# Use of Languages in Android Applications

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*Software Composition Seminar*
*University of Bern*

# RELEVANCE

Android smartphone market share > 85%

Used for sensitive applications
*(e-banking, healthcare, etc.)*

Languages influence app development

# MOTIVATION

## LEVERAGING INFORMATION

Not much information is available about the use of languages

"Missing generalization” of languages in Android development

## IMPROVING CODE QUALITY

Problems may arise due to the use of complex languages, or their improper integration

Support of practical use

# ASSESSMENT TOOL

## cloc

github.com/AlDanial/cloc v 1.76  T=0.10 s (667.6 files/s, 57257.8 lines/s)

| Language | files | blank | comment | code |
|---|---|---|---|---|
| Java | 23 | 442 | 478 | 2262 |
| XML | 40 | 221 | 564 | 1736 |
| Groovy | 3 | 10 | 49 | 47 |
| Markdown | 1 | 24 | 0 | 42 |
| YAML | 1 | 5 | 7 | 14 |
| ProGuard | 1 | 2 | 15 | 0 |
| SUM: | 69 | 704 | 1113 | 4101 |

# Structure

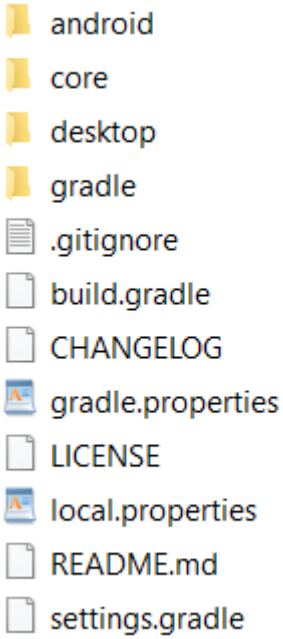
File structures used in projects

# STRUCTURE

- android
- core
- desktop
- gradle
- .gitignore
- build.gradle
- CHANGELOG
- gradle.properties
- LICENSE
- local.properties
- README.md
- settings.gradle

- assets
- gradle
- libs
- res
- src
- AndroidManifest.xml
- build.gradle
- local.properties
- proguard-project.txt
- project.properties

# STRUCTURE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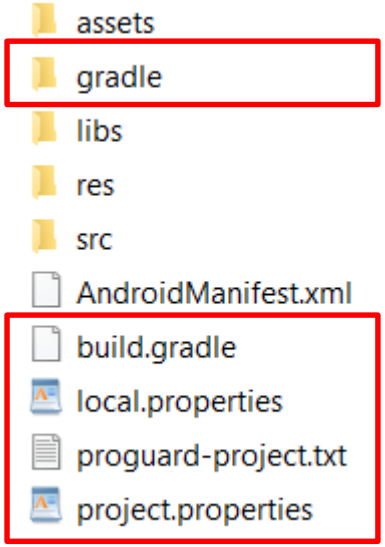
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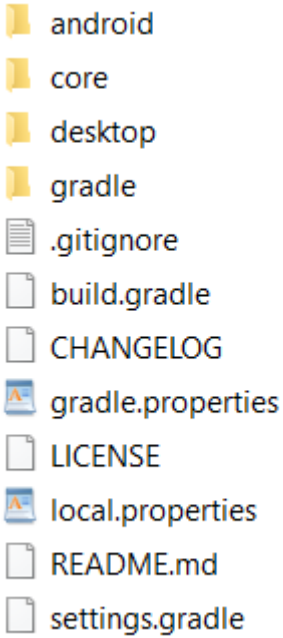
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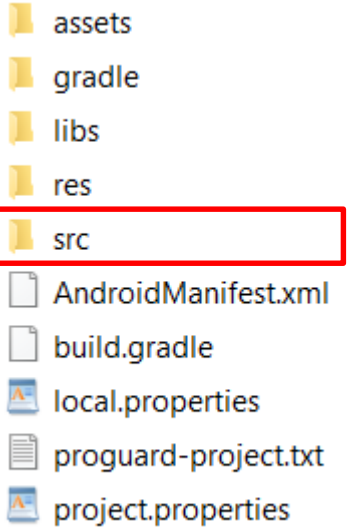
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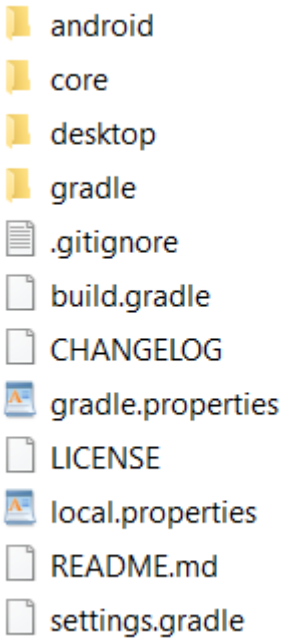
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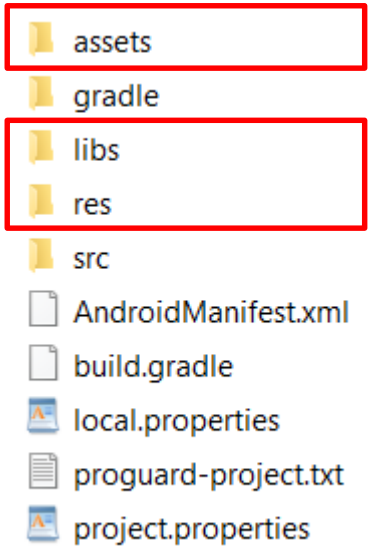
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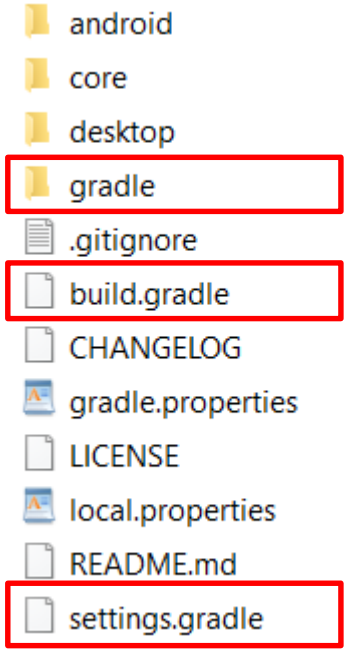
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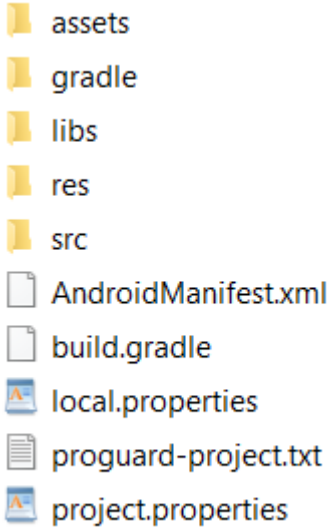
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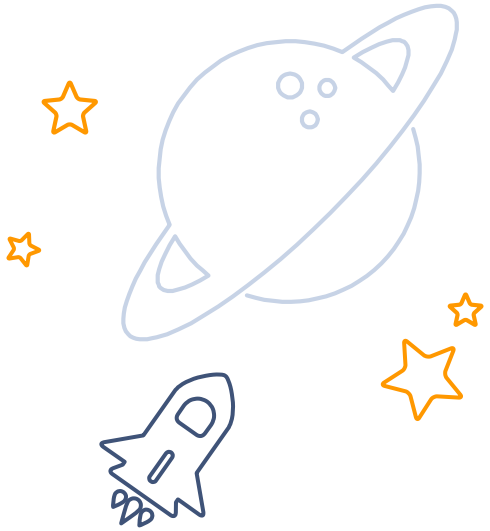
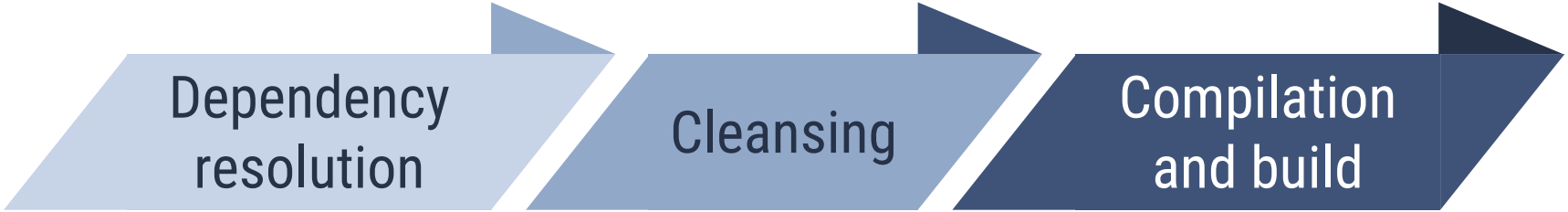


# BUILD TOOLS

Features and differences

# BUILD TASKS




**Dependencies: JUnit,  Hamcrest**

# ANT


| | |
|---|---|
| `ivy.xml` | Ivy dependencies specified in `ivy.xml` |
| `build.xml` | build script |

# MAVEN

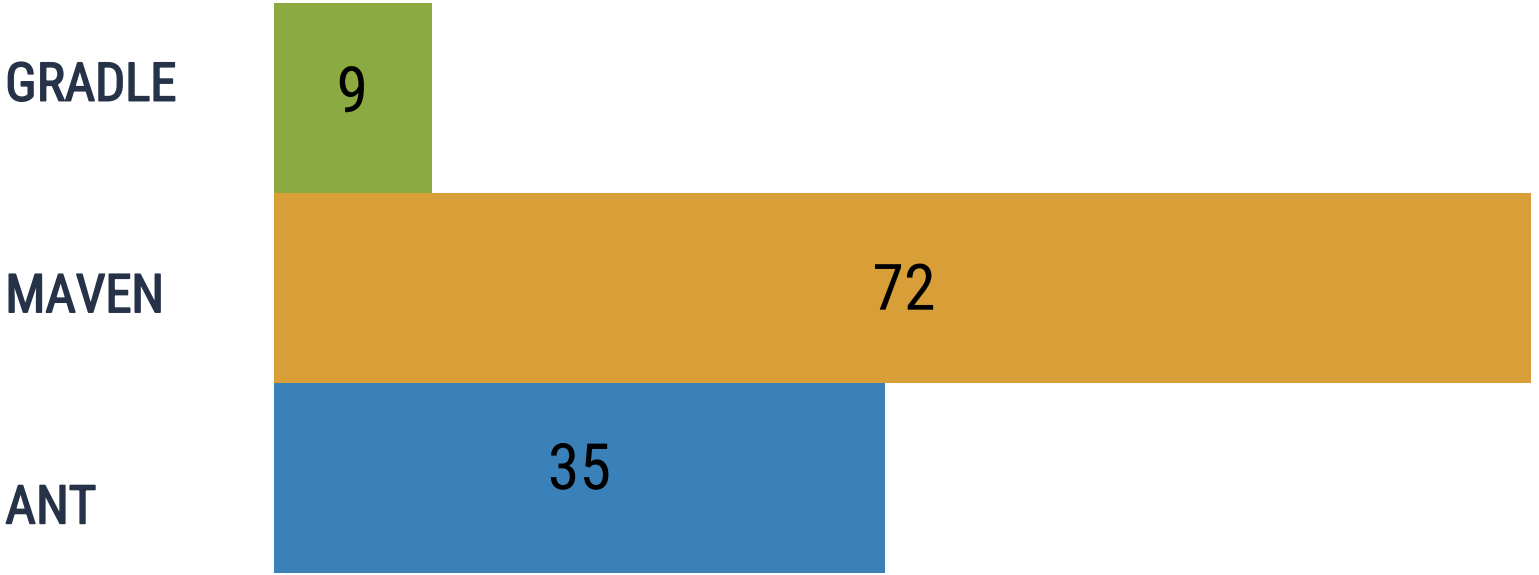

| | |
|---|---|
| `pom.xml` (main config) | Compiles project by using parameters |
| `pom.xml` (supplemental config) | Plugins |

# GRADLE


`build.gradle`

Custom DSL based on Groovy

# LINES OF CODE



# BUILD TOOLS OVERVIEW

## Ant

Full control
over the build process.

Build scripts use XML.

## Maven

Flexibility.

Strictly structured,
highly standardized.
Complicated.

## Gradle

Provides all features.

More intuitive and shorter
build scripts.

# PROGUARD

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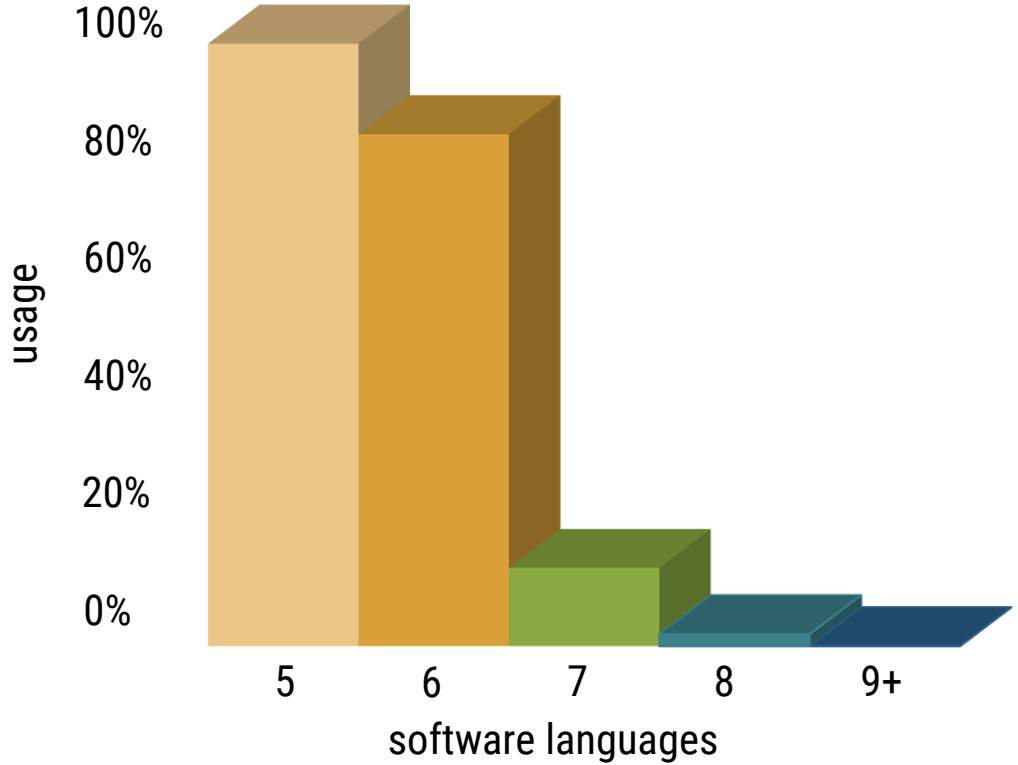
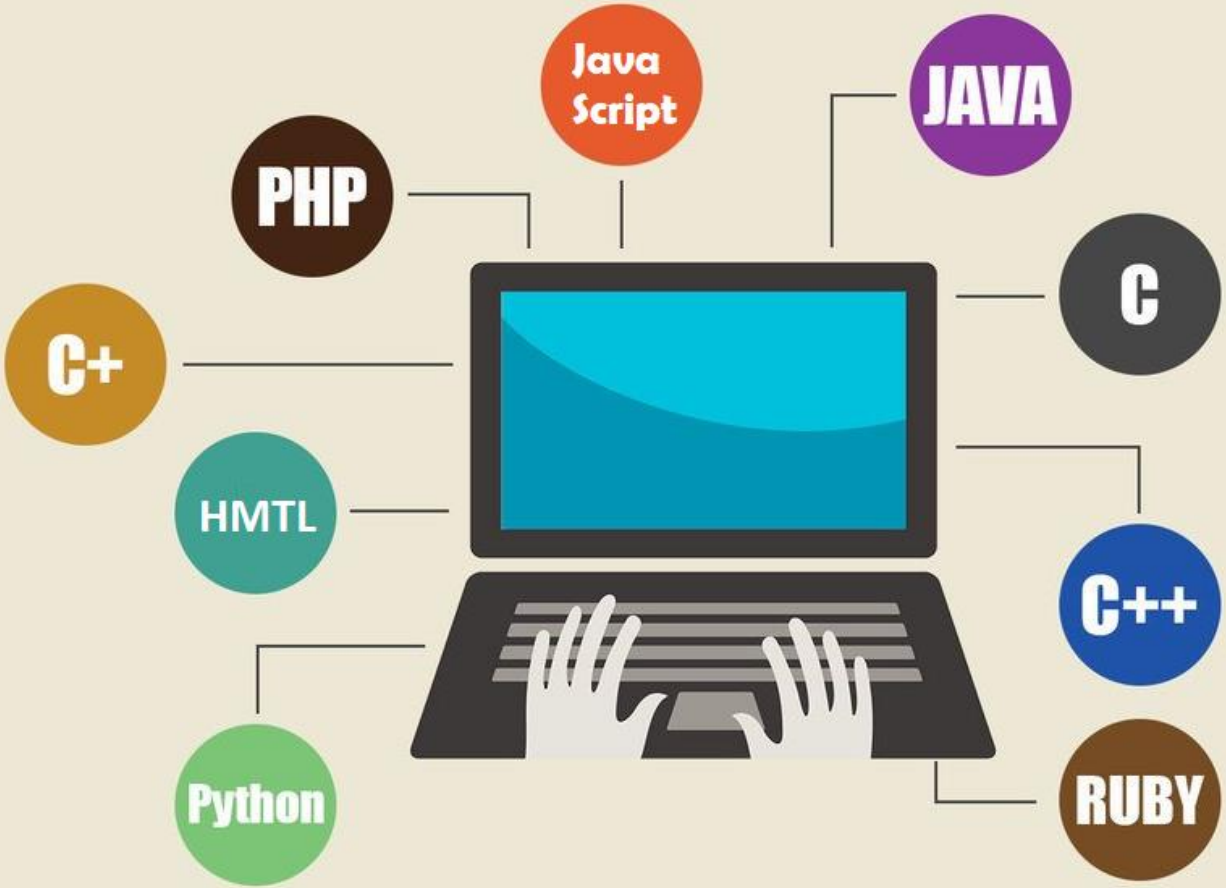
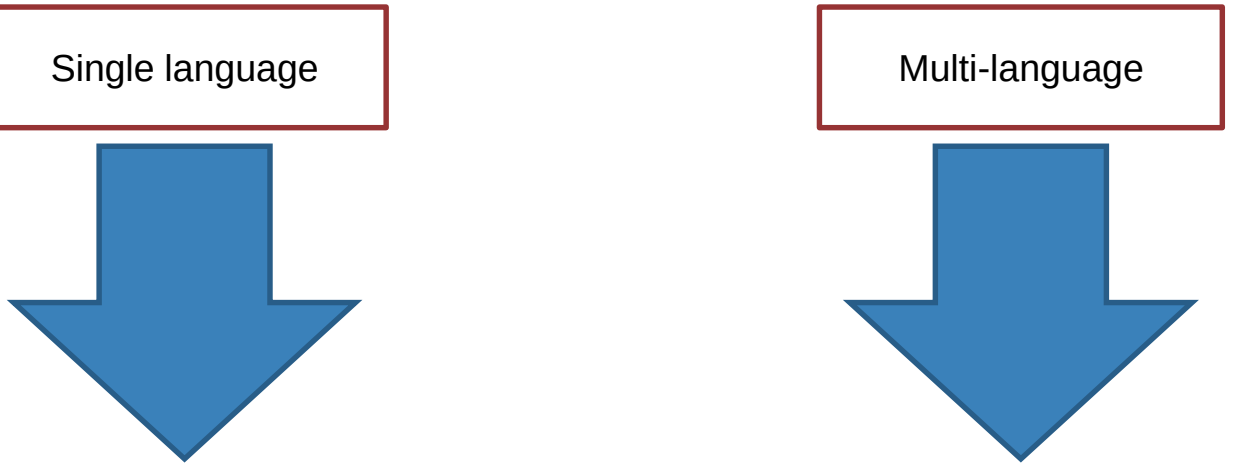


# LANGUAGES

Features and differences


Java Script
JAVA
PHP
C
C+
HMTL
C++
Python
RUBY

# XML



## JAVA

well-established language

## KOTLIN

new programming language

- less lines of code
- data classes
- null safety

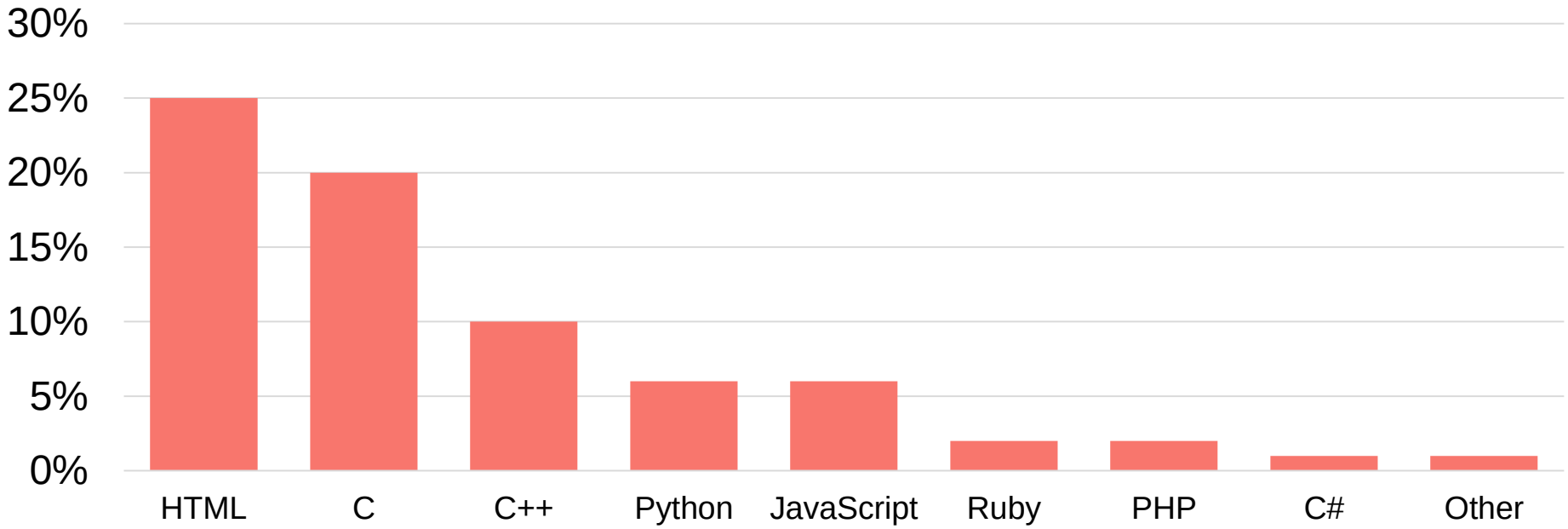
# BUILD TIME DIFFERENCE

| [s] | Without Gradle | With Gradle |
|---|---|---|
| JAVA | 10.82 | 9.17 |
| KOTLIN | 13.12 | 11.44 |

22%

13%

# LANGUAGE USAGE



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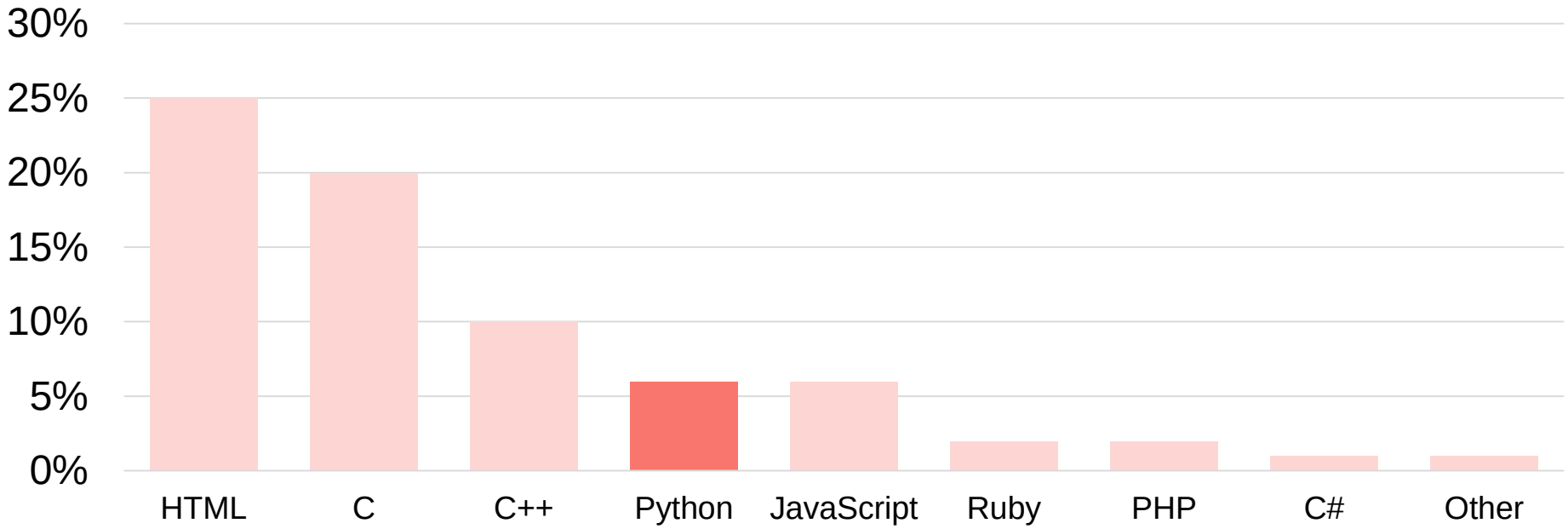
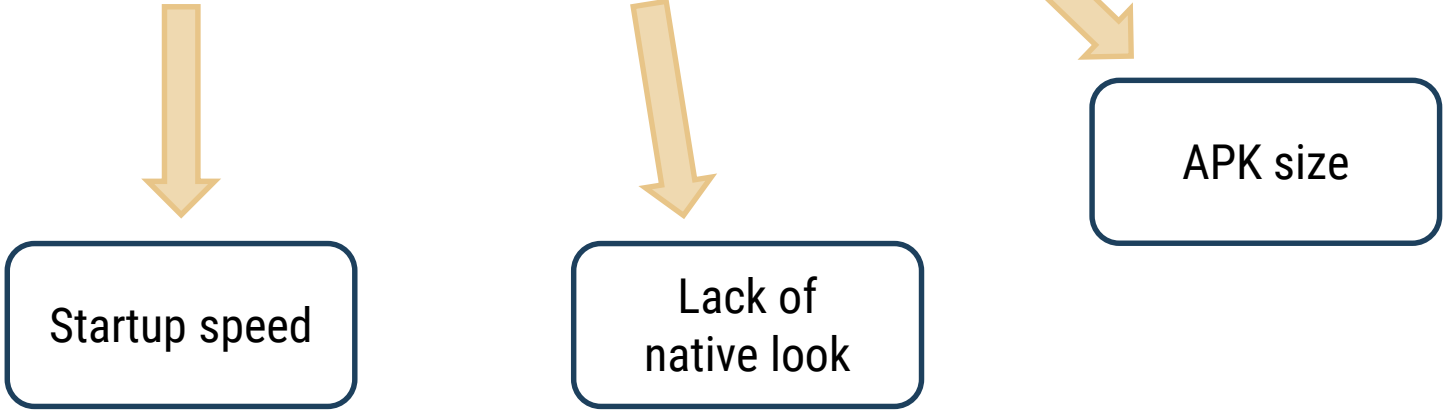
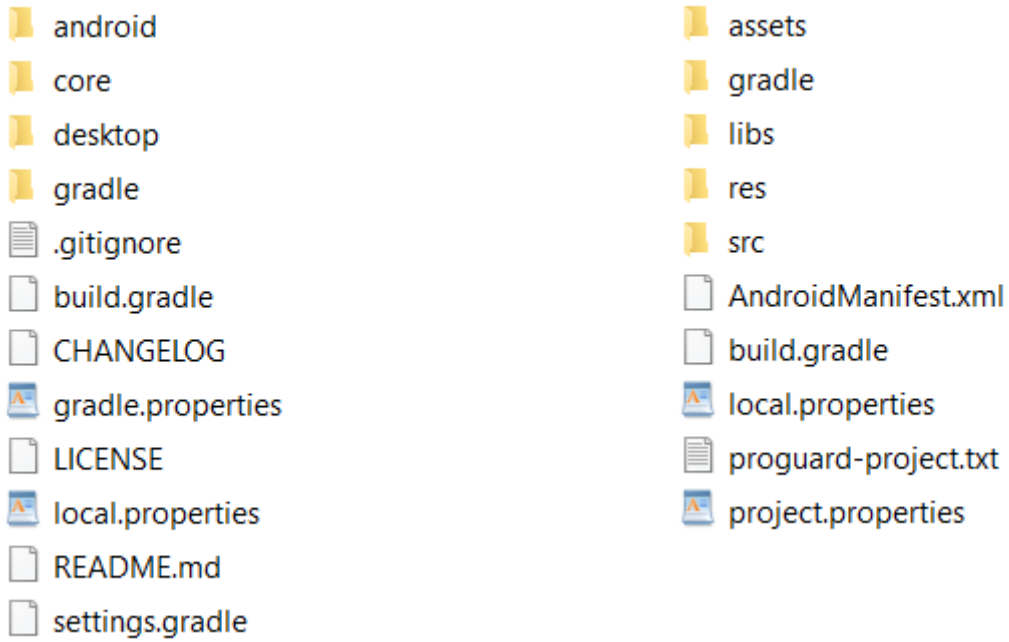


# Why Python?



# AMAZING DISCOVERIES

# 1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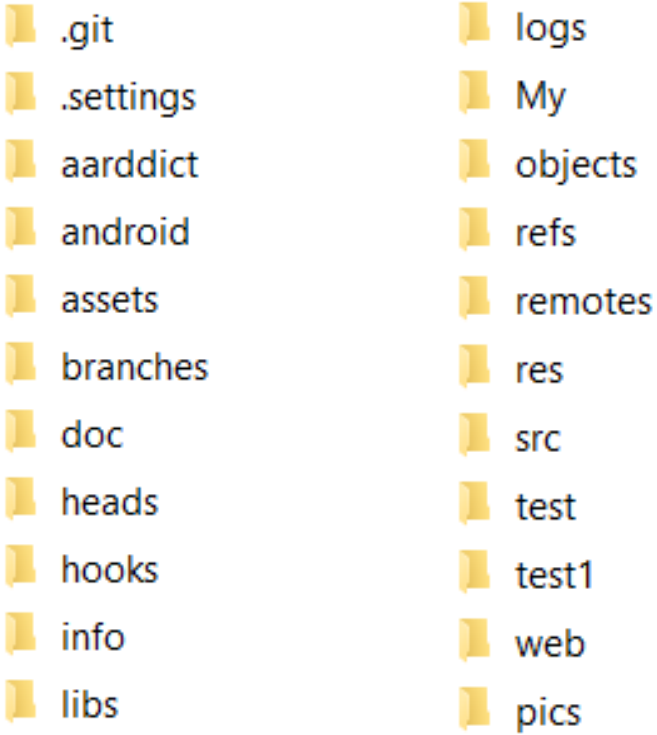
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test1
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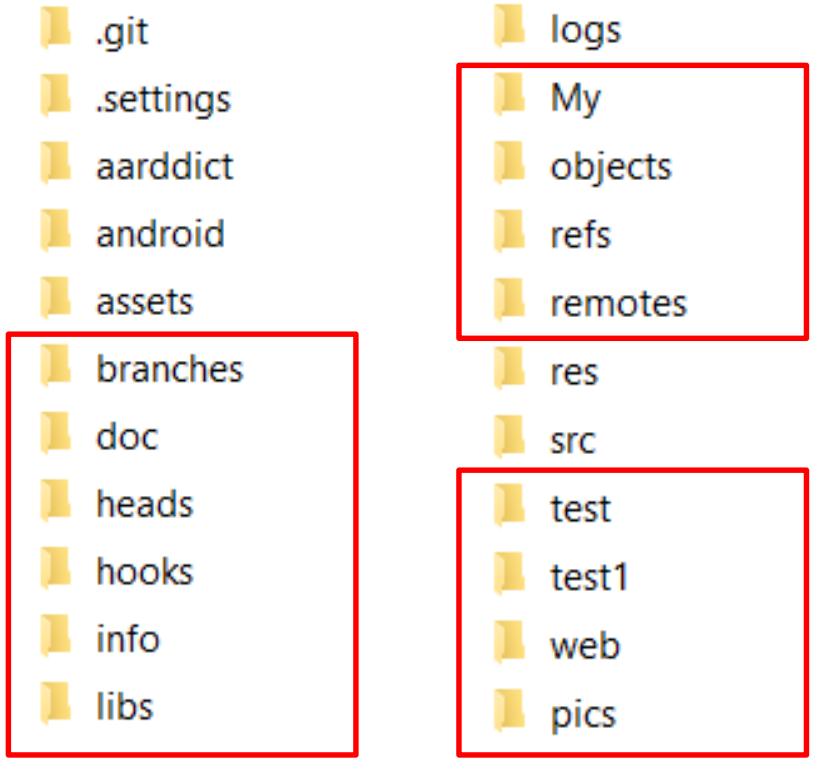
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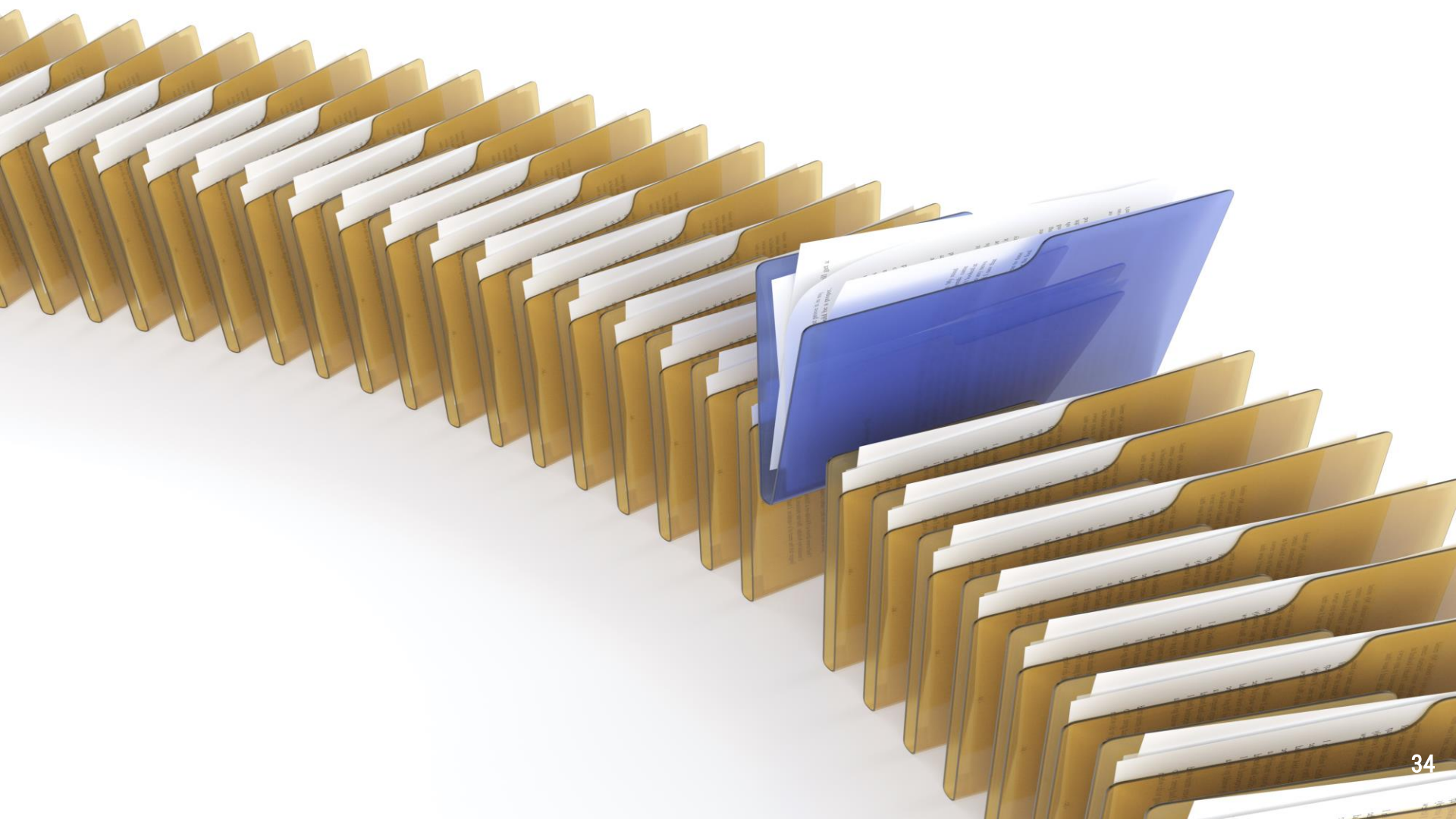
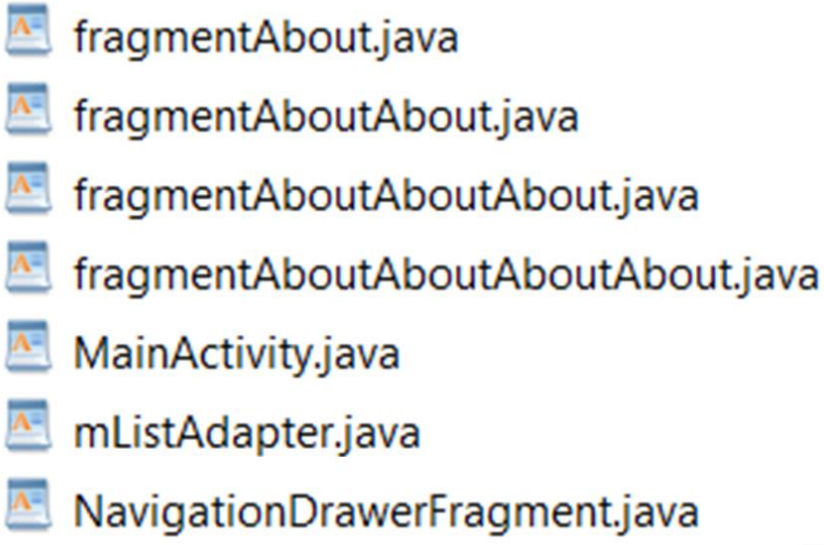
# 2



# 3


fragmentAbout.java
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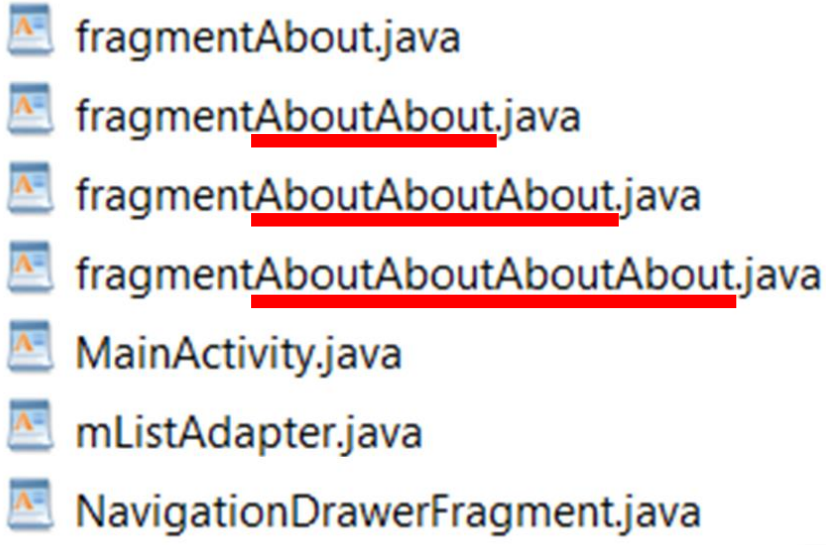
MainActivity.java
mListAdapter.java
NavigationDrawerFragment.java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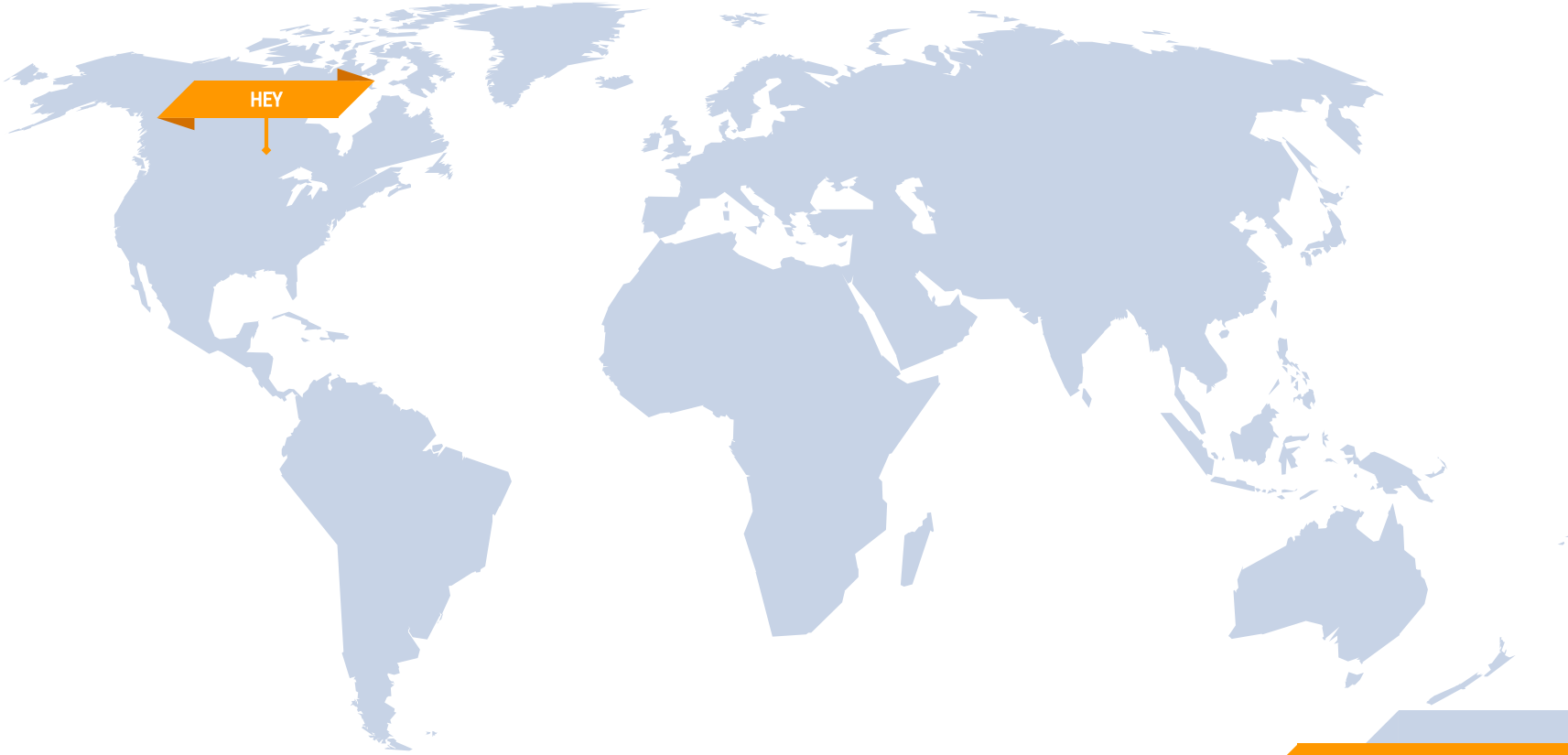
# 4

> *I've wanted to be able to run **Smalltalk** on Android and iOS for many years. I finally decided to do something about it.*

# 5

# FORTRAN



# OUTLOOK

Security Investigation

Automatization

# SUMMARY

## Structure

no consistent implementation of best practices

## Build Tools

many projects lack proper use of build tools

## Languages

diverse use of languages complicates application maintenance