Kotlin, one language to build them all!

Rodrigo Oliveira & Paul Merlin

Gradle

gradle.github.io/imaginate

video - pdf - sources

Agenda

Imaginate

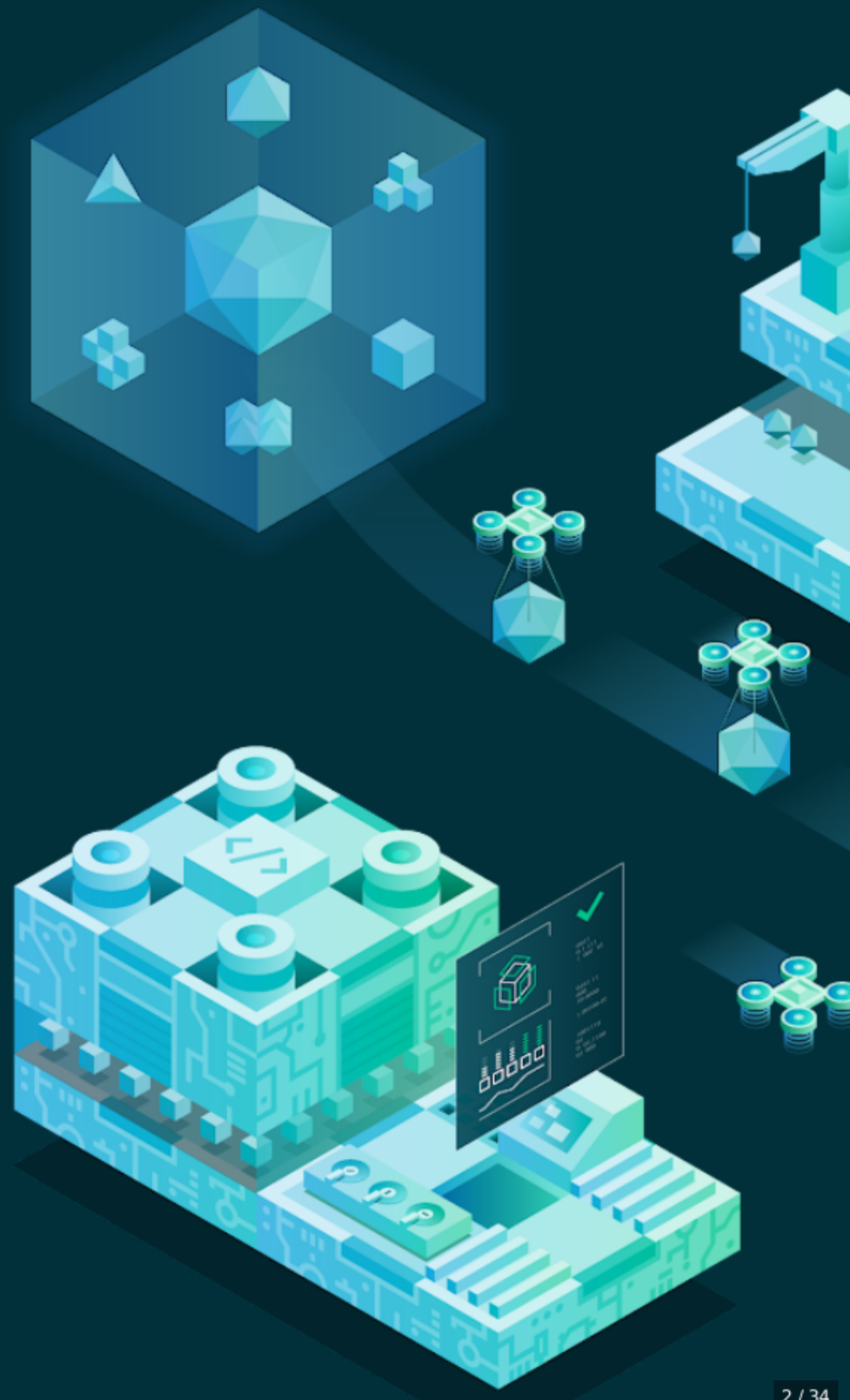
An imaginary image generator

Gradle & Kotlin ❤

Build logic

Speed-up Loop Bonus

Configuration cache



Who are we?

```
speaker {
    name = "Paul Merlin"
    company = "Gradle"
    joined = 2015
    position = "Kotlin DSL Project Lead, again \o/"
    previously = "Configuration Cache Project Lead"
    github = "eskatos"
    mastodon = "@eskatos@mastodon.social"
}
```

```
speaker {
    name = "Rodrigo B. de Oliveira"
    company = "Gradle"
    joined = 2015
    position = "Configuration Team Lead"
    previously = "Kotlin DSL Project Lead"
    github = "bamboo"
    mastodon = "@rbo@mastodon.social"
}
```

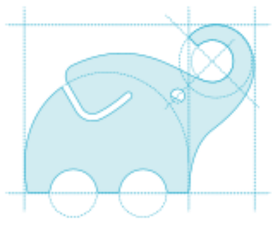
Gradle

gradleware

gradle

Gradle

Since 2008, our mission is to
accelerate developer productivity.



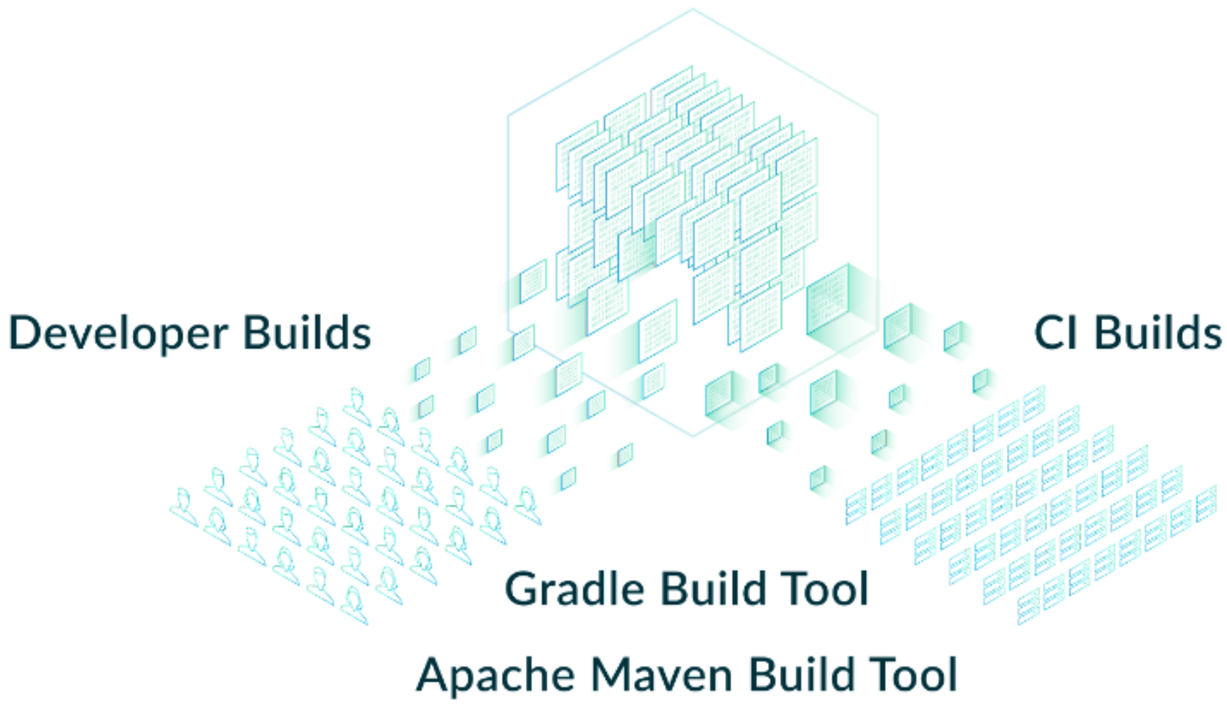
Gradle Build Tool

Apache licenced sofware build tool

With 30M+ monthly downloads, this is one of the top 20 popular open source projects according to TechCrunch.

Gradle Enterprise

Gradle Enterprise, commercial product, is the first Developer Productivity Engineering (DPE) integrated solution.



Developer Productivity Engineering

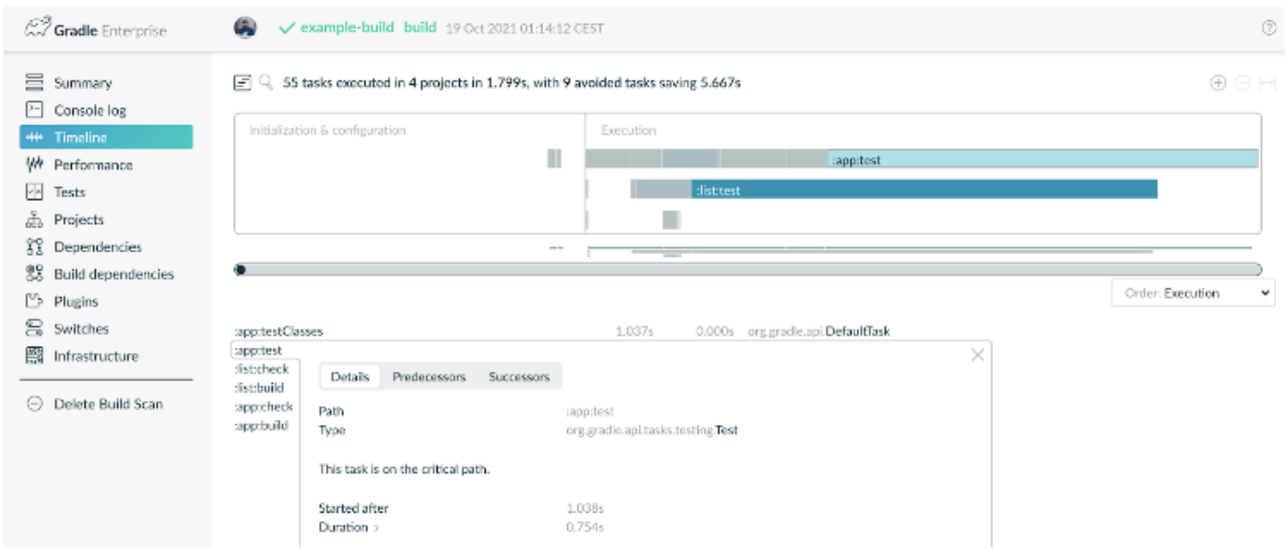
DPE is an emerging software practice that relies on acceleration technologies and data analysis to improve developer productivity.

- make builds and tests faster
- make problem research more efficient

twitter.com/DpeShowdown

Build Scans

A permanent record
of what happens during a build.



build scan

Gradle & Maven build speed challenge

Get some swag :)

We recruit!

If what we're going to talk about Today is of interest to you, come work with us!

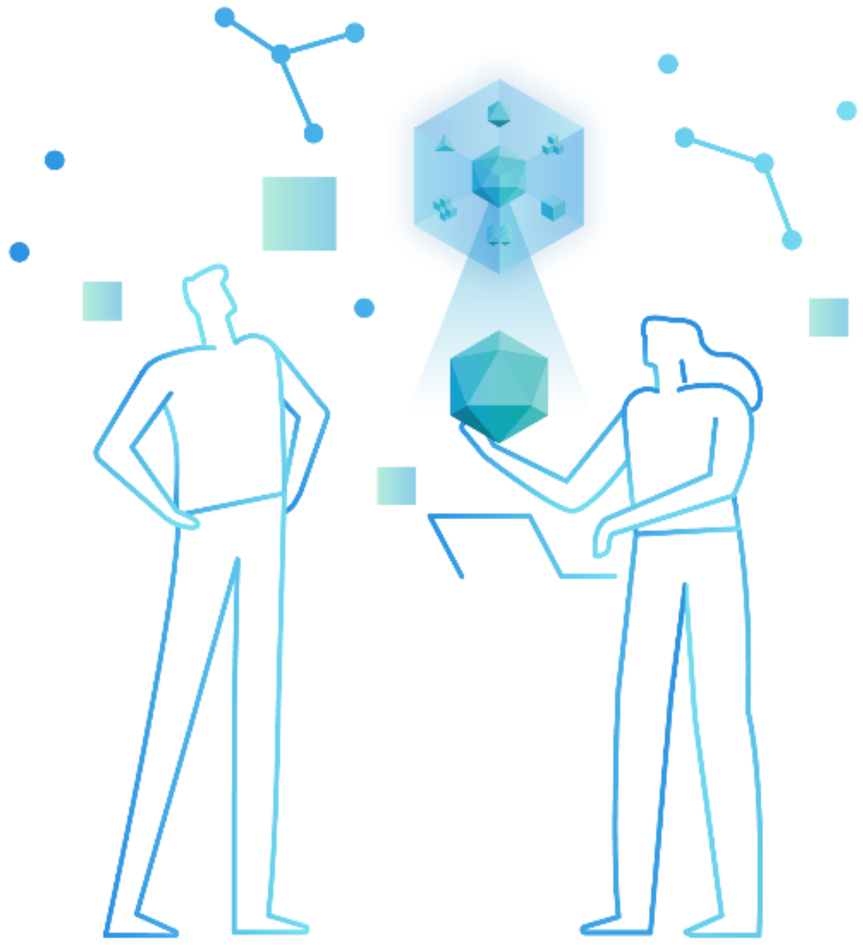
gradle.com/careers

Imaginate

An imaginary image generator

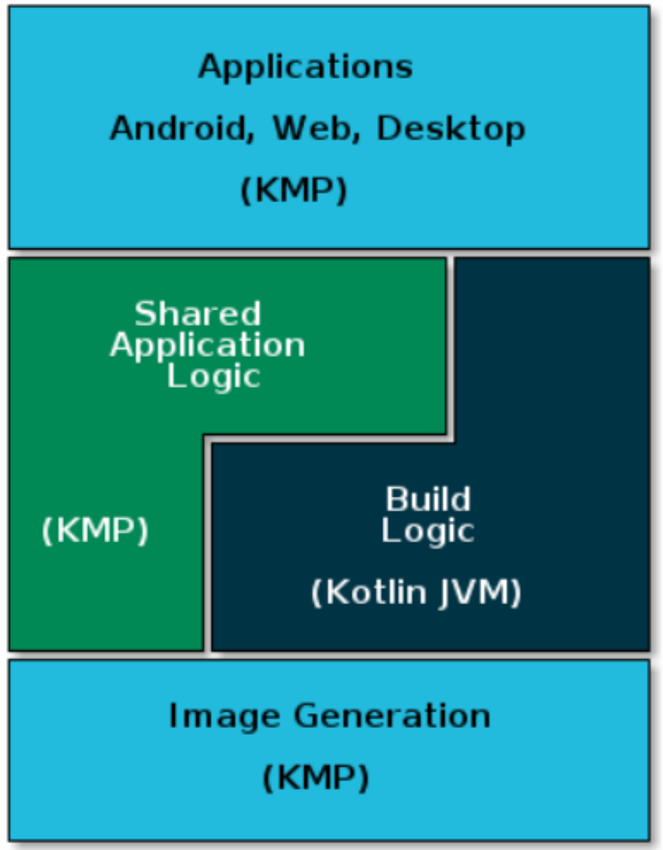
Imaginate - Demo

Imaginate - Exploration



gradle/imaginate#DesktopMain.kt

Imaginate - Overview



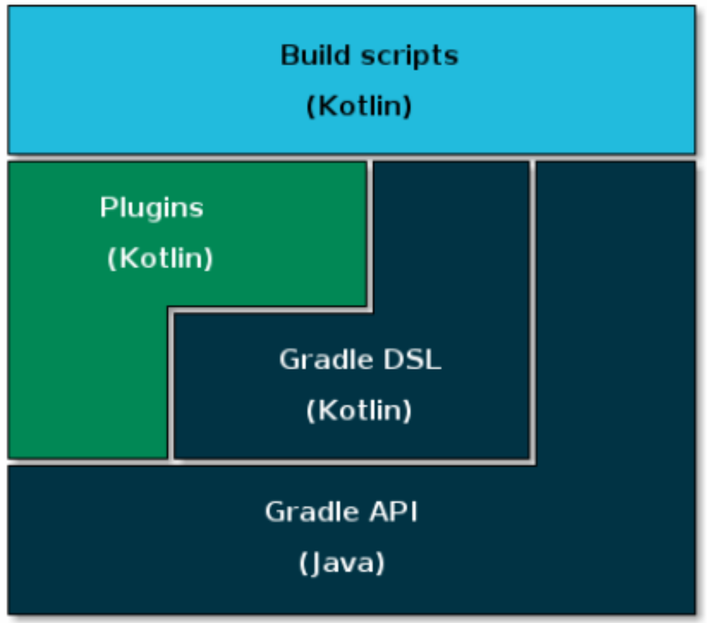
Gradle & Kotlin ❤

Build logic

Build logic - Kotlin!

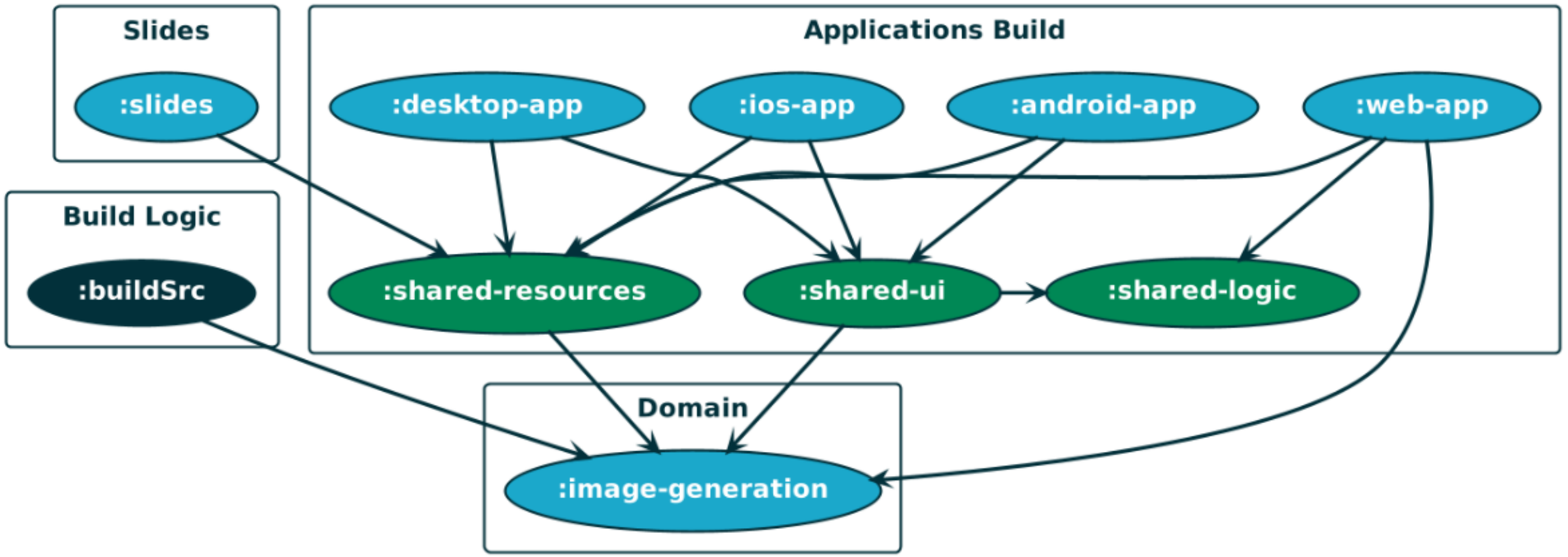
Gradle's Kotlin DSL

- Kotlin DSL on top of Gradle's Java API
- Low ceremony thanks to Kotlin Scripting
- Official Kotlin compiler plugins
- IDE assistance, code navigation etc…



Build logic - Structure

A composite build bringing 4 included builds together.



Build logic - Slides

"capital letter K. elephant. pop art."

"elephant in the Kotlin island. caravaggio."

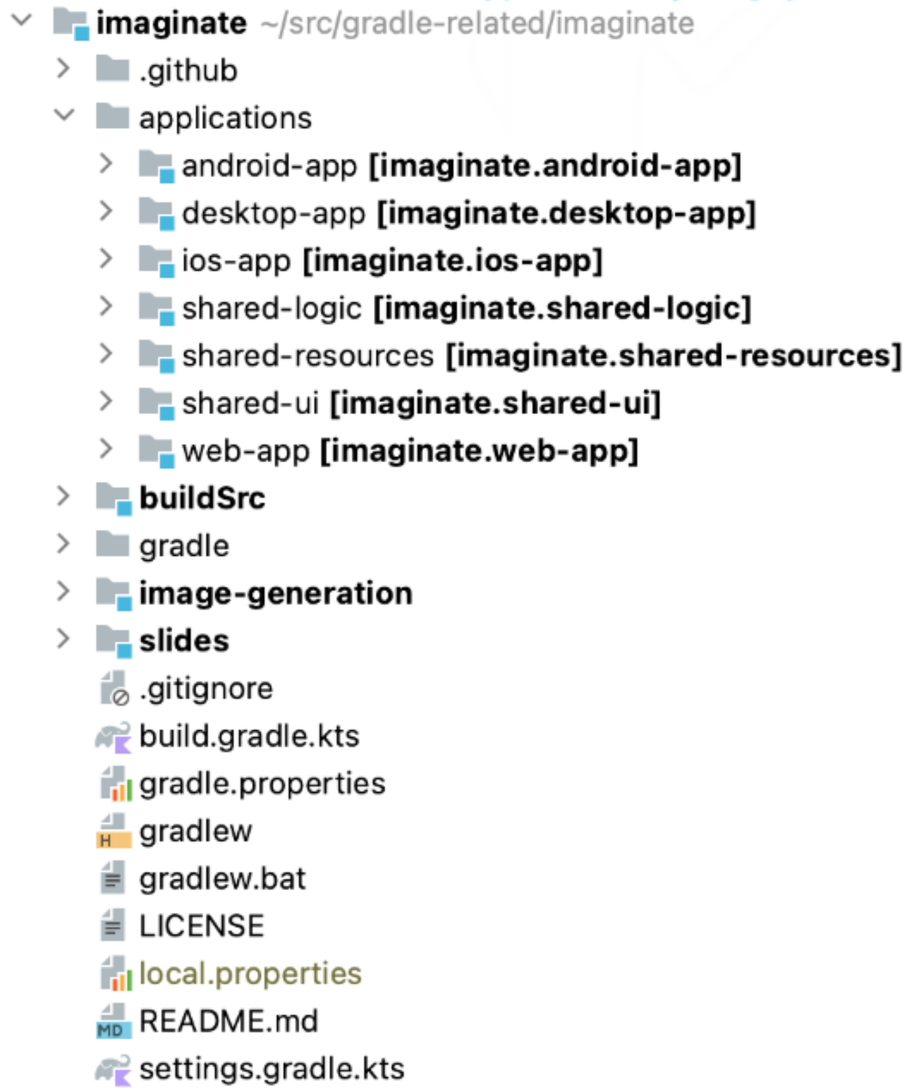
Build logic - Overview

settings.gradle.kts

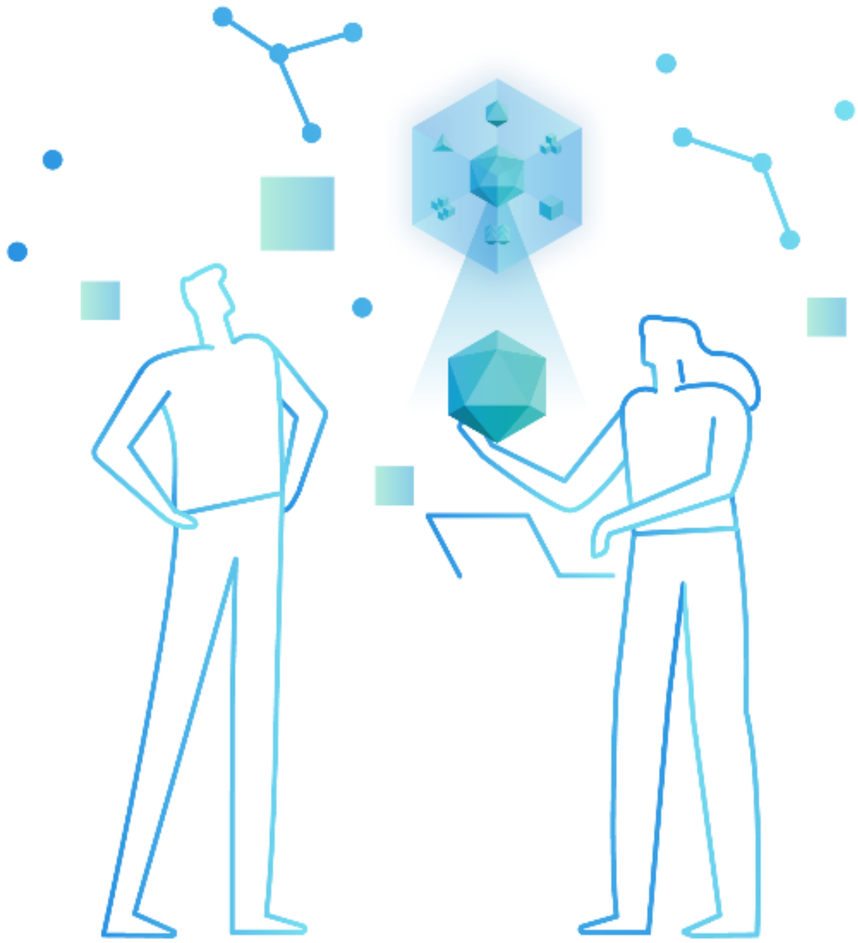
```
includeBuild("image-generation")
includeBuild("slides")

include("shared-resources")
include("shared-logic")
include("shared-ui")
include("desktop-app")
include("android-app")
include("ios-app")
include("web-app")

for (project in rootProject.children) {
    project.projectDir = file("applications/${project.name}")
}
```

buildSrc/settings.gradle.kts

```
includeBuild("../image-generation")
```



Build logic - Exploration



gradle/imaginate#ImageGenerator.kt

Build logic - Kotlin DSL

Gradle plugins contribute to a dynamic model

Kotlin DSL provides static accessors

- extensions and tasks
- projects and version catalogs

IDE assistance, code navigation etc…

applications/web-app/build.gradle.kts

```
plugins {
  id("web-app")
}

dependencies {
  // Configuration defined in the
  // `shared-resources-consumer` convention plugin
  sharedBitmaps(projects.sharedResources)
}

kotlin {
  sourceSets {
    // Source set defined in `web-app` convention plugi
    jsMain {
      dependencies {
        // Static project accessor
        implementation(projects.sharedLogic)
        // Static version catalog accessors
        implementation(libs.imaginate.imageGeneration)
      }
    }
  }
}
```

Build logic - Building blocks

Convention plugins

- Put `.gradle.kts` files in `buildSrc/src/main/kotlin`
- Apply them in project build scripts

Helpers

- Put `.kt` files in `buildSrc/src/main/kotlin`
- Prefer `internal` visibility

Custom DSL

- Use Gradle extensions and containers

Custom Tasks

- Use the Worker API for isolation and parallelism

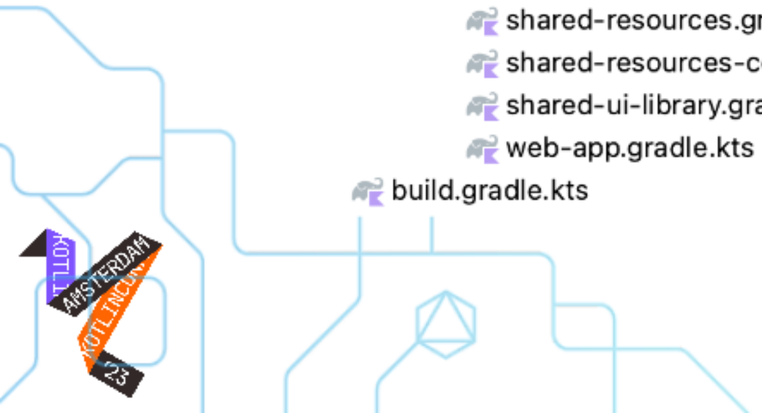
Build logic - `buildSrc`

Keep imperative logic out of project build scripts.
Expose declarative DSL from convention plugins instead.

- **buildSrc**
  - src
    - **main**
      - kotlin
        - imaginate
          - android-app.gradle.kts
          - android-library.gradle.kts
          - build-credentials.gradle.kts
          - desktop-app.gradle.kts
          - ios-app.gradle.kts
          - kotlin-compose-component.gradle.kts
          - kotlin-ios-component.gradle.kts
          - kotlin-js-executable.gradle.kts
          - kotlin-js-library.gradle.kts
          - kotlin-jvm-component.gradle.kts
          - root-project.gradle.kts
          - shared-logic-library.gradle.kts
          - shared-resources.gradle.kts
          - shared-resources-consumer.gradle.kts
          - shared-ui-library.gradle.kts
          - web-app.gradle.kts
  - build.gradle.kts

applications/android-app/build.gradle.kts

```
plugins {
    id("android-app")
}

android {
    namespace = "imaginate.android"
}

dependencies {
    implementation(projects.sharedLogic)
}
```



Build logic - `buildSrc`?

`buildSrc` vs `includeBuild` for build logic

`buildSrc`

Everything is made available in the owner build's project scripts.

You can directly use anything.

`includeBuild`

Nothing is made available by default.

You have to declare dependencies.

Convention plugins

```
plugins {
    id("my-convention-plugin")
}
```

From `buildSrc`

```
dependencies {
    implementation("my:included-build:latest")
}
```

Since Gradle 8.0, `buildSrc` is much more like included builds

docs.gradle.org/8.0/release-notes.html#improvements-for-buildsrc-builds

Build logic - `buildSrc` first

Start with `buildSrc`,
move to included builds when you need to

- share logic between builds,
- isolate a portion of build logic.

Transition is simple
if you only use convention plugins

Publish your convention plugins for sharing them across repositories

Build logic - Learn more

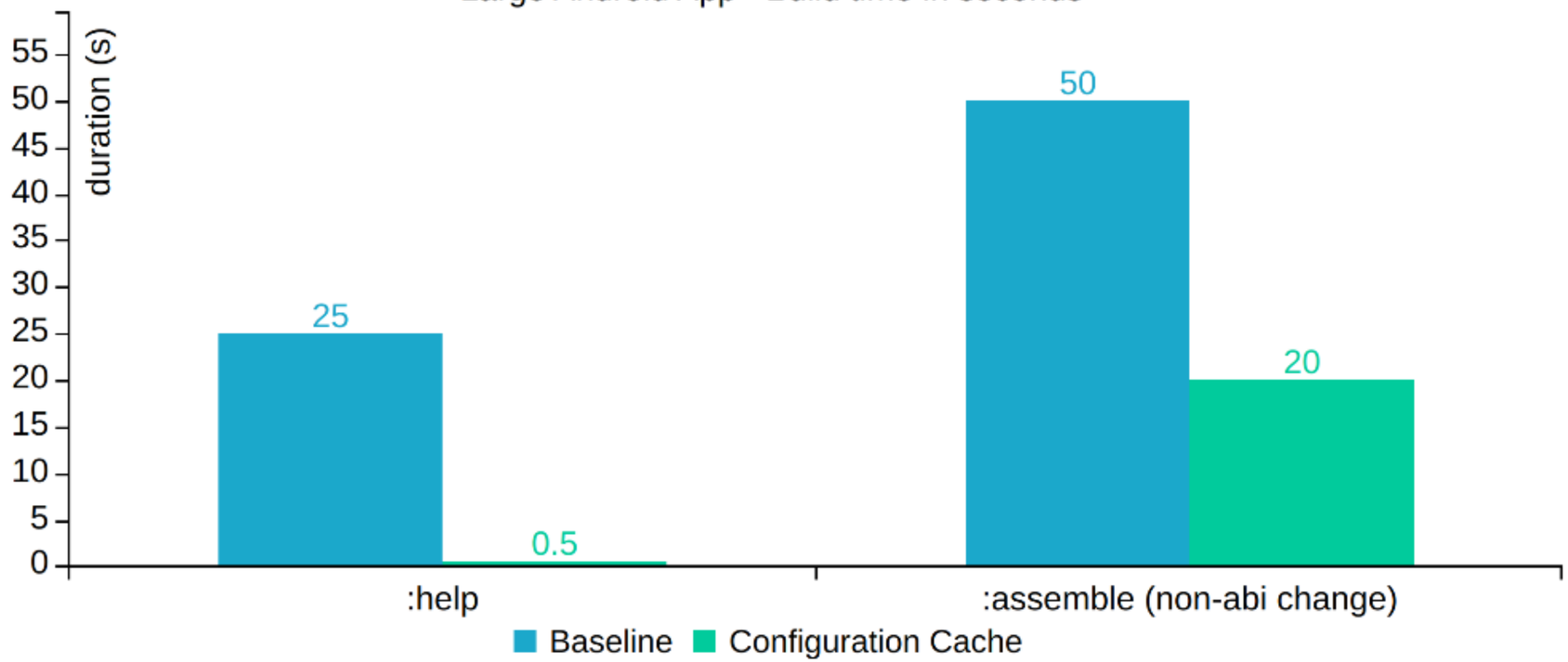
- Gradle's Kotlin DSL
  - Documentation
  - DSL Reference
- Build organization
  - Structuring individual builds
  - Structuring software products
  - Jendrik's Understanding Gradle videos
  - Tony's and Cédric's blog posts

Speed-up Loop Bonus

Configuration cache

Configuration cache

Significantly improves build performance
by caching the result of the configuration phase
and reusing this for subsequent builds.



Configuration cache - How does it work?

First run

Subsequent runs

Configuration cache - What are the benefits?

- Configuration time becomes work graph loading time
- Increased parallelism
- Reduced memory consumption

Configuration cache - Turn it on!

Stable in Gradle 8.1

docs.gradle.org/8.1/release-notes.html

On the command line

```
./gradlew --configuration-cache build
```

Persistently in `gradle.properties`

```
org.gradle.configuration-cache=true
```

What's next?

Usability

- Simpler container DSL
- Kotlin and Kotlin DSL version management
- DSL reference improvements
- And more…

Performance

- Script compilation avoidance
- `plugins {}` block interpreter
- Faster precompiled script plugins build
- K2
- Quicker first-use
- Configuration cache by default for Android
- Project Isolation

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