



CONTINUOUS ARCHITECTURE VALIDATION

Wolfgang Gottesheim
Compuware APM



Compuware?



+ **dynaTrace**
software

=  Compuware
APM

What We Do

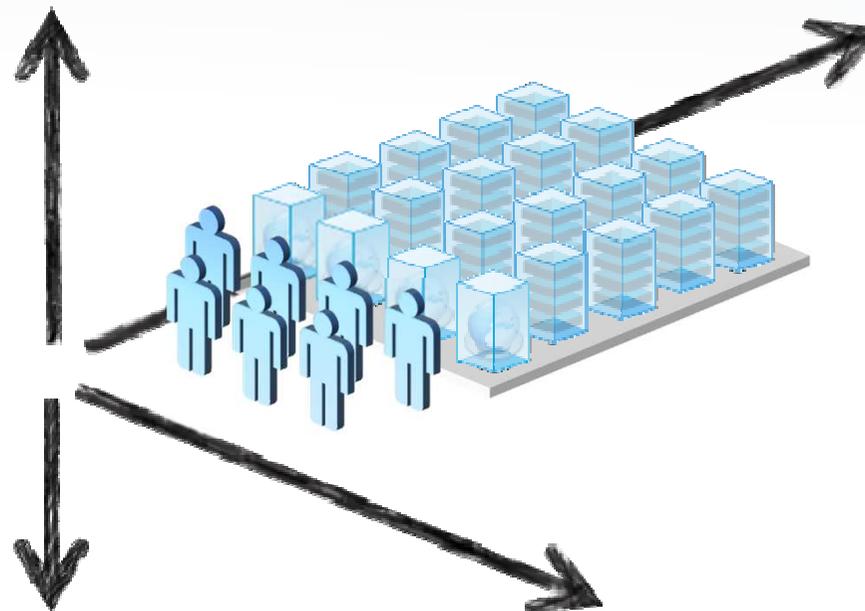


Business

User Experience
Service Level Mgmt.
Impact Analysis
Transaction Types
Conversions

End-to-end transaction capture

Across Java,
.NET, PHP,
Mainframe,
NGINX,...



Deep

Code-Level
Context
Information

Full Coverage

24x7 Transaction Tracing
All Transactions & Users

Why do we care about architectures?



Runtime Application Architecture

...from a performance angle

- » Understand relations and dependencies at runtime
- » Raise awareness for performance impact of architectural problems among developers, testers, operators
- » Help with the identification and resolution of architectural problems

- » How does architecture relate to performance issues?

The Problems We Solve

* I would like to comment about: 

Comments:

I'm looking to drop some **serious cash** on cookware, but I **can't add items** to my cart!



Lili Mush @Lili_Mush

8 Sep.
@AussieFarmersD do you have an **app**? Using your site on my mobile is ridiculous, **slow** and extremely unresponsive. Very **frustrating!**

Expand



Morgan € @absoloutea

9 Sep

if i had a dollar for every time the twitter **app crashed** i'd be able to afford m&g for every single show on the wwa tour

Expand



Paulo Portillo @chikkopao

4h

I couldnt get through my instagram account. :(tried to reset the password but the **link** that was sent to my email **doesnt** seem to **work**.

Expand

← Reply ↻ Retweet ★ Favorite ⋮ More

What We Often See



"I couldn't help but notice your pain."

"My pain?"

"It runs deep. Share it with me!"

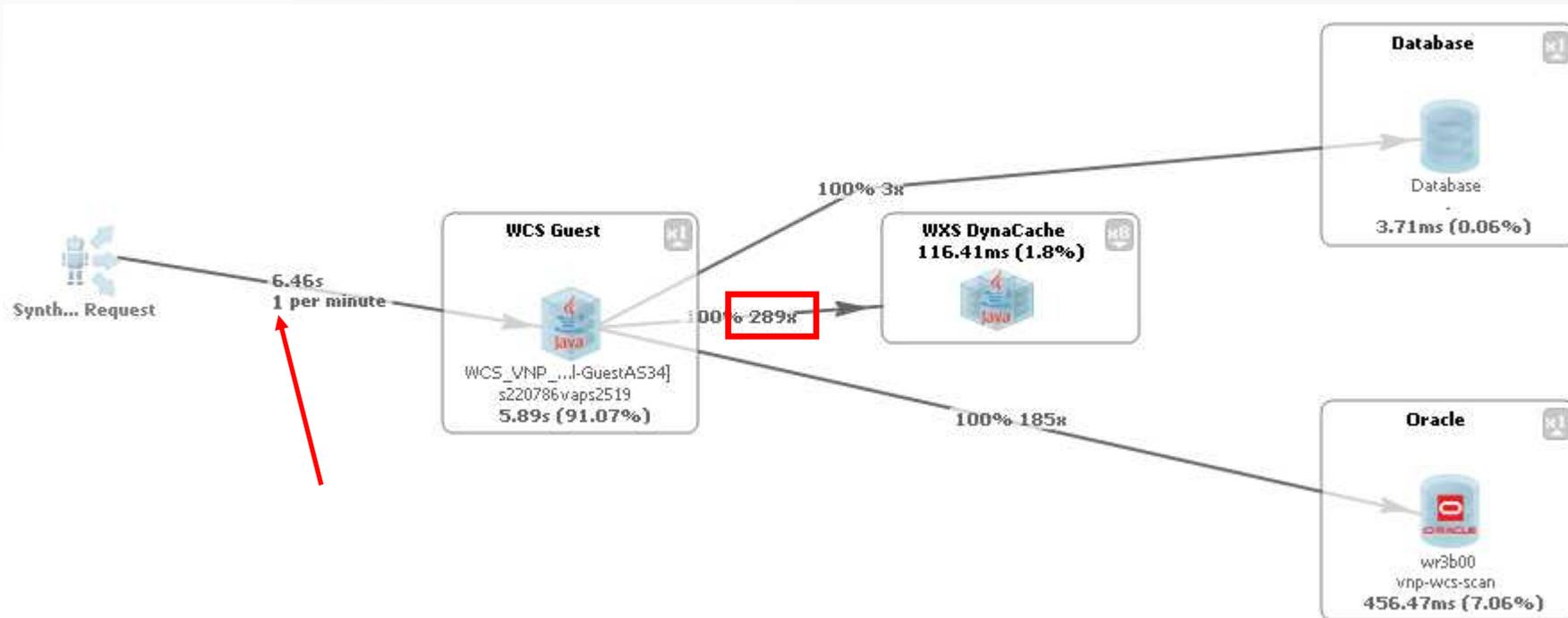
(Star Trek V)

- » Performance is not a band aid you can stick on your application
- » Architecture has enormous influence on performance
- You have to make sure your architecture supports your performance requirements!

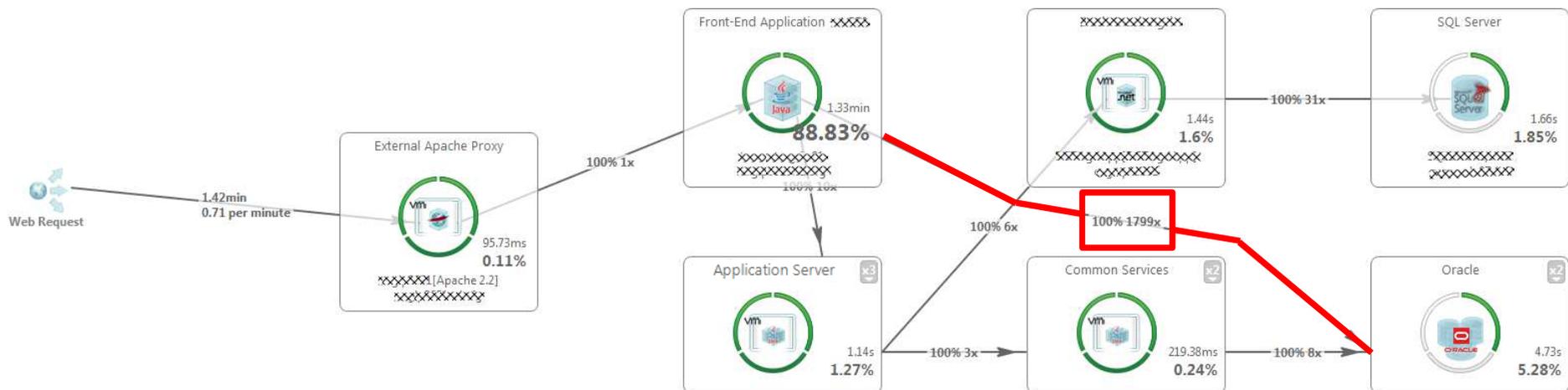
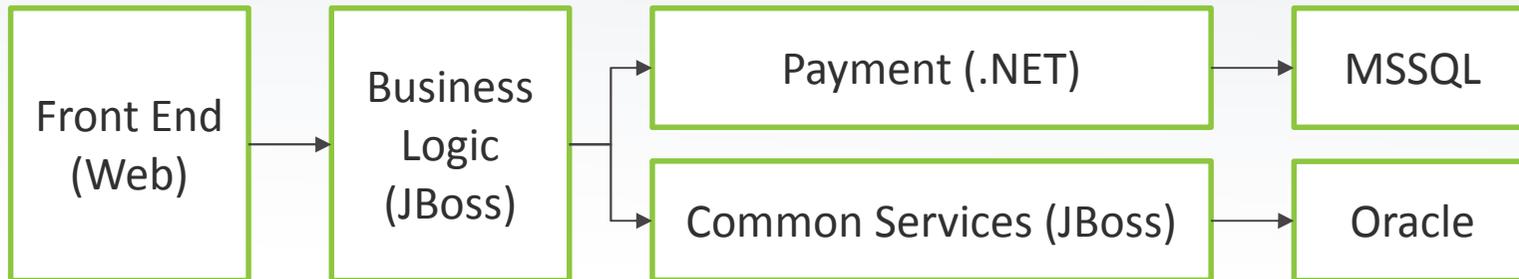


**How does your architecture
become a problem for
performance?**

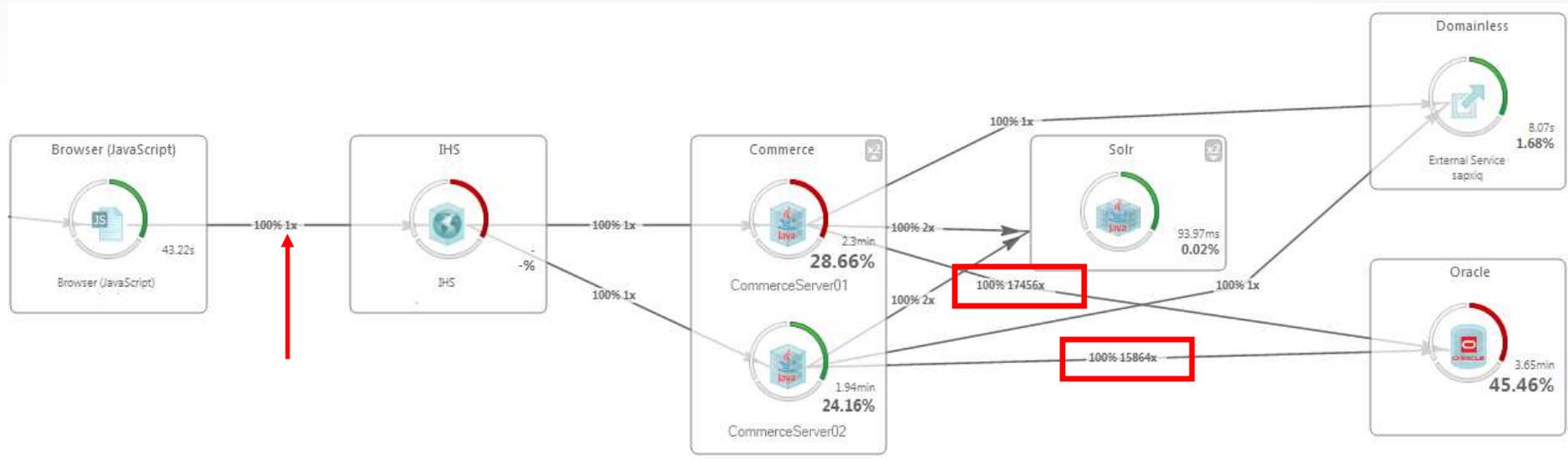
#1: Chatty Components



#2: Implementation Flaws



#3: Too Many Database Calls



#3: Too Many Database Calls

Method	Argument	Exec Total [ms]	Breakdown	Class	API
prepare()	SELECT v.name AS name, v.value AS value FROM variable v WHERE (name IN (:db_condition_placeholder_0, :db_co...	0.02	cpu (93.0%) io	PDO	Database
execute()	SELECT v.name AS name, v.value AS value FROM variable v WHERE (name IN (:db_condition_placeholder_0, :db_co...	1.06	io (93.0%)	PDOStatement	Database
prepare()	SELECT value FROM variable WHERE name = :name	0.04	cpu (95.0%) io	PDO	Database
execute()	SELECT value FROM variable WHERE name = :name	0.91	io (93.0%)	PDOStatement	Database
prepare()	SELECT value FROM variable WHERE name = :name	0.01	cpu (93.0%) io	PDO	Database
execute()	SELECT value FROM variable WHERE name = :name	1.79	cpu (53.0%) io (47.0%)	PDOStatement	Database
prepare()	SELECT value FROM variable WHERE name = :name	0.02	cpu (91.0%) io	PDO	Database
execute()	SELECT value FROM variable WHERE name = :name	0.61	cpu io (88.0%)	PDOStatement	Database
prepare()	SELECT value FROM variable WHERE name = :name	0.02	cpu (91.0%) io	PDO	Database
execute()	SELECT value FROM variable WHERE name = :name	1.01	io (95.0%)	PDOStatement	Database
prepare()	SELECT value FROM variable WHERE name = :name	0.02	cpu (91.0%) io	PDO	Database
execute()	SELECT value FROM variable WHERE name = :name	0.72	io (93.0%)	PDOStatement	Database
prepare()	SELECT value FROM variable WHERE name = :name	0.05	cpu (51.0%) io (49.0%)	PDO	Database
execute()	SELECT value FROM variable WHERE name = :name	0.61	cpu io (89.0%)	PDOStatement	Database
prepare()	SELECT value FROM variable WHERE name = :name	0.02	cpu (90.0%) io	PDO	Database

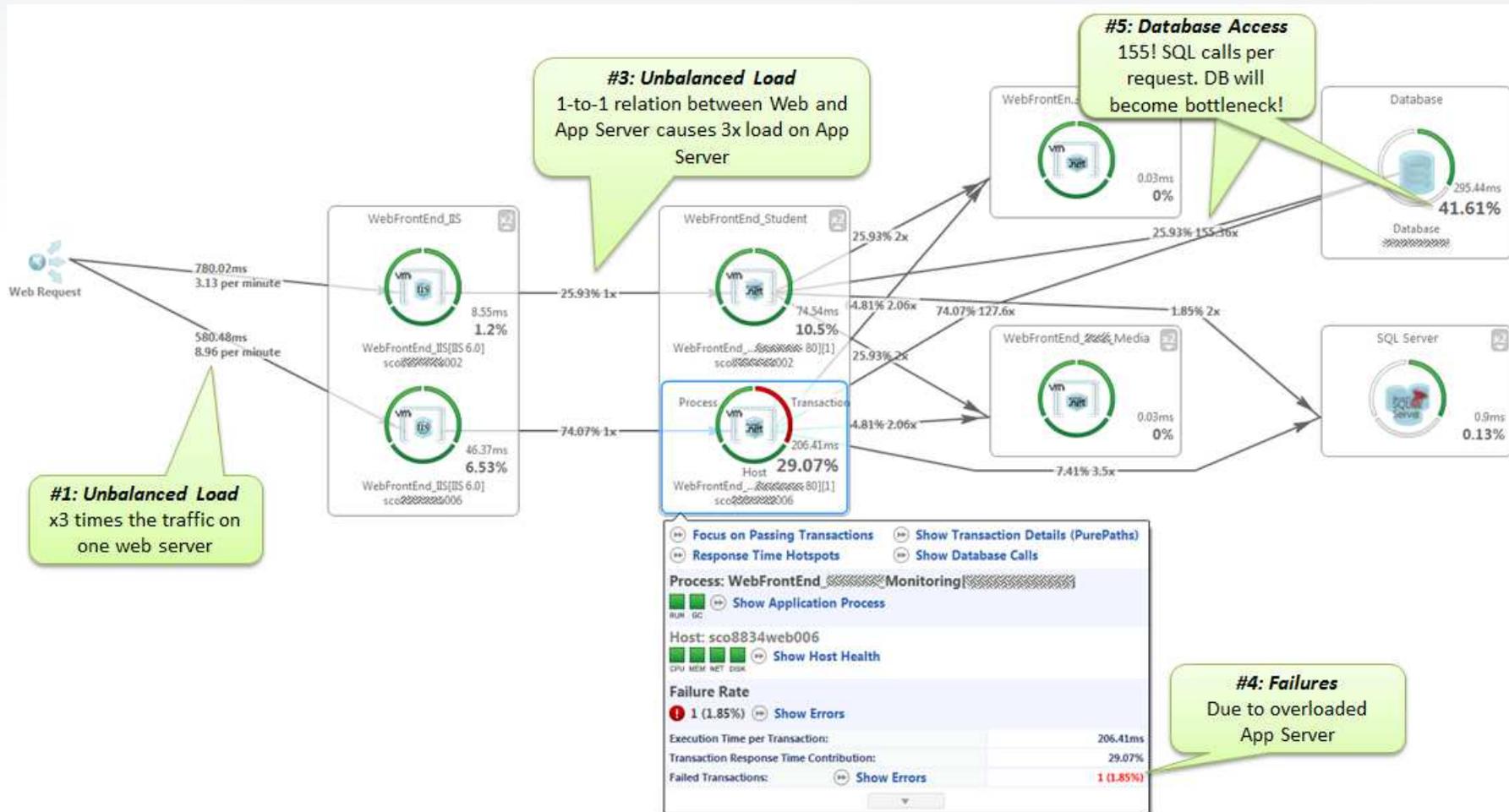
SQL

Execs/calling Tran...

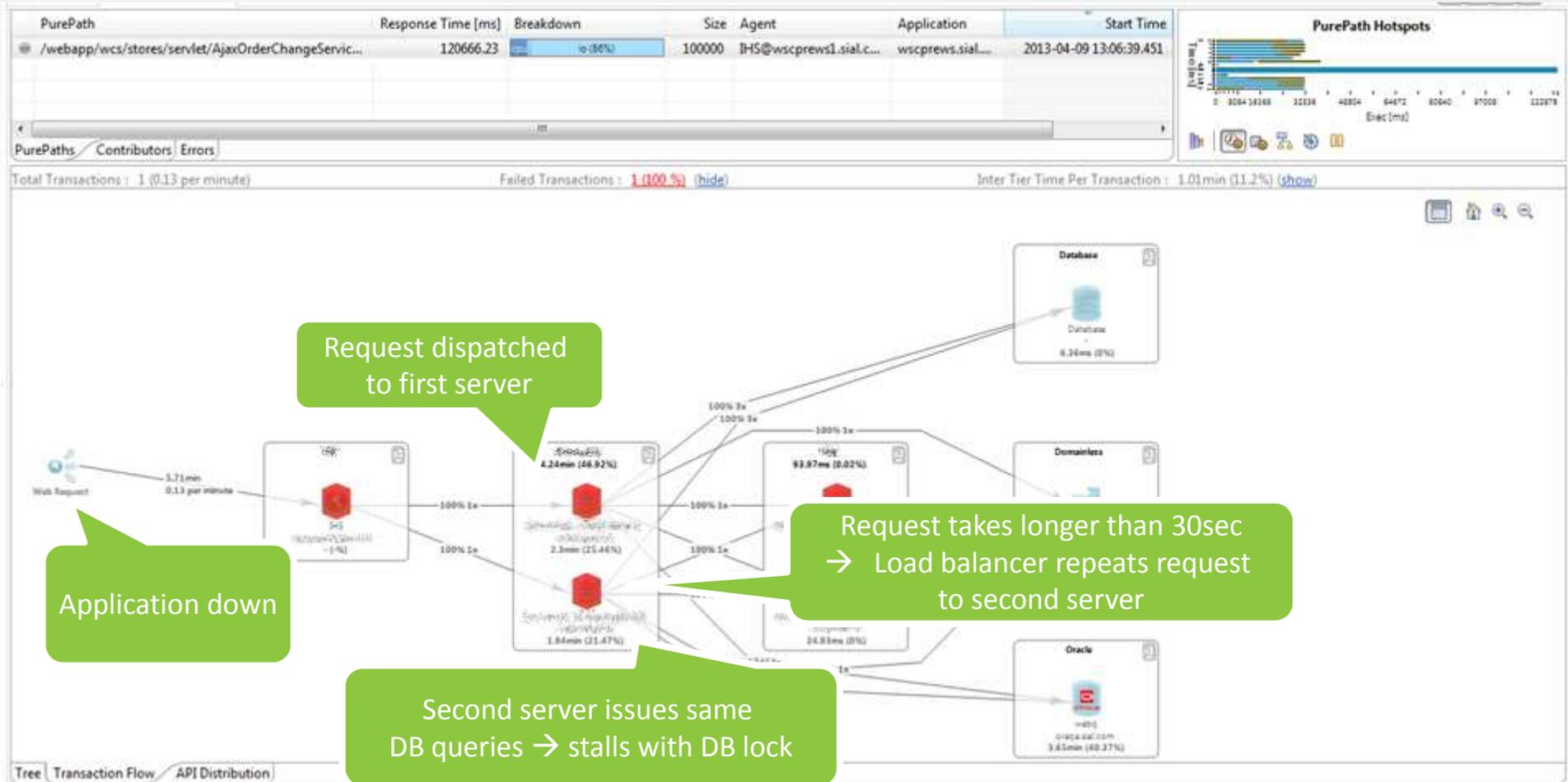
SELECT value FROM variable WHERE name = :name	2464.00
INSERT INTO search_total (word, count) VALUES (:db_insert_placeholder_0, :db_insert_placeholder_1)	587.00
UPDATE block SET module=:db_update_placeholder_0, delta=:db_update_placeholder_1, theme=:db_up	296.00

execute()	SELECT value FROM variable WHERE name = :name	0.00	cpu (93.0%) io	PDOStatement	Database
prepare()	SELECT value FROM variable WHERE name = :name	0.02	cpu (93.0%) io	PDO	Database
execute()	SELECT value FROM variable WHERE name = :name	1.41	io (97.0%)	PDOStatement	Database
prepare()	SELECT value FROM variable WHERE name = :name	0.02	cpu (92.0%) io	PDO	Database
execute()	SELECT value FROM variable WHERE name = :name	0.52	io (90.0%)	PDOStatement	Database
prepare()	SELECT value FROM variable WHERE name = :name	0.02	cpu (93.0%) io	PDO	Database
execute()	SELECT value FROM variable WHERE name = :name	0.53	io (91.0%)	PDOStatement	Database
prepare()	SELECT value FROM variable WHERE name = :name	0.02	cpu (90.0%) io	PDO	Database
execute()	SELECT value FROM variable WHERE name = :name	0.53	cpu io (88.0%)	PDOStatement	Database
prepare()	SELECT value FROM variable WHERE name = :name	0.01	cpu (92.0%) io	PDO	Database
execute()	SELECT value FROM variable WHERE name = :name	0.52	io (90.0%)	PDOStatement	Database
prepare()	SELECT value FROM variable WHERE name = :name	0.03	cpu (92.0%) io	PDO	Database
execute()	SELECT value FROM variable WHERE name = :name	0.76	cpu io (88.0%)	PDOStatement	Database
prepare()	SELECT value FROM variable WHERE name = :name	0.01	cpu (92.0%) io	PDO	Database
execute()	SELECT value FROM variable WHERE name = :name	1.58	io (96.0%)	PDOStatement	Database
prepare()	SELECT value FROM variable WHERE name = :name	0.02	cpu (92.0%) io	PDO	Database
execute()	SELECT value FROM variable WHERE name = :name	2.06	io (97.0%)	PDOStatement	Database
prepare()	SELECT value FROM variable WHERE name = :name	0.02	cpu (91.0%) io	PDO	Database
execute()	SELECT value FROM variable WHERE name = :name	0.79	io (93.0%)	PDOStatement	Database
prepare()	SELECT value FROM variable WHERE name = :name	0.02	cpu (92.0%) io	PDO	Database

#4: Architecture affected by Deployment

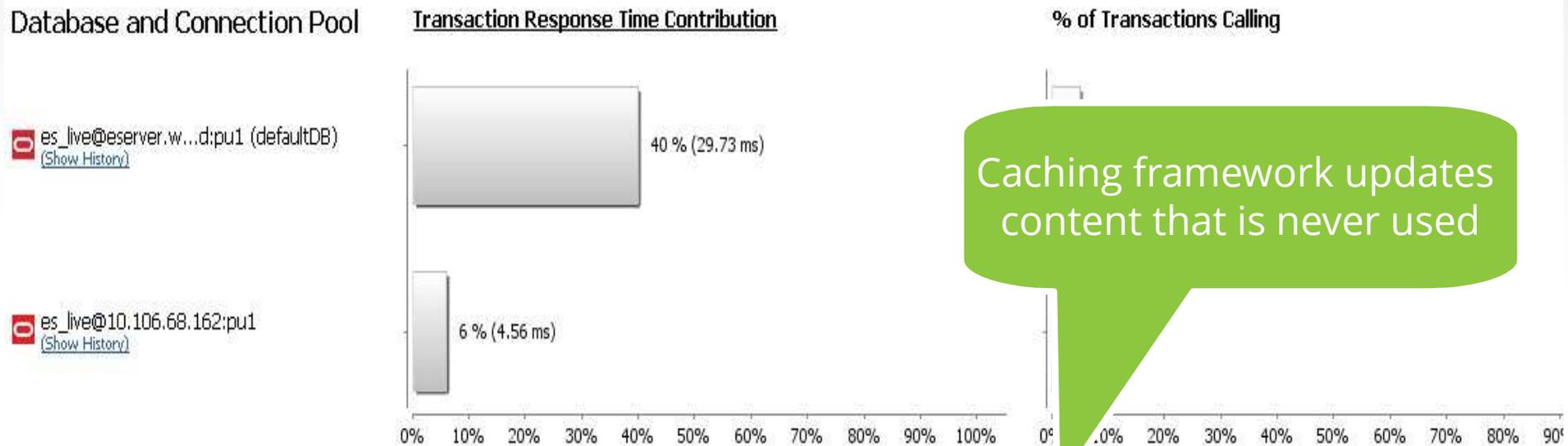


#5: "Falling Dominoes"



Smith, C. U., & Williams, L. G. (2003). More new software performance antipatterns: Even more ways to shoot yourself in the foot. In *Computer Measurement Group Conference* (pp. 717-725).

#6: Unnecessary work



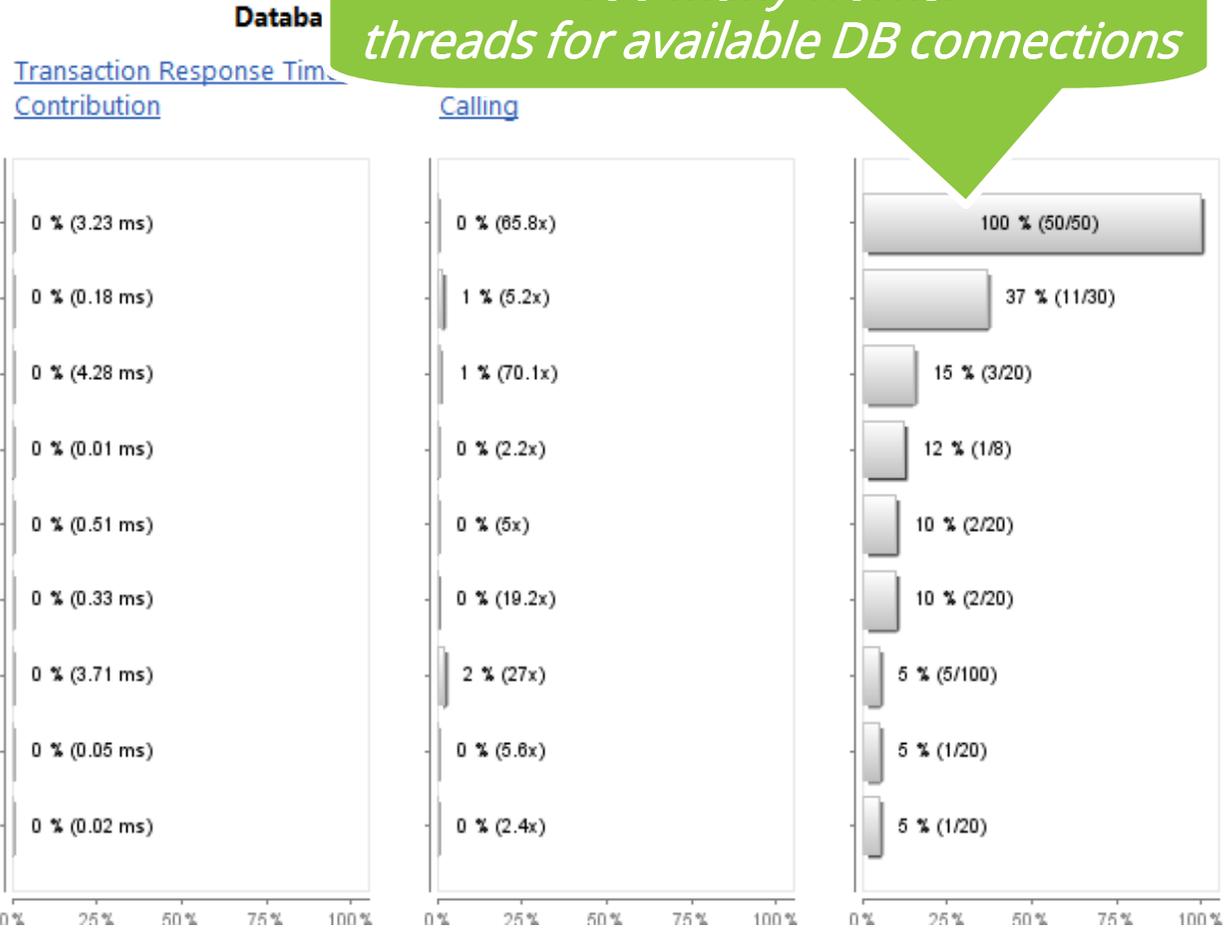
Database and Connection Pool	RT/Trans [ms]	Executions	Exec Avg [ms]	Exec Min [ms]	Exec Max [ms]
es_live@eserver.world:pu1 (defaultDB)	29.73	798772	13.51	0.84	14914.98
/*search/ProductSearchQuery (Cartridge swa_b2c_app)*/ select a.productID as productID,a.catalog	0.02	1	6284.08	6284.08	6284.08
/*search/GetOrderForSearch (Cartridge swa_enterprise_app)*/ SELECT opi.uuid AS opiuuid, COUNT(	0.02	1	5614.66	5614.66	5614.66
/*search/ProductSearchQuery (Cartridge swa_b2c_app)*/ select a.productID as productID,a.catalog	0.01	1	3720.67	3720.67	3720.67
/*search/GetOrderForSearch (Cartridge swa_enterprise_app)*/ SELECT opi.uuid AS opiuuid, COUNT(	0.01	1	3446.98	3446.98	3446.98
/*search/ProductSearchQuery (Cartridge swa_b2c_app)*/ select a.productID as productID,a.catalog	0.01	1	2151.42	2151.42	2151.42
/*search/ProductSearchQuery (Cartridge swa_b2c_app)*/ select a.productID as productID,a.catalog	0.01	2	2012.36	1967.03	2057.69
/*search/GetOrderForSearch (Cartridge swa_enterprise_app)*/ SELECT opi.uuid AS opiuuid, COUNT(	0.02	5	1575.58	905.66	3205.31
/*search/ProductSearchQuery (Cartridge swa_b2c_app)*/ select a.productID as productID,a.catalog	0.00	1	1460.08	1460.08	1460.08
/*search/GetOrderForSearch (Cartridge swa_enterprise_app)*/ SELECT opi.uuid AS opiuuid, COUNT(	0.03	7	1325.69	834.60	2707.77

#7: "More is Less"

Too many worker threads for available DB connections

Database and Connection Pool

- support@sqlserver:Community (c3p0) [\(Show history in new dashboard\)](#)
- wiki@emea-lnz-db002.em...orp:devwiki_359 (c3p0) [\(Show history in new dashboard\)](#)
- support@sqlserver:dtadm...sinesslog (Apache DBCP) [\(Show history in new dashboard\)](#)
- support@sqlserver:eserv...reporting (Apache DBCP) [\(Show history in new dashboard\)](#)
- eservices@emea-lnz-db0...agestats (Apache DBCP) [\(Show history in new dashboard\)](#)
- support@sqlserver:license_JIRA516 (Apache DBCP) [\(Show history in new dashboard\)](#)
- support@sqlserver:support_jira434 (Apache DBCP) [\(Show history in new dashboard\)](#)
- support@sqlserver:user...nagement (Apache DBCP) [\(Show history in new dashboard\)](#)
- support@sqlserver:community (Apache DBCP) [\(Show history in new dashboard\)](#)



Smith, C. U., & Williams, L. G. (2003). More new software performance antipatterns: Even more ways to shoot yourself in the foot. In *Computer Measurement Group Conference* (pp. 717-725).

What can we do?

Who Cares About Performance?

Developers?

Architects?

Testers?

Operators?

Business?

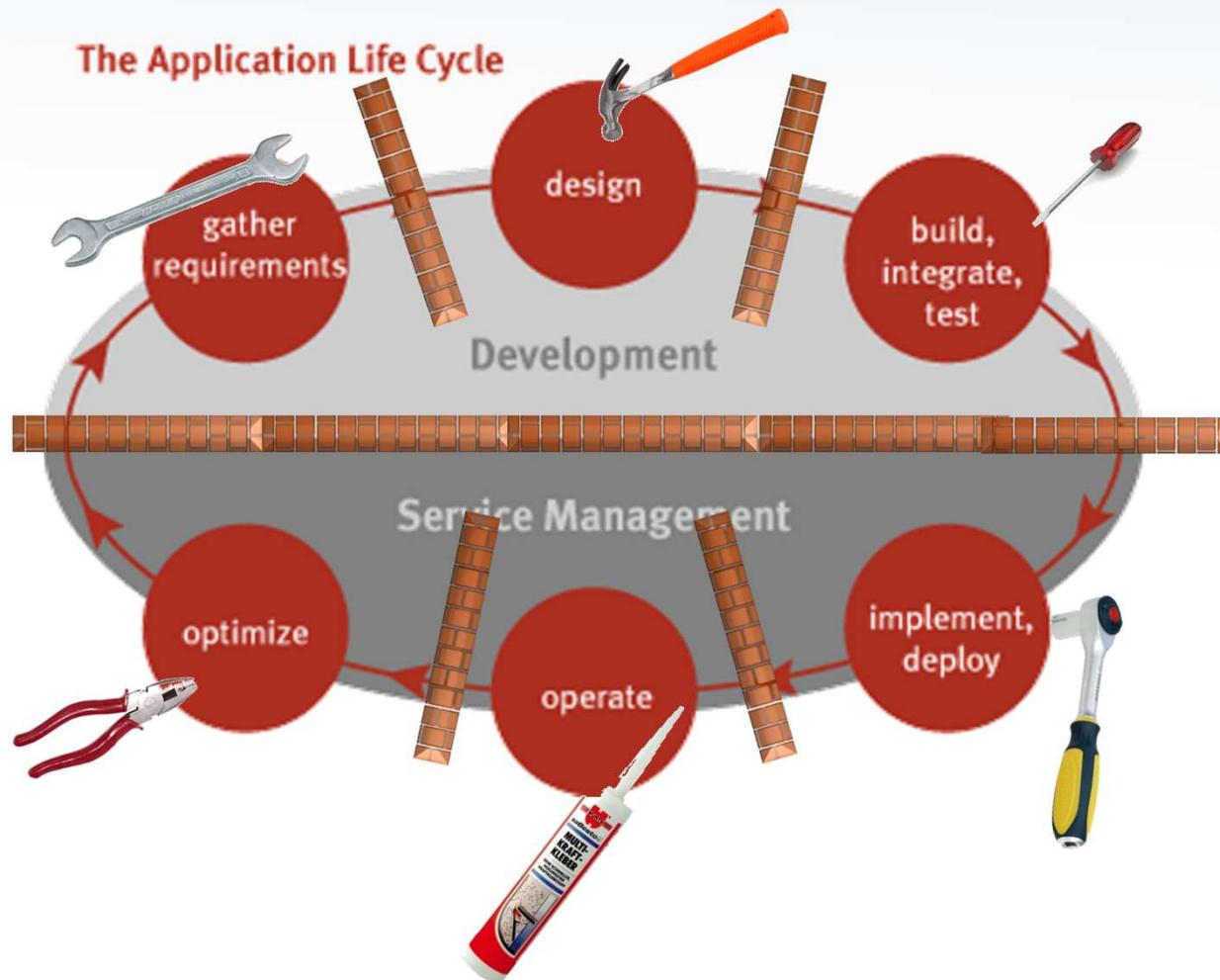
Everone!

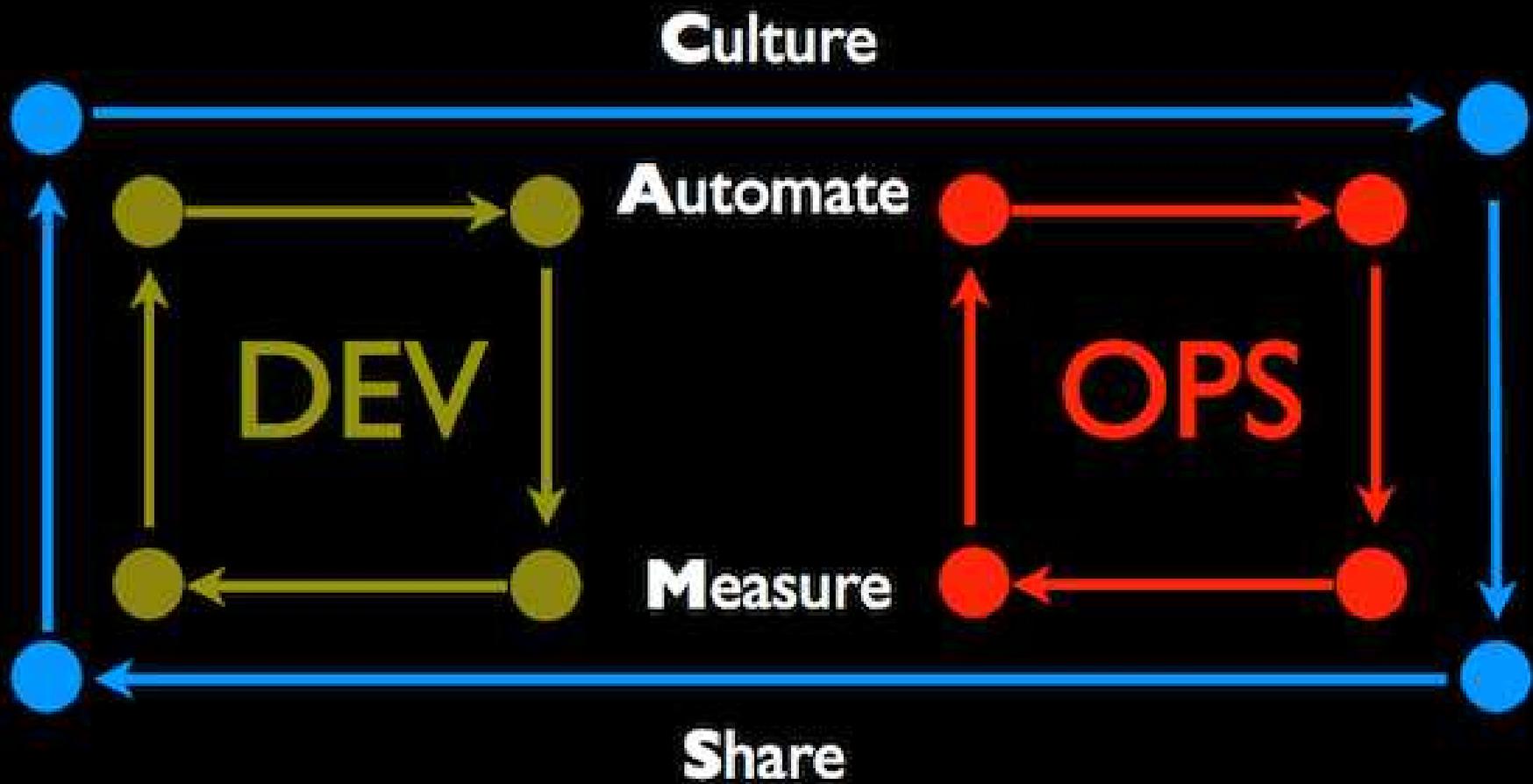


But remember:



Monitor Architecture Across the Lifecycle





Define Architectural KPIs accepted by all teams

of Web Service Calls

Response Times

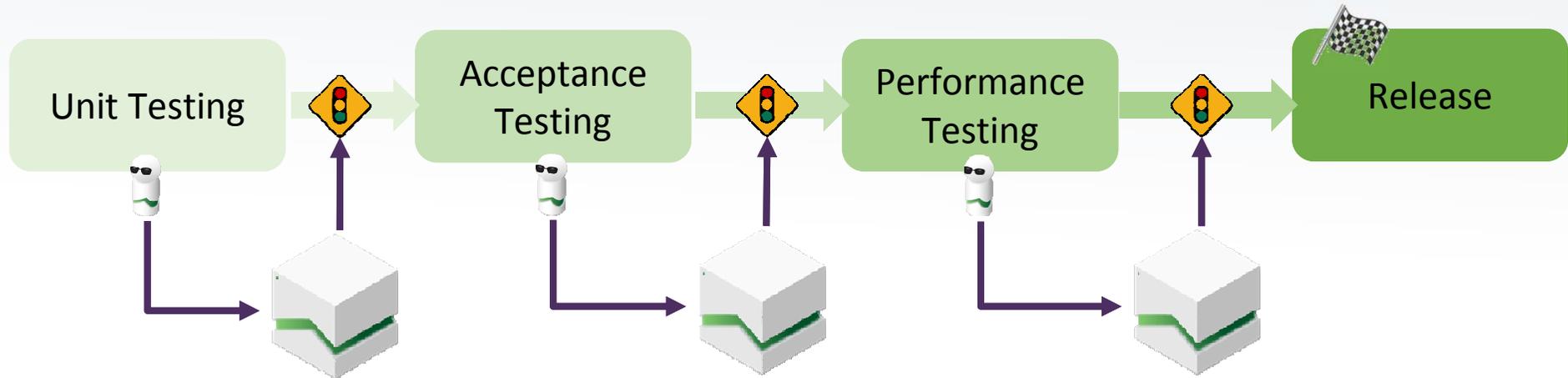
MBs / Uses

of SQL Executions

of Log Lines



How?



Monitor Tests

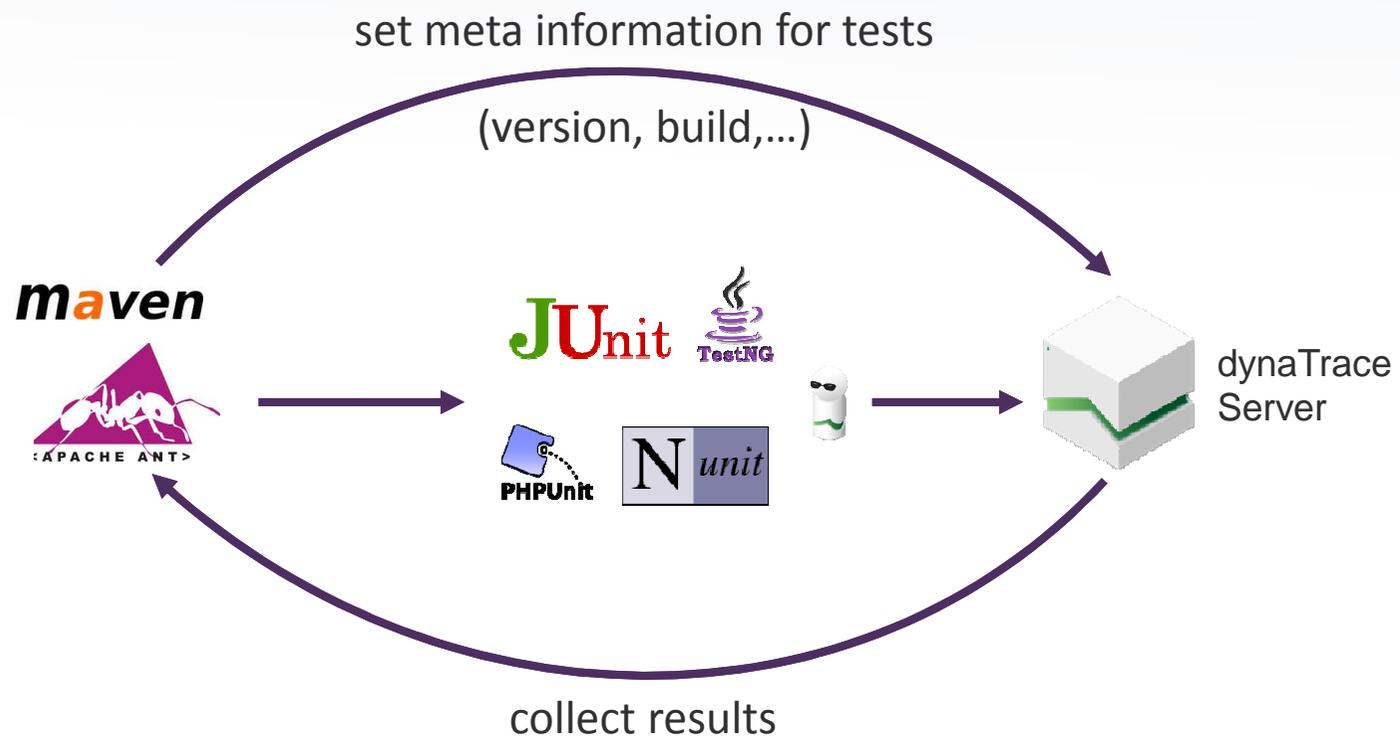


Analyze Results

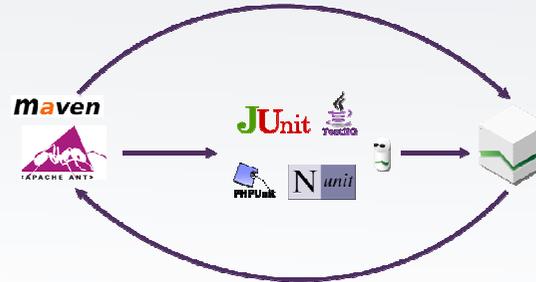


Integrate with Build Infrastructure

Monitor Automated Tests



Analyze Results



- Architectural validation
 - # of DB calls
 - # Exceptions
- Response time of tests
- Method hotspots



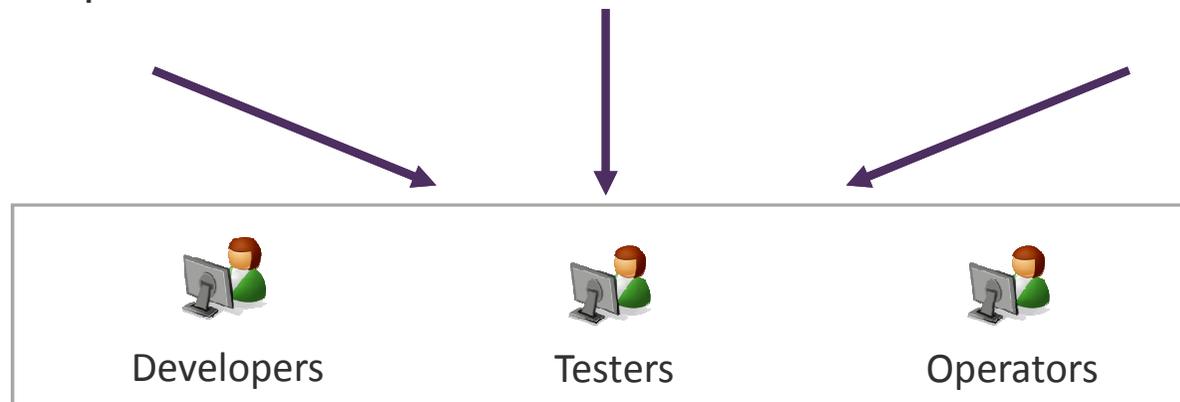
Automatic Baseline

- No need to define thresholds manually
- Identify tests that are not normal



Test Automation Dashlet

- Analyze tests
- Compare tests
- Configure alerting



Continuous Performance Validation

Lets look behind the scenes

Test Framework Results			Architectural Data	
Build #	Test Case	Status	# SQL	# Excep
Build 17	testPurchase	OK	12	0
	testSearch	OK	3	1
Build 18	testPurchase	FAILED	12	5
	testSearch	OK	3	1
Build 19	testPurchase	OK	75	0
	testSearch	OK		1
Build 20	testPurchase	OK		0

We identified a regression

Problems probably reason
 Problem fixed but now we have an
 architectural regression

Now we have the functional and architectural confidence

Performance Focus in Test Automation

The screenshot displays the dynaTrace Client interface with the following components:

- Test Automation Table:** A table listing various tests. A green callout box labeled "Analyzing All Unit / Performance Tests" points to the "Unit Tests" and "Performance Tests" sections. The "Performance Tests" section is expanded, showing tests like "LoginTest.testLogin1" and "LoginTest.testLogin2".
- Violations Table:** A table below the main list showing metrics for degraded runs. A green callout box labeled "Analyzing Metrics such as DB Exec Count" points to this table.

Degraded Ru...	Violation %	Volatility	Platform	Measure Name	Expected Maxi
▲ 2	-	0 %	Windows	AG_Invocation QueryImpl.getResult...	0.00
▲ 2	▲ 2200 %	0 %	Windows	DB Count	3.00
▲ 2	▲ 66 %	13 %	Windows	PurePath Duration w/o Suspension	1223.68
▲ 2	▲ 65 %	13 %	Windows	PurePath Duration	1237.55
▲ 2	▲ 65 %	13 %	Windows	PurePath Response Time	1237.55
▶ 0	▶ 0 %	0 %	Windows	Failed Transaction Count of Web Se...	0.00
▶ 0	▶ 0 %	0 %	Windows	Failed Transaction Count of Web Se...	0.00
▶ 0	▶ 0 %	0 %	Windows	Failed Transaction Count of Web Se...	0.00
▶ 0	▶ 0 %	0 %	Windows	Failed Transaction Count	0.00
▶ 0	▶ 0 %	0 %	Windows	Failed Transaction Count of Web Se...	0.00
▶ 0	▶ 0 %	0 %	Windows	PurePath CPU Duration	994.12
- Line Graph:** A line graph on the right side of the interface showing a sharp increase in a metric at 10:45. A green callout box labeled "Jump in DB Calls from one Build to the next" points to this graph.

Performance Focus in Test Automation

The screenshot shows the Jenkins interface for 'Project easyTravel'. On the left is a navigation menu with options like 'Back to Dashboard', 'Status', 'Changes', 'Workspace', 'Build Now', 'Delete Project', 'Configure', and 'dynaTrace Test Automation Dashboard'. The main area displays 'Project easyTravel' with links for 'Workspace' and 'Recent Changes'. Below this is a 'Permalinks' section with a list of build links. On the right, a 'dynaTrace Test Automation Results' chart shows the number of tests for builds #25, #26, and #30, categorized by status: Degraded, Failed, Improved, Passed, and Volatile. A green callout box points to the chart with the text 'Embed your Architectural Results in Jenkins'.

Project easyTravel

Workspace
Recent Changes

Permalinks

- [Last build \(#30\), 56 min ago](#)
- [Last stable build \(#30\), 56 min ago](#)
- [Last successful build \(#30\), 56 min ago](#)
- [Last failed build \(#29\), 1 hr 2 min ago](#)
- [Last unsuccessful build \(#29\), 1 hr 2 min ago](#)

dynaTrace Test Automation Results

Build	Degraded	Failed	Improved	Passed	Volatile
#25	1	0	0	23	11
#26	1	1	0	22	11
#30	0	5	0	30	0

Embed your Architectural Results in Jenkins

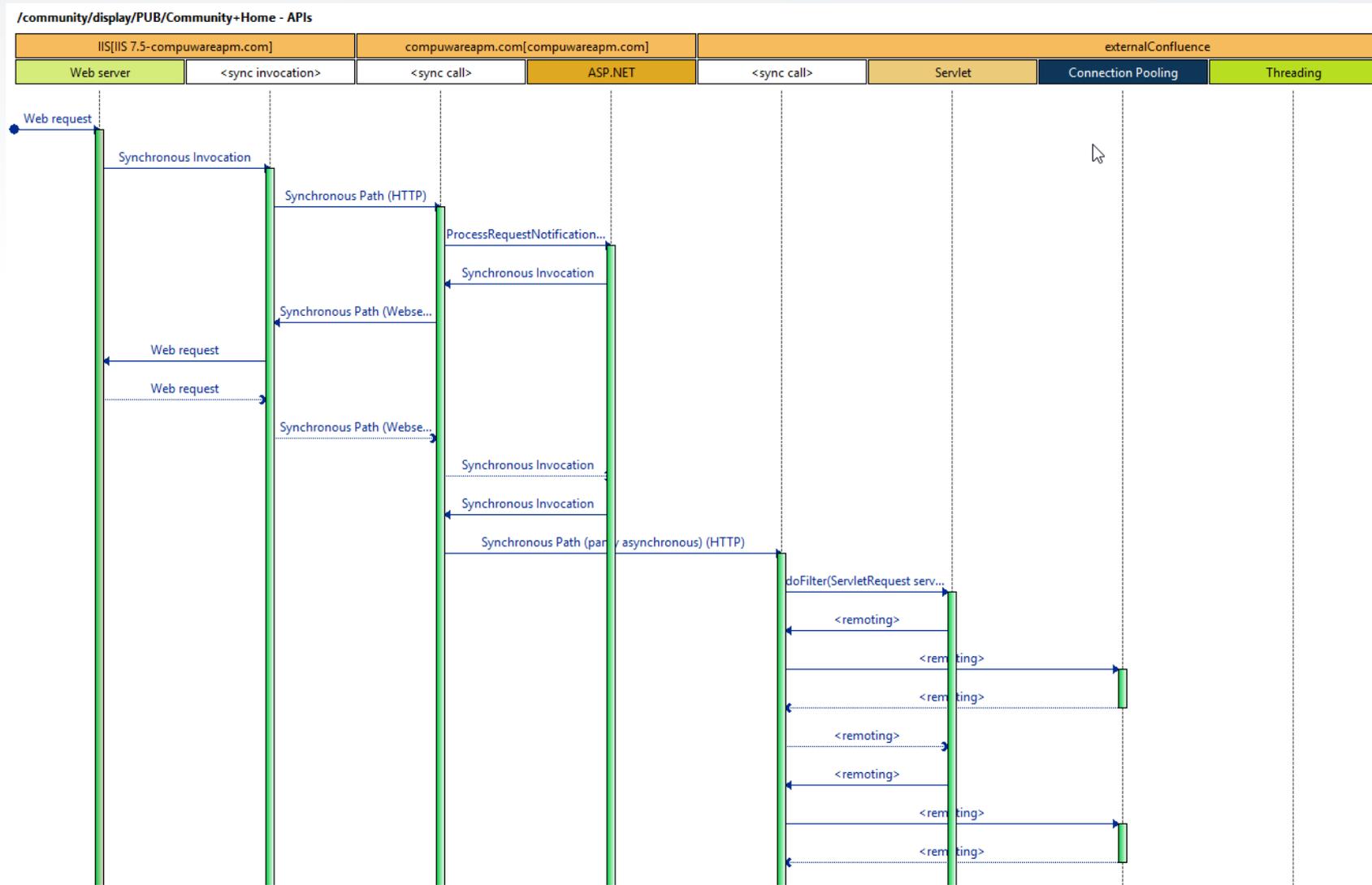
Performance Focus in Test Automation

Compare Build that shows **BAD** Behavior!

With Build that shows **GOOD** Behavior!



Sequence Diagram Generation



Check out our trial
<http://bit.ly/dtecsa2014>

Thank You



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APM Discussion **Forums**
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Compuware APM User Group



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