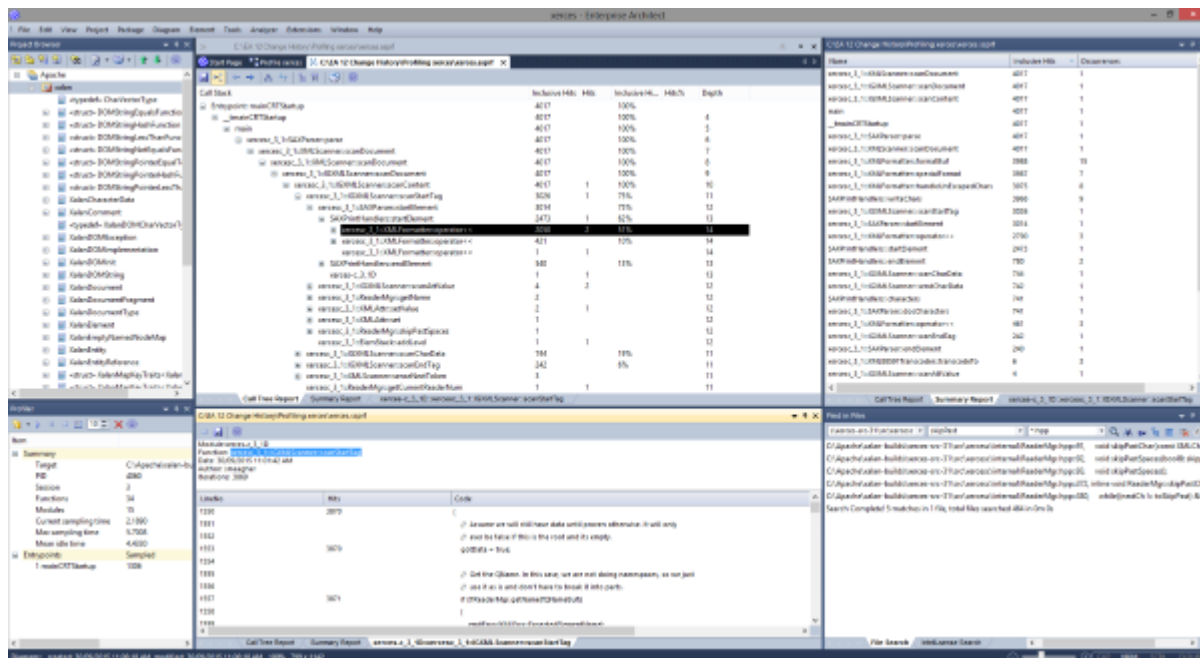
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Profiling

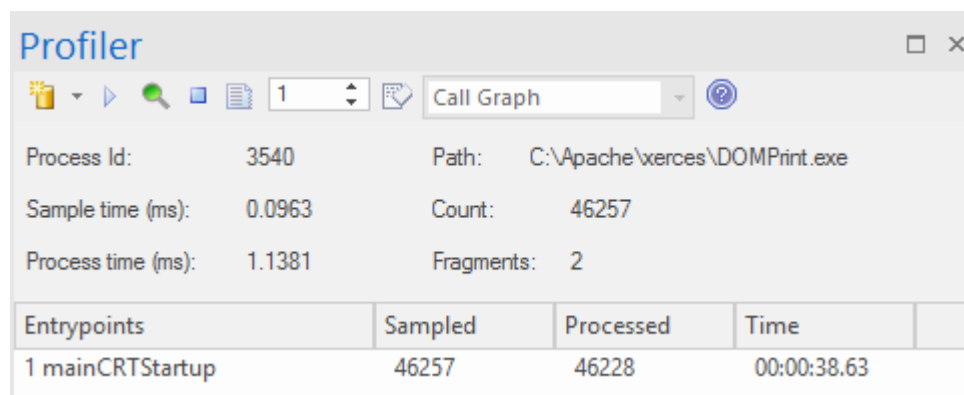


During the lifetime of software applications, it is not uncommon to investigate application tasks that are determined to be performing slower than expected. You might also simply want to know what is going on when you 'press this button'! You can work this out quite quickly in Enterprise Architect by using its Profiler. Results can usually be produced in a few seconds and you will quickly be able to see the actions that are consuming the application and the functions involved. In the Execution Analyzer, The feature employs two separate strategies; *Process Sampling* and *Process Hooking*. In one, samples are taken at regular intervals to identify CPU-intensive patterns, while in the other, the process is hooked to record demands made on memory. Data is analyzed to produce a weighted Call Graph. Behaviors are usually identifiable as root nodes (entrypoints) in the graph, or branches near these points. All reports can be reviewed on demand. They can be saved to file within the model, both as Artifact elements and as Team Review posts.

Access

Ribbon	Code > Analyzer > Profile Execute > Analyze > Profiler > Open Profiler
Other	Execution Analyzer toolbar : Analyzer Windows Profiler

Call Sampling



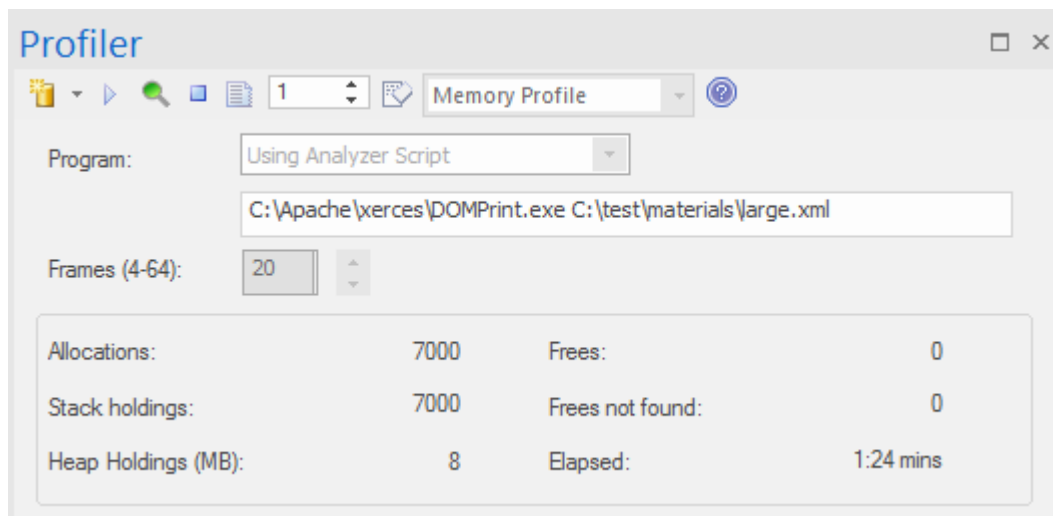
The Profiler is controlled using its toolbar buttons. Here you can attach the Profiler to an existing process (or JVM), or launch the application for the active Analyzer Script. The Profiler window displays the details of the target process as it is profiled. These details provide feedback, letting you see the number of samples taken. You also have options for pausing and resuming capture, clearing captured data and generating reports. You can gain access to the reporting feature by pausing the capture - the reporting feature is disabled whilst data capture is in progress.

Weighted Call Graph

Call Stack	Inclusive Hits	Hits
[-] xercesc_3_1::SAX2XMLReaderImpl::parse	16051	
[-] xercesc_3_1::XMLScanner::scanDocument	16051	
[-] xercesc_3_1::IGXMLScanner::scanDocument	16051	
[-] xercesc_3_1::IGXMLScanner::scanContent	16051	
[-] xercesc_3_1::IGXMLScanner::scanStartTagNS	16051	
[-] xercesc_3_1::IGXMLScanner::resolveSchemaGrammar	16051	
[-] xercesc_3_1::SchemaValidator::preContentValidation	16049	
[-] xercesc_3_1::ComplexTypeInfo::checkUniqueParticleAttribution	16049	
[-] xercesc_3_1::ComplexTypeInfo::makeContentModel	16049	
[-] xercesc_3_1::DFACContentModel::DFACContentModel	16047	
[-] xercesc_3_1::DFACContentModel::buildDFA	15998	515
[-] xercesc_3_1::CMStateSet::operator =	8174	8093
memcpy	32	32
[-] xercesc_3_1::CMStateSet::allocateChunk	27	1
_security_check_cookie	21	21
TrailUpVec	1	1
[-] xercesc_3_1::CMStateSet::~CMStateSet	3573	4
[-] xercesc_3_1::XMemory::operator delete	841	2
xerces-c_3_1D	4416	2
xercesc_3_1::CMStateSet::getBit	1036	1036
[-] xercesc_3_1::DFACContentModel::buildSyntaxTree	528	3
[-] xercesc_3_1::CMStateSet::CMStateSet	373	3
xercesc_3_1::CMStateSet::getBitCountInRange	285	285
[-] xercesc_3_1::XMemory::operator new	211	2
[-] xercesc_3_1::CMStateSet::zeroBits	154	
[-] xercesc_3_1::CMStateSetEnumerator::nextElement	153	136
[-] xercesc_3_1::RefHashTableOf<xercesc_3_1::XMLInteger>	59	2
[-] xercesc_3_1::RefHashTableOf<xercesc_3_1::XMLInteger>	28	2
[-] xercesc_3_1::RefHashTableOf<xercesc_3_1::XMLInteger>	25	
[-] xercesc_3_1::DFACContentModel::makeDefStateList	25	2

This detailed report shows the unique set of Call Stacks/behaviors as a weighted Call Graph. The weight of each branch is depicted by a hit count, which is the total hits of that branch plus all branches from this point. By following the hit trail, a user can quickly identify the areas of code that occupied the program the most during the capture period.

Memory Profiles



The Memory profile tracks allocations, ignoring when memory is freed. It uses this information to rate the executing code's demands for memory, in terms not of the amount of memory but of the frequency of demands. The *Allocations* figure is the total number of memory allocations requested. The *Stack Holdings* is the number of stack traces taken at those times, and the *Heap Holding* figure is the total amount of memory obtained by these calls. Note that profiling can be turned on and off on demand. There is also no need to rebuild your program to get it to work as there is no linkage involved.

Memory Graph

profile		
Start Page *leaks *profile x		
Call Stack	Instances	Bytes
E:\Apache\alan-builds\xerces-src-31\Build\Win32\VC9\debug\DOMPrint.exe C:\test\materials\portrait.xml	0	0
ntdll:RtlAllocateHeap	7,068	4,830,947
ntdll:RtlpNtSetValueKey	7,068	4,830,947
ntdll:RtlDestroyMemoryBlockLookaside	7,068	4,830,947
ntdll:RtlAllocateHeap	7,068	4,830,947
ntdll	7,068	4,830,947
msvc90d:malloc_base	4,813	3,985,885
msvc90d:malloc_dbg	4,813	3,985,885
msvc90d:malloc_dbg	4,813	3,985,885
msvc90d:malloc_dbg	4,813	3,985,885
msvc90d:malloc	4,812	3,985,734
msvc90d:operator new	4,812	3,985,734
xerces-c_3_1d:xercesc_3_1::MemoryManagerImpl::allocate	4,807	3,985,526
xerces-c_3_1d:xercesc_3_1::RangeToken::expand	803	396,984
xerces-c_3_1d:xercesc_3_1::ValueHashTableOf<bool,xercesc_3_1::StringHasher>::put	791	37,968
xerces-c_3_1d:xercesc_3_1::XMLMemory::operator new	753	239,048
xerces-c_3_1d:xercesc_3_1::XMLMemory::operator new	333	21,652
xerces-c_3_1d:xercesc_3_1::RangeToken::doCreateMap	291	19,788
xerces-c_3_1d:xercesc_3_1::RangeToken::addRange	287	28,700
xerces-c_3_1d:xercesc_3_1::XMLString::replicate	218	12,914
xerces-c_3_1d:xercesc_3_1::RefHashTableOf<xercesc_3_1::RangeTokenElemMap,xercesc_3_1	146	7,008
xerces-c_3_1d:xercesc_3_1::RefHashTableOf<xercesc_3_1::CPMapEntry,xercesc_3_1::StringH	144	6,912
xerces-c_3_1d:xercesc_3_1::Win32TransService::Win32TransService	112	6,612
xerces-c_3_1d:xercesc_3_1::Win32TransService::Win32TransService	106	6,258

This example is of a report produced from Profiling a demonstration program in the Xerces project from Apache. The program iterates over the Document Object Model (DOM) for a provided xml file.

Function Summary Report

Name	Inclusive Hits
profiler/Example.Run	156
profiler/Example.main	156
java/io/FileOutputStream.write	154
java/io/PrintStream.println	154
profiler/Example.Print	154
profiler/Example.MakeItalianCars	2
profiler/Example.NewCar	2

This summary report lists the functions and only those functions executed during the sample period. Functions are listed by total invocations, with a function that presents twice in separate Call Stacks appearing before a function that appears just the once.

Function Line Report

LineNo	Hits	Code
54	1	for(int n = 0; n < 10000; n++)
55		{
56	1408	m_Cars = new Collection<Car>();
57	1408	if((n % 3) > 0)
58		{
59	938	for(int i = 0; i < 1000; i++)
60		{
61	938000	MakeItalianCars();
62		}

This detailed report shows the source code for a function line by line displaying beside it the total times each was executed. We uncovered code using this report, that exposed case statements in code that never appeared to be executed.

Support

The Profiler is supported for programs written in C, C++, Visual Basic, Java and the Microsoft .NET languages. Memory profiling is currently available for native C and C++ programs.

Notes

- The Profiler is available in Enterprise Architect Professional editions and above
- The Profiler can also be used under WINE (Linux and Mac) for Profiling standard Windows applications deployed in a WINE environment

System Requirements

Using the Profiler, you can analyze applications built for these platforms:

- Microsoft TM Native (C++, C, Visual basic)
- Microsoft .NET (supporting a mix of managed and unmanaged code)
- Java

Microsoft Native applications

For C, C++ or Visual Basic applications, the Profiler requires that the applications are compiled with the Microsoft TM Native compiler and that for each application or module of interest, a PDB file is available. The Profiler can sample both debug and release configurations of an application, provided that the PDB file for each executable exists and is up to date.

Microsoft .NET applications

For Microsoft .NET applications, the Profiler requires that the appropriate Microsoft .NET framework is installed, and that for each application or module to be analyzed, a PDB file is available.

Java

For Java, the Profiler requires that the appropriate JDK from Oracle is installed.

The classes of interest should also have been compiled with debug information. For example: "java -g *.java"

- New instance of application VM is launched from Enterprise Architect - no other action is required
- Existing application VM is attached to from within Enterprise Architect - the target Java Virtual Machine has to have been launched with the Enterprise Architect profiling agent

These are examples of command lines to create a Java VM with a specific JVTI agent:

1. `java.exe -cp "%classpath%;\" -agentpath:"C:\Program Files (x86)\Sparx Systems\EA\vea\x86\ssamplerlib32" myapp`
2. `java.exe -cp "%classpath%;\" -agentpath:"C:\Program Files (x86)\Sparx Systems\EA\vea\x64\ssamplerlib64" myapp`

(Refer to the JDK documentation for details of the -agentpath VM startup option.)

Getting Started

The Profiler can be used to investigate performance issues, providing three separate tools for you to choose from, namely:

- Call Graph
- Memory Profile
- Memory Leaks

You select the tools from the Profiler toolbar.



Tools







Tool	Description
Call Graph	Analyzes performance by taking samples during an activity in a program. Each sample represents a stack. The samples are taken at intervals controlled using the toolbar. In this scenario, poor performance is rated by the patterns of behavior that repeat the most during the sample time period. This figure is used to weight the Call Graph produced.
Memory Profile	Analyzes performance by hooking the memory allocations made by a program. In this scenario, poor performance is rated by the activities making the most requests for memory. This figure is used to weight the Call Graph produced.
Memory Leaks	Analyzes memory leaks by hooking the memory operations performed by a program. What is produced is a Call Graph presenting the Call Stacks that allocated memory for which a free operation was not detected.

Access

Ribbon	Code > Analyzer > Profile Execute > Analyze > Profiler > Open Profiler
Other	Execution Analyzer toolbar : Analyzer Windows Profiler

Toolbar Buttons

Button	Action
	Profiler options
	Launches the configured application to be profiled. By default, this is the application configured in the active Analyzer Script.

	While the Profiler is running, pauses and resumes capture. When capture is paused, the Report button and Discard Data button are active.
	Stops the Profiler process; if any samples have been collected, the Report button is enabled.
	Generates a report from the current data collection.
	For the call sampler, sets the interval, in milliseconds, at which samples are taken of the target process; the range of possible values is 1 - 250. (Sampler strategy only.)
	Discards the collected data. You are prompted to confirm the discard.
	Displays the Help topic for this window.

Call Graph

Profiler				
<div> 🔍 📄 📊 📌 1 📄 Call Graph ? </div>				
Process Id:	3540	Path:	C:\Apache\xerces\DOMPrint.exe	
Sample time (ms):	0.0963	Count:	46257	
Process time (ms):	1.1381	Fragments:	2	
Entrypoints	Sampled	Processed	Time	
1 mainCRTStartup	46257	46228	00:00:38.63	

Call Stack	Inclusive Hits	UFP
mainCRTStartup	7,408	
sax2print:mainCRTStartup	7,408	1
sax2print:_tmainCRTStartup	7,407	1
sax2print:main	7,350	1
xerces-c_3_1D:xercesc_3_1::SAX2XMLReaderImpl::parse	7,350	1
xerces-c_3_1D:xercesc_3_1::XMLScanner::scanDocument	7,350	1
xerces-c_3_1D:xercesc_3_1::XMLScanner::scanDocument	7,349	1
xerces-c_3_1D:xercesc_3_1::IGXMLScanner::scanDocument	7,348	1
xerces-c_3_1D:xercesc_3_1::IGXMLScanner::scanContent	3,309	1
xerces-c_3_1D:xercesc_3_1::IGXMLScanner::scanCharData	3,301	1
xerces-c_3_1D:xercesc_3_1::IGXMLScanner::sendCharData	3,301	1,742
xerces-c_3_1D:xercesc_3_1::SAX2XMLReaderImpl::docCharacters	3,301	1,742

- Quickly discover what a program is doing at any point in time
- Easily identify performance issues
- Be surprised how quickly you can realize improvements
- See your improvements at work and have the evidence
- Support for C/C++, .NET and Java platforms

Usage

The 'Call Graph' option is typically used in situations where an activity is performing slower than expected, but it can also be used simply to better understand the patterns of behavior at play during an activity.

Operation

The Profiler operates by taking samples - or Call Stacks - at regular intervals over a period of time; the interval is set using the Profiler toolbar. You use the Profiler to run a particular program, or you can attach to an existing process. The Profiler capture is controlled, and you can pause and resume capture at any time. You can also elect to have capture initiated immediately when the Profiler is started. If necessary, you can discard any captured samples and start again during the same session. If you can't continue with the same session, restarting the Profiler is quick and easy.

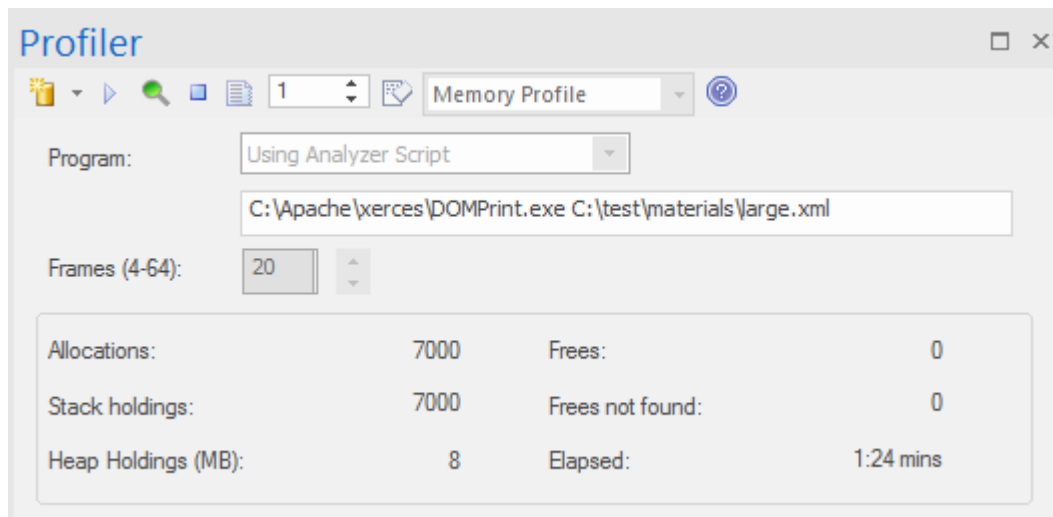
Results

Results can be produced at any time during the session; however, capture must be disabled in order for the Report button to become active. It is up to you to decide how long you let the Profiler run. You might know when an activity is finished, or it might be apparent for other reasons. The reason you are here might be that an activity is not completing at all.

You enable the Report button by either pausing capture or stopping the Profiler altogether.

Results are displayed in a Report view. The report opens with two tabs initially visible: the Call Graph and the Function Summary. The reports can be saved to file, stored in the model as Artifacts or posted in Team Review.

Memory Profile



Call Stack	Instances	Bytes
<ul style="list-style-type: none"> c:\Apache\alan-builds\xerces-src-31\Build\Win32\VC9\debug\DOMPrint.exe "c:\sysinternals\LogFile.xml" ntdll:RtlAllocateHeap <ul style="list-style-type: none"> ntdll:RtlpNtSetValueKey <ul style="list-style-type: none"> ntdll:RtlDestroyMemoryBlockLookaside <ul style="list-style-type: none"> ntdll:RtlAllocateHeap <ul style="list-style-type: none"> ntdll <ul style="list-style-type: none"> msvcr90d:malloc_base <ul style="list-style-type: none"> msvcr90d:malloc_dbg <ul style="list-style-type: none"> msvcr90d:malloc_dbg <ul style="list-style-type: none"> msvcr90d:malloc_dbg <ul style="list-style-type: none"> msvcr90d:malloc <ul style="list-style-type: none"> msvcr90d:operator new <ul style="list-style-type: none"> xerces-c_3_1d:xercesc_3_1::MemoryManagerImpl::allocate <ul style="list-style-type: none"> xerces-c_3_1d:xercesc_3_1::ValueHashTableOf<bool,xercesc_3_1::StringHasher>::put xerces-c_3_1d:xercesc_3_1::XMemory::operator new xerces-c_3_1d:xercesc_3_1::DOMDocumentImpl::allocate xerces-c_3_1d:xercesc_3_1::XMemory::operator new xerces-c_3_1d:xercesc_3_1::RangeToken::doCreateMap xerces-c_3_1d:xercesc_3_1::RangeToken::addRange xerces-c_3_1d:xercesc_3_1::XMLString::replicate xerces-c_3_1d:xercesc_3_1::DOMDocumentImpl::allocate xerces-c_3_1d:xercesc_3_1::RefHashTableOf<xercesc_3_1::RangeTokenElemMap,xercesc_3_1::RefHashTableOf<xercesc_3_1::CPMapEntry,xercesc_3_1::StringHasher>::expand 	<ul style="list-style-type: none"> 4,136 4,136 4,136 4,136 4,136 4,132 4,132 4,132 4,132 4,131 4,131 4,126 791 746 372 332 291 223 202 152 146 144 64 	<ul style="list-style-type: none"> 78,256,467 78,256,467 78,256,467 78,256,467 78,256,467 78,253,895 78,253,895 78,253,895 78,253,895 78,253,747 78,253,747 78,253,539 37,968 75,364 142,664 21,596 19,788 22,300 11,906 77,583,712 7,008 6,912 74,052

- Quickly rate performance of activities that interest you
- Nothing influences a discussion more than evidence
- Reward your efforts by working in those areas that will make a difference
- Surprise yourself by delivering optimizations you might not have known existed

Usage

The Memory Profile can be used to reveal how activities perform in regard to memory consumption. Using this mode, a user would be interested in questioning the frequency of demands made for memory during a task. They would be less interested in the actual amount consumed. A well managed activity might make relatively few calls to allocate resources but allocate enough memory to do its job efficiently. Other activities might make many thousands of requests, and that typically makes them less efficient. This mode is useful for detecting those scenarios.

Operation

The Memory Profile works by hooking the process in question, so that program has to be launched using the tool in Enterprise Architect. Unlike the Call Graph option, you cannot attach to an existing process. When the program is started, hooking mechanisms track the allocation of memory; this information is collected and collated in Enterprise Architect. You can easily monitor the number of allocations being made. Also, the process is controlled; that is, the memory hooks can be turned on and off on demand. If you might have mistimed some action, you can pause capture, discard the data and resume capture again easily.

Results

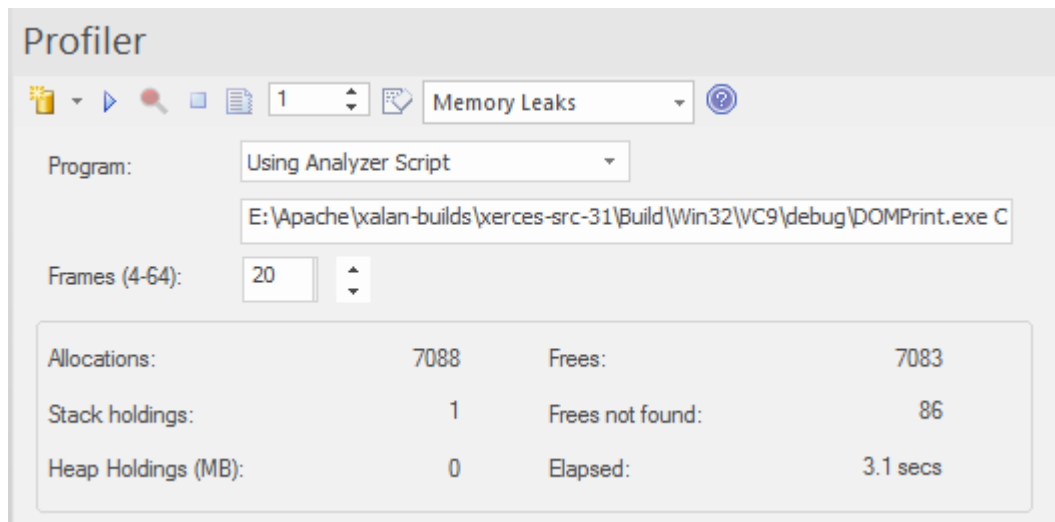
Results can be produced at any time during the session; however, capture must be disabled in order for the Report button to become active. It is your decision how long you let the Profiler run. You enable the Report button by either pausing capture or stopping the Profiler altogether.

Results are displayed in a Report view. The report initially opens with two tabs visible; a single weighted Call Graph and a Function Summary. The Call Graph depicts all the Call Stacks that led to memory allocations, which are aggregated and weighted according to the frequency of the pattern.

Requirements

For best results, the image and its modules should be built with debug information included, and without optimizations. Any module with the Frame Pointer Omission (FPO) optimization is likely to produce misleading results.

Memory Leaks



The Profiler control, showing the count of memory allocations and the count of operations that are memory free.

leaks		
Start Page *leaks x		
Call Stack	Instances	Bytes
E:\Apache\Xalan-Builds\Xerces-src-31\Build\Win32\VC9\debug\DOMPrint.exe C:\test\materials\portrait.xml	0	0
ntdll:RtlAllocateHeap	1	151
ntdll:RtlpNtSetValueKey	1	151
ntdll:RtlDestroyMemoryBlockLookaside	1	151
ntdll:RtlAllocateHeap	1	151
ntdll	1	151
msvcr90d:malloc_base	1	151
msvcr90d:malloc_dbg	1	151
msvcr90d:malloc_dbg	1	151
msvcr90d:malloc_dbg	1	151
msvcr90d:malloc_dbg	1	151
msvcr90d:unlock	1	151
msvcr90d:getmainargs	1	151
msvcr90d	1	151
msvcr90d:initterm	1	151
msvcr90d	1	151
msvcr90d	1	151

A well behaved program.

Memory leak detection is a road well traveled. Although many other good options are available, we believe our approach has major benefits, such as:

- No changes at all to existing project build
- No header files required by the project code
- No runtime dependencies to worry about
- No system configuration to think about

Usage

A person would use this mode to track memory leaks in an application or in an activity within the application. A memory

leak from the Profiler's point of view is a successful call made to a memory allocation function that returns a memory address for which no matching call to free that address is made.

Operation

The Memory Leak detection works through hooking. The memory routines of the process are hooked to track when memory is both allocated and freed. Call Stacks are captured at the point of the allocation and this information is collated in Enterprise Architect to produce a report in the form of a Call Graph. Capture is controlled; that is, the hooking mechanisms can be enabled or disabled on demand.

Depending on the type of program and its memory consumption, you could employ an appropriate strategy. For small programs, you might track the program from start to finish. For larger windowed programs, you would probably do better by toggling capturing before and after a specific task to avoid tracking too much data.

Results

Results can be produced at any time during the session; however, capture must be disabled in order for the Report button to become active. It is your decision how long you let the Profiler run. You enable the Report button by either pausing capture or stopping the Profiler altogether.

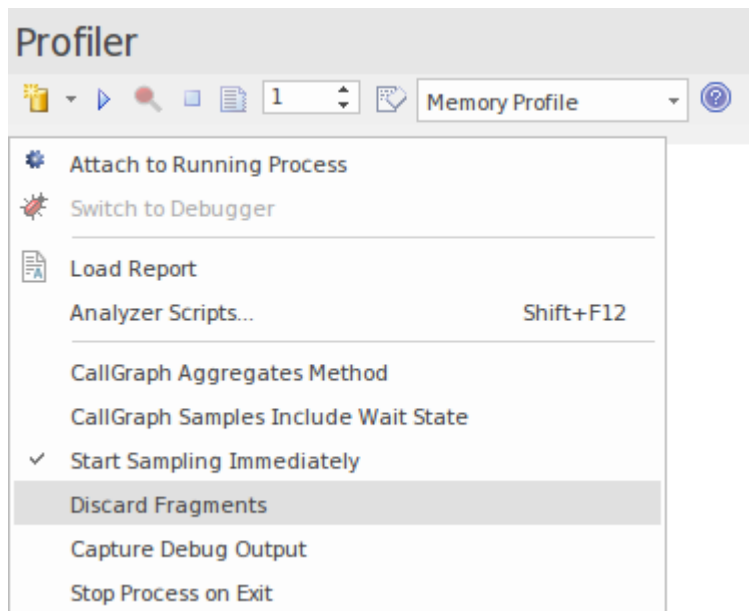
Results are displayed in a Report view. The report initially opens with two tabs visible; a single weighted Call Graph and a Function Summary. The Call Graph depicts all the Call Stacks that led to memory allocations, and are aggregated and weighted according to the frequency of the pattern.

Reports can contain a variable amount of 'noise'. To focus on an area you have specific concerns for, locate a function known to you in the summary report and use that to navigate directly into the line in the graph where it is featured.


Requirements

For best results, the image and its modules should be built with debug information included, and without optimizations. Any module with the Frame Pointer Omission (FPO) optimization is likely to produce misleading results.

Setting Options



Call Graph Options

Option	Description
Interval	 <p>Clicking on the up/down arrows, set the interval, in milliseconds, at which samples are taken of the target process; the range of possible values is 1 - 250 ms.</p>
Attach to Running Process	Click on this option to select a running process.
Switch to Debugger	Click on this option to switch from Profiling to Debugging. The Debugger has an equivalent drop-down menu option that you can use to switch from Debugging to Profiling.
CallGraph Aggregates Method	When this option is selected, instances of the identical stack sequences are aggregated by method. That is to say, line numbers / instructions within a method are ignored, so two stacks will be counted as one where they differ only by line number in their final frame.
CallGraph Samples Include Wait State	When this option is selected, the Profiler will sample all threads, including those in Wait states. When unselected, the Profiler only samples threads that have accumulated CPU time since the last interval expired.
Discard Fragments	Sometimes, it just happens that the results of a stack walk operation can not be reconciled; that is, they do not appear to lead back to the entry point for the thread reporting the stack. We refer to these partial stack traces as 'fragments' and you can decide to display them or select this option to ignore them.

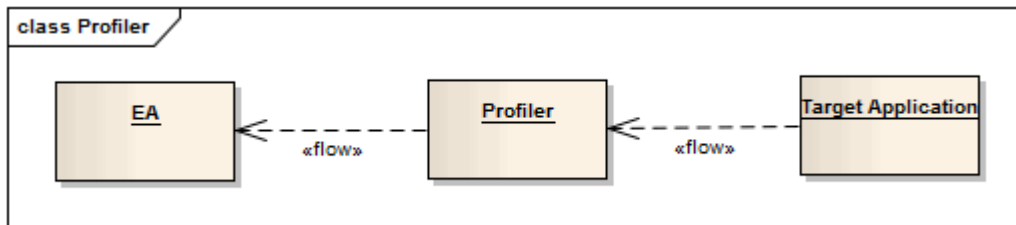
Capture Debug Output	Applies to Process Sampling. When selected, output normally visible during debugging is captured and displayed in the Debugger window. Note that only debug builds will typically emit debug output.
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General Options

Option	Description
Load Report	Select this option to load a previously saved report from the file system.
Analyzer Scripts	Select this option to open the Analyzer Script window, which is the model repository for configuring builds, debugging, and all other Visual Execution Analyzer options.
Start Sampling Immediately	Select this option to trigger Data Collection immediately on launch. You would typically use this option to profile a process during startup.
Stop Process on Exit	This option determines termination behavior for the Profiler. When the option is selected, the target process will terminate when the Profiler is stopped.

Start & Stop the Profiler

Profiling is a two stage process of data collection and reporting. In Enterprise Architect the data collection has the advantage of being a background task - so you are free to do other things while it runs. The information sent back to Enterprise Architect is stored until you generate a report. To view a report, the capture must be turned off. After the report is produced you can resume capture with the click of a button. If, for some reason, you decide to scrap your data and start again, you can do so easily and without having to stop and start the program again.



Access

Ribbon	Code > Analyzer > Profile Execute > Analyze > Profiler > Open Profiler
Other	Execution Analyzer toolbar : Analyzer Windows Profiler

Actions

Action	Detail
Toolbar	
Strategy Selection	Select the Profiling strategy from the available options on the Toolbar.
Start the Profiler	Click the Run button on the Profiler window
Stop the Profiler	<p>The process exits if:</p> <ul style="list-style-type: none"> You click on the Stop button The target application terminates, or You close the current model <p>If you stop the Profiler and the process is still running, you can quickly attach to it again.</p>
Pause and Resume Capture	<p>You can pause and resume capture at any time during a session.</p> <p>When capture is turned on, samples are collected from the target. When paused, the</p>

	Profiler enters and remains in a wait state until either capture is enabled, the Profiler is stopped or the application finishes.
Generate Reports	The Report button is disabled during capture but is available when capture is turned off.
Clear Data Collection	You can clear any data samples collected and resume at any time. First suspend capture by clicking on the Pause button. The Discard button, as for the Report button, is enabled whenever capture is turned off. In clicking on the Discard button you will be asked to confirm the operation. This action cannot be undone.

Function Line Reports

After you have run the Profiler on an executing application and generated a Sampler report, you can further analyze the activity of a specific function listed in the report by generating a Function Line report from that item. A Function Line report shows the number of times each line of the function was executed. You produce one Function Line report at a time, on any method in the Sampler report that has a valid source file. The Function Line report is particularly useful for functions that perform loops containing conditional branching; the coverage can provide a picture of the most frequently and least frequently executed portions of code within a single method.

The line report you generate is saved when you save the Sampler report. The body of the function is also saved with the Function Line report to preserve the function state at that time.

Platforms supported

Java, Microsoft .NET and Microsoft native code

Create a Line Report

In the Sampler report, right-click on the name of the function to analyze, and select the 'Create Line report for function' option.

Once the Profiler binds the method, the Function Line report is opened on the Sampler Report window. The report shows the body of the function, including line numbers and text. As each line is executed a hit value will accumulate against that line. A timer will update the report approximately once every second.

Call Tree Report Summary Report ConsoleApplication::CQuickSort::Quicksort		
Module: ConsoleApplication Function: CQuickSort::Quicksort Date: 20/09/2013 2:53:21 PM Author: smeagher Iterations: 28679		
LineNo	Hits	Code
21	28645	{
22	28644	if (r <= l)
23	14460	return;
24	14184	int i = l-1, j = r, p = l-1, q = r;
25		for (,;)
26		{
27	439580	while (a[++i] < a[r]) ;
28	14185	while (a[-j] > a[r])
29		if (i == l)
30		break;
31		if (j >= r)
32	14185	break;
33		
34		Exchange(a, i, j);
35		if (a[i] == a[r])
36		Exchange(a, ++p, i);
37		
38		if (a[j] == a[r])
39		Exchange(a, j, --q);
40		
41		}
42	14185	Exchange(a, i, r);
43	14185	j = i-1; i = i+1;
44	14185	for (int k = l; k < p; k++, j--)

End Line Report Capture

Once enough information is captured, or the function has ended, click on the Profiler toolbar Stop button to stop recording the capture.

Save Reports

Use the Save button on the Call Stack toolbar to save the Sampler report and any Function Line reports to a file.

Delete Line Reports


Closing the 'Line Report' tab will close that report but the report data will only be deleted when the report is saved.

Generate, Save and Load Profile Reports

Reports can be produced at any time during a session, or naturally when a program ends. To enable the Report button while the program is running, however, you need to suspend Profiling by toggling the Pause/Resume button, or by terminating the Profiler with the Stop button. You have some options for reviewing and sharing the results:

- View the report
- Save the report to File
- Distribute the report as a Team Review resource
- Attach the report as a document to an Artifact element
- Synchronize the model by reverse engineering the source code that participated in the profile

Access

Ribbon	Execute > Analyze > Profiler > Create Report from Current Data
Other	From the Profiler window, click on the  icon in the toolbar.

CallFrequency Report

Call Stack		Inclusive Hits	Hits
[-] xercesc_3_1::SAX2XMLReaderImpl::parse		16051	
[-] xercesc_3_1::XMLScanner::scanDocument		16051	
[-] xercesc_3_1::IGXMLScanner::scanDocument		16051	
[-] xercesc_3_1::IGXMLScanner::scanContent		16051	
[-] xercesc_3_1::IGXMLScanner::scanStartTagNS		16051	
[-] xercesc_3_1::IGXMLScanner::resolveSchemaGrammar		16051	
[-] xercesc_3_1::SchemaValidator::preContentValidation		16049	
[-] xercesc_3_1::ComplexTypeInfo::checkUniqueParticleAttribution		16049	
[-] xercesc_3_1::ComplexTypeInfo::makeContentModel		16049	
[-] xercesc_3_1::DFACContentModel::DFACContentModel		16047	
[-] xercesc_3_1::DFACContentModel::buildDFA		15998	515
[-] xercesc_3_1::CMStateSet::operator =		8174	8093
[-] memcpy		32	32
[+] xercesc_3_1::CMStateSet::allocateChunk		27	1
[-] _security_check_cookie		21	21
[-] TrailUpVec		1	1
[+] xercesc_3_1::CMStateSet::~CMStateSet		3573	4
[+] xercesc_3_1::XMemory::operator delete		841	2
[-] xerces-c_3_1D		4416	2
[-] xercesc_3_1::CMStateSet::getBit		1036	1036
[+] xercesc_3_1::DFACContentModel::buildSyntaxTree		528	3
[+] xercesc_3_1::CMStateSet::CMStateSet		373	3
[-] xercesc_3_1::CMStateSet::getBitCountInRange		285	285
[+] xercesc_3_1::XMemory::operator new		211	2
[+] xercesc_3_1::CMStateSet::zeroBits		154	
[+] xercesc_3_1::CMStateSetEnumerator::nextElement		153	136
[+] xercesc_3_1::RefHashTableOf<xercesc_3_1::XMLInteger,>		59	2
[+] xercesc_3_1::RefHashTableOf<xercesc_3_1::XMLInteger,>		28	2
[+] xercesc_3_1::RefHashTableOf<xercesc_3_1::XMLInteger,>		25	
[+] xercesc_3_1::DFACContentModel::makeDefStateList		25	2

Function Summary

Start Page C:\ea\tests\cg-xerces-sax2print.ssprf X		
Name	Inclusive Hits	Occurrences
mainCRTStartup	7408	1
__tmainCRTStartup	7407	1
xercesc_3_1::XMLFormatter::handleUnEscapedChars	7351	10
xercesc_3_1::XMLFormatter::formatBuf	7351	10
xercesc_3_1::XMLFormatter::specialFormat	7351	10
SAX2PrintHandlers::writeChars	7350	10
xercesc_3_1::XMLScanner::scanDocument	7350	1
main	7350	1
xercesc_3_1::SAX2XMLReaderImpl::parse	7350	1
xercesc_3_1::XMLScanner::scanDocument	7349	1
xercesc_3_1::IGXMLScanner::scanDocument	7348	1
xercesc_3_1::XMLFormatter::formatBuf	4042	8

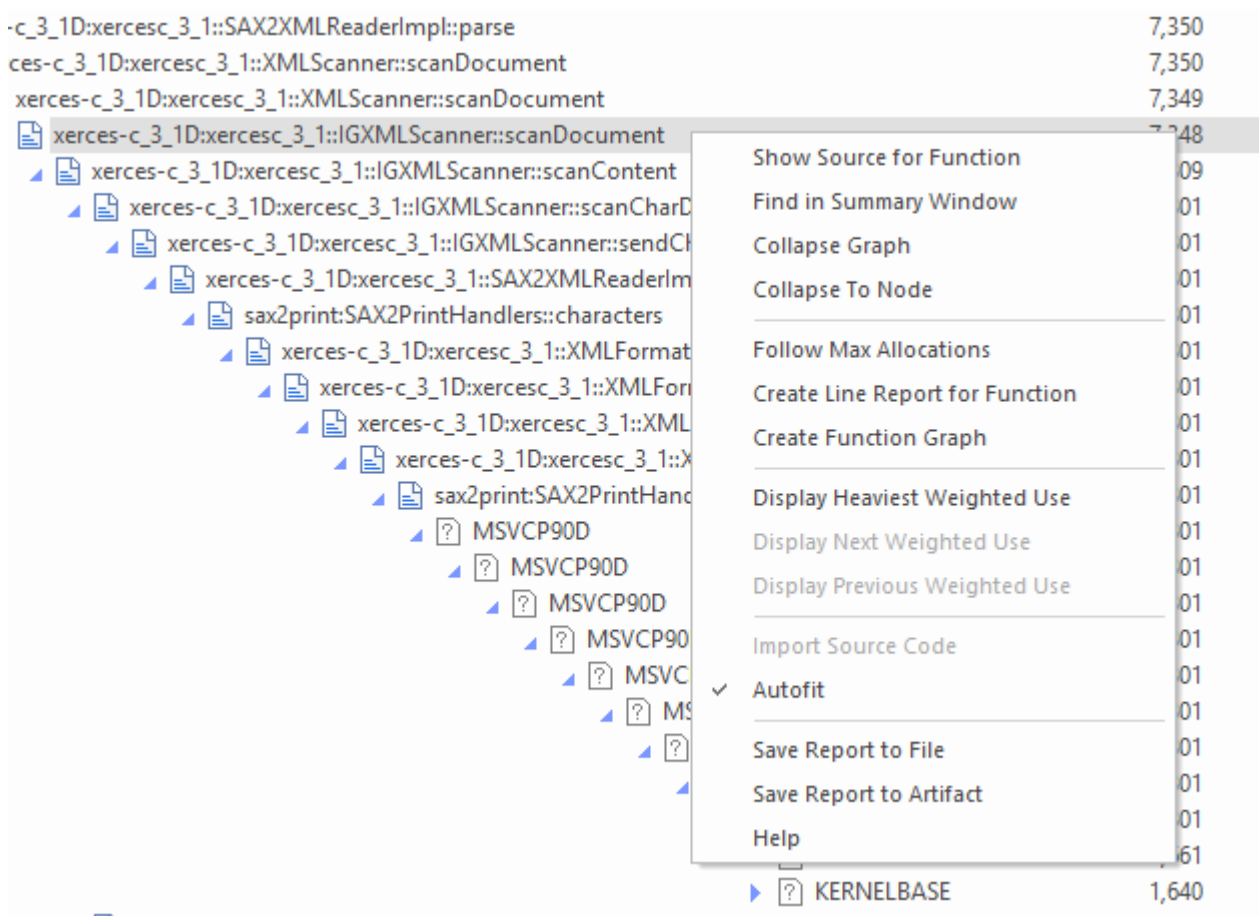
Unfiltered Summary Report listing all participating functions in order of inclusive hits.

Start Page C:\ea\tests\cg-xerces-sax2print.ssprf X		
Name	Inclusive Hits	Occurrences
SAX		
SAX2PrintHandlers::writeChars	7350	10
xercesc_3_1::SAX2XMLReaderImpl::parse	7350	1
xercesc_3_1::SAX2XMLReaderImpl::docCharacters	3309	2
SAX2PrintHandlers::characters	3309	2
xercesc_3_1::SAX2XMLReaderImpl::endElement	2114	1
xercesc_3_1::SAX2XMLReaderImpl::startElement	1925	1
SAX2PrintHandlers::endElement	1523	1

You can filter and reorganize the information in the report, in the same way as you do for the results of a Model Search.

Report Options

Right-click on the report to display the context menu.



Action	Detail
Show Source for Function	For the selected frame, select this option to display the corresponding line of code in a code editor. Frames that have source available are identifiable by their icon.
Find in Summary Window	Select this option to locate the function in the 'Summary' tab.
Collapse Graph	Select this option to collapse the entire graph including child nodes, visible or not.
Collapse to Node	Select this option to collapse the entire graph, then expand and set the focus to the selected node.
Follow Max Allocations	Select this option to expand an entire line in the graph.
Create Line Report for Function	<p>Select this option to launch the Profiler (if it is not already running), immediately bind the selected function and ready it for recording. Once bound, an extra tab is opened in the current Report View. This report will update instantaneously, showing the number of times each line executed. Of course, the report will continue to record activity in the function even if is not visible.</p> <p>Note: In windowed programs, it is usually necessary to take some action in the application to cause the function to be invoked.</p>
Create Function Graph	Select this option to create an additional tab, which shows the selected function in isolation. For a Call Frequency Profile, this produces a graph showing all the lines that led to this function being called (that is, the callers). For a Memory Profile, this produces a graph showing all lines that emanate from this function (that is, the callees).

Display the Heaviest Weighted Use	Select this option to display the line in the graph with the highest weight in which this function appears.
Display the Next Weighted Use	Select this option to navigate to the next line in the graph where the function appears. You can use the shortcut key combination Ctrl+Down Arrow.
Display the Previous Weighted Use	Select this option to navigate to the previous line in the graph where this function appears. You can also use the shortcut key combination Ctrl+Up Arrow
Save Report to File	Select this option to display the 'Save As' dialog, allowing you to choose where to store the report.
Save Report to Artifact	<p>Note: Before selecting this option, go to the Project Browser and select the Package or element under which to create the Artifact element.</p> <p>You are prompted to provide a name for the report (and element); type this in and click on the OK button.</p> <p>The Artifact element is created in the Project Browser, underneath the selected Package or element.</p> <p>If you add the Artifact to a diagram as a simple link, when you double-click on the element the report is re-opened.</p>

Team Review Options

Option	Description
Make Report a Team Review Resource	<p>You can save any current report as a resource for a Category, Topic or Post in the Team Review to share and review at any time, as it is saved with the model. The report can also be compared with future runs.</p> <p>To begin this process, on the 'Team Review context menu select the menu option 'Share Resource Add Active Profiler Report'.</p>

Notes

- If you add the Profiler report to an Artifact element and also attach a linked document, the Profiler report takes precedence and is displayed when you double-click on the element; you can display the linked document using the 'Edit Linked Document' context menu option

Save Report in Team Review

You can save any current report as a resource for a Category, Topic or Document in the Team Review. The report can then be shared and reviewed at any time as it is saved with the model. This helps you to:

- Preserve a Profiler report to compare against future runs
- Allow other people to investigate the profile

Access

Context Menu	Right-click in Team Review window Share Resource Active Profiler Report
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