The new build system for Android

Overview

- Gradle basics
- Gradle Plugins
- Gradle and Studio
- Demos
- Gradle 与TV版
- Resources

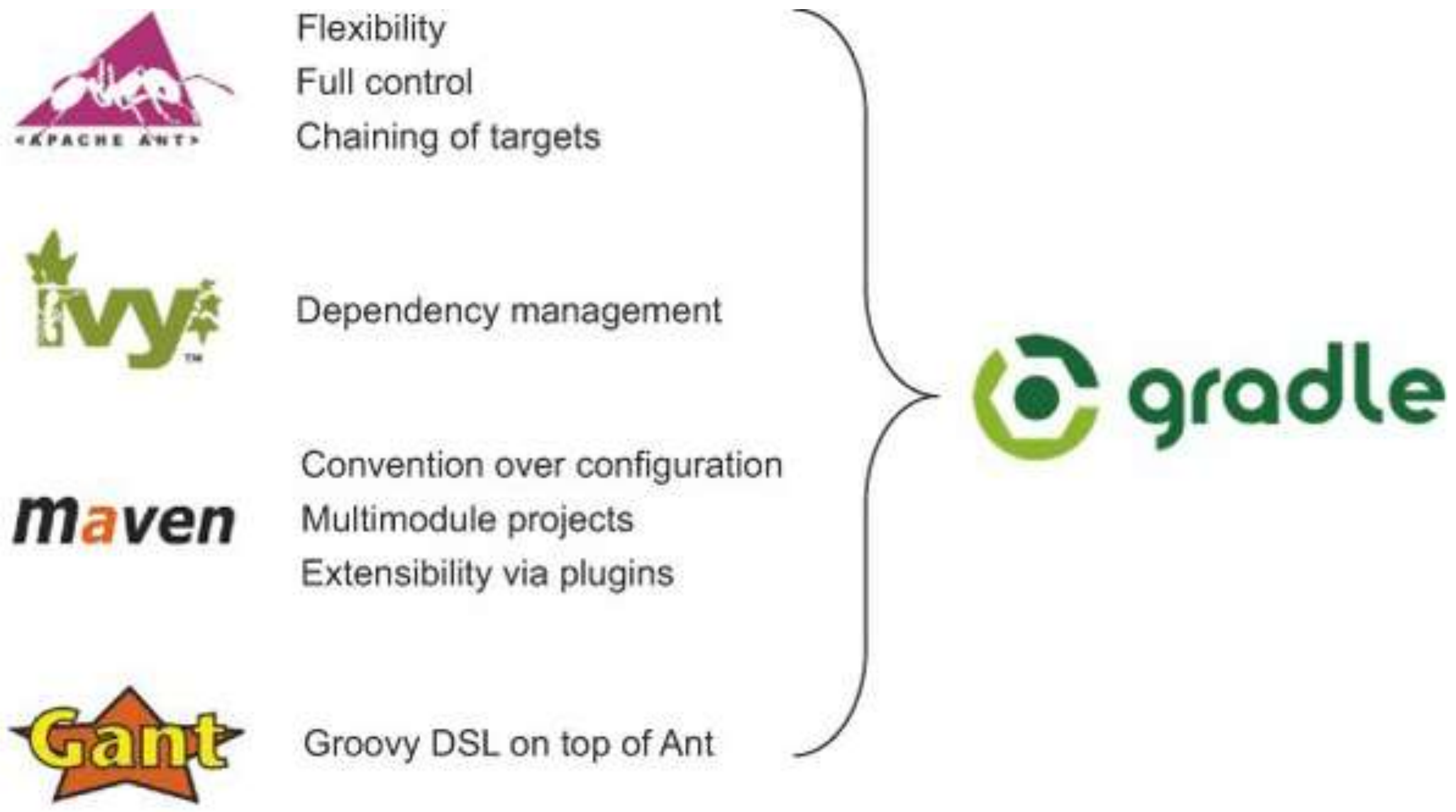
What’s Gradle?

- Gradle is an open source build automation system.
- Grade introduces DSL instead of the more traditional XML form of declaring the project configuration.
- focused around Java, Groovy and Scala development and deployment, but more languages and project workflows are on the roadmap.
- Gradle can automate the building, testing, publishing, deployment.

1. https://gradle.org
2. https://en.wikipedia.org/wiki/Gradle

Why Gradle?

- create custom build logic through plugins.
- dependency management
- Plugins can expose their own DSL and their own API for build files to use.
- Gradle combines the best features from other build tools.



1. Why Gradle?
2. Why choose Gradle?

Installing Gradle

- requires a Java JDK or JRE to be installed, version 6 or higher
- Gradle ships with its own Groovy library, therefore Groovy does not need to be installed.
- Any existing Groovy installation is ignored by Gradle.
- Gradle uses whatever JDK it finds in your path
- download （http://gradle.org/downloads）
- unpacking
- add GRADLE_HOME/bin to your PATH environment variable
- Android Studio Project includes grade

1. gradle installation

Groovy

- http://groovy-lang.org/
- The language used by Gradle
- Great similarity to Java
- builds upon the strengths of Java but has additional power features inspired by languages like Python, Ruby and Smalltalk

1. http://learnxinyminutes.com/docs/groovy/

Build Script Basics

- Project

  What a project represents depends on what it is that you are doing with Gradle

- Task

  A task represents some atomic piece of work which a build performs.This might be compiling some classes, creating a JAR, generating Javadoc, or publishing some archives to a repository.

- Plugin

  A plugin is a mechanism by which we can extend the capabilities of Gradle .

1. http://rominirani.com/2014/07/28/gradle-tutorial-part-1-installation-setup/
2. https://gradle.org/docs/current/userguide/tutorial_using_tasks.html#N101A9

Demo

build.gradle

```
//defaultTasks 'buildTask'

task compileTask << {
   System.out.println "compiling..."
 }

 task buildTask << {
 //task buildTask (dependsOn:compileTask) << {
   System.out.println "building..."
 }
```

1. http://rominirani.com/2014/07/28/gradle-tutorial-part-1-installation-setup/

2.Gradle Plugin

- Gradle plugin for Java
- Gradle plugin for Android
- for eclipse,idea,findbugs,c,cpp,oc,jetty……

1. https://gradle.org/docs/current/userguide/plugins.html
2. https://gradle.org/docs/current/userguide/standard_plugins.html

Gradle Plugin for Java

- Source sets
- Tasks
- Project layout
- Dependency management
- …

1. http://gradle.org/docs/current/userguide/java_plugin.html

Demo

build.gradle

```
apply plugin: ‘java'    // packaged with grade
archivesBaseName = "quote"
version = '1.0-FINAL'

repositories {
  mavenCentral()
}

dependencies {
  compile group: 'org.apache.commons', name: 'commons-lang3', version: '3.3.2'
  testCompile group: 'junit', name: 'junit', version: '4.+'
}
```

1. http://rominirani.com/2014/07/28/gradle-tutorial-part-2-java-projects/

Gradle Plugin for Android

- Published in May, 2013
- 1.0 Released in Dec, 2014
- git clone https://android.googlesource.com/platform/prebuilts/gradle-plugin

```
$ repo init -u https://android.googlesource.com/platform/manifest -b gradle_1.0.0
$ repo sync
```

1. http://tools.android.com/tech-docs/new-build-system/user-guide
2. https://www.youtube.com/watch?v=LCJAgPkpmR0
3. http://tools.android.com/build

Goals of the new build system

- Make it easy to reuse code and resources
- Make it easy to create several variants of an application, either for multi-apk distribution or for different flavors of an application
- Make it easy to configure, extend and customize the build process
- Good IDE integration

1. http://tools.android.com/tech-docs/new-build-system/user-guide

Android Plugin DSL Reference

Blocks	DSL types
defaultConfig{}	LintOptions
productFlavors{}	ProductFlavor
buildTypes{}	BuildType
signingConfigs{}	signingConfig
…{}	…

1. Android Plugin DSL Reference

signing Configs

- configuration of how an application is signed
- what can be customised?
  - keyAlias
  - keyPassword
  - storeFile
  - storePassword
  - storeType
- hide key password

1. http://stackoverflow.com/questions/18328730/how-to-create-a-release-signed-apk-file-using-gradle

Product Flavors

- A product flavor defines a customized version of the application build by the project. A single project can have different flavors which change the generated application
- This new concept is designed to help when the differences are very, very minimum
- Although different flavors could be very different applications, using Library Projects is a better use case for this, and the build system still supports this.

1. http://tools.android.com/tech-docs/new-build-system/build-system-concepts

What can be customised by Product Flavor?

- minSdkVersion
- targetSdkVersion
- versionCode
- versionName
- package name (overrides value from manifest)
- release signing info (keystore, key alias, passwords,…)
- BuildConfig: Ability to provide custom Java code
- NDK ABI filter (Not implemented yet)
- Additionally, Product Flavor can provide their own source code, resources and manifest.

1. http://tools.android.com/tech-docs/new-build-system/build-system-concepts

Build Types

- A build type allows configuration of how an application is packaged for debugging or release purpose.
- This concept is not meant to be used to create different versions of the same application. This is orthogonal to Product Flavor.

1. http://tools.android.com/tech-docs/new-build-system/build-system-concepts

gradle

What can be customised by Build Types?

- manifest debuggable flag
- native compilation debug flag
- proguard enabled + specific rules
- debug signing flag (ie whether to use debug key or release key)
- package name suffix (2)
- Buildconfig
- DEBUG flag. Set automatically based on the manifest debuggable flag.
- Ability to provide custom Java code.
- Types "Release" and "Debug" are automatically created and can be reconfigured

1. http://tools.android.com/tech-docs/new-build-system/build-system-concepts

Build Variants

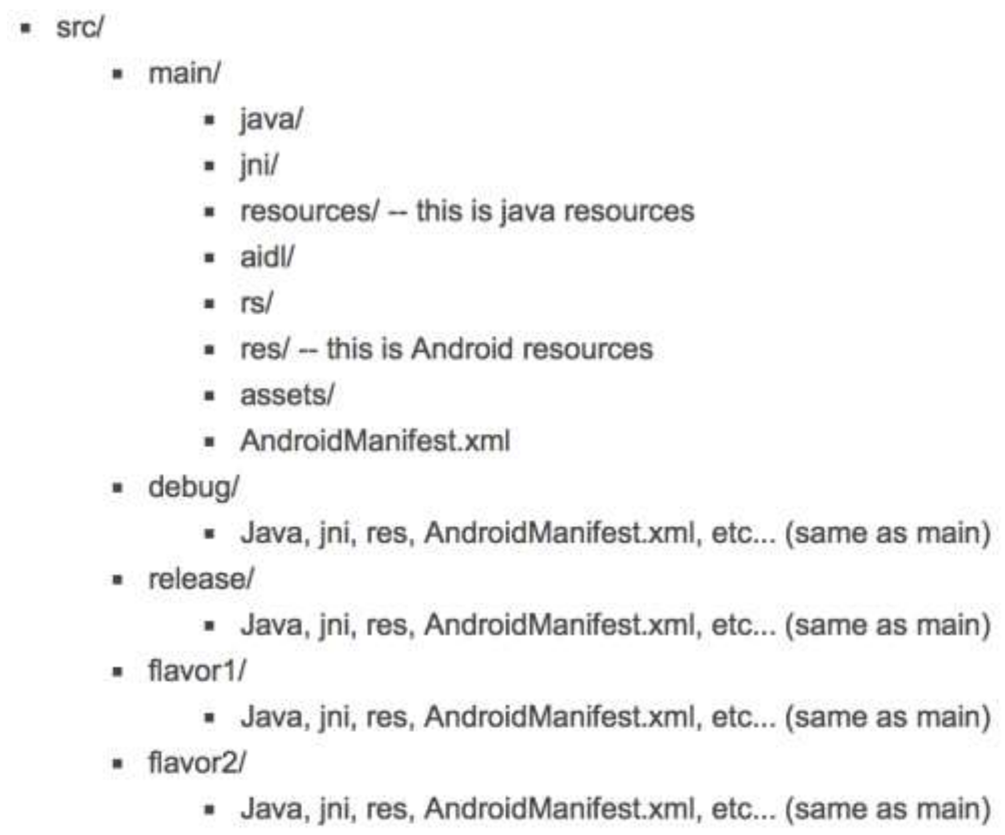
- Build Type + Product Flavor = Build Variant

	type1	type2
flavor1	flavor1-type1	flavor1-type2
flavor2	flavor2-type1	flavor2-type2

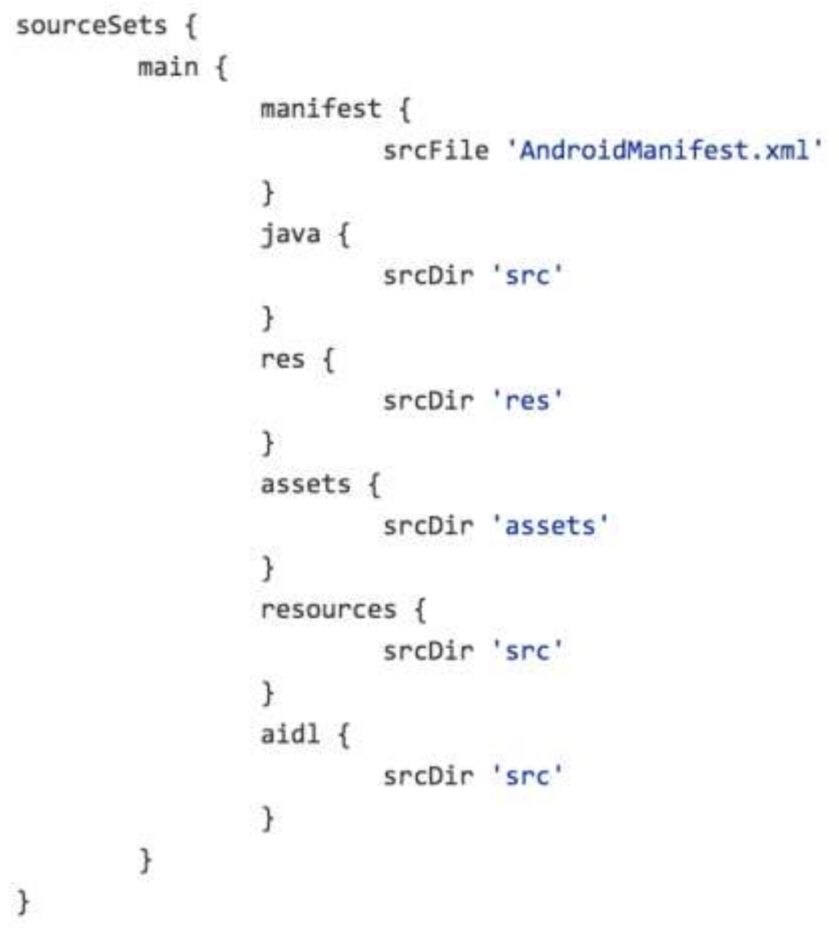
1. http://tools.android.com/tech-docs/new-build-system/build-system-concepts

Sourcesets

- remap src structure
- eclipse compatibility



- src/
  - main/
    - java/
    - jni/
    - resources/ -- this is java resources
    - aidl/
    - rs/
    - res/ -- this is Android resources
    - assets/
    - AndroidManifest.xml
  - debug/
    - Java, jni, res, AndroidManifest.xml, etc... (same as main)
  - release/
    - Java, jni, res, AndroidManifest.xml, etc... (same as main)
  - flavor1/
    - Java, jni, res, AndroidManifest.xml, etc... (same as main)
  - flavor2/
    - Java, jni, res, AndroidManifest.xml, etc... (same as main)



```
sourceSets {
        main {
                manifest {
                        srcFile 'AndroidManifest.xml'
                }
                java {
                        srcDir 'src'
                }
                res {
                        srcDir 'res'
                }
                assets {
                        srcDir 'assets'
                }
                resources {
                        srcDir 'src'
                }
                aidl {
                        srcDir 'src'
                }
        }
}
```

1. http://tools.android.com/tech-docs/new-build-system/build-system-concepts

Dependencies

- Simply include any artifacts provided by mavenCentral()

build.gradle

```
…
dependencies {
    compile fileTree(dir: 'libs', include: ['*.jar'])
    compile 'com.android.support:appcompat-v7:21.0.2'
    compile 'com.jpardogo.flabbylistview:library:+'
    compile 'com.jpardogo.googleprogressbar:library:+'
    compile 'com.mcxiaoke.volley:library:1.0.+'
    compile 'com.umeng.analytics:analytics:5.2.4'
  }
…
```

Dependencies

- 指定你自己的仓库地址

build.gradle

```
…
repositories {
    maven {
        url "http://repo.mycompany.com/repo"
    }
}
…
```

- 常见的maven仓库
  - http://search.maven.org （mavenCentral()）
  - https://bintray.com/bintray/jcenter (jcenter())
  - http://maven.oschina.net/home.html
    - （ maven{ url 'http://maven.oschina.net/content/groups/public/'} ）

Multi Project Build (Library Projects)

- use the settings.gradle files to declare library projects
- add library projects as "compile" dependency
- 自定义library project位置

settings.gradle

```
…
include ':letvCore'
include ':loginLib'
include ':letv'
project(':letvCore').projectDir = new File(rootDir, "../librarys/letvCore")
project(':loginLib').projectDir = new File(rootDir, "../librarys/loginLib")
…
```

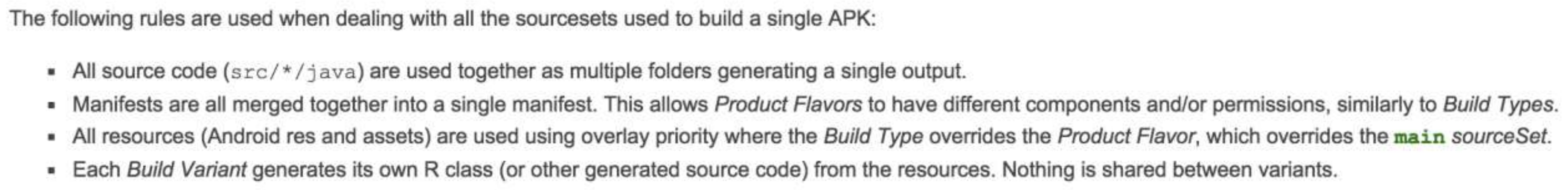
1. http://tools.android.com/tech-docs/new-build-system/build-system-concepts

Demo

- **如何通**过一套代码开发不同功能的apk
- git clone https://github.com/ghuiii/gradledemo.git

代码合并规则

- 图片、音频、 XML 类型的 Drawable 等资源文件，将会进行文件级的覆盖
- 字符串、颜色值、整型等资源以及 AndroidManifest.xml， 将会进行元素级的覆盖
- 代码资源，同一个类， buildTypes 、 productFlavors 、 main 中只能存在一次，否则会有类重复的错误
- 覆盖等级为：buildTypes > productFlavors > main

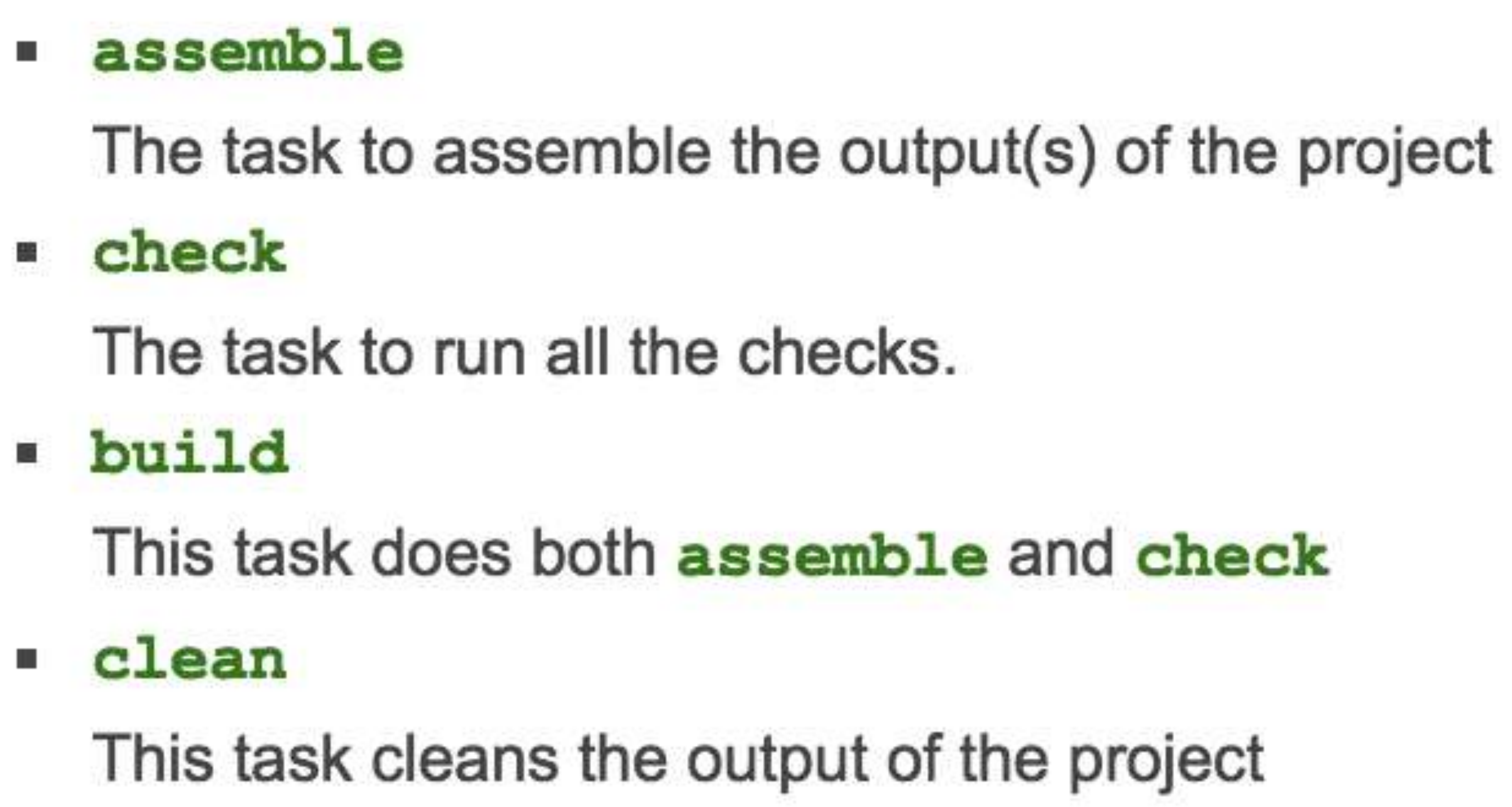


The following rules are used when dealing with all the sourcesets used to build a single APK:

- All source code (`src/*/java`) are used together as multiple folders generating a single output.
- Manifests are all merged together into a single manifest. This allows *Product Flavors* to have different components and/or permissions, similarly to *Build Types*.
- All resources (Android res and assets) are used using overlay priority where the *Build Type* overrides the *Product Flavor*, which overrides the `main` *sourceSet*.
- Each *Build Variant* generates its own R class (or other generated source code) from the resources. Nothing is shared between variants.

1. http://ask.android-studio.org/?/article/30

Gradle plugin for android 常见task



- `assemble`

  The task to assemble the output(s) of the project
- `check`

  The task to run all the checks.
- `build`

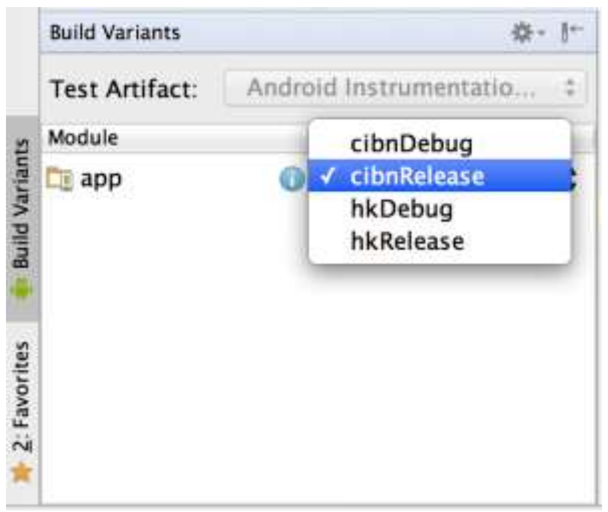
  This task does both `assemble` and `check`
- `clean`

  This task cleans the output of the project

1. http://tools.android.com/tech-docs/new-build-system/user-guide#TOC-Build-Tasks

Studio&Gradle

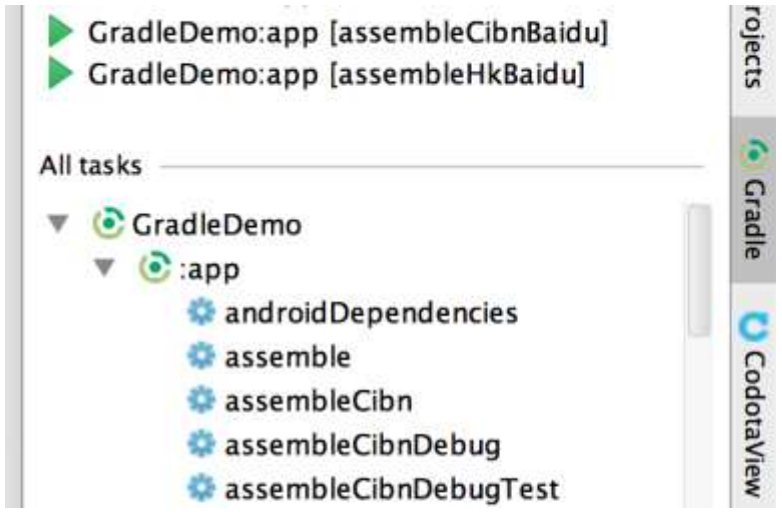
- Good IDE integration
- The IDE doesn't do a build anymore
- Building and Running from Android Studio
- Building and Running from Command Line


Build Variants

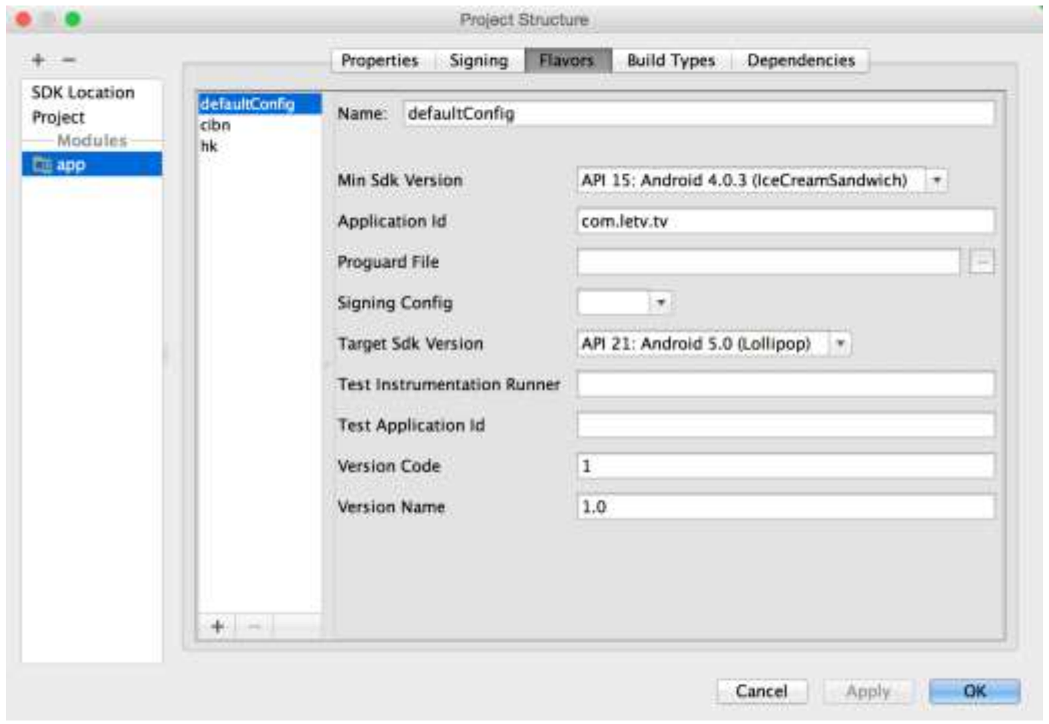
Test Artifact: Android Instrumentatio...

Module: app

cibnDebug
✓ cibnRelease
hkDebug
hkRelease


```
GradleDemo:app [assembleCibnBaidu]
GradleDemo:app [assembleHkBaidu]

All tasks
▼ GradleDemo
  ▼ :app
      androidDependencies
      assemble
      assembleCibn
      assembleCibnDebug
      assembleCibnDebugTest
```


Project Structure

SDK Location
Project
Modules
app

Properties | Signing | Flavors | Build Types | Dependencies

defaultConfig
cibn
hk

Name:	defaultConfig
Min Sdk Version	API 15: Android 4.0.3 (IceCreamSandwich)
Application Id	com.letv.tv
Proguard File	
Signing Config	
Target Sdk Version	API 21: Android 5.0 (Lollipop)
Test Instrumentation Runner	
Test Application Id	
Version Code	1
Version Name	1.0

1. http://developer.android.com/tools/building/index.html

Gradle 与 tv版

从maven仓库获取依赖的好处

1. **将主工程与依**赖隔离开，方便对依赖的管理，它们之间只是通过一条gradle语句建**立**联系
2. **依**赖不再会进入主工程的代码仓库
3. **在本地不会存在依**赖的重复副本（依赖只会缓存一份到本地）

Resources

- http://gradle.org/docs/current/userguide/userguide.html
- http://rominirani.com/2014/07/28/gradle-tutorial-series-an-overview/
- http://avatarqing.github.io/Gradle-Plugin-User-Guide-Chinese-Verision/introduction/README.html
- http://developer.android.com/sdk/installing/studio-build.html
- http://apdr.qiniudn.com/index.html

Thanks