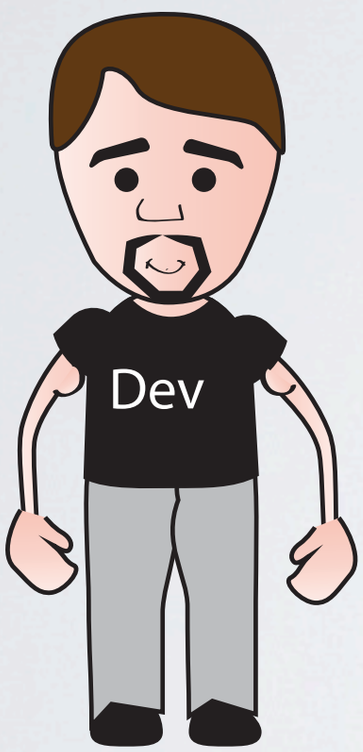
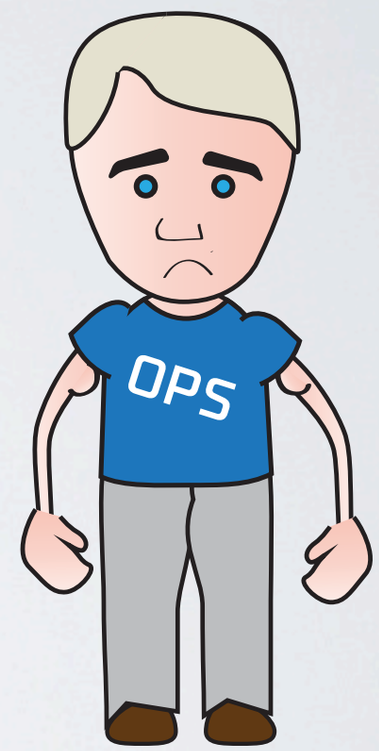
WHAT CAN DEVOPS LEARN FROM





Stephen Burton, Tech Evangelist
@BurtonSays

AppDynamics

ABOUT ME

- App Support
- Developer
- Systems Engineer
- Pre-Sales
- Product Management
- **Tech Evangelist**

WHO IS THIS?

2011 Formula 1 World Champion
Sebastian Vettel

FORMULA 1

- 20 Races on the World Calendar
- 12 Teams, 24 Cars & Drivers
- 220mph Top Speed, 0-100mph < 4 secs
- Cost is ~5 Million per car
- Accidents happen...

WHY THIS PRESENTATION?

Formula 1 is about delivering

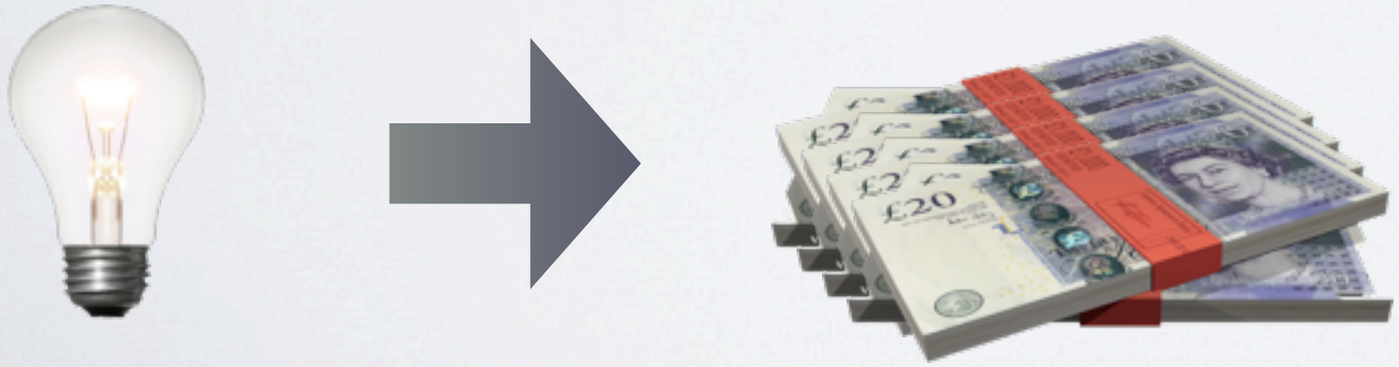
Success through

Innovation, Agility and **Change**

WHY RELATE FI TO DEVOPS?

"DevOps is about being agile,
and going from
A-Ha to Cha Ching
as quickly as possible"

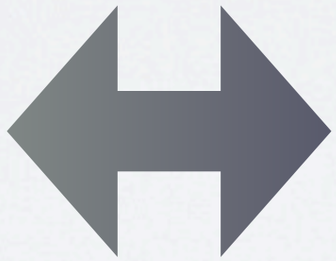
John Willis
DevOps Evangelist



COMPARING TEAMS

Formula 1

- Driver
- Sponsors
- Architects
- Designers
- Engineers
- Testing
- Operations
- Support



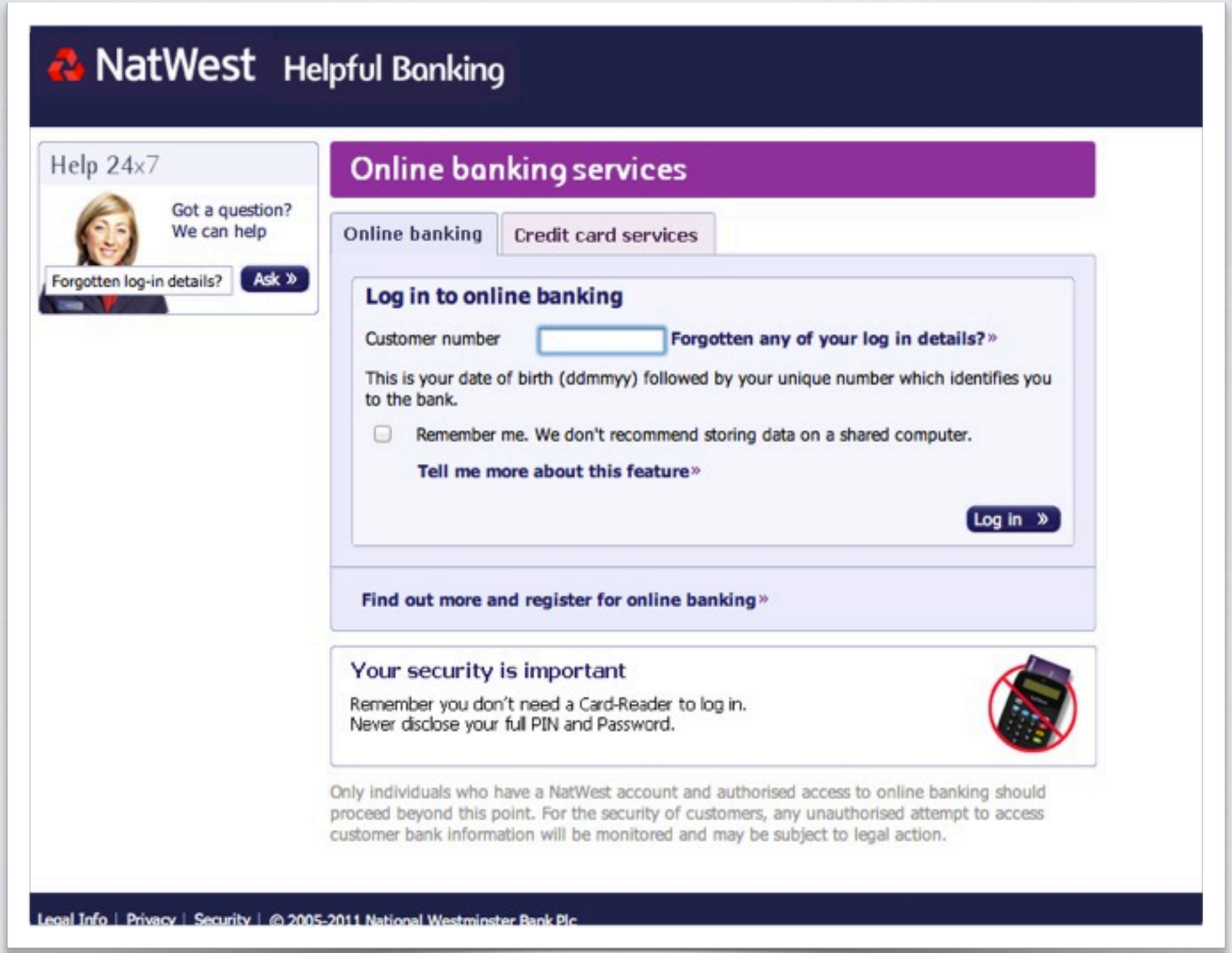
Applications

- End User
- Business
- Architects
- Designers
- Developers
- Testing
- Operations
- Support

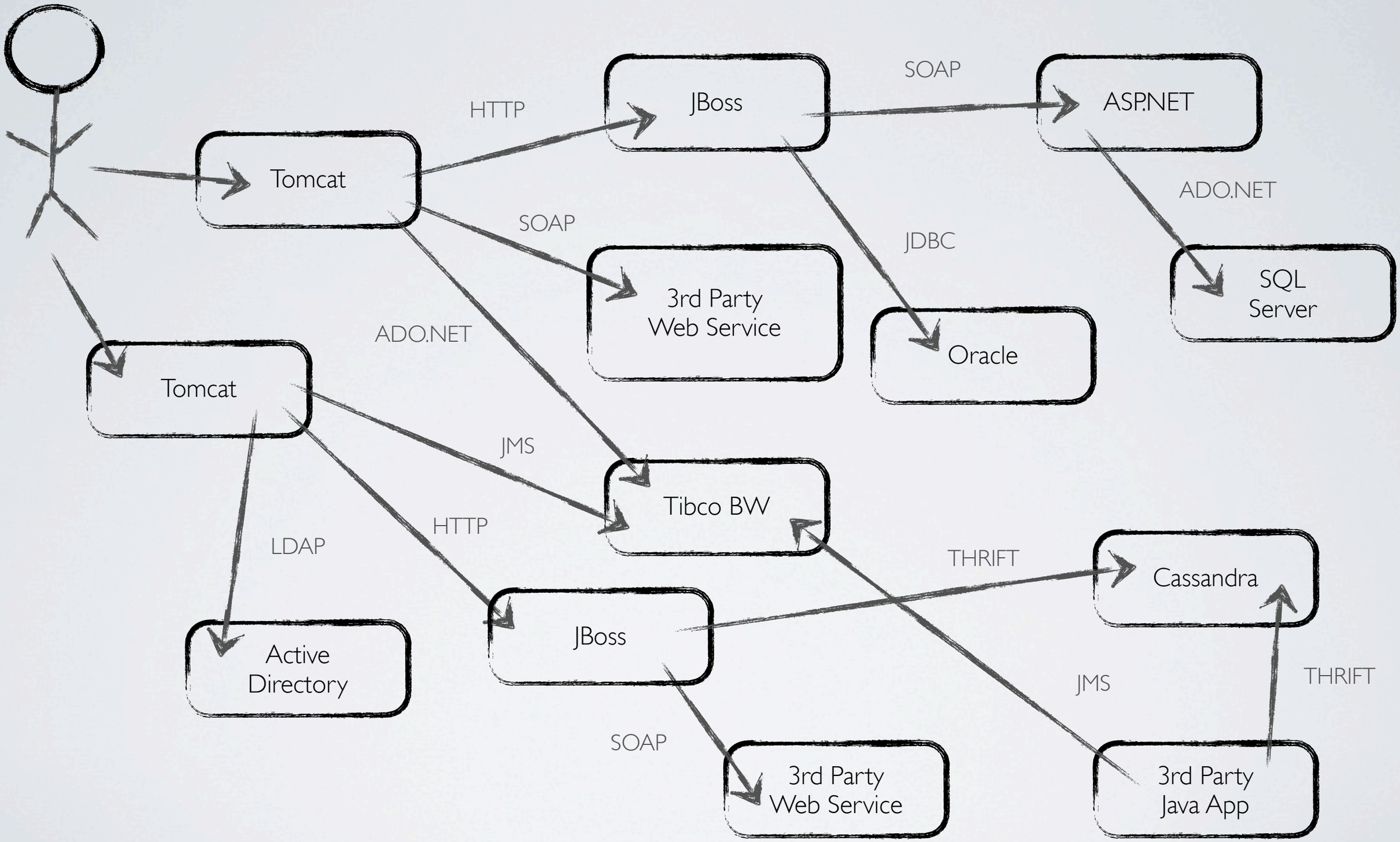
F1 CARS LOOKS SIMPLE


HondaRacingF1.com
INTERCOND
DON'T
NTN

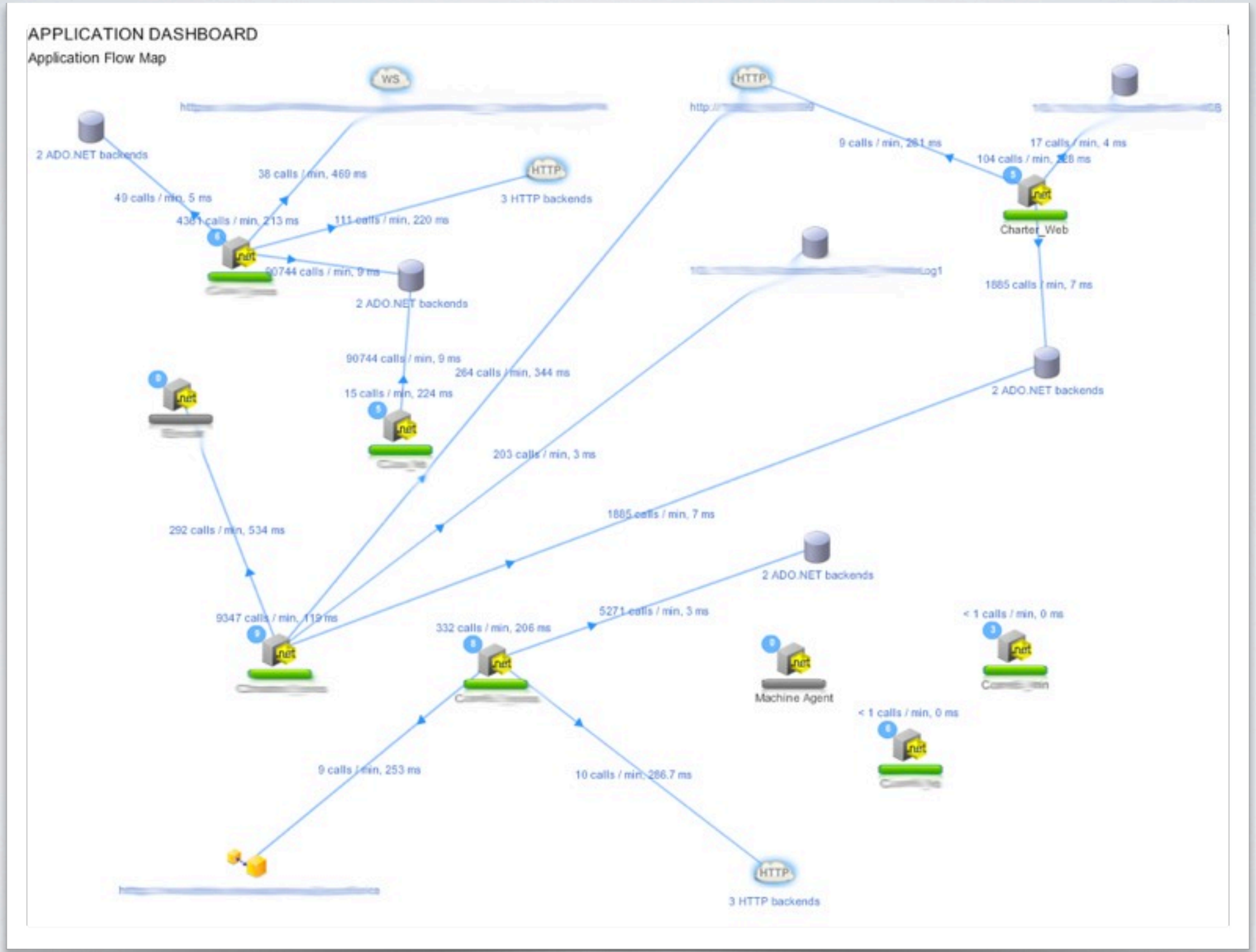
APPS LOOKS SIMPLE



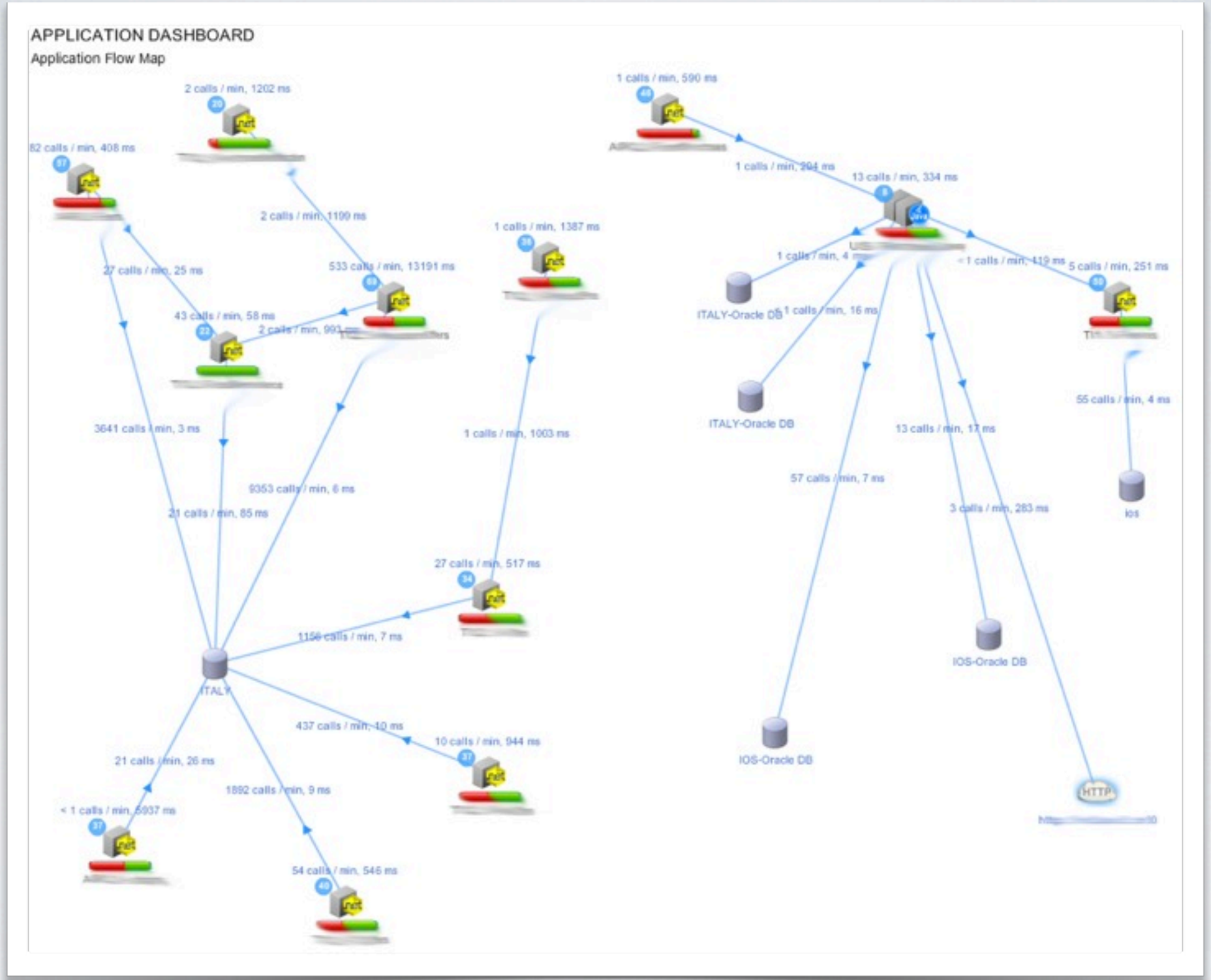
But complexity lies beneath



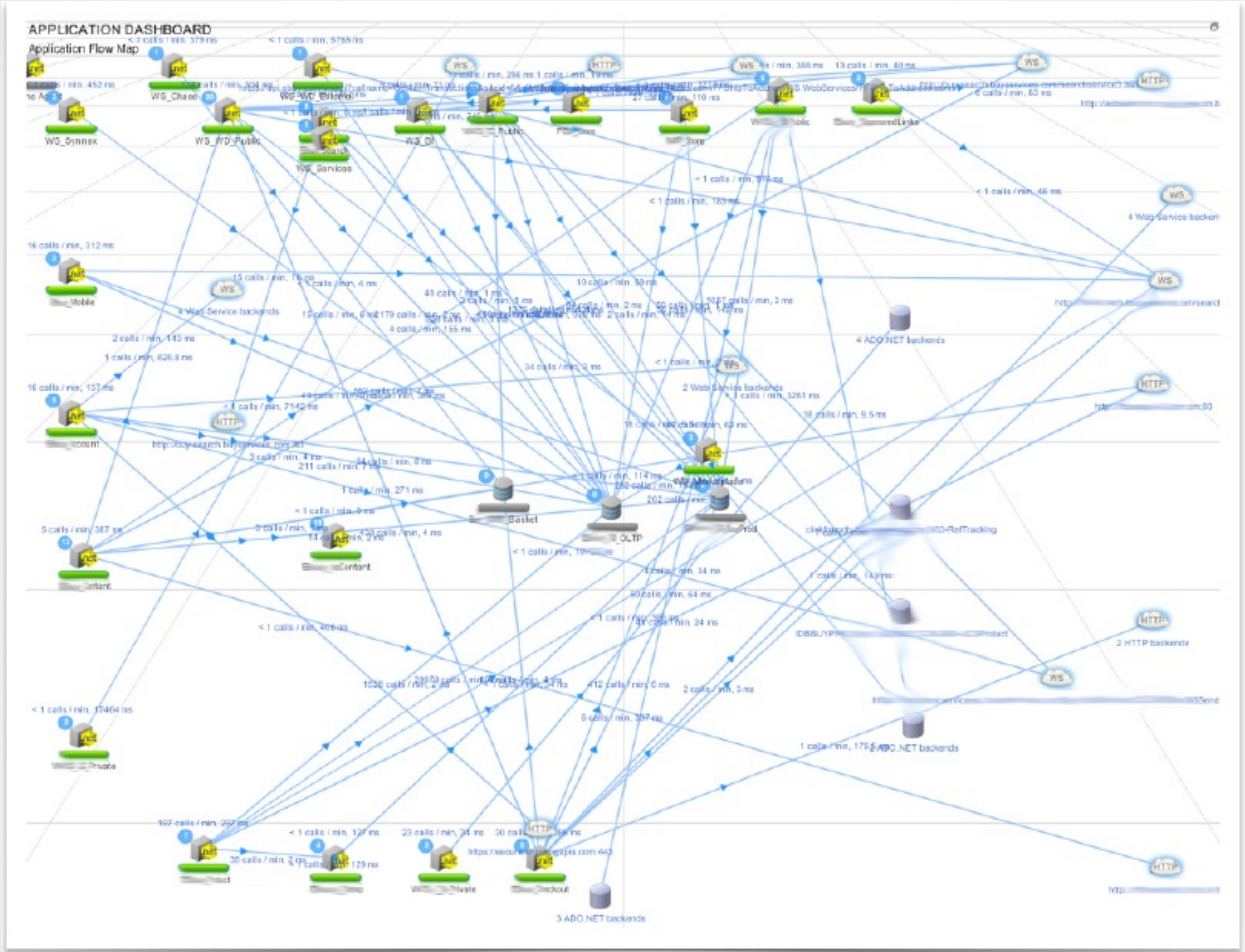
REALLY


APPLICATION DASHBOARD
Application Flow Map
WS
HTTP
2 ADO.NET backends
38 calls / min, 469 ms
49 calls / min, 5 ms
4361 calls / min, 213 ms
111 calls / min, 220 ms
3 HTTP backends
90744 calls / min, 9 ms
2 ADO.NET backends
9 calls / min, 261 ms
17 calls / min, 4 ms
104 calls / min, 128 ms
Charter_Web
1885 calls / min, 7 ms
2 ADO.NET backends
90744 calls / min, 9 ms
264 calls / min, 344 ms
15 calls / min, 224 ms
203 calls / min, 3 ms
292 calls / min, 534 ms
1885 calls / min, 7 ms
2 ADO.NET backends
9047 calls / min, 119 ms
332 calls / min, 206 ms
5271 calls / min, 3 ms
Machine Agent
< 1 calls / min, 0 ms
< 1 calls / min, 0 ms
9 calls / min, 253 ms
10 calls / min, 286.7 ms
3 HTTP backends

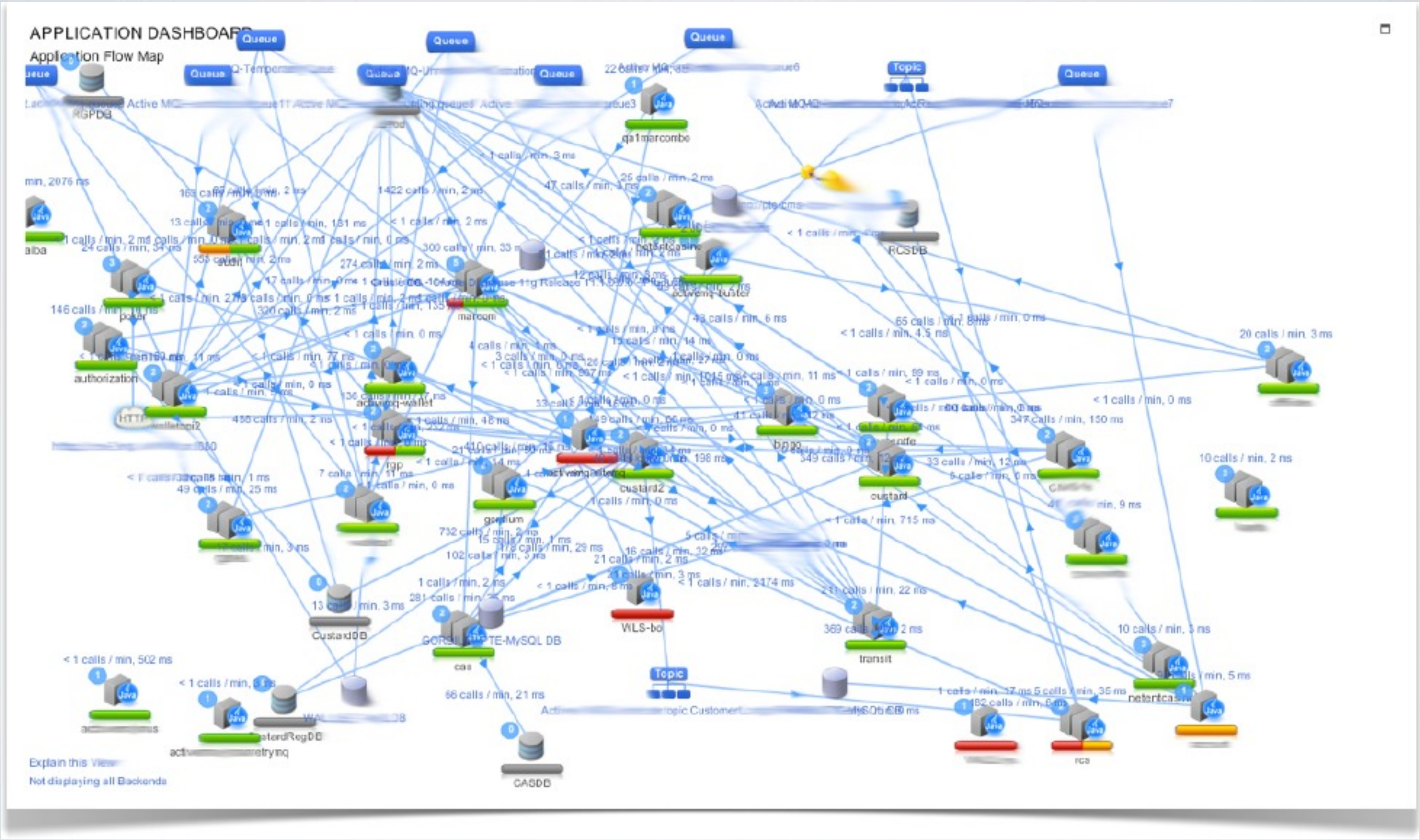
REALLY REALLY



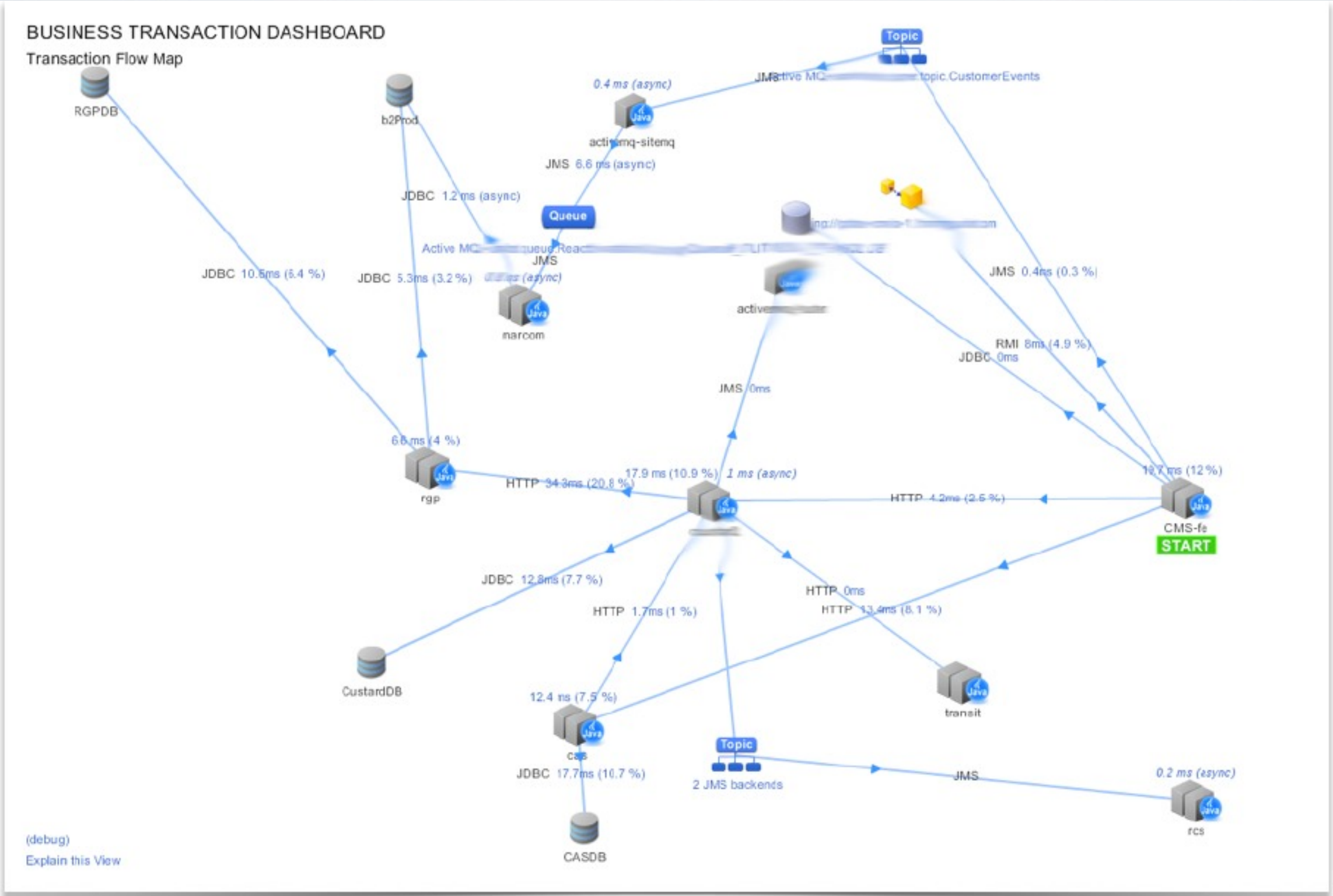
REALLY REALLY REALLY



HOLY SH!T REALLY



A SIMPLE LOGIN TRANSACTION



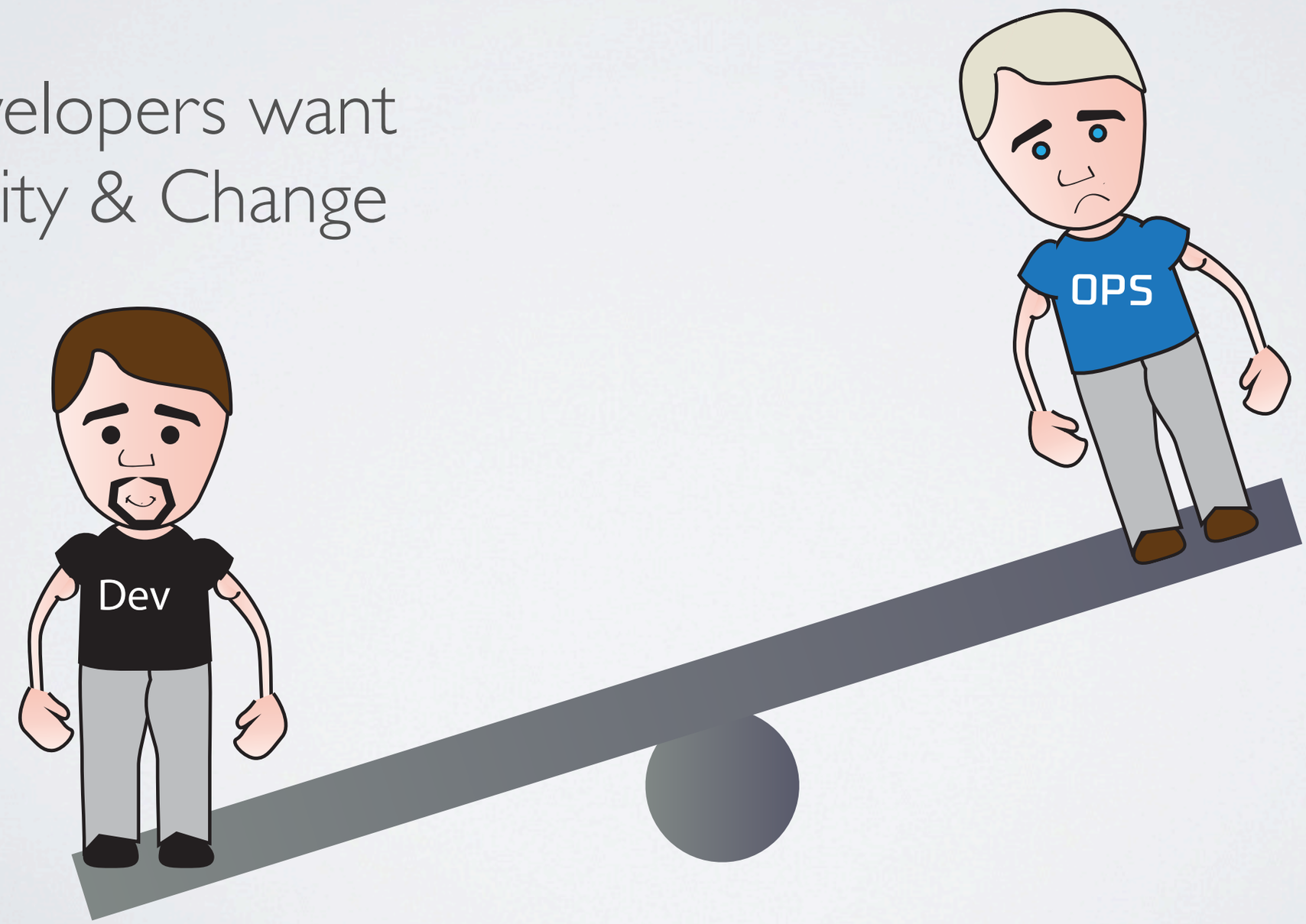
SUCCESS IN FORMULA 1

is Winning Races

WHAT IS SUCCESS FOR DEVOPS ?

Operations want
Availability & Stability

Developers want
Agility & Change



MANAGING CHANGE ISN'T EASY

Mis-configuration

Business Requirements

End User Complaints

Bottlenecks

Design > Build > Test > Deploy > Support

Project Plans

Bugs

Slowdowns

Outages

More Business Requirements

SO HOW DO F1 TEAMS MANAGE CHANGE?

INTERESTING F1 FACTS

- F1 car has 80,000 components, 1KM wiring &100+ sensors
- 99.9% assembled correctly still means 80 POF's
- Teams can bring up to 30 upgrades per race weekend
- Brakes on F1 Car is like hitting a brick wall at 200mph
- Downforce a baby elephant sitting on drivers head

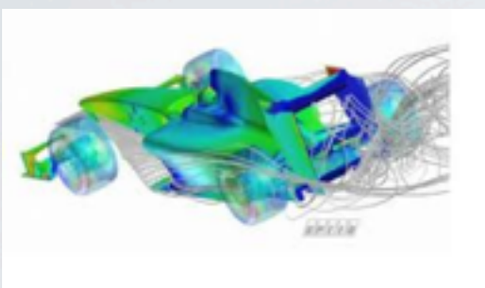
FORMULA 1

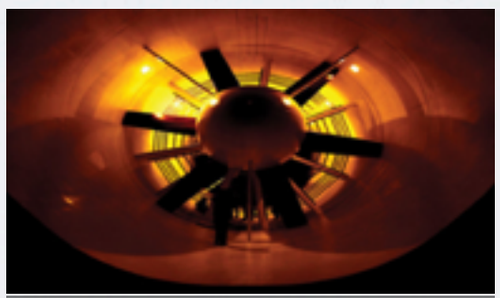
Ideas Win Races

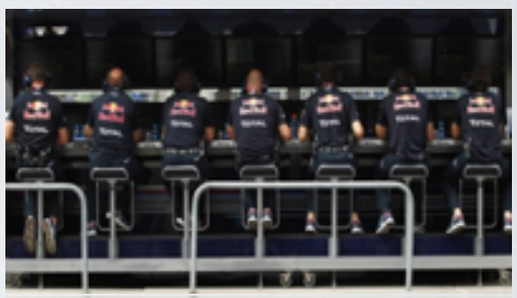
COLLABORATION TURNS IDEAS INTO REALITY

- Cars Evolve
  - Up to 30 new parts per race weekend
- Engineering
  - Aero, Engine, Transmission, ...
- Operations
  - Mechanics, Telemetry, Pit Crew

F1 CAR LIFECYCLE







Design Develop Test Deploy Support

Race Weekend

Engineers work hand in hand with Operations.

CHANGE ISN'T EASY

					AUS	MAL	BHR	ESP	MON	CAN	USA	FRA	GBR	EUR	HUN	TUR	ITA	BEL	JPN	CHN	BRA				
2007	Red Bull RB3	Renault RS27 V8	B	Coulthard	Ret	Ret	Ret	5	14	Ret	Ret	13	11	5	11	10	Ret	Ret	4	8	9			24	5th
				Webber	13	10	Ret	Ret	Ret	9	7	12	Ret	3	9	Ret	9	7	Ret	10	Ret				
					AUS	MAL	BHR	ESP	TUR	MON	CAN	FRA	GBR	GER	HUN	EUR	BEL	ITA	SIN	JPN	CHN	BRA			
2008	Red Bull RB4	Renault RS27 V8	B	Coulthard	Ret	9	18	12	9	Ret	3	9	Ret	13	14	17	11	16	7	Ret	10	Ret		29	7th
				Webber	Ret	7	7	5	7	4	12	6	10	Ret	9	12	8	8	Ret	8	14	9			
					AUS	MAL	CHN	BHR	ESP	MON	TUR	GBR	GER	HUN	EUR	BEL	ITA	SIN	JPN	BRA	ABU				
2009	Red Bull RB5	Renault RS27 V8	B	Webber	12	6†	2	11	3	5	2	2	1	3	9	9	Ret	Ret	17	1	2			153.5	2nd
				Vettel	13	15	1	2	4	Ret	3	1	2	Ret	Ret	3	8	4	1	4	1				
					BHR	AUS	MAL	CHN	ESP	MON	TUR	CAN	EUR	GBR	GER	HUN	BEL	ITA	SIN	JPN	KOR	BRA	ABU		
2010	Red Bull RB6	Renault RS27 V8	B	Vettel	4	Ret	1	6	3	2	Ret	4	1	7	3	3	15	4	2	1	Ret	1	1	498	1st
				Webber	8	9	2	8	1	1	3	5	Ret	1	6	1	2	6	3	2	Ret	2	8		
					AUS	MAL	CHN	TUR	ESP	MON	CAN	EUR	GBR	GER	HUN	BEL	ITA	SIN	JPN	KOR	IND	ABU	BRA		
2011	Red Bull RB7	Renault RS27 V8	P	Vettel	1	1	2	1	1	1	2	1	2	4	2	1	1	1	3	1	1			595*	1st*
				Webber	5	4	3	2	4	4	3	3	3	3	5	2	Ret	3	4	3	4				

Being Competitive doesn't happen overnight

MEASURING SUCCESS

- Downforce
- Performance
- Reliability
- Race Wins

Telemetry & Monitoring

Driver Results

Monitoring is critical to Managing Change

MONITOR & MANAGE IMPACT OF CHANGE

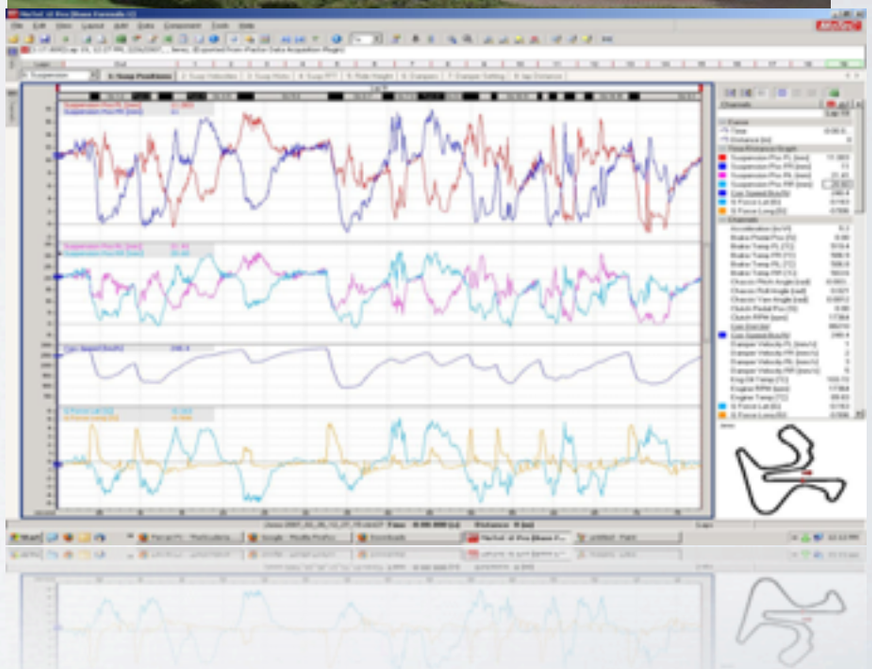
Fast

Slow

Fail

MEASURING CHANGE

- Why were we fast/slow/useless?
- What new parts worked/didn't work?
- Where did we find time?
- Where do we focus next?



SO, DO YOU KNOW HOW FAST AND RELIABLE **YOUR CODE IS** IN PRODUCTION?

<1% of Developers did at last Event

This Developer knew how fast his code was.
(His code just crashed Production)

CODE CAN BE **FUNCTIONALLY** PERFECT

But how Fast and Reliable will it be?

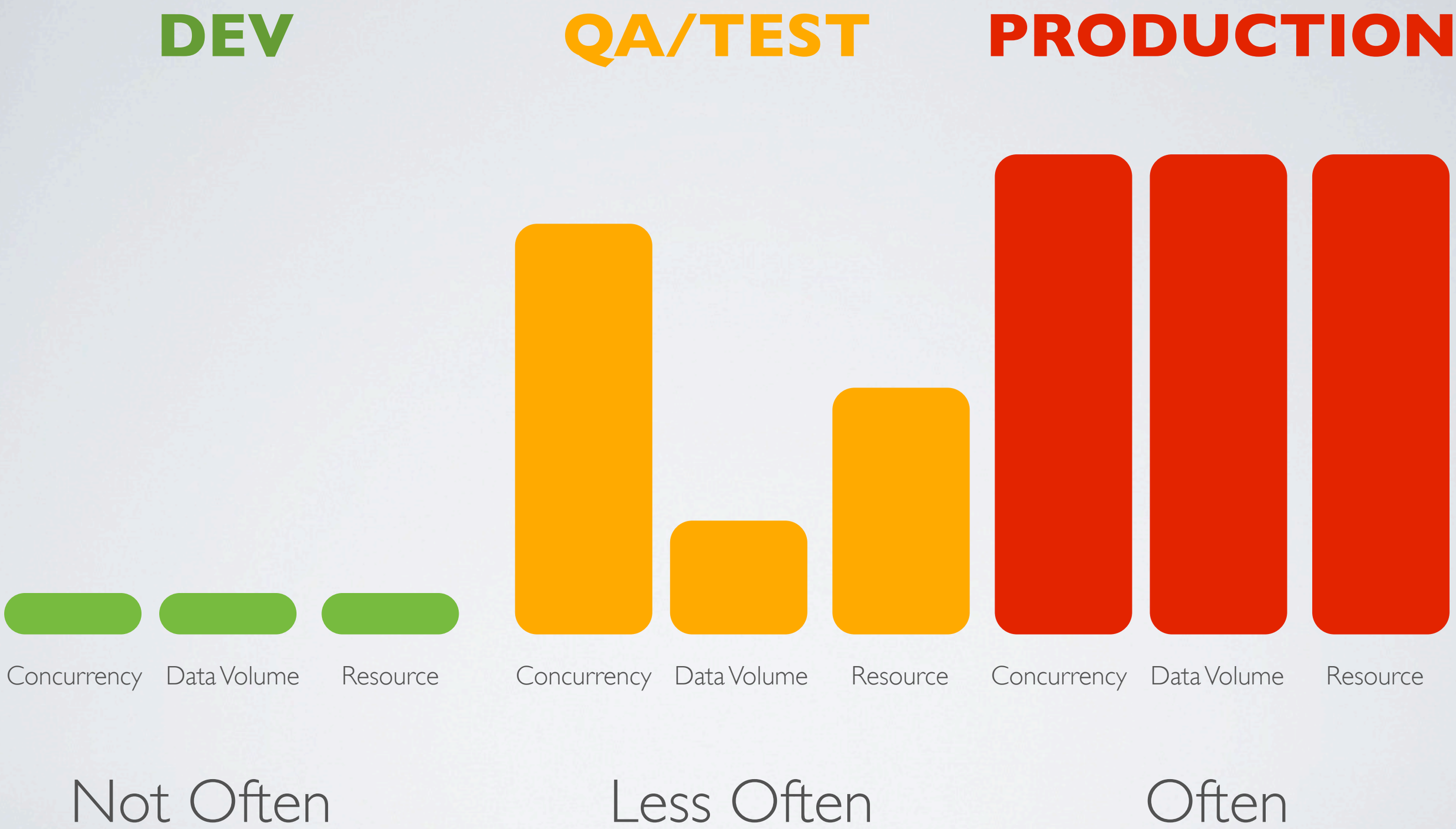
3 KEY THINGS IMPACT APPLICATION PERFORMANCE

Concurrency

Data Volume

Resource

WHERE DO YOU FIND REAL BOTTLENECKS?



HANDS UP IF YOU DO

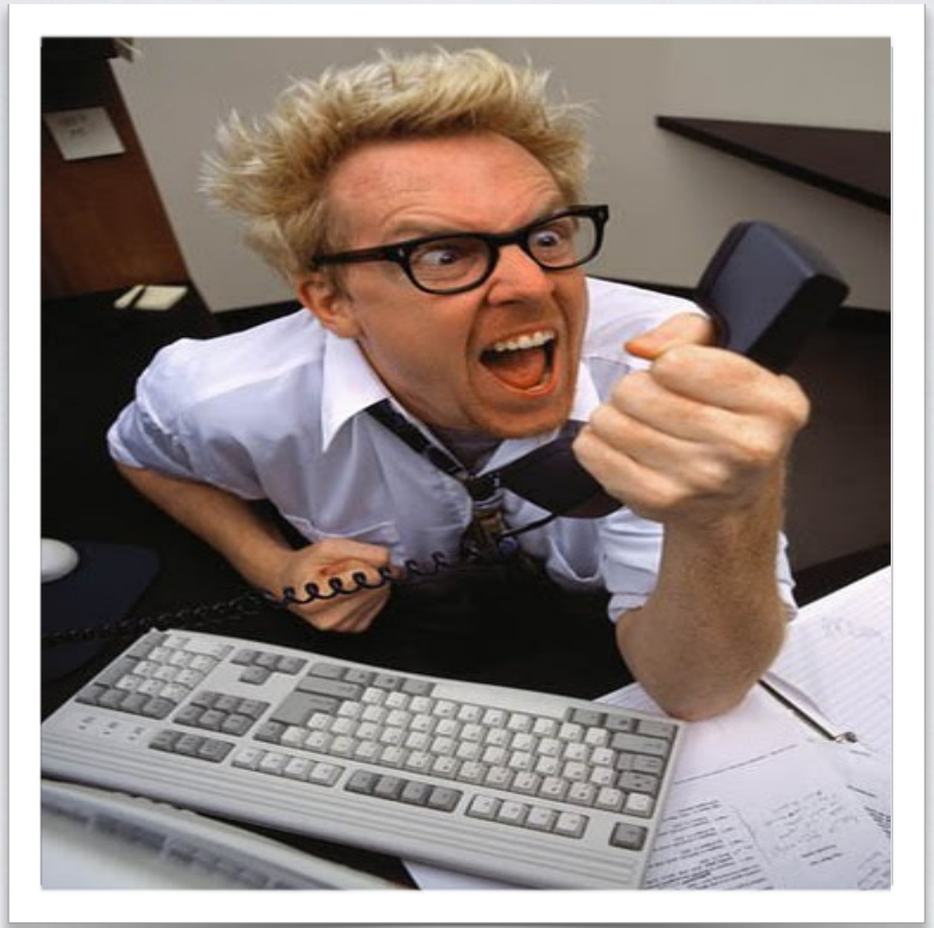
PERFORMANCE TESTING

ON EVERY RELEASE

(Its tough with Agile cycles)

DEV **SUCCESS** ISN'T HANDING OVER A RELEASE TO OPS

GIFTS CAN HAVE SURPRISES



NOBODY LIKES SURPRISES

DEV **SUCCESS**
ISN'T THE APP LASTING
1 HOUR IN PRODUCTION

CUSTOMER STORY

- Ops has a 48 hour warranty period with Dev
- If the App experiences consistent slowdowns or outages
- All Tickets get re-assigned to Development

DEV & OPS NEED COMMON GOALS

- # Agile Releases or % Availability is **pointless**
- End User Experience?
- Business Transaction Throughput?
- MTBF and Business Impact?

WHAT YOU CAN'T SEE

DEVOPS

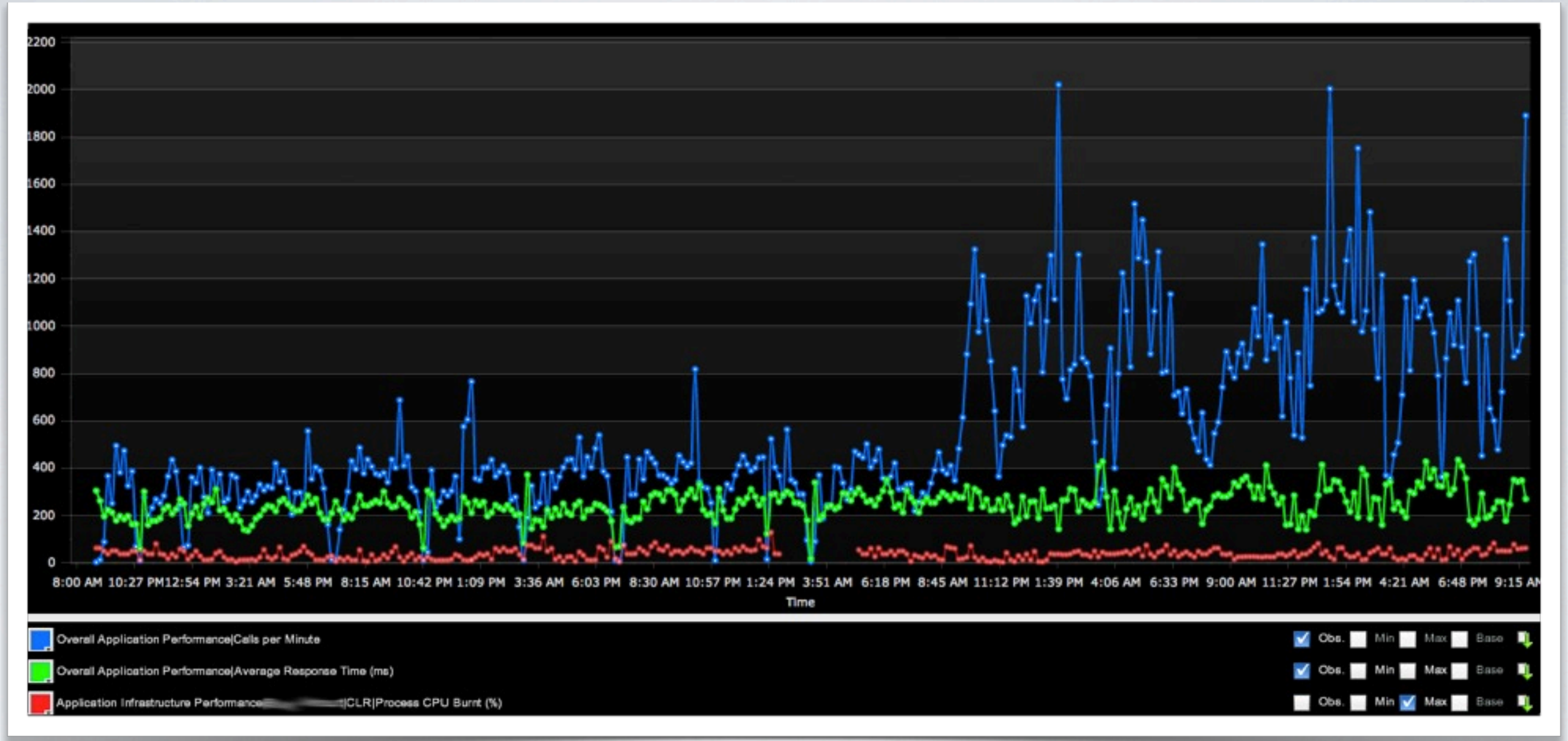
1. Application Complexity cannot be handled by Operations
2. Operational Complexity is unknown to Developers

Fabian Lange, Head of Performance, Code-Centric

CAN HURT YOU

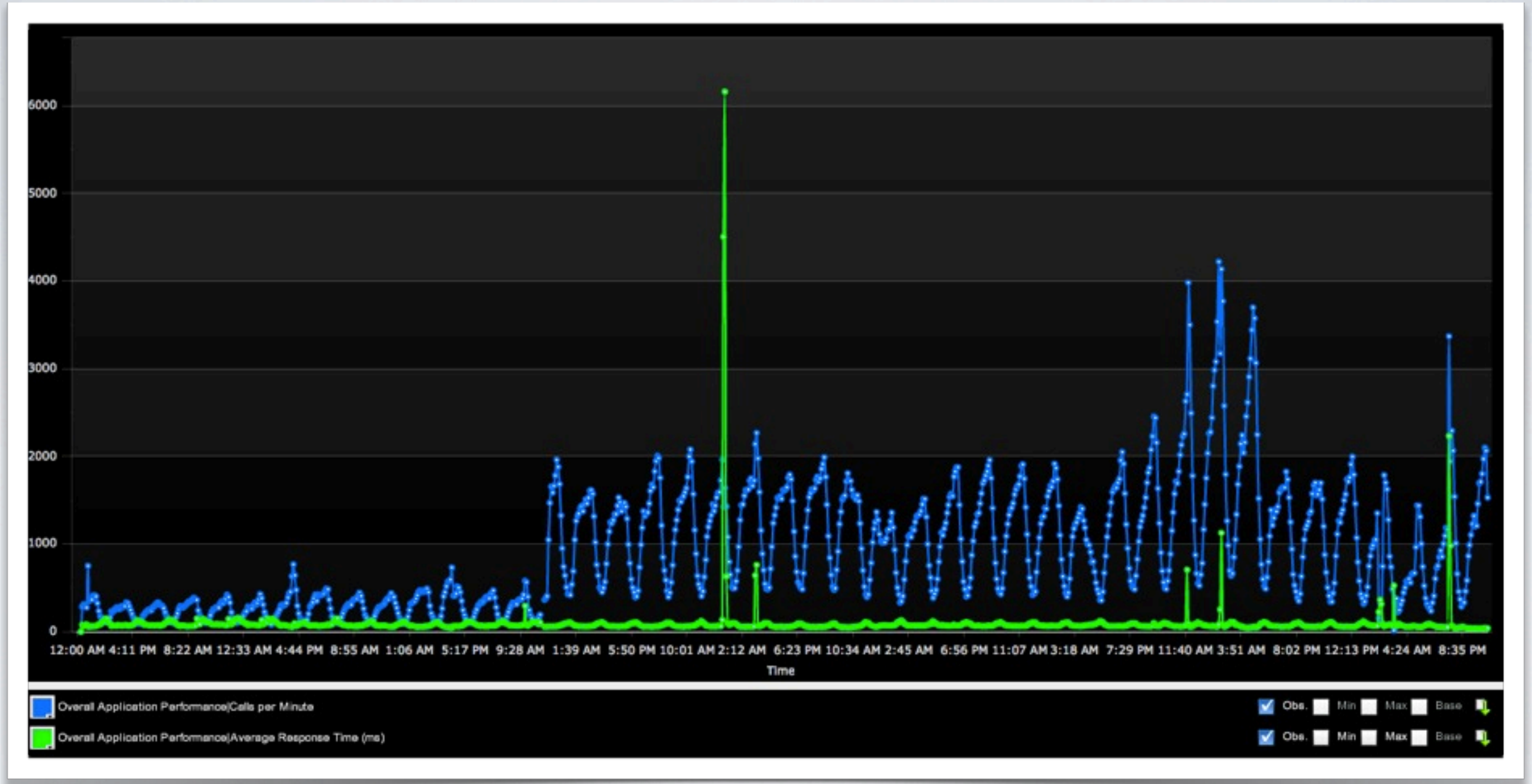
REAL-LIFE SURPRISES

WORK LOAD SPIKES - SCALABLE



BLUE - Concurrency (Trx/min)
GREEN - Avg Response Time
RED - Resource (CPU %)

WORK LOAD SPIKES - NOT SCALABLE



BLUE - Concurrency (Trx/min)
GREEN - Avg Response Time

2 OUTAGES IN 2 DAYS

Production Ground to a halt for 2 hours

And again the next day

Trx/min

Avg RT

Pool Limit

Pool Usage

Trx Stalls

Who owns JVM Configuration? Ops or Dev?

EXCESSIVE DATA ACCESS

Name	Time (ms)		External Calls
JSPBaseServlet:service:34	1 ms (self)	0.1 %	
Servlet - _jspService:663	0 ms (self)	0 %	
InfoFeedHelper:getTotalNumberOfArticlesByClauses:559	0 ms (self)	0 %	
ejb.InfoFeedController_qeaw0g_EOImpl:getTotalNumberOfArticlesByClauses:1866	76 ms (total)	5.3 %	JDBC
eed.InfoFeedHelper:getArticlesByClauses:518	80 ms (total)	5.6 %	JDBC
fofeed.InfoFeedHelper:getArticle:80	0 ms (self)	0 %	
infofeed.InfoFeedHelper:getArticle:71	55 ms (total)	3.9 %	JDBC
nfofeed.InfoFeedHelper:getArticles:105	0 ms (self)	0 %	
infofeed.ejb.InfoFeedController_qeaw0g_EOImpl:findArticlesByPage:238	319 ms (total)	22.4 %	JDBC
Servlet - getTotalNumberOfArticles:408	22 ms (total)	1.5 %	
Servlet - getArticles:391	273 ms (total)	19.1 %	JDBC
Servlet - _jsp__tag16:1867	600 ms (total)	42.1 %	JDBC

	Query Type	Query	Count	Time (ms)	% Time	From Tier	To Tier	Error
	Query	SELECT ITEM_ID, URL, ALT_TEXT, CAPTION, WIDTH, HEIGHT, PARAGRAPH_TEXT, PARAGRAPH_SU	85	326	22.9		Oracle - Orac	
	Query	SELECT LINK_ID, URL, TEXT, TYPE, RELATED_ID, IMAGE_URL, ALT_TEXT, TITLE FROM ARTICLE_LI	85	311	21.8		Oracle - Orac	
	Query	SELECT ARTICLE_ID FROM ARTICLE WHERE SITE_ID=? AND (PUBLISHED IS NULL OR PUBLISHED ·	2	210	14.7		Oracle - Orac	
	COMMIT	DB Transaction Commit	192	130	9.1		Oracle - Orac	
	Query	SELECT ARTICLE_ID, SITE_ID FROM ARTICLE WHERE ARTICLE_ID=? AND SITE_ID=? AND (PUBLISH	85	106	7.4		Oracle - Orac	
	Query	SELECT SITE_ID, EXTERNAL_REF, ARTICLE_TYPE, PUBLISHED, EXPIRES, LAST_MODIFIED, HEADL	85	85	6.0		Oracle - Orac	
	Query	SELECT ARTICLE_ID FROM ARTICLE WHERE SITE_ID=? AND SPARE_NUMBER <= ? AND SPARE_NU	12	54	3.8		Oracle - Orac	
	Query	SELECT SITE_ID, SITE_NAME, ARTICLES_PER_PAGE, DEFAULT_ARTICLE_ID, DISPLAY_TITLE, DES(	4	15	1.1		Oracle - Orac	
	Datasource:	Get Pooled Connection From Datasource	210	11	0.8		Oracle - Orac	

Whose responsible for this? Ops?

SLOW SQL QUERIES

Name	Time (ms)		External Calls
▼ ThreadPool$Worker:run:1604	0 ms (self)	0 %	
▼ ce.wcs.filter.AkamaiContentTargetingFilter:doFilter:130	0 ms (self)	0 %	
▼ merce.wcs.filter.MobileDeviceServletFilter:doFilter:81	0 ms (self)	0 %	
▼ HTTPServlet:service:831	0 ms (self)	0 %	
▼ HTTPServlet:service:718	0 ms (self)	0 %	
▼ Servlet - ActionServlet:process:1196	0 ms (self)	0 %	
▼ HTTPServlet:service:831	0 ms (self)	0 %	
▼ JSPBaseServlet:service:99	0 ms (self)	0 %	
▼ Servlet - OrderTrackingDisplay.jsp:_jspService:1021	10874 ms (self)	97.2 %	JDBC
▼ Servlet - OrderTrackingDisplay.jsp:_jspx_meth_tmnt_propertyitem_21:7972	0 ms (self)	0 %	
▶ textmanagement.databasebundle.DataBaseResourceTag:doStartTag	42 ms (total)	0.4 %	
Servlet - OrderTrackingDisplay.jsp:_jspx_meth_c_import_2:8158	238 ms (self)	2.1 %	

Query Type	Query	Count	Time (ms)	% Time	From Tier	To Tier	Error
Query	SELECT T1.TOTALTAX, T1.LOCKED, T1.TOTALTAXSHIPPING, T1.STATUS, T1.FIELD2, T1.TIMEPLACEI	1	10871	97.1	App		
Query	SELECT T1.STRELTYP_ID, T1.RELATEDSTORE_ID, T1.STORE_ID, T1.SEQUENCE, T1.STATE FROM S	89	93	0.8	App		
Query	SELECT T1.STRINGVALUE, T1.INTEGERVALUE, T1.FLOATVALUE, T1.FIELD1, T1.FIELD2, T1.FIELD3, T	2	10	0.1	App		
Query	SELECT T1.STRINGVALUE, T1.INTEGERVALUE, T1.FLOATVALUE, T1.FIELD1, T1.FIELD2, T1.FIELD3, T	4	5	0.0	App		
Query	SELECT T1.DESCRIPTION, T1.FIELD1, T1.FIELD2, T1.FIELD3, T1.OPTCOUNTER, T1.ATTRTYPE_ID, T1.	2	5	0.0	App		
Query	SELECT T1.DESCRIPTION, T1.FIELD1, T1.FIELD2, T1.FIELD3, T1.OPTCOUNTER, T1.ATTRTYPE_ID, T1.	4	5	0.0	App		

Query

```
SELECT T1.TOTALTAX, T1.LOCKED, T1.TOTALTAXSHIPPING, T1.STATUS, T1.FIELD2, T1.TIMEPLACED, T1.FIELD3, T1.CURRENCY, T1.SEQUENCE, T1.TOTALADJUSTMENT, T1.ORMORDER,
T1.SHIPASCOMPLETE, T1.PROVIDERORDERNUM, T1.TOTALPRODUCT, T1.DESCRIPTION, T1.MEMBER_ID, T1.ORGENTITY_ID, T1.FIELD1, T1.STOREENT_ID, T1.ORDCHNLTYP_ID,
T1.ADDRESS_ID, T1.LASTUPDATE, T1.ORDERS_ID, T1.COMMENTS, T1.NOTIFICATIONID, T1.TYPE, T1.EDITOR_ID, T1.OPTCOUNTER, T1.SOURCEID, T1.EXPIREDATE, T1.BUSCHN_ID,
T1.BLOCKED, T1.TOTALSHIPPING, T1.TRANSFERSTATUS, T1.OPSYSTEM_ID, T1.BUYERPO_ID FROM ORDERS T1 WHERE T1.MEMBER_ID = '254518851'
```

Whose responsible for this? Ops?

NESTED LOOP CODE LOGIC

Comparing the following two snapshots:

Snapshot 1 - Taken at 12:56:47 PM on 02/27/12 View

Execution time: 3194 ms
Occurred on transaction: [redacted]rStats
Occurred on node: [redacted]at/delivery

Snapshot 2 - Taken at 12:26:43 PM on View

Execution time: 1361 ms
Occurred on transaction: [redacted]
Occurred on node: [redacted]is0

Methods in Both Snapshots | Methods in One Snapshot

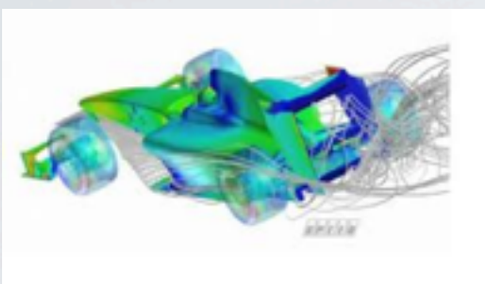
Methods Invoked in Both Snapshots

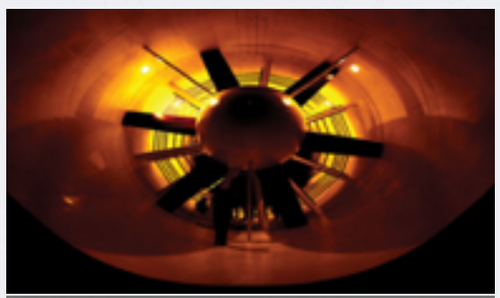
The following methods were invoked in both snapshots. A positive value listed in the 'Overall Change' colurnged between snapshots was less than the slider value. 8 ms 2877 ms

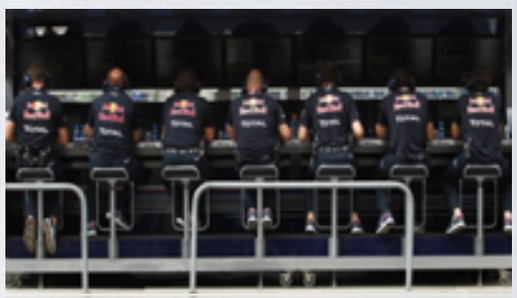
Class and Method	Time in S1 (ms)	Time in S2 (ms)	Change (ms)	Call Count
[redacted]ion.common.dao.jpa.GenericDaoJpa:findByNamedQueryNamedParameter:19(	27	2904	2877	3
Spring Bean - matchRosterDao:findMatchRosterByMatchId:93	0	23	23	1
Servlet - SportsDataRetrievalService:service	22	30	8	2
Spring Bean - aflPersistenceService:getMatchRoster:385	11	22	11	1

Whose responsible for this? Ops?

IMAGINE F1 ENGINEERS WITH NO RACE VISIBILITY







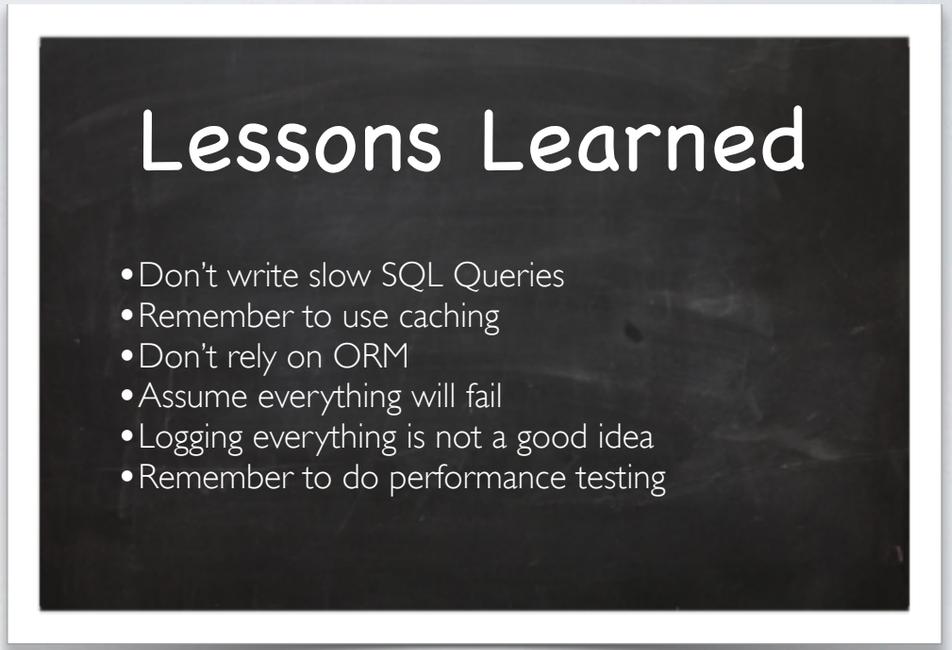
Design Develop Test Deploy Support

Race Weekend

Engineers wouldn't learn anything.

DEVOPS IS ABOUT LEARNING

- Ops must provide Visibility To Dev
- Common Tools & Processes
- Knowledge Sharing
- Learning from Failure isn't a bad idea
- If we failed more we'd learn more



KEY TIPS FOR DEVOPS

- Define what Real Success is for both Dev and Ops
- Accept Change is the enabler to Success
- Monitor, Measure and Manage Change
- Accept Failures and Learn from them
- Have Fun and work as a Team

T-SHIRTS & PRODUCTION VISIBILITY?

Available at AppDynamics Booth (11)