Gradle Concepts And Best Practices

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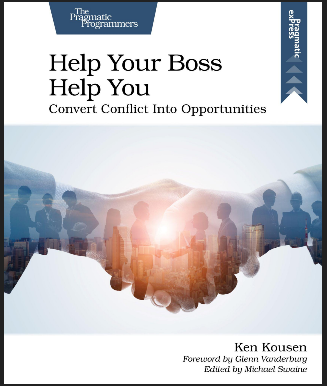
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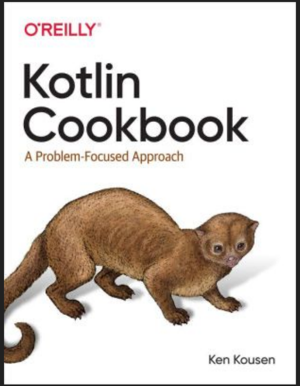

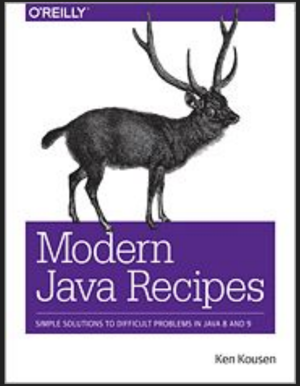

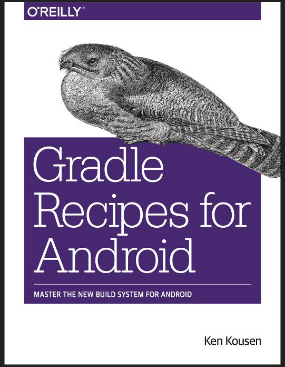
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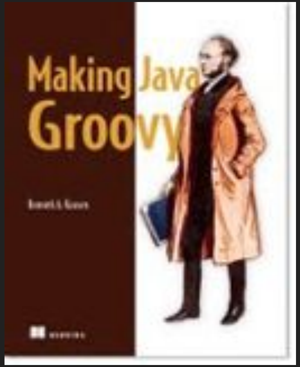

Gradle

- Build tool
- Defines DSL (domain specific language) for builds
- DSL in either Groovy or Kotlin
    - `build.gradle` → Groovy
    - `build.gradle.kts` → Kotlin

Know the Gradle Lifecycle

Phases

Initialization time

Configuration time

Execution time

Initialization

- Determines which build files to process
- Reads gradle.properties file
- Runs any "init" tasks

Configuration

- Gradle processes build files
- Instantiates and configures all tasks

Remember: ALL tasks are configured before ANY are executed

Anything outside doFirst or doLast happens at configuration time

Execution

- Runs `@TaskAction` method in requested tasks
- All tasks (other than DefaultTask) have a task action
- `doFirst` is pre-processing before task action
- `doLast` is post-processing after task action

From Eager to Lazy

- Instead of `task myTask` use `tasks.register("myTask")`
- Instead of `myTask { … }` use `tasks.named("myTask") { … }`

Arrange Tasks In The DAG

DAG

Gradle builds Directed Acyclic Graph

Graph based on task dependencies

- `dependsOn`
- `mustRunAfter`
- `shouldRunAfter`
- `finalizedBy`

See execution path with `--dry-run` (or `-m` for short)

Each task executed only once

Start with settings.gradle

Multi-project builds

`settings.gradle` → uses `include`

Specifies which subdirectories are also Gradle projects

Can also modify project dir, build dir, other properties

Extra properties

`ext.myprop` → avoid conflicting with existing project properties

myprop now available

- throughout project
- in any subproject

Use the Gradle API

Gradle API

- Gradle is written in (primarily) Java
- Each task in the DSL backed by Java class
- Those classes are heavily tested and maintained
- Use these typed tasks whenever possible

Ad-Hoc vs Typed tasks

Ad-hoc:

```
task hello {
    doLast { println 'What up?' }
}
```

Typed:

```
task copy(type: Copy) {
    from 'mydir'
    into 'otherDir'
}
```

Create a Custom Task

Custom Task

- Extend `DefaultTask` or other from API
- Annotate exactly one method with `@TaskAction`
- Can create class in `build.gradle`
- Eventually move it to `buildSrc` directory
- Eventually make a plugin

Creating Custom Tasks

Extend `DefaultTask`

Use `@org.gradle.api.tasks.TaskAction`

Ad hoc tasks have no defined action

Ad hoc task

- Basis of most Gradle tutorials (unfortunately)
- Have no `type:` parameter
- Are instances of `DefaultTask`
- Need `doFirst` or `doLast`, or they don't do anything

Useful command line flags

Command line flags

Exclude task with `-x`

Continuous build `-t`

Keep going `--continue`

Dry run `-m` or `--dry-run`

Parallel `--parallel` (for multi-project builds)

Manage project dependencies

Dependency Resolution

`jcenter()` or `mavenCentral()`

Any Ivy or Maven url

Local file system

Note: jcenter() is now deprecated and is going away

Configuration

A configuration is a collection of dependencies

Constraints DSL

- version block
- Specify:
    - strictly
    - prefer
    - require
    - reject

https://docs.gradle.org/current/userguide/rich_versions.html

Checking dependencies

```
> gradle dependencies [--configuration <name>]

> gradle dependencyInsight --dependency <name>
    --configuration <name>
```

Incremental builds (Inputs and Outputs)

Inputs and Outputs

files, directories, properties

In task class, annotate:

- `@InputFile, @InputFiles`
- `@InputDirectory`
- `@Input (for a String property)`
- `@OutputFile`
- `@OutputDirectory`

Inputs and Outputs

In the build file,

```
task mytask {
    inputs.file file('myfile.txt')
    outputs.file file('output.txt')
    doLast {
        // … whatever …
    }
}
```

Inputs and Outputs

Task is up to date when:

- Inputs haven't changed
- Outputs still present and unchanged

Input/Output files are hashed

Contents of directories are hashed

Values of properties are serialized

Miscellaneous

Build Scans

Add plugin

Add license agreement

Run with `--scan` (3.4) or `-Dscan`

Check out results

- Self-hosted version part of Gradle Enterprise

Logger

In build.gradle, use logger

```
logger.info "An info message"
logger.warn 'A warning'
```

```
> gradle -i hello
```

Ant integration

Gradle includes "ant" object → AntBuilder

Import Ant build files → Ant tasks become Gradle tasks

```
ant.importBuild 'build.xml'
```

IDE Support

Eclipse → Buildship

IntelliJ → Gradle support built-in

`apply plugin: 'eclipse'` or `apply plugin: 'eclipse-wtp'`

`apply plugin: 'idea'`

Script Plugins

Like an import

```
apply from: 'other.gradle'
```

"from" value can be a full URL

- Not cached -- if unavailable, build will fail

Binary Plugins

Class that implements `Plugin<Project>`

```
void apply(Project project) {
    // ...
}
```

```
apply plugin: 'org.foo.my-plugin'

apply plugin: org.foo.plugins.MyPlugin
```

Plugin ID

```
apply plugin: 'org.foo.my-plugin'
```

META-INF/gradle-plugins/org.foo.my-plugin.properties:

```
    implementation-class=org.foo.plugins.MyPlugin
```

Plugin Repository

- Gradle Plugins Repository
  - http://plugins.gradle.org

Key Concepts

- Know the Gradle lifecycle
- Start with settings.gradle
- Use the DSL where possible
- Then use Gradle API
- Try to create a custom task
- Only use ad hoc tasks when necessary
- Incremental builds
- Useful keyboard shortcuts
- Miscellaneous

Inside Joke

This is an inside joke, but if you know, you know…

Best Practice

Remember, kids! Andres says:

```
> mvn clean install
```

(Who cares about performance, anyway?)

Bestest Practice

Remember, kids! Andres says:

```
> mvn verify
```

(Who cares about performance, anyway?)