EG-M42 Software for Smartphone:
Overview of Android

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Outline

- Introduction
- Android Architecture
- Building Apps
  - Workflow
  - Development Environment
    - Android Development Tools (ADT)
    - Android Studio
    - MIT App Inventor
- Examples

What is Android?

- A Linux-based operating system from Google
  - Designed primarily for touchscreen mobile devices like smartphones and tablet computers.

- Open source in nature
  - The code is released under the Apache License which allows the software to be freely modified and distributed by device manufacturers, wireless carriers, as well as individual users.

Milestones

- October 2003
  - Android Inc. founded by Andy Rubin, Rich Miner, Nick Sears, & Chris White.

- August 2005
  - Google acquires Android Inc.

- 5 November 2007
  - Open Handset Alliance (OHA) Formed. Android Unveiled.

- 12 November 2007
  - Android Beta SDK Released.

- 23 September 2008
  - Android 1.0 Released. Featured on HTC Dream (G1).

- 9 February 2009
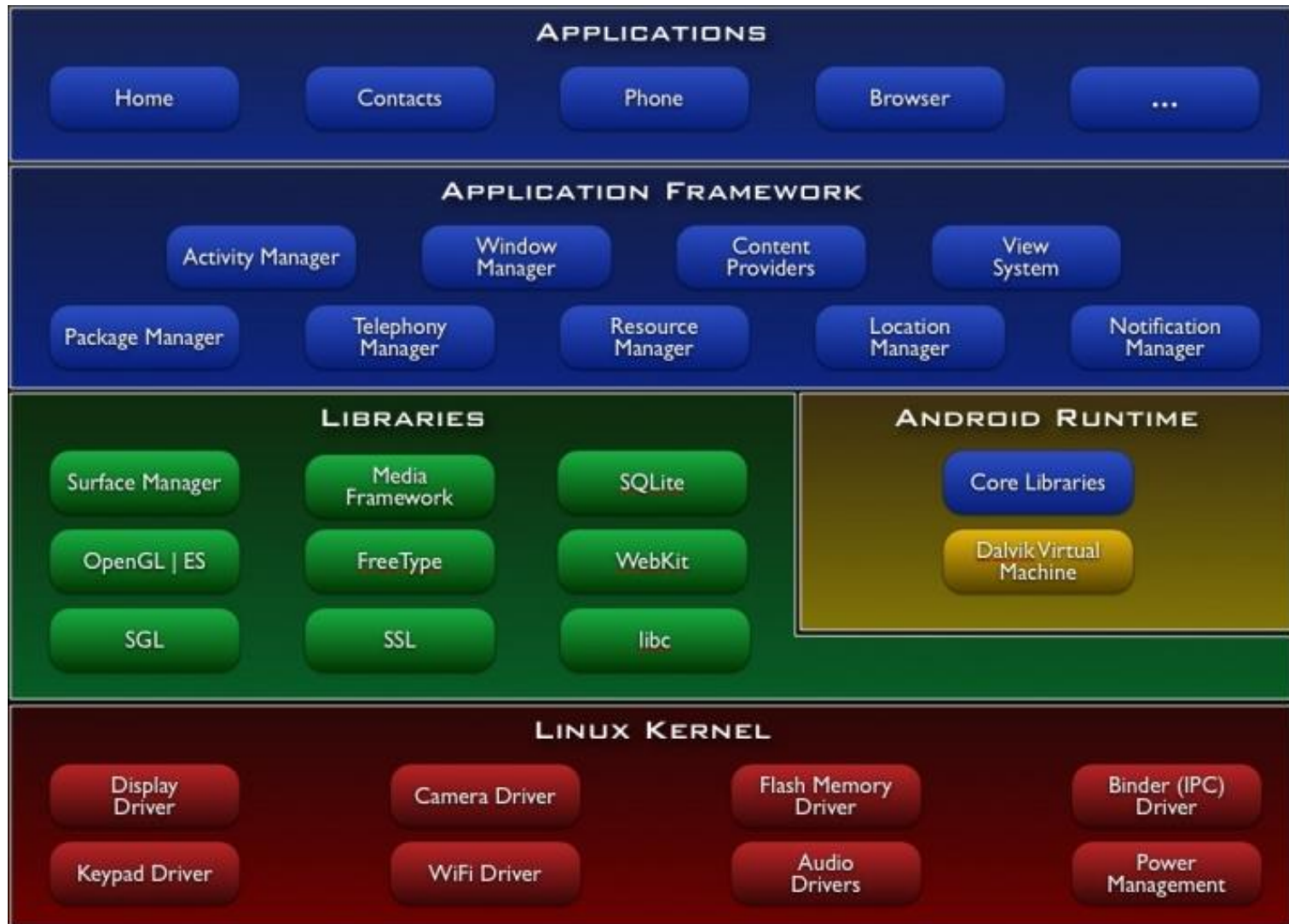 - Android 1.1 update released for T-Mobile G1.

Version History by API Level

- Android 1.0 (API Level 1)
  - Released on 23/09/08.
  - 1st commercial version
- Android 1.1 (API Level 2)
  - Released on 09/02/09.
- Android 1.5 *Cupcake* (API Level 3)
  - Released on 27/04/09.
  - 1st release to officially use a code name based on dessert item.
- Android 1.6 *Donut* (API Level 4)
  - Released on 15/09/09.
- Android 2.0-2.1 *Eclair* (API Level 5-7)
  - Released on 26/10/09.
- Android 2.2-2.2.3 *Froyo* (API Level 8)
  - Released on 20/05/10.

- Android 2.3-2.3.7 *Gingerbread* (API Level 9-10)
  - Released on 06/12/10.
- Android 3.0-3.2 *Honeycomb* (API Level 11-13)
  - Released on 22/02/11.
  - 1st tablet-only update.
- Android 4.0-4.0.4 *Cream Sandwich* (API Level 14-15)
  - Released on 19/10/11.
- Android 4.1-4.3 *Jelly Bean* (API Level 16-18)
  - Released on 09/07/12.
- Android 4.4 KitKat (API Level 19)
  - Will be released in Oct./2013.
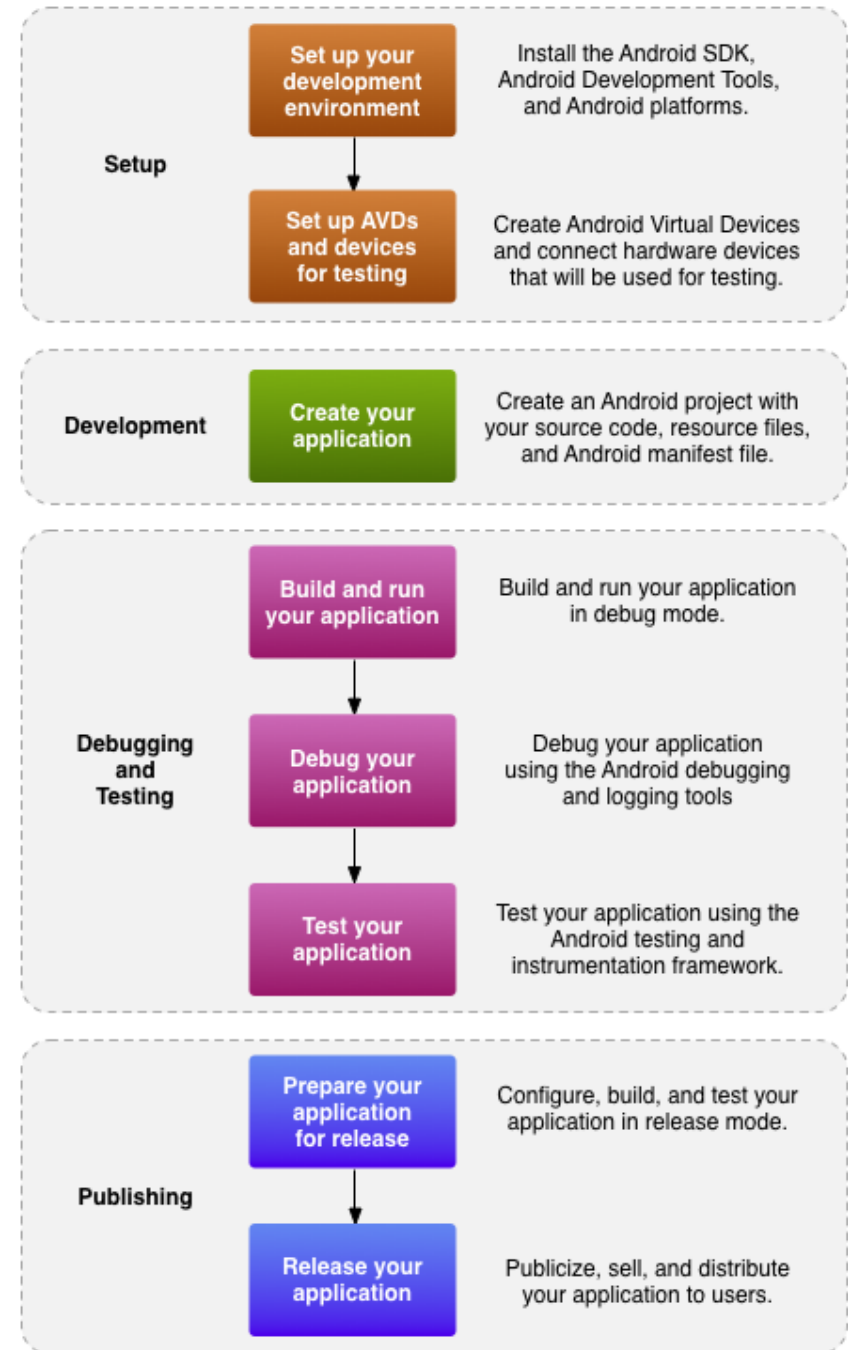
Android Architecture: Overview

Android Architecture: Layers

- Applications
  - Written in java, executing in Dalvik virtual machine
- Application Framework
  - Services and libraries written mostly in java
  - Applications and most framework code executes in a virtual machine
- Native libraries, daemons and services
  - Written in C or C++
- Linux kernel
  - Drivers for HW, networking, file system access and inter-process-communication
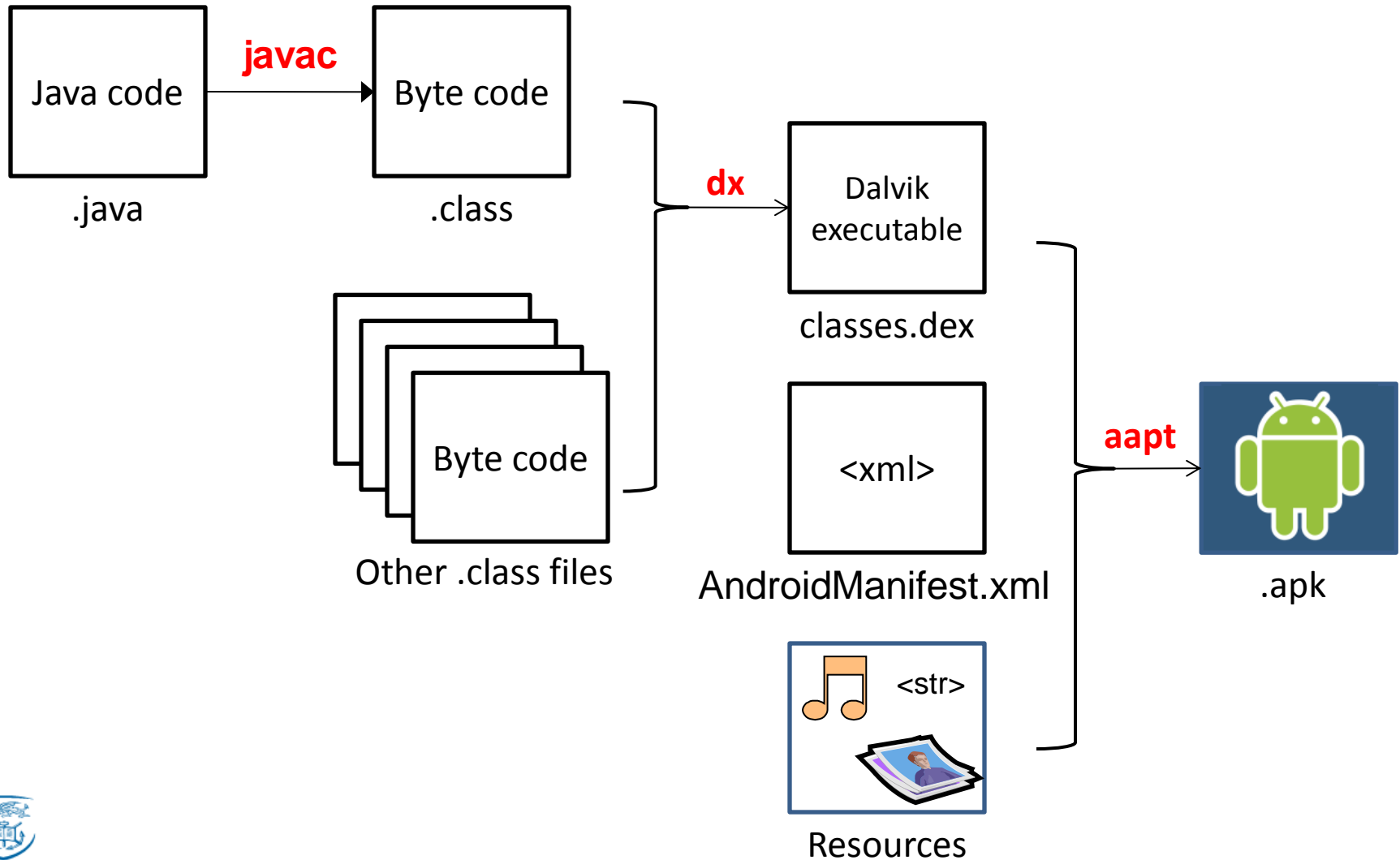
Work Flow

- Setup
  - Development tools
  - AVDs
- Development
  - UI design
  - Logic programming
- Debugging and Testing
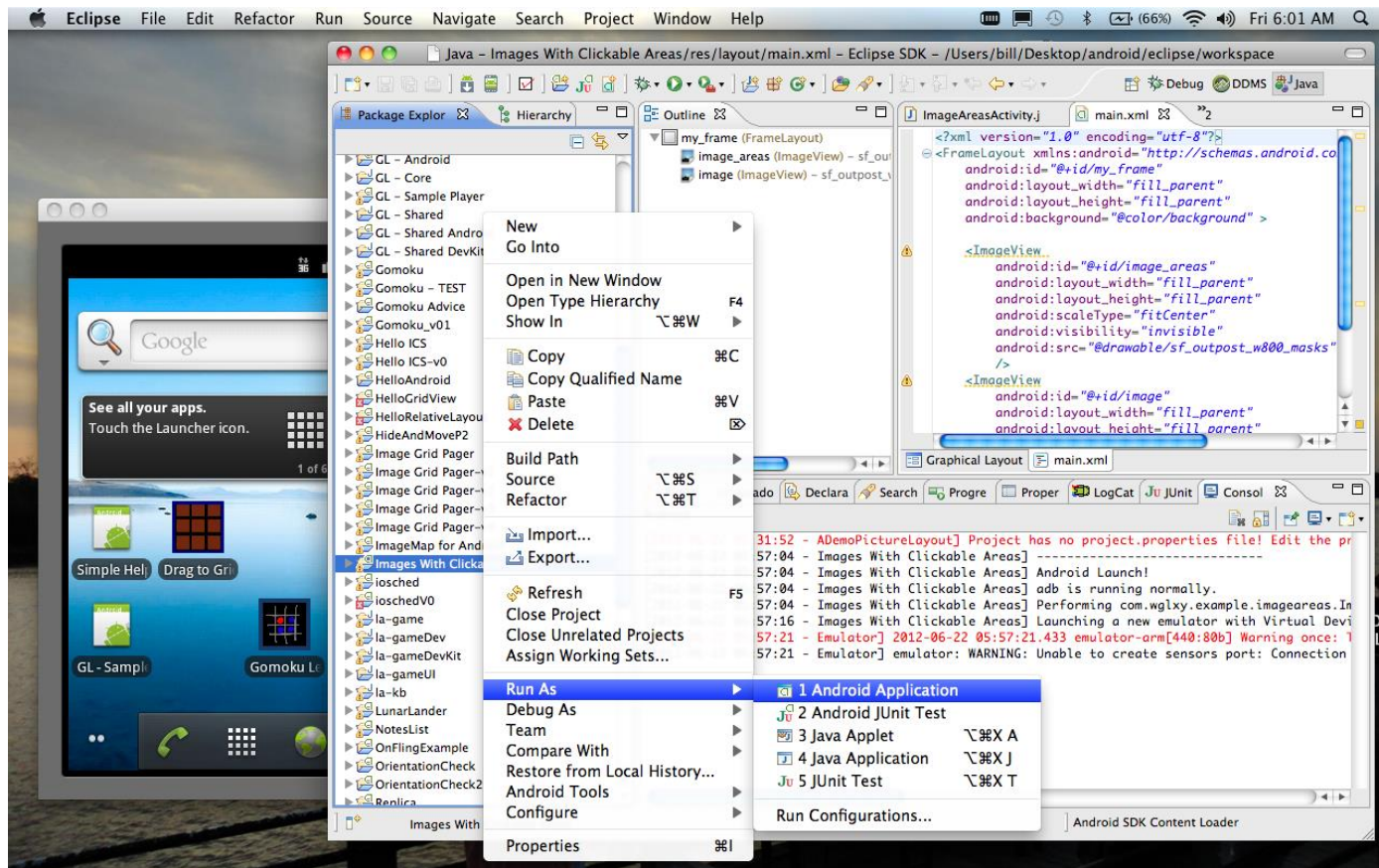- Publishing
  - Through Google Play

Producing an Android App

Java code
.java

javac →

Byte code
.class

Byte code
Other .class files

dx →

Dalvik executable
classes.dex

<xml>
AndroidManifest.xml

<str>
Resources

aapt →

.apk

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Android Development Tools (ADT)

- A plugin for Eclipse IDE
  - SDK tools integration
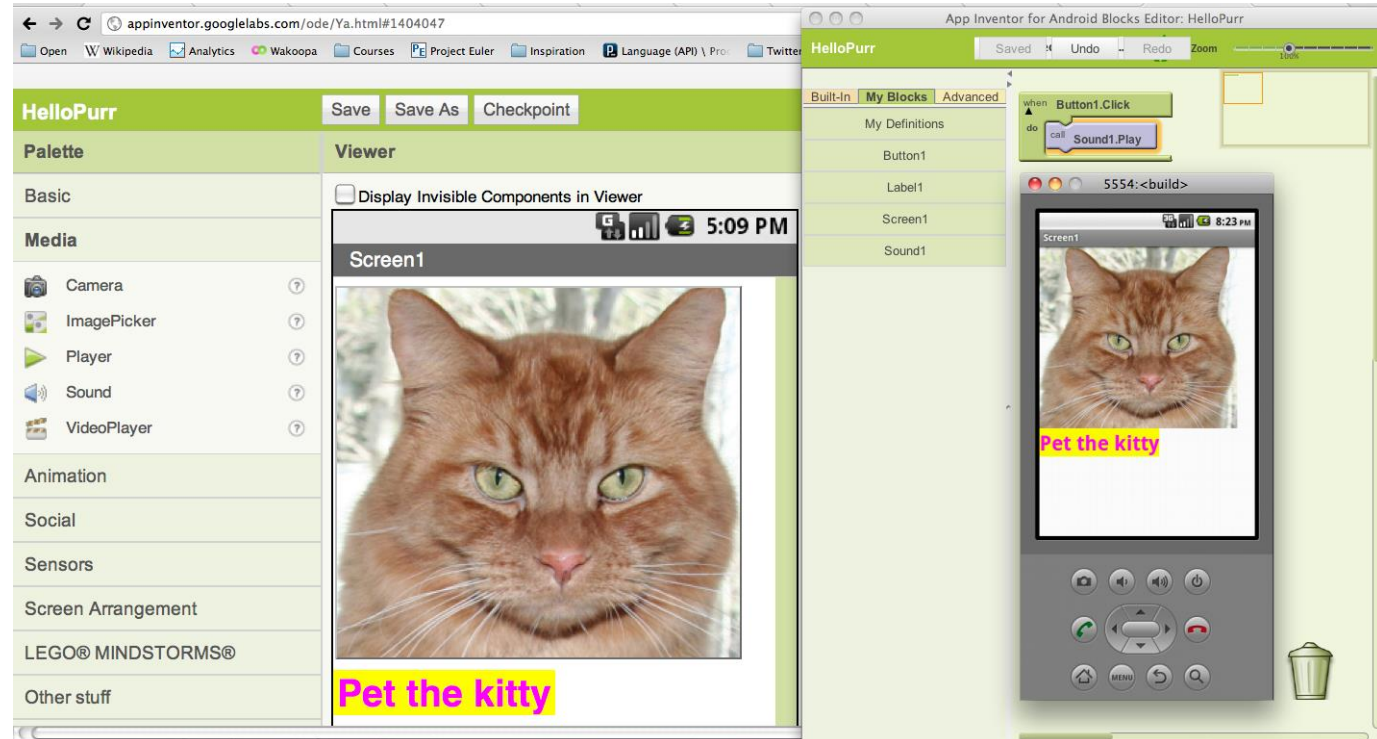 - Java and XML editors

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Android Studio

- Another Android development environment based on JetBrain's IntelliJ IDEA
  - Announced on 16/05/2013.
  - Live layout: WYSIWYG editor.
  - Gradle-based build support

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MIT App Inventor

- Originally provided by Google, and now maintained by MIT.
- Allow users, who may have no experience in computer programming, to create android Apps by drag-and-drop visual objects

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Examples

- Android Sensor Box
  - Detects and demonstrate capabilities of all sensors of Android devices.

- manageWifiScans
  - Build WLAN signal strength maps.
  - Starting point of term project for indoor wireless localisation.

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