Rocking the Gradle!

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What you will learn

- Declarativeness
- Extensibility
- Performance Features
- Build Integration
- Build Migration
- Testing
- Discoverability
- Multiproject Builds
- Eclipse Integration
- Gradle Bootstrap Install

Intro

What is Gradle?

- A general purpose build system
- Groovy DSL with a Java core.
- Provides build-in support for Java, Groovy, Scala, Web, OSGi, EAR, C/C++ and many more types.
- Exciting solutions for many of the big pain points you often have with current build systems.
  - Maintainability
  - Performance
  - Usability
  - Extendability
  - Standardization

Gradle Project Background

- Very active community (forum, patches, issues)
- Apache v2 license.
- Excellent user's guide (300 pages) + many samples
- Excellent DSL reference
- Frequent releases, multiple commits per day
- Quality is king:
    - 6000 unit tests, 1000 integration test
    - Healthy codebase
    - low defect rate
- Some Committers and Gradleware Employees:
    - Szczepan Faber (Mr. Mockito)
    - Peter Niederwieser (Mr. Spock)
    - Luke Daley (Grails committer and Geb Founder)
    - Daz DeBoer (Original contributor to Selenium and Ant)

Carrier
A United Technologies Company

HIBERNATE

ORBITZ

LinkedIn

software AG

Qi4j

GRAILS

spring

Farm Credit Canada

THALES

GRIFFON

Groovy

EADS

Community Portal

- Forum: forums.gradle.org
- Keep up to date: This Week in Gradle
- Roadmap: gradle.org/roadmap

Training

gradleware

25. – 27. Sep. 2012 Frankfurt
23. – 25. Okt. 2012 London

Sie erhalten einen **Rabatt von 20%** auf die Teilnehmergebühr, wenn Sie sich mit dem JFS-Code innerhalb der nächsten 30-Tage online auf www.gradleware.com/training registrieren.
Fragen Sie uns nach dem JFS-Rabattcode!

gradleware Free Webinars

A gentle introduction to Gradle – with Tim Berglund
11. Juli 2012 um 19:00 Uhr (MESZ)

In-depth Gradle 1.0 Power Features – with Szczepan Faber
12. Juli 2012 um 11:00 Uhr (MESZ)

Administering Gradle in the Enterprise – with Luke Daley
31. Juli 2012 um 11:00 Uhr (MESZ)

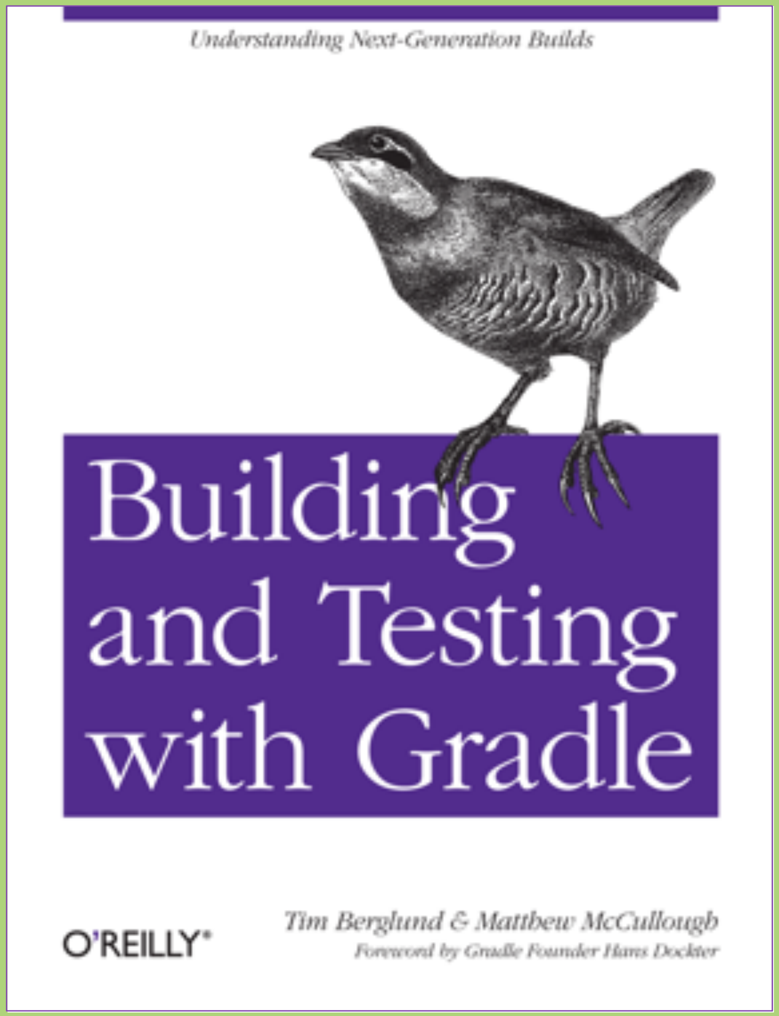
Migrating and Upgrading with Gradle – with Szczepan Faber
9. August 2012 um 11:00 Uhr (MESZ)

PDT = Pacific Daylight Time / EDT = Eastern Daylight Time / CEST = Central European Summer Time /

gradleware

O‘Reilly-Buch

Das erste O‘Reilly-Buch bietet anschauliche Beschreibungen und Beispiele zur intensiven Beschäftigung mit Gradle


Understanding Next-Generation Builds
Building and Testing with Gradle
O'REILLY
Tim Berglund & Matthew McCullough
Foreword by Gradle Founder Hans Dockter

So finden Sie das Buch:

1. Als **E-Book** auf shop.oreilly.com
2. Als **Hardcover** im (Online-)Buchhandel
3. **Zum kostenlosen Lesen auf unserer Website**

Gradle is Declarative

Declarative

You specify the **WHAT**

Gradle figures out the **HOW**

Labs

- Demo - Source Sets

An Ant Example

```
<project name="Foo" basedir=".">
    <property name="classesDir" value="build/classes/test"/>

    <target name="compileTests">
        <javac ... destdir="${classesDir}"
           ...
        </javac>
    </target>
    <target name="test" depends="compileTests">
        <junit ...>
            <classpath>
              <pathelement path="{classesDir}"/>
            </classpath>
        </junit>
    </target>
    <target name="testJar" depends="compileTests">
        <jar basedir="${classesDir}" .../>
    </target>
</project>
```

Gradle
is
declarative
without
being **rigid**

Extensible Build Language

vs.

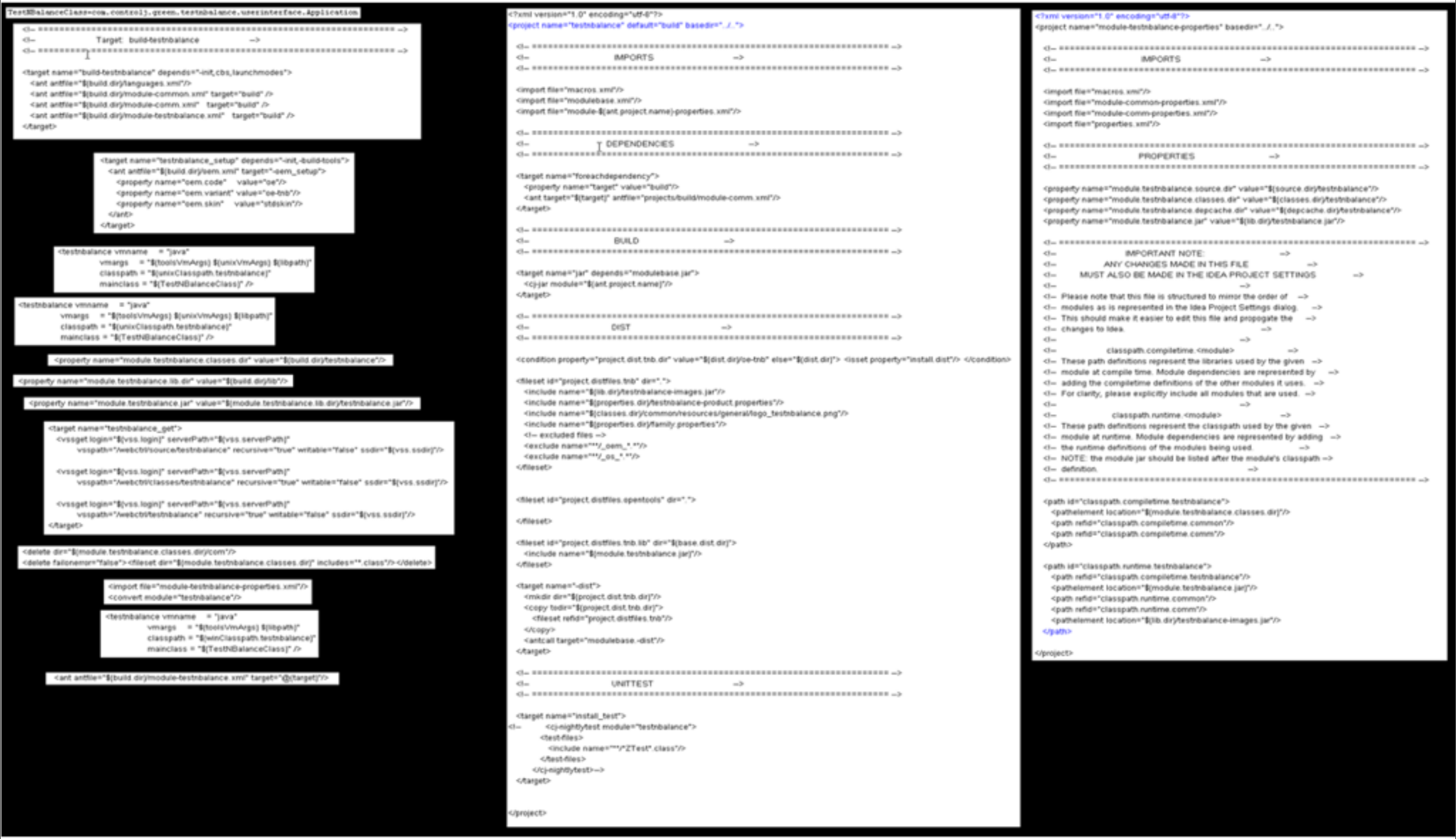
Build Framework

Custom Language Elements

```
usePlugin ‘editions’

productEditions {
 enterprise core, plugins, powerAddons
 public core, plugins, openApi
}
```

```
>gradle enterpriseEditionZip
```

```
>gradle publicEditionTar
```



```
TestNBalanceClass=com.controlj.green.testnbalance.userinterface.Application
```

```
<!-- ====================================================================== -->
<!--                    Target:  build-testnbalance                  -->
<!-- ====================================================================== -->

<target name="build-testnbalance" depends="-init,cbs,launchmodes">
  <ant antfile="${build.dir}/languages.xml"/>
  <ant antfile="${build.dir}/module-common.xml" target="build" />
  <ant antfile="${build.dir}/module-comm.xml"   target="build" />
  <ant antfile="${build.dir}/module-testnbalance.xml"   target="build" />
</target>
```

```
<target name="testnbalance_setup" depends="-init,-build-tools">
  <ant antfile="${build.dir}/oem.xml" target="-oem_setup">
    <property name="oem.code"    value="oe"/>
    <property name="oem.variant" value="oe-tnb"/>
    <property name="oem.skin"    value="stdskin"/>
  </ant>
</target>
```

```
<testnbalance vmname    = "java"
              vmargs    = "${toolsVmArgs} ${unixVmArgs} ${libpath}"
              classpath = "${unixClasspath.testnbalance}"
              mainclass = "${TestNBalanceClass}" />
```

```
<testnbalance vmname    = "java"
              vmargs    = "${toolsVmArgs} ${unixVmArgs} ${libpath}"
              classpath = "${unixClasspath.testnbalance}"
              mainclass = "${TestNBalanceClass}" />
```

```
<property name="module.testnbalance.classes.dir" value="${build.dir}/testnbalance"/>
```

```
<property name="module.testnbalance.lib.dir" value="${build.dir}/lib"/>
```

```
<property name="module.testnbalance.jar" value="${module.testnbalance.lib.dir}/testnbalance.jar"/>
```

```
<target name="testnbalance_get">
  <vssget login="${vss.login}" serverPath="${vss.serverPath}"
          vsspath="/webctrl/source/testnbalance" recursive="true" writable="false" ssdir="${vss.ssdir}"/>

  <vssget login="${vss.login}" serverPath="${vss.serverPath}"
          vsspath="/webctrl/classes/testnbalance" recursive="true" writable="false" ssdir="${vss.ssdir}"/>

  <vssget login="${vss.login}" serverPath="${vss.serverPath}"
          vsspath="/webctrl/testnbalance" recursive="true" writable="false" ssdir="${vss.ssdir}"/>
</target>
```

```
<delete dir="${module.testnbalance.classes.dir}/com"/>
<delete failonerror="false"><fileset dir="${module.testnbalance.classes.dir}" includes="*.class"/></delete>
```

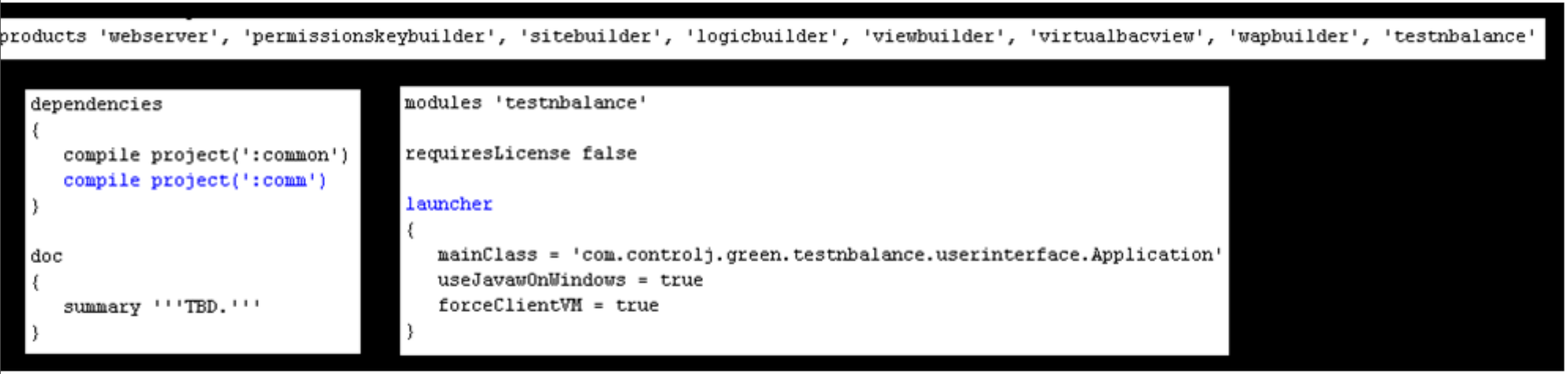
```
<import file="module-testnbalance-properties.xml"/>
<convert module="testnbalance"/>
```

```
<testnbalance vmname    = "java"
              vmargs    = "${toolsVmArgs} ${libpath}"
              classpath = "${winClasspath.testnbalance}"
              mainclass = "${TestNBalanceClass}" />
```

```
<ant antfile="${build.dir}/module-testnbalance.xml" target="@{target}"/>
```

```
<?xml version="1.0" encoding="utf-8"?>
<project name="testnbalance" default="build" basedir="../..">

  <!-- ====================================================================== -->
  <!--                         IMPORTS                              -->
  <!-- ====================================================================== -->

  <import file="macros.xml"/>
  <import file="modulebase.xml"/>
  <import file="module-${ant.project.name}-properties.xml"/>

  <!-- ====================================================================== -->
  <!--                       DEPENDENCIES                              -->
  <!-- ====================================================================== -->

  <target name="foreachdependency">
    <property name="target" value="build"/>
    <ant target="${target}" antfile="projects/build/module-comm.xml"/>
  </target>

  <!-- ====================================================================== -->
  <!--                         BUILD                            -->
  <!-- ====================================================================== -->

  <target name="jar" depends="modulebase.jar">
    <cj-jar module="${ant.project.name}"/>
  </target>

  <!-- ====================================================================== -->
  <!--                        DIST                             -->
  <!-- ====================================================================== -->

  <condition property="project.dist.tnb.dir" value="${dist.dir}/oe-tnb" else="${dist.dir}"> <isset property="install.dist"/> </condition>

  <fileset id="project.distfiles.tnb" dir=".">
    <include name="${lib.dir}/testnbalance-images.jar"/>
    <include name="${properties.dir}/testnbalance-product.properties"/>
    <include name="${classes.dir}/common/resources/general/logo_testnbalance.png"/>
    <include name="${properties.dir}/family.properties"/>
    <!-- excluded files -->
    <exclude name="**/_oem_*.*"/>
    <exclude name="**/_os_*.*"/>
  </fileset>


  <fileset id="project.distfiles.opentools" dir=".">

  </fileset>

  <fileset id="project.distfiles.tnb.lib" dir="${base.dist.dir}">
    <include name="${module.testnbalance.jar}"/>
  </fileset>

  <target name="-dist">
    <mkdir dir="${project.dist.tnb.dir}"/>
    <copy todir="${project.dist.tnb.dir}">
      <fileset refid="project.distfiles.tnb"/>
    </copy>
    <antcall target="modulebase.-dist"/>
  </target>

  <!-- ====================================================================== -->
  <!--                         UNITTEST                          -->
  <!-- ====================================================================== -->

  <target name="install_test">
<!--        <cj-nightlytest module="testnbalance">
           <test-files>
             <include name="**/*ZTest*.class"/>
           </test-files>
         </cj-nightlytest>-->
  </target>


</project>
```

```
<?xml version="1.0" encoding="utf-8"?>
<project name="module-testnbalance-properties" basedir="../..">

  <!-- ====================================================================== -->
  <!--                         IMPORTS                              -->
  <!-- ====================================================================== -->

  <import file="macros.xml"/>
  <import file="module-common-properties.xml"/>
  <import file="module-comm-properties.xml"/>
  <import file="properties.xml"/>

  <!-- ====================================================================== -->
  <!--                        PROPERTIES                              -->
  <!-- ====================================================================== -->

  <property name="module.testnbalance.source.dir" value="${source.dir}/testnbalance"/>
  <property name="module.testnbalance.classes.dir" value="${classes.dir}/testnbalance"/>
  <property name="module.testnbalance.depcache.dir" value="${depcache.dir}/testnbalance"/>
  <property name="module.testnbalance.jar" value="${lib.dir}/testnbalance.jar"/>

  <!-- ====================================================================== -->
  <!--                    IMPORTANT NOTE:                          -->
  <!--               ANY CHANGES MADE IN THIS FILE                    -->
  <!--         MUST ALSO BE MADE IN THE IDEA PROJECT SETTINGS               -->
  <!--                                                        -->
  <!--  Please note that this file is structured to mirror the order of     -->
  <!--  modules as is represented in the Idea Project Settings dialog.      -->
  <!--  This should make it easier to edit this file and propogate the      -->
  <!--  changes to Idea.                                             -->
  <!--                                                        -->
  <!--                 classpath.compiletime.<module>                  -->
  <!--  These path definitions represent the libraries used by the given   -->
  <!--  module at compile time. Module dependencies are represented by      -->
  <!--  adding the compiletime definitions of the other modules it uses.   -->
  <!--  For clarity, please explicitly include all modules that are used.  -->
  <!--                                                        -->
  <!--                   classpath.runtime.<module>                  -->
  <!--  These path definitions represent the classpath used by the given   -->
  <!--  module at runtime. Module dependencies are represented by adding   -->
  <!--  the runtime definitions of the modules being used.               -->
  <!--  NOTE: the module jar should be listed after the module's classpath -->
  <!--  definition.                                                 -->
  <!-- ====================================================================== -->

  <path id="classpath.compiletime.testnbalance">
    <pathelement location="${module.testnbalance.classes.dir}"/>
    <path refid="classpath.compiletime.common"/>
    <path refid="classpath.compiletime.comm"/>
  </path>

  <path id="classpath.runtime.testnbalance">
    <path refid="classpath.compiletime.testnbalance"/>
    <pathelement location="${module.testnbalance.jar}"/>
    <path refid="classpath.runtime.common"/>
    <path refid="classpath.runtime.comm"/>
    <pathelement location="${lib.dir}/testnbalance-images.jar"/>
  </path>

</project>
```



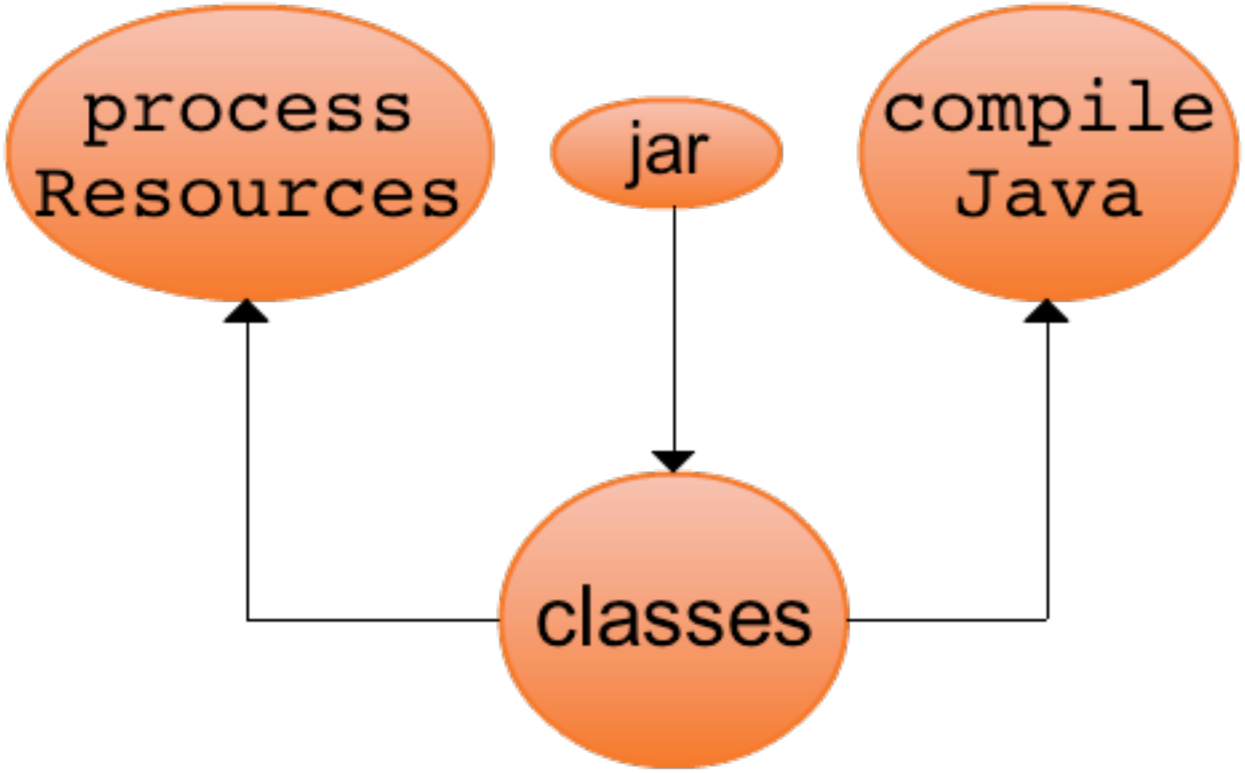
```
products 'webserver', 'permissionskeybuilder', 'sitebuilder', 'logicbuilder', 'viewbuilder', 'virtualbacview', 'wapbuilder', 'testnbalance'
```

```
dependencies
{
   compile project(':common')
   compile project(':comm')
}

doc
{
   summary '''TBD.'''
}
```

```
modules 'testnbalance'

requiresLicense false

launcher
{
   mainClass = 'com.controlj.green.testnbalance.userinterface.Application'
   useJavawOnWindows = true
   forceClientVM = true
}
```

Extensible

Directed Acyclic Graph (DAG)



- Each task to be executed is a node.
- The dependsOn relations define directed edges.
- No cycles are allowed (acyclic)
- Each task is executed once and only once.
- Execution order is against the edge directions.

Expect the unexpected

- Custom Language Elements
- Deep Configuration API
- Deep Execution API
- Rich API
- Extendable Domain Objects
- Custom Tasks
- Custom Plugins

Labs

- Demo - Task Rules

Groovy vs.XML

It’s the design, stupid!

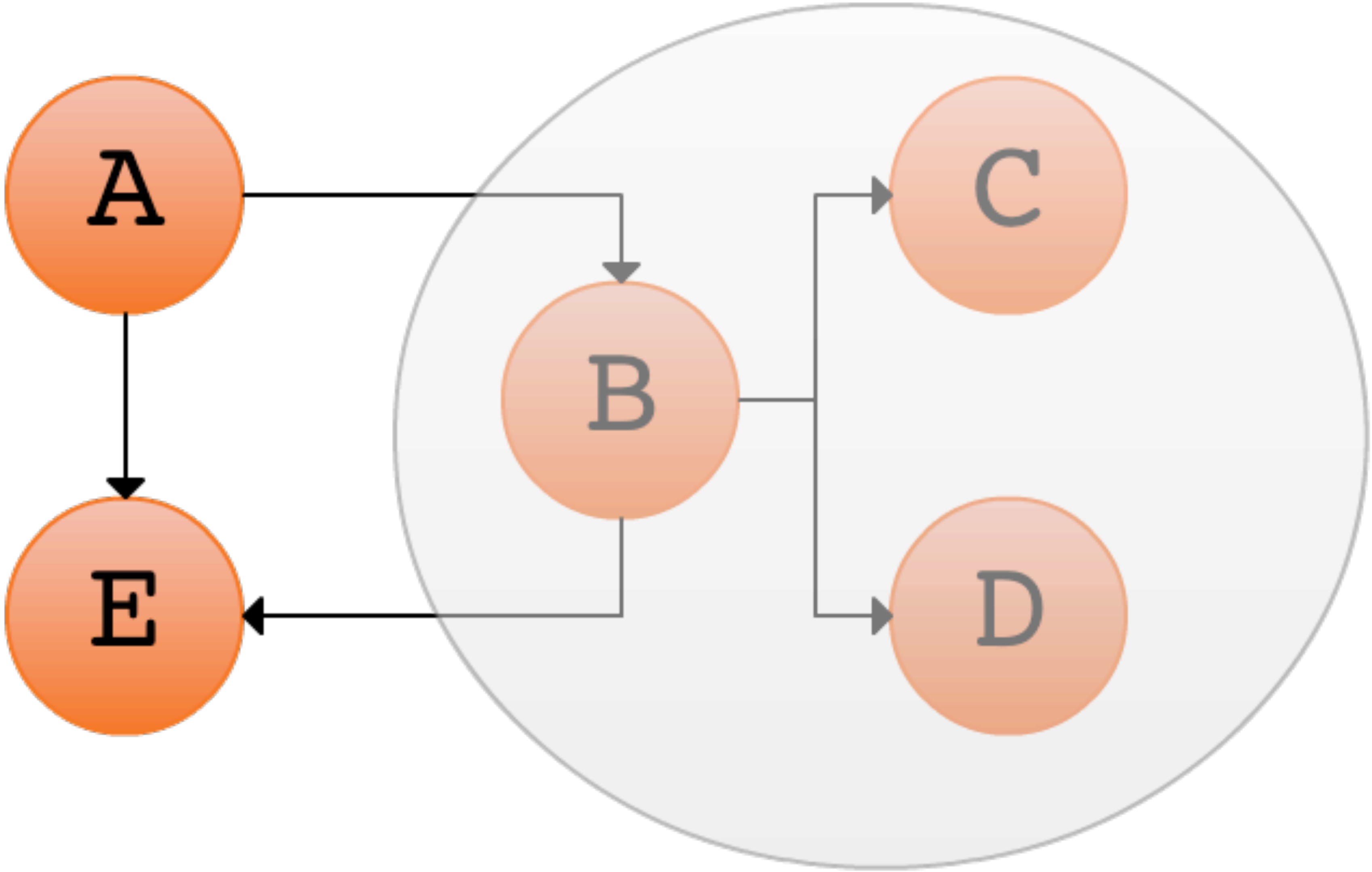
Please
no
messy
build scripts

Performance

Labs

- Demo-Excluding Tasks

Smart Exclusion



```
>gradle A -x B
```

Task Input/Output

Labs

- Demo-Incremental Build

Should **clean** be **required** for a **reliable build**?
(Hint: We have the 21st century)

Task Input/Output

- You can describe:
  - Input/Output Files
  - Input/Output Dirs
  - Input Properties
- Gradle's build-in tasks all describe their input/output.

Incremental Build

- The hashes of the input/output files are cached.
- The hashes for all files of the input dirs are cached.
- The property values are cached (serialized).
- Cache == Current -> Skip Task

Annotations

```
class MyTask extends DefaultTask {
  @InputFile File text
  @InputFiles FileCollection path
  @InputDirectory File templates
  @Input String mode
  @OutputFile File result
  @OutputDirectory transformedTemplates
  File someProp // ignored

  @TaskAction
  generate() { ... }
}
```

Input/Output API

```
ant.import 'build.xml'
someAntTarget {
  inputs.files 'template.tm',new File('data.txt')
  inputs.dir 'someDir'
  outputs.files 'output.txt'
  outputs.dir 'generatedFilesDir'
  outputs.upToDateWhen { task ->
    dbDataUpToDate(task.dbUrl)
  }
}
```

Property Processing

- Exception if input files/dir do not exists
  - Disable validation with @Optional
- Output dirs are created before execution.

Performance

- Incremental Build
- Parallel Testing
- Soon: Parallel Builds, Distributed testing/builds
- Rich Model

Integration

Ant

Ant

- Ant is Gradle's friend not its competitor.
- Gradle uses Ant task's internally.
- You can use any Ant task from Gradle.
- Ant tasks are an integral part of Gradle.
- Gradle ships with Ant.
- You can import any Ant build into Gradle

Ant Tasks

- Gradle provides an instance of the Groovy AntBuilder

```
ant.delete dir: 'someDir'
ant {
  ftp(server: "ftp.comp.org", userid: 'me', ...) {
    fileset(dir: "htdocs/manual") {
      include name: "**/*.html"
    }
    // high end
    myFileTree.addToAntBuilder(ant, 'fileset')
  }
  mkdir dir: 'someDir'
}
```

Importing Ant Builds

```xml
<project>
  <target name="hello" depends="intro">
    <echo>Hello, from Ant</echo>
  </target>
</project>
```

```groovy
ant.importBuild 'build.xml'
hello.doFirst { println 'Here comes Ant' }
task intro << { println 'Hello, from Gradle'}
```

```
>gradle hello
Hello, from Gradle
Here comes Ant
[ant:echo] Hello, from Ant
```

Maven

Labs

- Demo-Maven Import

Maven

- Retrieve/Deploy to Maven/Ivy repositories
- Autogeneration of pom.xml/ivy.xml
- Convert Maven build into build.gradle
- Import of Maven builds
  - Soon: Deep Import
  - Soon: Use Gradle from Maven

Ecosystem

- Deep Integration with Artifactory
- Nexus
- Jenkins/Hudson
- Teamcity
- Eclipse (via STS)
- Idea 11
- Sonar

Migration

Build Migration

- Mission Critical!
- Nightmare if the new build system can’t adapt to the existing project layout:
  - Freeze
  - Project automation not working for a while
  - Different branches (unreliable, hard to compare, ...)
- Gradle’s suppleness enables baby steps.
  - Gradle can adapt to any project layout.
  - No separate branches
  - Comparable --> Write tests

Enterprise Dependency Cache

New Dependency Cache

- Metadata cache per resolver (url = id)
- Global checksum cache for jars
- Concurrency
- Dynamic Versions
- SOON: Reuse existing caches (older Gradle versions, m2, ivy)

Usecases

- Repository Change:
  - A new metadata cache is created
  - Check for Jar
    - If not there, Exception:
    - If checksum OK no download
  - No inconsistencies between cache and repository.
- Dynamic revisions are retrieved per repository.
- Changing modules are retrieved per repository.
- Local installs don’t pollute other builds.

Benefits

- Local Cache is not hiding problems
- Local Cache is not creating special behaviour
- Better Reproducibility.
- Transactional

Testing

Test Task

- Support for JUnit and TestNG
- Parallel Testing
- Custom Fork Frequency
- Remote Listeners
- Tests auto-detected in `sourceSets.test.classes`

Name	`test`
Type	`Test`
Input	`sourceSets.test.classes` `configurations.testRuntime`

Test Task Example

```
test {
  jvmArgs: ["-Xmx512M"]
  include "**/tests/special/**/*Test.class"
  exclude "**/Old*Test.class"
  forkEvery = 30
  maxParallelForks = guessMaxForks()
}

def guessMaxForks() {
    int processors =
        Runtime.runtime.availableProcessors()
    return Math.max(2, (int) (processors / 2))
}
```

Disables Auto Detection

Test Task Listeners

```
test {
  beforeTest { descr ->
    // do something
  }
  afterTest { descr, result ->
    // do something
  }
  afterSuite { descr, result ->
    // do something
  }
}
```

Labs

- Demo - Testing

Discoverability

Lifecycle Tasks

- The relevant tasks for a build user.
- Achieve a certain stage in the build lifecycle for a project.
  - clean
  - classes
  - test
  - assemble
  - check
  - build (depends on assemble and check)
- Hooks for worker tasks.

Labs

- Lab 19-Discoverability

Multiproject Builds

Multi-Project Builds

- Arbitrary Multiproject Layout
- Configuration Injection
- Project Dependencies & Partial builds
- Separate Config/Execution Hierarchy

Configuration Injection

- **ultimateApp**
  - api
  - webservice
  - shared

```
subprojects {
    apply plugin: 'java'
    dependencies {
        compile "commons-lang:commons-lang:3.1"
        testCompile "junit:junit:4.4"
    }
    test {
        jvmArgs: ['Xmx512M']
    }
}
```

Filtered Injection

- **ultimateApp**
  - api
  - webservice
  - shared

```
configure(nonWebProjects()) {
  jar.manifest.attributes
     Implementor: 'Gradle-Inc'
}

def nonWebProjects() {
  subprojects.findAll {project ->
    !project.name.startsWith('web')
  }
}
```

Project Dependencies

- ultimateApp
  - **api**
  - webservice
  - shared

```
dependencies {
  compile "commons-lang:commons-lang:3.1",
    project(':shared')
}
```

First Class Citizen

Partial Builds

- ultimateApp
  - **api**
  - webservice
  - shared

```
>gradle build
>gradle buildDependents
>gradle buildNeeded
```

There is
no one-size-fits-all
project structure
for the
enterprise.

The physical structure of your projects should be determined by **your requirements**.

Defining a Multi Project Build

- `settings.gradle` (location defines root).
- root project is implicitly included

Defines a virtual hierarchy

By default maps to file path `<root>/project1`

```
include 'project1','project2','project2:child1'

// Everything is configurable
rootProject.name = 'main'
project(':project1').projectDir = '/myLocation'
project(':project1').buildFileName =
  'project1.gradle'
```

Default to root dir name

Default to build.gradle

Labs

- Lab 20-Multi-Project Build

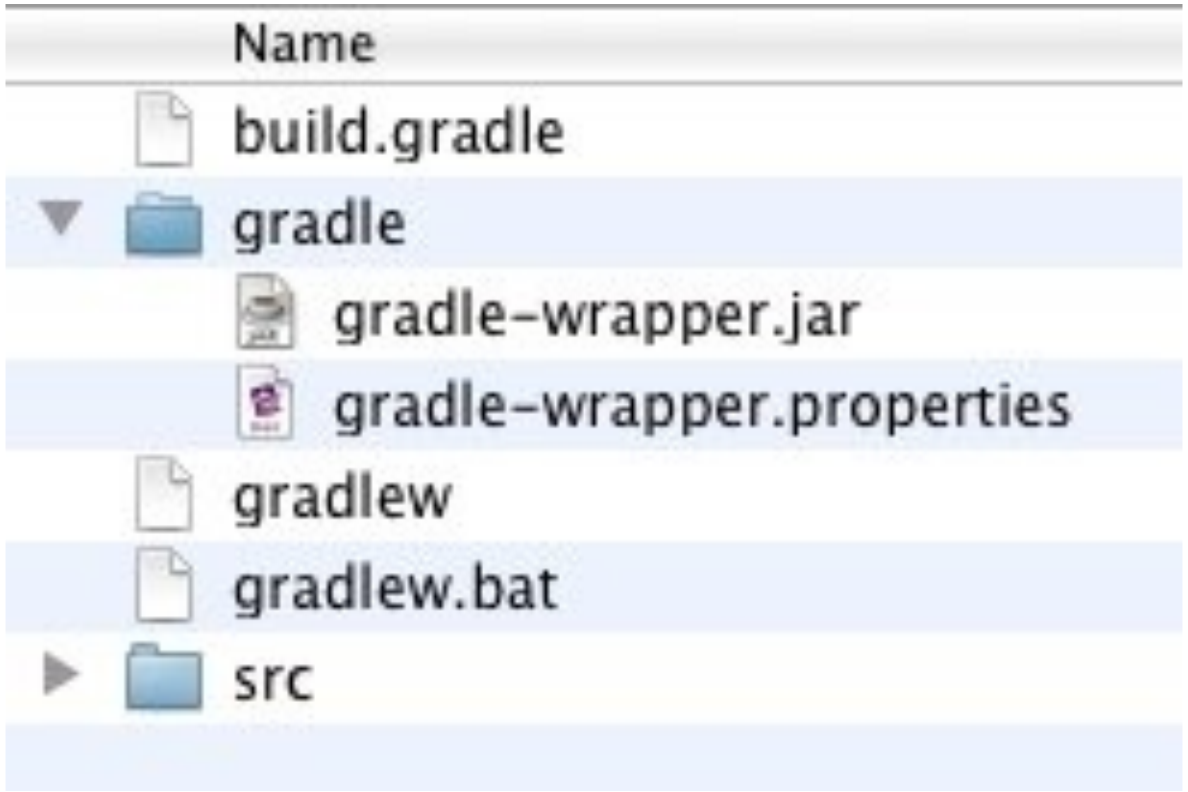
Wrapper

Wrapper Task

- Wrapper task generates:
  - wrapper scripts
  - wrapper jar
  - wrapper properties.

```
task wrapper(type: Wrapper) {
  gradleVersion = '0.6'
  jarPath = 'gradle'
}
```

Wrapper Files



Name
build.gradle
gradle
gradle-wrapper.jar
gradle-wrapper.properties
gradlew
gradlew.bat
src

```
>./gradlew assemble
```

Q & A