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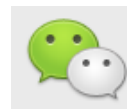
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Performance Methodology @ Salesforce

罗婷Tina Luo(Performance Engineer)



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Why Do We Care Performance?

Money

- Attract more customers
- More customer can be served
- Decrease the cost

Money



Money



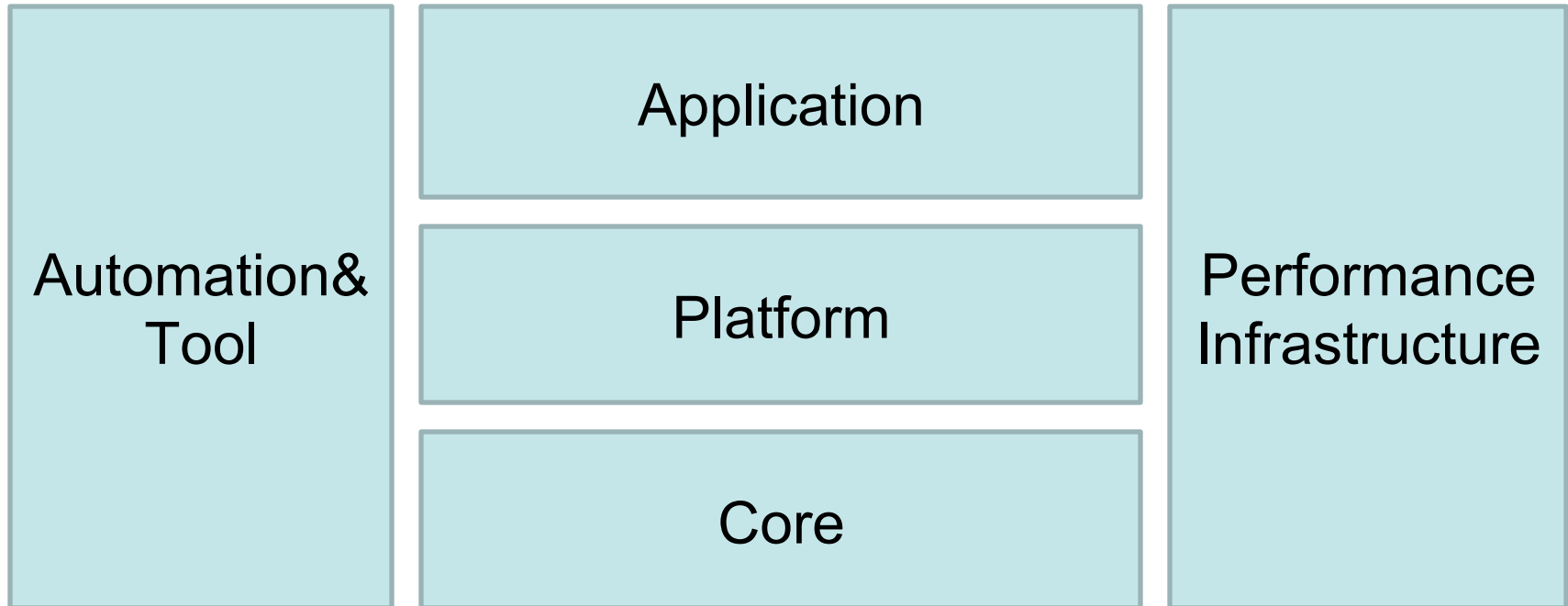
AGENDA

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



Performance Team Overview

- Dedicated Large Performance Team

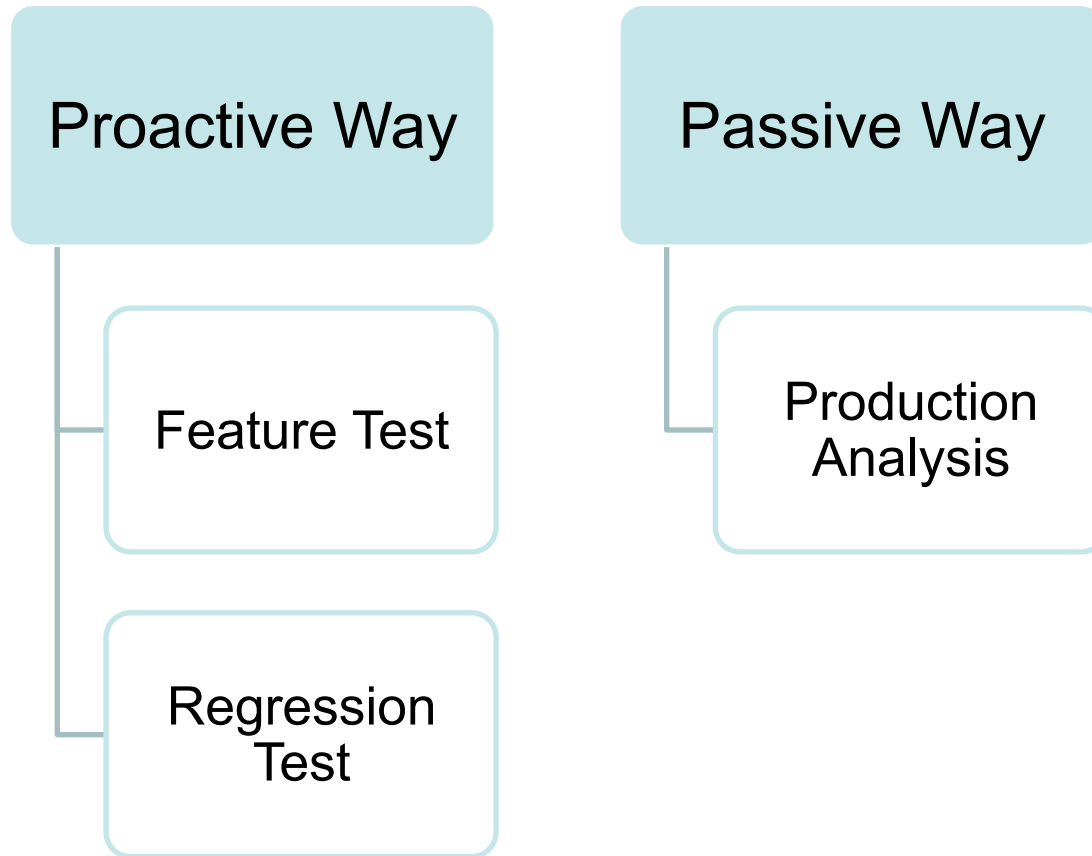


Key Performance Metrics

- Average Response Time
- Throughput
- CPU Utilization
- Memory Allocation
- GC Count



How Do We Test Performance?



Feature Test

Requirements

- Target Load
- Target Performance
- Performance Overhead
- Comparison with Old Feature

Performance Test

- Test Data Shape
- Load Test
- Capture and analyze the performance metrics



How to Analyze Performance Issues – 3 Examples

- #1 Example
- CPU Utilization- CPU profiling
 - Find the cpu hotspot
 - Causes of cpu-consuming method
 - Method itself expensive
 - Called too many times



How to Analyze Performance Issues – 3 Examples

- #2 Example
- Could not handle target load
 - Various possibilities: cpu utilization, cpu iowait, disk and network bandwidth, GC throughput, database bottleneck, thread pool, thread contention
 - Thread contention-VisualVM, Thread dump
 - `"/testthread1" prio=10 tid=0x0 nid=0x4 in Object.wait`
(java.lang.Thread.State: BLOCKED (on object monitor)
at test.synchronizedMethod(test.java:10)
at test main(test.java:5)



How to Analyze Performance Issues – 3 Examples

- #3 Example
- OutOfMemoryError
 - Heap dump: take snapshot of memory
 - Memory allocation problem
 - Examples: size of array, reuse allocated memory, appropriate data structure.
 - Memory leak
 - Unneeded object is still referenced by other live object.
 - Compare heap dump results taken in different times.



Regression Test

Regularly Monitor Key Features

- Run nightly or weekly

Fully Automated!

- Internal Performance Test Framework

Creation of Regression Test

- Often Come From Feature Test
- Data Shape
- Estimate load from production
- Test Coverage



How to Identify Cause of Regression?

- Use version control to find the culprit code change
- Examples:
 - CPU: Yourkit
 - Memory allocation, GC: Heapaudit, Yourkit



Production Analysis

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



Some Tools Used

■ Jmeter

- Open source software designed to load test functional behavior and measure performance.
- 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

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
 - 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,corasa09.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)}
AGGREGATE_FILE	--- Required for integration with Suzuki --- \${_P(aggregateFile)}
PASSWORD	\${_P(password,123456)}
NumUsers	--- Thread Properties --- \${_P(NumUsers,1)}
RampUp	\${_P(rampUp,1)}
CreationInterleave	\${_P(creationInterleave,10)}
loop	\${_P(loop,10)}

Add Add from Clipboard Delete Up Down

☐ 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 Browse... Delete Clear

Library



Splunk

- Log analyzing tool
- Search, monitor, and analyze machine-generated big data
- Production analysis
- Monitor production performance and traffic

splunk[®]>



Yourkit

- Java Profiler
 - CPU Profiling
 - CPU Sampling
 - CPU Tracing
 - Memory Profiling
- Help find CPU Hotspot, memory leak and cause of the regression.



HeapAudit

- Java Memory Profiler
- Open source project by Foursquare
- Only collect allocation of objects you are interested in
- Integrated with internal performance test framework
- Used in regression test



Comparison with Yourkit

	Yourkit	Heapaudit
Memory Allocation	YES	YES
Call Stack	YES	NO
Automation	NO	YES
Result Size	BIG	SMALL
Overhead	BIG	SMALL



Conclusion

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



References

- Jmeter: <http://jmeter.apache.org/>
- Splunk: <http://www.splunk.com/>
- Yourkit: <http://www.yourkit.com/docs/index.jsp>
- Heapaudit: <https://github.com/foursquare/heapaudit>



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Question?

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