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Performance Methodology @ Salesforce

Tina Luo(Performance Engineer)

ADM

Adaptive Delivery Methodology

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Why Do We Care Performance?

- User Experience
- Decrease the hardware cost
- More customer can be served

Money

Money

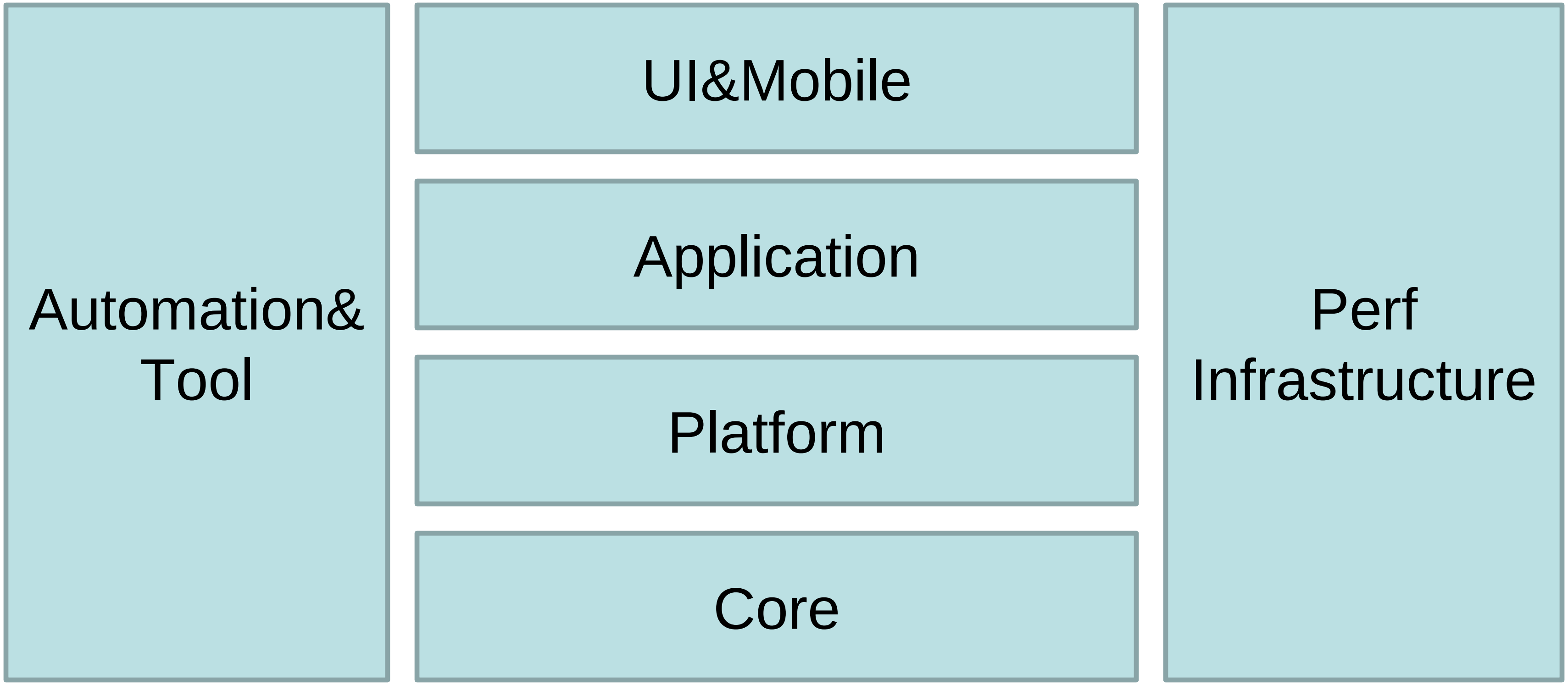
Money

AGENDA

- Performance Team Overview
- Key Performance Metrics
- How Do We Test Performance?
- Tools
- Q&A

Performance Team Overview

- Dedicated Large Performance Team



Automation& Tool

UI&Mobile

Application

Platform

Core

Perf Infrastructure

Key Performance Metrics

- Average Response Time
- Throughput
- CPU Utilization
- Memory Utilization
- Memory Allocated
- GC Count
- Db Buffer Get
- Db CPU Utilization

How Do We Test Performance?

- Proactive
  - Feature Test
  - Regression Test
- Passive
  - Production Analysis

Feature Test

- Requirement
  - Target Load
  - Target Performance
  - Performance Overhead
  - Comparison with Old Feature
- Performance Test
  - Test Data Shape
  - Load Test
  - Capture and analyze the performance metrics

Regression Test

- Often Come From Feature Test
- Regularly Monitor Performance Of Key Features
  - Run nightly or weekly
- Fully Automated!
  - Internal Performance Test Framework
- Creation of Performance Workload
  - Data Shape
  - Estimate load from production
  - Test Coverage

How to Identify Cause of Regression?

- CPU, Response Time: Yourkit
- Memory Allocation: GC log, Heapaudit, Heapdump, VisualVM, Yourkit
- DB Buffer get: Awr Diff Tool, SQL tracing, Explain Plan

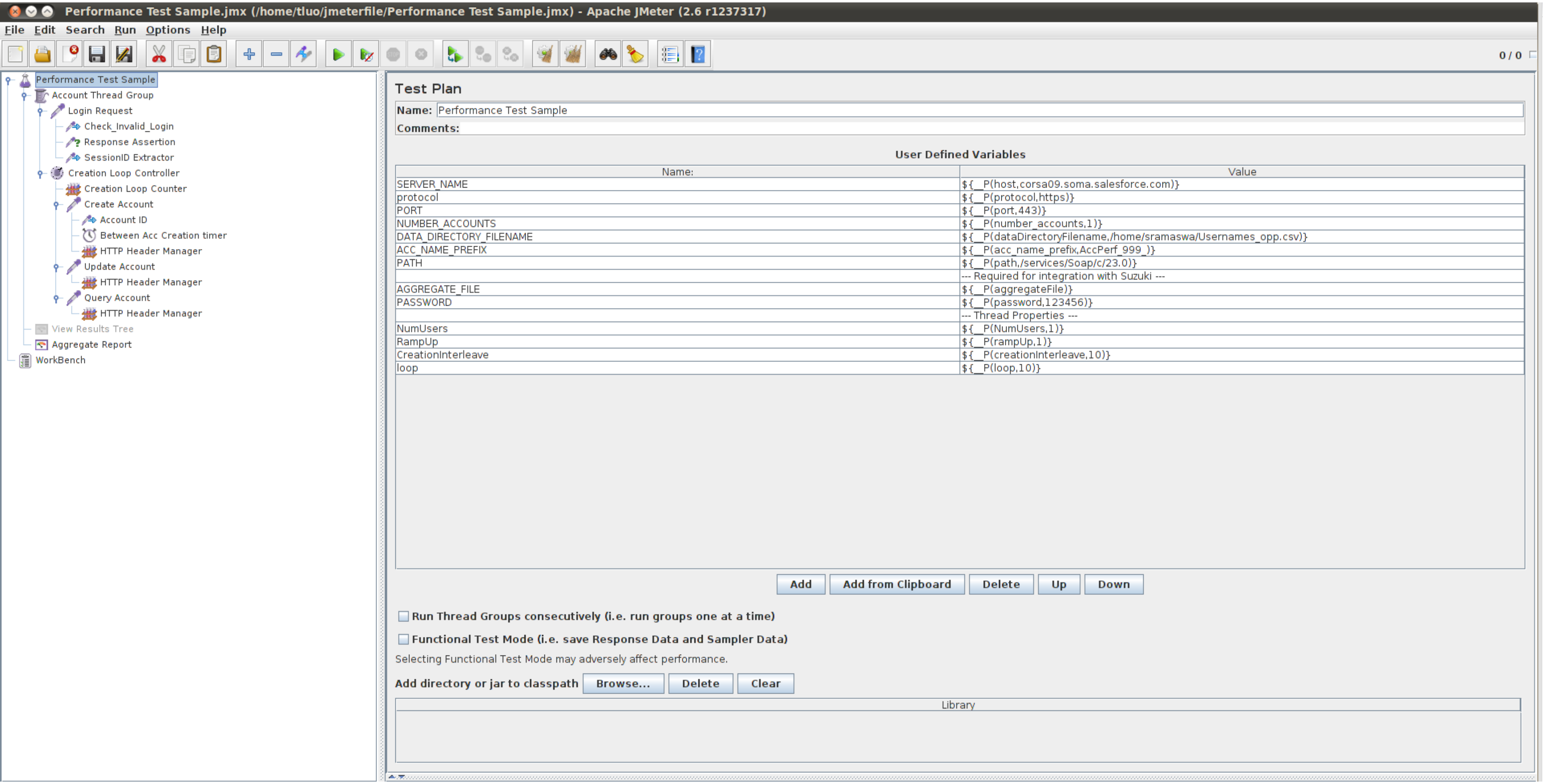
Production Analysis

- Production Performance Monitor Tools
    - Dashboard
- Splunk
    - 1. What features do they use
    - 2. How the features are used
    - 3. How do they perform in production

Some Tools Used

- Jmeter
  - Load Generator
  - Integrated with Internal performance test framework

Jmeter



Performance Test Sample.jmx (/home/tluo/jmeterfile/Performance Test Sample.jmx) - Apache JMeter (2.6 r1237317)
File Edit Search Run Options Help
0 / 0
Add
Add from Clipboard
Delete
Up
Down
Browse...
Delete
Clear
Library

- Performance Test Sample
  - Account Thread Group
    - Login Request
      - Check_Invalid_Login
      - Response Assertion
      - SessionID Extractor
    - Creation Loop Controller
      - Creation Loop Counter
      - Create Account
        - Account ID
        - Between Acc Creation timer
        - HTTP Header Manager
      - Update Account
        - HTTP Header Manager
      - Query Account
        - HTTP Header Manager
  - View Results Tree
  - Aggregate Report
- WorkBench

Test Plan

Name: Performance Test Sample

Comments:

User Defined Variables

Name:	Value
SERVER_NAME	${__P(host,corsa09.soma.salesforce.com)}
protocol	${__P(protocol,https)}
PORT	${__P(port,443)}
NUMBER_ACCOUNTS	${__P(number_accounts,1)}
DATA_DIRECTORY_FILENAME	${__P(dataDirectoryFilename,/home/sramaswa/Usernames_opp.csv)}
ACC_NAME_PREFIX	${__P(acc_name_prefix,AccPerf_999_)}
PATH	${__P(path,/services/Soap/c/23.0)}
	--- Required for integration with Suzuki ---
AGGREGATE_FILE	${__P(aggregateFile)}
PASSWORD	${__P(password,123456)}
	--- Thread Properties ---
NumUsers	${__P(NumUsers,1)}
RampUp	${__P(rampUp,1)}
CreationInterleave	${__P(creationInterleave,10)}
loop	${__P(loop,10)}

□ Run Thread Groups consecutively (i.e. run groups one at a time)

□ Functional Test Mode (i.e. save Response Data and Sampler Data)

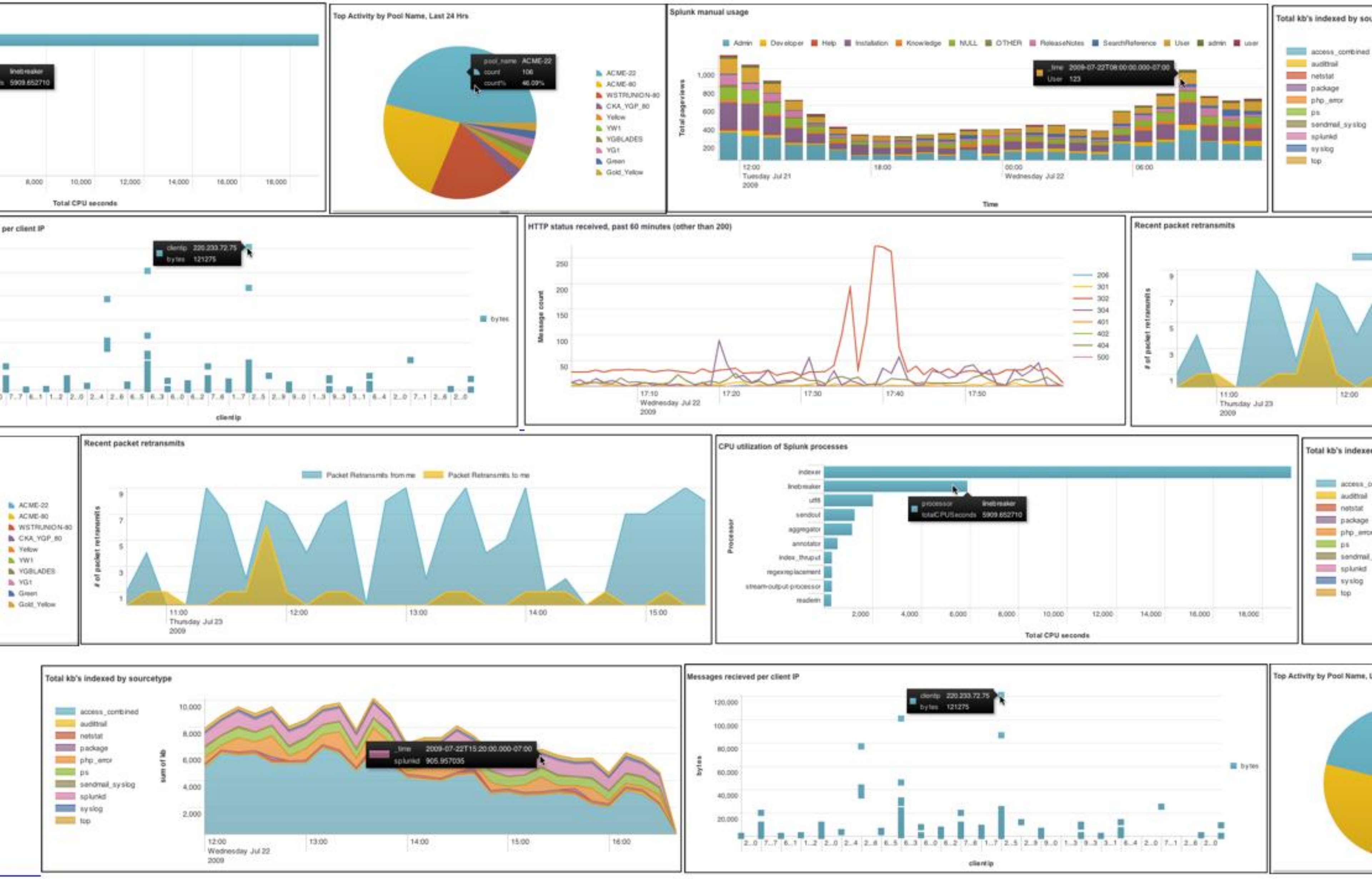
Selecting Functional Test Mode may adversely affect performance.

Add directory or jar to classpath

Splunk

- Log analyzing tool
- Search, monitor, and analyze machine-generated big data
- Production analysis
- Internal performance run log analyzer
- Data Shape

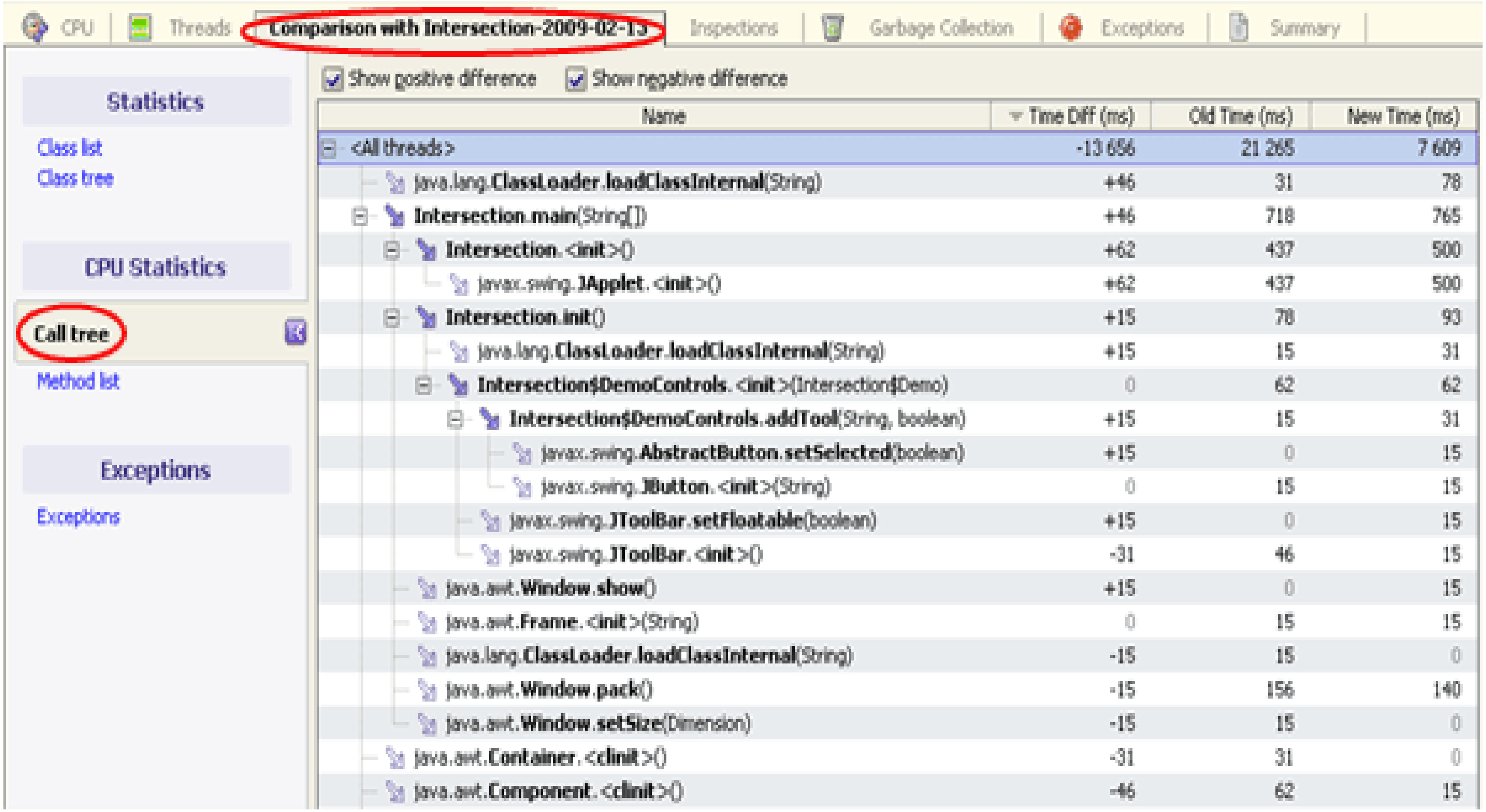
Splunk


Top Activity by Pool Name, Last 24 Hrs
pool_name ACME-22
count 106
count% 46.09%
ACME-22
ACME-80
WSTRUNION-80
CKA_YGP_80
Yellow
YW1
YGBLADES
YG1
Green
Gold_Yellow
Splunk manual usage
Admin
Developer
Help
Installation
Knowledge
NULL
OTHER
ReleaseNotes
SearchReference
User
admin
user
_time 2009-07-22T08:00:00.000-07:00
User 123
Total pageviews
1,000
800
600
400
200
12:00
Tuesday Jul 21
2009
18:00
00:00
Wednesday Jul 22
06:00
Time
Total kb's indexed by sou
Total CPU seconds
linebreaker
5909.652710
per client IP
clientip 220.233.72.75
bytes 121275
bytes
clientip
HTTP status received, past 60 minutes (other than 200)
Message count
250
200
150
100
50
17:10
Wednesday Jul 22
2009
17:20
17:30
17:40
17:50
206
301
302
304
401
402
404
500
Recent packet retransmits
# of packet retransmits
11:00
Thursday Jul 23
2009
12:00
Packet Retransmits from me
Packet Retransmits to me
13:00
14:00
15:00
CPU utilization of Splunk processes
indexer
linebreaker
utf8
sendout
aggregator
annotator
index_thruput
regexreplacement
stream-output-processor
readerin
Processor
processor linebreaker
totalCPUSeconds 5909.652710
2,000
4,000
6,000
8,000
10,000
12,000
14,000
16,000
18,000
Total CPU seconds
Total kb's indexed by sourcetype
access_combined
audittrail
netstat
package
php_error
ps
sendmail_syslog
splunkd
syslog
top
sum of kb
10,000
8,000
6,000
4,000
2,000
_time 2009-07-22T15:20:00.000-07:00
splunkd 905.957035
12:00
Wednesday Jul 22
2009
13:00
14:00
15:00
16:00
Messages recieved per client IP
clientip 220.233.72.75
bytes 121275
120,000
100,000
80,000
60,000
40,000
20,000
bytes
clientip
Top Activity by Pool Name, L

Yourkit

- Java Profiler
  - CPU Profilling
  - Memory Profilling
- Help Find CPU Hotspot, cause of the regression, memory leak.

Yourkit



☑ Show positive difference ☑ Show negative difference

Name	Time Diff (ms)	Old Time (ms)	New Time (ms)
<All threads>	-13 656	21 265	7 609
java.lang.ClassLoader.loadClassInternal(String)	+46	31	78
Intersection.main(String[])	+46	718	765
Intersection.<init>()	+62	437	500
javax.swing.JApplet.<init>()	+62	437	500
Intersection.init()	+15	78	93
java.lang.ClassLoader.loadClassInternal(String)	+15	15	31
Intersection$DemoControls.<init>(Intersection$Demo)	0	62	62
Intersection$DemoControls.addTool(String, boolean)	+15	15	31
javax.swing.AbstractButton.setSelected(boolean)	+15	0	15
javax.swing.JButton.<init>(String)	0	15	15
javax.swing.JToolBar.setFloatable(boolean)	+15	0	15
javax.swing.JToolBar.<init>()	-31	46	15
java.awt.Window.show()	+15	0	15
java.awt.Frame.<init>(String)	0	15	15
java.lang.ClassLoader.loadClassInternal(String)	-15	15	0
java.awt.Window.pack()	-15	156	140
java.awt.Window.setSize(Dimension)	-15	15	0
java.awt.Container.<clinit>()	-31	31	0
java.awt.Component.<clinit>()	-46	62	15

HeapAudit

- Java Memory Profiller
- Open source project by Foursquare
- Java agent built on top of ASM
- Three modes: Static, Dynamic, Hybrid
- Only collect allocation of objects you are interested in

https://github.com/foursquare/heapaudit

Comparison with Yourkit

	Yourkit	HeapAudit
pros	Provides complete understanding of memory allocations mapped to callstacks	Provides enough information to understand our allocation pattern, Small size of result file, Automated, Low overhead
Cons	Manual analysis Large Size of result file Pretty slow	Don’t have stack trace

How HeapAudit detect memory regression (Demo)

- Diff Results are sorted in two ways: Objects Allocation and Classes Allocation
- Object Allocation
  - Most different object will be shown in the top.
  - Under the object, a list of classes which allocate that object will be shown in the order.
- Class Allocation
  - The most different class will be shown in the top
  - Under the class, a list of methods of that class will be shown in order
  - Under the method, a lot of objects will be shown in order.

Conclusion

- Log is your best friend
- Automate your work
- Software quality is as important as software quantity

Thanks!

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Question?

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