

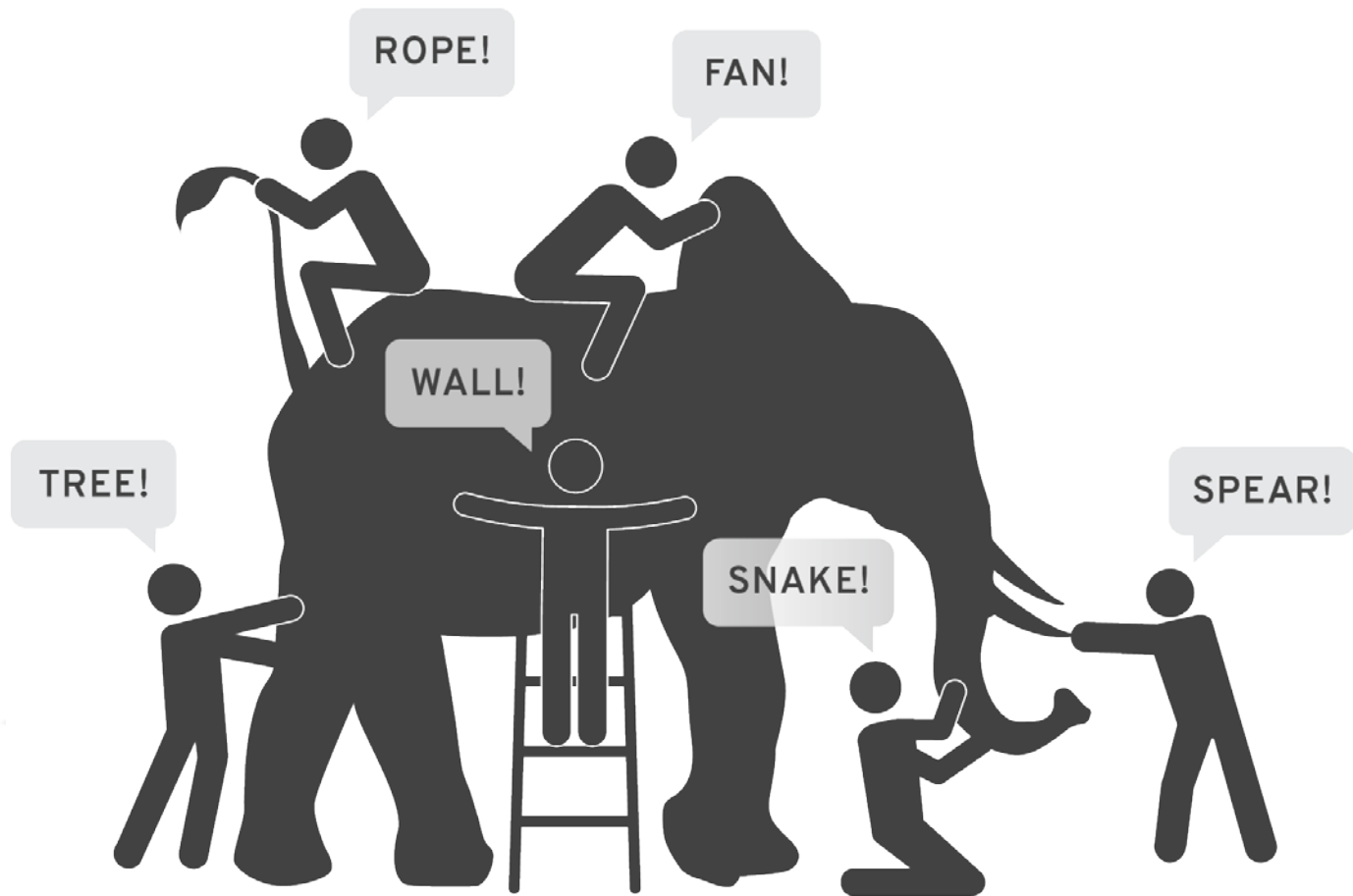
Teaching Elephants to Dance (and Fly!)

A Developer's Journey to Digital Transformation



6 Blind Men

(and an elephant)



Perspective & Assumptions

What we see depends on ...

Who we are (worldview).

What we're looking for.

Where we're standing.

What we know (or don't).







Burdened and lumbering?



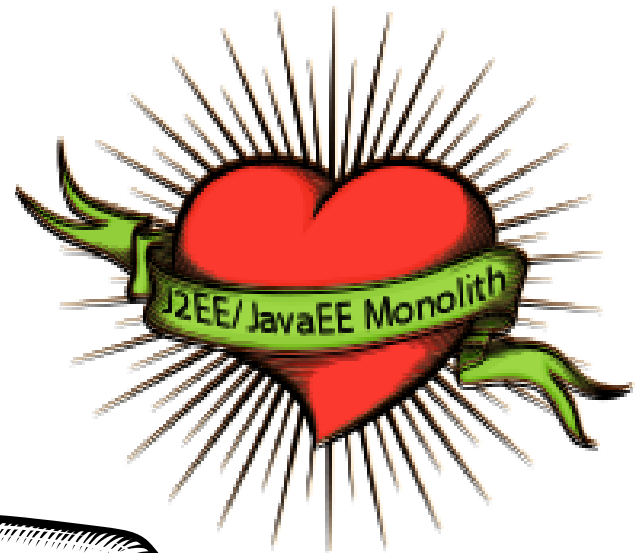
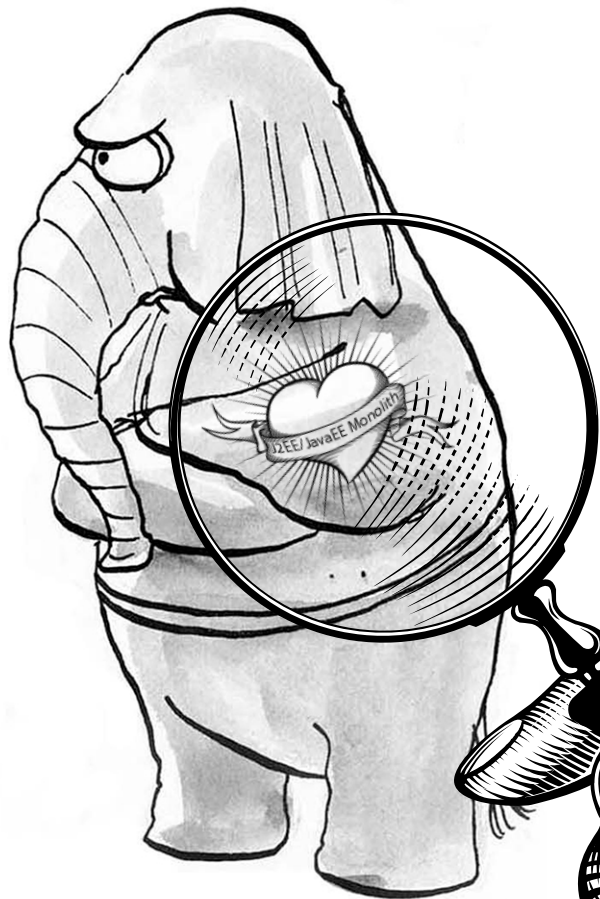
Or remover of obstacles?

A Developer's Reality

What most of us are up against.



**“I suppose I’ll be the one
to mention the elephant in the room.”**





“Unfortunately, there’s another elephant in the room.”





&





The average life expectancy of a Fortune 500 company has declined from around 75 years half a century ago to less than 15 years today.

Deloitte Shift Index





By 2020, more than 75% of the
S&P 500 will be companies
that we have not heard of yet.

Professor Richard Foster,
Yale University, in Lean Enterprise





By 2020 every business
will become a digital
predator or digital prey.

Nigel Fenwick,
Forrester Research, 2015





87% of surveyed executives
believe digital technologies
will disrupt their industries ...

MIT Sloan Management Review, 2016





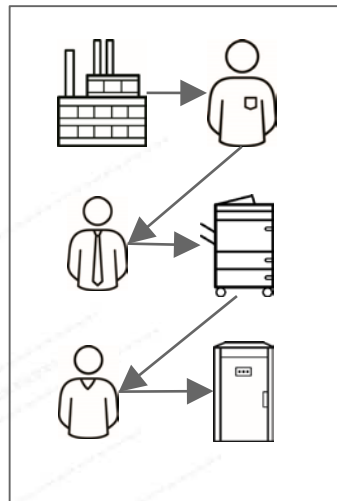
... yet only 44% indicated their organizations were taking appropriate measures to avert disruption.

MIT Sloan Management Review, 2016



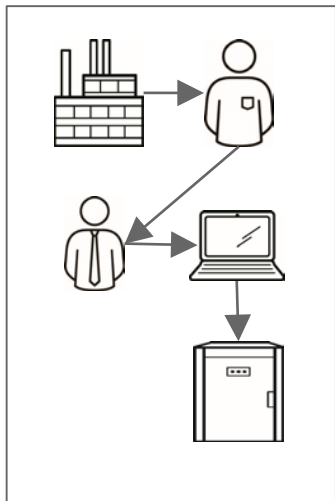
Business & IT: 80s to Future

ChUI



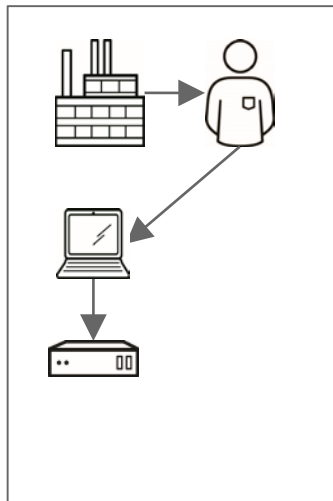
80s

GUI



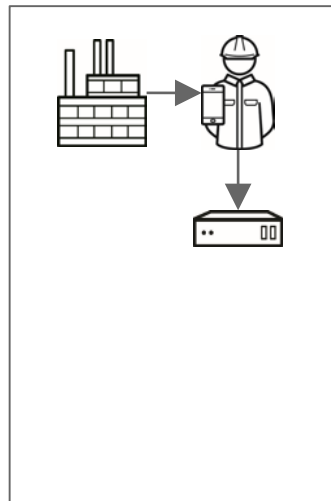
90s

Web



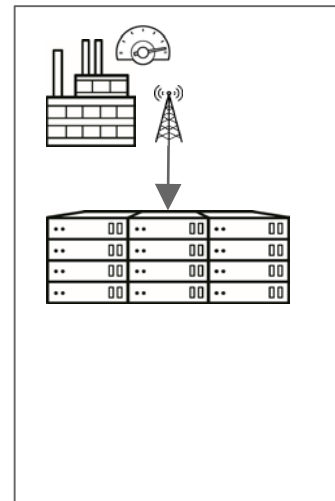
00s

Mobile



10s

Things



Transformers

On Black Friday (2013) the Walmart servers didn't go over 1% CPU utilization and the team deployed with 200,000,000 users online.



Eran Hammer @eranhammer · Nov 30

I guess too nuts for anyone to guess: we felt so good about everything, we decided middle of Black Friday is perfect time for a release.

[Details](#)

[↩ Reply](#)

[↻ Retweeted](#)

[★ Favorited](#)

[... More](#)

<http://www.nearform.com/nodecrunch/node-js-becoming-go-technology-enterprise/>



High-performing organizations
are decisively outperforming
their lower performing peers ...



200X

200X More Deployments

<https://puppet.com/resources/whitepaper/2016-state-of-devops-report>

24X

24X Faster Recovery from Failure

<https://puppet.com/resources/whitepaper/2016-state-of-devops-report>

3X

3X Lower Change Failure Rate

<https://puppet.com/resources/whitepaper/2016-state-of-devops-report>

2555X

2555X Shorter Lead Times

<https://puppet.com/resources/whitepaper/2016-state-of-devops-report>



Your code has
no business value
until it's deployed.



Every business is a
technology business.





More Developer Reality

- Your deployments likely take 6 to 9 months today (super stars might deploy every 3 to 4 weeks but that is not the norm).
- What if competitive pressures change?
- What if regulatory requirements change?
- What if a major CVE descends on your OS, App Server, JVM, framework?

Digital Darwinism

The Developer's Journey



Re-Org to
DevOps



Self-Service,
On-Demand,
Elastic
Infrastructure



Automation
Puppet, Chef,
Ansible,
Kubernetes



CI & CD
Deployment
Pipeline



Advanced
Deployment
Techniques



Microservices
(and flying
elephants!)

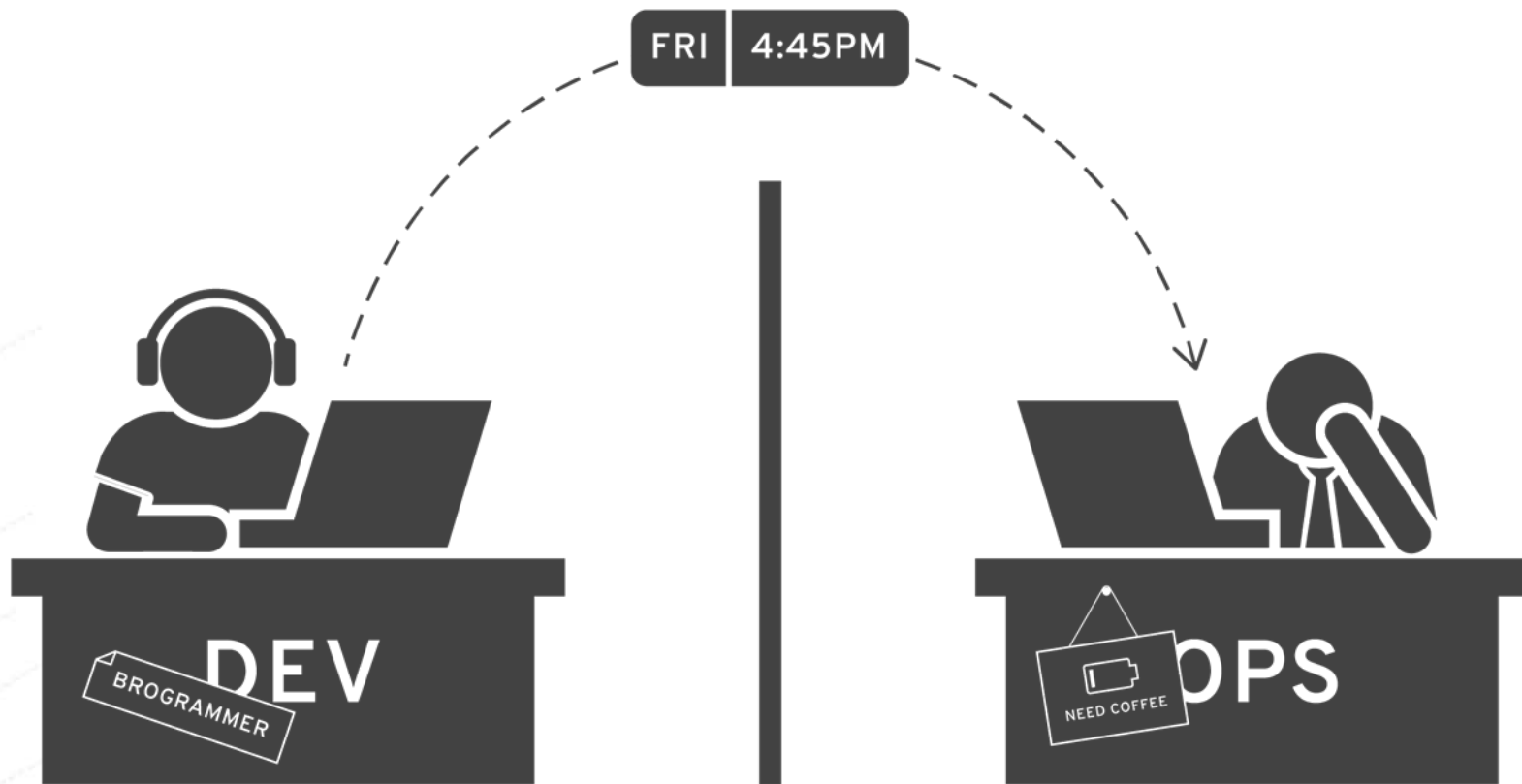


Nº 1 | Re-Org to DevOps



An Ugly Reality?

If this looks familiar, consider changing your ways.





WALL OF CONFUSION





WALL OF CONFUSION







But wait— there's more!

The Extended DevOps Reality



DEV



OPS



DEV



SEC



DBA



OPS



QA



BIZ







Any organization that designs
a system will inevitably produce
a design whose structure is
a copy of the organization's
communication structure.

Conway's Law

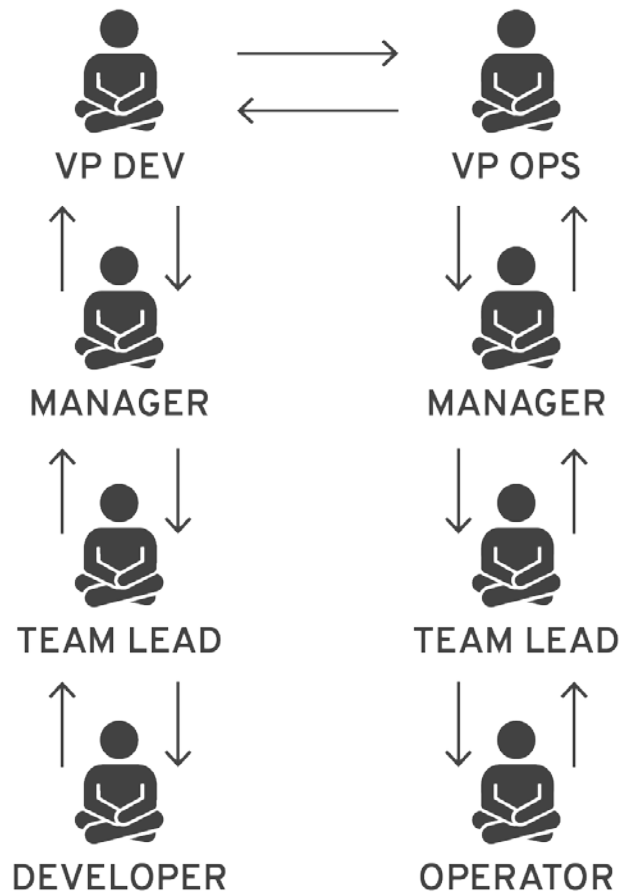




Chinese Whispers

https://en.wikipedia.org/wiki/Chinese_whispers



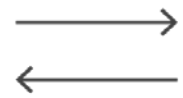




Upgrade Java
bugs and lembas



VP DEV



VP OPS

Upgrade Java?
bugs and lembas

Upgrade Java
bugs and lambaz



MANAGER



MANAGER

WTF? Java upgrade
bugs and lambs?

Upgrade to Java 1.8,
bunch of bug fixes, Lambdas



TEAM LEAD



TEAM LEAD

Damn Devs want Java upgrade!
something about buggy sheep?

Upgrade to JRE 1.8,
bug fixes, Lambdas

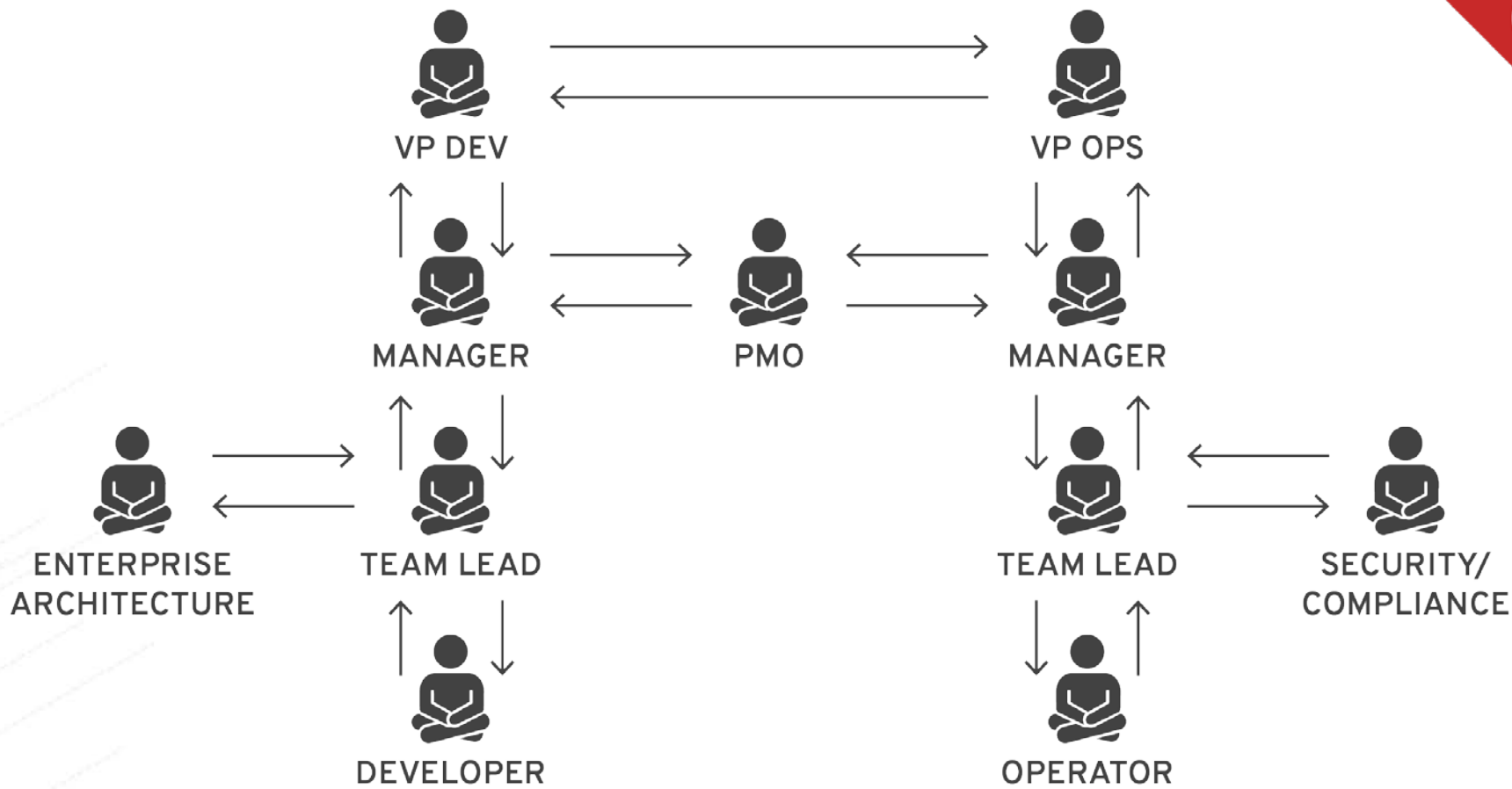


DEVELOPER



OPERATOR

I think of heard of that sheep bug







When restructuring
teams yields better
results, it illustrates
once again that ...



... software development is still
mostly a communication problem.
ThoughtWorks Radar





Building cross-functional teams increases the beneficial surface area of communication across traditionally segregated job roles, which in turn removes friction imposed by artificial structures like silos.

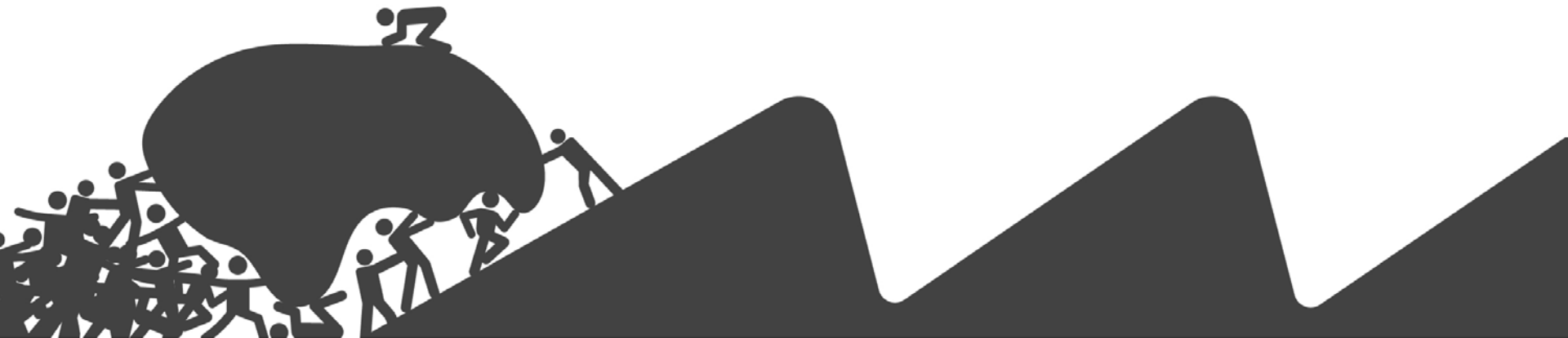


Only 11% of organizations across industries indicated their existing in-house talent has the competitive skills necessary for success in the digital economy.

MIT Sloan Management Review, 2016











Burr Sutter @bursutter · Feb 16
 **@RealGeneKim @botchagalupe** How to advise Devs who wish to embrace #DevOps? A fair bit of the current knowledge is Ops oriented

4 2 4

Jeffrey Sykes
@sykesjs

@bursutter @RealGeneKim @botchagalupe Got any ops people who might be looking for friends?

9:21 PM - 16 Feb 2017

Stuart Stevenson
@stevenson_sj

@bursutter @RealGeneKim @botchagalupe read the State of devops report 2014. Then 2015 then 2016. But I find 2014 has the core practices

RETWEET 1 LIKE 1

4:34 AM - 17 Feb 2017

Burr Sutter @bursutter · Feb 16
 Just sitting in or actually putting hands on? :-)

Dave Neary @nearyd
@bursutter @RealGeneKim @botchagalupe Start by sitting in on a deployment.

1 2 1

Dave Neary
@nearyd

@bursutter Feeling the pain would be a start. I learned a lot on on-site customer visits as a developer.

9:21

Jayme Edwards
@jaymeedwards

@bursutter @RealGeneKim @botchagalupe have them read Continuous Delivery so they can understand how slinging code is MVP of their job!

LIKE 1

8:13 AM - 17 Feb 2017



Part of a clever shop
that files tickets?

How many tickets
does it take?



Nº 2 | Self-Service, On-Demand, Elastic Infrastructure



How many weeks do you wait for
a new VM to be provisioned?

Why do expensive resources
like developers wait so long for
inexpensive resources like VMs?

Self-Service Means No Tickets

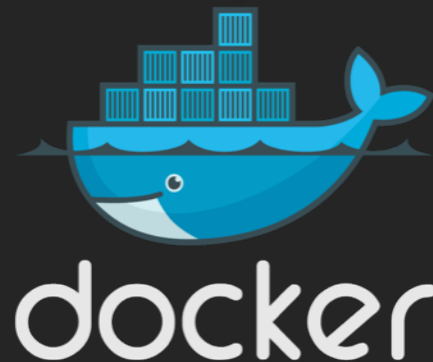




Nº 3 | Automation, Puppet, Chef, Ansible, Kubernetes



- Phoenix Servers vs. Snowflakes
(<https://martinfowler.com/bliki/PhoenixServer.html>)
- Programmable Infrastructure as Code
- Containers move developers closer
a production environment, even on
a laptop.
- Address the “But it works on my
machine” issue!





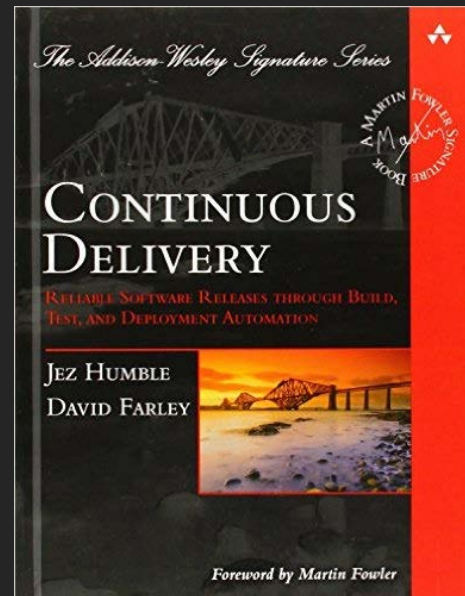
- Datasource
- Version of the JDBC driver
- Configuration of the db connection pool
- JVM settings
- JMS Queues
- Default User/Passwords
- “/” vs “\”



Nº 4 | CI & CD Deployment Pipeline

Jez Humble Continuous Integration

- Software (trunk) is always deployable
- Everyone is checking into trunk daily (at least)—not feature branches
- If the build breaks, it's fixed in 10 minutes (all hands on deck)
- A new engineer can be on-boarded in 1 day—with a production-like environment on the developer workstation
- Deployment is a low-risk, push-button affair





The job of a deployment pipeline
is to prove that the release
candidate is unreleasable.

Jez Humble





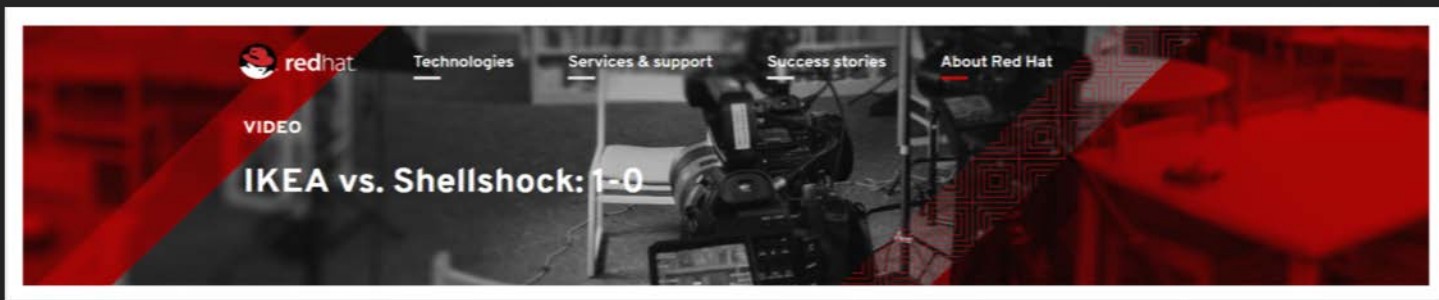
Nº 5 | Advanced Deployment Techniques



‘Speed Kills!’ vs. ‘Go Fast, Go Safe’



IKEA®



Shellshock <http://www.bbc.com/news/technology-29361794>

<https://www.redhat.com/en/about/videos/ikea-vs-shellshock>



<https://cve.mitre.org/cgi-bin/cvename.cgi?name=CVE-2014-0160>



JDK Vulnerabilities

It was discovered that the Hotspot component of OpenJDK did not properly check arguments of the `System.arraycopy()` function in certain cases.

An untrusted Java application or applet could use this flaw to corrupt virtual machine's memory and completely bypass Java sandbox restrictions. (CVE-2016-5582)

<https://access.redhat.com/security/cve/CVE-2016-5582>

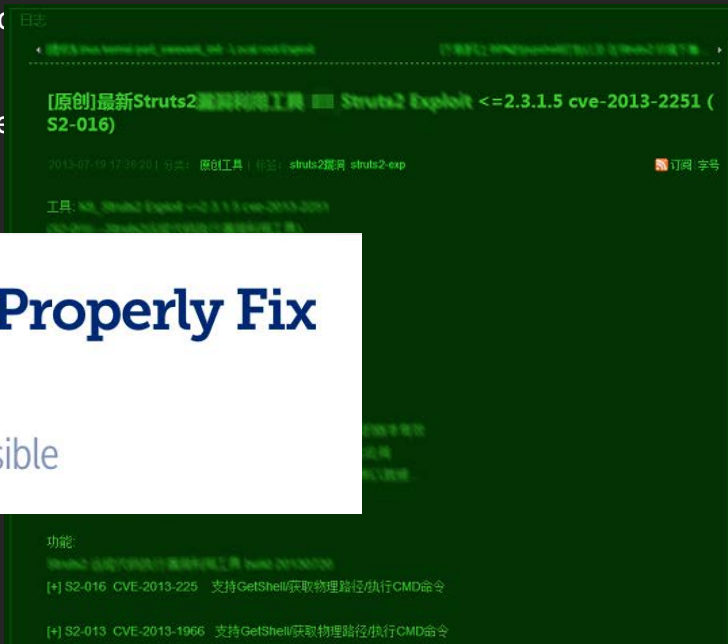


Actually, Slow Kills!

Apache Struts 2—zero-day vulnerability

https://www.cvedetails.com/vulnerability-list/vendor_id-45/product_id-11811-Struts-2.3.15.1.html

<http://blog.trendmicro.com/trendlabs-security-intelligence/chinese-0-day-vulnerability-in-apache-struts-vulnerability/>



Apache Struts 2.3.16.2 Released to Properly Fix Zero-Day Vulnerability

Users are advised to update their installations as soon as possible



Chinese Underground Creates Tool Exploiting Apache Struts Vulnerability

Posted on: August 14, 2013 at 2:07 am Posted in: Exploits, Malware, Targeted Attacks, Vulnerabilities

Author: Noriaki Hayashi (Senior Threat Researcher)



About a month ago, the Apache Software Foundation released **Struts 2.3.15.1**, an update to the popular Java Web application development framework. The patch was released because **vulnerabilities in older versions** of Struts could allow attackers to run arbitrary code on vulnerable servers.

Since then, we've found that hackers in the Chinese underground have created an automated tool that exploits these problems in older versions of Struts. We first confirmed the existence of these tools on July 19; this was only three days after the vulnerabilities were disclosed to the public.





118K JMX Consoles



JMX MBean View

MBean Name: **Domain Name:** jboss.web
name: //localhost/jmx-console
J2EE Server: none
J2EE Application: none
j2eeType: WebModule

MBean Java Class: org.apache.commons.modeler.BaseModelMBean

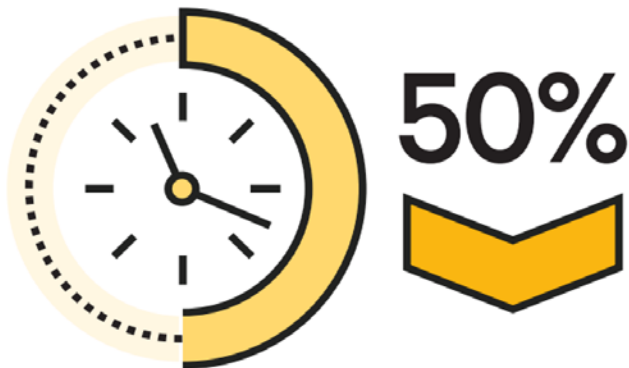
[Back to Agent View](#) [Refresh MBean View](#)

MBean description:

Standard Context Component

List of MBean attributes:

Name	Type	Access	
modelerType	java.lang.String	RW	org.apache.catalina.core.S
allowLinking	boolean	RW	☐ True ☒ False



**Less time spent
remediating security issues**

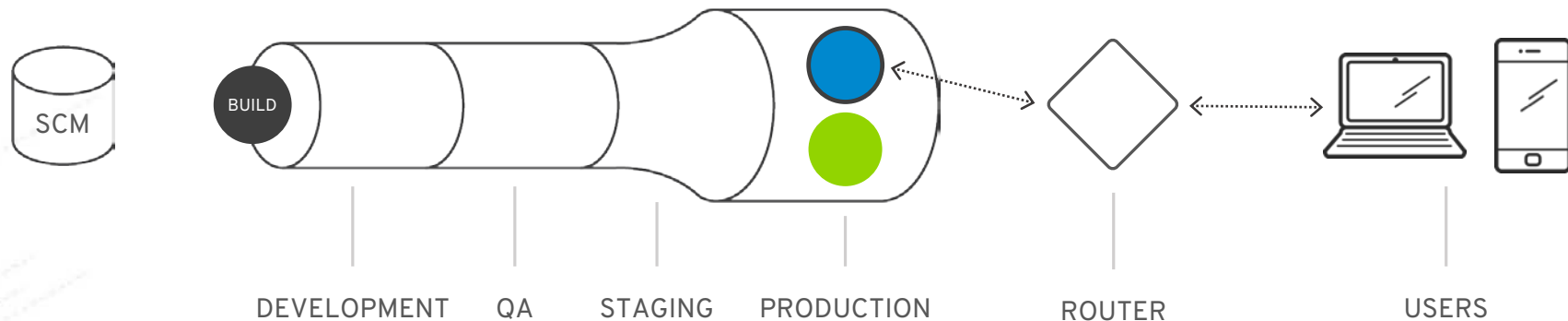
**High-performing teams
spend less time fixing security issues.**

That's because they address security at every stage of the software development and delivery cycle, instead of retrofitting security at the end.

<https://puppet.com/resources/whitepaper/2016-state-of-devops-report>



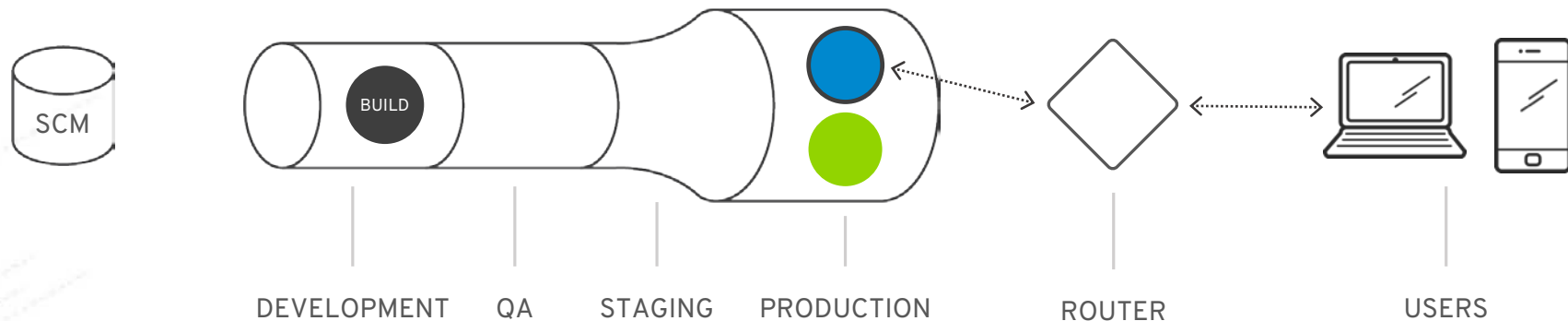
Blue/Green Deployment



Starts with a “git commit and git push”

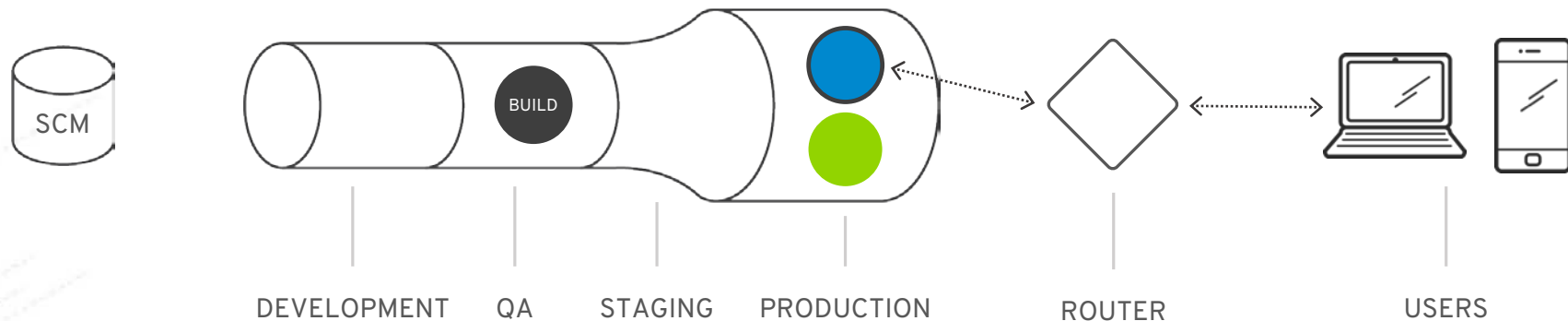


Blue/Green Deployment



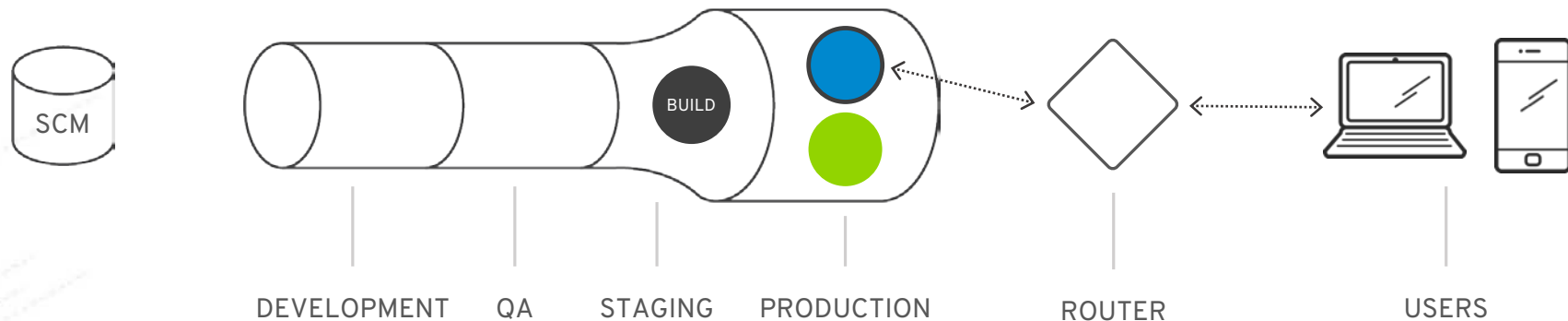


Blue/Green Deployment



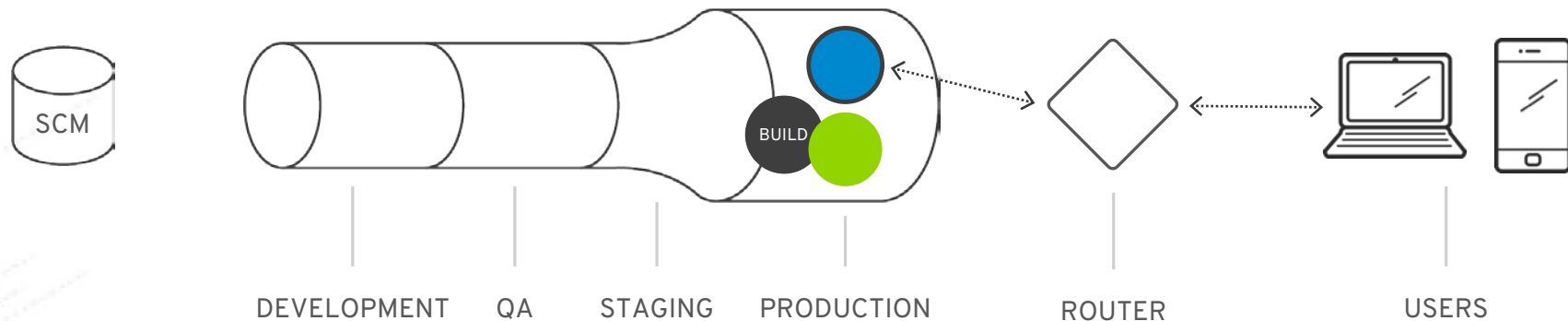


Blue/Green Deployment



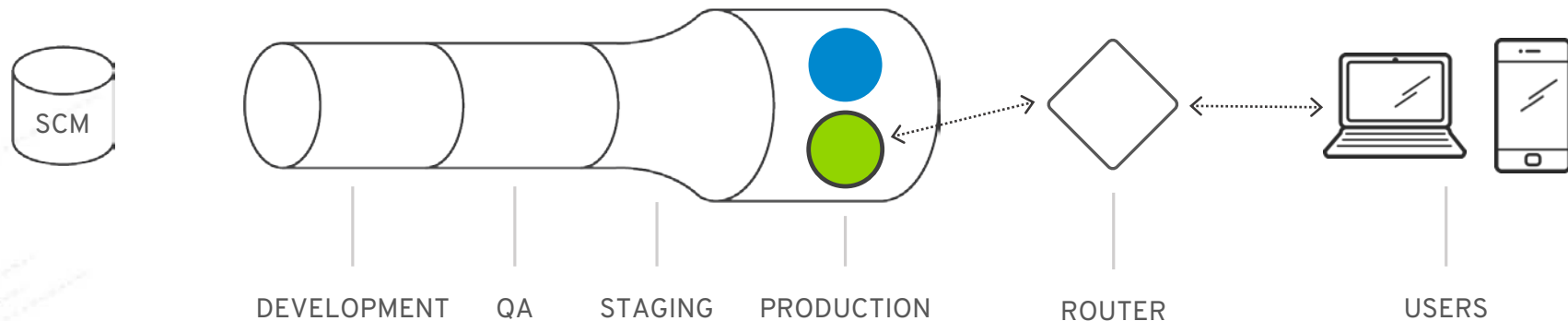


Blue/Green Deployment



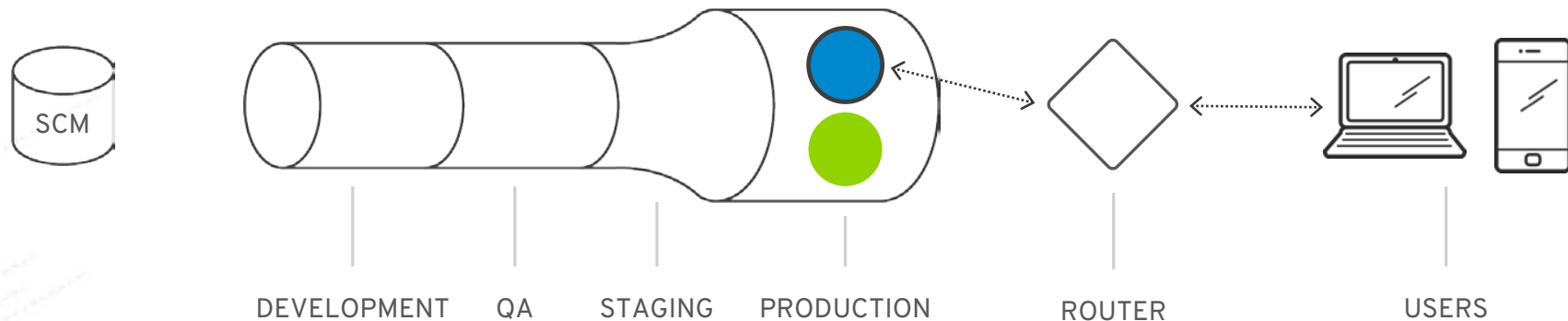


Blue/Green Deployment





Blue/Green Deployment





Nº 6 | Microservices (and flying elephants!)



THE QUICK SHALL
INHERIT THE EARTH.
Fast is better than slow.
Facebook's Little Red Book





Why Pipeline?

Code offers no value until it deploys.

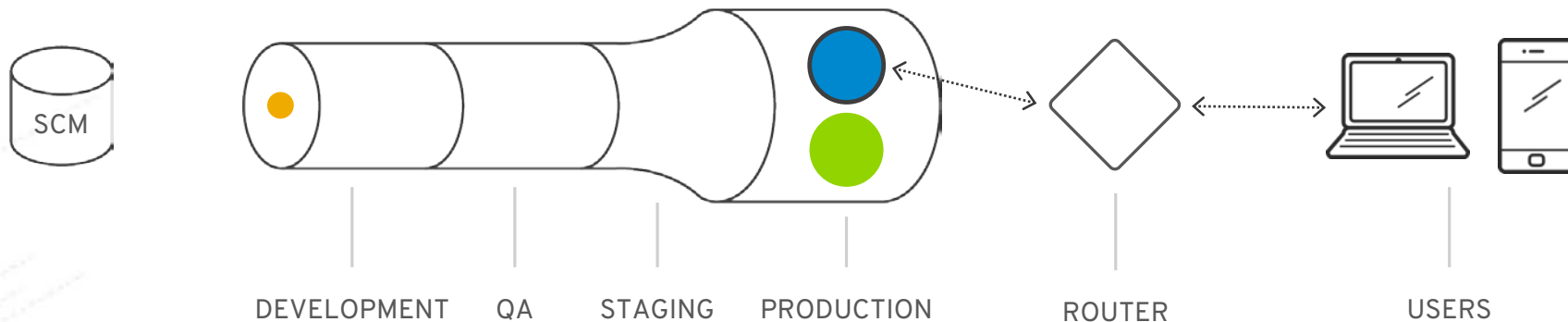


Why Canary Deployments?



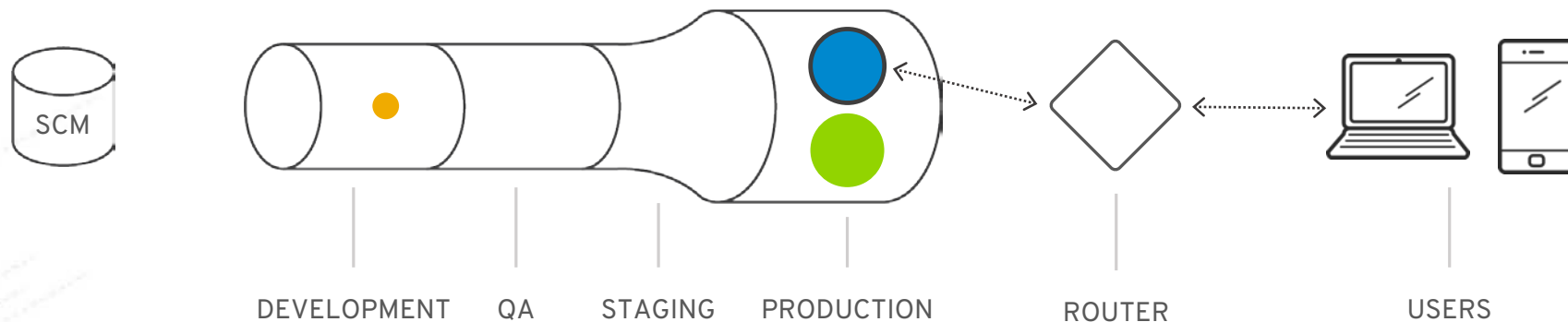


Canary Deployment



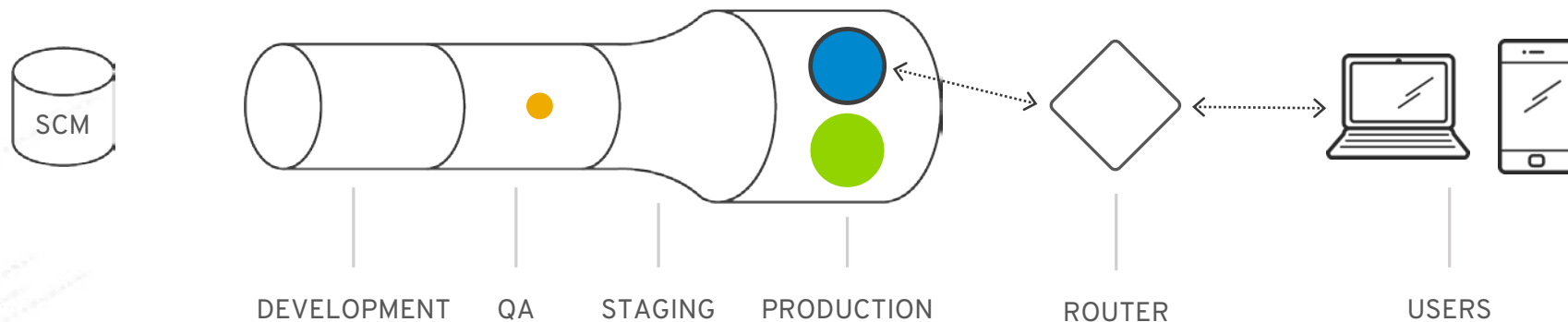


Canary Deployment



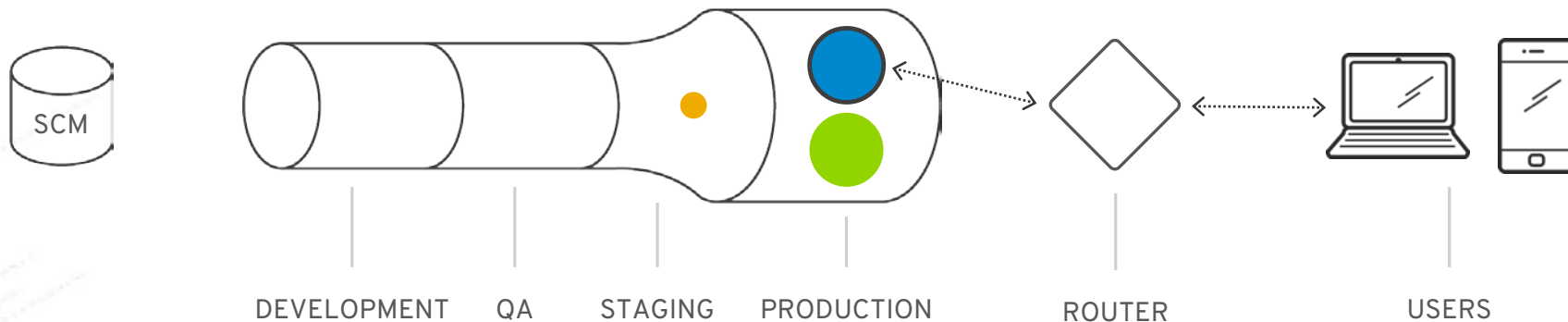


Canary Deployment



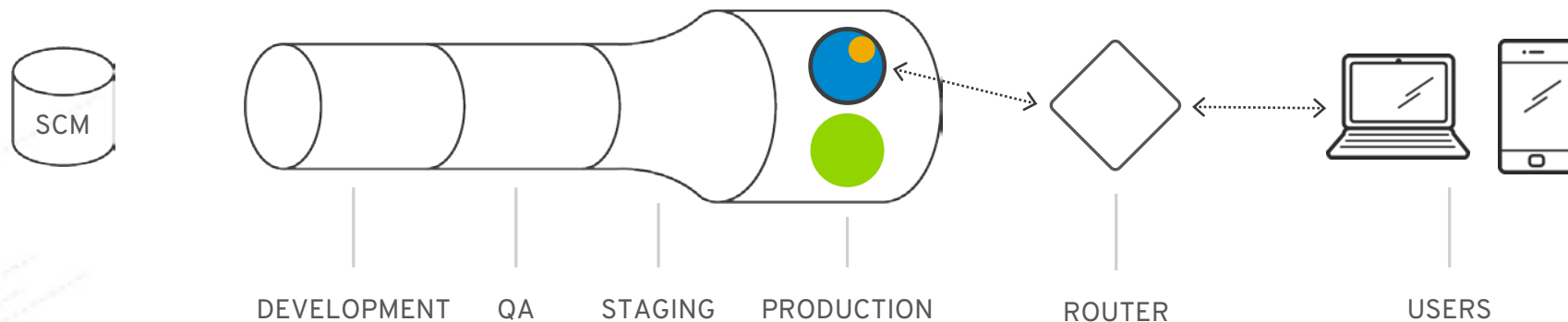


Canary Deployment



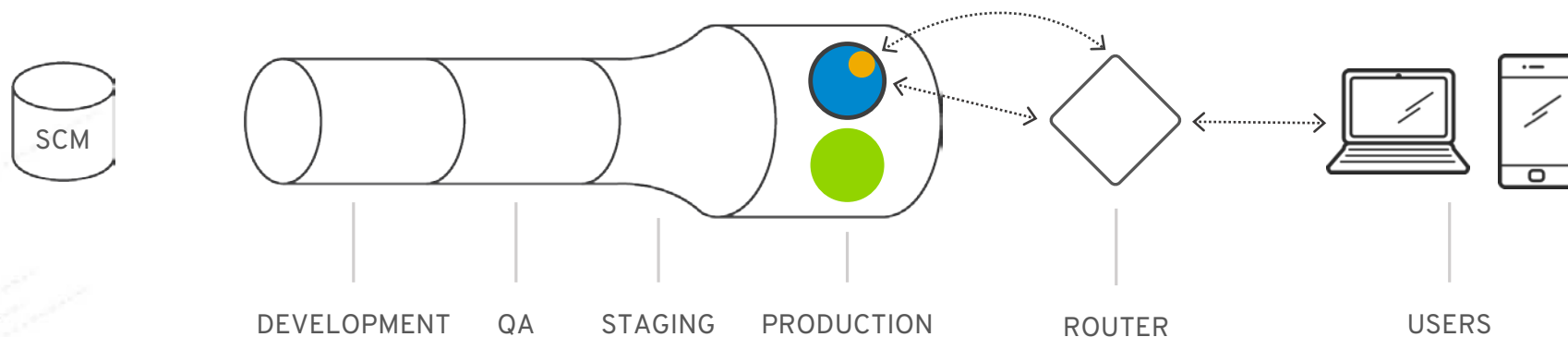


Canary Deployment



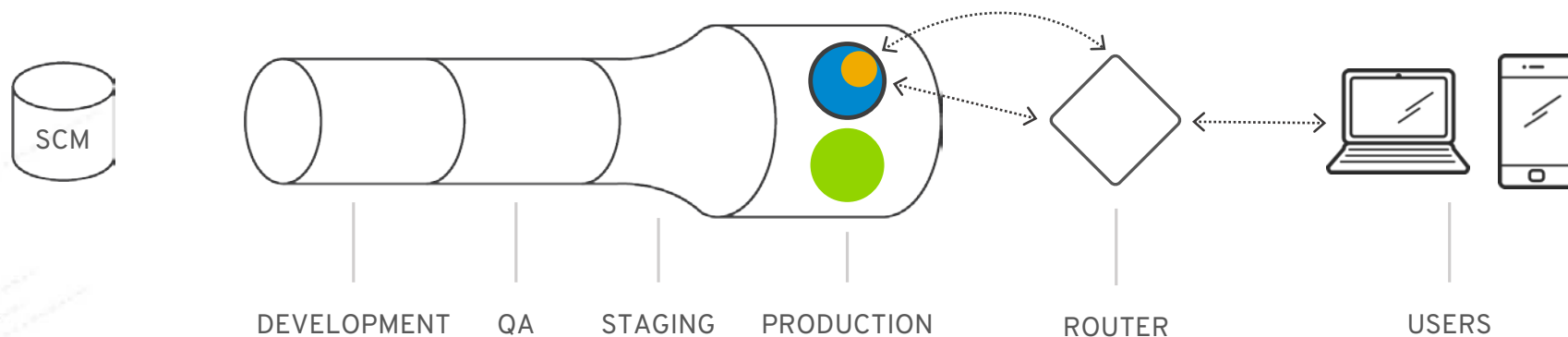


Canary Deployment



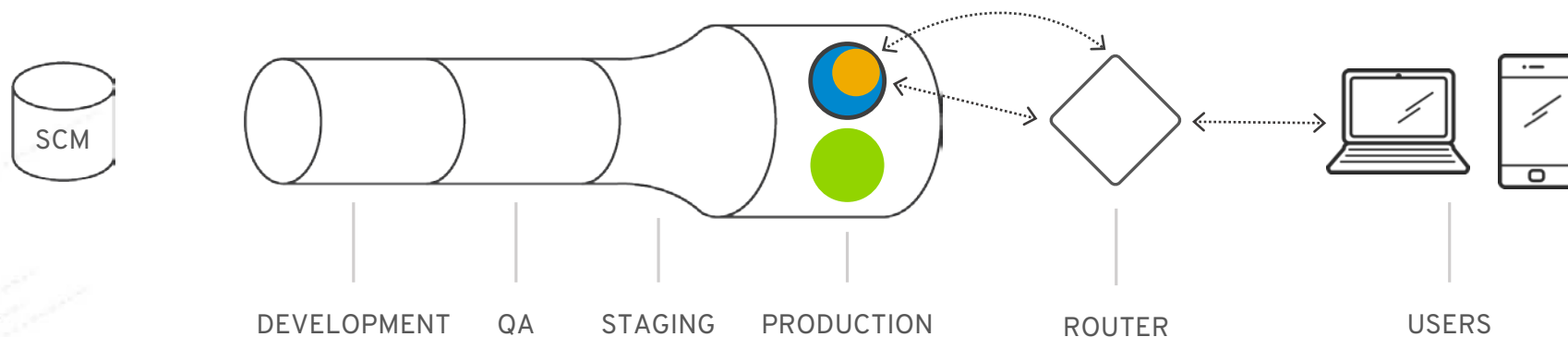


Canary Deployment



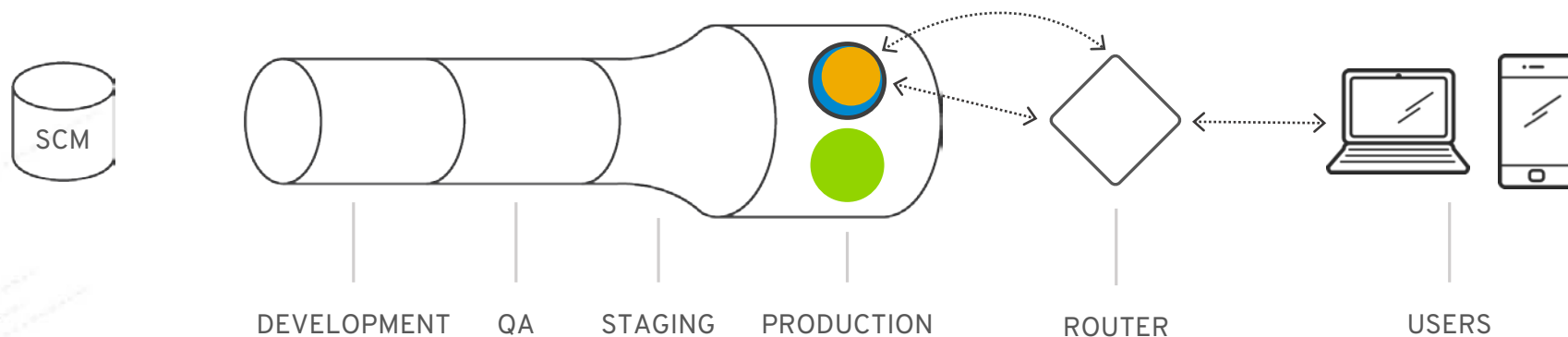


Canary Deployment



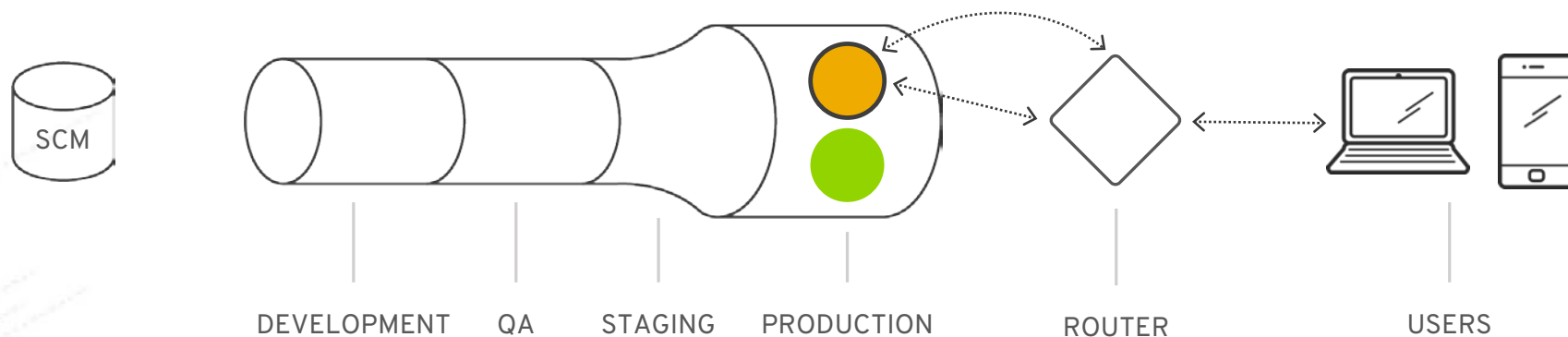


Canary Deployment





Canary Deployment





THE BEST CODE



=





Our experience at Microsoft is no different—only about 1/3 of ideas improve the metrics they were designed to improve.

Ronny Kohavi, Microsoft (Amazon)

<http://ai.stanford.edu/~ronnyk/ExPThinkWeek2009Public.pdf>





If you must code, first do no harm!

Developers' Hippocratic Oath

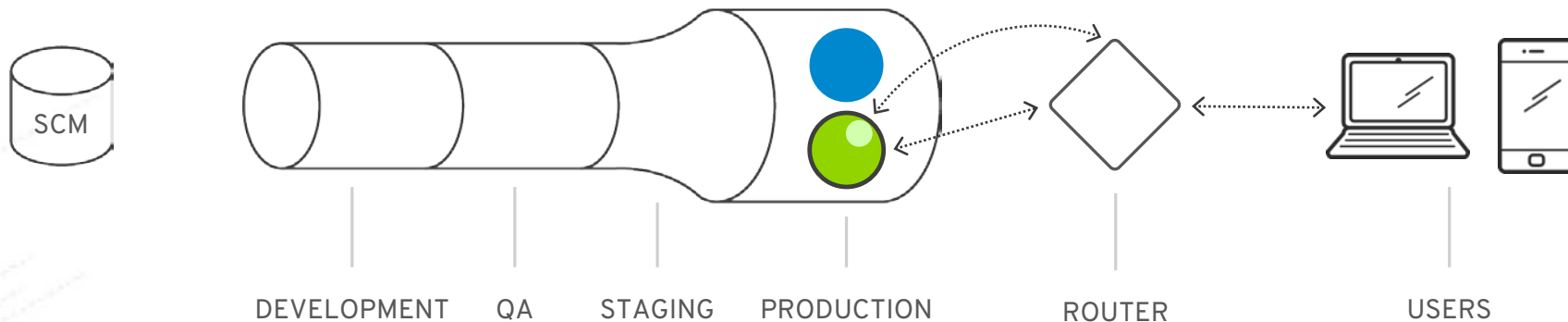


So what's your hypothesis?

In search of the Holy Grail (A/B Testing)



A/B Testing

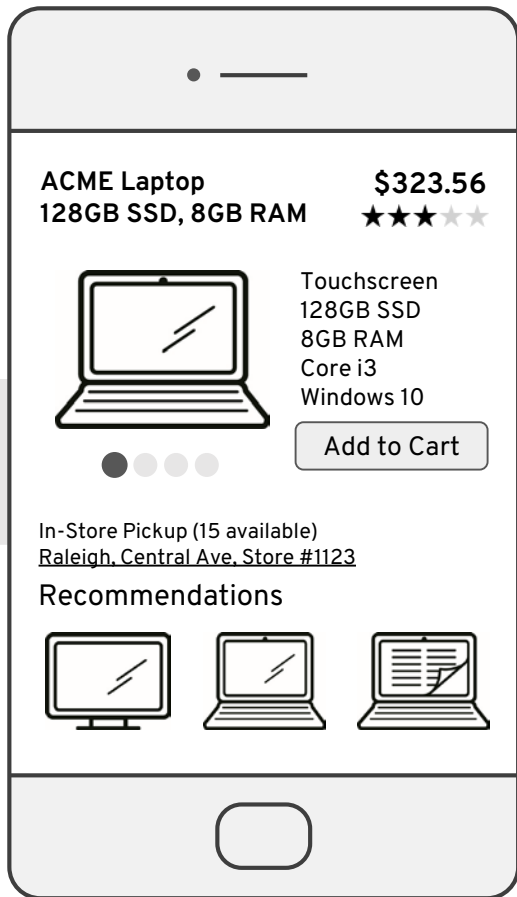


Hypothesis & Experiment (two variants):

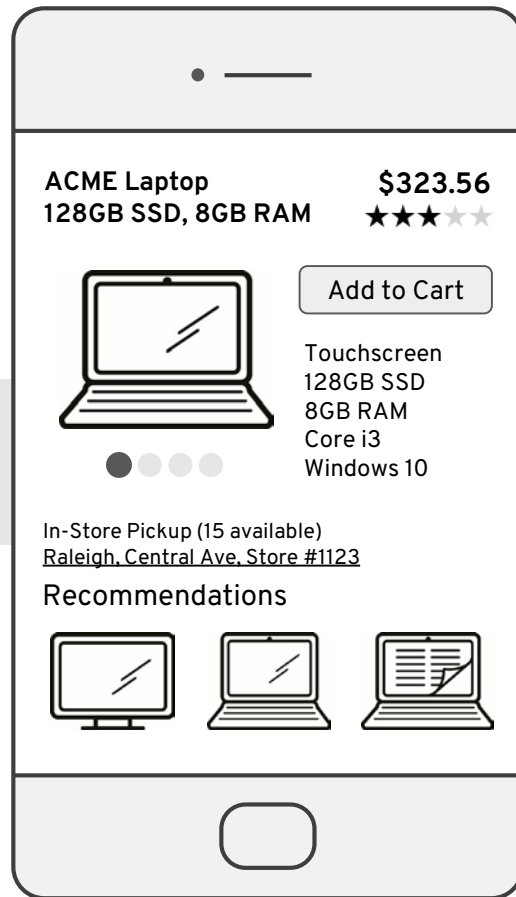
Check-out button placement increase sales conversions for iOS users?



A

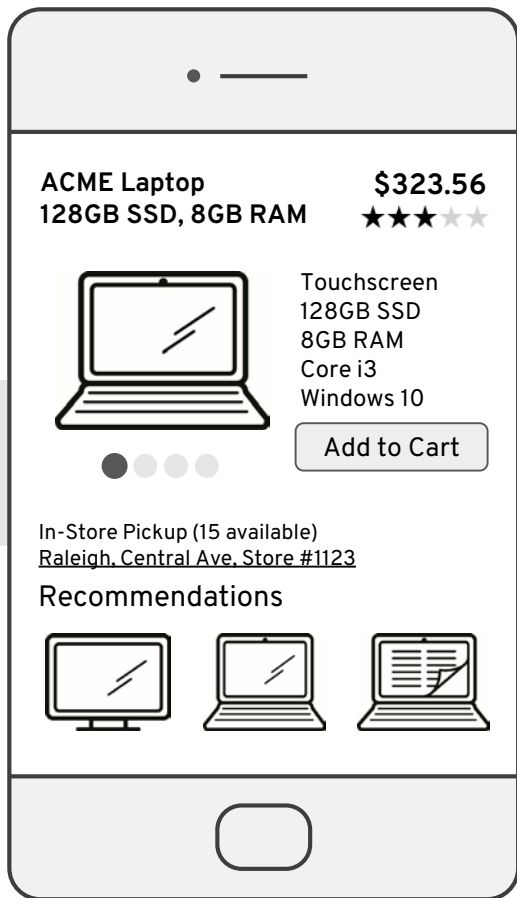


B

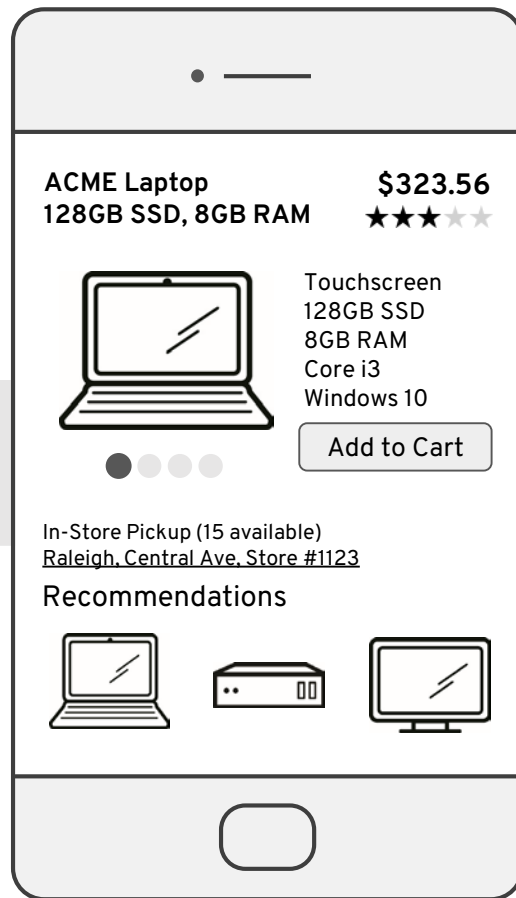




A

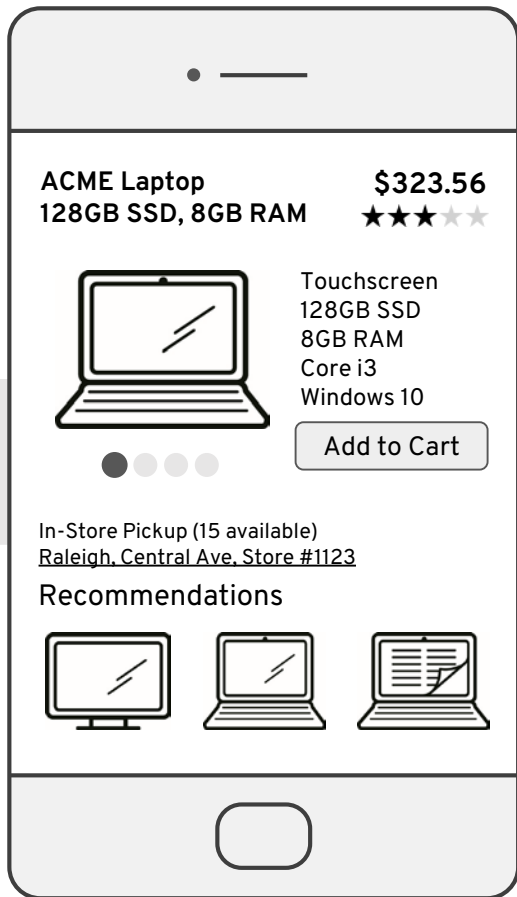


B

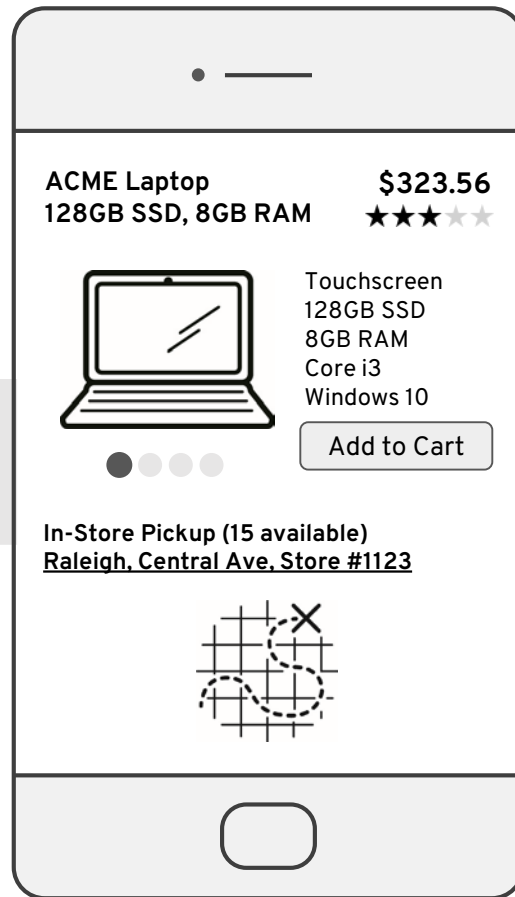




A



B



At 1-week deployment intervals?
Assess whether this meets your needs!



Majestic Monolith

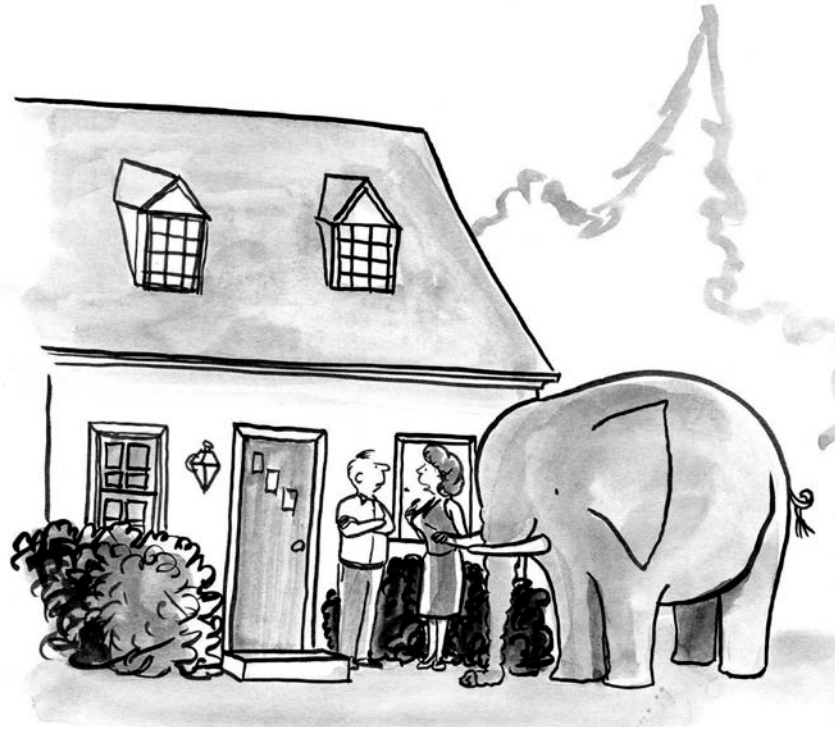
<https://m.signalvnoise.com/the-majestic-monolith-29166d022228#.4skbfc2gj>

<https://developers.redhat.com/blog/2016/10/27/the-fast-moving-monolith-how-we-spiced-up-delivery-from-every-three-months-to-every-week/>



Not yet fast enough?

Shrink your elephant!



“Instead of getting a bigger office,
why don’t we get a smaller elephant?”

Fallacies of Distributed Computing

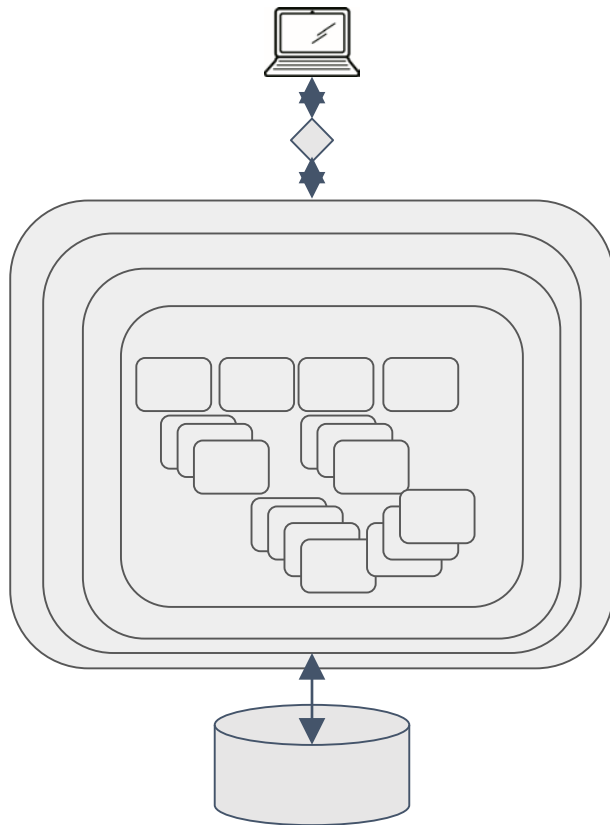
- The [network](#) is reliable.
- [Latency](#) is zero.
- [Bandwidth](#) is infinite.
- The network is [secure](#).
- [Topology](#) doesn't change.
- There is one [administrator](#).
- Transport cost is zero.
- The network is homogeneous.

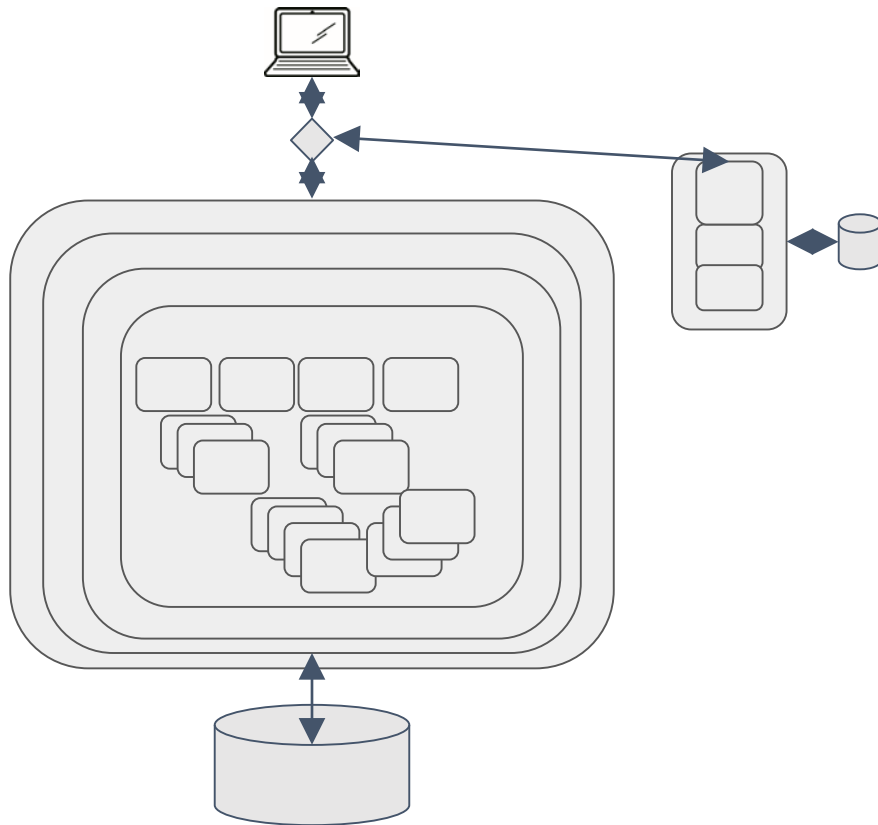
The first rule of distributed computing is DO NOT!

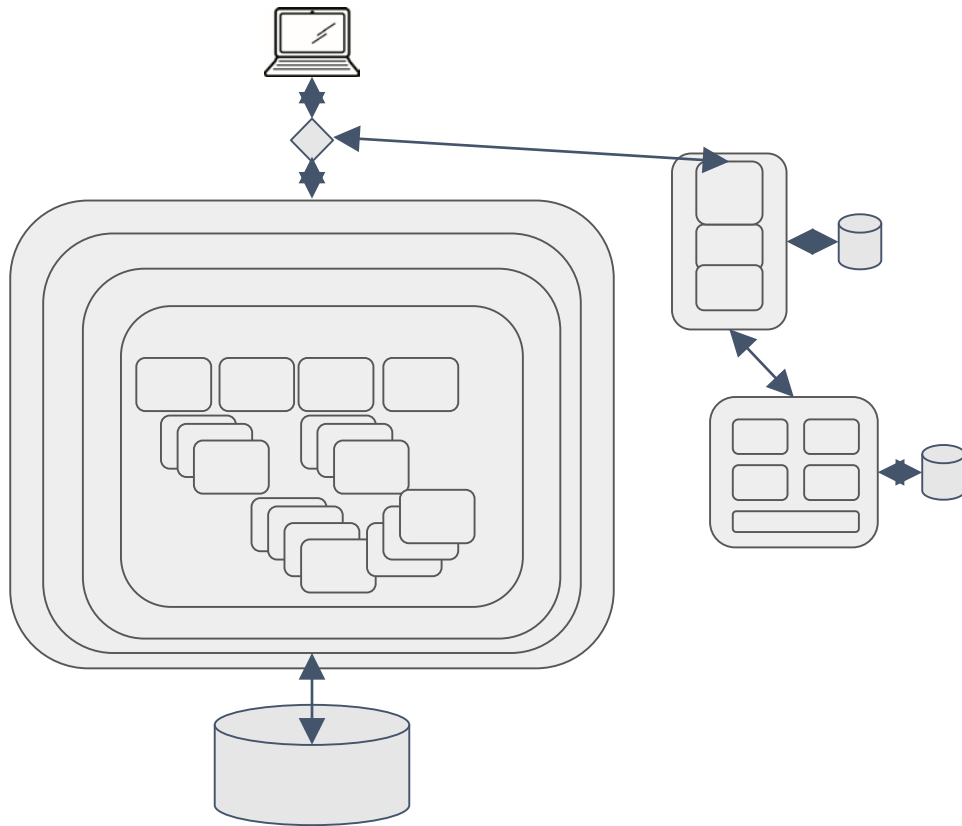
https://en.wikipedia.org/wiki/Fallacies_of_distributed_computing

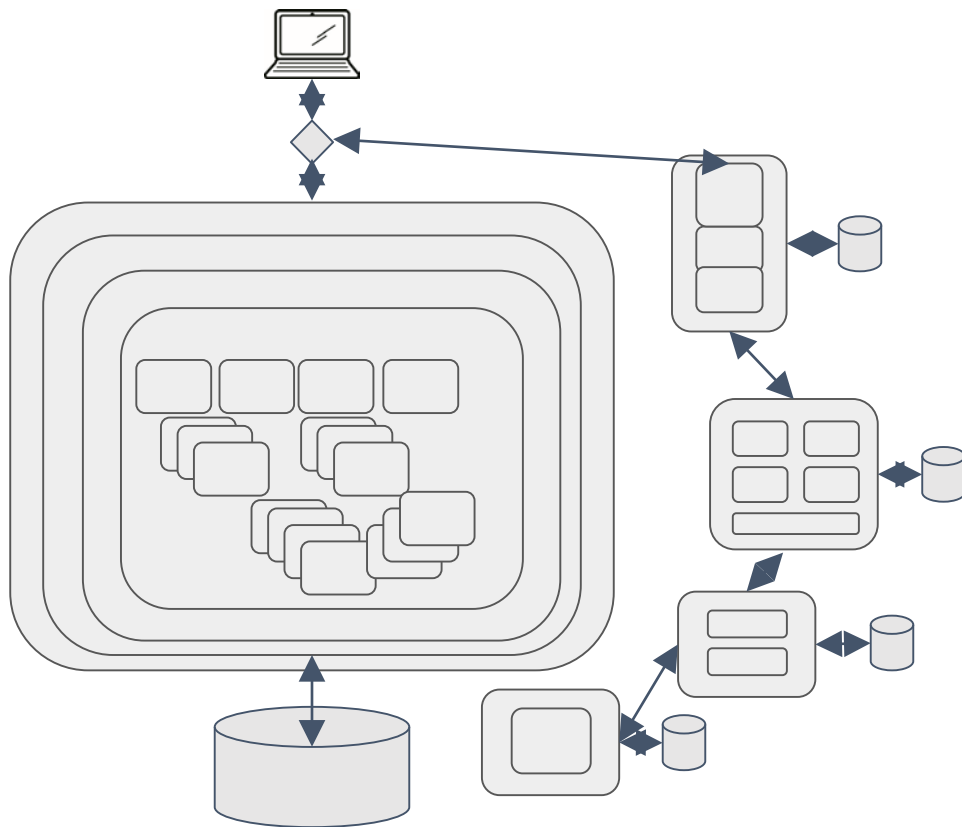


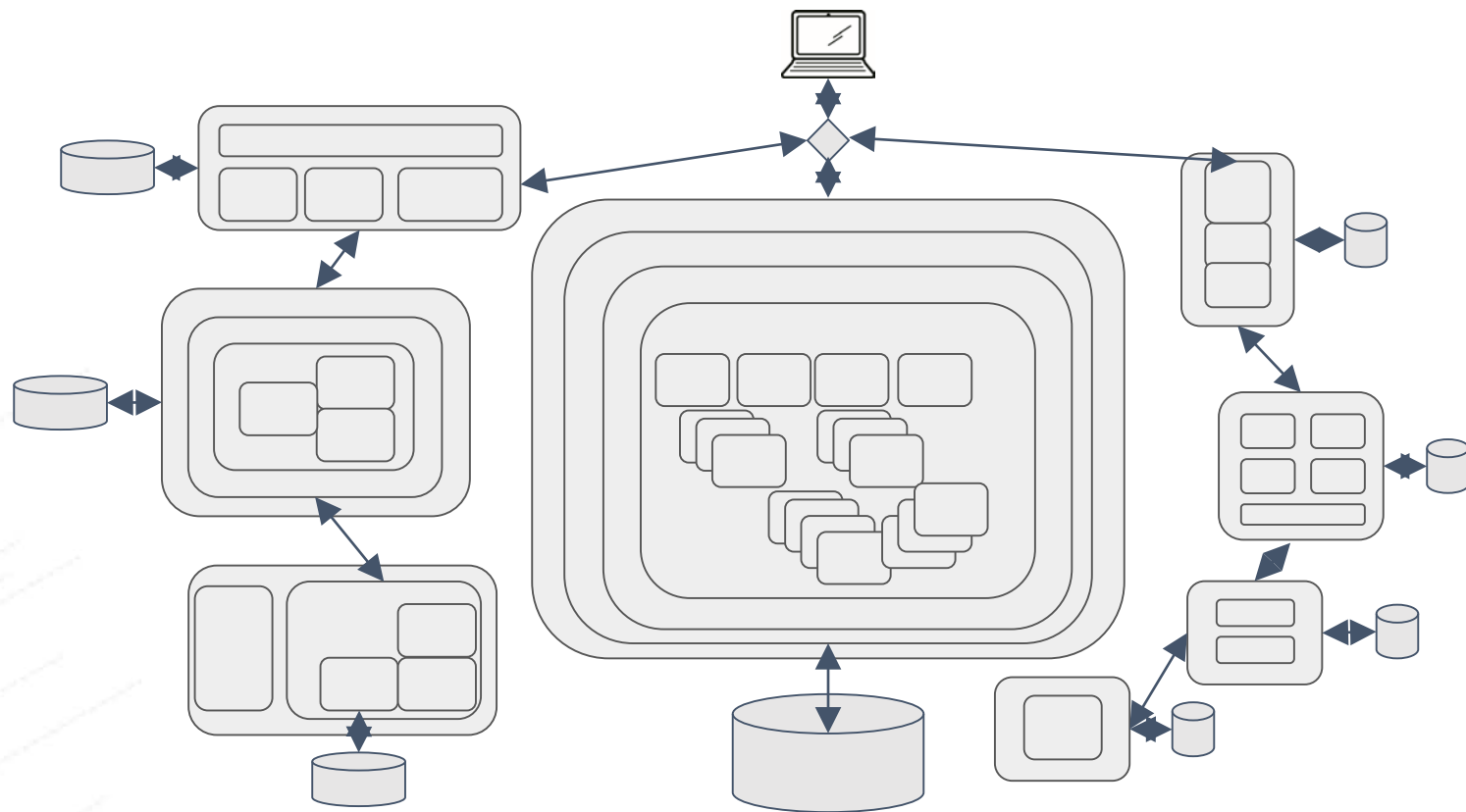
Strangle the Monolith

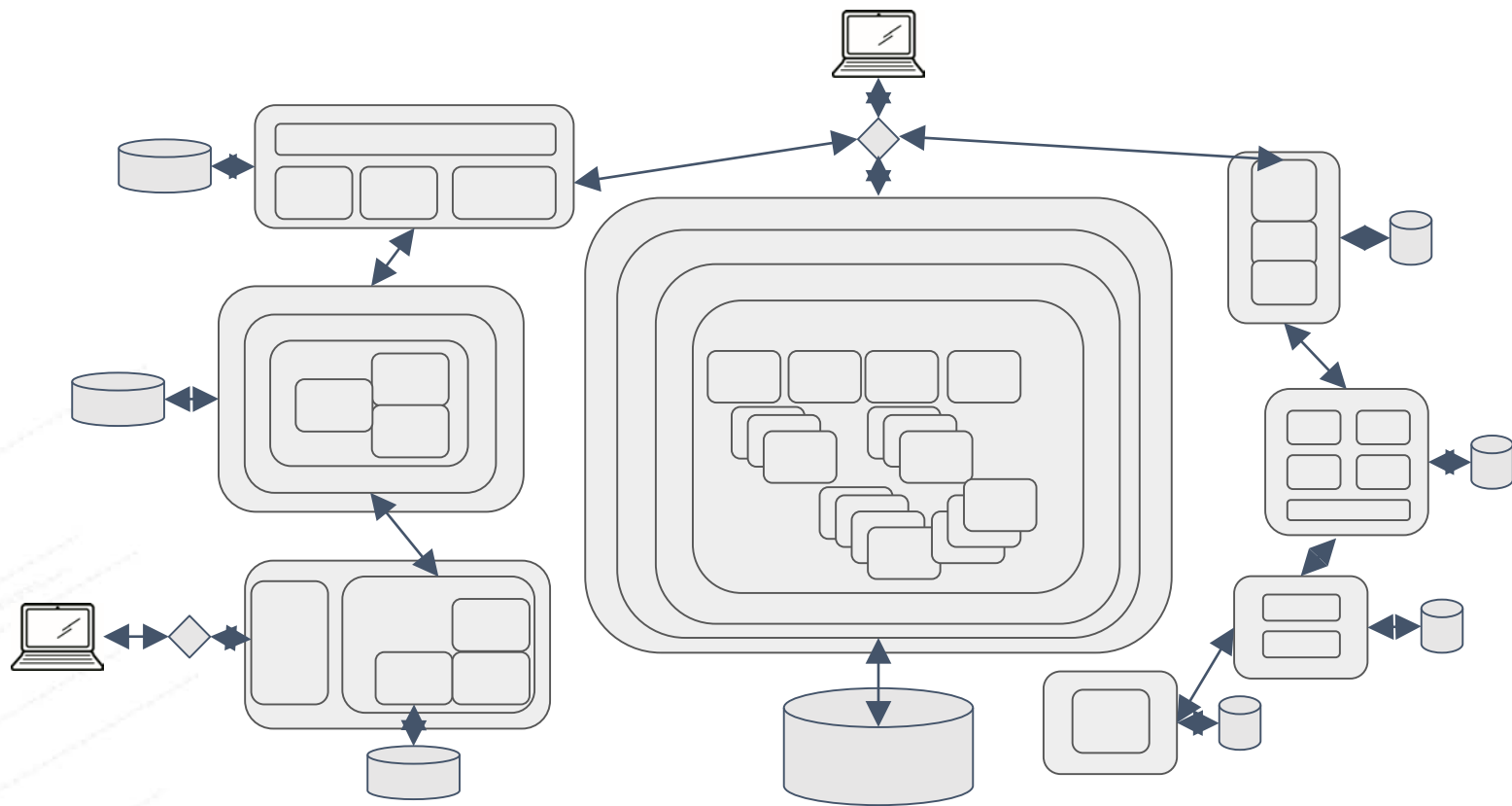


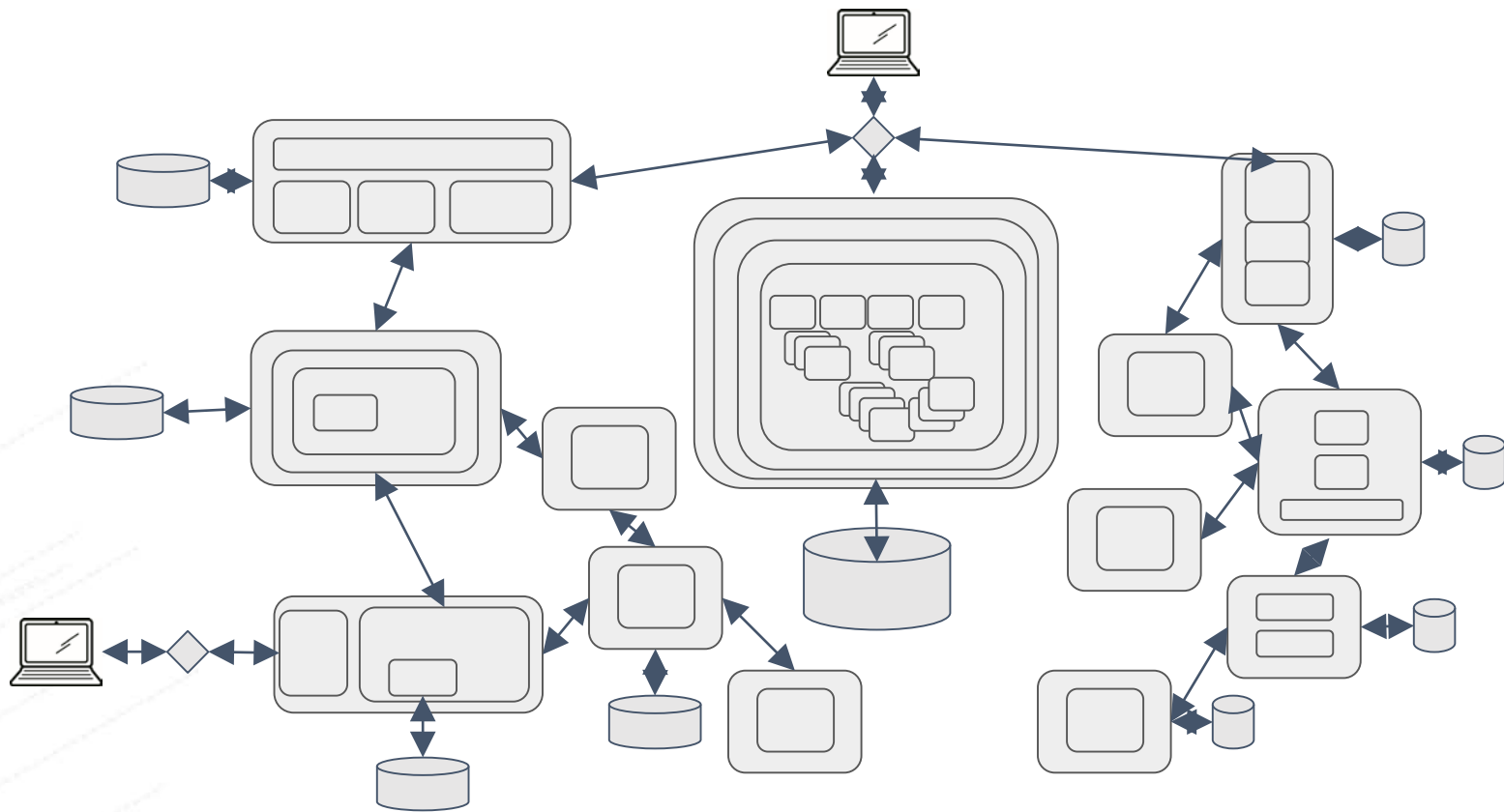


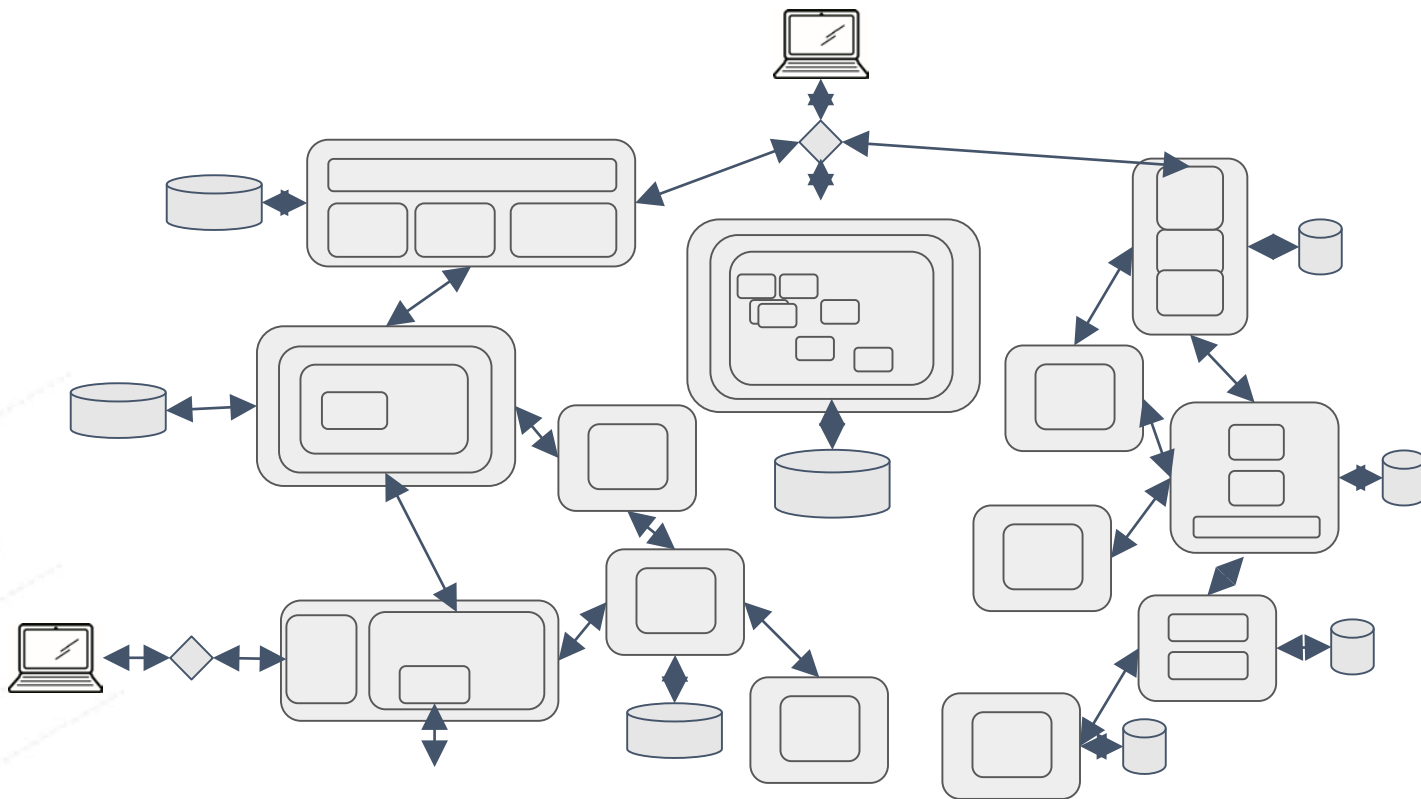












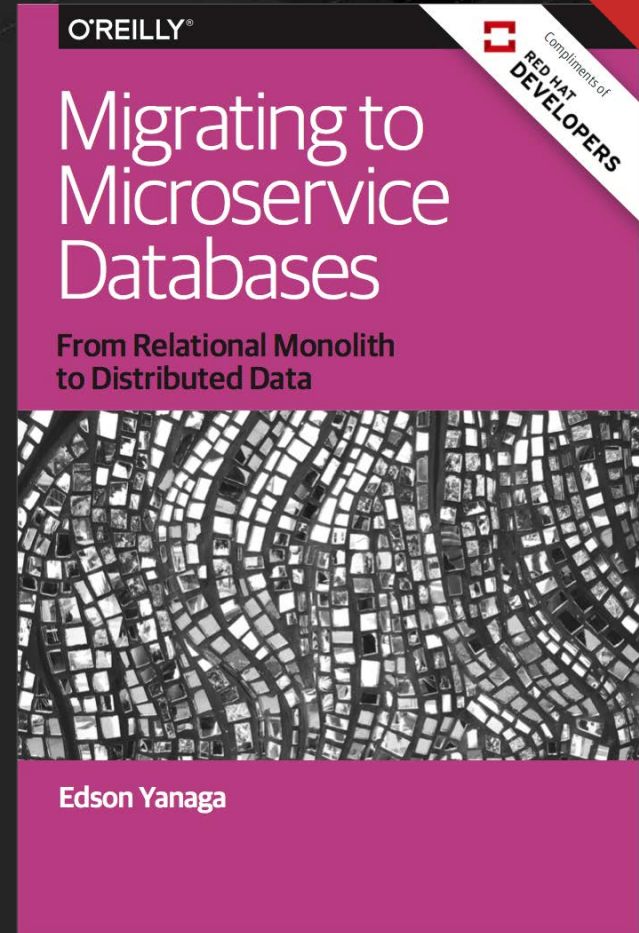


"This just arrived on the midnight train from Georgia."

There's an Elephant in the Room

Your Monolithic Database
(Your DBA will kill you.)

Download a copy
of Edson's book at
developers.redhat.com



java -jar myapp.jar



DropWizard

www.dropwizard.io

JAX-RS API

First to market

DropWizard Metrics

Embeddable servers:
Jetty



Spring Boot

projects.spring.io/spring-boot

Spring API
(@RestController)

'Starter' POMs:
start.spring.io

Embeddable servers:
Tomcat, Jetty,
Undertow



WildFly Swarm

wildfly-swarm.io

Java EE 7 APIs

'Starter' POMs:
wildfly-swarm.io/generator

Embeddable servers:
WildFly (Undertow)



Vert.x

vertx.io

Reactive
Async/non-blocking

vertx run myhttp.java

HTTP, HTTP/2, TCP,
UDP, Websockets, etc
out-of-the-box





Failure Happens

Release It!

Design and Deploy
Production-Ready Software



Michael T. Nygard

“

CHAPTER 2: The Exception that Grounded an Airline

The delays were shown on
Good Morning America (complete with
video of pathetically stranded single
moms and their babies) ...





WORLD TIMES

VERIZON OUTAGE CRASHES JETBLUE AIRLINES' ELECTRONICS SYSTEMS, DELAYING FLIGHTS AND BRINGING DOWN ONLINE SITES FOR BOOKING AND CHECK-IN

January 14, 2016. A Verizon data center outage Thursday morning brought down JetBlue's electronic systems, causing flight delays and shutting down the airline's website, along with its online booking and check-in systems.



WORLD TIMES

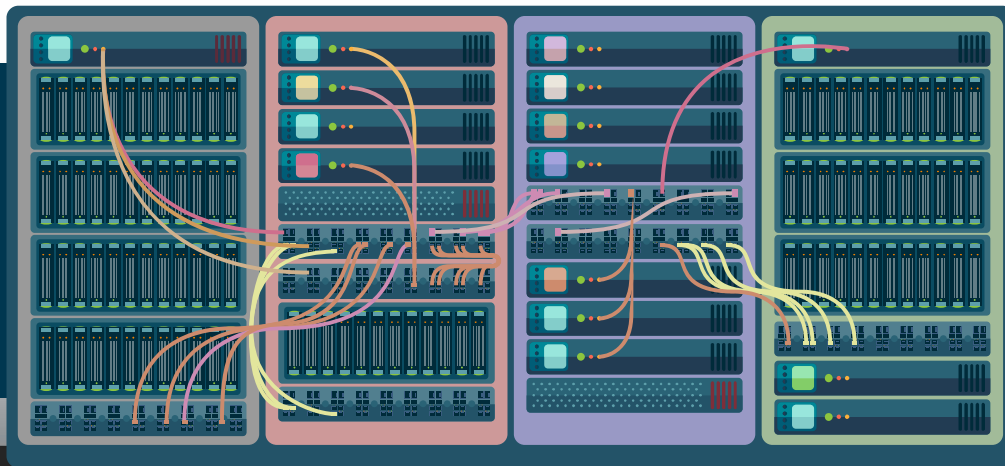
SOUTHWEST AIRLINES SYSTEM OUTAGE BRINGS FLIGHTLINE TO FULL GROUND STOP, DELAYS AND MADDENS PASSENGERS

July 21, 2016. Southwest Airlines has cancelled 1,150 flights since the airline's full ground stop for on Wednesday. The trouble started with a "system outage," and the ground stop lasted for just over an hour.



WORLD TIMES

DELTA AIRLINES SAYS THE TOTAL BILL FOR
ITS DEVASTATING COMPUTER OUTAGE WILL
COME TO \$150 MILLION, AUGUST 8, 2016



Digital Darwinism

The Developer's Journey



Re-Org to
DevOps



Self-Service,
On-Demand,
Elastic
Infrastructure



Automation
Puppet, Chef,
Ansible,
Kubernetes



CI & CD
Deployment
Pipeline



Advanced
Deployment
Techniques



Microservices
(and flying
elephants!)



If we don't create the thing that
kills Facebook, someone else will.

‘Embracing change’ isn’t enough. It has to be
so hardwired into who we are that even talking
about it seems redundant.

Facebook’s Little Red Book



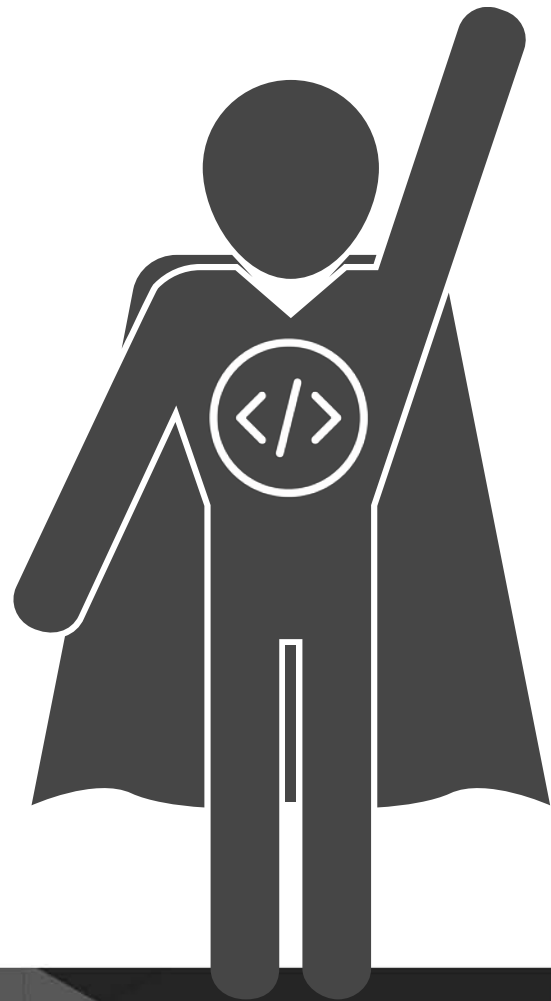
Some Practical Advice



1. Learn Linux, AWS/GCP/Azure, Docker & Kubernetes
2. Start an Email List
3. Every other week Demo Day
4. Opposite every other week Book Club
5. Quarterly Mini-Conference—internal and external presenters
6. Document your Value Stream Map



BUT
remember



Organization First

Focus on Team



Continuous Improvement

Life-long Learning

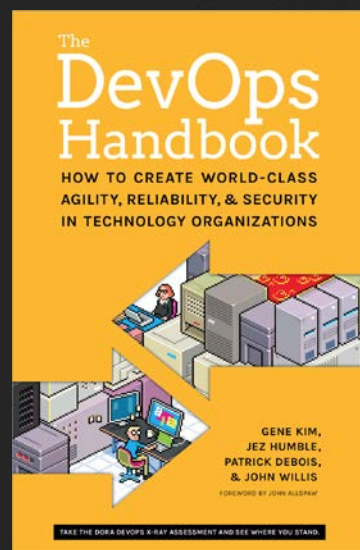
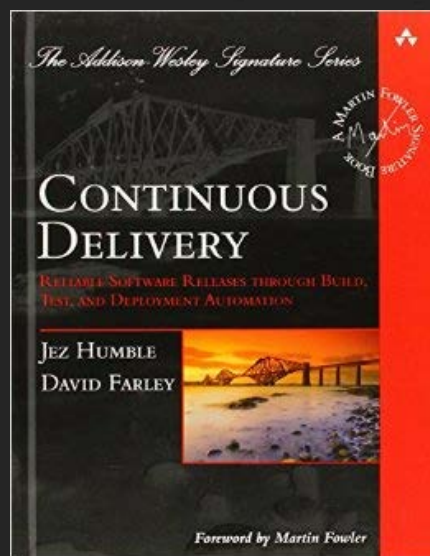
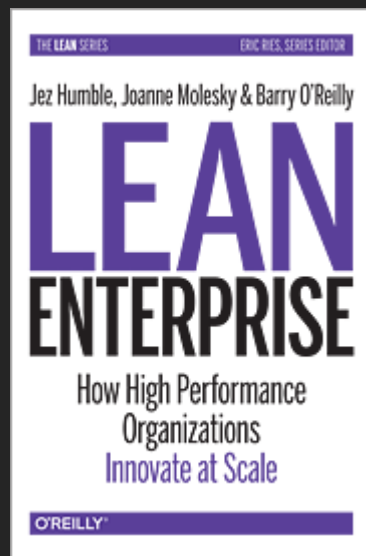
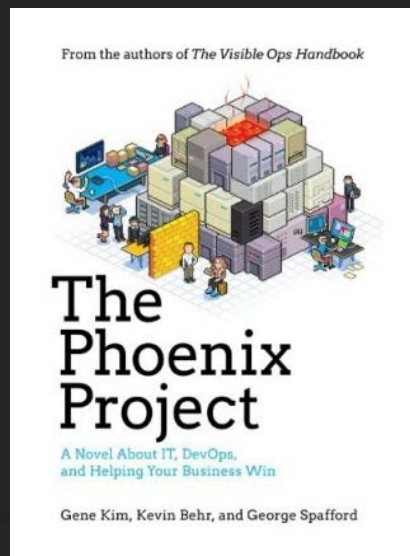
Always Accountable



When we are no longer able to
change a situation, we are
challenged to change ourselves.

Viktor Frankl





<https://puppet.com/resources/whitepaper/2016-state-of-devops-report>



First they ignore you, then
they laugh at you, then they
fight you, then you win.

Gandhi







THANK YOU!