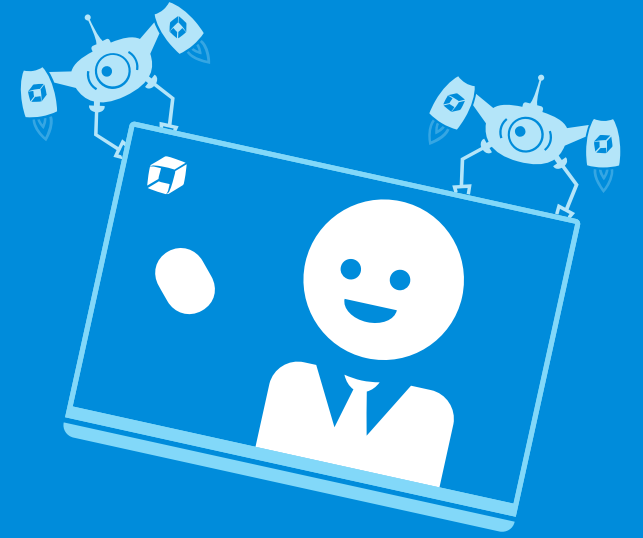




# Monitoring Redefined



Klaus Enzenhofer

Director Technology Strategy

 klaus-enzenhofer

 @kenzenhofer











# The 4 Core KPIs of Monitoring

# #1: Business KPI

*(Heading omitted)*

## Revenues

Sales \$ 85,000

Investment income 500

**Total revenues** **85,500**

## Expenses

Cost of goods sold 61,000

Selling, general & admin expenses 13,000

Interest expense 800

**Total expenses** **74,800**

**Net income** **\$ 10,700**



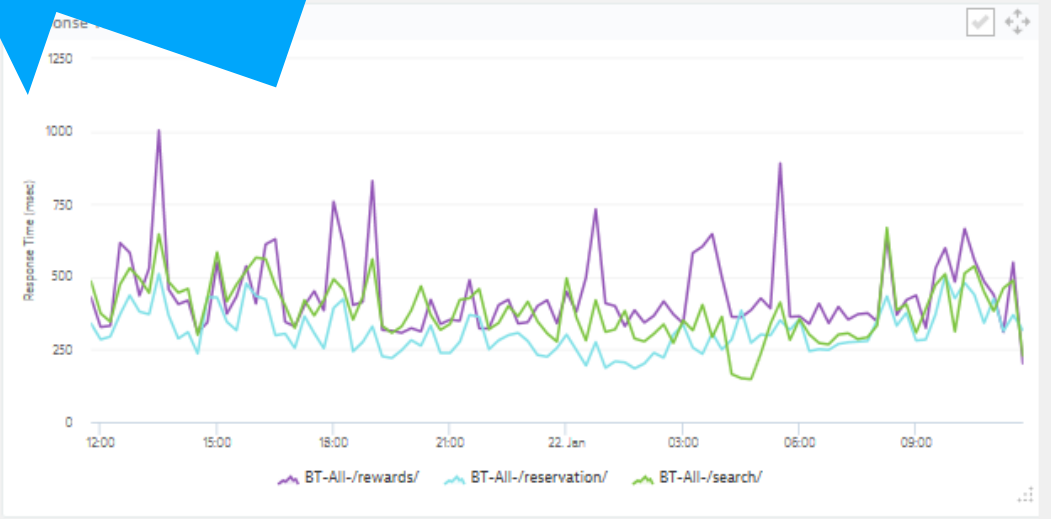
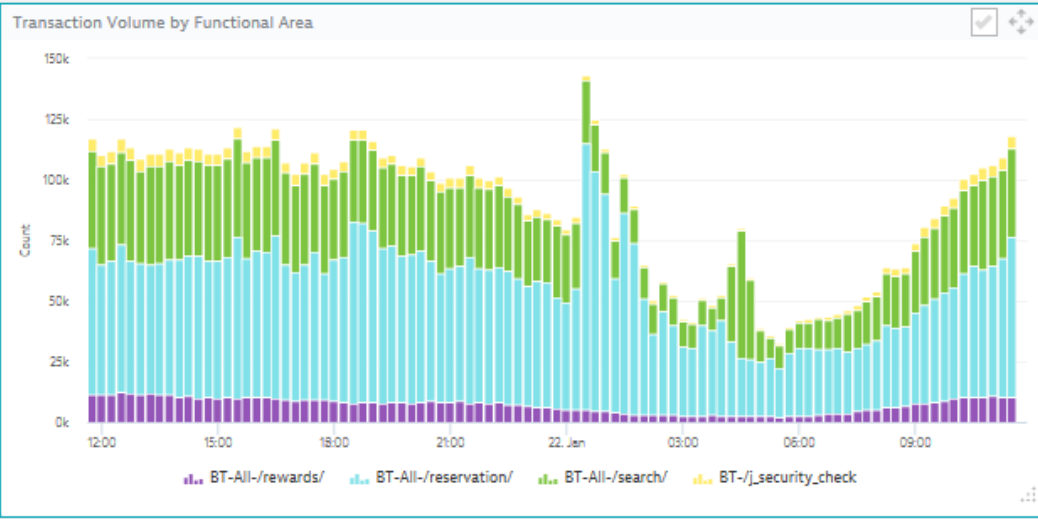
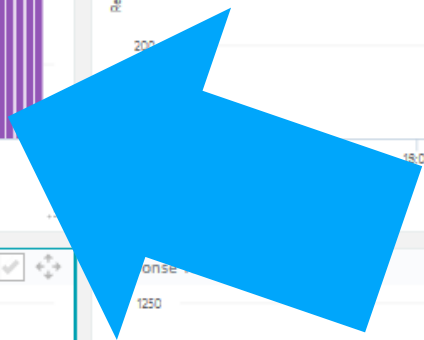
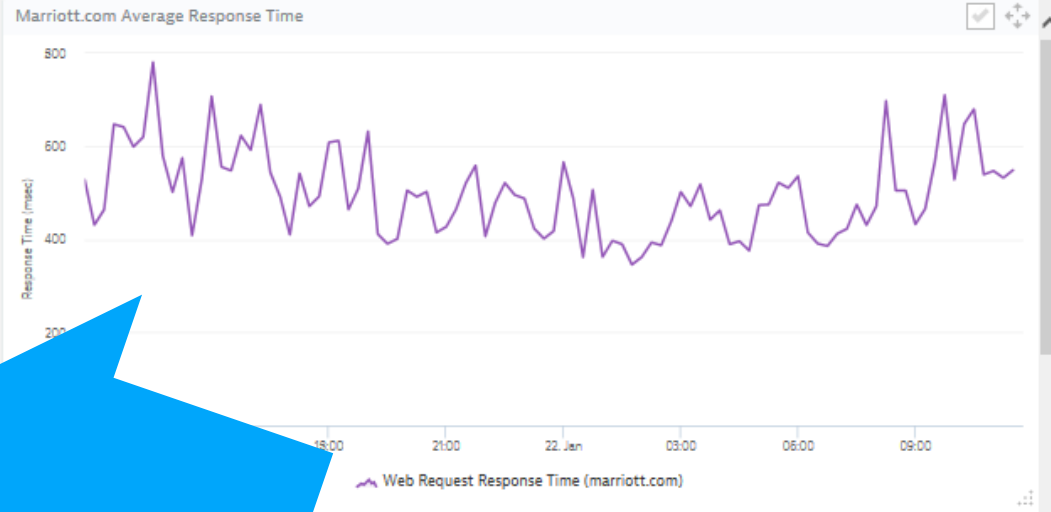
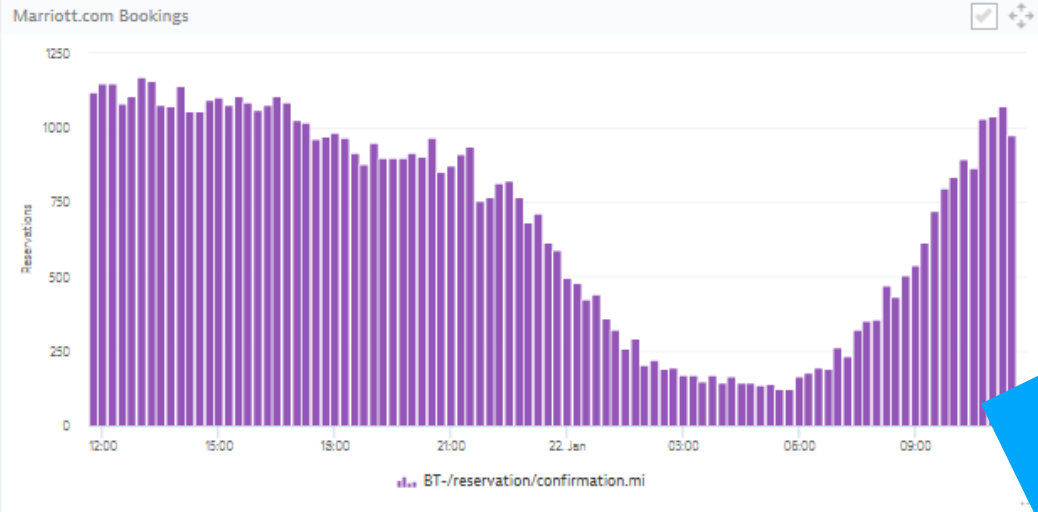


Dashboard name  
Critical Systems Summary

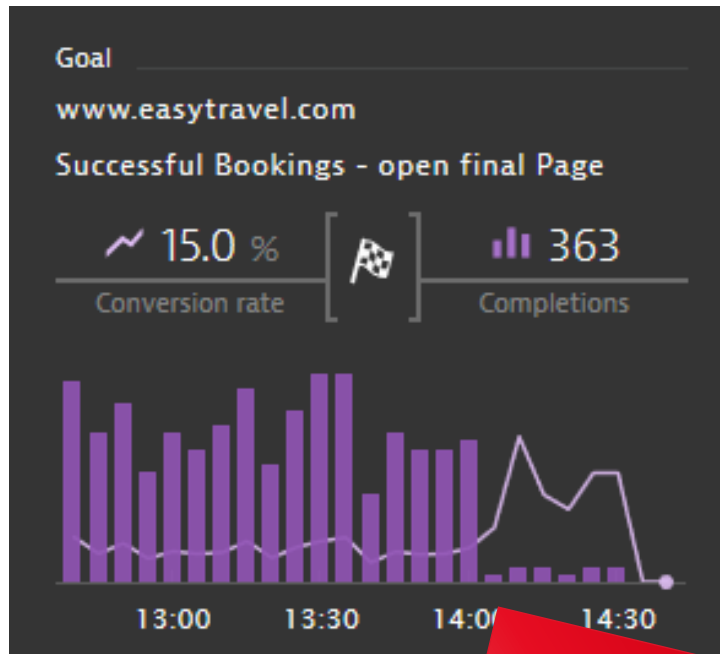
System profile  
Marriott.com Production

Application  
All applications (incl 2280 auto-de...)

Timeframe  
Last 24 hours



# Business KPI

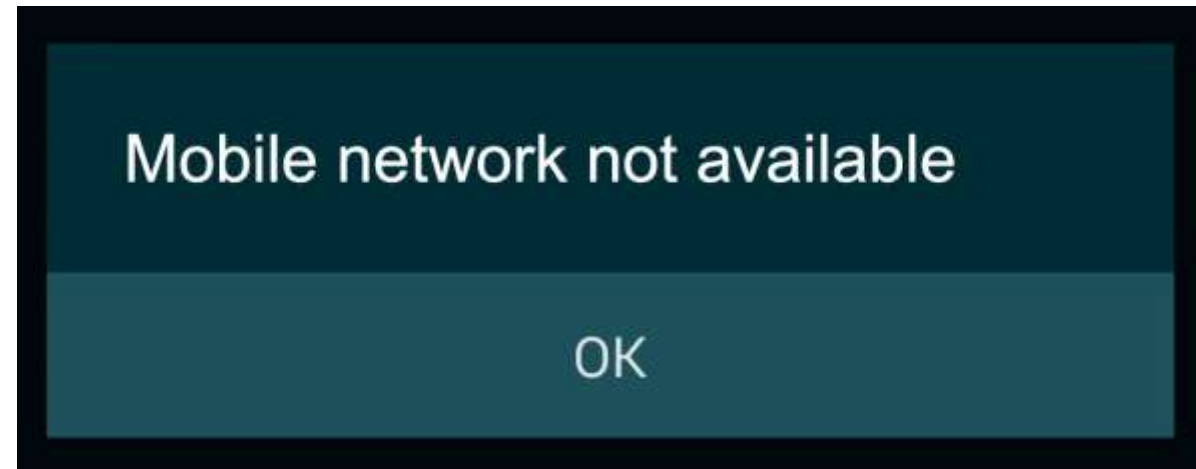


Watch your business success!

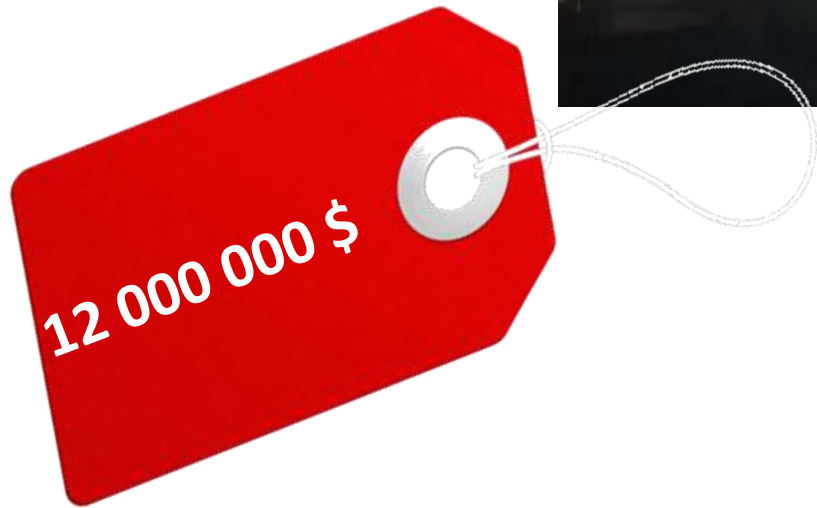
What's next?



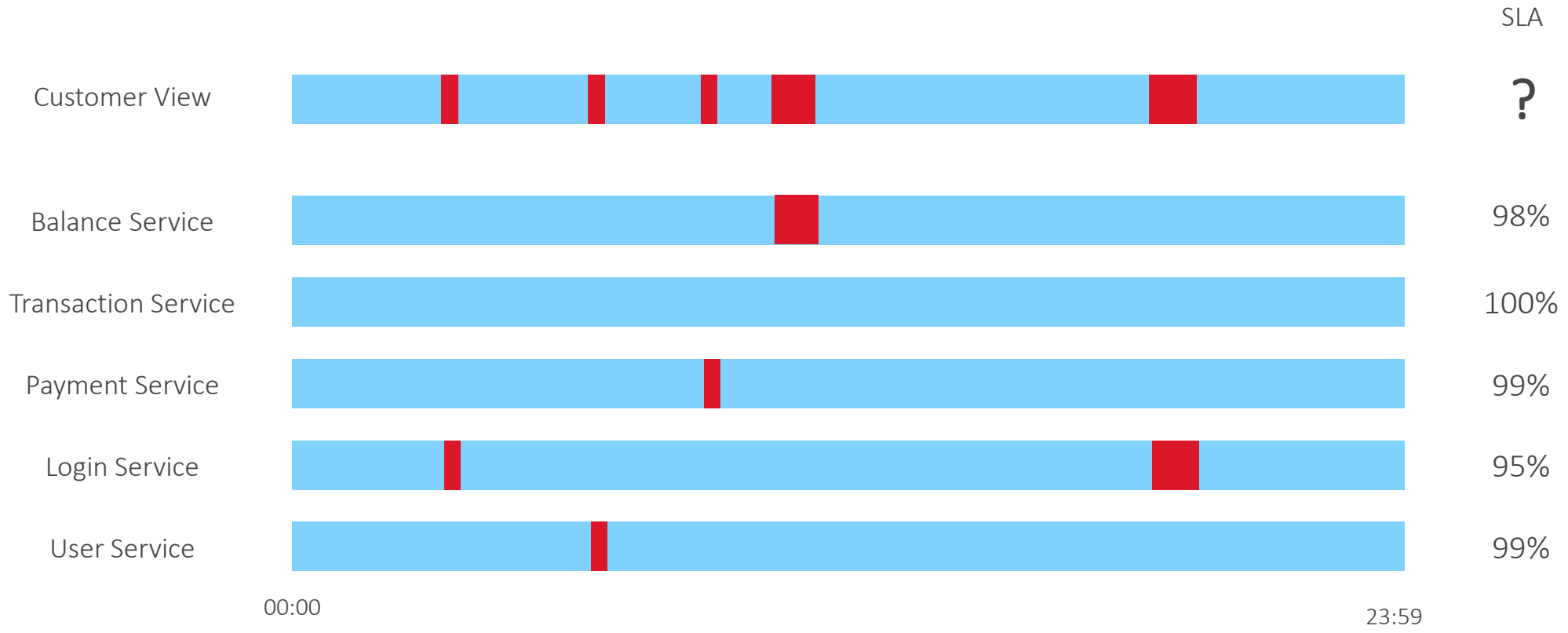
**Currently  
Not Available**



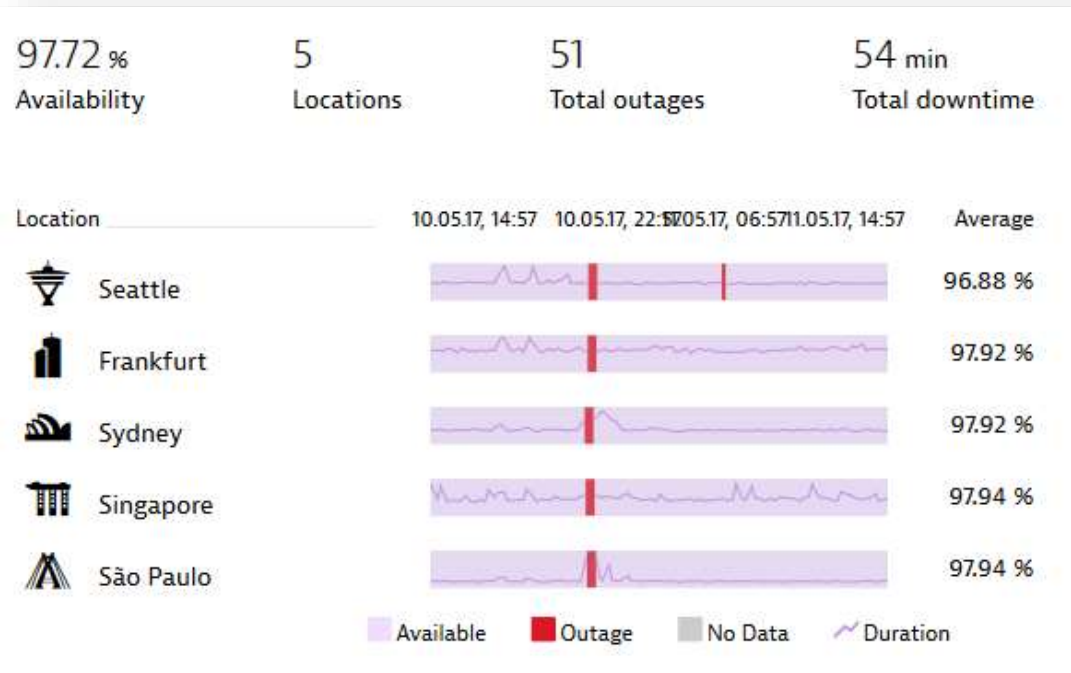
# #2: Availability KPI











Watch your Availability!

What's next?

Firefox


Error 404: doughnut not found!


livadaru.net/404

roomstog

Disable Cookies CSS Forms Images Information Miscellaneous Outline Resize Tools View Source Options

# 404





**https://www.btopenzone.com:8443**  
JavaScript error detected!  
Error: TypeError: 'null' is not an object  
Line: 0  
URL: undefined  
Browser: Mozilla/5.0 (Macintosh; Intel Mac OS X 10\_7\_3) AppleWebKit/534.53.11 (KHTML, like Gecko) Version/5.1.3 Safari/534.53.10

OK

[Go to website home page](#)


This website server is powered by [Domain Technologie Control \(DTC\)](#), an open-source control panel  
Webhosting by: [toX.at](#)

exists!  
his server.  
an incorrect

Büroprofi Kanex SK - výsledky: baterka 9v

[Môj košík](#)
[Najnovšie pridané tovary](#)
[Oblíbené položky](#)
[Rychlá objednávka](#)
[Pomoc](#)
[Kontakty](#)

Vítejte! Přiházejte se, abyste se zaregistrovali


 Dodanie do 24-48 hodín Od 60 € doprava zadarmo Viac ako 10.000 výrobkov

Zelená linka: 0800 154 609

0 produktov v košíku  
 Eur 0,00  
 možnosť dopravy zdarma





Zadáte názov alebo objednávacie číslo produktu **Hľadať**

[Papier](#)
[Archivácia](#)
[Tonery](#)
[Kancelárske potreby](#)
[Prezentácia](#)
[Drogeria](#)
[Písacie a kóp. prost.](#)
[Prehľad](#)

## "baterka 9v"

nájdených: 4 výsledkov

Usporiadať podľa:  ▼


 <p><b>Bateria Connect alkalická, 9V, MN1604</b> napájací: 9V typ: MN1604, batéria: 1 ks Obj. číslo: PBS050363</p> <p><small>obrazok</small></p>	<p>1 ks <b>€ 1,74</b></p> <p> <input type="text" value="Hľadajte"/> <input type="button" value="W"/> </p> <p><small>Do obľúbených</small></p>
 <p><b>Bateria 9V, B1258</b> Obj. číslo: 6F22</p> <p><small>obrazok</small></p>	<p>1 ks <b>€ 1,76</b></p> <p> <input type="text" value="Hľadajte"/> <input type="button" value="W"/> </p> <p><small>Do obľúbených</small></p>
 <p><b>Bateria alkalická Verbatim 9 V block, 1 ks...</b> napájací: 9V typ: block, batéria: 1 ks Obj. číslo: LAMB0VEA9VB1</p> <p><small>obrazok</small></p>	<p>1 ks <b>€ 2,49</b></p> <p> <input type="text" value="Hľadajte"/> <input type="button" value="W"/> </p> <p><small>Do obľúbených</small></p>
 <p><b>Energizer batéria alkalická SLR61, 9 V Block</b> Obj. číslo: TFK10016</p> <p><small>obrazok</small></p>	<p>1 ks <b>€ 5,28</b></p> <p> <input type="text" value="Hľadajte"/> <input type="button" value="W"/> </p> <p><small>Do obľúbených</small></p>

Náša ponuka je zamierená na právnické osoby. Naše ceny sú uvedené bez DPH a zahrnujú sa do príslušných území.

Büroprofi Kanex SK - výsledky: baterka 9v - Microsoft Internet Explorer

[Môj košík](#)
[Najnovšie pridané tovary](#)
[Oblíbené položky](#)
[Rychlá objednávka](#)
[Pomoc](#)
[Kontakty](#)

Vítejte! Přiházejte se, abyste se zaregistrovali


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[Papier](#)
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[Kancelárske potreby](#)
[Prezentácia](#)
[Drogeria](#)
[Písacie a kóp. prost.](#)
[Prehľad](#)

nájdených: 4 výsledkov

Usporiadať podľa:  ▼

Internet



**Federal Aviation  
Administration**



IE6/IE7

NO reload button

# Example of error:

PurePath	Response Time (ms)	Server Contrib	Network Cont	User Experience	Client Errors	Client IP	Start Time
click on "Continue"	3151	7		- satisfied	1	172.17.0.58.48	2016-02-28 07:25:54.286
Frame Resize Event=[Leaving View=genderSelection][Event=W...	-			satisfied	0	172.17.0.58.48	2016-02-28 07:25:54.802
click on "No"	2715	7		- satisfied	1	172.17.0.58.48	2016-02-28 07:26:08.746
Frame Resize Event=[Leaving View=vdbc offerVdbCompensati...	-			satisfied	0	172.17.0.58.48	2016-02-28 07:26:09.266
click on "Continue"	1139	13		- satisfied	1	172.17.0.58.48	2016-02-28 07:26:13.407
Frame Resize Event=[Leaving View=checkin dangerousGoodsQ...	-			satisfied	0	172.17.0.58.48	2016-02-28 07:26:13.933
click on "Continue"	4322	14		- tolerating	0	172.17.0.58.48	2016-02-28 07:26:18.553
Frame Resize Event=[Leaving View=itinerary][Event=Waiting Fr...	-			satisfied	0	172.17.0.58.48	2016-02-28 07:26:19.051
click on "No thanks continue to checkin"	1092	13		- satisfied	1	172.17.0.58.48	2016-02-28 07:26:26.433
Frame Resize Event=[Leaving View=seatUpgrade][Event=Waiti...	-			satisfied	0	172.17.0.58.48	2016-02-28 07:26:26.952
click on "Continue with baggage options"	686	9		- satisfied	0	172.17.0.58.48	2016-02-28 07:26:35.319
Frame Resize Event=[Leaving View=itinerary][Event=Waiting Fr...	-			satisfied	0	172.17.0.58.48	2016-02-28 07:26:35.839
click on "No"	2668	11		- satisfied	0	172.17.0.58.48	2016-02-28 07:26:40.948
Frame Resize Event=[Leaving View=aba personalizedBaggage...	-			satisfied	0	172.17.0.58.48	2016-02-28 07:26:41.444
click on "javascript:addBaggagePieces('1'; A`Ti` 2` ` /` 2...	5694	13		- tolerating	1	172.17.0.58.48	2016-02-28 07:26:57.16...
Frame Resize Event=[Leaving View=aba personalizedOffer][Ev...	-			satisfied	0	172.17.0.58.48	2016-02-28 07:27:00.254
CUSS Callback status 309	78	-		- satisfied	0	172.17.0.58.48	2016-02-28 07:44:49.176
Browser Error on '/i /webkiosk/start.htm'	-			frustrated	1	172.17.0.58.48	2016-02-28 07:44:49.271

Node	Detail	Exec Total (ms)	Elapsed Time (ms)	Timeline
Action (click on "javascript:addBaggageP...	click on "javascri...	5694.00	0.00	
Loading of page '/i /webkiosk/start.htm'	_load_:_load_	437.00	5257.00	
Web Requests		-	-	
(200) '/i /webkiosk/start.htm'		12.80	5257.00	
onLoad handler executions of page '/	_onload_:_load_	328.00	5366.00	
Frame Resize Event	[View=goToDesk...	0.00	5366.00	
Browser Error: error:https://kiosk.k	error:https://kios...	0.00	5678.00	
Frame Resize Event				

Node Summary	
Node:	
Error Type:	
Detail:	erro
Exec Total (ms):	
API:	Bro
Agent:	

Approximately 20 minutes before 309 there is the last customer interaction

What you see here, is the CUSS status 309


The fix:  
Improved the code to prevent this freeze situation.



# CK – Business KPI Dashboard

Webkiosk LE KPI dashboard (WorldWide per hour)

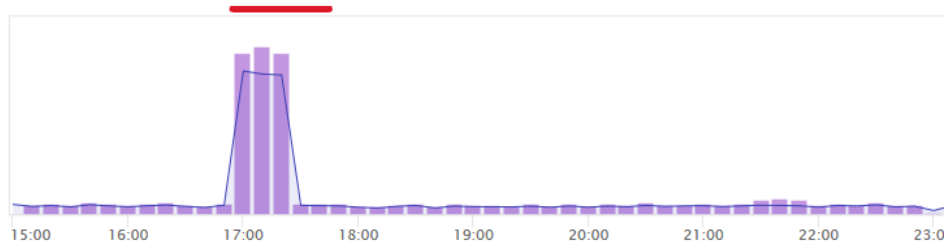


 www.easytravel.com

Improve the quality of your application by fixing most frequent JavaScript errors. Click on one of the JavaScript errors to view details.

Filter user types

Start typing to filter...



### Top JavaScript errors In last 6 hours

Analysis range 6 hours. Click anywhere in the chart to change the time frame for analysis.

Error

Unexpected end of input – *jquery-1.10.2.min.js*

Cannot set property 'w' of undefined – *hook.js*

TypeError: Result of expression 'test' [undefined] is not an object

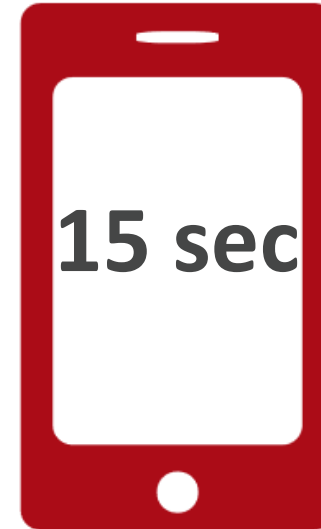
Invalid argument – *jquery.js*

Watch your Errors!



What's next?

# Why?





4.5 sec

Chrome 49

# Sanity Check



15 sec

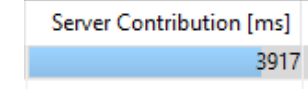
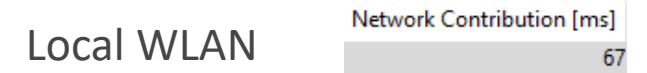
Chrome Mobile 33

## Browser Check

## Same Page

## Network

## Server Side



Only difference is Browser & Device

Why did they look at the performance  
on the mobile device?

Change in their  
compensations plan!

Contract SLA:  
Average Response Time < 3 sec  
on Desktop + Mobile



User

Good idea?!



## Develop Across All Platforms

Learn one way to build applications with Angular and reuse your code and abilities to build apps for any deployment target. For web, mobile web, native mobile and native desktop.

## Speed & Performance

Achieve the maximum speed possible on the Web Platform today, and take it further, via Web Workers and server-side rendering.

Angular puts you in control over scalability. Meet huge data requirements by building data models on RxJS, Immutable.js or another push-model.





# Let's take a look at the timings!

Navigation Start:	0 ms
Domain Lookup End:	269 ms
Connect End:	330 ms
Response Start:	517 ms
Response End:	518 ms
Dom Loading:	519 ms
Dom Interactive:	519 ms
DomContentLoaded Event End:	520 ms
Dom Complete:	520 ms
<b>Load Event End:</b>	<b>522 ms</b>

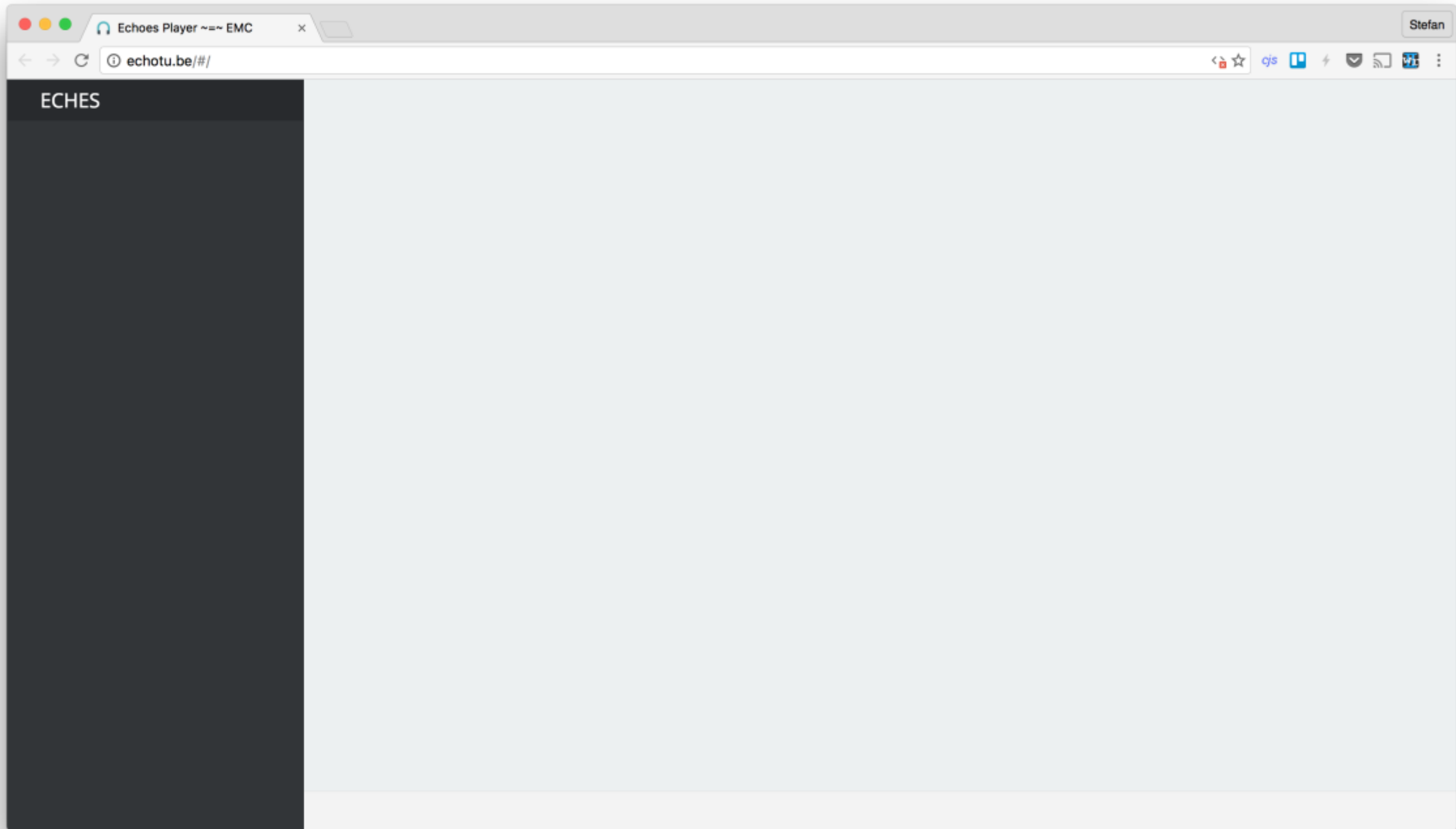


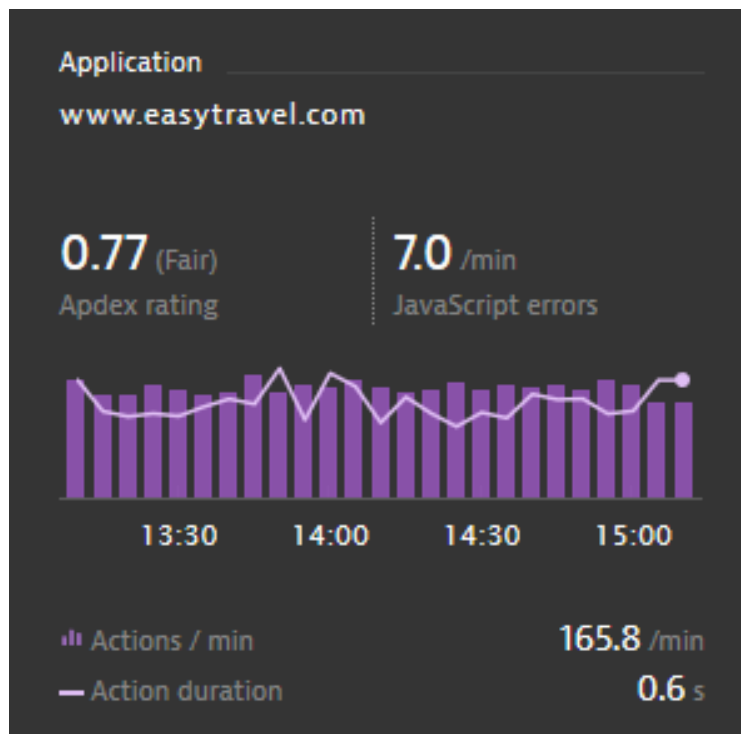
Developer





User





## #4: Performance KPI

# Monitoring needs to cover:

Business Results

Availability

Errors

Performance

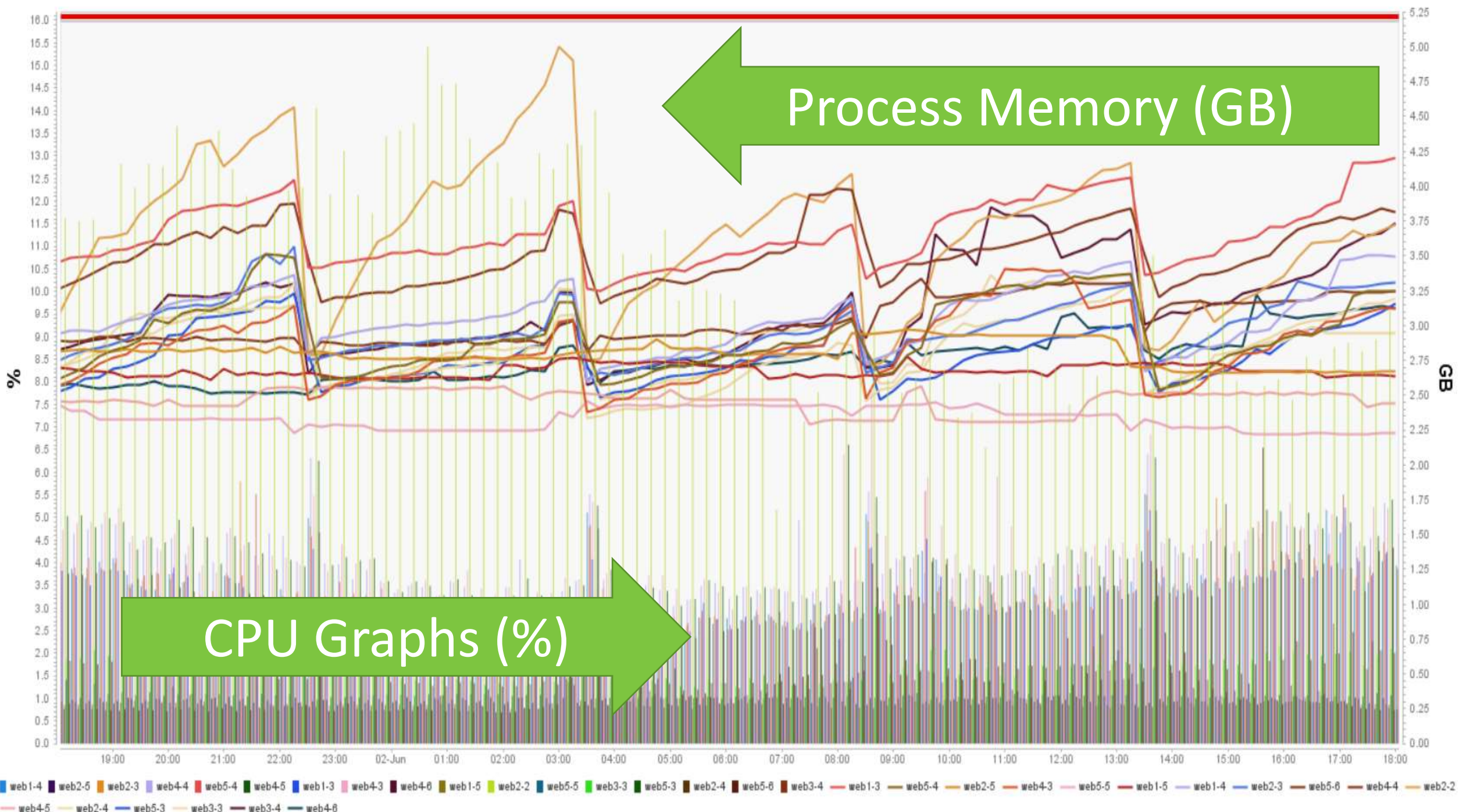






Monitoring used to  
be about looking at  
dashboards ...





Process Memory (GB)

CPU Graphs (%)

- web1-4
- web2-6
- web2-3
- web4-4
- web5-4
- web4-5
- web1-3
- web4-3
- web4-6
- web1-5
- web2-2
- web5-5
- web3-3
- web5-3
- web2-4
- web5-6
- web3-4
- web1-3
- web5-4
- web2-5
- web4-3
- web5-5
- web1-5
- web1-4
- web2-3
- web5-6
- web4-4
- web2-2
- web4-5
- web2-4
- web5-3
- web3-3
- web3-4
- web4-6

.. and about  
analyzing logs &  
exceptions ...



Exceptions

Count	Exception Class	Message	Throwing Cl
3369	org.apache.catalina.connector.ClientAbortException		org.apache.c
1084	org.apache.axis.ConfigurationException	No service named WebServiceSo...	org.apache.a
999	org.jboss.ejb.plugins.cmp.ejbql.JBossQLParser\$Lookahead...	-	org.jboss.ejb
730	com.ctc.wstx.exc.WstxIOException	-	com.ctc.wstb
730	org.apache.axis2.AxisFault	-	org.apache.a
450	org.apache.axis.ConfigurationException	No service named http://dotnetp...	org.apache.a
368	org.apache.axis2.AxisFault	Read timed out	org.apache.a

Top Exceptions

Logging

Count	Name	Severity	Message
3973	com.jloadtrace.gospace.backend.util.EJBHomeFactory	INFO	Retrieving EJB home interface
765	com.jloadtrace.gospace.backend.webservices.communications...	INFO	special offers webservice called
765	com.jloadtrace.gospace.backend.webservices.logic.Special...	INFO	Special offers logic eib called
730	org.apache.axis2.transport.http.CommonsHTTPTransport...	ERROR	
368	org.apache.axis2.transport.http.HTTPSender	INFO	Unable to send via Post to uri[h
365	org.apache.axis2.transport.http.AxisServlet	INFO	org.apache.axis2.AxisFault
365	org.apache.axis2.engine.AxisEngine	ERROR	null

Top Logs

But the apps and services we build have transformed to something more dynamic...



# A whole new technology stack & polyglot development

## Develop



Amazon  
DynamoDB



AWS Lambda



nodejs



mongo db



netty



cassandra



redis

## Ship



AWS  
CodeDeploy



ansible



jenkins



puppet



chef

## Deploy



AWS Elastic  
Beanstalk



Amazon  
API Gateway



docker



cloudfoundry



rh openshift



rh atomic



rocket

## Run



Amazon EC2



core os



rancher



kvm



busybox



eureka/hystrix

## Scale



Amazon EC2  
Container Services



mesos



marathon



kubernetes



swarm

## Compute



Amazon



azure



openstack



mesosphere



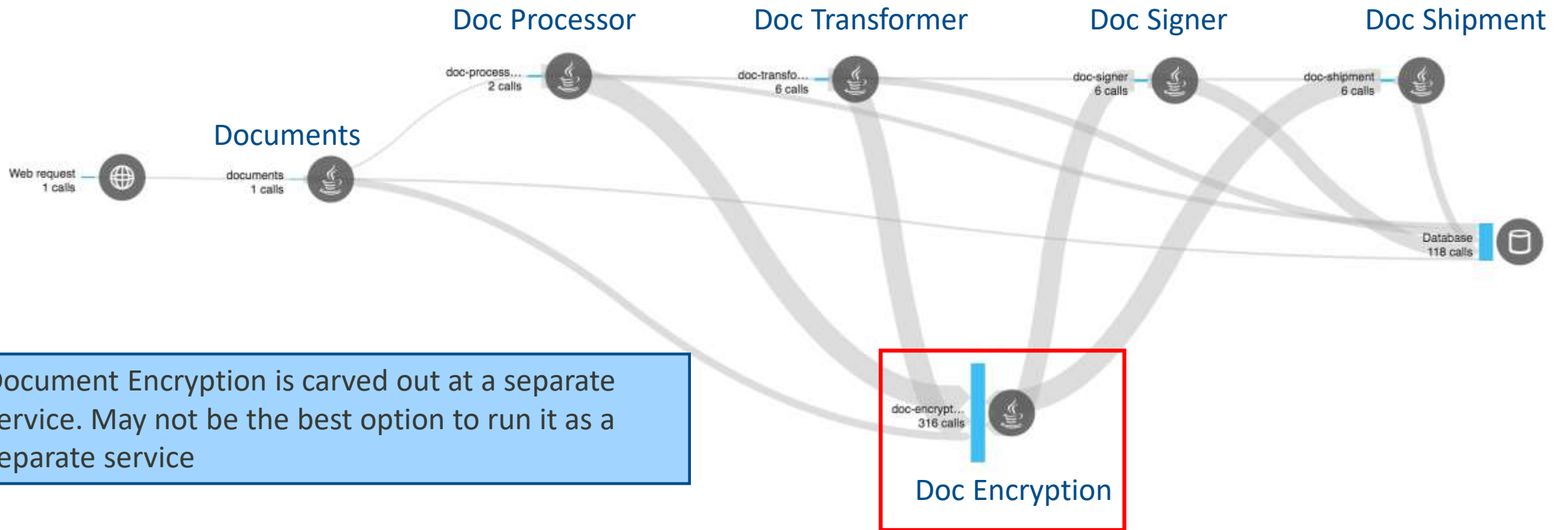
calico



weave

# Granularity

# Granularity



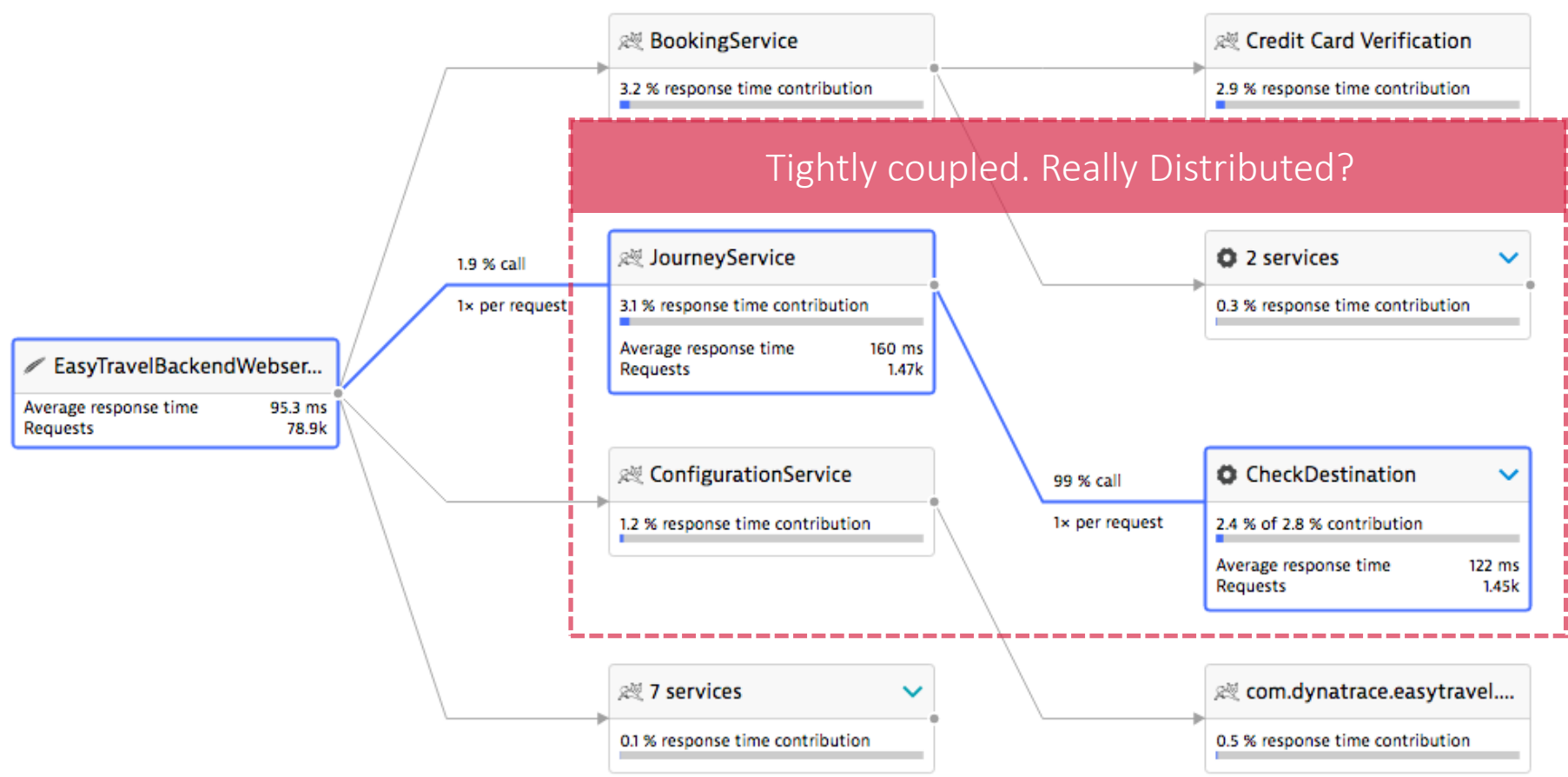


# Tight Coupling

# Showing service flow of requests to EasyTravelBackendWebserver:8091

today, 10:10 - 12:10  
99 % of requests to JourneyService call CheckDestination (averaging 1 call per request) [View PurePaths](#)

[Add filter](#)



# Inefficient Service Flow

(drawing parallels to Web Performance Optimization)

Showing service flow of requests to 'Varnish:8079'  
yesterday, 23:27 - today 01:27

Add filter

# SFPO (Service Flow & Performance Optimization) has to teach us how to optimize (micro)service dependencies through Service Flows

**Varnish:8079**

Avg. response time	46.8 ms
Avg. time spent in called services	22.8 ms
Requests	368k
Failed requests	704
Calls to other services	302k

See every single request in PurePath view

[View PurePaths](#)

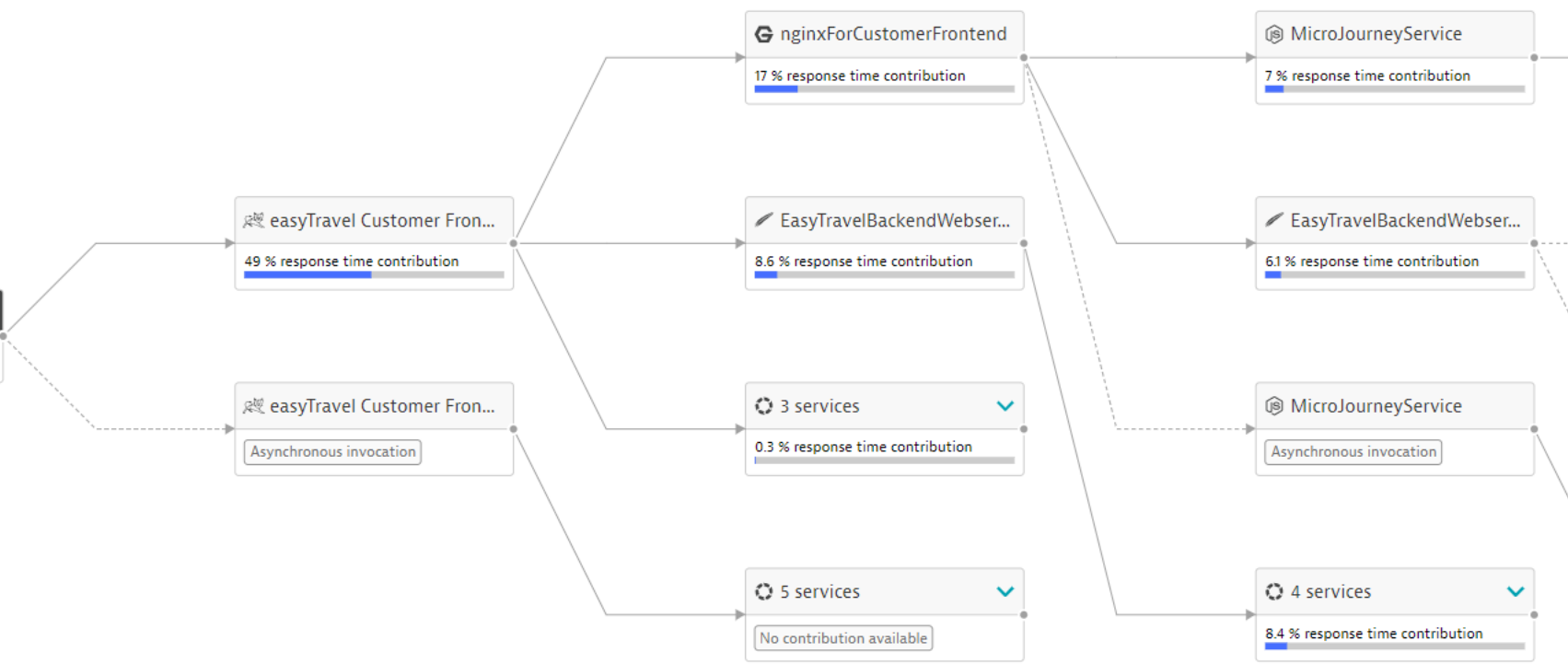
show more

No service selected

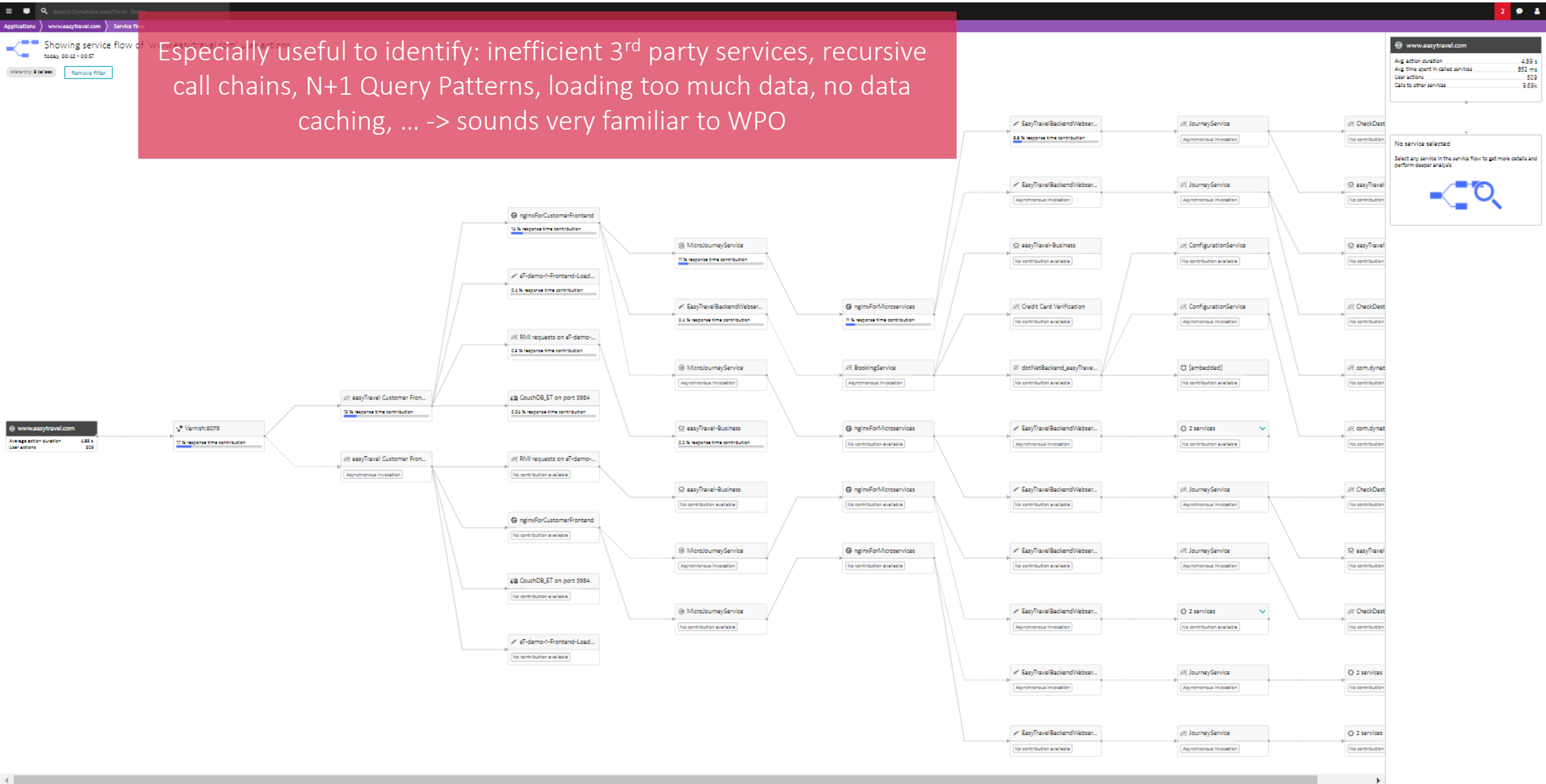
Select any service in the service flow to get more details and perform deeper analysis

**Varnish:8079**

Average response time	46.8 ms
Requests	368k



Especially useful to identify: inefficient 3<sup>rd</sup> party services, recursive call chains, N+1 Query Patterns, loading too much data, no data caching, ... -> sounds very familiar to WPO



**'Varnish:8079' PurePath**

Start time: 2017 August 1 00:51:17

Response time: 115 s

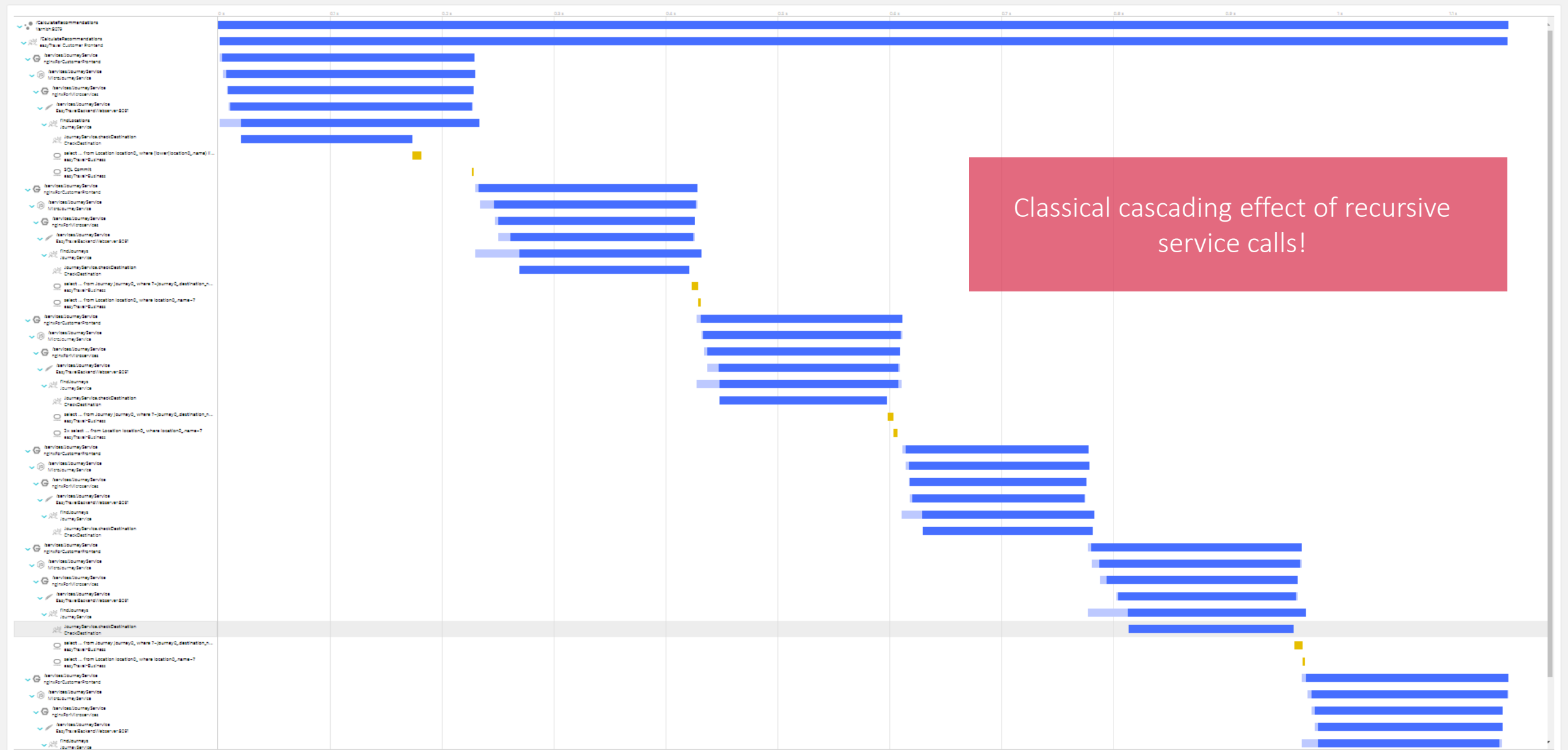
Total processing time: 116 s

Breakdown of PurePath processing time

- 922 ms CPU time
- 210 ms other

Top findings

- 1 database consuming 65.0 ms



Classical cascading effect of recursive service calls!

THIS IS WHY  
monitoring had to  
transform as well



2011

**2** major releases/year  
customers deploy & operate **on-prem**



**6** months  
major/minor release

2016

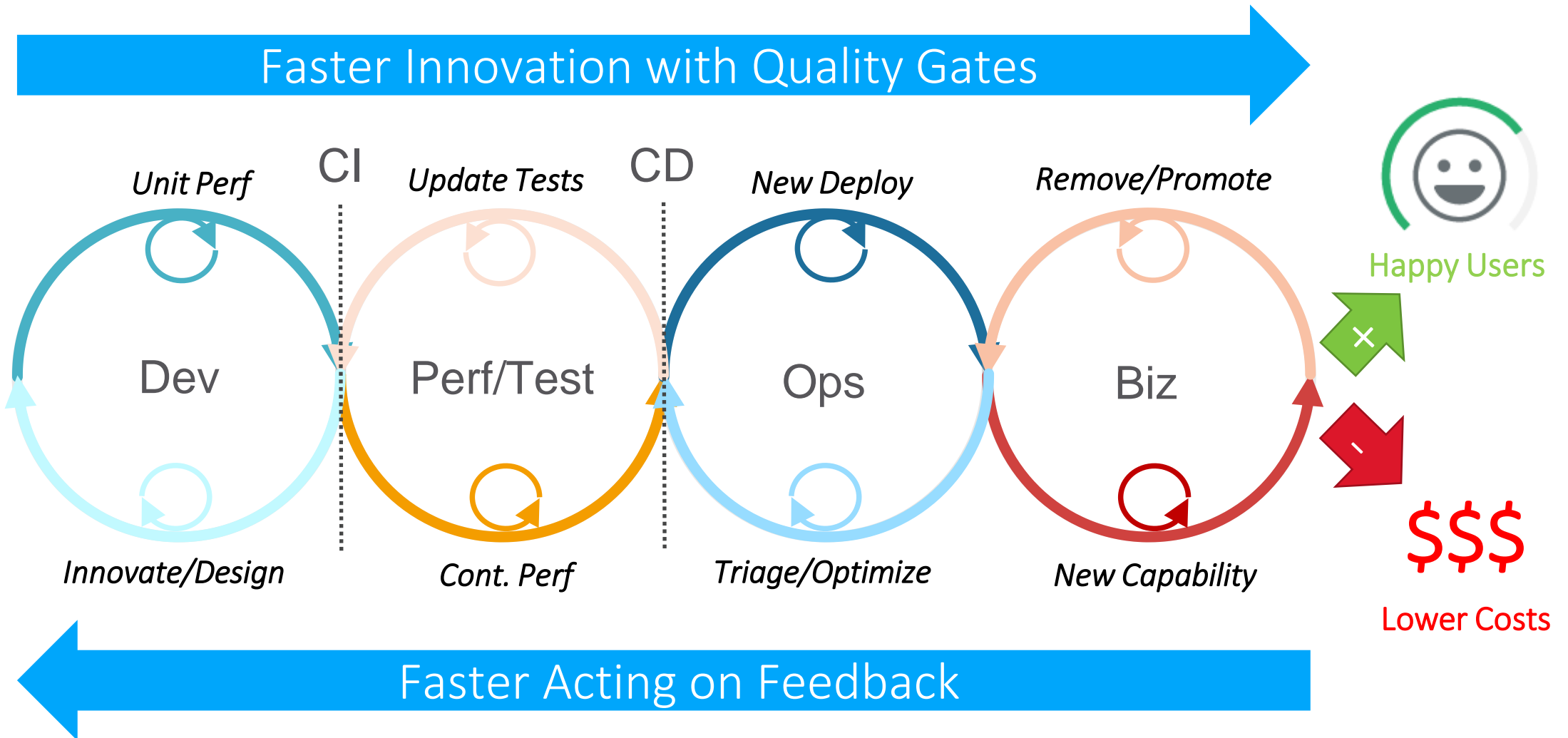
**26** major releases/year  
500 prod deployments/day  
self-service online sales  
**SaaS & Managed**



**1h** : Code -> Prod  
sprint releases (continuous-delivery)



# Monitoring as Pipeline & Platform Feature



# Shift-Left Continuous Performance with Dynatrace

Response time

Failure rate

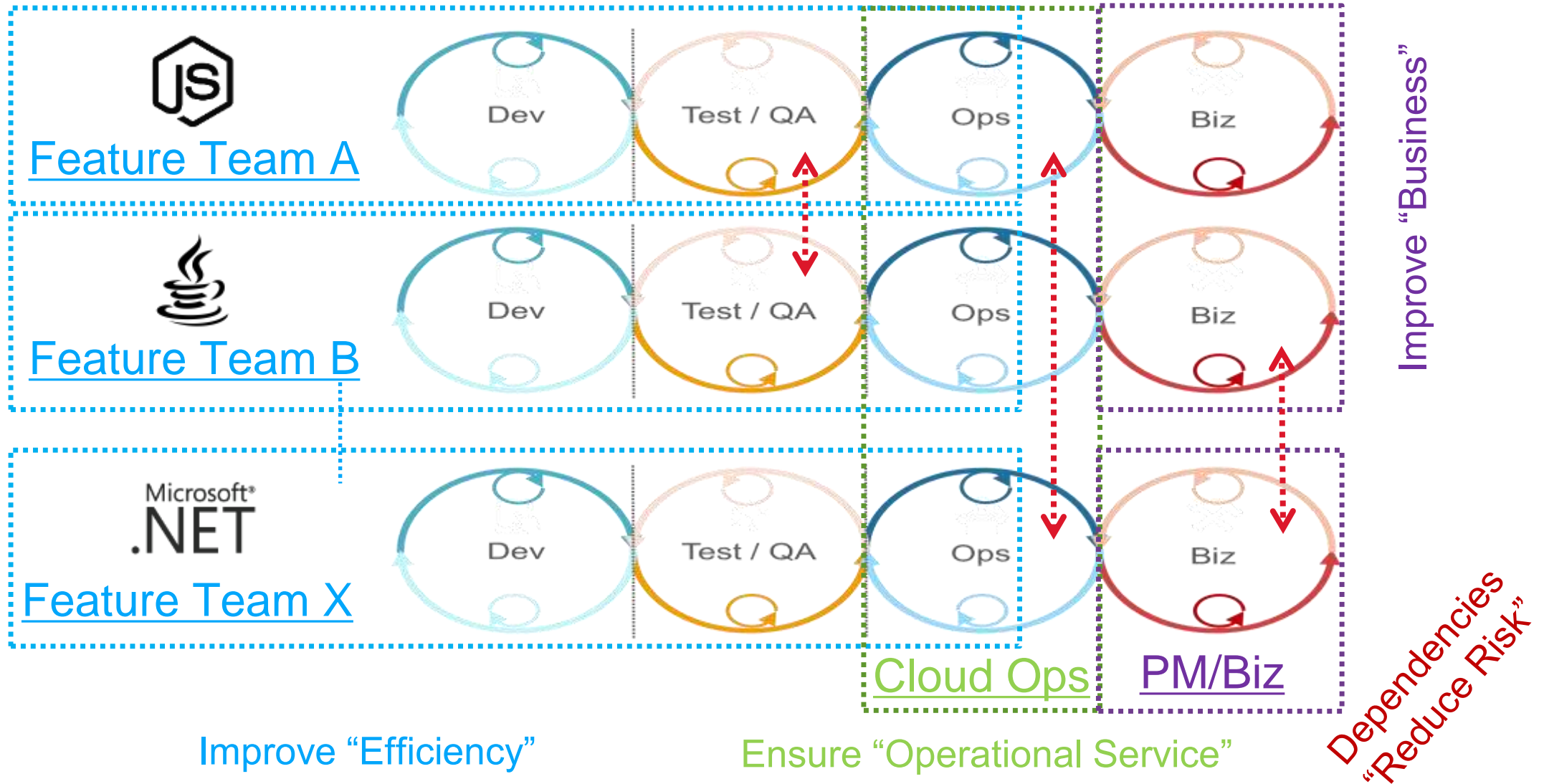
CPU consumption

*“Performance Signature”*  
for Build Nov 16

*“Performance Signature”*  
for Build Nov 17



# Learnings when scaling DevOps Pipelines



# Dynatrace Transformation by the numbers

More Agile

~120

Code commits / day

340

Stories per sprint

26

Releases / Year

More Quality

31000

Unit & Int Tests / hour

60h

UI Tests per Build

93%

Production bugs found  
by Dev

More Stability

450

Global EC2 Instances

99.998%

Global Availability

500

Deployments / Day

# High Performers vs Low Performers: Speed Gap Closing but Quality Gap Increasing

Table 1: Changes In IT performance of high performers, 2016 to 2017

IT performance metrics	2016		2017
Deployment frequency	200x more frequent	➔	46x more frequent
Lead time for changes	2,555x faster	➔	440x faster
Mean time to recover (MTTR)	24x faster	➔	96x faster
Change failure rate	3x lower (1/3 as likely)	➔	5x lower (1/5 as likely)

# BizDevOps Adoption Challenges

## **Technical Complexity**

DevOps promotes choice:  
“the best stack for your problem”

## **Bad Data & Code Quality**

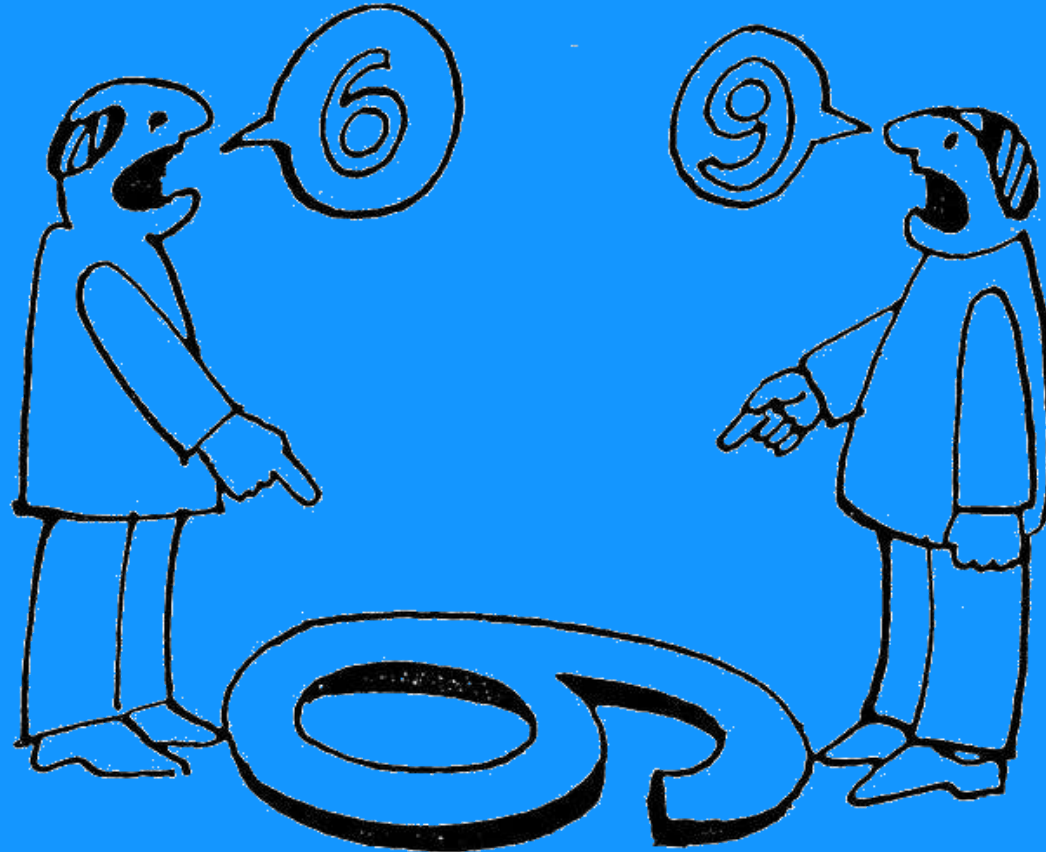
DevOps today mainly driven by Biz  
“faster to market” but not “quality to market”

## **Data & Department Silos**

DevOps promotes small & agile:  
“2 Pizza Teams”, “Services”, “Containers”

# The reason why:

Different Perspective from Biz and DevOps







UX-Designer

Executives

Marketing Analysts

Search Engine Optimization

CxO

Customer Success Team

Security team

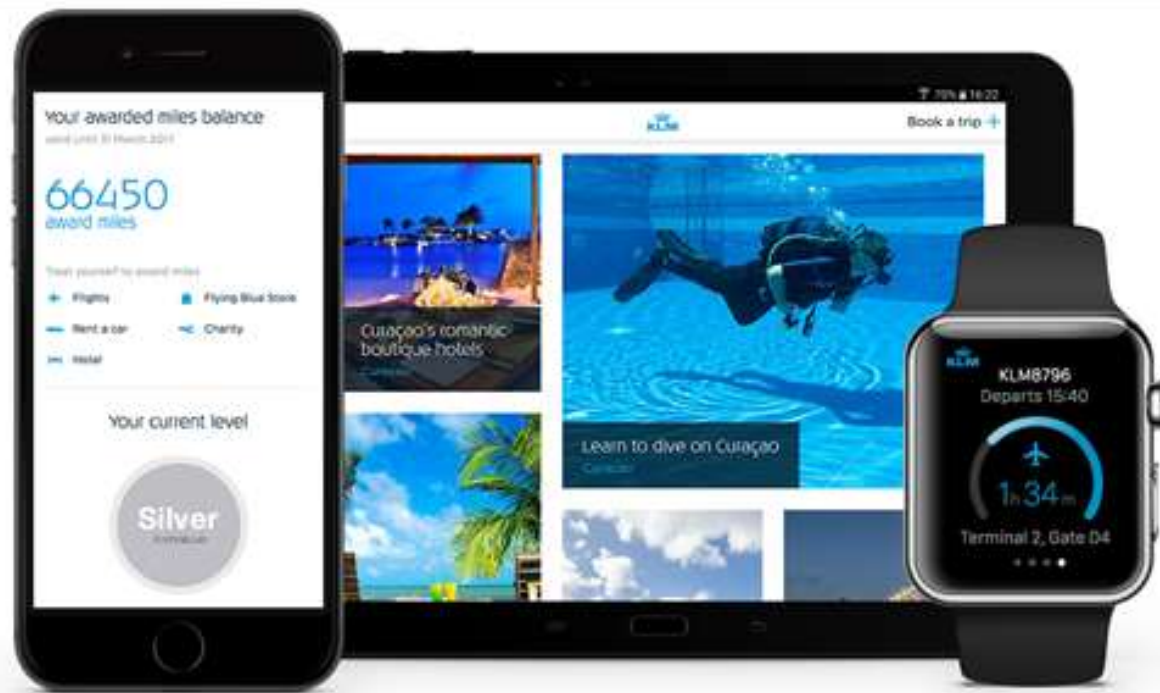
App Owner

Fraud Detection

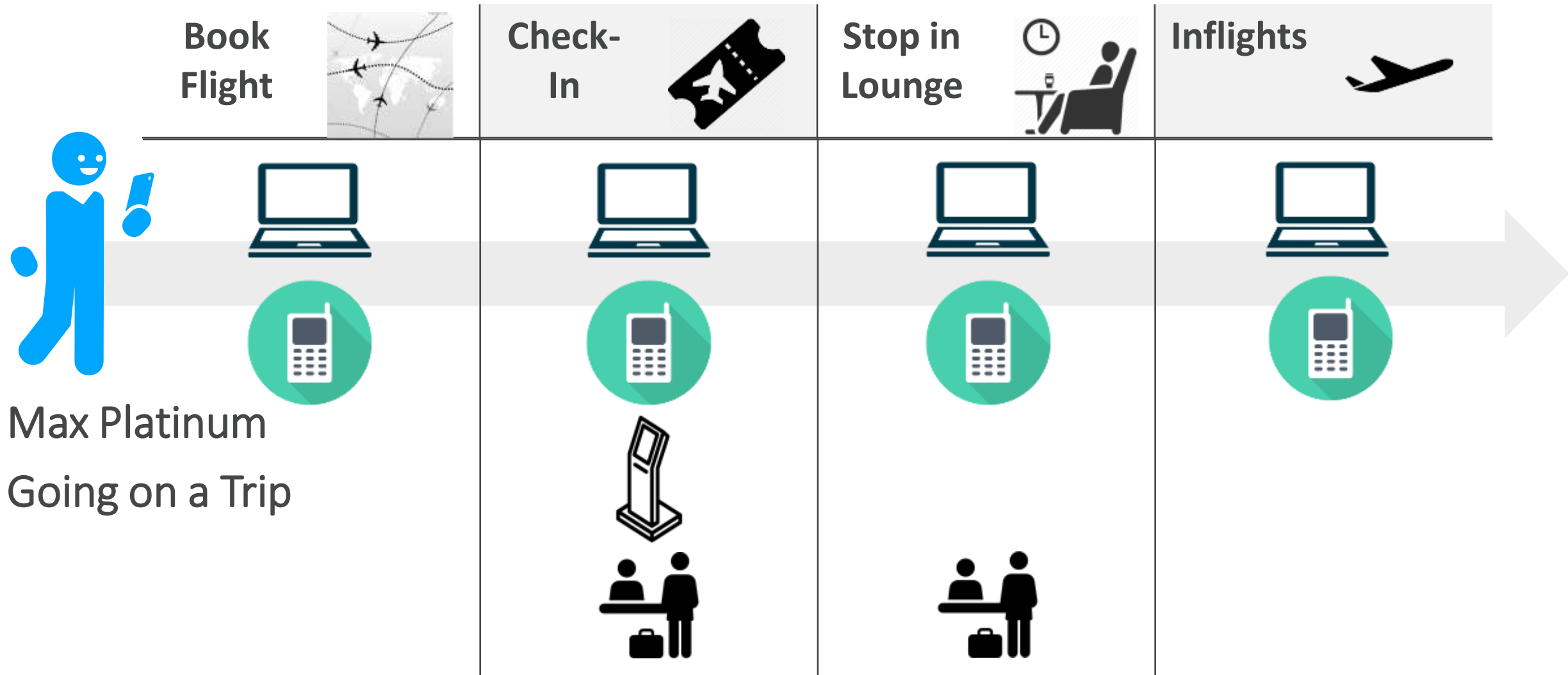
Business Analytics







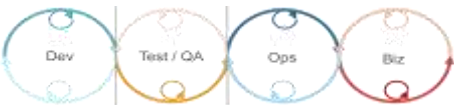





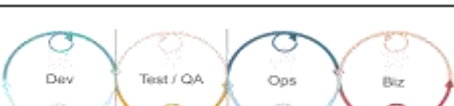



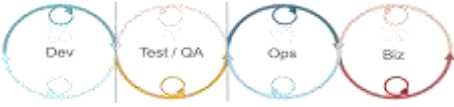





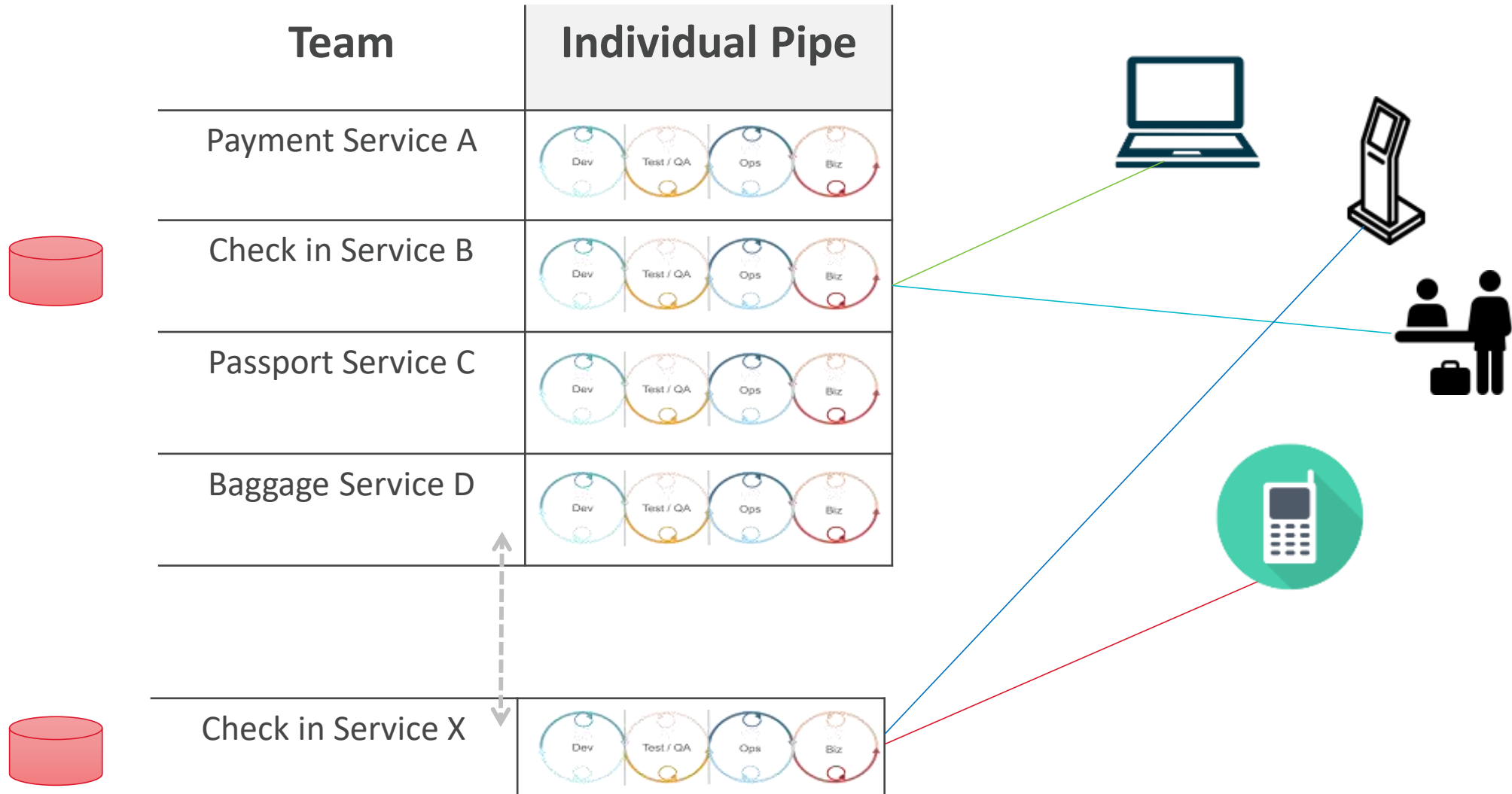
# Biz View: Airline – Platinum Member Traveling

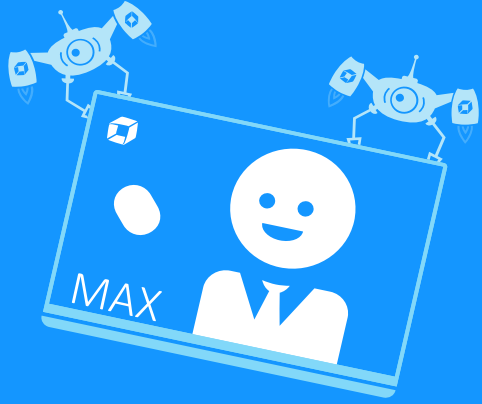


# Dev View: Airline – Platinum Member Traveling

Team	Individual Pipe	Cycle Time	Monitoring
 Geo Service Team		Weekly	
 Product Service Team		Every Sprint	
 Book Service Team		Daily	
 Auth Service Team		On-Demand	
			
 Mobile App Team		Monthly	

# ISSUE! Max Platinum Can Not Check In!





Are we making MONEY with Max?  
Which digital touchpoints is MAX using?

### Digital Touchpoints:

M Silo #1	Business Result	System Availability	Errors	Performance
D Silo #2	Business Result	System Availability	Errors	Performance
P Silo #3	Business Result	System Availability	Errors	Performance
Voice In R Silo #4	Business Result	System Availability	Errors	Performance
	Silo #6	Silo #7	Silo #8	

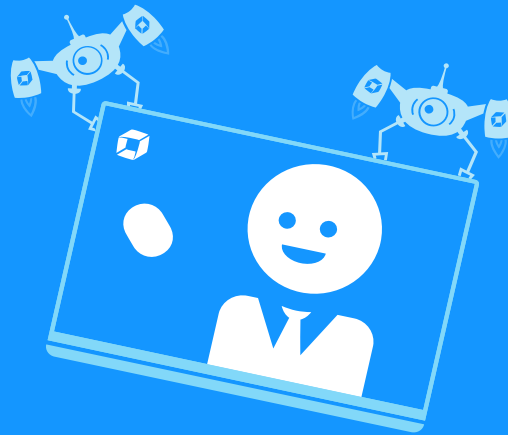


So what should we do now?

Have a BIG vision

## Digital Touchpoints:

- Mobile App
- Desktop Web
- Kiosk App
- PoS System
- Voice Interfaces (Alexa,...)
- Rich Client App



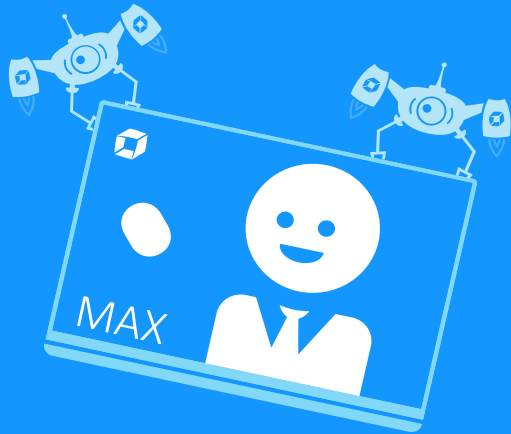
## Device:

- Mobile
- Mobile Browser
- Smart Watch
- ATM
- Car Entertainment System
- TV

## Locations:

- Vienna, Austria
- Store Salzburg
- Check-in Terminal A FRA
- Construction Site ABC, India

# We need to answer the same questions for ALL touchpoints

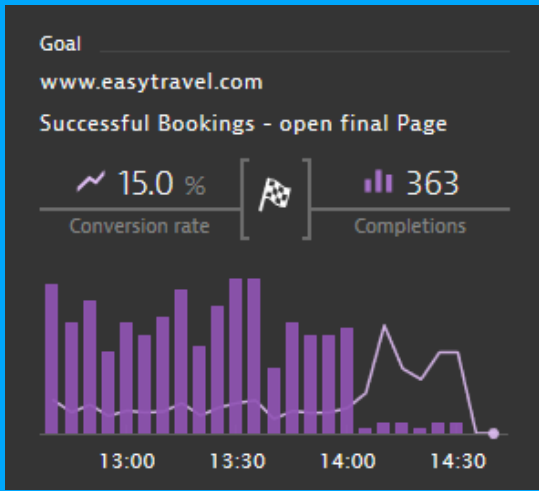


## Digital Touchpoints:

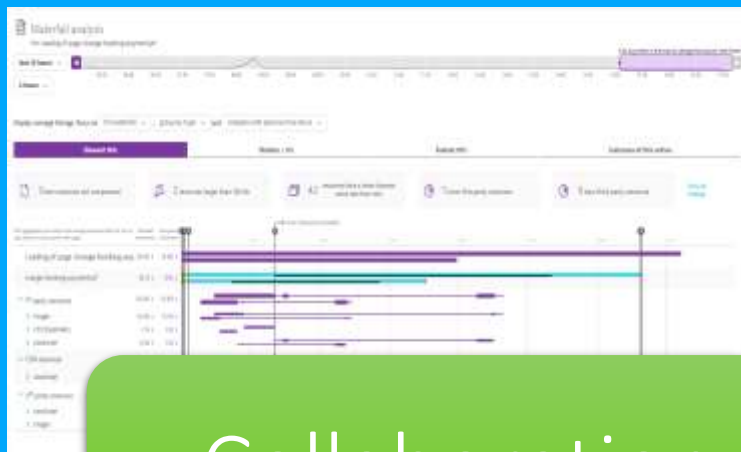
- Mobile App
- Desktop Web
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Business Result	System Availability	Errors	Performance
Business Result	System Availability	Errors	Performance
Business Result	System Availability	Errors	Performance
Business Result	System Availability	Errors	Performance

Biz



Dev



Ops



Collaboration based on Consistent Data

# Act tomorrow locally!

Make the KPIs available to others

Take a look the 4 Key KPIs and check them

Establish a quality gate beyond functional health

Introduce monitoring early in the pipeline

Chart your money making step/action

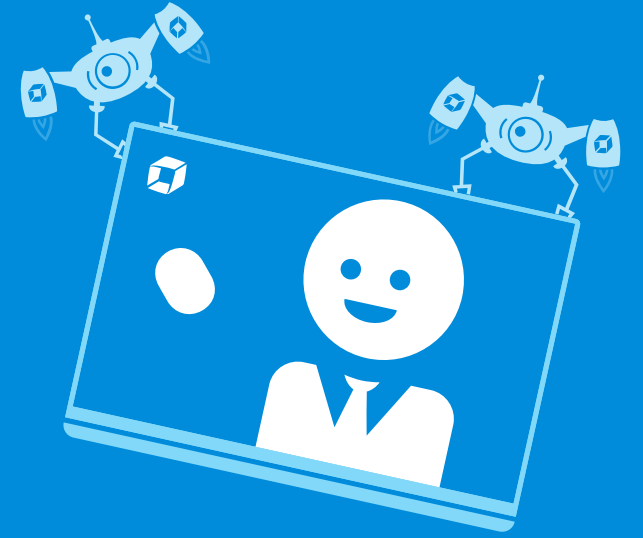
Start with a minimal DevOps

Check your monitoring solution future readiness

No Monitoring in place? – Checkout Dynatrace



Monitoring redefined



Klaus Enzenhofer

Director Technology Strategy

 klaus-enzenhofer

 @kenzenhofer