Continuous Delivery

Tools and Techniques

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@jmichaelmcgarr

About Me

- J. Michael (Mike) McGarr
- Excella Consulting, Arlington VA
- Lead of Excella's Java Center of Excellence

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www.excella.com/careers/javajvm-languages-developer.aspx

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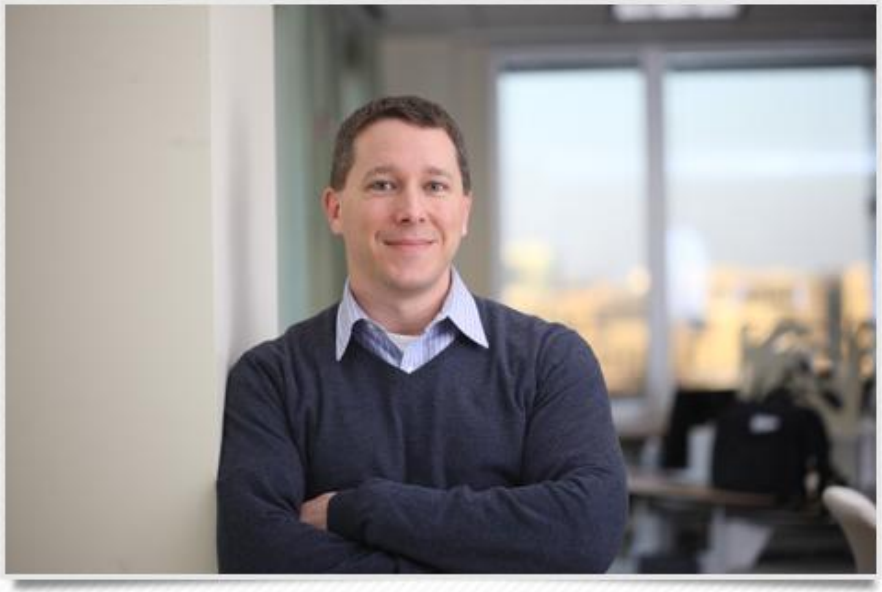


Java/JVM Languages Developer

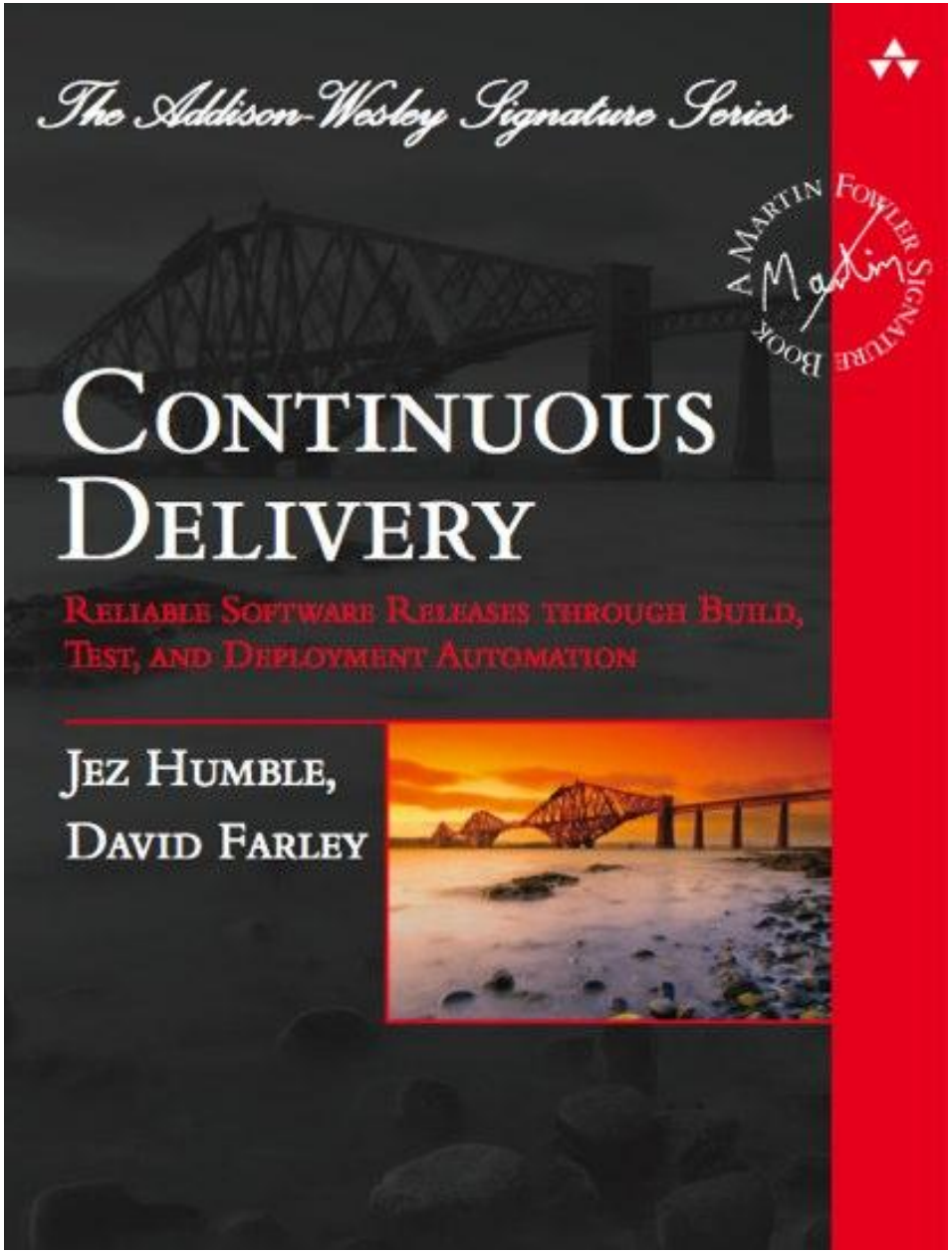
We are currently looking for experienced, analytical thinkers with great business and technology skills. The ideal candidate is a great communicator and is interested in working with small agile teams to deliver mission critical applications using and learning a diverse mix of the following Java Virtual Machine (JVM) technologies:

- Groovy, Scala, Clojure, Ruby/JRuby
- Python/Jython
- Spring MVC, Struts 2, Google Web Toolkit, Grails
- Spring 3, EJB3
- HTML, Dojo, jQuery, ExtJS
- Ant+Ivy, Maven, Gradle
- Subversion, Git, Mercurial
- Jenkins/Hudson, Sonar, Nexus
- Tomcat, JBoss, WebSphere, WebLogic
- Oracle, DB2, MySQL, PostgresSQL
- JPA, Hibernate, iBaTis

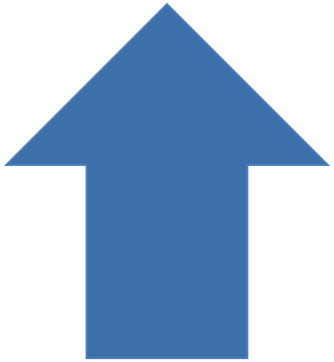
To submit your resume now, click here.

Continuous Delivery is…

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

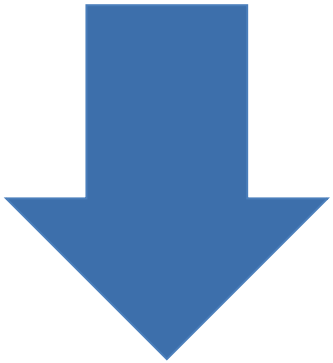

The Addison-Wesley Signature Series
A Martin Fowler Signature Book
Continuous Delivery
Reliable Software Releases through Build, Test, and Deployment Automation
Jez Humble,
David Farley

Goals

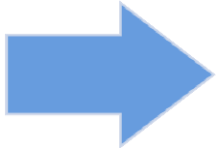
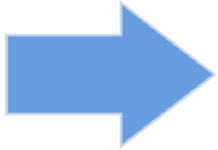


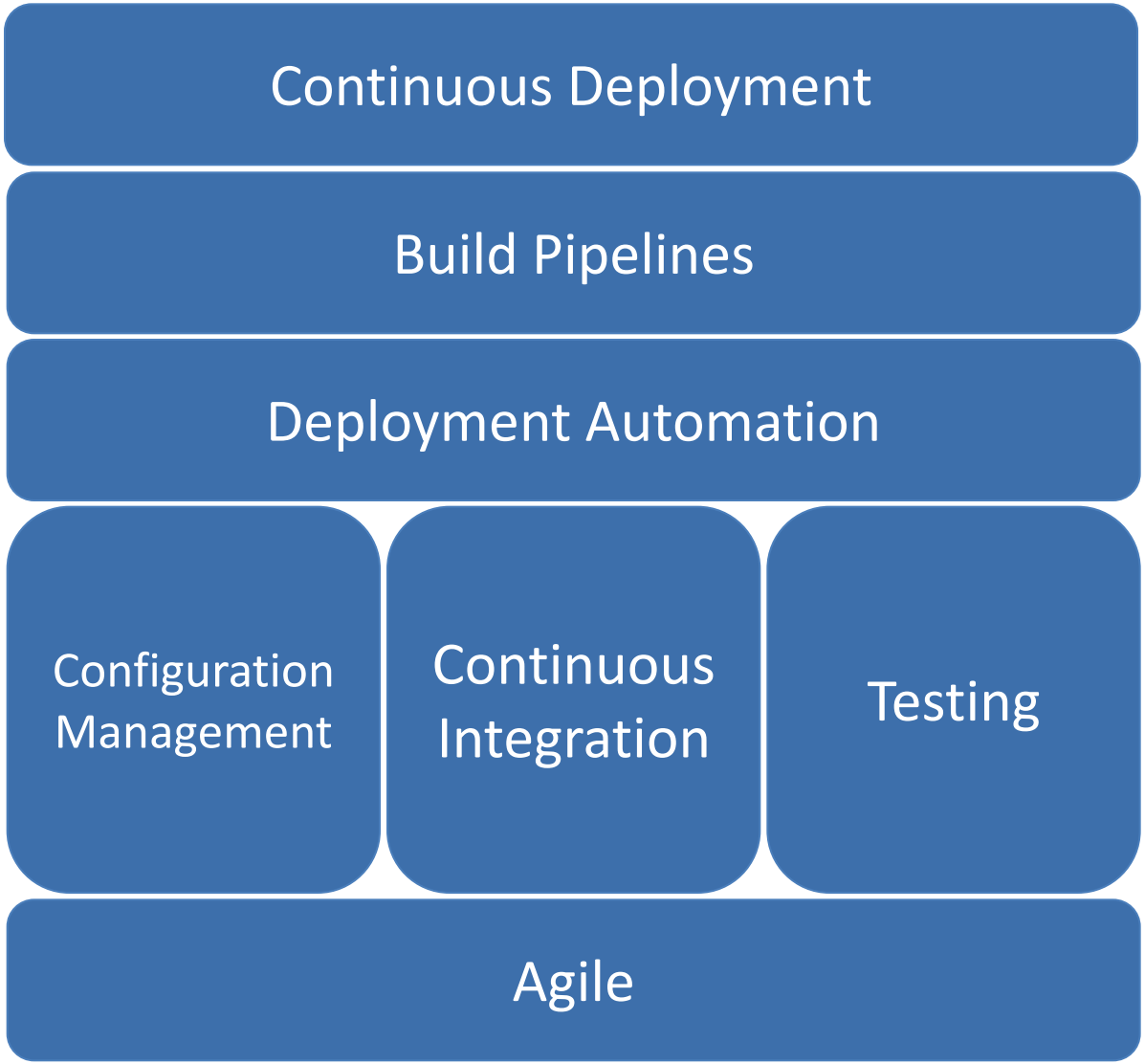
Quality

Cycle Time



Continuous what?

Continuous Integration  Continuous Delivery  Continuous Deployment


Continuous Deployment
Build Pipelines
Deployment Automation
Configuration Management
Continuous Integration
Testing
Agile

Developers

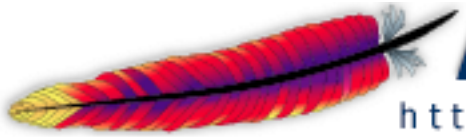
http://flic.kr/p/5cK2

Version Control

Build Automation

Gradle

a better way to build



Apache Maven Project

http://maven.apache.org/

Unit Testing

hamcrest

Hamcrest - library of matchers for building test expressions

JUnit, Hamcrest & Mockito

TemperatureTest.java

```
1  import ...
11
12 @RunWith(MockitoJUnitRunner.class)
13 public class TemperatureTest {
14
15     private Temperature temp;
16     @Mock private WeatherService service;
17
18     @Before public void setUp () {
19         Temperature temp = new Temperature();
20         temp.setWeatherService(service);
21     }
22
23     @Test public void canRetrieveCurrentTemp () {
24         when(service.getTemp()).thenReturn(78);
25         assertThat(temp.currentTemp(), is(equalTo(78)));
26     }
```

spock

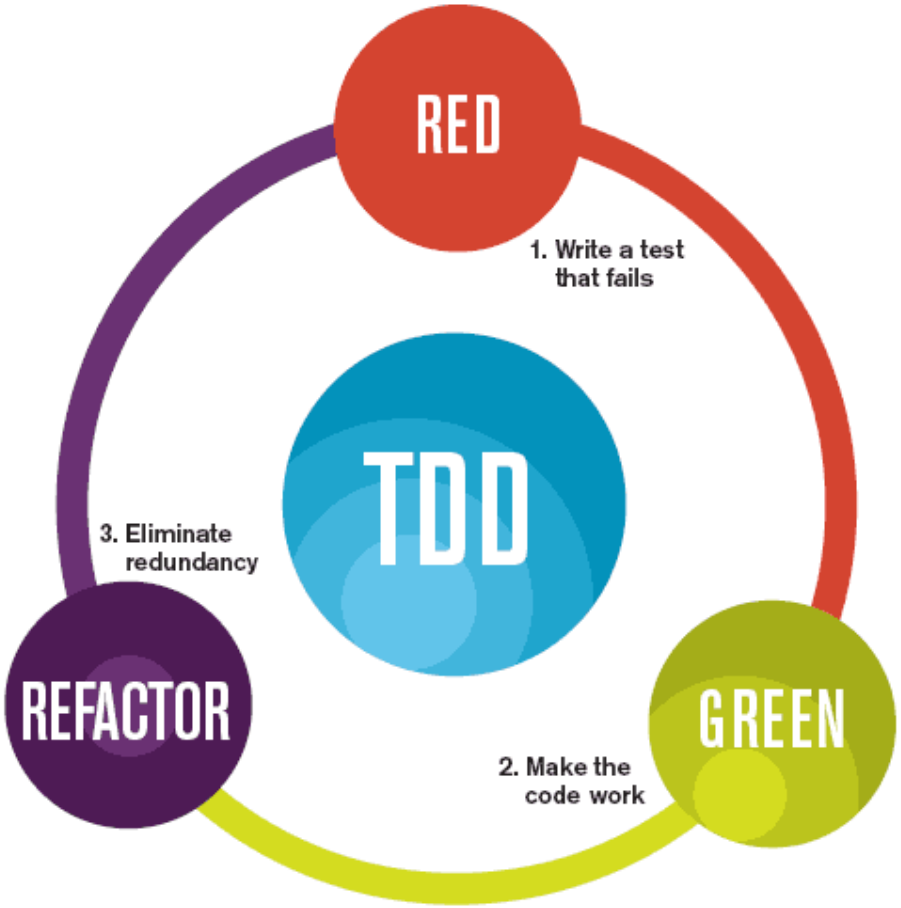
the enterprise ready specification framework

Spock

TemperatureTestSpec.groovy

```groovy
class TemperatureTestSpec {

    def temperature = new Temperature()
    def mockWeatherService = Mock(WeatherService)

    def setUp() {
        temperature.weatherService = mockWeatherService
    }

    def "can retrieve current temperature" () {
        given: "the current temperature is 78"
        mockWeatherService.getTemp() >> 78

        when: "requesting the current temperature"
        def temp = temperature.currentTemp()

        then: "the weather service returns 78 degrees"
        temp == 78
    }
}
```

Test Driven Development



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

http://reddevnews.com/articles/2007/11/01/testdriven-development-tdd.aspx

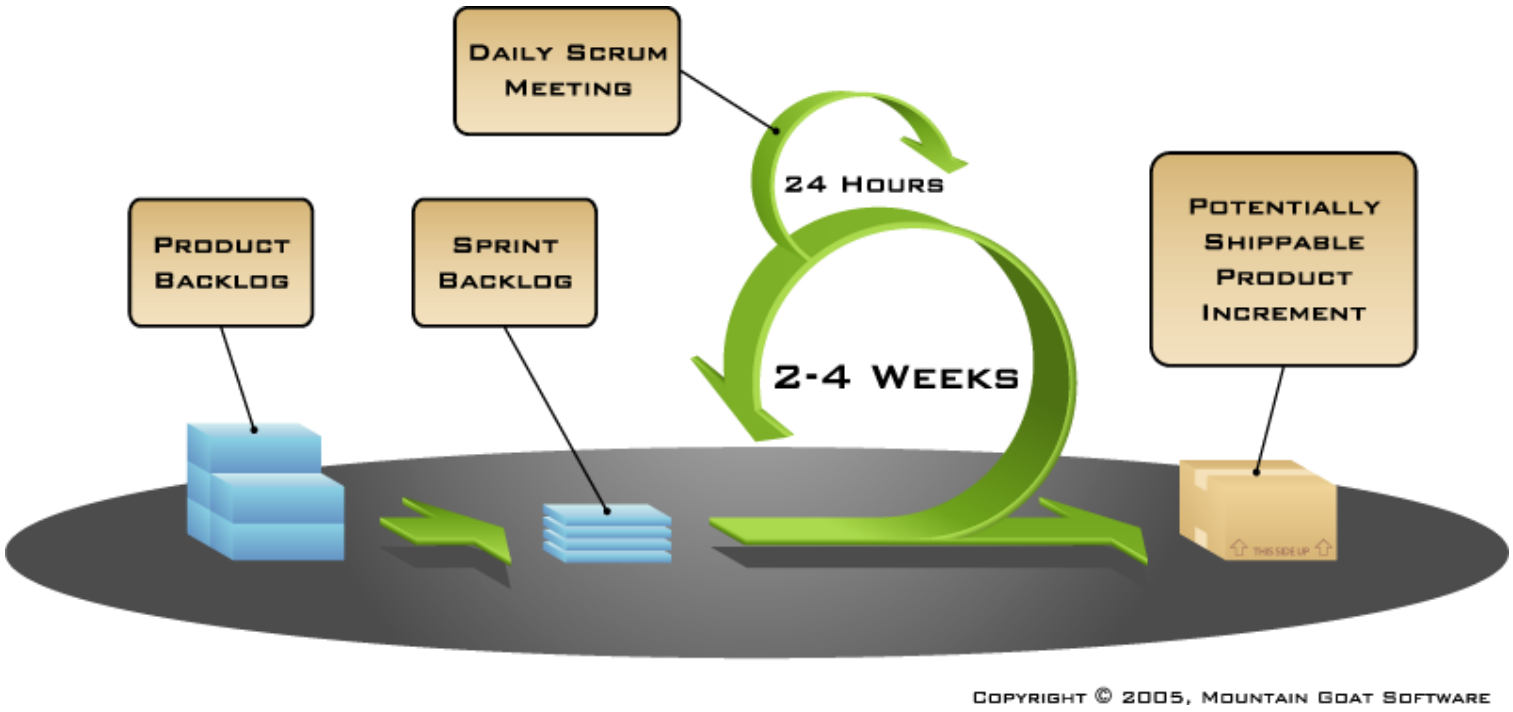
Integration Testing

Static Code Analysis

CheckStyle

The Team

Agile


Daily Scrum Meeting
24 Hours
Product Backlog
Sprint Backlog
2-4 Weeks
Potentially Shippable Product Increment
Copyright © 2005, Mountain Goat Software

Task Management

Continuous Integration

Check-in Daily

Commit to Trunk

Automate the Build

Keep the Build Fast

Every Commit results in Build

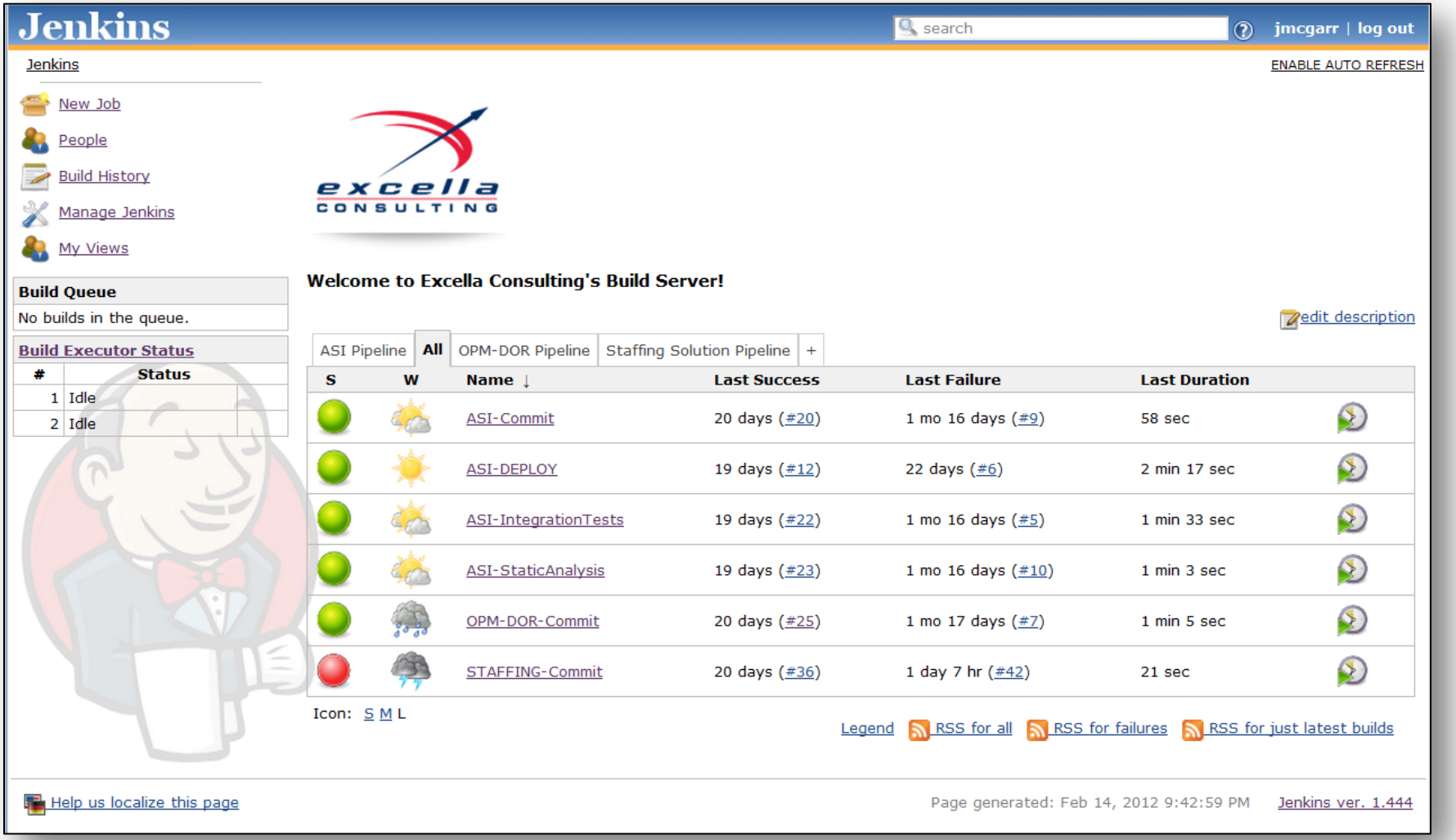
Test in Clone of Production

Automate Deployment

Continuous Integration

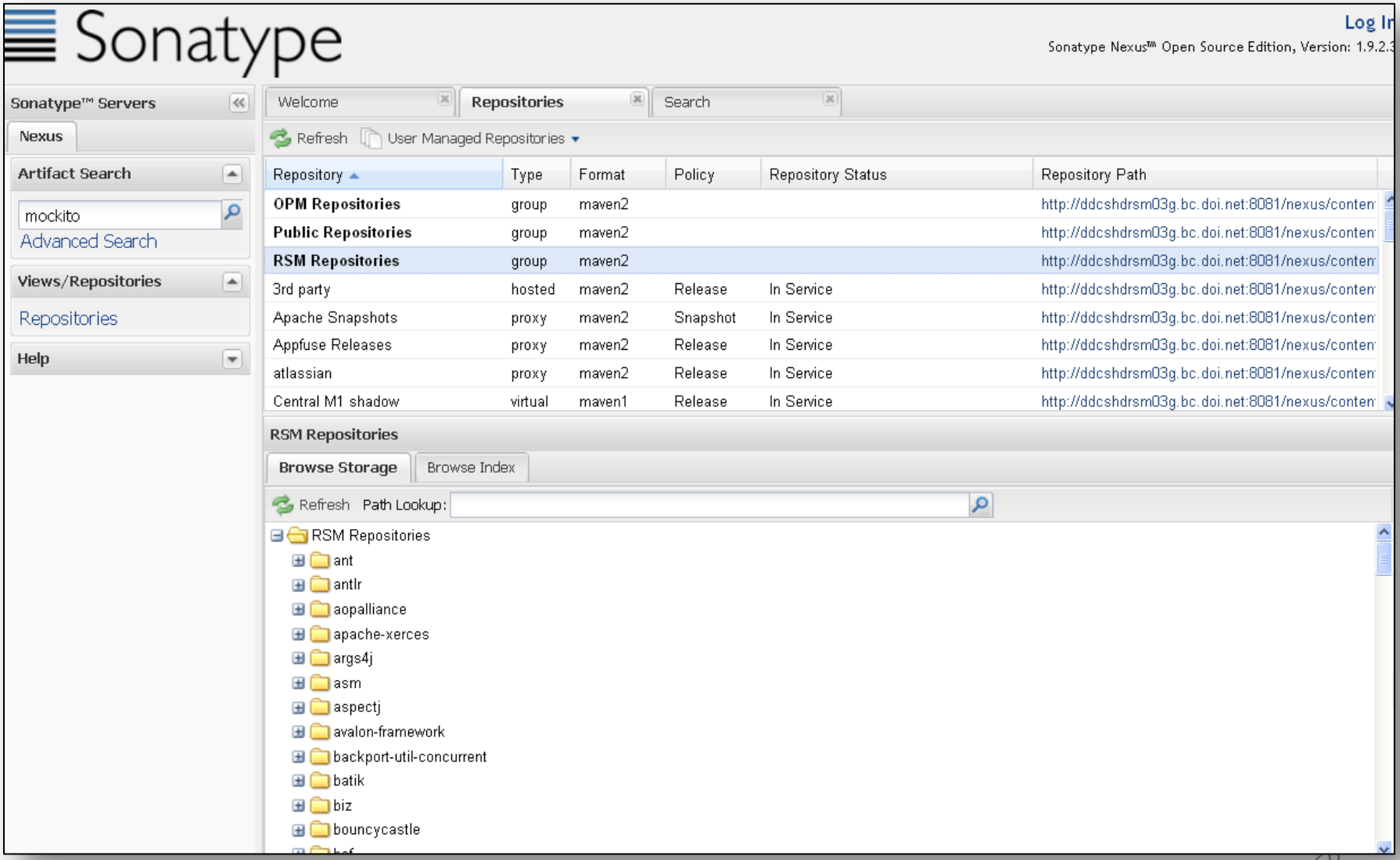
Jenkins

Jenkins


Jenkins
search
jmcgarr | log out
Jenkins
ENABLE AUTO REFRESH
New Job
People
Build History
Manage Jenkins
My Views
excella
CONSULTING
Build Queue
No builds in the queue.
Build Executor Status
Status
1 Idle
2 Idle
Welcome to Excella Consulting's Build Server!
edit description
ASI Pipeline
All
OPM-DOR Pipeline
Staffing Solution Pipeline
+
S W Name ↓ Last Success Last Failure Last Duration
ASI-Commit 20 days (#20) 1 mo 16 days (#9) 58 sec
ASI-DEPLOY 19 days (#12) 22 days (#6) 2 min 17 sec
ASI-IntegrationTests 19 days (#22) 1 mo 16 days (#5) 1 min 33 sec
ASI-StaticAnalysis 19 days (#23) 1 mo 16 days (#10) 1 min 3 sec
OPM-DOR-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

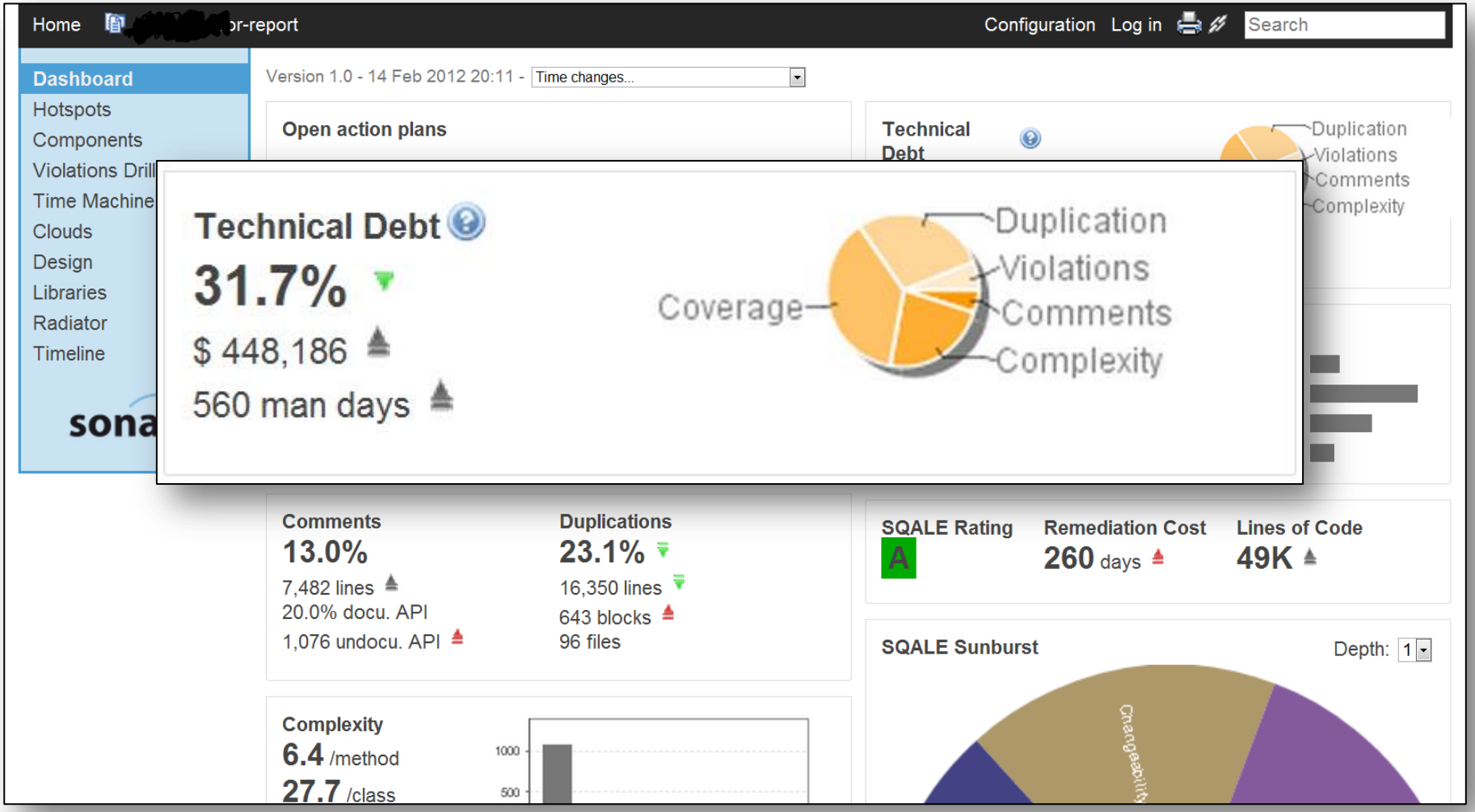
Dependency Management

Nexus


Sonatype
Log In
Sonatype Nexus™ Open Source Edition, Version: 1.9.2.3
Sonatype™ Servers
Nexus
Artifact Search
mockito
Advanced Search
Views/Repositories
Repositories
Help
Welcome
Repositories
Search
Refresh
User Managed Repositories
Repository
Type
Format
Policy
Repository Status
Repository Path
OPM Repositories group maven2 http://ddcshdrsm03g.bc.doi.net:8081/nexus/conten
Public Repositories group maven2 http://ddcshdrsm03g.bc.doi.net:8081/nexus/conten
RSM Repositories group maven2 http://ddcshdrsm03g.bc.doi.net:8081/nexus/conten
3rd party hosted maven2 Release In Service http://ddcshdrsm03g.bc.doi.net:8081/nexus/conten
Apache Snapshots proxy maven2 Snapshot In Service http://ddcshdrsm03g.bc.doi.net:8081/nexus/conten
Appfuse Releases proxy maven2 Release In Service http://ddcshdrsm03g.bc.doi.net:8081/nexus/conten
atlassian proxy maven2 Release In Service http://ddcshdrsm03g.bc.doi.net:8081/nexus/conten
Central M1 shadow virtual maven1 Release In Service http://ddcshdrsm03g.bc.doi.net:8081/nexus/conten
RSM Repositories
Browse Storage
Browse Index
Refresh
Path Lookup:
RSM Repositories
ant
antlr
aopalliance
apache-xerces
args4j
asm
aspectj
avalon-framework
backport-util-concurrent
batik
biz
bouncycastle

Technical Debt

Sonar


Home
Configuration
Log in
Search
Dashboard
Hotspots
Components
Violations Drill
Time Machine
Clouds
Design
Libraries
Radiator
Timeline
Version 1.0 - 14 Feb 2012 20:11 -
Time changes...
Open action plans
Technical Debt
Duplication
Violations
Comments
Complexity
Technical Debt
31.7%
$ 448,186
560 man days
Coverage
Duplication
Violations
Comments
Complexity
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
A
Remediation Cost
260 days
Lines of Code
49K
SQALE Sunburst
Depth: 1
Changeability
Complexity
6.4 /method
27.7 /class
1000
500

Specification by Example

concordion

Spock and Geb

```
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 "HomePa
17          when: "
18          to Amaz
19
20          then: "
21          at Amaz
22
23          and: "t
24          searchF
25      }
```

```
3   import geb.Page
4
5   class AmazonHomePage extends Page {
6
7       static url = "http://www.amazon.com"
8       static at = { title == "Amazon.com: Online Shopping for
9
10      static content = {
11          searchForm { $("form", name: "site-search") }
12          keywords { $("input", name: "field-keywords") }
13          //searchBy { $("select", name: "url") }
14          searchButton { $("input", alt: "Go" ) }
15      }
16  }
```

Concordion

RSM > Guide to Retirement Data Validations (GRDV) > 1 - Individual Validations >

00001 - Record Type Code

The following record type codes are valid. All other codes will cause a record to be rejected.

01 = Separation 02 = Transfer 03 = At Retirement 04 = Death in Service 05 = FERS Election 06 = Preliminary Disability Retirement 07 = Re-employed Annuitant

Acceptance Criteria

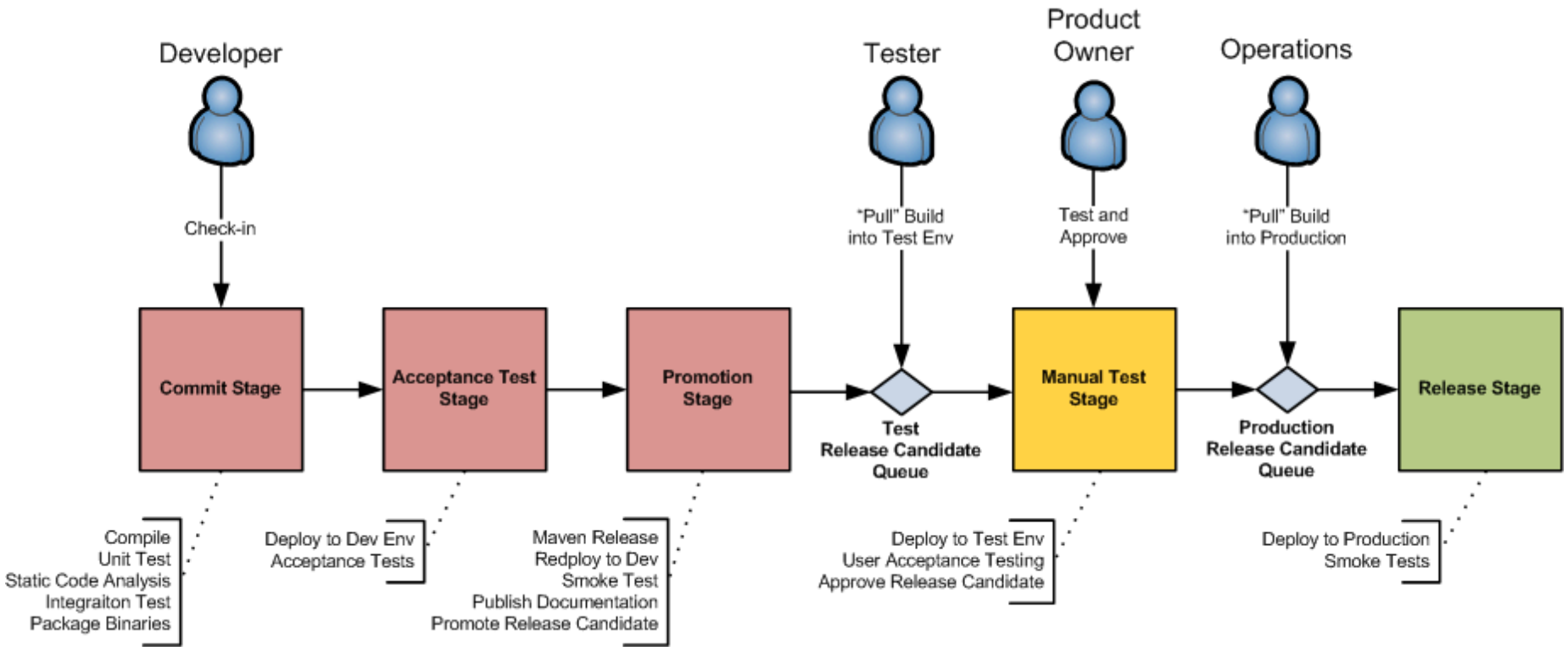
Record Type	Record Type Code	Is Valid?
ElectronicRetirementRecord	00	false
ElectronicRetirementRecord	01	true
ElectronicRetirementRecord	02	true
ElectronicRetirementRecord	03	true
ElectronicRetirementRecord	04	true
ElectronicRetirementRecord	05	true
ElectronicRetirementRecord	06	true
ElectronicRetirementRecord	07	false
ElectronicRetirementRecord	08	false

Results generated by concordion™
in 266279 ms on 20-Aug-2010 at 07:31:33 MDT

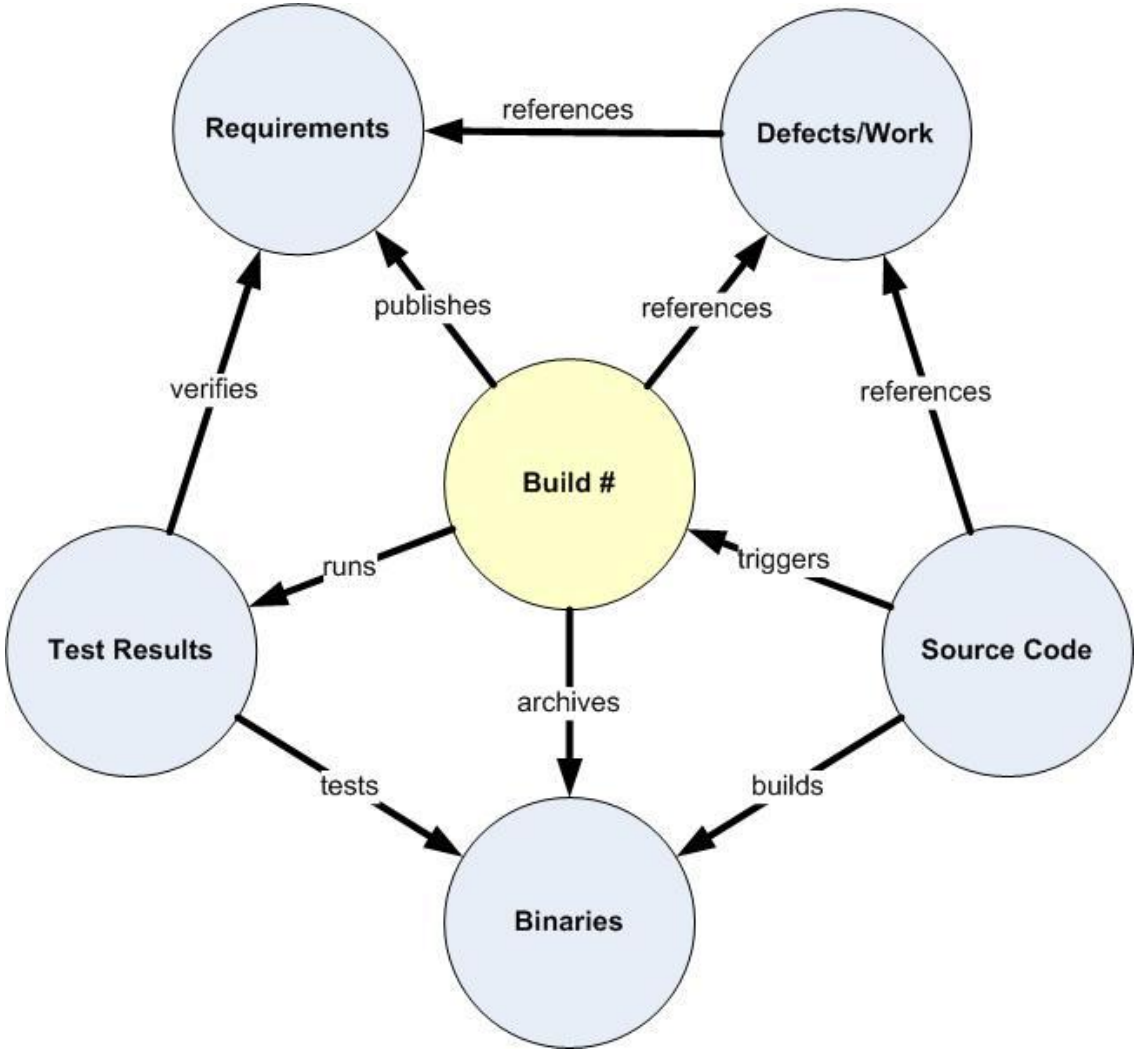
Deployment

http://flic.kr/p/y8

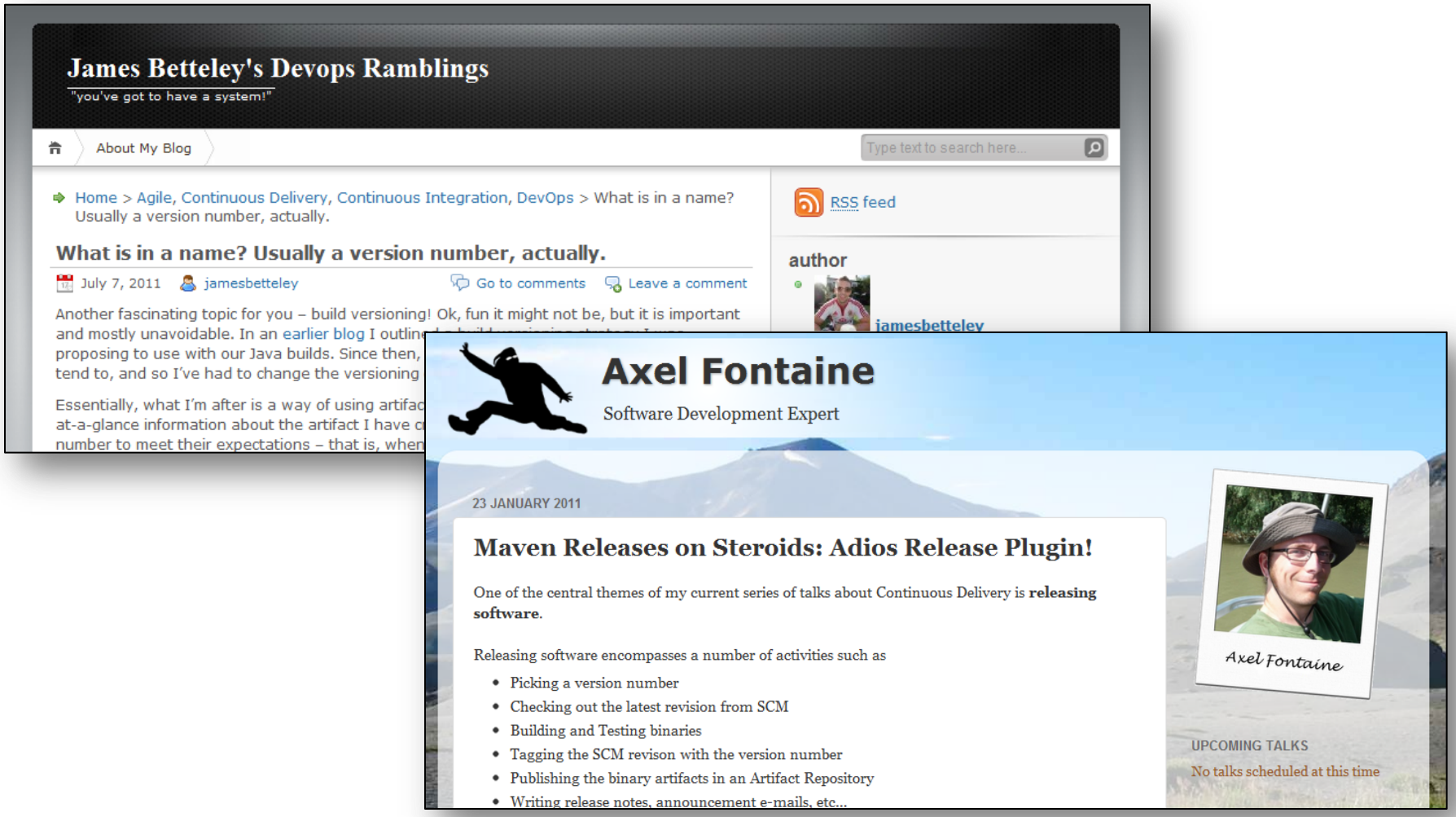
Build Pipelines



Single Identifier



Versioning


James Betteley's Devops Ramblings
"you've got to have a system!"
About My Blog
Type text to search here...
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 outlin
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 artifac
at-a-glance information about the artifact I have c
number to meet their expectations – that is, when
RSS feed
author
jamesbetteley
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 revison 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

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.chtpa.wikimedia.org (207.142.131.247) 56(84) bytes of data.

--- rr.chtpa.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$
```

Database Management

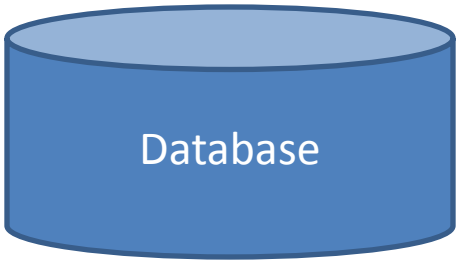
```xml
<?xml version="1.0" encoding="UTF-8" standalone="no"?>
<databaseChangeLog xmlns="http://www.liquibase.org/xml/ns/dbchangelog/1.9"
                   xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
                   xsi:schemaLocation="http://www.liquibase.org/xml/ns/dbchangelog/1.9 http://www.

    <changeSet author="Mike McGarr" id="1262122929632-1">
        <createTable tableName="BATCH_JOB_EXECUTION">
            <column name="JOB_EXECUTION_ID" type="NUMBER(22,0)">
                <constraints nullable="false" primaryKey="true" primaryKeyName="SYS_C0034123"/>
            </column>
            <column name="VERSION" type="NUMBER(22,0)"/>
            <co
```

```xml
<?xml version="1.0" encoding="UTF-8"?>

<databaseChangeLog
  xmlns="http://www.liquibase.org/xml/ns/dbchangelog/1.9"
  xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
  xsi:schemaLocation="http://www.liquibase.org/xml/ns/dbchangelog/1.9
        http://www.liquibase.org/xml/ns/dbchangelog/dbchangelog-1.9.xsd">

    <preConditions onFail="HALT">
        <dbms type="oracle" />
    </preConditions>

    <include file="pre/setup.xml"/>
    <include file="r0.2/releasechanges.xml"/>
    <include file="r0.3/releasechanges.xml"/>
    <include file="r0.4/releasechanges.xml"/>
    <include file="r0.5/releasechanges.xml"/>
    <include file="r0.5.1/releasechanges.xml"/>
    <include file="r1.0/releasechanges.xml"/>
    <include file="r1.2/releasechanges.xml"/>

</databaseChangeLog>
```

```xml
        </createTable>
    </changeSet>
```

Runtime Configuration

ESCAPE



Infrastructure Management

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"],
    }
```

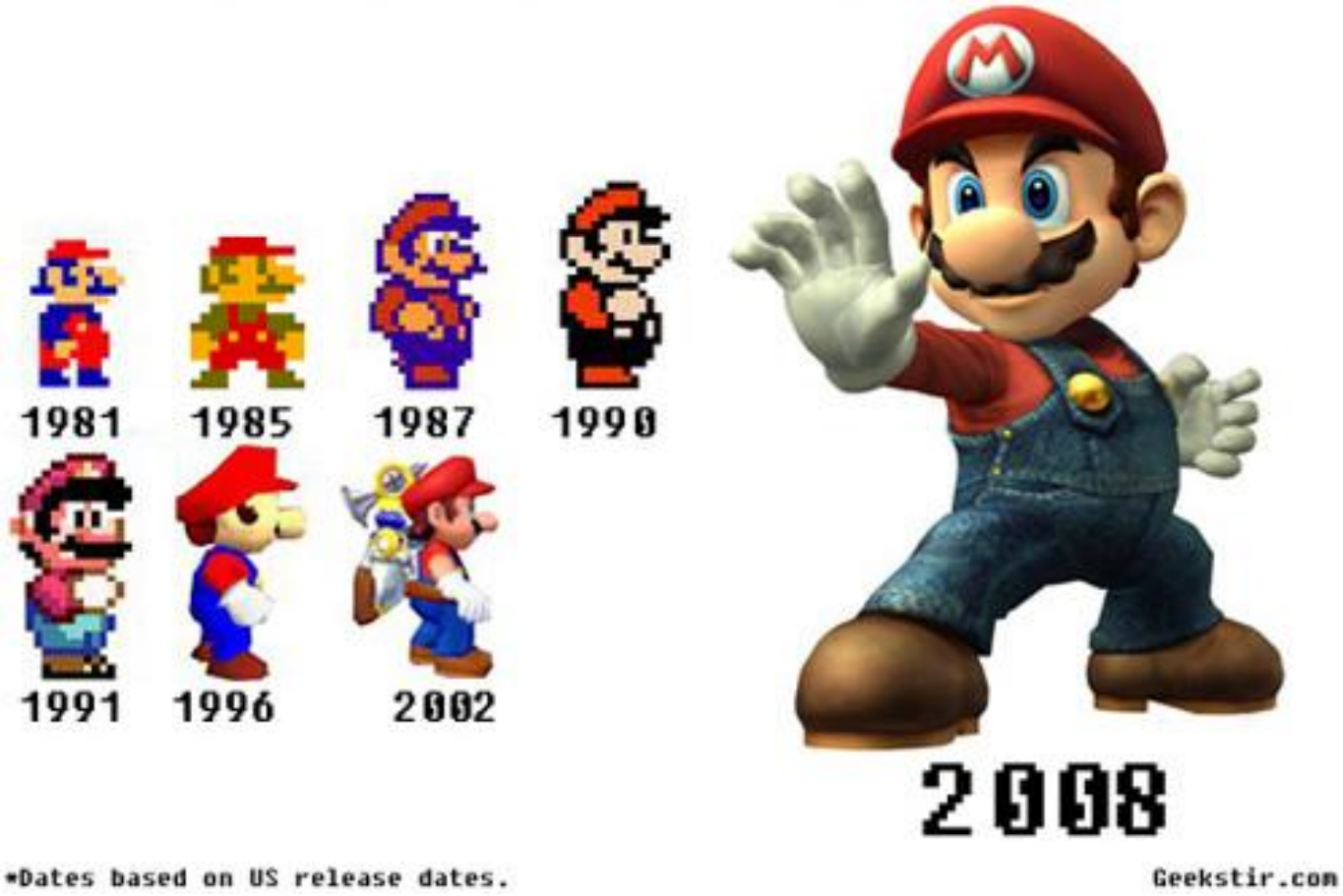
Vagrant

```
$ 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
```

Optimizing
http://flic.kr/p/6hDAEK

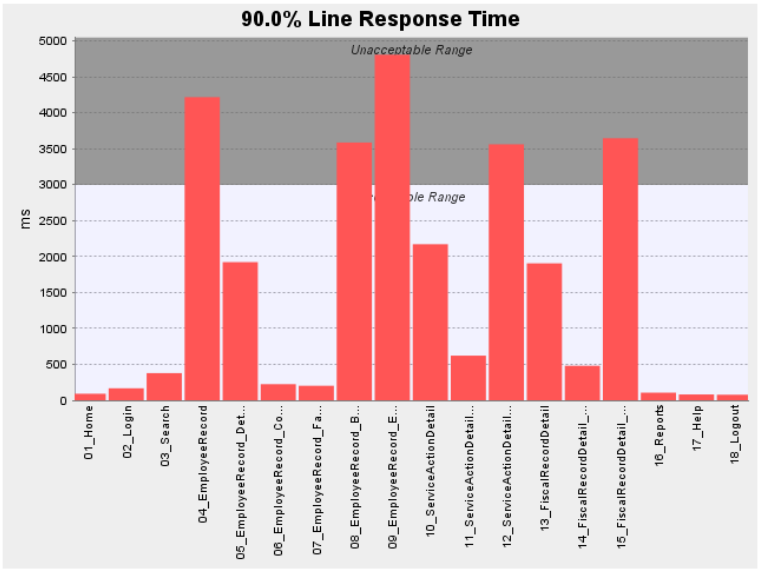
Evolutionary Design



Performance Testing

Performance Testing

JMeter Report



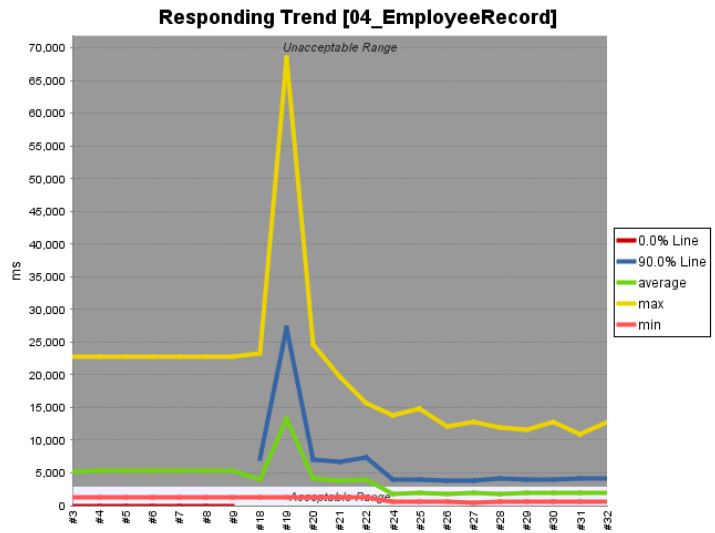
Overall JMeter Summary

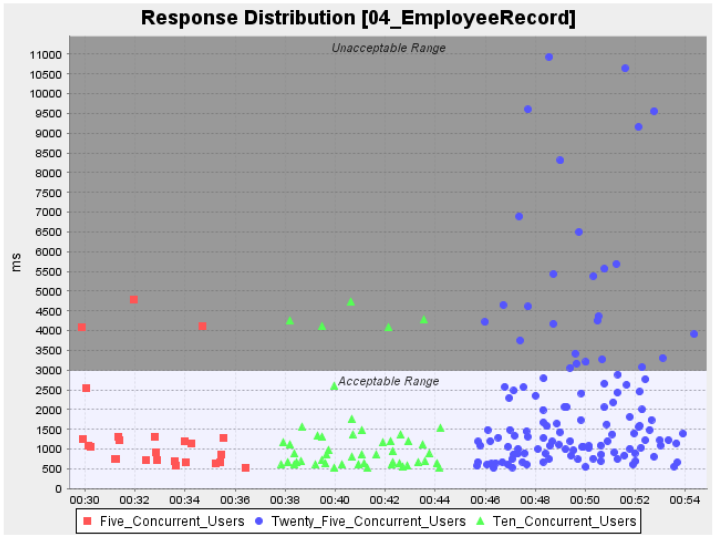
URI	# samples	Average (ms)	Min (ms)	Max (ms)	Percentile (ms)	Errors (%)
All URIs	3601	692	15	14452	61	0

JMeter Breakdown by URI

URI	# samples	Average (ms)	Min (ms)	Max (ms)	Percentile (ms)	Errors (%)
01_Home	201	117	15	10888	91	0
02_Login	200	100	43	4418	167	0
03_Search	200	193	82	1514	378	0
04_EmployeeRecord	200	1887	520	10935	4217	0
05_EmployeeRecord_Details	200	876	159	4651	1922	0
06_EmployeeRecord_ContactInfo	200	158	65	2344	224	0
07_EmployeeRecord_FamilyInfo	200	109	53	802	202	0
08_EmployeeRecord_BackToSummary	200	1446	160	9842	3586	0
09_EmployeeRecord_ExpandAll	200	1962	182	14452	4807	0
10_ServiceActionDetail	200	1048	254	4476	2171	0
11_ServiceActionDetail_Next	200	316	137	2780	621	0
12_ServiceActionDetail_BackToSummary	200	1430	191	11535	3561	0
13_FiscalRecordDetail	200	897	177	6236	1905	0

URI 04_EmployeeRecord





Monitoring

Nagios®

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

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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
- *Introducing BDD, by Dan North* – http://dannorth.net/introducing-bdd/
- *Agile Manifesto* – http://agilemanifesto.org/
- *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 Steriods, 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/
- 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/