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VisualVM: Integrated and Extensible Troubleshooting Tool for the Java™ Platform

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Introduce **VisualVM** - new tool that integrates several existing JDK monitoring and management tools with lightweight memory and CPU profiling capabilities.



GOAL

Agenda

➤ Using VisualVM

- Monitoring & troubleshooting
- VisualVM features
- Extending VisualVM with plugins

➤ Developing plugins for VisualVM

- API overview
- Do it yourself! - how to write a VisualVM plugin

➤ Q&A

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➤ Q&A

Demo

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DEMO

Monitoring & troubleshooting

- Important part of application lifetime
- Current JDK tools designed separately for very specific functionality
- Need for integrated tool
- No profiler

VisualVM features

- can monitor JVM from 1.4.2 up
- 4 technologies
 - Jvmstat, Attach API, JMX, Serviceability Agent (SA)
- VisualVM uses all of them
- Local and remote application
- CPU and Memory Profiling
 - stripped down version of NetBeans Profiler
- File viewer
 - binary HPROF heap dump
 - NetBeans Profiler CPU and Memory snapshots
 - Thread dump, Core dumps
- Application snapshots
 - offline analysis

VisualVM feature matrix

Localhost	1.4.2	5.0	6	7
Jvmstat	X	X	X	X
JMX		X ¹	X	X
Attach			X	X
SA ²		X	X	X

- 1) With `-Dcom.sun.management.jmxremote`
- 2) Linux and Solaris only

VisualVM feature matrix

Remote	1.4.2	5.0	6	7
Jvmstat ¹	X	X	X	X
JMX ²		X	X	X
Attach				
SA				

- 1) jstatd must be running on remote host
- 2) with `-Dcom.sun.management.jmxremote.port=portno`

VisualVM feature matrix

Functions	Jvmstat	JMX	Attach	SA
detect app	X	X		
monitoring	X	X		
threads		X		
profiler			X	
threadump		X	X	X
heapdump		X ¹	X	
invoke GC		X		
OOME		X ¹	X	
sys prop		X	X	X
JVM args	X	X		X
main class	X			X

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Extending VisualVM with plugins

- Standard
 - MBeans
 - JConsole
- Beta
 - GlassFish
- Experimental
 - JavaDB, BTrace, GChisto, VisualGC
- 3rd party
 - Terracotta
 - TDA
 - SureLogic

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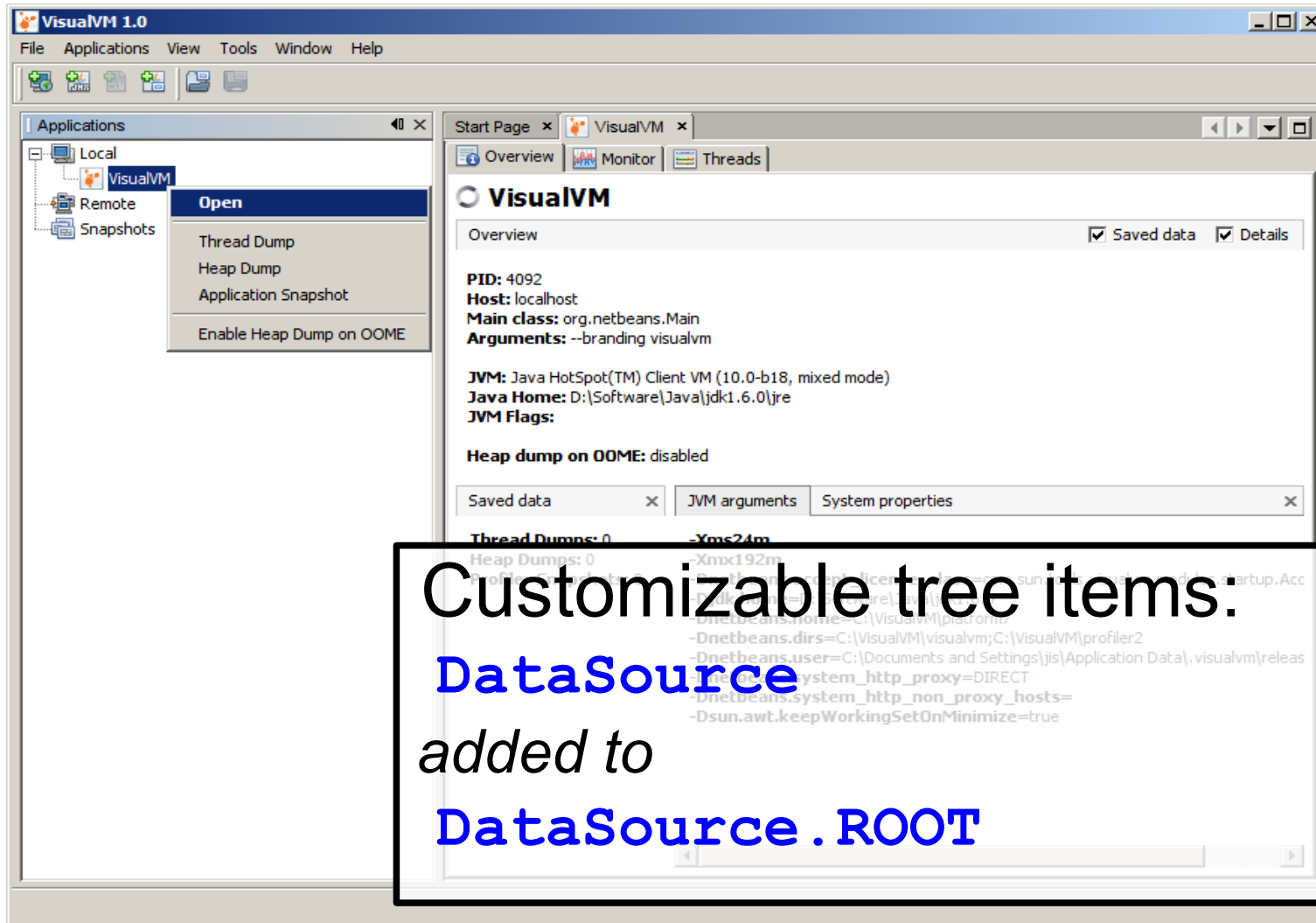
- API overview
- Do it yourself! - how to write a VisualVM plugin

➤ Q&A

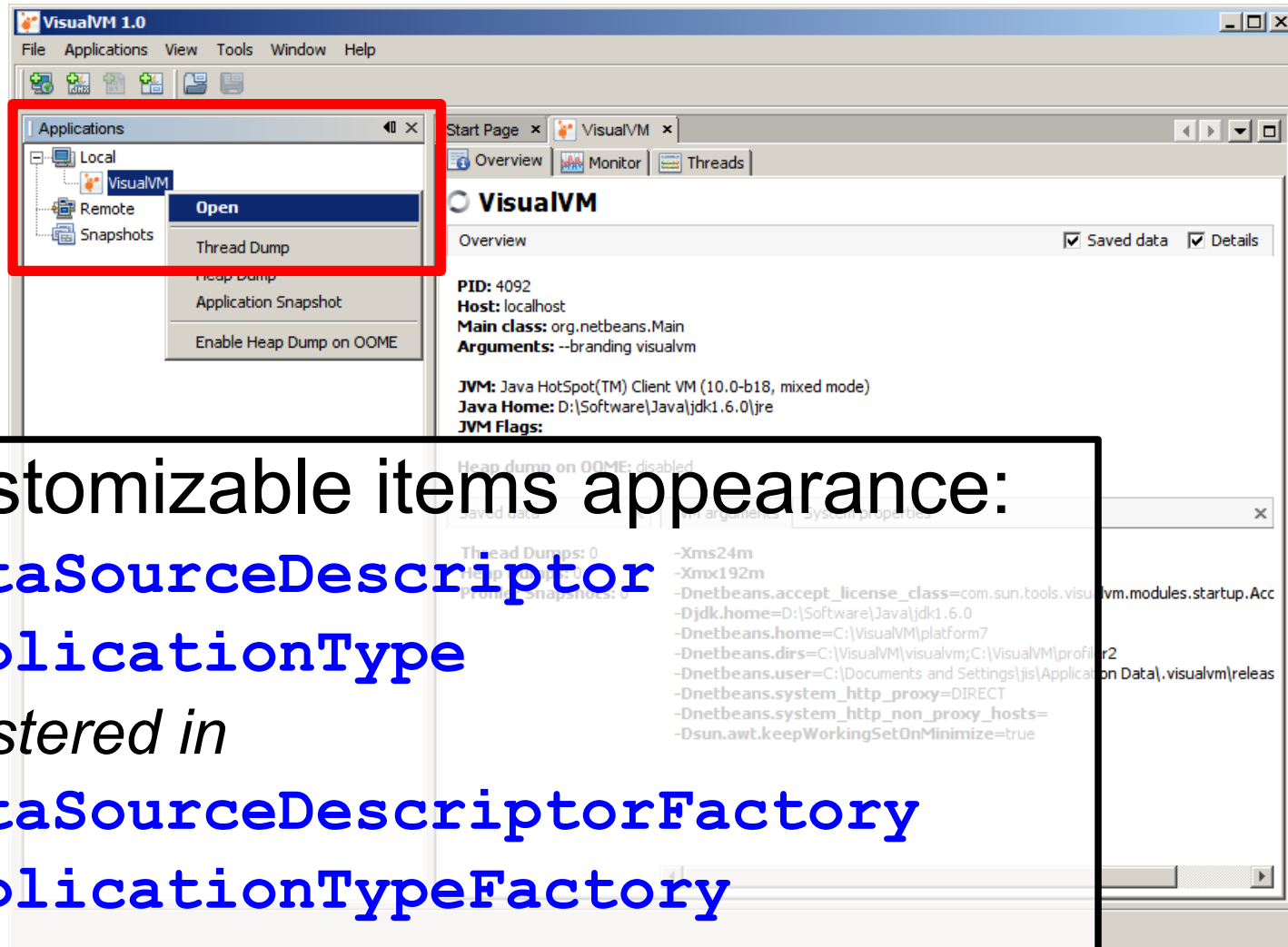
API overview

- DataSource
 - Application
 - Host
 - ThreadDump, HeapDump, ...
- Models for DataSource
 - attaching functionality to DataSource
- Tools API
 - Jvmstat
 - JMX
 - Attach
 - SA
- JVM abstraction

VisualVM 1.0 API Entrypoints



VisualVM 1.0 API Entrypoints



Customizable items appearance:

DataSourceDescriptor

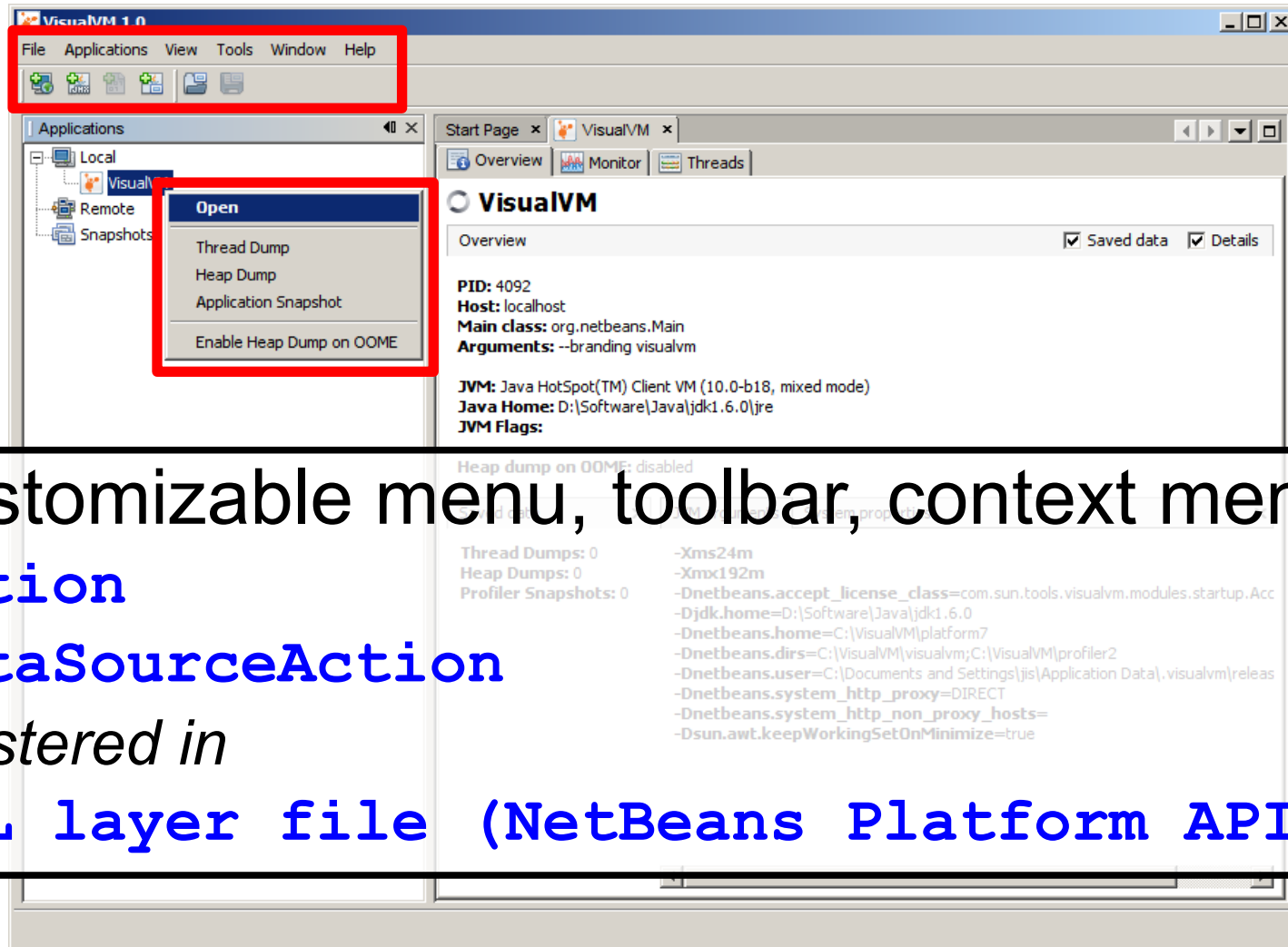
ApplicationType

registered in

DataSourceDescriptorFactory

ApplicationTypeFactory

VisualVM 1.0 API Entrypoints



Customizable menu, toolbar, context menu:

Action

DataSourceAction

registered in

XML layer file (NetBeans Platform API)

VisualVM 1.0

File Applications View Tools Window Help

Applications

Local

VisualVM

Remote

Snapshots

Open

Thread Dump

Heap Dump

Application Snapshot

Enable Heap Dump on OOME

Start Page x VisualVM x

Overview Monitor Threads

VisualVM

Overview

Saved data

Details

PID: 4092

Host: localhost

Main class: org.netbeans.Main

Arguments: --branding visualvm

JVM: Java HotSpot(TM) Client VM (10.0-b18, mixed mode)

Java Home: D:\Software\Java\jdk1.6.0\jre

JVM Flags:

Heap dump on OOME: disabled

Saved data x JVM arguments System properties x

Thread Dumps: 0

Heap Dumps: 0

-Xms24m

-Xmx192m

-Dnetbeans.home=C:\VisualVM\platform7

-Dnetbeans.dirs=C:\VisualVM\visualvm;C:\VisualVM\profiles

-Dnetbeans.system_http_non_proxy_hosts=

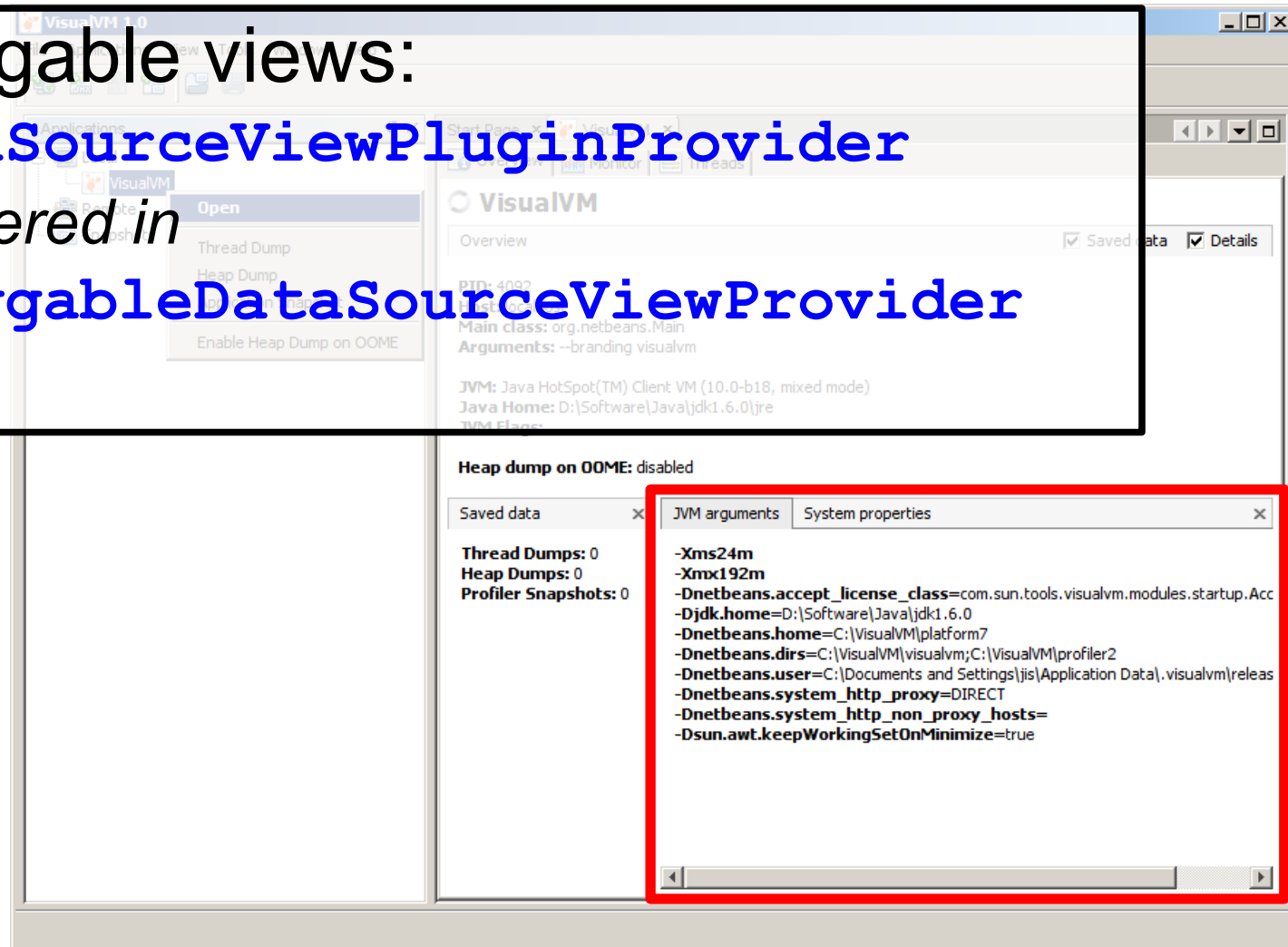
-Dsun.awt.keepWorkingSetOnMinimize=true

Customizable views:
 DataSourceViewProvider
 registered in
 DataSourceViewsManager

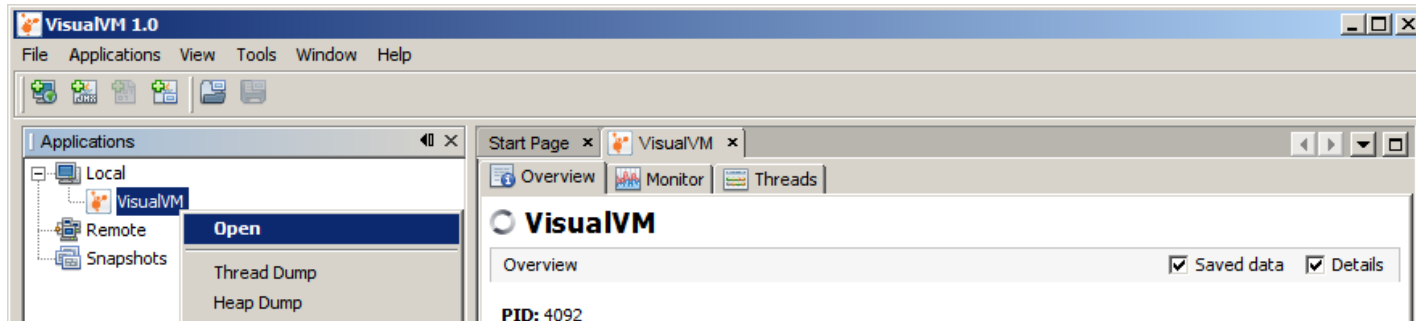
VisualVM 1.0 API Entrypoints

Pluggable views:

DataSourceViewPluginProvider
registered in
PluggableDataSourceViewProvider



VisualVM 1.0 API Entrypoints



And much more:

Jvm, JvmFactory

JmxModel, JmxModelFactory

JvmMXBeans, JvmMXBeansFactory

JvmstatModel, JvmstatFactory

JvmJvmstatModel, JvmJvmstatFactory

AttachModel, AttachModelFactory

SaModel, SaModelFactory

Demo

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THANK YOU

Q&A

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<http://visualvm.dev.java.net>

