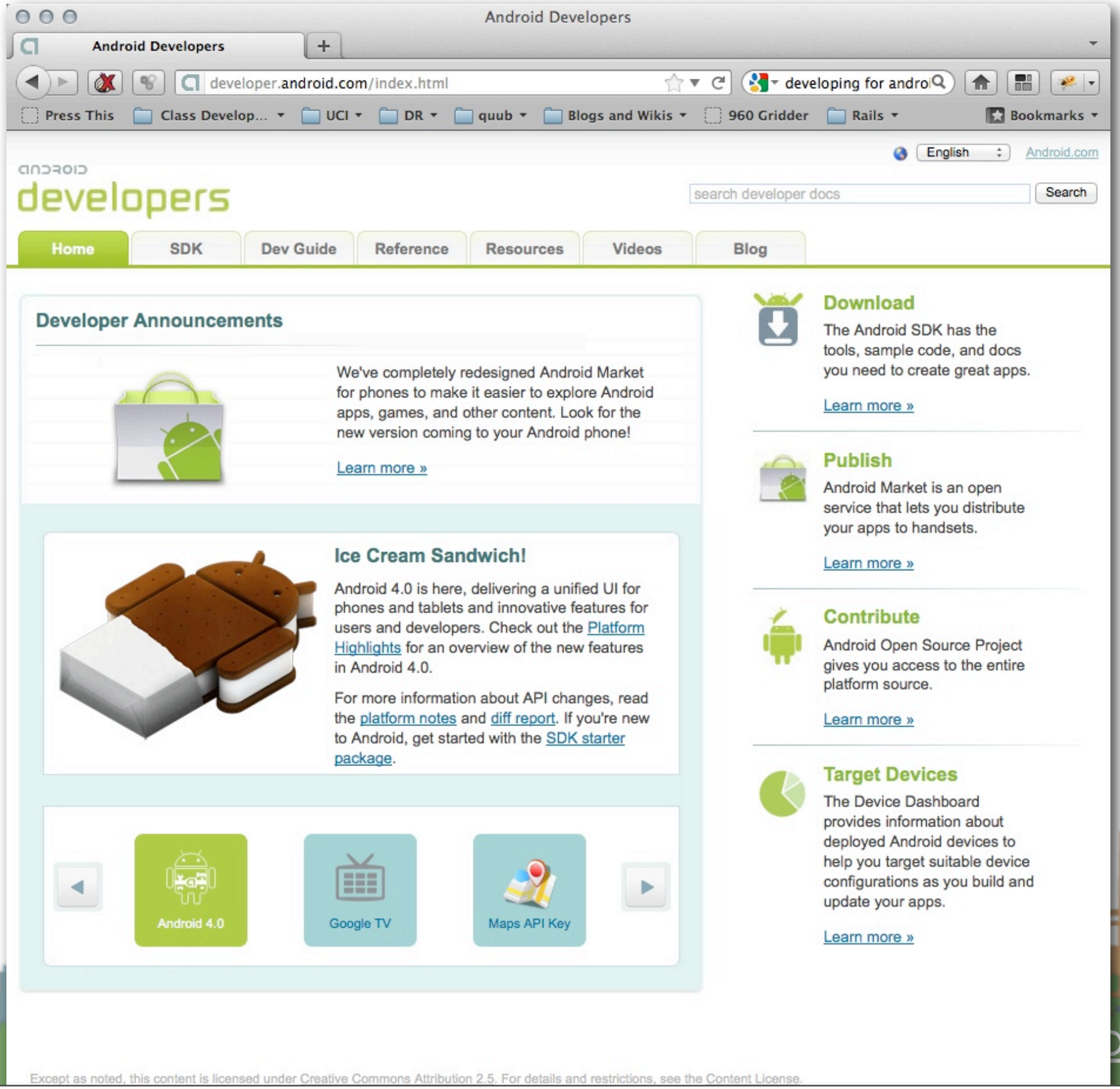
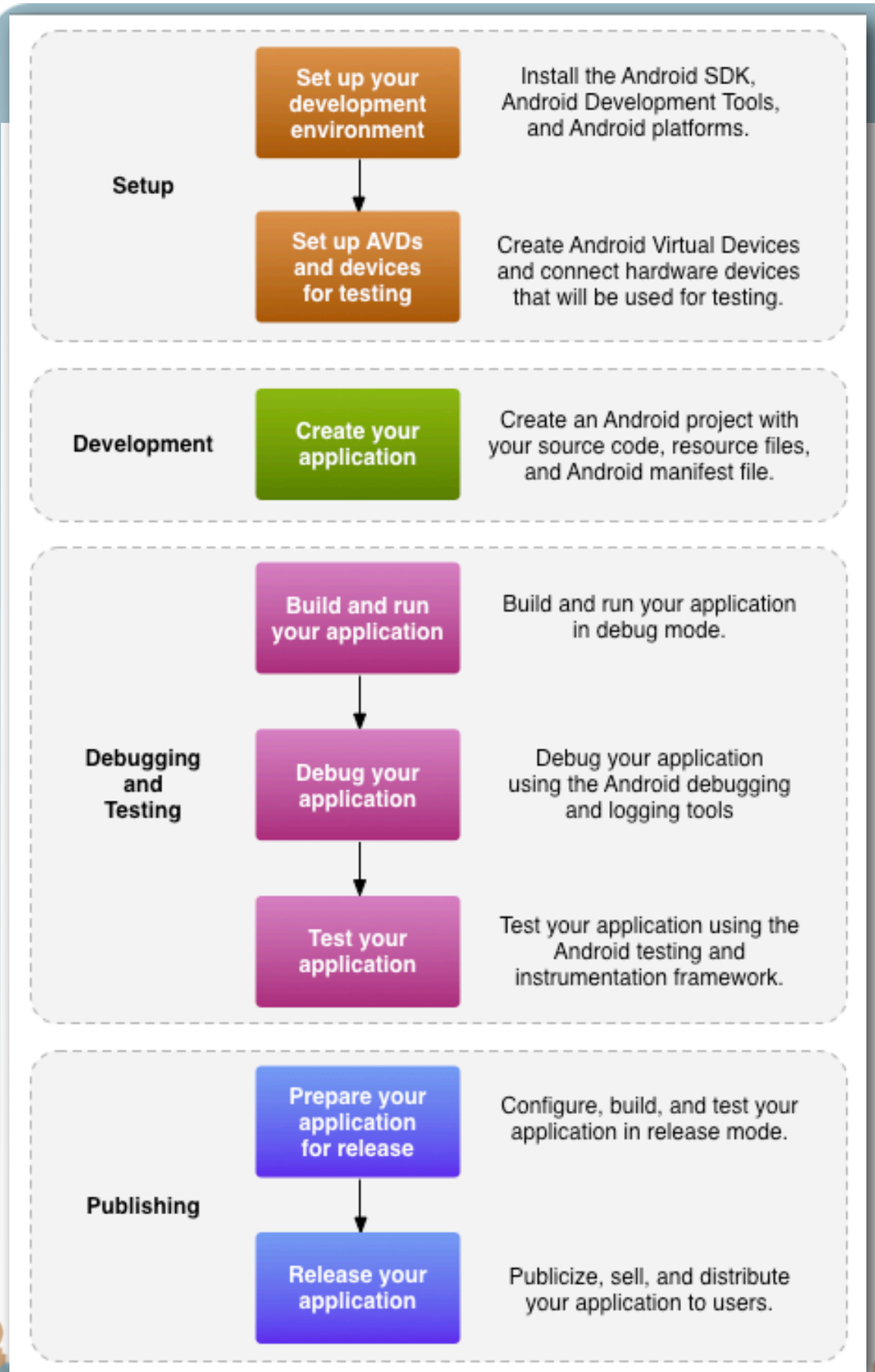
Intro to Android: Getting going with development

Assoc. Professor Donald J. Patterson
INF 241 Winter 2012

Intro to Android

Intro to Android





- SDK (Software development kit)
- AVD (Android Virtual Device)
- .apk (Android application package file)
- “platform”: Gingerbread v2.3.6 / v2.3.4 is our target
- ADT (Android Development Tools) Eclipse plug-ins plus command line tools

http://developer.android.com/guide/index.html

Actually Developing for Android 2.3.6

- Requirements
- SDK/AVD
- Eclipse Plug-in
- Hello World

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Intro to Android: Requirements

- OS
  - Windows XP (32), Vista (32/64)or Windows 7(32/64)
  - Mac OS 10.5.8 or later (Leopard, x86 only)
  - Linux (e.g., Ubuntu Lucid Lynx (32))
- IDE
  - Eclipse 3.5 or greater
    - “Eclipse IDE for Java Developers” (for example)
- Java
  - JDK 5 or 6 (1.5 or 1.6 (not just JRE!))

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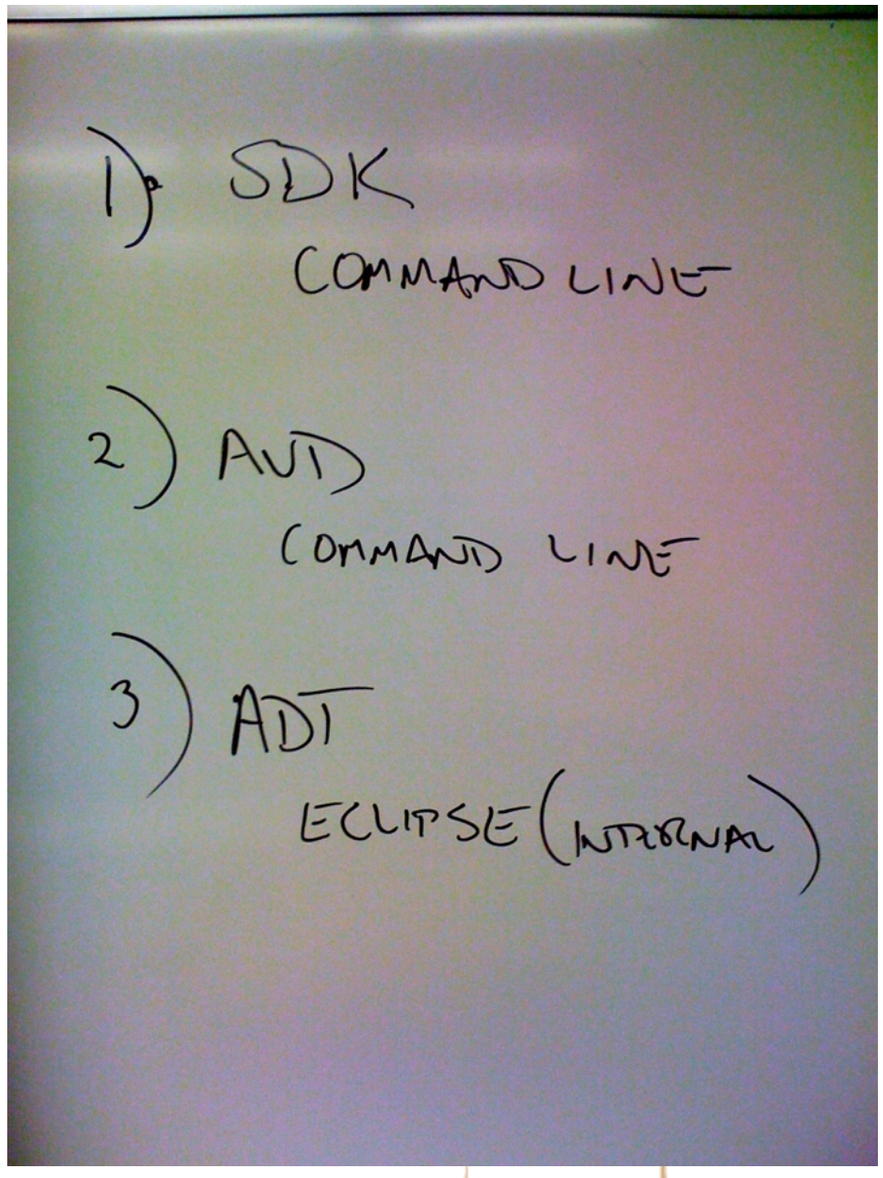

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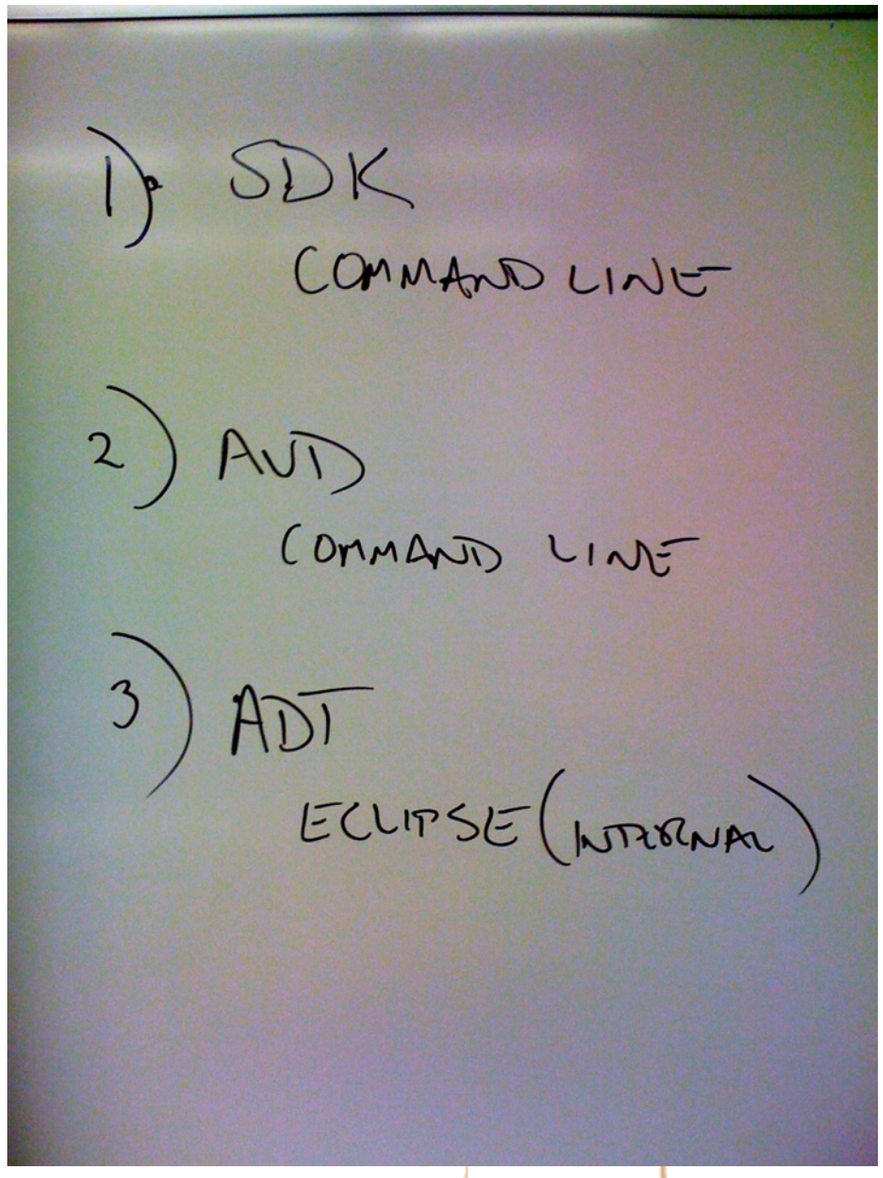

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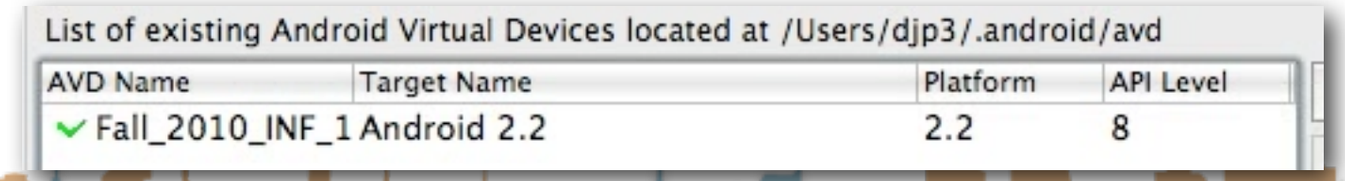
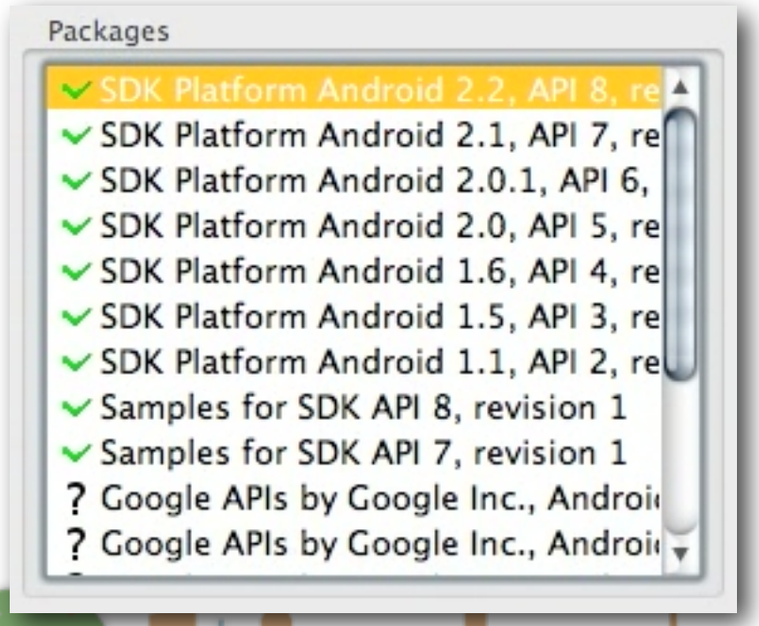
Intro to Android: SDK

- Download and unpack the appropriate "Android SDK and AVD manager"

Platform	Package	Size	MD5 Checksum
Windows	android-sdk_r15-windows.zip	33895447 bytes	cc2aadf7120d12b574981461736a96e9
	installer_r15-windows.exe (Recommended)	33902520 bytes	ee8481cb86a6646a4d963d5142902c5c
Mac OS X (intel)	android-sdk_r15-macosx.zip	30469921 bytes	03d2cdd3565771e8c7a438f1c40cc8a5
Linux (i386)	android-sdk_r15-linux.tgz	26124434 bytes	f529681fd1eda11c6e1e1d44b42c1432

  - This is a program that downloads and manages the installation of libraries for you
- Load the correct "Platform SDK"
- Create an Android Virtual Device





http://developer.android.com/sdk/adding-components.html

Intro to Android: SDK

Intro to Android: AVD

djp3 — djp3@dhcp-v019-018.mobile.uci.edu: /Users/djp3/Downloads — bash — 95×29

```
[512]djp3@dhcp-v019-018: ~/Downloads
$
```

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Intro to Android: Eclipse Plug-in

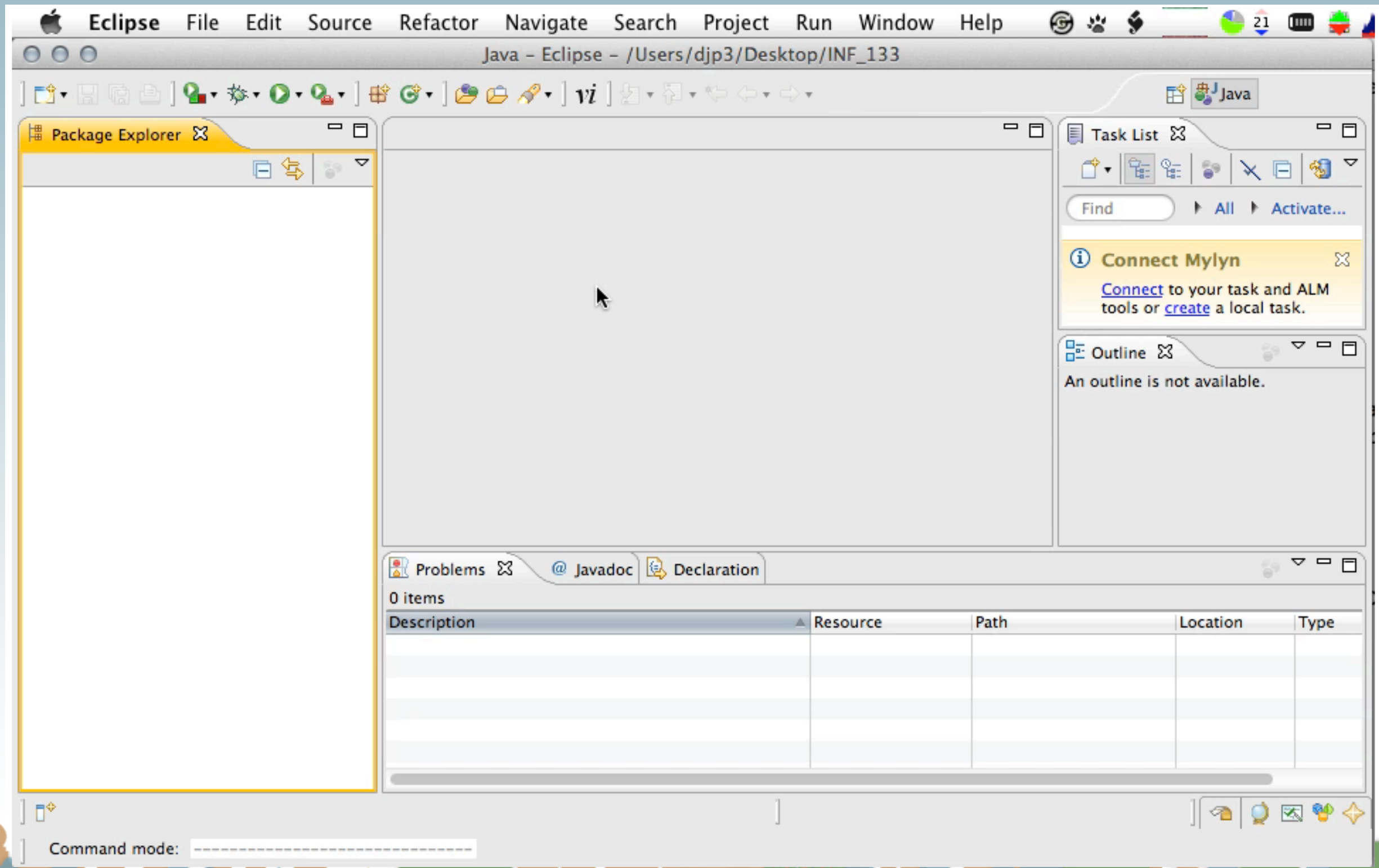
- The Eclipse Plug-in is called the "ADT"
  - Android Development Tools
  - Support for menu options in Eclipse which support
    - Automatically building Android projects
    - User-Interface building for Android
    - Debugging support for Android
    - Packaging files for the Android Market (.apk files)
- The ADT is installed from within Eclipse

http://developer.android.com/sdk/eclipse-adt.html

Intro to Android: Eclipse Plug-in

- Install the plug-in
- Restart Eclipse
- Configure the plug-in

Intro to Android: Eclipse Plug-in



http://developer.android.com/sdk/eclipse-adt.html

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Actually Developing for Android

Hello World

- Create a project
- Build a basic U/I
- Run the Application
- Improve the U/I
- Debug the Application

http://developer.android.com/guide/index.html

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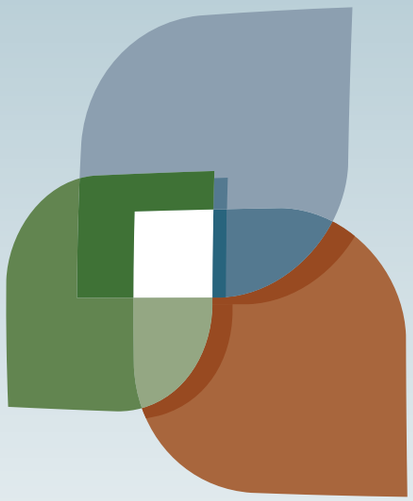

LUCI

User Interaction: Intro to Android

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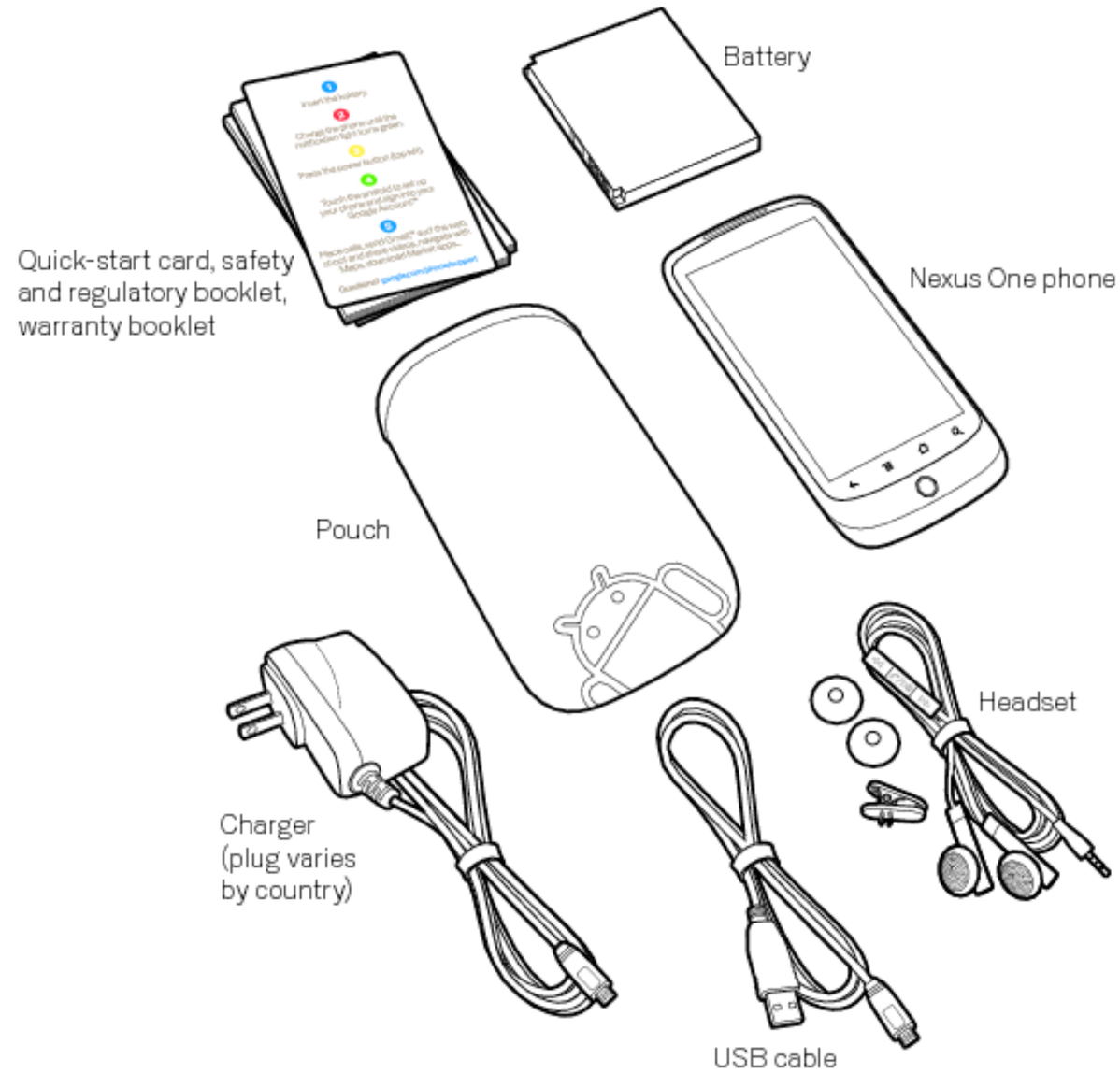
INF 241 Winter 2012

Checking out the phone

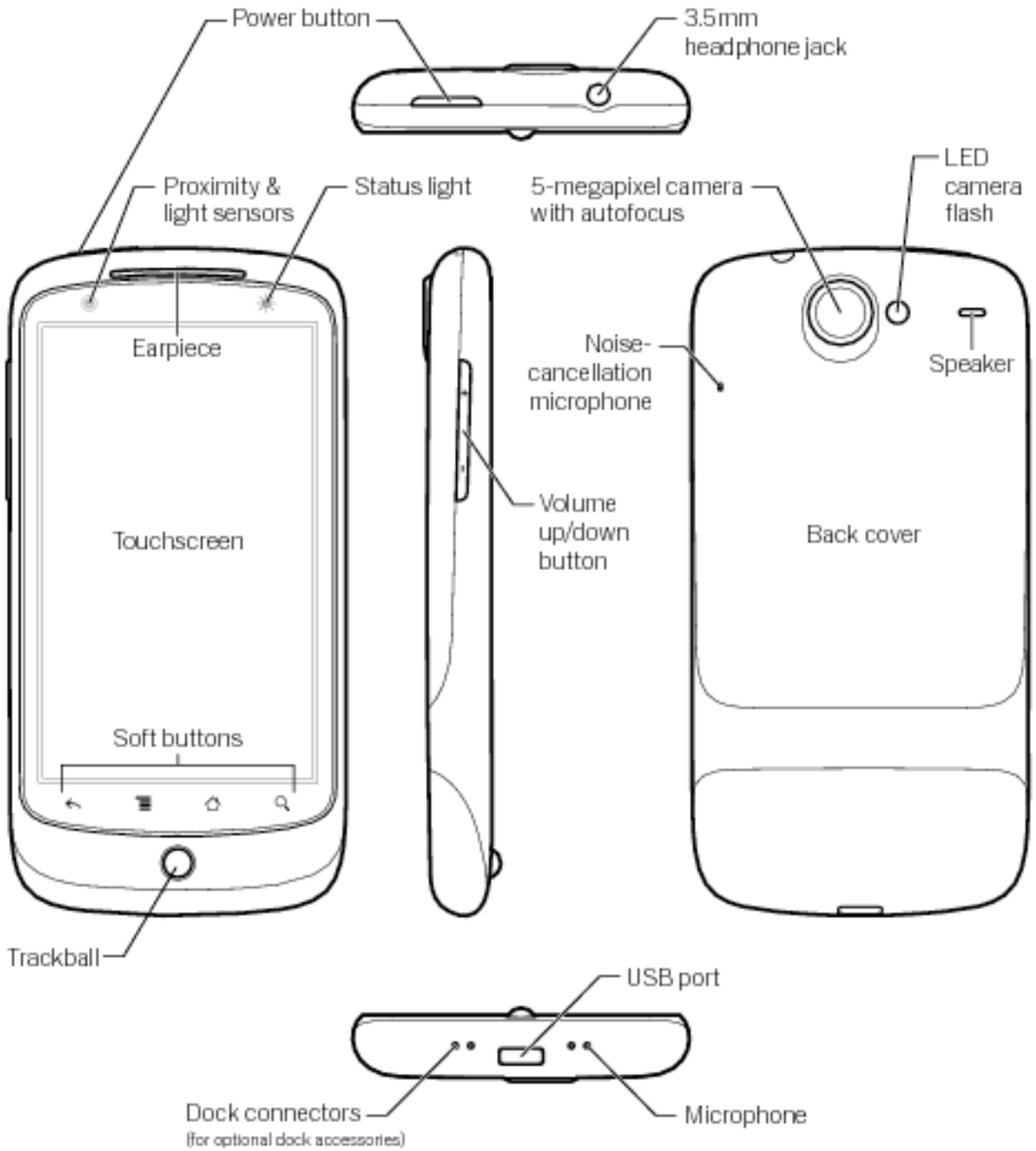
- Unpack the phone



http://www.google.com/support/android/bin/topic.py?hl=en&topic=28930

Checking out the phone

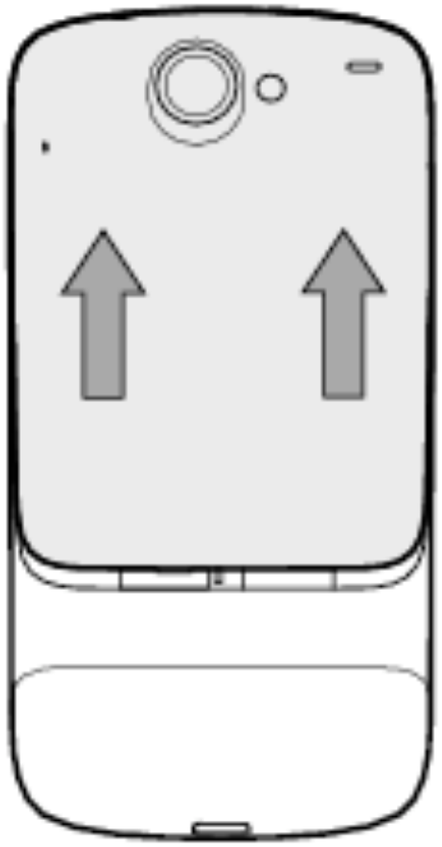
- Take a look at the sensors

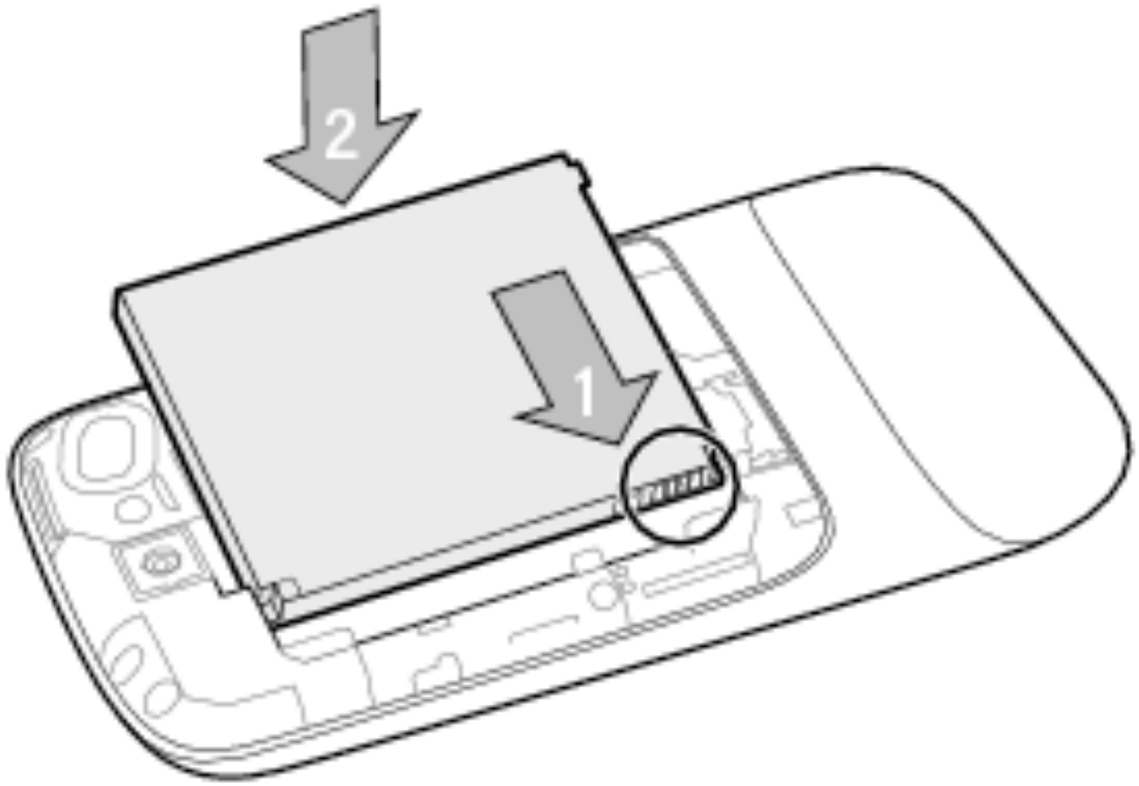


http://www.google.com/support/android/bin/topic.py?hl=en&topic=28930

Checking out the phone

- Install the battery - Do Not Damage My Phones!





http://www.google.com/support/android/bin/topic.py?hl=en&topic=28930

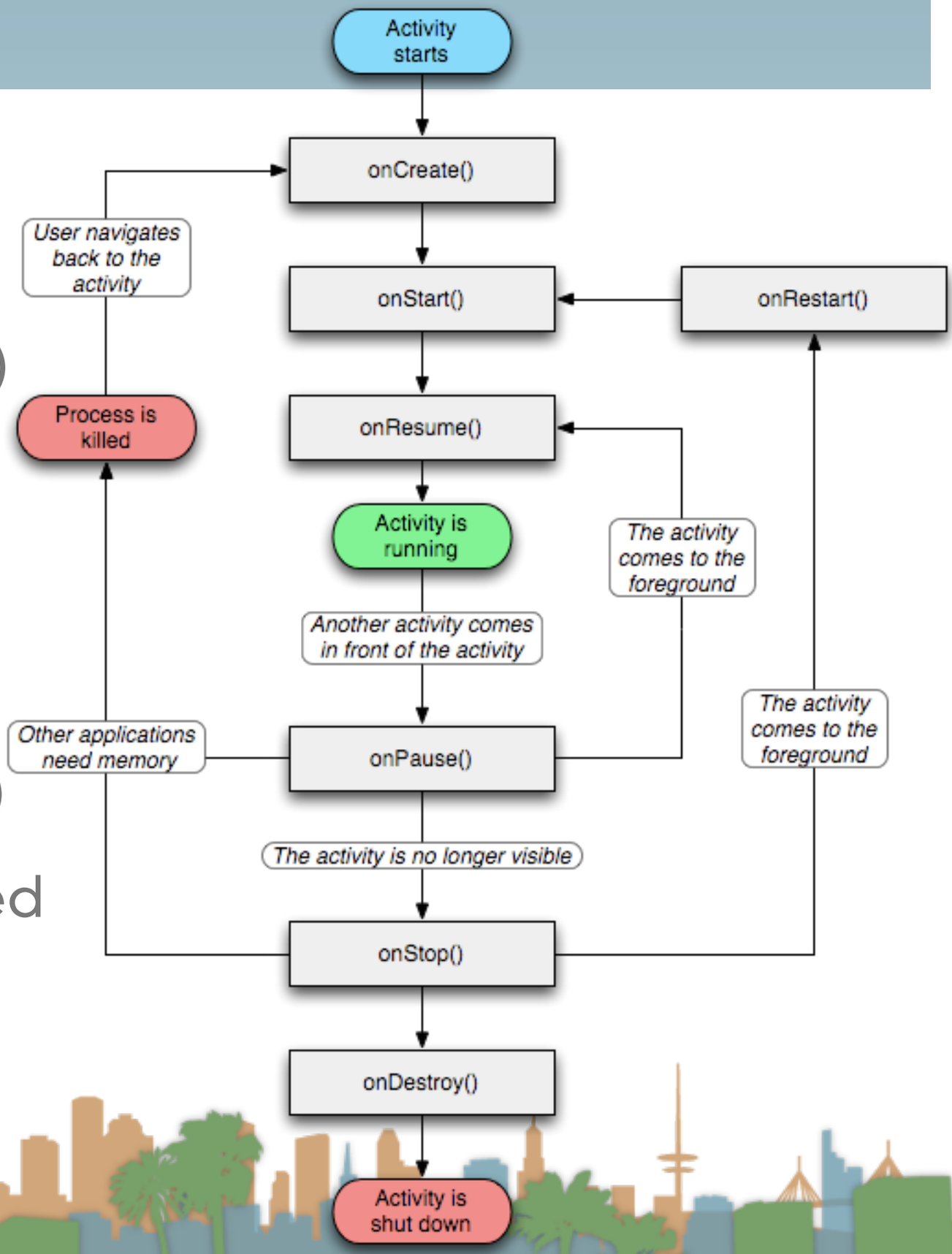
Checking out the phone

- Charge the phone to 100%
  - USB to computer
  - USB to wall plug
- While charging, go through on-phone tutorial
- Do not sync to your Google
- Enable Location reporting
- Set Date and Time
- Register your device with OIT (or send me the MAC address)
  - Home -> Menu -> Settings -> About Phone -> Status

http://www.google.com/support/android/bin/topic.py?hl=en&topic=28930

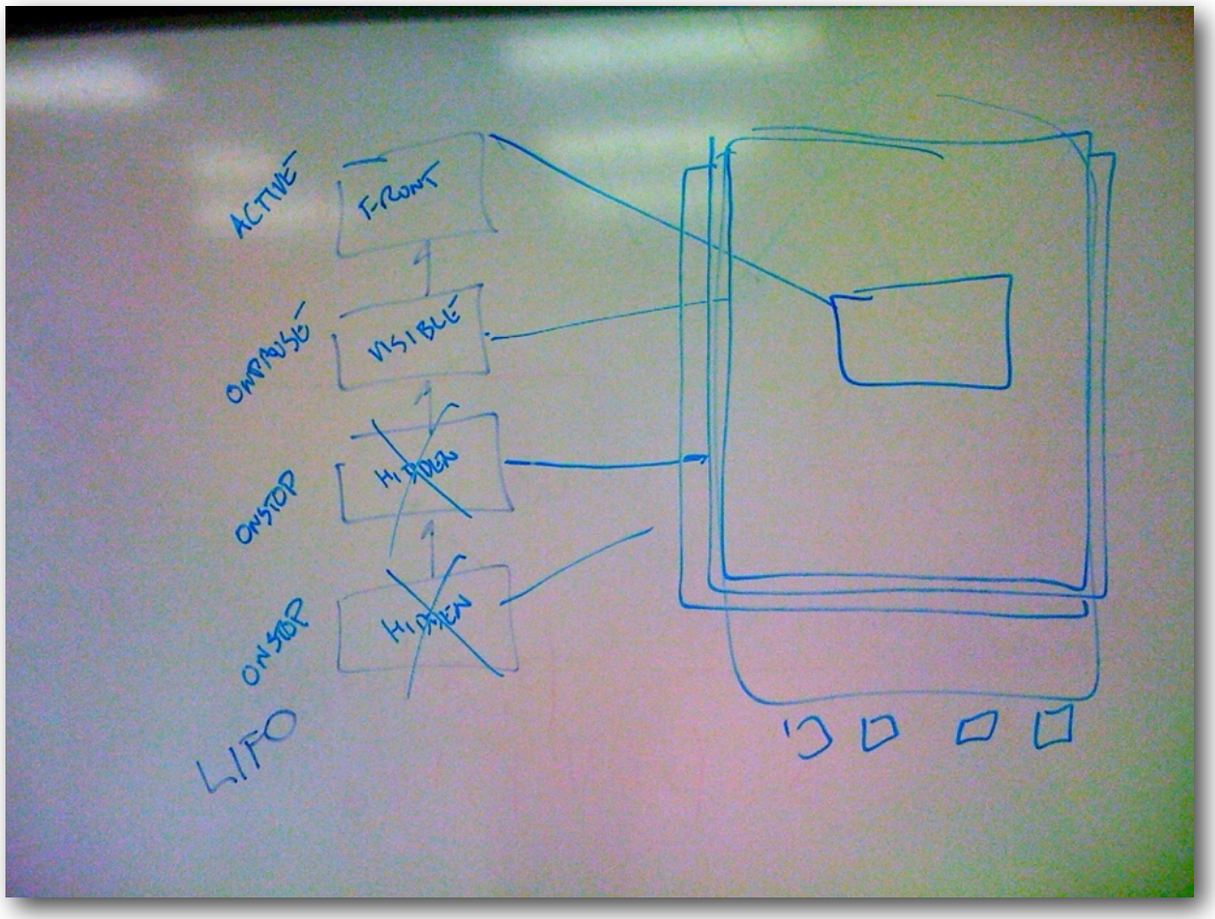
Activity Lifecycle

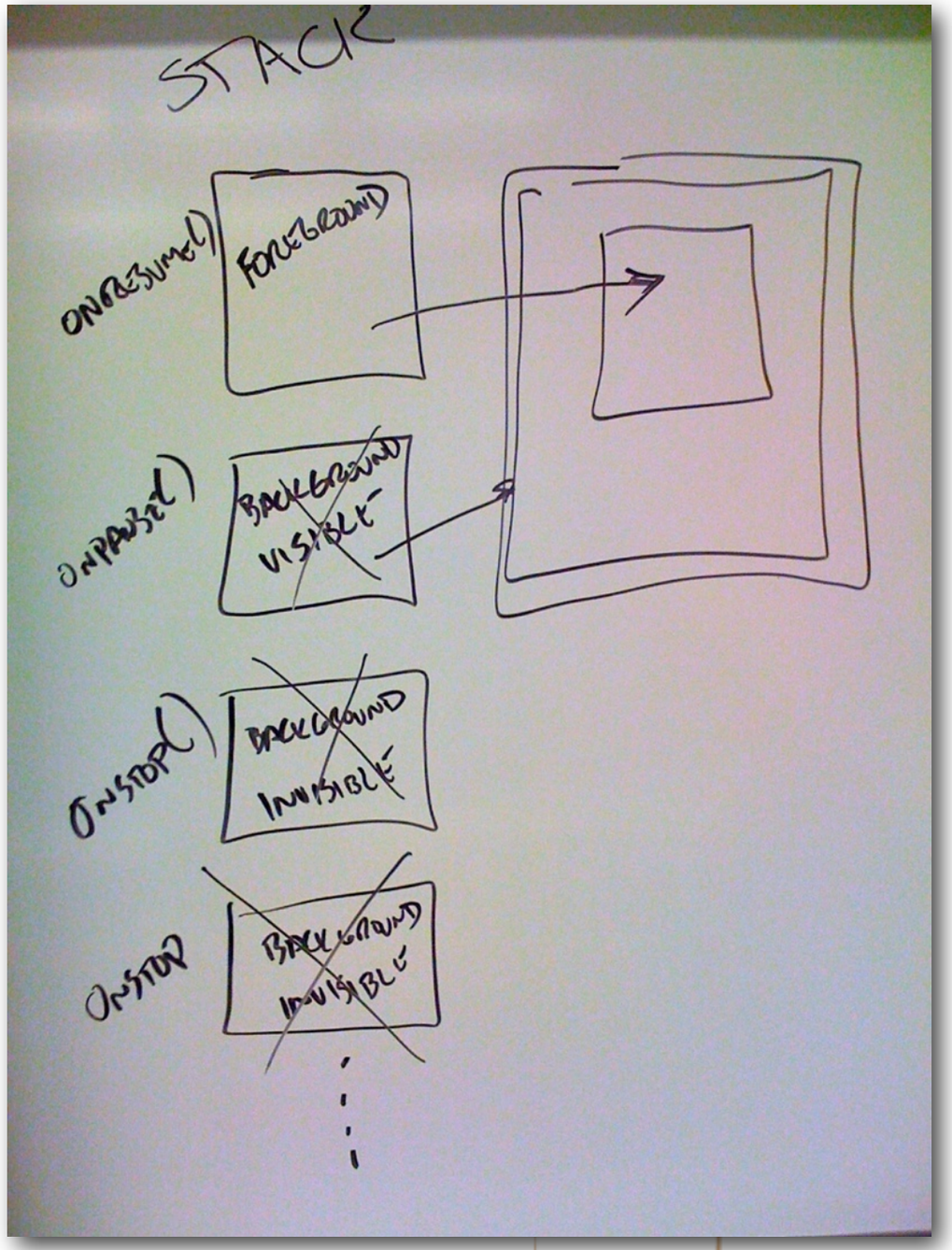
- Key loops
  - Entire Lifetime
    - onCreate()- onDestroy()
  - Visible Lifetime
    - onStart() - onStop()
  - Foreground Lifetime
    - onResume() - onPause()
- onPause() may be followed by kill



http://developer.android.com/reference/android/app/Activity.html

Activity Stack





Intents

- Requests made by an Activity to have the phone do something
  - e.g., take a picture, look up a contact etc.
- Specified abstractly so that new software can answer the Intent
- Calling an Intent requires an Action and some data
  - e.g., ACTION_DIAL, tel:555-1212 = use phone to call 555-1212
- An Activity can start an Intent
- A Broadcast Receiver can respond to an Intent
- An Intent is a message sent from one app to another

http://developer.android.com/reference/android/content/Intent.html

Simulating Sensors

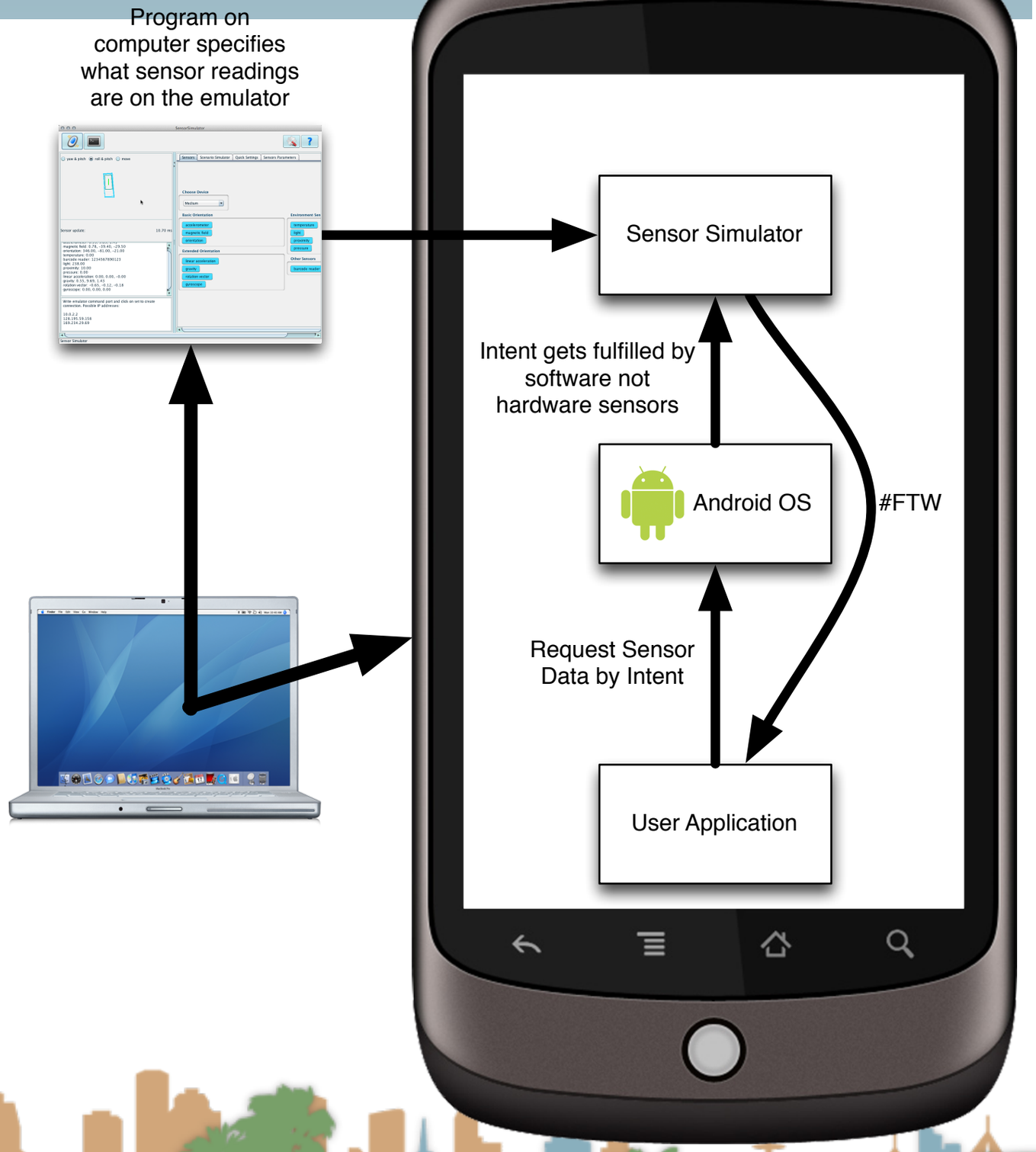
- On the emulator

Sensors in the emulator

Emulator

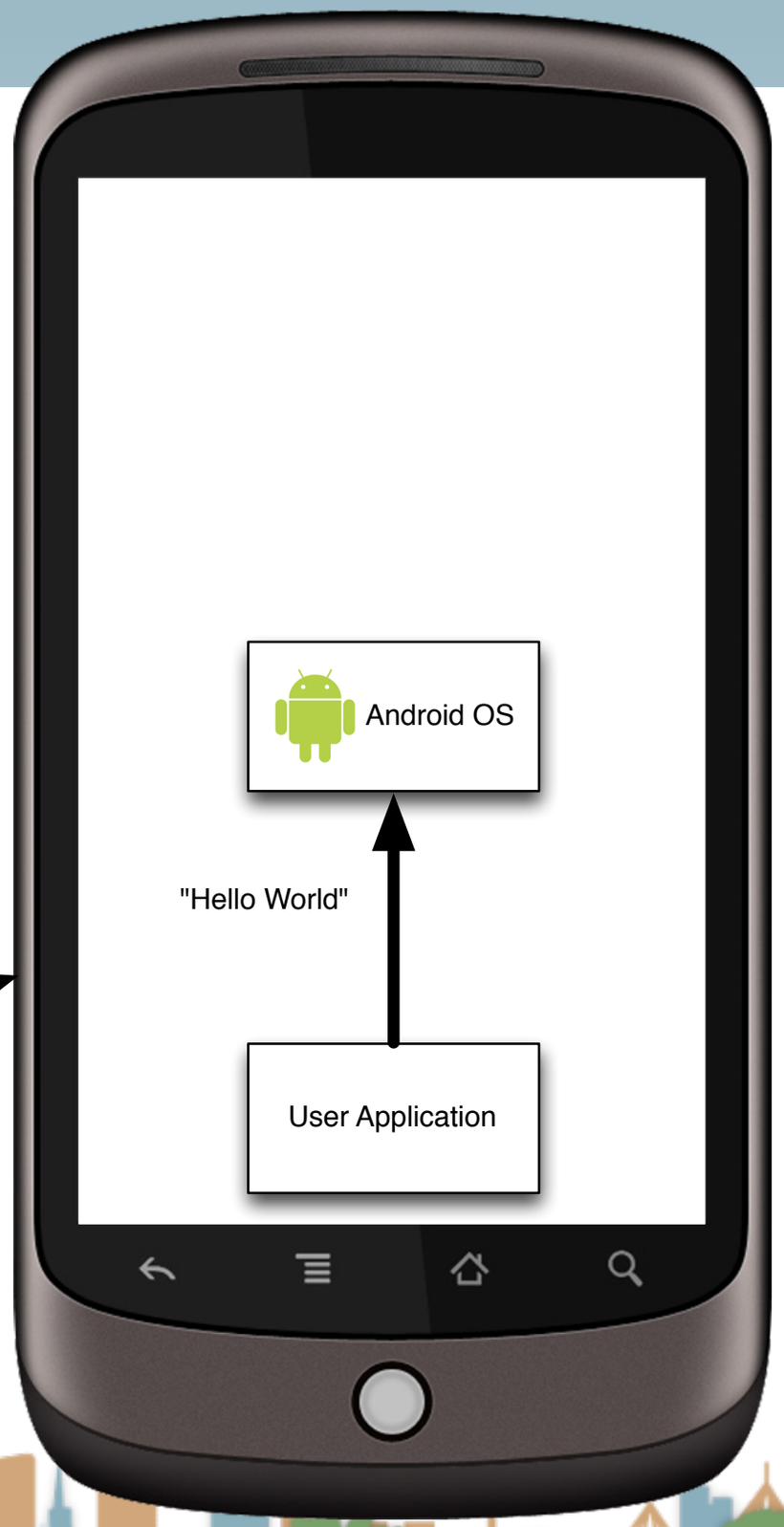
Sensors in the emulator

- Simulating Sensors on the Emulator requires:
  - A 3rd-party program on the emulator
  - A 3-rd party program on your computer
  - configuration of the two
  - small changes to your code



How to handle the assignment

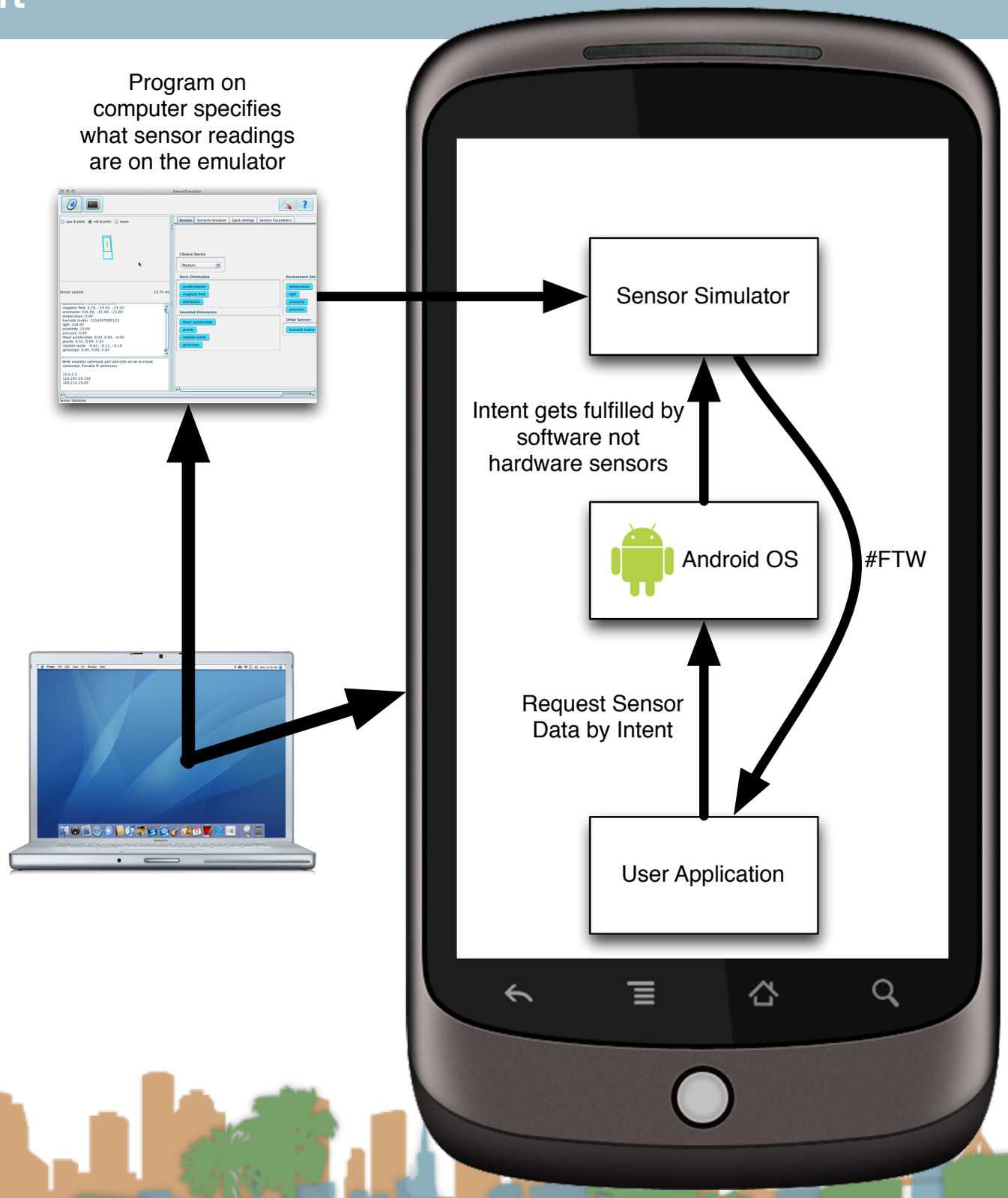
- Your approach: Stage 1
  - get your environment working



Emulator

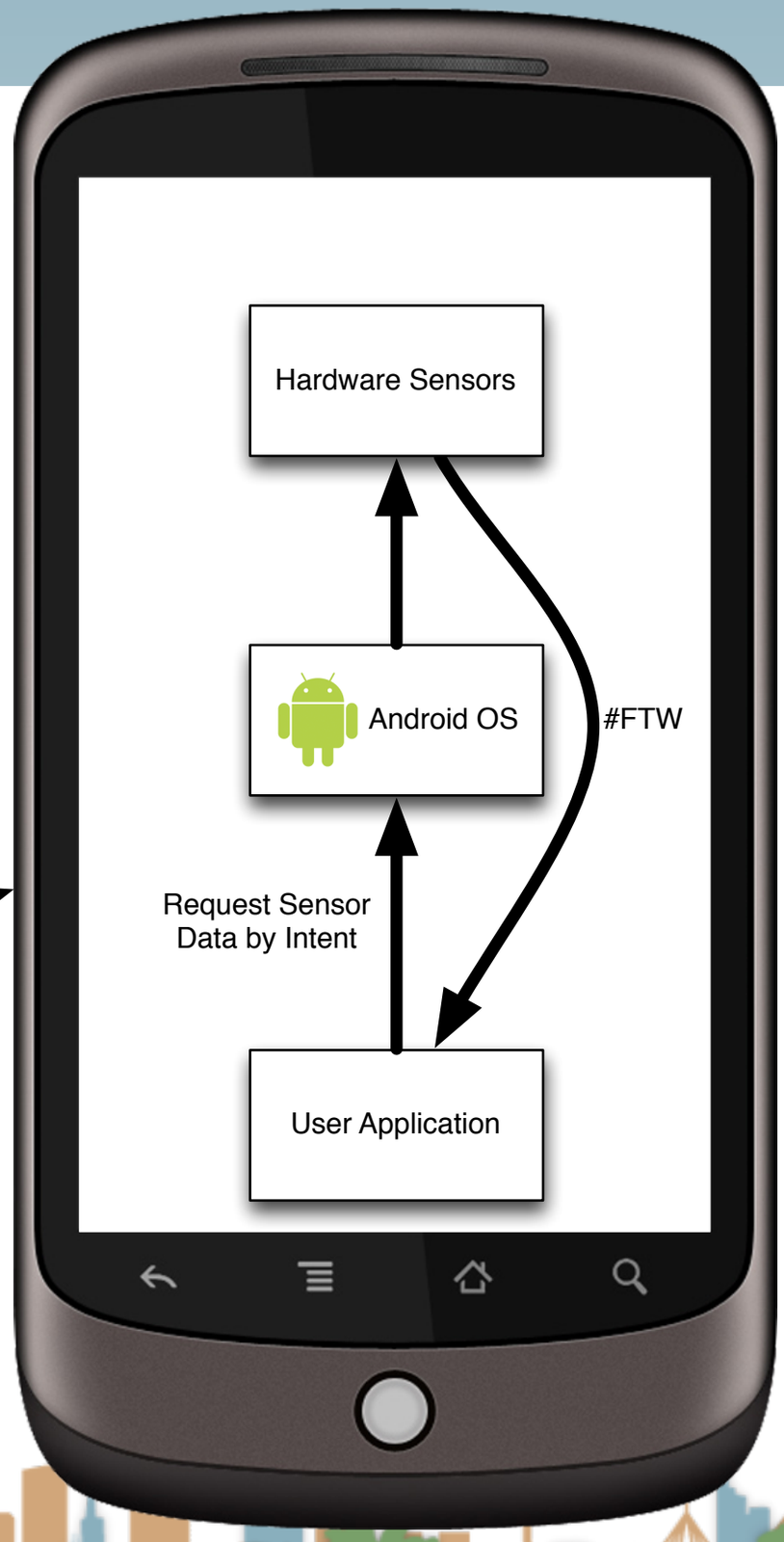
How to handle the assignment

- Your approach: Stage 2
  - get your program working with simulated sensors
  - fast and easy to iterate



How to handle the assignment

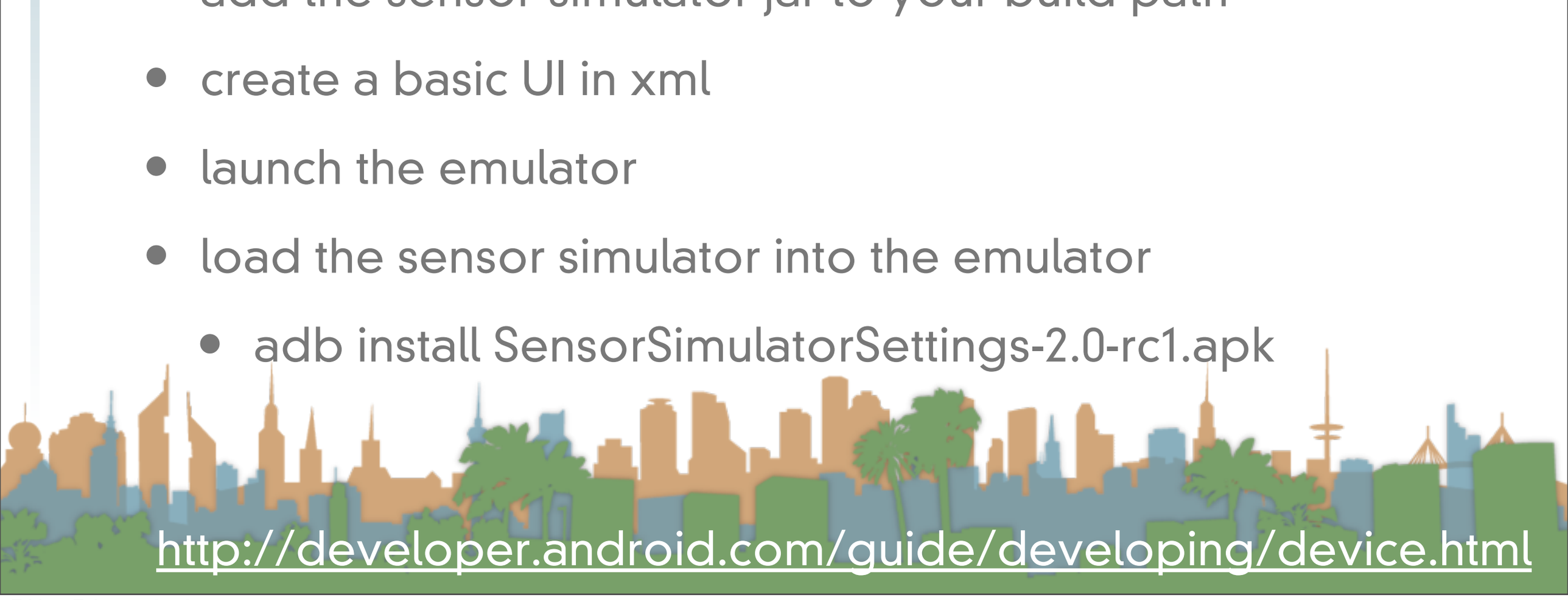
- Your approach: Stage 3
  - get your program working with a real phone



Real Phone

How to handle the assignment

- Stage 2
  - Start a new project on Android 2.3.3
  - download the sensor simulator from
    - http://code.google.com/p/openintents/downloads/list?q=sensorsimulator
  - unzip the code into a lib directory
  - add the sensor-simulator jar to your build path
  - create a basic UI in xml
  - launch the emulator
  - load the sensor simulator into the emulator
    - adb install SensorSimulatorSettings-2.0-rc1.apk



http://developer.android.com/guide/developing/device.html

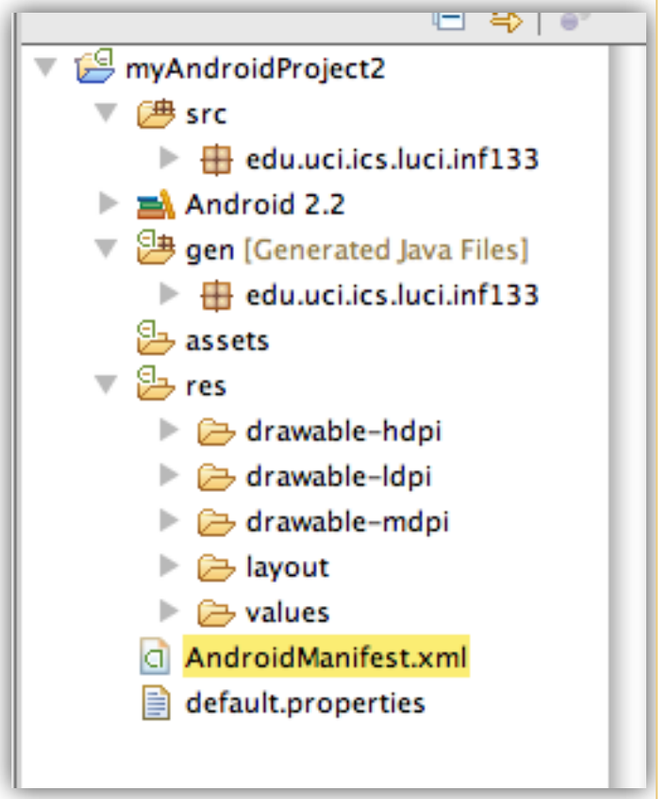
How to handle the assignment

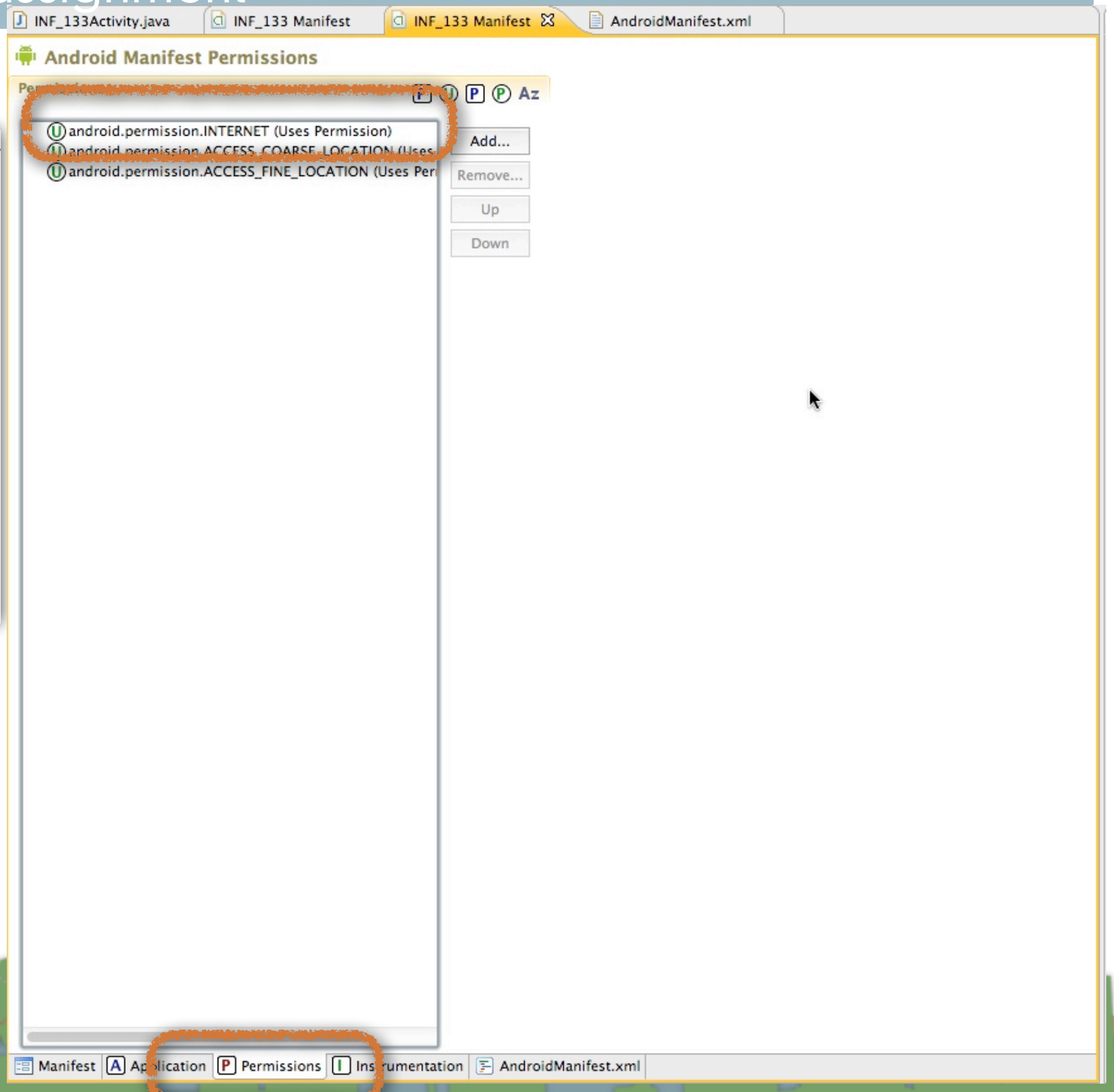
- Stage 2
  - Give your application permission to use the Internet in AndroidManifest.xml
    - <uses-permission android:name="android.permission.INTERNET"/>
  - Start the sensor simulator on your computer
    - java -jar ./sensorsimulator-2.0-rc1.jar
  - Test the sensor software on the phone
  - Make your application debuggable
  - Run your application that requests sensor information

http://developer.android.com/guide/developing/device.html

How to handle the assignment

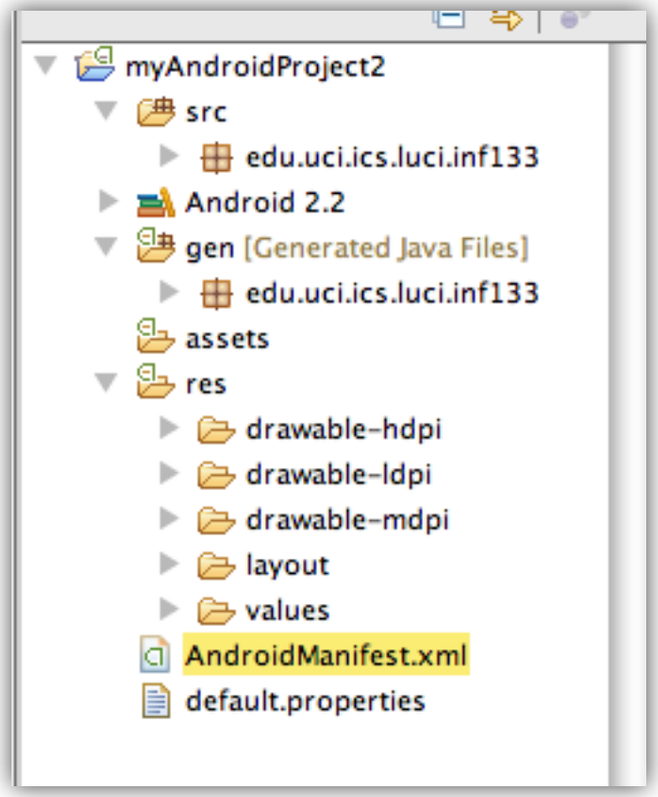
- Stage 2

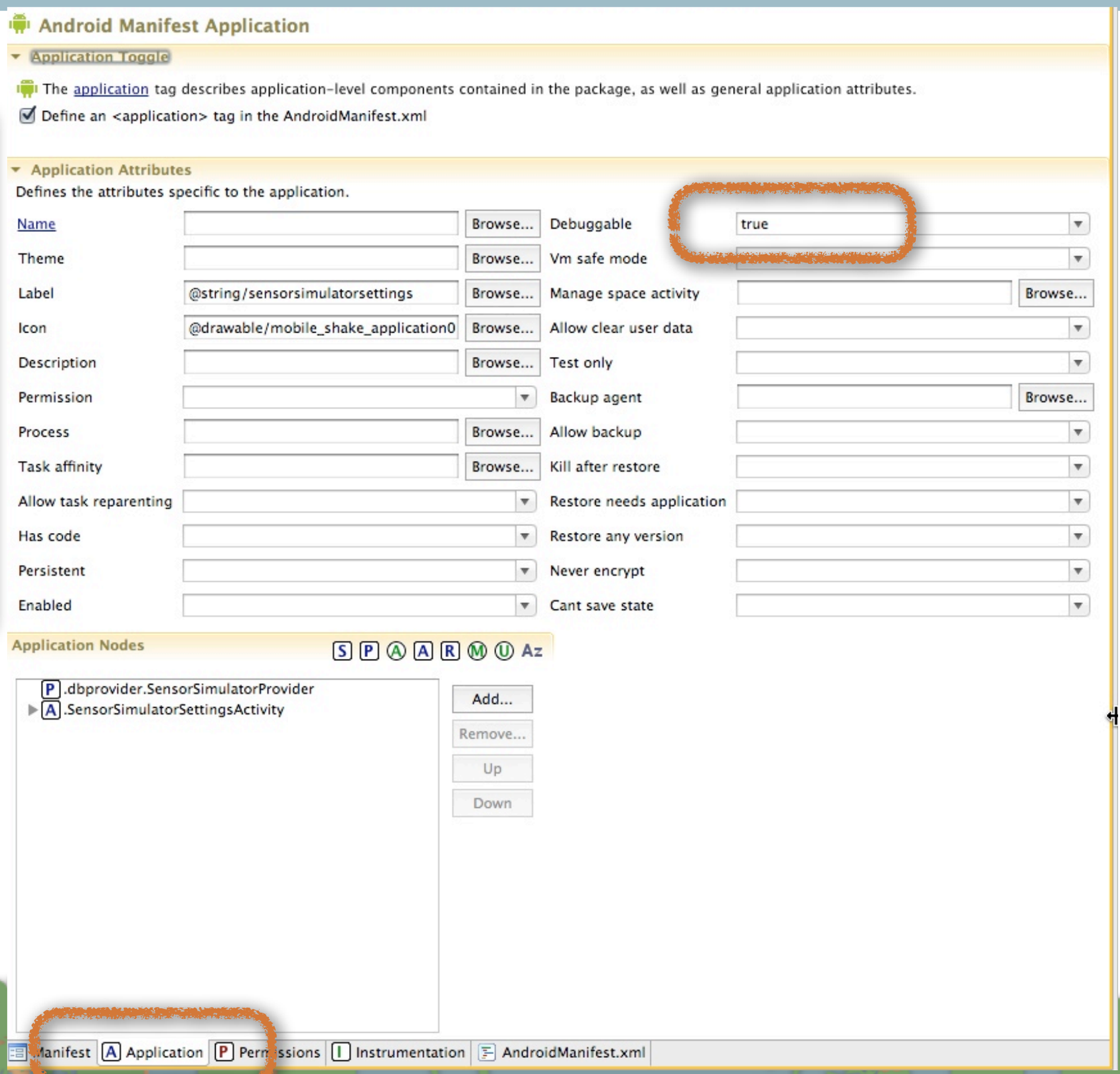




How to handle the assignment

- Stage 2





How to handle the assignment

INF_133ActivityTemp. | INF_133 Manifest | INF_133Activity.java | main.xml | main.xml | 2

```
package edu.uci.ics.luci.inf133;

import org.openintents.sensorsimulator.hardware.Sensor;
import org.openintents.sensorsimulator.hardware.SensorEvent;
import org.openintents.sensorsimulator.hardware.SensorEventListener;
import org.openintents.sensorsimulator.hardware.SensorManagerSimulator;

import android.app.Activity;
import android.hardware.SensorManager;
import android.os.Bundle;
import android.widget.TextView;

public class INF_133Activity extends Activity {
    //private SensorManager mSensorManager;
    private SensorManagerSimulator mSensorManager;

    private TextView mTextViewLight;

    private SensorEventListener mEventListenerLight;

    /** Called when the activity is first created. */
    @Override
    public void onCreate(Bundle savedInstanceState) {
        super.onCreate(savedInstanceState);
        setContentView(R.layout.main);

        mTextViewLight = (TextView) findViewById(R.id.text_light);

        //mSensorManager = (SensorManager) getSystemService(SENSOR_SERVICE);
        mSensorManager = SensorManagerSimulator.getSystemService(this, SENSOR_SERVICE);
        mSensorManager.connectSimulator();

        mEventListenerLight = new SensorEventListener() {

            public void onSensorChanged(SensorEvent event) {
                float[] values = event.values;
                mTextViewLight.setText("Light: " + values[0]);
            }

            public void onAccuracyChanged(Sensor sensor, int accuracy) {
            }
        };
    }
```

Ho

```
import android.widget.TextView;

public class INF_133Activity extends Activity {
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                float[] values = event.values;
                mTextViewLight.setText("Light: " + values[0]);
            }

            public void onAccuracyChanged(Sensor sensor, int accuracy) {
            }
        };
    }

    @Override
    protected void onResume() {
        super.onResume();
        mSensorManager.registerListener(mEventListenerLight,
                mSensorManager.getDefaultSensor(Sensor.TYPE_LIGHT),
                SensorManager.SENSOR_DELAY_FASTEST);
    }

    @Override
    protected void onStop() {
        mSensorManager.unregisterListener(mEventListenerLight);
        super.onStop();
    }
}
```
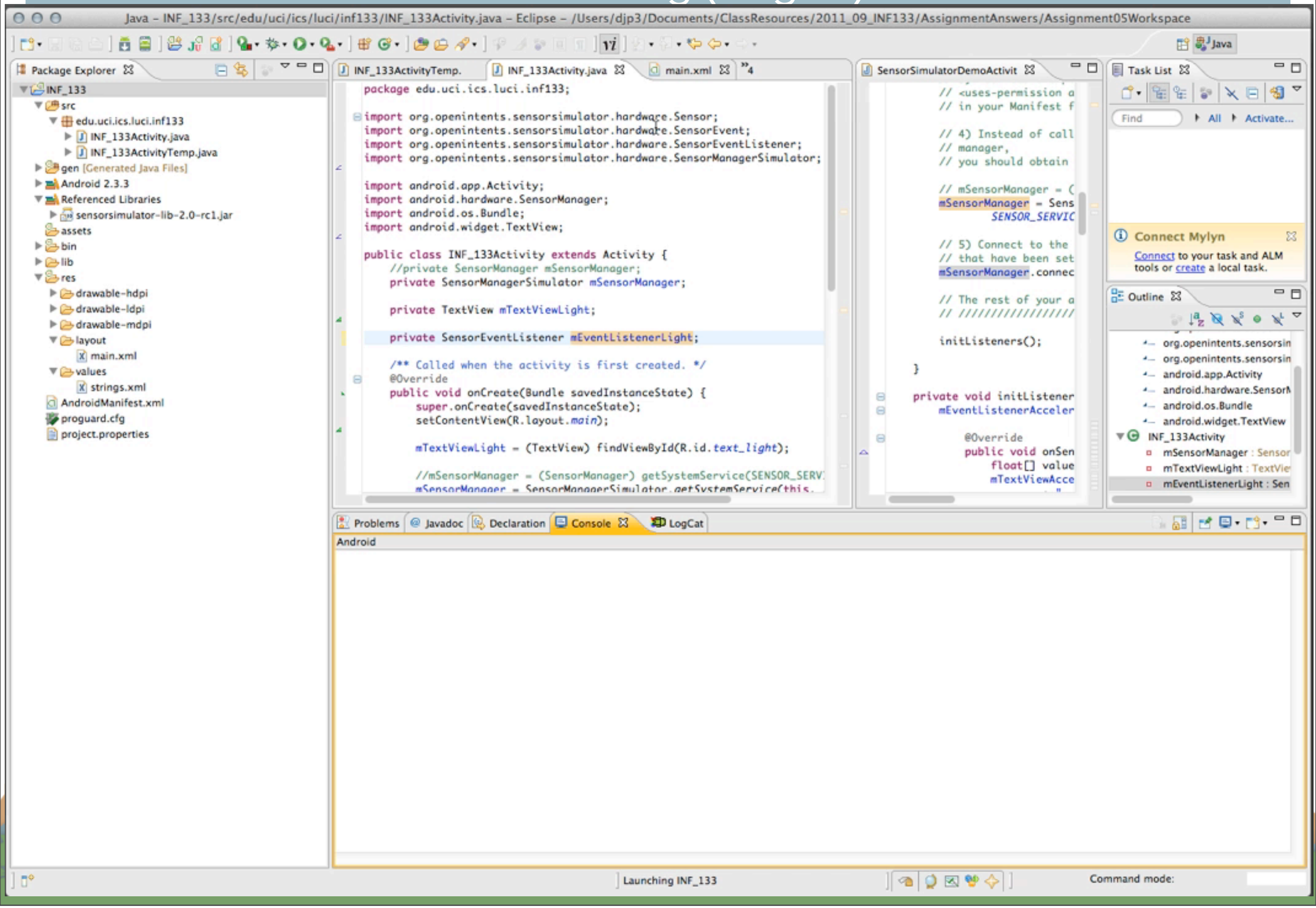

What it looks like when it's working (Stage 2)



Hints

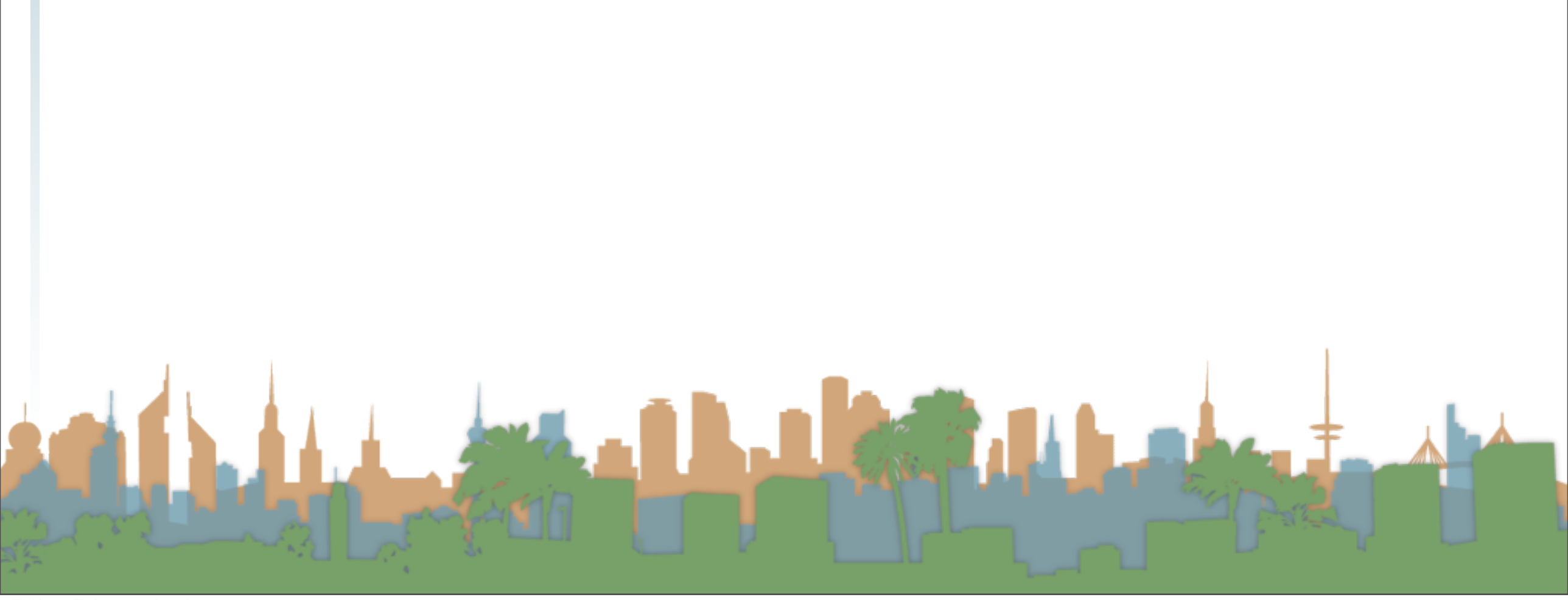
- Playing a sound
  - The key is the MediaPlayer call
  - Do not instantiate more than one MediaPlayer object

```
static MediaPlayer mp = new MediaPlayer();
public void playSound(String path) {
    if (mp.isPlaying()) {
        return;
    }
    mp.reset();
    try {
        mp.setDataSource(path);
        mp.prepare();
    } catch (Exception ex) {
        Log.d("main thread ex", ex.getStackTrace()[0].toString() + " path: " + path);
    }
    mp.start();
}
```

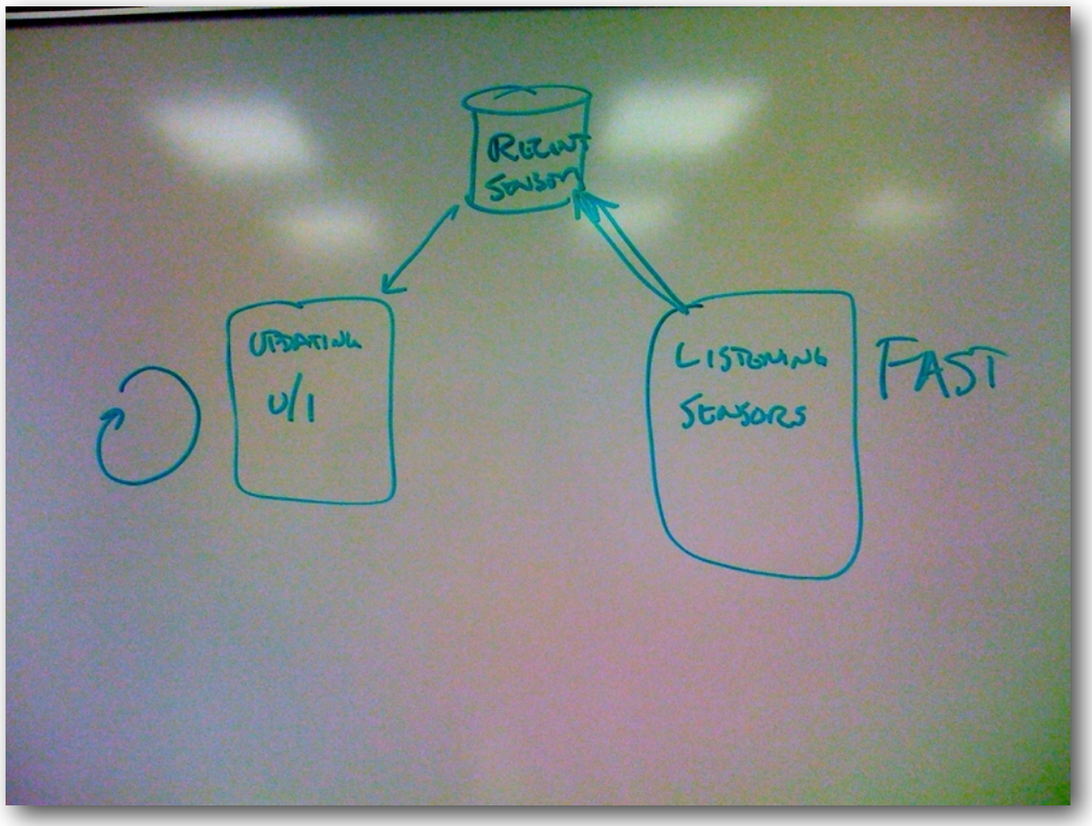
  - http://developer.android.com/guide/topics/media/index.html

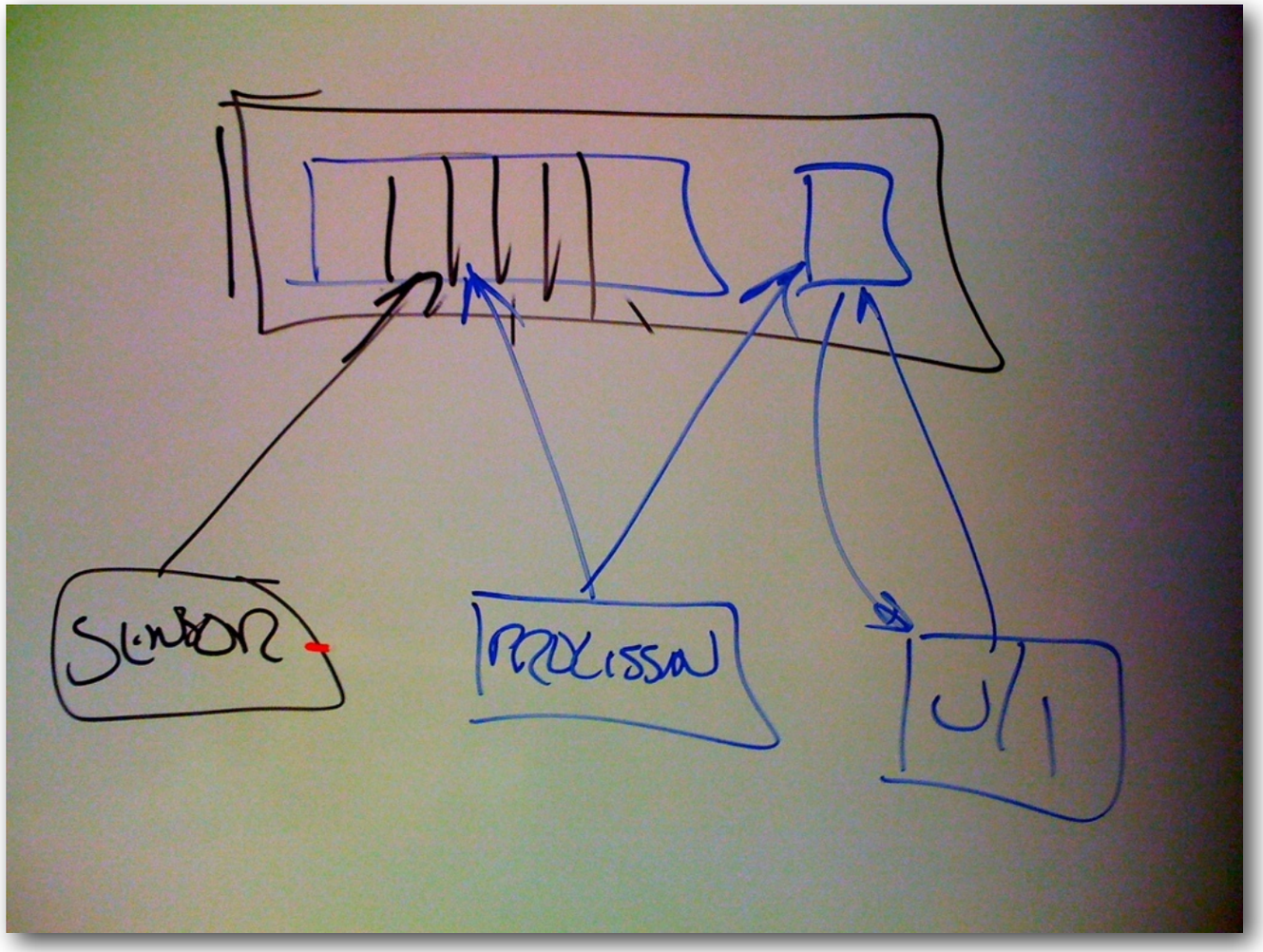
Hints

- Playing a sound
  - You will need to get the audio media onto the phone



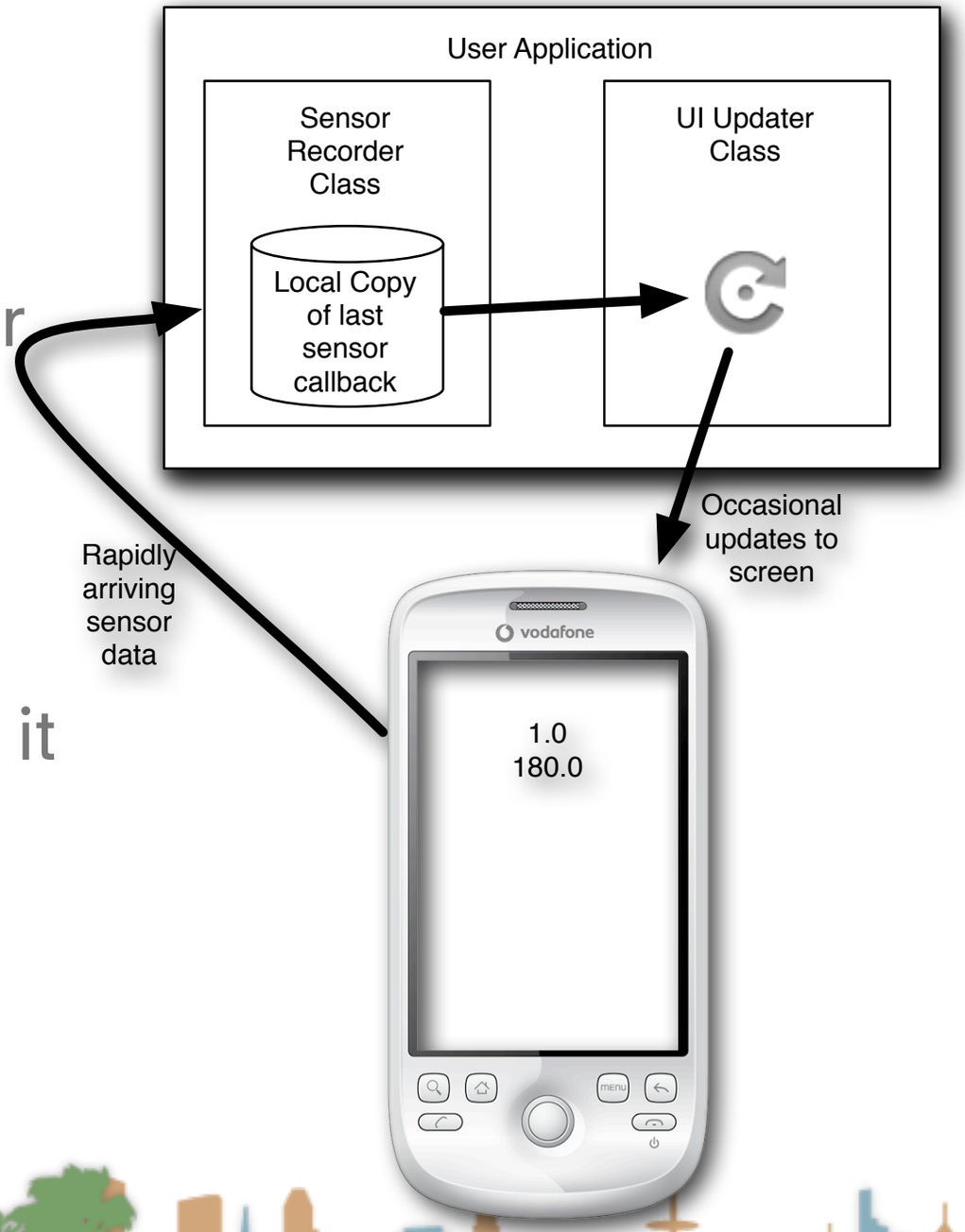
Hints


Recent Sensor
Updating
U/I
Listening
Sensors
FAST


Sensor
Process
U/I

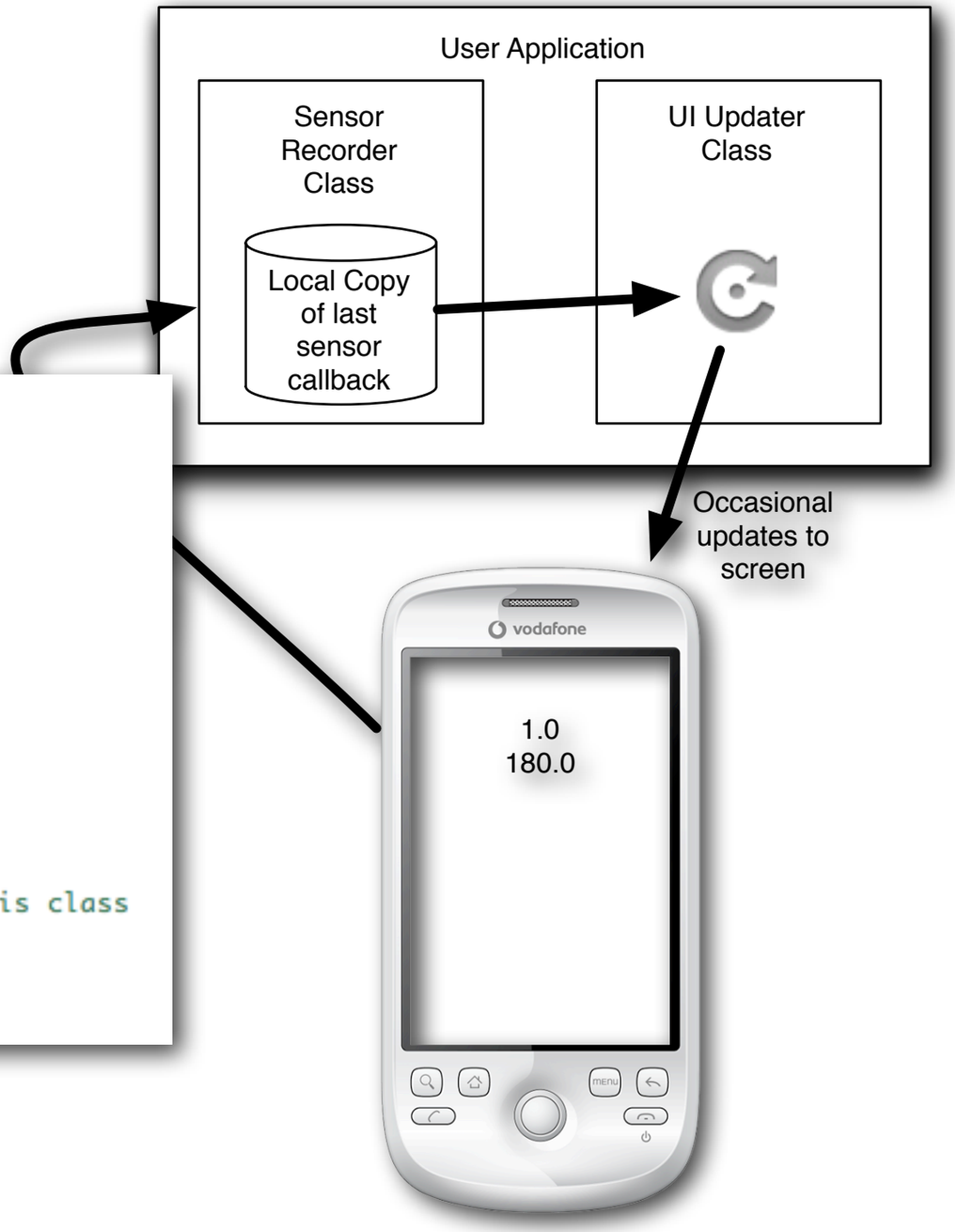
Hints

- One possible architecture for getting sensor readings
- Steps
  - Create a U/I for the data
  - Instantiate your Sensor Recorder
  - Register for sensor callbacks
  - Instantiate your UI Updater
  - Have a timer occasionally run it

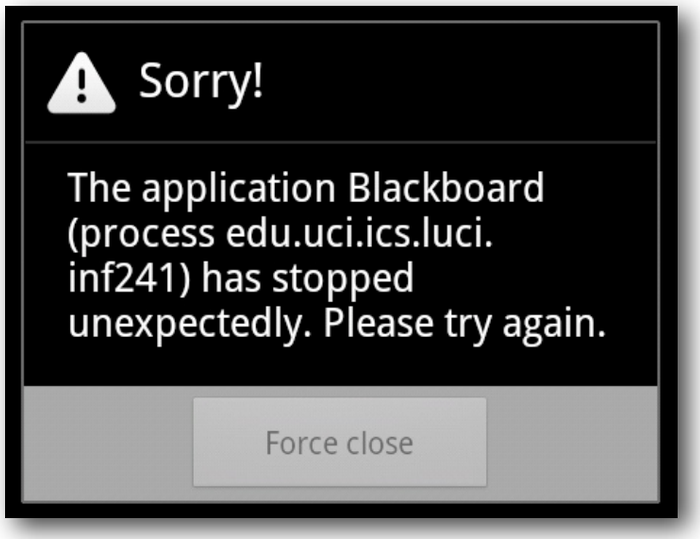


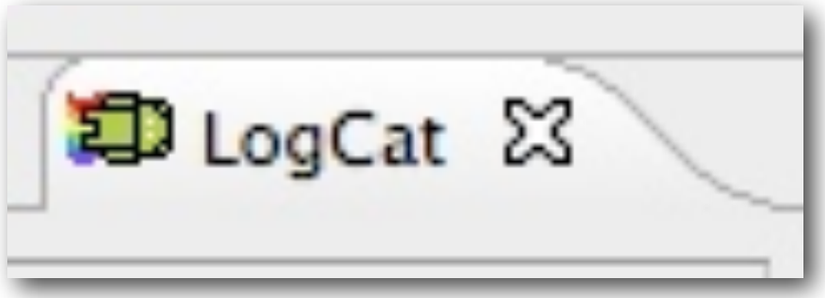
Hints

```
public void onCreate(Bundle savedInstanceState) {
    super.onCreate(savedInstanceState);
    setContentView(R.layout.main); //This is from an xml description of the UI

    deviceSensor = new DeviceSensor();  // I implement this class

    /* This is provided by the Android OS */
    mSensorManager = (SensorManager) getSystemService(SENSOR_SERVICE);

    mSensorManager.registerListener(deviceSensor, mSensorManager
            .getDefaultSensor(Sensor.TYPE_ORIENTATION),
            SensorManager.SENSOR_DELAY_FASTEST);

    Timer timerUI = new Timer();
    UpdateUITask updateValuesTask = new UpdateUITask(this);  // I implement this class
    timerUI.schedule(updateValuesTask, 500, 500);

}
```

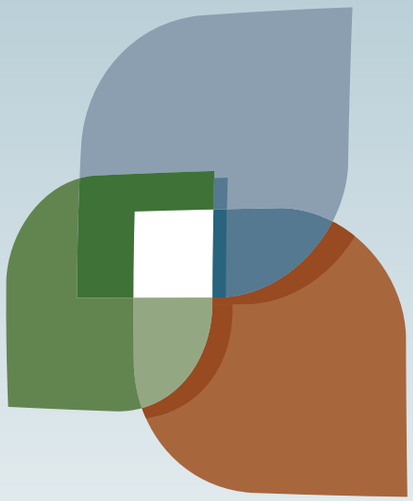


Troubleshooting






```
W 02-02 14:31:19.308  430  edu.uci.ics.luci.in dalvikvm     threadid=1: thread exiting with uncaught exception (group=0x40015560)
E 02-02 14:31:19.318  430  edu.uci.ics.luci.in AndroidRuntime FATAL EXCEPTION: main
E 02-02 14:31:19.318  430  edu.uci.ics.luci.in AndroidRuntime java.lang.RuntimeException: Unable to start activity ComponentInfo{edu.uci.ics
E 02-02 14:31:19.318  430  edu.uci.ics.luci.in AndroidRuntime     at android.app.ActivityThread.performLaunchActivity(ActivityThread.java:16
E 02-02 14:31:19.318  430  edu.uci.ics.luci.in AndroidRuntime     at android.app.ActivityThread.handleLaunchActivity(ActivityThread.java:166
E 02-02 14:31:19.318  430  edu.uci.ics.luci.in AndroidRuntime     at android.app.ActivityThread.access$1500(ActivityThread.java:117)
E 02-02 14:31:19.318  430  edu.uci.ics.luci.in AndroidRuntime     at android.app.ActivityThread$H.handleMessage(ActivityThread.java:931)
E 02-02 14:31:19.318  430  edu.uci.ics.luci.in AndroidRuntime     at android.os.Handler.dispatchMessage(Handler.java:99)
E 02-02 14:31:19.318  430  edu.uci.ics.luci.in AndroidRuntime     at android.os.Looper.loop(Looper.java:130)
E 02-02 14:31:19.318  430  edu.uci.ics.luci.in AndroidRuntime     at android.app.ActivityThread.main(ActivityThread.java:3683)
E 02-02 14:31:19.318  430  edu.uci.ics.luci.in AndroidRuntime     at java.lang.reflect.Method.invokeNative(Native Method)
E 02-02 14:31:19.318  430  edu.uci.ics.luci.in AndroidRuntime     at java.lang.reflect.Method.invoke(Method.java:507)
E 02-02 14:31:19.318  430  edu.uci.ics.luci.in AndroidRuntime     at com.android.internal.os.ZygoteInit$MethodAndArgsCaller.run(ZygoteInit.j
E 02-02 14:31:19.318  430  edu.uci.ics.luci.in AndroidRuntime     at com.android.internal.os.ZygoteInit.main(ZygoteInit.java:597)
E 02-02 14:31:19.318  430  edu.uci.ics.luci.in AndroidRuntime     at dalvik.system.NativeStart.main(Native Method)
E 02-02 14:31:19.318  430  edu.uci.ics.luci.in AndroidRuntime Caused by: java.lang.NumberFormatException: unable to parse 'Preferences table
E 02-02 14:31:19.318  430  edu.uci.ics.luci.in AndroidRuntime     at java.lang.Integer.parse(Integer.java:383)
E 02-02 14:31:19.318  430  edu.uci.ics.luci.in AndroidRuntime     at java.lang.Integer.parseInt(Integer.java:372)
E 02-02 14:31:19.318  430  edu.uci.ics.luci.in AndroidRuntime     at java.lang.Integer.parseInt(Integer.java:332)
E 02-02 14:31:19.318  430  edu.uci.ics.luci.in AndroidRuntime     at org.openintents.sensorsimulator.hardware.SensorSimulatorClient.connect(
E 02-02 14:31:19.318  430  edu.uci.ics.luci.in AndroidRuntime     at org.openintents.sensorsimulator.hardware.SensorManagerSimulator.connect
E 02-02 14:31:19.318  430  edu.uci.ics.luci.in AndroidRuntime     at edu.uci.ics.luci.inf241.BlackboardActivity.onCreate(BlackboardActivity.
E 02-02 14:31:19.318  430  edu.uci.ics.luci.in AndroidRuntime     at android.app.Instrumentation.callActivityOnCreate(Instrumentation.java:1
E 02-02 14:31:19.318  430  edu.uci.ics.luci.in AndroidRuntime     at android.app.ActivityThread.performLaunchActivity(ActivityThread.java:16
E 02-02 14:31:19.318  430  edu.uci.ics.luci.in AndroidRuntime     ... 11 more
```



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