LFE Medieninformatik • Prof. Dr. Heinrich Hußmann (Dozent), Alexander De Luca, Gregor Broll (supervisors)

Praktikum Entwicklung von Mediensystemen mit Android

Implementing a User Interface

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Outline

- Introduction
- Layouting Components using XML
- Common Layout Objects
- Hooking into a Screen Element
- Listening for UI Notifications
- Applying a Theme to Your Application

Introduction

- Activity
  - Basic functional unit of an Android application
  - But by itself, it does not have any presence on the screen

- Views and Viewgroups
  - Basic units of user interface expression on the Android platform

Views

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Views

Introduction

- android.view.View
  - Stores layout and content for a specific rectangular area of the screen
  - Handles measuring and layout, drawing, focus change, scrolling, and key/gestures
  - Base class for widgets
    - Text
    - EditText
    - InputMethod
    - MovementMethod
    - Button
    - RadioButton
    - Checkbox
    - ScrollView

```
package com.android.hello;

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

public class HelloAndroid extends Activity {
   /** Called when the activity is first created. */
   @Override
   public void onCreate(Bundle icicle) {
       super.onCreate(icicle);
       TextView tv = new TextView(this);
       tv.setText("Hello, Android");
       setContentView(tv);
   }
}
```

Viewgroups

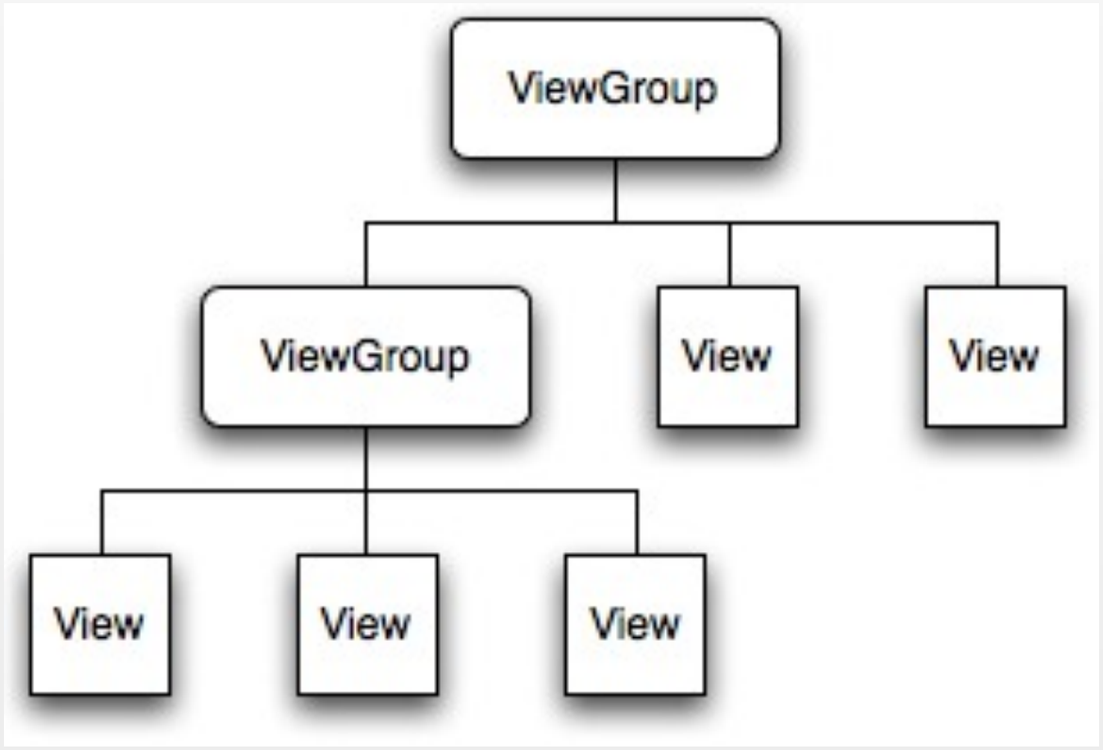
Introduction

- android.view.Viewgroup
  - Contains and manages a subordinate set of views and other viewgroups
  - Base class for layouts

Tree-Structured UI

Introduction

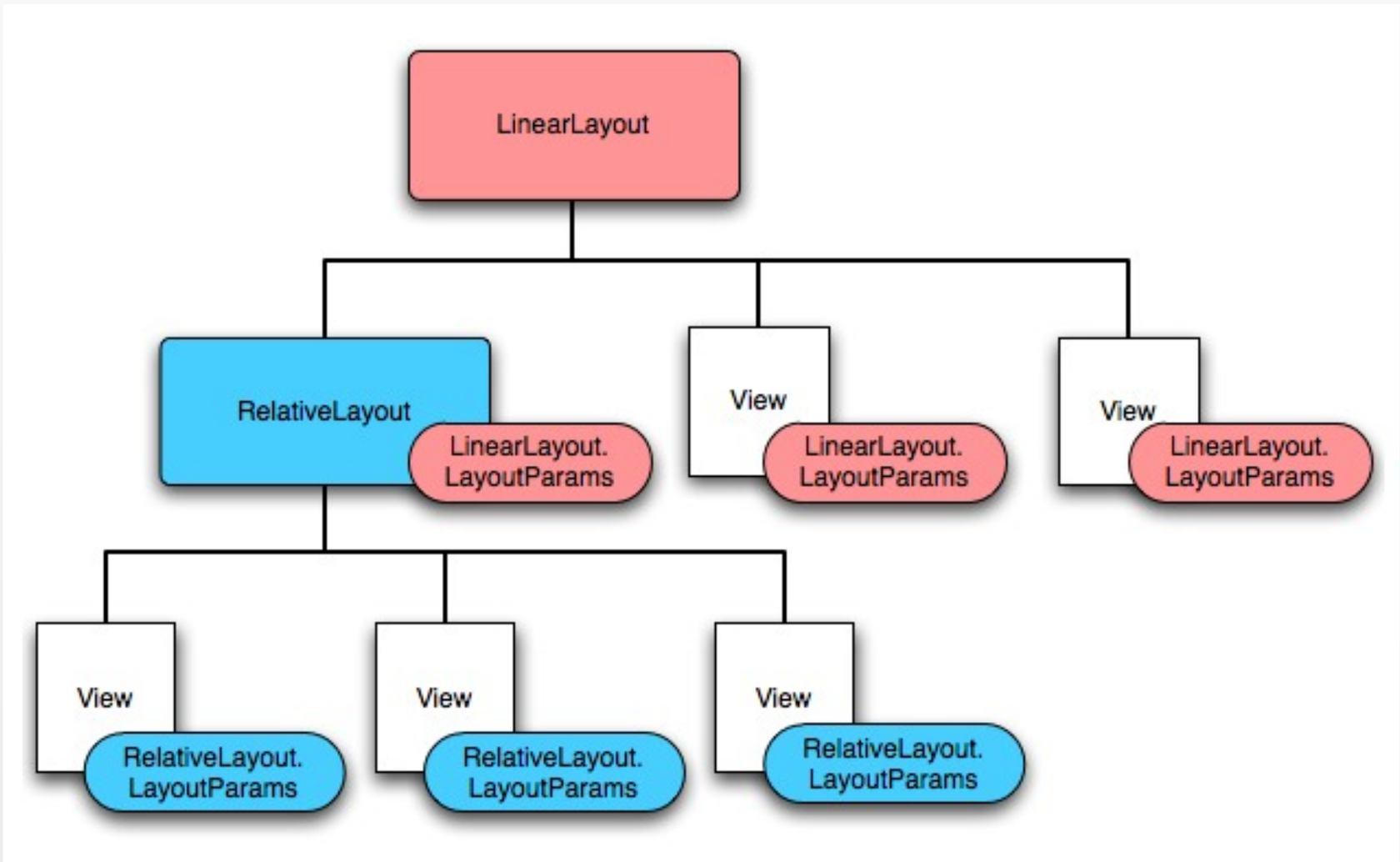
- An Activity in Android
  - Defined using a tree of view and viewgroup nodes
- setContentView() method
  - Called by the Activity to attach the tree to the screen for rendering



LayoutParams

Introduction

- Every viewgroup class uses a nested class that extends ViewGroup.LayoutParams
  - ➢Contains property types that defines the child's size and position



Programmatic UI Layout

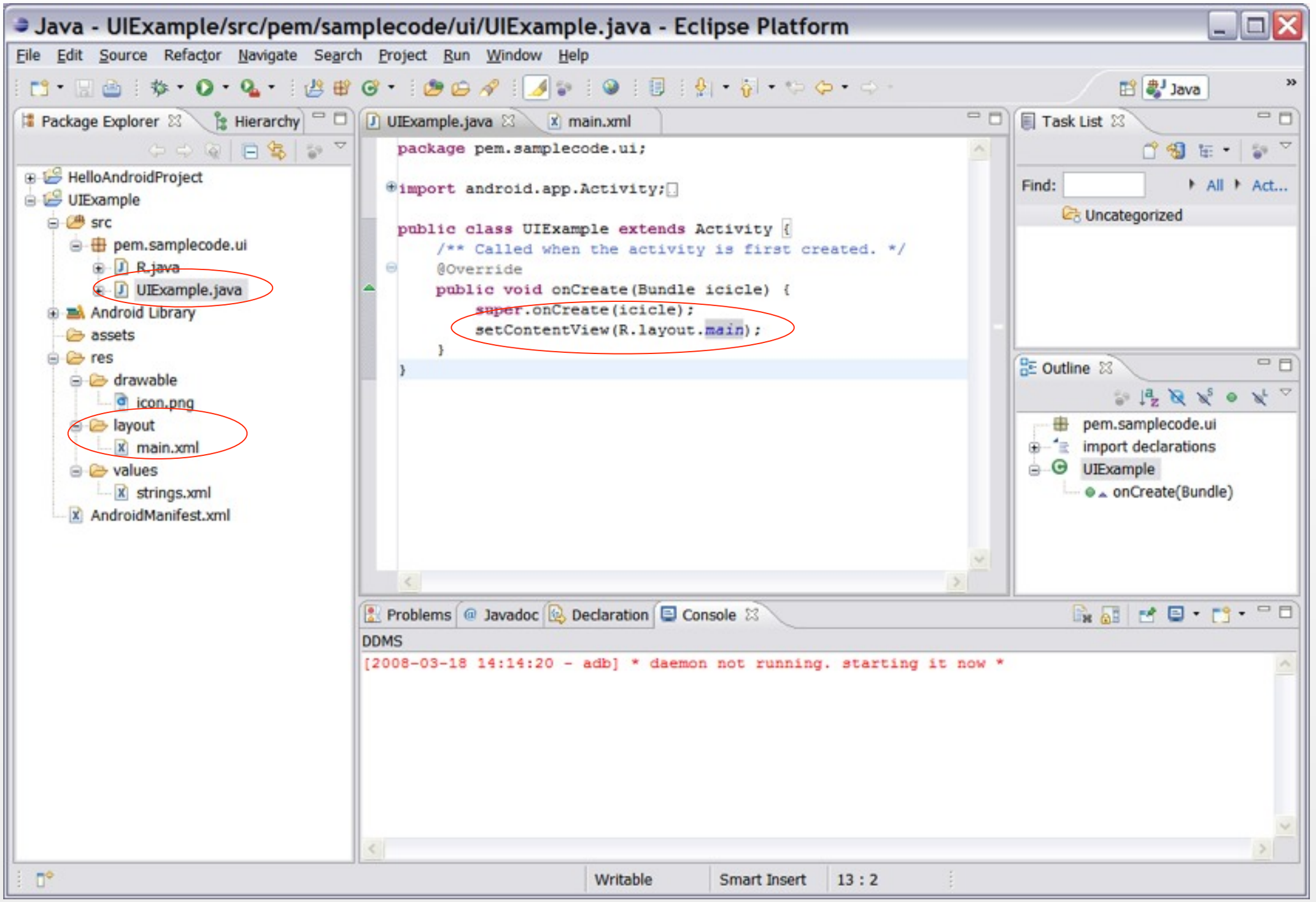
- Programmatic UI Layout
  - ➢Constructing and building the applications UI directly from source code
  - ➢Disadvantage
    - small changes in layout can have a big effect on the source code

```
package com.android.hello;

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

public class HelloAndroid extends Activity {
    /** Called when the activity is first created. */
    @Override
    public void onCreate(Bundle icicle) {
        super.onCreate(icicle);
        TextView tv = new TextView(this);
        tv.setText("Hello, Android");
        setContentView(tv);
    }
}
```

Upgrading UI to XML Layout

- XML-based Layout
  - Inspired by web development model where the presentation of the application's UI is separated from the logic
  - Two files to edit
    - Java file – application logic
    - XML file – user interface

Upgrading UI to XML Layout



Upgrading UI to XML Layout

UIExample.java | main.xml

xml	version="1.0" encoding="utf-8"
LinearLayout	
xmlns:android	http://schemas.android.com/apk/res/and
android:orientation	vertical
android:layout_width	fill_parent
android:layout_height	fill_parent
TextView	

UIExample/res/layout/main.xml

Design | Source

UIExample.java | main.xml

```
<?xml version="1.0" encoding="utf-8"?>
<LinearLayout xmlns:android="http://schemas.android.com/apk/res/android"
    android:orientation="vertical"
    android:layout_width="fill_parent"
    android:layout_height="fill_parent"
    >
<TextView
    android:layout_width="fill_parent"
    android:layout_height="wrap_content"
    android:text="Hello World, UIExample"
    />
</LinearLayout>
```

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2:29 PM
UI Example
Hello World, UIExample
MENU

Common Layout Objects

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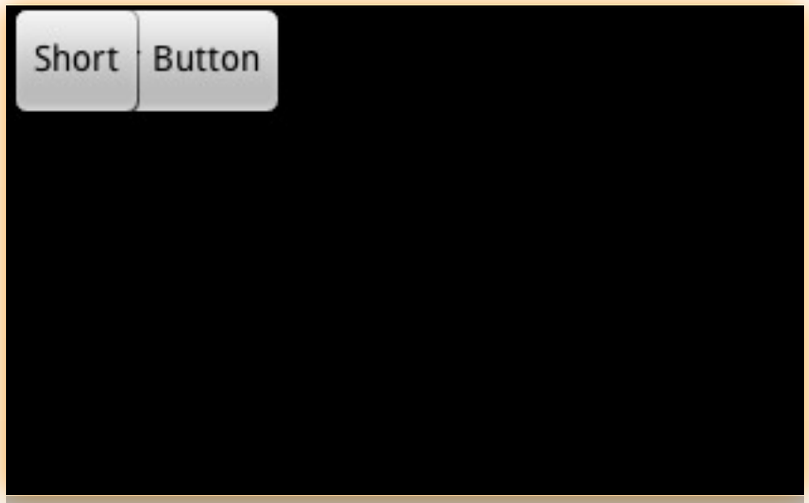
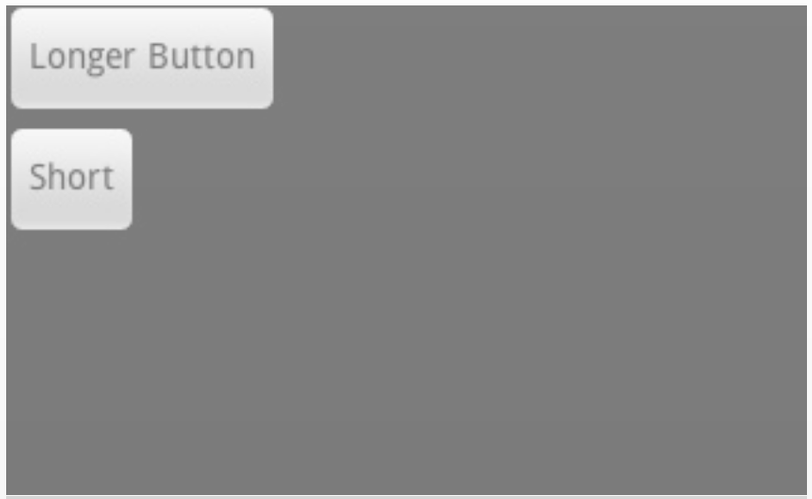
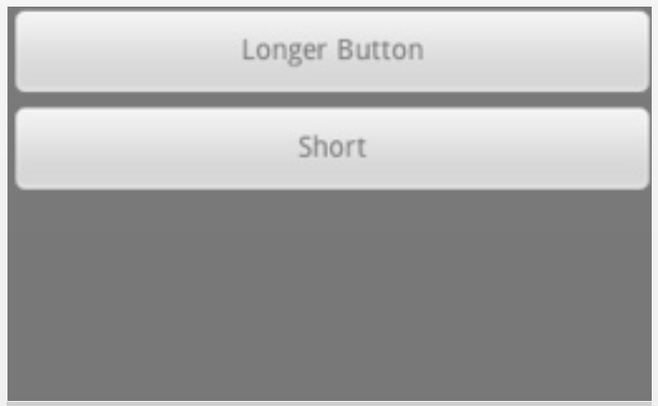
Common Layout Objects



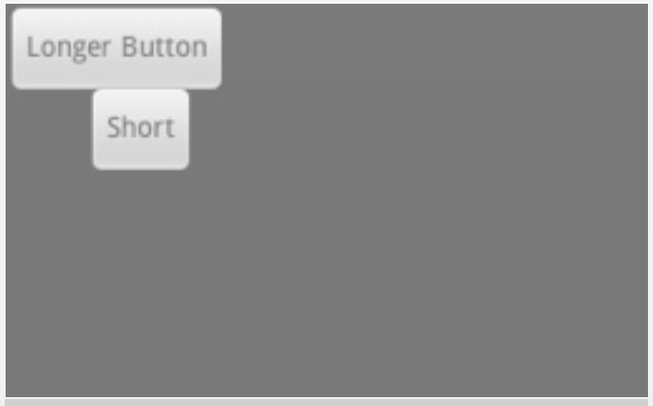
FrameLayout



LinearLayout



TableLayout



AbsoluteLayout

RelativeLayout

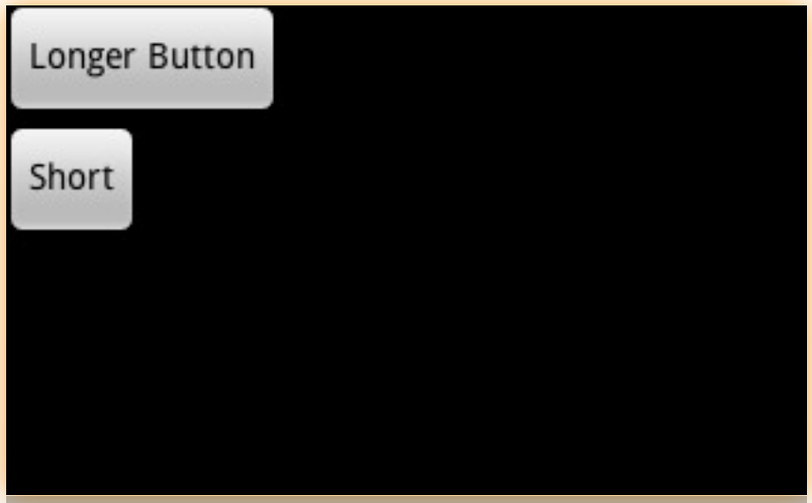
FrameLayout

Common Layout Objects

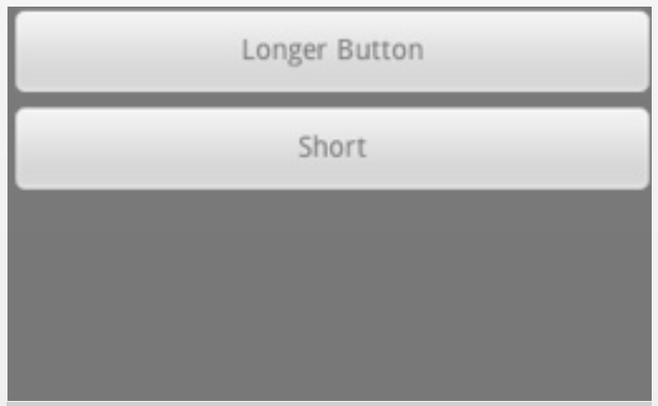
- Simplest layout object
- Intended as a blank reserved space on your screen that you can later fill with a single object
  - Example: a picture that you'll swap out
- All child elements are pinned to the top left corner of the screen
- Cannot specify a location for a child element

Common Layout Objects

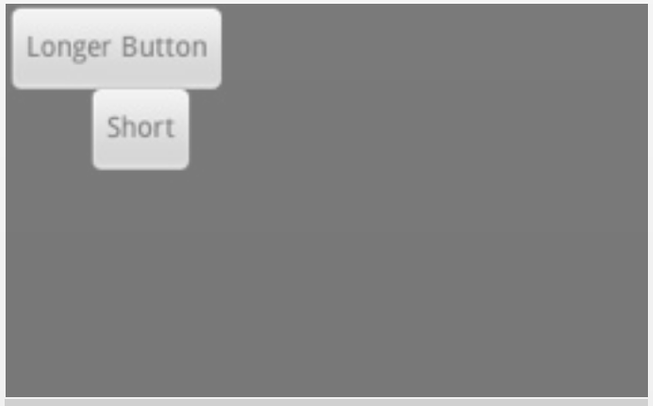
FrameLayout



LinearLayout



TableLayout



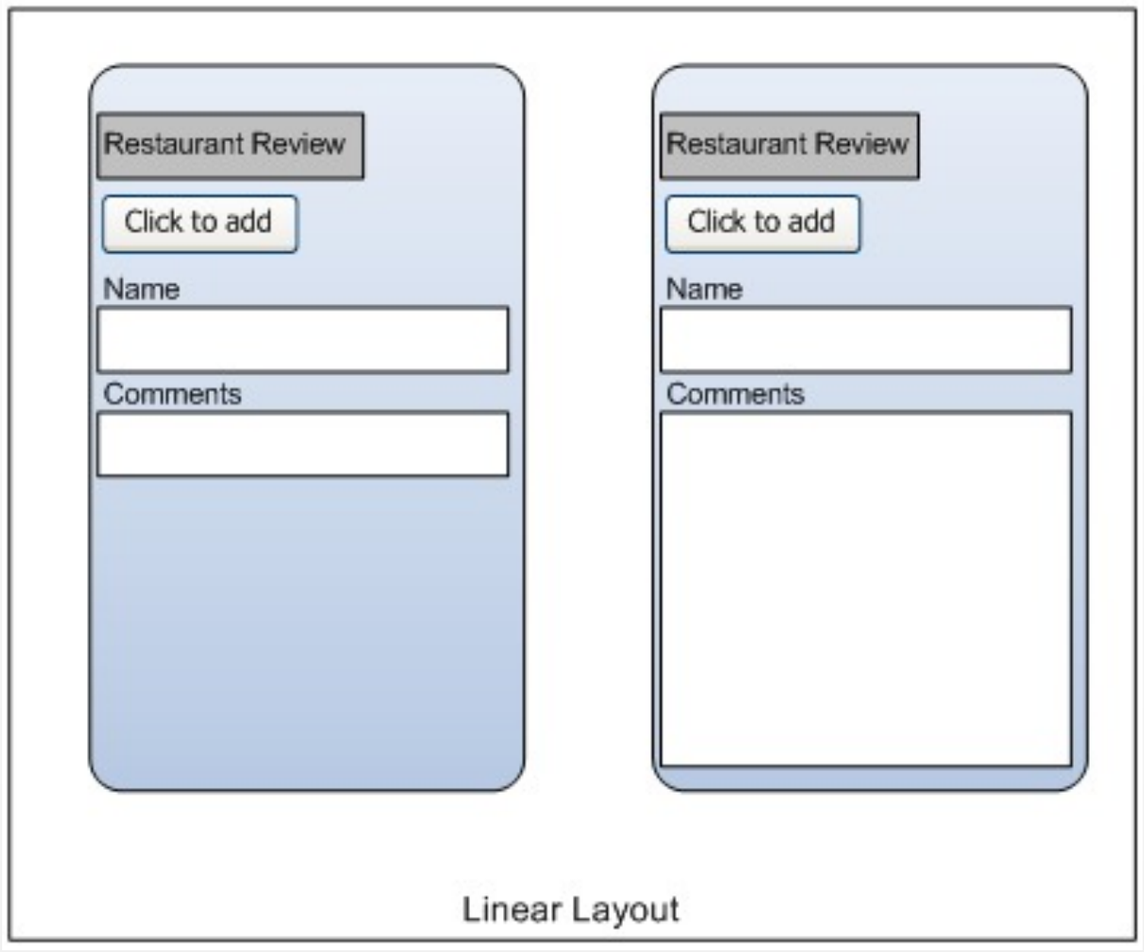
AbsoluteLayout

RelativeLayout

LinearLayout

Common Layout Objects

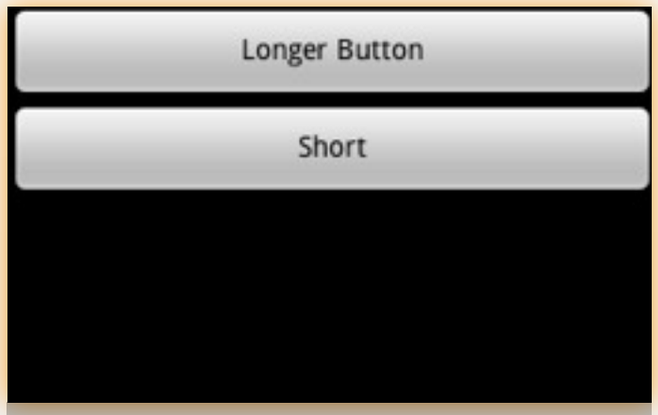
- Aligns all children in a single direction — vertically or horizontally
  - ➢All children are stacked one after the other
    - a vertical list will only have one child per row (no matter how wide they are)
    - a horizontal list will only be one row high (the height of the tallest child, plus padding)



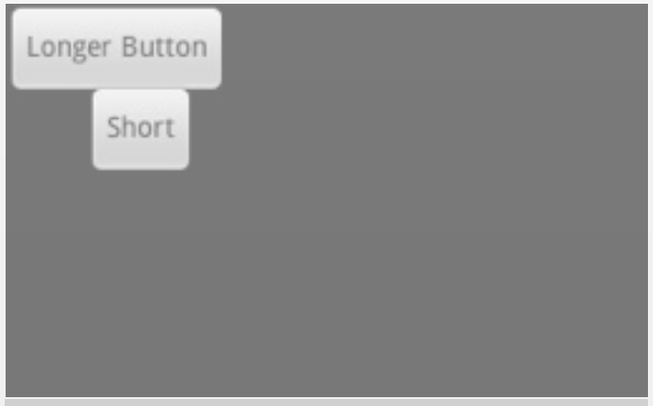
Common Layout Objects

FrameLayout

LinearLayout



TableLayout



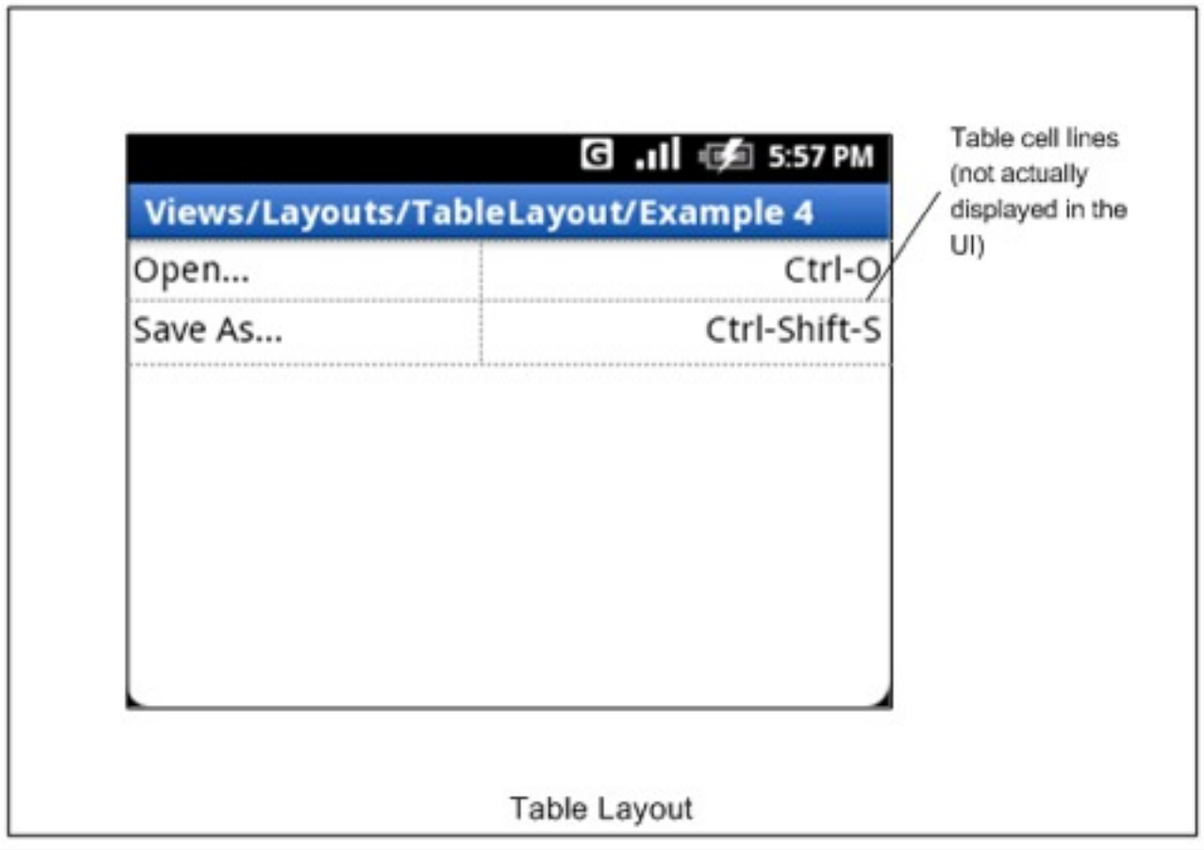
AbsoluteLayout

RelativeLayout

TableLayout

Common Layout Objects

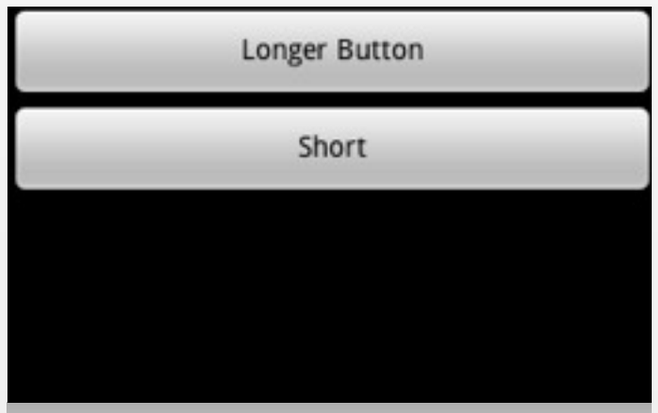
- Positions its children into rows and columns
- Does not display border lines for their rows, columns, or cells
- Cells cannot span columns, as they can in HTML



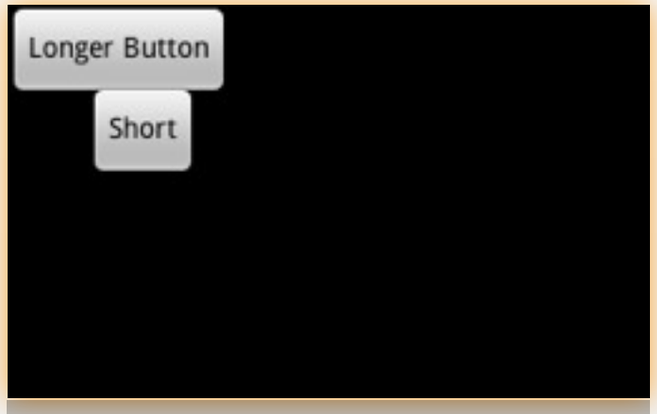
Common Layout Objects

FrameLayout

LinearLayout



TableLayout



AbsoluteLayout

RelativeLayout

AbsoluteLayout

Common Layout Objects

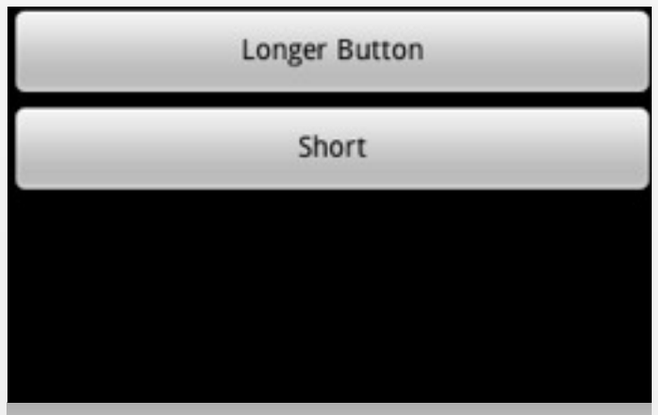
- Enables children to specify exact x/y coordinates to display on the screen
  - (0,0) is the upper left corner
  - values increase as you move down or to the right
- Overlapping elements are allowed (although not recommended)

- NOTE:
  - It is generally recommended NOT to use AbsoluteLayout UNLESS you have good reasons to use it
  - It is because it is fairly rigid and does not work well with different device displays

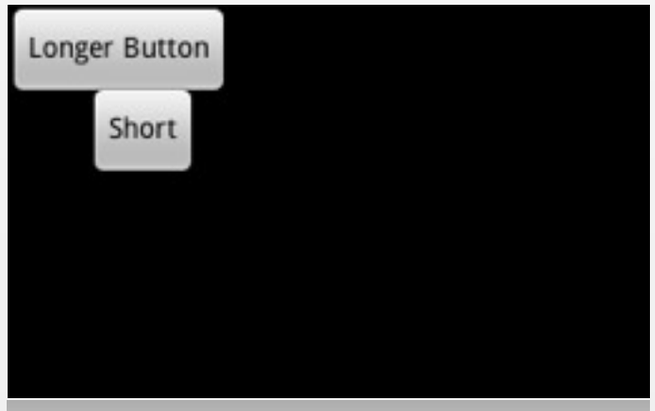
Common Layout Objects

FrameLayout

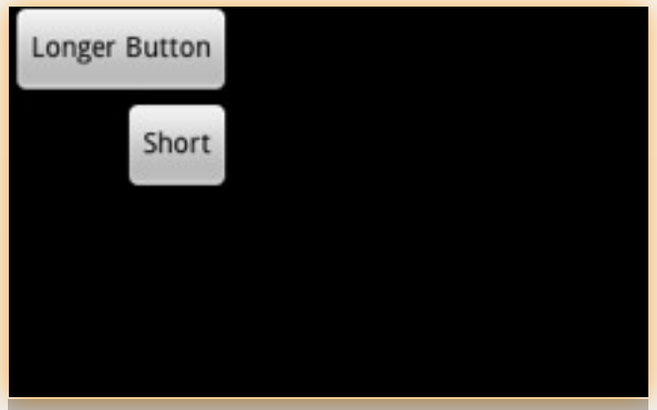
LinearLayout



TableLayout



AbsoluteLayout

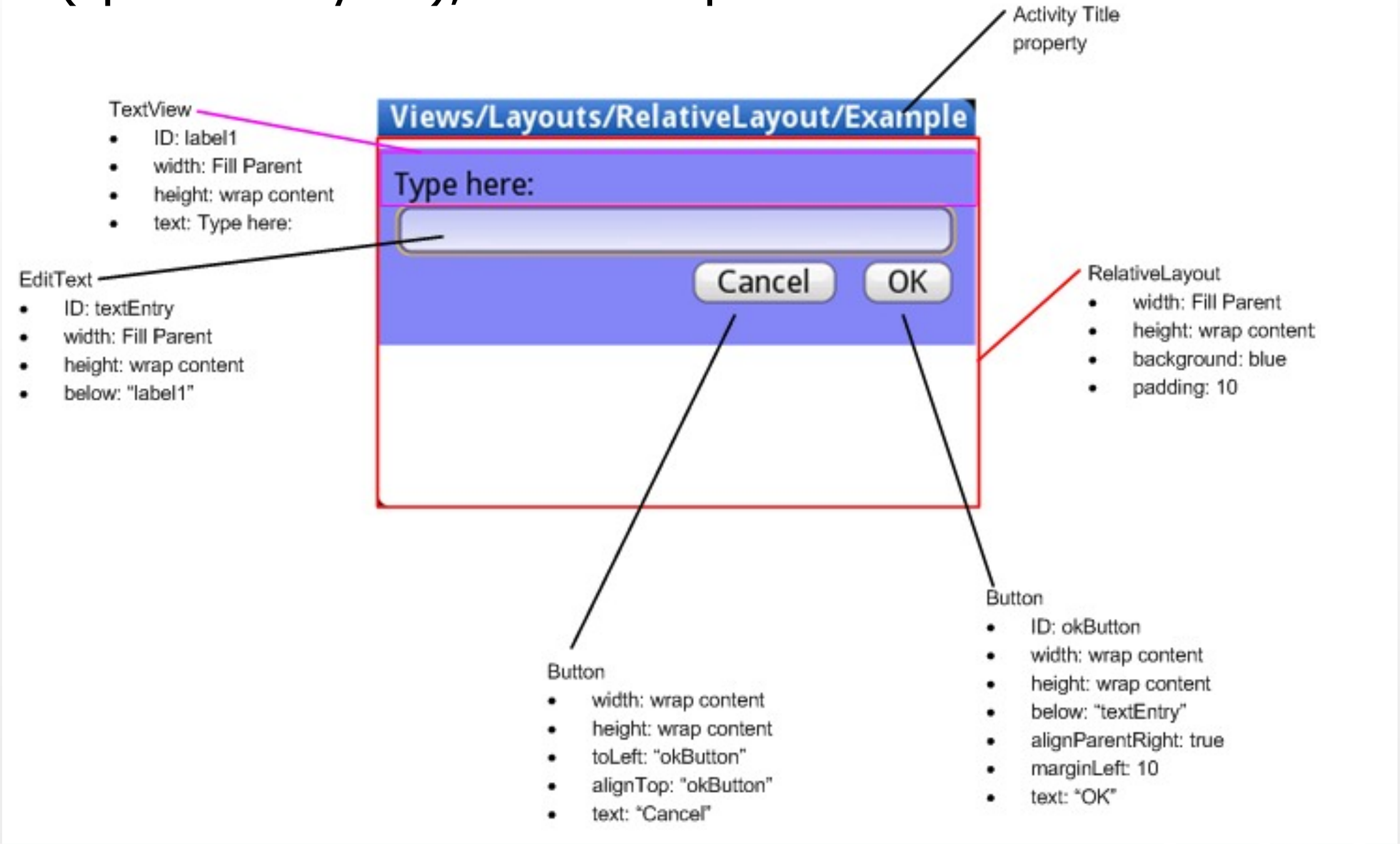


RelativeLayout

RelativeLayout

Common Layout Objects

- Lets children specify their position relative to each other (specified by ID), or to the parent



Important Layout Paramters

Allgemein:

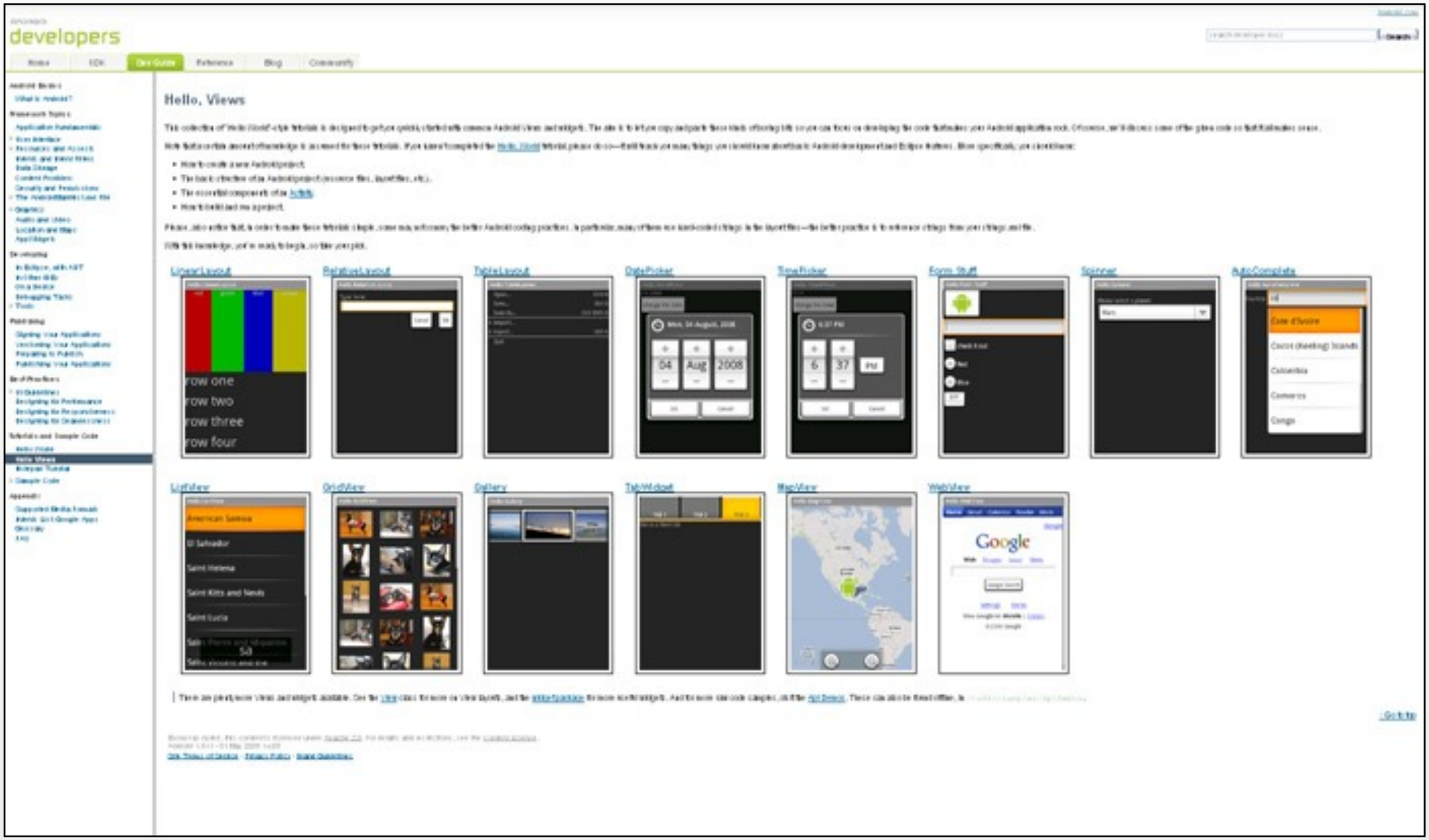
Layout-Height:	fill_parent, wrap_content, Pixels
Layout-Width:	fill_parent, wrap_content, Pixels
Id:	@+id/my_variable
Min-Height, Max-Height...	
Min-Width, Max-Width	

Speziell:

EditText	Input type	text, textEmailAddress, number, numberDecimal
TextView, Button, EditText	Text	@string/resource_id
TextView	Text color, Text size	

Online Reference

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



Hooking into a screen element

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Hooking into a Screen Element

Hooking into a Screen Element

UIExample.java | main.xml

```
<?xml version="1.0" encoding="utf-8"?>
<LinearLayout xmlns:android="http://schemas.android.com/apk/res/android"
    android:orientation="vertical"
    android:layout_width="fill_parent"
    android:layout_height="fill_parent"
    >

    <TextView
    android:layout_width="fill_parent"
    android:layout_height="wrap_content"
    android:text="Hello World, UIExample"
    />

    <EditText
    android:id="@+id/name_entry"
    android:layout_width="fill_parent"
    android:layout_height="wrap_content"
    />

    <Button
    android:id="@+id/ok"
    android:layout_width="fill_parent"
    android:layout_height="wrap_content"
    android:text="OK"
    />

</LinearLayout>
```

Design | Source

Hooking into a Screen Element

```
<E
  android:id="@+id/name_entry"
an
android:layout_height="wrap_content"
/>

<Button
android:id="@+id/ok"
android:layout_width="fill_parent"
android:layout_height="wrap_content"
android:text="OK"
/>
```

Any String value
(no spaces)

@+id syntax**:**
Creates a resource number in the R class (R.java file) if one doesn't exist, or uses it if it does exist.

Hooking into a Screen Element

UIExample.java | main.xml | main2.xml | R.java

```
/* AUTO-GENERATED FILE.  DO NOT MODIFY.
 *
 * This class was automatically generated by the
 * aapt tool from the resource data it found.  It
 * should not be modified by hand.
 */

package pem.samplecode.ui;

public final class R {
    public static final class attr {
    }
    public static final class drawable {
        public static final int icon=0x7f020000;
    }
    public static final class id {
        public static final int name_entry=0x7f050000;
        public static final int ok=0x7f050001;
    }
    public static final class layout {
        public static final int main=0x7f030000;
        public static final int main2=0x7f030001;
    }
    public static final class string {
        public static final int app_name=0x7f040000;
    }
}
```

Hooking into a Screen Element

UIExample.java | main.xml

```
package pem.samplecode.ui;

import android.app.Activity;
import android.os.Bundle;
import android.widget.EditText;

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

        //Add a handle to UI components
        EditText nameEntry = (EditText)findViewById(R.id.name_entry);
        nameEntry.setText("Enter your name here");

    }
}
```

Hooking into a Screen Element

Listening for UI Notifications

UIExample.java | main.xml

```
package pem.samplecode.ui;

import android.app.Activity;
import android.os.Bundle;
import android.view.View;
import android.view.View.OnClickListener;
import android.widget.Button;
import android.widget.EditText;

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

        //Add a handle to UI components
        EditText nameEntry = (EditText)findViewById(R.id.name_entry);
        nameEntry.setText("Enter your name here");

        Button okButton = (Button)findViewById(R.id.ok);

        //Create an anonymous class to act as a button click listener
        okButton.setOnClickListener(new OnClickListener()
        {
            public void onClick(View v){
                setResult(RESULT_OK, "Done!");
                finish();
            }
        });
    }
}
```

Resource Folders and Localization

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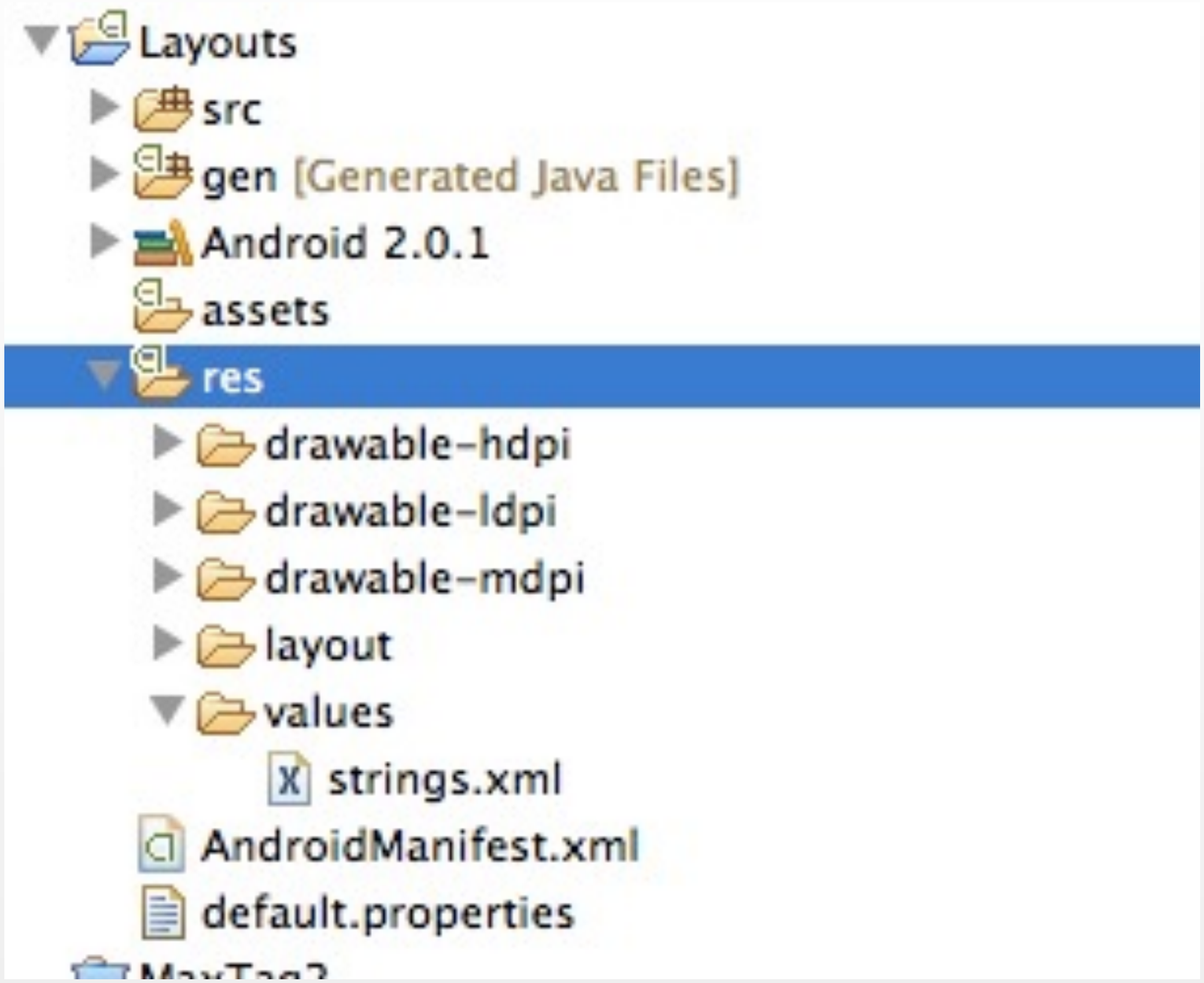
Resource Folders



Resource Folders

- Folder structure is automatically parsed into Resource-File
- Do not modify this file!

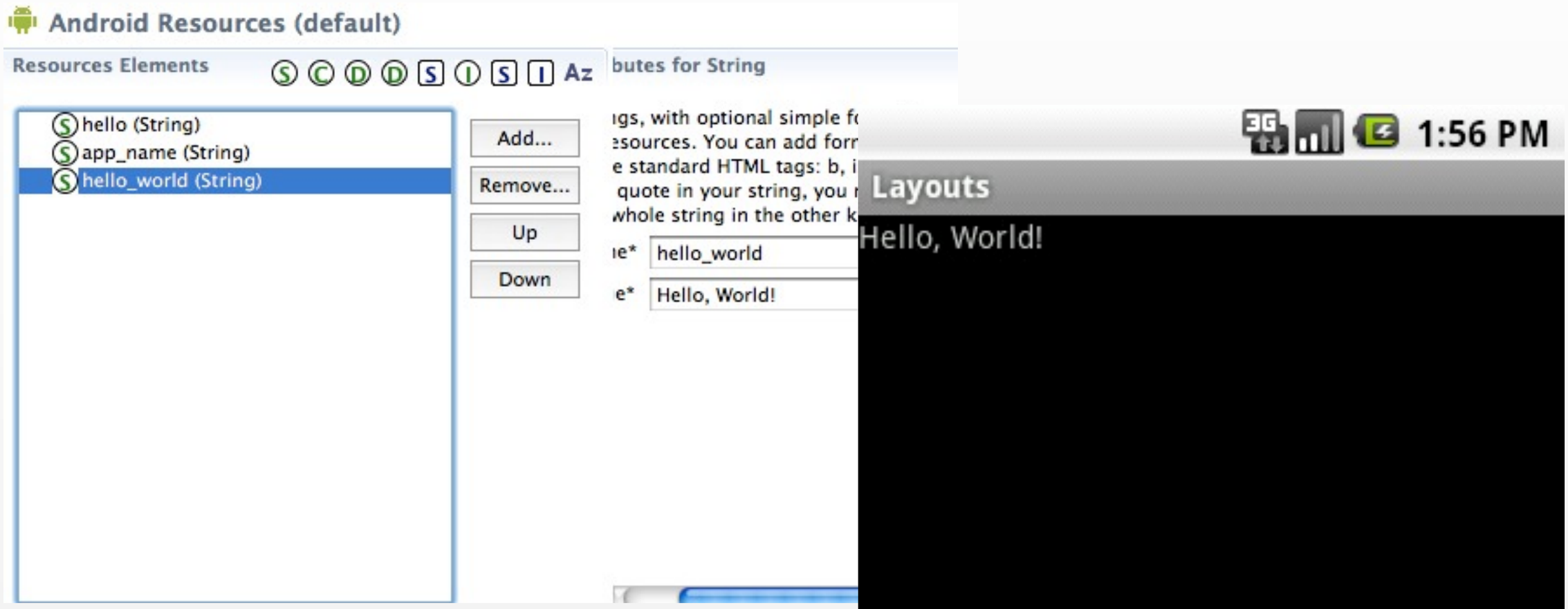

```
/* AUTO-GENERATED FILE.  DO NOT MODIFY.

package de.maxmaurer.layouts;

public final class R {
    public static final class attr {
    }
    public static final class drawable {
        public static final int icon=0x7f020000;
    }
    public static final class id {
        public static final int Button01=0x7f050001;
        public static final int Button02=0x7f050000;
    }
    public static final class layout {
        public static final int main=0x7f030000;
    }
    public static final class string {
        public static final int app_name=0x7f040001;
        public static final int hello=0x7f040000;
    }
}
```

Resource Folders

- Separate storage of Strings and Graphics
- Makes it easier to modify software parts
- Resources are accessed via „R.java“

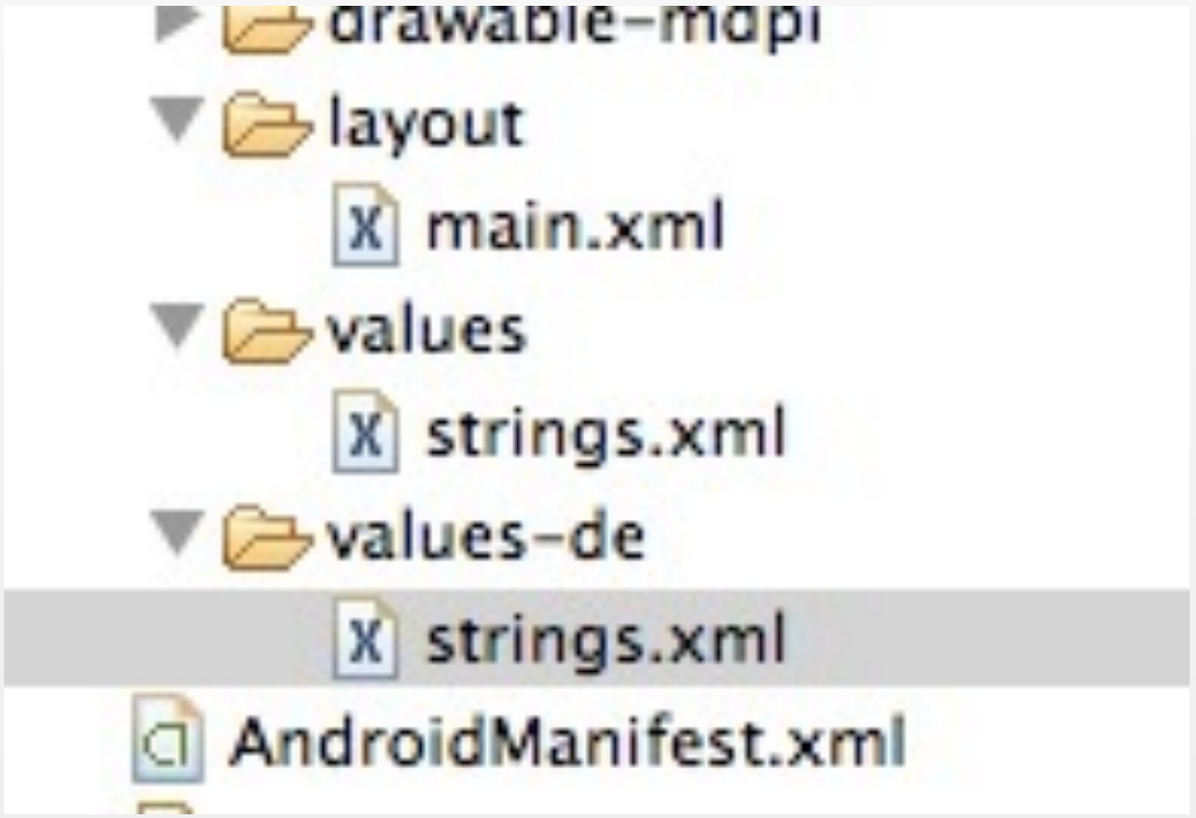
```
package de.maxmaurer.layouts;

import android.app.Activity;

public class Layouts extends Activity {
    /** Called when the activity is first created. */
    @Override
    public void onCreate(Bundle savedInstanceState) {
        super.onCreate(savedInstanceState);
        View v = findViewById(R.layout.main);
        TextView tv = new TextView(this);
        tv.setText(getString(R.string.hello_world));
        setContentView(v);
    }
}
```

Resource Folders

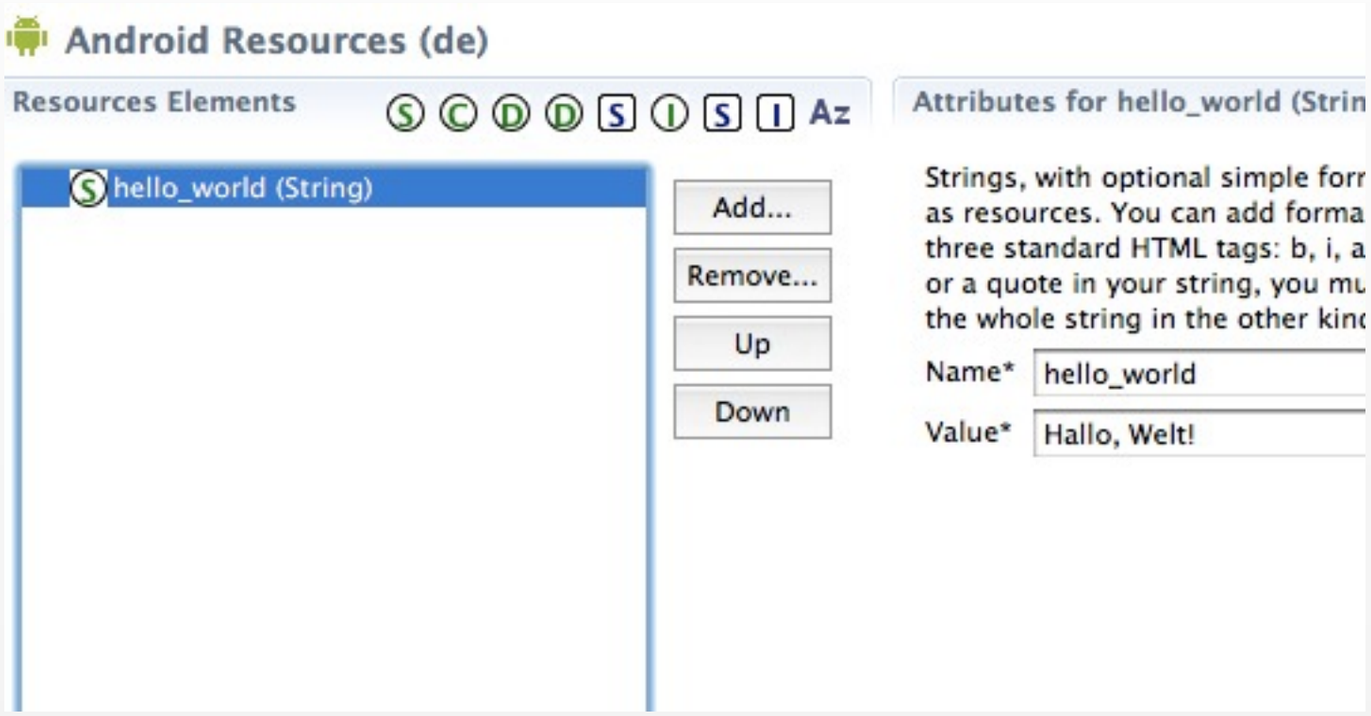


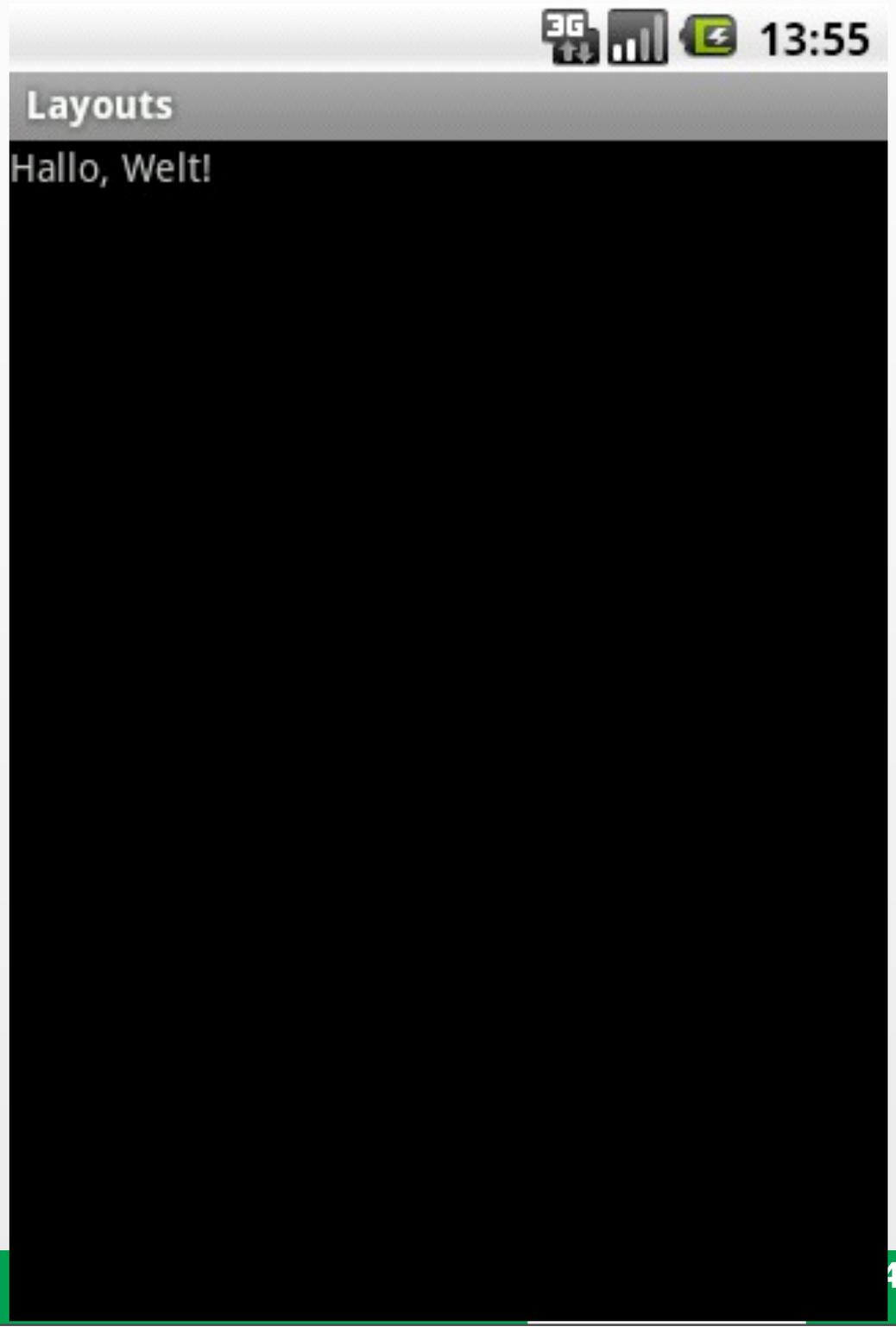
Localization

- Creating folders for other languages does not need any code change
- Watch the application size!



Localization





Localization

- May be used for other device specific things as well
  - Country
  - Screen dimensions
  - Screen orientation
  - Touchscreen type (finger, stylus)
  - and many more

```
MyApp/
    res/
        drawable-en-rUS-large-long-port-mdpi-finger-keysexposed-qwerty-navexposed-dpad-480x320/
```

Applying a Theme to your application

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Applying a Theme to Your Application

- Default theme: android.R.style.Theme
  - http://developer.android.com/reference/android/R.style.html

- Two ways to set the theme
  - Adding the theme attribute in `AndroidManifest.xml`
  - Calling `setTheme()` inside the `onCreate()` method

Editing AndroidManifest.xml

Applying a Theme to Your Application

- Adding the theme attribute in AndroidManifest.xml

UIExample.java | main.xml | AndroidManifest.xml

```
<?xml version="1.0" encoding="utf-8"?>
<manifest xmlns:android="http://schemas.android.com/apk/res/android"
    package="pem.samplecode.ui">
    <application android:icon="@drawable/icon"
        android:theme="@android:style/Theme.Black">
        <activity android:name=".UIExample" android:label="@string/app_name">
            <intent-filter>
                <action android:name="android.intent.action.MAIN" />
                <category android:name="android.intent.category.LAUNCHER" />
            </intent-filter>
        </activity>
    </application>
</manifest>
```

Calling setTheme()

Applying a Theme to Your Application

- Calling setTheme() inside the onCreate() method

UIExample.java | main.xml | AndroidManifest.xml

```
package pem.samplecode.ui;

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

public class UIExample extends Activity {
    /** Called when the activity is first created. */
    @Override
    public void onCreate(Bundle icicle) {
        super.onCreate(icicle);

        setTheme(android.R.style.Theme_Black);
        setContentView(R.layout.main);
    }
}
```

Theme_Black

Theme_Light

Exercise

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Exercise

- Chatting with Myself Application
  - ➢ Components
    - Image
    - Text that displays the Name
    - Drop down box that displays the status
      - o Available
      - o Busy
      - o Away
    - Text Area that displays messages
      - o Format for the output is
        - ▫ ChatterName:The Message
    - Text Field where the user can type the message
    - Send Button
      - o When Pressed
        - ▫ Message typed on the text field is displayed on the text area
        - ▫ Text field is cleared

- Any improvements on the design or additional functionality is encouraged

Fragen?
Viel Spaß!