

# Continuous Delivery Applied



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<http://www.meetup.com/DC-continuous-integration/>  
[@jmichaelmcgarr](https://twitter.com/jmichaelmcgarr)

# About Me

- J. Michael (Mike) McGarr
- *Excella Consulting*, Arlington VA
- Lead of Excella's Java Center of Excellence
- Founder of the *DC Continuous Integration, Delivery, and Deployment Meetup*



# Excella is Hiring!



CONTACT US  SEARCH

ABOUT US SERVICES PEOPLE PERSPECTIVES CASE STUDIES CAREERS



## WHAT'S HOT?

While Excella is always looking for great people in any focus area, our opportunities are often evolving with our clients' needs.

If you are interested in learning more about a career with Excella as a Java/JVM Languages Developer, today would be a great day to check it out!

## CAREER PROFILES

- ▷ Extension Center Consultant
- ▷ Java/JVM Languages Developer
- ▷ .NET Developer
- ▷ Agile Coach or ScrumMaster

# Continuous Delivery is...

...a set of practices and principles aimed at,  
*building, testing, and releasing* software  
*faster* and more *frequently*.

*The Addison-Wesley Signature Series*



A MARTIN FOWLER SIGNATURE  
Book  
Jez Humble

# CONTINUOUS DELIVERY

RELIABLE SOFTWARE RELEASES THROUGH BUILD,  
TEST, AND DEPLOYMENT AUTOMATION

---

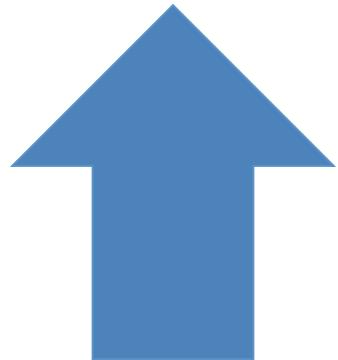
JEZ HUMBLE,  
DAVID FARLEY



“Our highest priority is to satisfy the customer through early and *continuous delivery* of valuable software.”

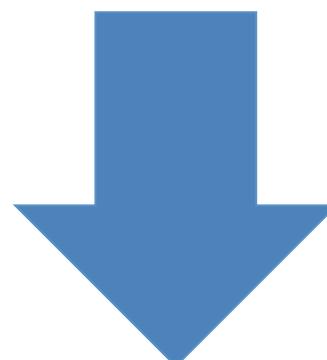
- First of the Twelve Principles  
behind the Agile Manifesto

# Goals



Quality

Cycle Time



# Cycle Time

“How long would it take your organization to deploy a change [to production] that involves just one single line of code? Do you do this on a repeatable, reliable basis?”

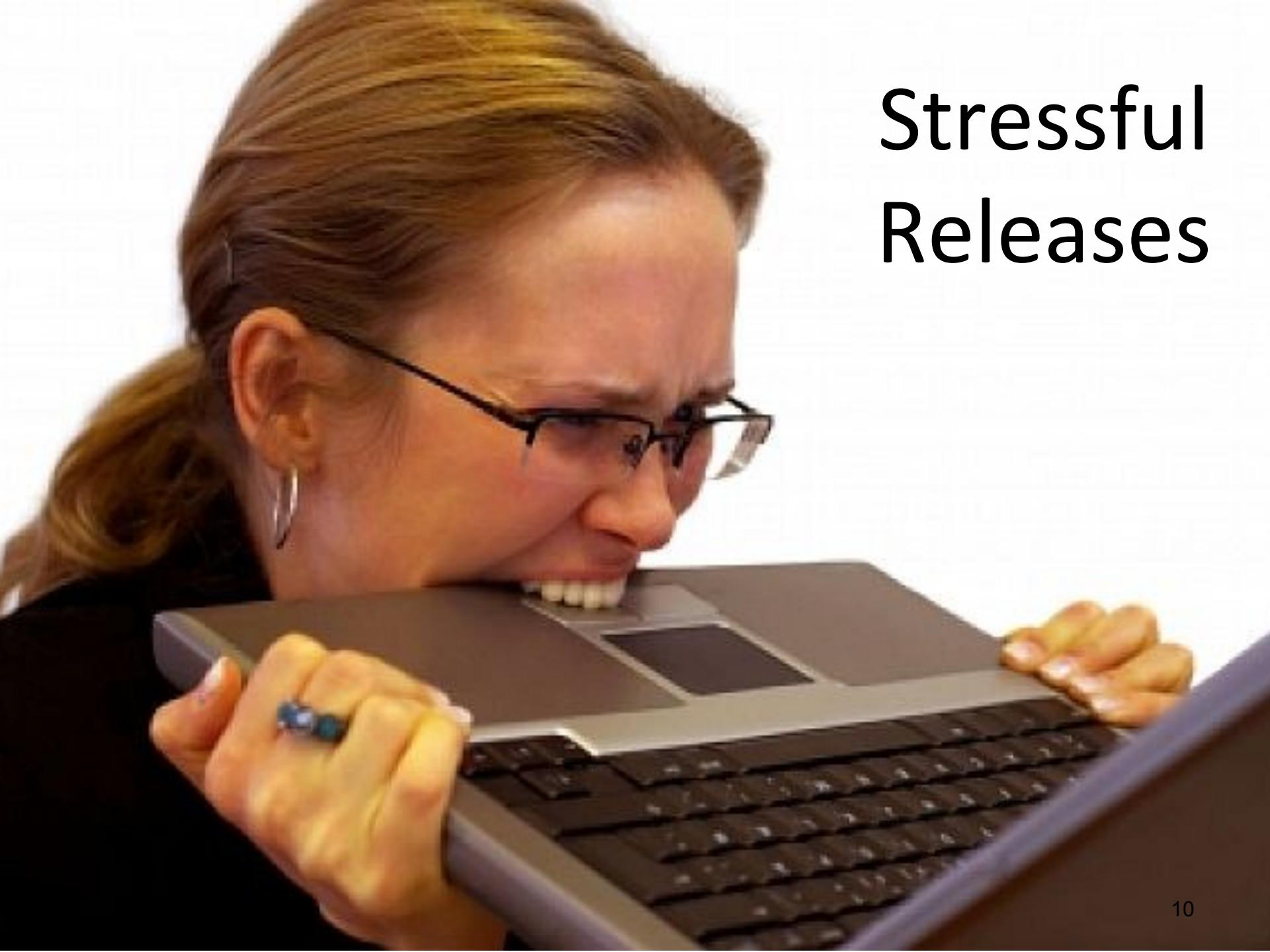
- *Mary and Tom Poppendieck,  
Implementing Lean Software Development*

# The Last Mile

Manual Deployments

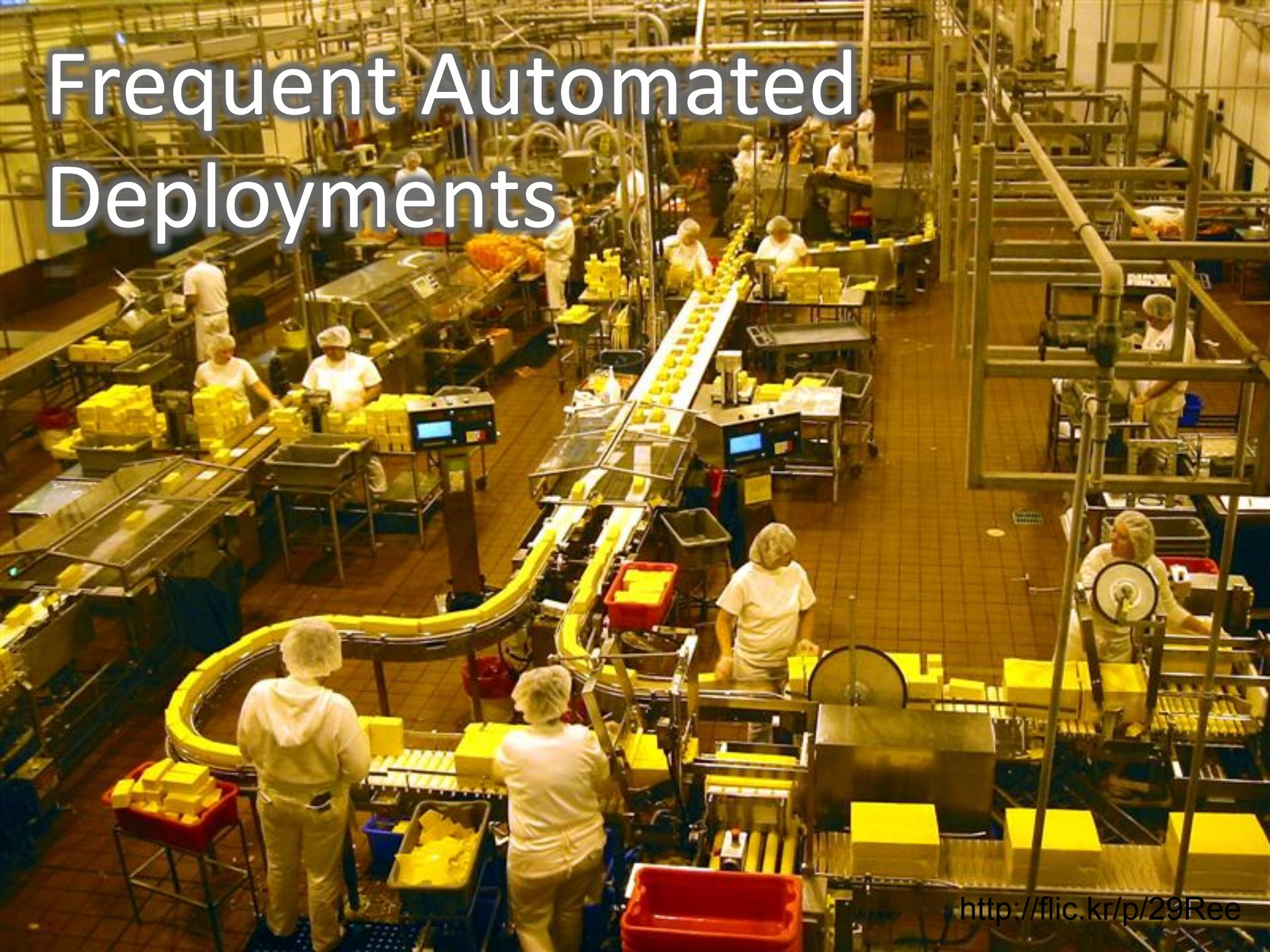
Insufficient Configuration Management

Infrequent, Error Prone Deployments

A close-up photograph of a woman with long brown hair pulled back, wearing black-rimmed glasses and a silver hoop earring. She is leaning forward over a laptop keyboard, her eyes focused intently on the screen which is visible behind the keyboard. Her hands are positioned on the keys, and she appears to be in a state of deep concentration or stress.

# Stressful Releases

# Frequent Automated Deployments



# Always Production Ready



Continuous Deployment

Deployment Pipelines

Deployment Automation

Configuration  
Management

Continuous  
Integration

Testing

Agile

# Deployment Pipelines

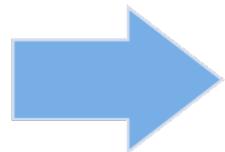


# Deployment Pipelines

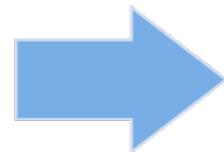
A Deployment Pipeline is an automated manifestation of your process for getting software from version control into the hands of your users.

# Continuous what?

Continuous  
Integration



Continuous  
Delivery



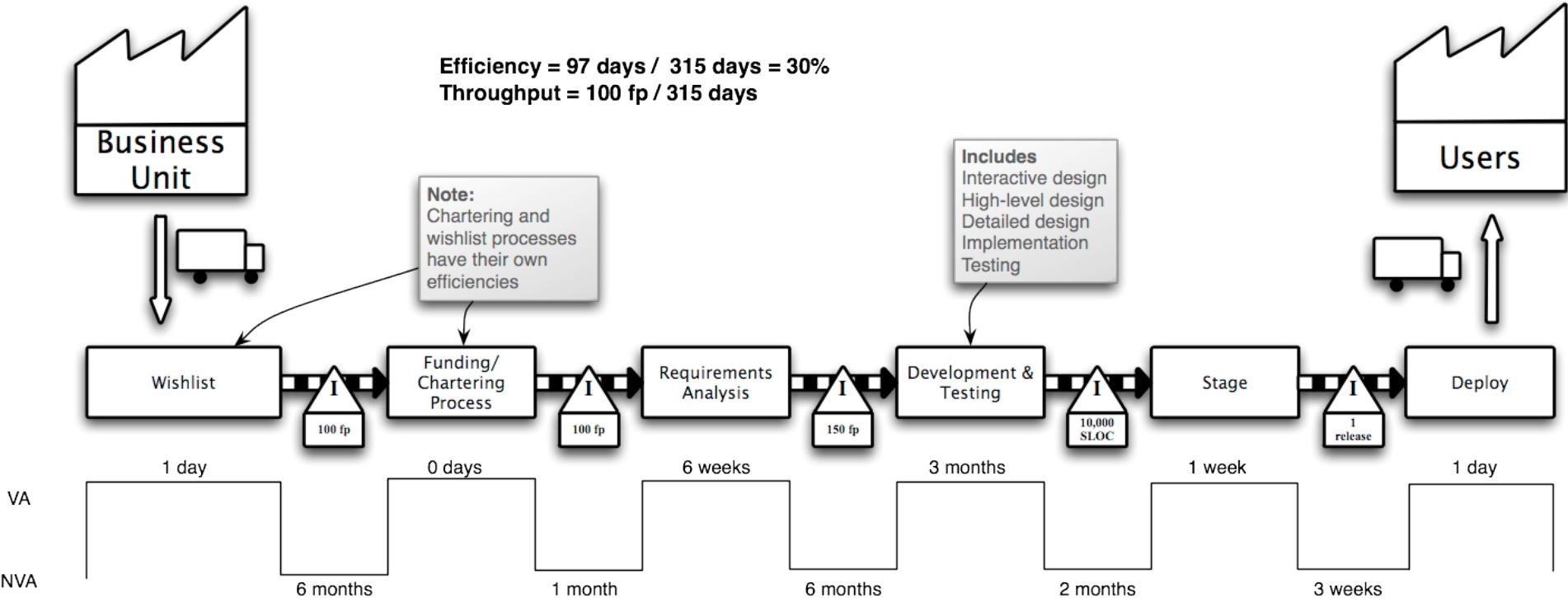
Continuous  
Deployment

# Getting Started

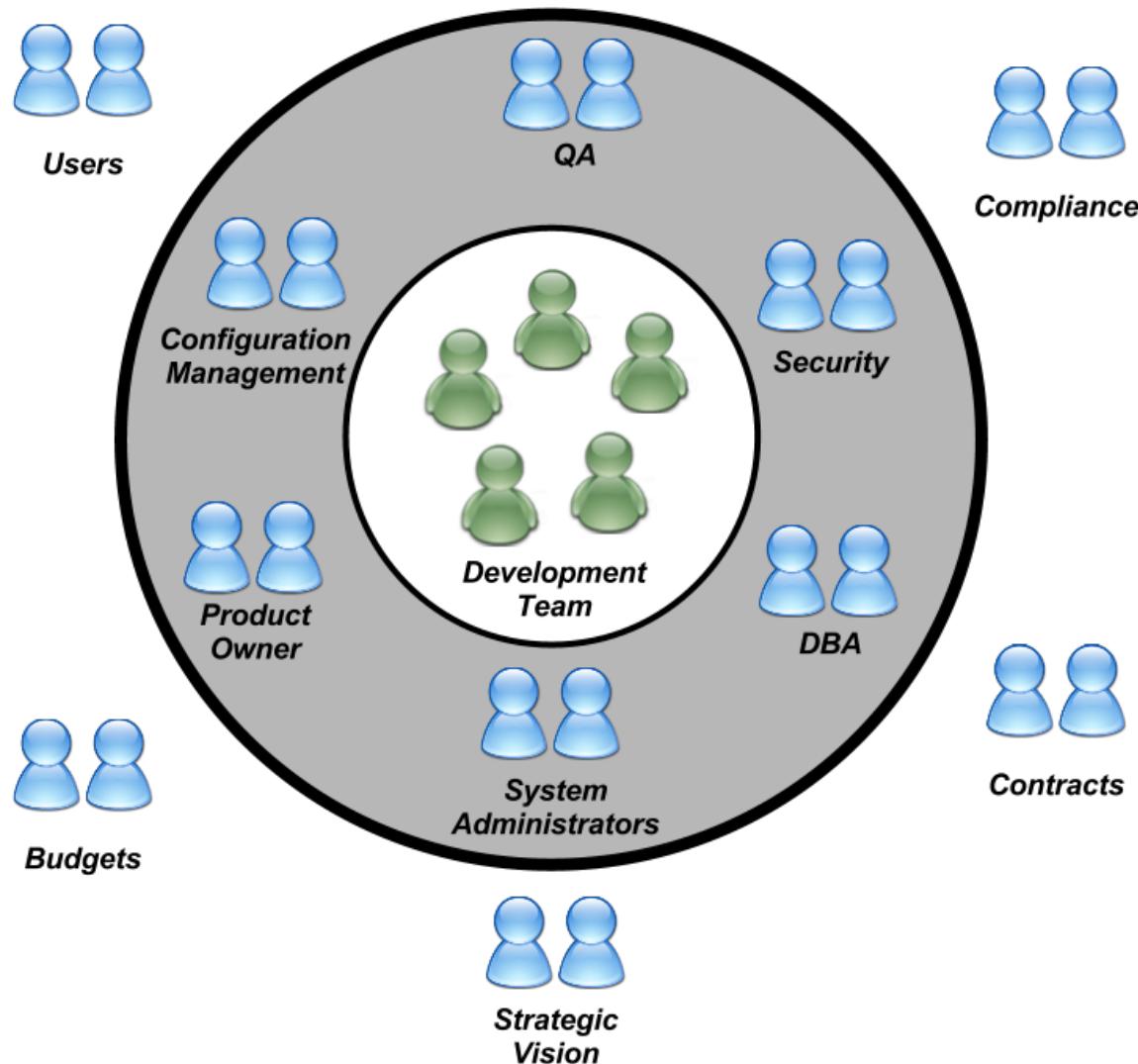


Continuous Delivery Applied

# Understand your Process



# Understand your Organization



14



Kawasaki

17

# Developers

5/8 — ARMALOY — 5/8

ARMSTRONG  
Imported from USA

EISEMANN

REINWAGNER

11/16

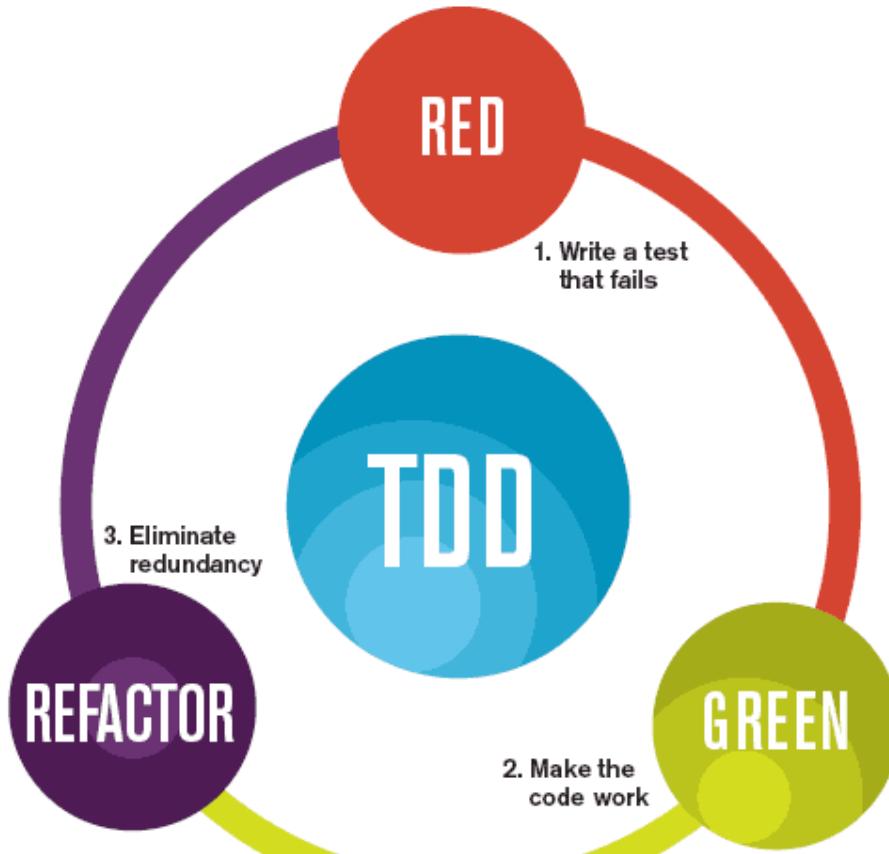
J

S

B

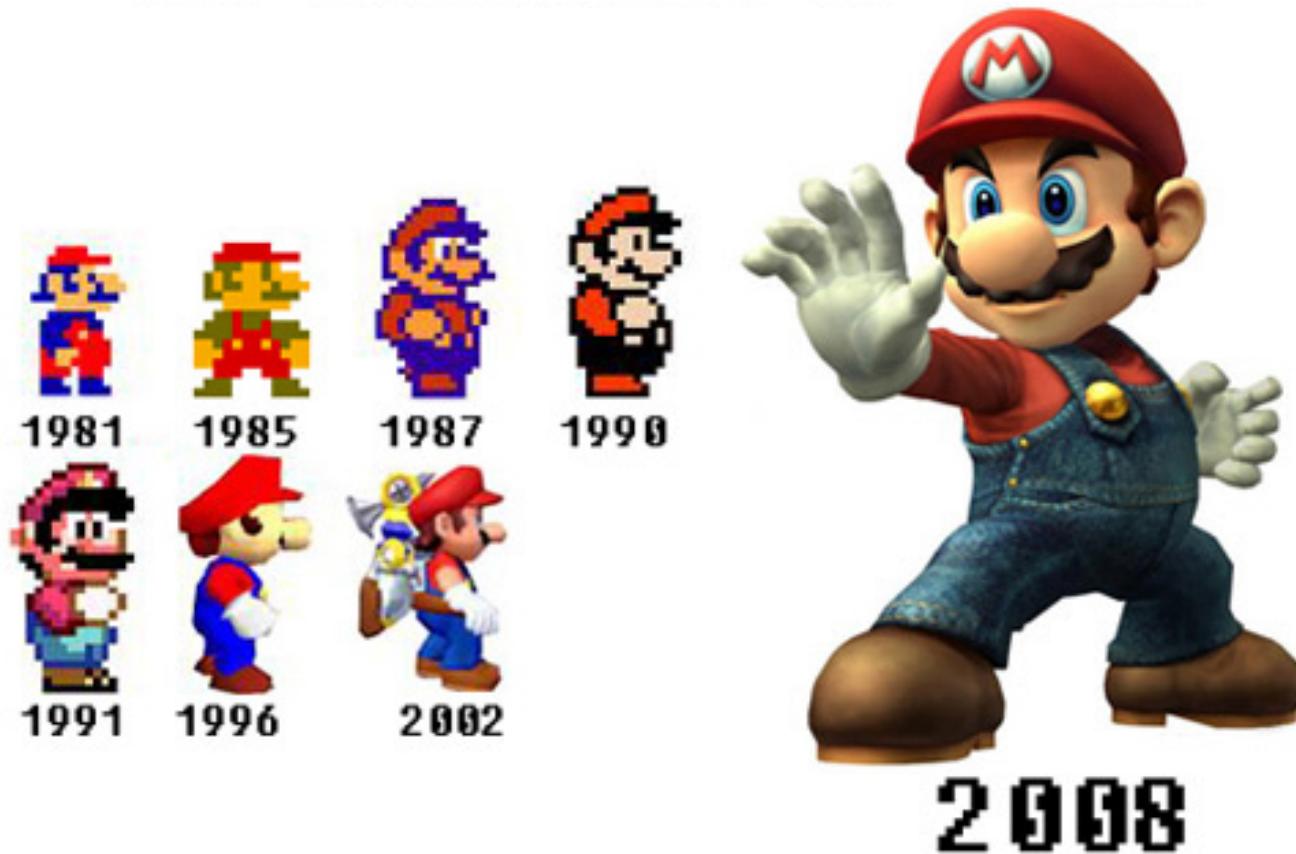
, 13/32

# Test Driven Development



The mantra of Test-Driven Development (TDD) is “red, green, refactor.”

# Evolutionary Design



\*Dates based on US release dates.

Geekstir.com

# Automate the Build

**Gradle**  
a better way to build



# Static Code Analysis



# Technical Debt

Home pr-report Configuration Log in Search

Dashboard Hotspots Components Violations Drill Time Machine Clouds Design Libraries Radiator Timeline

sonar

Version 1.0 - 14 Feb 2012 20:11 - Time changes...

Open action plans

Technical Debt

**Technical Debt**

31.7%

\$ 448,186

560 man days

Duplication  
Violations  
Comments  
Complexity

Coverage

Comments 13.0%   
7,482 lines   
20.0% docu. API  
1,076 undocu. API

Duplications 23.1%   
16,350 lines   
643 blocks   
96 files

SQALE Rating Remediation Cost 260 days   
Lines of Code 49K

Complexity 6.4 /method  
27.7 /class

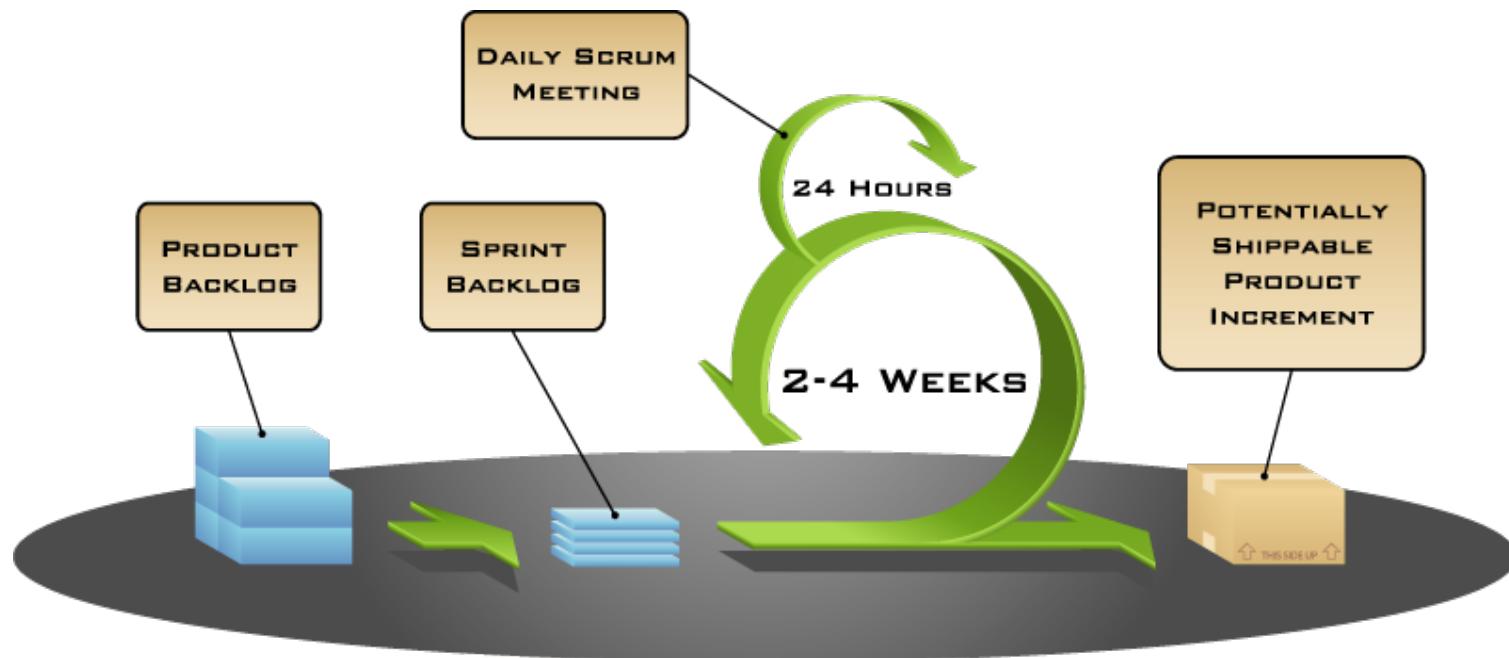
1000  
500

SQALE Sunburst Depth: 1

# The Team



# Agile



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# Continuous Integration

Jenkins

New Job People Build History Manage Jenkins My Views

ENABLE AUTO REFRESH

search

?

jmcgarr | log out

**Welcome to Excella Consulting's Build Server!**



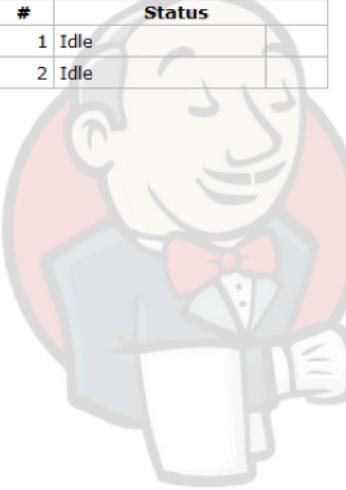
All	ASI Pipeline	OPM-DOR Pipeline	Staffing Solution Pipeline	+	
S	W	Name ↓	Last Success	Last Failure	Last Duration
		Commit	20 days (#20)	1 mo 16 days (#9)	58 sec
		DEPLOY	19 days (#12)	22 days (#6)	2 min 17 sec
		-IntegrationTests	19 days (#22)	1 mo 16 days (#5)	1 min 33 sec
		-StaticAnalysis	19 days (#23)	1 mo 16 days (#10)	1 min 3 sec
		-Commit	20 days (#25)	1 mo 17 days (#7)	1 min 5 sec
		STAFFING-Commit	20 days (#36)	1 day 7 hr (#42)	21 sec

Icon: S M L

Legend RSS for all RSS for failures RSS for just latest builds

 Help us localize this page

Page generated: Feb 14, 2012 9:42:59 PM Jenkins ver. 1.444



# Continuous Integration

Check-in Daily

Commit to Trunk

Automate the Build

Keep the Build Fast

Every Commit results in Build

Test in Clone of Production

Automate Deployment



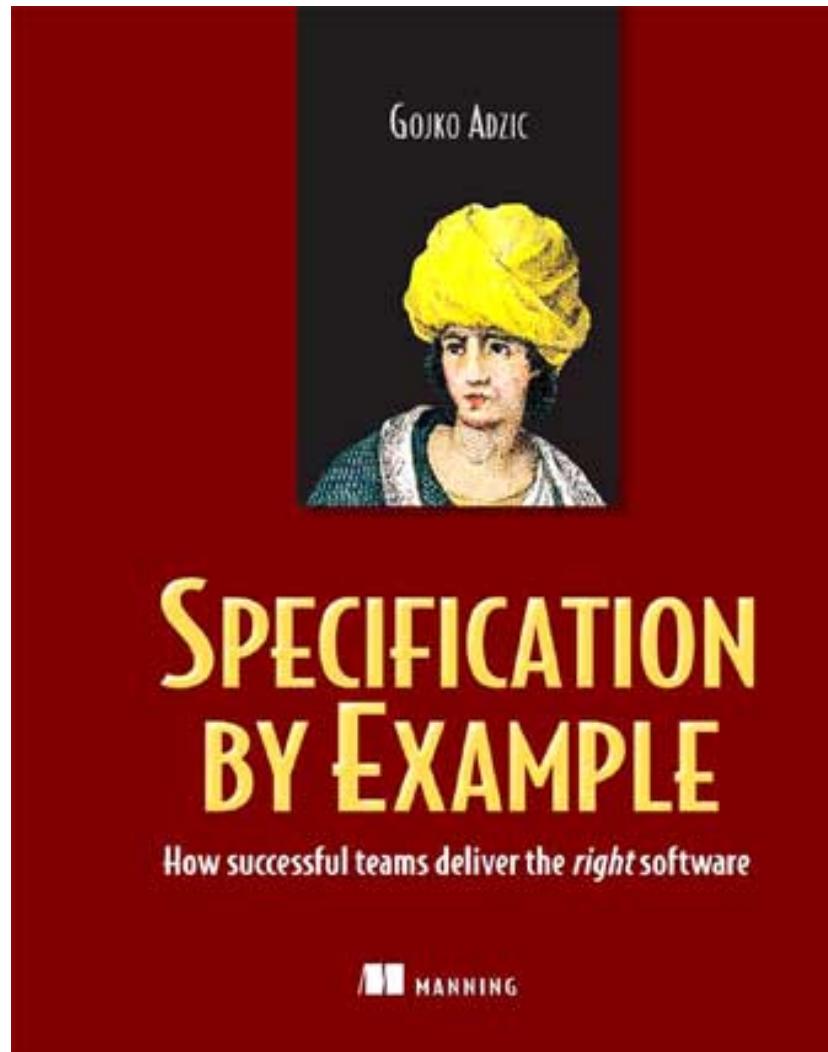
# TESTING

I FIND YOUR LACK OF TESTS DISTURBING.

# Testing is not a Phase



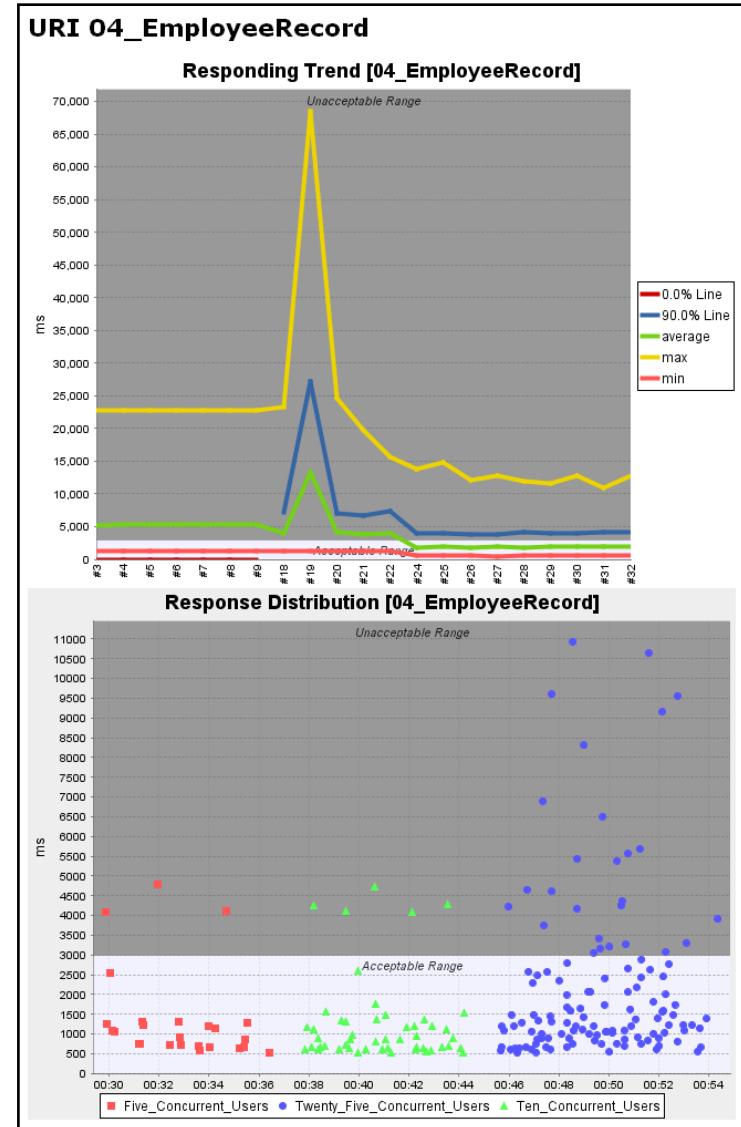
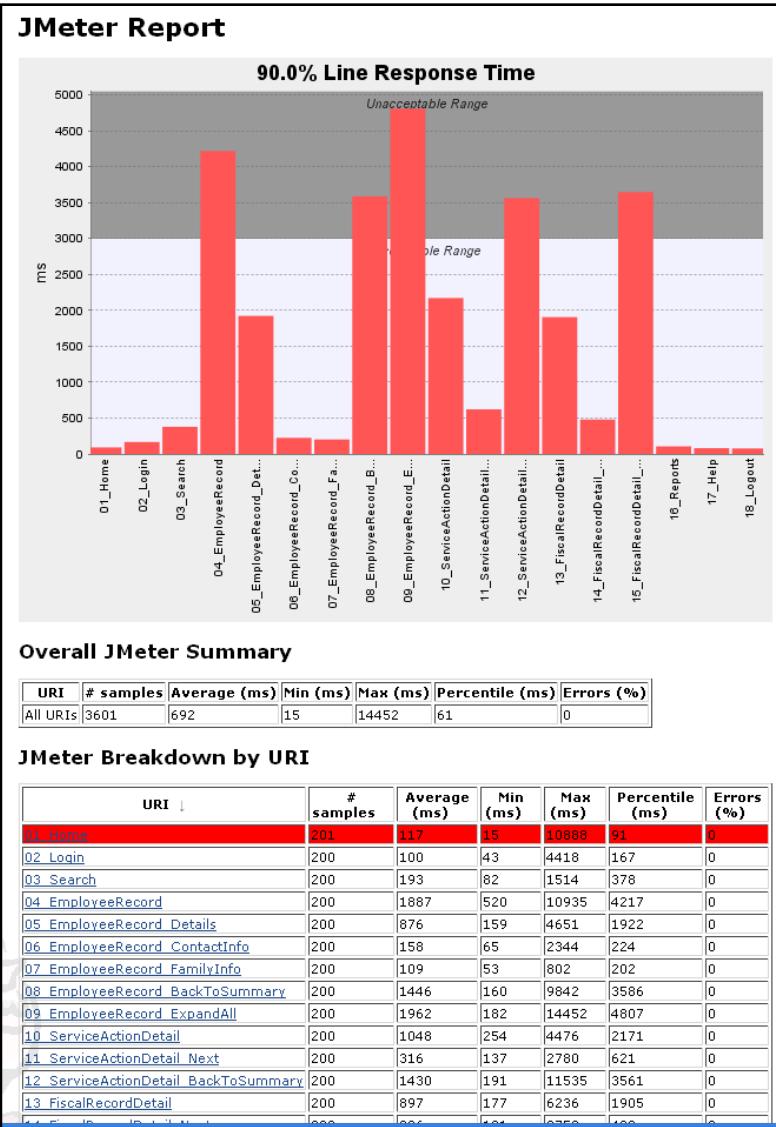
# Specification by Example



# Specification by Example

```
6  class SearchForBookByTitleSpec extends GebReportingSpec {  
7  
8      def "Loads the Amazon Homepage" () {  
9          when: "I navigate to Amazon.com"  
10         to AmazonHomePage  
11  
12         then: "the homepage is displayed"  
13         at AmazonHomePage  
14     }  
15  
16     def "HomePage loads the Search Form" () {  
17         when: "I navigate to Amazon.com"  
18         to AmazonHomePage  
19  
20         then: "the homepage is displayed"  
21         at AmazonHomePage  
22  
23         and: "the search form is available"  
24         searchForm  
25     }
```

# Automated Performance Testing



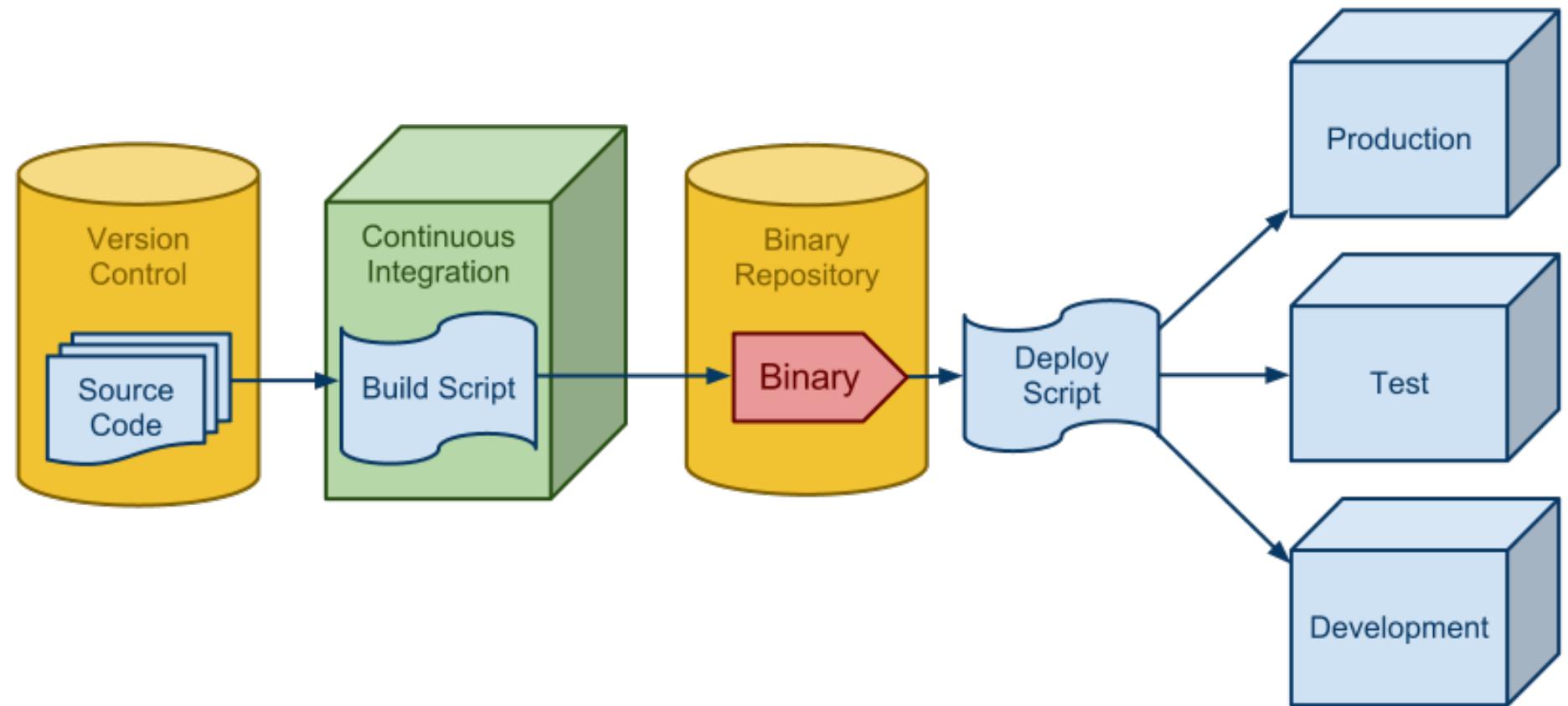
# Configuration Management



# Version Control



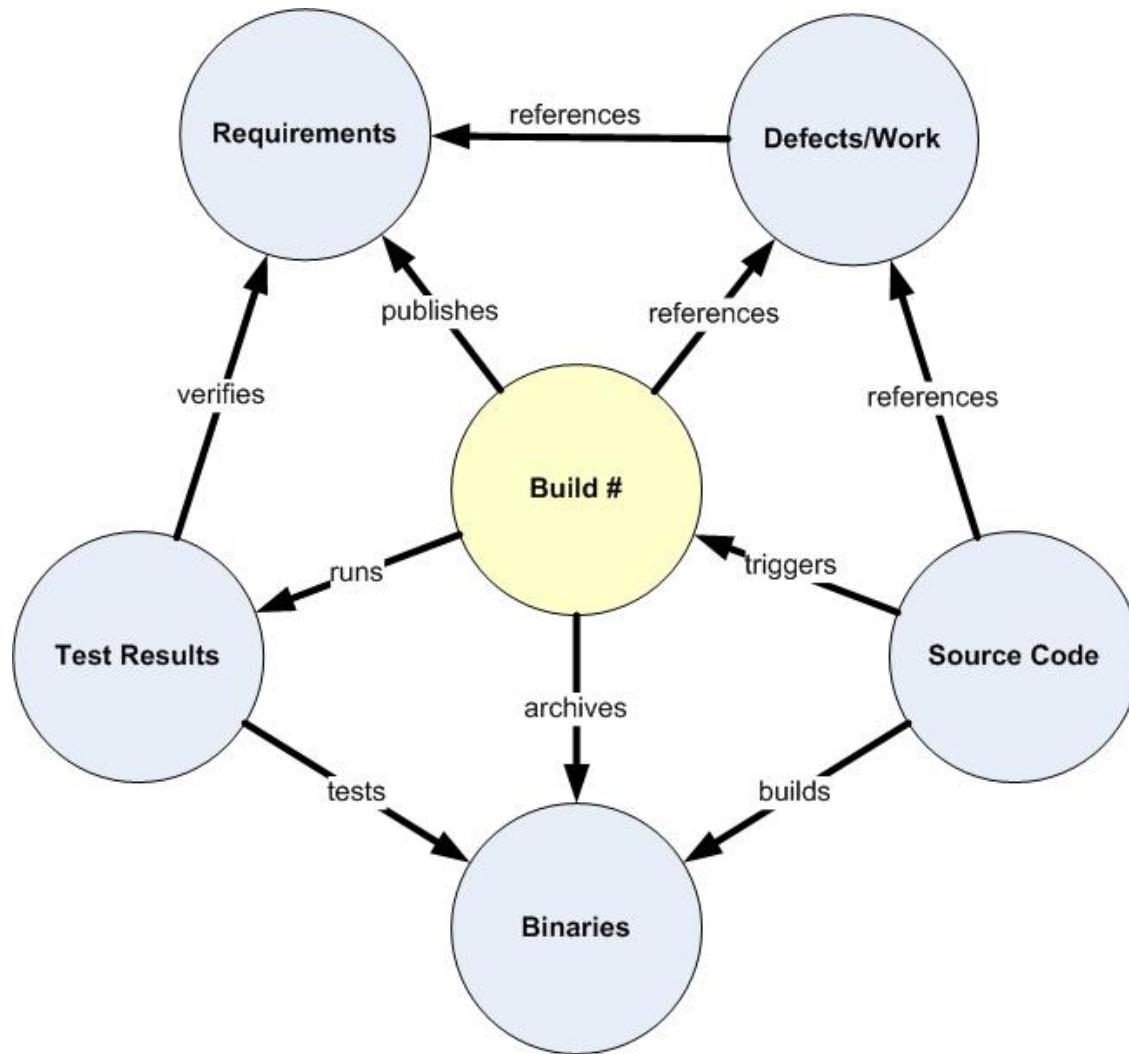
# Build Once, Deploy Many



# Artifact Repositories



# Traceability



# Versioning Numbers

**James Betteley's Devops Ramblings**  
"you've got to have a system!"

Home > Agile, Continuous Delivery, Continuous Integration, DevOps > What is in a name?  
Usually a version number, actually.

**What is in a name? Usually a version number, actually.**

July 7, 2011    jamesbetteley    Go to comments    Leave a comment

Another fascinating topic for you – build versioning! Ok, fun it might not be, but it is important and mostly unavoidable. In an [earlier blog](#) I outlined some of the reasons for proposing to use with our Java builds. Since then, tend to, and so I've had to change the versioning

Essentially, what I'm after is a way of using artifacts that provides at-a-glance information about the artifact I have or number to meet their expectations – that is, when

**Axel Fontaine**  
Software Development Expert

23 JANUARY 2011

## Maven Releases on Steroids: Adios Release Plugin!

One of the central themes of my current series of talks about Continuous Delivery is **releasing software**.

Releasing software encompasses a number of activities such as

- Picking a version number
- Checking out the latest revision from SCM
- Building and Testing binaries
- Tagging the SCM revision with the version number
- Publishing the binary artifacts in an Artifact Repository
- Writing release notes, announcement e-mails, etc...

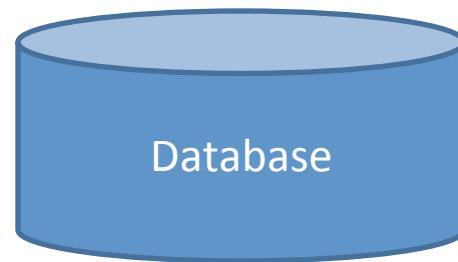


Axel Fontaine

UPCOMING TALKS  
No talks scheduled at this time

# Externalize Configuration

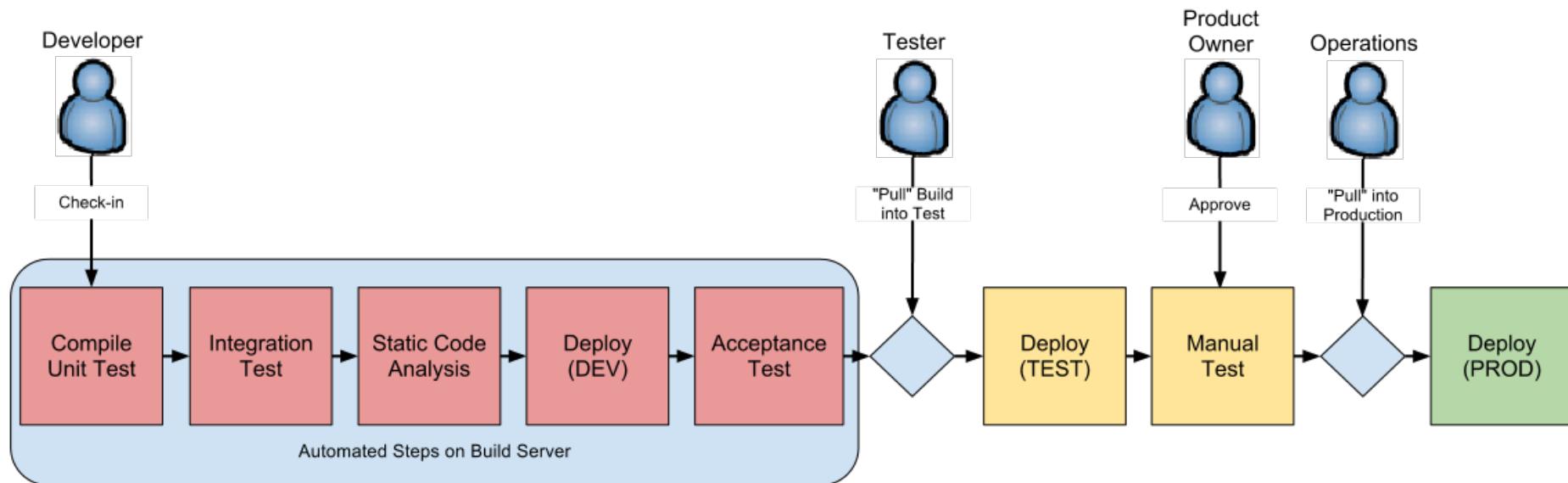
**ESCAPE**





Deploying

# Deployment Pipelines (aka Build Pipelines)



# Code Deployments

```
bash-2.05b$ pwd
/home/dstone
bash-2.05b$ cd /usr/portage/app-shells/bash
bash-2.05b$ ls -al
total 68
drwxr-xr-x  3 root root  4096 May 14 12:05 .
drwxr-xr-x  26 root root  4096 May 17 02:36 ..
-rw-r--r--  1 root root 13710 May  3 22:35 ChangeLog
-rw-r--r--  1 root root  2924 May 14 12:05 Manifest
-rw-r--r--  1 root root  3720 May 14 12:05 bash-2.05b-r11.ebuild
-rw-r--r--  1 root root  3516 May  2 20:05 bash-2.05b-r9.ebuild
-rw-r--r--  1 root root  5083 May  3 22:35 bash-3.0-r11.ebuild
-rw-r--r--  1 root root  4038 May 14 12:05 bash-3.0-r7.ebuild
-rw-r--r--  1 root root  3931 May 14 12:05 bash-3.0-r8.ebuild
-rw-r--r--  1 root root  4267 Mar 29 21:11 bash-3.0-r9.ebuild
drwxr-xr-x  2 root root  4096 May  3 22:35 files
-rw-r--r--  1 root root   164 Dec 29  2003 metadata.xml
bash-2.05b$ cat metadata.xml
<?xml version="1.0" encoding="UTF-8"?>
<!DOCTYPE pkgmetadata SYSTEM "http://www.gentoo.org/dtd/metadata.dtd">
<pkgmetadata>
<herd>base-system</herd>
</pkgmetadata>
bash-2.05b$ sudo /etc/init.d/bluetooth status
Password:
 * status: stopped
bash-2.05b$ ping -q -c1 en.wikipedia.org
PING rr.cktpa.wikimedia.org (207.142.131.247) 56(84) bytes of data.

--- rr.cktpa.wikimedia.org ping statistics ---
1 packets transmitted, 1 received, 0% packet loss, time 0ms
rtt min/avg/max/mdev = 112.076/112.076/112.076/0.000 ms
bash-2.05b$ grep -i /dev/sda /etc/fstab | cut --fields=-3
/dev/sda1          /mnt/usbkey
/dev/sda2          /mnt/ipod
bash-2.05b$ date
Wed May 25 11:36:56 PDT 2005
bash-2.05b$ lsmod
Module           Size  Used by
joydev            8256  0
ipw2200          175112  0
ieee80211         44228  1 ipw2200
ieee80211_crypt    4872  2 ipw2200,ieee80211
e1000            84468  0
bash-2.05b$ █
```

# Version your Database

LIQUI<sup>DB</sup> BASE



```

1  <?xml version="1.0" encoding="UTF-8" standalone="no"?>
2  <databaseChangeLog xmlns="http://www.liquibase.org/xml/ns/dbchangelog/1.9"
3      xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
4      xsi:schemaLocation="http://www.liquibase.org/xml/ns/dbchangelog/1.9 http://www.
5
6      <changeSet author="Mike McGarr" id="1262122929632-1">
7          <createTable tableName="BATCH_JOB_EXECUTION">
8              <column name="JOB_EXECUTION_ID" type="NUMBER(22,0)">
9                  <constraints nullable="false" primaryKey="true" primaryKeyName="SYS_C0034123"/>
10             </column>
11             <column name="VERSION" type="NUMBER(22,0)" />
12         <co 1   <?xml version="1.0" encoding="UTF-8"?>
2
3     <databaseChangeLog
4         xmlns="http://www.liquibase.org/xml/ns/dbchangelog/1.9"
5         xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
6         xsi:schemaLocation="http://www.liquibase.org/xml/ns/dbchangelog/1.9
7             http://www.liquibase.org/xml/ns/dbchangelog/dbchangelog-1.9.xsd">
8
9         <preConditions onFailure="HALT">
10             <dbms type="oracle" />
11         </preConditions>
12
13         <include file="pre/setup.xml"/>
14         <include file="r0.2/releasechanges.xml"/>
15         <include file="r0.3/releasechanges.xml"/>
16         <include file="r0.4/releasechanges.xml"/>
17         <include file="r0.5/releasechanges.xml"/>
18         <include file="r0.5.1/releasechanges.xml"/>
19         <include file="r1.0/releasechanges.xml"/>
20         <include file="r1.2/releasechanges.xml"/>
21
22     </databaseChangeLog>
23
24     </createTable>
25
26 </changeSet>

```



## rsm / data

.svn  
 pre  
 r0.2  
 r0.3  
 r0.4  
 r0.5  
 r0.5.1  
 r1.0  
 r1.2  
 master.xml

# Infrastructure as Code



# Puppet

```
class mongodb {
    include mongodb::params

    package { "python-software-properties":
        ensure => installed,
    }

    exec { "10gen-apt-repo":
        path => "/bin:/usr/bin",
        command => "add-apt-repository '${mongodb::params::repository}'",
        unless => "cat /etc/apt/sources.list | grep 10gen",
        require => Package["python-software-properties"],
    }

    exec { "10gen-apt-key":
        path => "/bin:/usr/bin",
        command => "apt-key adv --keyserver hkp://keyserver.ubuntu.com:80 --recv 7F0CEB10",
        unless => "apt-key list | grep 10gen",
        require => Exec["10gen-apt-repo"],
    }

    exec { "update-apt":
        path => "/bin:/usr/bin",
        command => "apt-get update",
        unless => "ls /usr/bin | grep mongo",
        require => Exec["10gen-apt-key"],
    }

    package { "mongodb-stable":
        ensure => installed,
        require => Exec["update-apt"],
    }

    service { "mongodb":
        enable => true,
        ensure => running,
        require => Package["mongodb-stable"],
    }
}
```

# Vagrant

```
$ gem install vagrant  
$ vagrant box add base http://files.vagrantup.com/lucid32.box  
$ vagrant init  
$ vagrant up
```

```
Vagrant::Config.run do |config|  
  config.vm.box = "lucid32"  
  
  # Enable the Puppet provisioner  
  config.vm.provision :puppet  
end
```

# Monitoring (sucks)



**logstash**

**Nagios®**

**StatsD**

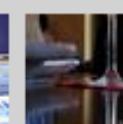


**Graphite**

<https://github.com/monitoringsucks>

# Continuous Deployment

## FEATURING



*Flickr was last deployed 1 day ago, including 24 changes by 4 people.*

*In the last week there were 70 deploys of 521 changes by 23 people.*

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# Contact Me

Mike McGarr

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<http://earlyandoften.wordpress.com>

@jmichaelmcgarr



# Further Reading

- *Continuous Delivery: Reliable Software Releases through Build, Test and Deployment Automation*, by Jez Humble and David Farley -  
<http://www.amazon.com/Continuous-Delivery-Deployment-Automation-Addison-Wesley/dp/0321601912>
- *Test Driven Development (TDD)* –  
[http://en.wikipedia.org/wiki/Test-driven\\_development](http://en.wikipedia.org/wiki/Test-driven_development)
- *Introducing BDD*, by Dan North – <http://dannorth.net/introducing-bdd/>
- *Agile Manifesto* – <http://agilemanifesto.org/>
- *Scrum* – [http://www.scrumalliance.org/learn\\_about\\_scrum](http://www.scrumalliance.org/learn_about_scrum)
- *Continuous Integration*, by Martin Fowler –  
<http://martinfowler.com/articles/continuousIntegration.html>
- *Specification by Example*, by Gojko Adzic –  
<http://specificationbyexample.com/>
- *Build Pipelines* –  
<http://www.magpiebrain.com/2009/12/13/a-brief-and-incomplete-history-of-build-pipelines/>

# Further Reading

- *Maven Releases on Steroids, by Axel Fontaine* –  
<http://www.axelfontaine.com/2011/01/maven-releases-on-steroids-adios.html>
- *What is in a Name? Usually a version number, actually., by James Betteley* –  
<http://jamesbetteley.wordpress.com/2011/07/07/what-is-in-a-name-usually-a-version-number-actually/>
- *Build Once, Deploy Many* –  
<http://earlyandoften.wordpress.com/2010/09/09/build-once-deploy-many/>
- *Evolutionary Design* - <http://martinfowler.com/articles/designDead.html>
- *Continuous Deployment* –  
<http://timothyfitz.wordpress.com/2009/02/08/continuous-deployment/>
- *Sonar's Technical Debt Calculation* –  
<http://www.sonarsource.org/evaluate-your-technical-debt-with-sonar/>
- *Gherkin* - <https://github.com/cucumber/cucumber/wiki/Gherkin>

# Tools

- *Git* - <http://git-scm.com/>
- *Subversion* - <http://subversion.tigris.org/>
- *Mercurial* - <http://mercurial.selenic.com/>
- *Rational ClearCase* -  
<http://www-01.ibm.com/software/awdtools/clearcase/>
- *Serena Dimensions CM* -  
<http://www.serena.com/products/dimensions-cm/index.html>
- *Ant* - <http://ant.apache.org/>
- *Ivy* - <http://ant.apache.org/ivy/>
- *Maven* - <http://maven.apache.org/>
- *Gradle* - <http://gradle.org/>
- *JUnit* – <http://www.junit.org/>
- *Mockito* – <http://code.google.com/p/mockito/>
- *Hamcrest* – <http://code.google.com/p/hamcrest/>
- *Spock* – <http://code.google.com/p/spock/>
- *dbUnit* – <http://www.dbunit.org/>
- *Unitils* – <http://unitils.org/summary.html>

# Tools

- *Findbugs* – <http://findbugs.sourceforge.net/>
- *PMD* – <http://pmd.sourceforge.net/>
- *Checkstyle* – <http://checkstyle.sourceforge.net/>
- *JIRA* – <http://www.atlassian.com/software/jira/overview>
- *GitHub* – <https://github.com/>
- *Jenkins* - <http://jenkins-ci.org/>
- *TeamCity* – <http://www.jetbrains.com/teamcity/>
- *Nexus* – <http://www.sonatype.org/nexus/>
- *Artifactory* – <http://www.jfrog.com/products.php>
- *Sonar* – <http://www.sonarsource.org/>
- *FitNesse* –
- *Concordion* – <http://www.concordion.org/>
- *Cucumber* – <http://cukes.info/>
- *easyb* – <http://www.easyb.org/>
- *jBehave* - <http://jbehave.org/>
- *geb* - <http://www.gebish.org/>

# Tools

- Liquibase – [www.liquibase.org/](http://www.liquibase.org/)
- Flyway – <http://code.google.com/p/flyway/>
- Escape – <http://code.google.com/p/escservesconfig/>
- Puppet – <http://puppetlabs.com/>
- Chef – <http://www.opscode.com/chef/>
- Vagrant – <http://vagrantup.com/>
- JMeter – <http://jmeter.apache.org/>
- Nagios - <http://www.nagios.org/>