Building a Continuous Delivery Pipeline with

and

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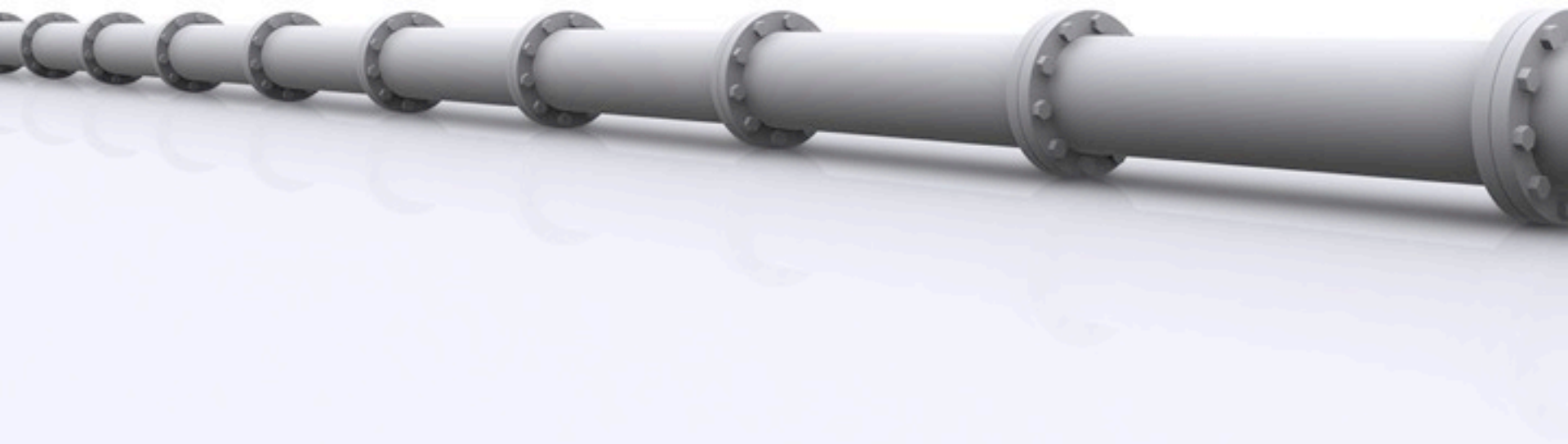
@bmuschko

Releases don’t have to be painful

Continuous Delivery

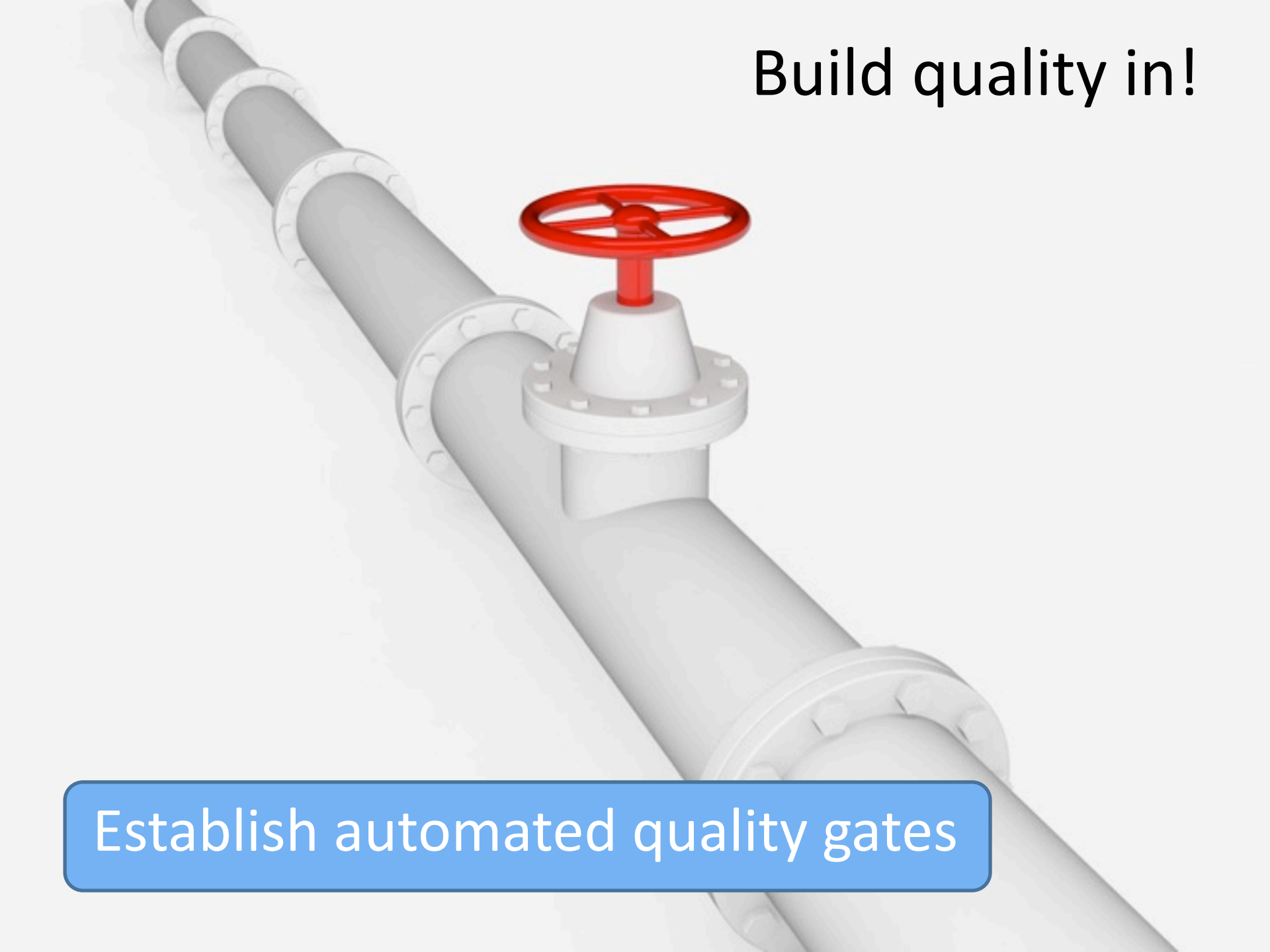
Deliver software fast and frequently

Build pipeline

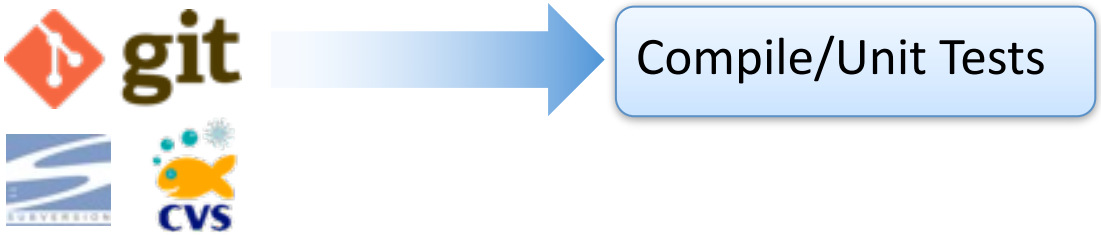


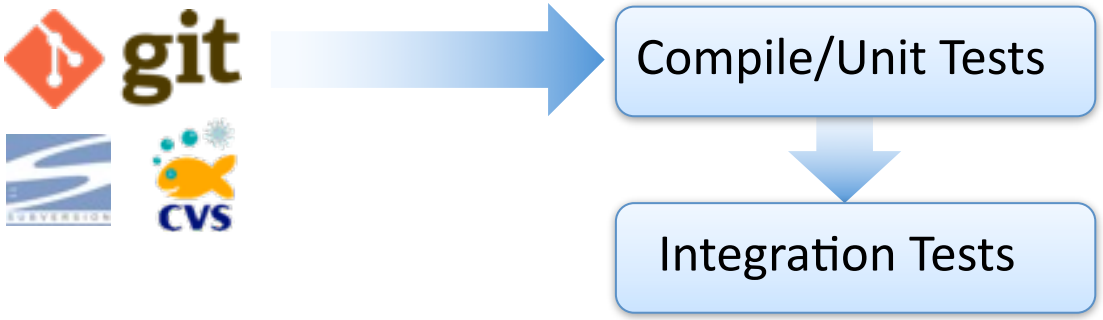
Automated manifestation of delivery process

Build quality in!



Establish automated quality gates


git
CVS
Compile/Unit Tests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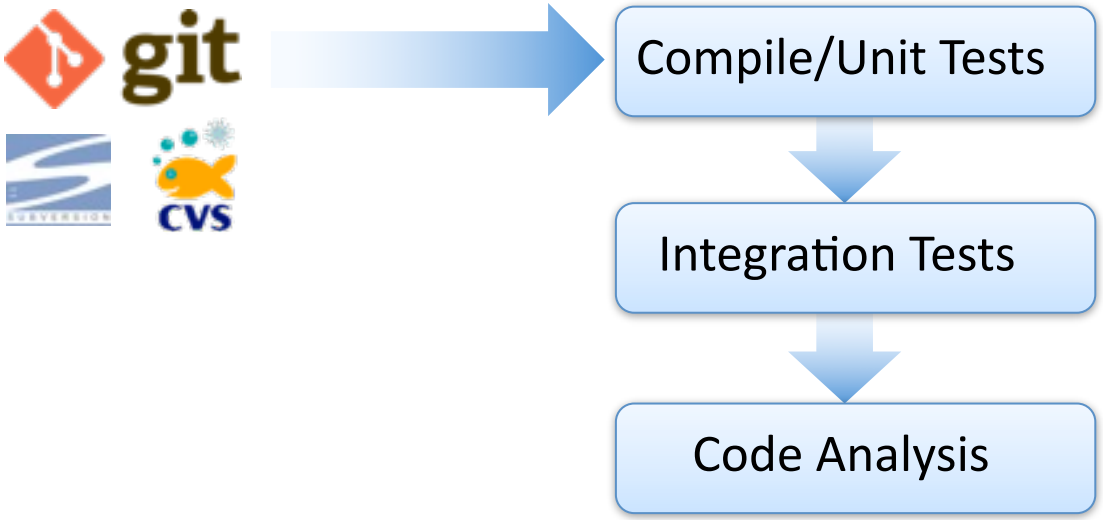
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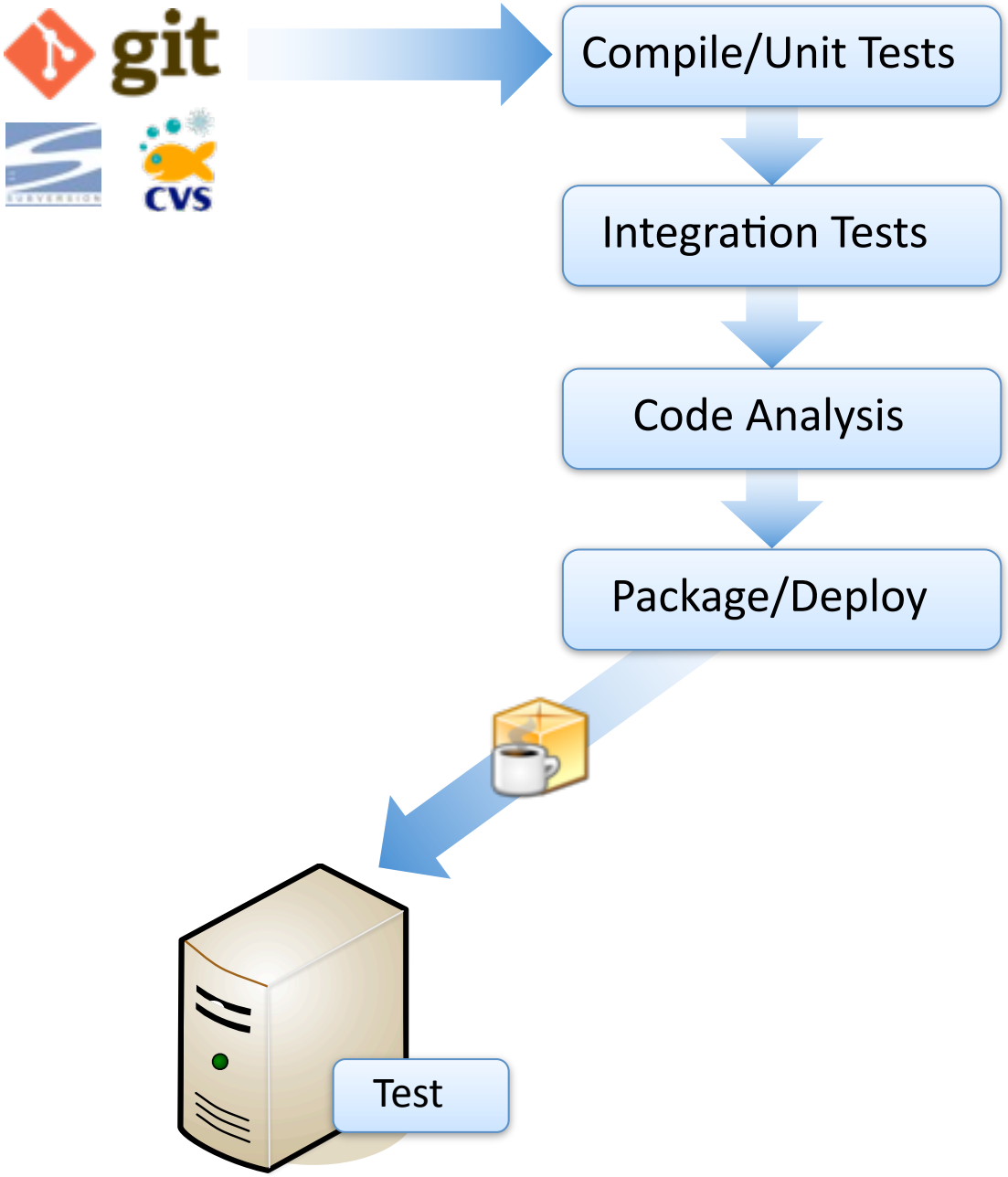
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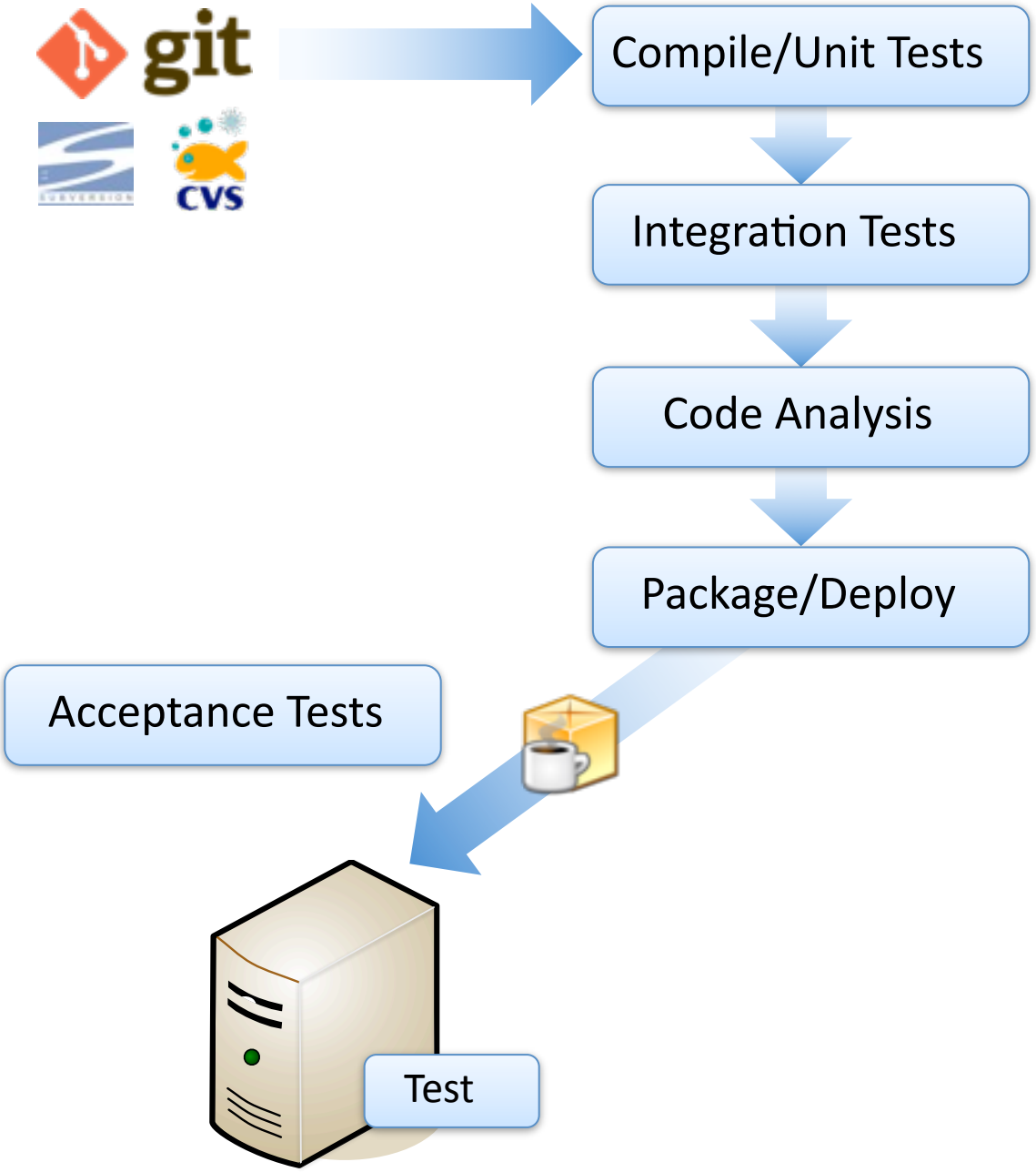
Package/Deploy
Test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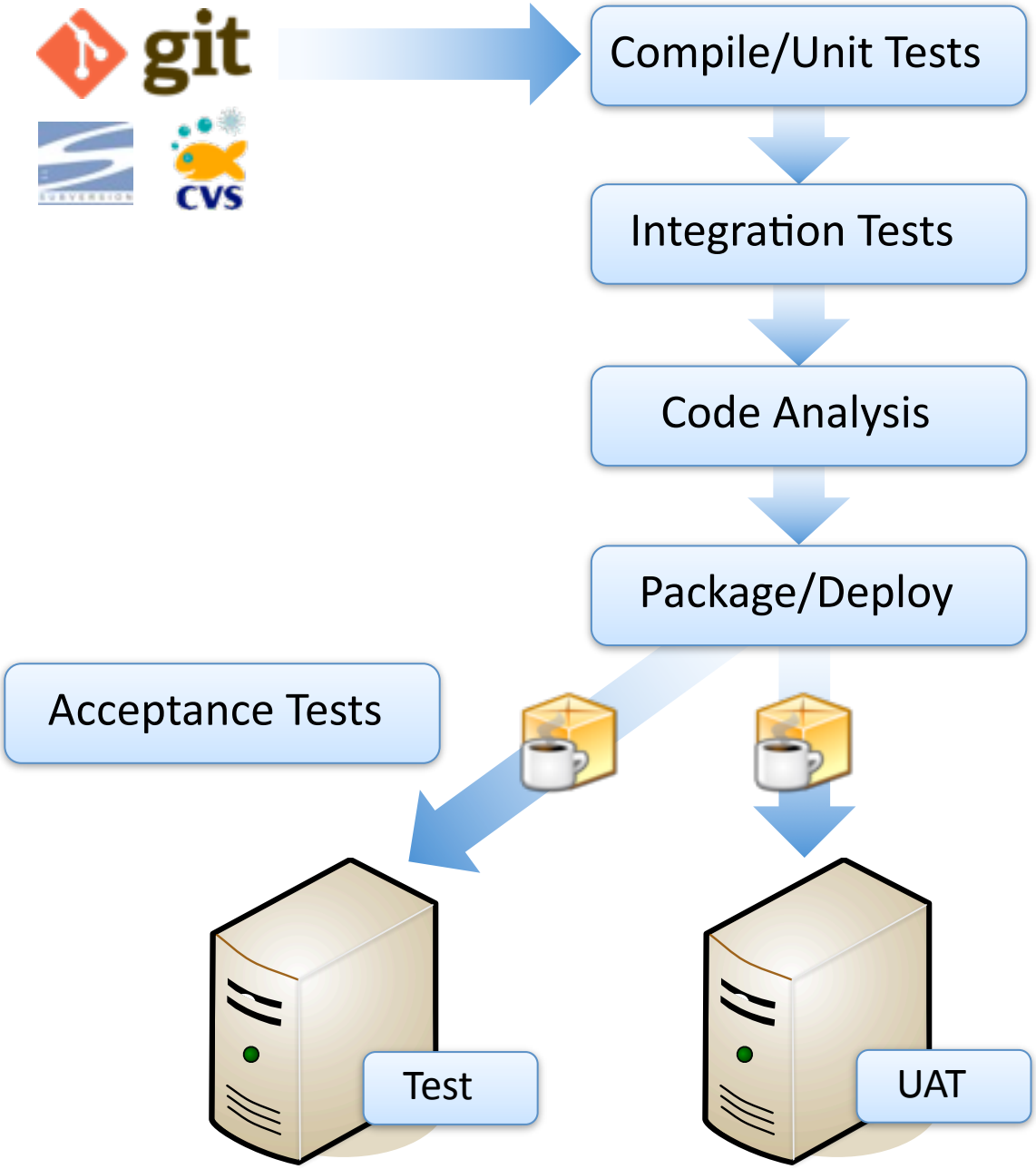
Integration Tests
Code Analysis
Package/Deploy
Acceptance Tests
Test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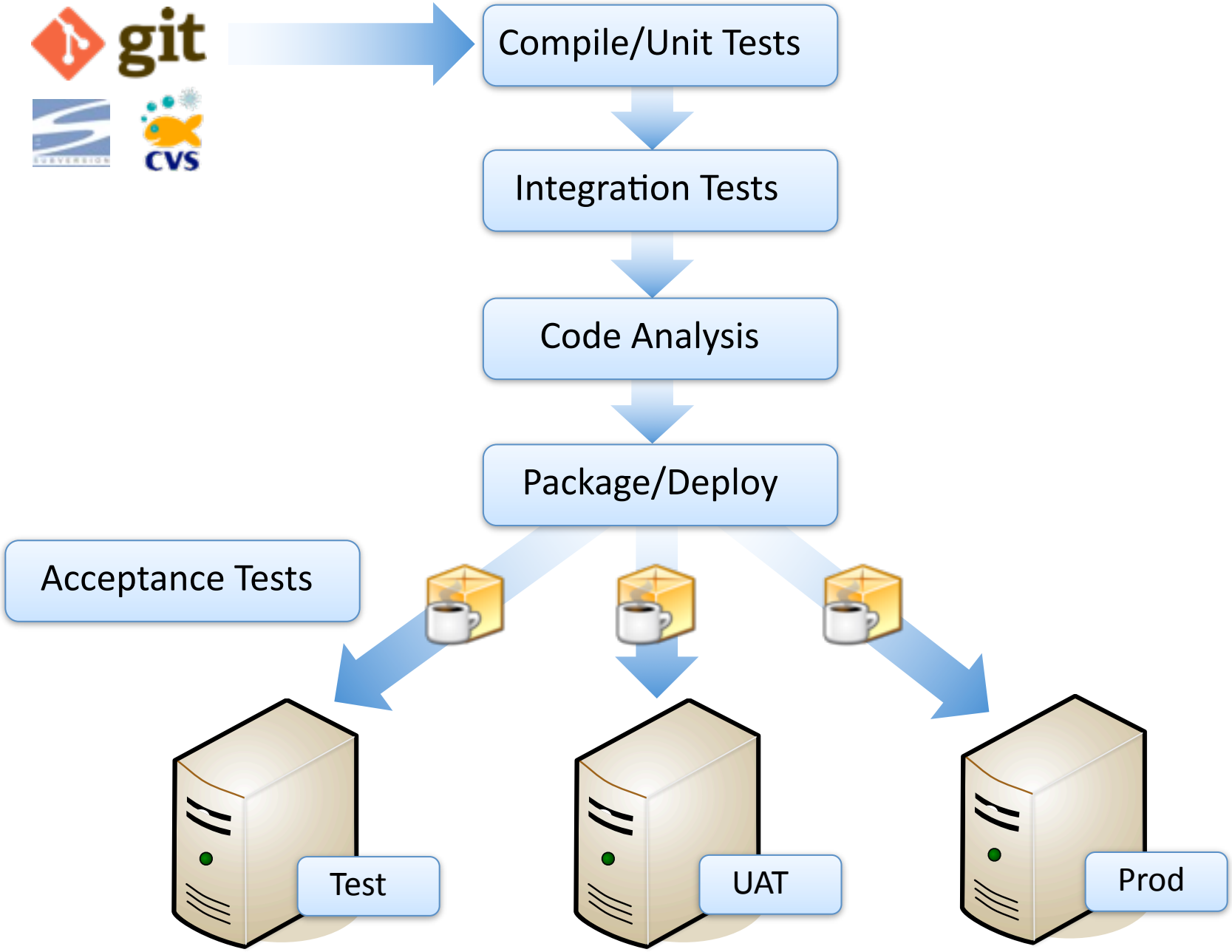
UAT


git
CVS
Compile/Unit Tests
Integration Tests
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Test
UAT
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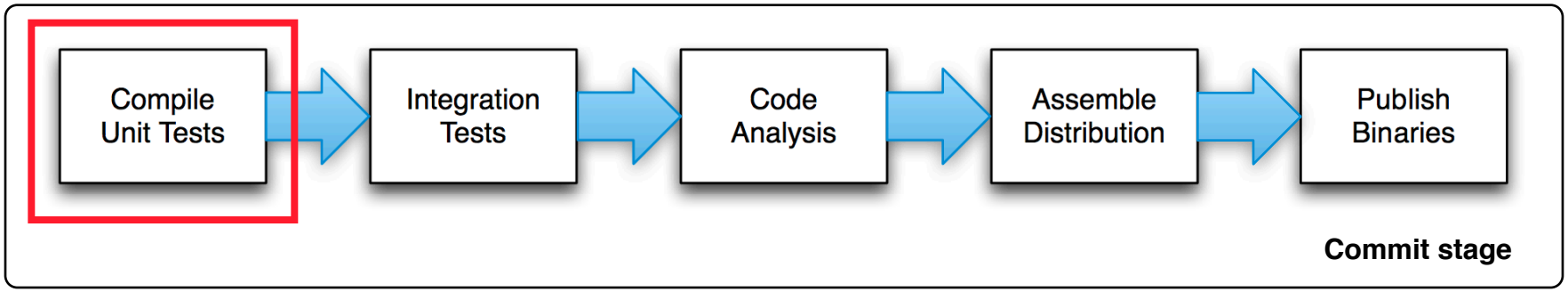
Continuous Delivery
!

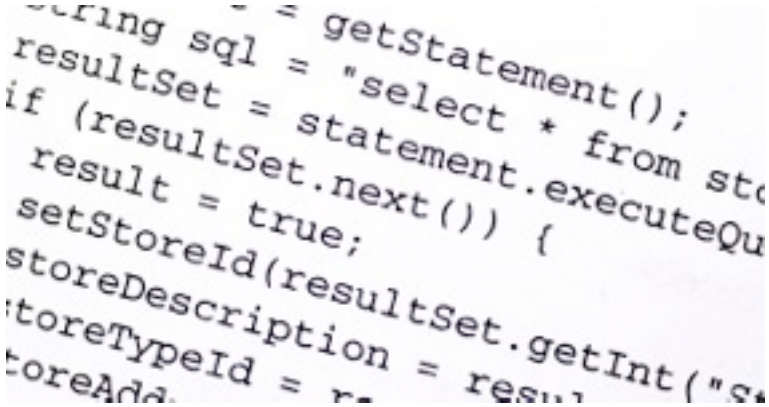

Continuous Delivery
!
But how?

Why  ?

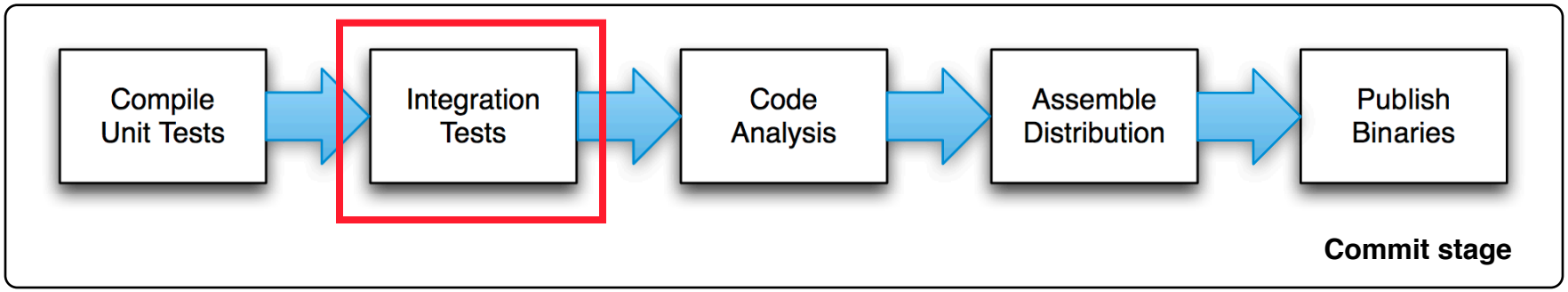
Commit stage: Compile/unit tests



- Rapid feedback (< 5 mins)
- Run on every VCS check-in
- Priority: fix broken build

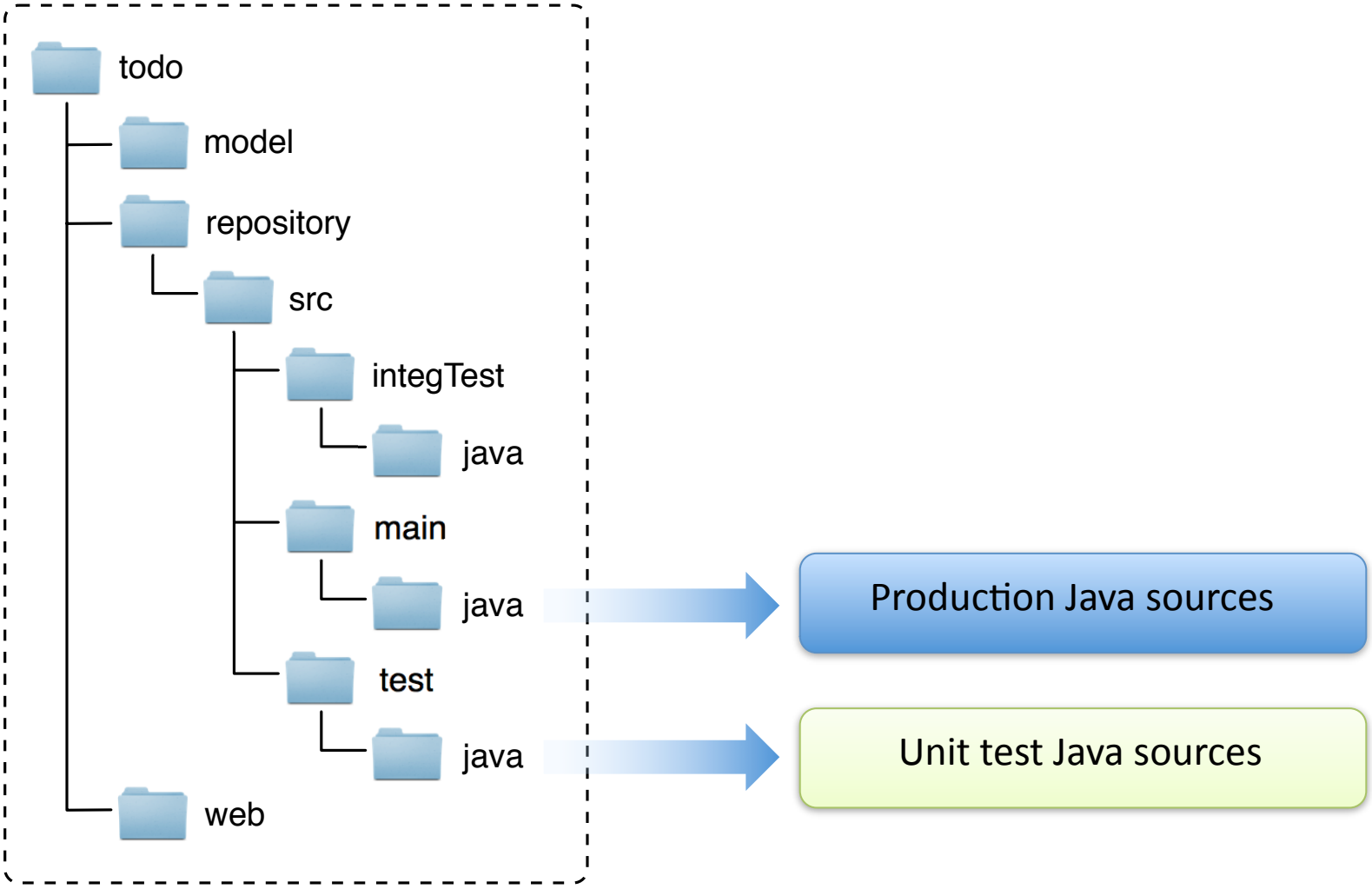


Commit stage: Integration tests

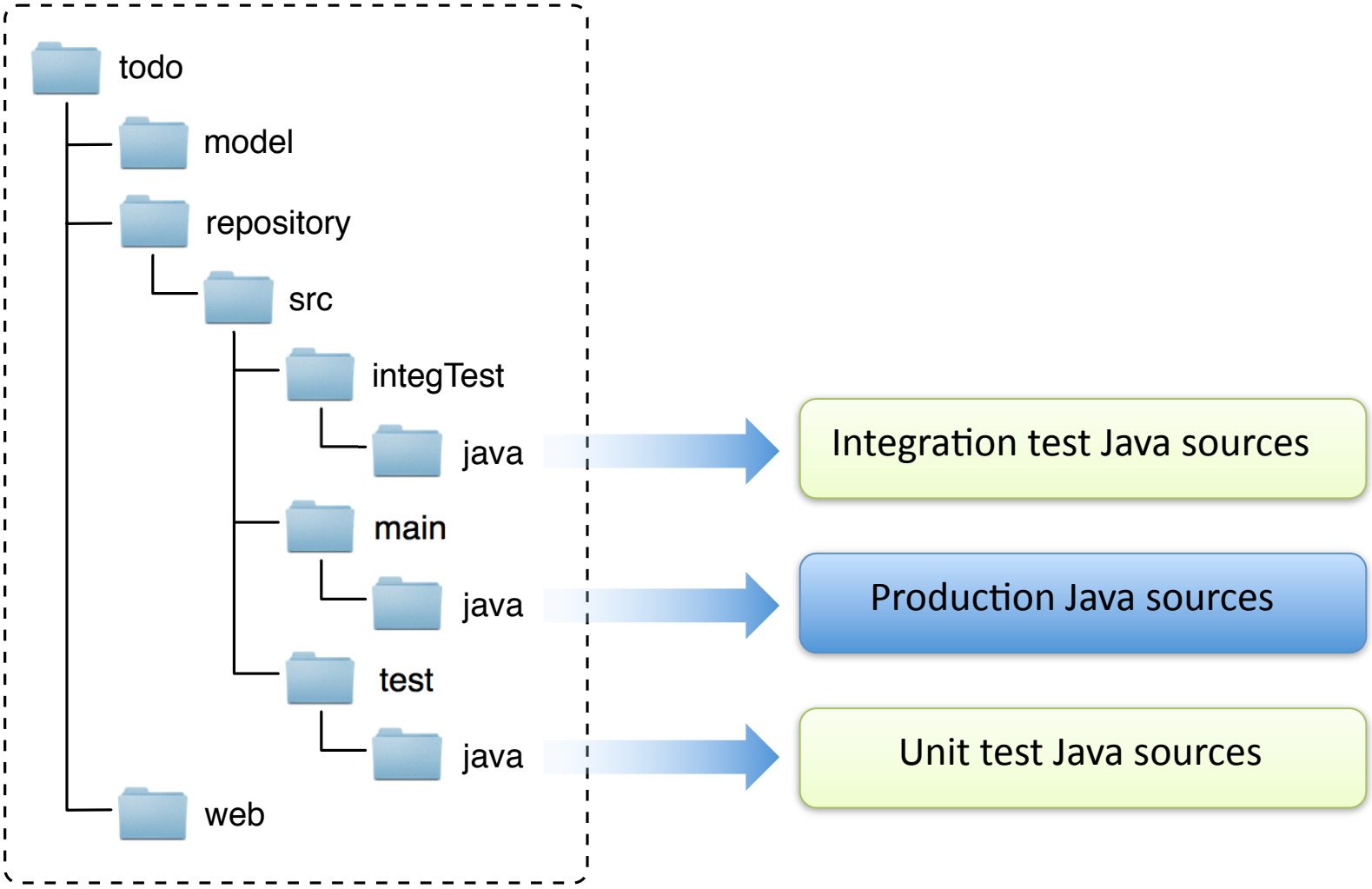


- Long running tests
- Require environment setup
- Hard to maintain

Separate tests in project layout



Separate tests in project layout



Separate tests with SourceSets

```
sourceSets {
    integrationTest {
        java.srcDir file('src/integTest/java')
        resources.srcDir file('src/integTest/resources')
        compileClasspath = sourceSets.main.output + configurations.testRuntime
        runtimeClasspath = output + compileClasspath
    }
}

task integrationTest(type: Test) {
    description = 'Runs the integration tests.'
    group = 'verification'
    testClassesDir = sourceSets.integrationTest.output.classesDir
    classpath = sourceSets.integrationTest.runtimeClasspath
    testResultsDir = file("$testResultsDir/integration")
}
```

Separate tests with SourceSets

Set source and resources directory

```
sourceSets {
    integrationTest {
        java.srcDir file('src/integTest/java')
        resources.srcDir file('src/integTest/resources')
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Set source and resources directory

Set compile and runtime classpath

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Set source and resources directory

Set compile and runtime classpath

Custom test results directory

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    }
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task integrationTest(type: Test) {
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    classpath = sourceSets.integrationTest.runtimeClasspath
    testResultsDir = file("$testResultsDir/integration")
}
```

Set source and resources directory

Set compile and runtime classpath

Custom test results directory

```
gradlew integrationTest
```

JACOCO
Java Code Coverage

On-the-fly bytecode instrumentation

No modification to source or bytecode

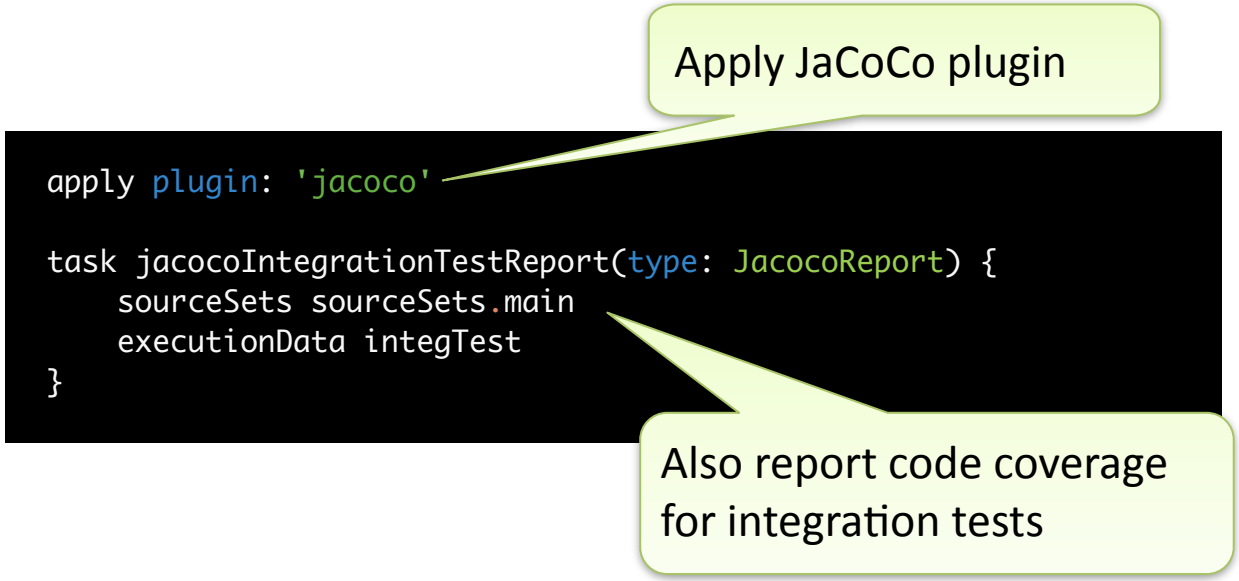
Code coverage with JaCoCo

```
apply plugin: 'jacoco'

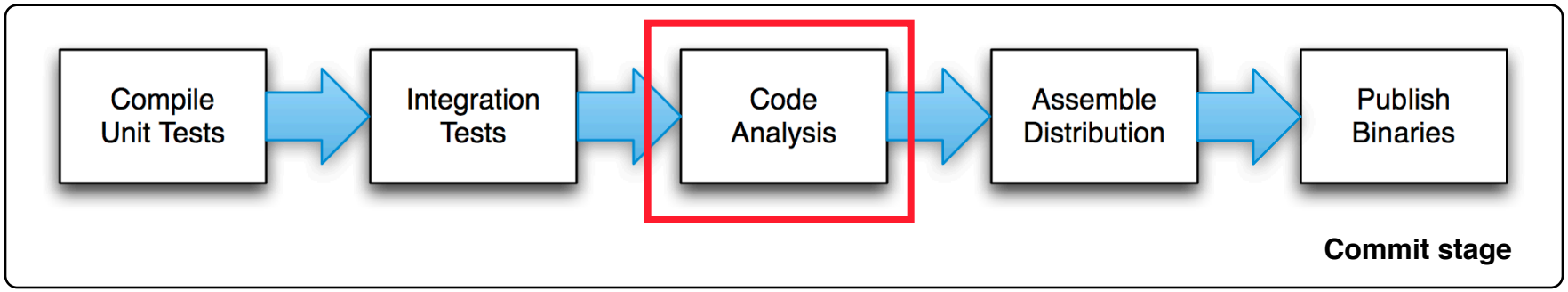
task jacocoIntegrationTestReport(type: JacocoReport) {
    sourceSets sourceSets.main
    executionData integTest
}
```

Code coverage with JaCoCo

Code coverage with JaCoCo

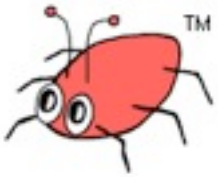


Commit stage: Code analysis



- Perform code health check
- Fail build for low quality
- Record progress over time

Static code analysis tools



FindBugs

Checkstyle


```
apply plugin: 'pmd'

pmd {
    ignoreFailures = true
}

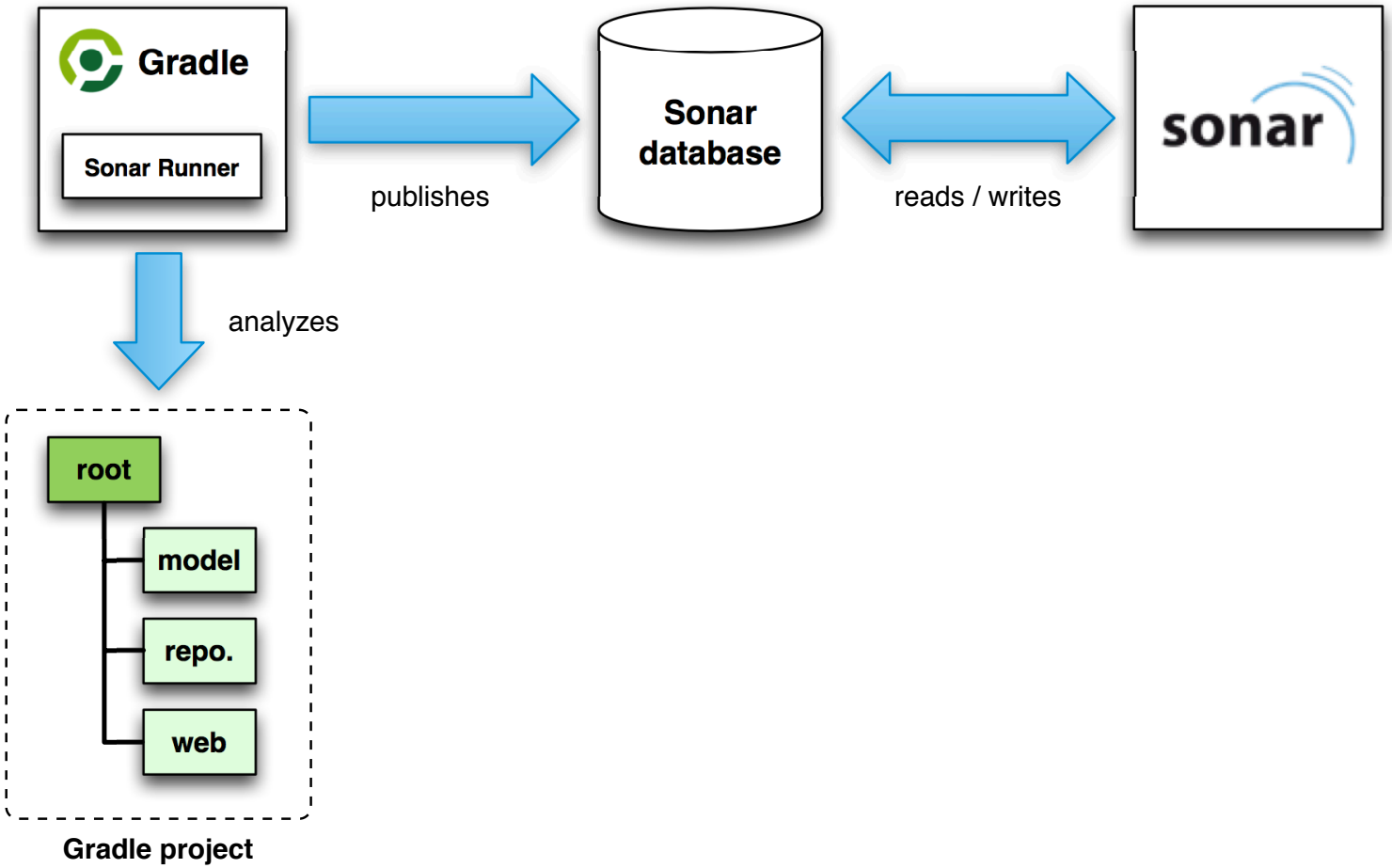
tasks.withType(Pmd) {
    reports {
        xml.enabled = false
        html.enabled = true
    }
}
```

```
apply plugin: 'jdepend'

jdepend {
    toolVersion = '2.9.1'
    ignoreFailures = true
}
```

```
gradlew check
```

Measure quality over time with Sonar



Applying the Sonar Runner plugin

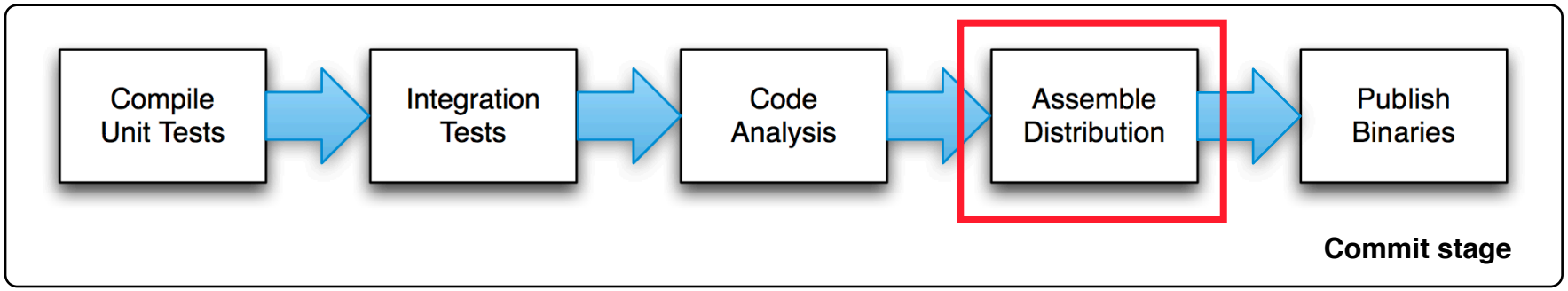
```
apply plugin: "sonar-runner"

sonarRunner {
    sonarProperties {
        property "sonar.host.url", "http://my.server.com"
        property "sonar.jdbc.url", "jdbc:mysql://my.server.com/sonar"
        property "sonar.jdbc.driverClassName", "com.mysql.jdbc.Driver"
        property "sonar.jdbc.username", "Fred Flintstone"
        property "sonar.jdbc.password", "very clever"
    }
}

subprojects {
    sonarRunner {
        sonarProperties {
            property "sonar.sourceEncoding", "UTF-8"
        }
    }
}
```

```
gradlew sonarRunner
```

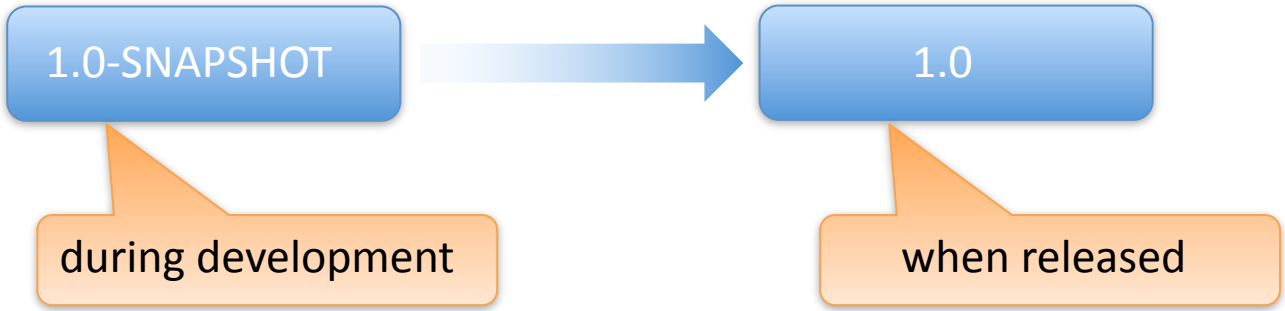
Commit stage: Assemble distribution



- Exclude env. configuration
- Include build information
- Choose versioning strategy

Versioning strategy

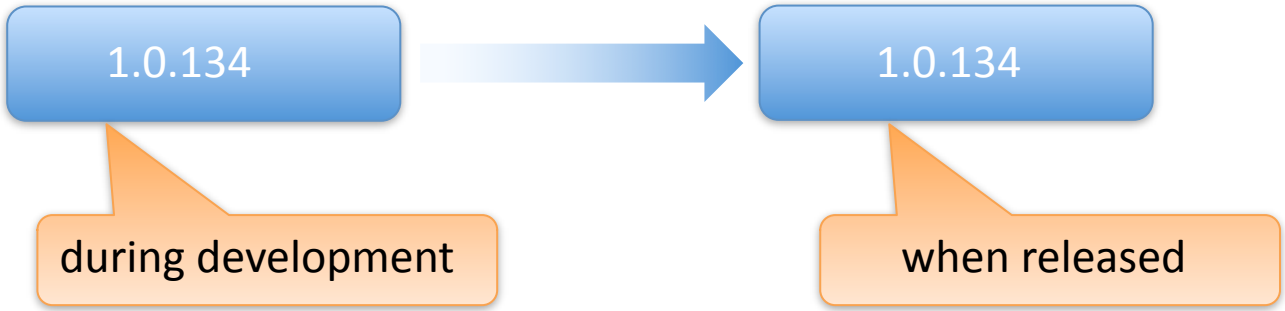
…the Maven way



Change version with Maven Release plugin

Versioning strategy

…the Continuous Delivery way



1.0.134

Project version number

Jenkins build number

Versioning strategy

…implemented with Gradle

```
ext.buildTimestamp = new Date().format('yyyy-MM-dd HH:mm:ss')

version = new ProjectVersion(1, 0, System.env.SOURCE_BUILD_NUMBER)

class ProjectVersion {
    Integer major
    Integer minor
    String build

    ProjectVersion(Integer major, Integer minor, String build) {
        this.major = major
        this.minor = minor
        this.build = build
    }

    @Override
    String toString() {
        String fullVersion = "$major.$minor"

        if(build) {
            fullVersion += ".$build”
        }

         fullVersion
     }
}
```

Versioning strategy

…implemented with Gradle

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ext.buildTimestamp = new Date().format('yyyy-MM-dd HH:mm:ss')

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Jenkins Build Number

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}
```

Jenkins Build Number

Builds version
String representation

Packaging the deployable artifact

```
project(':web') {
    apply plugin: 'war'

    task createBuildInfoFile << {
        def buildInfoFile = new File("$buildDir/build-info.properties")
        Properties props = new Properties()
        props.setProperty('version', project.version.toString())
        props.setProperty('timestamp', project.buildTimestamp)
        props.store(buildInfoFile.newWriter(), null)
    }

    war {
        dependsOn createBuildInfoFile
        baseName = 'todo'

        from(buildDir) {
            include 'build-info.properties'
            into('WEB-INF/classes')
        }
    }
}
```

Packaging the deployable artifact

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Creates file containing build information

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Include build info file Into WAR distribution

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    war {
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        baseName = 'todo'

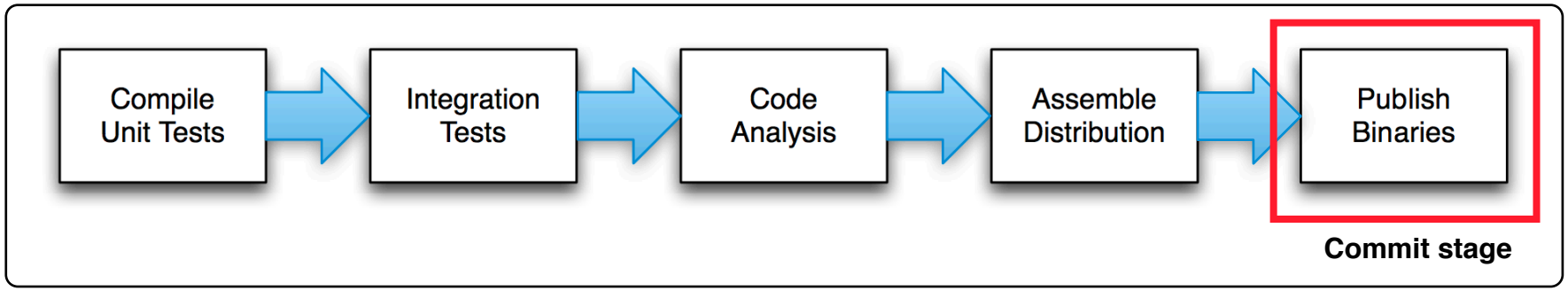
        from(buildDir) {
            include 'build-info.properties'
            into('WEB-INF/classes')
        }
    }
}
```

Creates file containing build information

Include build info file Into WAR distribution

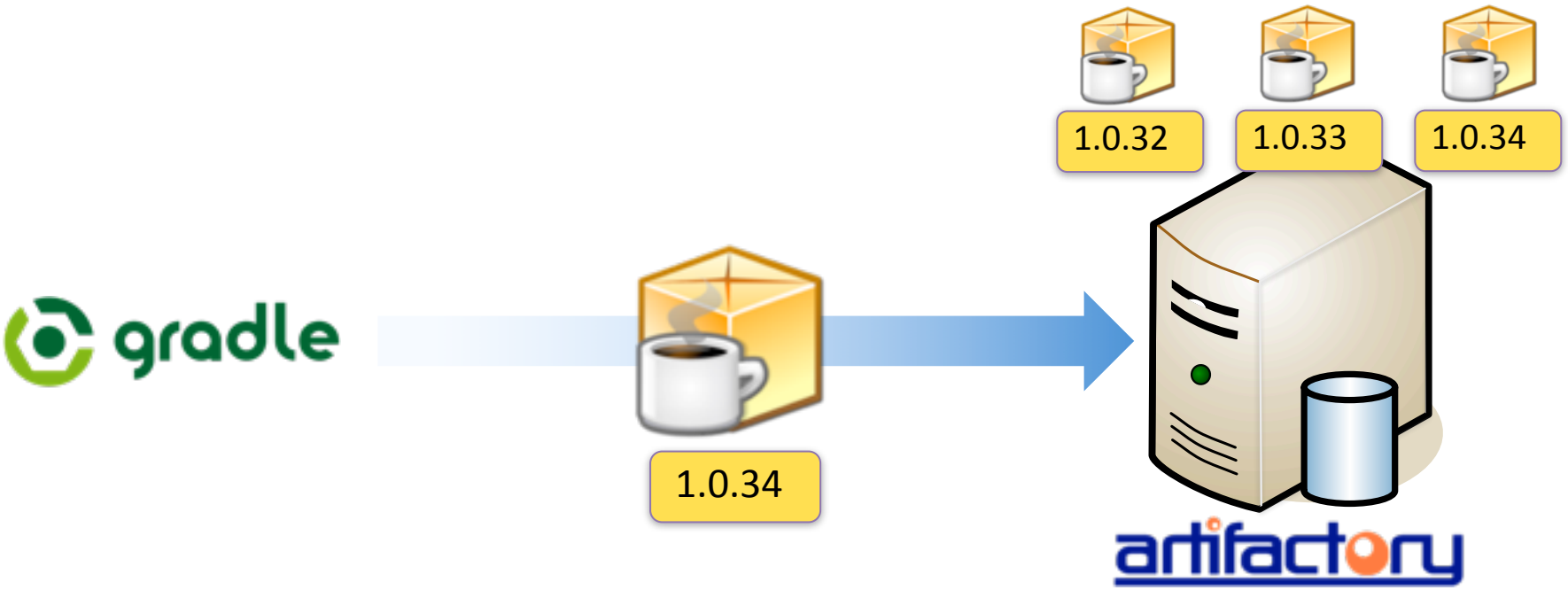
```
gradlew assemble
```

Commit stage: Publish binaries



- Version artifact(s)
- Use binary repository
- Publish once, then reuse

Publishing the deployable artifact



Using the Maven Publishing plugin

```
apply plugin: 'maven-publish'

ext.fullRepoUrl = "$config.binaryRepository.url/$config.binaryRepository.name"

publishing {
    publications {
        webApp(MavenPublication) {
            from components.web
        }
    }

    repositories {
        maven {
            url fullRepoUrl

            credentials {
                username = config.binaryRepository.username
                password = config.binaryRepository.password
            }
        }
    }
}
```

Using the Maven Publishing plugin

Build repository URL from configuration

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apply plugin: 'maven-publish'

ext.fullRepoUrl = "$config.binaryRepository.url/$config.binaryRepository.name"

publishing {
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        }
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```

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```

Assign publication name and component

Using the Maven Publishing plugin

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            }
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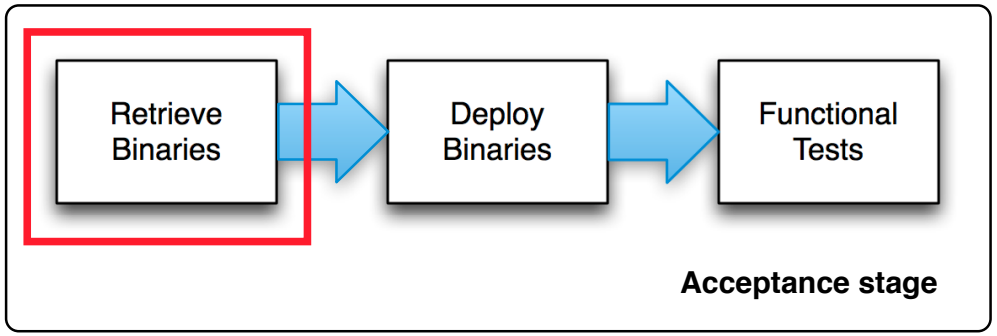
    }
}
```

Assign publication name and component

```
gradlew publish
```

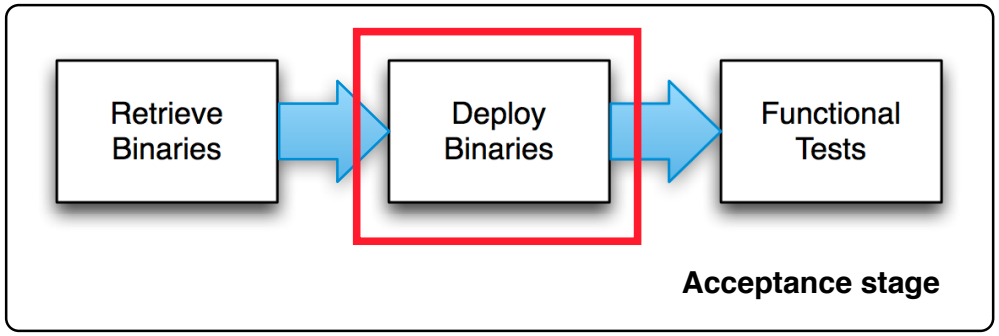
Acceptance stage: Retrieve binaries



Request versioned artifact

Store in temp. directory

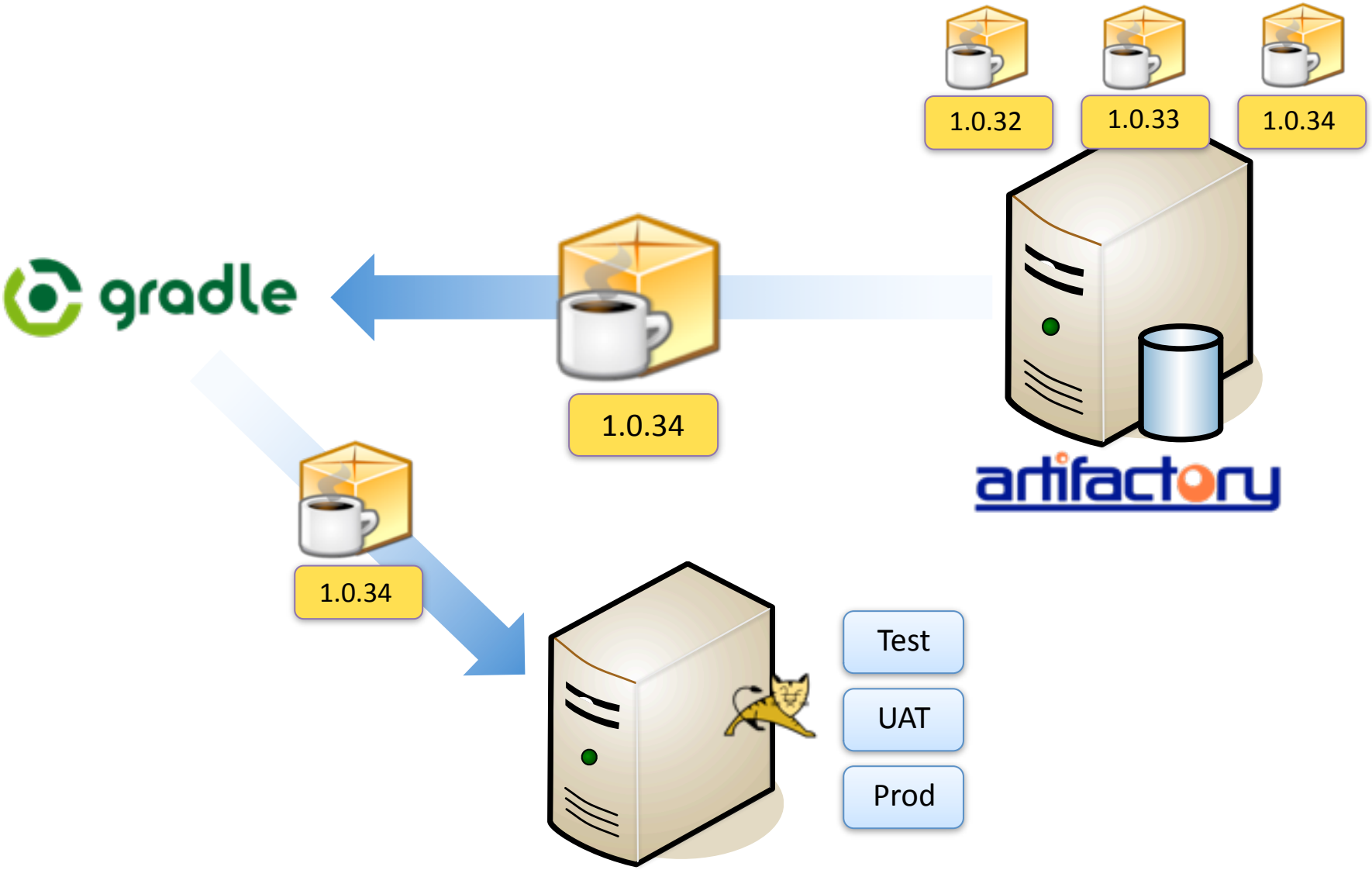
Acceptance stage: Deploy binaries



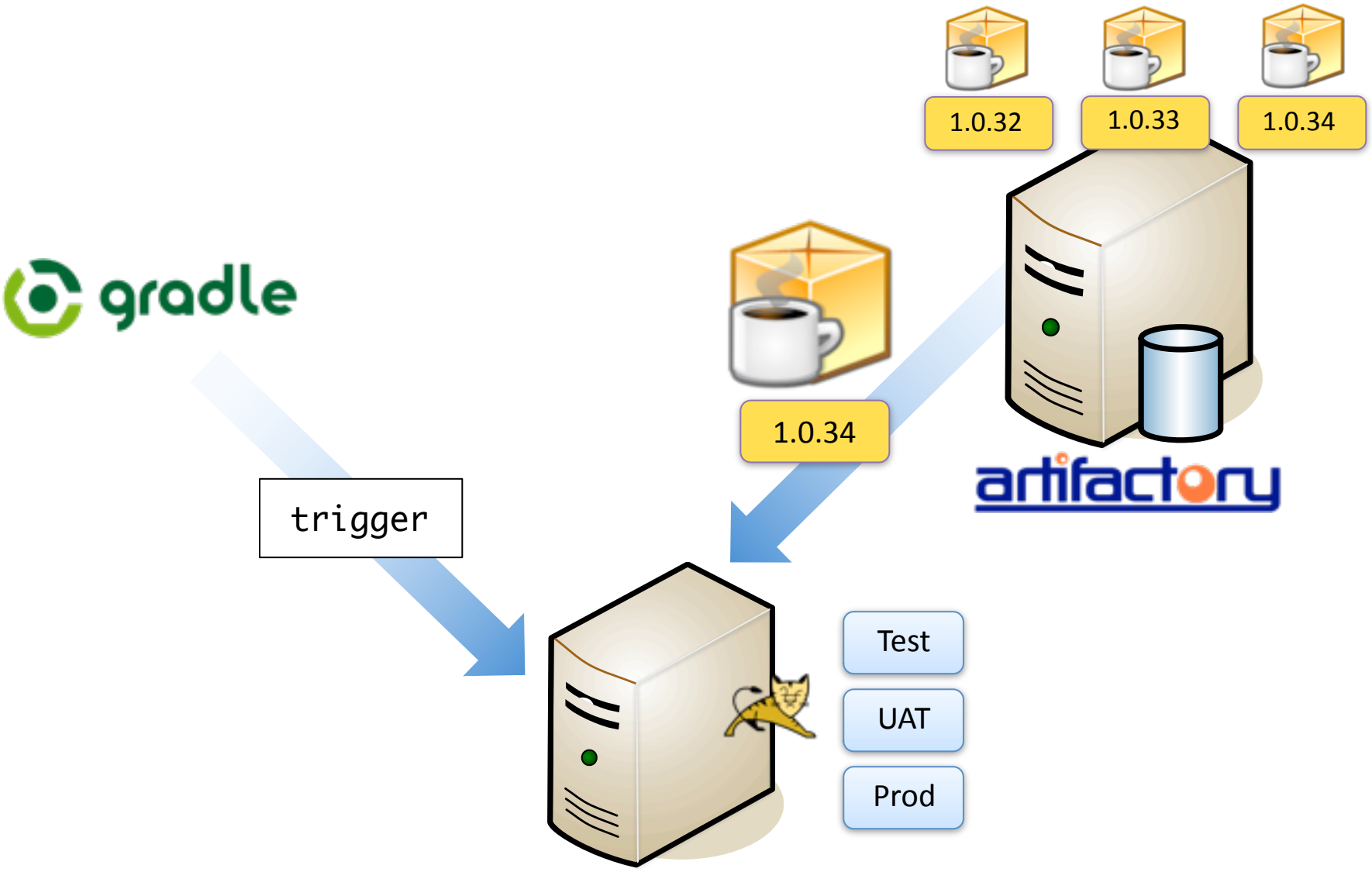
- Deployment on request
- Make it a reliable process
- Use process for all envs

Deployment is often more than just copying a file

Push deployment



Pull deployment



Remote command execution with plugin


```
apply plugin: 'ssh'

remotes {
    localhost {
        host = 'localhost'
        user = System.properties['user.name']
        identity = file("${System.properties['user.home']}/.ssh/id_rsa")
    }
}

task deploy(type: SshTask) {
    session(remotes.localhost) {
        execute('sudo -u tomcat $tomcatRemoteDir/bin/shutdown.sh')
        execute('sudo -u tomcat rm -rf $tomcatRemoteDir/webapps/myapp')
        ...
    }
}
```

Remote command execution with plugin

Define hosts configuration

ssh

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remotes {
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task deploy(type: SshTask) {
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        ...
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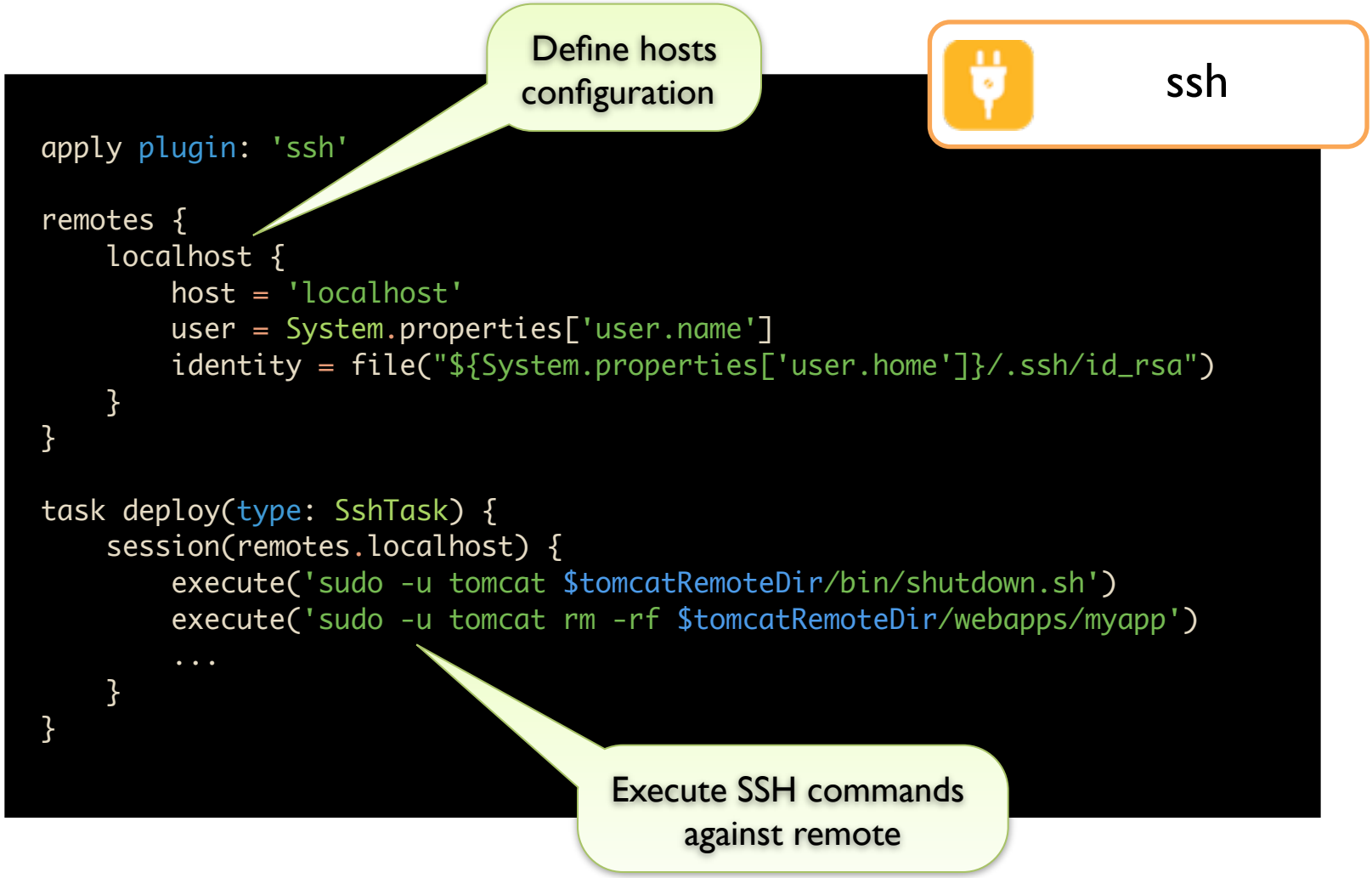
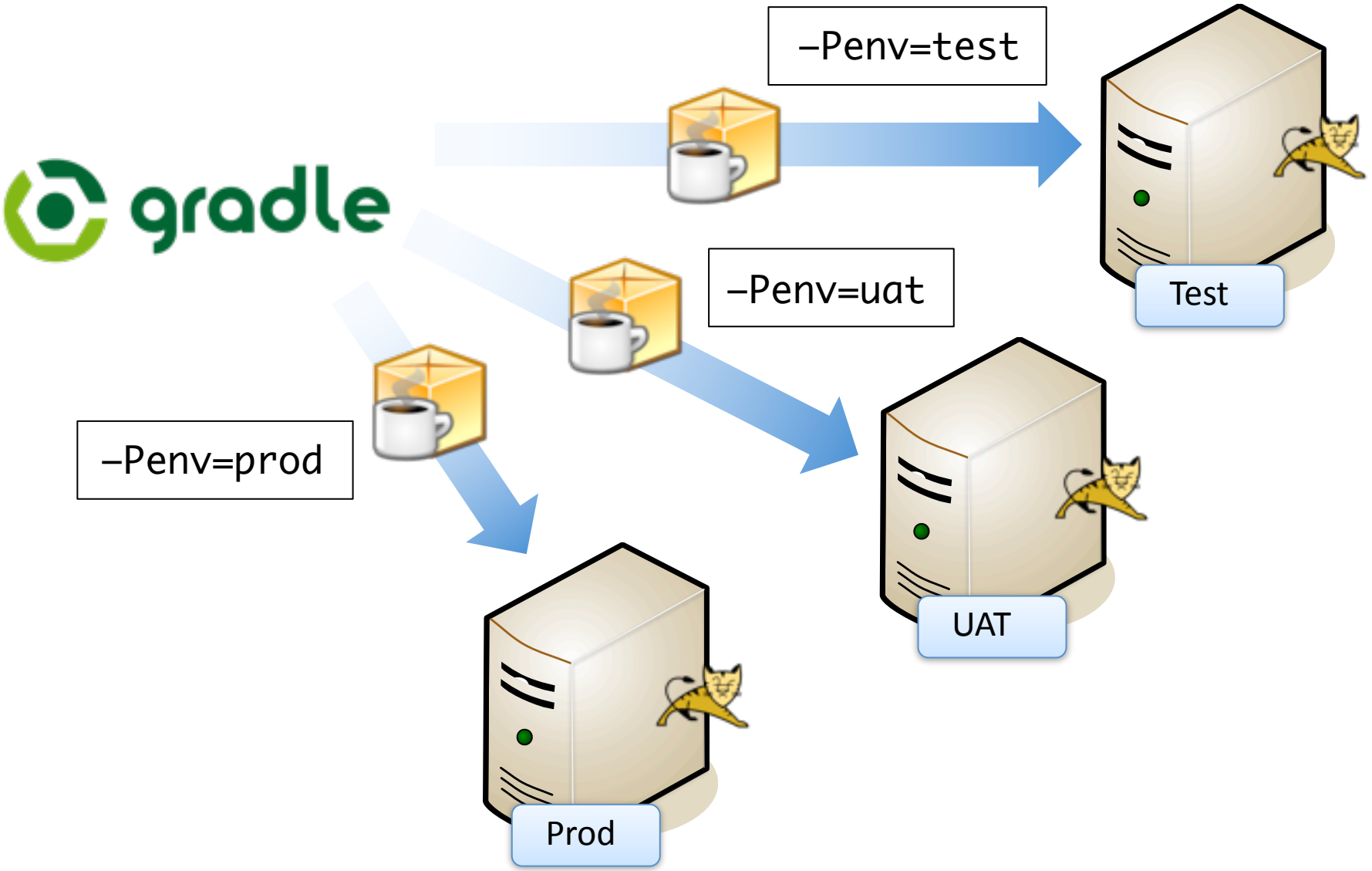
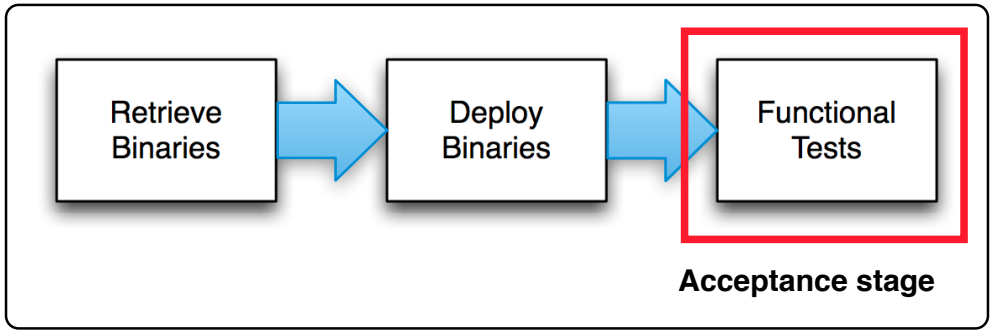


Deploying to multiple environments



Acceptance stage: Functional tests



- Test all UI permutations
- Test important use cases
- Run against different envs

Automate most important use cases as functional tests

```
task functionalTest(type: Test) {
    testClassesDir = sourceSets.functionalTest.output.classesDir
    classpath = sourceSets.functionalTest.runtimeClasspath
    reports.html.destination = file("$reports.html.destination/functional")
    reports.junitXml.destination = file("$reports.junitXml.destination/functional")
    systemProperty 'geb.env', 'firefox'
    systemProperty 'geb.build.reportsDir', reporting.file("$name/geb")
    mustRunAfter deploy
    dependsOn smokeTest
}
```

```
gradlew functionalTest
```

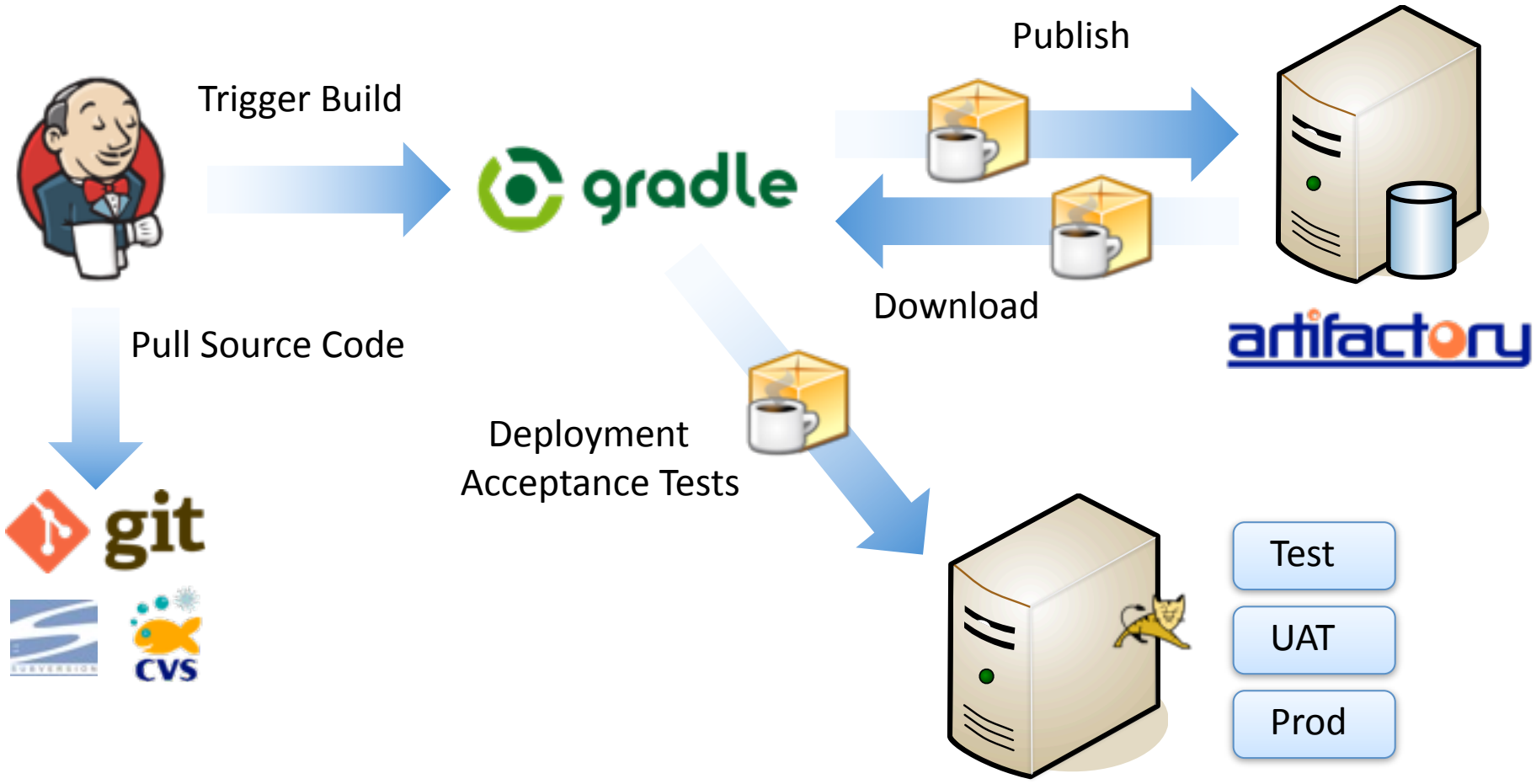
Automate most important use cases as functional tests

```
task functionalTest(type: Test) {
    testClassesDir = sourceSets.functionalTest.output.classesDir
    classpath = sourceSets.functionalTest.runtimeClasspath
    reports.html.destination = file("$reports.html.destination/functional")
    reports.junitXml.destination = file("$reports.junitXml.destination/functional")
    systemProperty 'geb.env', 'firefox'
    systemProperty 'geb.build.reportsDir', reporting.file("$name/geb")
    mustRunAfter deploy
    dependsOn smokeTest
}
```

Only run tests after environment is deemed "functional"

```
gradlew functionalTest
```

Let’s bring Jenkins into play!



Model pipeline as series of jobs

		todo-acceptance-tests	15 days (todo#76)	N/A	1 min 56 sec	
		todo-code-quality	15 days (todo#76)	N/A	1 min 6 sec	
		todo-deploy-production	N/A	N/A	N/A	
		todo-deploy-test	15 days (todo#76)	N/A	51 sec	
		todo-deploy-uat	20 days (todo#65)	16 days (todo#67)	47 sec	
		todo-distribution	15 days (todo#76)	29 days (todo#41)	45 sec	
		todo-initial	15 days (todo#76)	N/A	56 sec	
		todo-integ-tests	15 days (todo#76)	N/A	46 sec	
		todo-performance-tests	15 days (todo#76)	15 days (todo#74)	1 min 28 sec	

Jenkins

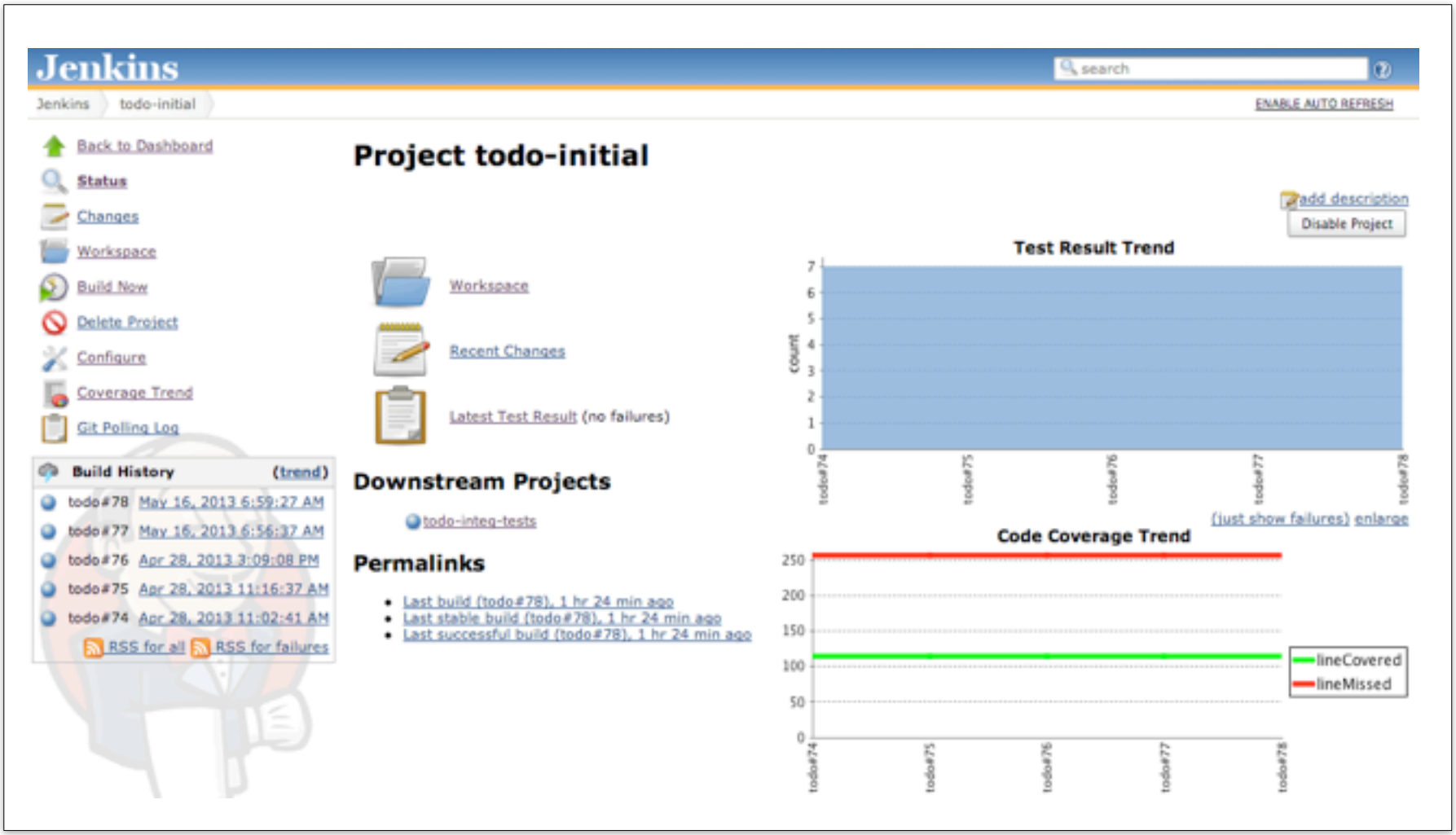
Model pipeline as series of jobs

todo-acceptance-tests	15 days (todo#76)	N/A	1 min 56 sec	
todo-code-quality	15 days (todo#76)	N/A	1 min 6 sec	
todo-deploy-production	N/A	N/A	N/A	
todo-deploy-test	15 days (todo#76)	N/A	51 sec	
todo-deploy-uat	20 days (todo#65)	16 days (todo#67)	47 sec	
todo-distribution	15 days (todo#76)	29 days (todo#41)	45 sec	
todo-initial	15 days (todo#76)	N/A	56 sec	
todo-integ-tests	15 days (todo#76)	N/A	46 sec	
tod formance-tests	15 days (todo#76)	15 days (todo#74)	1 min 28 sec	

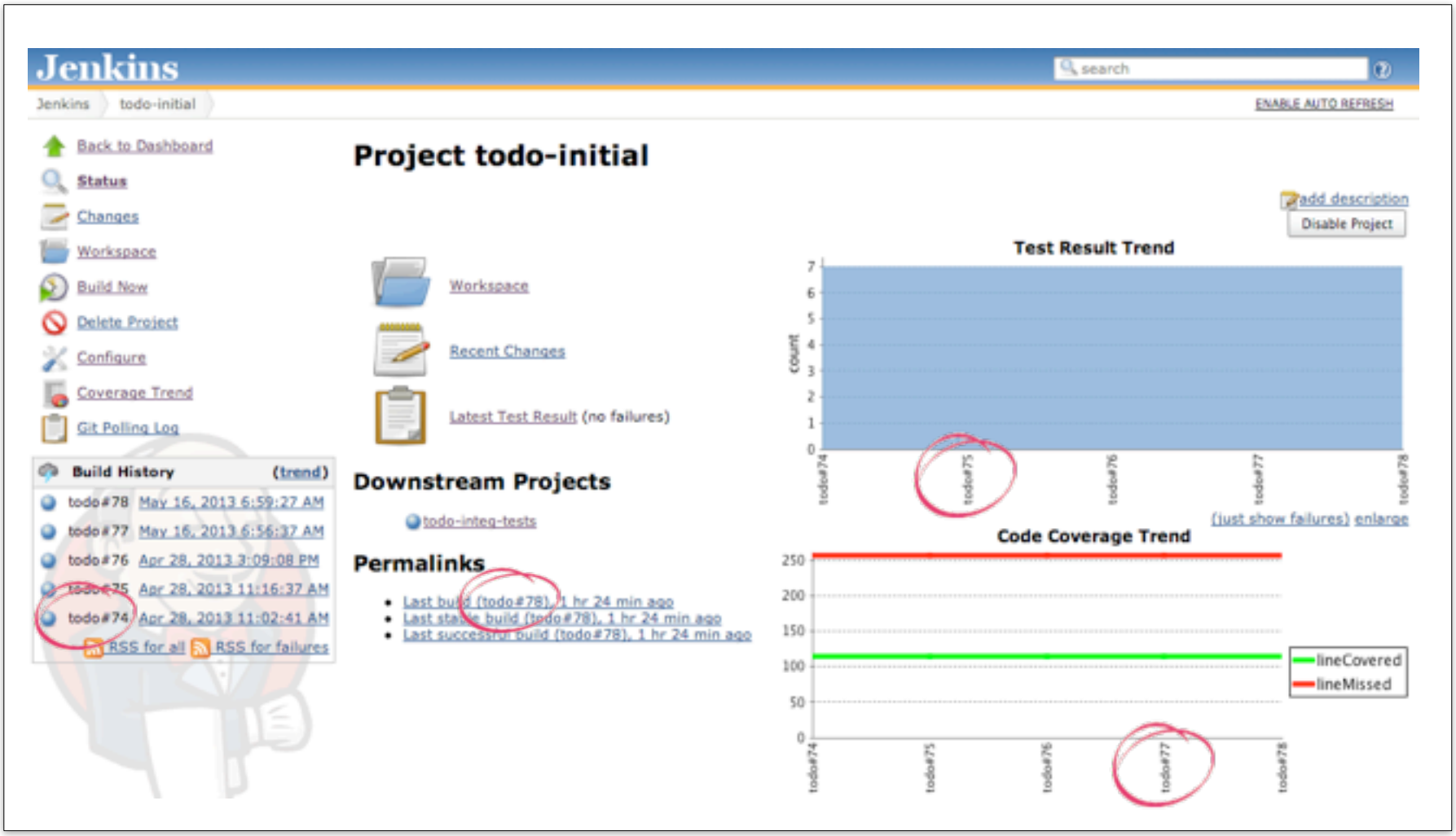
Triggered job when change to SCM is detected

Jenkins

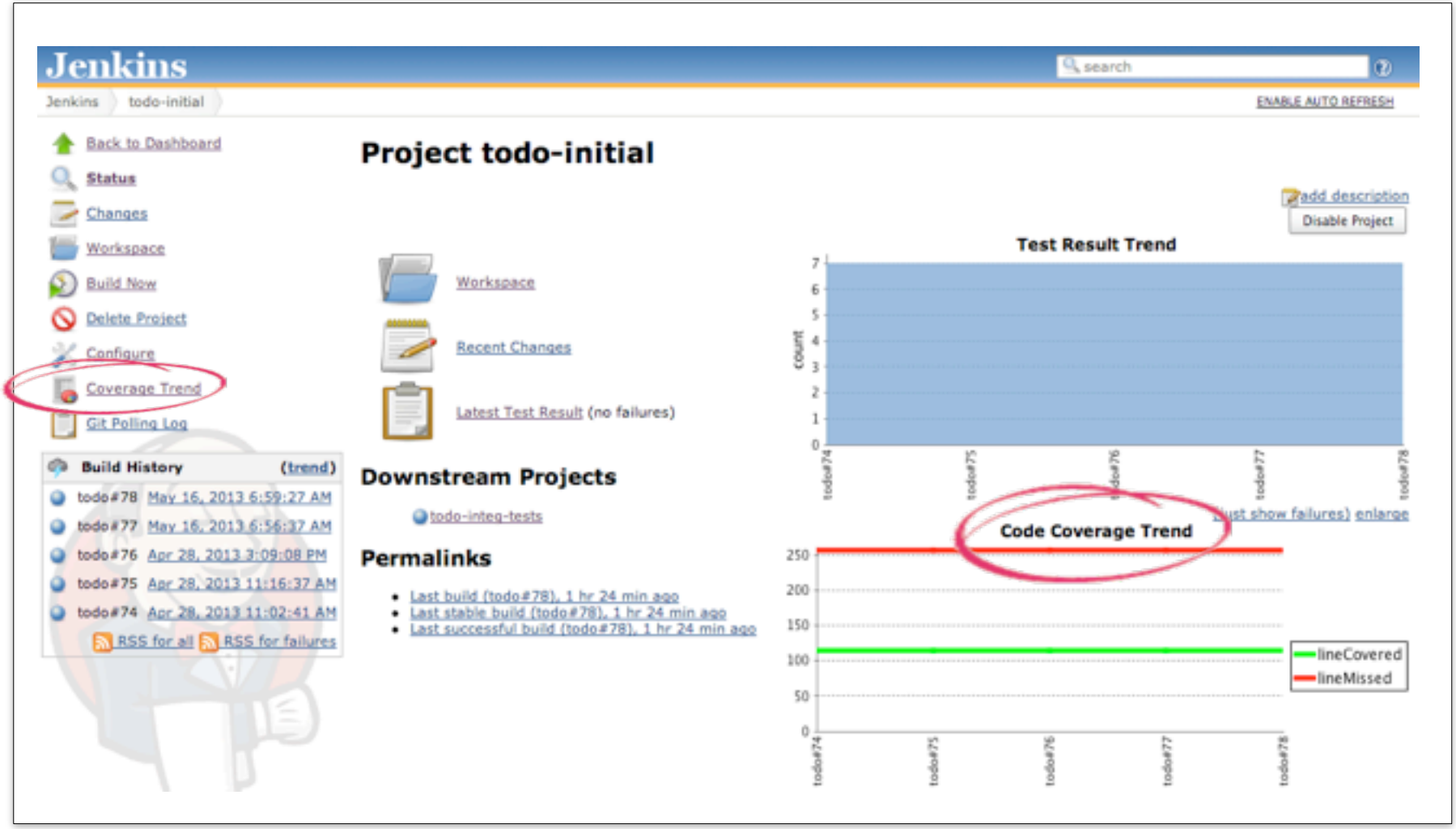
Initial Jenkins Build Job



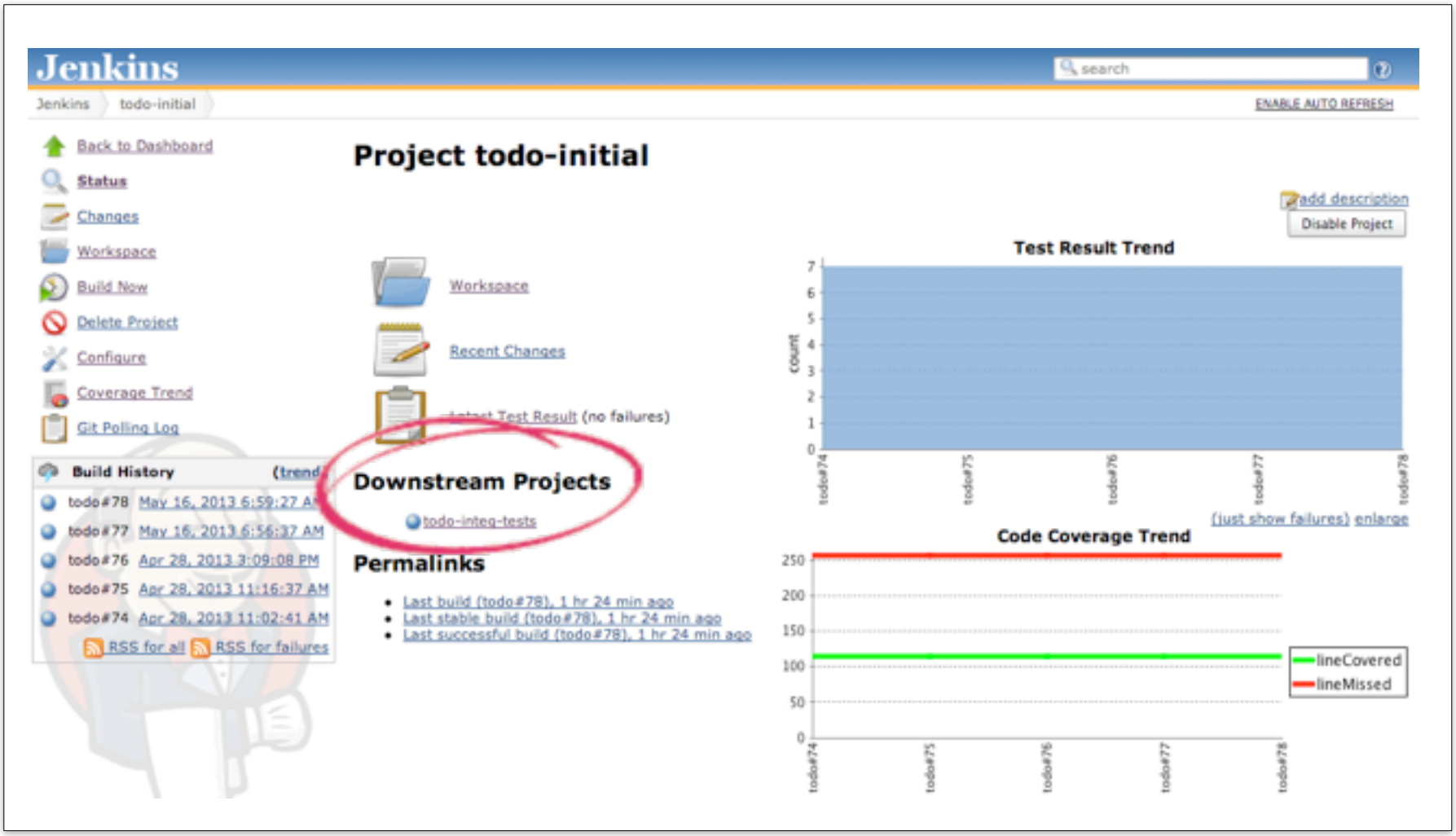
Build Name Setter Plugin



JaCoCo Plugin



Parameterized Trigger Plugin



Build

Invoke Gradle script

- Invoke Gradle
- Use Gradle Wrapper

Make gradlew executable

From Root Build Script Dir

Build step description

Switches

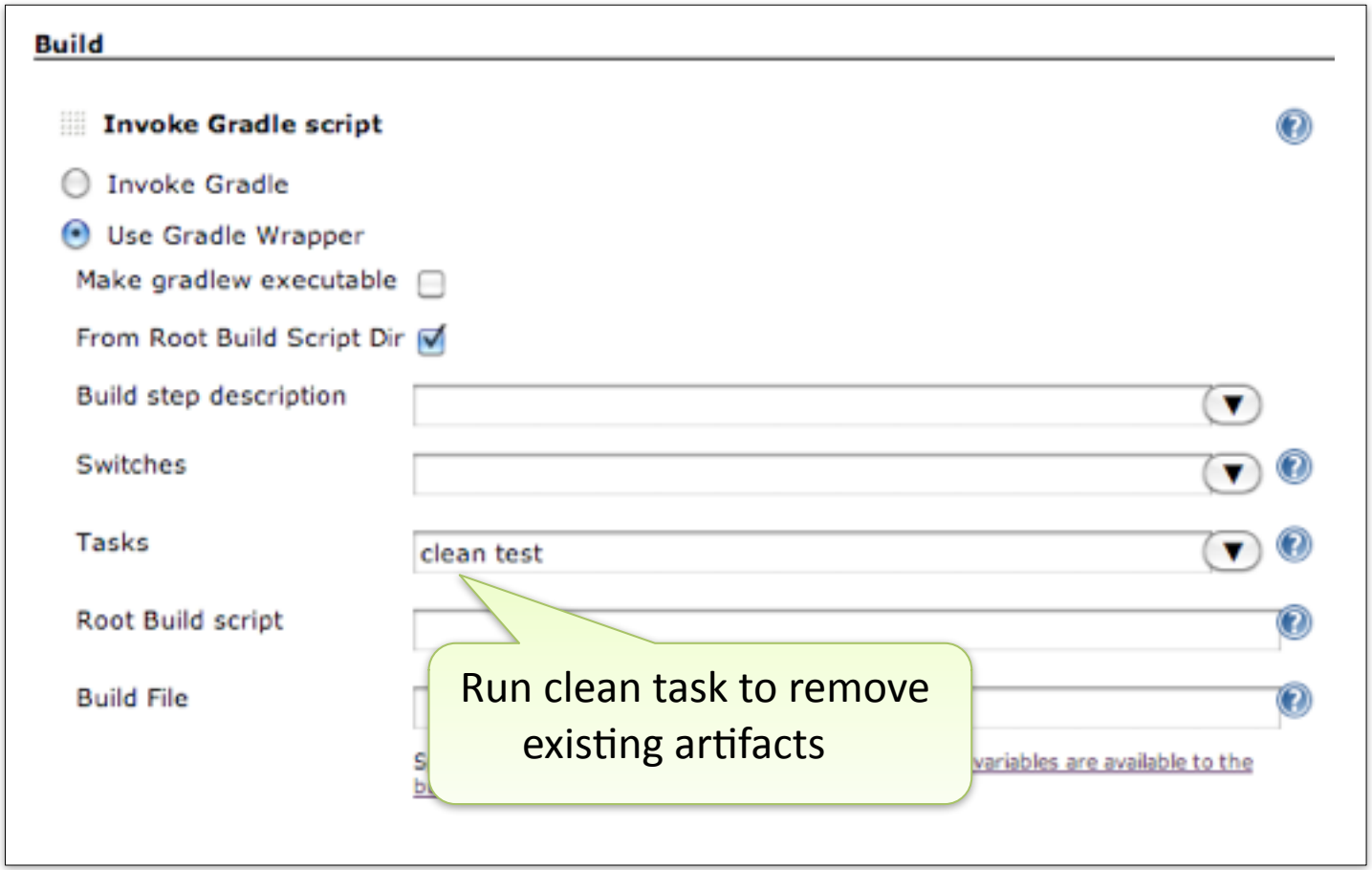
Tasks: clean test

Root Build script

Build File

Specify Gradle build file to run. Also, some environment variables are available to the build script

Gradle Plugin



Build Pipeline Plugin

Visualization of chained pipeline jobs

```
> gradle askQuestions
:askQuestions

BUILD SUCCESSFUL

Total time: 300 secs
```