AIDE

Develop apps with an app

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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
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: <= 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“

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

• Use IPC with AIDL for communication

```java
interface ICodeAnalysisEngineService {
    oneway void build();
    oneway void rebuild();
}
AIDE's Build: Dexer

- Dex tool converts the .class files to Dalvik byte code as one large dex file
  
  - Incremental dexter, 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

- Cave: The build process is a bit complex.
Interactive tutorials

Add a Button element below the TextView element in this user interface layout XML file. You can also use the designer to do this.

Continue ➤

```xml
<?xml version="1.0" encoding="utf-8"?>
<LinearLayout xmlns:android="http://schemas.android.com/apk/res/android"
    android:layout_width="fill_parent"
    android:layout_height="fill_parent"
    android:gravity="center"
    android:orientation="vertical" >

    <TextView
        android:layout_width="wrap_content"
        android:layout_height="wrap_content"
        android:textSize="30dp"
        android:text="Hi World" />

</LinearLayout>
```
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

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ENTWICKLERTAG

1. OG DIREKT ÜBER DEM EMPFANG