



Android Environment and Ecosystem

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Android Developer Advocate

Agenda

Intro to Android

Android Internals

Setting up a development environment

Understanding the Android build process

Debugging apps

Creating your first app

Icebreaker

Turn to the person next to you.

Introduce yourself. What is your favorite app? (any platform)

Rules of Engagement

1. Informal, this is not a university
2. Ask questions
3. Sidebar long questions



What is Android?

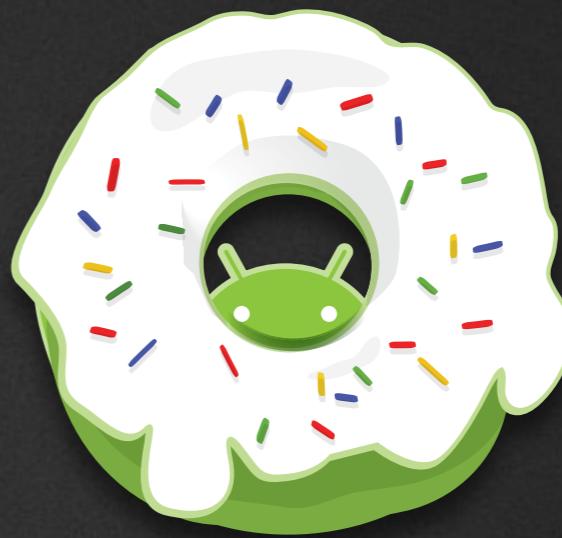
1 Million
daily activations

400 Million
global activations

600 Thousand
published apps



1.5 CUPCAKE
04.30.2009



1.6 DONUT
09.15.2009



2

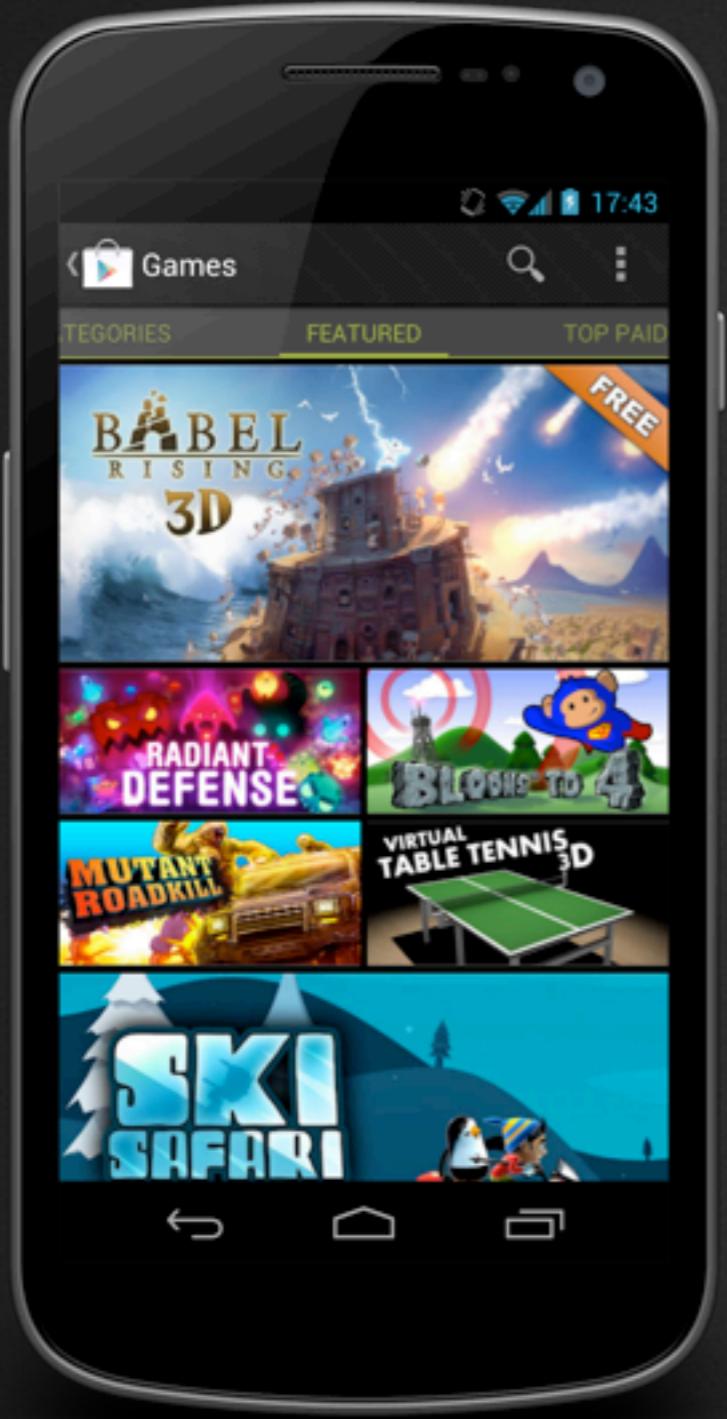


4.1 Jelly Bean

06.27.2012



Google Play



Google Play

- Google's distribution channel for Android apps.
- No approval process. Apps published immediately.
- Extra services:
 - In-app billing, License verification, Cloud messaging



Trevor Johns trevor.johns@gmail.com Sign out

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BADGE SCANNER

[Unpublished](#) ▾[Ratings & Reviews](#)

STORE LISTING

[Saved](#)[Statistics](#)

PRODUCT DETAILS

Fields marked with * need to be filled before publishing

[APK](#)[English \(United States\)](#)[Add translations](#)[Store Listing](#)**Title ***

English (United States)

Badge Scanner

13 of 30 characters

[Pricing and Distribution](#)**Description ***

English (United States)

Read the NFC business cards encoded in Mobile World Congress 2012 (MWC 2012) attendee badges.

[Services & APIs](#)

Once read, the badge owner's contact information is displayed on screen, along with the ability to add additional notes and then save to a custom group inside your Google Contacts account.

New: Now compatible with devices running Gingerbread!

440 of 4000 characters

Promo text

English (United States)

Scanner for MWC 2012 attendee badges.



Android Internals

APPLICATIONS

Home

Contacts

Phone

Browser

...

APPLICATION FRAMEWORK

Activity Manager

Window Manager

Content Providers

View System

Package Manager

Telephony Manager

Resource Manager

Location Manager

Notification Manager

LIBRARIES

Surface Manager

Media Framework

SQLite

OpenGL | ES

FreeType

WebKit

SGL

SSL

libc

ANDROID RUNTIME

Core Libraries

Dalvik Virtual Machine

LINUX KERNEL

Display Driver

Camera Driver

Flash Memory Driver

Binder (IPC) Driver

Keypad Driver

WiFi Driver

Audio Drivers

Power Management

APPLICATIONS

Home

Contacts

Phone

Browser

...

APPLICATION FRAMEWORK

Activity Manager

Window Manager

Content Providers

View System

Package Manager

Telephony Manager

Resource Manager

Location Manager

Notification Manager

LIBRARIES

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OpenGL | ES

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WebKit

Dalvik Virtual Machine

SGL

SSL

libc

ANDROID RUNTIME

Display Driver

Camera Driver

Flash Memory Driver

Binder (IPC) Driver

Keypad Driver

WiFi Driver

Audio Drivers

Power Management

LINUX KERNEL

Application Components

- Activities
- Services
- Content Providers
- Broadcast Receivers

Intents

- Intents “link” activities, services, & receivers together
- Intents consists of
 - An action (i.e. ACTION_VIEW)
 - Categories (i.e. CATEGORY_DEFAULT)
 - A URI (i.e. content://contacts/people/123)
 - “Extras” metadata
- Intents can also be to hard-coded class names (com.foo.FooActivity)

Application Components

Apps can communicate with each other by providing and consuming each other's Intents



Manifest

```
<?xml version="1.0" encoding="utf-8"?>
<manifest ...>

    <uses-feature ... />
    <uses-permission ... />
    <uses-sdk ... />

    <application ...>
        <activity ...>
            ...
        </activity>
        <service ...>
            ...
        </service>
        <provider ...>
            ...
        </provider>
        <receiver ...>
            ...
        </receiver>
    </application>

</manifest>
```

- Declare components of your app
- Declare required features for your app
- State permissions required by your app
- State platform versions app is compatible with

APKs



- Android apps are packed inside of .apk files.
- One file contains all executable code, resources, and libraries.
- Code signing to authenticate developer.



Security

- Applications run inside a **sandbox**. Each app runs as a separate UID, framework restricts access to the outside world.
- Privileges can be requested for additional access.



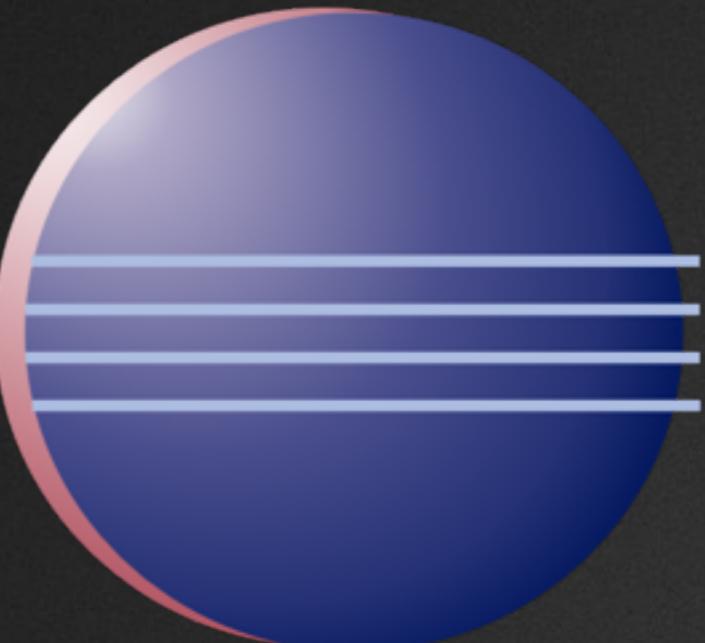
Development

Development Environment

- Android apps are developed using the Java language. (C++ is also available via NDK, but should be reserved for special cases.)
- The Android SDK is open source and available free from developer.android.com.

Your laptop has already been pre-loaded with a copy of the Android SDK.

Supported Build Systems

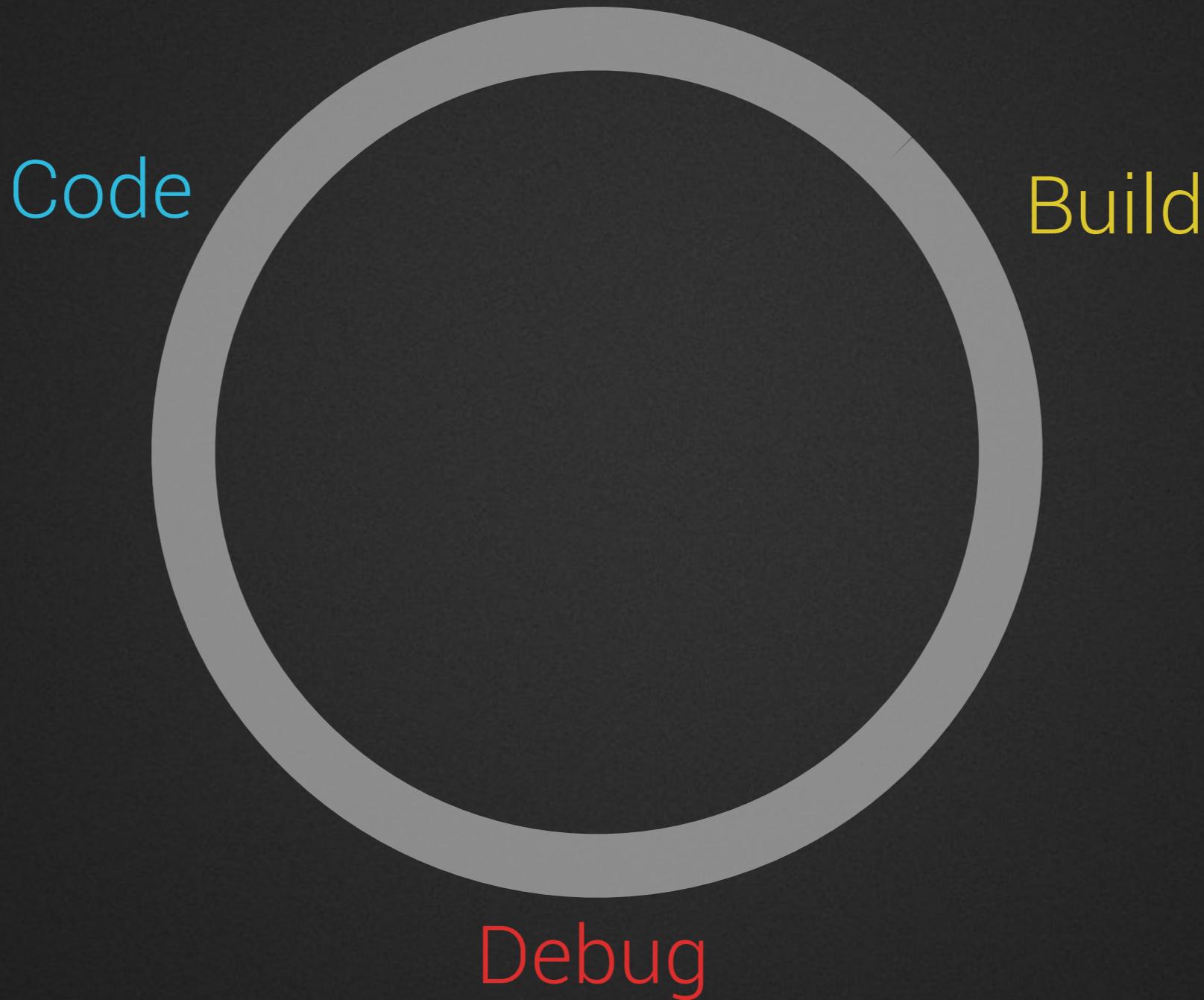


Eclipse
via ADT Plug-in



Apache Ant

Development Process

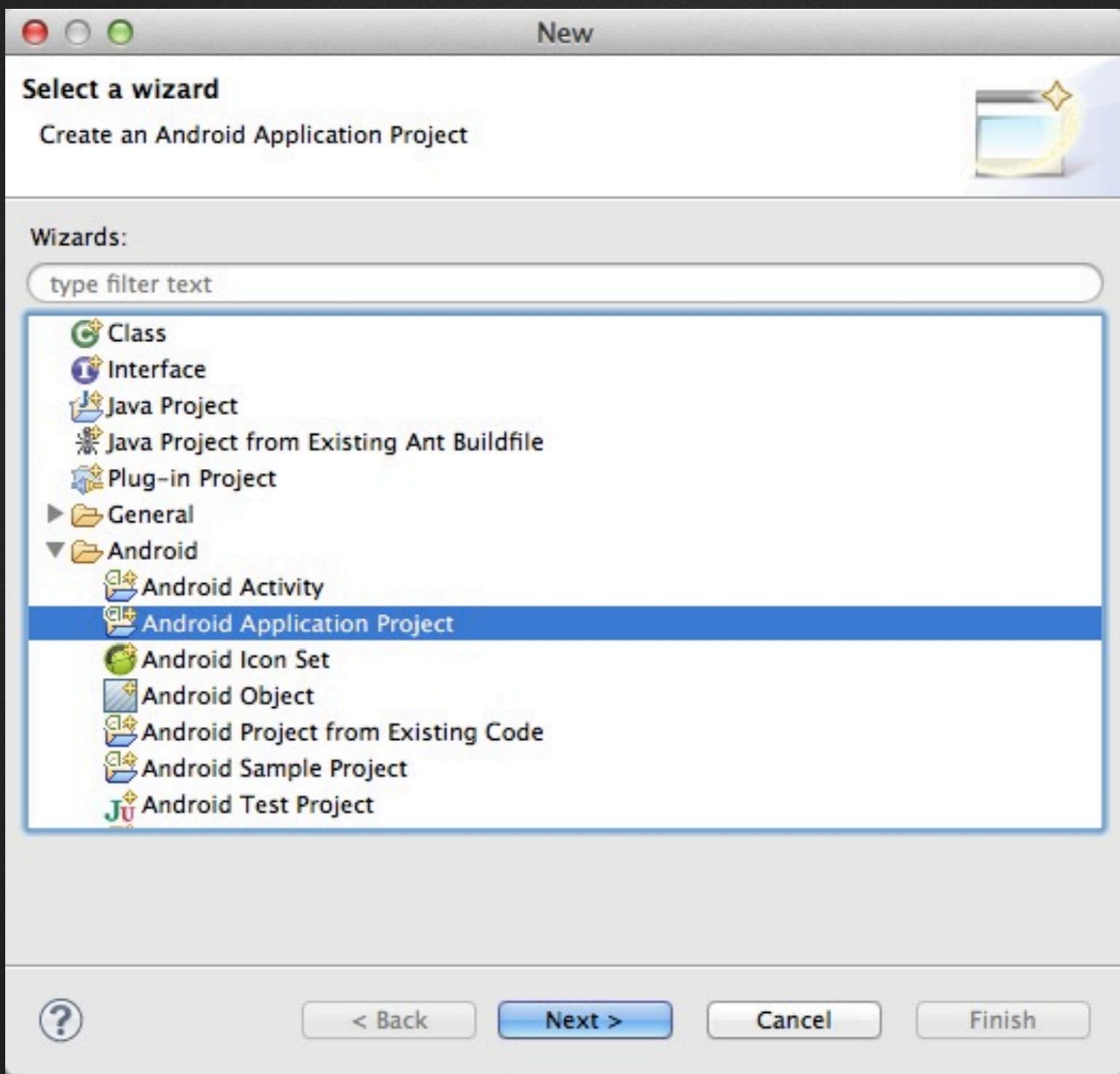


Development Process

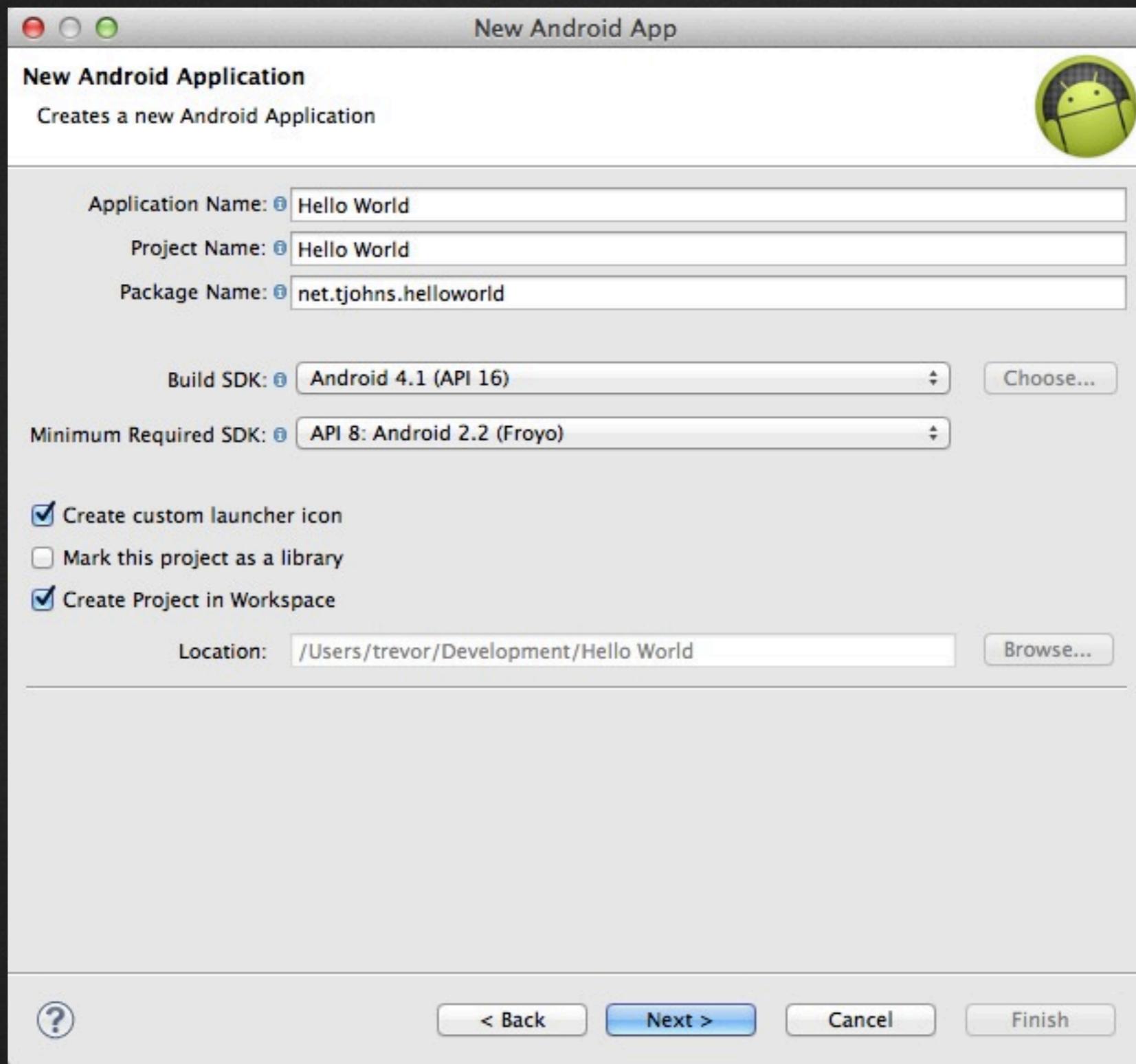


Process: Code

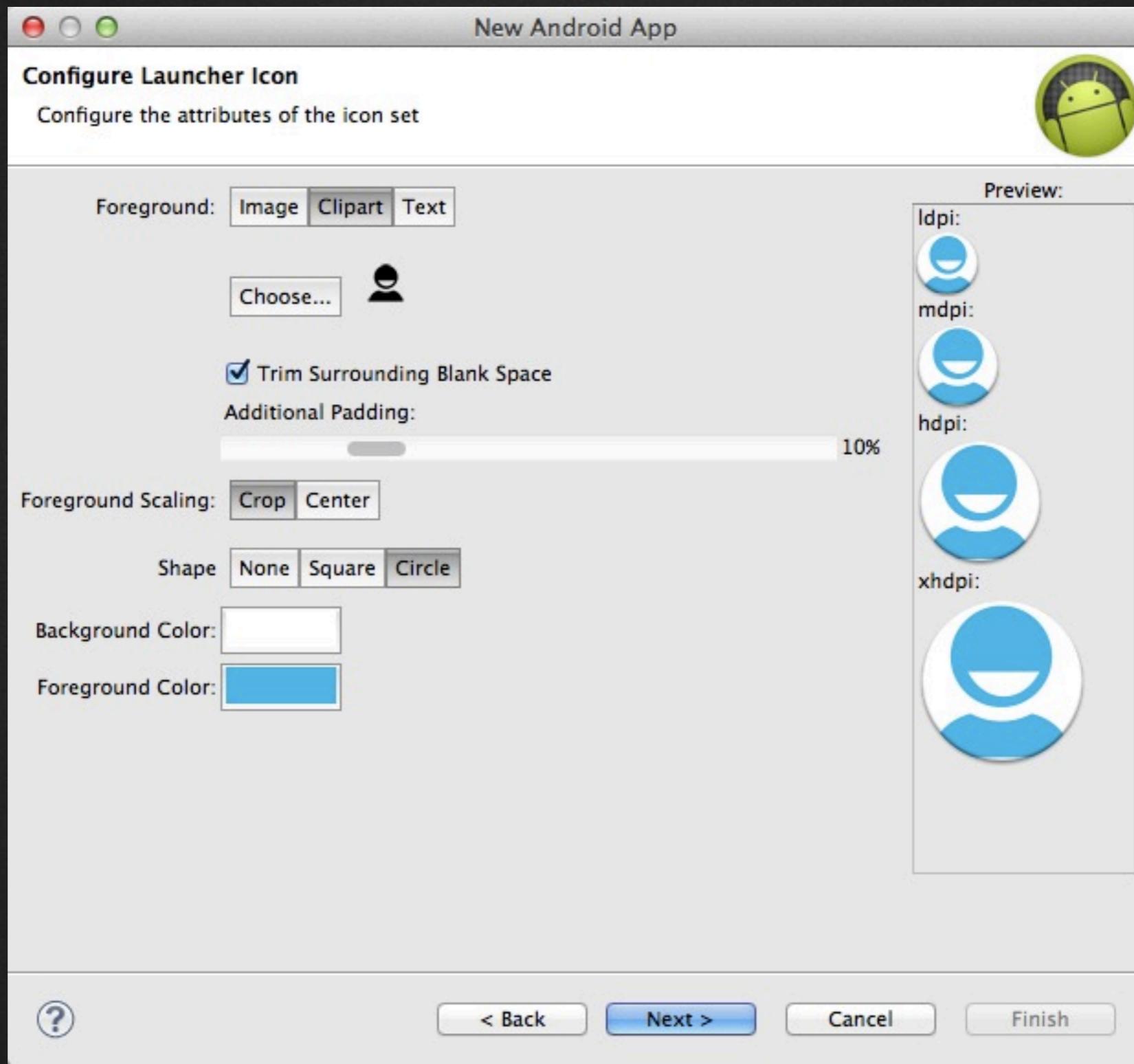
File > New > Other...



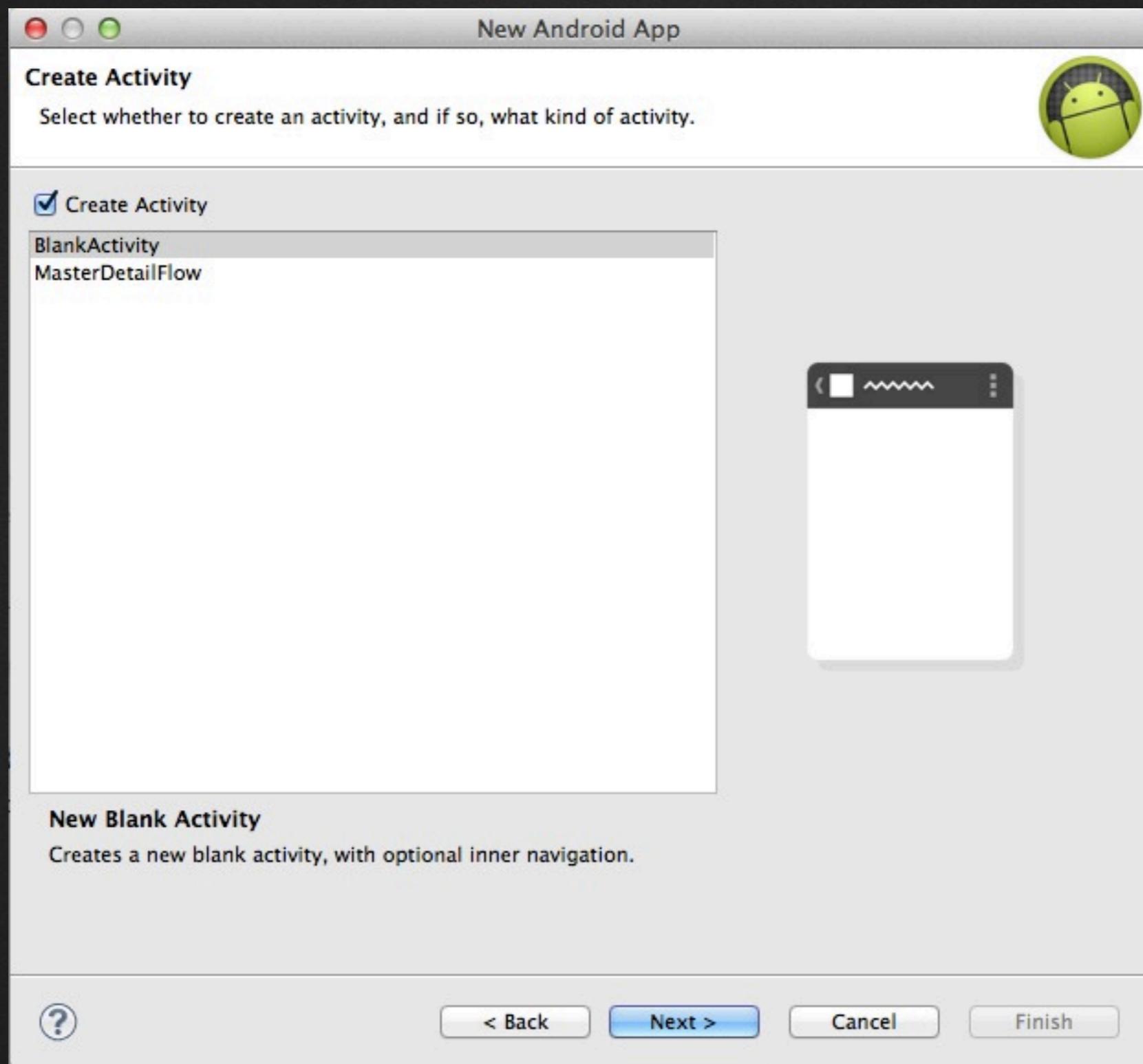
Process: Code



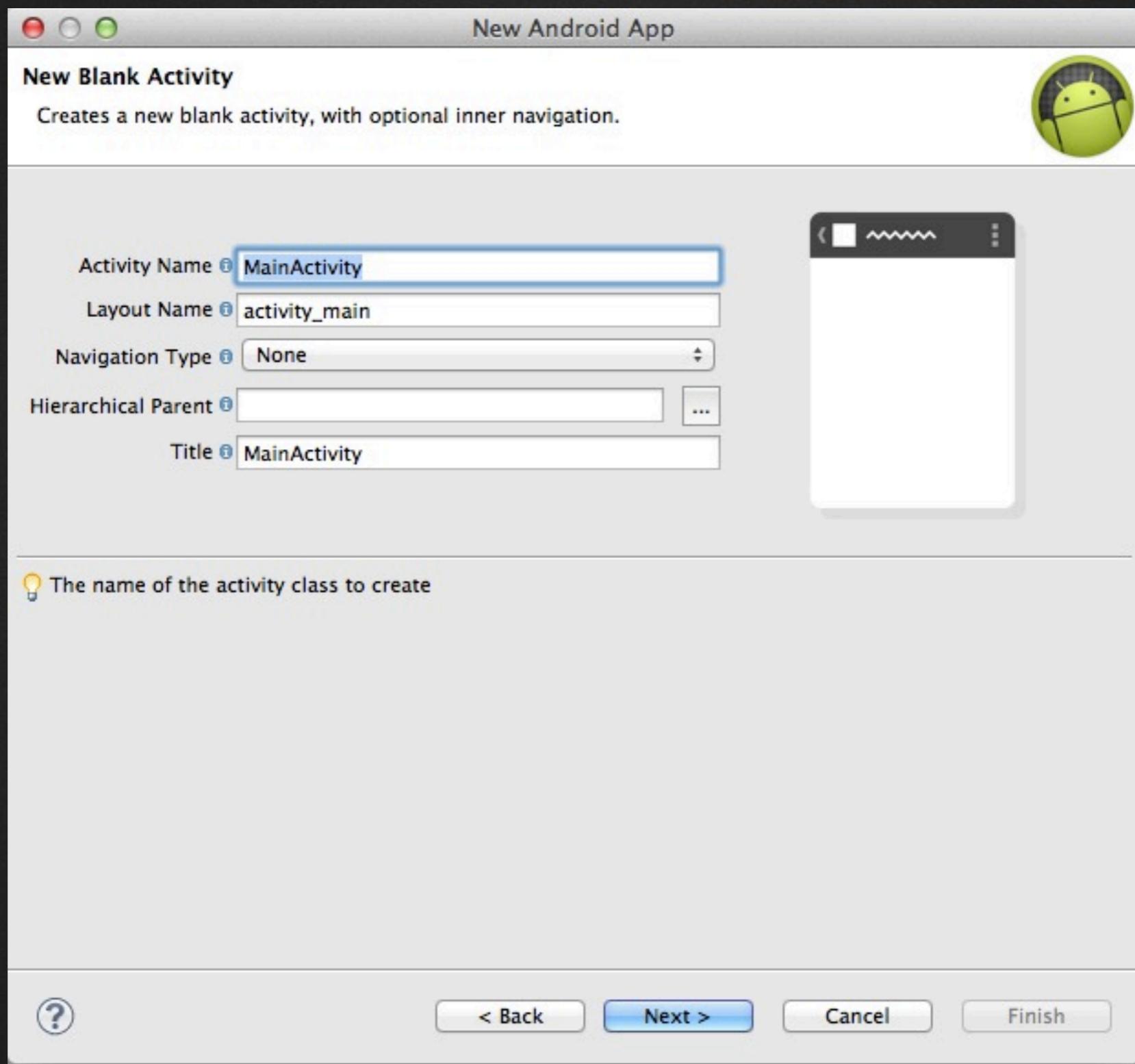
Process: Code



Process: Code



Process: Code



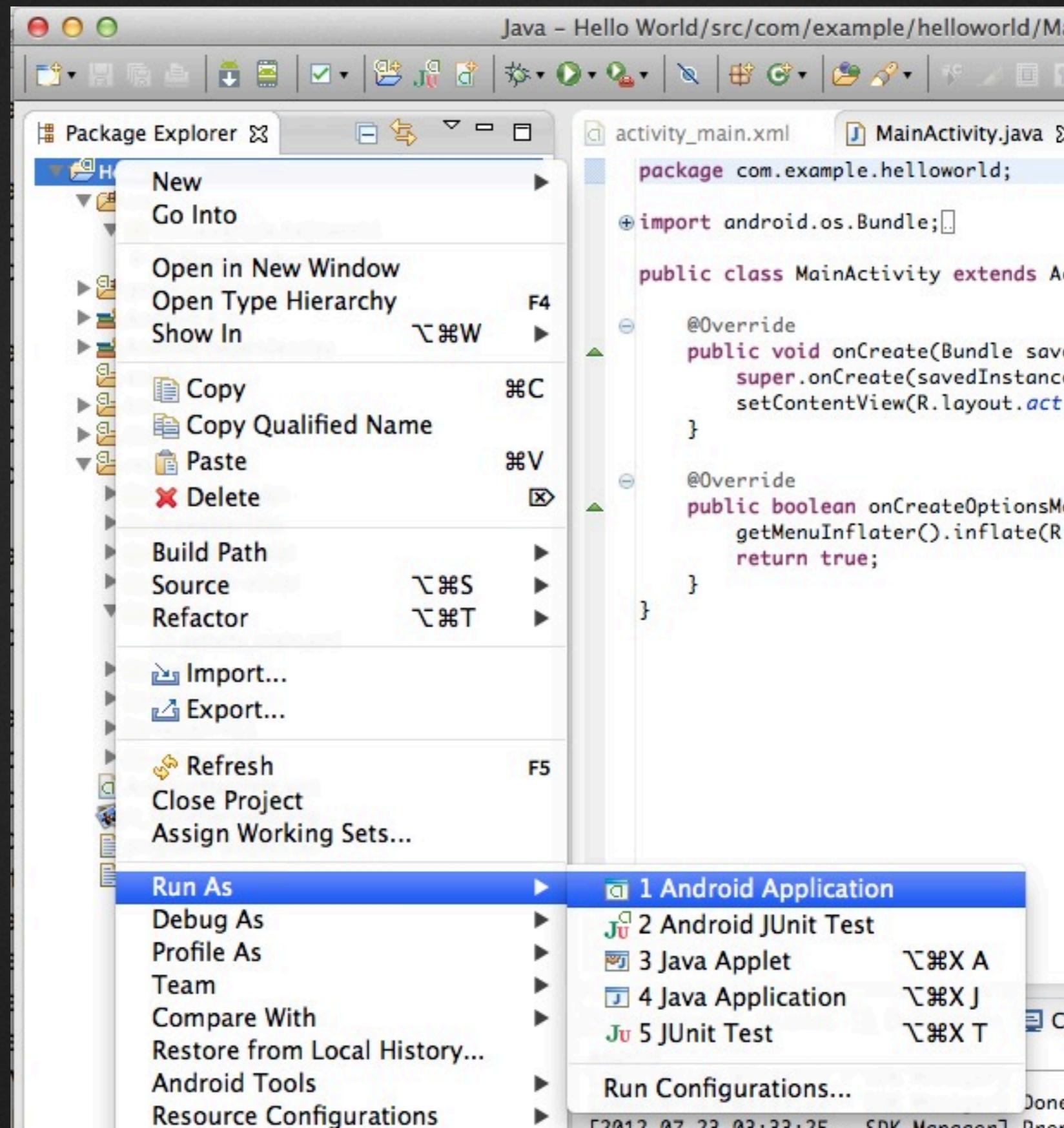
Process: Code

For existing projects, use...

File > New > Other...

Android > Android Project from Existing Code

Process: Debug



Process: Debug

If a phone is connected, your app will be installed via [USB](#).

If a phone is not available, you can create an [Android Virtual Device \(AVD\)](#) via [Window > AVD Manager](#).

Process: Debug

AVD Performance Tips:

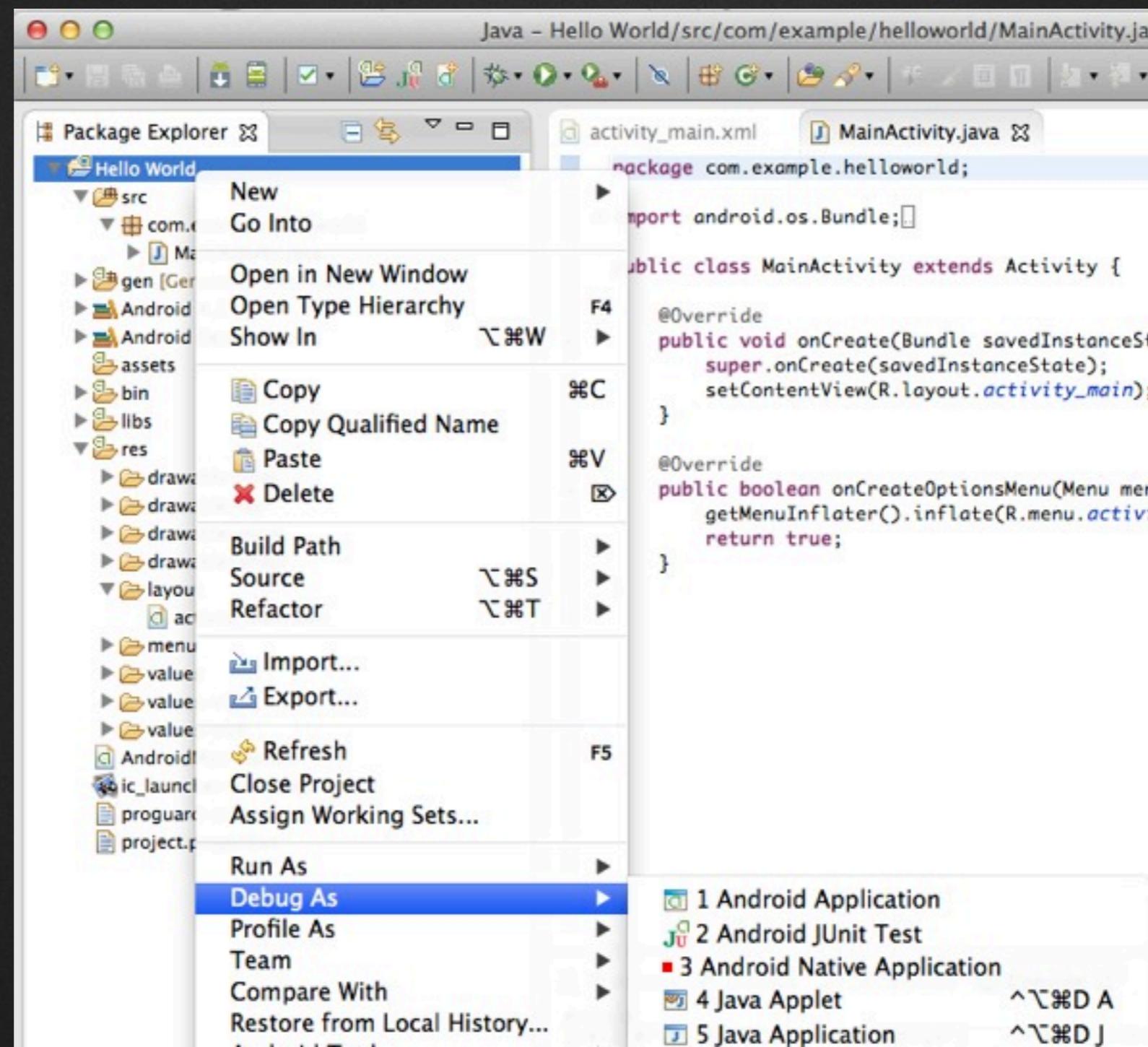
- Enable GPU Acceleration from Hardware Properties menu.
- Select x86 image from CPU menu when available.

Process: Debug

- When debugging, use the graphical debugger.
- Allows you to set breakpoints and inspect variables.

Process: Debug

To launch graphical debugger, use Debug As...
instead of Run As...



Process: Debug

Logcat can be used to monitor system logs.

To access...

Window > Open Perspective > Other... > DDMS

Process: Release

All builds must be signed with an X.509 certificate.

Debug builds use a auto-generated debug certificate.

Process: Release

When you package your app up for release on Google Play, you'll need to use a release key that you've generated.

Don't lose this. Ever.

Android Tools >
Export Signed Application Package...

Codelab: Creating a project

Codelab

Create a new Android project.

The default project contains “Hello World” boilerplate code.

Build this code and run it on your phone.

If time permits:

- Set a breakpoint and run your app in the graphical debugger.
- Create an AVD to simulate a different OS version or screen size.

Resources

<http://d.android.com/>

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