Android Development

Capstone Project

https://goo.gl/Xh1NZG

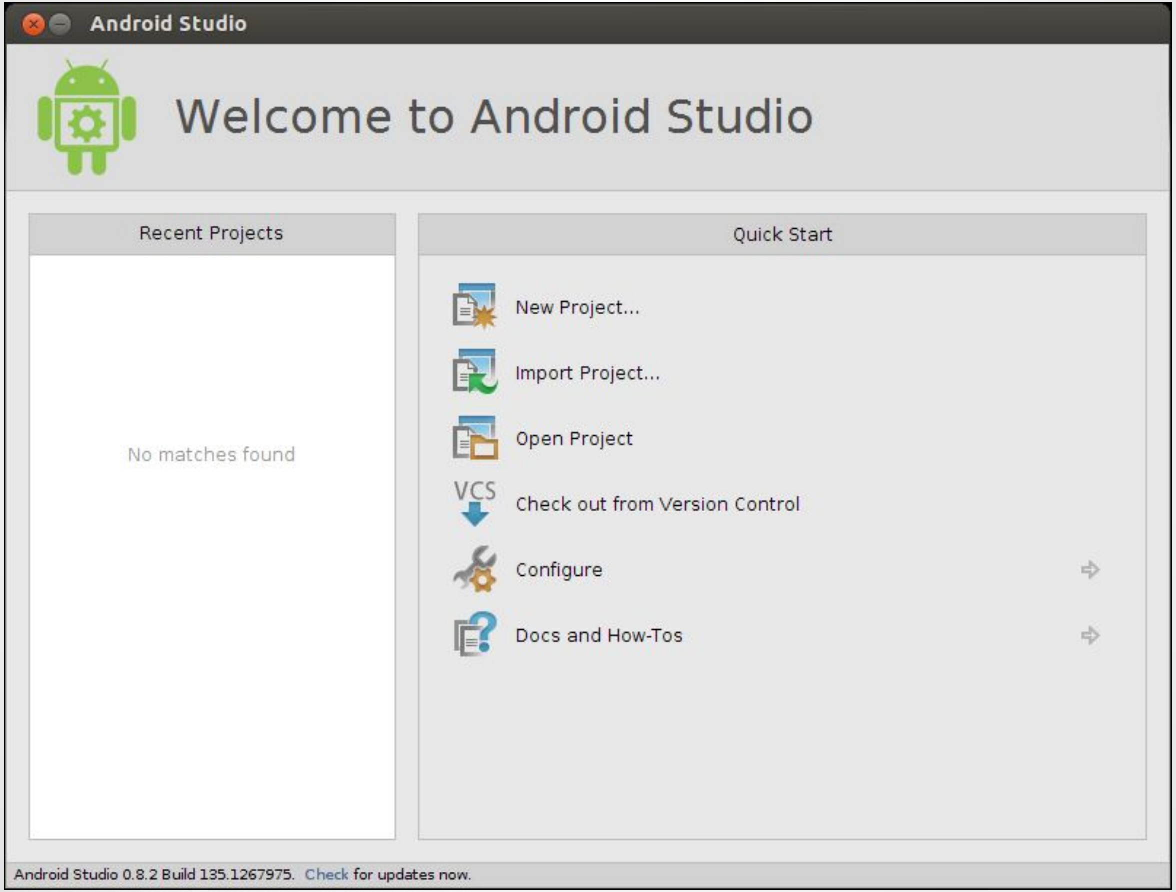
Standard Android Development

- Android Apps are written in Java using:
    - Android runtime core libraries (android.jar):
        - Java libraries developed solely for Android
        - A large subset of open source Java SE libraries
    - Additional libraries in Android SDK from Google & other device manufacturers (Google Play Services)
    - Third-party libraries downloaded from elsewhere (Picasso)

Android Development Environment

- Android Studio + Android SDK
  - Android Studio (currently v3.2.1)
    - http://d.android.com/sdk/installing/studio.html
  - Android SDK (included in the download of Android Studio)

Android Studio



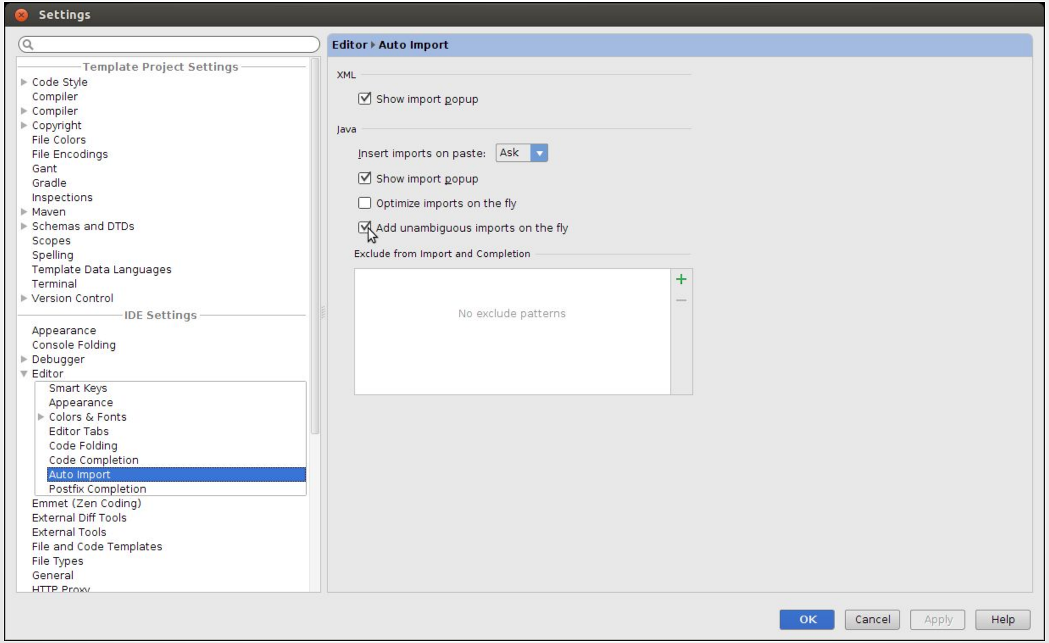
Android Studio

Welcome to Android Studio

Android Studio 0.8.2 Build 135.1267975. Check for updates now.

Configure Android Studio

- Configure → Settings → Editor → General → Auto Import → Add unambiguous imports on the fly



Settings

Editor ▸ Auto Import

XML

☑ Show import popup

Java

Insert imports on paste: Ask

☑ Show import popup

☐ Optimize imports on the fly

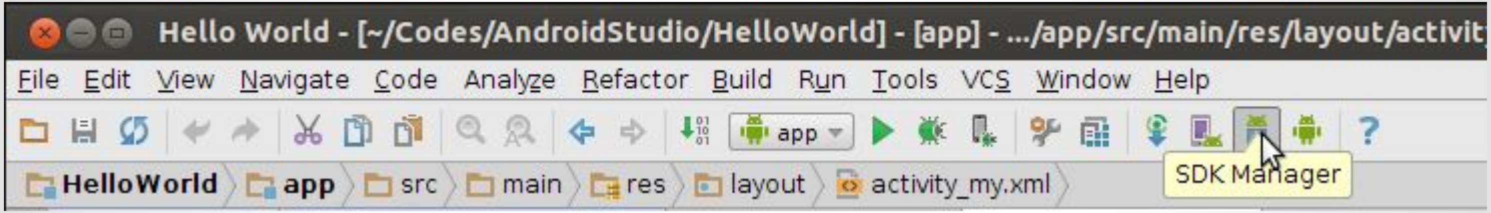
☑ Add unambiguous imports on the fly

Exclude from Import and Completion

No exclude patterns

Android SDK

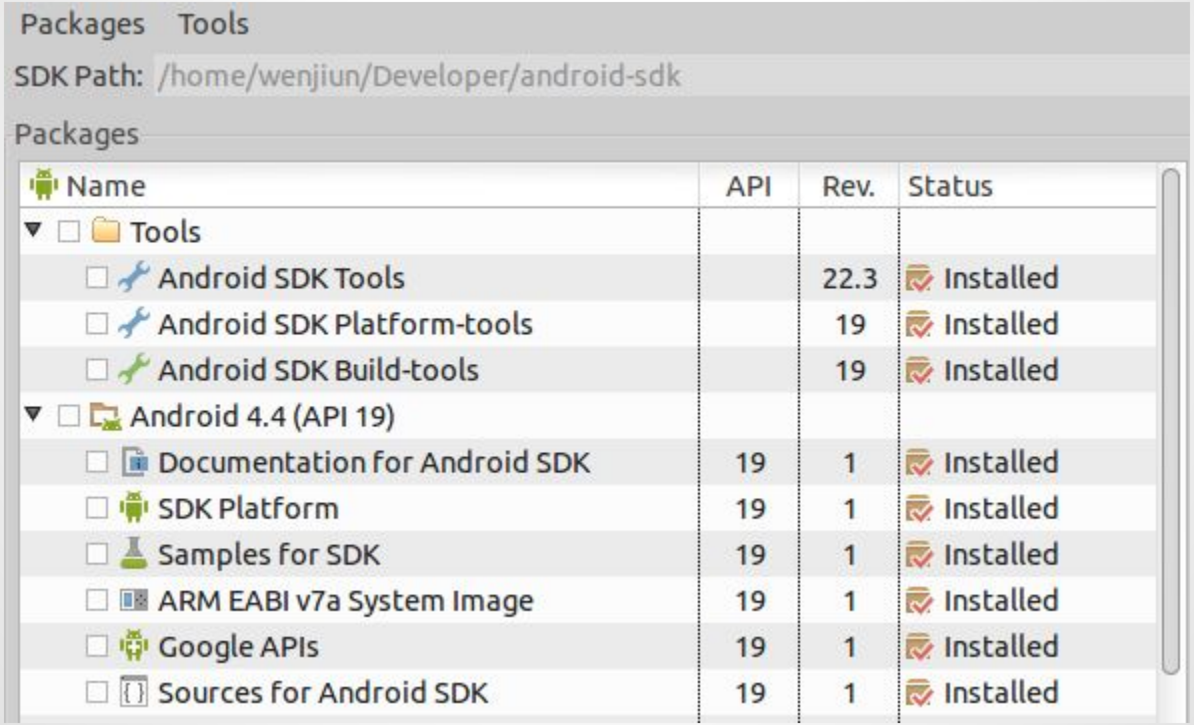
- Install & update in Android Studio



Hello World - [~/Codes/AndroidStudio/HelloWorld] - [app] - .../app/src/main/res/layout/activit
File Edit View Navigate Code Analyze Refactor Build Run Tools VCS Window Help
app
SDK Manager
HelloWorld
app
src
main
res
layout
activity_my.xml

Android SDK

- Install & update in Android Studio



SDK Path: /home/wenjiun/Developer/android-sdk

Packages

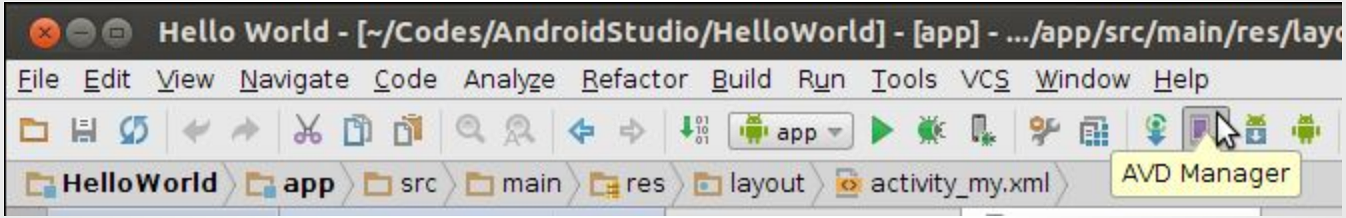
Name	API	Rev.	Status
▼ □ Tools			
□ Android SDK Tools		22.3	Installed
□ Android SDK Platform-tools		19	Installed
□ Android SDK Build-tools		19	Installed
▼ □ Android 4.4 (API 19)			
□ Documentation for Android SDK	19	1	Installed
□ SDK Platform	19	1	Installed
□ Samples for SDK	19	1	Installed
□ ARM EABI v7a System Image	19	1	Installed
□ Google APIs	19	1	Installed
□ Sources for Android SDK	19	1	Installed

In Android SDK

- Core Libraries (platforms) – android.jar
- Extra Libraries (extras) – android-support-v4.jar, google-play-services.jar etc.
- Documentation (docs)
- Sample Codes (samples) – API Demos etc.
- Tools (tools, platform-tools)– Android Debug Bridge (adb), monitor, draw9patch, ProGuard, SQLite3 etc.
- Emulator (system-images) – Android Virtual Device (AVD)

Android Virtual Device (AVD)

- Emulator to test Android applications
- Created with AVD Manager

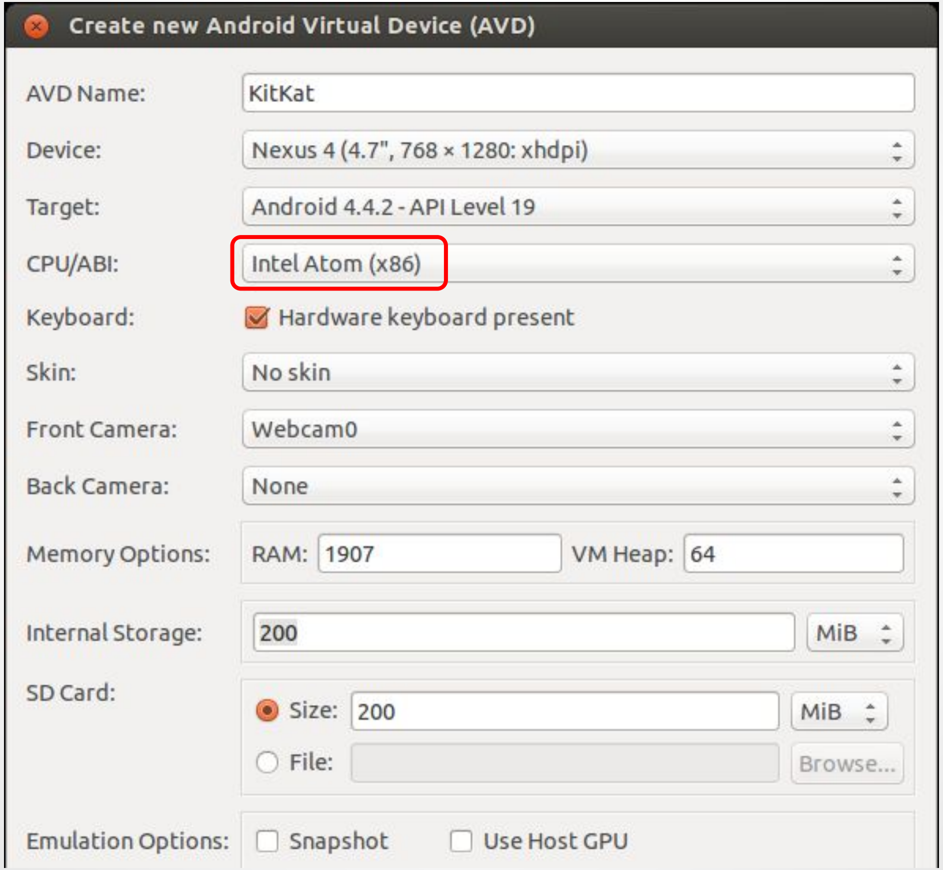


Hello World - [~/Codes/AndroidStudio/HelloWorld] - [app] - .../app/src/main/res/layo

Android Virtual Device (AVD)

- Download “Intel x86 Emulator Accelerator (HAXM installer)” in Android SDK Manager (inside Extras)
- Run the installer in <Android SDK Folder>\extras\intel\Hardware_Accelerated_Execution_Manager\
- Download the latest “Intel x86 Atom System Image” e.g. Android 7.1.1 (API 25)
- When create new AVD, select “Intel Atom (x86)” for CPU/ABI after selecting the appropriate Target.

Android Virtual Device (AVD)



Create new Android Virtual Device (AVD)

AVD Name: KitKat

Device: Nexus 4 (4.7", 768 × 1280: xhdpi)

Target: Android 4.4.2 - API Level 19

CPU/ABI: Intel Atom (x86)

Keyboard: ☑ Hardware keyboard present

Skin: No skin

Front Camera: Webcam0

Back Camera: None

Memory Options: RAM: 1907 VM Heap: 64

Internal Storage: 200 MiB

SD Card:
● Size: 200 MiB
○ File: Browse...

Emulation Options: □ Snapshot □ Use Host GPU

Testing Using Hardware

- Developing on Windows requires ADB driver

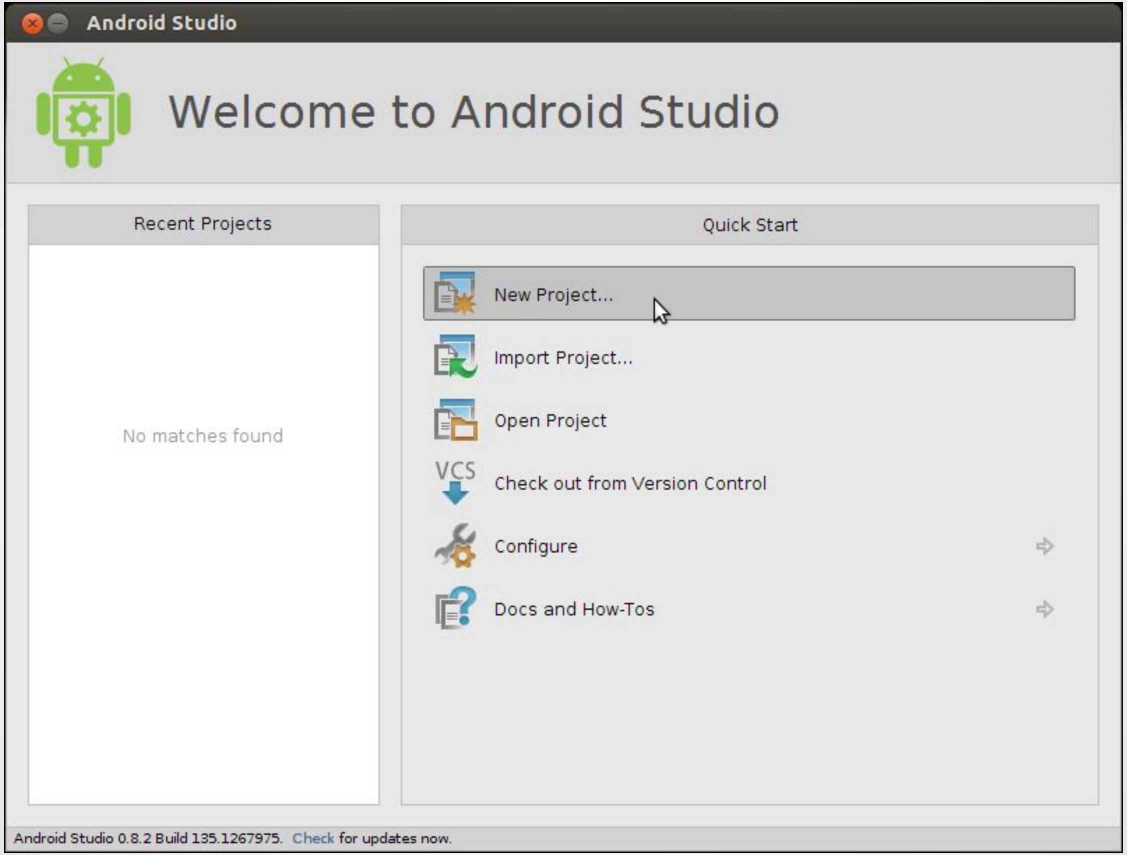
https://developer.android.com/studio/run/oem-usb.html

- Since Android 4.2, to enable “Developer options”
  - Open Settings → “About phone” or “About tablet”
  - Tap “Build number” 7 times
- Enable “USB Debugging” in Developer options

Android Studio New Project

- Start a New Android Studio Project
- Enter Application Name & Company Domain (e.g. mmu.edu.my) to generate Package name (a unique identifier)
- Choose Empty Activity

Android Studio New Project


Android Studio

Welcome to Android Studio

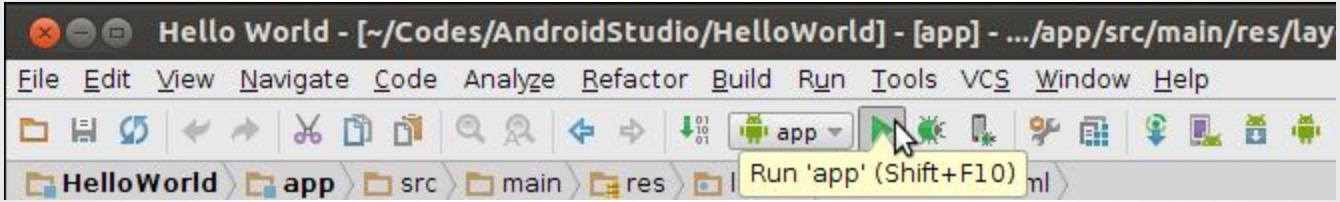
Recent Projects

No matches found

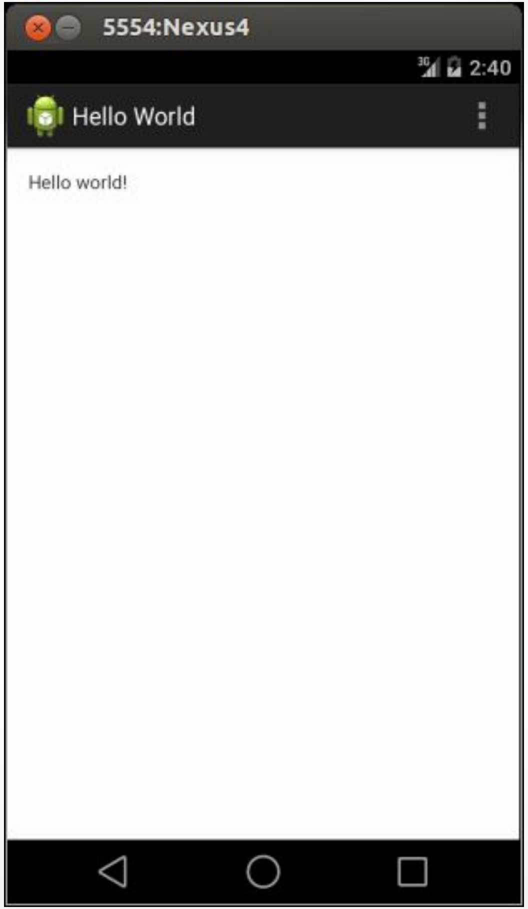
Quick Start

Android Studio 0.8.2 Build 135.1267975. Check for updates now.

Running App


Hello World - [~/Codes/AndroidStudio/HelloWorld] - [app] - .../app/src/main/res/lay
File Edit View Navigate Code Analyze Refactor Build Run Tools VCS Window Help
app
Run 'app' (Shift+F10)
HelloWorld
app
src
main
res
ml

Running App



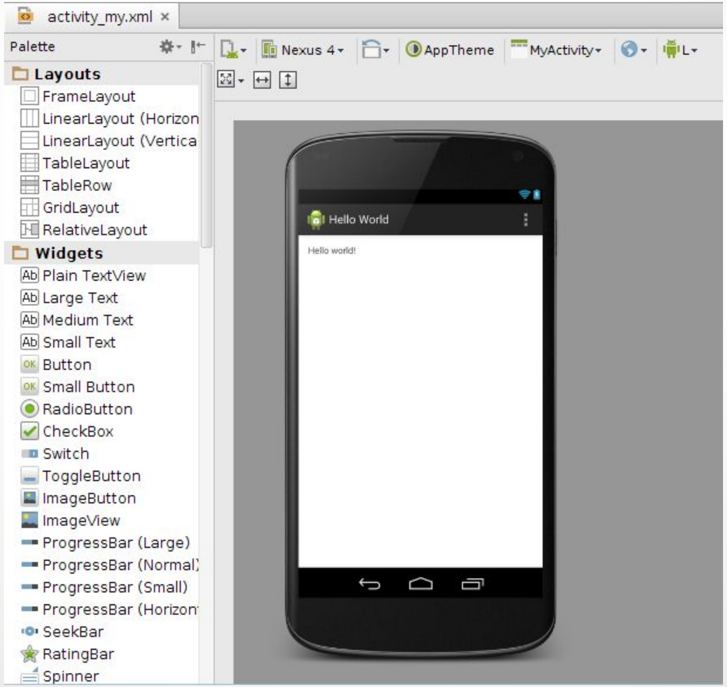
Hello world!

XML-based Layouts

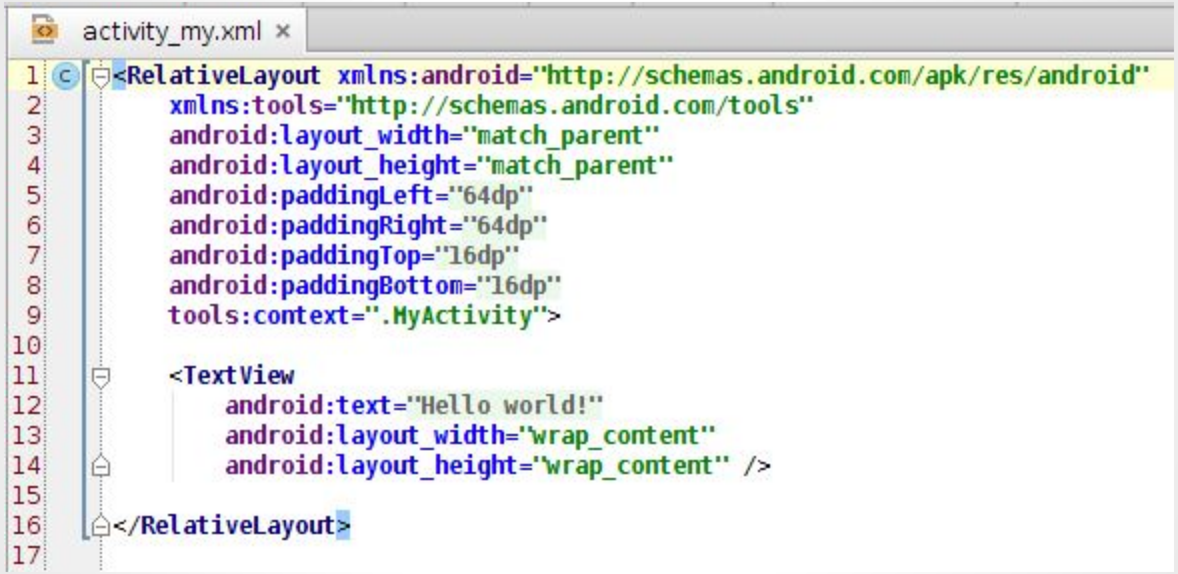
- A specification of relationships between widgets (e.g. buttons) and between widgets and their containers
- The approach to create and attach UI widgets to the Activity
- Stored in app/src/main/res/layout/
- Attached in setContentView() in Activity's onCreate() callback

Layout Editor Design view

- Basic elements of Android GUI toolkit, listed in the “Palette”, at the left side in Graphical Layout editor



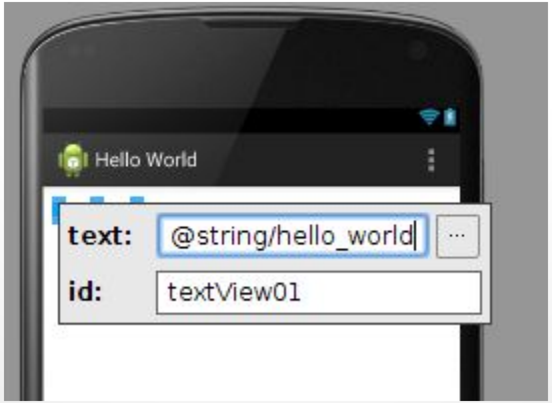
Layout Editor Text view



```
<RelativeLayout xmlns:android="http://schemas.android.com/apk/res/android"
    xmlns:tools="http://schemas.android.com/tools"
    android:layout_width="match_parent"
    android:layout_height="match_parent"
    android:paddingLeft="64dp"
    android:paddingRight="64dp"
    android:paddingTop="16dp"
    android:paddingBottom="16dp"
    tools:context=".MyActivity">

    <TextView
        android:text="Hello world!"
        android:layout_width="wrap_content"
        android:layout_height="wrap_content" />

</RelativeLayout>
```

ID in XML-based Layouts

- UI widget that need to be referenced in the Java source needs an ID.
- For example the ID of a TextView: android:id="@+id/textView01"
- Double click on a UI widget to assign/modify ID



text: @string/hello_world

id: textView01

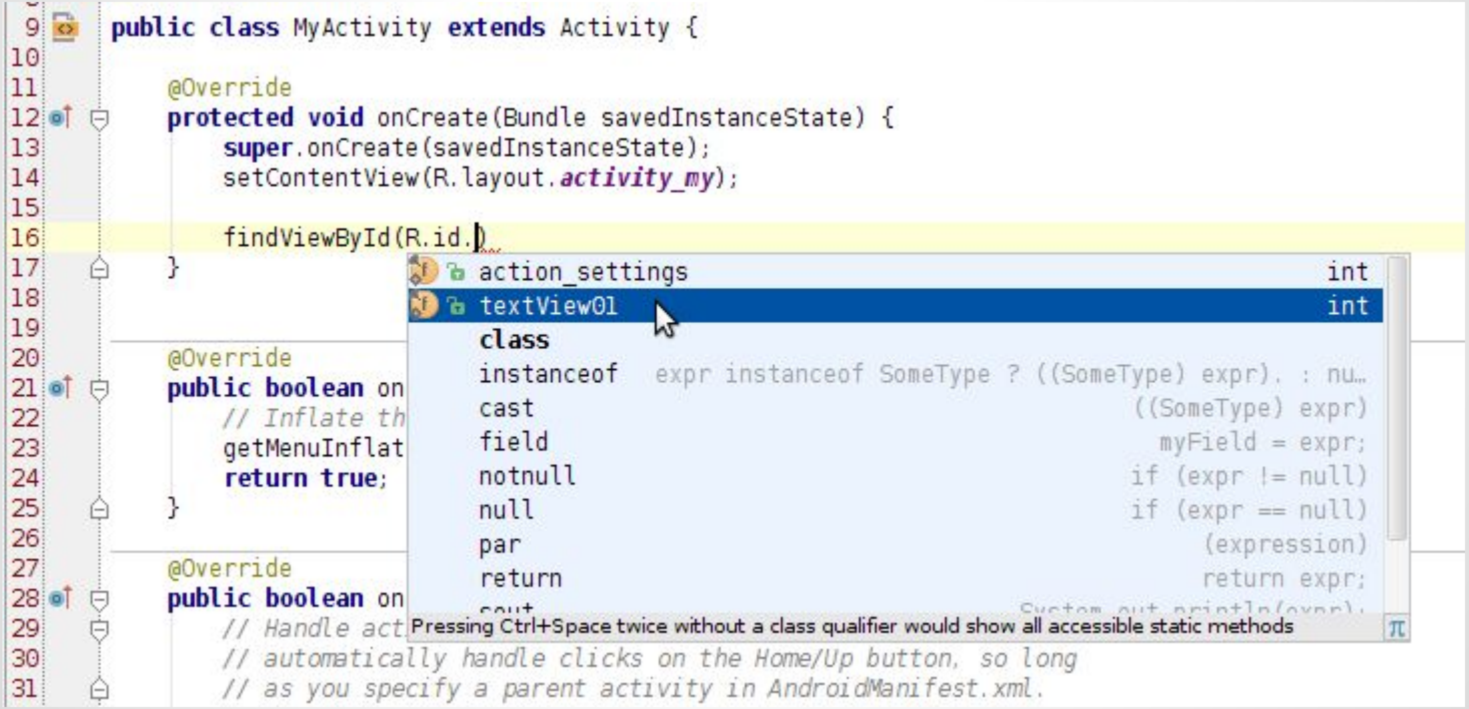
ID in XML-based Layouts

- Access the identified widgets with findViewById() in Java source code.
- For example:

```
TextView tv = findViewById(R.id.textView01);
```

ID in XML-based Layouts

- Autocomplete (automatic or triggered via **Ctrl+Space**)

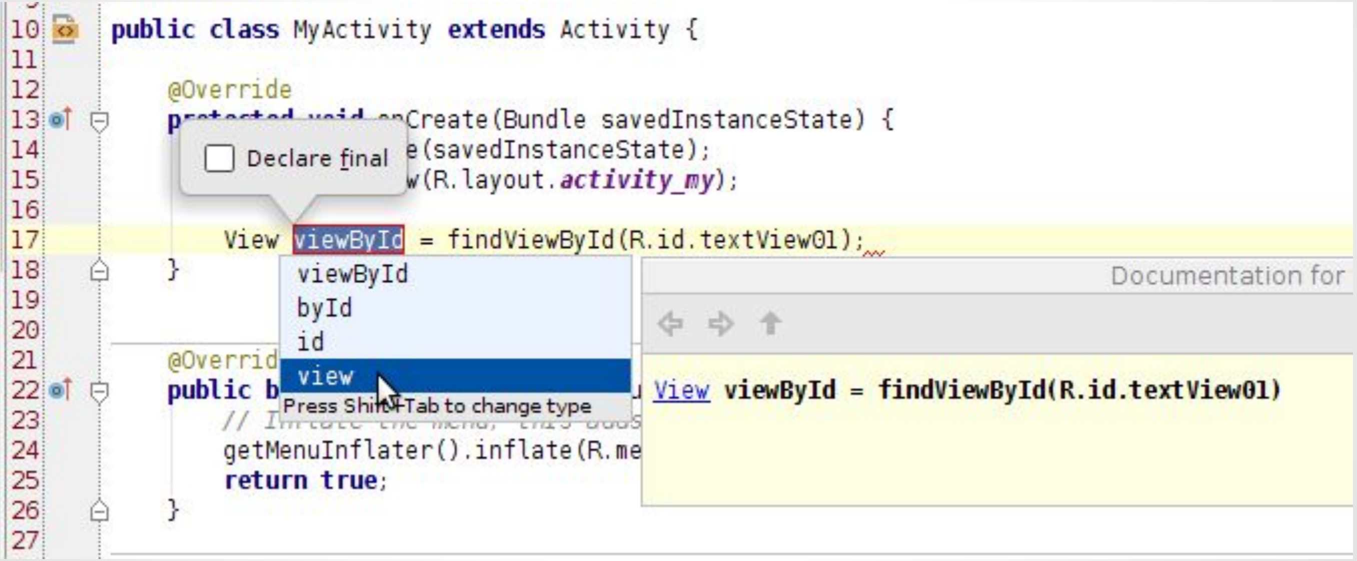


```
public class MyActivity extends Activity {

    @Override
    protected void onCreate(Bundle savedInstanceState) {
        super.onCreate(savedInstanceState);
        setContentView(R.layout.activity_my);

        findViewById(R.id.)
    }


    @Override
    public boolean on
        // Inflate th
        getMenuInflat
        return true;
    }

    @Override
    public boolean on
        // Handle act
        // automatically handle clicks on the Home/Up button, so long
        // as you specify a parent activity in AndroidManifest.xml.
```

```
action_settings                                                  int
textView01                                                       int
class
instanceof   expr instanceof SomeType ? ((SomeType) expr). : nu…
cast                                                 ((SomeType) expr)
field                                                   myField = expr;
notnull                                              if (expr != null)
null                                                 if (expr == null)
par                                                       (expression)
return                                                     return expr;
sout                                          System.out.println(expr);
Pressing Ctrl+Space twice without a class qualifier would show all accessible static methods
```

ID in XML-based Layouts

- Create a variable from an expression with **Ctrl+Alt+V**

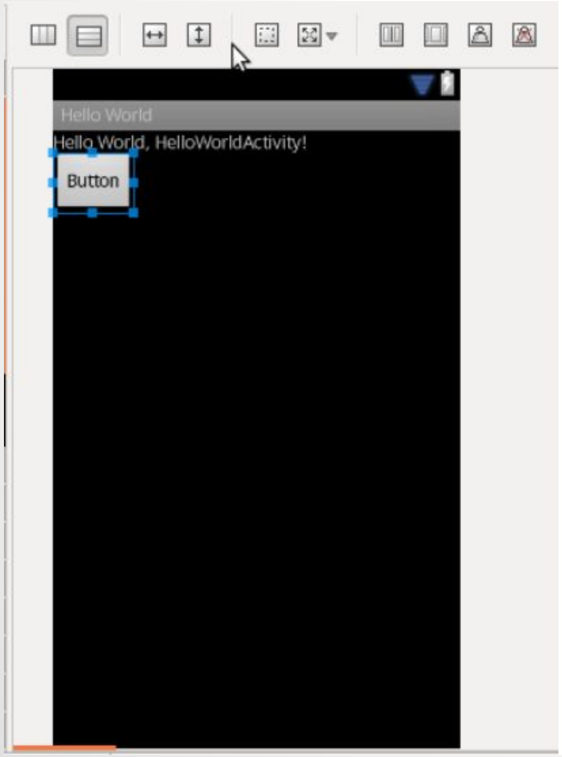


```
public class MyActivity extends Activity {

    @Override
    protected void onCreate(Bundle savedInstanceState) {
                      e(savedInstanceState);
                      w(R.layout.activity_my);

        View viewById = findViewById(R.id.textView01);
    }


    @Overrid
    public b
        // Inflate the menu; this adds
        getMenuInflater().inflate(R.me
        return true;
    }

```

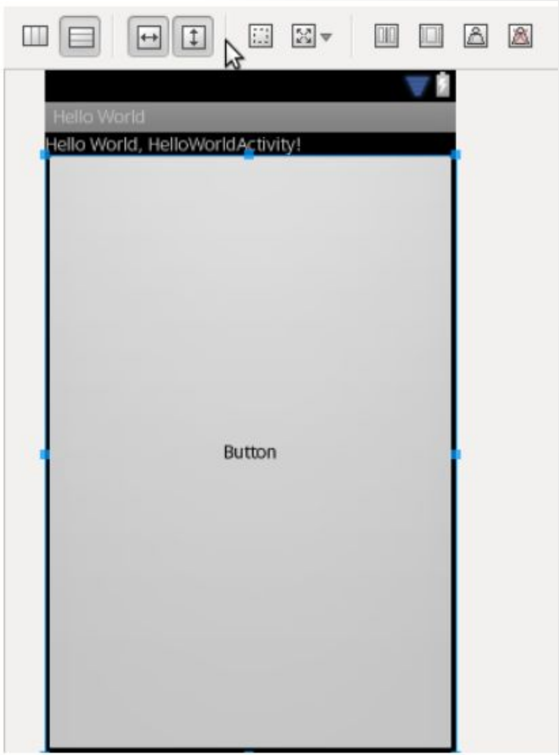
View viewById = findViewById(R.id.textView01)

Layout width & layout height

- “match_parent” or “wrap_content”



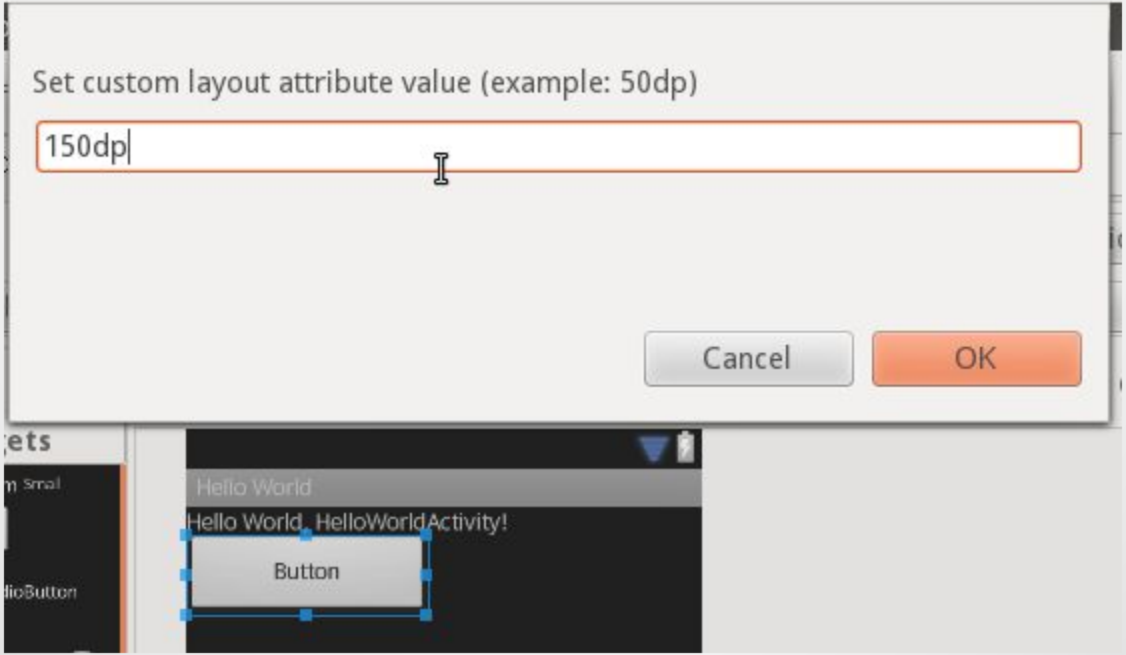
Hello World, HelloWorldActivity!



Hello World, HelloWorldActivity!

Layout width & layout height

- Can also be set to a value such as 150dp (density-independent pixel, scales based on screen density)



Set custom layout attribute value (example: 50dp)

150dp

Handling UI Widgets' Events

- Using Event Listeners interface such as **OnClickListener**(), **OnCheckChangeListener**()
- Register Event Listeners to UI Widgets or Activity using methods such as **setOnClickListener**()
- Event Listeners include callback methods such **onClick**() for **OnClickListener**()

Handling UI Widgets' Events

```
final Button b = findViewById(R.id.Button01);
b.setText(new Date().toString());
b.setOnClickListener(new OnClickListener() {

        public void onClick(View v) {
                b.setText(new Date().toString());
        }
});
```

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Thank you