Performance Engineering at Mastercard

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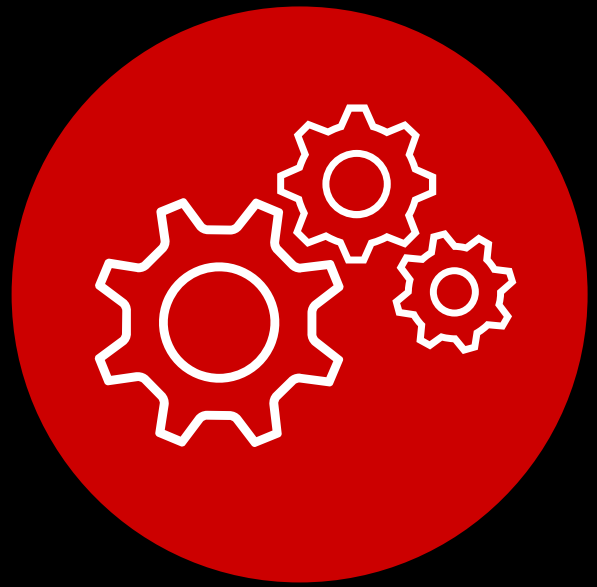
Three Guiding Principles

Tiers

Tools

Strategery

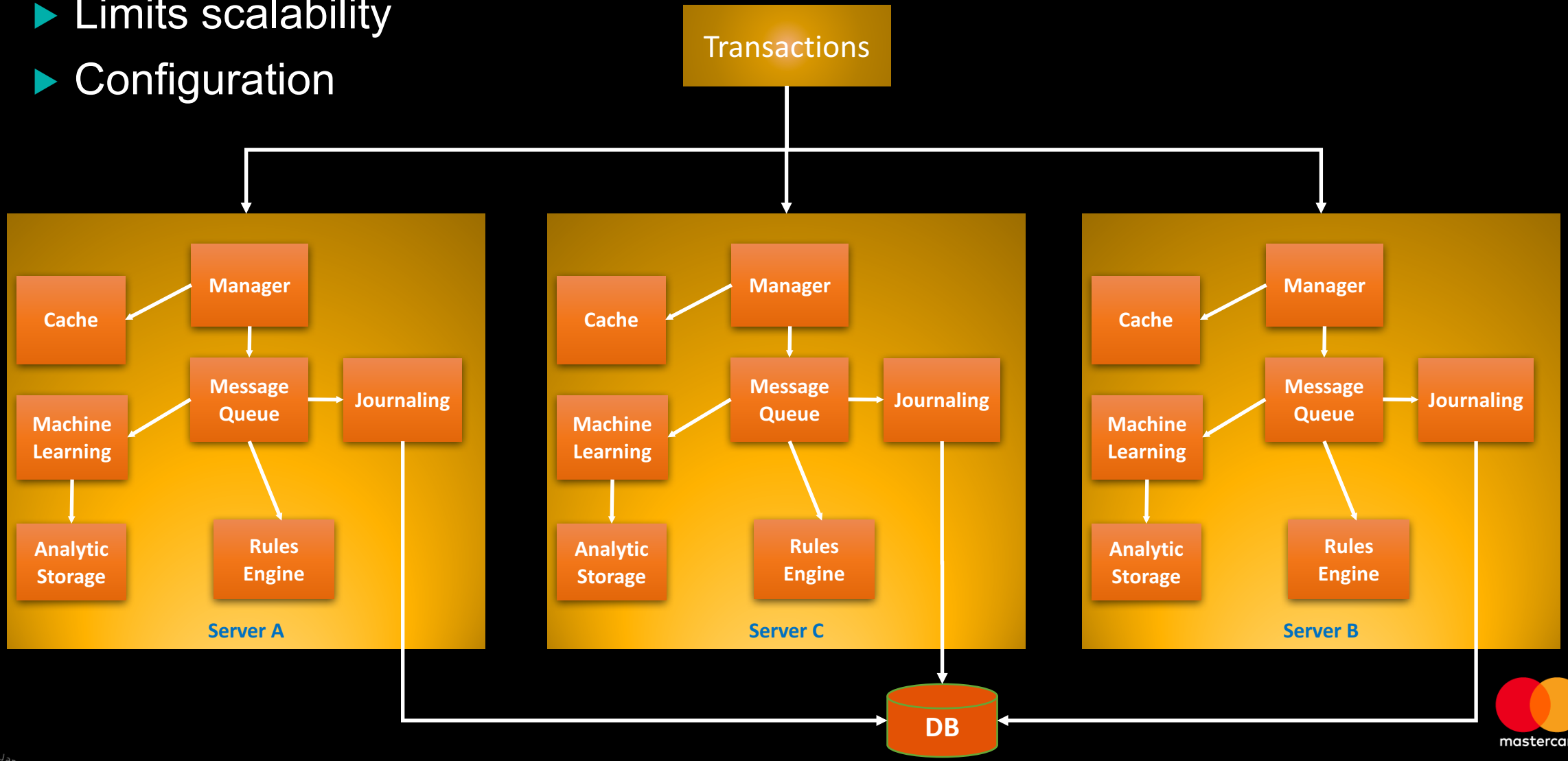
First Principle



Tiers

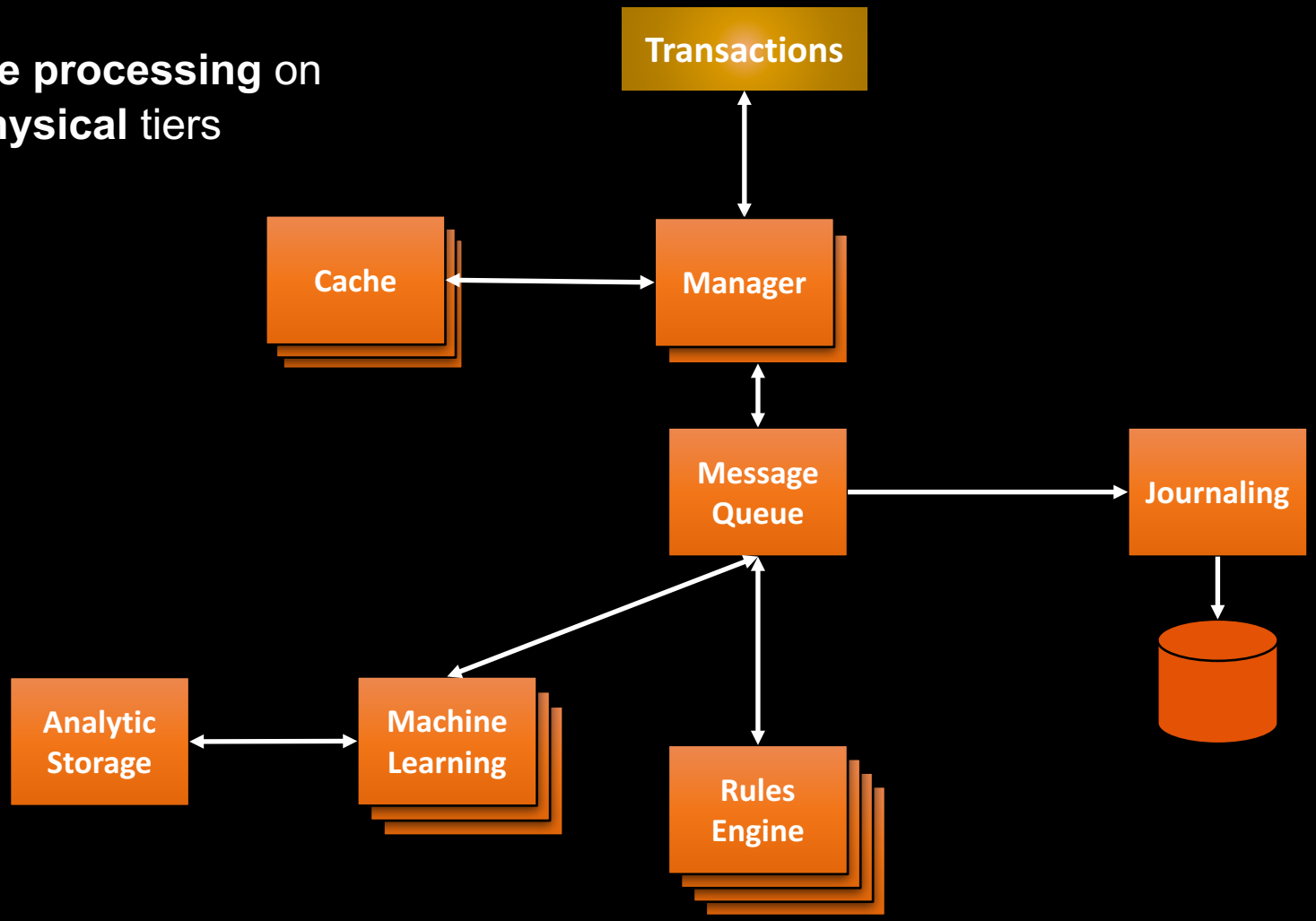
Centralized Approach

- Limits scalability
- Configuration



Tiered Approach

Distribute **like processing** on **separate**, **physical** tiers

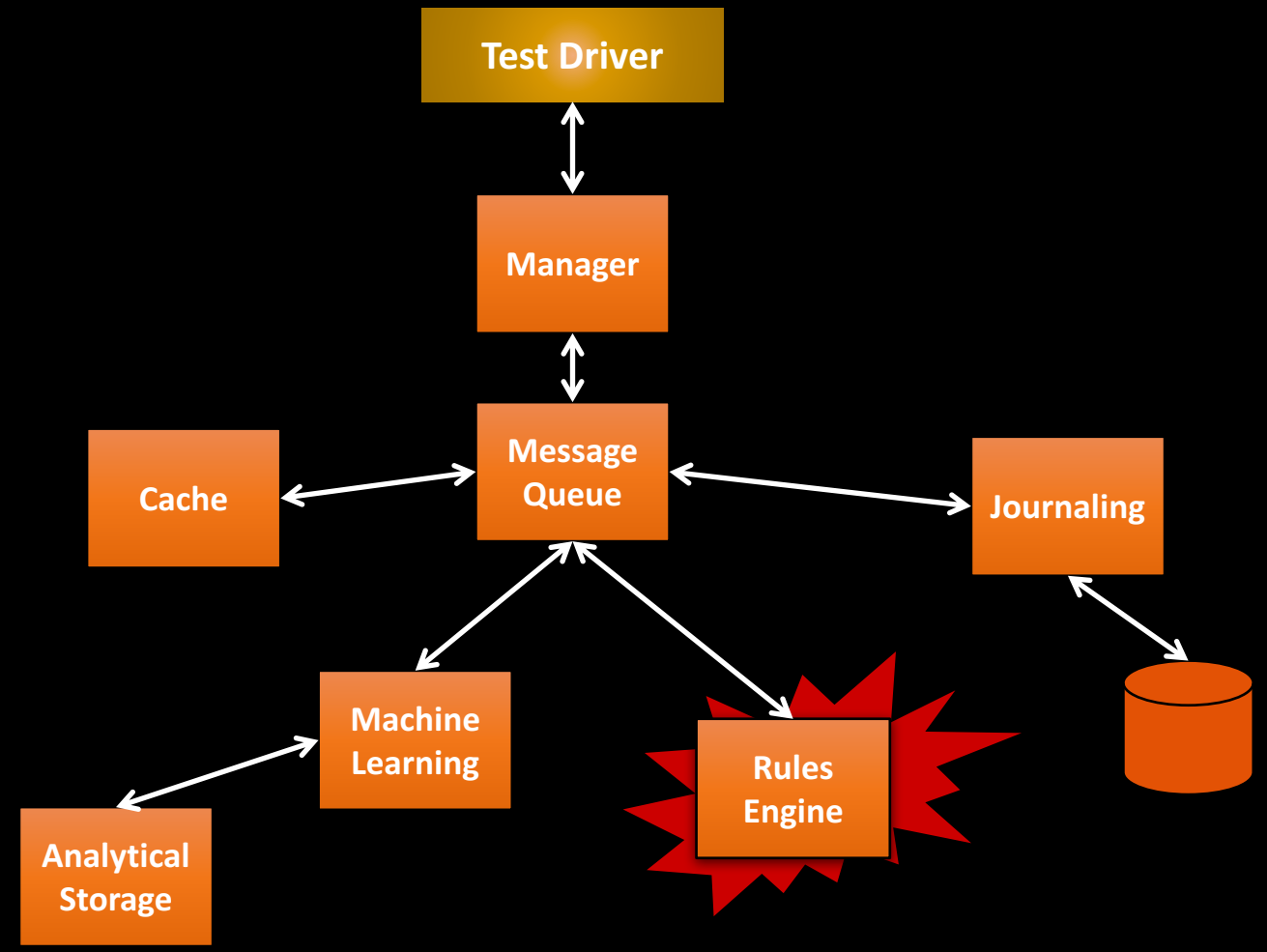


Second Principle

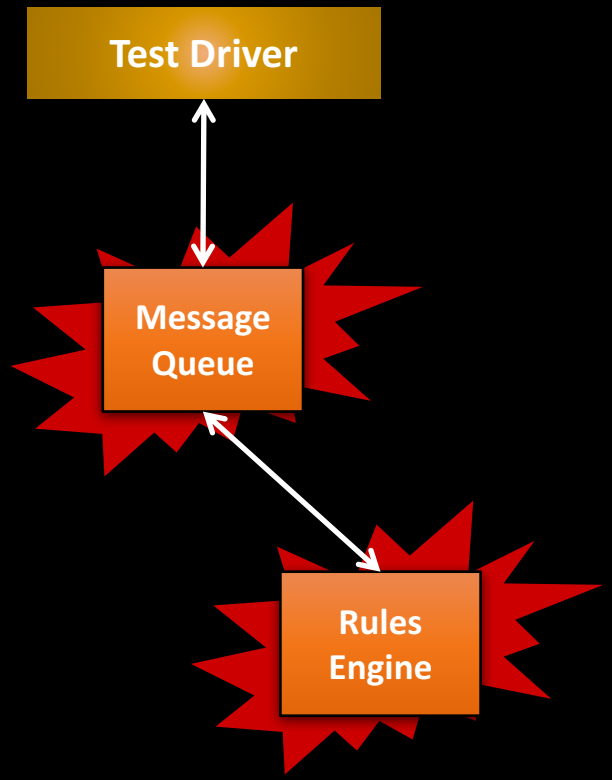
Tools

Building a Performance Environment

End-To-End Testing Approach



Tiered Testing Approach

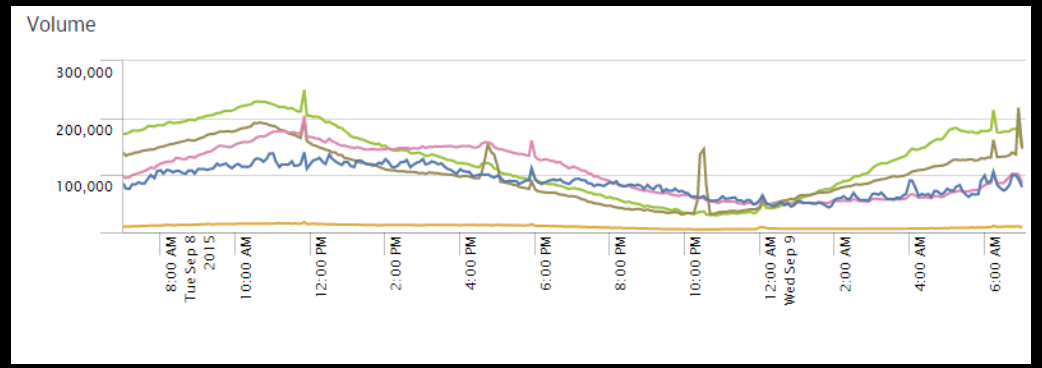


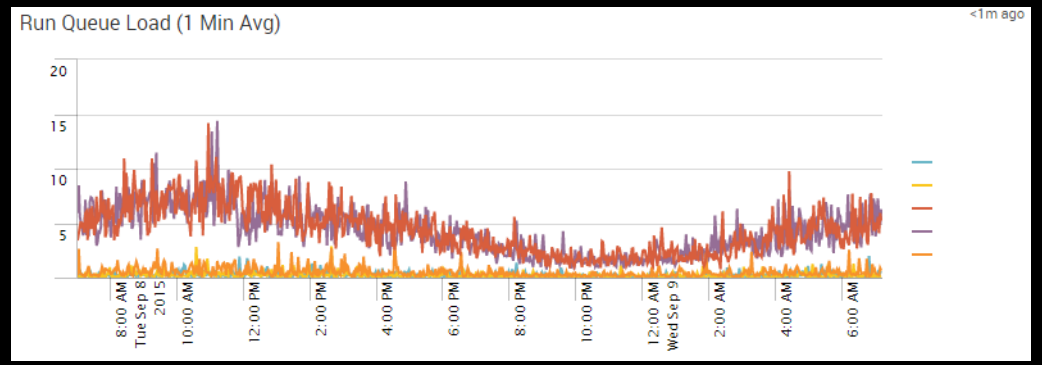
Stress Testing

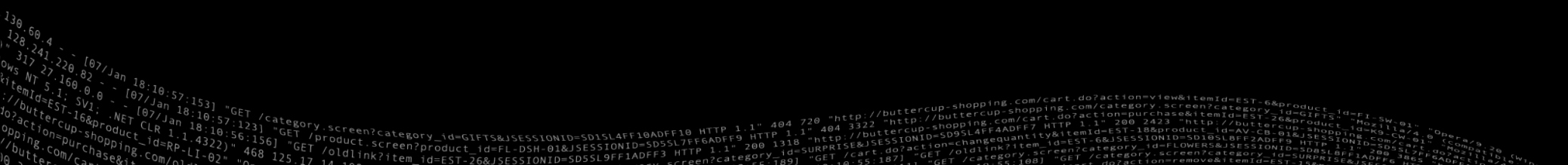
- Test the tiers until they break
  - Fail
  - Stop Scaling
  - Bottleneck
    - Operating System
    - I/O Level
    - Code
- Commercial Tools
- DIY
- Test Drivers
  - Tiers would outperform the testing tools

Track Metrics

- Application
  - Design
  - Track “important” metrics (Always)
  - Toggle more detailed information (As needed)
- Server
  - Single collector, outside of your application
  - CPU, I/O, Memory, Disk, etc
- Infrastructure Specific
- Continual Metrics
- Report & Review
- Avoids ”The Blame Game”







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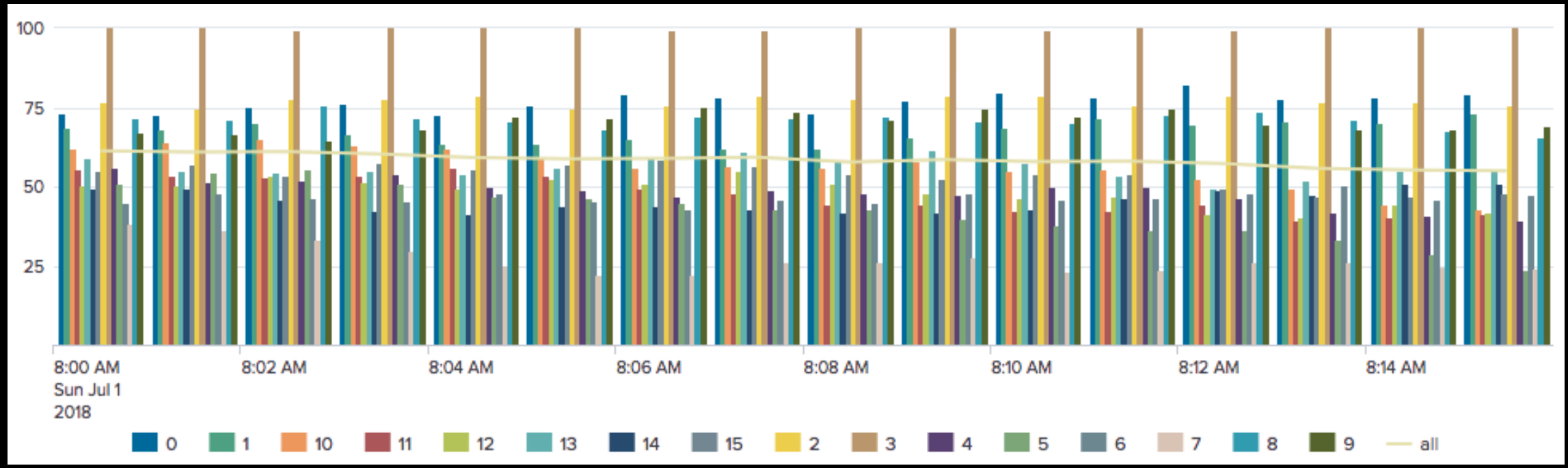
Messaging Finding

Single CPU Bottleneck

- Maxed out puts/gets
- Soft IRQ CPU Usage
- Interrupts configured on a single CPU
- Receives are much more expensive

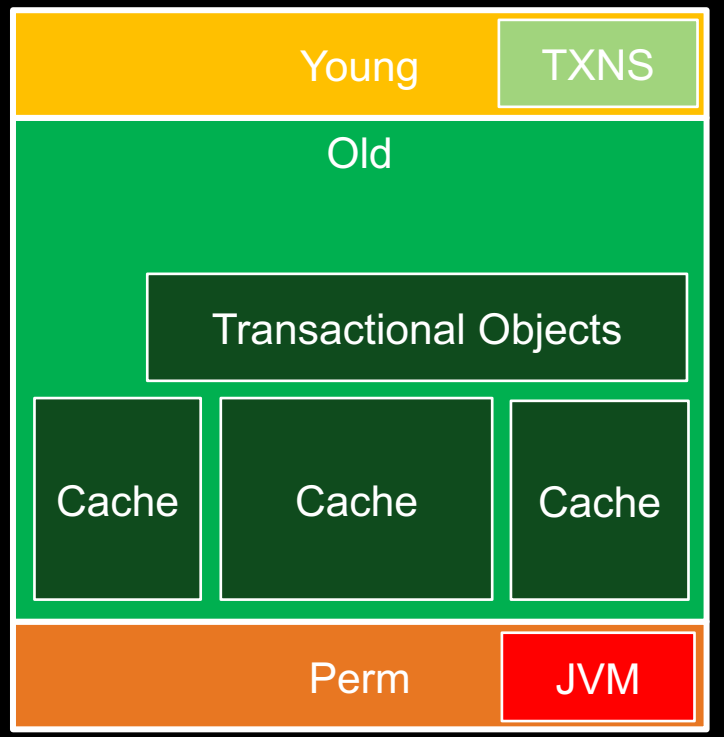


Messaging

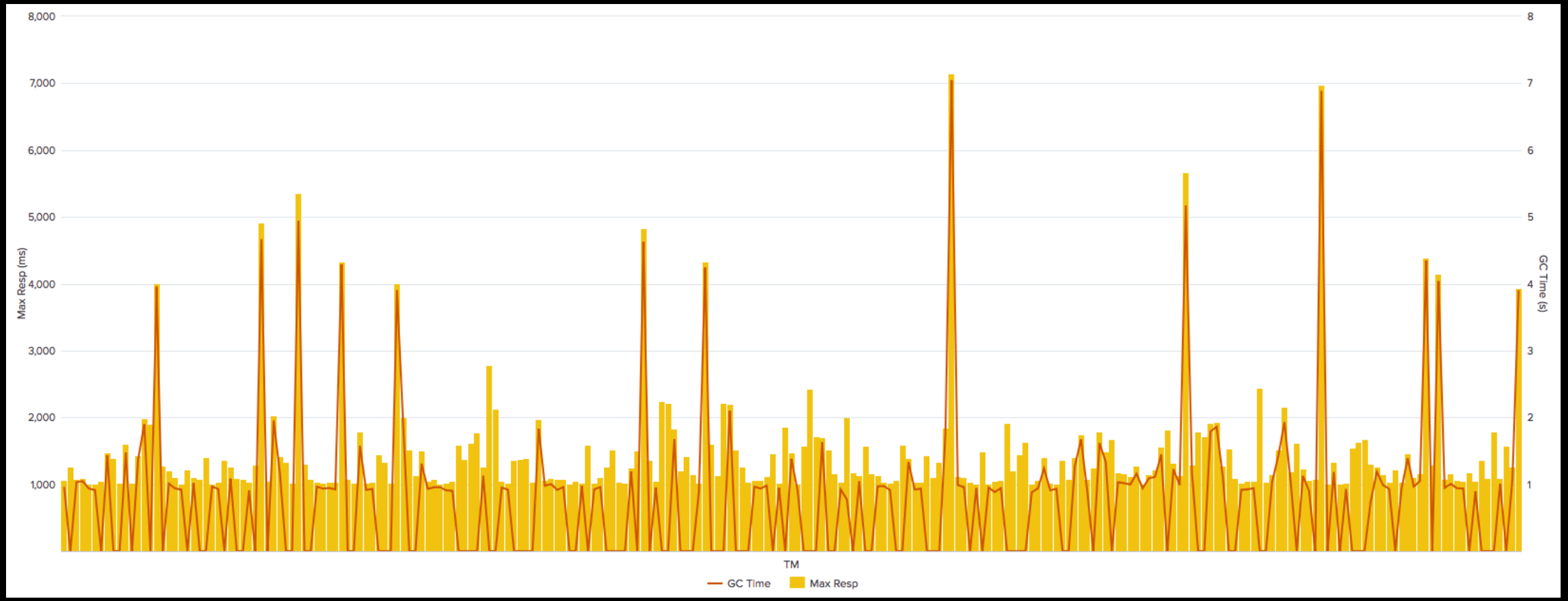
MQ Queue Manager Test

Java and Low Latency Are (always) Not Friends

- Discoveries
  - Java cleans up garbage (minors and majors)
  - Daily in production
    - Nearly 10K “Major” Garbage Collections
    - ~6 hours spent in Full GC
  - Limited on heap size
- Goals
  - Eliminate time from majors
  - Limit minors
  - Improve SLA

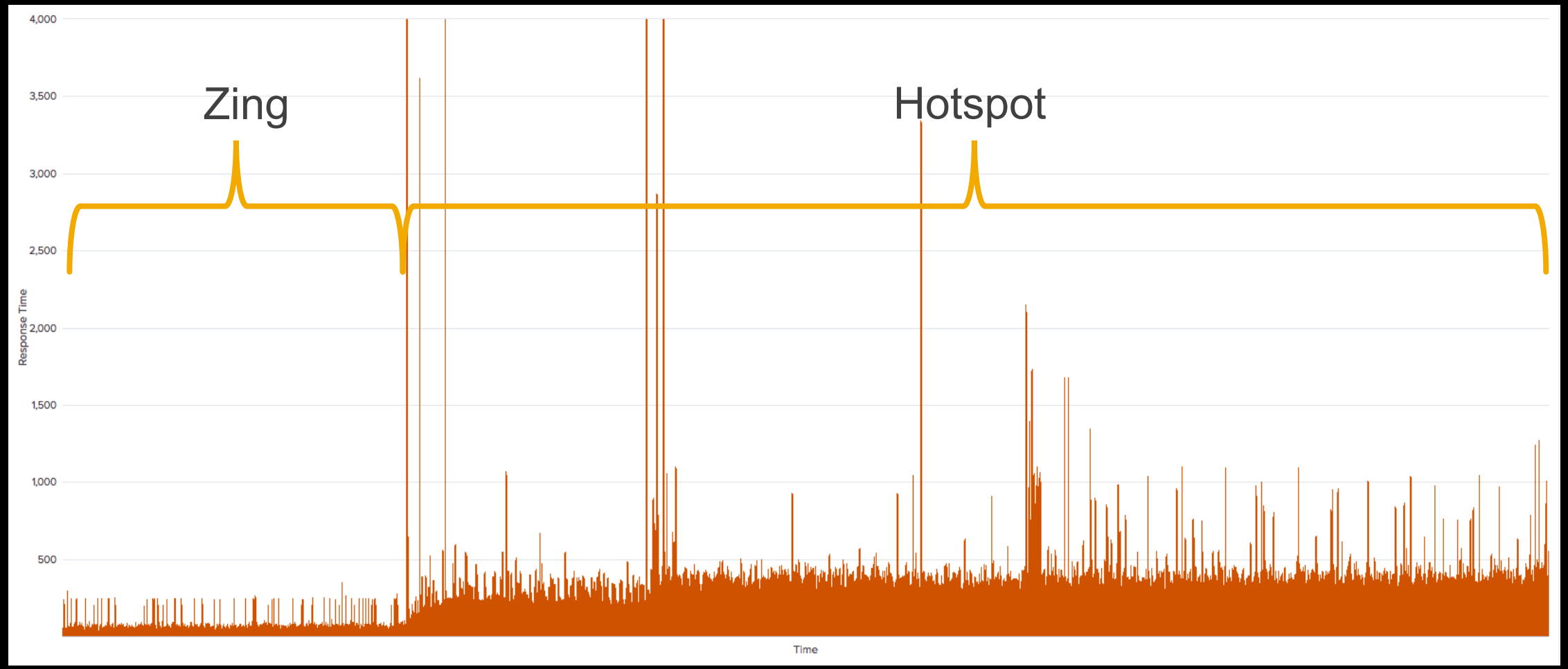


Garbage Collections vs Response Times



Azul Zing vs Hotspot

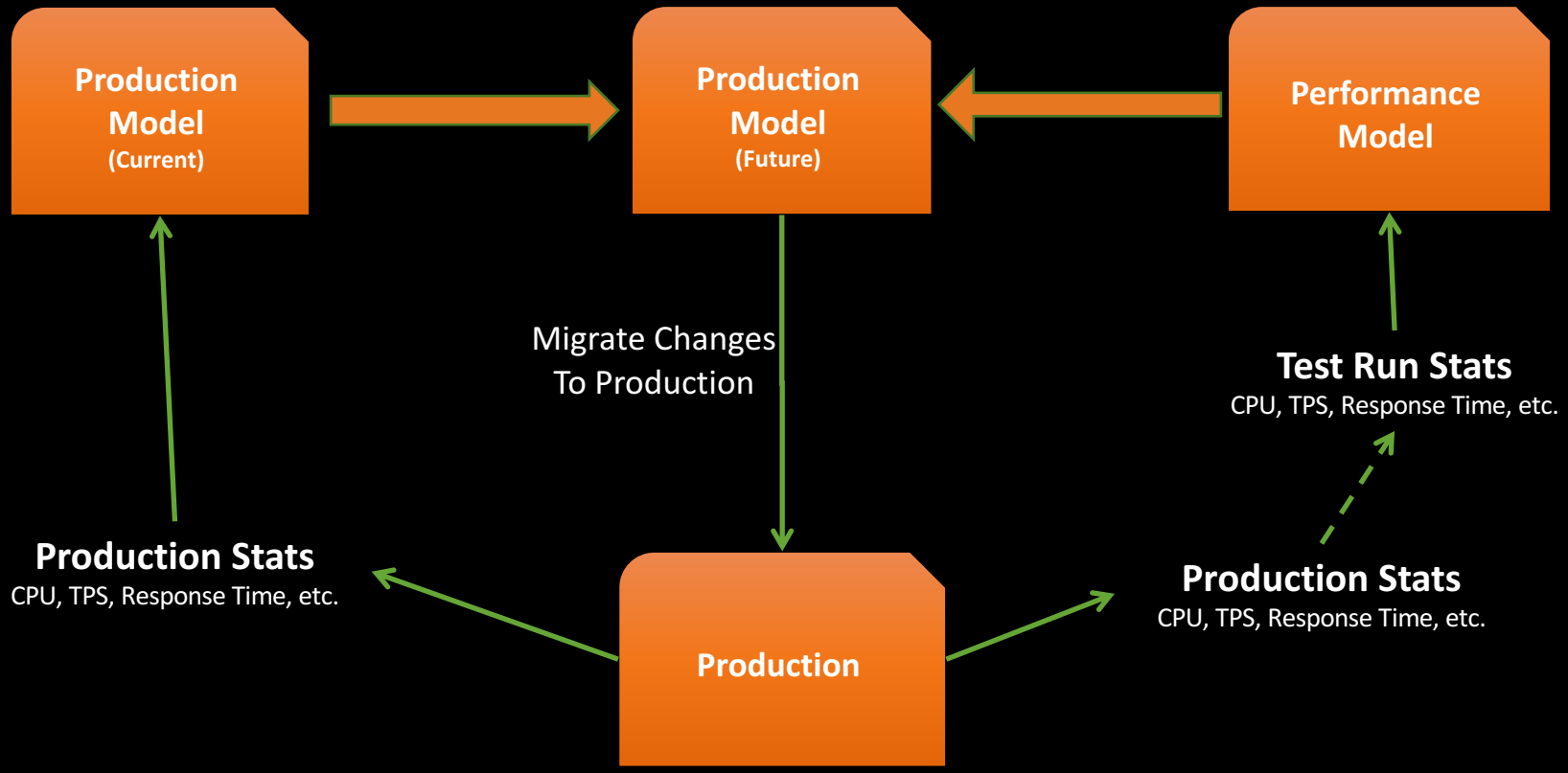
Commercial, ultra low pause JVM



Third Principle

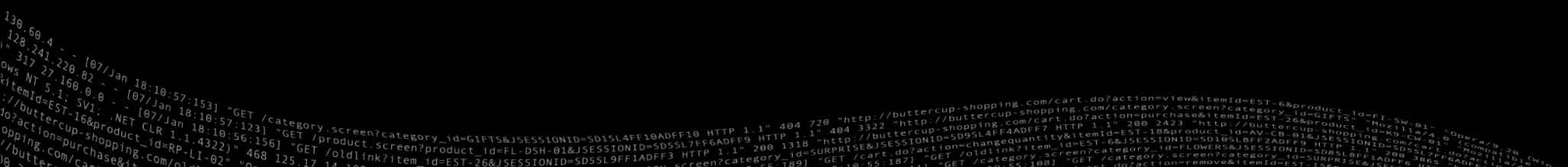
Strategery

Model Your Environment



Capacity Heat Map

	Date / Tier	Jan-18	Feb-18	Mar-18	Apr-18	May-18	Jun-18	Jul-18	Aug-18	Sep-18	Oct-18	Nov-18	Dec-18
Tier Utilization	Manager	24%	24%	30%	30%	34%	35%	25%	25%	44%	45%	46%	51%
	Queue	39%	40%	50%	50%	58%	13%	15%	14%	26%	26%	27%	29%
	Analytic	35%	36%	44%	44%	50%	52%	60%	30%	10%	10%	12%	18%
	Rules	62%	63%	78%	78%	88%	91%	70%	38%	51%	52%	53%	58%
	NoSQL	13%	13%	16%	16%	18%	52%	52%	52%	46%	59%	59%	59%
	Tracking	13%	13%	16%	16%	18%	18%	21%	22%	30%	31%	32%	35%
	Web	19%	19%	23%	23%	27%	27%	31%	33%	45%	46%	47%	52%
	Web Svc	15%	15%	15%	15%	15%	15%	15%	15%	15%	15%	20%	22%
	RDBMS	47%	48%	58%	59%	67%	69%	79%	81%	31%	31%	32%	35%
	DataMart	63%	63%	65%	65%	72%	72%	72%	73%	75%	75%	78%	81%



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ITSI – Glass Tables

ITSI – Service Analyzer

Dashboards

Ones even your managers can understand!

Guidelines for Success

1. Show the problem
2. Identify the solution
3. Follow up with results

Q&A

Ted Boehm | Chief Platform Architect

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Thank You

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