Programming

Christopher League
30 November 2011

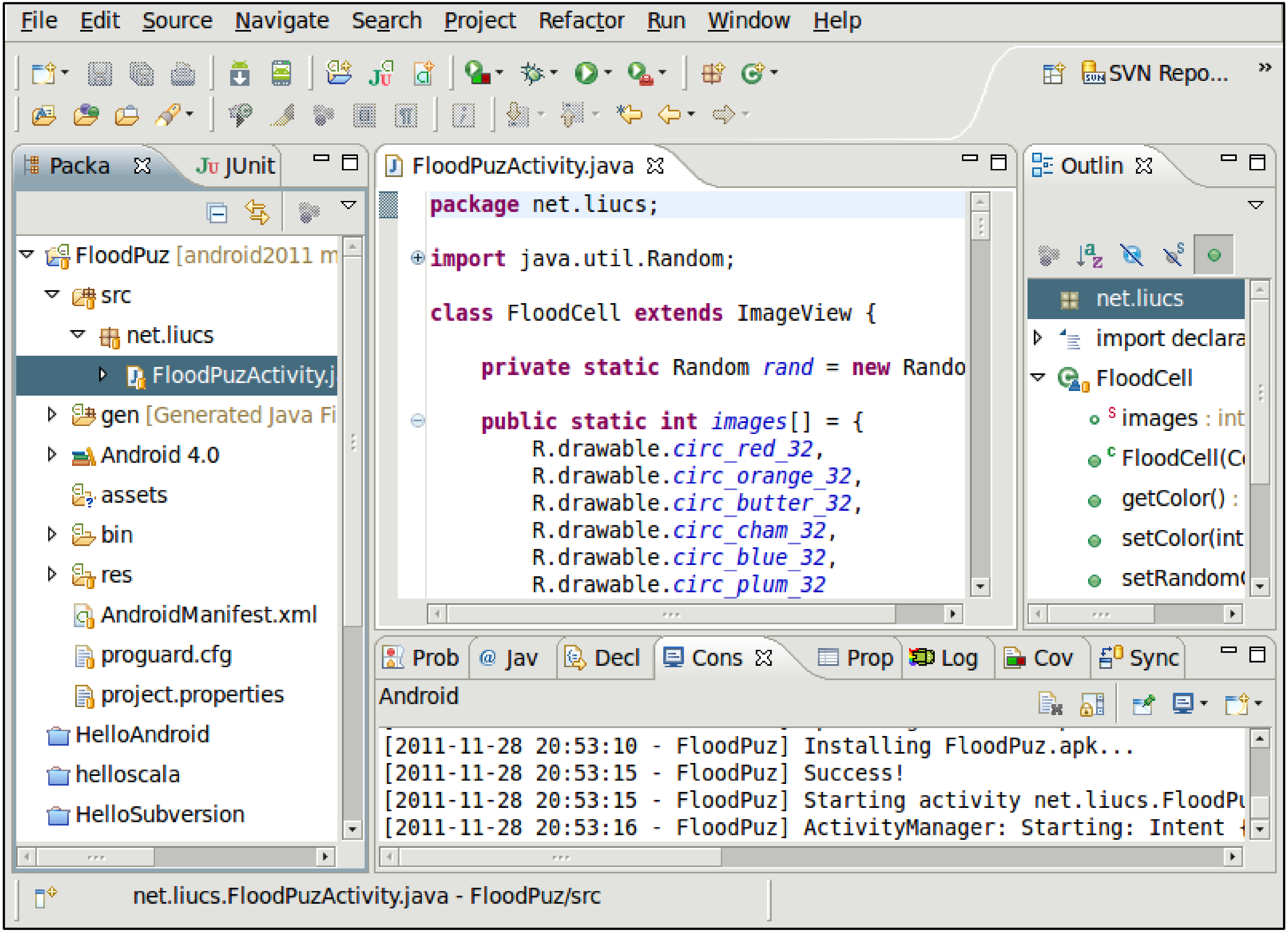
Links for later

- eclipse.org/
  Integrated Development Environment for Java
- developer.android.com/
  Complete developer’s guide and reference
- slidesha.re/soQgoZ
  These slides
- github.com/league/android2011/
  Source code for my sample apps

Teach Yourself Java in 21 seconds

- All code is in the context of a *class*
- Class can contain fields, methods, *inner* classes
- *Static* pertains to class itself, not every object
- All objects are references, and can be *null*
- *Inherit* and *override* methods from base classes
- *Import* classes from library packages
- The rest is mostly the same as C/C++/C#
- Beginners should use an IDE, such as *Eclipse*

Eclipse



```
package net.liucs;

import java.util.Random;

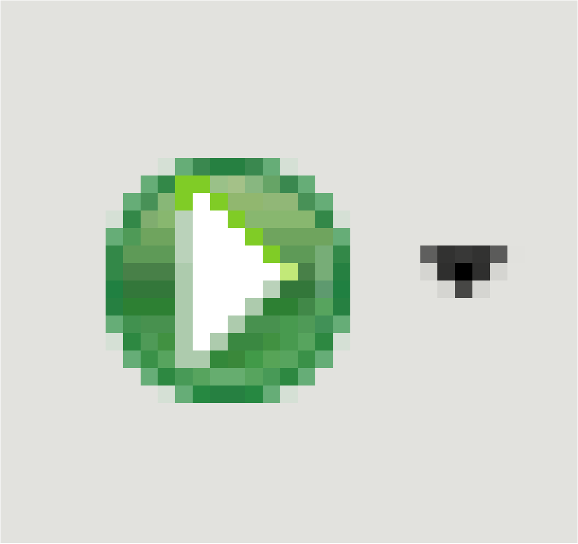
class FloodCell extends ImageView {

    private static Random rand = new Rando

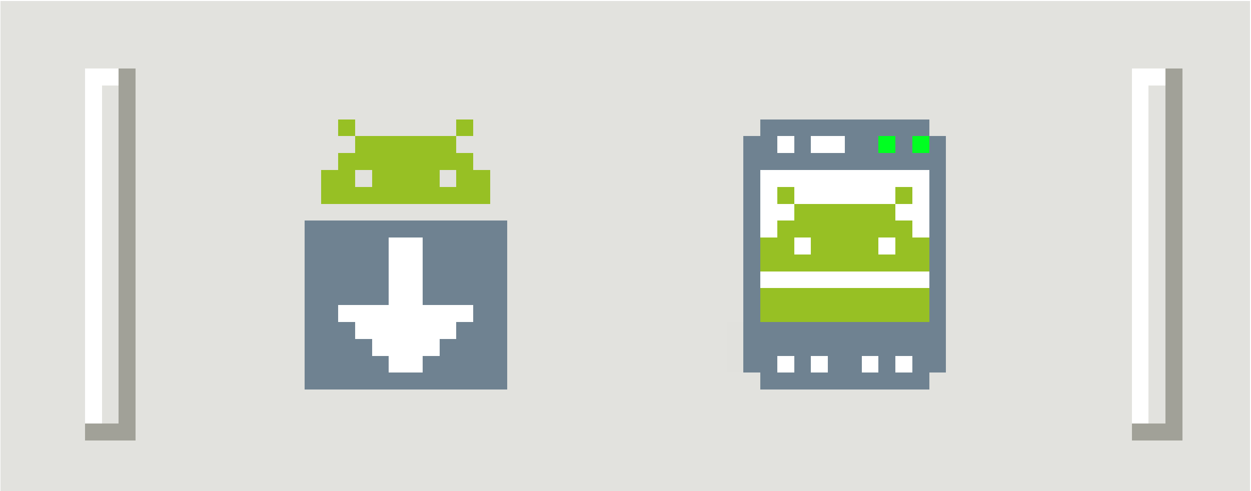
    public static int images[] = {
        R.drawable.circ_red_32,
        R.drawable.circ_orange_32,
        R.drawable.circ_butter_32,
        R.drawable.circ_cham_32,
        R.drawable.circ_blue_32,
        R.drawable.circ_plum_32
```

```
[2011-11-28 20:53:10 - FloodPuz] Installing FloodPuz.apk...
[2011-11-28 20:53:15 - FloodPuz] Success!
[2011-11-28 20:53:15 - FloodPuz] Starting activity net.liucs.FloodPu
[2011-11-28 20:53:16 - FloodPuz] ActivityManager: Starting: Intent {
```

Eclipse toolbar



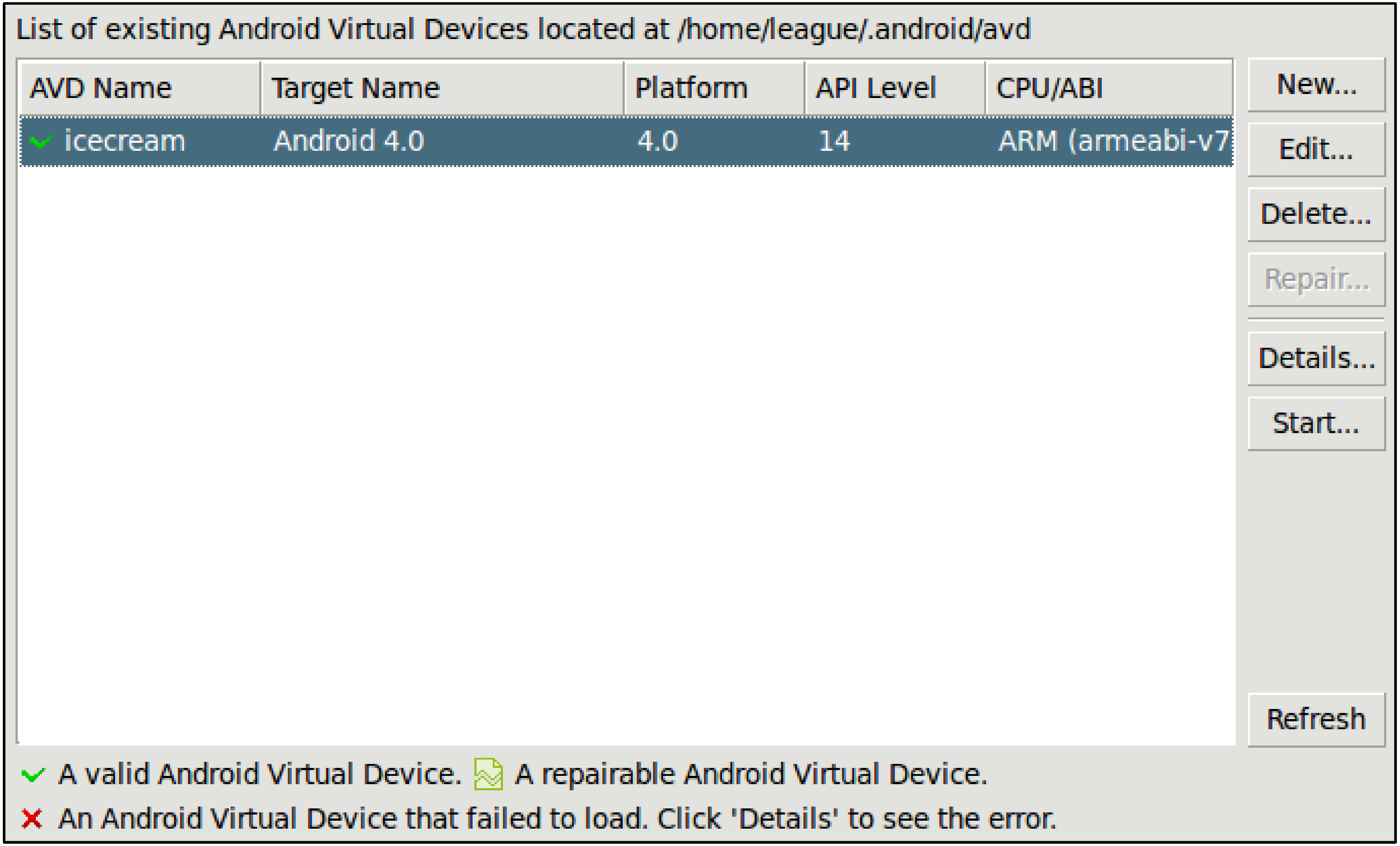
Run » Run
(Ctrl+F11)



Android SDK
Manager

Android Virtual
Device Manager

AVD, AVD, wherefore art thee?

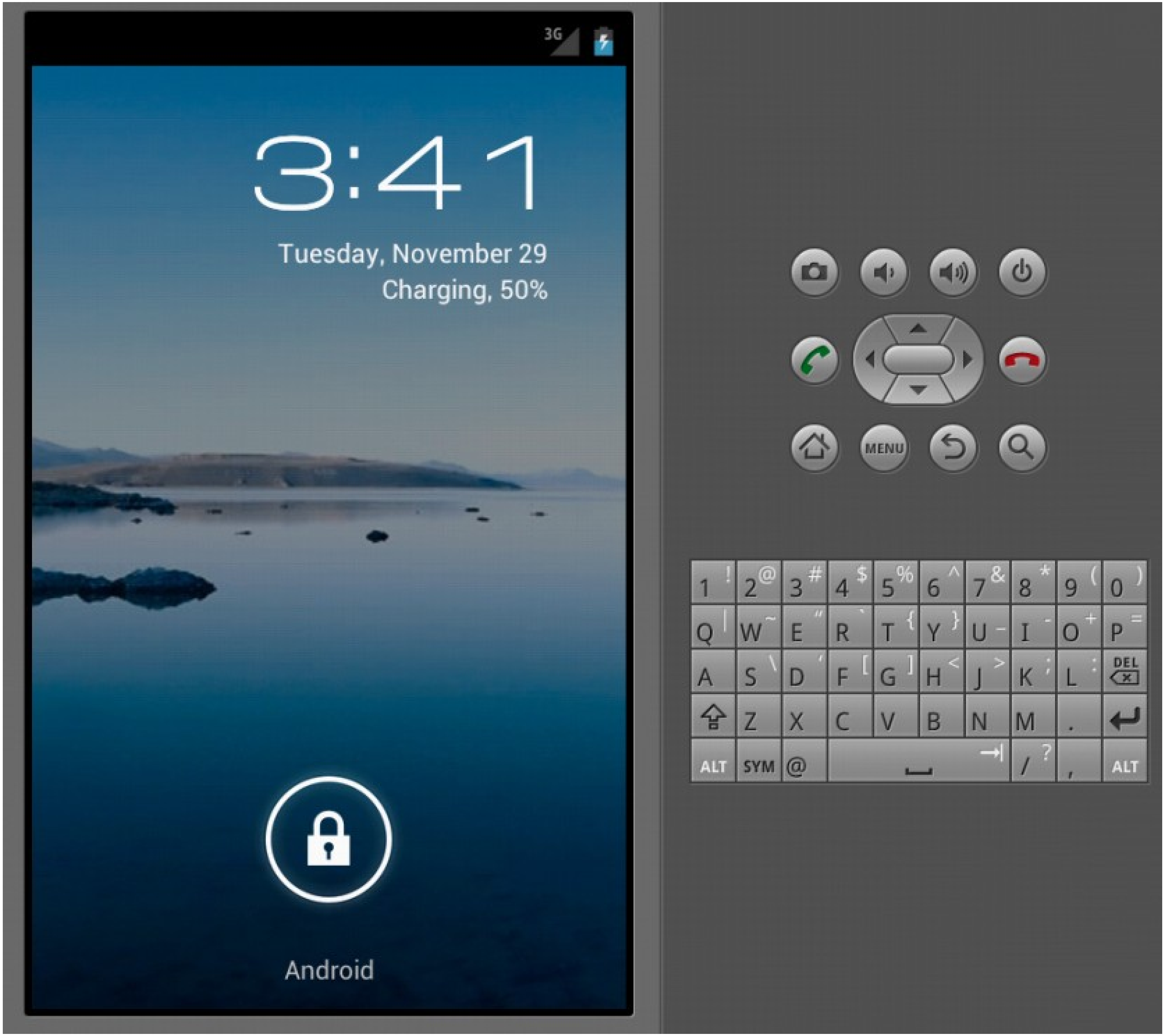


List of existing Android Virtual Devices located at /home/league/.android/avd

AVD Name	Target Name	Platform	API Level	CPU/ABI
✓ icecream	Android 4.0	4.0	14	ARM (armeabi-v7

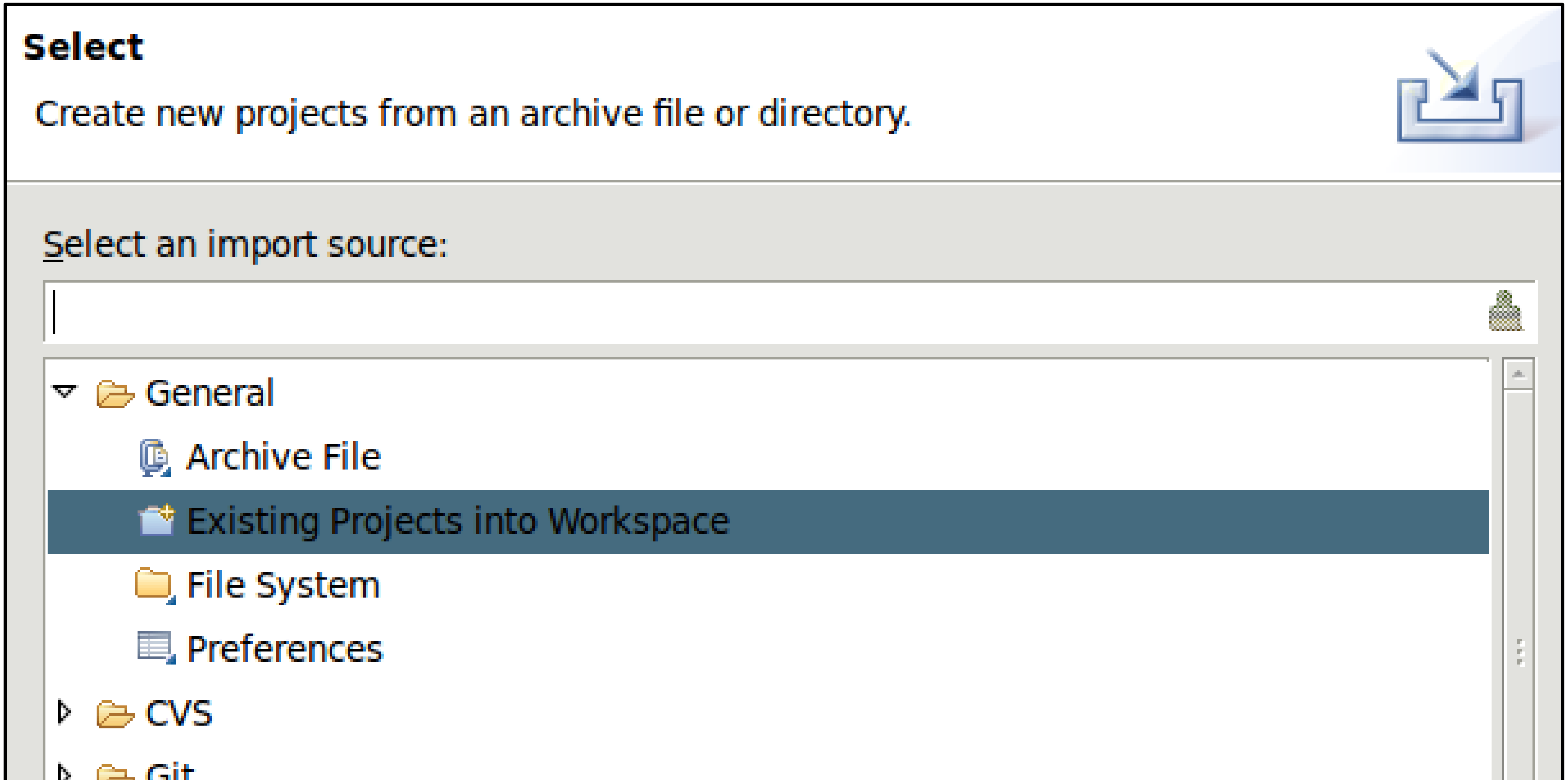
✓ A valid Android Virtual Device. A repairable Android Virtual Device.

✗ An Android Virtual Device that failed to load. Click 'Details' to see the error.


3G
3:41
Tuesday, November 29
Charging, 50%
Android
MENU
ALT
SYM
DEL
ALT

Importing an Eclipse project

- Download: http://bit.ly/liu-android-zip
- Eclipse menu: File » Import
- Import source: General » Existing Projects



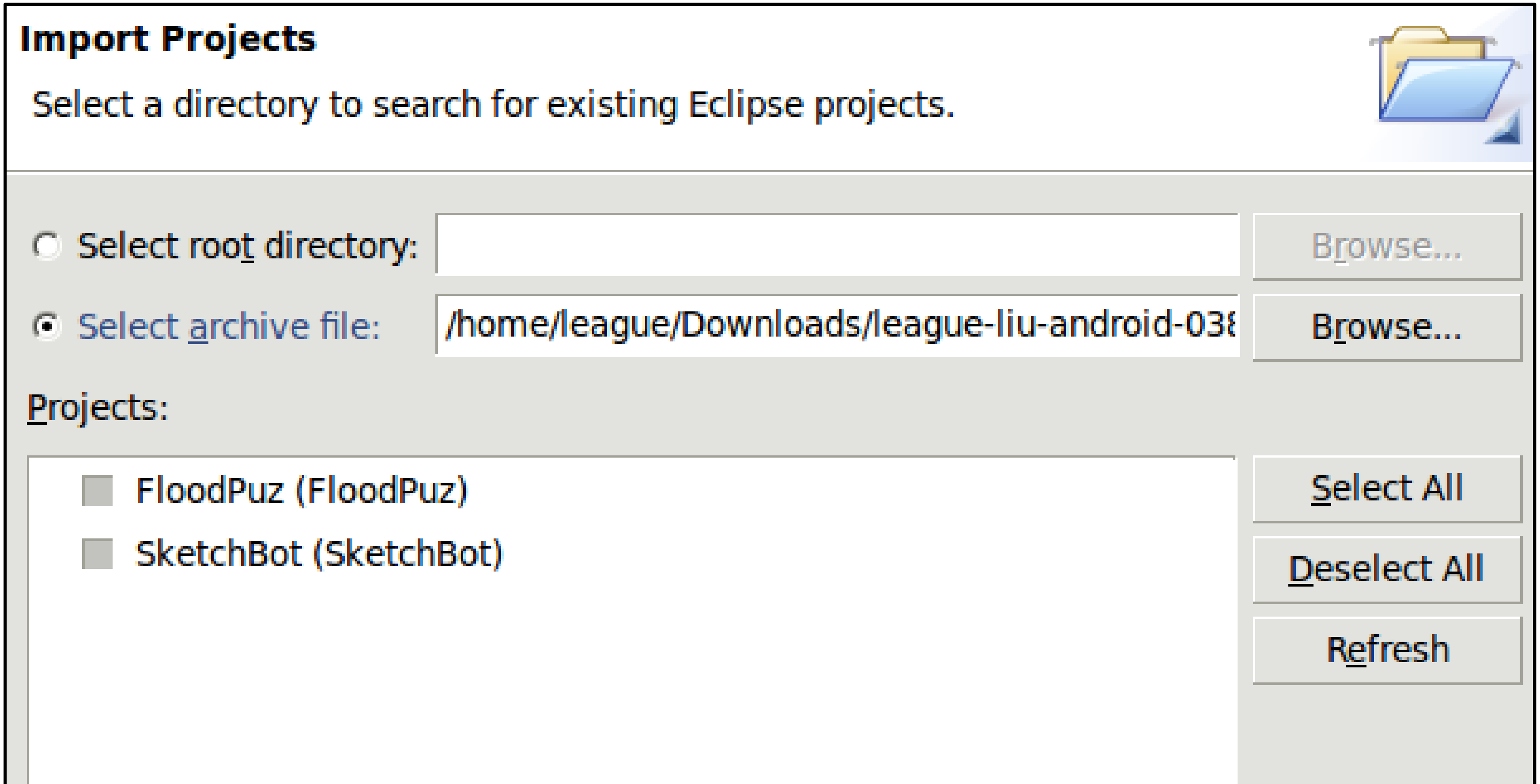
Select

Create new projects from an archive file or directory.

Select an import source:

Importing an Eclipse project

- Select archive file: browse to downloaded league-liu-android-blahblah.zip
- Select all; Finish



Import Projects

Select a directory to search for existing Eclipse projects.

○ Select root directory: Browse...

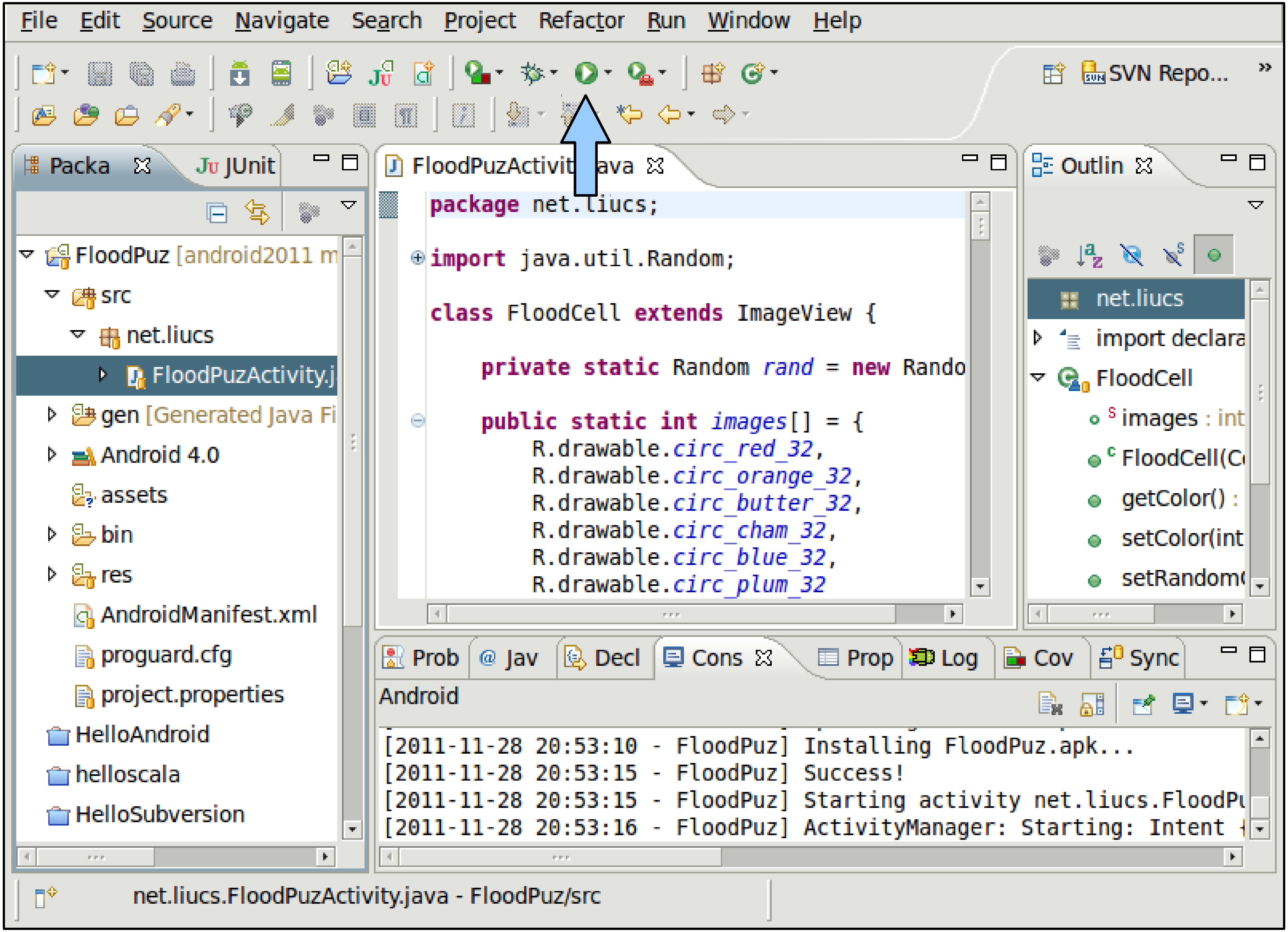
● Select archive file: /home/league/Downloads/league-liu-android-03 Browse...

Projects:

□ FloodPuz (FloodPuz)

□ SketchBot (SketchBot)

open FloodPuz » FloodPuzActivity



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        R.drawable.circ_cham_32,
        R.drawable.circ_blue_32,
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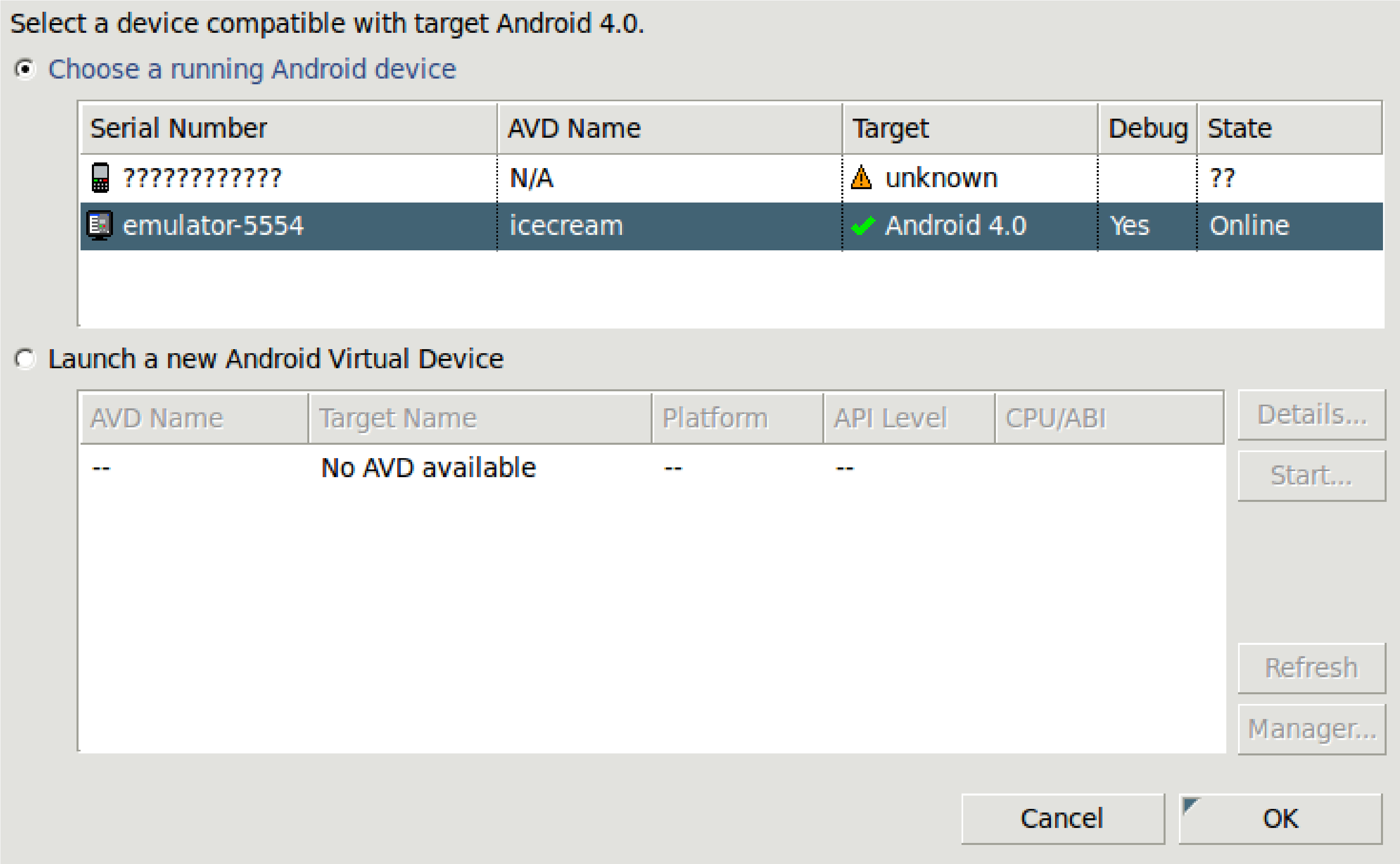
```

Run, select device



Select a device compatible with target Android 4.0.

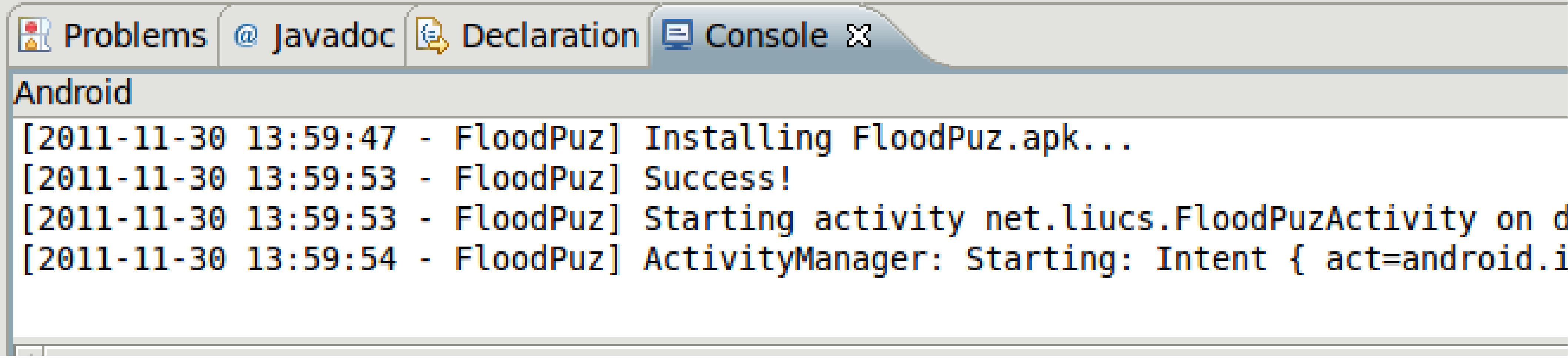
● Choose a running Android device

Serial Number	AVD Name	Target	Debug	State
????????????	N/A	⚠ unknown		??
emulator-5554	icecream	✓ Android 4.0	Yes	Online

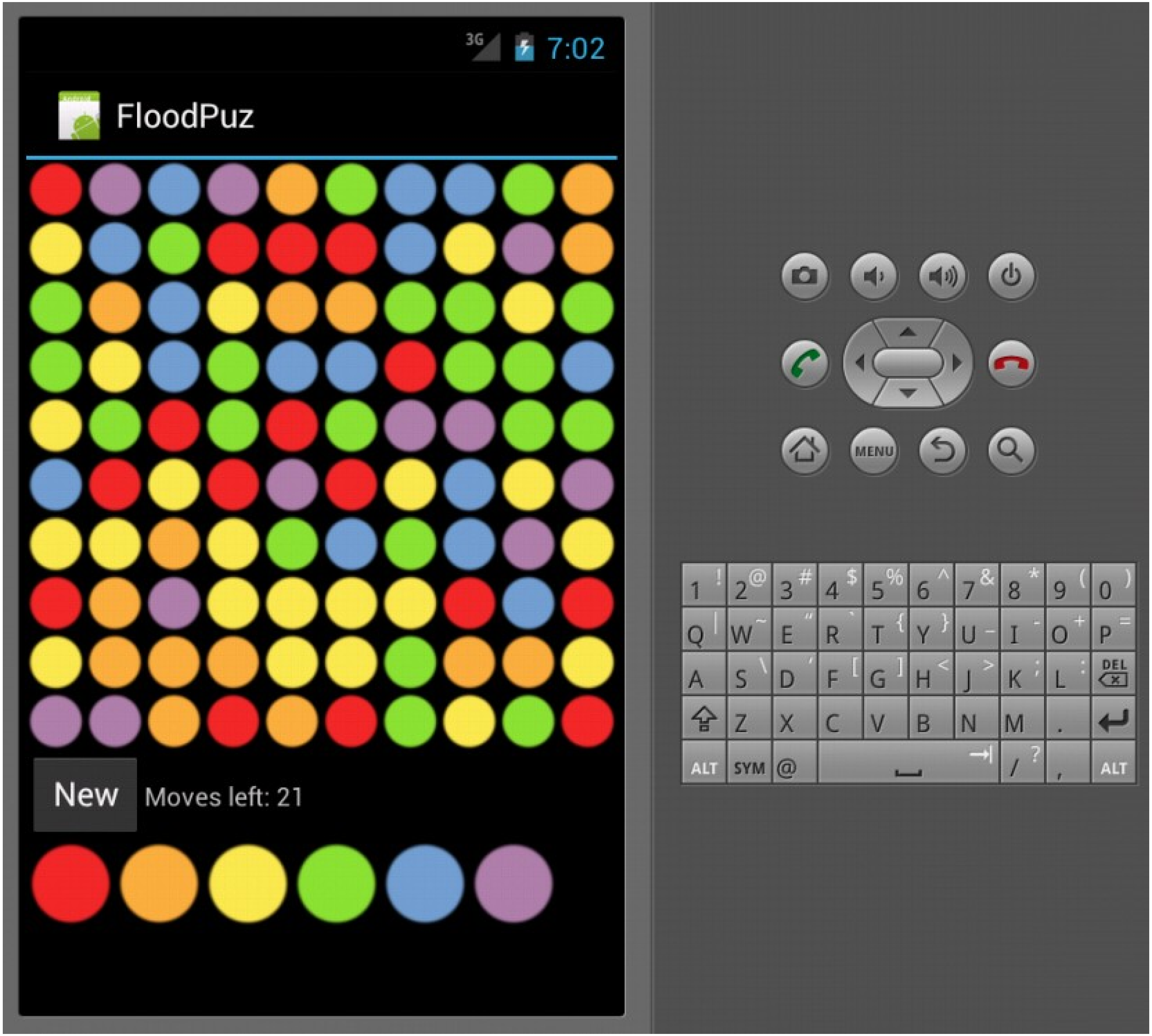
○ Launch a new Android Virtual Device

AVD Name	Target Name	Platform	API Level	CPU/ABI
--	No AVD available	--	--	

Check progress in console



```
[2011-11-30 13:59:47 - FloodPuz] Installing FloodPuz.apk...
[2011-11-30 13:59:53 - FloodPuz] Success!
[2011-11-30 13:59:53 - FloodPuz] Starting activity net.liucs.FloodPuzActivity on d
[2011-11-30 13:59:54 - FloodPuz] ActivityManager: Starting: Intent { act=android.i
```

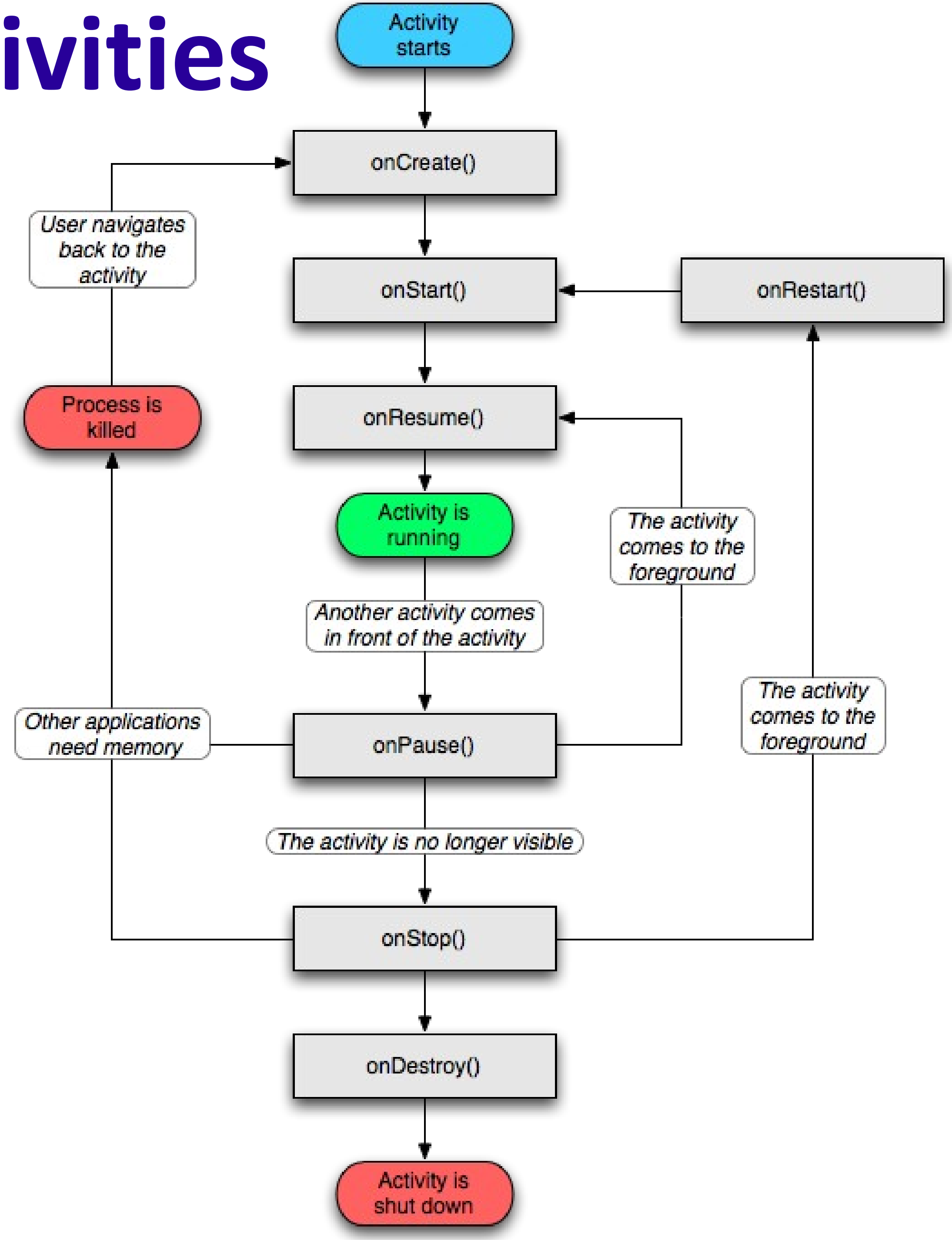


FloodPuz

Moves left: 21

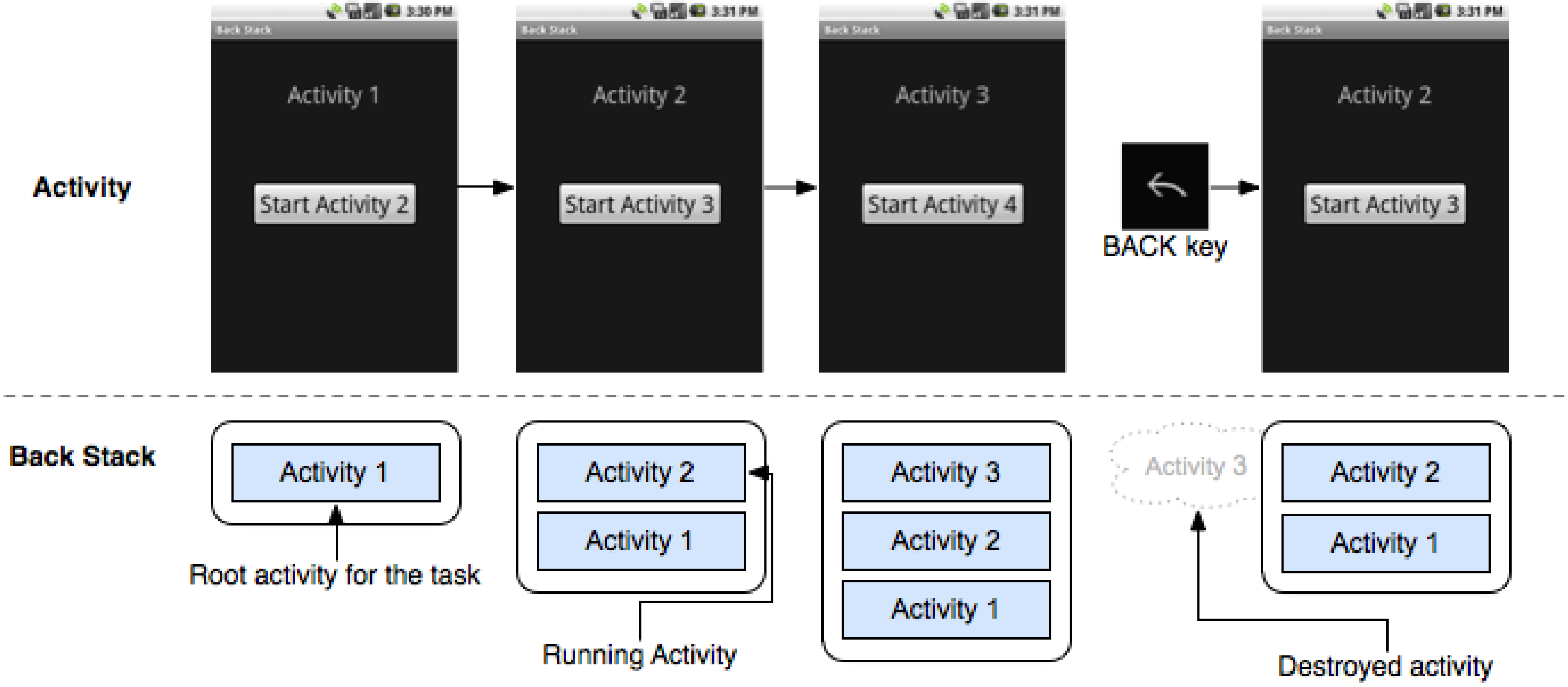
Activities

- Roughly:
  each UI screen
  in your app
  is an *activity*

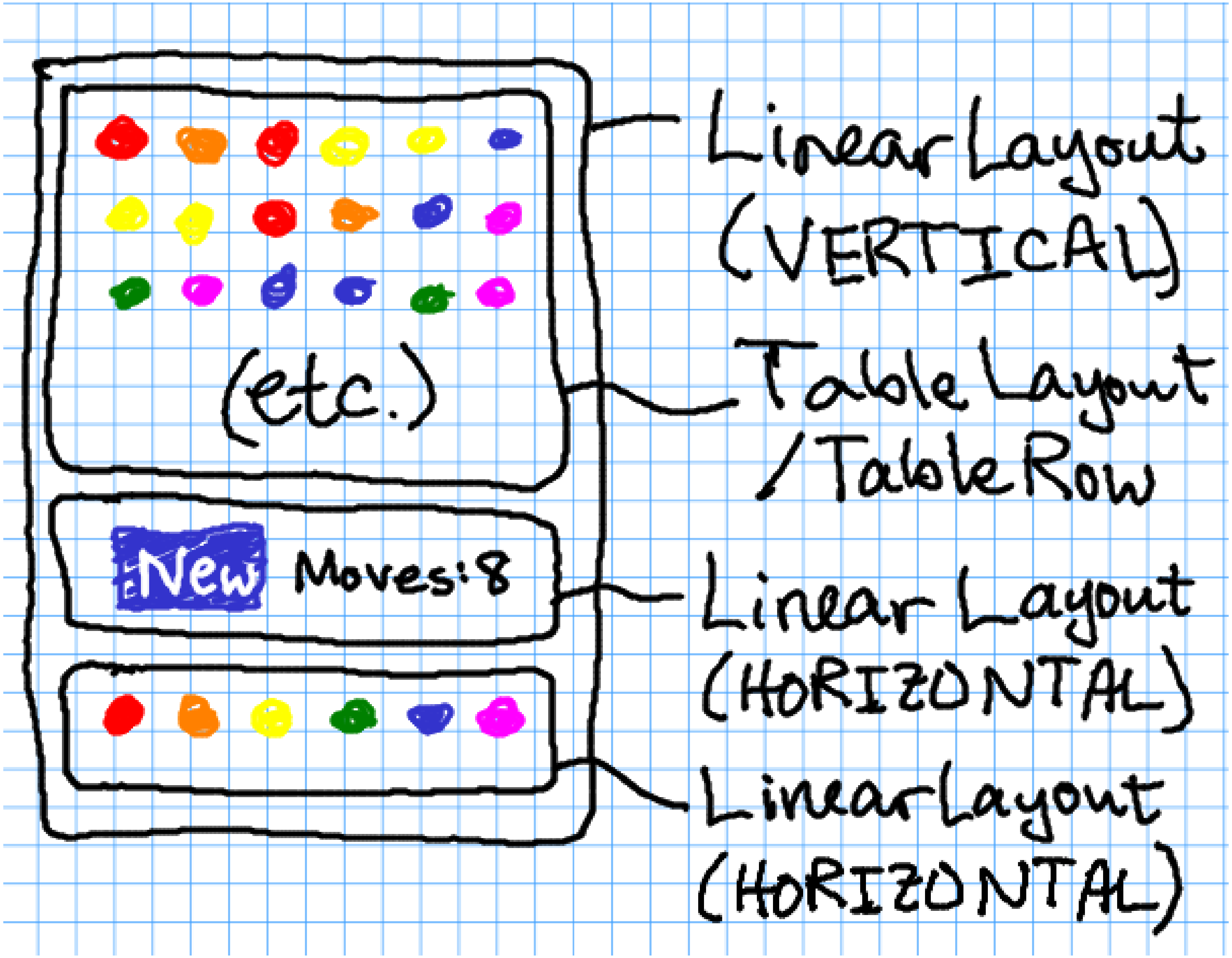

Activity starts
onCreate()
User navigates back to the activity
onStart()
onRestart()
Process is killed
onResume()
Activity is running
The activity comes to the foreground
Another activity comes in front of the activity
The activity comes to the foreground
Other applications need memory
onPause()
The activity is no longer visible
onStop()
onDestroy()
Activity is shut down

Activities

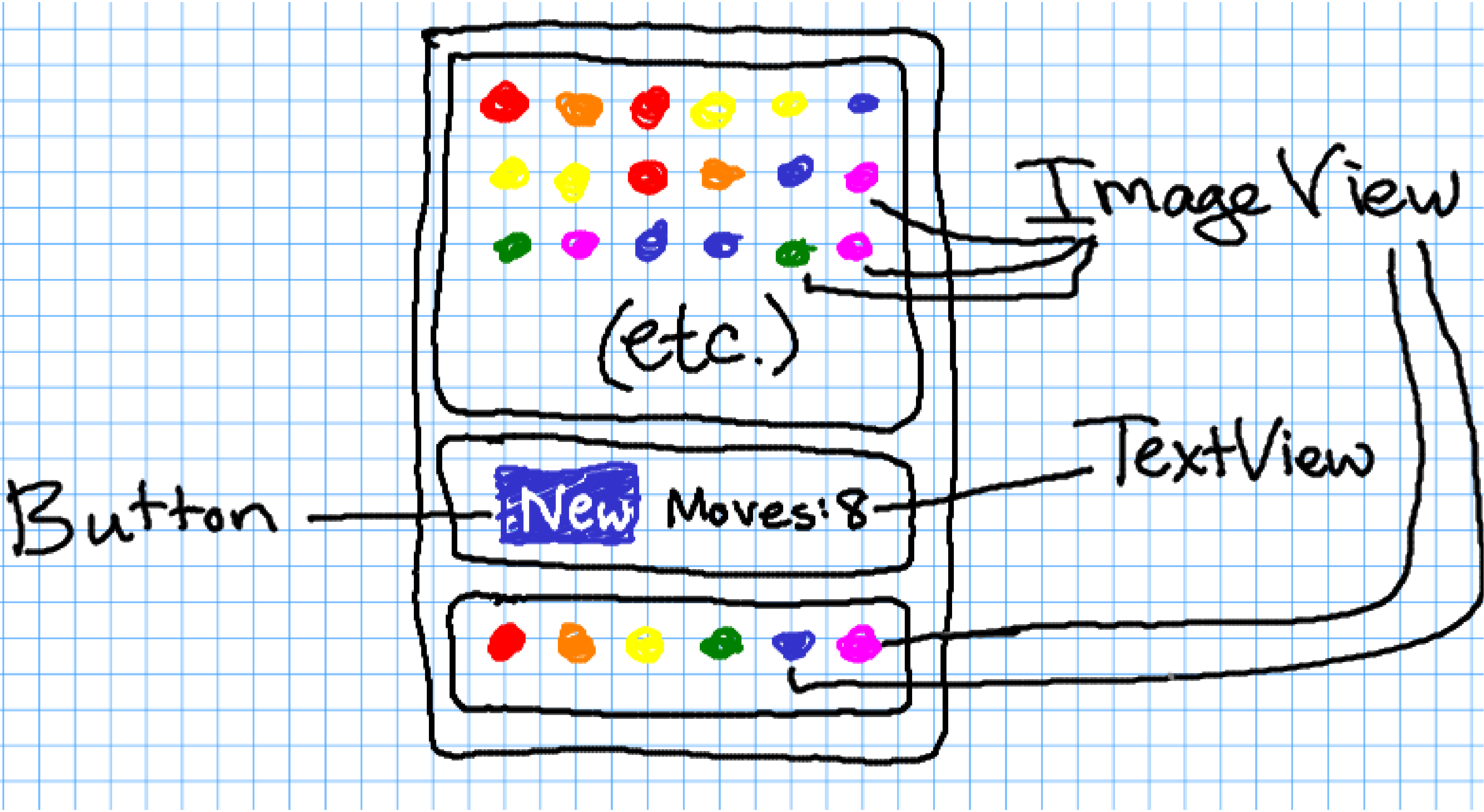
- Multiple activities sequenced using *back stack*



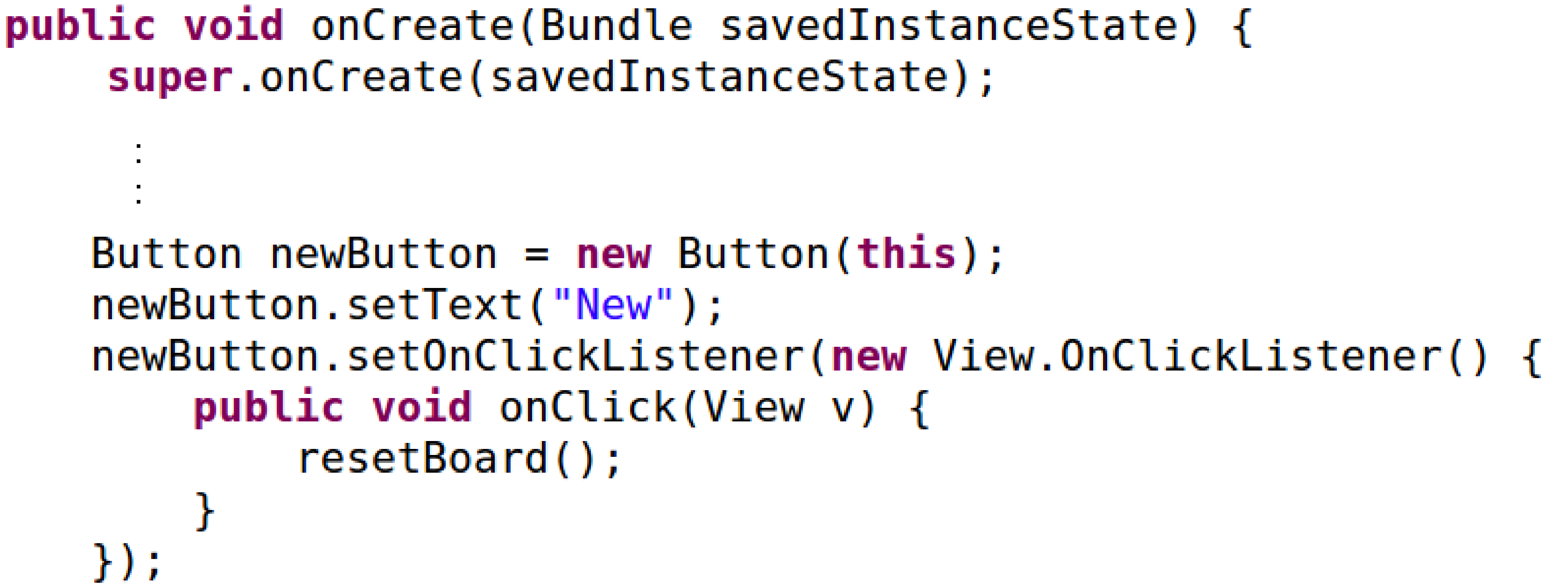
Layouts, views, & widgets



Layouts, views, & widgets



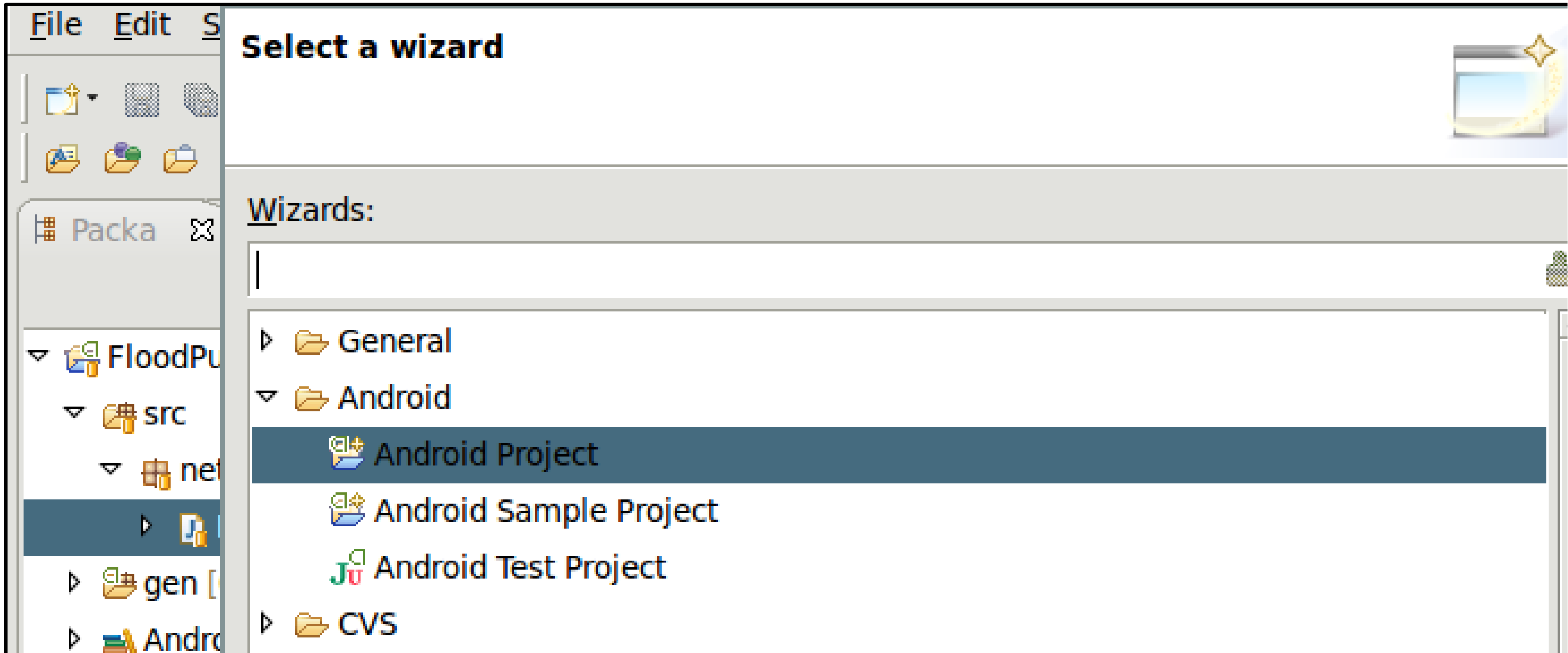
Event-based programming



```
public void onCreate(Bundle savedInstanceState) {
    super.onCreate(savedInstanceState);
     :
     :
    Button newButton = new Button(this);
    newButton.setText("New");
    newButton.setOnClickListener(new View.OnClickListener() {
        public void onClick(View v) {
            resetBoard();
        }
    });
```

Starting a new project

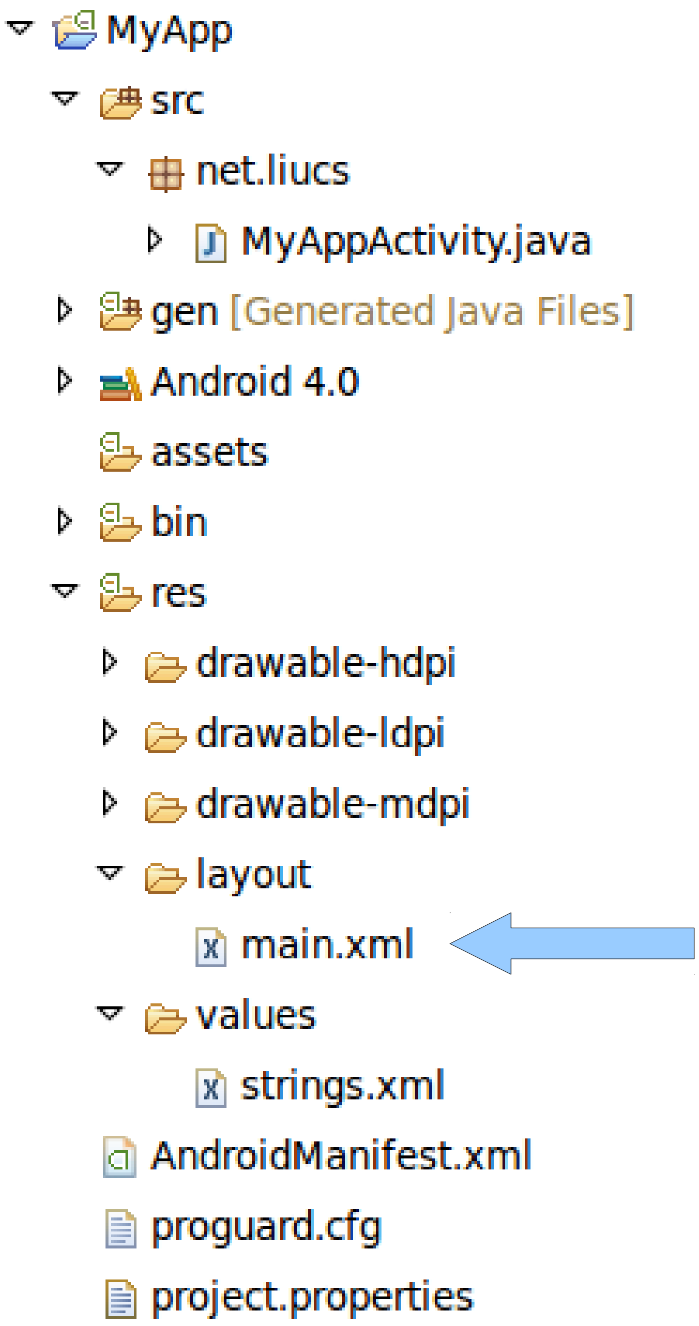
- File » New » Project
- Android » Android Project (Next)
- Project name: MyApp (Next)
- Target: Android 4.0 (Next)
- Package name: net.liucs (Next)
- Finish



Select a wizard

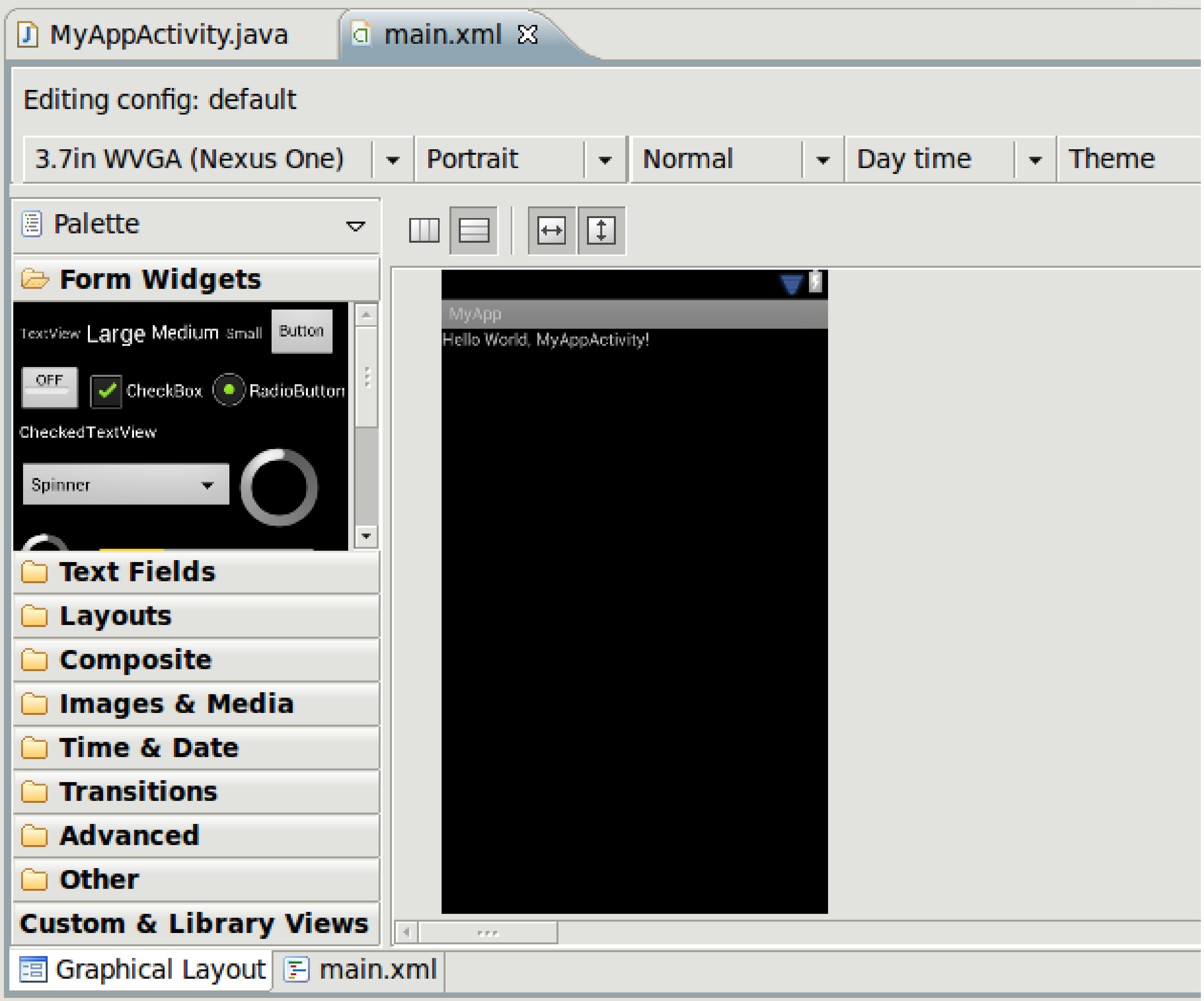
Wizards:

Initial files



```
▽ MyApp
    ▽ src
        ▽ net.liucs
            ▷ MyAppActivity.java
    ▷ gen [Generated Java Files]
    ▷ Android 4.0
      assets
    ▷ bin
    ▽ res
        ▷ drawable-hdpi
        ▷ drawable-ldpi
        ▷ drawable-mdpi
        ▽ layout
              main.xml
        ▽ values
              strings.xml
      AndroidManifest.xml
      proguard.cfg
      project.properties
```

XML Layout editor



Editing config: default

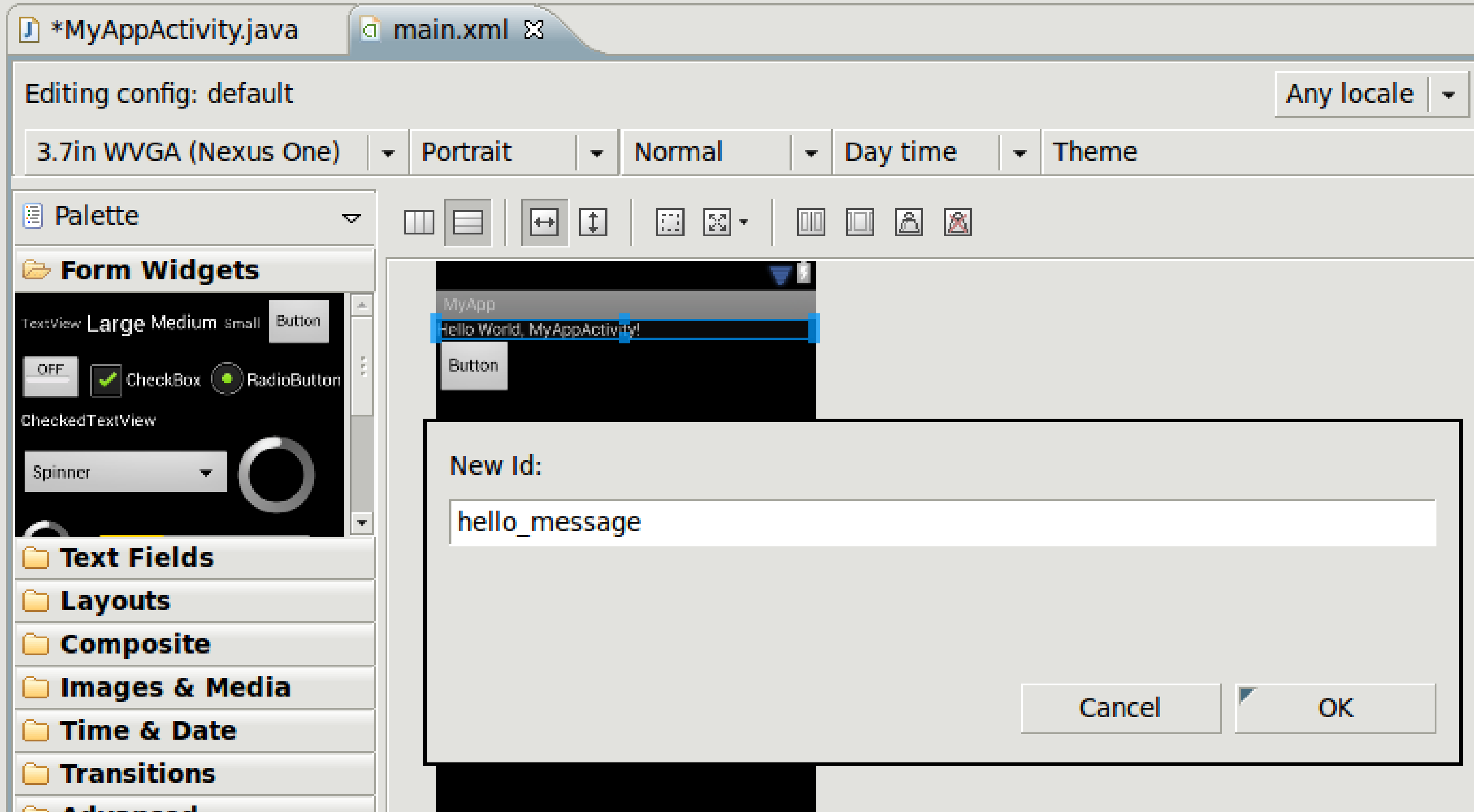
3.7in WVGA (Nexus One) | Portrait | Normal | Day time | Theme

MyApp

Hello World, MyAppActivity!

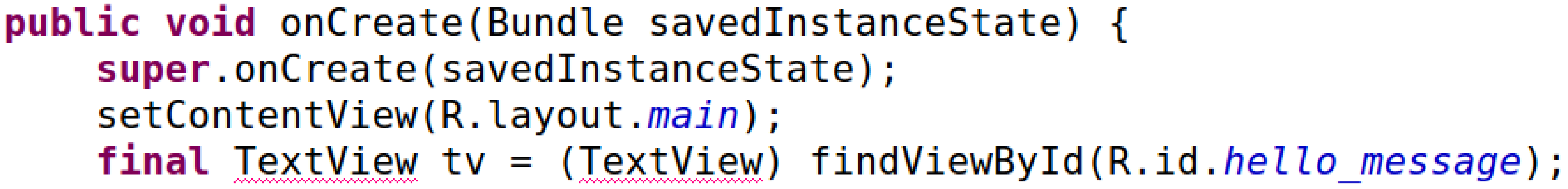
XML Layout editor

- Drag a button onto the layout
- Right-click “hello” text, edit ID



New Id: hello_message

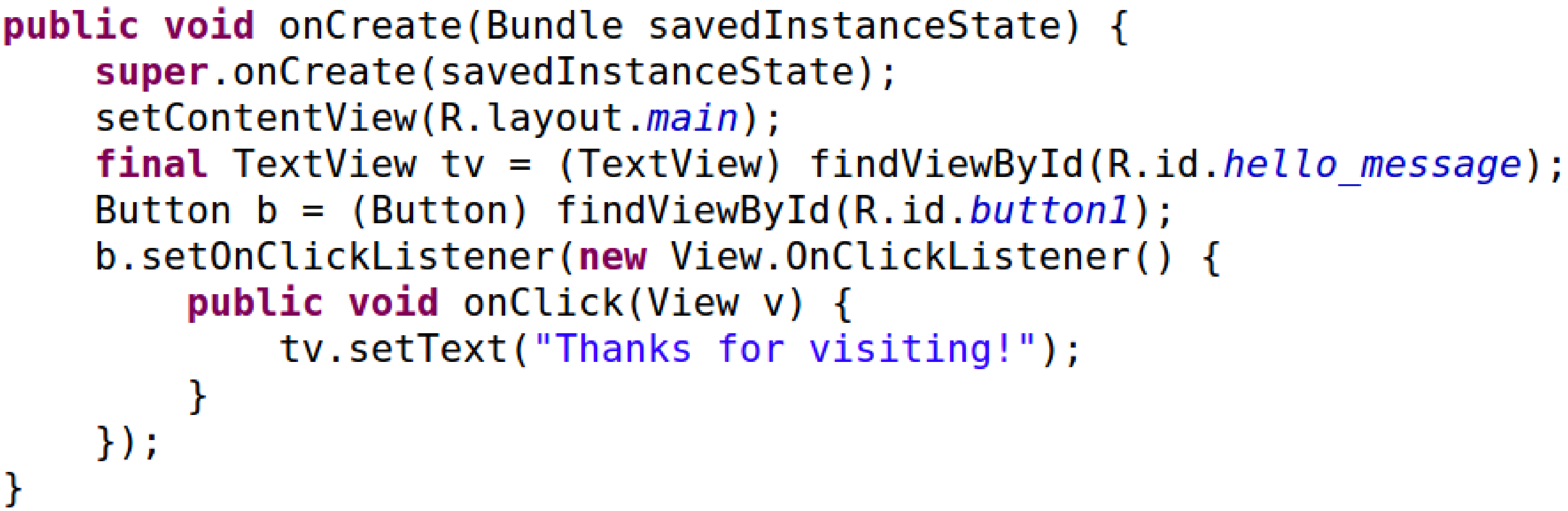
Access widgets in Java code



```
public void onCreate(Bundle savedInstanceState) {
    super.onCreate(savedInstanceState);
    setContentView(R.layout.main);
    final TextView tv = (TextView) findViewById(R.id.hello_message);
```

Source » Organize Imports (Ctrl+Shift+O) to fix

Access widgets in Java code



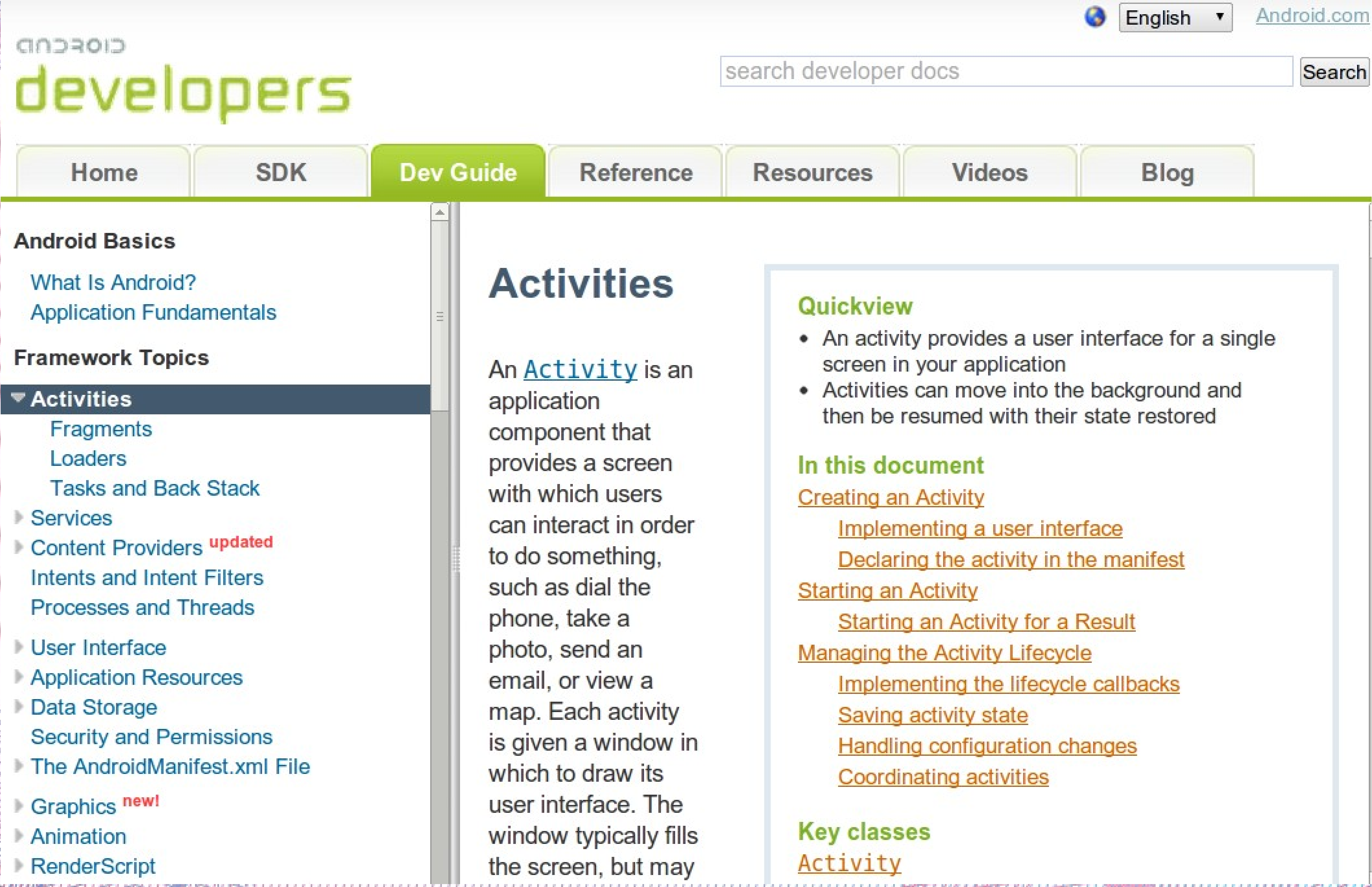
```java
public void onCreate(Bundle savedInstanceState) {
    super.onCreate(savedInstanceState);
    setContentView(R.layout.main);
    final TextView tv = (TextView) findViewById(R.id.hello_message);
    Button b = (Button) findViewById(R.id.button1);
    b.setOnClickListener(new View.OnClickListener() {
        public void onClick(View v) {
            tv.setText("Thanks for visiting!");
        }
    });
}
```

Or, get this code at
https://gist.github.com/1410641

Next steps

- Try to extend my projects, especially *SketchBot*
- Additional colors
- Draw shapes instead of just lines
- Save drawing across application switch

Docs are your friends



Android Basics

What Is Android?
Application Fundamentals

Framework Topics

Activities
Fragments
Loaders
Tasks and Back Stack
Services
Content Providers updated
Intents and Intent Filters
Processes and Threads

User Interface
Application Resources
Data Storage
Security and Permissions
The AndroidManifest.xml File

Graphics new!
Animation
RenderScript

Activities

An `Activity` is an application component that provides a screen with which users can interact in order to do something, such as dial the phone, take a photo, send an email, or view a map. Each activity is given a window in which to draw its user interface. The window typically fills the screen, but may

Quickview

- An activity provides a user interface for a single screen in your application
- Activities can move into the background and then be resumed with their state restored

In this document

Creating an Activity
    Implementing a user interface
    Declaring the activity in the manifest
Starting an Activity
    Starting an Activity for a Result
Managing the Activity Lifecycle
    Implementing the lifecycle callbacks
    Saving activity state
    Handling configuration changes
    Coordinating activities

Key classes

`Activity`