

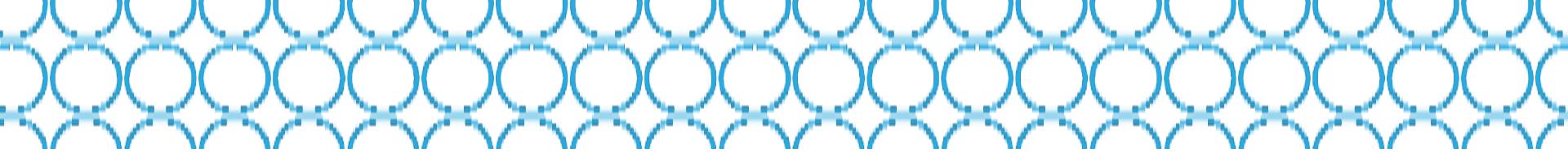


**NEW MEDIA &
COMMUNICATION
TECHNOLOGY**

Mobile App Development

Android History

Guided by nexus



“Android is a cancer,”
-- Not Steve Jobs

Android Dev Phone 1, Android 1.0



RAM	256 MB
Schijfruimte	192 MB
Scherm Pixels	320x480
Scherm	3.2 inch
GPU	528 Mhz
CPU	n/a
Jaar	Eind 2008

Android Dev Phone 2, Android 1.6



RAM	512 MB
Schijfruimte	192 MB
Scherm Pixels	320x480
Scherm	3.2 inch
GPU	528 Mhz
CPU	n/a
Jaar	Midden 2009

Nexus One, Android 2.1



RAM	512 MB
Schijfruimte	512 MB
Scherm Pixels	480x800
Scherm	3.7 inch
GPU	133 Mhz
CPU	1Ghz
Jaar	Begin 2010

Nexus S, Android 2.3



RAM	512 MB
Schijfruimte	16 GB
Scherm Pixels	480x800
Scherm	4 inch
GPU	200 Mhz
CPU	1Ghz
Jaar	Eind 2010

Galaxy Nexus, Android 4.0



RAM	1 GB
Schijfruimte	32 GB
Scherm Pixels	720x1280
Scherm	4.65 inch
GPU	307 Mhz
CPU	1.2 Ghz
Jaar	2011

Nexus 7, Android 4.1



Nexus 4, Android 4.2



RAM	2 GB
Schijfruimte	16 GB
Scherm Pixels	768x1280
Scherm	4.7 inch
GPU	400 Mhz
CPU	1.5 Ghz
Jaar	2012

Nexus 10, Android 4.2



Nexus 5, Android 4.4



RAM	2 GB
Schijfruimte	32 GB
Scherm Pixels	1080x1920
Scherm	4.65 inch
GPU	450 Mhz
CPU	2.26 Ghz
Jaar	2013

Nexus 6, Android 5

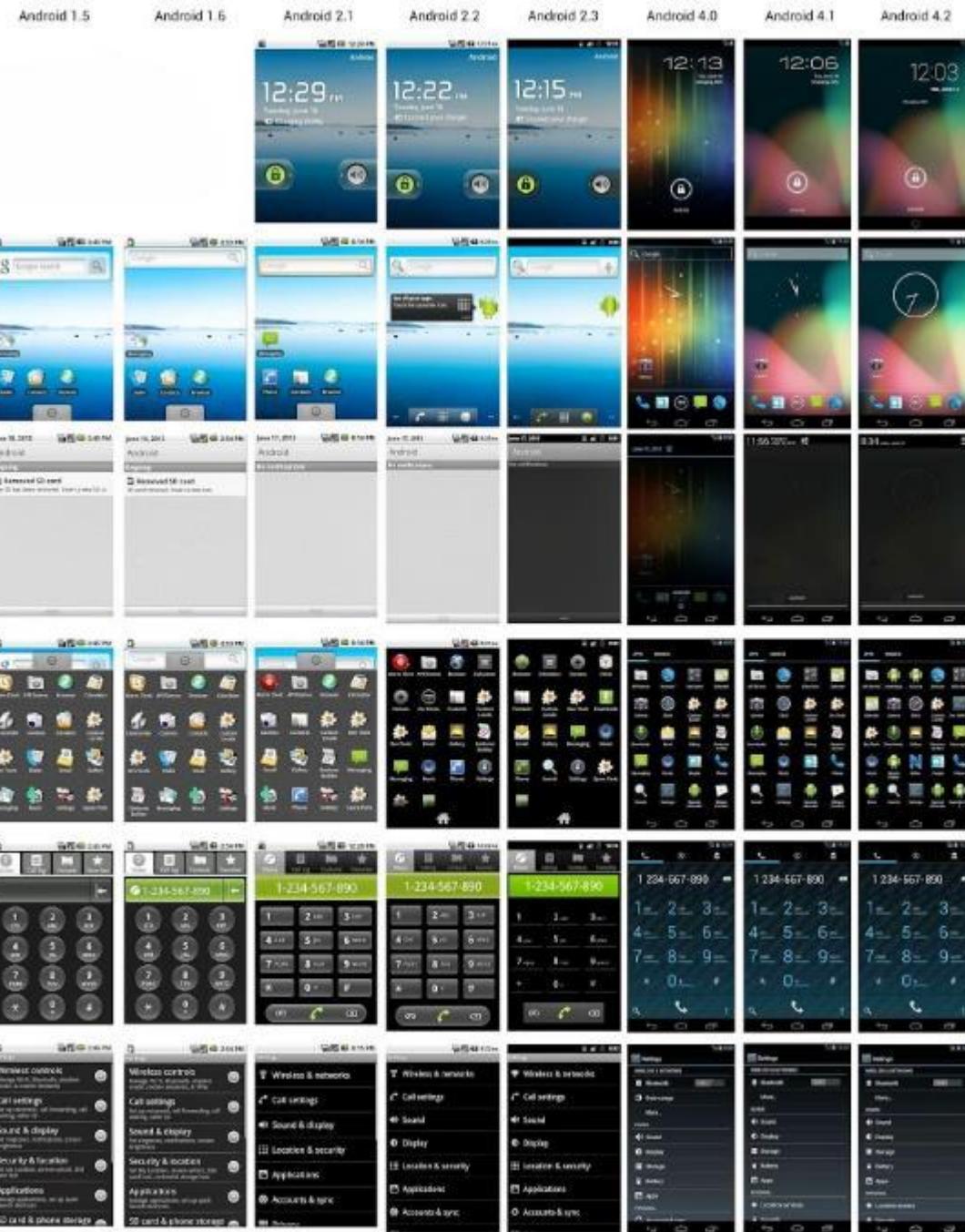


RAM	3 GB
Schijfruimte	32 GB
Scherm Pixels	2560x1440
Scherm	5.96 in
GPU	500Mhz
CPU	2.7 Ghz
Jaar	2014

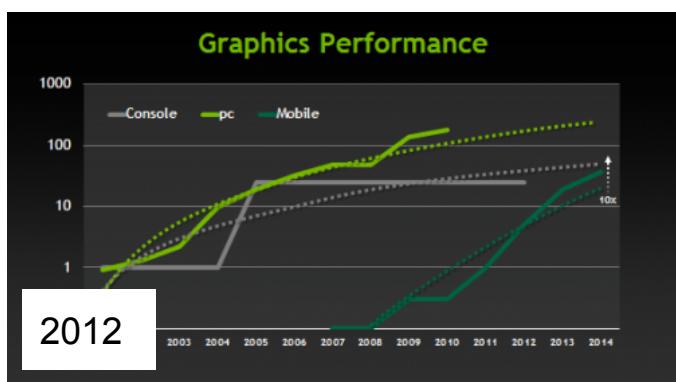
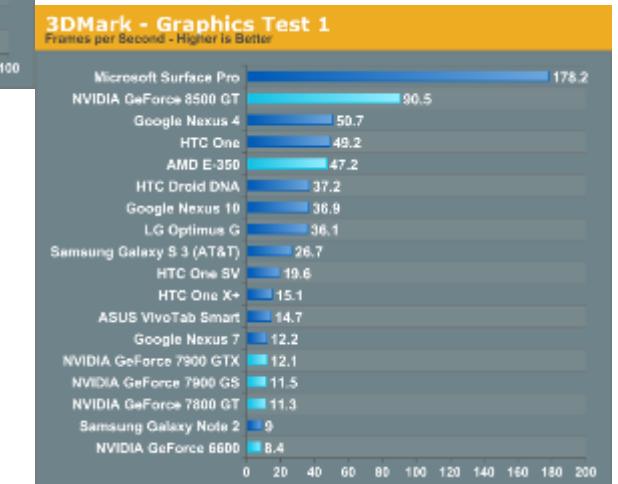
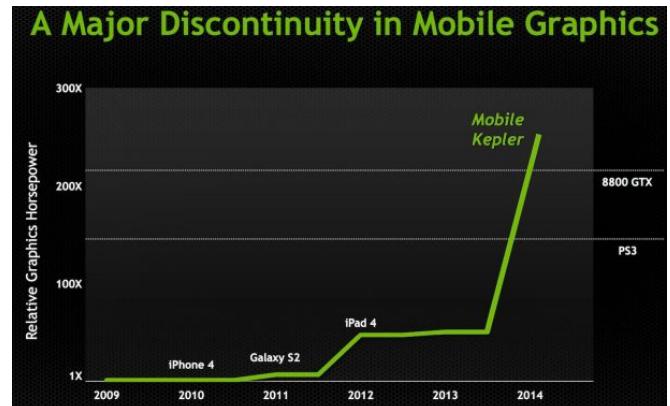
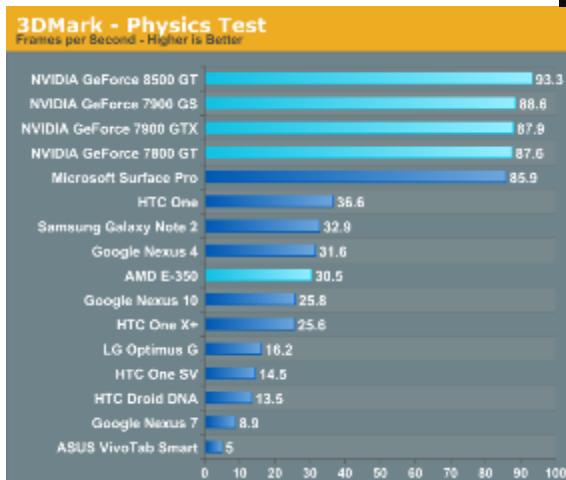
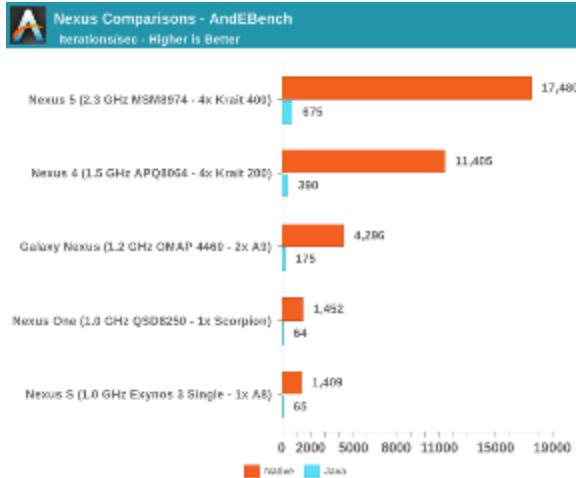
Nexus 9, Android 5



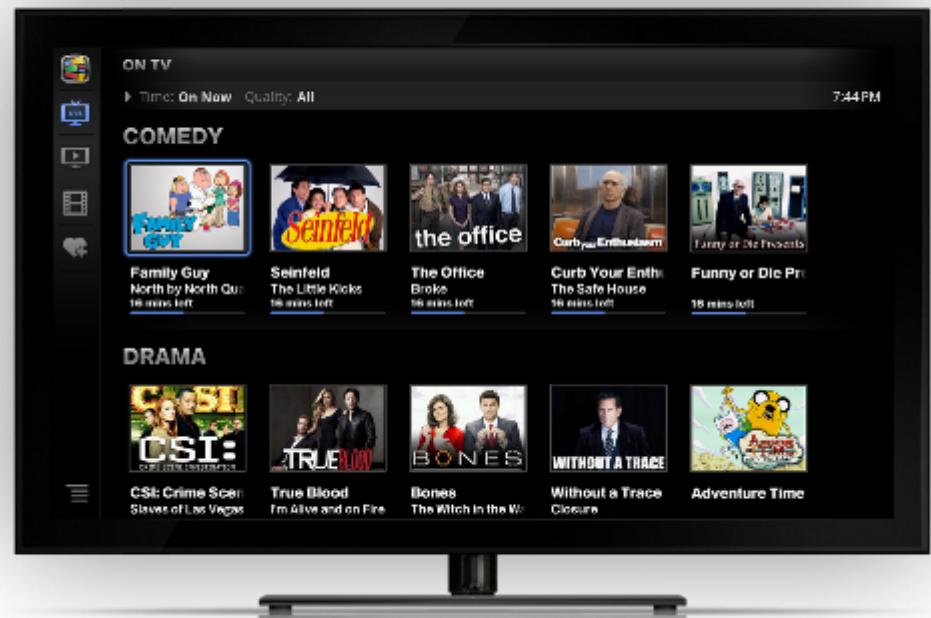
RAM	3 GB
Schijfruimte	32 GB
Scherm Pixels	2048x1536
Scherm	5.96 in
GPU	950 Mhz
CPU	2.3 Ghz
Jaar	2014
64 bit	



Performance?



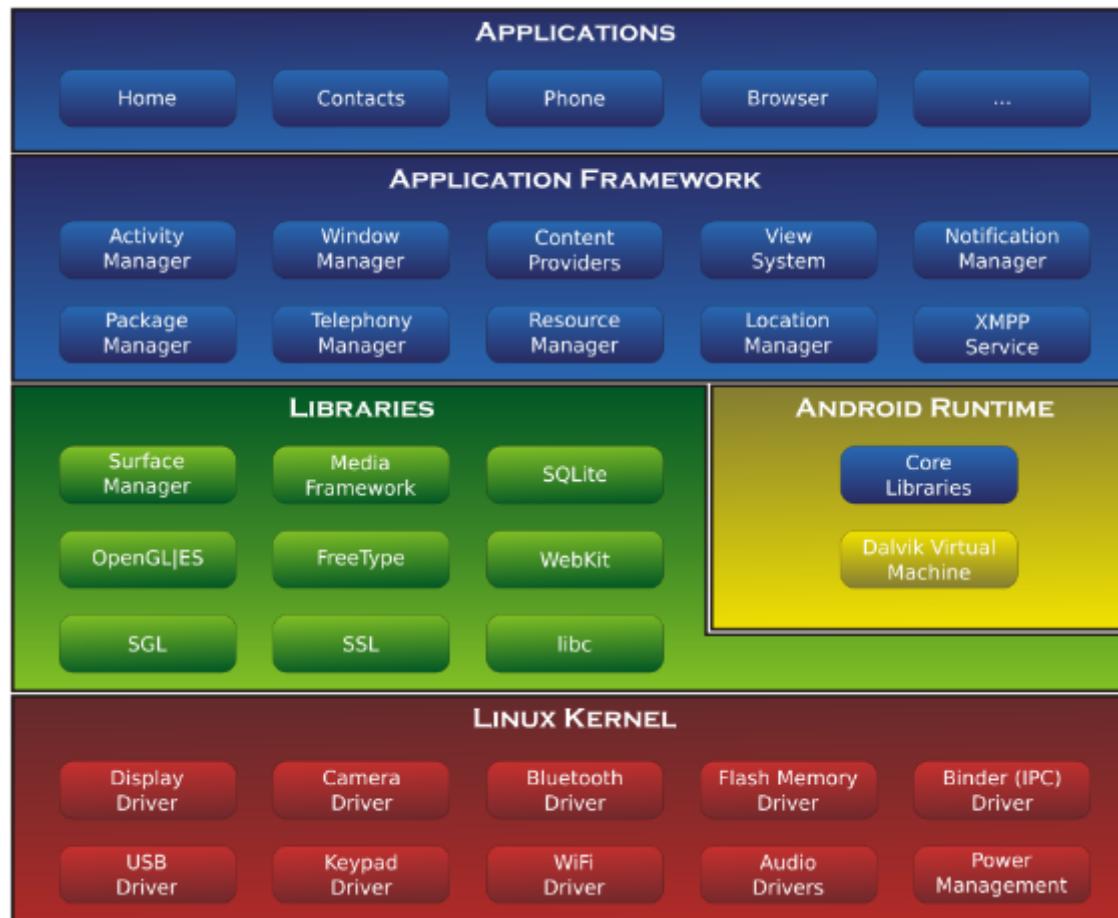
Devices



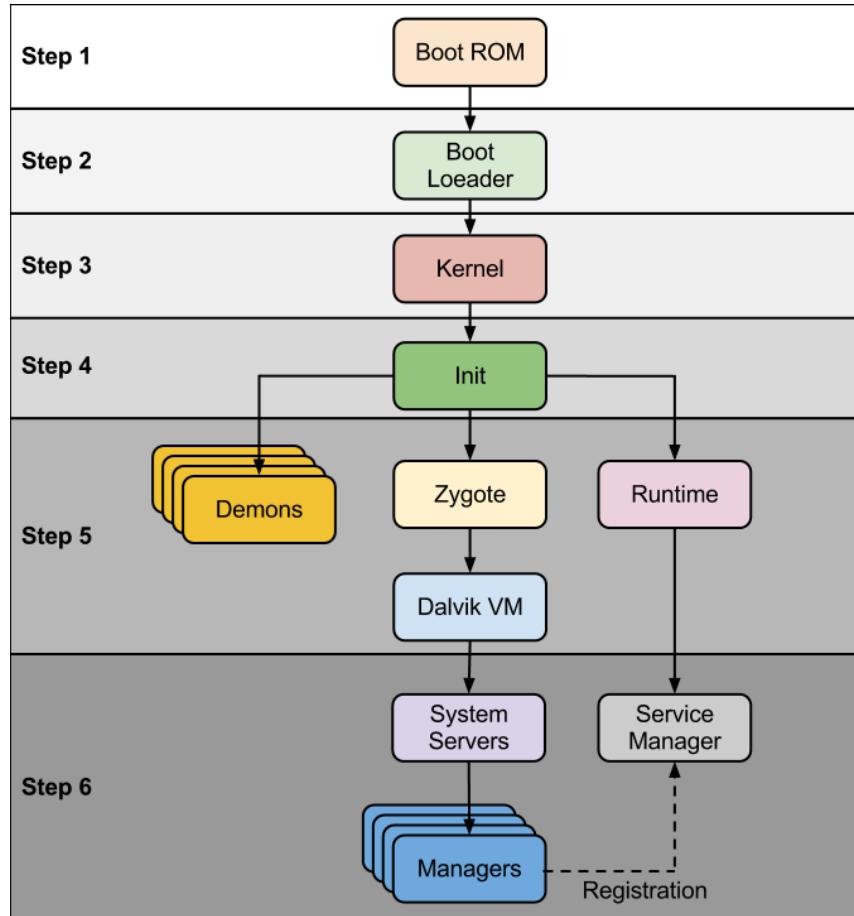
Android Operating System

Is it linux?

System Architecture



Android Boot Sequence

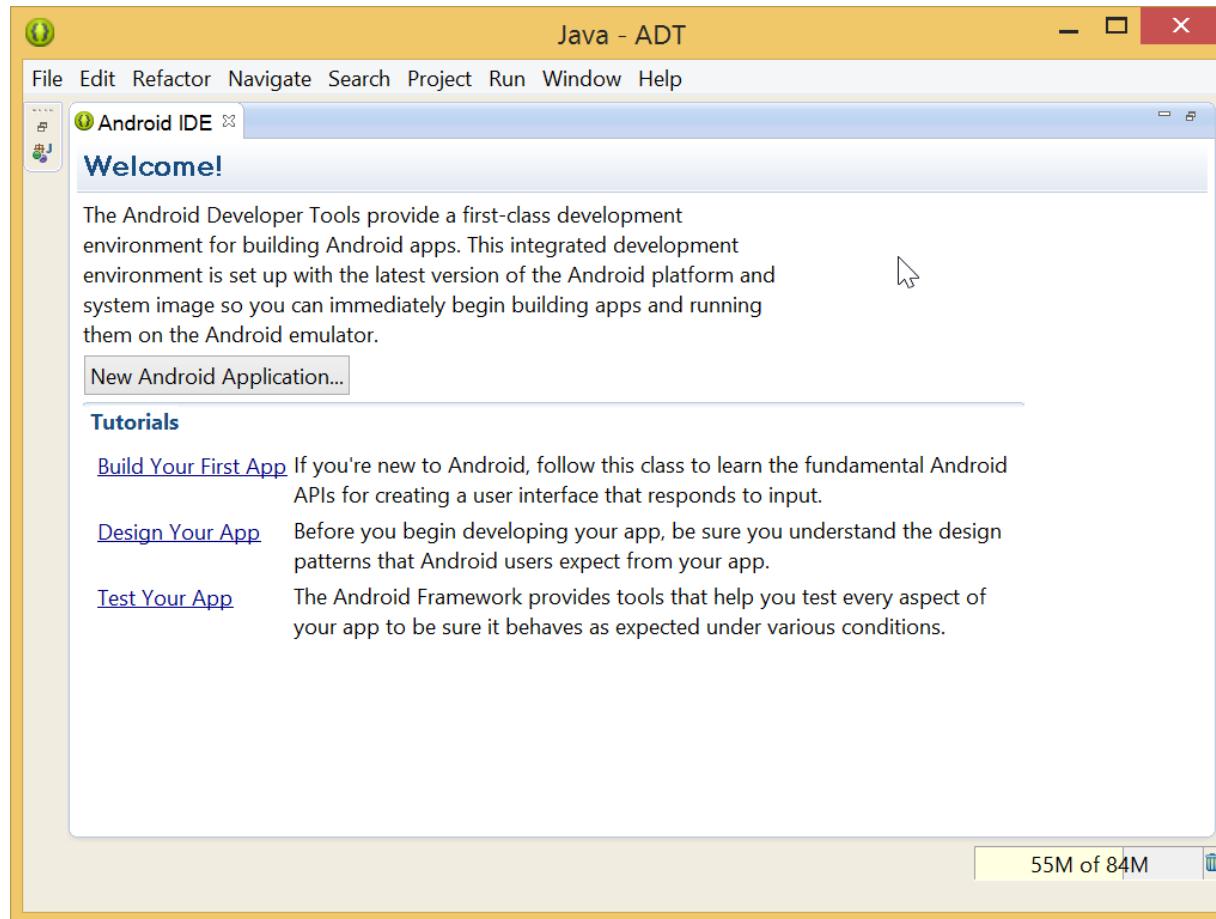


<http://www.kpbird.com/2012/11/in-depth-android-boot-sequence-process.html>

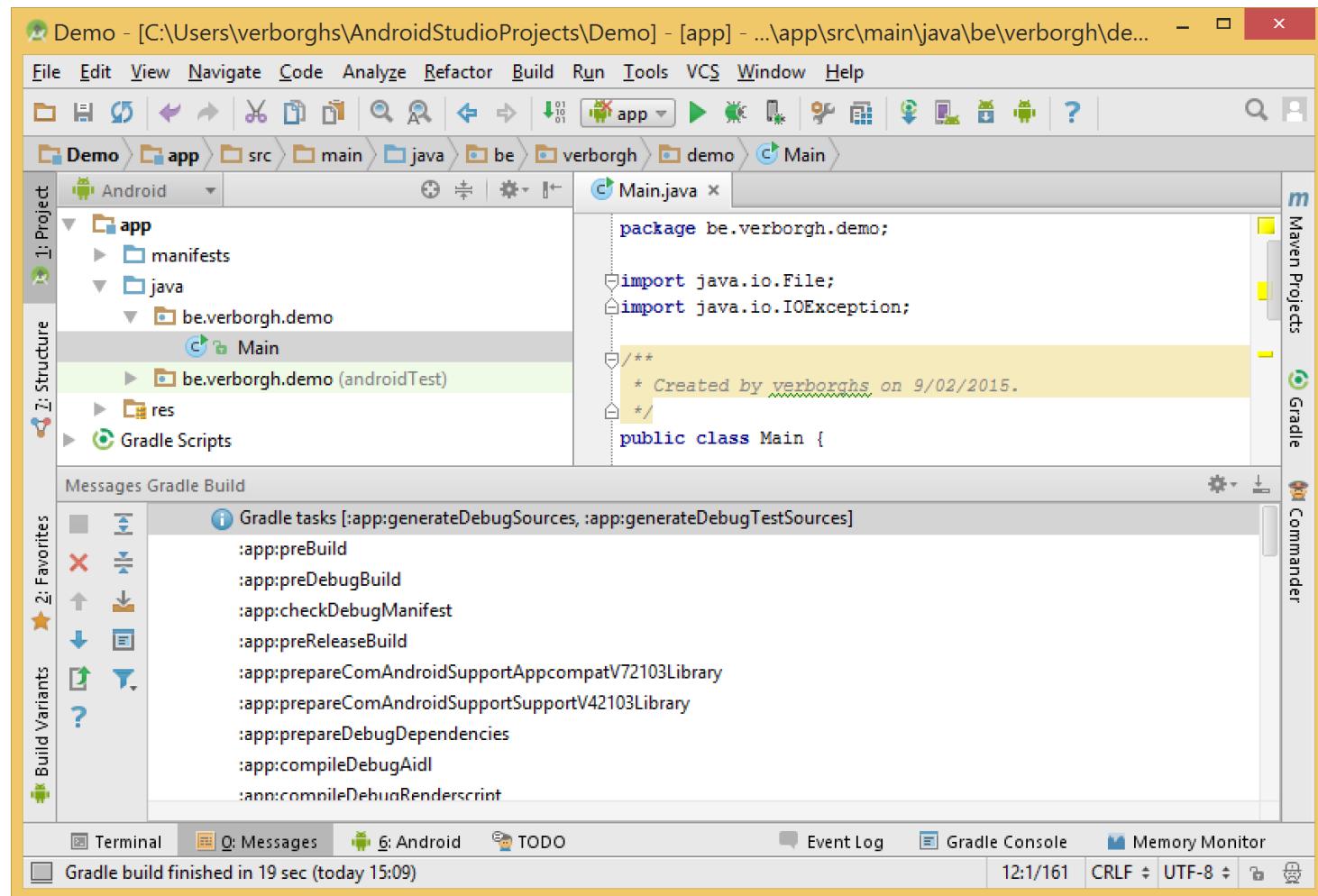
Android Tools

IDE's, SDK's & Emulators

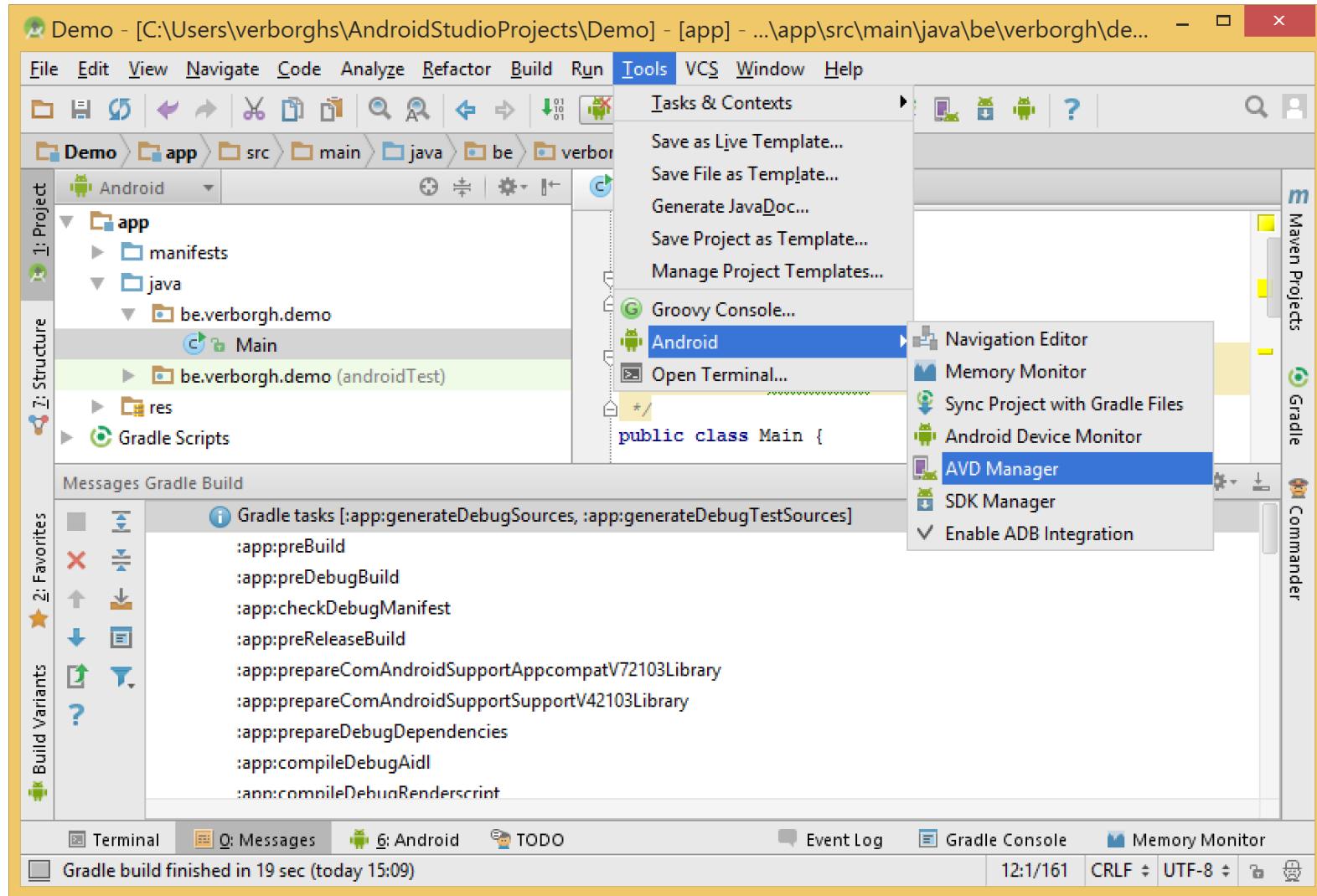
Android Development Tools



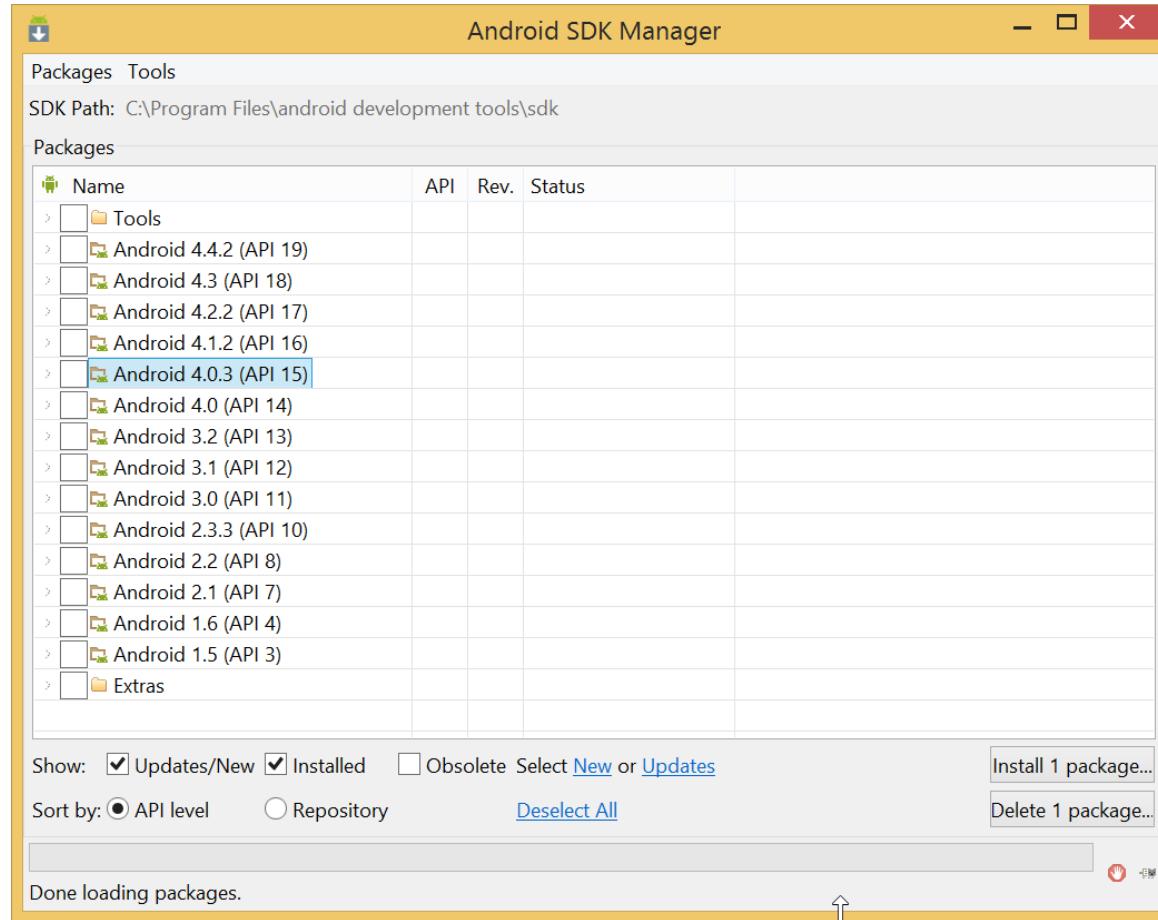
Android Development Tools



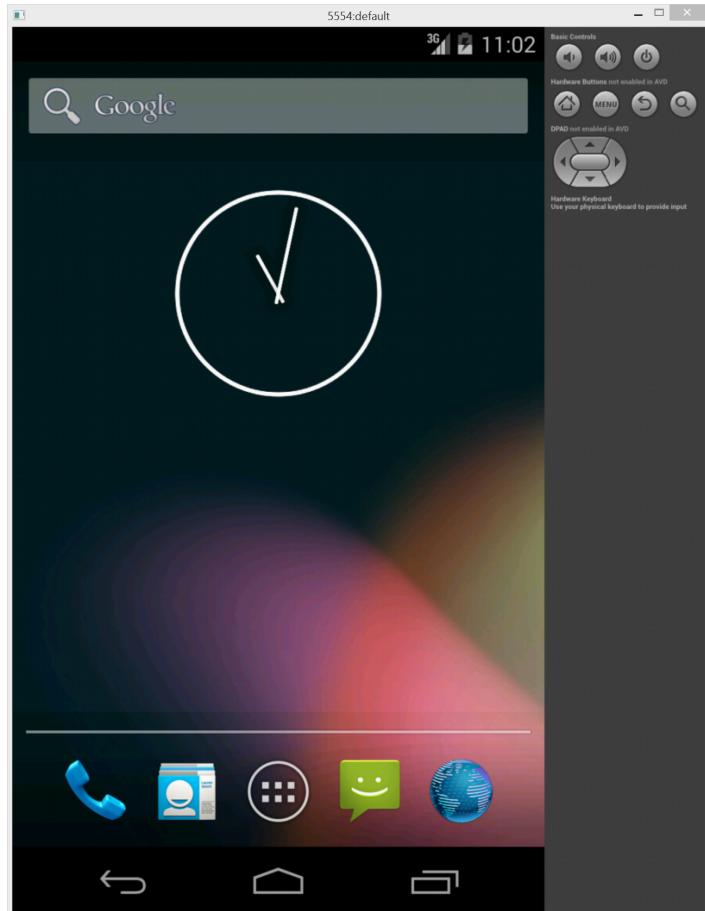
External Tools



Android SDK Manager



Emulators



Android Apps

Short for Application

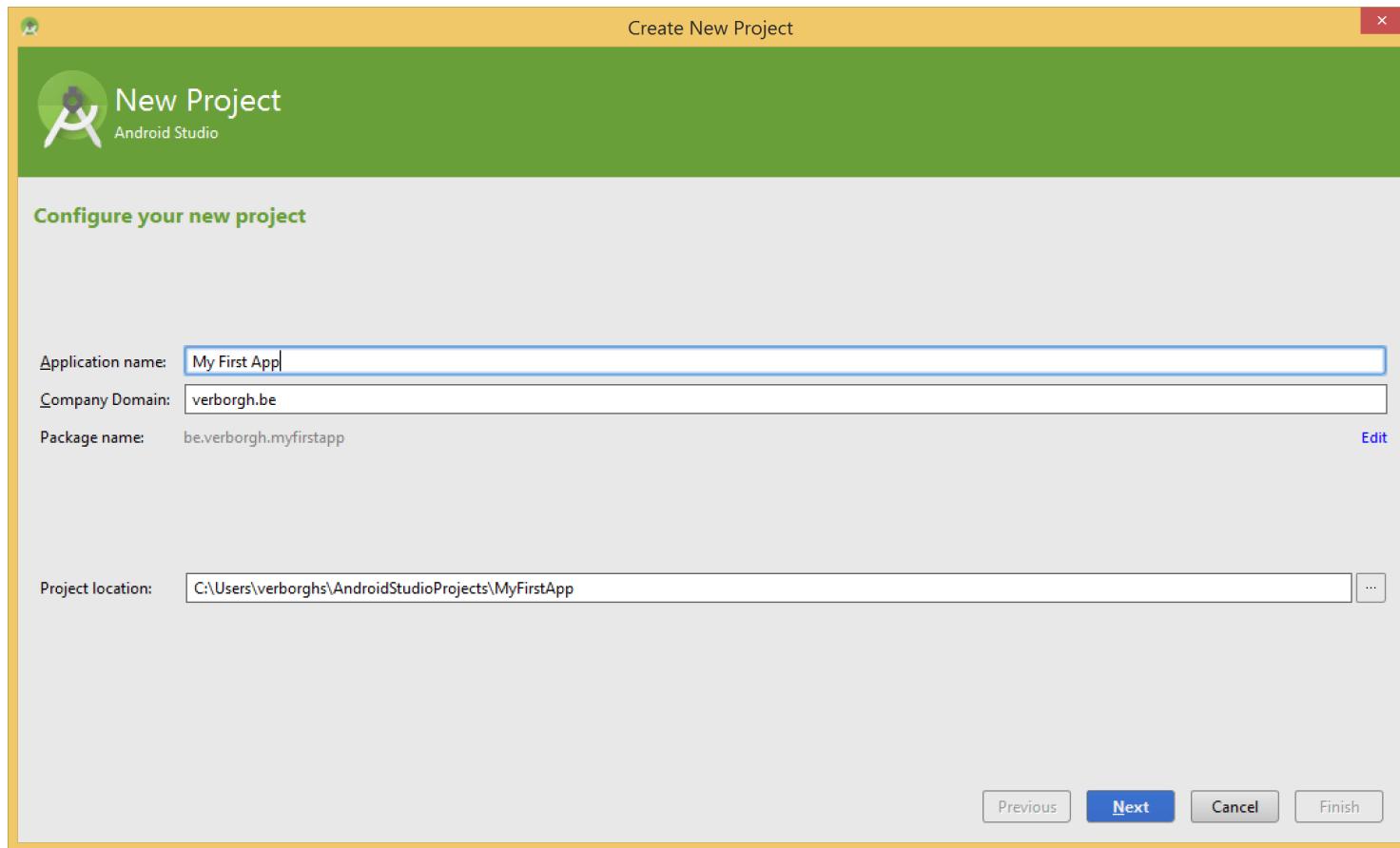
What?

- Code + Resource & data packaged in een Android Package or “.apk”
- Voor elke app
 - 1 (linux) gebruiker
 - 1 Virtual Machine
 - 1 process by default

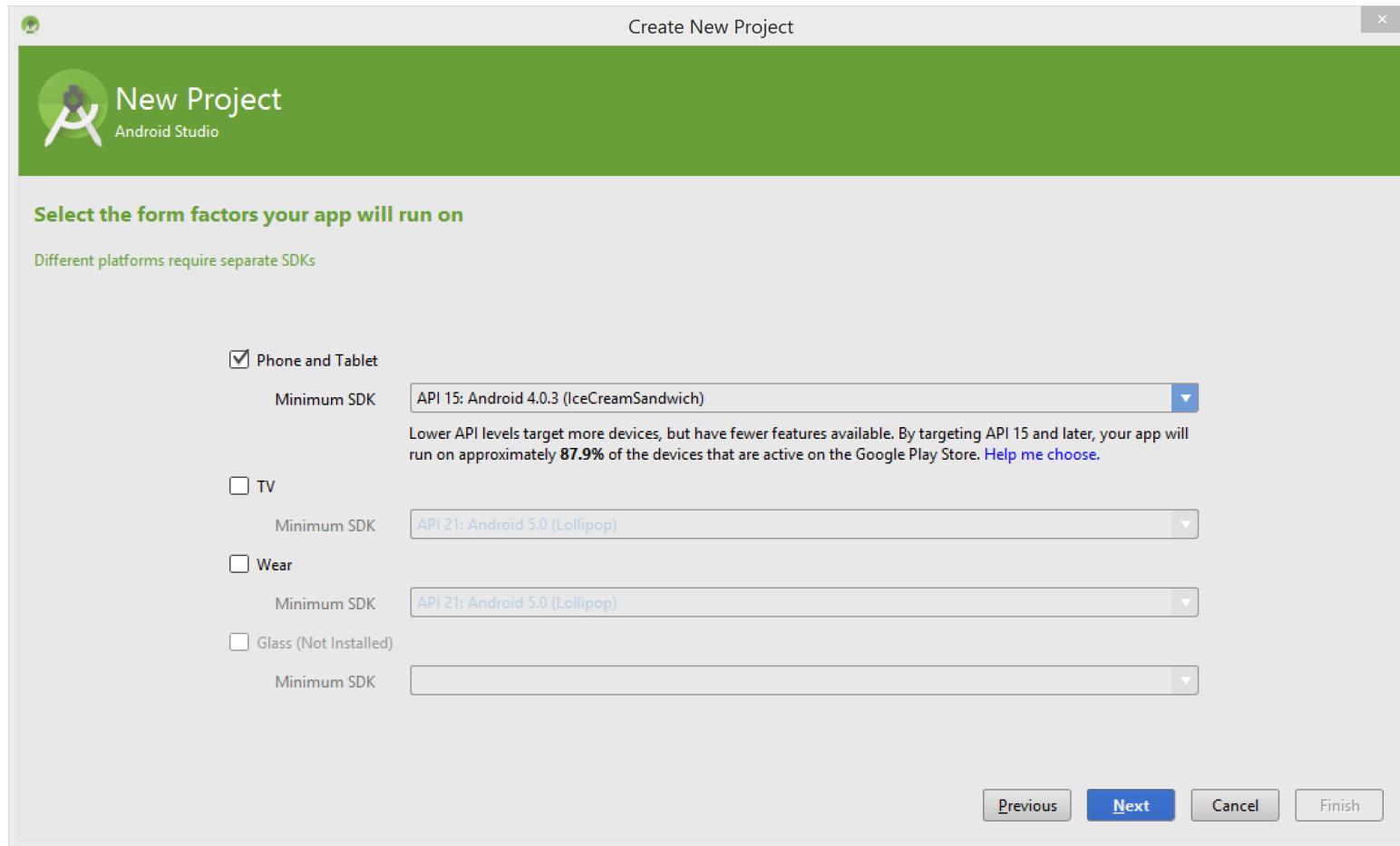
Components of an App

- Activities
- Services
- Content Providers
- Broadcast Recievers

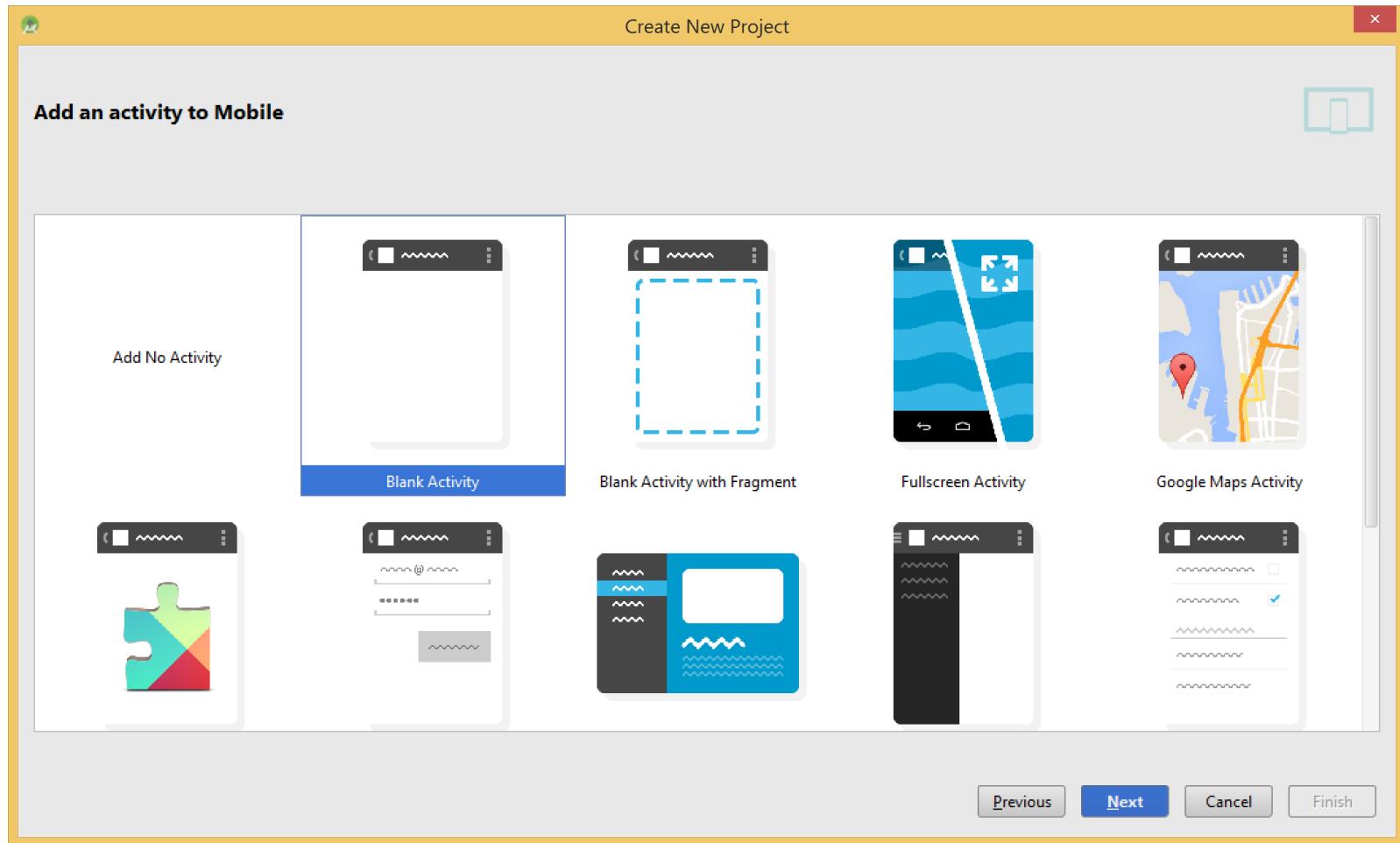
New App in Android Studio



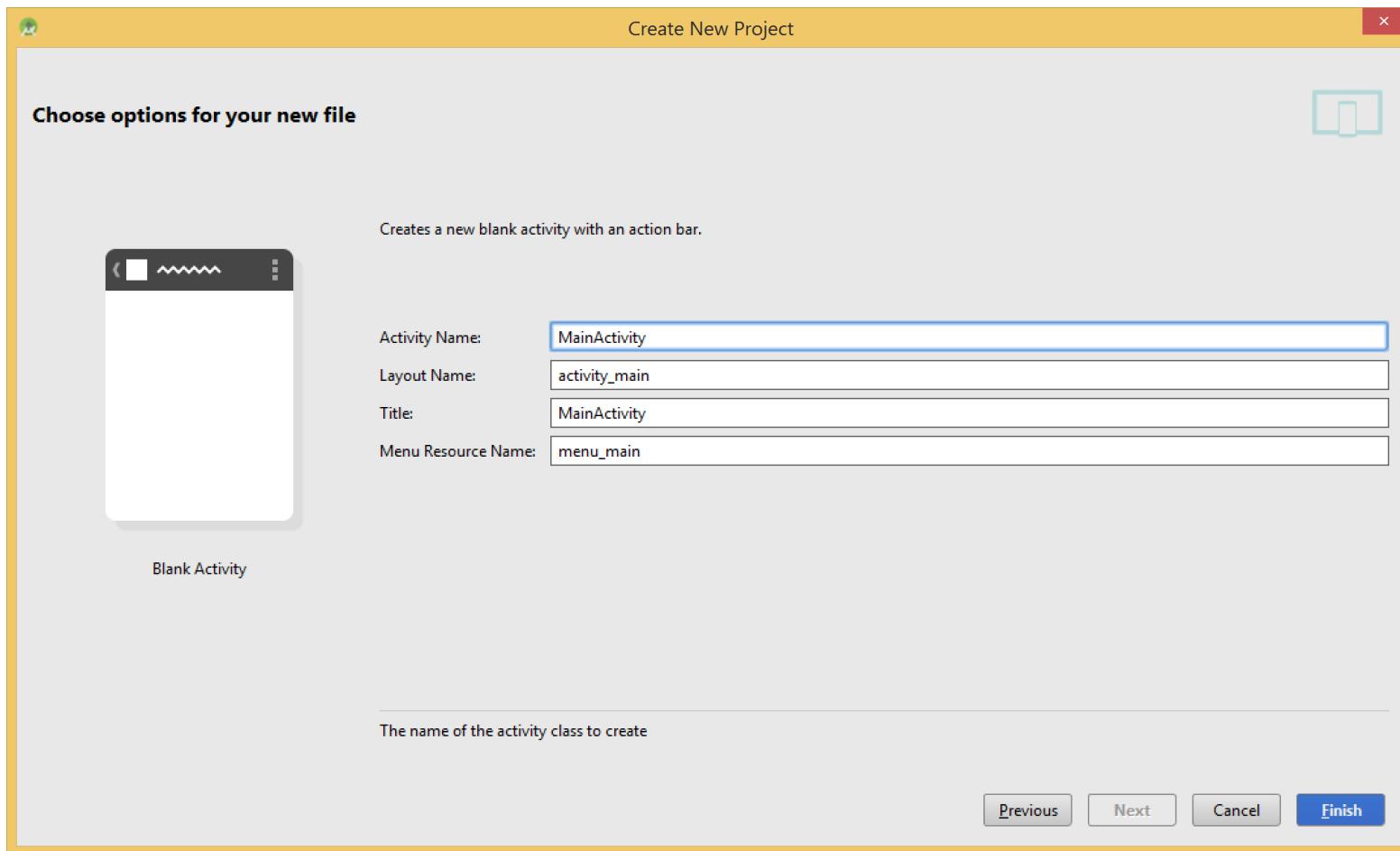
New App in Android Studio



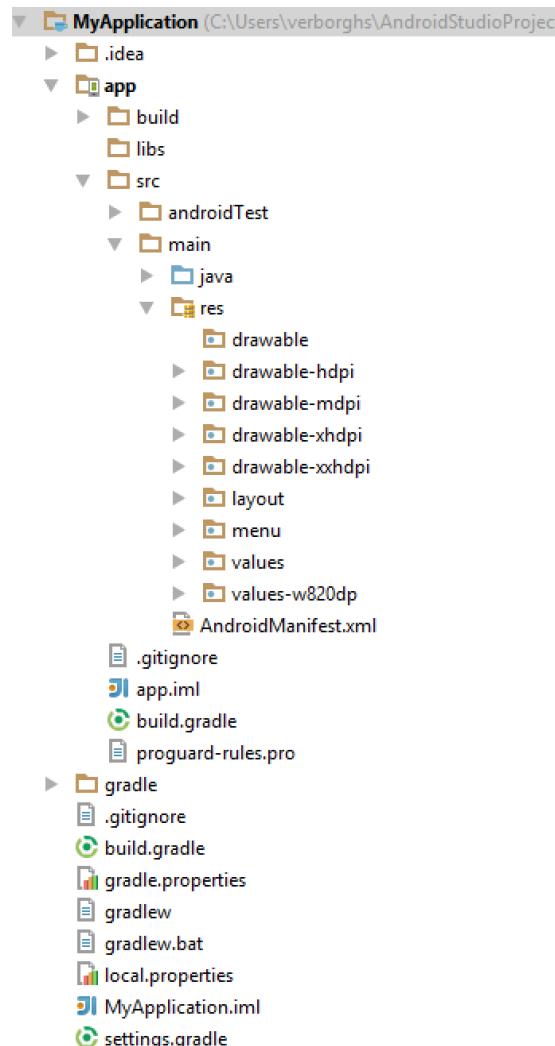
New App in Eclipse



New App in Eclipse



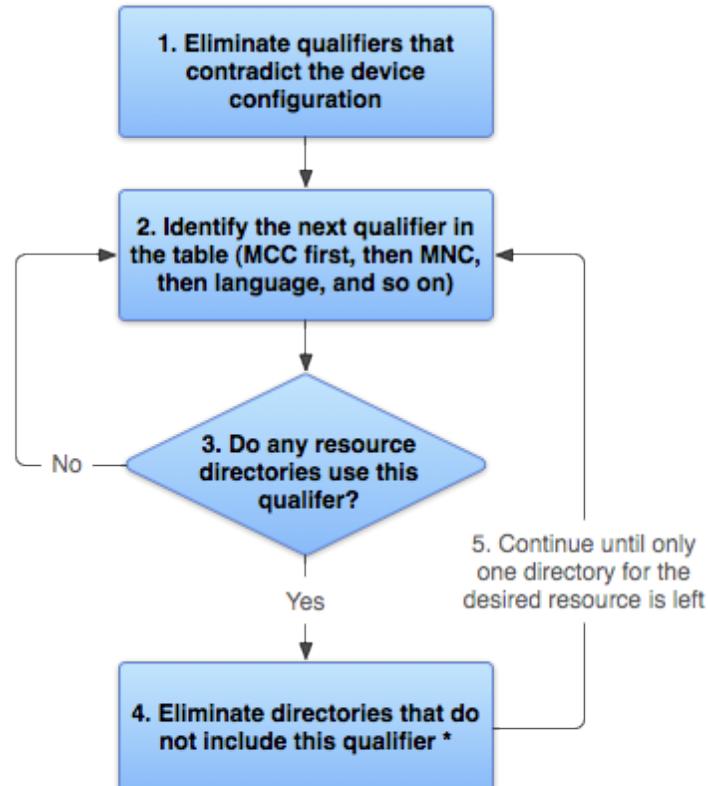
Android Project View



Resource Qualifiers

Example	Description
en, fr, en-rUS, fr-rFR, fr-rCA, ...	Language and region
ldrtl, ldltr	Layout Direction
sw320dp, sw600dp, sw720dp	Smallest Width
w720dp, w1024dp	Available width
h720dp, h1024dp	Available height
small, normal, large, xlarge	Screen Size
port, land	Screen Orientation
car, desk, television, appliance	UI Mode
night, notnight	Night Mode
ldpi, mdpi, hdpi, xhdpi, nodpi, tvdpi	Screen Pixel Density
v3, v4, v7	Platform Version (API level)

Resource Qualifier Resolution



* If the qualifier is screen density, the system selects the "best match" and the process is done

R.java

```
package be.howest.nmct.demo1;

public final class R {
    public static final class attr {
    }

    public static final class drawable {
        public static final int ic_launcher=0x7f020000;
    }

    public static final class string {
        public static final int app_name=0x7f030000;
    }

    public static final class style {
        public static final int AppBaseTheme=0x7f040000;
        public static final int AppTheme=0x7f040001;
    }
}
```

AndroidManifest.xml

```
<manifest xmlns:android="http://schemas.android.com/apk/res/android"
    package="be.howest.nmct.demo1"
    android:versionCode="1"
    android:versionName="1.0" >

    <uses-sdk
        android:minSdkVersion="19"
        android:targetSdkVersion="19" />

    <application
        android:allowBackup="true"
        android:icon="@drawable/ic_launcher"
        android:label="@string/app_name"
        android:theme="@style/AppTheme" >

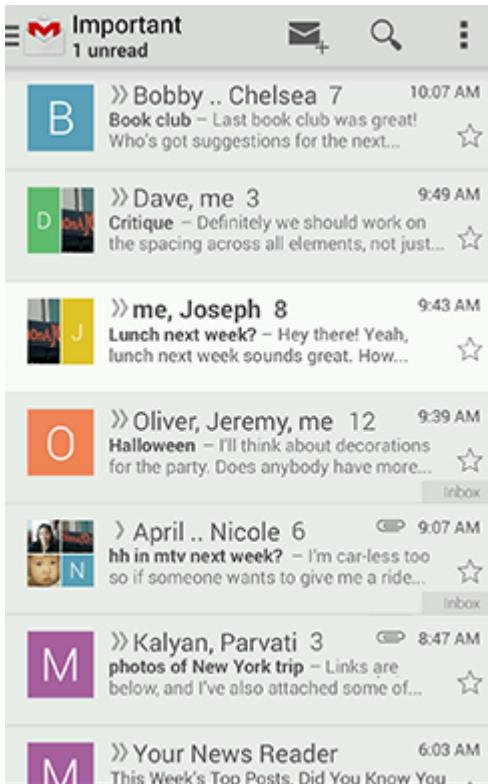
        </application>

</manifest>
```

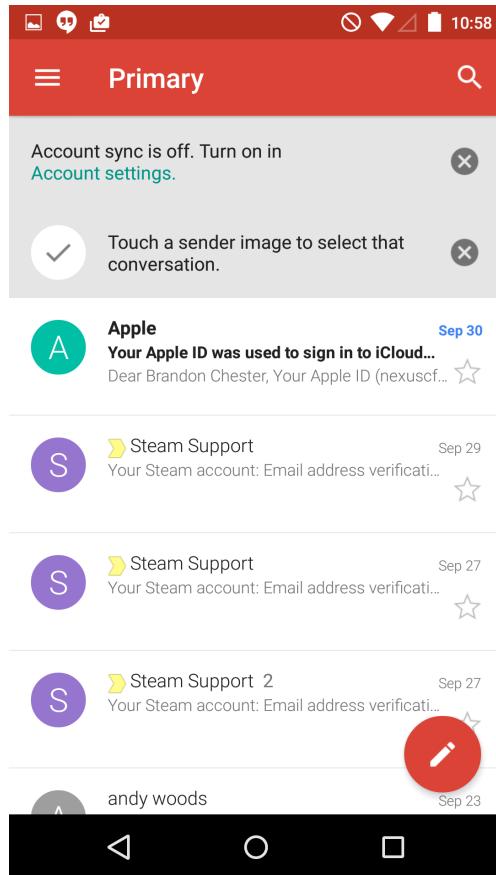
API Versions

API Version	Codename	Version
19	Kit Kat	4.4
16	Jelly Bean	4.1
14	Ice Cream Sandwich	4.0
11	Honeycomb	3.0
9	Gingerbread	2.3
8	Froyo	2.2
5	Eclair	2.0
4	Donut	1.6
3	Cupcake	1.5

Themes: Holo Light en Holo Dark



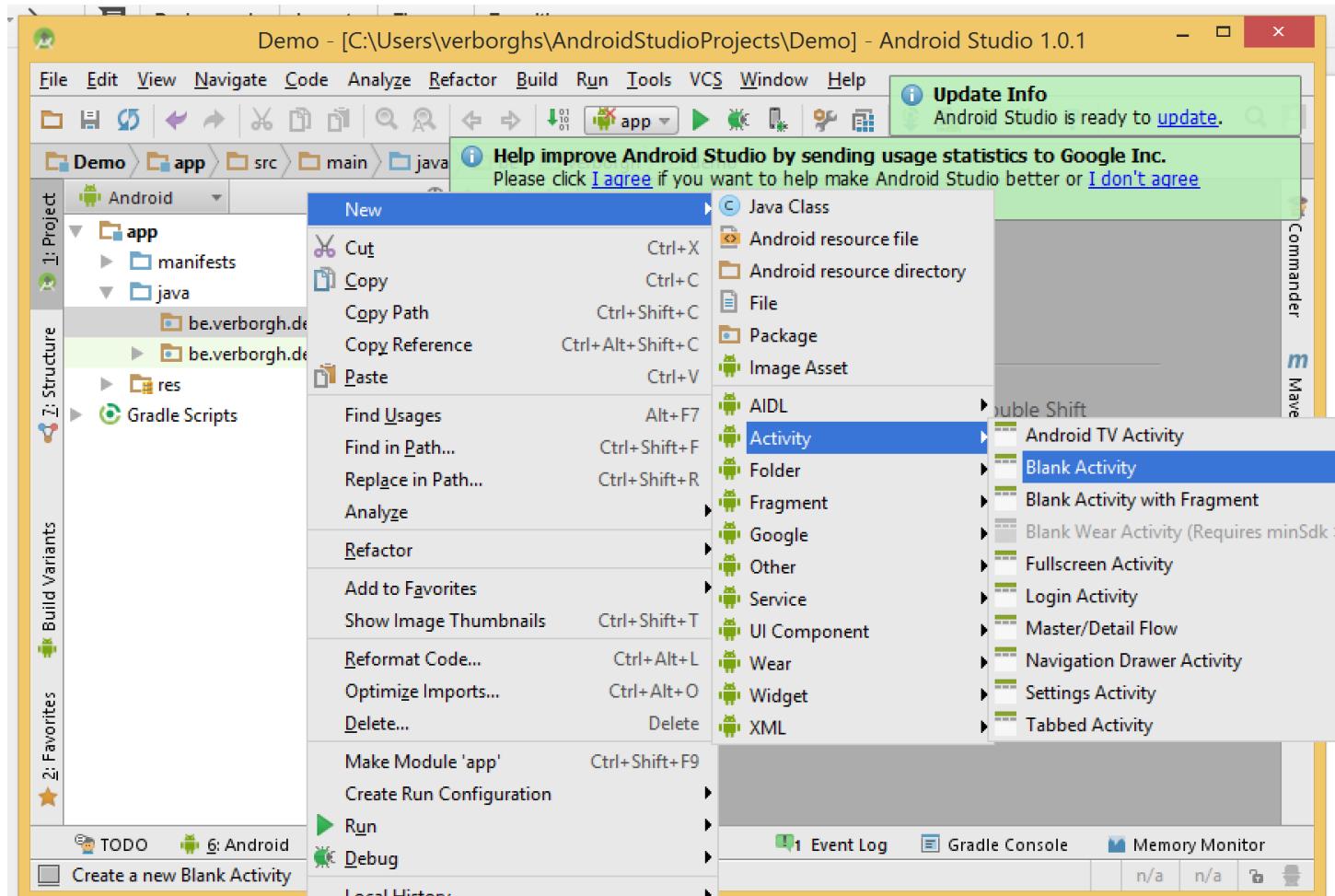
Themes: Material



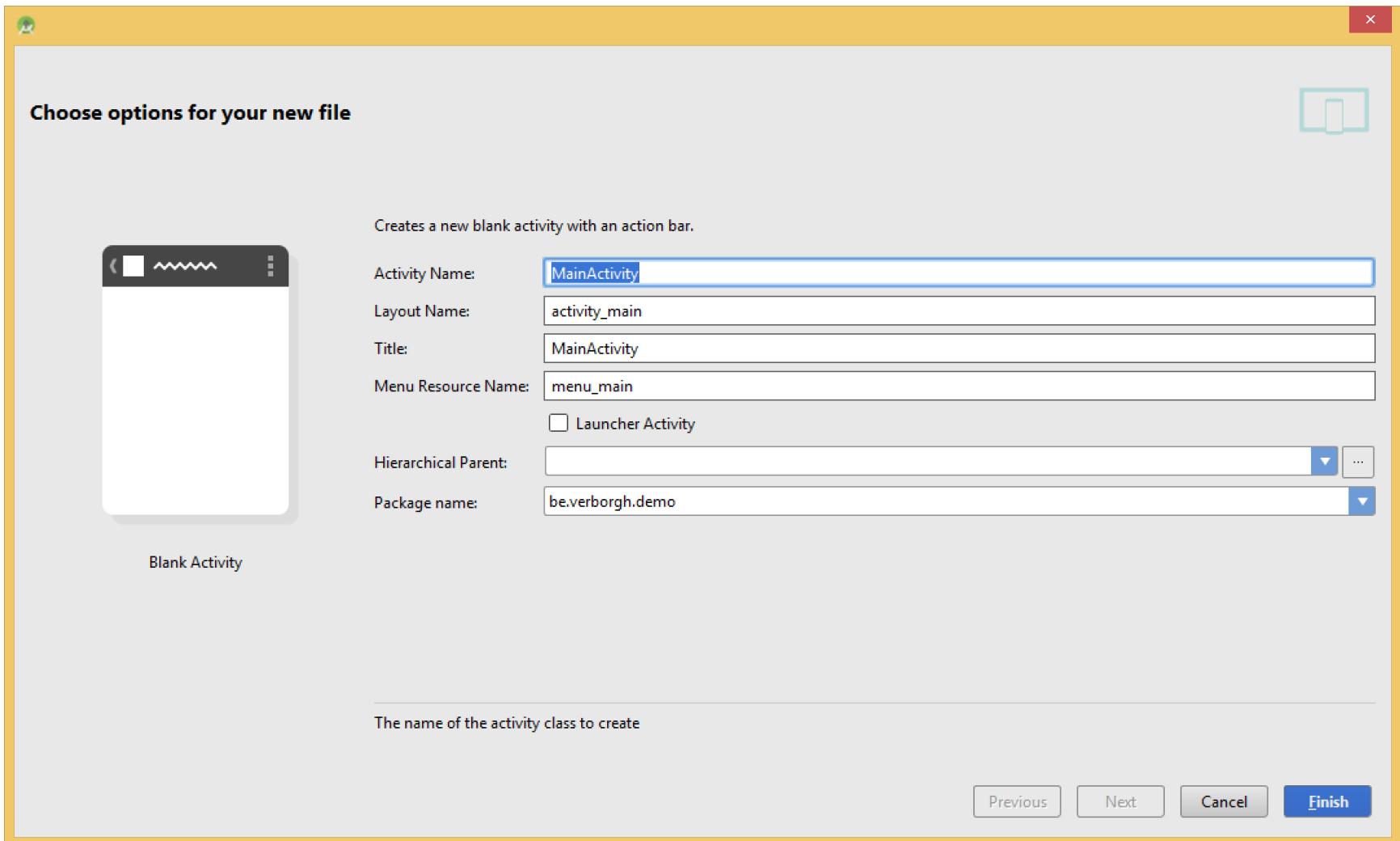
Activities

The user interfaces of your apps.

New Activity



New Activity



Activity Class

```
package be.howest.nmct.demo_theorie_2;

import android.os.Bundle;
import android.app.Activity;
import android.view.Menu;

public class MainActivity extends Activity {

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

    @Override
    public boolean onCreateOptionsMenu(Menu menu) {
        // Inflate the menu; this adds items to the action bar if it is present.
        getMenuInflater().inflate(R.menu.main, menu);
        return true;
    }
}
```

Activity Registration

```
<application
    android:allowBackup="true"
    android:icon="@drawable/ic_launcher"
    android:label="@string/app_name"
    android:theme="@style/AppTheme" >

    <activity
        android:name="be.howest.nmct.demo2.MainActivity"
        android:label="@string/title_activity_main" >
        <intent-filter>
            <action android:name="android.intent.action.MAIN" />
            <category android:name="android.intent.category.LAUNCHER" />
        </intent-filter>
    </activity>
</application>
```

Activity Menu

```
<menu xmlns:android="http://schemas.android.com/apk/res/android" >  
    <item  
        android:id="@+id/action_settings"  
        android:orderInCategory="100"  
        android:showAsAction="never"  
        android:title="@string/action_settings" />  
</menu>
```

Activity Layout

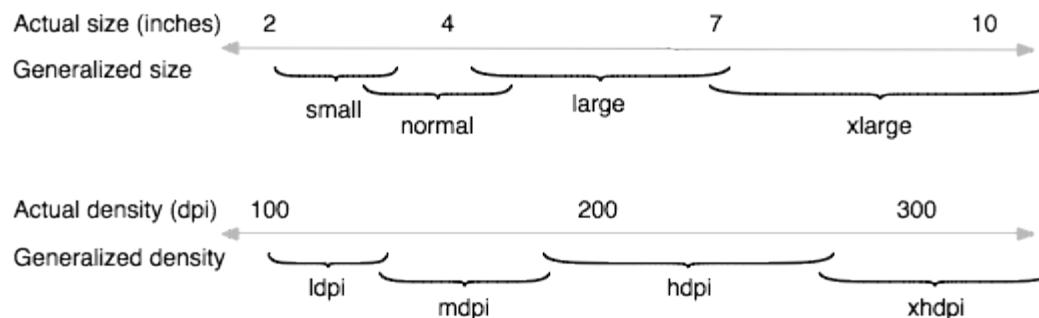
```
<RelativeLayout xmlns:android="http://schemas.android.com/apk/res/android"
    xmlns:tools="http://schemas.android.com/tools"
    android:layout_width="match_parent"
    android:layout_height="match_parent"
    android:paddingBottom="@dimen/activity_vertical_margin"
    android:paddingLeft="@dimen/activity_horizontal_margin"
    android:paddingRight="@dimen/activity_horizontal_margin"
    android:paddingTop="@dimen/activity_vertical_margin"
    tools:context=".MainActivity" >

    <TextView
        android:layout_width="wrap_content"
        android:layout_height="wrap_content"
        android:text="@string/hello_world" />

</RelativeLayout>
```

DPI/DP/Screens/

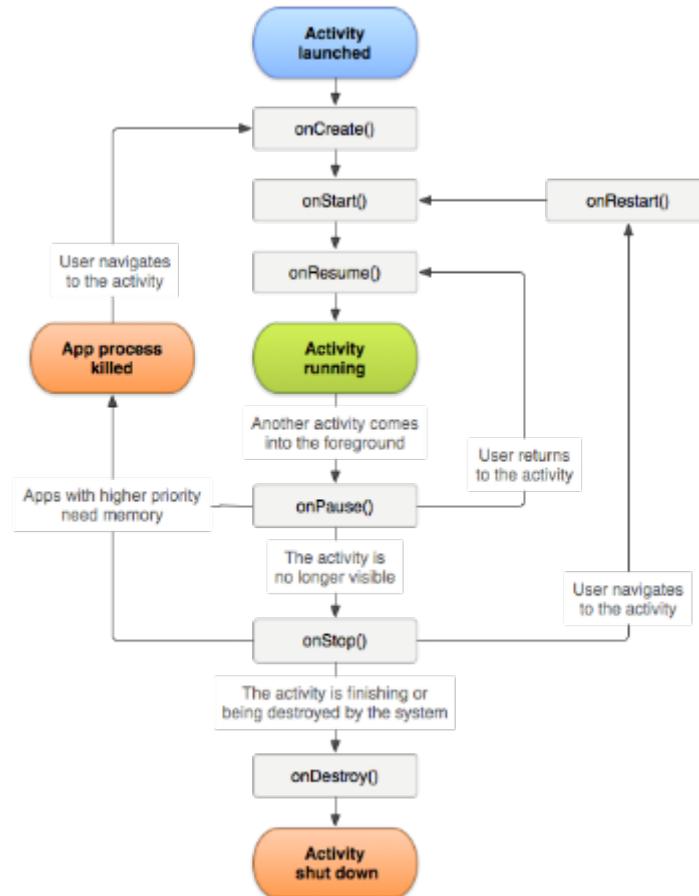
Xlarge	at least 960dp x 720dp
Large	at least 640dp x 480dp
Normal	at least 470dp x 320dp
small	at least 426dp x 320dp



Activity Lifecycle

How mobile operating systems threat your apps.

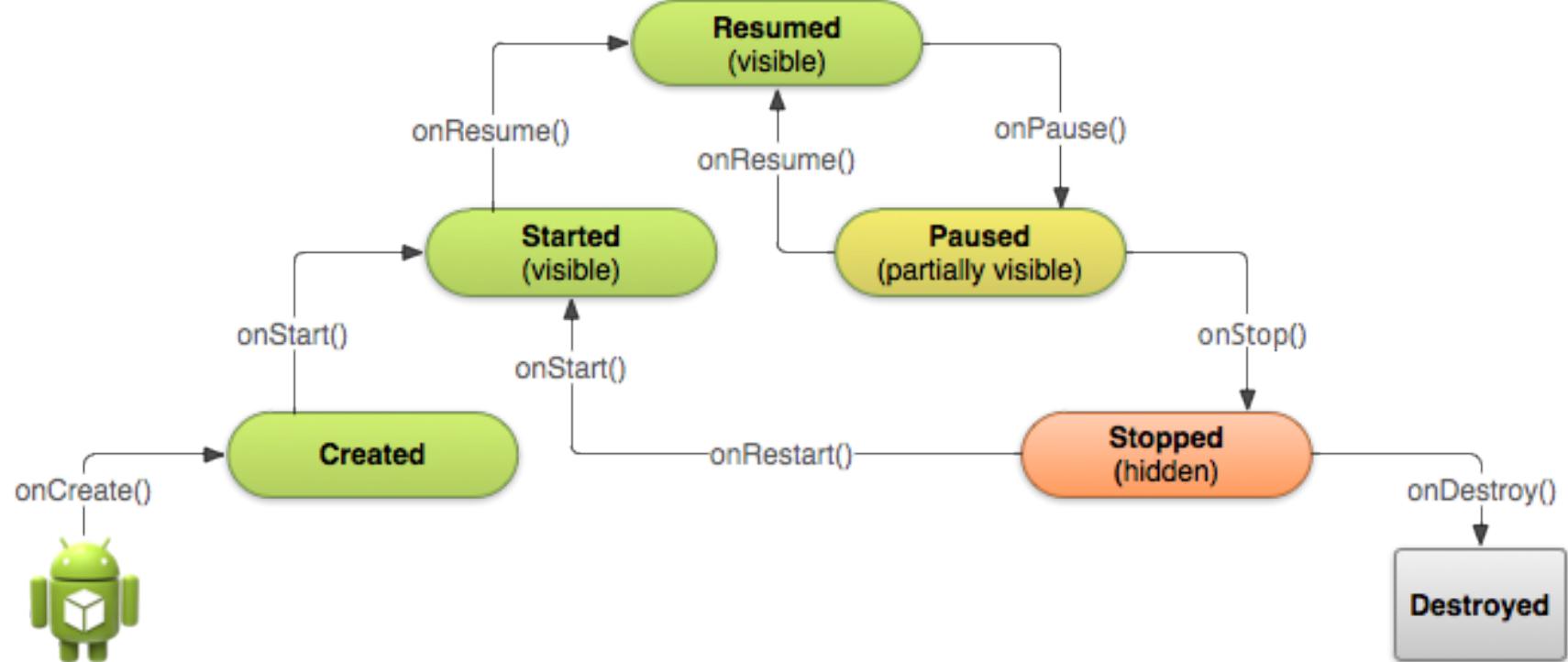
Overzicht Levenscyclus



Activity Lifecycle Callbacks

```
public class MainActivity extends Activity {  
  
    protected void onCreate(Bundle savedInstanceState) {  
        super.onCreate(savedInstanceState);  
        boolean withBundle = (savedInstanceState == null);  
    }  
  
    protected void onDestroy() { super.onDestroy(); }  
  
    protected void onPause() { super.onPause(); }  
  
    protected void onRestart() { super.onRestart(); }  
  
    protected void onResume() { super.onResume(); }  
  
    protected void onStart() { super.onStart(); }  
  
    protected void onStop() { super.onStop(); }  
}
```

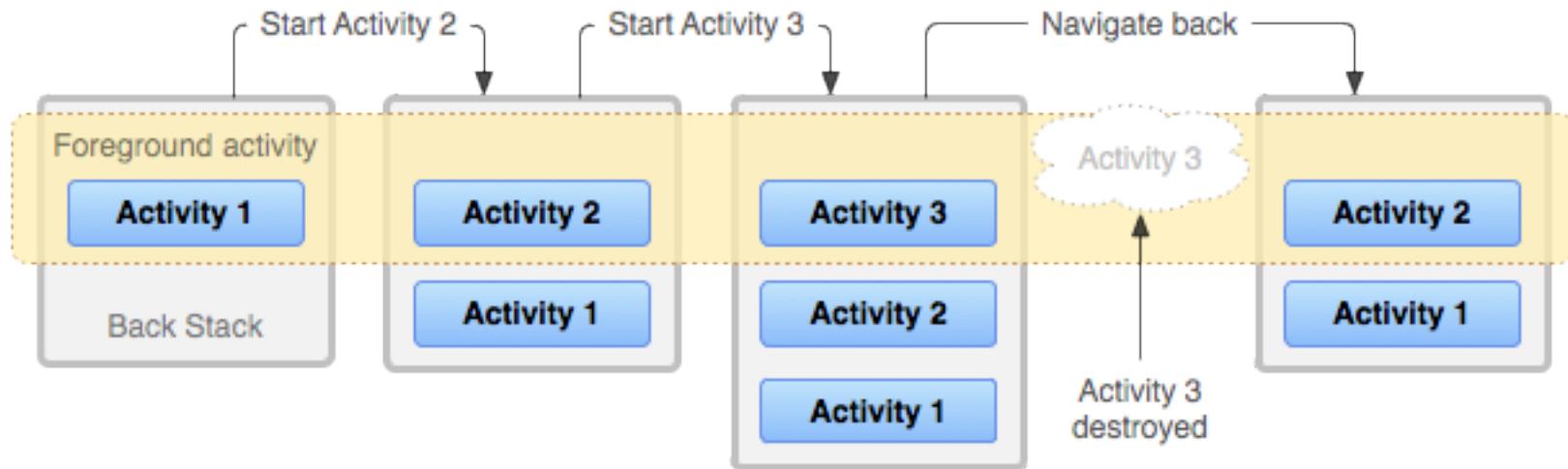
Activity Lifecycle Callbacks



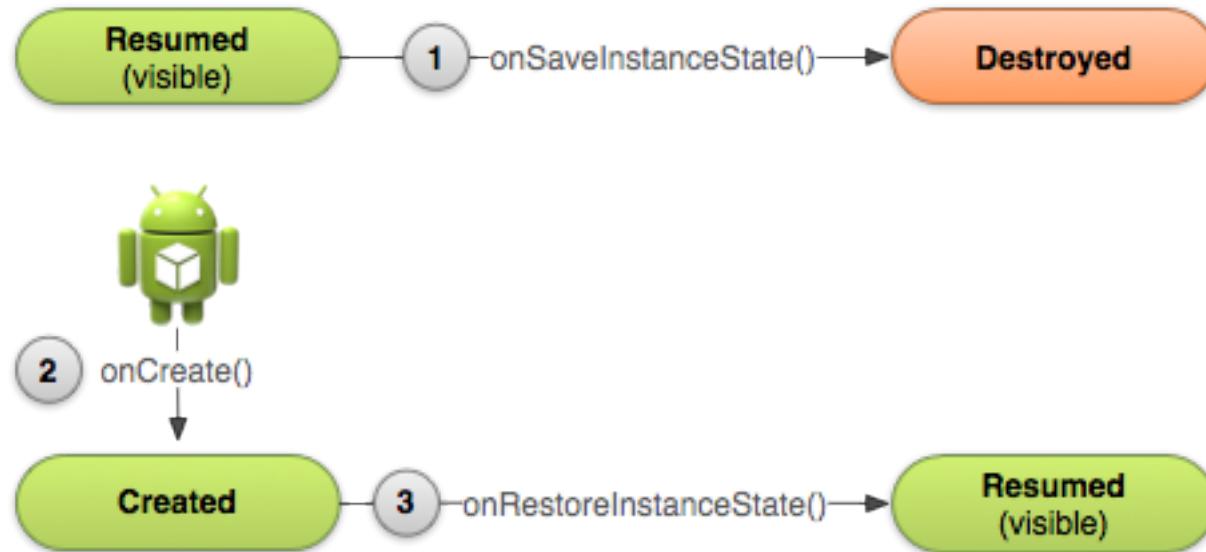
Apps, Processes, Activities, Stacks

Interaction between apps in android

Building the back stack



Saving instance state



Saving in a Activity

```
public class MainActivity extends Activity {
    private static final String SS_COLOR = "color";

    private ColorView colorView;

    @Override
    protected void onCreate(Bundle savedInstanceState) {
        super.onCreate(savedInstanceState);
        setContentView(R.layout.activity_main);
        colorView = (ColorView) findViewById(R.id.colorView1);
    }

    @Override
    protected void onSaveInstanceState(Bundle outState) {
        super.onSaveInstanceState(outState);
        outState.putString(SS_COLOR, colorView.getColor());
    }

    @Override
    protected void onRestoreInstanceState(Bundle savedInstanceState) {
        super.onRestoreInstanceState(savedInstanceState);
        colorView.setColor(savedInstanceState.getString(SS_COLOR));
    }
}
```

Saving in a View

```
@Override
protected Parcelable onSaveInstanceState () {
    Parcelable superSaveState =  super.onSaveInstanceState ();
    Bundle saveState =  new Bundle ();
    saveState.putParcelable (SS_SUPER_SAVE_STATE, superSaveState);
    saveState.putString (SS_COLOR, getColor ());

    return saveState;
}

@Override
protected void onRestoreInstanceState (Parcelable state) {
    Bundle saveState = (Bundle)state;
    setColor (saveState.getString (SS_COLOR));
    super.onRestoreInstanceState (saveState.getParcelable (SS_SUPER_SAVE_STATE));
}
```

Testing Saving instance state



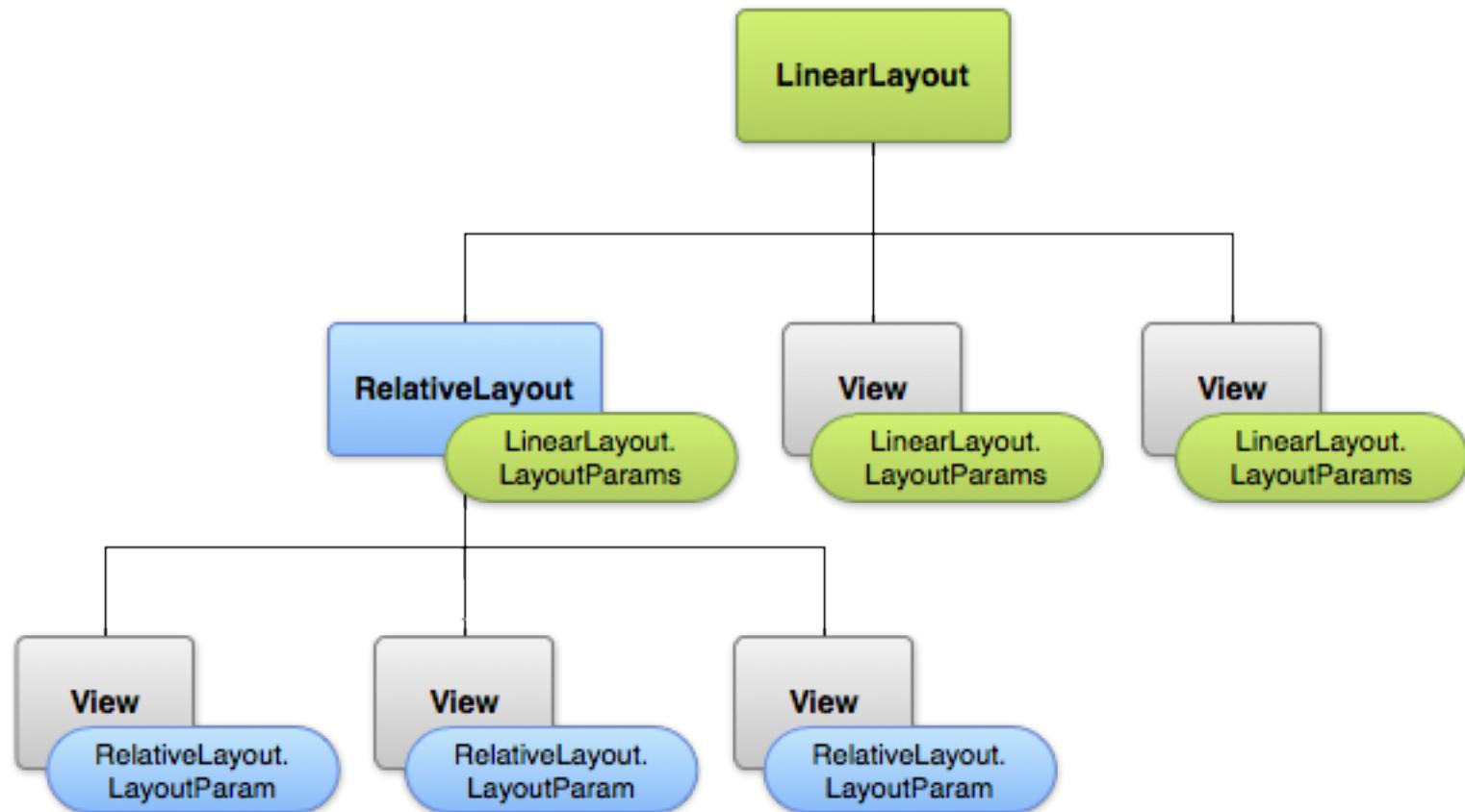
ViewGroups

Creating layout in android

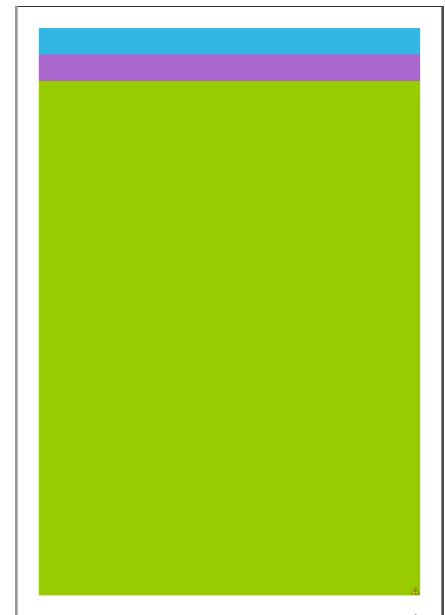
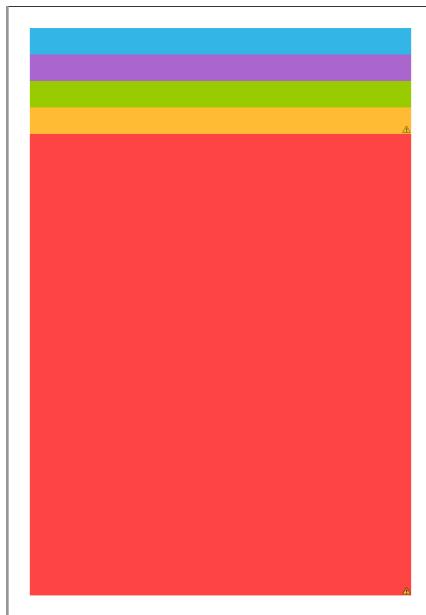
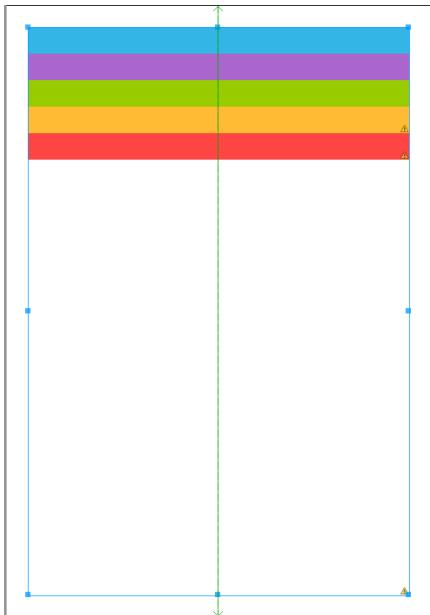
Some Properties

- General
 - id
- ViewGroup.LayoutParams
 - width/height
`<x>dp, fill_parent, wrap_content`
 - padding
- ViewGroup.MarginLayoutParams
 - margin
- LinearLayout.LayoutParams
 - weight
 - gravity

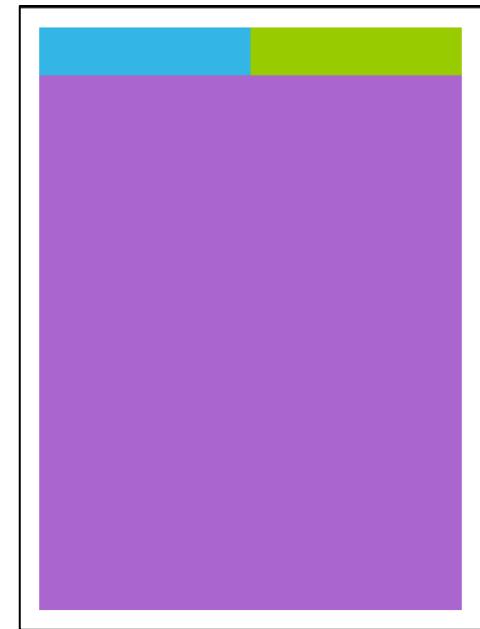
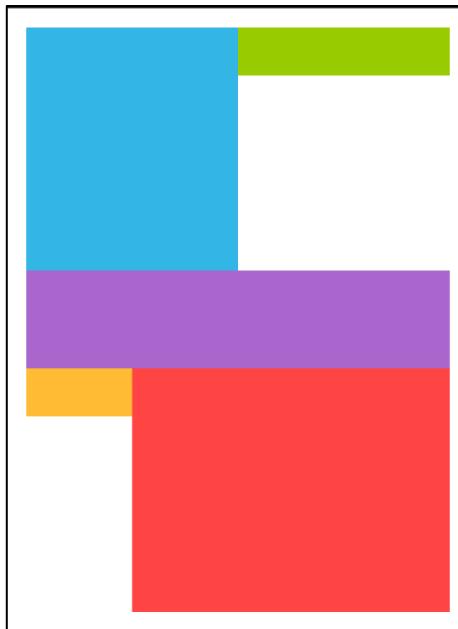
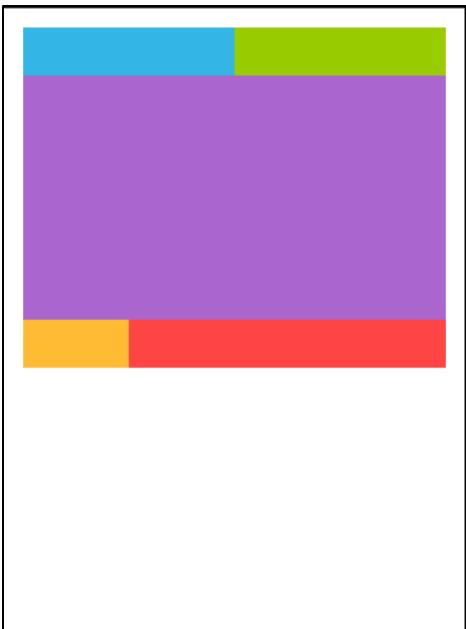
Layout Parameters



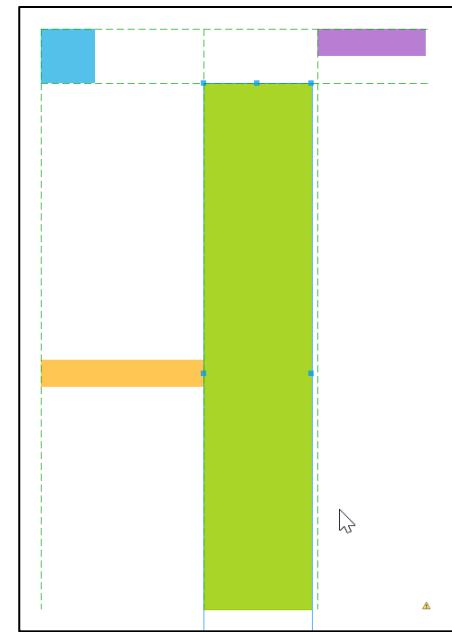
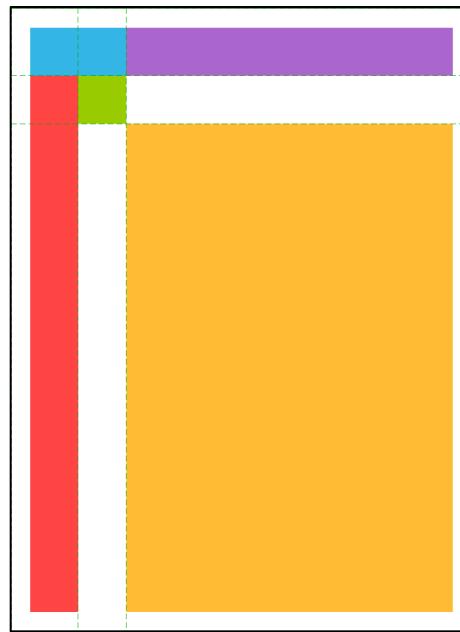
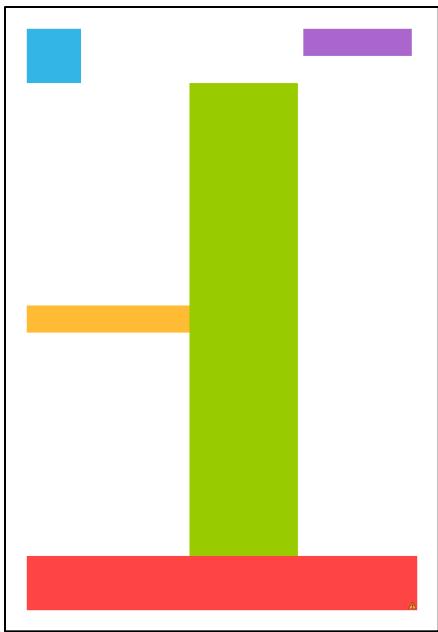
LinearLayout



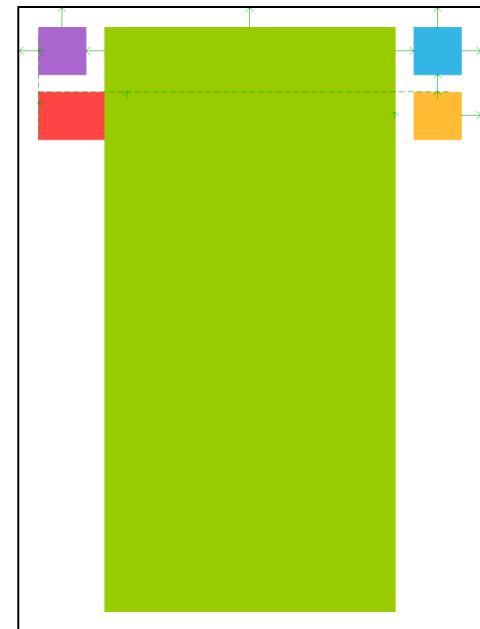
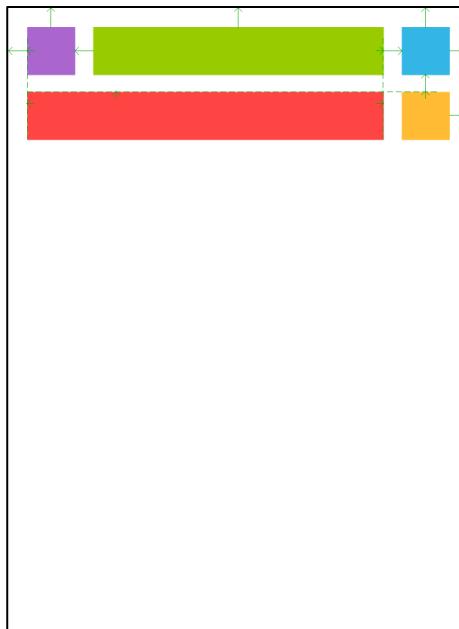
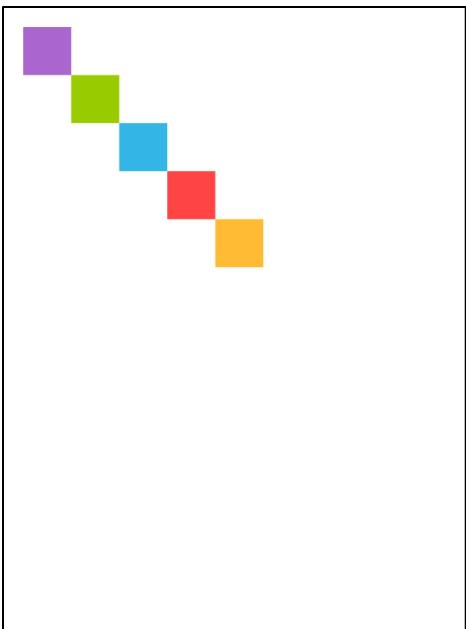
TableLayout



GridLayout



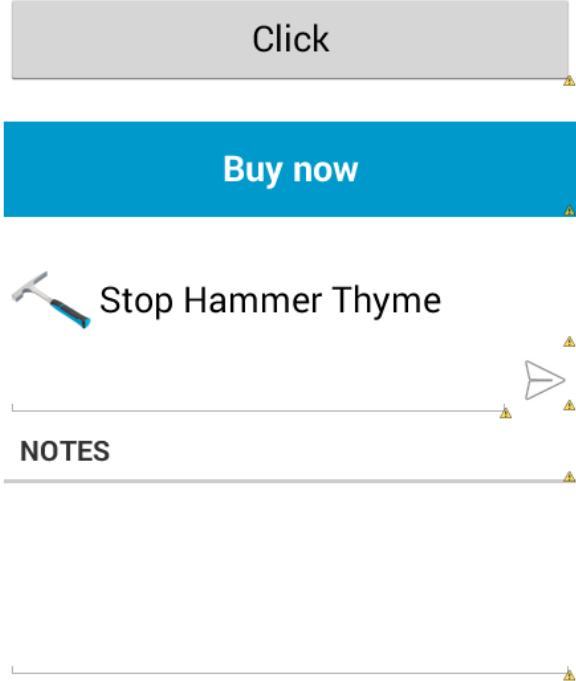
RelativeLayout



Views

UI Components/views/widgets/.... whatever

Button, ImageButton, EditText & TextView, ImageView



```
<Button  
    android:text="Click" />  
  
<Button  
    android:background="#0099CC"  
    android:text="Buy now"  
    android:textColor="#FFFFFF"  
    android:textStyle="bold" />  
  
<Button  
    android:background="#FFFFFF"  
    android:drawableLeft="@drawable/icon"  
    android:gravity="left|center_vertical"  
    android:text="Stop Hammer Thyme" />  
  
<ImageButton  
    android:background="#FFFFFF"  
    android:src="@android:drawable/icon" />  
  
<EditText />  
  
<EditText  
    android:inputType="textMultiLine"  
    android:lines="4" />  
  
<TextView  
    style="?android:attr/listSeparatorTextViewStyle"  
    android:text="Notes" />
```

Handling Button Clicks

```
public class MainActivity extends Activity {

    private Button mBuyButton;

    @Override
    protected void onCreate(Bundle savedInstanceState) {
        super.onCreate(savedInstanceState);
        setContentView(R.layout.activity_main);
        mBuyButton = (Button) findViewById(R.id.buy_button);
        mBuyButton.setOnClickListener(new OnClickListener() {
            @Override
            public void onClick(View view) {
                onBuyClicked(view);
            }
        });
    }

    protected void onBuyClicked(View view) {
        //...
    }
}
```

```
<Button
    android:id="@+id/buy_button"
    android:text="Buy now" />
```

Handling Button Clicks

```
public class MainActivity extends Activity {  
  
    private Button mBuyButton;  
  
    @Override  
    protected void onCreate(Bundle savedInstanceState) {  
        super.onCreate(savedInstanceState);  
        setContentView(R.layout.activity_main);  
    }  
  
    public void onBuyClicked(View view) {  
        //...  
    }  
}
```

```
<Button  
    android:id="@+id/buy_button"  
    android:onClick="onBuyClicked"  
    android:text="Buy now" />
```