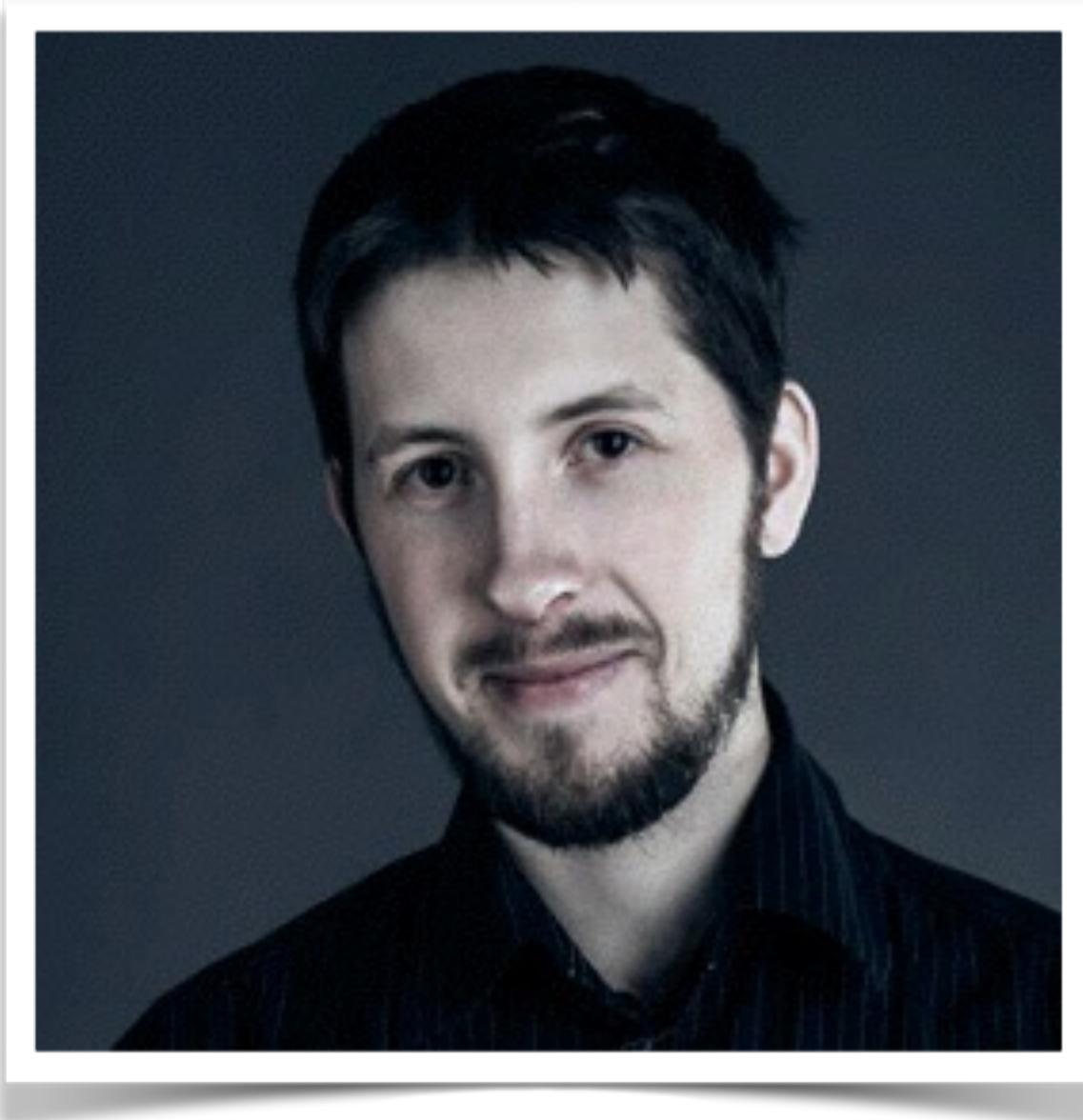


JDK not so hidden treasures

Andrzej Grzesik

andrzej grzesik



@ags313

andrzej@grzesik.it

andrzejgrzesik.info



[sckrk]



**When you are dead, you don't
know that you are dead. It is
difficult only for the others.**



via 9gag.com

It is the same when you are stupid.

@JavaOneConf @ags313
#JavaONE

please tweet!

questions?
just ask!

java

\$JAVA_HOME/bin

bash

bash



exit (bash)

[19:05] [ags@ags-mbpro:~]

\$ ls \$JAVA_HOME/bin

appletviewer*	javafxpackager*	jhat*	jstack*	policytool*	unpack200*
extcheck*	javah*	jinfo*	jstat*	rmic*	wsgen*
idlj*	javap*	jjs*	jstatd*	rmid*	wsimport*
jar*	javapackager*	jmap*	jvisualvm*	rmiregistry*	xjc*
jarsigner*	jcmd*	jmc*	keytool*	schemagen*	
java*	jconsole*	jps*	native2ascii*	serialver*	
javac*	jdb*	jrunscript*	orbd*	servertool*	
javadoc*	jdeps*	jsadebugd*	pack200*	tnameserv*	

bash

bash



[19:03] [ags@ags-mbpro:~]
\$ find \$JAVA_HOME/bin -type f | wc -l

44

tl;dr: log gc
please

log gc :-)

```
java -Xloggc:gc.log \
    -XX:+PrintGCDetails \
    -XX:+PrintGCDateStamps \
    -XX:+PrintTenuringDistribution \
    pl.agsLooper param1 param2 > /dev/null &
```

when things go...



Konrad Malawski @ktosopl

2 Oct

X: "Works on my machine" Y: "Awesome, please ship your laptop to our Data Center in Virginia" :D #devops #fun

[Collapse](#) [Reply](#) [Retweet](#) [★ Favorite](#)

does it run?

top // htop

[16:43][ags@ags-mbpro:~/vcs/misc]

\$ ps aux | grep java

```
ags      16179  0.1  2.3  4244084 291328 ?? S   Wed01AM  9:39.82 /Library/Java/JavaVirtualMachines/jdk1.7.0_07.jdk/Contents/Home/bin/java -Djdk.home=/Library/Java/JavaVirtualMach  
07.jdk/Contents/Home -classpath /Applications/NetBeans/NetBeans 7.2.app/Contents/Resources/NetBeans/platform/lib/boot.jar:/Applications/NetBeans/NetBeans 7.2.app/Contents/Resources/NetBeans/  
rg-openide-modules.jar:/Applications/NetBeans/NetBeans 7.2.app/Contents/Resources/NetBeans/platform/lib/org-openide-util-lookup.jar:/Applications/NetBeans/NetBeans 7.2.app/Contents/Resources/  
form/lib/org-openide-util.jar:/Applications/NetBeans/NetBeans 7.2.app/Contents/Resources/NetBeans/platform/lib/locale/boot_ja.jar:/Applications/NetBeans/NetBeans 7.2.app/Contents/Resources/N  
rm/lib/locale/boot_pt_BR.jar:/Applications/NetBeans/NetBeans 7.2.app/Contents/Resources/NetBeans/platform/lib/locale/boot_ru.jar:/Applications/NetBeans/NetBeans 7.2.app/Contents/Resources/N  
m/lib/locale/boot_zh_CN.jar:/Applications/NetBeans/NetBeans 7.2.app/Contents/Resources/NetBeans/platform/lib/locale/org-openide-modules_ja.jar:/Applications/NetBeans/NetBeans 7.2.app/Contents/  
tBeans/platform/lib/locale/org-openide-modules_pt_BR.jar:/Applications/NetBeans/NetBeans 7.2.app/Contents/Resources/NetBeans/platform/lib/locale/org-openide-modules_ru.jar:/Applications/NetB  
7.2.app/Contents/Resources/NetBeans/platform/lib/locale/org-openide-modules_zh_CN.jar:/Applications/NetBeans/NetBeans 7.2.app/Contents/Resources/NetBeans/platform/lib/locale/org-openide-util-  
:/Applications/NetBeans/NetBeans 7.2.app/Contents/Resources/NetBeans/platform/lib/locale/org-openide-util-lookup_pt_BR.jar:/Applications/NetBeans/NetBeans 7.2.app/Contents/Resources/NetBeans/  
locale/org-openide-util-lookup_ru.jar:/Applications/NetBeans/NetBeans 7.2.app/Contents/Resources/NetBeans/platform/lib/locale/org-openide-util-lookup_zh_CN.jar:/Applications/NetBeans/NetBeans  
ents/Resources/NetBeans/platform/lib/locale/org-openide-util_ja.jar:/Applications/NetBeans/NetBeans 7.2.app/Contents/Resources/NetBeans/platform/lib/locale/org-openide-util_pt_BR.jar:/Appli  
s/NetBeans/NetBeans 7.2.app/Contents/Resources/NetBeans/platform/lib/locale/org-openide-util_ru.jar:/Applications/NetBeans/NetBeans 7.2.app/Contents/Resources/NetBeans/platform/lib/locale/org-openide  
r:/Library/Java/JavaVirtualMachines/jdk1.7.0_07.jdk/Contents/Home/lib/dt.jar:/Library/Java/JavaVirtualMachines/jdk1.7.0_07.jdk/Contents/Home/lib/tools.jar -Dnetbeans.default_userdir_root=/Us  
y/Application Support/NetBeans -Dnetbeans.system_http_proxy=DIRECT -Dnetbeans.system_http_non_proxy_hosts= -Dnetbeans.dirs=/Applications/NetBeans/NetBeans 7.2.app/Contents/Resources/NetBeans  
ons/NetBeans/NetBeans 7.2.app/Contents/Resources/NetBeans/ergonomics:/Applications/NetBeans/NetBeans 7.2.app/Contents/Resources/NetBeans/ide:/Applications/NetBeans/NetBeans 7.2.app/Contents/  
eans/java:/Applications/NetBeans/NetBeans 7.2.app/Contents/Resources/NetBeans/apisupport:/Applications/NetBeans/NetBeans 7.2.app/Contents/Resources/NetBeans/webcommon:/Applications/NetBeans/  
pp/Contents/Resources/NetBeans/websvccommon:/Applications/NetBeans/NetBeans 7.2.app/Contents/Resources/NetBeans/enterprise:/Applications/NetBeans/NetBeans 7.2.app/Contents/Resources/NetBeans  
lications/NetBeans/NetBeans 7.2.app/Contents/Resources/NetBeans/profiler:/Applications/NetBeans/NetBeans 7.2.app/Contents/Resources/NetBeans/python:/Applications/NetBeans/NetBeans 7.2.app/Co  
es/NetBeans/php:/Applications/NetBeans/NetBeans 7.2.app/Contents/Resources/NetBeans/identity:/Applications/NetBeans/NetBeans 7.2.app/Contents/Resources/NetBeans/harness:/Applications/NetBean  
.app/Contents/Resources/NetBeans/cnd:/Applications/NetBeans/NetBeans 7.2.app/Contents/Resources/NetBeans/dlight:/Applications/NetBeans/NetBeans 7.2.app/Contents/Resources/NetBeans/groovy:/Ap  
Beans/NetBeans 7.2.app/Contents/Resources/NetBeans/extrax:/Applications/NetBeans/NetBeans 7.2.app/Contents/Resources/NetBeans/javacard:/Applications/NetBeans/NetBeans 7.2.app/Contents/Resources/  
vafx: -Dnetbeans.home=/Applications/NetBeans/NetBeans 7.2.app/Contents/Resources/NetBeans/platform -Dcom.apple.mrj.application.apple.menu.about.name=NetBeans -Xdock:name=NetBeans -Xdock:icon  
/NetBeans/NetBeans 7.2.app/Contents/MacOS/..../Resources/NetBeans/bin/..../nb/netbeans.icns -Dnetbeans.importclass=org.netbeans.upgrade.AutoUpgrade -Dnetbeans.accept_license_class=org.netbeans.l  
icense -XX:MaxPermSize=384m -Xmx768m -client -Xss2m -Xms32m -XX:PermSize=32m -Dapple.laf.useScreenMenuBar=true -Dapple.awt.graphics.UseQuartz=true -Dsun.java2d.noddraw=true -Dsun.zip.disable  
true -XX:+HeapDumpOnOutOfMemoryError -XX:HeapDumpPath=/Users/ags/Library/Application Support/NetBeans/7.2/var/log/heapdump.hprof org.netbeans.Main --userdir /Users/ags/Library/Application Su  
/7.2 --cachedir /Users/ags/Library/Caches/NetBeans/7.2 --branding nb  
ags      27064  0.0  1.0  3497972 120308 s001  S+  12:05AM  1:19.96 /usr/bin/java -Xmx512M -XX:MaxPermSize=256M -jar /usr/local/Cellar/sbt/0.12.0/libexec/sbt-launch.jar  
ags      15960  0.0  0.0  2433432  512 ?? S   Wed01AM  0:00.06 /bin/bash /Applications/NetBeans/NetBeans 7.2.app/Contents/MacOS/..../Resources/NetBeans/bin/..../platform/lib/nbexec  
ers/ags/Library/Application Support/NetBeans/7.2 --cachedir /Users/ags/Library/Caches/NetBeans/7.2 --jdkhome -J-Dcom.apple.mrj.application.apple.menu.about.name=NetBeans -J-Xdock:name=NetBe  
con=/Applications/NetBeans/NetBeans 7.2.app/Contents/MacOS/..../Resources/NetBeans/bin/..../nb/netbeans.icns --branding nb --clusters /Applications/NetBeans/NetBeans 7.2.app/Contents/Resources/N  
plications/NetBeans/NetBeans 7.2.app/Contents/Resources/NetBeans/ergonomics:/Applications/NetBeans/NetBeans 7.2.app/Contents/Resources/NetBeans/ide:/Applications/NetBeans/NetBeans 7.2.app/Co  
es/NetBeans/java:/Applications/NetBeans/NetBeans 7.2.app/Contents/Resources/NetBeans/apisupport:/Applications/NetBeans/NetBeans 7.2.app/Contents/Resources/NetBeans/webcommon:/Applications/Ne  
s 7.2.app/Contents/Resources/NetBeans/websvccommon:/Applications/NetBeans/NetBeans 7.2.app/Contents/Resources/NetBeans/enterprise:/Applications/NetBeans/NetBeans 7.2.app/Contents/Resources/N  
ty:/Applications/NetBeans/NetBeans 7.2.app/Contents/Resources/NetBeans/profiler:/Applications/NetBeans/NetBeans 7.2.app/Contents/Resources/NetBeans/python:/Applications/NetBeans/NetBeans 7.2.  
Resources/NetBeans/php:/Applications/NetBeans/NetBeans 7.2.app/Contents/Resources/NetBeans/identity:/Applications/NetBeans/NetBeans 7.2.app/Contents/Resources/NetBeans/harness:/Applications/  
ans 7.2.app/Contents/Resources/NetBeans/cnd:/Applications/NetBeans/NetBeans 7.2.app/Contents/Resources/NetBeans/dlight:/Applications/NetBeans/NetBeans 7.2.app/Contents/Resources/NetBeans/gro  
ons/NetBeans/NetBeans 7.2.app/Contents/Resources/NetBeans/extrax:/Applications/NetBeans/NetBeans 7.2.app/Contents/Resources/NetBeans/javacard:/Applications/NetBeans/NetBeans 7.2.app/Contents/  
eans/javafx: -J-Dnetbeans.importclass=org.netbeans.upgrade.AutoUpgrade -J-Dnetbeans.accept_license_class=org.netbeans.license.AcceptLicense -J-XX:MaxPermSize=384m -J-Xmx768m -J-client -J-Xss  
-J:PermSize=32m -J-Dapple.laf.useScreenMenuBar=true -J-Dapple.awt.graphics.UseQuartz=true -J-Dsun.java2d.noddraw=true -J-Dsun.zip.disableMemoryMapping=true -psn_0_2572916  
ags      1591   0.0  1.9  4081832 245000 ?? S   Mon11PM  3:41.26 /usr/bin/java -Djava.library.path=bin/jsw/lib -classpath bin/jsw/lib/wrapper-3.2.3.jar:./lib/appcontext-3.2.jar:  
vlet-api-3.0.1.jar:./lib/jetty-continuation-8.1.3.v20120416.jar:./lib/jetty-deploy-8.1.3.v20120416.jar:./lib/jetty-http-8.1.3.v20120416.jar:./lib/jetty-io-8.1.3.v20120416.jar:./lib/jetty-jmx  
16.jar:./lib/jetty-rewrite-8.1.3.v20120416.jar:./lib/jetty-security-8.1.3.v20120416.jar:./lib/jetty-server-8.1.3.v20120416.jar:./lib/jetty-servlet-8.1.3.v20120416.jar:./lib/jetty-util-8.1.3.
```

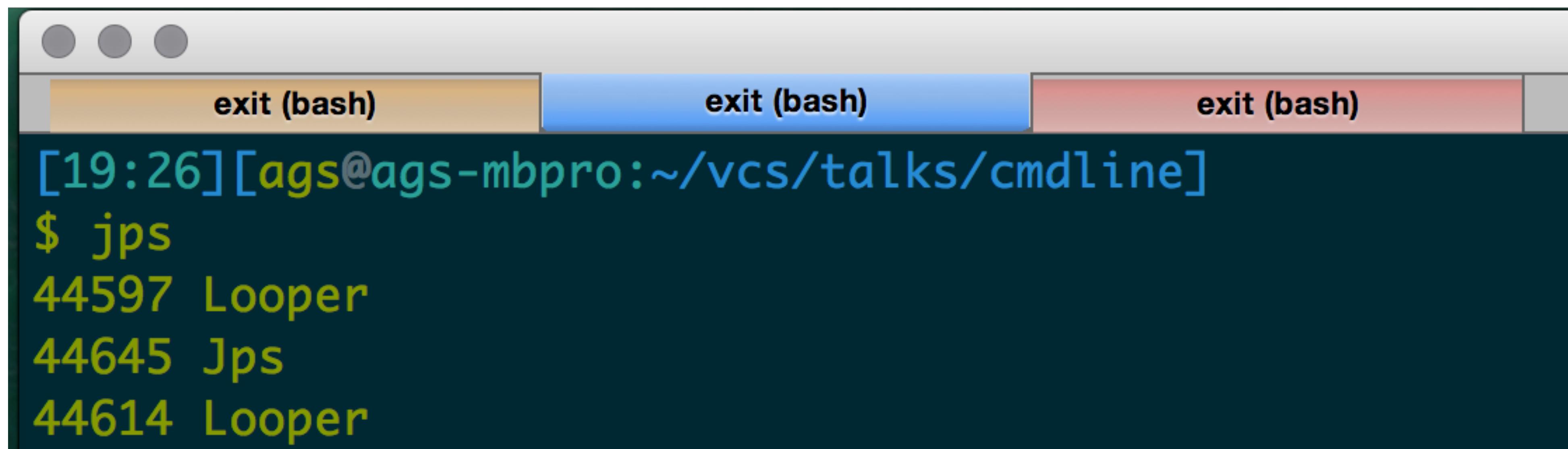
every known problem becomes completely new
when you add “in Java”

jps

instead of ps

jps

instead of ps



```
[19:26][ags@ags-mbpro:~/vcs/talks/cmdline]
$ jps
44597 Looper
44645 Jps
44614 Looper
```

jps -lvm

Java **P**rocesse**S** **L**oVe **M**emory

[19:28] [ags@ags-mbpro:~/vcs/talks/cmdline]
\$ jps -lvm
44841 sun.tools.jps.Jps -lvm -Dapplication.home=/Library/Java/JavaVirtualMachines/jdk1.8.0_60
44714 pl.agsLooper param1 param2 -Xloggc:gc.log -XX:+PrintGCDetails -XX:+PrintGCDateStamps
44732 pl.agsLooper param1 param2 -Xloggc:gc.log -XX:+PrintGCDetails -XX:+PrintGCDateStamps

[19:28] **main class** ~ / vcs / talks / cmdline [19:28] **params** ~ / vcs / talks / cmdline [19:28] **flags** ~ / vcs / talks / cmdline

```
$ jps -lvm
44841 sun.tools.jps.Jps -lvm -Dapplication.home=/Library/Java/JavaVirtualMachines/jdk1.8.0_60
44714 pl.ags.looper param1 param2 -Xloggc:gc.log -XX:+PrintGCDetails -XX:+PrintGCDateStamps
44732 pl.ags.looper param1 param2 -Xloggc:gc.log -XX:+PrintGCDetails -XX:+PrintGCDateStamps
[19:28] [ags@ags-mbpro:~/vcs/talks/cmdline]
```



DevOps Borat
@DEVOPS_BORAT



Following

Average length of Java one-liner is 21 line!



Reply



Retweet



Favorite

jar

jar -tf

```
[11:13][ags@ags-mbpro:~/m2/repository]
$ find ~/m2/repository/ -name "*.jar" | head -1 | xargs jar -tf
META-INF/
META-INF/MANIFEST.MF
META-INF/maven/
META-INF/plexus/
org/
org/apache/
org/apache/maven/
org/apache/maven/plugin/
org/apache/maven/plugin/antrun/
org/apache/maven/plugin/antrun/components/
META-INF/LICENSE
META-INF/maven/plugin.xml
META-INF/NOTICE
META-INF/plexus/components.xml
org/apache/maven/plugin/antrun/AbstractAntMojo.class
org/apache/maven/plugin/antrun/AntPropertyHelper.class
org/apache/maven/plugin/antrun/AntRunMojo.class
org/apache/maven/plugin/antrun/components/AntTargetConverter.class
org/apache/maven/plugin/antrun/HelpMojo.class
META-INF/maven/org.apache.maven.plugins/
META-INF/maven/org.apache.maven.plugins/maven-antrun-plugin/
META-INF/maven/org.apache.maven.plugins/maven-antrun-plugin/pom.xml
META-INF/maven/org.apache.maven.plugins/maven-antrun-plugin/pom.properties
```

javac

javac

just the compiler

javap

```
1 package pl.ags;
2
3 public class Looper {
4
5     private static final int DELAY = 20;
6     private static final String JAVAZONE = "Awesome";
7
8     public static void main(String[] args) throws Exception {
9         for(int i=0; i< 100; i++) {
10             System.out.println(i);
11             int[] a = new int[1024*1024];
12             Thread.sleep(DELAY * i);
13             a = null;
14     }
15 }
16
17 }
18
```

```
$ clear && javap -v pl.agsLooper.class  
Classfile /Users/ags/vcs/talks/cmdline/pl.agsLooper.class  
Last modified 09-Sep-2015; size 679 bytes ← just in case ;)  
MD5 checksum 7e6d9b22b35dfd1a2a681c264cb02481  
Compiled from "Looper.java"  
public class pl.agsLooper  
    minor version: 0 ← java 1.8  
    major version: 52  
    flags: ACC_PUBLIC, ACC_SUPER  
Constant pool:  
#1 = Methodref           #7.#26          // java/lang/Object."<init>":()V  
#2 = Fieldref             #27.#28         // java/lang/System.out:Ljava/io/PrintStream;  
#3 = Methodref           #29.#30         // java/io/PrintStream.println:(I)V  
#4 = Integer              1048576  
#5 = Class                #31             // pl.agsLooper  
#6 = Methodref           #32.#33         // java/lang/Thread.sleep:(J)V  
#7 = Class                #34             // java/lang/Object  
#8 = Utf8                 DELAY  
#9 = Utf8                 I  
#10 = Utf8                ConstantValue  
#11 = Integer              20  
#12 = Utf8                JAVAZONE ← constant value used during compilation  
#13 = Utf8                Ljava/lang/String;  
#14 = String               #35             // Awesome
```

jinfo

demo

```
[11:48][ags@ags-mbpro:~/vcs/talks/cmdline]
$ jinfo -flags 58808
Attaching to process ID 58808, please wait...
Debugger attached successfully.
Server compiler detected.
JVM version is 25.60-b23
Non-default VM flags: -XX:CICompilerCount=4 -XX:InitialHeapSize=268435456 -XX:MaxHeapSize=4294967296 -XX:MaxNewSize=
XX:MinHeapDeltaBytes=524288 -XX:NewSize=89128960 -XX:OldSize=179306496 -XX:+PrintGC -XX:+PrintGCDates -XX:+Pri
XX:+PrintGCTimeStamps -XX:+UseCompressedClassPointers -XX:+UseCompressedOops -XX:+UseFastUnorderedTimeStamps -XX:+Us
Command line: -Xloggc:gc.log -XX:+PrintGCDetails -XX:+PrintGCDates
[11:48][ags@ags-mbpro:~/vcs/talks/cmdline]
$ jinfo -flag PrintGCTimeStamps 58808
-XX:+PrintGCTimeStamps
[11:48][ags@ags-mbpro:~/vcs/talks/cmdline]
$ jinfo -flag PrintGCTimeStamps=1 58808
[11:48][ags@ags-mbpro:~/vcs/talks/cmdline]
$ jinfo -flag PrintGCTimeStamps 58808
-XX:+PrintGCTimeStamps
[11:48][ags@ags-mbpro:~/vcs/talks/cmdline]
$
```

see all the flags

or just a specific one

some can even be changed!

jmap

instead of pmap

1. exit

exit (bash)

exit (vim)

exit (bash)

java

```
1#!/bin/bash
2process=`jps | grep Looper | head -1 | cut -d" " -f1` 
3file="heap_`date +%s`.bin"
4echo "Dumping from ${process} into ${file}"
5jmap -dump:live,format=b,file=${file} ${process}
```

~

and jhat

demo

stacktraces :)

kill -3 <pid>

demo

caveat ;-)

caveat ;-)

prints to STDOUT of the running process

jstack

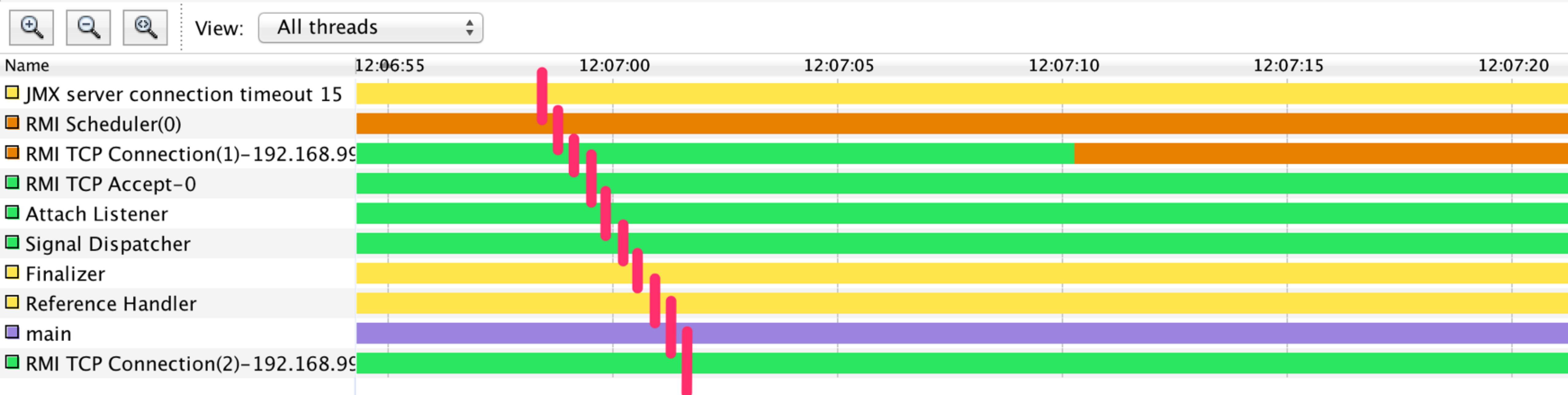
it's not like this ;(

Name	12:06:40	12:06:45	12:06:50	12:06:55	12:07:00	12:0	Running	Total
Image Fetcher 0	0 ms (0%)	5,006 ms						
pool-7-thread-1	0 ms (0%)	25,031 ms						
Attach Listener	25,031 ms (100%)	25,031 ms						
Default RequestProcessor	4,003 ms (16%)	25,031 ms						
JMX client heartbeat 3	0 ms (0%)	25,031 ms						
RMI RenewClean-[192.168.99.1:50]	0 ms (0%)	25,031 ms						
pool-6-thread-1	0 ms (0%)	25,031 ms						
pool-4-thread-1	0 ms (0%)	25,031 ms						
JMX client heartbeat 2	0 ms (0%)	25,031 ms						
RMI Scheduler(0)	0 ms (0%)	25,031 ms						
GC Daemon	0 ms (0%)	25,031 ms						
RMI RenewClean-[192.168.99.1:50]	0 ms (0%)	25,031 ms						
pool-2-thread-1	0 ms (0%)	25,031 ms						
Timer-0	997 ms (4%)	25,031 ms						
Inactive RequestProcessor thread [V	3,002 ms (12%)	25,031 ms						
Thread-1	0 ms (0%)	25,031 ms						
Inactive RequestProcessor thread [V	9,016 ms (36%)	25,031 ms						
DestroyJavaVM	25,031 ms (100%)	25,031 ms						
TimerQueue	0 ms (0%)	25,031 ms						
File Watcher	0 ms (0%)	25,031 ms						
Inactive RequestProcessor thread [V	16,025 ms (64%)	25,031 ms						
AWT-EventQueue-0	16,017 ms (64%)	25,031 ms						
Java2D Disposer	0 ms (0%)	25,031 ms						
Java2D Queue Flusher	0 ms (0%)	25,031 ms						
RequestProcessor queue manager	9,013 ms (36%)	25,031 ms						
Inactive RequestProcessor thread [V	0 ms (0%)	25,031 ms						
AWT-Shutdown	0 ms (0%)	25,031 ms						
AppKit Thread	25,031 ms (100%)	25,031 ms						
CLI Requests Server	25,031 ms (100%)	25,031 ms						
Active Reference Queue Daemon	0 ms (0%)	25,031 ms						
Signal Dispatcher	25,031 ms (100%)	25,031 ms						
Finalizer	0 ms (0%)	25,031 ms						
Reference Handler	0 ms (0%)	25,031 ms						
pool-8-thread-1	0 ms (0%)	21,025 ms						
JMX client heartbeat 5	0 ms (0%)	20,025 ms						

caveats

only at safepoints, one thread at a time

It's more like this



"Reference Handler" #2 daemon prio=10 os_prio=31 tid=0x00007fb85c83c800 nid=0x3303 in Object.wait
java.lang.Thread.State: WAITING (on object monitor)
at java.lang.Object.wait(Native Method)
- waiting on <0x000000076ab06af8> (a java.lang.ref.Reference\$Lock)
at java.lang.Object.wait(Object.java:502)
at java.lang.ref.Reference\$ReferenceHandler.run(Reference.java:157)
- locked <0x000000076ab06af8> (a java.lang.ref.Reference\$Lock)



thread id

demo

jstat

```
jstat <metric> <options> PID <interval> <count>
```

demo

custom options

[http://hg.openjdk.java.net/jdk9/jdk9/jdk/file/d49e247dade6/src/jdk.jcmd/share/
classes/sun/tools/jstat/resources/jstat_options](http://hg.openjdk.java.net/jdk9/jdk9/jdk/file/d49e247dade6/src/jdk.jcmd/share/classes/sun/tools/jstat/resources/jstat_options)

jstatd

jstatd

exposes your processes

jc md

jvisualvm

questions?

@JavaOneConf @ags313 #JavaONE

Thank you!