



splunk>

Performance Engineering at Mastercard

Ted Boehm

October 2018



Forward-Looking Statements

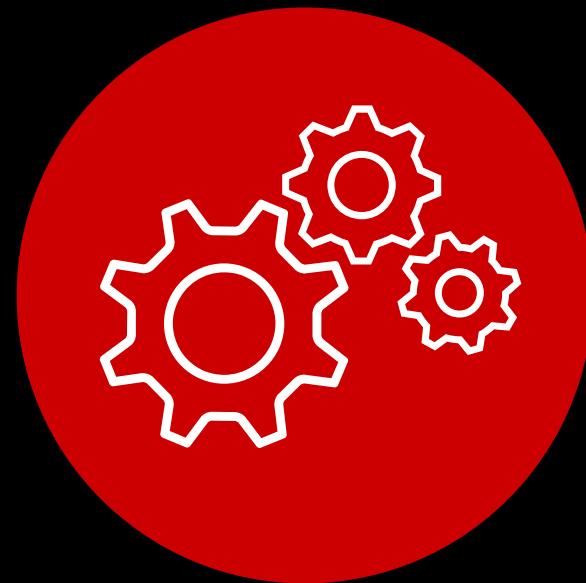
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Three Guiding Principles



Tiers



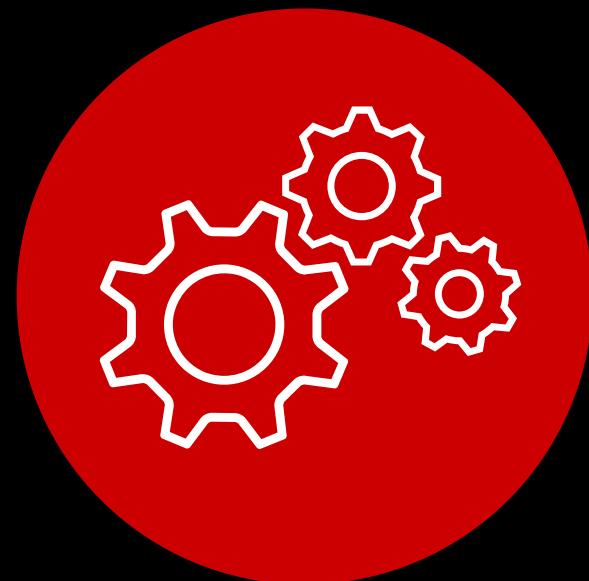
Tools



Strategy



First Principle

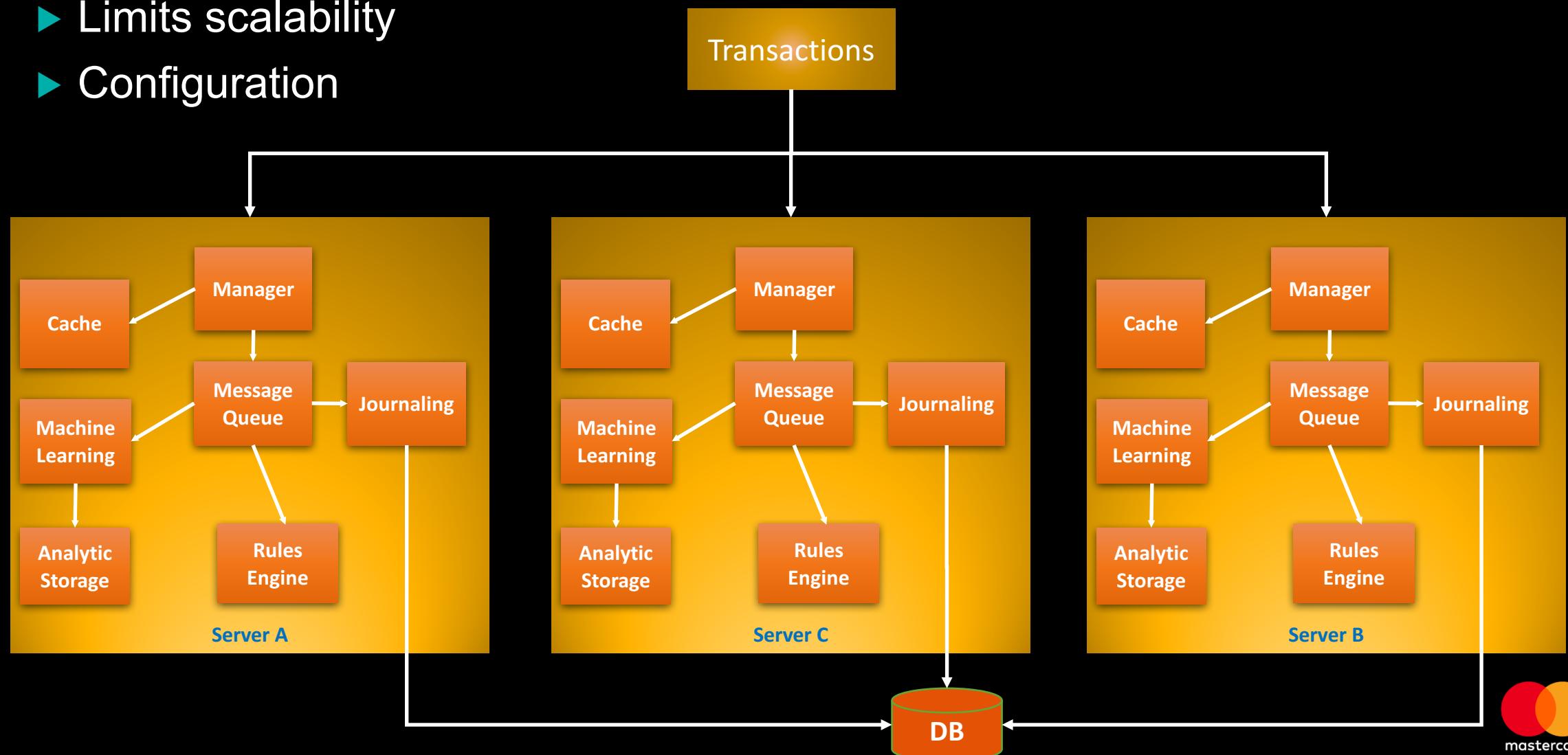


Tiers



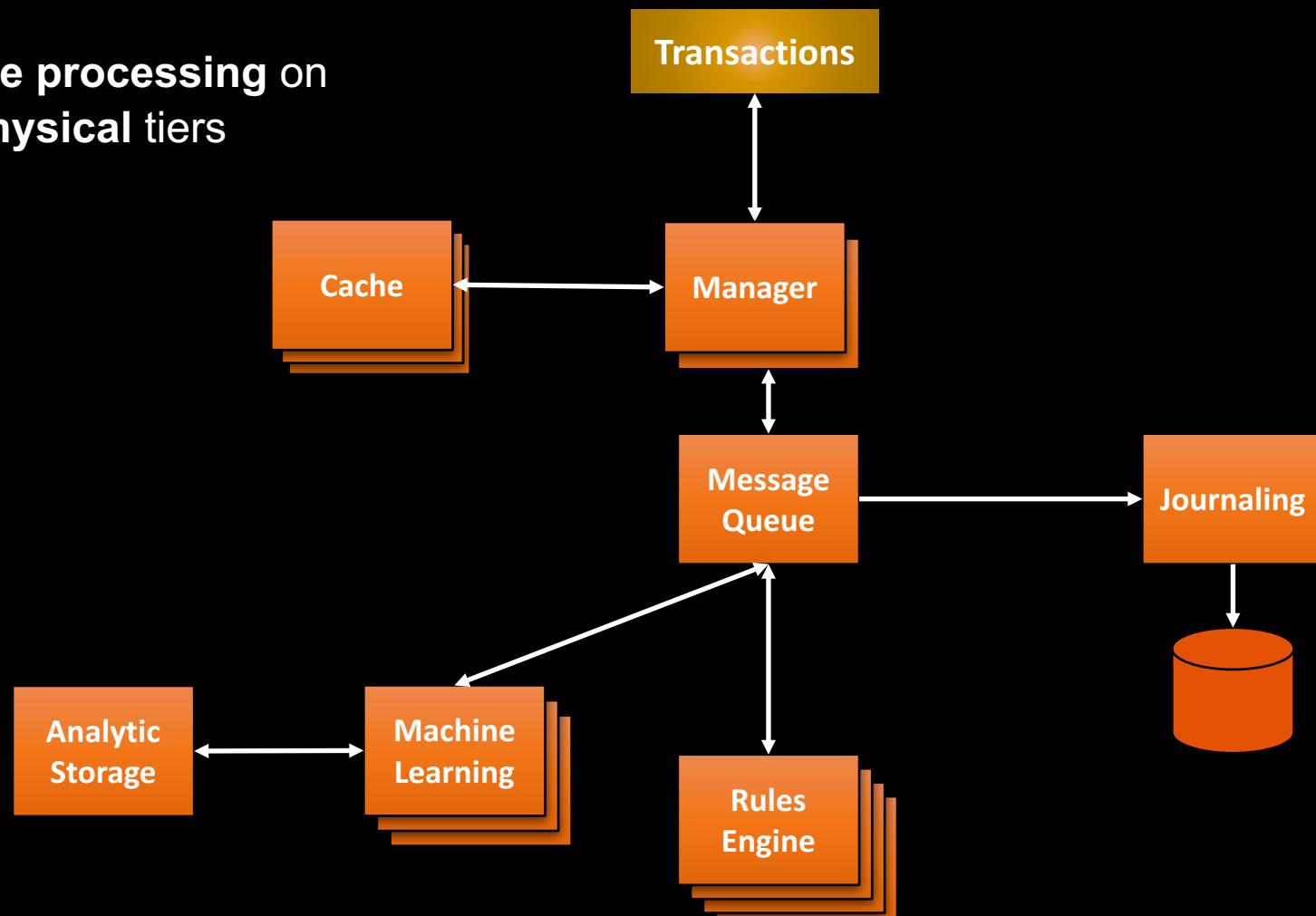
Centralized Approach

- ▶ Limits scalability
- ▶ Configuration



Tiered Approach

Distribute like processing on separate, physical tiers



Second Principle



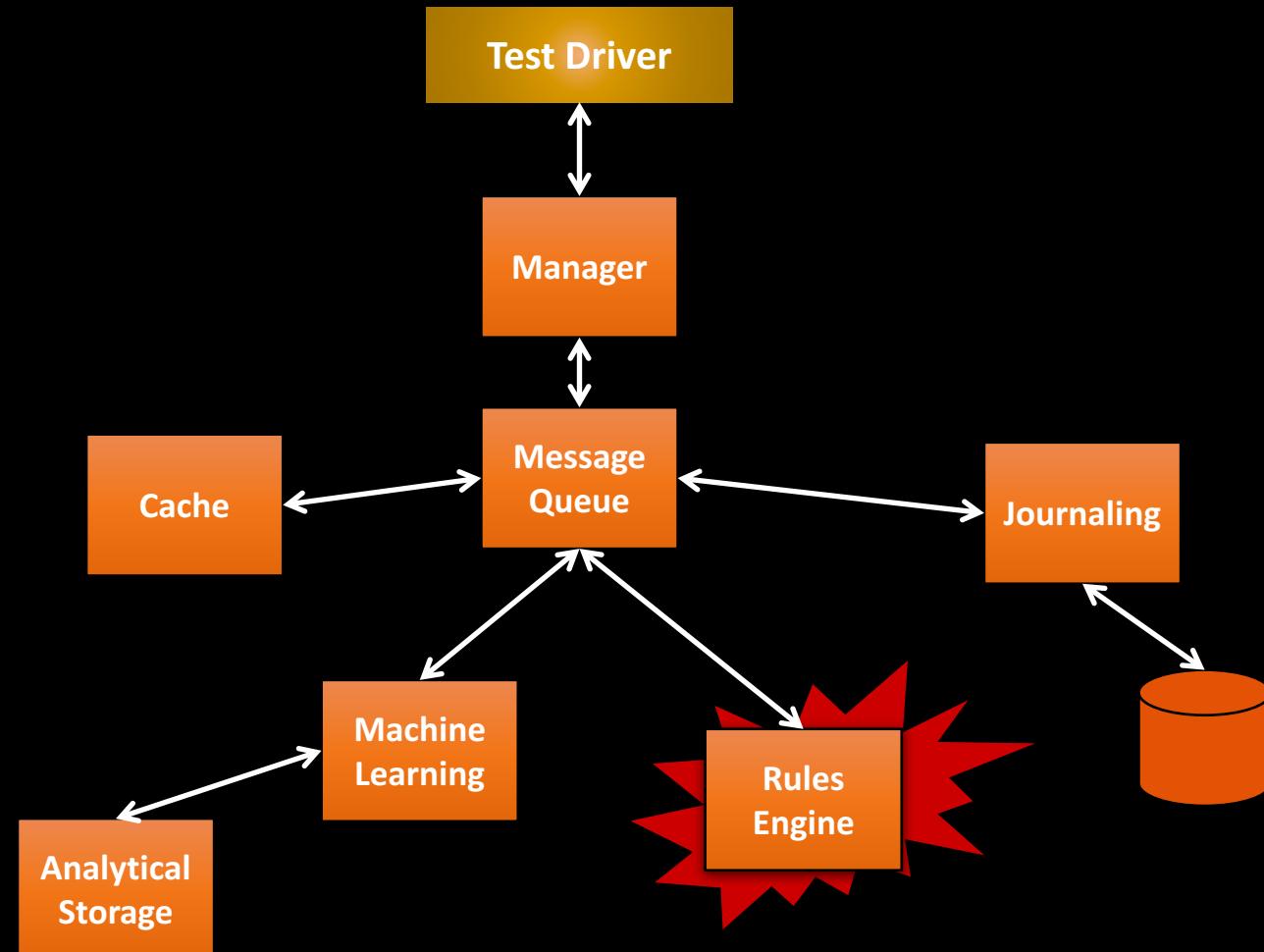
Tools



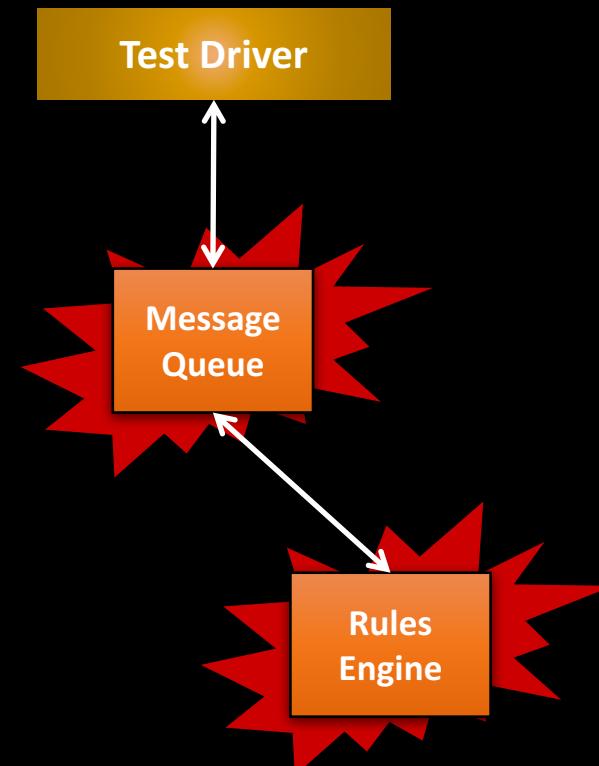
Building a Performance Environment



End-To-End Testing Approach



Tiered Testing Approach



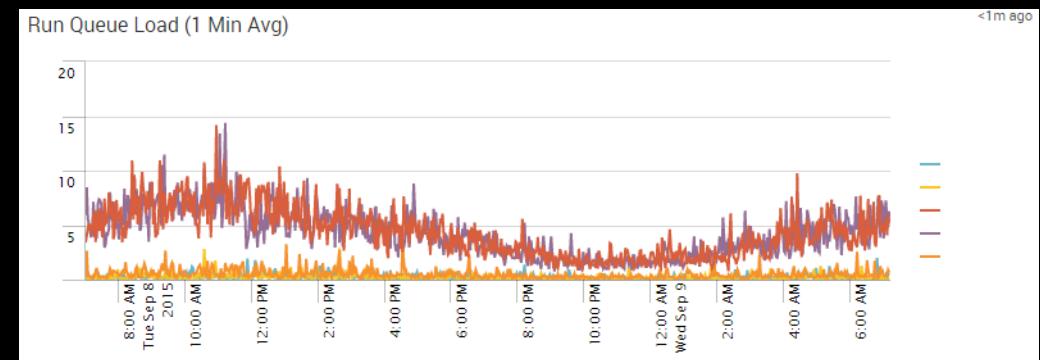
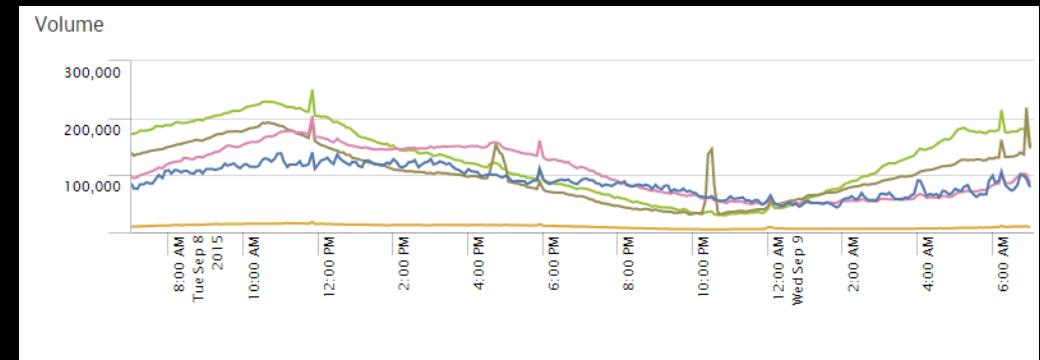
Stress Testing

- ▶ 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



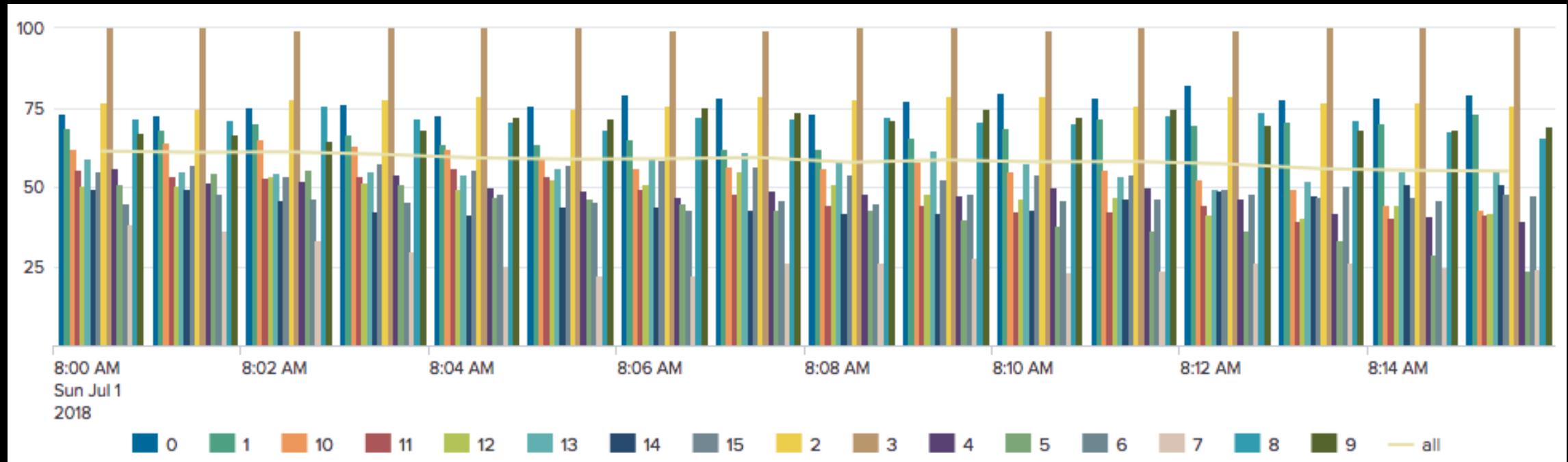
Track Metrics

- ▶ 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”



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



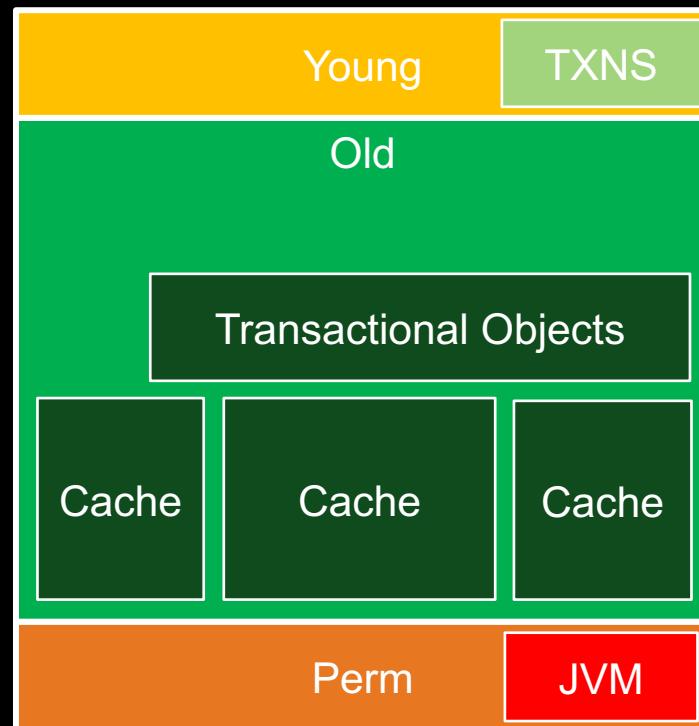
Java and Low Latency Are (always) Not Friends

► Discoveries

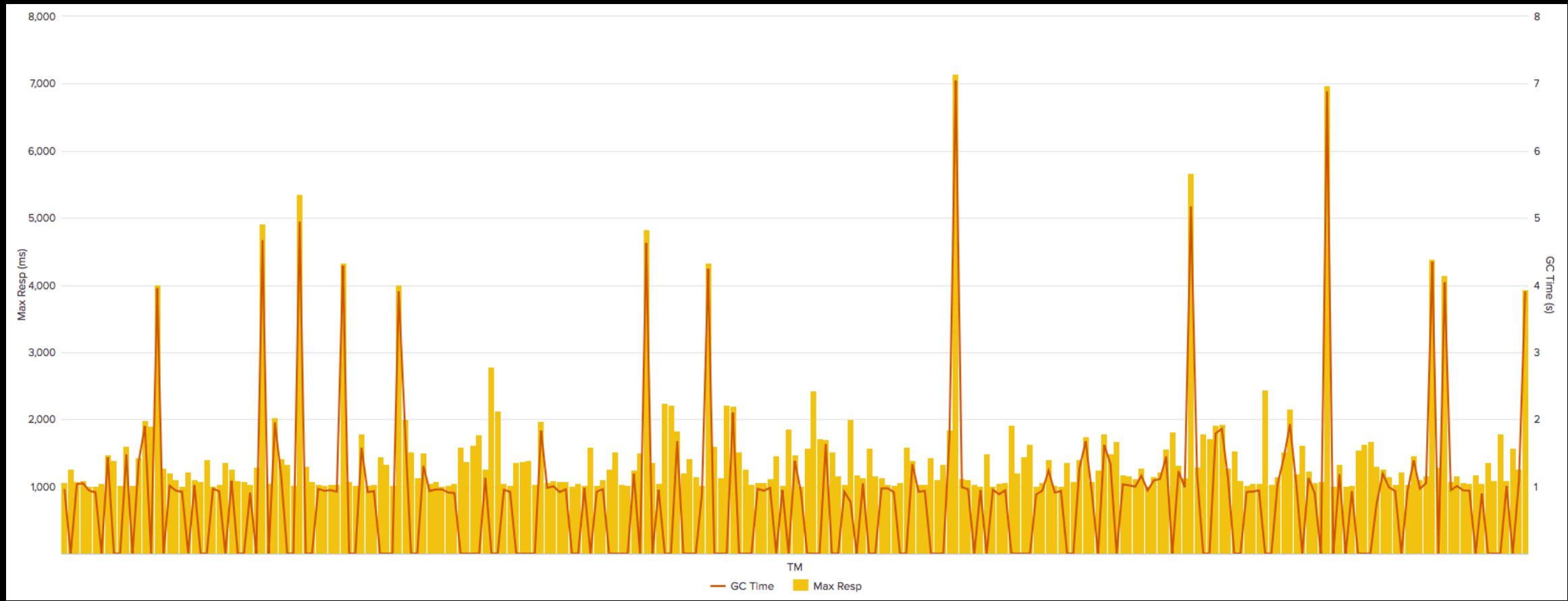
- Java cleans up garbage (minors and majors)
 - Daily in production
 - Nearly 10K “Major” Garbage Collections
 - ~6 hours spent in Full GC
 - Limited on heap size

► Goals

- Eliminate time from majors
 - Limit minors
 - Improve SLA

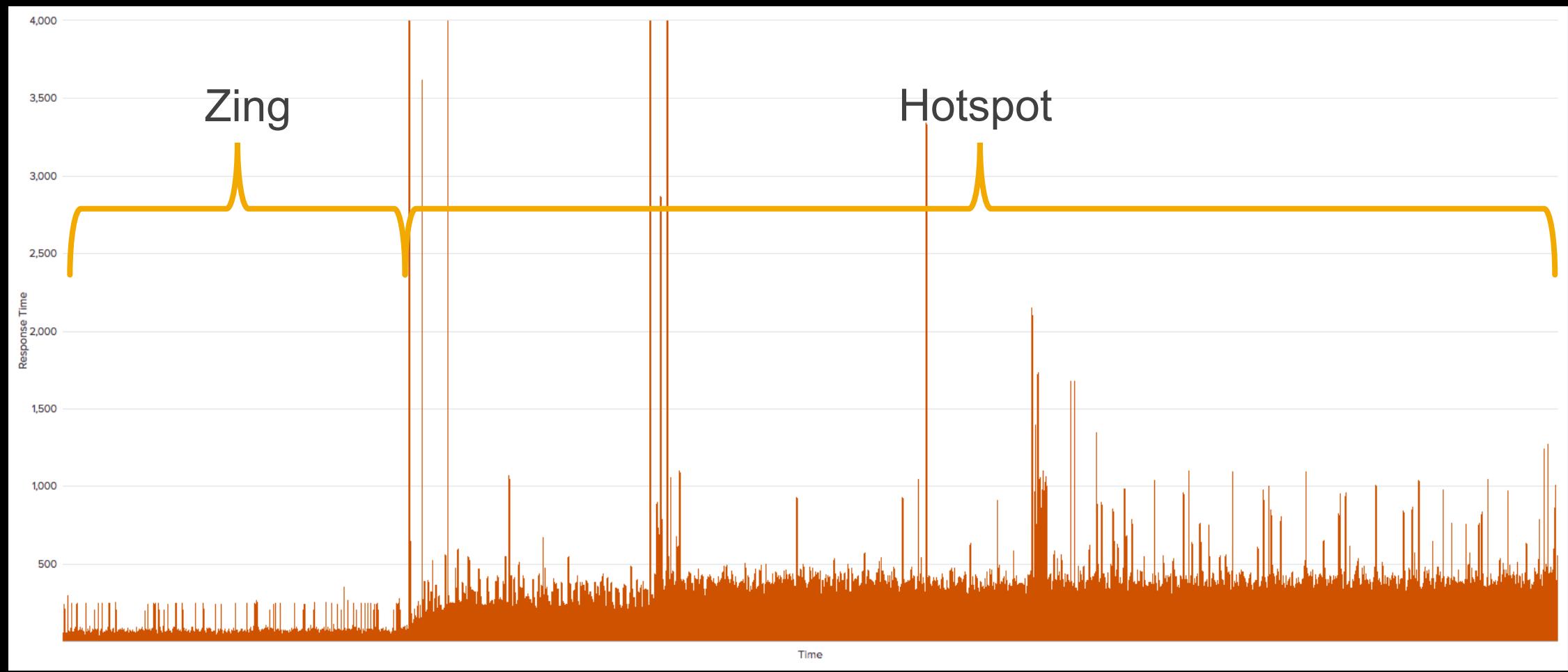


Garbage Collections vs Response Times



Azul Zing vs Hotspot

Commercial, ultra low pause JVM



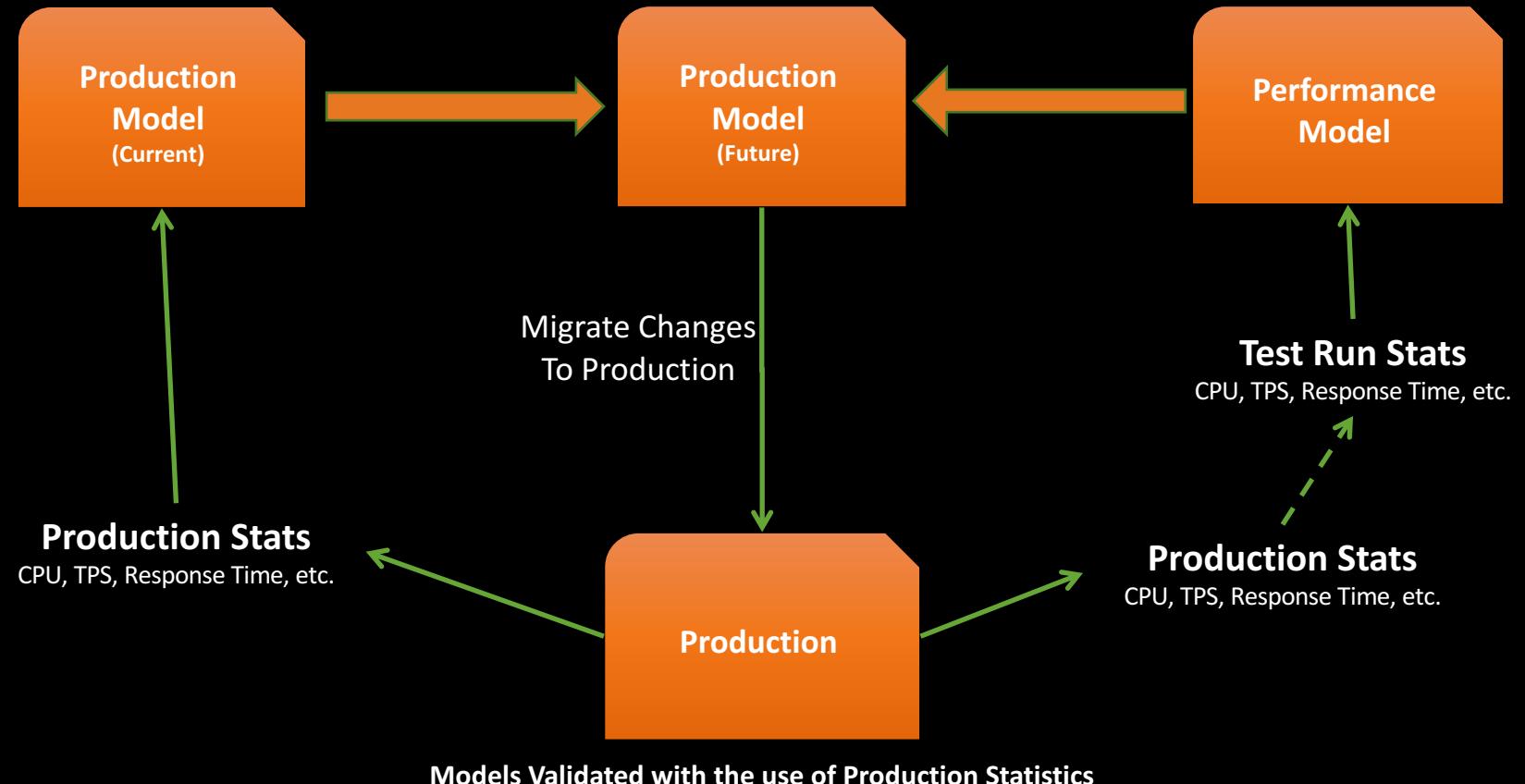
Third Principle



Strategy



Model Your Environment

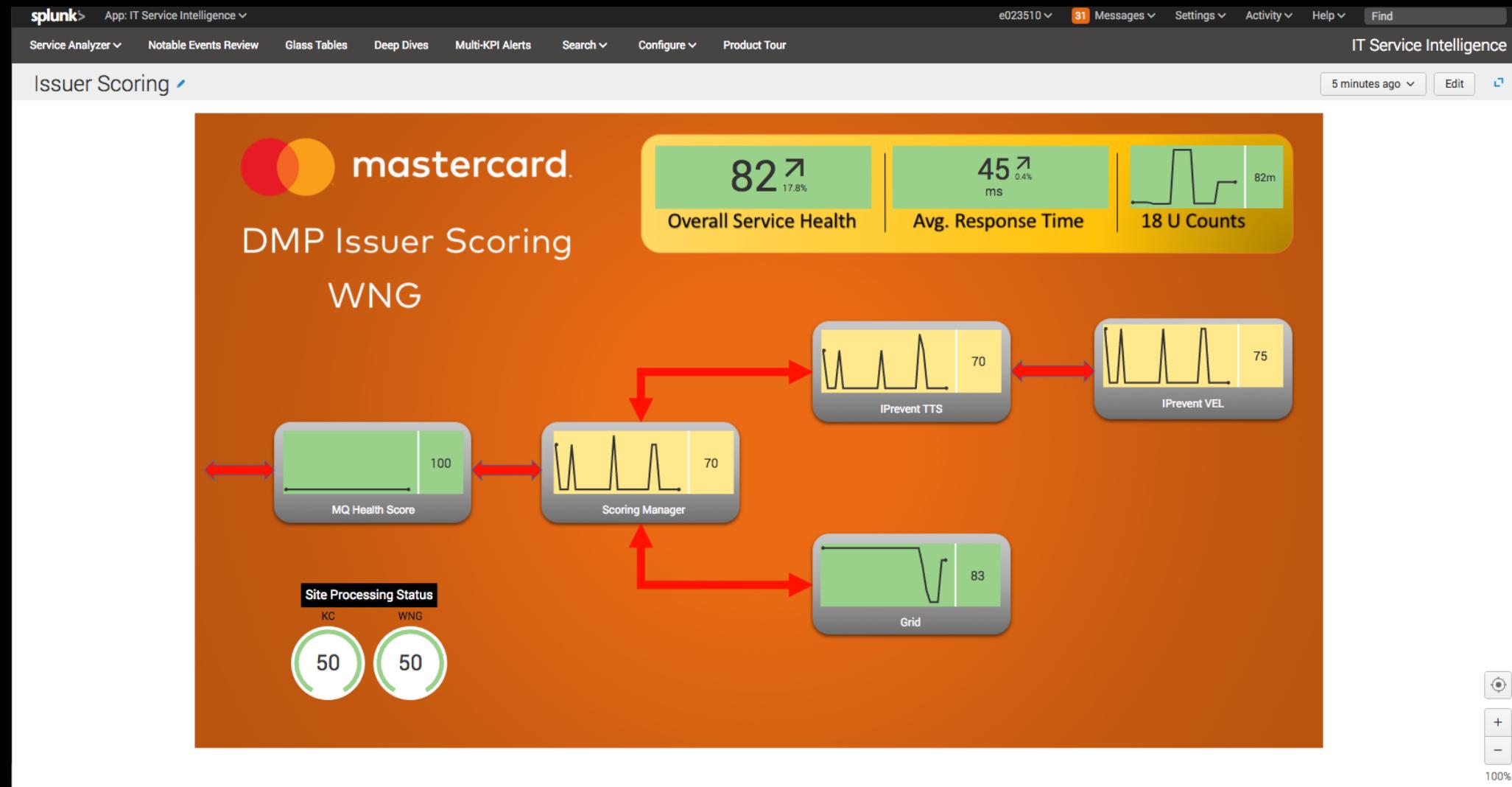


Capacity Heat Map

	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%



ITSI – Glass Tables



ITSI – Service Analyzer

Splunk App: IT Service Intelligence

Service Analyzer ▾ Notable Events Review Glass Tables Deep Dives Multi-KPI Alerts Search ▾ Configure ▾ Product Tour

e023510 ▾ 31 Messages ▾ Settings ▾ Activity ▾ Help ▾ Find

IT Service Intelligence

Service Analyzer

Last 12 hours ▾ Save as... Save

Filter Services Select service(s) to monitor Filter KPIs Select KPI(s) to monitor Show disabled service(s)

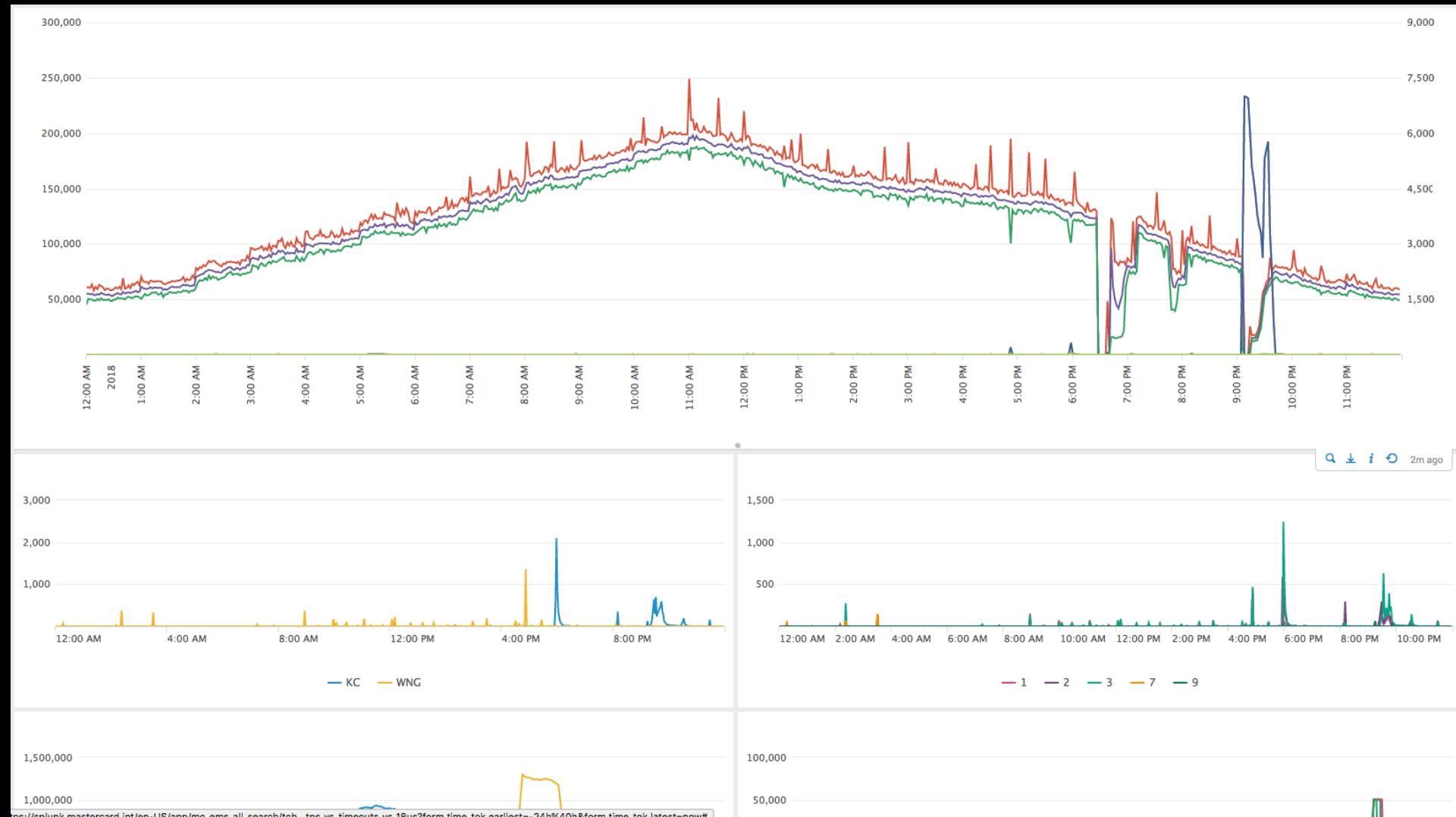
KPI Value: Aggregate ▾ Tile Size: Large ▾

TechOps - Host Filesystem TechOps - Jboss	TechOps - Host Filesystem TechOps - WWWServers	TechOps - WWW Available... TechOps - WWWServers	SM-WNG Log Messages SM-WNG	TechOps - WWW Disk Space TechOps - WWWServers	Issuer Scoring Timeouts ... Issuer Scoring	Storage Free Space: % SM-WNG	Memory Free: % SM-WNG	Storage Free Space: % MQ-WNG
2	2	86 %	454 k	5	172	17 %	14.4 %	22 %
Storage Free Space: % GRID-WNG	TechOps - XMLGW Volume TechOps - XMLGW	Memory Free: % VEL-WNG	Storage Free Space: % VEL-WNG	GRID-WNG Response Time GRID-WNG	TechOps - XMLGW P99 Re... TechOps - XMLGW	IPV-WNG Response Times IPV-WNG	Issuer Scoring Response ... Issuer Scoring	CPU Utilization: % IPV-WNG
10 %	36.2 k Reqs	39.4 %	10 %	5.07 ms	15.6 k ms	10.5 ms	50.3 ms	24.3 %
Network Utilization: Total ... IPV-WNG	Memory Free: % IPV-WNG	CPU Utilization: % SM-WNG	TechOps - WWW CPU Utili... TechOps - WWWServers	TechOps - XMLGW CPU Ut... TechOps - XMLGW	Volume WNG Issuer Scoring	Network Utilization: Total ... MQ-WNG	CPU Utilization: % VEL-WNG	BizOps - DML - Mastercar... BizOps - DML - Mastercard Send
5.79 k	73.5 %	20.9 %	4.64 %	7.02 %	49.9	22.9 k	20.3 %	169 Txns
Network Utilization: Total ... GRID-WNG	Volume KC Issuer Scoring	TechOps - XMLGW Media... TechOps - XMLGW	CPU Utilization: % BizOps - DML - APIGateway	CPU Utilization: % BizOps - DML - Mastercard Send	TechOps - Host CPU Utili... TechOps - WWWServers	TechOps - Host Memory F... TechOps - WWWServers	Network Utilization: Total ... VEL-WNG	TechOps - Host Memory F... TechOps - Jboss
14.6 k	50	284 ms	7.51 %	4.25 %	4.64 %	86 %	2.94 k	76.3 %
Masterpass Switch - CPU ... BizOps - DML - Masterpass Che...	MQ-WNG Queue Depth MQ-WNG	TechOps - Apache Volume TechOps - WWWServers	Memory Free: % MQ-WNG	TechOps - XMLGW Memor... TechOps - XMLGW	TechOps - Host CPU Utili... TechOps - Jboss	BizOps - DML - Masterpas... BizOps - DML - Masterpass Che...	Memory Free: % BizOps - DML - APIGateway	Masterpass Switch - Avail... BizOps - DML - Masterpass Che...
4.20 %	0 msgs	42.8 k Reqs	78.5 %	59.7 %	5.73 %	100 bxs	77.1 %	78.7 %
IPV-WNG Log Messages IPV-WNG	BizOps - DML - Mastercar... BizOps - DML - Mastercard Send	Issuer Scoring Timeouts KC Issuer Scoring	TechOps - WWWServers R... TechOps - WWWServers	BizOps - DML - APIGatewa... BizOps - DML - APIGateway				



Dashboards

Ones even your managers can understand!



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Guidelines for Success

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



Q&A

Ted Boehm | Chief Platform Architect



Thank You

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