



IBM Software Group

The MAT Tutorial

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Rational software





Agenda

- **Introduction**
- Working with Memory Analyzer
- Other features
- Demo
- Q & A





Introduction

- What Memory Analyzer is
- Concepts:
 - ▶ heap dump
 - ▶ shallow and retained heap
 - ▶ dominator tree
 - ▶ garbage collection roots





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Working with Memory Analyzer

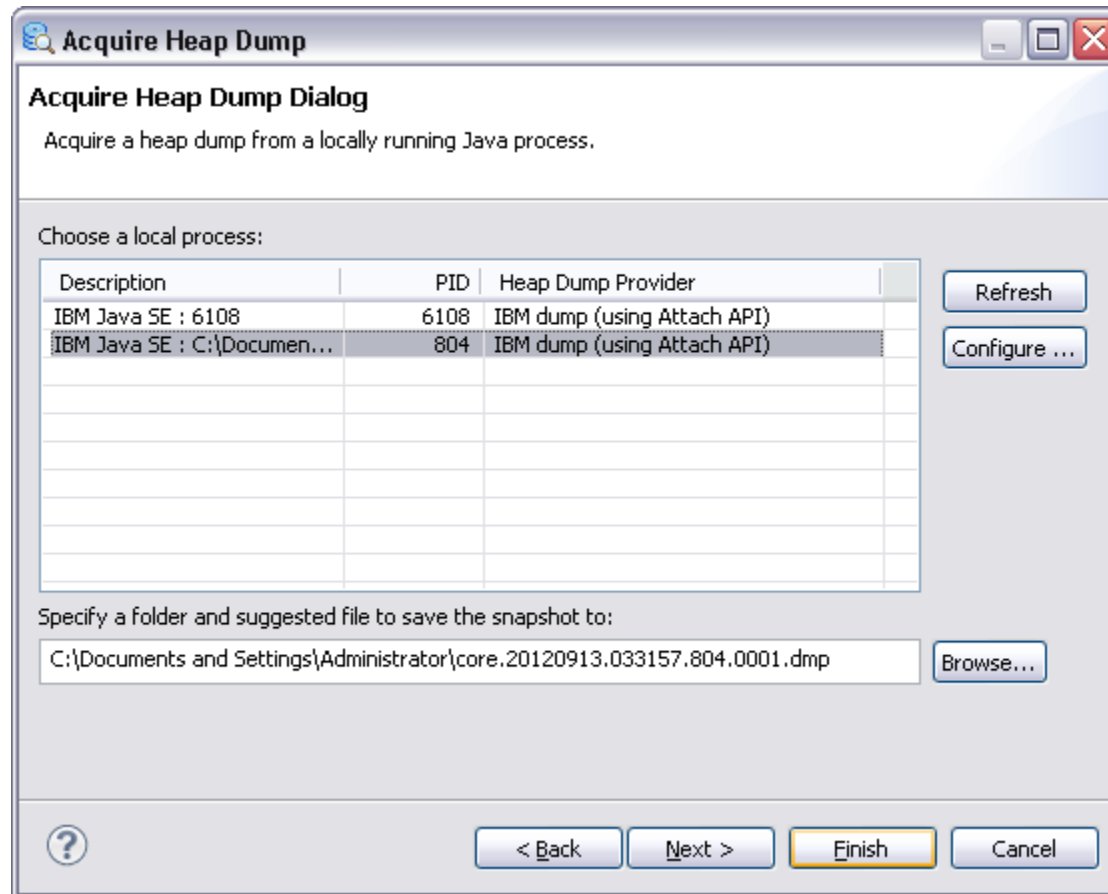
- Getting a Heap Dump
- Overview
- Histogram
- Dominator Tree
- Leak Suspects Report
- Top consumers



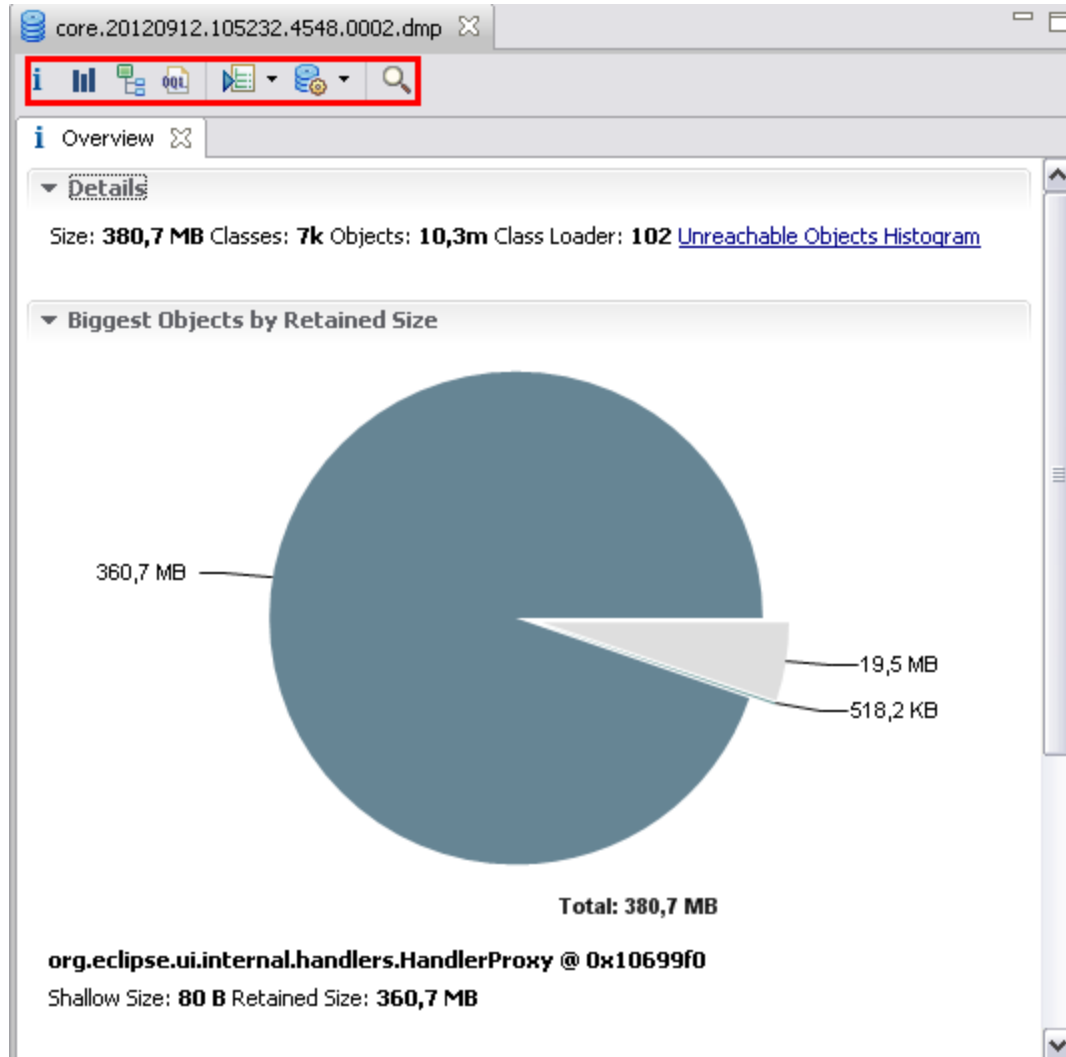


Getting a Heap Dump

- File > Acquire Heap Dump



Overview



Histogram



Class Name	Objects	Shallow Heap	Retained Heap
<Regex>	<Numeric>	<Numeric>	<Numeric>
java.lang.String	10 055 025	321 760 800	326 716 800
java.lang.Object[]	9 043	58 625 840	>= 379 025 716
java.lang.Class	7 024	6 028 967	>= 9 482 809
char[]	51 324	5 193 680	5 193 756
java.util.HashMap\$Entry	28 610	915 520	>= 2 869 247
java.util.HashMap\$Entry[]	3 889	695 480	>= 3 426 988
byte[]	676	558 648	>= 558 724
int[]	1 350	451 608	>= 451 684
java.util.Hashtable\$Entry	9 185	293 920	>= 1 150 989
java.lang.reflect.Method	2 795	245 960	>= 264 771
java.util.WeakHashMap\$Entry	5 966	238 640	>= 398 343
java.util.HashMap	3 883	186 384	>= 3 535 795
java.util.Hashtable\$Entry[]	1 261	173 600	>= 1 299 478
java.util.ArrayList	4 580	146 560	>= 378 809 439
java.lang.String[]	2 893	133 160	>= 325 100
org.eclipse.osgi.internal.resolver.E...	1 758	126 576	>= 177 913
java.lang.ref.Reference[]	176	112 776	>= 112 852
java.lang.Object	4 818	77 088	>= 77 321
java.lang.Integer	4 640	74 240	>= 81 749
java.lang.ref.WeakReference	3 011	72 264	>= 73 991
java.lang.Class\$ReflectRef	1 564	62 560	>= 63 268
org.eclipse.osgi.service.resolver.S...	1 839	58 848	>= 59 028
java.lang.Class[]	2 815	55 576	>= 55 652
Total: 23 of 7 024 entries; 7 00...	10 282 564	399 171 303	



Dominator Tree



Class Name	Shallow ...	Retained...	Percent...
<Regex>	<Numeric>	<Numeric>	<Numeric>
org.eclipse.ui.internal.handlers.HandlerProxy @	80	378 170 976	94,74%
org.eclipseday.krakow2012.handlers.Eclipsi	32	378 170 832	94,74%
java.util.ArrayList @ 0x1f99c88	32	378 170 720	94,74%
java.lang.Object[14542668] @ 0x1	58 170 688	378 170 688	94,74%
org.eclipse.core.runtime.ListenerList @	24	48	0,00%
java.lang.String @ 0x1e00530 Hello, K	32	32	0,00%
Σ Total: 3 entries			
org.eclipse.core.runtime.ListenerList @ 0x1	24	48	0,00%
org.eclipse.ui.internal.handlers.HandlerPro:	16	16	0,00%
Σ Total: 3 entries			
class sun.net.www.protocol.jar.JarFileFactory i	518	530 646	0,13%
org.eclipse.e4.ui.internal.workbench.E4XMIRes	128	331 800	0,08%
org.eclipse.jdt.internal.core.JavaModelManage	192	319 176	0,08%
org.eclipse.osgi.internal.baseadaptor.DefaultCl	96	261 453	0,07%
org.eclipse.e4.core.internal.di.InjectorImpl @ C	40	254 112	0,06%
org.eclipse.e4.core.internal.contexts.EclipseCo	48	247 776	0,06%
org.eclipse.osgi.internal.resolver.SystemState i	112	238 248	0,06%
org.eclipse.equinox.launcher.Main\$StartupClas	112	229 840	0,06%
org.eclipse.e4.core.internal.contexts.EclipseCo	48	224 864	0,06%
class org.apache.harmony.security.fortress.Se	2 596	223 508	0,06%
org.eclipse.jface.bindings.BindingManager @ 0:	96	193 736	0,05%
org.eclipse.core.internal.registry.RegistryObjec	72	186 528	0,05%
org.eclipse.e4.ui.css.swt.engine.CSS5SWTEngin	88	178 128	0,04%
class com.ibm.icu.text.RuleBasedCollator @ 0x:	12 937	176 785	0,04%
class org.eclipse.osgi.framework.util.ObjectRe	1 712	170 656	0,04%





Leak Identification

- Leak Suspects Report
- Top Consumers
- Top Components





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Other features

- Context menu for each row
- Threads Overview
- Analyzing Java Collection Usage
- OQL
- Comparing heap dumps
- And many, many more...





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Demo





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Q & A



References



- Memory Analyzer Home Page
- <http://eclipse.org/mat/>

