

# Što kad se (s)ruši ili stane Java aplikacija?

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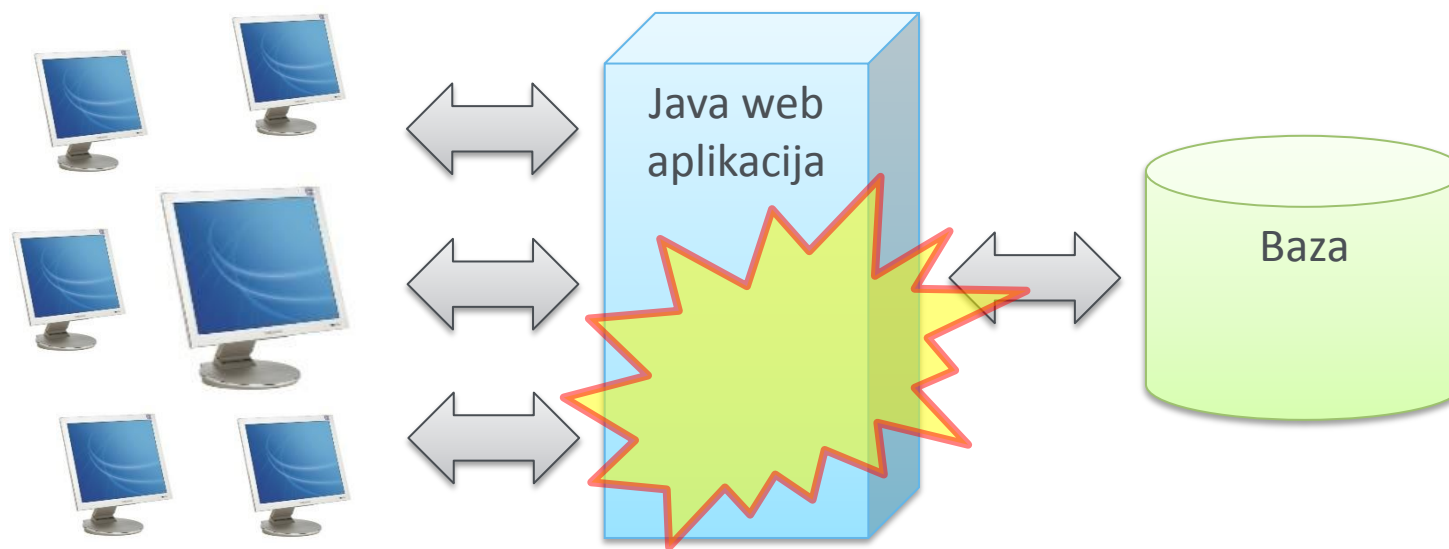


12.05.2015.

POSLOVNE WEB APLIKACIJE



# Java web aplikacije u enterprise okruženju



- › **enterprise okruženje** - veliki broj korisnika
- › **rušenje/zastoj aplikacije** – moguće ozbiljne **posljedice**

# Najčešći razlozi pada Java web aplikacija

- › Pad radi greške na nivou pojedine akcije
  - » česti uzrok: nedostatak granica
  - » prevencija: short term scenariji / unit testovi
- › Pad radi prevelikog opterećenja
  - » prevencija: peak test
- › Pad radi dugoročne anomalije
  - » prevencija : long-term testovi



# Najčešći razlozi pada Java web aplikacija

## Pad radi greške na nivou pojedine akcije

Aggregate Report

Name: Aggregate Report

Comments:

Write results to file / Read from file

Filename:  Browse... LogDisplay Only:  Errors  Successes

Label	# Samples	Average	Median	90% Line	Min	Max	Error %	Throughput	KB/sec
Početna stranica	10	605	603	1052	297	1052	0,00%	5,6/sec	58,4
Logiranje	10	956	920	1284	663	1284	0,00%	4,8/sec	37,5
Otvaranje meni-a	10	845	824	1040	692	1040	0,00%	4,9/sec	68,9
Otvaranje početn...	10	312	225	1328	102	1328	0,00%	3,8/sec	9,9
Otvaranje stanje ...	200	1164	217	3212	85	8931	0,00%	57,1/min	38,4
Pregled računa	200	466	261	777	152	4731	0,00%	57,7/min	4,0
Odabir prometa	200	161	92	209	52	2794	0,00%	58,5/min	,4
Otvaranje prometa	200	1836	390	4803	133	22940	0,00%	58,5/min	50,8
Pregled prometa	200	372	186	586	125	6198	0,00%	58,6/min	5,9
Odabir detalja pr...	200	164	102	188	60	2973	0,00%	59,0/min	,4
Otvaranje detalja ...	200	1956	1363	4949	195	11273	0,00%	59,0/min	64,6
Odnosi po računu	100	990	158	2934	74	7520	0,00%	30,2/min	19,6
Pregled odnosa	100	249	182	397	110	1810	0,00%	30,3/min	,7
Odabir detalja od...	100	178	117	249	75	1419	0,00%	30,4/min	,2
Otvaranje detalja ...	100	3840	2507	7970	639	23361	0,00%	30,3/min	55,9
Otvaranje portfelj...	100	1152	144	2765	80	23989	0,00%	31,0/min	19,4
Pregled portfelja ...	100	513	203	1656	130	5148	0,00%	31,1/min	3,6
Logout	10	346	114	1923	83	1923	0,00%	12,5/min	2,2
TOTAL	2050	950	208	2577	52	23989	0,00%	9,5/sec	250,8

Include group name in label?



# Klasifikacija pada sustava: rušenje ili zastoje?

## RUŠENJE

- › JVM crash

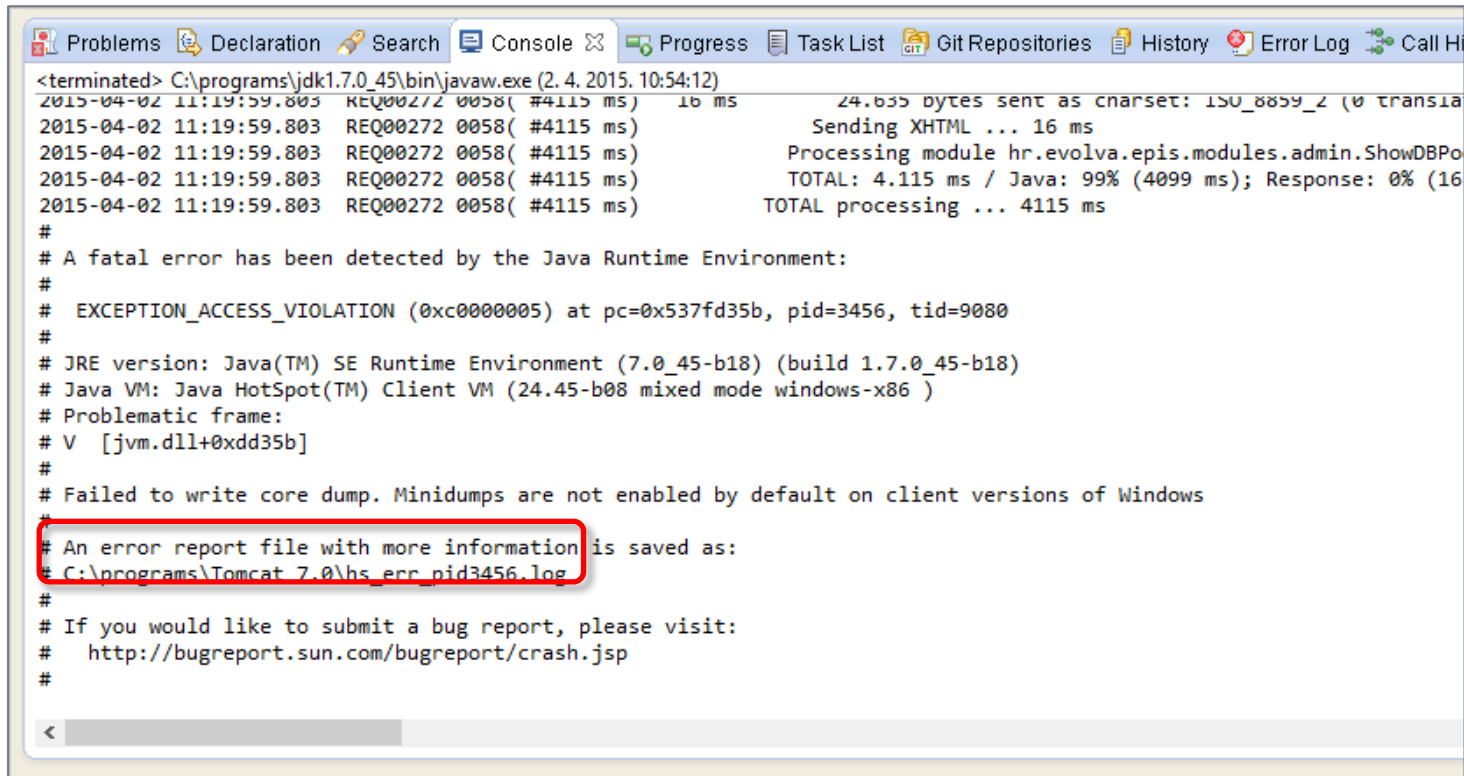
## ZASTOJI

- › Zauzeće resursa
  - » Memorija
  - » Thread pool
  - » Disk
  - » Baza: connection pools, statements, ...
- › Loša sinhronizacija threadova
  - » puno blocked threadova
  - » thread deadlock
- › Mrtva petlja

# JVM crash - analiza



# Situacija: JVM crash



```
<terminated> C:\programs\jdk1.7.0_45\bin\javaw.exe (2. 4. 2015. 10:54:12)
2015-04-02 11:19:59.803 REQ00272 0058( #4115 ms) 16 ms 24.635 bytes sent as charset: ISO_8859_2 (0 transia
2015-04-02 11:19:59.803 REQ00272 0058( #4115 ms) Sending XHTML ... 16 ms
2015-04-02 11:19:59.803 REQ00272 0058( #4115 ms) Processing module hr.evolva.epis.modules.admin.ShowDBPo
2015-04-02 11:19:59.803 REQ00272 0058( #4115 ms) TOTAL: 4.115 ms / Java: 99% (4099 ms); Response: 0% (16
2015-04-02 11:19:59.803 REQ00272 0058( #4115 ms) TOTAL processing ... 4115 ms
#
# A fatal error has been detected by the Java Runtime Environment:
#
# EXCEPTION_ACCESS_VIOLATION (0xc0000005) at pc=0x537fd35b, pid=3456, tid=9080
#
# JRE version: Java(TM) SE Runtime Environment (7.0_45-b18) (build 1.7.0_45-b18)
# Java VM: Java HotSpot(TM) Client VM (24.45-b08 mixed mode windows-x86 )
# Problematic frame:
# V [jvm.dll+0xdd35b]
#
# Failed to write core dump. Minidumps are not enabled by default on client versions of Windows
#
# An error report file with more information is saved as:
# C:\programs\Tomcat 7.0\hs_err_pid3456.log
#
# If you would like to submit a bug report, please visit:
# http://bugreport.sun.com/bugreport/crash.jsp
#
```

- › hs\_err\_pid\*.log datoteku kreira JVM kod rušenja
- › na vrhu je razlog

## Situacija: JVM crash

### Gdje je file?

- › datoteka je locirana gdje je pokrenut JVM proces
- › ako je u pitanju bio Windows servis, onda može završiti u C:\Windows\System32 (za 32bit)
- › Java 6+:
  - › -XX:ErrorFile=./hs\_err\_pid<pid>.log

### Uzrok?

- › ako koristite native kod – vrlo vjerojatno poziv vanjske native funkcije
- › ako ne koristite – onda JVM bug – prijaviti grešku i uzeti novi JDK

```
Stack: [0x210c0000,0x21110000], sp=0x2110f8c4, free space=318k
Native frames: (J=compiled Java code, j=interpreted, Uv=VM code, C=native code)
U [jvm.dll+0xdd35b]
U [jvm.dll+0x20e04a]
C [jdpw.dll+0x19d9d]
C [jdpw.dll+0x44e0]
C [jdpw.dll+0x451e]
```



# DEMO: JVM crash – native code

SampleBadStuffDemo x +

localhost:9080/evolution\_framework/app?module=com.evolutionframework.samples.SampleBadStuffDemo

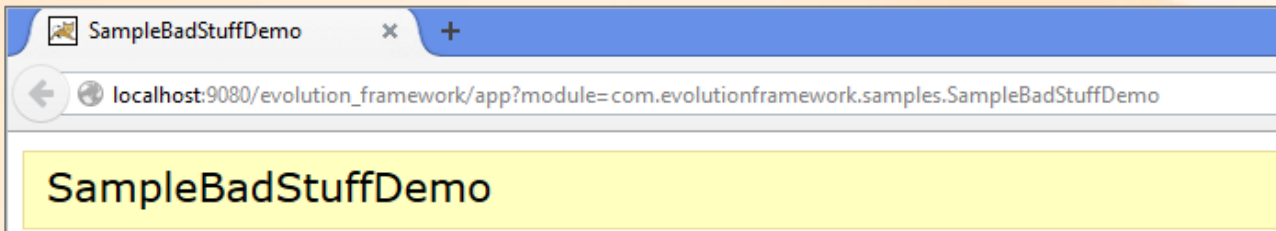
## SampleBadStuffDemo

### Java heap space

Creates instances of String objects, will cause:  
**java.lang.OutOfMemoryError: Java heap space**

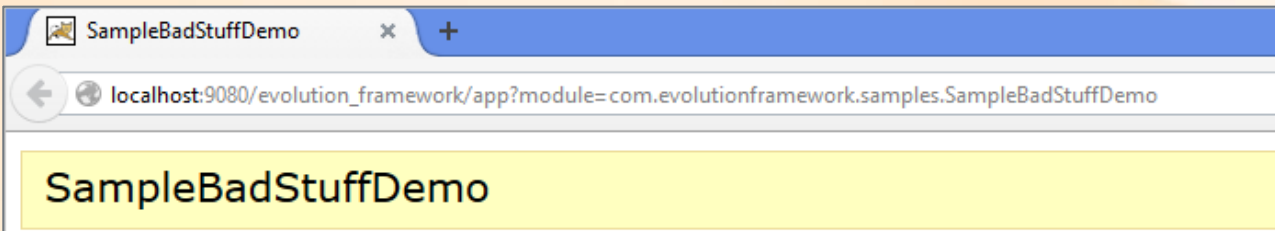
Number of loops

### JNI



```
SampleBadStuffDemo.java
148 @Override
149 public void btnCall_crash_jvm_onClick() throws Exception {
150
151     log("Creating CrashDemo object");
152     CrashDemo demo = new CrashDemo();
153
154     log("Java: Running crashJVM");
155     demo.crashJVM();
156
157     log("Java: Running crashJVM - it will never reach here");
158 }
159

CrashDemo.java
1 package com.evolutionframework.samples;
2
3 public class CrashDemo {
4
5     public native void crashJVM();
6
7     public native void java2jni();
8
9     public void native2java() {
10         System.out.println("jni2java test");
11     }
12 }
```

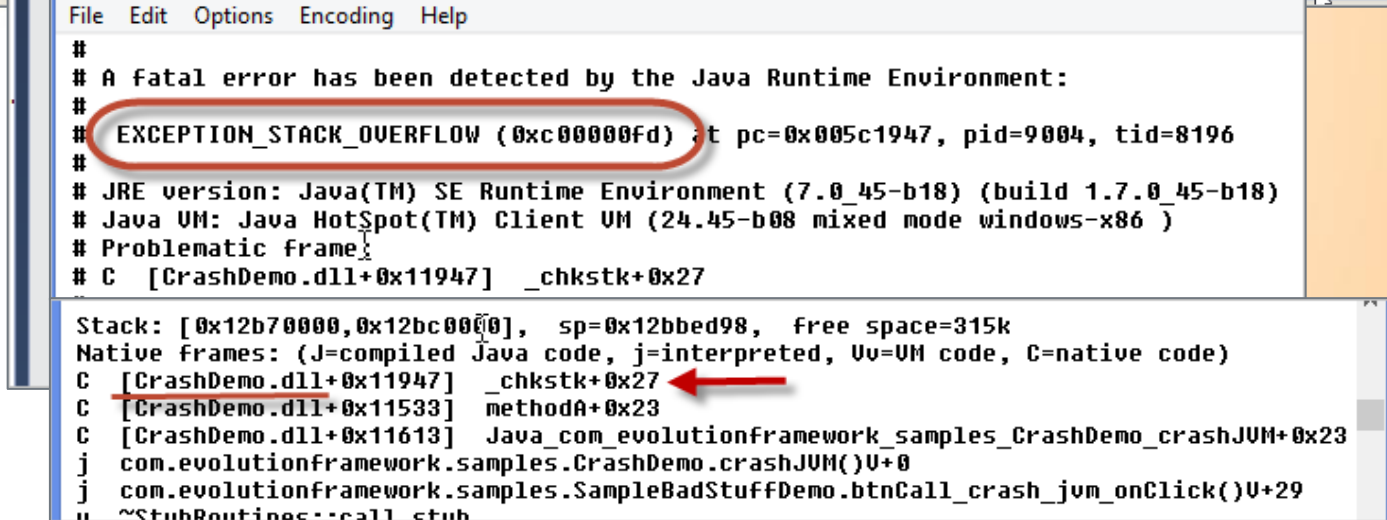
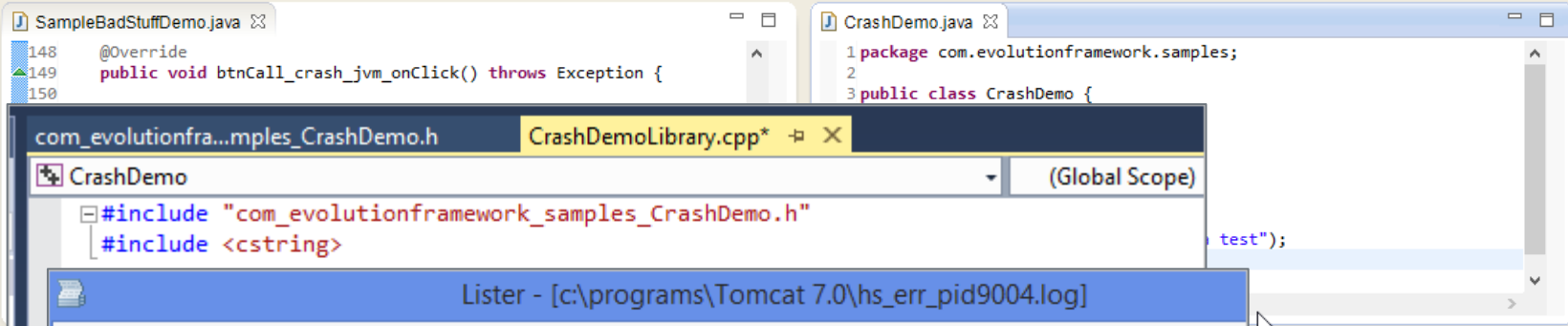
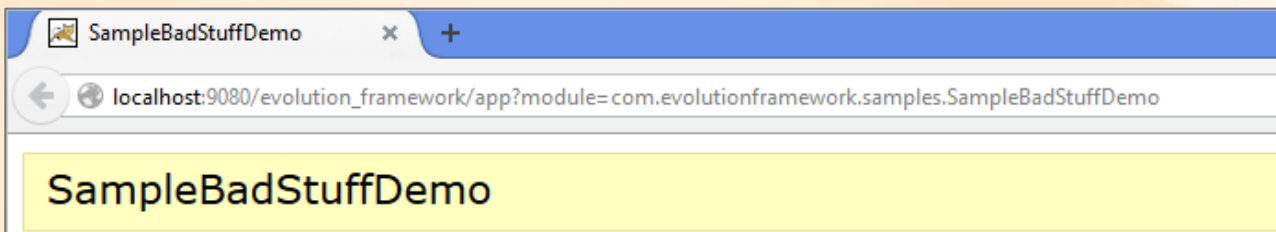


```
SampleBadStuffDemo.java
148 @Override
149 public void btnCall_crash_jvm_onClick() throws Exception {
150

CrashDemo.java
1 package com.evolutionframework.samples;
2
3 public class CrashDemo {

com_evolutionfra...mples_CrashDemo.h  CrashDemoLibrary.cpp*
CrashDemo (Global Scope)
#include "com_evolutionframework_samples_CrashDemo.h"
#include <cstring>

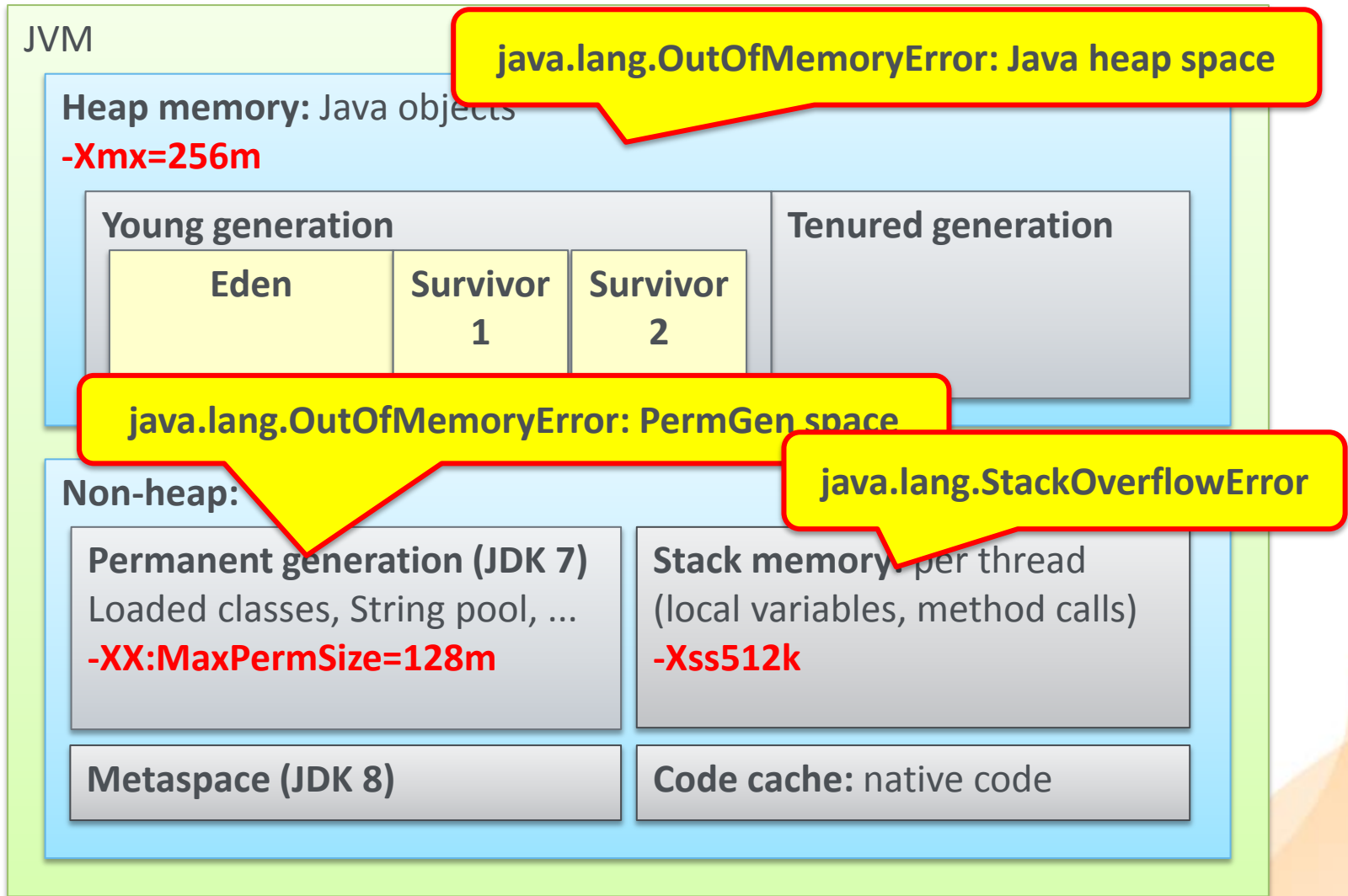
void methodB() {
    double x[100000000];
}
void methodA() {
    methodB();
}
JNIEXPORT void JNICALL Java_com_evolutionframework_samples_CrashDemo_crashJVM(JNIEnv
    methodA();
}
```



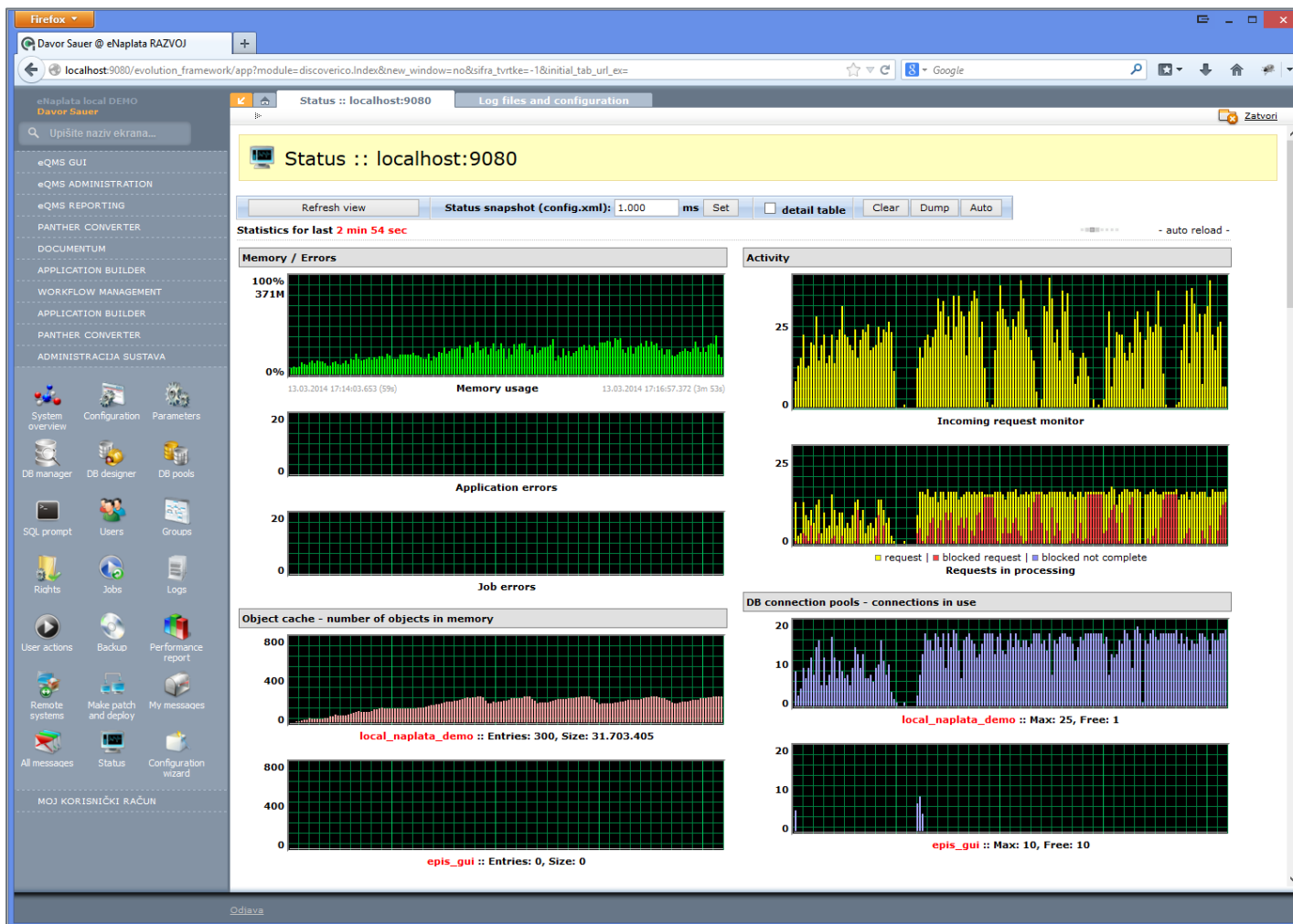
# Analiza memorije



# Struktura memorije JVM-a



# Potrošnja memorije u usporedbi s ostalim





# Potrošnja memorije u usporedbi s ostalim

The screenshot shows a web application monitoring interface. The top part displays a status bar for 'localhost:9080' with a 'Status snapshot (config.xml): 1.000 ms' and a 'Statistics for last 2 min 54 sec' section. Below this are two graphs: 'Memory / Errors' showing a green bar chart with a peak at 371M, and 'Activity' showing a yellow bar chart with a peak at 25. The bottom part of the screenshot is a 'Show memory details' window with a table of memory pools.

#	Memory pool	Memory area type	Usage / peak / collections
1	Code Cache	NON_HEAP	USAGE: ..... init = 163840 (160K) used = 7147456 (6979K) committed = 7176192 (7008K) max = 33554432 (32768K) PEAK: ..... init = 163840 (160K) used = 7147456 (6979K) committed = 7176192 (7008K) max = 33554432 (32768K) COLLECTIONS: null
2	Eden Space	HEAP	USAGE: ..... init = 4521984 (4416K) used = 11418072 (11150K) committed = 16777216 (16384K) max = 143130624 (139776K) PEAK: ..... init = 4521984 (4416K) used = 12779520 (12480K) committed = 16777216 (16384K) max = 143130624 (139776K) COLLECTIONS: init = 4521984 (4416K) used = 0 (0K) committed = 12779520 (12480K) max = 143130624 (139776K)
3	Survivor Space	HEAP	USAGE: ..... init = 524288 (512K) used = 0 (0K) committed = 2031616 (1984K) max = 17891328 (17472K) PEAK: ..... init = 524288 (512K) used = 1572864 (1536K) committed = 2031616 (1984K) max = 17891328 (17472K) COLLECTIONS: init = 524288 (512K) used = 0 (0K) committed = 1572864 (1536K) max = 17891328 (17472K)
4	Tenured Gen	HEAP	USAGE: ..... init = 11206656 (10944K) used = 24938720 (24354K) committed = 41566208 (40592K) max = 357957632 (349568K) PEAK: ..... init = 11206656 (10944K) used = 36239256 (35389K) committed = 41566208 (40592K) max = 357957632 (349568K) COLLECTIONS: init = 11206656 (10944K) used = 24938720 (24354K) committed = 36352000 (35500K) max = 357957632 (349568K)
5	Perm Gen	NON_HEAP	USAGE: ..... init = 12582912 (12288K) used = 17890648 (17471K) committed = 18087936 (17664K) max = 67108864 (65536K) PEAK: ..... init = 12582912 (12288K) used = 17890648 (17471K) committed = 18087936 (17664K) max = 67108864 (65536K) COLLECTIONS: init = 12582912 (12288K) used = 17802264 (17385K) committed = 17825792 (17408K) max = 67108864 (65536K)

epis\_gui :: Entries: 0, Size: 0

# Heap dump - analiza

- › Ručno:
  - › %JAVA\_HOME%\bin\jmap -dump:format=b, file=d:\manual\_heap\_dump.bin <pid>
- › Automatski:
  - › -XX:+HeapDumpOnOutOfMemoryError
  - › -XX:HeapDumpPath=D:\auto\_heap\_dump.bin
- › Oracle JDK
  - › heapdump file: \*.bin, \*.hprof
  - › Eclipse Memory Analyzer Toolkit:
    - › <http://www.eclipse.org/mat/>
  - › Visual VM:
    - › <http://visualvm.java.net/>
- › IBM WebSphere
  - › javacore file - \*.phd (portable heap dump)
  - › IBM HeapAnalyzer
    - › <https://www.ibm.com/developerworks/community/groups/service/html/communityview?communityUuid=4544bafec7a2-455f-9d43-eb866ea60091>

SampleBadStuffDemo

localhost:9080/evolution\_framework/app?module=com.evolutionframework.samples.SampleBadStuffDemo

## SampleBadStuffDemo

### Java heap space

Creates instanced of String objects, will cause:  
**java.lang.OutOfMemoryError: Java heap space**

Number of loops

### JNI

```

2015-04-28 22:35:08.528 REQ00026 0034( #169 ms) 3 ms Invoking .btnOutOfMemory_onClick() (start)
2015-04-28 22:35:08.529 REQ00026 0034( #170 ms) 1 ms 0 ... 18.777.824 of 129.761.280
2015-04-28 22:35:08.725 REQ00026 0034( #366 ms) 196 ms 5.000.000 ... 41.788.504 of 129.761.280
2015-04-28 22:35:08.900 REQ00026 0034( #540 ms) 174 ms 10.000.000 ... 39.232.600 of 129.761.280
java.lang.OutOfMemoryError: Java heap space
Dumping heap to d:\_demo\auto_heap_dump.bin ...
Heap dump file created [67683802 bytes in 0.345 secs]
java.lang.OutOfMemoryError: Java heap space
    at java.util.Arrays.copyOf(Arrays.java:2245)
    at java.util.Arrays.copyOf(Arrays.java:2219)
    at java.util.Vector.grow(Vector.java:262)
    at java.util.Vector.ensureCapacityHelper(Vector.java:242)

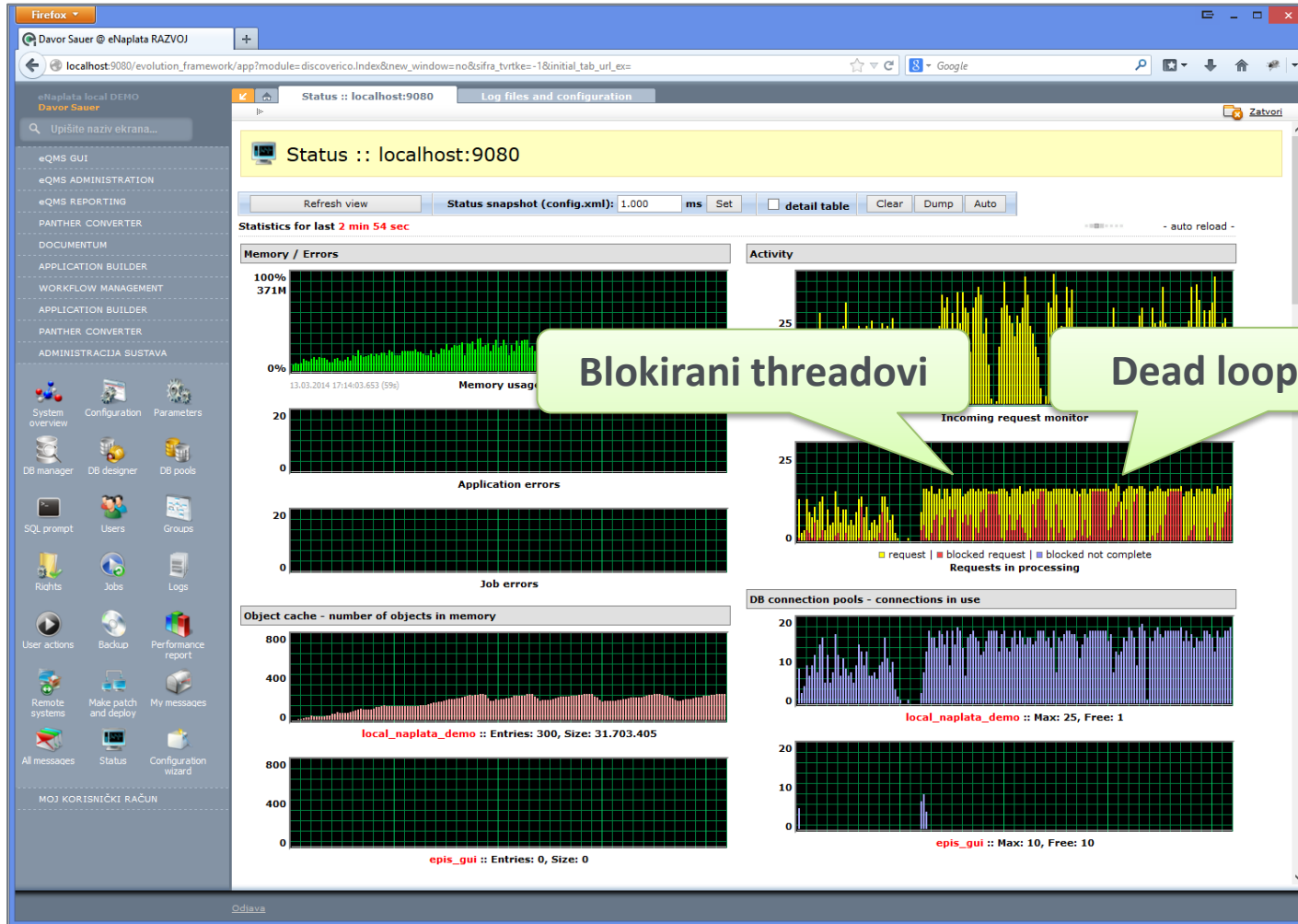
```



# Analiza threadova



# Praćenje threadova – blokade / dead loop



# Praćenje threadova - vizualno

**Tomcat (pid 12028)**

Threads visualization:  Threads visualization

Live threads: 43  
Daemon threads: 42

Thread Dump

Timeline View: All threads

Name	02:53:50	02:53:55	Running	Total
hr.evolve.epis.modules.objectcad			0 ms (0%)	27.999 ms
hr.evolve.epis.modules.objectcad			0 ms (0%)	27.999 ms
hr.evolve.epis.jobs.SystemStatisti			0 ms (0%)	27.999 ms
hr.evolve.epis.jobs.SessionCleane			0 ms (0%)	27.999 ms
http-bio-9080-exec-24			6.005 ms (21,4%)	27.999 ms
http-bio-9080-exec-23			0 ms (0%)	27.999 ms
http-bio-9080-exec-22			6.005 ms (21,4%)	27.999 ms
http-bio-9080-exec-21			6.005 ms (21,4%)	27.999 ms
http-bio-9080-exec-20			6.005 ms (21,4%)	27.999 ms
http-bio-9080-exec-19			6.005 ms (21,4%)	27.999 ms
http-bio-9080-exec-18			6.005 ms (21,4%)	27.999 ms
http-bio-9080-exec-17			0 ms (0%)	27.999 ms
http-bio-9080-exec-16			0 ms (0%)	27.999 ms
http-bio-9080-exec-15			0 ms (0%)	27.999 ms
RMI Scheduler(0)			0 ms (0%)	27.999 ms
RMI TCP Accept-0			27.999 ms (100%)	27.999 ms
ajp-bio-9009-AsyncTimeout			0 ms (0%)	27.999 ms
ajp-bio-9009-Acceptor-0			27.999 ms (100%)	27.999 ms

Legend: Running (Green), Sleeping (Purple), Wait (Yellow), Park (Orange), Monitor (Red)

# Praćenje threadova - pretraživanje

Remember

## Thread management

### Thread management

**Filter**

Name filter:

Stacktrace filter:

Exclude filter:

Show expanded:  ▼

Requests: 1

ID	Duration	Database	Module	User	Start	Info	Stop
1. REQ#568	7 ms	local_jadransko	admin.ShowCurrentRequests	-2 SYSADMIN	28.04.2015 02:55:28		<input type="button" value="Stop"/>

18 listed threads - Total threads: 33 of 33

ID	State	Name/Class/Stacktrace	ID	Priority	Alive	Daemon	Interrupted
1.	<b>RUNABLE</b>	<b>http-bio-9080-exec-16</b> ▼ org.apache.tomcat.util.threads.TaskThread java.lang.Thread.getStackTrace(Thread.java:1588) hr.evolva.epis.modules.admin.ShowCurrentRequests.on_before_map(ShowCurrentRequests.java:155) hr.evolva.epis.servlet.ActionModule.obradiZahtjev(ActionModule.java:236) hr.evolva.epis.servlet.Application.forwardToModule(Application.java:1388) hr.evolva.epis.servlet.Application.forwardToModule(Application.java:1198) hr.evolva.epis.servlet.Application.handleRequest(Application.java:882) hr.evolva.epis.servlet.AppServlet.doPost(AppServlet.java:73) javax.servlet.http.HttpServlet.service(HttpServlet.java:641) javax.servlet.http.HttpServlet.service(HttpServlet.java:722) org.apache.catalina.core.ApplicationFilterChain.internalDoFilter(ApplicationFilterChain.java:305) org.apache.catalina.core.ApplicationFilterChain.doFilter(ApplicationFilterChain.java:210) org.apache.catalina.core.StandardWrapperValve.invoke(StandardWrapperValve.java:222) org.apache.catalina.core.StandardContextValve.invoke(StandardContextValve.java:123) org.apache.catalina.authenticator.AuthenticatorBase.invoke(AuthenticatorBase.java:472) org.apache.catalina.core.StandardHostValve.invoke(StandardHostValve.java:168) org.apache.catalina.valves.ErrorReportValve.invoke(ErrorReportValve.java:99) org.apache.catalina.valves.AccessLogValve.invoke(AccessLogValve.java:929) org.apache.catalina.core.StandardEngineValve.invoke(StandardEngineValve.java:118)	147	5	true	true	false



# Praćenje threadova - uzorkovanje

Token [host\_port] is available, e.g. myapp\_[host\_port]

**Log file rotation (changes require restart of application)**

By size

Switch size:  bytes

Max files:  (-1 to turn off rotation)

By day (no automatic cleanup of old files - delete them manually!)

**System statistics and thread dumps**

SystemStatisticsJob is memory job that is doing following:

- logging of system statistics to "[prefix]\_statistics.log" file in form of XML elements
- logging of system statistics to memory array visible on System status screen
- logging of thread dump and DB connection thread dump to [prefix]\_memory\_SystemStatisticsJob\_details.log file if enabled

9. **SystemStatisticsJob** memory\_1

10. **JobObjectSaver** memory\_2

11. **JobObjectSaver** memory\_3 epis\_gui

12. **CommandProcessorJob** epis\_gui\_138 epis\_gui

Sleep time: 1 sec 28.04.2015 02:34:38 28.04.2015 Not finished Logs: 39 MB

- epis\_memory\_1\_SystemStatisticsJob\_details-2015-04-28-02-10-17-180.log 2.000.094 bytes
- epis\_memory\_1\_SystemStatisticsJob\_details-2015-04-28-02-38-30-959.log 2.000.102 bytes
- epis\_memory\_1\_SystemStatisticsJob\_details.log 332.445 bytes
- epis\_memory\_1\_SystemStatisticsJob\_error.log 0 bytes
- epis\_memory\_1\_SystemStatisticsJob\_summary.log 14.592 bytes

SystemStatisticsJob which will dump threads to SystemStatisticsJob log file. Job actually makes sleep pauses using **Job sleep** parameter above and checks each time if **Job dump sleep** time is reached to dump threads. **Job dump sleep** should therefore have bigger value than **Job sleep**.

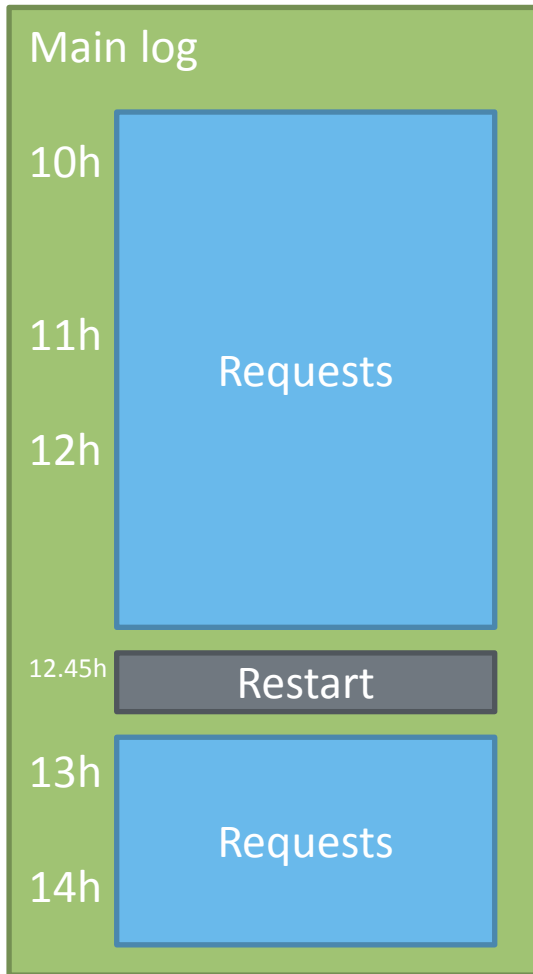
# Logging

## Orphan requests

## Log extractor



# Struktura loga



- › main log:
  - › **bilježiti requeste:**
    - › u svakoj liniji identifikator requesta
    - › početak requesta
    - › detalje
    - › kraj requesta
  - › **bilježiti (re)start sustava**
- › To omogućava pronalazak dugih i problematičnih requesta



# DEMO:

## Orphan log analyser

Orphan log analyzer

System overview » Orphan log analyzer

Absolute folder: d:\EPIS\_products\GUI\Marketing\2015-05 JavaCro 2015\orphan logs

File prefix: epis\_main

Min long request duration (ms): 5000

Max orphans:

Max long requests:

Find files

Retci 1 .. 10 od 21

#	Filename	File size	First line
1	<input type="checkbox"/> epis_main-2014-09-12-10-01-05-909.log	20.000.171 bytes	2014-09-12 08:37:38.164 DELETING LOG FILE: /opt/evolva/epis_logs/epis_main-2014-09-08-15-30-58-638....
2	<input type="checkbox"/> epis_main-2014-09-12-11-16-29-231.log	20.000.088 bytes	2014-09-12 10:01:05.909 DELETING LOG FILE: /opt/evolva/epis_logs/epis_main-2014-09-09-01-23-24-234....
3	<input type="checkbox"/> epis_main-2014-09-12-12-12-24-281.log	20.000.139 bytes	2014-09-12 11:16:29.232 DELETING LOG FILE: /opt/evolva/epis_logs/epis_main-2014-09-09-10-31-31-134....
4	<input checked="" type="checkbox"/> epis_main-2014-09-12-14-27-16-219.log	20.000.075 bytes	2014-09-12 12:12:24.282 DELETING LOG FILE: /opt/evolva/epis_logs/epis_main-2014-09-09-13-09-01-972....
5	<input checked="" type="checkbox"/> epis_main-2014-09-12-18-40-42-175.log	20.000.322 bytes	2014-09-12 14:27:16.219 DELETING LOG FILE: /opt/evolva/epis_logs/epis_main-2014-09-09-15-15-49-038....
6	<input checked="" type="checkbox"/> epis_main-2014-09-15-09-06-38-611.log	20.000.078 bytes	2014-09-12 18:40:42.176 DELETING LOG FILE: /opt/evolva/epis_logs/epis_main-2014-09-09-16-58-29-176....
7	<input checked="" type="checkbox"/> epis_main-2014-09-15-09-54-02-679.log	20.000.101 bytes	2014-09-15 09:06:38.612 DELETING LOG FILE: /opt/evolva/epis_logs/epis_main-2014-09-10-09-27-46-668....
8	<input type="checkbox"/> epis_main-2014-09-15-10-26-11-300.log	20.000.183 bytes	2014-09-15 09:54:02.698 DELETING LOG FILE: /opt/evolva/epis_logs/epis_main-2014-09-10-10-42-28-763....
9	<input type="checkbox"/> epis_main-2014-09-15-12-49-20-343.log	20.000.167 bytes	2014-09-15 10:26:11.300 DELETING LOG FILE: /opt/evolva/epis_logs/epis_main-2014-09-10-11-05-45-247....
10	<input type="checkbox"/> epis_main-2014-09-15-14-55-33-235.log	20.000.480 bytes	2014-09-15 12:49:20.343 DELETING LOG FILE: /opt/evolva/epis_logs/epis_main-2014-09-10-11-36-32-444....
		<b>Σ 191 MB</b>	

Find orphans

Number of orphans and long requests by server start time

Retci 1 .. 5 od 5

#	Server start time	Orphans	Long requests
1	12.09.2014 12:12:24.282	START	
2	12.09.2014 12:12:24.282	0	56
3	15.09.2014 09:06:12.485	2	24
4	15.09.2014 09:40:57.289	1	11
5	15.09.2014 09:54:02.679	END	

Orphans

Retci 1 .. 3 od 3

#	Server start time	Request ID	Request start time	Last line time	Request duration	Module name	Last line
1	15.09.2014 09:06:12.485	REQ00867	15.09.2014 09:28:37.298	15.09.2014 09:40:37.392	720.094 ms	hr.evolva.epis.modules.iskon.skladista_financijski.gui.IzvjestajTerminalnaOprema	SQL QUERY:
2		REQ00969	15.09.2014 09:33:29.766	15.09.2014 09:40:34.756	424.990 ms	null	SQL QUERY: select right_id from c_user_rights where user_id = 792
3	15.09.2014 09:40:57.289	REQ00669	15.09.2014 09:53:59.827	15.09.2014 09:54:02.663	2.836 ms	null	SQL QUERY: select t.* from wf_tasks t, wf_workflows wf where t.workflow_id=wf.id and wf.k_table_nam...cut...

# Request logging + log extractor

The screenshot displays a web application interface with two main panels. On the left is the 'Request list' panel, and on the right is the 'Log extractor' panel.

**Request list panel:**

- System overview » Request list
- Options for viewing (Razdoblje, Time, Host and port, Module, Module action, Do not show this action, User).
- Grid view | Graphical view
- Retci 1 ... 22 od 22
- Table with columns: Log request ID, [Pon], [2]

**Log extractor panel:**

- System overview » Request list » Log extractor
- Log path and filename: D:\EPIS\_products\GUI\evolution\_framework\WEB-INF\logs\epis\_main.log
- Select file
- Keyword to find: REQ01422
- Limit for bytes found: 300,000
- Find
- Log output showing processing times and request details:

```

2015-04-28 03:24:56.152 REQ01422 0156( #0 ms) TOTAL processing (start)
2015-04-28 03:24:56.152 REQ01422 0156( #0 ms) -----
2015-04-28 03:24:56.152 REQ01422 0156( #0 ms) --- NEW GET REQUEST >> module = admin.SystemArchitecture
2015-04-28 03:24:56.152 REQ01422 0156( #0 ms) --- app: hr.evolveva.epis.servlet.Application@7d8f39; servlet: hr.evolveva.epis.servl
1 ms Identify session (start)
2015-04-28 03:24:56.153 REQ01422 0156( #1 ms) Session: [WEB_SESSION: sifra_korisnika=-2; session_id=182; sifra_tvrtke=-1; ba
2015-04-28 03:24:56.153 REQ01422 0156( #1 ms) Identify session ... 0 ms
2015-04-28 03:24:56.153 REQ01422 0156( #1 ms) Identify location (start)
2015-04-28 03:24:56.153 REQ01422 0156( #1 ms) Location: [WEB_LOCATION: location_id=62; cookie_value=20150428.00:27:28.392;
2015-04-28 03:24:56.153 REQ01422 0156( #1 ms) Identify location ... 0 ms
2015-04-28 03:24:56.153 REQ01422 0156( #1 ms) Read request params (start)
2015-04-28 03:24:56.153 REQ01422 0156( #1 ms) Request type: null
2015-04-28 03:24:56.153 REQ01422 0156( #1 ms) Read request params ... 0 ms
2015-04-28 03:24:56.153 REQ01422 0156( #1 ms) Check to redirect login URL
2015-04-28 03:24:56.153 REQ01422 0156( #1 ms) Creating module admin.SystemArchitecture ... 0 ms
2015-04-28 03:24:56.154 REQ01422 0156( #2 ms) Parsing params to module hr.evolveva.epis.modules.admin.SystemArchitecture ... 0 ms
2015-04-28 03:24:56.154 REQ01422 0156( #2 ms)
2015-04-28 03:24:56.154 REQ01422 0156( #2 ms) Printed XML request ... 0 ms
2015-04-28 03:24:56.154 REQ01422 0156( #2 ms) Processing module hr.evolveva.epis.modules.admin.SystemArchitecture (start)
2015-04-28 03:24:56.154 REQ01422 0156( #2 ms) Creating XML screen ... 0 ms
2015-04-28 03:24:56.155 REQ01422 0156( #3 ms) Reading edit XML (start)
2015-04-28 03:24:56.155 REQ01422 0156( #3 ms) Parameter names
2015-04-28 03:24:56.155 REQ01422 0156( #3 ms) Reading edit XML ... 0 ms
2015-04-28 03:24:56.155 REQ01422 0156( #3 ms) Map Control: tabs
2015-04-28 03:24:56.155 REQ01422 0156( #3 ms) Map Control: tabs_db
2015-04-28 03:24:56.155 REQ01422 0156( #3 ms) DB local_jadransko pool assigned
2015-04-28 03:24:56.158 REQ01422 0156( #6 ms) 3 ms SQL: (Count=1) ... select count(*) from c_web_sessions
2015-04-28 03:24:56.159 REQ01422 0156( #7 ms) 1 ms SQL: (Count=5) ... select count(*) from c_web_locations
2015-04-28 03:24:56.161 REQ01422 0156( #9 ms) 2 ms SQL: (Count=7) ... select count(*) from c_users
2015-04-28 03:24:56.177 REQ01422 0156( #25 ms) 16 ms SQL: (Count=24) ... select count(*) from c_rights
2015-04-28 03:24:56.178 REQ01422 0156( #26 ms) 1 ms SQL: (Count=58) ... select count(*) from c_groups
2015-04-28 03:24:56.179 REQ01422 0156( #27 ms) 1 ms SQL: (Count=0) ... select count(*) from knjig_tvrtke_korisnika
2015-04-28 03:24:56.183 REQ01422 0156( #31 ms) 4 ms SQL: (Count=6640) ... select count(*) from c_messages
2015-04-28 03:24:56.186 REQ01422 0156( #33 ms) 2 ms SQL: (Count=0) ... select count(distinct lang_id) from c_labels where lang_id
2015-04-28 03:24:56.186 REQ01422 0156( #34 ms) 1 ms SQL: (Count=91) ... select count(id) from c_object_cache
2015-04-28 03:24:56.196 REQ01422 0156( #44 ms) 10 ms SQL: ('d:\epis_backups\epis_jadransko') select vrtnost from c_params where
    
```

# Praćenje konekcija na bazi



# Dekoracija konekcija

## Advanced Oracle features

Decorate connections for v\$session

```
SELECT username,
       schemaname,
       osuser,
       machine,
       program,
       client_info,
       module,
       action
FROM v$session b
WHERE type='USER' AND username!='ANONYMOUS'
ORDER BY username, client_info
```

Retci 1 ... 2 od 2

25 [2]

#	USERNAME	SCHEMANAME	OSUSER	MACHINE	PROGRAM	CLIENT_INFO	MODULE	ACTION
1.	EVOLUTION_JADRANSKO	EVOLUTION_JADRANSKO	mtomaskovic	mtomaskovic-dell-17	JDBC Thin Client	localhost:9080 (DB local_jadransko) *FREE* 28.04.2015 02:49:31	CommandProcessorJob	Processing...
2.	EVOLUTION_JADRANSKO	EVOLUTION_JADRANSKO	mtomaskovic	mtomaskovic-dell-17	JDBC Thin Client	localhost:9080 (EPIS DB local_jadransko) 28.04.2015 02:49:34	DBPoolManager	getDatabase



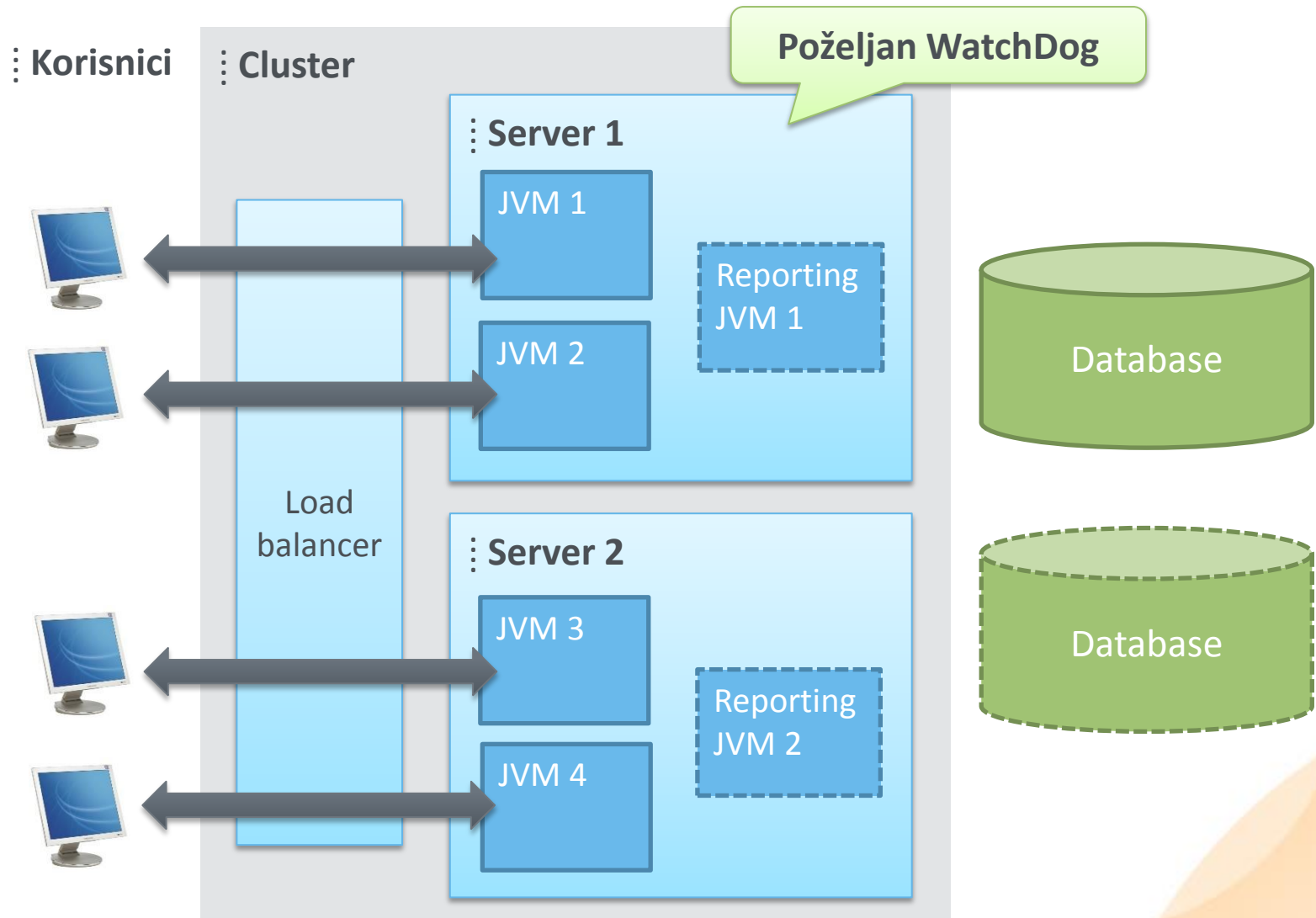
# Prevenција: što raditi da Java aplikacija radi bez zastoja



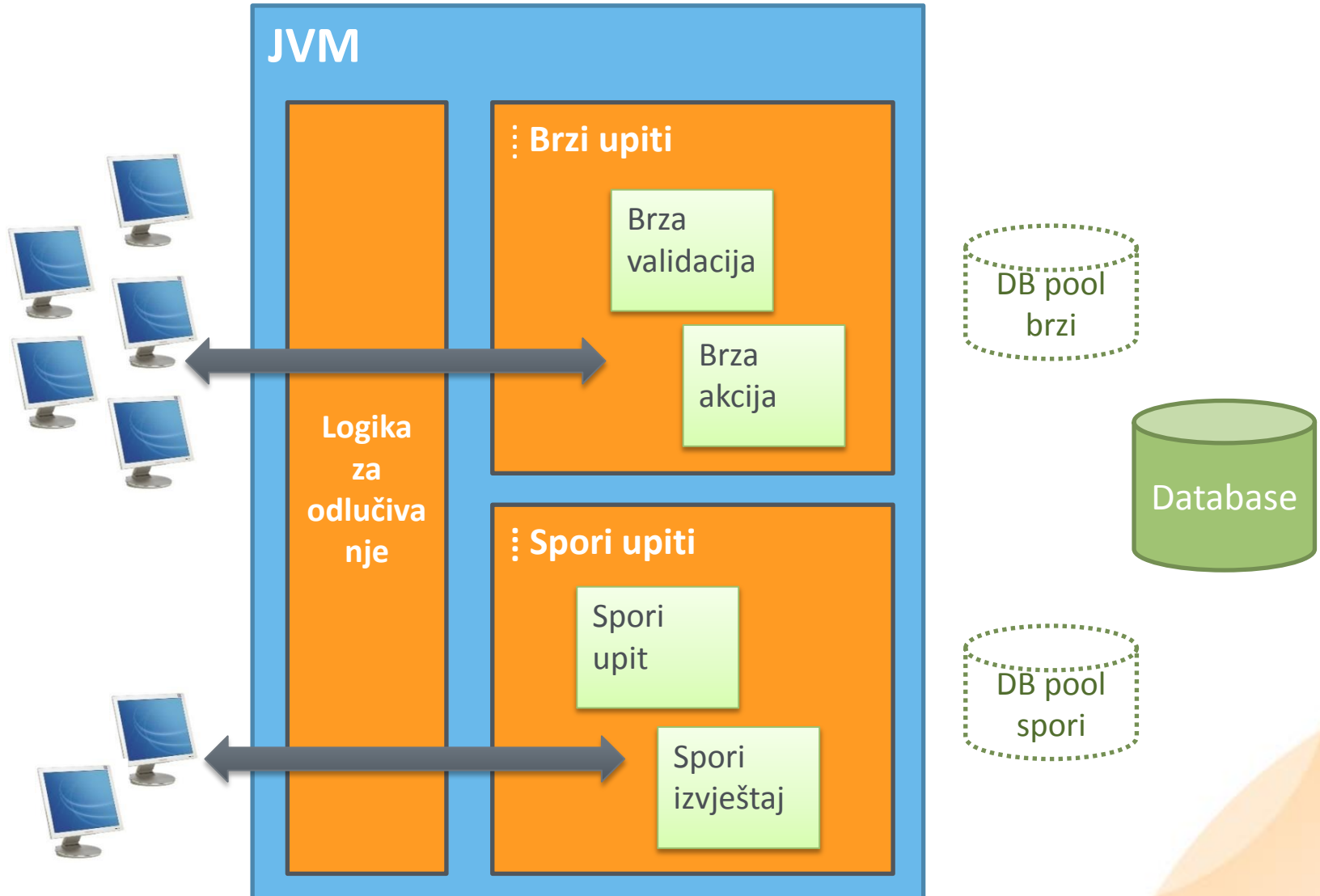
**ISO 9001:2008**  
sustav upravljanja  
kvalitetom



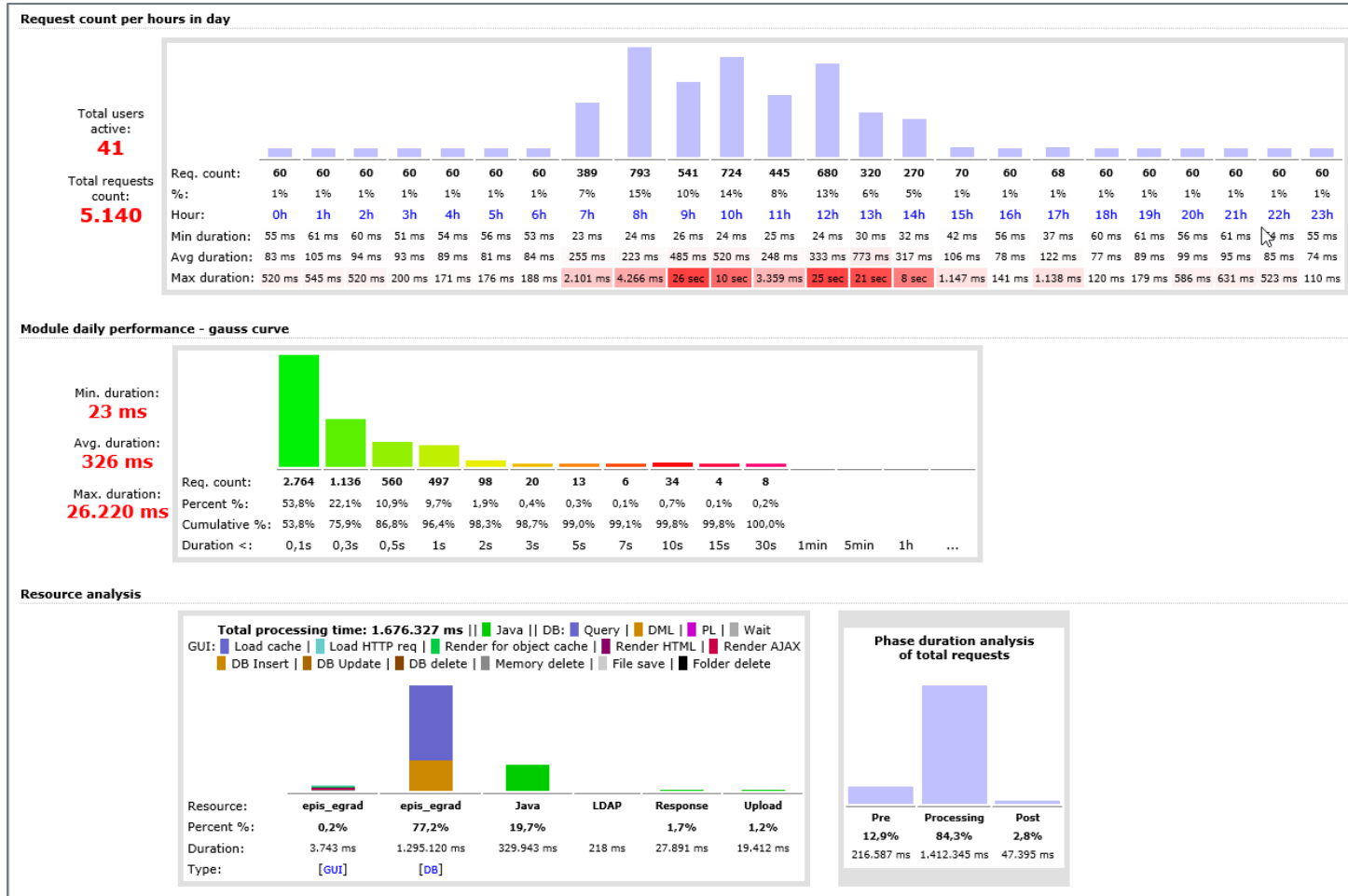
# Dobro planirati arhitekturu



# Segregacija upita/servisa



# Pratiti performanse sustava



# Zaključak



## Preporuka: sveobuhvatni report o ispadu

- › **Pokušati izbjeći**
- › **Biti spreman**
- › **Generalno**
  - » kronologija rada / trenutak ispada
  - » ... informacije o okolini koje se ne vide (lako) u logu
- › **PAD / ZASTOJ**
  - » hs error report (u slučaju JVM crash)
  - » heap dump
  - » thread dump
    - » thread dump uzorci koji su prethodili zastoju
  - » request log
    - » orphan analysis

# Hvala na pažnji

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