

Praktikum Entwicklung Mediensysteme

Implementing a User Interface



Outline

- Introduction
- Programmatic vs. XML Layout
- Common Layout Objects
- Hooking into a Screen Element
- Listening for UI Notifications
- Applying a Theme to Your Application



Introduction

Implementing a User Interface



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

Beautiful View from up here...

- 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

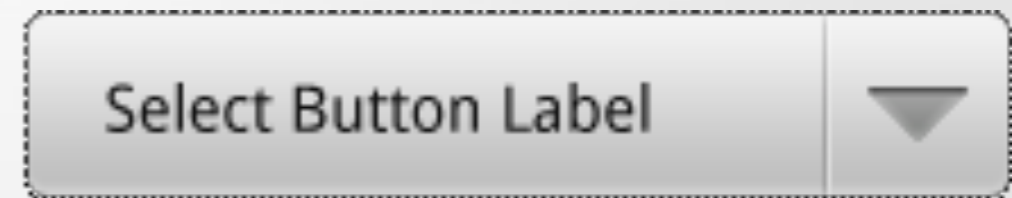
```
package com.android.hello;

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 savedInstanceState) {
        super.onCreate(savedInstanceState);
        TextView tv = new TextView(this);
        tv.setText("Hello, Android");
        setContentView(tv);
    }
}
```

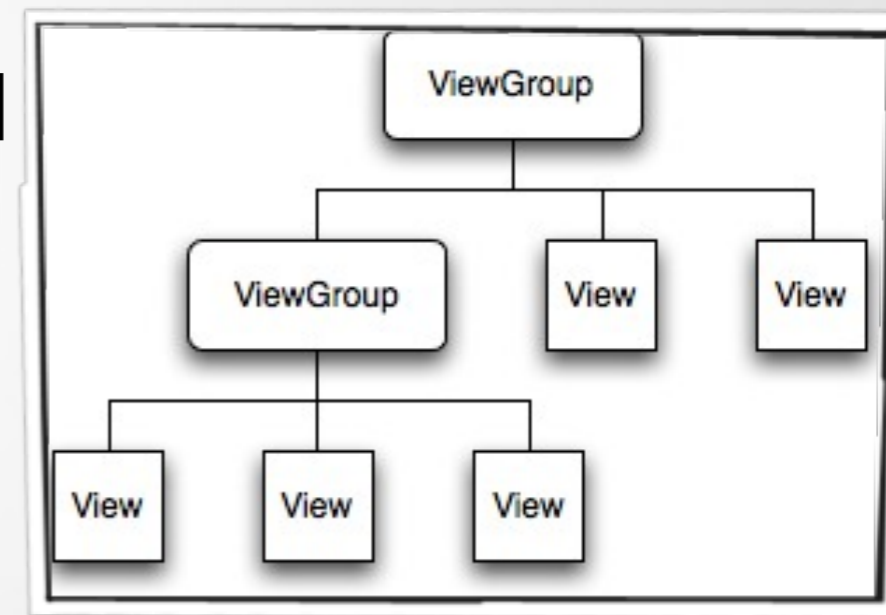
Viewgroups

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



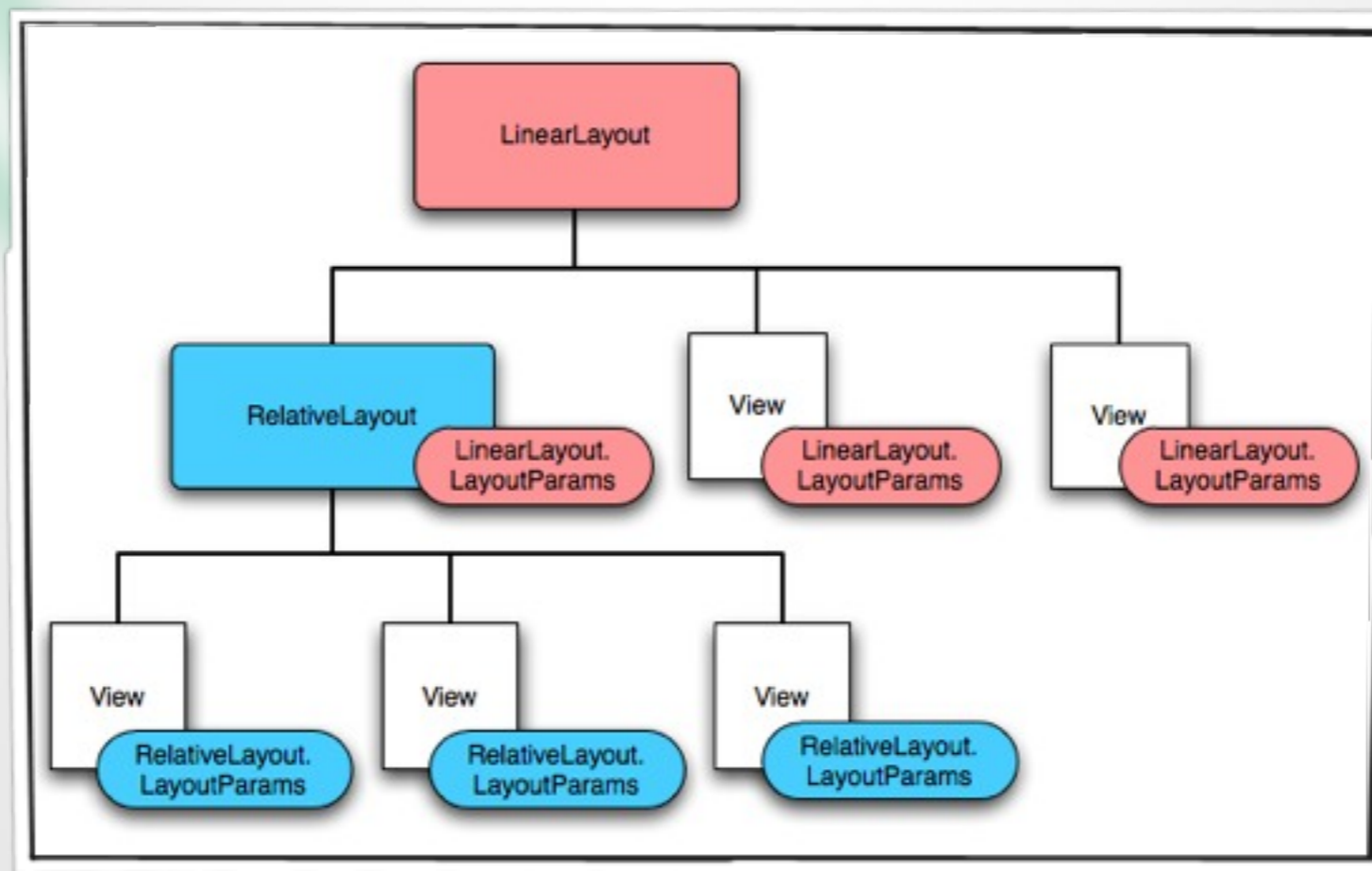
Tree-Structured UI

- 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

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



Creating Layouts

Implementing a User Interface



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;

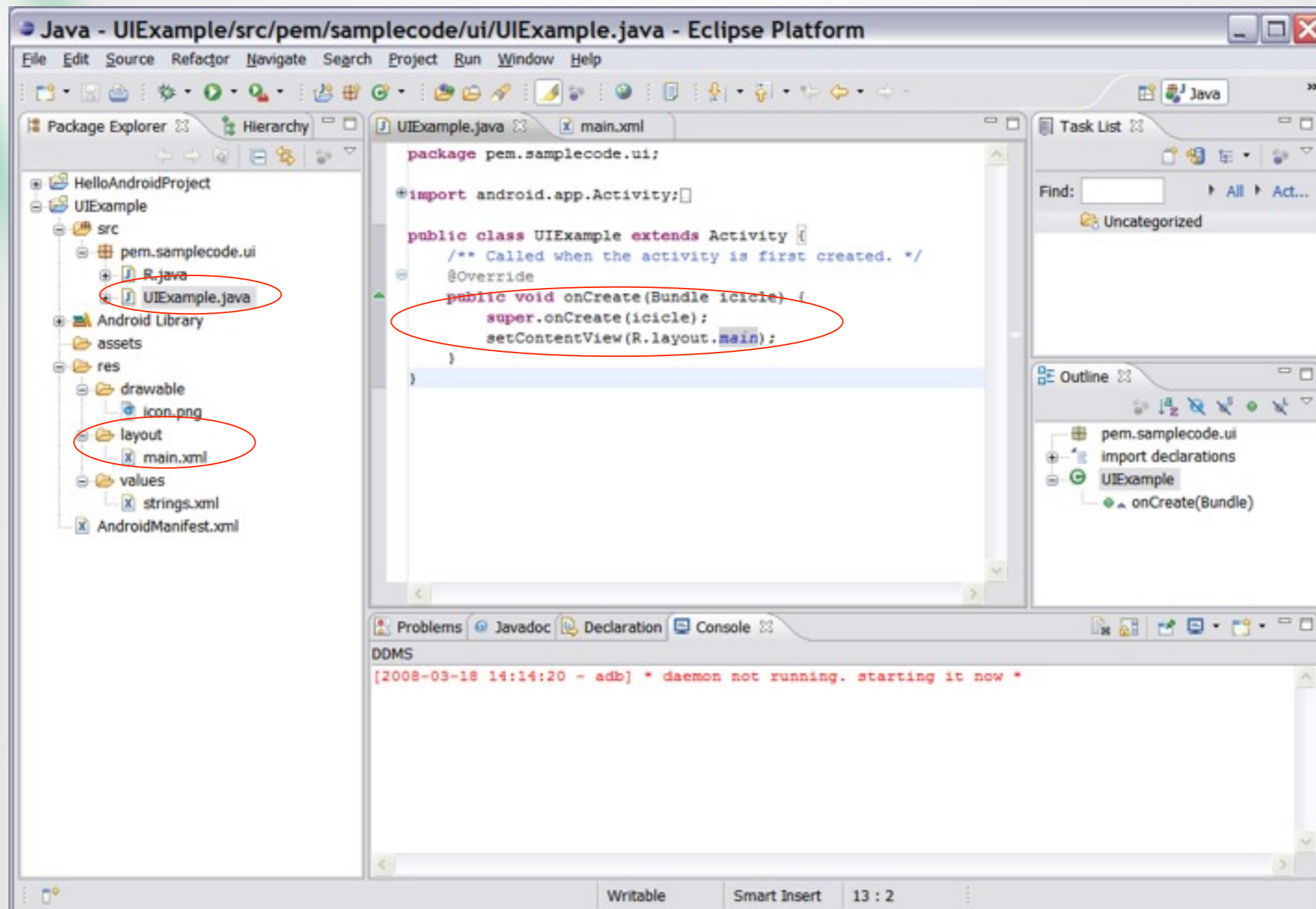
import android.app.Activity;
import android.os.Bundle;
import android.widget.TextView;

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

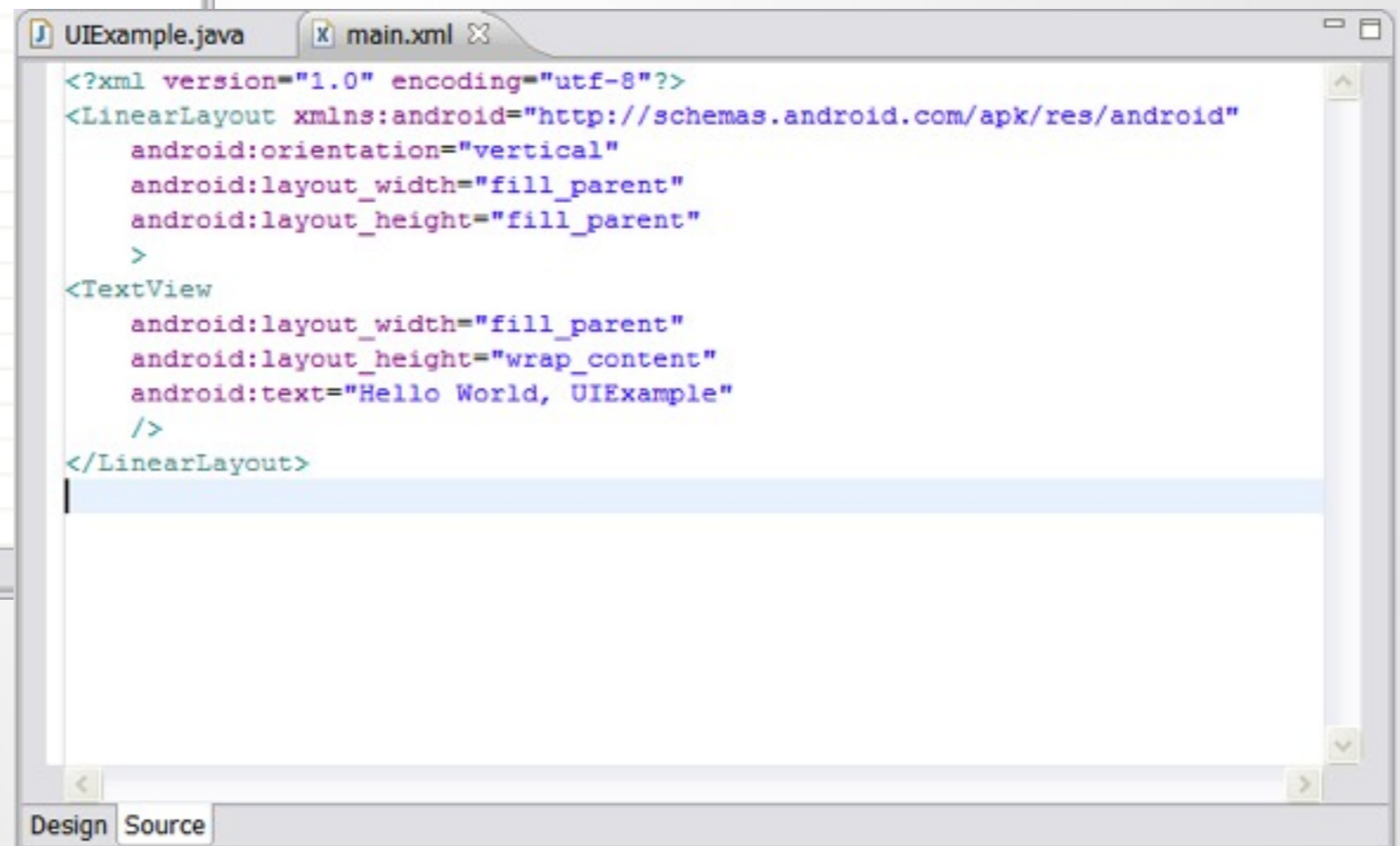
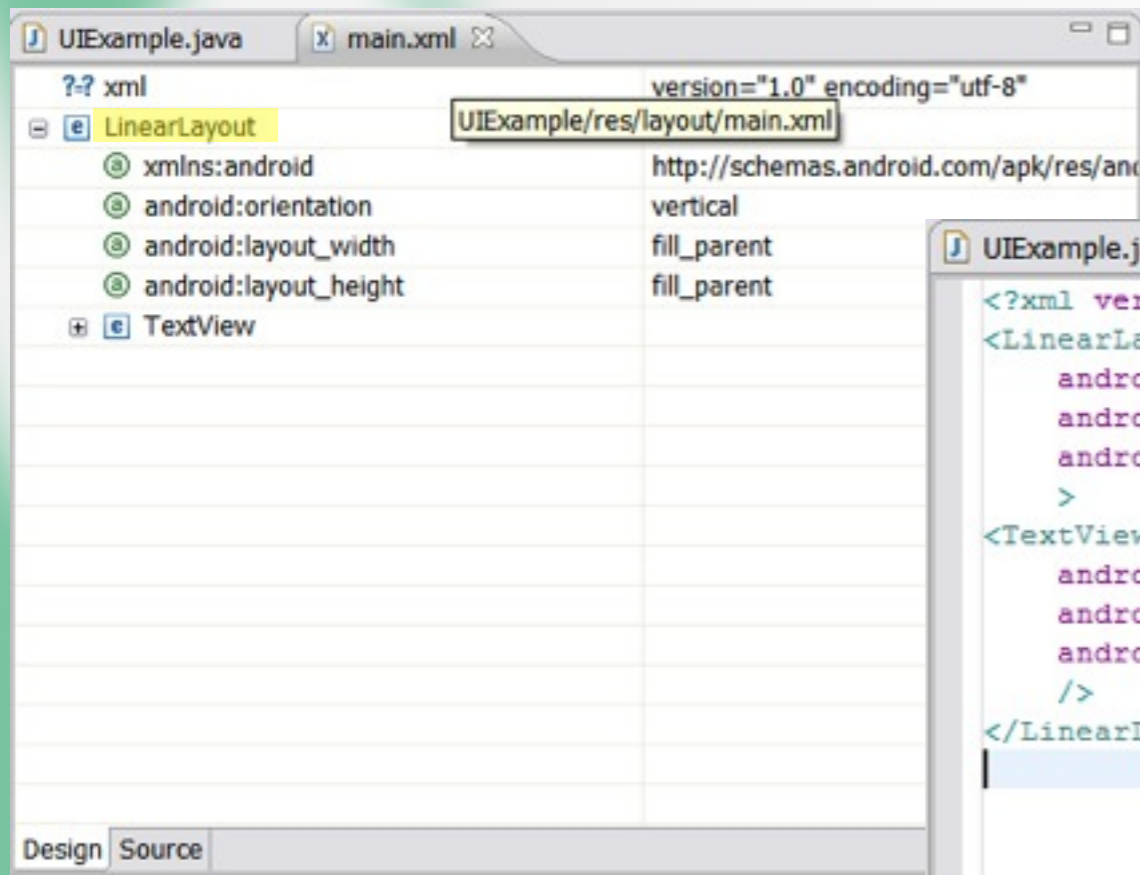
Upgrading UI to XML

- 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



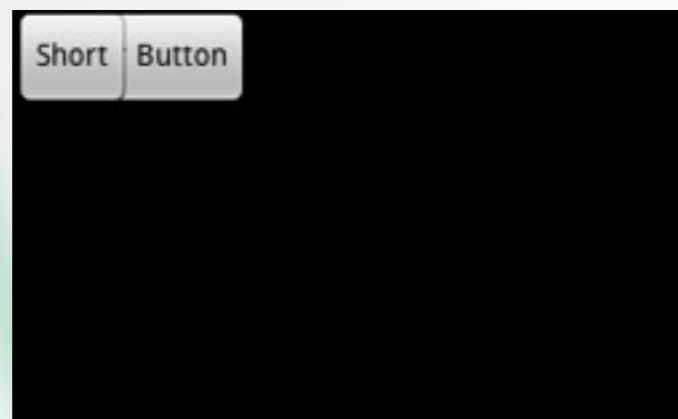


Common Layout Objects

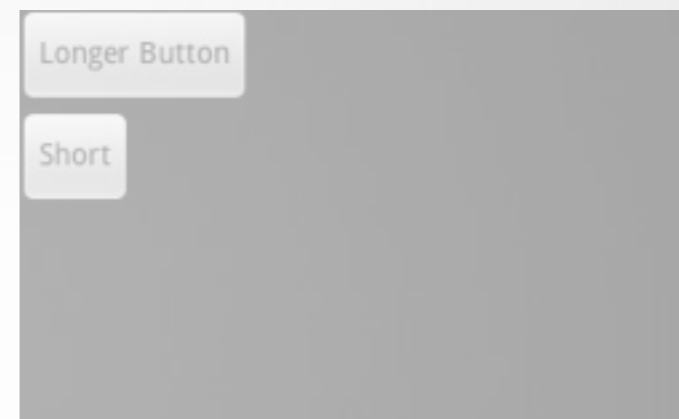
Implementing a User Interface



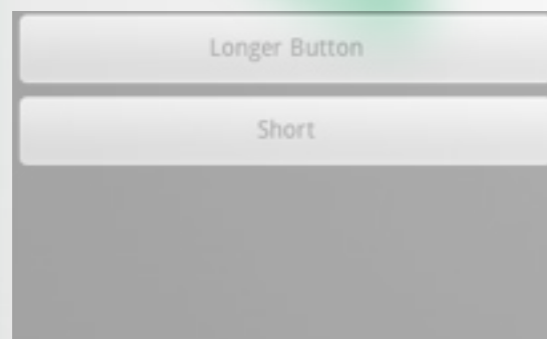
Common Layout Objects



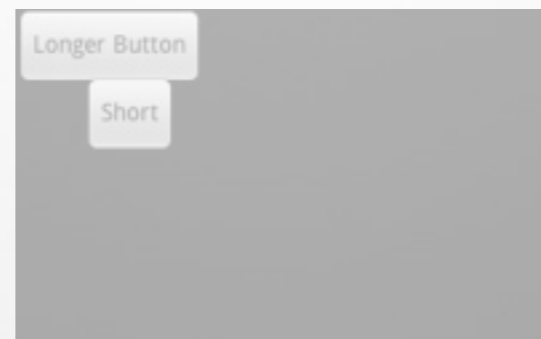
FrameLayout



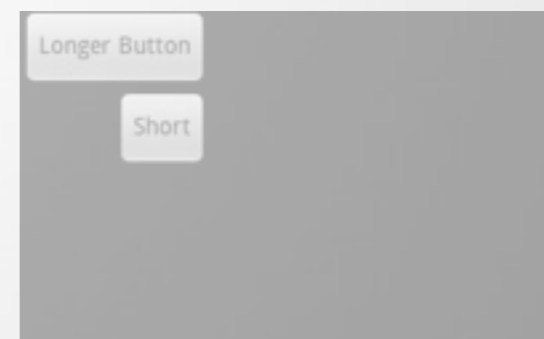
LinearLayout



TableLayout



AbsoluteLayout

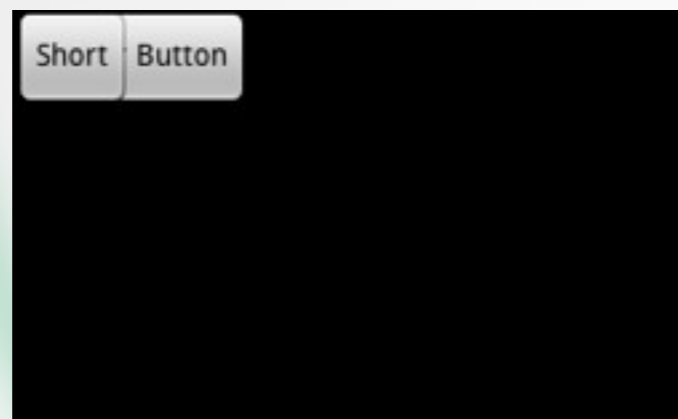


RelativeLayout

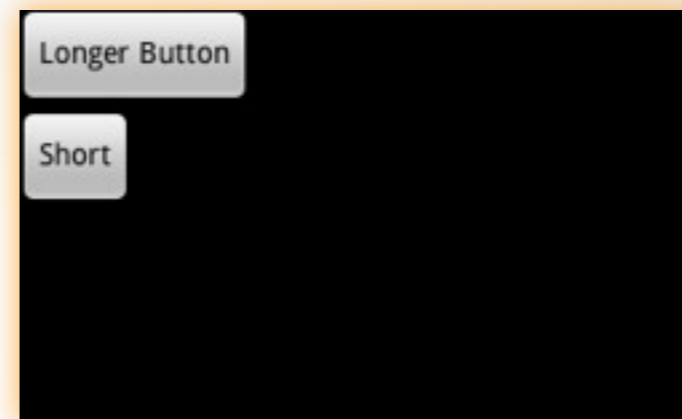
FrameLayout

- 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

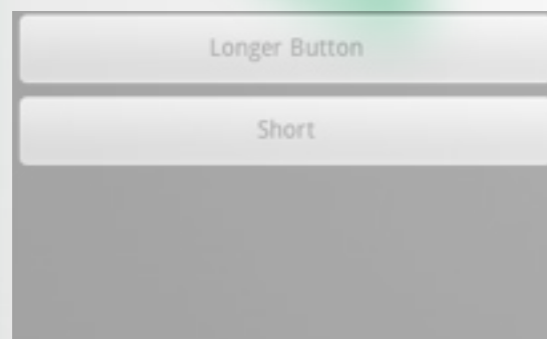
Common Layout Objects



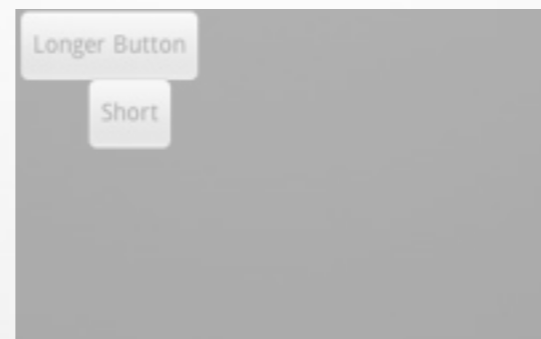
FrameLayout



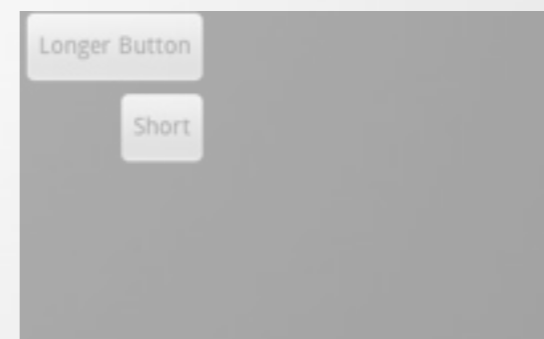
LinearLayout



TableLayout



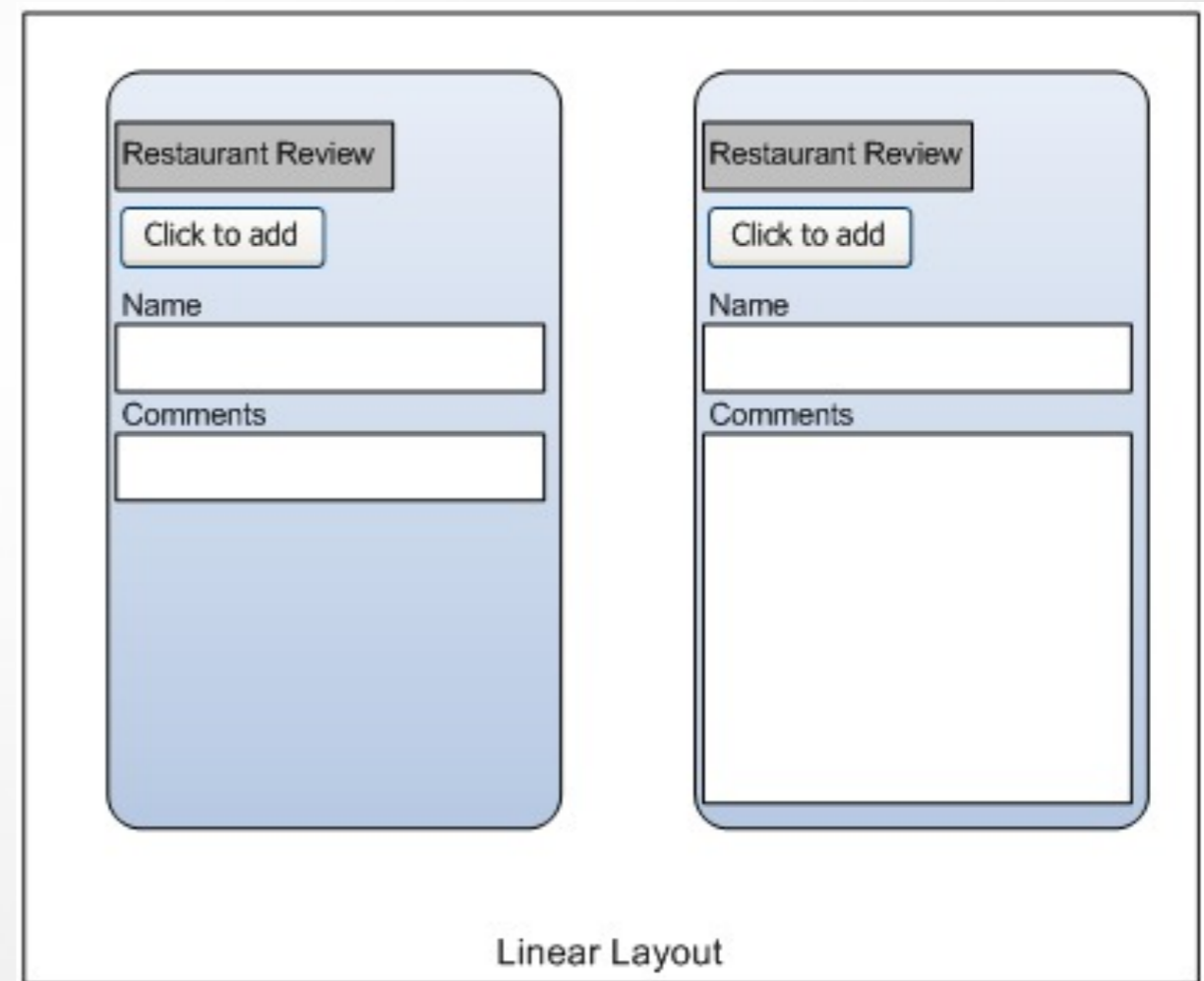
AbsoluteLayout



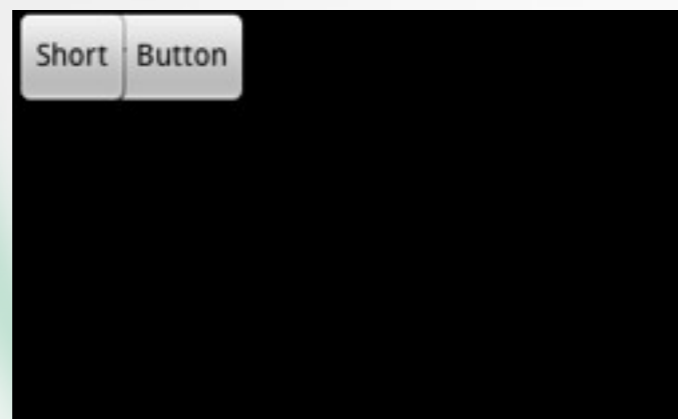
RelativeLayout

LinearLayout

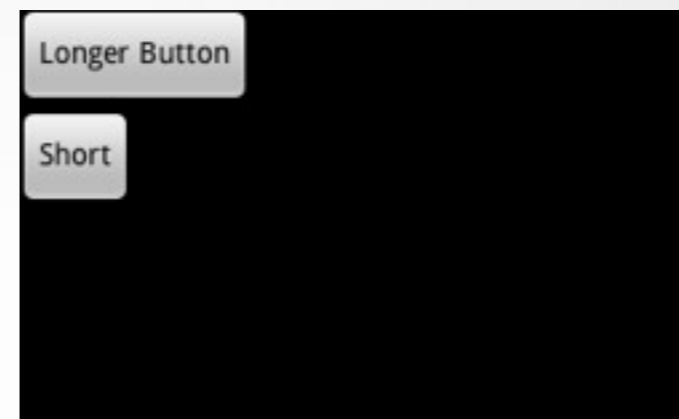
- Aligns all children in a single direction — vertically or horizontally
- All children are stacked one after the other
 - a vertical list will only have one child per row (no matter how wide they are)
 - a horizontal list will only be one row high (the height of the tallest child, plus padding)



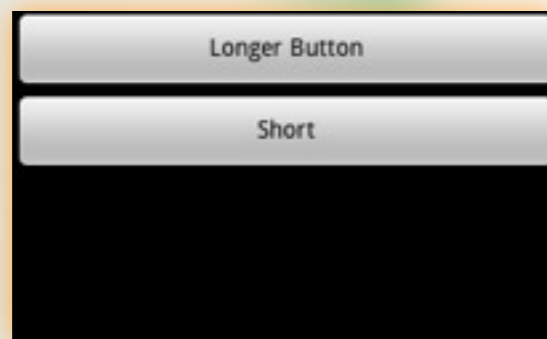
Common Layout Objects



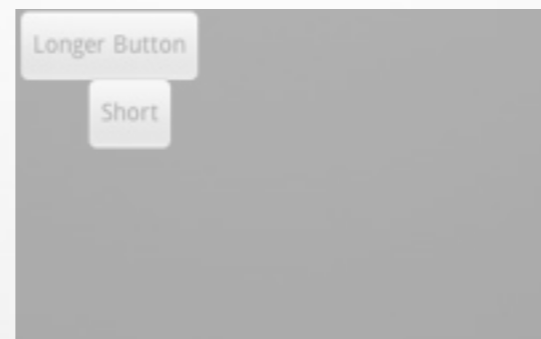
FrameLayout



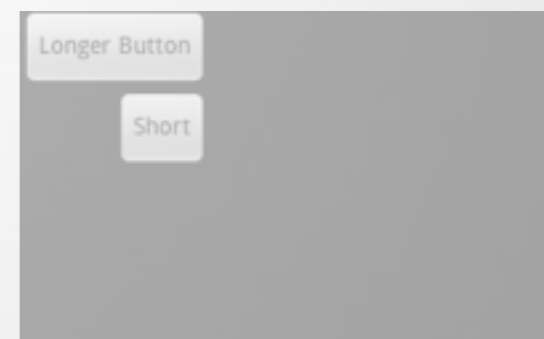
LinearLayout



TableLayout



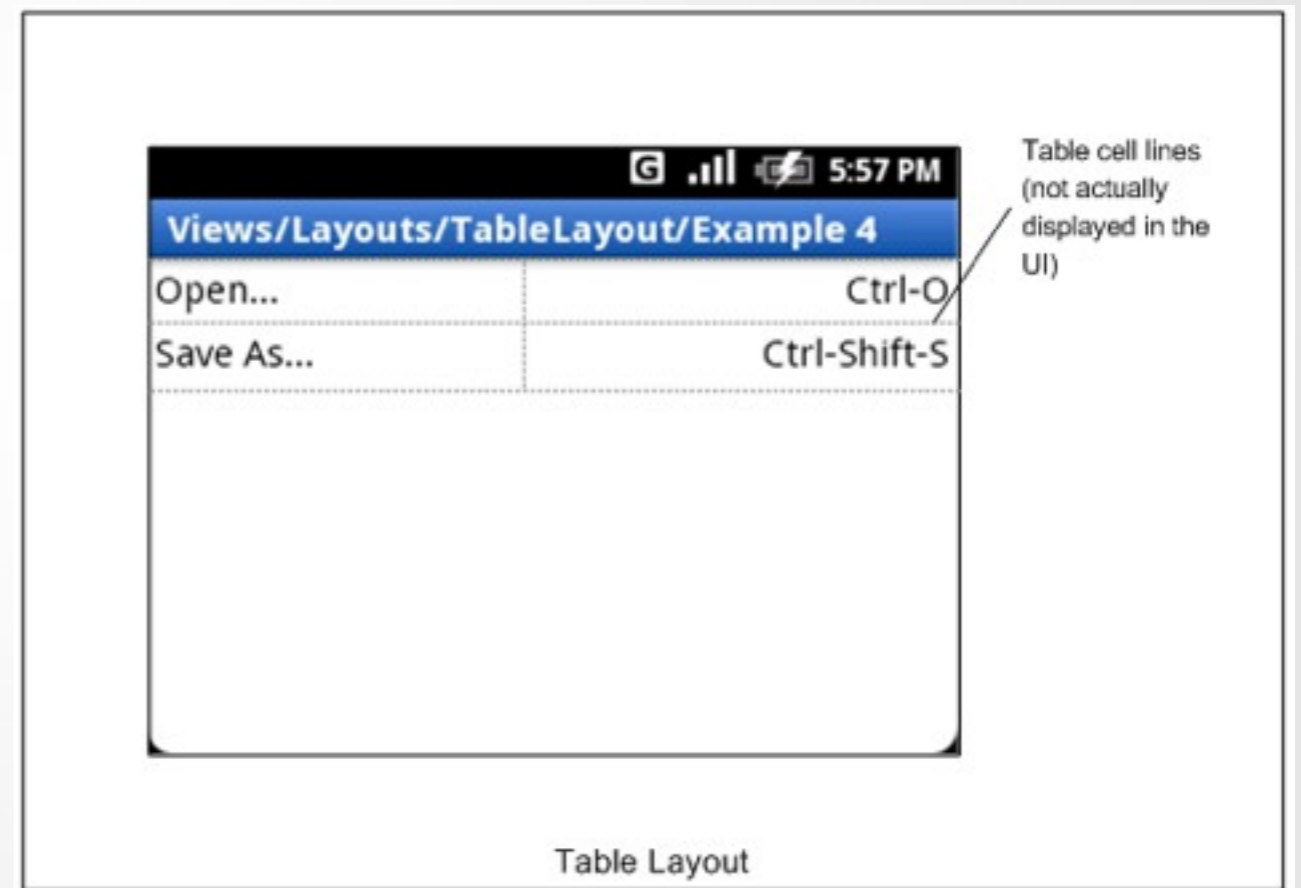
AbsoluteLayout



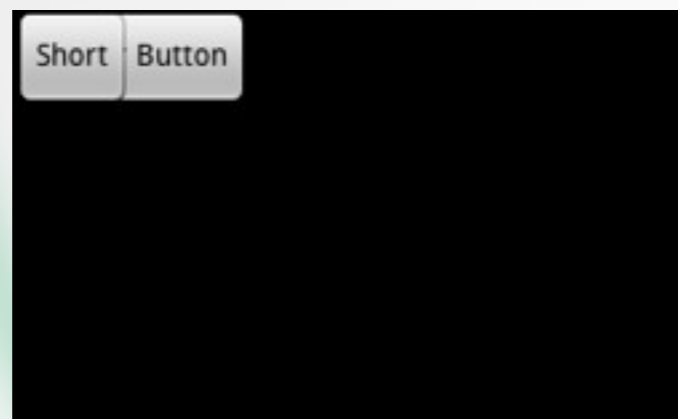
RelativeLayout

TableLayout

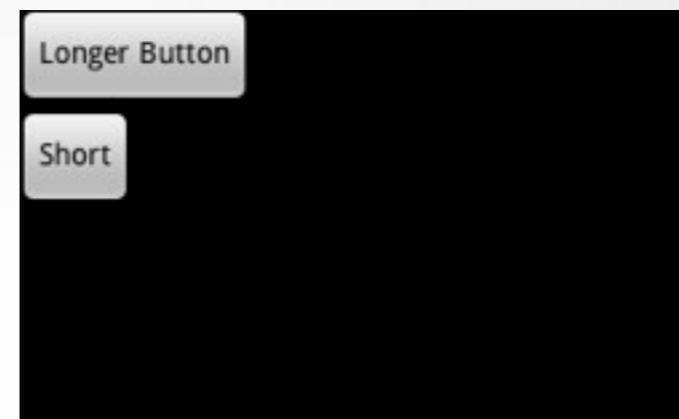
- Positions its children into rows and columns
- Does not display border lines for their rows, columns, or cells
- Cells cannot span columns, as they can in HTML



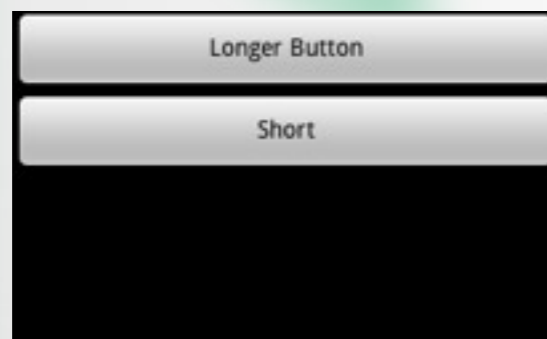
Common Layout Objects



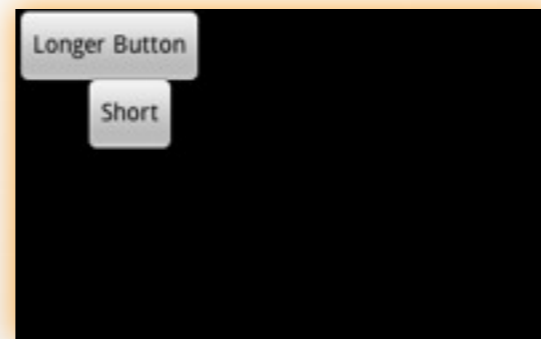
FrameLayout



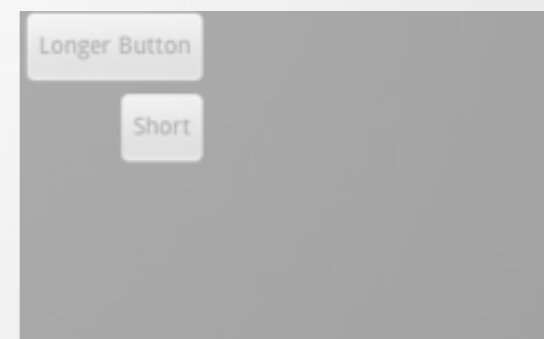
LinearLayout



TableLayout



AbsoluteLayout

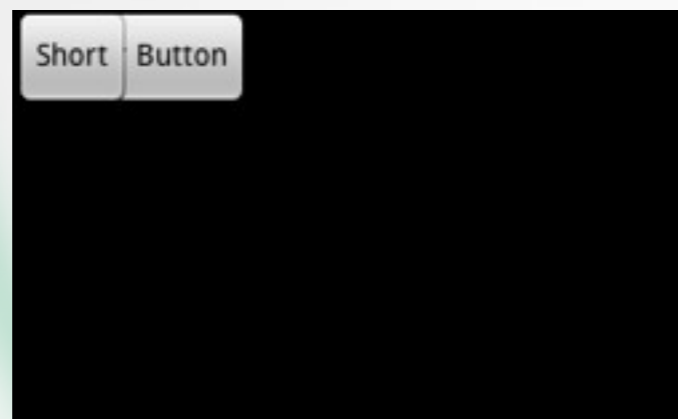


RelativeLayout

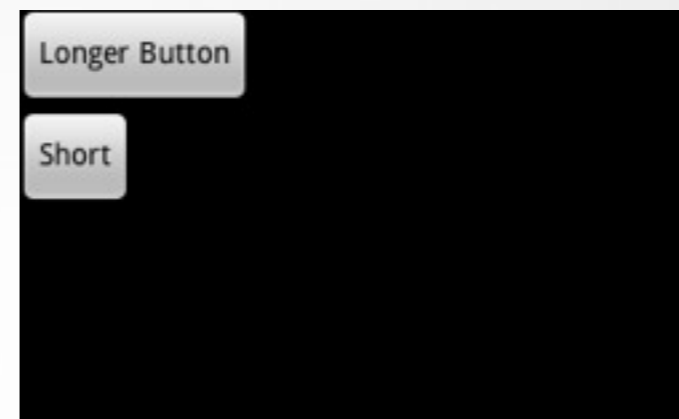
Absolute Layout

- 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

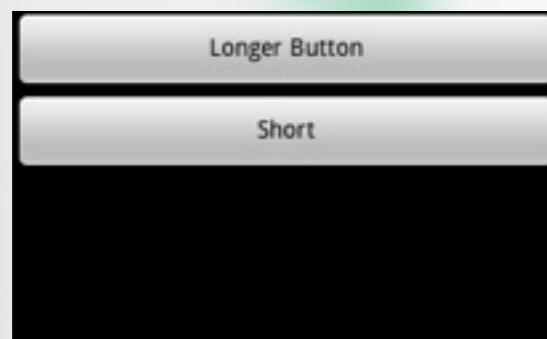
Common Layout Objects



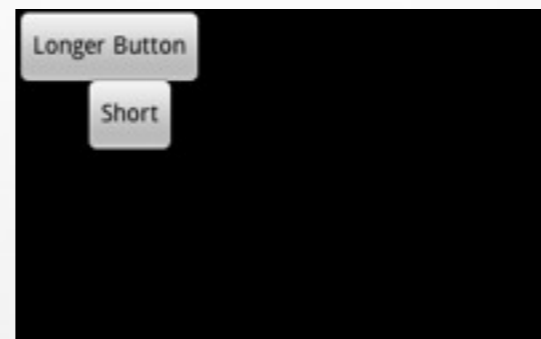
FrameLayout



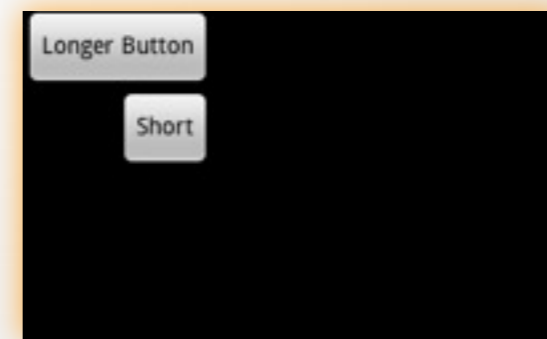
LinearLayout



TableLayout



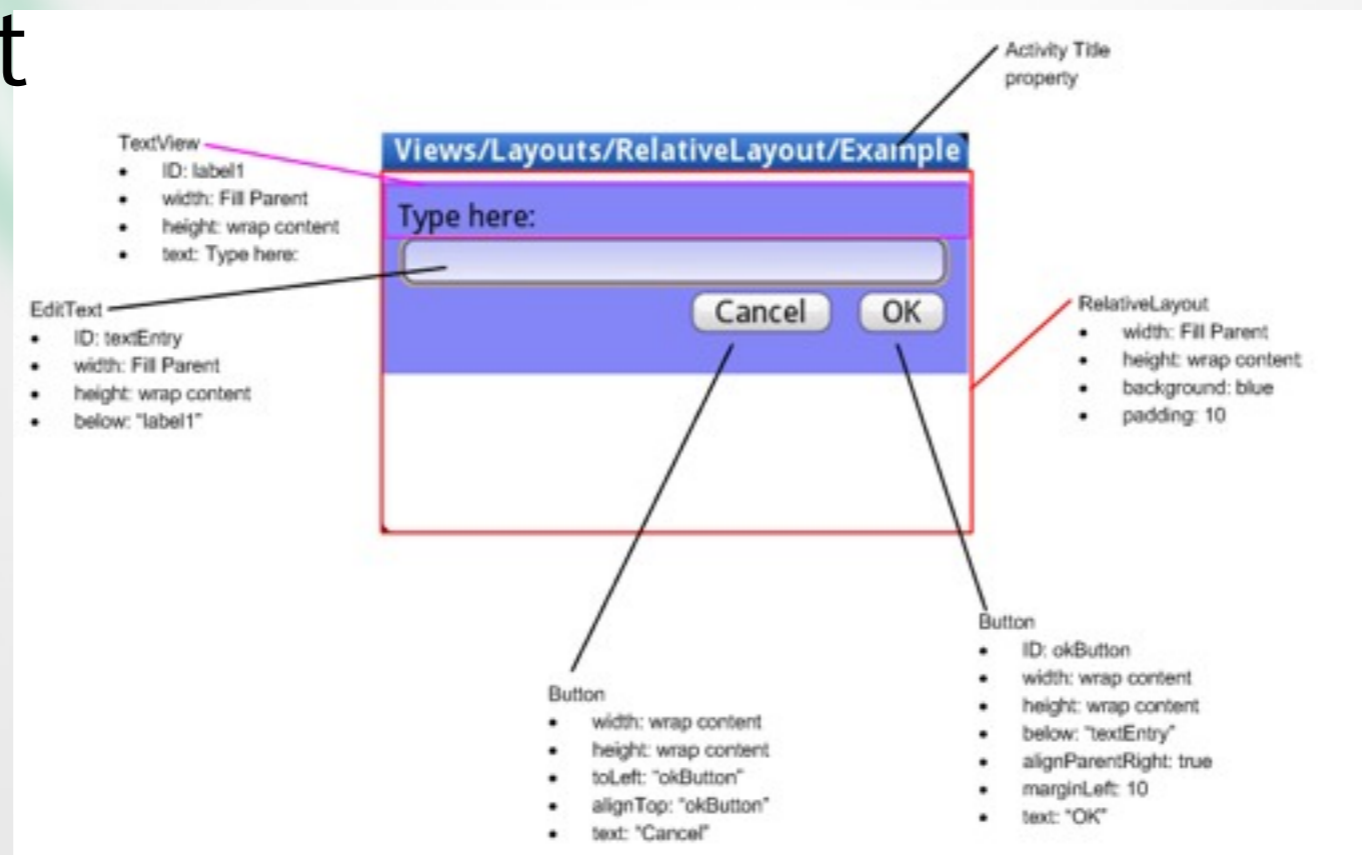
AbsoluteLayout



RelativeLayout

RelativeLayout

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



Important Layout

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

The screenshot shows the 'Hello, Views' tutorial page on the Android Developers website. The page is titled 'Hello, Views' and contains introductory text about the tutorial. Below the text is a grid of 14 mobile app screenshots, each with a title above it: LinearLayout, RelativeLayout, DatePicker, TimePicker, Spinner, ListView, GridView, Gallery, ImageView, MediaPlayer, and WebView. The screenshots demonstrate various Android views and their usage in a mobile application. The page also includes a navigation menu on the left and a footer with copyright information.

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

Hooking into a Screen Element

Implementing a User Interface



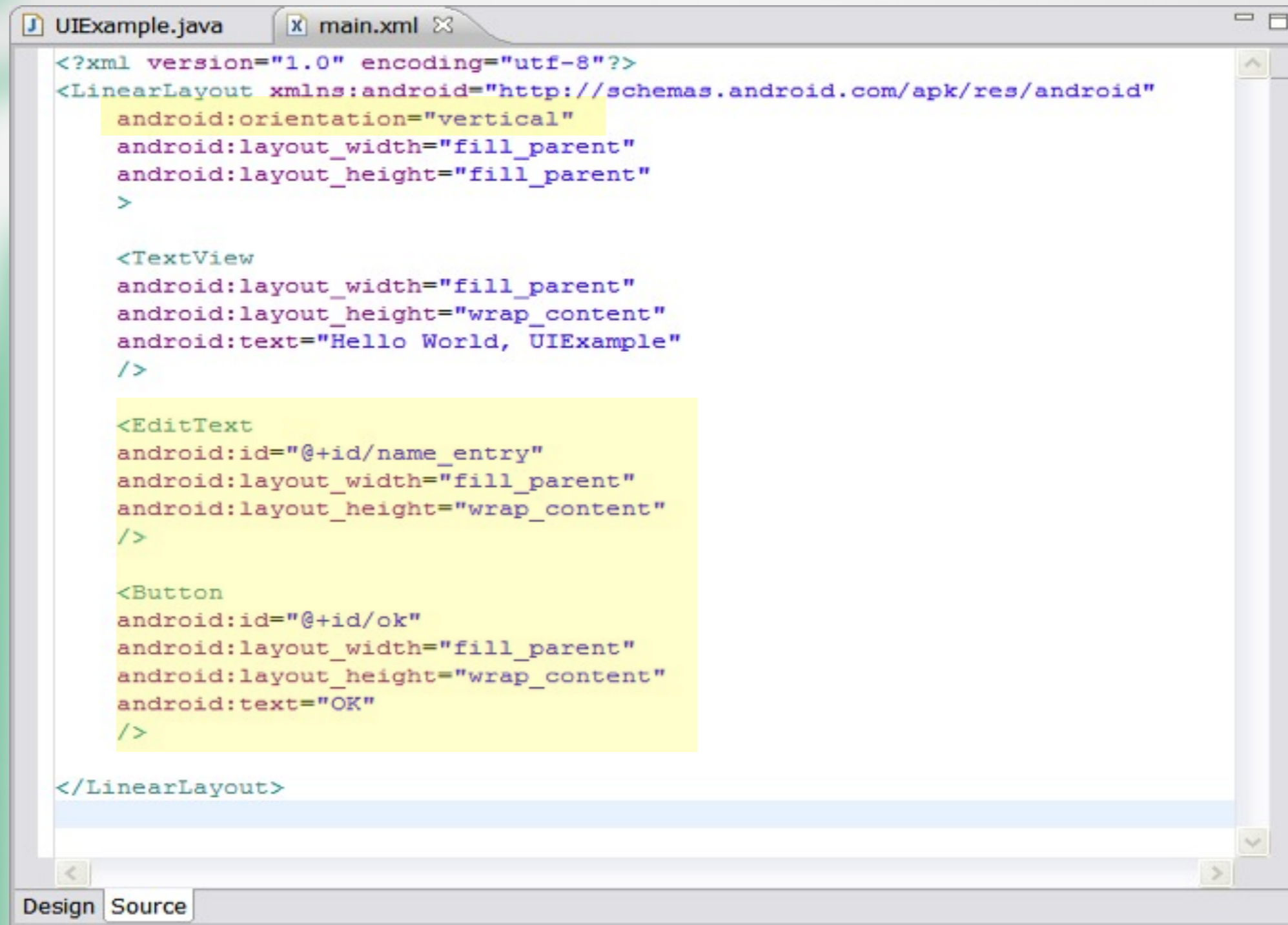
Hooking into a Screen



Text field

Button

Hooking into a Screen Element



```
<?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>
```

Hooking into a Screen Element

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

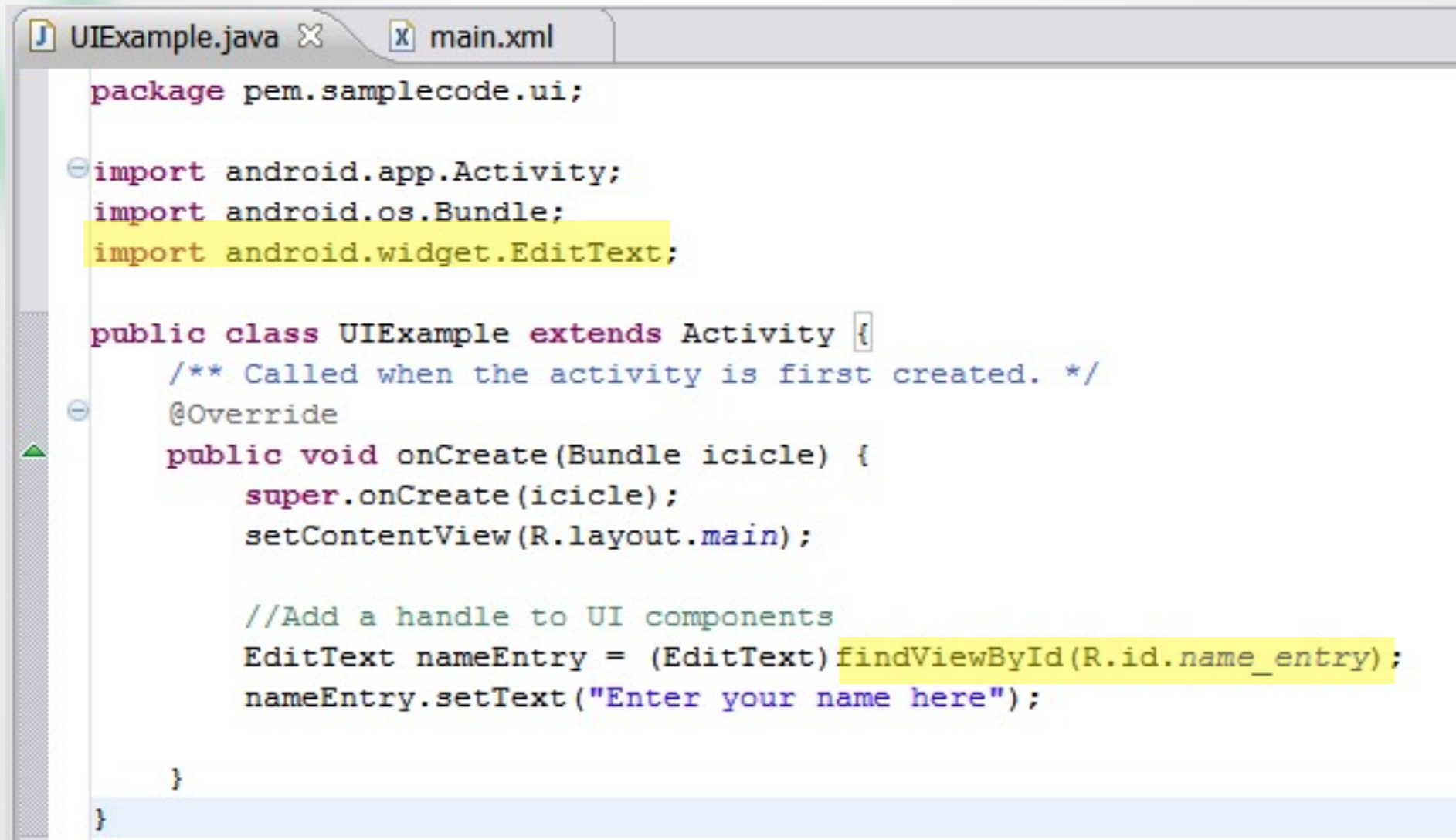
<Button
  android:id="@+id/ok"
  android:layout_width="fill_parent"
  android:layout_height="wrap_content"
  android:text="OK"
/>
```

@+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.

Any String value
(no spaces)

Hooking into a Screen Element



```
UIExample.java X 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 savedInstanceState) {
        super.onCreate(savedInstanceState);
        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 x 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 savedInstanceState) {
        super.onCreate(savedInstanceState);
        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);

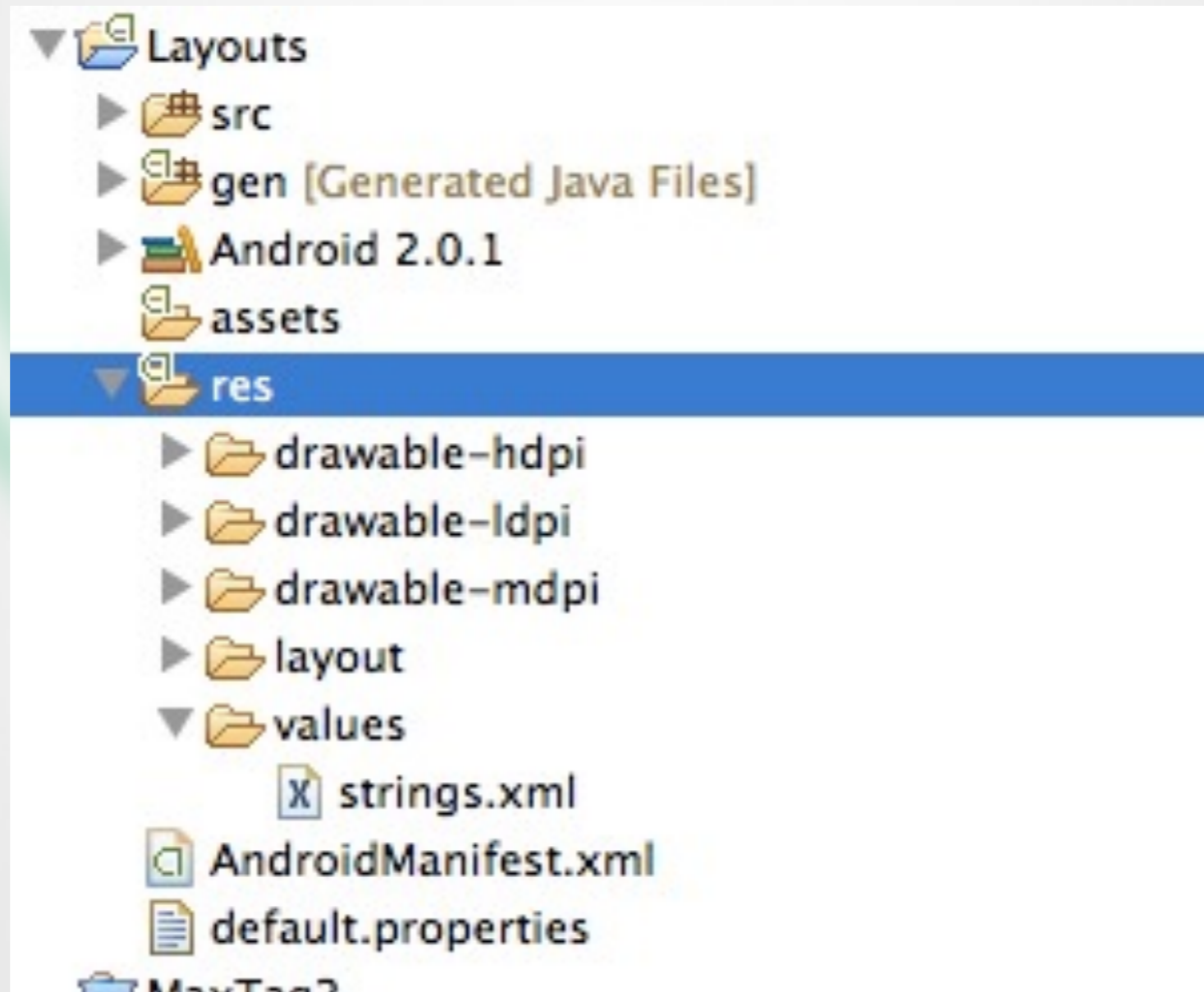
        //Create an anonymous class to act as a button click listener
        okButton.setOnClickListener(new OnClickListener()
        {
            public void onClick(View v){
                setResult(RESULT_OK, "Done!");
                finish();
            }
        });
    }
}
```

Resource Folders and Localization

Implementing a User Interface

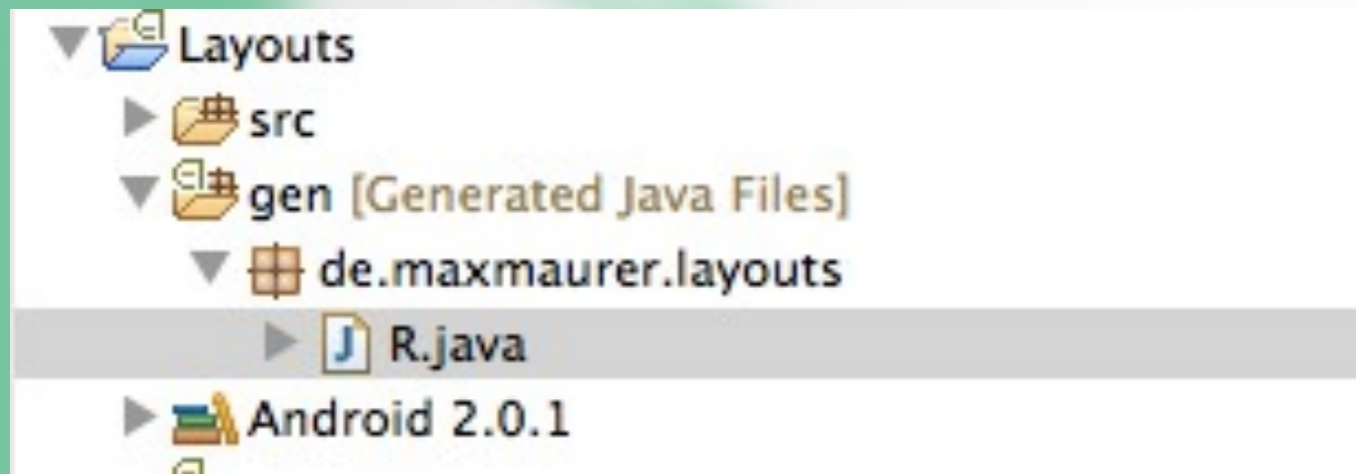


Resource Folders



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

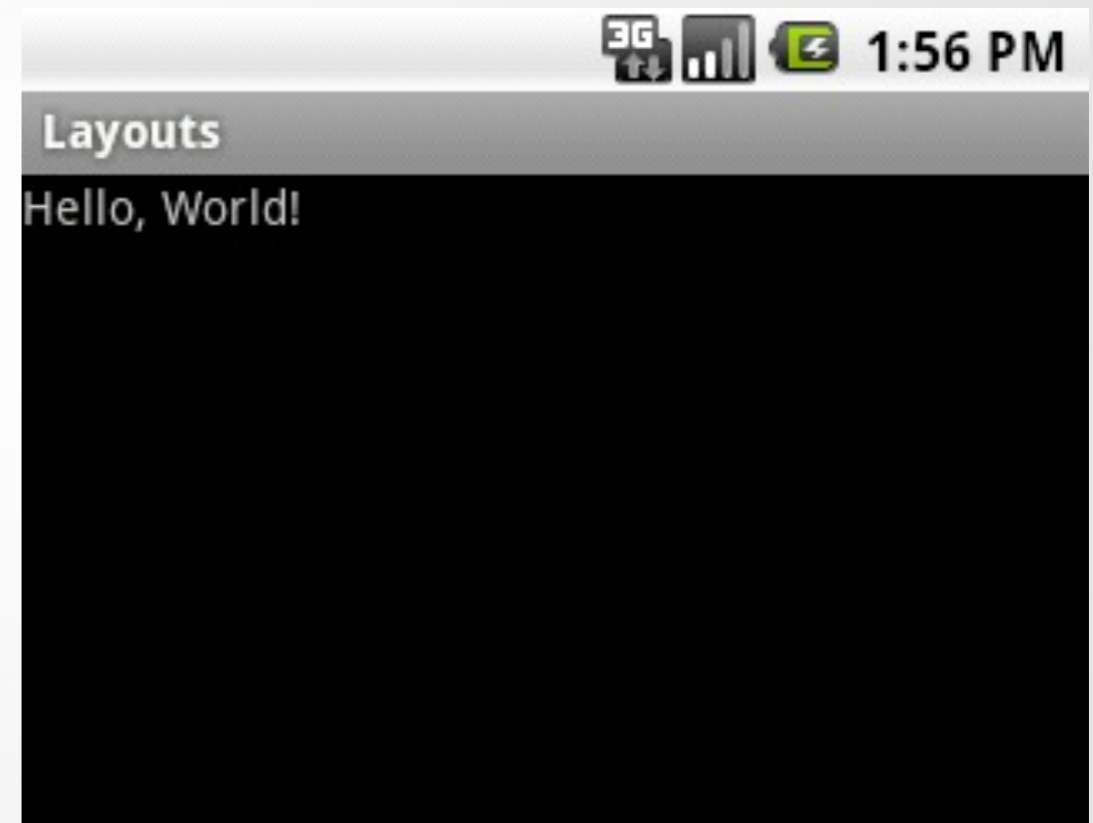
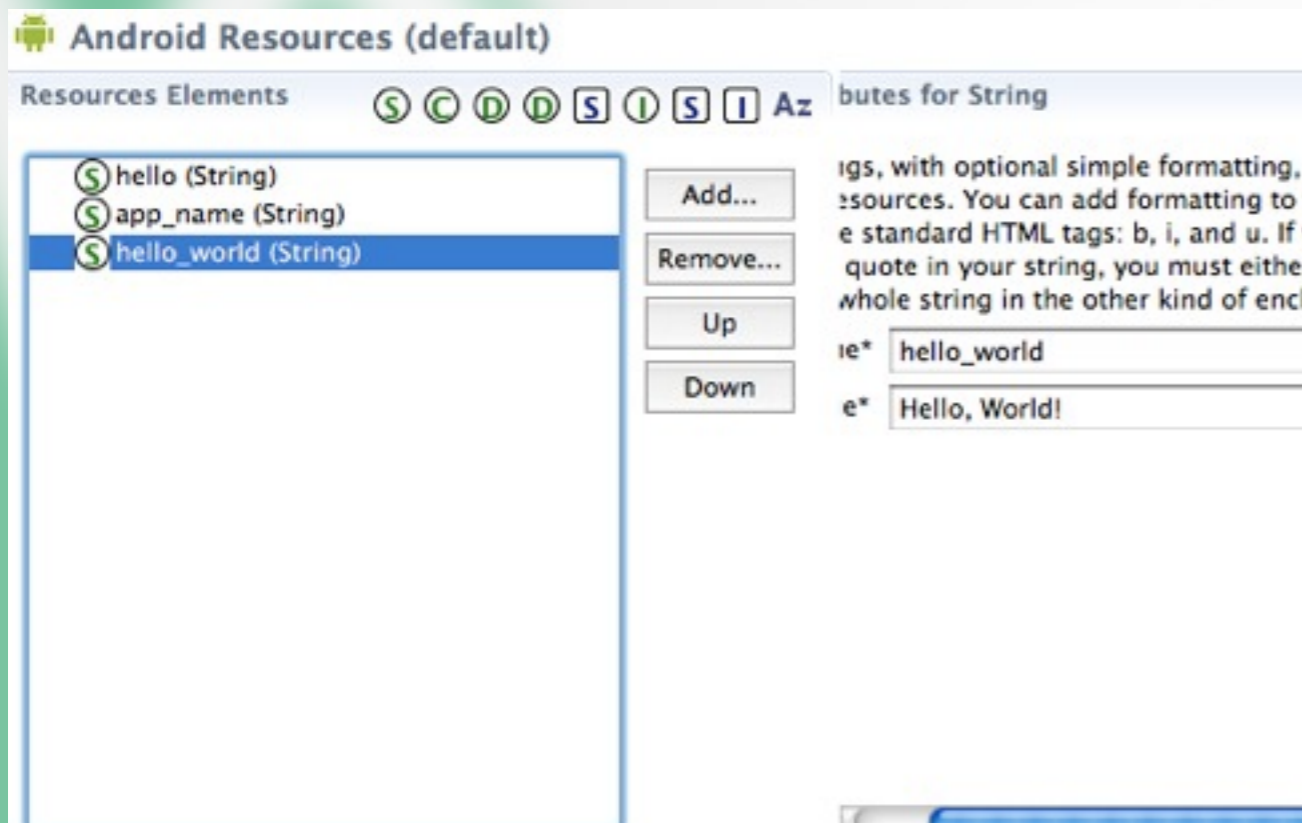
- Separate storage of Strings and Graphics
- Makes it easier to modify software parts
- Resources are accessed via „R.java“

```
package de.maxmaurer.layouts;

import android.app.Activity;

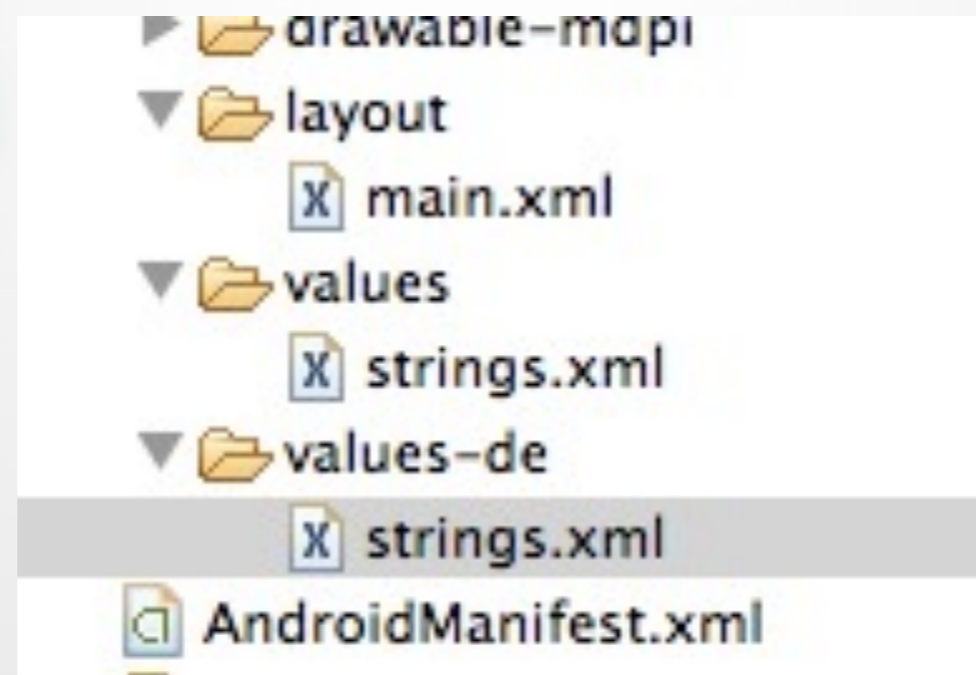
public class Layouts extends Activity {
    /** Called when the activity is first created. */
    @Override
    public void onCreate(Bundle savedInstanceState) {
        super.onCreate(savedInstanceState);
        View v = findViewById(R.layout.main);
        TextView tv = new TextView(this);
      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


Resource Folders

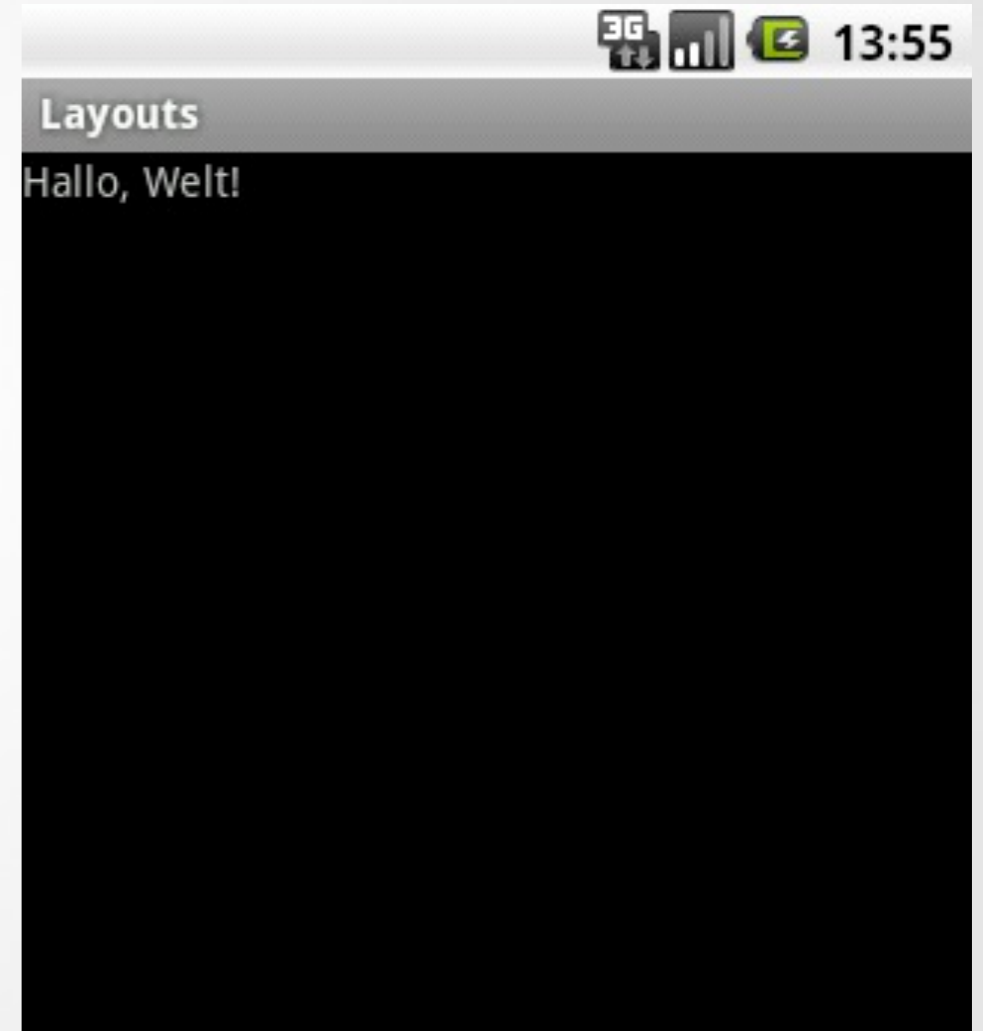
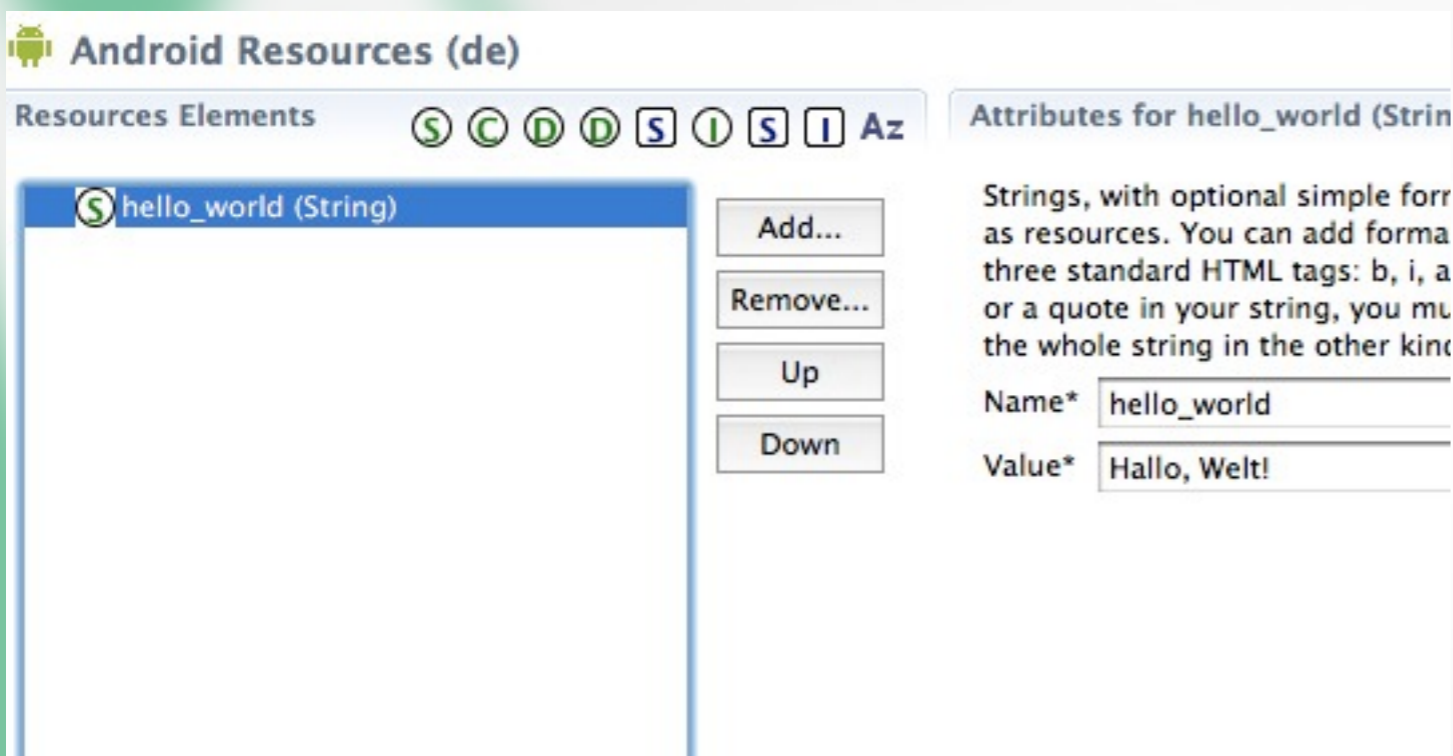


Localization

- 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

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/
```


Application Themes

Implementing a User Interface



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

- Adding the theme attribute in 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>
```

Applying a Theme using Code

- Calling `setTheme()` inside the `onCreate()` method



```
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 savedInstanceState) {
        super.onCreate(savedInstanceState);

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


Black



Light

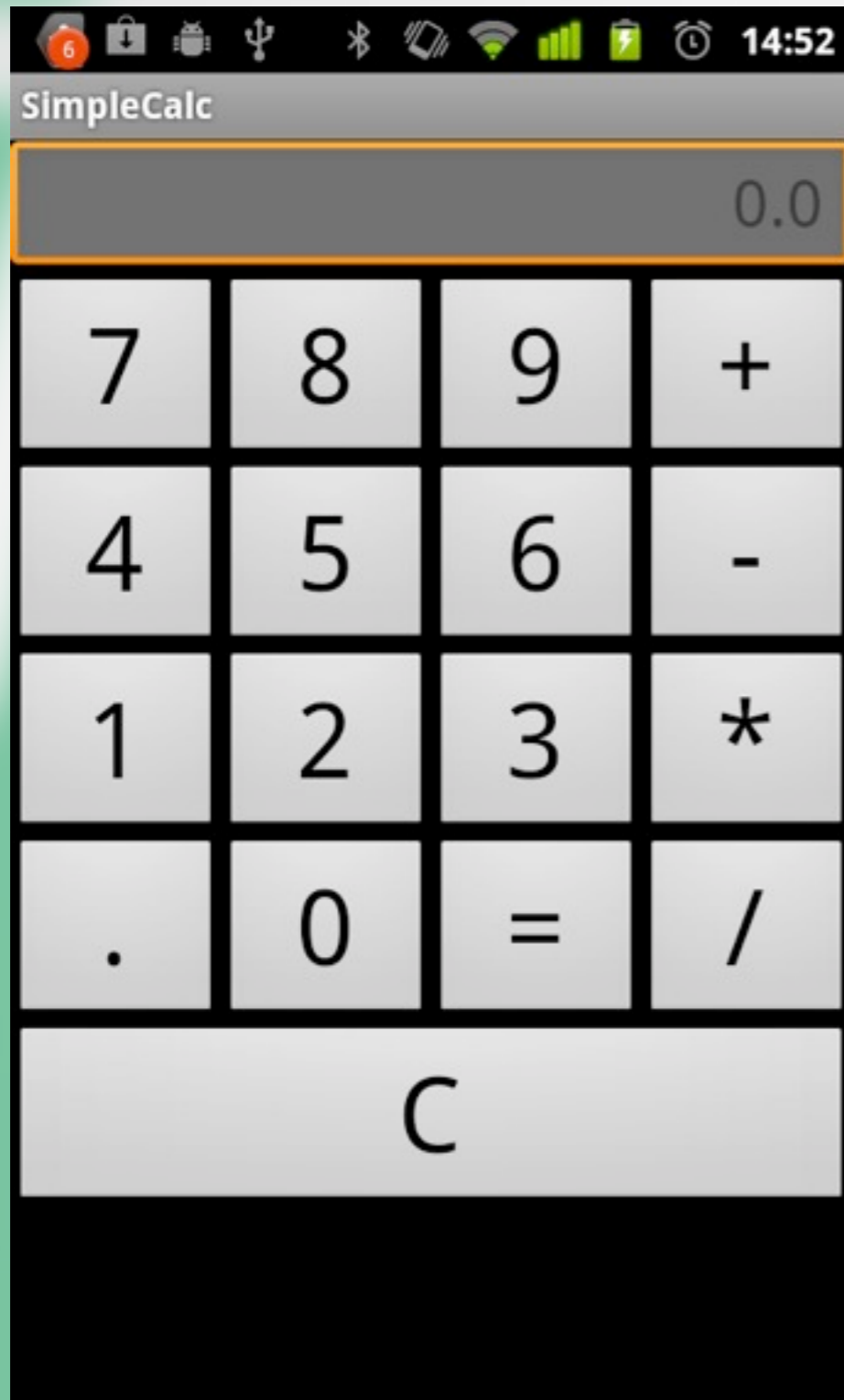


Exercise 1

The Calculator



Exercise 2



Anpassen an Bildschirmgrösse
Alle Buttons müssen erreichbar
bleiben!

Fragen?

