



IBM Software Group

IBM® SDK, Java™ Technology Edition, V6

Extensible Verbose Toolkit overview



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This presentation provides an overview of and shows you how to install the Extensible Verbose Toolkit.

Agenda

- Extensible Verbose Toolkit overview
- Installing the Extensible Verbose Toolkit



The first section of this presentation provides an overview of the Extensible Verbose Toolkit, including how to gather the garbage collection data that it processes, its basic functionality, and some typical usage scenarios. The second section will describe how to install the toolkit.

Garbage collection data

- The Extensible Verbose Toolkit processes garbage collection data
- Verbose garbage collection logs
 - ▶ Tool works with `optthruput`, `optavgpause`, and `gencon` GC policies
 - ▶ Preferred method for enabling verbose GC is with `-Xverbosegclog`
 - `-Xverbosegclog:file_name`
 - `-Xverbosegclog:%pid.txt`
 - `-Xverbosegclog`
 - ▶ Can also use `-verbose:gc` flag
 - File produced might contain additional application output not supported
- Garbage collection traces
 - ▶ Extensible Verbose Toolkit supports `-Xtgc:freelist` output
- Works with all IBM SDKs version 1.4.2 or higher

The Extensible Verbose Toolkit processes garbage collection data, including verbose GC logs and traces. It is compatible with three garbage collection policies: optimized for throughput, optimized for average pause time, and generational concurrent garbage collection. There are multiple ways to enable verbose garbage collection logging, and the recommended command-line option for doing so is `-Xverbosegclog`. You can use the `-Xverbosegclog` parameter to name your log files, either with a static file name, or with a tokenized file name string. Multiple tokens are supported, including the process ID, user name, several time-related tokens, and others; these are fully documented in the Java Diagnostics Guide. While the `-verbose:gc` flag is more commonly used to turn on verbose GC logging, the file produced might not be in valid XML format. If this is the case, the Extensible Verbose Toolkit might not be able to parse it. Only log files produced with `-Xverbosegclog` are officially supported in the toolkit. In addition to verbose log files, the Extensible Verbose Toolkit can also parse freelist traces. The tool can process garbage collection data from any IBM SDK for Java, version 1.4.2 or higher.

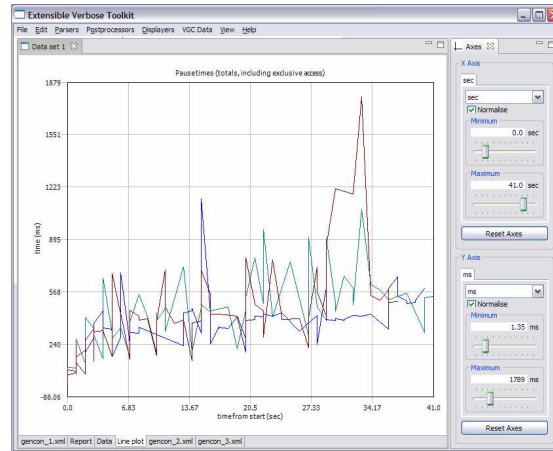
Extensible Verbose Toolkit overview

- The Extensible Verbose Toolkit is a visualizer for verbose garbage collection output
 - ▶ The tool parses and plots verbose GC output and garbage collection traces (-Xtgc output)
- The toolkit framework is extensible, and will be expanded over time to include visualization for other collections of data
- The Extensible Verbose Toolkit provides
 - ▶ Raw view of data
 - ▶ Line plots to visualize a variety of GC data characteristics
 - ▶ Tabulated reports with heap occupancy recommendations
 - ▶ View of multiple datasets on a single set of axes
 - ▶ Ability to save data as an image (jpeg) or comma separated file (csv)

The Extensible Verbose Toolkit allows you to visualize your garbage collection data, as raw datasets, line plots, reports, and images. The “Line plot” portion of the tool displays graphs of over forty different garbage collection data characteristics – including used heap, pause times, and the reason for garbage collection being triggered. You can read in multiple sets of garbage collection logs and display them together on a single set of axes, which allows you to easily compare garbage collection behavior across multiple test runs of an application. The “Report” section of the tool contains a summary of the line plot data, along with information on general garbage collection behavior and heap sizing recommendations based on overall heap occupancy.

Extensible Verbose Toolkit usage scenarios

- Investigate performance problems
 - ▶ Long periods of pausing or unresponsiveness
- Evaluate your heap size
 - ▶ Check heap occupancy and adjust heap size if needed
- Garbage collection policy tuning
 - ▶ Examine GC characteristics, compare different policies
- Look for memory growth
 - ▶ Heap consumption slowly increasing over time
 - ▶ Evaluate the general health of an application



When experiencing poor Java application performance, people sometimes have a tendency to jump to the conclusion that the garbage collector is to blame, but that is often not the case. One way to check whether garbage collection might be bogging your application down is by examining the logs. Is your application having to spend a large percentage of its time collecting garbage? Are you noticing period of unresponsiveness in your application that correspond to long garbage collection pause times in your logs? If so, you can probably tune your garbage collection policies to get better behavior. If you have concerns about your overall heap size, check out the Report tab portion of the Extensible Verbose Toolkit. It contains information on your heap utilization and offers recommendations for adjusting your heap size. To see how using different garbage collection policies will affect your application, gather logs for test runs using the different policies, and then load those logs into an Extensible Verbose Toolkit workspace. View and compare their characteristics on a single plot. To check the overall health of your application, use the Extensible Verbose Toolkit to examine your application's heap consumption over a long period of time. If your heap usage is slowly creeping up over time, you might have a memory leak in your application. If you suspect a memory leak, IBM provides another tool called the Memory Dump Diagnostic for Java, also available as a plug-in for IBM Support Assistant, that can help you isolate the source of the leak.

Section

Installing the toolkit

The Extensible Verbose Toolkit is available as an IBM Support Assistant plug-in. This section explains where to download IBM Support Assistant and how to install the Extensible Verbose Toolkit plug-in in your support assistant workbench.

IBM Support Assistant

- The Extensible Verbose Toolkit is available as a plug-in to IBM Support Assistant
 - ▶ Available on Windows® and Linux®
- The support assistant is an integrated serviceability workbench that offers many product documentation plug-ins and tools
 - ▶ Available as a free download from <http://www.ibm.com/software/support/isa/>
- Use the IBM Support Assistant updater to install product plug-ins and tools



IBM Support Assistant is a local serviceability tool that makes it easier and faster to resolve your software product challenges. It is available for free download on the IBM Software Support Web site. It is a software support enabler for several IBM software products, including the IBM developer kits for Java, WebSphere Application Server, and many others. It provides a number of features to aid you in problem determination and resolution, including federated search, data collection, problem submission, and diagnostic tools. You can use the “updater” link in the product’s interface to update your installation or to install plug-in components for IBM software products and tools, like the Extensible Verbose Toolkit. While the IBM Support Assistant tool itself runs on many platforms, the Extensible Verbose Toolkit is only available on Windows and Linux.

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IBM Support Assistant updater

Initially, you will not have any product plug-ins installed

Select the **Updater** link to begin installing new features

9

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The first time that you start IBM Support Assistant after installing it, you will notice a yellow box at the top of the workbench telling you that you do not have any product plug-ins installed. This is expected and just means that, in order to access Java product documentation and serviceability tools, you will need to install a Java-related product plug-in in your IBM Support Assistant workbench. You can click on the Updater link to find and install product plug-ins. The plug-ins for IBM Developer Kits for Java can be found on the New Plug-ins tab, under New Products and Tools, in the section called Others. In addition to customizing your workbench with product plug-ins, you can install a variety of serviceability tools, which are also located on the New Plug-ins tab, in the section called Common Component Tools.

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Installing IBM Support Assistant plug-ins

Installed Plug-ins Available Plug-ins Updates New Plug-ins

Expand Common Component Tools and select Extensible Verbose Toolkit

In the New Plug-ins tab, expand Others and select IBM Developer Kit for Java 5.0

Click the Install button to download and install the plug-ins

Install Refresh

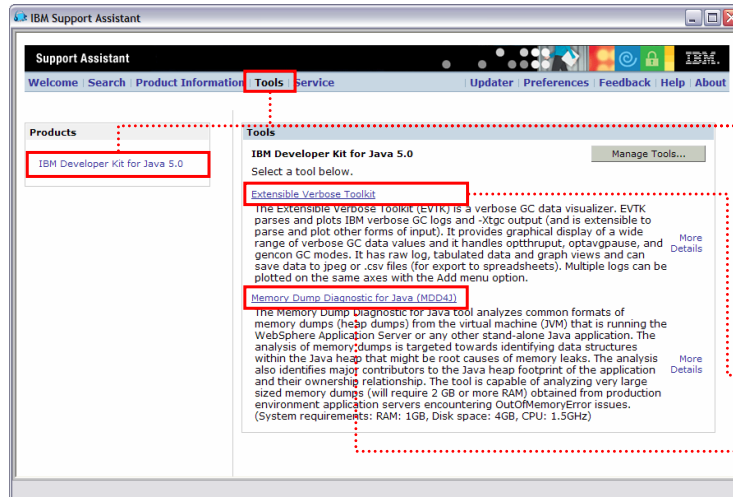
Install Refresh

10

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The IBM Support Assistant updater will show you all of the product plug-ins and tools that are available for you to download. In order to access the Extensible Verbose Toolkit, you will need to install two things: a product plug-in for a Java-related product, and the Extensible Verbose Toolkit plug-in. The plug-ins for IBM Developer Kits for Java can be found on the New Plug-ins tab, under New Products and Tools, in the section called Others. The Extensible Verbose Toolkit plug-in is also available from the New Plug-ins tab, in the Common Component Tools section. Once you have selected both the JDK plug-in and the Extensible Verbose Toolkit plug-in, click the Install button to download and install the tools in your IBM Support Assistant workbench. You will be prompted to select a license agreement, and the support assistant will automatically restart once the plug-in installation is complete. At that point, you will be able to access the new plug-ins that you just installed.

Starting the Extensible Verbose Toolkit



In the **Tools** section of the workbench, select the Java product plug-in to display the available tools

Click on the name of a tool to start that tool

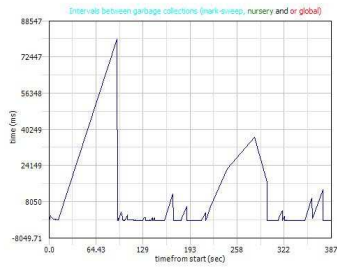
11

Extensible Verbose Toolkit overview

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Back in the IBM Support Assistant workbench, go to the Tools section and, on the left, select the IBM Developer Kit for Java plug-in that you have installed. Once you have selected it, you will see all of the related tools in the right portion of the workbench. To start the Extensible Verbose Toolkit, just click on the name of the tool. It will open in a separate window.

Extensible Verbose Toolkit data



[Occupancy recommendation](#)

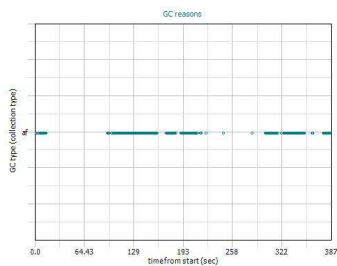
Occupancy recommendation

The mean occupancy is 98%. This is a bit high, so you may improve collection times by increasing your heap size.

[Summary](#)

Summary

Largest memory request (bytes)	1409048
Allocation failure count	603
GC Mode	opthruput
Proportion of time spent in garbage collection pauses (%)	34.99
Concurrent collection count	0
Proportion of time spent unpaused (%)	65.01
Forced collection count	0
Number of collections	298
Mean interval (sec)	0.62
Mean pause (ms)	217



12

Extensible Verbose Toolkit overview

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Once you have started the Extensible Verbose Toolkit, you will be able to read in your verbose GC logs and explore their data characteristics. You can see pause times and intervals between garbage collection cycles, your total used heap space, and over forty other measures. The toolkit also provides summary reports with overall garbage collection statistics and heap size recommendations.

Section

Summary and references

The next section contains a summary and links to references.

Summary

- The Extensible Verbose Toolkit is a graphical tool for visualizing garbage collection data
 - ▶ Provides line plots, reports, and configuration recommendations
 - ▶ Useful for performance analysis and GC tuning
 - ▶ Available as a plug-in to IBM Support Assistant



The Extensible Verbose Toolkit processes garbage collection data, including verbose GC logs and traces. You can create line plots of your data, view summary reports, and get heap size configuration recommendations. The toolkit allows you to do performance analysis, garbage collection tuning, and to inspect the general health of your Java applications. It is available for free download as a plug-in for the IBM Support Assistant workbench.

References

- IBM Support Assistant
 - ▶ <http://www-306.ibm.com/software/support/isa/>
- Diagnostics Guide
 - ▶ <http://publib.boulder.ibm.com/infocenter/javasdk/v6r0/index.jsp>
- developerWorks® articles about garbage collection
 - ▶ <http://www-128.ibm.com/developerworks/java/library/j-ibmjv2/>
 - ▶ <http://www-128.ibm.com/developerworks/java/library/j-ibmjv3/>



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