

S H A R E

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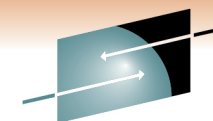
WebSphere Application Server for z/OS: Helping Customers Help Themselves

SHARE Winter 2011
Anaheim, CA
Wednesday, March 2, 2011

Michael Stephen
msteff@us.ibm.com
IBM WAS z/OS L2 Team Lead



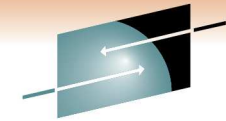
WebSphere Application Server Sessions



S H A R E

Room	Day	Time	Title	Speaker
208B	Monday	11:00	Lab	Multi
201A	Monday	11:00	The Value of the WebSphere Application Server Job Manager	Loos
205A	Monday	4:30	WebSphere Application Server for z/OS -- I am No Longer a Dummy but...	Hutchinson
205B	Tuesday	9:30	Performance Tuning for WebSphere Application Server for z/OS - Practical Advice	Follis
205A	Wednesday	4:30	WebSphere Application Server for z/OS: Tools and Tricks (Potpourri)	Loos and Co.
205A	Wednesday	6:00	WebSphere Application Server for z/OS: Helping Customers Help Themselves	Stephen
206B	Thursday	8:00	Securing WebSphere Application Server for z/OS	Kearney
206B	Thursday	9:30	Application Improvement and Savings Through Simplification	McCorkle
206B	Thursday	11:00	WebSphere Application Server for z/OS: Batch	Bagwell
206A	Thursday	12:15	WebSphere Application Server 101	Stephen
206B	Thursday	1:30	WebSphere Application Server for z/OS: Availability Considerations	Bagwell
206B	Thursday	3:00	WebSphere Application Server: z/OS Exploitation/Differentiation	Follis
206B	Thursday	4:30	Performance Tuning for WebSphere Application Server for z/OS - WAS and WLM Interactions and Concepts	Follis

Outline: *ISA Tools for WebSphere on z/OS*



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Garbage Collection analysis:

- **GC and Memory Visualizer (GCMV) ****
- **Pattern Modeling Tool for Java GC (PMAT)**

Dump analysis:

- **Memory Analyzer (MAT) ****
- **Dump Analyzer ****
- **HeapAnalyzer**
- **Memory Dump Diagnostic for Java (MDD4J)**
- **Thread & Monitor Dump Analyzer for Java (TMDA)**

Trace analysis:

- **Trace and Request Analyzer for WAS**
- **Log Analyzer**

Real-time analysis: **Health Center ****

Configuration analysis: **Visual Configuration Explorer (VCE)**

Appendix

- Installing the IBM Support Assistant
- Other Diagnostic Tools for WebSphere on z/OS
- Working with Dumps & Traces
- Testing Tools & Sample Applications
- Documentation, Help & Web Resources

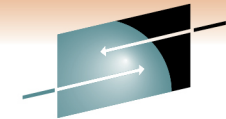
Comments:

- Many work on z/OS,
- Some do not..
- Some are Deprecated
- Some are “Tech.Preview”
- *Analysis vs. Visualization*



*** “IBM Monitoring and Diagnostic Tools for Java™”*





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Diagnostic Data from WAS on z/OS

TSO/SDSF

- Browse logs
- MVS Modify cmds
- Turn tracing on
- Display WAS Servers

Other TSO/ISPF Apps

- RMF Monitors
- IPCS
- DB2 Admin

Telnet Client

- View logs
- UNIX commands
- FTP

Java tools

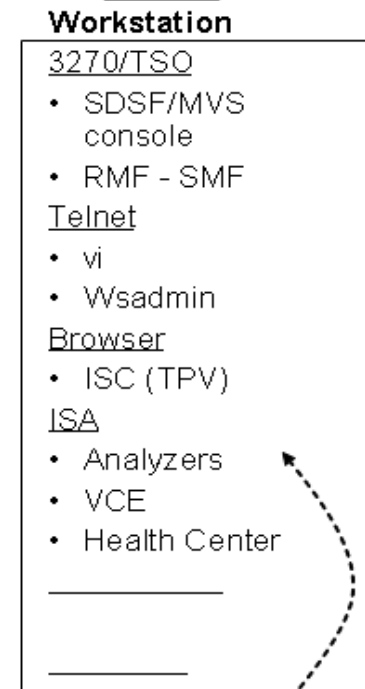
- Jextract, . . .

Web Browsers

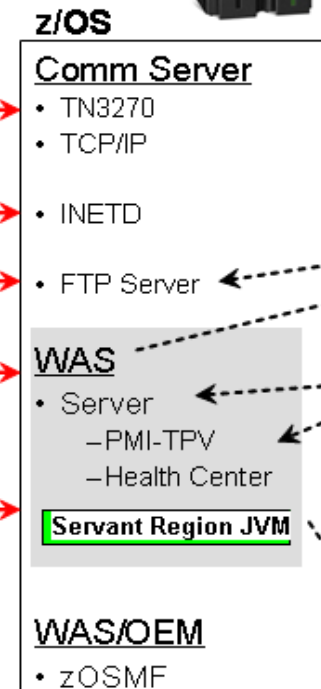
- ISC - TPV
- z/OSMF Inc.Log Mgr

ISA Tools

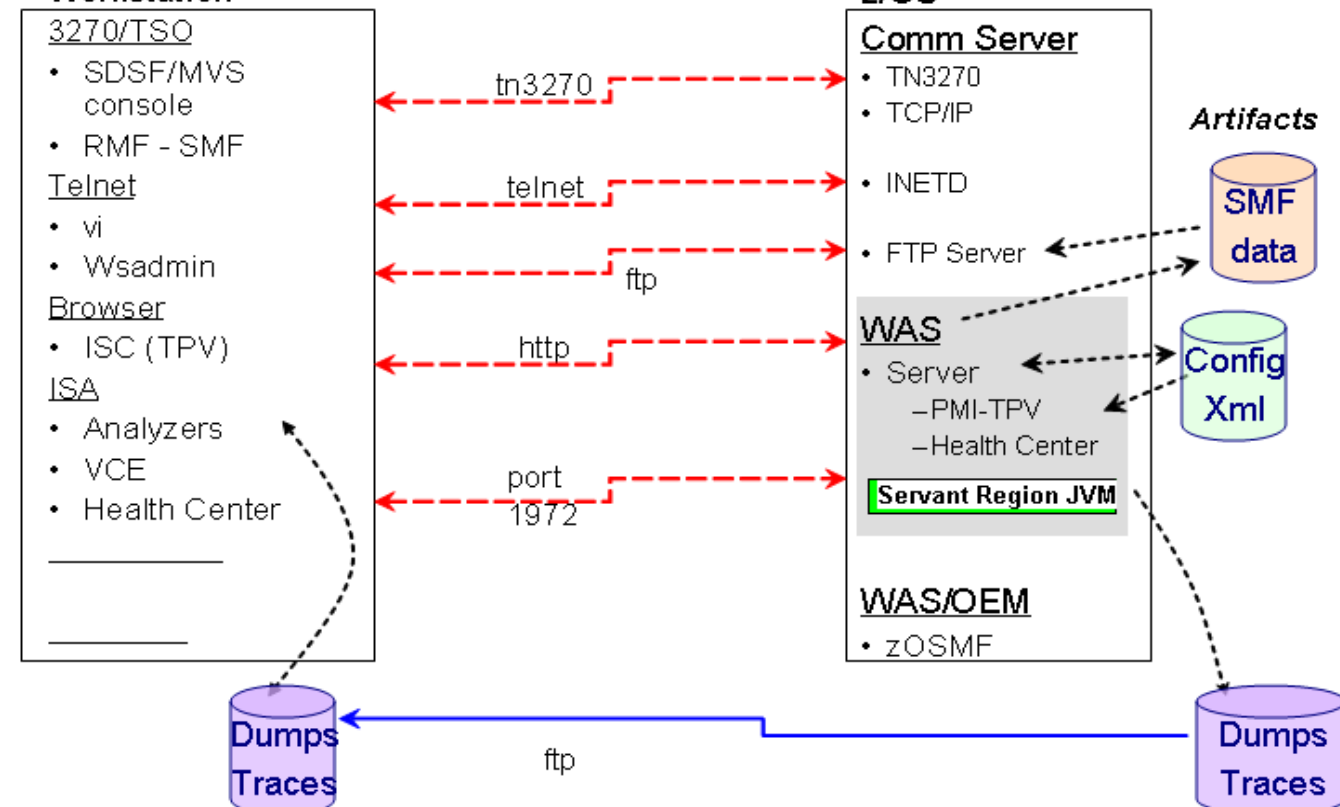
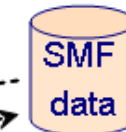
- Health Center
- GC analyzers
- Dump analyzers
- Log Analyzers
- VCE



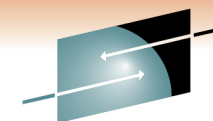
How many ways can we analyze WAS on z/OS?



Artifacts



Which Tools for which Artifacts?



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<i>Artifact</i>	<i>Tool</i>
GCverbose xml (SYSOUT)	GCMV PMAT
Javacore	TMDA
Heapdump	Memory Analyzer MDD4J HeapAnalyzer
System Dump (jextracted)	Memory Analyzer Dump Analyzer
Logs & Traces	TRA Log Analyzer
Real Time Running Server	Health Center
Configuration XML files	VCE

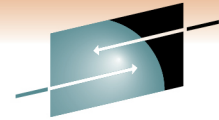
Use "Launch Activity" pull-down > "Analyze Problem" IBM Support Assistant (ISA) - Launch pad:



The screenshot shows the IBM Support Assistant (ISA) interface. The 'Launch Activity' pull-down menu is open, with 'Analyze Problem' selected. The 'Tools Catalog' table is displayed below, listing various diagnostic tools and their versions. At the bottom, there are buttons for 'Launch', 'Submit Feedback', and 'Help'.

Tool Name	Version
[Tech Preview] Database Connection Pool Analyzer for IBM WebSphere Application Server	1.5.0.02
[Tech Preview] HeapAnalyzer	4.0.6.00
[Tech Preview] IBM Pattern Modeling and Analysis Tool for Java Garbage Collector (PMAT)	4.0.1.00
[Tech Preview] IBM Port Scanning Tool	1.1.0.00
[Tech Preview] IBM Thread and Monitor Dump Analyzer for Java (TMDA)	4.0.1.00
[Tech Preview] IBM Trace and Request Analyzer for WebSphere Application Server	2.5.0.00
[Tech Preview] IBM Web Server Plug-in Analyzer for WebSphere Application Server (WSPA)	3.5.0.02
[Tech Preview] Memory Dump Diagnostic for Java (MDD4J) version 3.0	3.0.1.beta-20091201202124
[Tech Preview] ThreadAnalyzer (Deprecated)	6.0.3.02
[Tech Preview] Visual Configuration Explorer	1.0.16.201006151648
IBM Monitoring and Diagnostic Tools for Java™ - Dump Analyzer	2.2.2.20090926232659
IBM Monitoring and Diagnostic Tools for Java™ - Garbage Collection and Memory Visualizer	2.4.0.20100127
IBM Monitoring and Diagnostic Tools for Java™ - Health Center	1.2.1.20100721
IBM Monitoring and Diagnostic Tools for Java™ - Memory Analyzer [Tech Preview]	0.6.0.201007061358
Log Analyzer	4.5.0.200909240916
Memory Dump Diagnostic for Java (MDD4J)	2.0.0.20081219132011

GC Visualization and Analysis



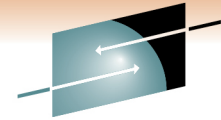
```
<af type="tenured" id="13" timestamp="Jul 30 17:33:20 2009" intervalms="1.601">
  <minimum requested_bytes="24" />
  <time exclusiveaccessms="0.132" meanexclusiveaccessms="0.063" threads="4" lastthreadtid="0x43FA5200" />
  <refs soft="249" weak="11193" phantom="2" dynamicSoftReferenceThreshold="0" maxSoftReferenceThreshold="32
  <tenured freebytes="0" totalbytes="536870400" percent="0" >
    <soa freebytes="0" totalbytes="536870400" percent="0" />
    <loa freebytes="0" totalbytes="0" percent="0" />
  </tenured>
  <gc type="global" id="17" totalid="17" intervalms="1.684">
```

1. Enable verbose GC in your ISC:
 - AppServer -> Process defs -> Servant -> JVM, click on "Verbose garbage collection".
 - Click "OK", Save the changes, and re-start server.
2. Verify the verbose GC setting using SDSF
 - Look for <af> & <gc> xml structures in servant's log.
3. Drive an application in your server.
 - Use your own, or sample apps provided.
 - Jmeter, MS Web AppStress tool or your own to drive load.
4. Copy verboseGC output from SYSOUT to ASCII file (on your workstation)
5. Launch GC verbose visualizers (GCMV or PMAT) and browse to the file you uploaded.

4%)" />

ferenceThreshold="32

GC Tuning Suggestions



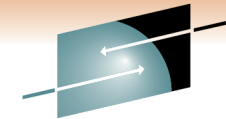
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Do this before putting your applications into Production:

1. Install the application, test it.
2. Set JVM heap min/max size, & enable Verbose GC
3. Use a load driver to drive a representative, but constant load. (Consider using a “peak” load.)
4. Extract verbose GC statistics and study with a visualizer.
5. Under peak load, the time between GCs should be:
 - Constant, and about once every 10 seconds or more.
6. Look for Memory leaks – times between GC shorten.
7. Tune by experimenting independently with different heap sizes and GC policies.
8. To study the JVM contents, take a heap, core, or SDump, and use one of the Dump analysis tools.

(Don't forget to also analyze your applications with a profiler such as JinsightLive for System z.)

GC Visualization and Analysis tools



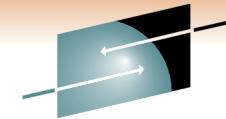
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Launch one of the GC verbose visualizers (GCMV or PMAT) and browse to the file you uploaded.

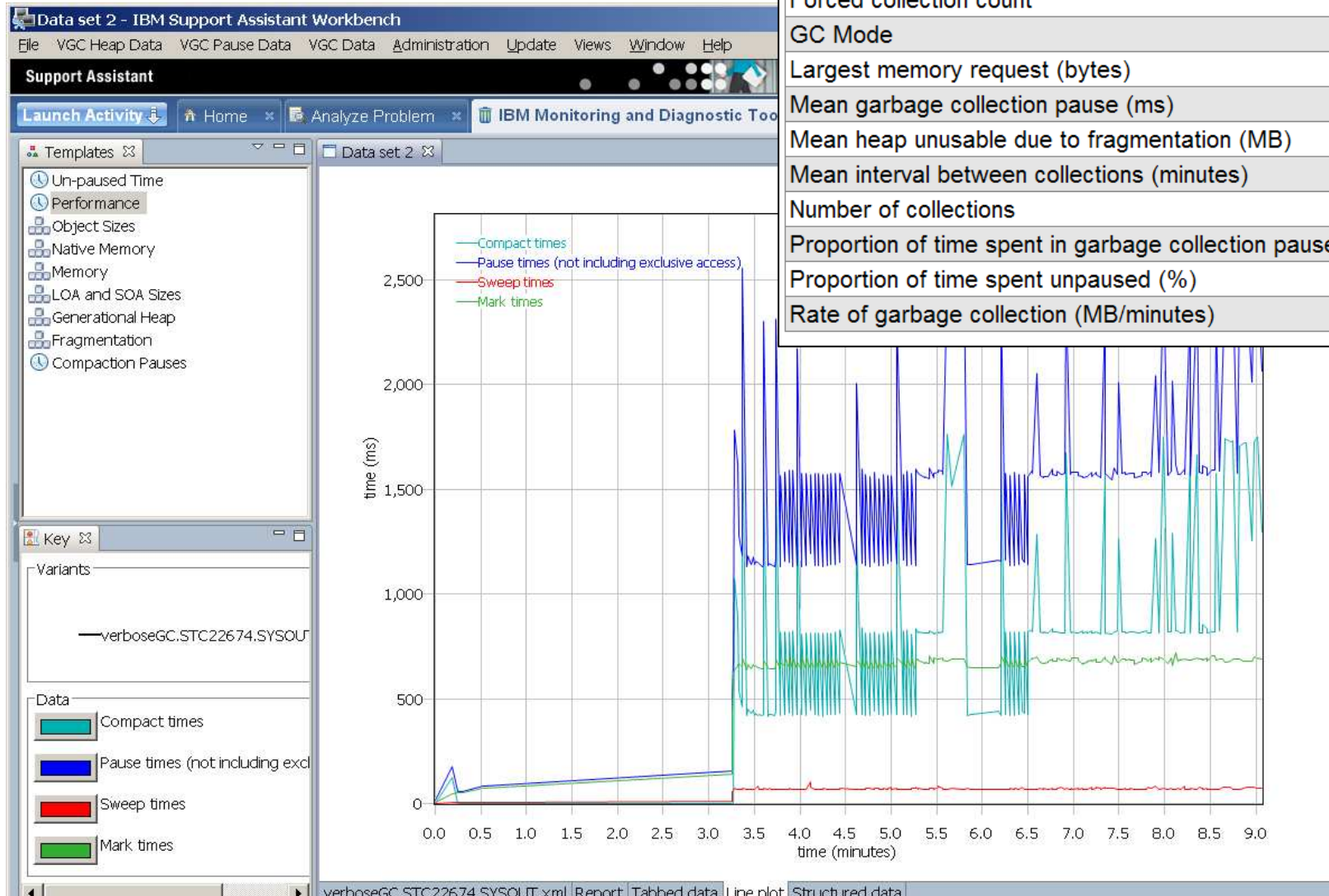
The screenshot shows the IBM Monitoring and Diagnostic Tools for Java™ interface. The main window is titled "Analyze Problem" and contains a "Tools Catalog" table. A "Tool Input Parameter Values" dialog box is open, showing the "Log name" field and a "Browse..." button. A "System File Browser" dialog box is also open, showing the file structure of the local agent. Red arrows point from the "Browse..." button in the dialog box to the "System File Browser" dialog box, and from the "System File Browser" dialog box to the "Log name" field in the "Tool Input Parameter Values" dialog box.

Tool Name	Version
[Tech Preview] Database Connecti	
[Tech Preview] HeapAnalyzer	3.9.8.00
[Tech Preview] IBM Pattern Modeling and Analysis Tool for Java Garbage Co	3.9.0.01
[Tech Preview] IBM Port Scanning Tool	1.1.0.00
[Tech Preview] IBM Thread and Monitor Dump Analyzer for Java (TMDA)	3.9.0.00
[Tech Preview] IBM Trace and Request Analyzer for WebSphere Applicatio	2.1.0.03
[Tech Preview] IBM Web Server Plug-in Analyzer for WebSphere Applicatio	3.5.0.02
[Tech Preview] Memory Dump Diagnostic for Java (MDD4J) version 3.0	3.0.1.beta-2
[Tech Preview] ThreadAnalyzer (Deprecated)	6.0.3.02
IBM Monitoring and Diagnostic Tools for Java™ - Dump Analyzer	2.2.2.20090
IBM Monitoring and Diagnostic Tools for Java™ - Garbage Collection and M	2.3.0.20090
IBM Monitoring and Diagnostic Tools for Java™ - Health Center	1.1.0.2009:
IBM Monitoring and Diagnostic Tools for Java™ - Memory Analyzer (Tech P	0.5.2.2009:
Log Analyzer	4.5.0.20090
Memory Dump Diagnostic for Java (MDD4J)	2.0.0.2008:
Symptom Editor	4.5.0.20090
Visual Configuration Explorer (Tech Preview)	1.0.16.2009

GC and Memory Visualizer (GCMV) - *IMDTJ*

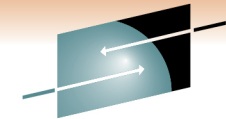


Uses verbose GC (xml doc)

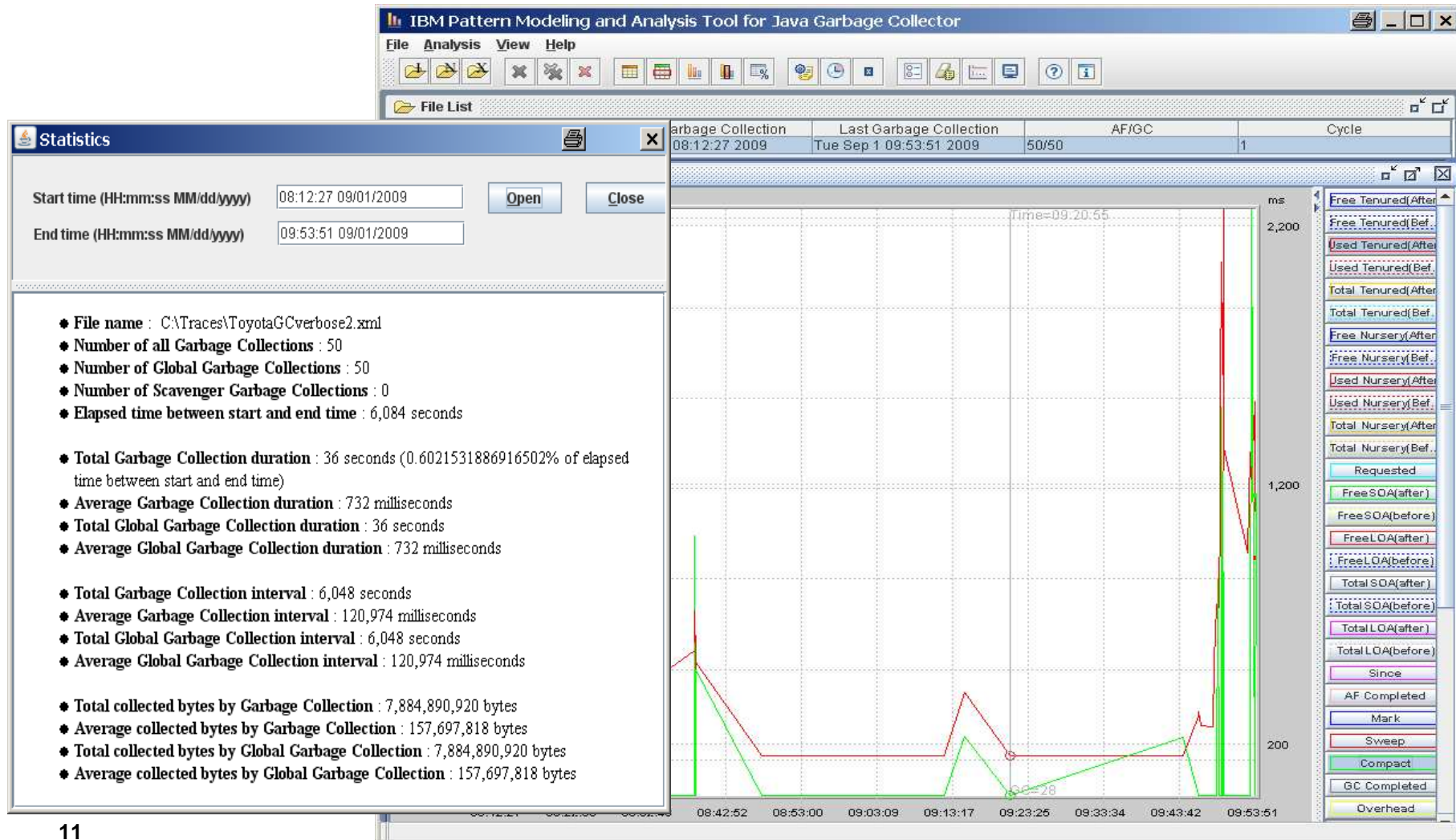


Pattern Modeling & Analysis Tool for Java GC (PMAT)

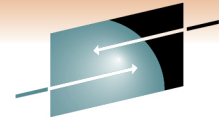
Different perspective than GCMV - PMAT does not run in the ISA workspace. When you click Next, a separate display appears.



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JVM Dumps - Many kinds . . .



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- **Java Dumps** > /var/home/...
 - Heap
 - JavaCore
 - JVM TDUMP:
- SVC Dumps, ABEND Dumps, SYSABENDs
- CEE Dumps

Analysis Tools:

- MDD4J – high level – good for “Leak Suspects”
- Memory Analyzer – More detailed
- Dump Analyzer
- Heap Analyzer
- Thread & Monitor Dump Analyzer for Java (TMDA)

See “Analyzing Dumps” in appendix for more details.

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2011

Memory Dump Diagnostic for Java - V3 (MDD4J)

- Focus on data structures that may cause memory related problems.
- Analyze heap dumps:
 - “Baseline” heap dump – take when application is started.
 - “Primary” heap dump – when a problem occurs.
 - “Comparative” heap dumps – analyze differences.



The screenshot shows the MDD4J application interface. At the top, it says "Memory Dump Diagnostic for Java" and "Leading edge heap dump analysis for today's memory problems." Below this is a menu bar with "Open", "View", "Help", and "Release Notes". There are tabs for "Analysis Summary", "Reach Size Leak Suspects", "Object Tables", and "Data Structures". The "Analysis Summary" tab is active, showing a list of heap dumps with details like "C:\Traces\heapdump.20090925.143726.197112.0001.phd" and "Date generated: Fri Sep 25 14:37:26 EDT 2009". There are buttons for "HTML Report" and "Yeti Report". A "Quick tips" section provides instructions on how to use the tool. On the right, there are two pie charts: "Type Breakdown" and "Websphere.miscellaneous: 15MB (31.3% of the heap)".

Memory Dump Diagnostic for Java
Leading edge heap dump analysis for today's memory problems.

Open View Help Release Notes

Analysis Summary Reach Size Leak Suspects Object Tables Data Structures

- Heapdump:
C:\Traces\heapdump.20090925.143726.197112.0001.phd
- Date generated: Fri Sep 25 14:37:26 EDT 2009

HTML Report Yeti Report

Quick tips

- For detailed instructions on how to use this tool and other tools to diagnose a memory leak, see the [Getting Started help section](#), and other sections under the **Help** tab above.
- Examine the **Predefined Components** and **Type Breakdown** graphs on the right to see if there are any very large or abnormal contributors to the heap
- Switch to the **Reach Size Leak Suspects** tab above to see a number of potential suspects in case of a leak

Type Breakdown

- char[]
- String
- long[]
- Object[]
- byte[]
- HashMap\$Entry
- HashMap\$Entry[]
- Hashtable\$Entry
- WeakHashMap\$Entry
- HashMap

Websphere.miscellaneous: 15MB (31.3% of the heap)

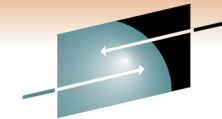
Legend: Websphere.miscellaneous, shared Strings, eclipse.miscellaneous, Modeling.emf

MDD4J analysis (cont'd)



- **Guided Activity Assistant**
 - “Summary” – Basic Heap Info & Contents Summary.
 - “Reach Size Leak Objects” – Cumulative size of all objects.
 - “Object/Class” leak suspects.
 - “Data Structures view” – Understand relations & Track Changes.
 - Big/Growing/Shrinking/Steady
- **Yeti Reports:** (HTML or Yeti zip file)
 - Save as HTML file, or Yeti analysis zip file – extract & open `index.html` file.
 - Analysis engine based on "Yeti" technology.
 - Overview
 - Health Report
 - Content Graphs – Type & Field layout views
- Additional documentation:
 - Techdoc WP101612 – “Getting started with GC, Heapdumps and Javacores for WebSphere on z/OS”
 - DeveloperWorks Summary doc:
www.ibm.com/developerworks/websphere/techjournal/0909_supauth/0909_supauth.html

Yeti Reports (from MDD4J)



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Extract zip file created by MDD4J, & launch index.html

Data Structures: Big Growing Shrinking Steady

ServletWrapperImpl	472MB
HTODDynamacache	4.67MB
JmxMBeanServer et al.	3.41MB
SystemState et al.	3.18MB
ResourceBundle class o...	2.66MB

Overview Health Report

Summary of all live objects in the heap.
There are 512MB of live objects, of which 80MB is overhead.

Predefined Components

- Websphere.miscellaneous
- shared Strings
- eclipse.miscellaneous
- jmx
- Modeling.emf
- IBM.miscellaneous
- Websphere.security

Type Breakdown

by

Analysis Summary Report

Primary heap file info:
 C:\AppTraces\heapdump.20091013.140817.196909.0

Big Data Structures ?

Heap Contents Summary ?

Aggregated Data Structure Leak Suspects ?

Object/Class Leak Suspects ?

Big Data Structures ?

Whole Heap Health Measures ?

Description	Size	Reachable Size	Shared Size
+ com.ibm.ws.security.web.WebAppCache class object	446kB	230MB	229MB
+ com.ibm.ws.webcontainer.servlet.ServletWrapperImpl	207MB	207MB	0 bytes
+ com.ibm.ws.cache.HTODDynamacache	8.16MB	8.16MB	0 bytes
+ com.ibm.ws.management.descriptor.MBeanDescriptorManager	191kB	5.36MB	5.17MB
+ org.eclipse.emf.ecore.impl.EPackageRegistryImpl class object	16kB	3.69MB	3.67MB
+ org.eclipse.emf.ecore.impl.EPackageRegistryImpl	1.47MB	3.02MB	1.55MB
+ com.ibm.ws.naming.ipbase.NameSpace	183kB	2.23MB	2.05MB
+ com.ibm.ws.naming.ipbase.NameSpace	47kB	2.11MB	2.07MB
+ com.ibm.ws390.orb.CommonBridge class object	360 bytes	1.75MB	1.75MB
+ javax.management.modelmbean.ModelMBeanOperationInfo	1.6MB	1.65MB	52kB

MDD4J: Content Schematic of ServletWrapperImpl

file:///C:/Documents and Settings/Hutch/My Docum...

Content Schematic of ServletWrapperImpl

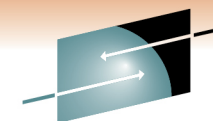
This schematic explains 472MB.

```

    graph TD
      A[ServletWrapperImpl 20MB] -- 872,116 --> B[MemWorkout$Blob 452MB]
    
```

Done

Memory Analyzer (IMDTJ)



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- Based on open source M.A.T. + DTFJ - www.eclipse.org/mat
- For java heapdumps, System Dumps (jextracted) & javacore*

Getting Started wizard:

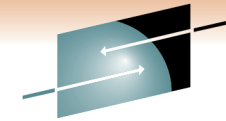
- Overview ----->
- Leak report
- Component reports

Navigate: (TOC, Fly-over, Click)

- Histogram (tables)
- Context (In, Out Refs)
- Group (Pkg, Class, Loader)
- Dominator Tree
 - Objects keeping others
- Path to GC roots
- Leak reports



Memory Analyzer samples



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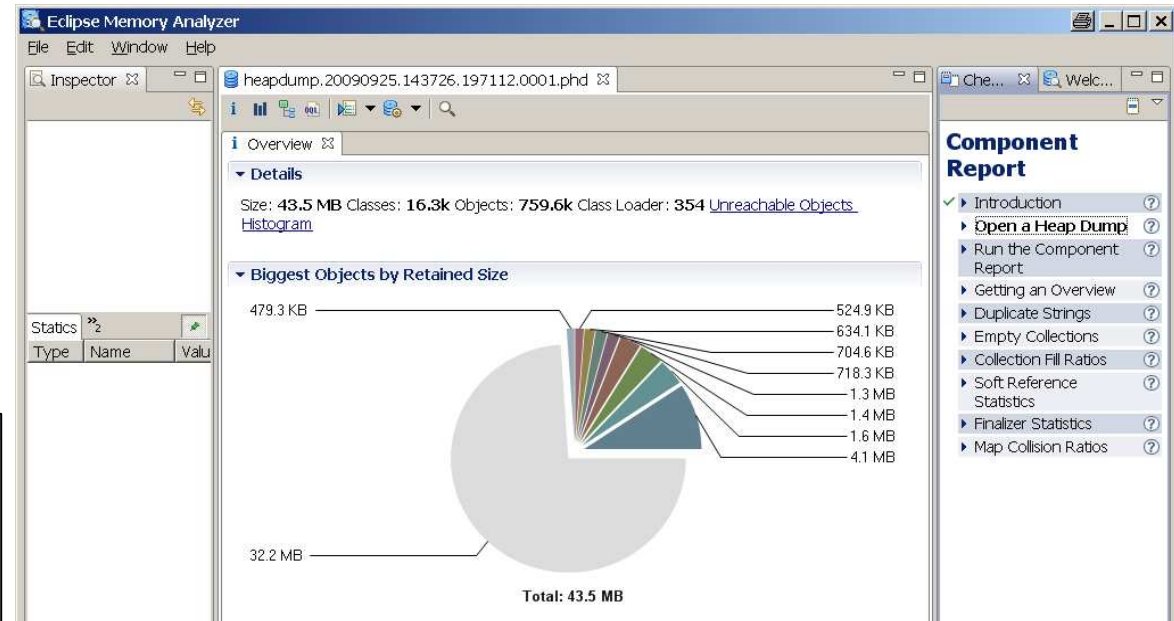
Navigate: (TOC, Fly-over, Click)

- Histogram (tables)
- Context (In, Out Refs)
- Group (Pkg, Class, Loader)
- Dominator Tree
 - Objects keeping others
- Path to GC roots
- Leak reports

Overview | default_report | org.eclipse.mat.api:suspects

Table Of Contents

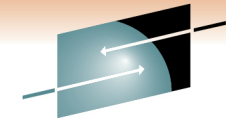
- System Overview
 - Heap Dump Overview
 - System Properties
 - Thread Overview
 - Top Consumers
 - Biggest Objects (Overview)
 - Biggest Objects
 - Biggest Top-Level Dominator Classes (Overview)
 - Biggest Top-Level Dominator Classes
 - Biggest Top-Level Dominator Class Loaders (Overview)
 - Biggest Top-Level Dominator Class Loaders
 - Biggest Top-Level Dominator Packages
 - Class Histogram
- Leaks
 - Overview
 - Problem Suspect 1
 - Description



Shortest Paths To the Accumulation Point

Class Name	Shallow Heap	Retained Heap
java.util.LinkedList\$Link @ 0x83401c470	48	209,384,520
java.util.LinkedList @ 0x83401c448	40	209,384,560
com.ibm.washington.tai.MemWorkout @ 0x83401b3b0	64	209,384,624
com.ibm.washington.tai.MemoryLeak @ 0x833f91150	40	209,384,664
com.ibm.ws.webcontainer.servlet.ServletWrapperImpl @ 0x831eab8e8	240	209,385,000
com.ibm.ws.webcontainer.webapp.WebAppServletInvocationEvent @ 0x833a75828 Unknown	88	88
com.ibm.oti.vm.BootstrapClassLoader @ 0x837f42010 System Class	200	128,824

Memory Analyzer sample use case



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File>Open Heap Dump > Leak Suspects Report > Problem Suspect1 > “Shortest Paths To the Accumulation Point” and “Accumulated Objects”

- There we found the suspect “MemoryLeak.”

The screenshot shows the Eclipse Memory Analyzer interface. On the left, the 'Leaks' section is expanded to 'Problem Suspect 1', with 'Shortest Paths To the Accumulation Point' selected. The main area displays two tables:

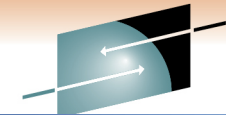
Shortest Paths To the Accumulation Point

Class Name	Shallow Heap	Retained Heap
java.util.LinkedList\$Link @ 0x83401c470	48	209,384,520
java.util.LinkedList @ 0x83401c448	40	209,384,560
com.ibm.washington.tai.MemWorkout @ 0x83401b3b0	64	209,384,624
com.ibm.washington.tai.MemoryLeak @ 0x833f91150	40	209,384,664
com.ibm.ws.webcontainer.servlet.ServletWrapperImpl @ 0x831eab8e8	240	209,385,000
com.ibm.ws.webcontainer.webapp.WebAppServletInvocationEvent @ 0x833a75828 Unknown	88	88
com.ibm.oti.vm.BootstrapClassLoader @ 0x827f42910 System Class	200	128,824
java.util.LinkedList\$Link @ 0x833a6d880 »	48	48
com.ibm.ws.util.ClauseNode @ 0x831ec8590 »	56	432
Σ Total: 3 entries		

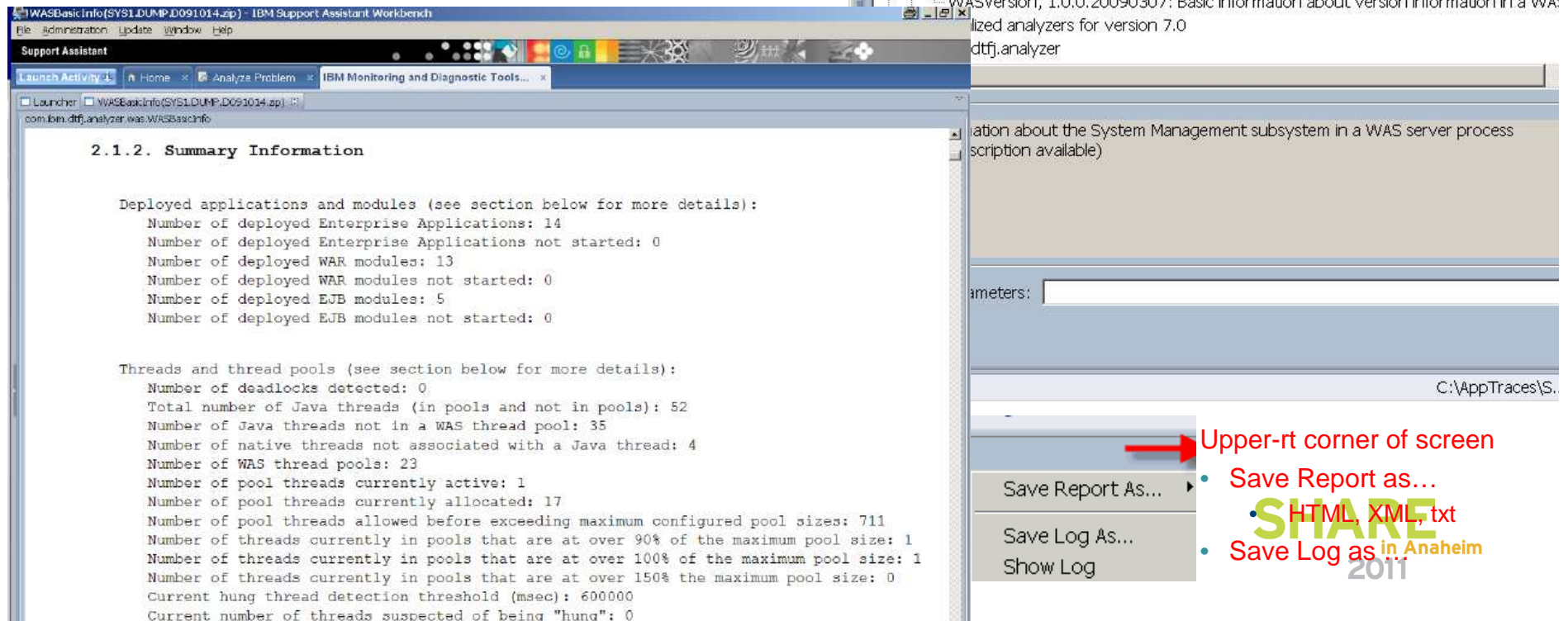
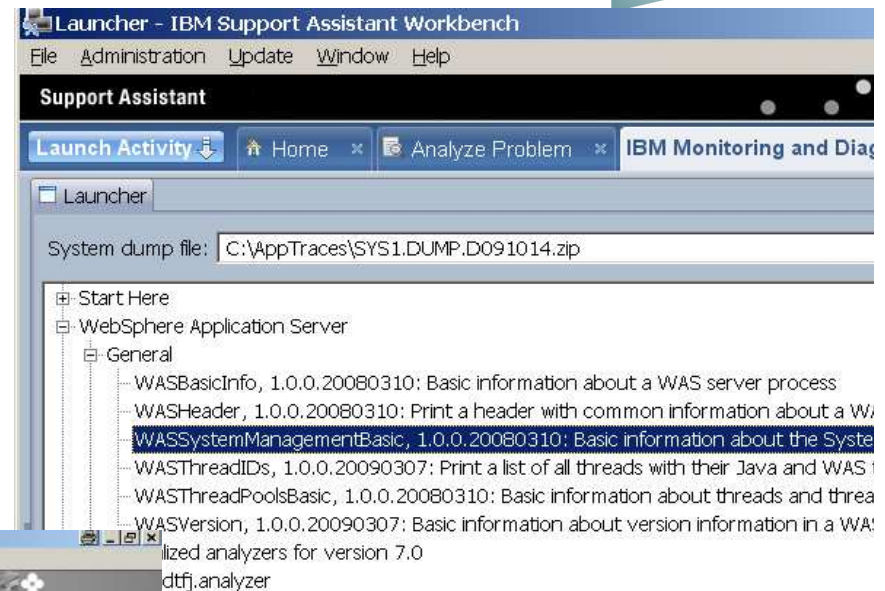
Accumulated Objects

Class Name	Shallow Heap	Retained Heap	Percentage
com.ibm.ws.webcontainer.servlet.ServletWrapperImpl @ 0x831eab8e8	240	209,385,000	77.79%
com.ibm.washington.tai.MemoryLeak @ 0x833f91150	40	209,384,664	77.79%
com.ibm.washington.tai.MemWorkout @ 0x83401b3b0	64	209,384,624	77.79%
java.util.LinkedList @ 0x83401c448	40	209,384,560	77.79%

Dump Analyzer - *IMDTJ*



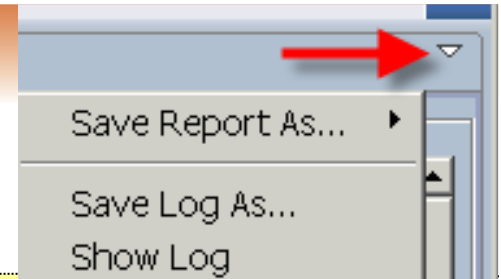
- Based on JVM's `jdumpview` tool
- System dumps processed by `jextract`
- FTP to workstation (binary)
- Import dump – “Browse”
- Select report, “Analyze”
 - Click on `WASBasicInfo` . . . or . . .



Dump Analyzer – Analysis Reports

- Save Report As: html, xml, or txt files

- Default Dump Report:



2. Analysis results

DumpAnalyzer V:2.2.2.20090926232659 : Start analysis of C:\AppTraces\SYS1.DUMP.D091014.zip

2.1. Results from Analyzer=com.ibm.dtfj.analyzer.jvm.DefaultDumpReport_Standard

Analyzer full name: com.ibm.dtfj.analyzer.jvm.DefaultDumpReport_Standard

Analyzer version: 1.3.0.20070812

Analyzer description: Report basic information from this JVM image (similar to javacore) - Standard version

2.1.1. Image and runtime information

Now reporting on runtime: 0.0.0

Image: (no identity)

Time of dump: Wed Oct 14 02:28:14 EDT 2009

System Type: z/OS

System SubType: 01.10.00

Processor Type: s390x

Processor SubType:

Number of Processors: 2

Installed Memory: 6442450944

Host Name: wsc2

IP address: /9.82.24.70

This Image contains: 1 address spaces; 1 processes; 1 runtimes

Process: PID:0x30208

Executable: main

Command line: [<null>]

Pointer size (bits): 64

Signal that triggered this dump: 0 ((no signal info available, or dump was not triggered by a signal))

Current Thread: 0x14b06000

Java Runtime: JavaVM@0x000000080B178548

Java Version: Java(TM) SE Runtime Environment(build pmz6460sr5ifx-20090623_02 (SR5)) IBM J9

2.1.2. JVM Initialization Arguments

JNI ignoreUnrecognized: False

JNI version: 65540

-Xthr:tw=HEAVY

ExtraInfo=0x00000000

HeapAnalyzer



- Originally provided on AlphaWorks
- Graphical analysis of javacores (heapdumps)
- Creates tables & graphs
- Heuristic engine to find memory leaks and excessive heap usage.

Working Directory: C:\Documents and Settings\Hutch\IBM\SAv41\applications\eclipse\plugins\com.ibm.esupport.tool.heapanalyzer_3.9.8.00
C:\Program Files\ibm\IBM Support Assistant
Command Line: v41\rcp\eclipse\plugins\com.ibm.rcp.j2se.win32.x86_1.6.0.20090211a-200903301321\jre\bin\java.exe -Xmx1024M -jar ha.jar "C:\Traces\heapdump.20090925.143726.197112.0001.phd"

IBM HeapAnalyzer

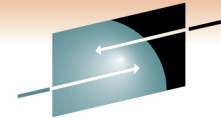
File Analysis View Help

Property	Value
Heap dump file name	C:\Traces\heapdump.20090925.143726.197112.0001.phd
Java Version	J2RE 6.0 z/OS s390
Number of Classes	16,320
Number of Objects	506,690
Number of ObjectArrays	97,695
Number of PrimitiveArrays	139,171
Total Number of Instances	759,876
Total Number of References	1,423,751
Number of roots	19,914
Number of types	16,322
Heap range	0x1b7e4000 to 0x1e3e3ef0
Java heap usage	45,092,856 bytes
Dark Matter	1,072 bytes (0.0023773168 %)

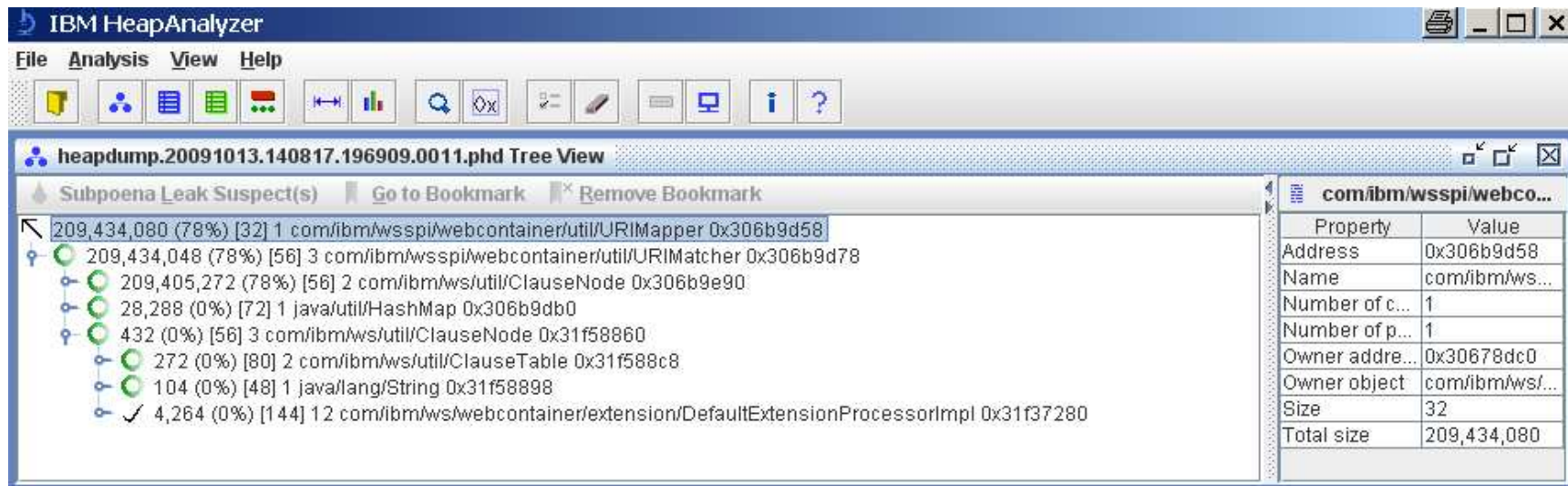
Console

[Tue Dec 08 17:51:51 EST 2009] Heap Analysis of C:\Traces\heapdump.20090925.143726.197112.0001.phd completed in 00

HeapAnalyzer (cont'd)



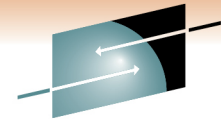
- Analysis Views:
 - Tree view
 - Objects List
 - Types List
 - Root List
 - Gaps by size



See detailed information of a node; search for total size drop between parent and child.

- Tree node format: TotalSize(Size/Heap%)[ObjSize] #ChildObj (# root obj) Name Addr
- Select a node and right click to find an address.

Thread & Monitor Dump Analyzer for Java (TMDA)



TMDA for Java analyzes javacore dumps and helps you find hangs, deadlocks, resource contention, and bottlenecks in Java threads. (Tech preview.)

SOFTWARE
Technology • Connections • Results

Webcast & Foils: ibm.com/support/docview.wss?uid=swg27011855

Features provided & Color coding:

- Summary of Javacore
- Thread detail view
- Monitor detail view
- List of hang suspects
- Thread compare view
- Thread comparison summary
- Monitor lock compare view
- Garbage collector statistics for IBM JVM

Status	Number of Threads : 59	Percentage
Deadlock	0	0 (%)
Runnable	16	27 (%)
Waiting on condition	39	66 (%)
Waiting on monitor	0	0 (%)
Suspended	0	0 (%)
Object.wait()	0	0 (%)
Blocked	3	5 (%)
Parked	1	2 (%)

Thread Detail : javacore.20091030.141317.197179.0003.txt

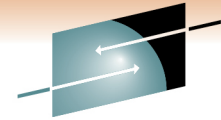
Free Java heap size: 25,168 bytes
Allocated Java heap size: 268,435,456 bytes
Memory Segment Analysis

Memory Type	# of Segments	Used Memory(bytes)	Used Memory(%)	Free Memory(bytes)	Free Memory(%)	Total Memory(bytes)
Internal	322	26,222,036	35.63	47,377,824	64.37	73,599,860
Object	1	268,435,456	100	0	0	268,435,456
Class	1,856	82,220,372	70.97	33,635,508	29.03	115,855,880
JIT Code Cache	3	25,165,824	100	0	0	25,165,824
JIT Data Cache	1	3,786,552	45.14	4,602,056	54.86	8,388,608
Overall	2,183	405,830,240	82.58	85,615,388	17.42	491,445,628

Memory Segment Analysis

RE
in Anaheim
011

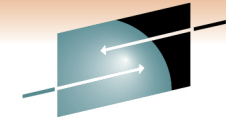
Working with Traces from WAS on z/OS



SHARE
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- **STDOUT & STDERR** traces usually go to JES logs
 - Keep them off SYSLOG by specifying separate DD files
 - May be re-directed to HFS files – TD103695
 - Not suited for ISA trace analysis tools
- **java tracing** - enable dynamically:
 - Modify (F) MVS commands:
 - F server,tracejava='com.ibm.*=all'
 - F server,tracedetail=(3,4)
 - F server, TRACEINIT
- **ffdc** logs – automatically generated
- **wsadmin.sh** tracing – modify `wsadmin.properties` file
- **JDBC** tracing – `db2.jcc.override.traceFile=` in `DB2JccConfiguration.properties` file

TRA - Trace and Request Analyzer for WAS



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Technology • Connections • Results

- Here's a Gap Analysis for the addNode.log:

(Works with trace files from wsadmin logs.)

IBM Trace and Request Analyzer for WebSphere Application Server						
File Analysis Customized Analysis View Help						
Trace Gap Analysis						
Time(...)	Trace				Line Num...	Fi...
72,494	[9/8/08 15:12:38:376 EDT]	00000000	AdminTool	A BBOO0222: ADMU0022: Node Agent launched. Waiting for initialization status.	107	a...
	[9/8/08 15:13:50:870 EDT]	00000000	AdminTool	A BBOO0222: ADMU0030: Node Agent initialization completed successfully. Process id is: 000002ac00000002	108	a...
55,457	[9/8/08 15:11:12:337 EDT]	00000000	AdminTool	A BBOO0222: ADMU0120: isclite on BLA will not be uploaded since it already exists in the target repository.	38	a...
	[9/8/08 15:12:07:794 EDT]	00000000	AdminTool	A BBOO0222: ADMU0016: Synchronizing configuration between node and cell.	39	a...
29,879	[9/8/08 15:12:07:794 EDT]	00000000	AdminTool	A BBOO0222: ADMU0016: Synchronizing configuration between node and cell.	39	a...
	[9/8/08 15:12:37:673 EDT]	00000000	AdminTool	A BBOO0222: ADMU0018: Launching Node Agent process for node: h2nodeb	105	a...
29,249	[9/8/08 15:10:34:944 EDT]	00000000	AdminTool	A BBOO0222: ADMU0009: Successfully connected to Deployment Manager Server: wsc2.washington.ibm.com:24010	21	a...
	[9/8/08 15:11:04:193 EDT]	00000000	AdminTool	A BBOO0222: ADMU0505: Servers found in configuration:	22	a...
6,967	[9/8/08 15:12:27:595 EDT]	00000001	FileRepositor A	BBOO0222: ADMR0011: Document cells/h2cell/PolicySets/WSP-I RSP/policySet.xml is deleted.	102	a...
	[9/8/08 15:12:34:562 EDT]	00000001	NodeSyncTask	I com.ibm.ws.management.sync.NodeSyncTask doSync ADMS0003: The configuration synchronization completed su...	103	a...
4,920	[9/8/08 15:10:25:076 EDT]	00000000	ModelMgr	I BBOO0222: WSVR0801: Initializing all server configuration models	18	a...
	[9/8/08 15:10:29:996 EDT]	00000000	SSLConfigMana	I BBOO0222: CWPKI0027: Disabling default hostname verification for HTTPS URL connections.	19	a...
4,503	[9/8/08 15:10:29:996 EDT]	00000000	SSLConfigMana	I BBOO0222: CWPKI0027: Disabling default hostname verification for HTTPS URL connections.	19	a...
	[9/8/08 15:10:34:499 EDT]	00000000	AdminTool	A BBOO0222: ADMU0001: Begin federation of node h2nodeb with Deployment Manager at wsc2.washington.ibm.com:...	20	a...
3,266	[9/8/08 15:11:05:883 EDT]	00000000	AdminTool	A BBOO0222: ADMU0015: Backing up the original cell repository.	27	a...
	[9/8/08 15:11:09:149 EDT]	00000000	AdminTool	A BBOO0222: ADMU0012: Creating Node Agent configuration for node: h2nodeb	28	a...
1,279	[9/8/08 15:11:04:293 EDT]	00000000	AdminTool	A BBOO0222: ADMU2010: Stopping all server processes for node h2nodeb	24	a...
	[9/8/08 15:11:05:572 EDT]	00000000	AdminTool	A BBOO0222: ADMU0512: Server h2sr01b cannot be reached. It appears to be stopped.	25	a...
768	[9/8/08 15:11:10:527 EDT]	00000000	AdminTool	A BBOO0222: ADMU0014: Adding node h2nodeb configuration to cell: h2cell	32	a...
	[9/8/08 15:11:11:295 EDT]	00000000	AdminTool	A BBOO0222: ADMU0120: WebSphereWSDM on CU will not be uploaded since it already exists in the target repository.	33	a...
693	[9/8/08 15:11:09:149 EDT]	00000000	AdminTool	A BBOO0222: ADMU0012: Creating Node Agent configuration for node: h2nodeb	28	a...
	[9/8/08 15:11:09:842 EDT]	00000000	AdminTool	A BBOO0222: ADMU0120: WebSphereWSDM.ear will not be uploaded since it already exists in the target repository.	29	a...
686	[9/8/08 15:12:21:688 EDT]	00000001	FileRepositor W	BBOO0221W: ADMR0114W: The system is overwriting document cells/h2cell/variables.xml by request.	48	a...
	[9/8/08 15:12:22:374 EDT]	00000001	FileRepositor A	BBOO0222: ADMR0010: Document cells/h2cell/variables.xml is modified.	49	a...
669	[9/8/08 15:12:37:707 EDT]	00000000	AdminTool	A BBOO0222: ADMU0020: Reading configuration for Node Agent process: nodeagent	106	a...
	[9/8/08 15:12:38:376 EDT]	00000000	AdminTool	A BBOO0222: ADMU0022: Node Agent launched. Waiting for initialization status.	107	a...
575	[9/8/08 15:12:25:886 EDT]	00000001	FileRepositor A	BBOO0222: ADMR0010: Document cells/h2cell/cus/ibmasyncrsp/cver/BASE/cu.xml is modified.	88	a...
	[9/8/08 15:12:26:461 EDT]	00000001	FileRepositor A	BBOO0222: ADMR0009: Document cells/h2cell/PolicySets/WSP-I RSP ND/policySet.xml is created.	89	a...

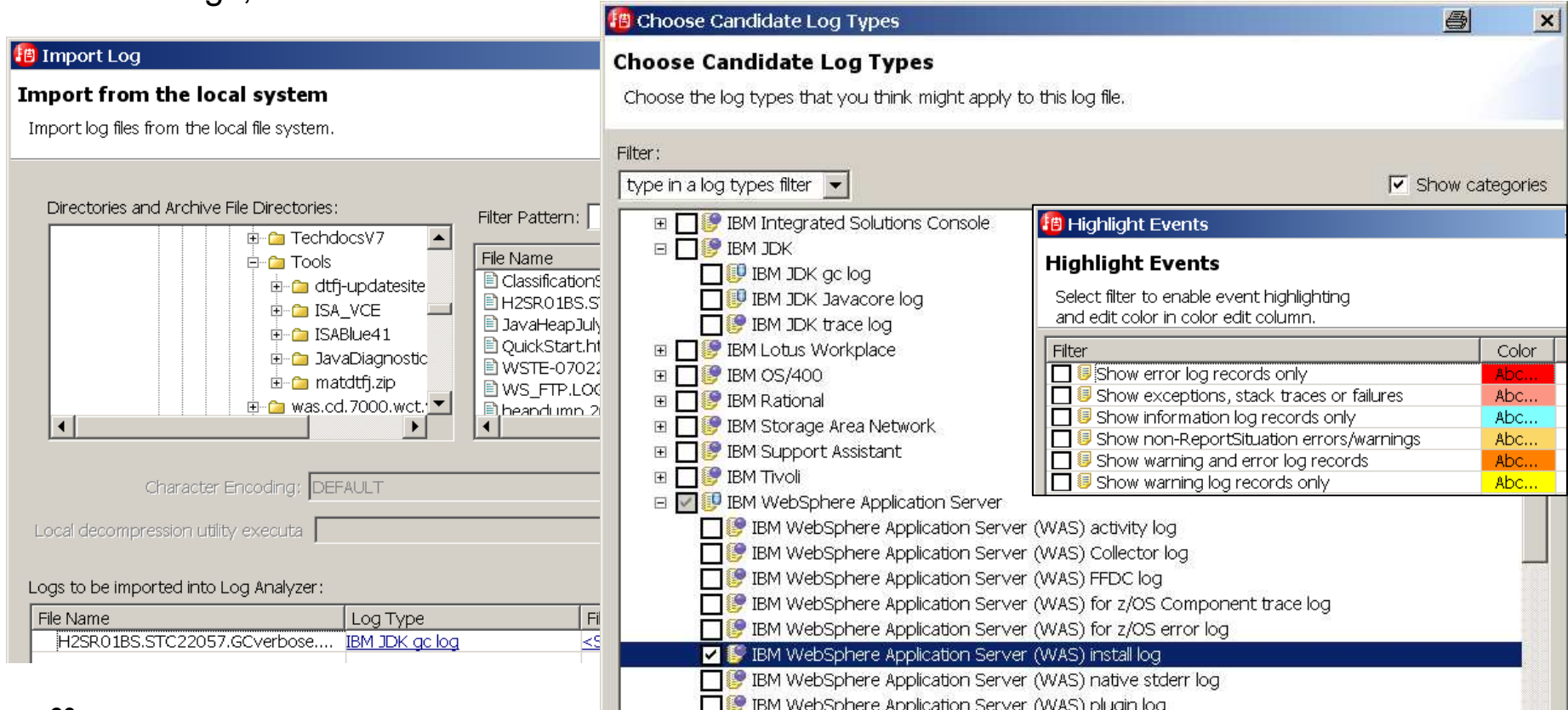
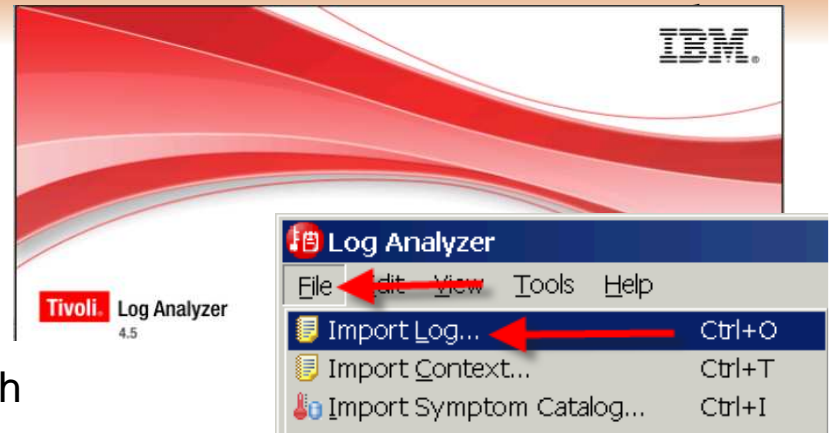
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2011

Log Analyzer – Importing Logs

Tivoli Log Analyzer opens in a new window

Click on File → Import Log from local system

Select log file → Symptom Catalog (WAS V.7) → Finish
wsadmin logs, verboseGC



Health Center:

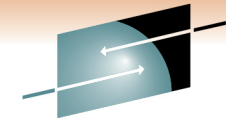
Real-time Monitor with low overhead



- **YouTube** videos
 1. **Overview of Health Center features**
www.youtube.com/watch?v=5Tcktcl0qxs
 2. **Install IBM Support Assistant and Health Center**
www.youtube.com/watch?v=6WjE9U0jvEk
 3. **How to enable a Java application for live monitoring by the Health Center**
www.youtube.com/watch?v=Hdp0mJ13NLQ
- **Enabling a server** (*very easy!*):
 - Add `-Xhealthcenter` to servant JVM properties
- **Updating the healthcenter.jar file**
 - Download, unpax & copy the z/OS agent pkg (**mz64.pax**) from ISA Help
- **Using:** Launch from ISA with host & port (1972)
- **Views:**
 - Classes
 - Environment
 - Garbage Collection
 - I/O (New!)
 - Locking
 - Native Memory
 - Profiling

See also SHARE 113 (Denver) Presentation – Session 1153

Health Center - Profiling



SHARE

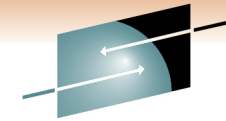
Technology • Connections • Results

- Lower overhead *than Jinsight Live for z, but not as rich.*

The screenshot displays the IBM Support Assistant Workbench interface. The main window is titled "Invocation paths (Methods that call SimpleCIWork.run()) - IBM Support Assistant Workbench". The interface includes a menu bar (File, Administration, Update, Data, Window, Help), a toolbar, and several panes. The "Method profile" pane is active, showing a table of method profiles. The table has columns for Samples, Self (%), Self, Tree (%), Tree, and Method. The top row shows 25679 samples, 92.9% self, and 93.2% tree for the method com.ibm.websphere.ci.samples.SimpleCIWork.run(). Below this, a list of methods that call SimpleCIWork.run() is shown, including CIControllerWork.run (100%), J2EEContext\$RunProxy.run (100%), AccessController.doPrivileged (100%), and J2EEContext.run (100%).

Samples	Self (%)	Self	Tree (%)	Tree	Method
25679	92.9		93.2		com.ibm.websphere.ci.samples.SimpleCIWork.run()
84	0.3		0.36		java.lang.ClassLoader.defineClassImpl(java.lang.ClassLoader, byte[], int, int)
80	0.29		0.29		java.lang.String.lastIndexOf(int, int)
44	0.16		0.2		java.lang.Math.random()
32	0.12		0.15		org.apache.xerces.dom.NamedNodeMapImpl.setName(java.lang.String, java.lang.String)
28	0.1		0.61		java.lang.J9VMInternals.initialize(java.lang.String)
27	0.098		0.17		com.ibm.oti.vm.VM.findClassOrNull(java.lang.ClassLoader, java.lang.String)
27	0.098		0.098		org.eclipse.xsd.util.XSDConstants.nodeTypeToQName(java.lang.String)
25	0.09		0.41		java.lang.ClassLoader.loadClass(java.lang.String)
22	0.08		1.54		org.eclipse.xsd.impl.XSDConcreteComponentImpl.addContent(java.lang.String)
16	0.058		0.25		java.lang.J9VMInternals.verifyImpl(java.lang.String)
14	0.051		0.3		org.eclipse.osgi.baseadaptor.loader.ClasspathUtil.resolveClassPath(java.lang.String)
13	0.047		0.09		java.text.CollationElementIterator.next()

Health Center - Classes



SHARE
Technology • Connections • Results

- Timeline shows Class Loading frequency

The screenshot displays the IBM Support Assistant Workbench interface. The main window is titled "Status - IBM Support Assistant Workbench" and shows a "Support Assistant" toolbar. The "Classes" tab is active, showing a "Class loading timeline" graph and a "Classes loaded" table.

Class loading timeline

The graph shows "Loaded classes" over time (minutes). The x-axis ranges from 0:00 to 0:29. The y-axis represents the frequency of class loading, shown as vertical bars of varying heights. The bars are most dense between 0:05 and 0:20.

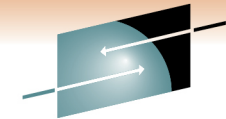
Classes loaded

Filter classes: Apply Clear

Time loaded	Shared cache	Classname
0:00	No	com/sun/xml/internal/bind/v2/runtime/property/TagAndType
0:00	No	com/sun/xml/internal/bind/v2/runtime/Name
0:00	No	com/sun/xml/internal/bind/v2/runtime/reflect/Listener
0:00	No	com/sun/xml/internal/bind/v2/runtime/reflect/PrimitiveArrayList
0:00	No	com/sun/xml/internal/bind/v2/runtime/reflect/PrimitiveArrayList
0:00	No	com/sun/xml/internal/bind/v2/runtime/reflect/PrimitiveArrayList
0:00	No	com/sun/xml/internal/bind/v2/runtime/reflect/PrimitiveArrayList
0:00	No	com/sun/xml/internal/bind/v2/runtime/reflect/PrimitiveArrayList
0:00	No	com/sun/xml/internal/bind/v2/runtime/reflect/PrimitiveArrayList
0:00	No	com/sun/xml/internal/bind/v2/runtime/reflect/PrimitiveArrayList
0:00	No	com/sun/xml/internal/bind/v2/runtime/reflect/PrimitiveArrayList

Recommendation: Your application has loaded 1,747 classes. Some monitored data was dropped in the JVM being monitored because it was produced at a faster rate than the Health Center client was able to consume. This dropped data might have included

Health Center - Environment



SHARE
Technology • Connections • Results

- Verify environmental variables, and Classpath setting

The screenshot shows the IBM Support Assistant Workbench interface. The main window is titled "Configuration - IBM Support Assistant Workbench" and has a menu bar with "File", "Administration", "Update", "Data", "Window", and "Help". The "Support Assistant" toolbar is visible, along with a "Launch Activity" dropdown and several tabs: "Home", "Analyze Problem", "Memory Dump Diagnosti...", "IBM Monitoring and Diag...", and "Environment".

The "Environment" tab is active, showing a tree view on the left with "Classes" (green checkmark), "Environment" (yellow warning), "Garbage Collection" (green checkmark), "Locking" (yellow warning), and "Profiling" (blue information). Below the tree is a checkbox for "Reduce profiling overhead".

The main area displays the "Environment Variables" configuration. It has a table with "Property" and "Value" columns. The "Java parameters" section is expanded, showing the following values:

- Dcom.ibm.CORBA.iop.noLocalCopies=false
- Dcom.ibm.itp.location=/wasv7config/h2cell/h2nodeb/AppServer/bin
- Dcom.ibm.oti.vm.bootstrap.library.path=/wasv7config/h2cell/h2nodeb/AppServer/java
- Declipse.security
- Dfile.encoding=ISO8859-1
- Djava.awt.headless=true
- Djava.class.path=/wasv7config/h2cell/h2nodeb/AppServer/profiles/default/properties:/v
- Djava.ext.dirs=/wasv7config/h2cell/h2nodeb/AppServer/java/lib/ext
- Djava.ext.dirs=/wasv7config/h2cell/h2nodeb/AppServer/java/lib/ext:/wasv7config/h2c

Below this, there are two more tables. The "Java Virtual Machine" table shows:

Property	Value
Full version	J2RE 1.6.0 IBM J9 2.4 z/C
Java home	/wasv7config/h2cell/h2nc
Java vendor	IBM Corporation
Java virtual machine name	IBM J9 VM
Process id	196834
Version	1.6

The "System" table shows:

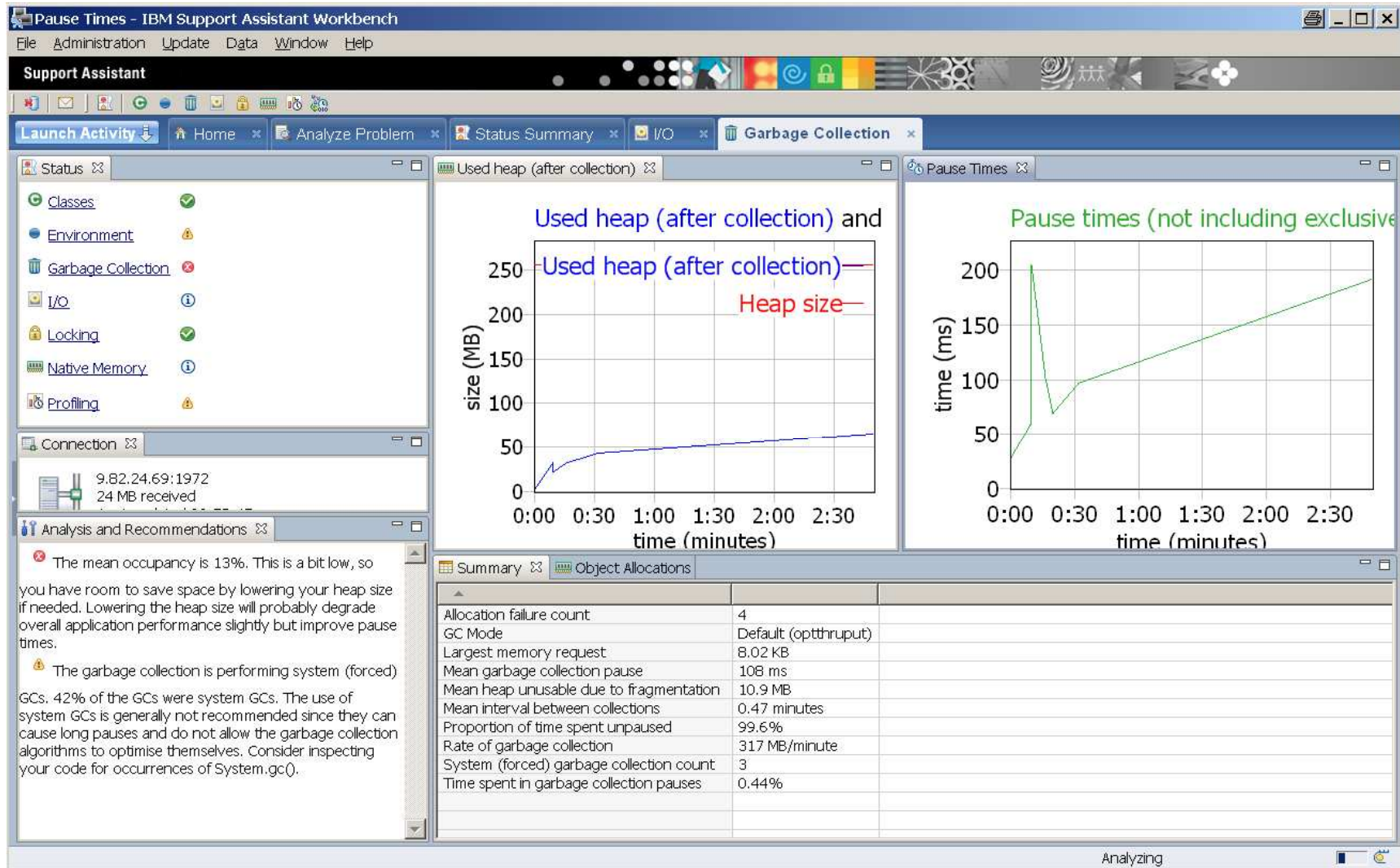
Property	Value
Architecture	s390
Number of available processors	2
Operating system	z/OS
Operating system version	01.10.00

At the bottom left, a "Configuration Recommendations" panel shows a warning: "The option -Xthr:tw=HEAVY is not a supported option."

Health Center – Garbage Collection



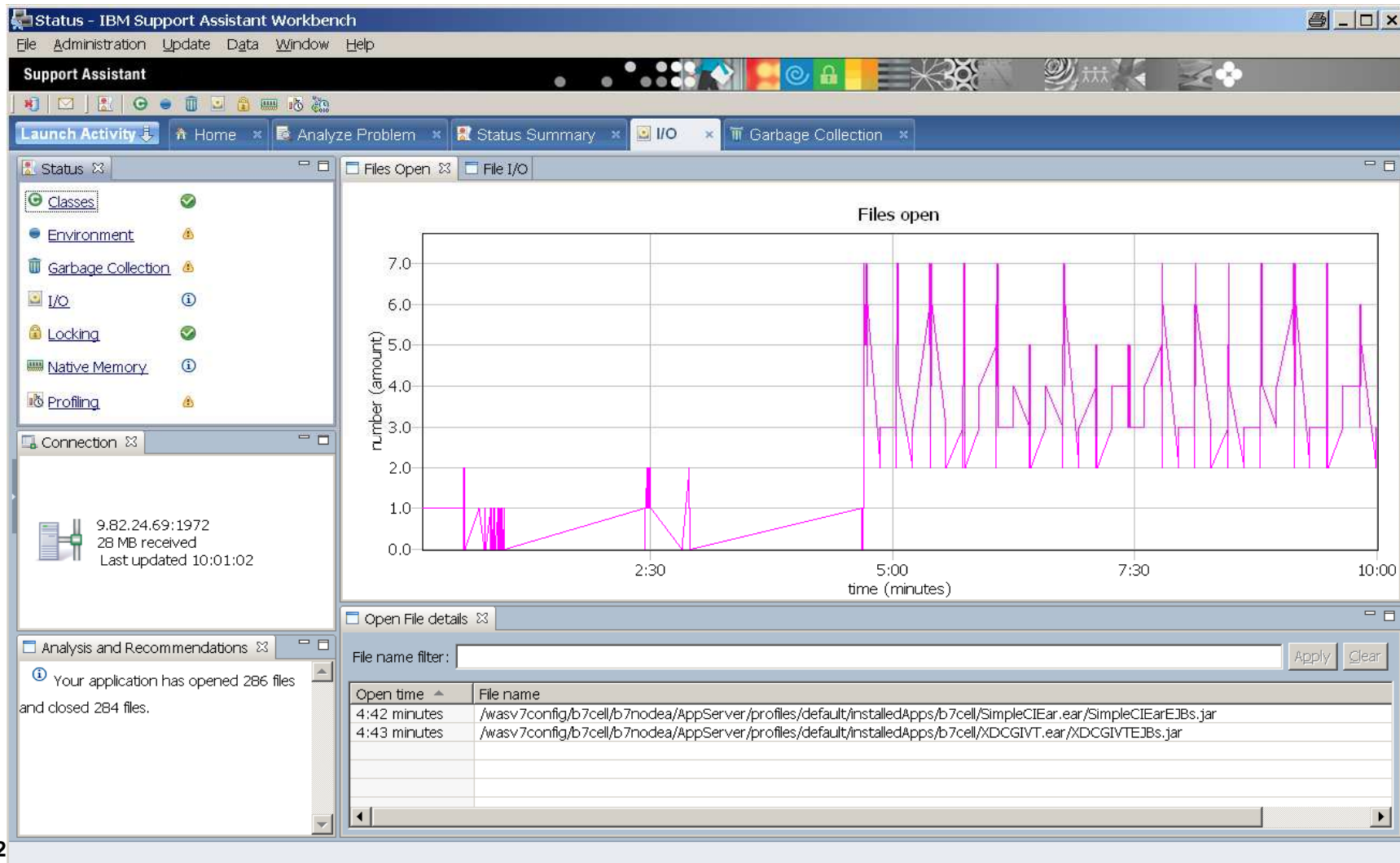
- Graph shows Heap Use, Size, and Pause Times



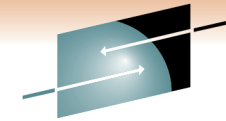
Health Center – I/O View



- Graph shows Number of Files Open over Time



Health Center - Locking



SHARE
Technology • Connections • Results

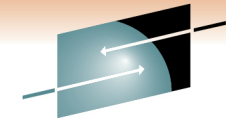
- Identify Lock Contention and avg. Lock Hold Times

The screenshot displays the 'Monitors (Inflated Java Monitors) - IBM Support Assistant Workbench' interface. The 'Locking' monitor is selected, showing a bar chart of 'Total Slow lock count (number)' for various monitors. The chart highlights the monitor [42F41010] with a high count. Below the chart, a table provides detailed statistics for the selected monitor.

% miss	Gets	Slow	Recursive	% util	Average hold time	Name
0	2373	0	0	0	38663	[3D25C...
0	1229	0	0	0	23719	[41C42...
0	1140	0	0	0	83855	[3D25C...
0	1024	0	0	0	80030	[42B99...
0	680	0	0	0	20005	[42FFE...

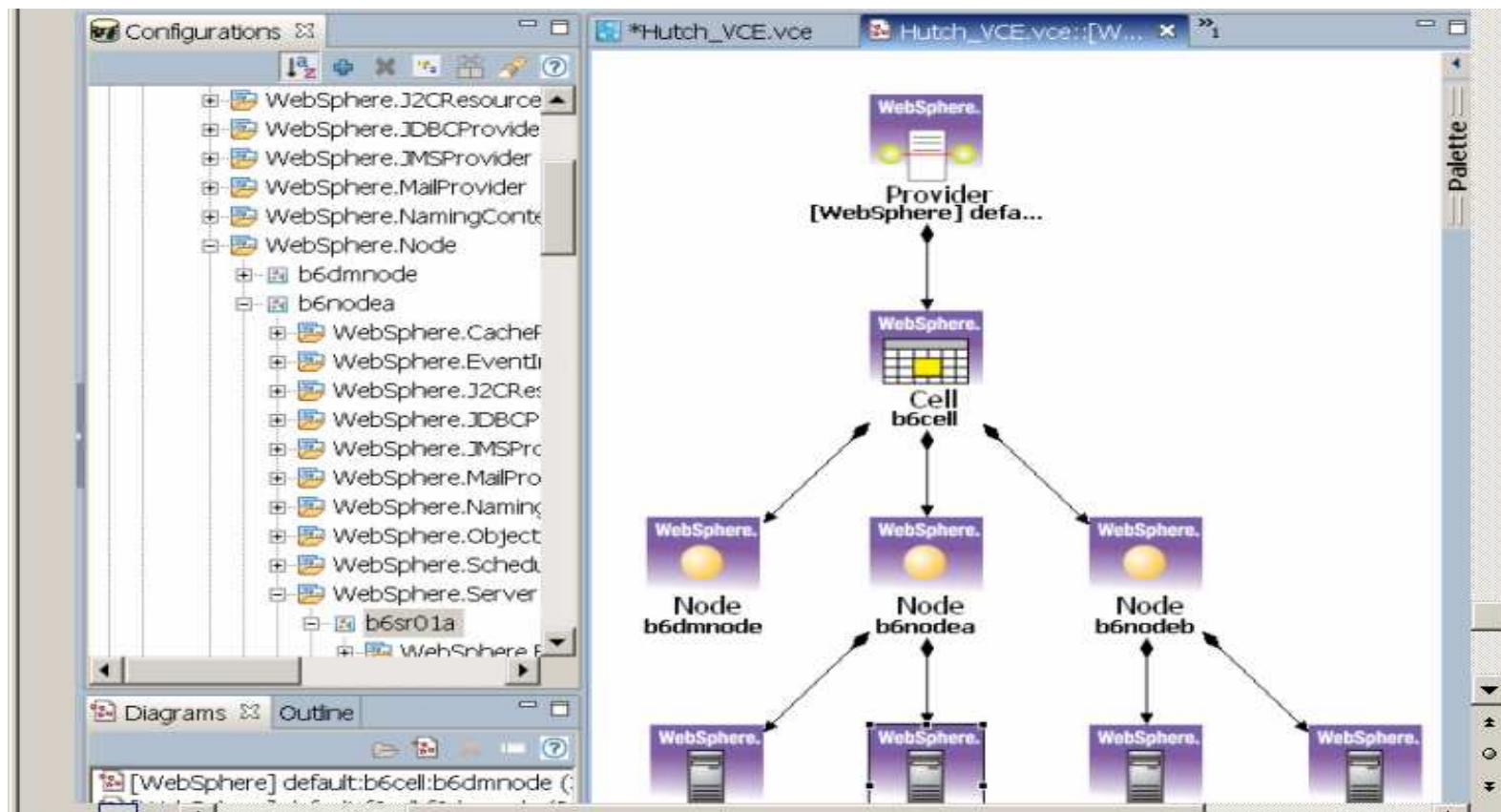
The detailed view for monitor [42F41010] shows: com.ibm.jvm/InterruptibleIOContext@27ECFF60 (Class) had a high miss percentage indicating that 36% of attempts by a thread to own the lock (when the requesting thread did not already own it) required the thread to wait. Reducing contention on this lock could result in a performance...

Visual Configuration Explorer (VCE)



SHARE
Technology • Connections • Results

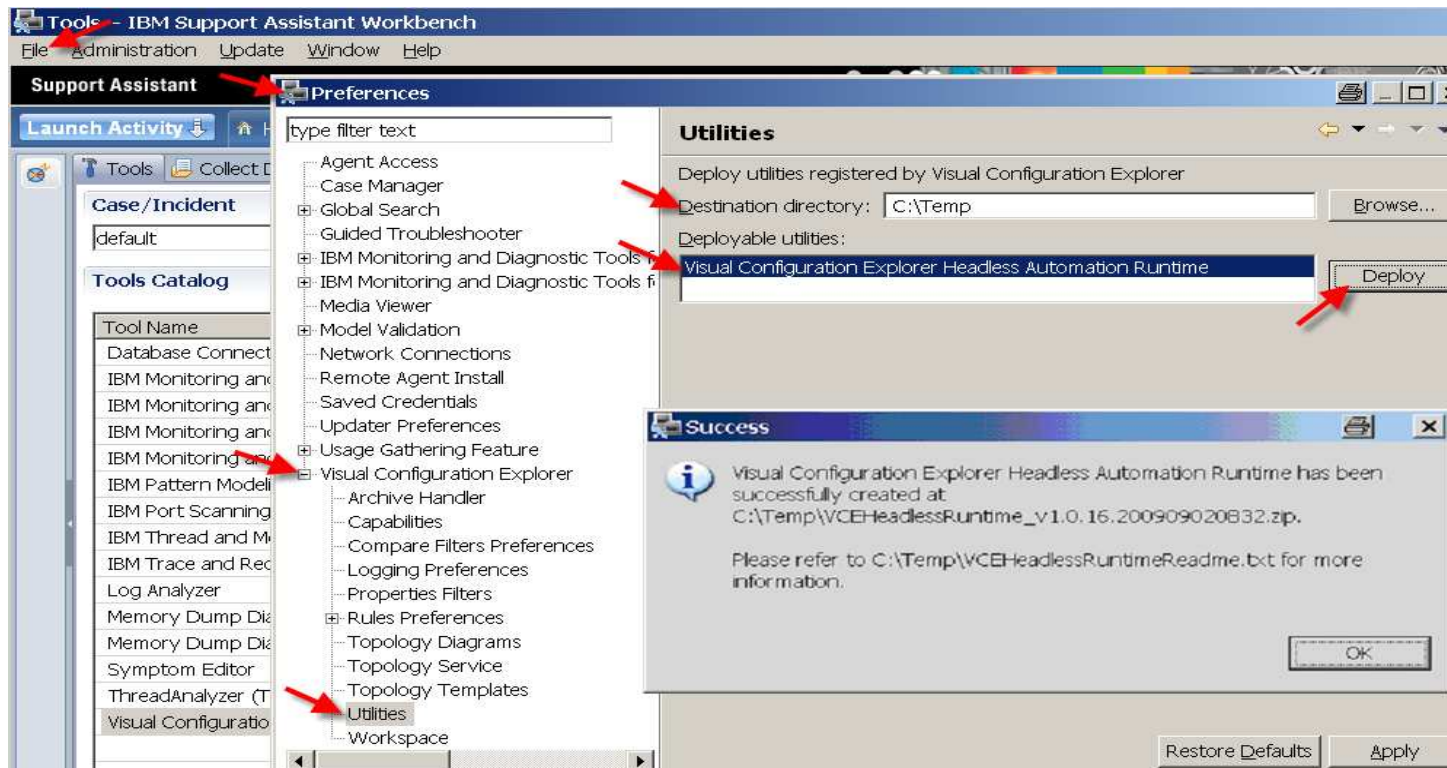
Visualize, explore, and analyze configuration information
Correlate configuration information between different products
Collaborate with others during problem analysis
Also see SHARE 113 Session 1153 for more examples...



ISA VCE “Headless Installation”



Click on File → Preferences → VCE → Utilities → “Deploy” to create VCEHeadlessRuntime_v1.0...zip file



Transfer zip file to your USS working directory, and unzip to ./vce dir.

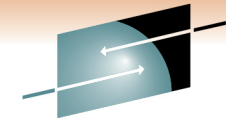
```
jar -xvf VCEHeadlessRuntime_v1.0.15.20090624.0925.zip
```

Run the exporter from ./vce/ directory after setting WAS_HOME:

```
java jar startup.jar -buildfile wasexporter/wasexport.xml -Dwas.root=$WAS_HOME
```

FTP the wasexport.xml configuration file to your workstation and re-name it.

VCE Quick Start



SHARE
Technology • Connections • Results

- Create Workspace
- Add Configuration(s)
- Create New Diagram
- Drag objects to diagram
- Show Parents or Children

Add Configuration tool

New Diagram tool

Welcome to Visual Configuration Explorer!

A workspace is required before you can begin.

Quick Start

You can start fresh with a new workspace or open an existing one to continue a previous session.

- Create a new workspace from the 'File/Visual Configuration Explorer/New Workspace' dialog.
- Open an existing workspace from the 'File/Visual Configuration Explorer/Open Workspace' dialog.
- Import a configuration into a new or existing workspace from the 'File/Visual Configuration Explorer/Import configuration' dialog.
- Choose from the most recently used workspaces

C:\Documents and Settings\Hutch\My

Launch Activity | Home | Analyze Problem | Visual Configuration Explorer (Tech... |

Configurations | *March8.vce |

WebSphere.Node

- WebSphere.CacheProvider
- WebSphere.EventInfrastructurePro
- WebSphere.J2CResourceAdapter
- WebSphere.JDBCProvider
- WebSphere.JMSProvider
- WebSphere.MailProvider
- WebSphere.NamingContext
- WebSphere.ObjectPoolProvider
- WebSphere.SchedulerProvider
- WebSphere.Server
 - f6sr01c
 - nodeagent
 - WebSphere.ServerIndex

Context Menu:

- Show Properties
- Search
- Create Diagram
- Validate
- Template View
- Show children
- Show parents
- Show DB2 datab...
- Show referenced

Diagram View:

- WebSphere. Cell b6cell
- WebSphere. Cell f6cell
- WebSphere. Node b6nodeb
- WebSphere. Node f6nodec
- WebSphere. Server b6sr01b
- WebSphere. Server f6sr01c

Palette

Diagrams | Outline

b6nodea Show parents

b6nodeb Show DB2 databases from parent node

Appendix



- **Installing the ISA**
- **Other Diagnostic Tools for WebSphere on z/OS**
 - MVS Modify (F) commands
- **Working with Dumps & Traces**
 - Triggering dumps & Traces
 - Extracting system dumps for ISA tools
- **Testing Tools & Sample Applications**
- **Documentation, Help & Web Resources**

Installing the IBM Support Assistant (ISA)

- Download & Install ISA
 - <http://www.ibm.com/software/support/isa/>
 - See IEA (IBM Education Assistant) for tutorials:
 - http://publib.boulder.ibm.com/infocenter/ieduasst/v1r1m0/index.jsp?topic=/com.ibm.iea.selfassist/selfassist/ISAv41_Task.html
 - Install Product Add-ons: (100's)
 - ISA: Update > Find New... > Tools Add-ons
 - <http://www.ibm.com/support/docview.wss?uid=swg27013279>

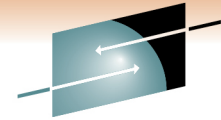
Other Diagnostic Tools for WebSphere



- WebSphere “built-in” tools (See InfoCenter)
 - Display server - MVS Modify commands
 - Trace Dynamically - MVS Modify (F) commands
 - Performance Monitor (PMI) & Viewer
 - threadmonitor (WAS V7)
 - dumpNameSpace
 - wsadmin
 - ISC
- Other:
 - JinsightLive for IBM System z
<http://www.alphaworks.ibm.com/tech/jinsightlive>



The all-powerful MVS Modify command



S H A R E

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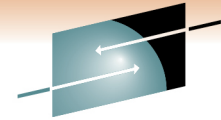
F <server_name>, HELP

- TRACEALL - Set overall trace level
- TRACEBASIC - Set basic trace components
- TRACEDETAIL - Set detailed trace components
- TRACESPECIFIC - Set specific trace points
- TRACEINIT - Reset to initial trace settings
- TRACENONE - Turn off all tracing
- JAVACORE - Generate jvm core dump
- HEAPDUMP - Generate jvm heap dump
- JAVATDUMP - Generate jvm tdump
- TRACEJAVA - Set java trace options

F <server_name>, DISPLAY, HELP

- LISTENERS - Display listeners
- CONNECTIONS - Display connection information
- TRACE - Display information about trace settings
- JVMHEAP - Display jvm heap statistics
- WORK - Display work elements
- ERRLOG - Display the last 10 entries in the error log
- THREADS - Display thread status

Working with Dumps



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- Java Dumps > /var/home/... MVS console commands

- **Heap:** MVS command: `F <server_name>,HEAPDUMP`
- **Core:** `F <server_name>,JAVACORE`
- **JVM TDUMP:** `F <server_name>,JAVATDUMP`

Heapdumps (and javacore) written to home dir

(Default = /var/WebSphere/home/cell/<servant Group ID>

- WebSphere ABEND dumps >/var/home/...

- SYSABEND & CEE Dumps > JES SPOOL

- SVC Dumps, ABEND Dumps > SYS1.DUMP.Dyy

- Setup Dump Options:

```
CD SET,SDUMP=(RGN)
```

```
D DUMP,O
```

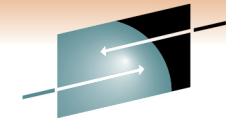
```
SDUMP- ADD OPTIONS (LSQA,RGN,TRT)
```

- MVS Dump console command:

```
Dump COMM='title'
```

```
R nn,jobname=H7SR01AS
```

jextract - Convert SVC dump for Dump Analyzer



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- jextract is shipped with the IBM JVM in the ../java/bin/ directory
- Point directly to the Dump dataset:

```
/shared/zWebSphere/V7R0/java64/J6.0_64/bin/jextract SYS1.DUMP.D091014.T102814.SYSB.S00003
Loading dump file...
Read memory image from SYS1.DUMP.D091014.T102814.SYSB.S00003
Set debug scratch space size to 8 MB
VM set to 000000080B178548
Dumping JExtract file to SYS1.DUMP.D091014.T102814.SYSB.S00003.xml
<!-- extracting gpf state --> <!-- 5ms -->
<!-- extracting host network data --> <!-- 9ms -->
<!-- extracting classes --> <!-- 183200ms -->
<!-- extracting monitors --> ..<!-- 188234ms -->
<!-- extracting threads --> .<!-- 195727ms -->
<!-- extracting trace buffers --> <!-- 195740ms -->
<!-- extracting roots -->.<!-- 199500ms -->
<!-- extracting objects --> .<!-- 268266ms -->
Finished writing jextract XML file in 268268ms
Warning: found 14 inconsistencies in the dump file. Further information has been written to the jextract XML
file
Creating archive file: SYS1.DUMP.D091014.T102814.SYSB.S00003.zip
Adding "SYS1.DUMP.D091014.T102814.SYSB.S00003"
Adding "SYS1.DUMP.D091014.T102814.SYSB.S00003.xml"
Adding "/shared/zWebSphere/V7R0/java64/J6.0_64/lib/TraceFormat.dat"
Adding "/shared/zWebSphere/V7R0/java64/J6.0_64/lib/J9TraceFormat.dat"
jextract complete..
```

- FTP the resulting .zip file to your workstation.
- May have to specify these arguments:
export J9DBGEXT_SCRATCH_SIZE=8
jextract -J-DJavaio.tmpdir=/u/hutch/largezfs-Xmx1024 SYS1.DUMP.D091014.

jdmpview - Replaced by the ISA Dump Analyzer or Memory Analyzer?

Testing Tools



- Load Drivers
 - JMeter
 - Microsoft™ Web Application Stress Tool
 - LoadRunner, Silk, ...
- Sample Applications
 - Techdoc WP101612 “Getting started with analysis of GC, Heapdumps and Javacores For WebSphere on z/OS”
 - PD Application Tools: causeOutOfMemory, Sleeper

ISA Built-in Documentation (local eclipse):



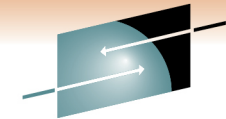
Welcome to IBM Support Assistant

Find Information
Easily find the information you need including product specific information and search capabilities

“Find Information” - Search

The screenshot shows the IBM Support Assistant search interface. The top navigation bar includes 'Launch Activity', 'Home', 'Analyze Problem', and 'Find Information'. Below this, there are tabs for 'Search Information', 'Media Viewer', and 'Product Information'. The main search area has a search box with the text 'z/OS "Process Server"' and a 'Go!' button. To the left, a 'Search Targets' panel lists several sources with checkboxes: IBM Software Support Documents, IBM developerWorks, IBM Newsgroups and Forums, Google, and Product Information Centers. The search results are displayed in a list, showing 'IBM Software Support Documents (50 of 1523 result)' and 'IBM developerWorks Information Management (45 of 45 results)'. A preview of a document titled 'WebSphere Process Server 6.1 > WebSphere Process Serve' is visible on the right, with the text 'Uninstalling WebSphere Process Server for z/OS'.

ISA Help



S H A R E

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<http://localhost:1260/help/index.jsp>

- Highlight a tool
(e.g., HeapAnalyzer)
- Click on the “Help” tab:

Tools Catalog

Tool Name
[Tech Preview] Database Connection Pool Analyzer for IBM
[Tech Preview] HeapAnalyzer
[Tech Preview] IBM Pattern Modeling and Analysis Tool for
[Tech Preview] IBM Port Scanning Tool

Launch Submit Feedback **Help**

IBM Support Assistant Workbench

Search: GO Search scope: All topics

Contents

- Introduction to IBM Support Assistant V4.1
- IBM Support Assistant Migration
- Customizing the Workbench
- Network Connections
- Usage Gathering Feature
- Administering the Agents
- Customizing the Agent
- Using the Data Collector
- Using Tools
- Using the Media Viewer
- Using the Case Manager
- Using the Guided Troubleshooter
- Using the Systems Explorer
- Securing the IBM Support Assistant
- Submitting a Service Request
- Troubleshooting and Support
- Reference
- How to use Help
- Log Analyzer
- Tool: [Tech Preview] Database Connection Po
- Tool: [Tech Preview] HeapAnalyzer**
- Tool: [Tech Preview] IBM Pattern Modeling an
- Tool: [Tech Preview] IBM Thread and Monitor
- Tool: [Tech Preview] IBM Trace and Request A
- Tool: [Tech Preview] IBM Web Server Plug-in
- Tool: [Tech Preview] Memory Dump Diagnosti
- Tool: IBM Monitoring and Diagnostic Tools for
- Tool: IBM Monitoring and Diagnostic Tools for
- Tool: IBM Monitoring and Diagnostic Tools for
- Tool: IBM Monitoring and Diagnostic Tools for
- Tool: IBM Port Scanning Tool (Tech Preview)
- Tool: Memory Dump Diagnostic for Java
- Tool: Visual Configuration Explorer

Tool: [Tech Preview] HeapAnalyzer

IBM® HeapAn

IBM HeapAna
Creator/Architect/E
Jinwoo Hwa
jinwoo@us.ibm.c

Welcome to IBM HeapAnalyzer. IBM allows the finding of a possible Java¹ through its heuristic search engine and heap dump in Java applications. You information at <http://www.alphaworks.ibm.com/tecl>

Introduction

The Heapdump contains a list of all th the heap.

Heapdumps can be very large with m them.

It's not always easy to analyze a large analyzes heapdumps of Java SDK 1.3

ISA Resources



ISA website:

www.ibm.com/support/docview.wss?rs=3455&uid=swg27012682

www.ibm.com/support/docview.wss?rs=3455&context=SSLLVC&q1=vce&uid=swg27013116

ISA Download website www.ibm.com/software/support/isa/download.html

ISA V4.1.1 ReadMe www.ibm.com/support/docview.wss?uid=swg27016886

IBM Support Assistant Team www.ibm.com/software/support/isa

ISA Forum www.ibm.com/developerworks/forums/forum.jspa?forumID=935

Comments/feedback to: IBMSA@us.ibm.com

IBM Education Assistant (IEA) tutorials:

publib.boulder.ibm.com/infocenter/ieduasst/v1r1m0/index.jsp?topic=/com.ibm.iea.selfassist/selfassist/ISAv41_Task.html

IBM Diagnostics Guides www.ibm.com/developerworks/java/jdk/diagnosis/index.html

IBM Techdocs at www.ibm.com/support/techdocs: [WP101575](#) & [WP101612](#)