

# AIDE

Develop apps with an app

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[www.android-ide.com](http://www.android-ide.com)



# What is AIDE

- An Android app to make Android apps
- **Android Integrated Development Environment**
- Android SDK apps with Java & XML
- Android NDK apps with C/C++
- Phonegap/Cordova apps with HTML5 & JavaScript (with *AIDE for PhoneGap*)



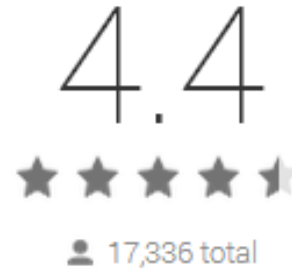
# Session Overview

- Introduction to AIDE
- Demonstration time
- The magic of AIDE
- Questions



# AIDE Popularity

1.000.000 downloads/year

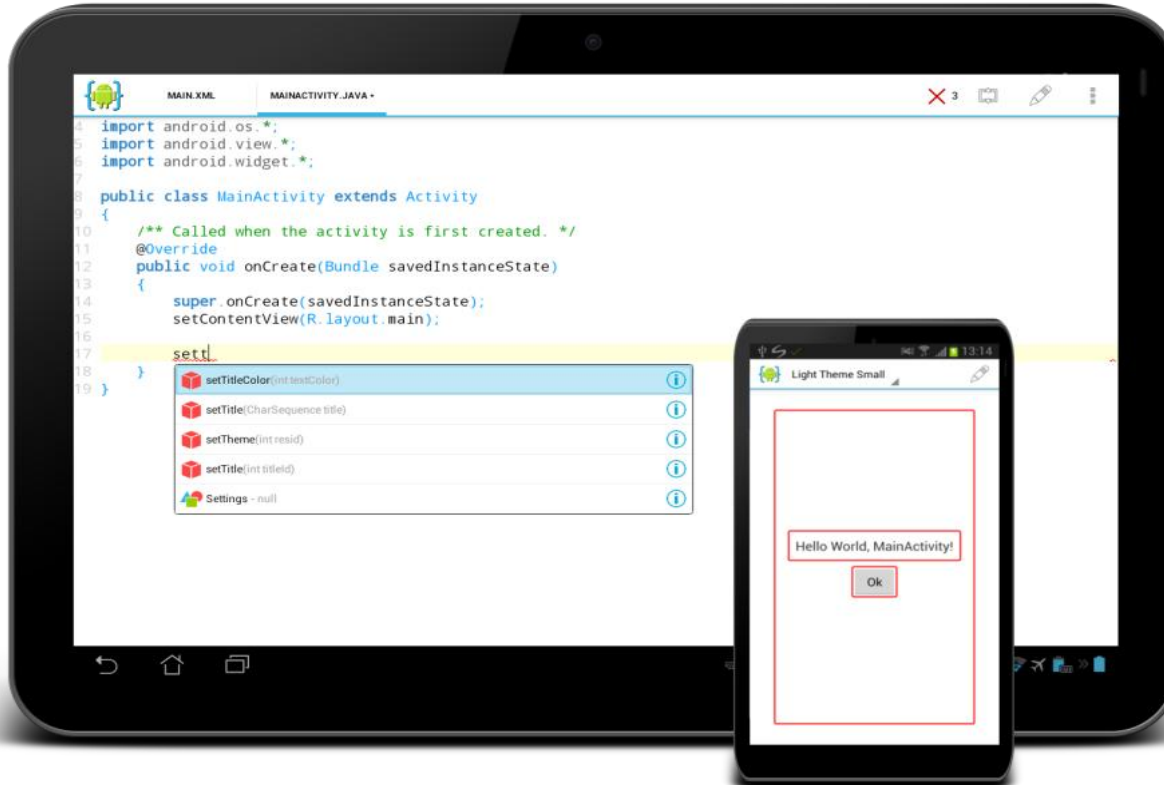


# Install AIDE on your device!

- In Google Play search for „**AIDE**“ or just „**IDE**“



# Demonstration time

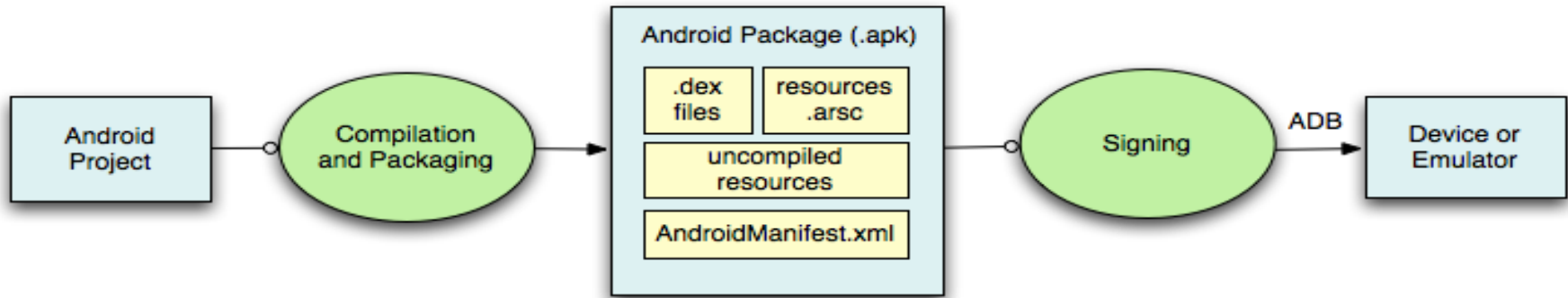


# The magic of AIDE

- Java build process
- Native build process
- Interactive tutorials

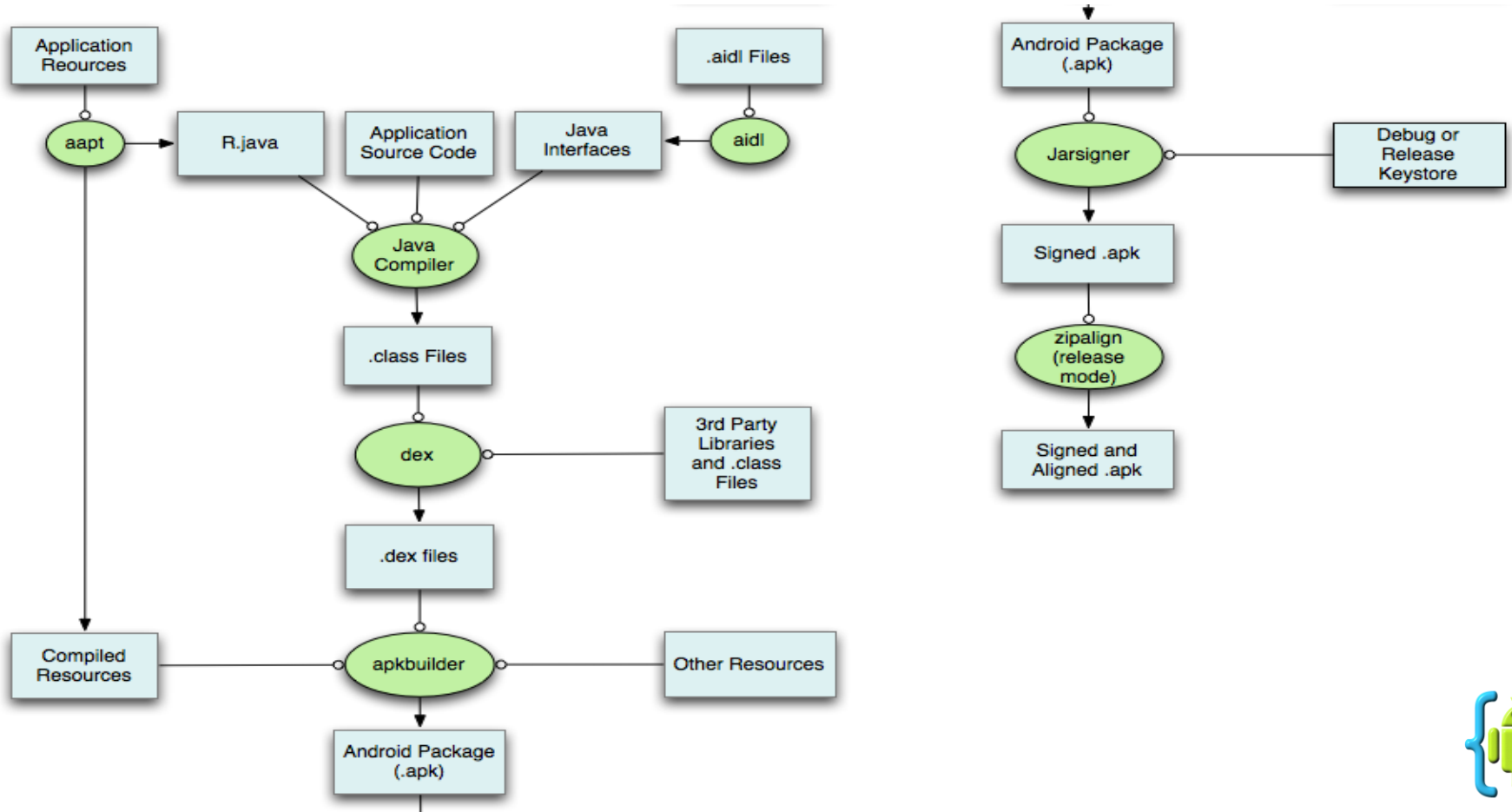


# Android Build Process (1)





# Android Build Process (2)



# Technical Challenge: Memory

- Device RAM
- Dalvik VM heap size:  $\leq 256$  MB for 80% of users (Oct. 2013), e.g. Galaxy S2 with Android 2.x has 64 MB
- AIDE (200 kloc) build with Eclipse requires 2 GB heap
- **Objective: Build 200 kloc on a low-end device**



# Technical Challenge: Performance

- ARM optimized for battery life (not speed)
- Dalvik VM is slow (5x slower than HotSpot on the same hardware in relevant benchmarks)
- ART is a bit better but not widely supported yet
- **Objective: Build 200 kloc after code changes within seconds on a low-end device**



# AIDE's Build: Asset Packaging

- Android Asset Packaging Tool (aapt) takes resource files (AndroidManifest, XMLs, ...) and compiles them
  - aapt binaries for ARM and x86
  - Taken from official Android source code
  - Tweaked to compile for Android



# AIDE's Build: Java Compiler

- Java Compiler compiles Java source files into .class files
- Incremental compilation: Compile only Java files needed
- Custom Java compiler, optimized for memory & performance
- Runs as a service in extra process



# Compilation service in separate Process

- Declare „android:process“

```
<service
    android:exported="false"
    android:name=".CodeAnalysisEngineService"
    android:process=":EngineService" />
```

- Use IPC with AIDL for communication

```
interface ICodeAnalysisEngineService {
    oneway void build();
    oneway void rebuild();
}
```



# AIDE's Build: Dex

- Dex tool converts the .class files to Dalvik byte code as one large dex file
- Incremental dexer, dexes only changed .class files
- Highly optimized custom dex merger, merges all individual dex files in one step



# AIDE's Build: Packaging

- Dex file and compiled resources are packaged into a (signed) APK file
  - Java ZIP API for APK building
  - Tweaked open source Zipsigner





# AIDE's Build: Native code

- C/C++ files are compiled into a shared library using the GCC toolchain
- Custom NDK based on the Google Linux NDK.
- Cross-compiled for ARM
- Statically compiled against GNU libc
- Officially supports only ia32/ia64 on Windows, Linux and Mac OS X
- Bundle Busybox for UNIX tools



# AIDE's Build: Java console applications

- Java code is compiled to .class files
- Dexing those .class files creates .dex file
- An extra activity in an extra process is started
- The .dex file is loaded using `DexClassLoader`
- The main method is invoked using Reflection
- Custom console view for I/O

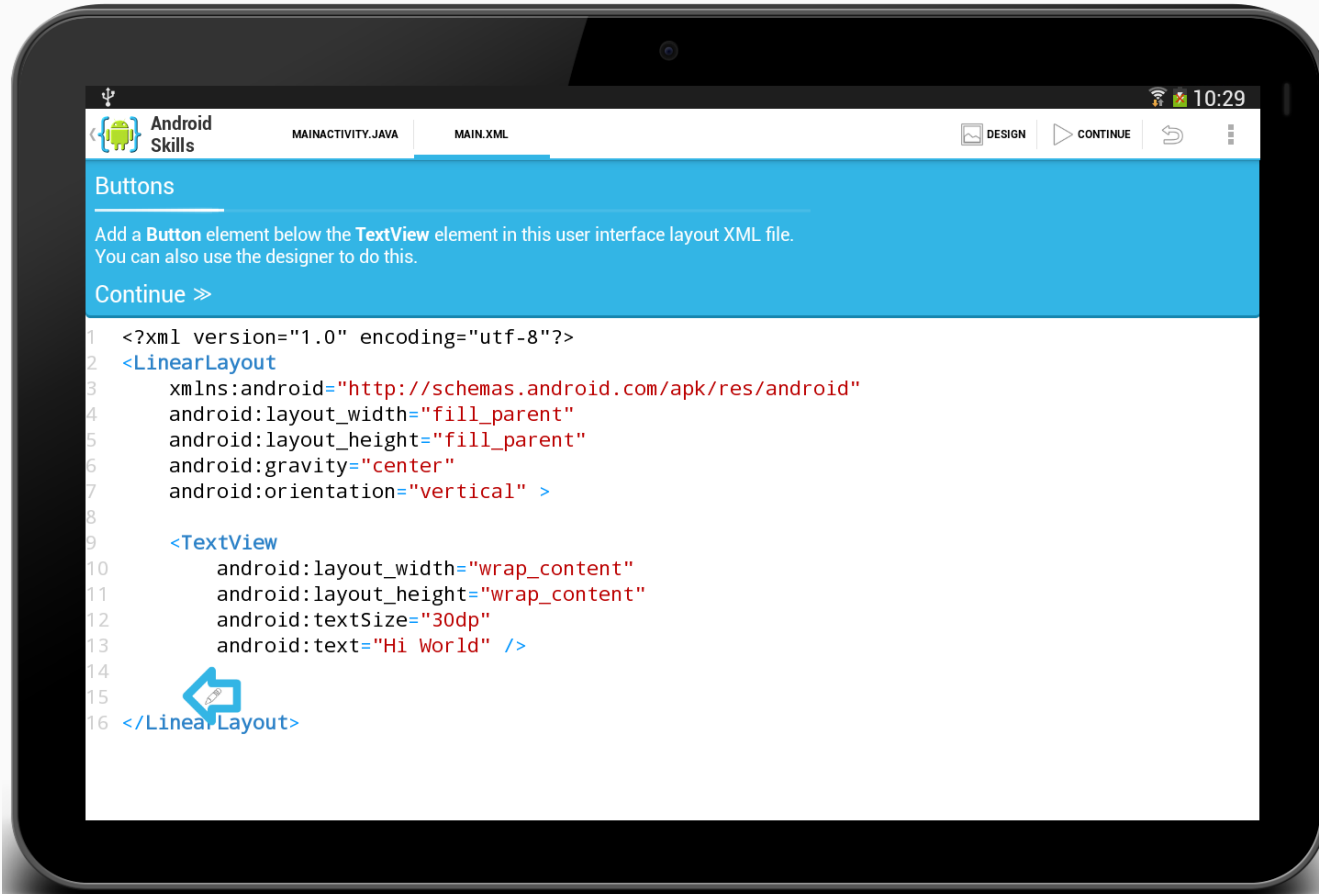


# Giving back to the community

- NDK is part of the **Android Open Source Project** (AOSP) under the Apache 2.0 licence.
- Our modifications and build scripts are on GitHub:  
[https://github.com/android-ide/aide\\_ndk](https://github.com/android-ide/aide_ndk)
- Cave: The build process is a bit complex.



# Interactive tutorials



# Courses

- Java
- Android
- Games with libgdx



# Recap

- Develop Android apps with your Android device
- Improve your skills using interactive tutorials
- Work on your Eclipse & Android Studio projects on-the-go
- AIDE magic makes it happen



# We are hiring

- Want to work on cool stuff like this at appfour?
- Talk to us or contact [info@appfour.com](mailto:info@appfour.com)





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1. OG DIREKT ÜBER DEM EMPFANG