

# Monitoring with JVisualVM

Business Intelligence & Advanced Data Discovery

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### Disclaimer

This document is intended to support administrators, technology managers or developers using and implementing Smarten. The business needs of each organization will vary and this document is expected to provide guidelines and not rules for making any decisions related to Smarten. The overall performance of Smarten depends on many factors, including but not limited to hardware configuration and network throughput.

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# **1** Smarten-Monitoring with JVisualVM

JVisualVM is a tool that provides a visual interface for viewing detailed information about java applications while they are running on a java Virtual Machine (JVM) and for troubleshooting and profiling these applications.

# 1.1 Configure JVisualVM

### 1.1.1 For Windows

### Procedure

- 1. Stop wildfly services.
- 2. Download jboss-cli-client.jar using below mention Dropbox link. https://www.dropbox.com/s/mvmuuum7ok2nz3i/jboss-cli-client.jar?dl=0
- 3. Create a new client folder inside <WILDFLY\_HOME>/bin folder and put jboss-cli-client.jar file in client folder.



JVISUALVM WINDOWS-COPY CLIENT JAR

- 4. Open standalone.conf.bat file which is located in <WILDFLY\_HOME>/bin folder and add below mentioned parameter.
  - set "JAVA\_OPTS=%JAVA\_OPTS% -Xms2048M -Xmx2048M -XX:+UseG1GC -XX:MaxMetaspaceSize=512m -noverify -Djava.util.Arrays.useLegacyMergeSort=true -Dfile.encoding=UTF-8"
  - set "JAVA\_OPTS=%JAVA\_OPTS% -Dcom.sun.management.jmxremote.port=9902"
  - set "JAVA\_OPTS=%JAVA\_OPTS% -Dcom.sun.management.jmxremote.authenticate=false"
  - set "JAVA\_OPTS=%JAVA\_OPTS% -Dcom.sun.management.jmxremote"
  - set "JAVA\_OPTS=%JAVA\_OPTS% -Dcom.sun.management.jmxremote.ssl=false"
  - set "JAVA\_OPTS= %JAVA\_OPTS% Djboss.modules.system.pkgs=org.jboss.byteman,org.jboss.logmanager"
  - set "JAVA\_OPTS=%JAVA\_OPTS% -Djava.util.logging.manager=org.jboss.logmanager.LogManager"
  - set "JAVA\_OPTS=%JAVA\_OPTS% -Xbootclasspath/p:
     KULDFLY\_HOME>/modules/system/layers/base/org/jboss/log4j/logma nager/main/log4j-jboss-logmanager-1.1.4.Final.jar"

- set "JAVA\_OPTS=%JAVA\_OPTS% Xbootclasspath/p:
   <WILDFLY\_HOME>/modules/system/layers/base/org/jboss/logmanager/main/jbosslogmanager-2.0.7.Final.jar"
- set "JAVA\_OPTS=%JAVA\_OPTS% -Djava.net.preferIPv4Stack=true"
- set "JAVA\_OPTS=%JAVA\_OPTS% -

Djboss.modules.system.pkgs=org.jboss.byteman,com.manageengine,org.jboss.logmanager"

rem # JVM memory allocation pool parameters - modify as appropriate.		
set "JAVA_OPTS=%JAVA_OPTS% -Xms2048M -XX:+UseG1GC -XX:MaxMetaspaceSize=512m -noverify -Djava.util.Arrays.useLegacyMergeSort=true -Dfile.encoding=UTF-8"		
set "JAVA_OPTS=%JAVA_OPTS% -Dcom.sun.management.jmxremote.port=9902"		
set "JAVA_OPTS=%JAVA_OPTS% -Dcom.sun.management.jmxremote.authenticate=false"		
set "JAVA_OFTS=%JAVA_OFTS% -Dcom.sun.management.jmxremote"		
set "JAVA_OPTS% -Dcom.sun.management.jmxremote.ssl=false"		
<pre>set "JAVA_OPTS=%JAVA_OPTS% -Djboss.modules.system.pkgs=org.jboss.byteman.org.jboss.logmanager"</pre>		
<pre>set "JAVA_OPTS=%JAVA_OPTS% -Djava.util.logging.manager=org.jboss.logmanager.LogManager"</pre>		
set "JAVA_OPTS=%JAVA_OPTS% -Xbootclasspath/p:C:/smarten/wildfly/modules/system/layers/base/org/jboss/log4j/logmanager/main/log4j-jboss-logmanager-1.1.4.Final.jar"		
set "JAVA_OPTS=%JAVA_OPTS% -Xbootclasspath/p:C:/smarten/wildfly/modules/system/layers/base/org/jboss/logmanager/main/jboss-logmanager-2.0.7.Final.jar"		
rem # Prefer IPv4		
set "JAVA_OPTS=%JAVA_OPTS% -Djava.net.preferIFv4Stack=true"		
rem # Make Byteman classes visible in all module loaders		
rem # This is necessary to inject Byteman rules into AS7 deployments		
set "JAVA_OFTS= <mark>%JAVA_OPTS%</mark> -Djboss.modules.system.pkgs=org.jboss.byteman,com.manageengine,org.jboss.logmanager"		

JVISUALVM WINDOWS-EDIT STANDALONE CONF FILE

- 5. Open 9902 port in firewall, if any firewall is setup.
- 6. Start wildfly services.
- Open cmd and open jvisualvm using jboss-cli-client.jar path as shown below example jvisualvm.exe -cp:a "C:\smarten\wildfly\bin\client\jboss-cli-client.jar"



JVISUALVM WINDOWS-RUN JVISUALVM COMMAND



JVISUALVM WINDOWS-MAIN SCREEN

8. Click on file and add JMX connection.

4			Ja <sup>,</sup> '
File	Applications View Tools Window	Help	
2	Load		
	Save As	— Start Page ×	
	Delete Delete		
2	Add Remote Host		
	Add JMX Connection		
	Add VM Coredump		
<u>1</u>	Add Application Snapshot		
	Compare Snapshots		
		-	
	Exit		
<			>

JVISUALVM WINDOWS-ADD JMX CONNECTION

9. Connection string >> localhost:9902

Check check box **Do not require SSL connection**, then click ok.

<b>*</b>	Add JMX Connection
Connection:	localhost:9902
Display name:	localhost:9902
Use security o	redentials
Username:	
Password:	
Save se	curity credentials
Do not require	SSL connection
	OK Cancel
	OK Cancel

JVISUALVM WINDOWS—JMX CONNECTION SETTINGS

10. Add remote JVisualVM host, Right click on Remote and Add Remote Host.

File Applications View Tools Window Help	
Applications × -	Start Page X
Company (pid 105564)	
Market Ma	

JVISUALVM WINDOWS-ADD REMOTE HOST

11. Enter remote host ip address and click ok



JVISUALVM WINDOWS—ADD REMOTE HOST SETTINGS

12. Right click on remote host and Add JMX Connection.

-	Start Page	×
		Start Page

JVISUALVM WINDOWS-BIND JMX CONNECTIN FOR REMOTE HOST

Add remote host jmx connection string, remote host: 10.0.0.21 remote port: 9902
 Check check box **Do not require SSL connection**, then click ok.

<b>*</b>	Add JMX Connection	x
Connection:	10.0.0.21:9902	
Display name:	10.0.0.21:9902	
Use security cr	edentials	
Username:		
Password:		
Save see	curity credentials	
Do not require	SSL connection	
	OK Cancel	1
	OK Cance	

JVISUALVM WINDOWS-ADD JMX CONNECTION FOR REMOTE HOST

14. Double click on JMX connection to monitor JVM details.

File Applications View Tools Window Help	
Applications × Local VisualVM Calhost:9902 (pid 105564) Remote VM Coredumps Snapshots	Start Page X Monitor Threads Samp Overview Monitor Threads Samp Overview PID: 105564 Host: Jocalhost Main class: <unknown> Arguments: <none> JVM: Java HotSpot(TM) 64-Bit Server VM (25.151-b1 Java: version 1.8.0_151, vendor Oracle Corporation Java Home: C: \Program Files\Java\jdk1.8.0_151\jr JVM Flags: <none> Heap dump on OOME: disabled</none></none></unknown>
	Thread Dumps: 0 Heap Dumps: 0 Profiler Snapshots: 0

JVISUALVM WINDOWS-MONITOR JVM

# 1.1.2 For Linux

### Procedure

Smarten

- 1. Stop wildfly services.
- 2. Open standalone.conf file located in <WILDFLY\_HOME>/bin folder and add below mentioned parameter.
  - sudo nano <WILDFLY\_HOME>/bin/standalone.conf
- 3. Default configuration look like.

if [ "x\$JAVA\_OPTS" = "x" ]; then JAVA\_OPTS="-Xms64m -Xmx512m -XX:+UseG1GC -XX:MaxMetaspaceSize=512m -noverify -Djava.net.preferIPv4Stack=true -Djava.util.Arrays.useLegacyMergeSort=true -Dfile.encoding=UTF-8"

- Remove following parameter JAVA\_OPTS="\$JAVA\_OPTS - Djboss.modules.system.pkgs=\$JBOSS\_MODULES\_SYSTEM\_PKGS -Djava.awt.headless=true" From standalone.conf
- 5. Add below mention parameter in standalone.conf.

Parameter Name	Parameter Description
-Djboss.modules.system.pkgs	This parameter initialize the JVM
-Djava.util.logging.manager	This parameter access wildfly log manager
-Dcom.sun.management.jmxremote.port	This parameter use JMX connector to listen through the specified port
-Djava.rmi.server.hostname	The hostname or ip address of the smarten server.
-Djava.awt.headless	This parameter use headless system configuration.
-Dcom.sun.management.jmxremote.local.only	This parameter use disallow JMX connection locally
-Dcom.sun.management.jmxremote.authenticate	This parameter use disable authentication
-Dcom.sun.management.jmxremote	This parameter use allow JMX remote connection
-Dcom.sun.management.jmxremote.ssl	This parameter use disallow SSL remote connection
-Xbootclasspath	This parameter use set location of the log manager

### For example

if [ "x\$JAVA\_OPTS" = "x" ]; then

JAVA\_OPTS="-Xms10G -Xmx10G -XX:+UseG1GC -XX:MaxMetaspaceSize=1G -noverify -Djava.net.preferIPv4Stack=true -Djava.util.Arrays.useLegacyMergeSort=true -Dfile.encoding=UTF-8"

JAVA\_OPTS="\$JAVA\_OPTS -Djboss.modules.system.pkgs=org.jboss.byteman,org.jboss.logmanager -Djava.util.logging.manager=org.jboss.logmanager.LogManager -Dcom.sun.management.jmxremote.port=9002 -Djava.rmi.server.hostname=172.31.23.241 -Djava.awt.headless=true -Dcom.sun.management.jmxremote.local.only=false - Dcom.sun.management.jmxremote.authenticate=false -Dcom.sun.management.jmxremote -Dcom.sun.management.jmxremote.ssl=false -Xbootclasspath/p:/home/yarn/smarten/:wildfly/modules/system/layers/base/org/jboss/log4j/logm anager/main/log4j-jboss-logmanager-1.1.4.Final.jar -Xbootclasspath/p:/home/yarn/smarten/wildfly/modules/system/layers/base/org/jboss/logmanager /main/jboss-logmanager-2.0.7.Final.jar"

- 6. Open 9902 port in firewall.
- 7. Start wildfly services.

Smarten

8. Open Jvisualvm from any windows host pc using following path.

C:\Program Files\Java\jdk1.8.0\_151\bin\ jvisualvm.exe

( → This PC → Local Disk (	C:) → Program Files → Java → jdk	1.8.0_151 → bin		
🛚 🔆 Favorites	Name	Date modified	Type	Size
Downloads Recent places	jjs.exe	01-Aug-18 5:04 PM	Application	16 KB
Desktop	ili.dll ∭iman exe	01-Aug-18 5:04 PM	Application extens	172 KB
😌 Dropbox	imc.exe	01-Aug-18 5:04 PM	Application	315 KB
	jmc.ini	01-Aug-18 5:04 PM	Configuration sett	1 KB
⊿ 🖳 This PC	jrunscript.exe	01-Aug-18 5:04 PM	Application	17 KB
Desktop	jsadebugd.exe	01-Aug-18 5:04 PM	Application Application	17 KB
Downloads	jstat.exe	01-Aug-18 5:04 PM	Application	16 KB
<ul> <li>Music</li> <li>Pictures</li> </ul>	jstatd.all.policy	27-May-19 4:30 PM	POLICY File	1 KB
Videos	jvisualvm.exe	01-Aug-18 5:04 PM	Application	193 KB
Local Disk (C:)	JVISUALVM-	OPEN	a an an	471.005



JVISUALVM-MAIN SCREEN

9. Add remote Jvisualvm host, Right click on Remote and Add Remote Host.



JVISUALVM LINUX-REMOTE HOST

10. Enter remote host ip address and click ok

2	Add Remote Host
Host name:	10.0.0.6
Display name:	10.0.0.6
Advanced Sett	ngs OK Cancel

JVISUALVM LINUX—ADD REMOTE HOST SETTINGS

Add Linux remote host jmx connection string, Linux remote host: 10.0.0.6 remote port: 9002
 Click check box **Do not require SSL connection**, then click ok.



JVISUALVM LINUX—BIND JMX CONNECTIN FOR REMOTE HOST

2	Add JMX Connection		
Connection:	Connection: 10.0.0.6:9002		
Display name:	10.0.0.6:9002		
Use security credentials			
Username:			
Password:			
Save security credentials			
✓ Do not require SSL connection			
	OK Cancel		

JVISUALVM LINUX-ADD JMX CONNECTION FOR REMOTE HOST

12. Double click on JMX connection.



JVISUALVM LINUX-MONITOR JVM

## 1.2 How to take Snapshot

### Procedure

1. Select JMX connection, Right click on JMX connection and click on Application Snapshot.

applications A	<ul> <li>Start Page × An 10.0.0.6:9002 (pid 1462) ×</li> </ul>	
		Overview       Monitor       Threads       Sar         10.0.0.6:9002 (pid 1462)         Monitor         Uptime: 1 hrs 02 min 52 sec
in 🚮 10.0.0.6:9002 (pid 14 میلی استان) WM Coredumps	Open	CPU
Snapshots	Sample	CPU usage: 0.2%
	Thread Dump Heap Dump	80%
	Application Snapshot	60%-
	Remove	40%-
	Properties	20% -

#### JVISUALVM TAKE A APPLICATION SNAPSHOT

2. Application snapshot under the Snapshots.



JVISUALVM APPLICATION SNAPSHOT

3. Save as Application Snapshot, Right click on JMX connection and save as Snapshot.





### 1.3 How to take heap dump

#### Procedure

1. Right click on JMX connection and click on Heap Dump.



JVISUALVM TAKE A HEAP DUMP

2. Set path which is you want to save Heap Dump and click ok.



TITLE-NAME OF THE IMAGE

### 1.4 How to take thread dump

### Procedure

1. Right click on JMX connection and click on Heap Dump.



JVISUALVM TAKE A THREAD DUMP

2. Right click on generated Thread Dump and save as.

File Applications View Tools Window Help	
File Applications View Tools Window Help	<ul> <li>Start Page × £ 10.0.0.6:9002 (pid 71966) ×</li> <li>Overview Monitor Threads Samp</li> <li>10.0.0.6:9002 (pid 71966)</li> <li>Thread Dump</li> <li>2020-08-12 16:21:32</li> <li>Full thread dump Java HotSpot (TM) 64</li> <li>"RMI TCP Connection(4)-10.0.0.21" - 3</li> <li>java.lang.Thread.State: RUNNABLE</li> <li>at sun.management.ThreadImp1</li> <li>at sun.management.ThreadImp1</li> <li>at sun.reflect.NativeMethodA</li> <li>at sun reflect.NativeMethodA</li> </ul>
Rename Delete Delete Properties	at sun.management.ThreadImpl at sun.reflect.NativeMethodA at sun.reflect.NativeMethodA at sun.reflect.DelegatingMeti at java.lang.reflect.Method.: at sun.reflect.misc.Trampoli at sun.reflect.DelegatingMeti at sun.reflect.DelegatingMeti at java.lang.reflect.Method.: at sun.reflect.misc.MethodUt: at com.sun.jmx.mbeanserver.C at com.sun.jmx.mbeanserver.M at com.sun.jmx.mbeanserver.M

JVISUALVM THREAD DUMP SAVE

# 2 Product and Support Information

Find more information about Smarten and its features at www.smarten.com

Support: <u>support@smarten.com</u> Sales: <u>sales@smarten.com</u> Feedback & Suggestions: <u>support@smarten.com</u> Support & Knowledgebase Portal: <u>support.smarten.com</u>