



Lesson 5

List-Based Widgets: Lists, Grids, and Scroll Views

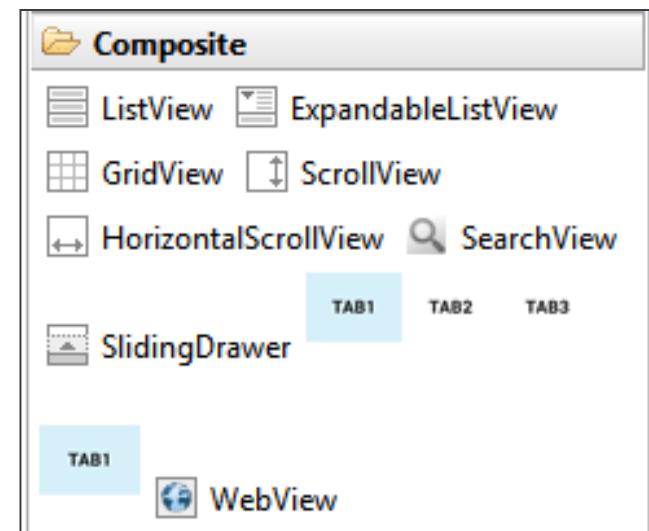
Victor Matos
Cleveland State University

Portions of this page are reproduced from work created and [shared by Google](#) and used according to terms described in the [Creative Commons 3.0 Attribution License](#).

List-Based Widgets

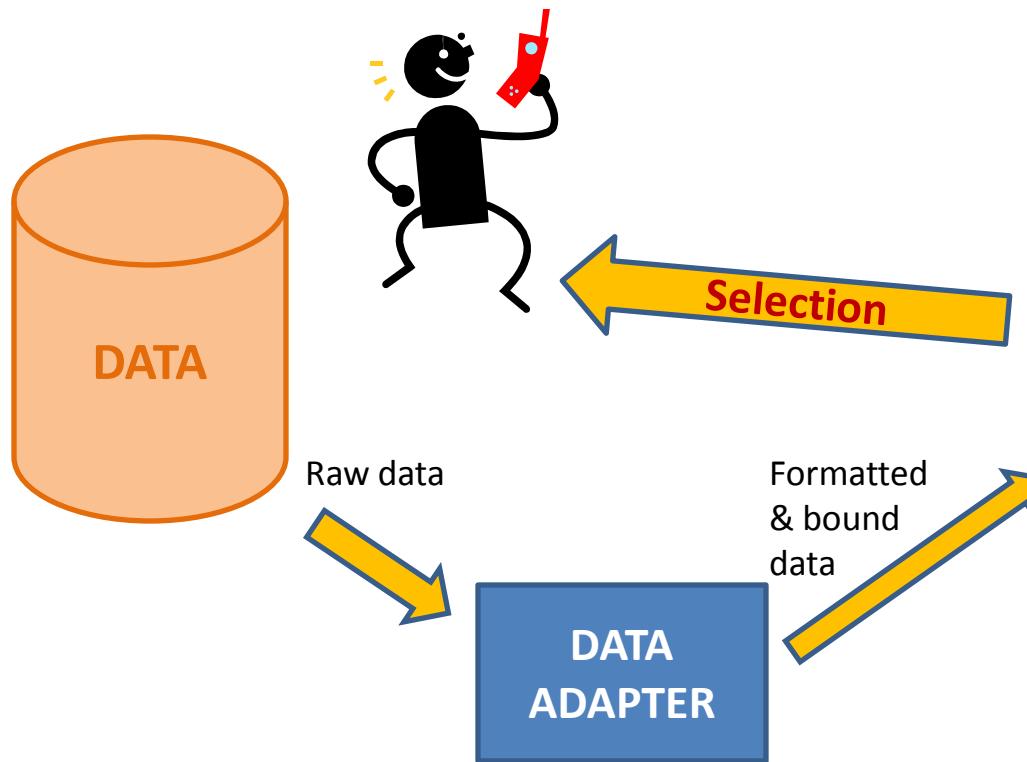
GUI Design for Selection Making

- **RadioButtons** and **CheckButtons** are widgets suitable for selecting options offered by a *small* set of choices. They are intuitive and uncomplicated; however they occupy a permanent space on the GUI (which is not a problem when only a few of them are shown)
- When the set of values to choose from is large, other Android **List-Based Widgets** are more appropriate.
- Example of **List-Based Widgets** include:
 - **ListView**,
 - **Spinner**,
 - **GridView**
 - **Image Gallery**
 - **ScrollViews**, etc.

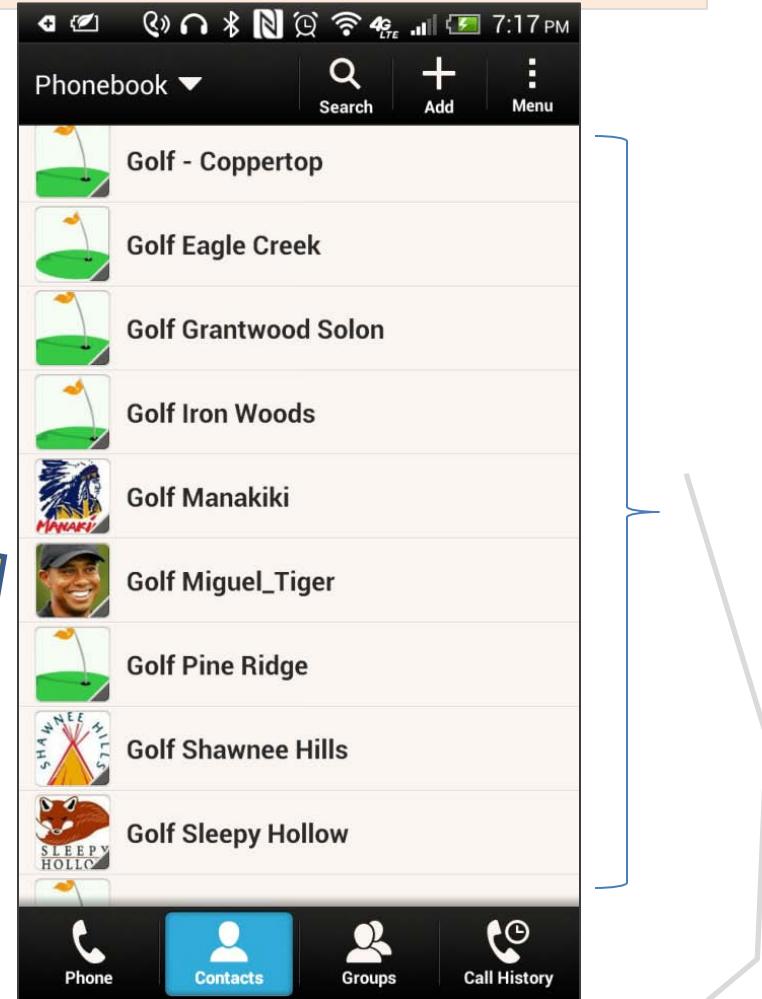


List-Based Widgets

Showing a large set of choices on the GUI



- The Android **DataAdapter** class is used to feed a collection of data items to a *List-Based Widget*.
- The Adapter's raw data may come from a variety of sources, such as small arrays as well as large databases.



Destination layout
Holding a **ListView**

List-Based App = ListView + Data + DataAdapter

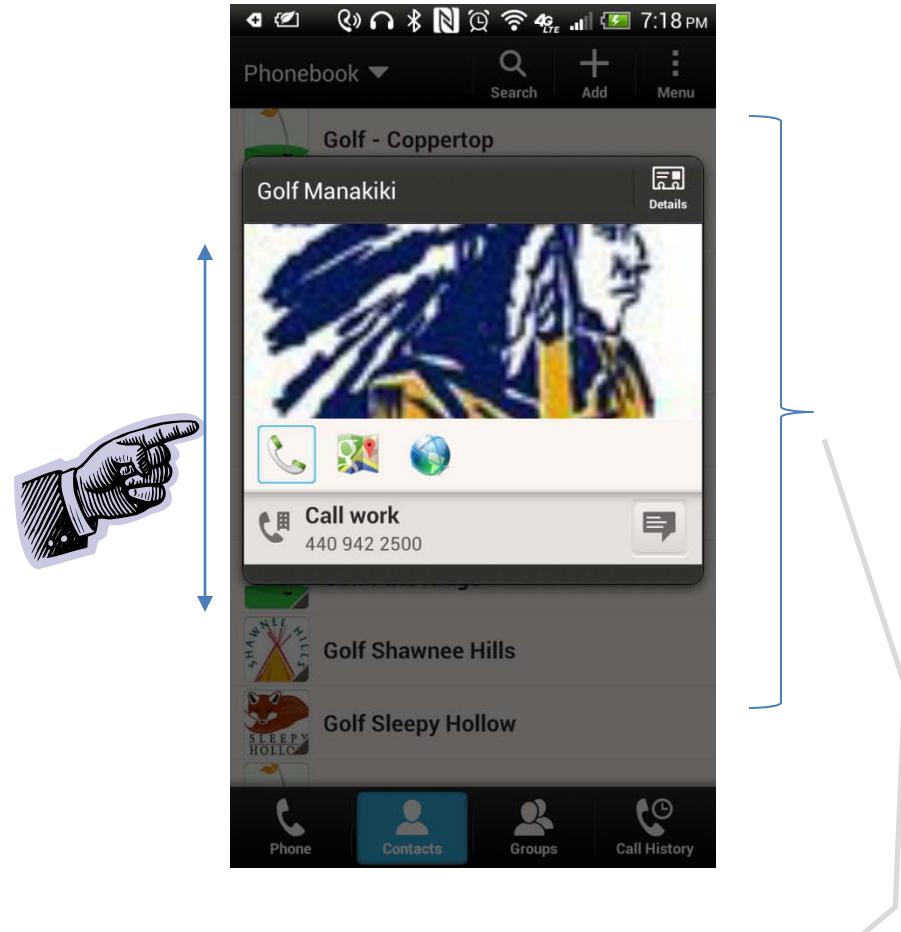
Lists

The Android **ListView** widget is the most common element used to display data supplied by a **data adapter**.

Lists are **scrollable**, each item from the base data set can be shown in an individual row.

Users can **tap** on a row to make a selection.

A row could display one or more lines of text as well as images.



Destination layout
Holding a **ListView**

List-Based App = ListView + Data + DataAdapter

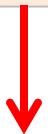
ArrayAdapter (A Data Beautifier)

- An **ArrayAdapter<T>** accepts for input an **array** (or **ArrayList**) of objects of some arbitrary type T.
- The adapter works on each object by (a) applying its **toString()** method, and (b) moving its formatted output string to a **TextView**.
- The formatting operation is guided by a user supplied XML layout specification which defines the appearance of the receiving **TextView**.
- For **ListView**s showing **complex** arrangement of visual elements –such as text plus images- you need to provide a **custom made adapter** in which the **getView(...)** method explains how to manage the placement of each data fragment in the complex layout. For a detailed sample see Example 8.

List-Based App = ListView + Data + DataAdapter

Output: 'Pretty' GUI

Input Data - array or java.util.List
{ object₁, object₂, ..., object_n }

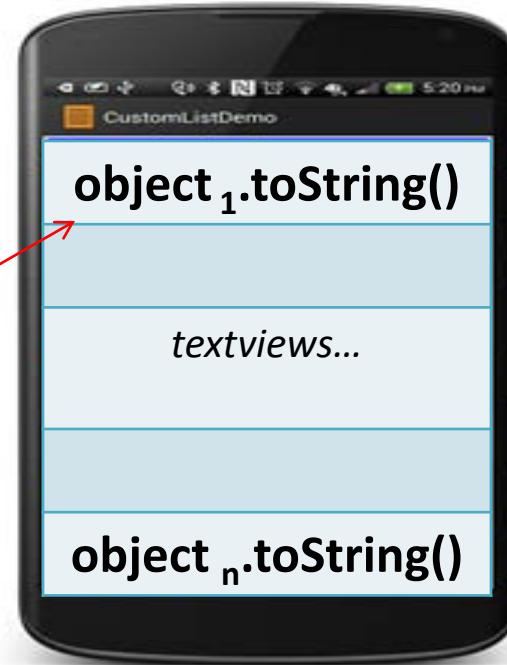


Array Adapter



Input XML Specification

```
<?xml version="1.0" encoding="utf-8"?>
<TextView
    xmlns:android="http://schemas.android.com/apk/res/android"
    android:layout_width="match_parent"
    ...
/>
```



List-Based App = ListView + Data + DataAdapter

Using the ArrayAdapter<String> Class

```
String[] items = { "Data-0", "Data-1", "Data-2", "Data-3",
                  "Data-4", "Data-5", "Data-6", "Data-7" };
```

```
ArrayAdapter<String> adapter = new ArrayAdapter<String>(
        this,
        android.R.layout.simple_list_item_1,
        items );
```

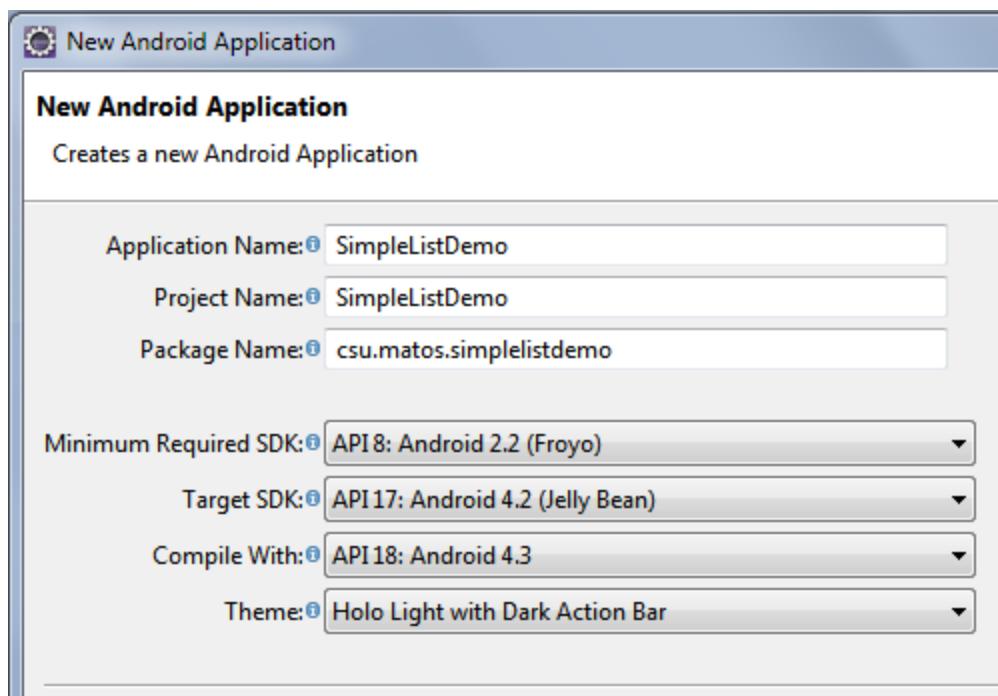
Parameters:

1. The current activity's **context (this)**
2. The **TextView** layout indicating how an individual row should be written (`android.R.id.simple_list_item_1`).
3. The actual **data source (Array or Java.List** containing **items** to be shown).

Using ListActivity + ArrayAdapter

Example1A: ListView showing a simple list (plain text)

Assume a large collection of input data items is held in a **String[]** array. Each row of the ListView must show a line of text taken from the array. In our example, when the user makes a selection, you must display on a TextView the selected item and its position in the list.



Using ListActivity + ArrayAdapter

Example1A: Layout

```
<LinearLayout 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:orientation="vertical">  
  
    <TextView  
        android:id="@+id/txtMsg"  
        android:layout_width="match_parent"  
        android:layout_height="wrap_content"  
        android:background="#fffff00"  
        android:text="Using ListView..."  
        android:textSize="16sp" />  
  
    <ListView  
        android:id="@android:id>List"  
        android:layout_width="match_parent"  
        android:layout_height="match_parent"  
    </ListView>  
  
    <TextView  
        android:id="@android:id/empty"  
        android:layout_width="match_parent"  
        android:layout_height="wrap_content"  
        android:background="#ffff0000"  
        android:text="empty list" />  
  
</LinearLayout>
```

Pay attention to the use of predefined
Android components:

@android:id/list
@android:id/empty

See Appendix A for a description of
@android:id/list

Android's built-in list layout

Used for empty lists

Using ListActivity + ArrayAdapter

Example1A: MainActivity (using a ListActivity !)

```
package csu.matos;  
  
import ...  
  
public class ListViewDemo extends ListActivity {  
  
    TextView txtMsg;  
  
    String[] items = { "Data-0", "Data-1", "Data-2", "Data-3",  
                      "Data-4", "Data-5", "Data-6", "Data-7" };  
  
    // next time try an empty list such as:  
    // String[] items = {};
```



CAUTION:

A **ListActivity** is not a “plain” Activity. It is bound to a built-in ListView called @android:id/list

Data
Source

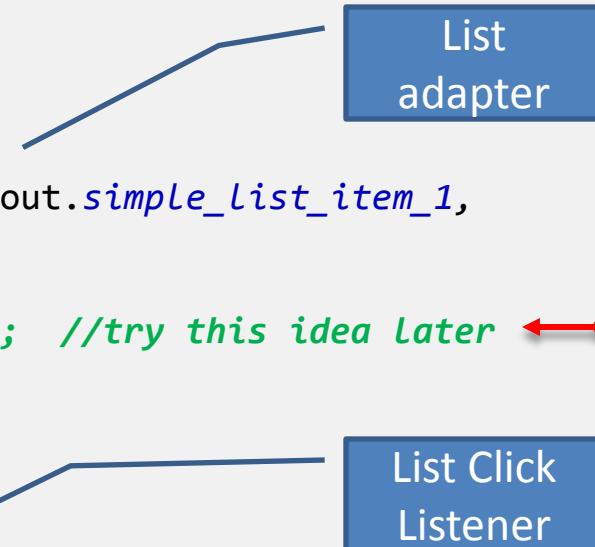
```
...  
    <ListView  
        android:id="@+id/list"  
        android:layout_width="match_parent"  
        android:layout_height="match_parent" >  
    </ListView>  
...
```

Fragment already defined in
Layout: activity_main.xml

Using ListActivity + ArrayAdapter

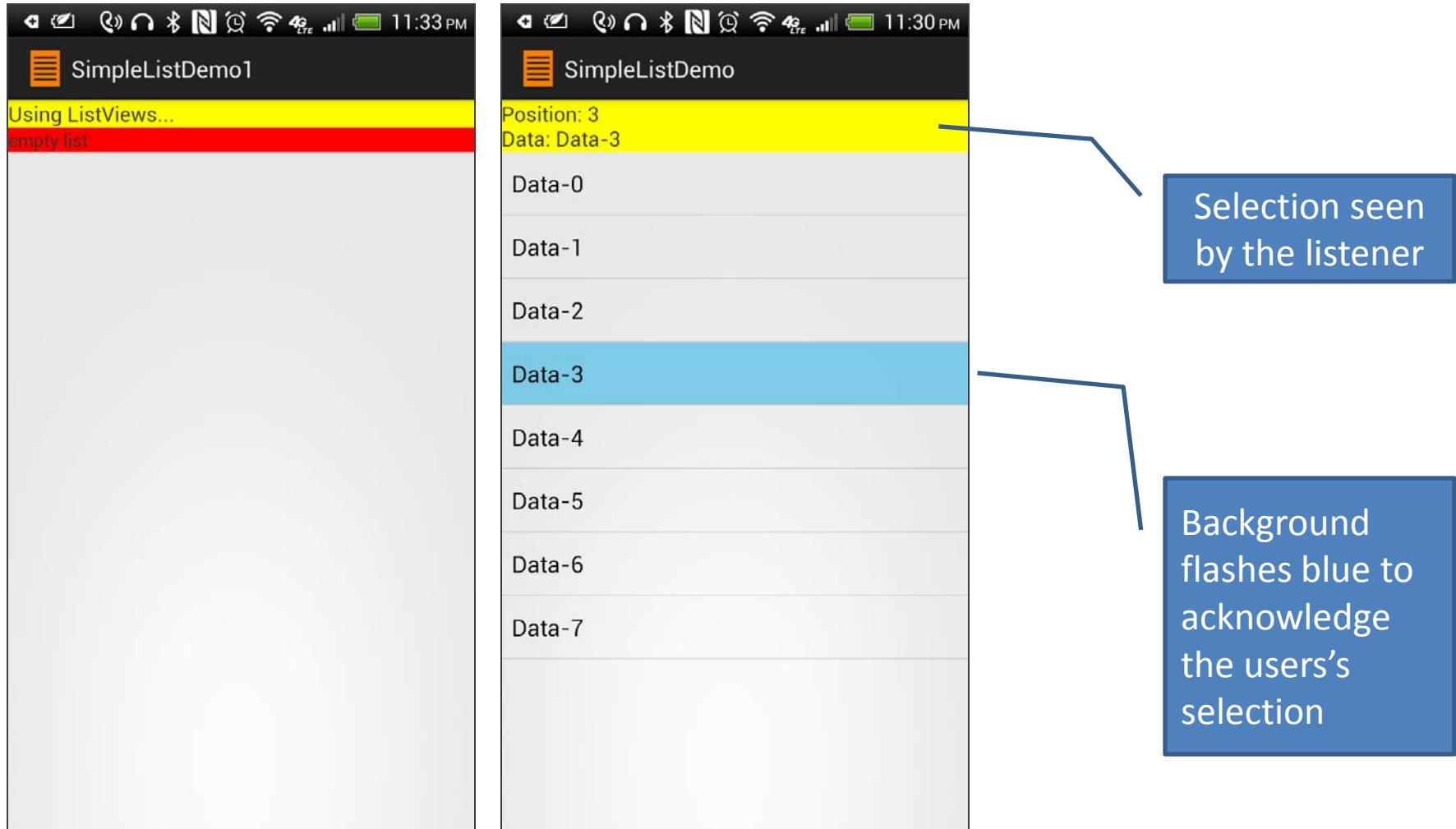
Example1A: MainActivity (using a ListActivity !)

```
@Override  
public void onCreate(Bundle savedInstanceState) {  
    super.onCreate(savedInstanceState);  
    setContentView(R.layout.activity_main);  
  
    setListAdapter(new ArrayAdapter<String>(this,  
                                         android.R.layout.simple_list_item_1,  
                                         items));  
  
    //getListView().setBackgroundColor(Color.GRAY); //try this idea later ←  
  
    txtMsg = (TextView) findViewById(R.id.txtMsg);  
}  
  
@Override  
protected void onListItemClick(ListView l, View v, int position, long id) {  
    super.onListItemClick(l, v, position, id);  
    String text = " Position: " + position + " " + items[position];  
    txtMsg.setText(text);  
}  
}
```



Using ListActivity + ArrayAdapter

Example1A: MainActivity (using a ListActivity !)



ListView displayed on a device running SDK4.3

Using ListActivity + ArrayAdapter

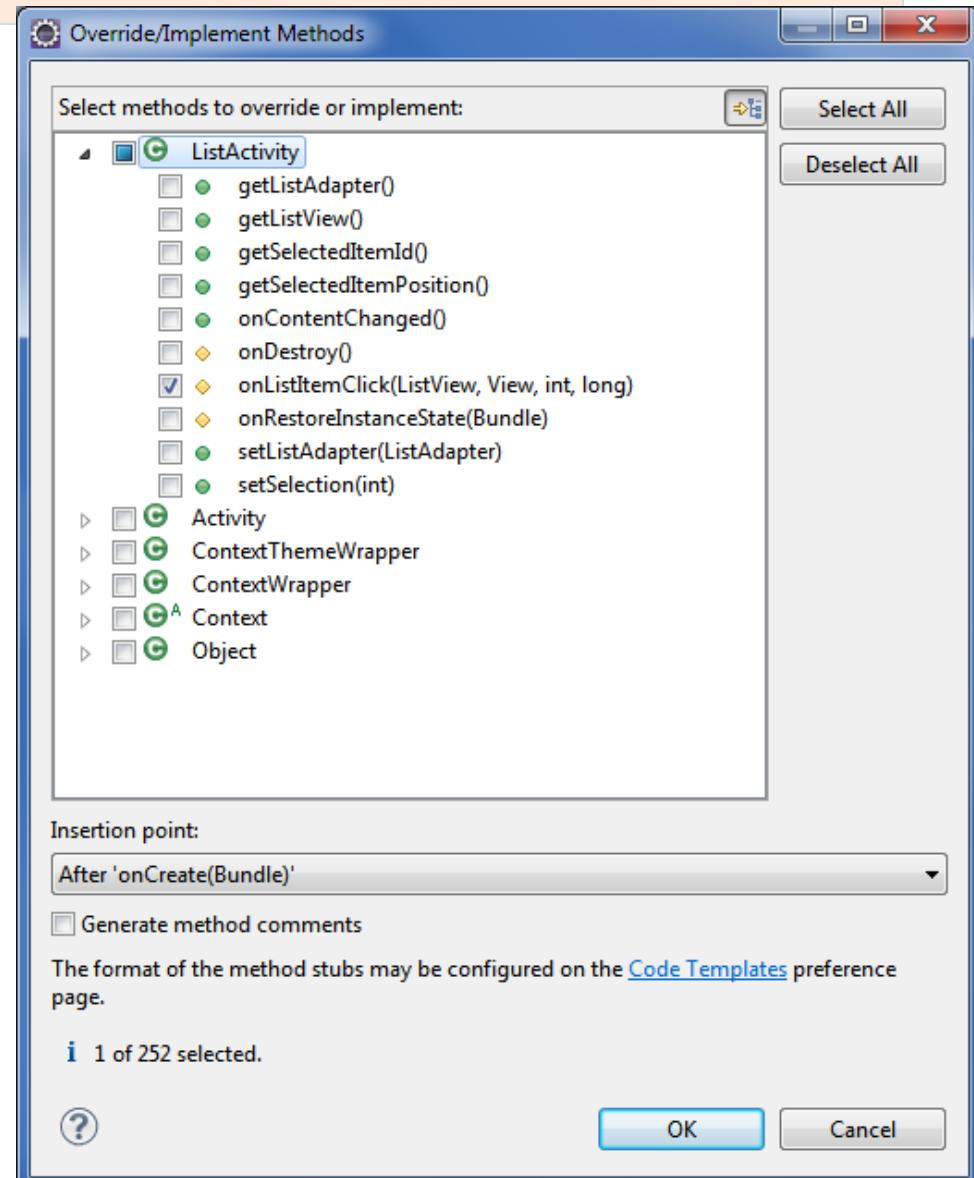
A Comment on Example1A

Using Eclipse & ADT.

A simple way to add new code

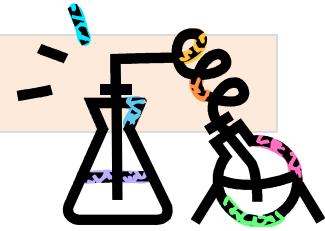
Assume you have NOT written the click listener yet. In order to easily add a listener (or any other valid method) to the ListActivity class under construction do this:

1. Position the cursor in between the end of the onCreate method and the end of the class.
2. On the Eclipse Tool Bar Menu click Source > Override/Implement Methods... >
3. A list of pertinent methods is shown.
4. Check onListItemClick > Ok
5. Add your actions to the selected method.



Using ListActivity + ArrayAdapter

An experiment based on Example1A



1. Open the `AndroidManifest.xml` file. Under the `<Application>` tag look for the clause

```
    android:theme="@style/AppTheme"
```

2. Change the previous line to the following value

```
    android:theme="@android:style/Theme.Black"
```

3. Try some of the other styles, such as:

`Theme.DeviceDefault`

`Theme.Dialog`

`Theme.Holo`

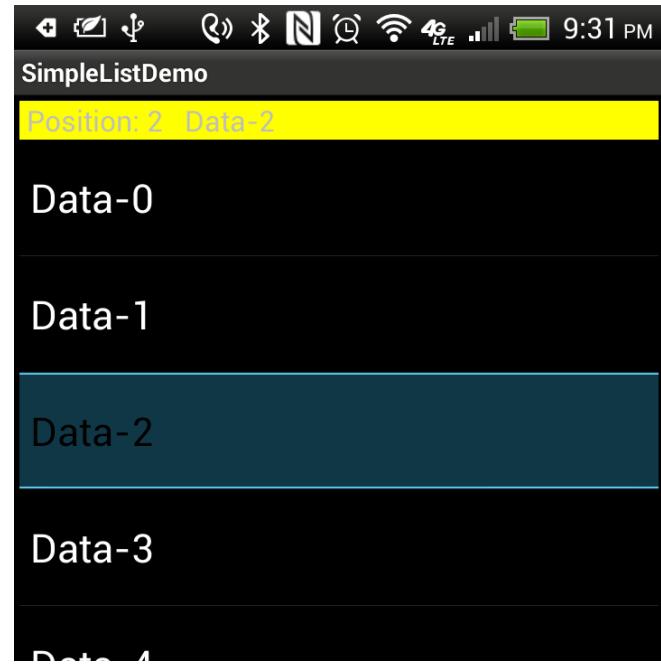
`Theme.Light`

`Theme.Panel`

`Theme.Translucent`

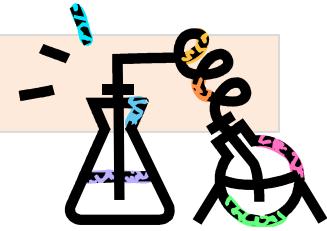
`Theme.Wallpaper`

etc.

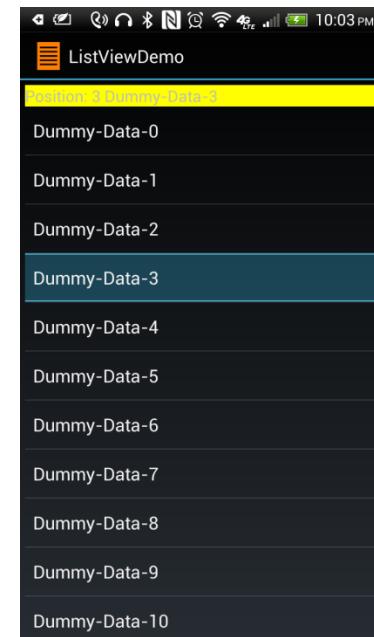


Using ListActivity + ArrayAdapter

Another code experiment based on Example1A



1. Open the `AndroidManifest.xml` file. Under the `<Application>` tag look for the clause `android:theme="@style/AppTheme"`
2. Now open the `res/values/styles` folder. Look for the entry
`<style name="AppTheme" parent="android:Theme.Light" />`
which indicates to use the “Light” theme (white background instead of black).
3. Remove from the manifest the entry `android:theme`.
4. Remove from the `onCreate` method the statement:
`getListView().setBackgroundColor(Color.GRAY);`
5. Run the application again. Observe its new look.



Using Activity + ArrayAdapter

Example1B: Using Activity & ArrayAdapter

- You may use a common **Activity** class instead of a **ListActivity**.
- The Layout below uses a ListView identified as **@+id/my_list** (instead of **@android:id/list** used in the previous Example1).

```
<LinearLayout 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:orientation="vertical" >

    <TextView
        android:id="@+id/txtMsg"
        android:layout_width="match_parent"
        android:layout_height="wrap_content"
        android:background="#fffff00"
        android:text="Using ListViews..." 
        android:textSize="16sp" />

    <ListView
        android:id="@+id/my_list"
        android:layout_width="match_parent" 
        android:layout_height="match_parent" >
    </ListView>

</LinearLayout>
```



```
<ListView
```

```
    android:id="@+id/my_list"
```

```
    android:layout_width="match_parent" 
    android:layout_height="match_parent" >
```

```
try:  
wrap_content  
to see limitations
```

Using Activity + ArrayAdapter

Example1B: Instead of using a **ListActivity** (as we did on the previous example) we now employ a regular Android **Activity**. Observe that you must ‘wired-up’ the ListView to a Java proxy, and later bind it to an Adapter.

Example 1B – MainActivity 1 of 2



```
public class ListViewDemo2 extends Activity {
    String[] items = { "Data-0", "Data-1", "Data-2", "Data-3",
                      "Data-4", "Data-5", "Data-6", "Data-7" };
    ListView myListView;
    TextView txtMsg;

    @Override
    public void onCreate(Bundle savedInstanceState) {
        super.onCreate(savedInstanceState);
        setContentView(R.layout.activity_main);
        myListView = (ListView) findViewById(R.id.my_list);

        ArrayAdapter<String> aa = new ArrayAdapter<String>(this,
                android.R.layout.simple_list_item_1,           ←
                // R.layout.my_text,   //try this later...      ←
                items);
        myListView.setAdapter(aa);

        txtMsg = (TextView) findViewById(R.id.txtMsg);
    } //onCreate
}
```

Using Activity + ArrayAdapter

Example 1B – MainActivity 2 of 2

```
myListView.setOnItemClickListener(new OnItemClickListener() {
    @Override
    public void onItemClick(AdapterView<?> av, View v,
                           int position, long id) {

        String text = "Position: " + position
                     + "\nData: " + items[position];

        txtMsg.setText(text);
    }
});
```

To provide a listener to the ListView control add the fragment above to the **onCreate** method.

Using Activity + ArrayAdapter

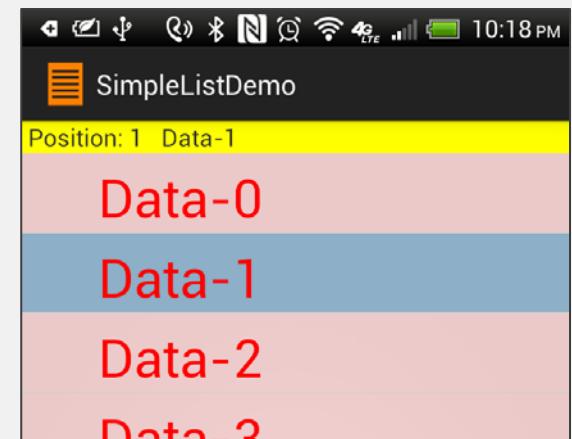
Example1C: Custom ListView

You may want to modify the ListView control to use your own GUI design. For instance, you may replace

`android.R.layout.simple_list_item_1` with
`R.layout.my_custom_text`.

Where `my_custom_text` is the Layout specification listed below (held in the `res/layout` folder). It defines how each row is to be shown.

```
<?xml version="1.0" encoding="utf-8"?>
<TextView
    xmlns:android="http://schemas.android.com/apk/res/android"
    android:layout_width="match_parent"
    android:layout_height="wrap_content"
    android:layout_margin="2dp"
    android:paddingTop="5dp"
    android:padding="5dp"
    android:textColor="#ffff0000"
    android:background="#22ff0000"
    android:textSize="35sp" />
```



Note: As of SDK4.0 a TextView could also include an image (For example `.setDrawableLeft(some_image)`)

Using Activity + ArrayAdapter

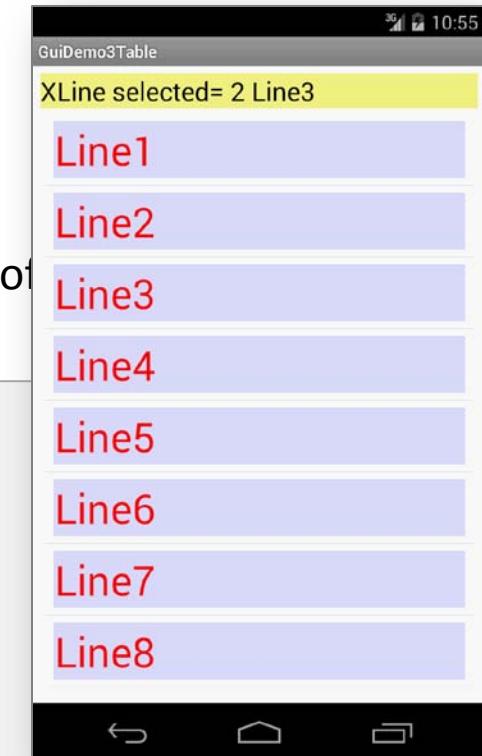
Example1C: Custom ListView

You may also create the ArrayAdapter with more parameters. For instance, the following statement:

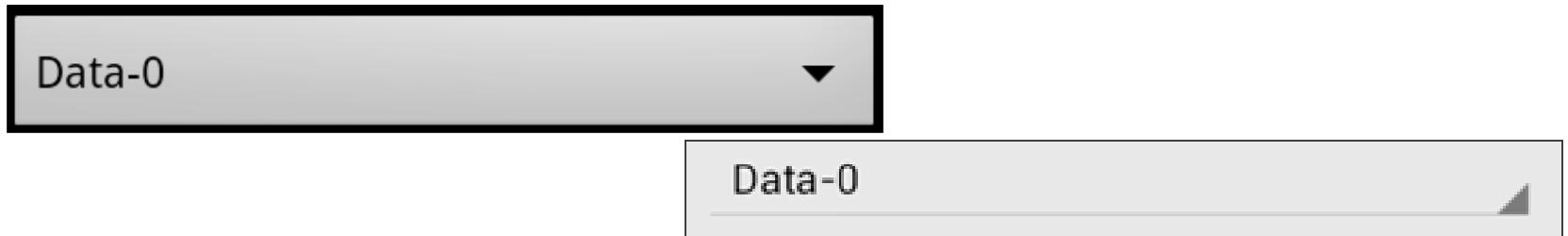
```
ArrayAdapter<String> adapter = new ArrayAdapter<String>(
    getApplication(),
    R.layout.my_custom_line3,
    R.id.my_custom_textview3,
    data );
```

Defines a custom *list* and *textview* layout to show the contents of the *data* array.

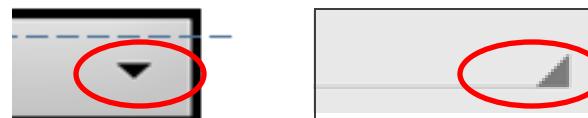
```
<!-- my_custom_line3 -->
<LinearLayout xmlns:android="http://schemas.android.com/apk/res/android"
    android:layout_width="match_parent"
    android:layout_height="match_parent"
    android:orientation="vertical"
    android:padding="6dp" >
    <TextView
        android:id="@+id/my_custom_textview3"
        android:layout_width="match_parent"
        android:layout_height="wrap_content"
        android:background="#220000ff"
        android:padding="1dp"
        android:textColor="#ffff0000"
        android:textSize="35sp" />
</LinearLayout>
```



The Spinner Widget

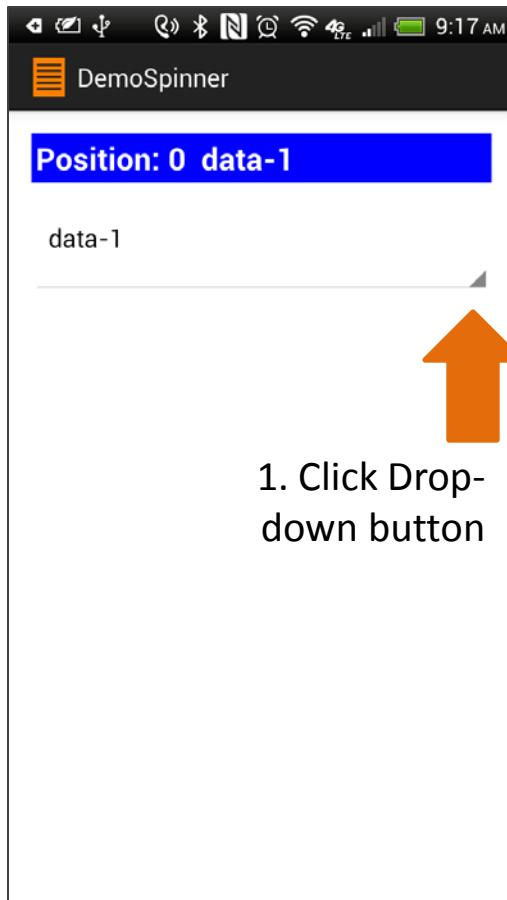


- Android's **Spinner** is equivalent to a *drop-down* selector.
- Spinners have the same functionality of a ListView but take less screen space.
- An Adapter is used to supply its data using *setAdapter(...)*
- A listener captures selections made from the list with *setOnItemSelectedListener(...)*.
- The *setDropDownViewResource(...)* method shows the drop-down multi-line window

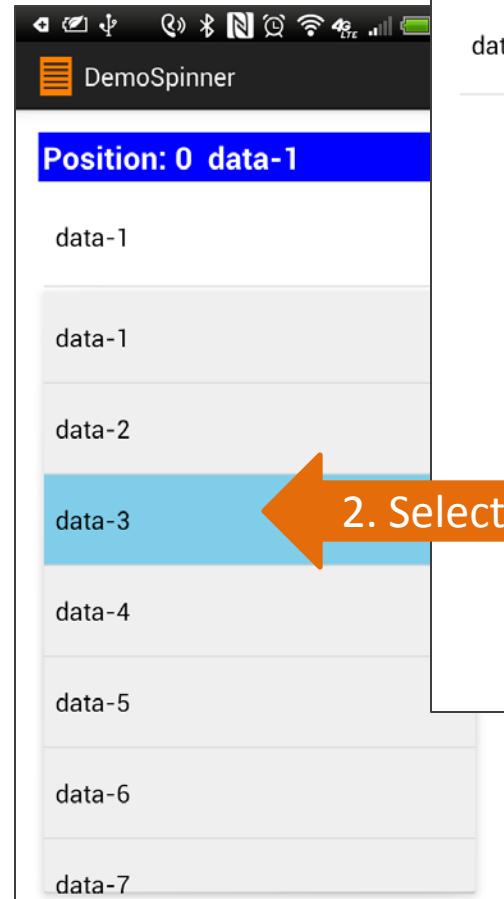


Example2: Using the Spinner Widget

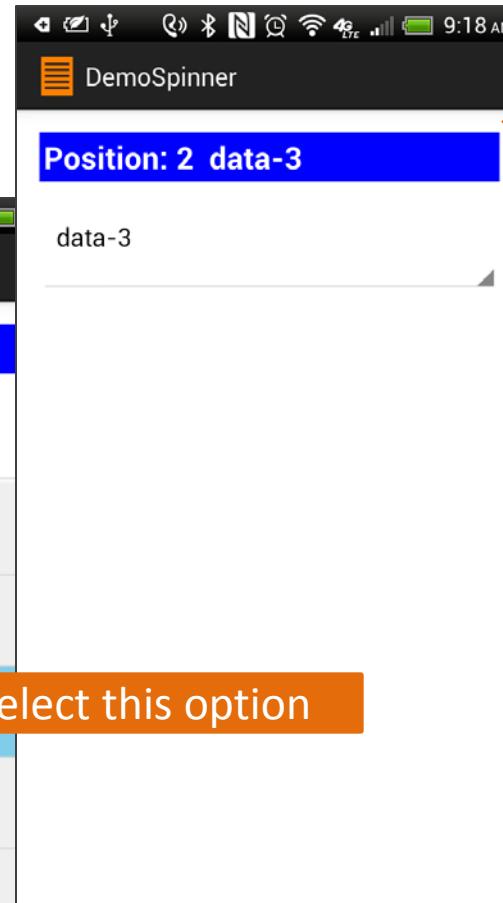
Example 2. A list of options named ‘Data-0’, ‘Data-1’, ‘Data-2’ and so on, should be displayed when the user taps on the ‘down-arrow’ portion of the spinner.



1. Click Drop-down button



2. Select this option



3. Selected value

Images taken from a device running SDK JellyBean 4.3

Using the Spinner Widget

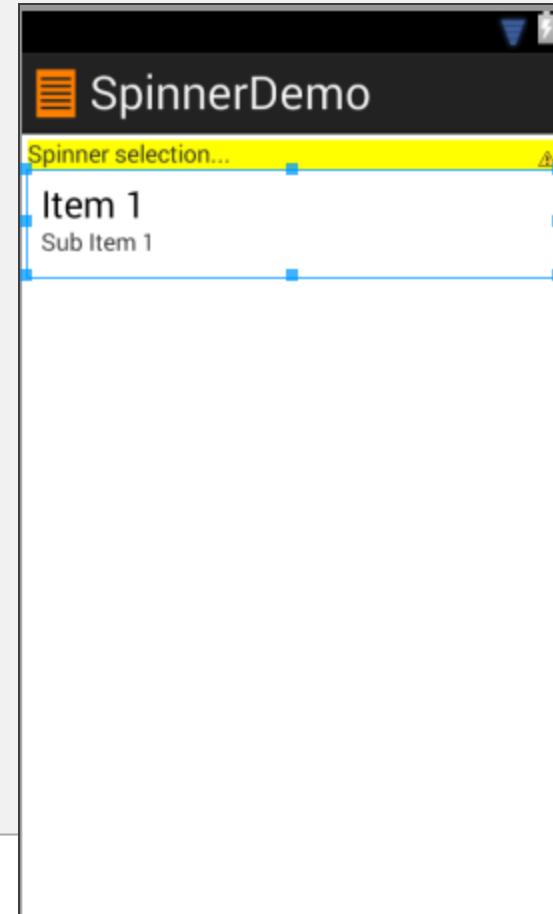
Example2: Spinner Demo - Layout

```
<LinearLayout 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:orientation="vertical"
    android:padding="3dp"
    tools:context=".MainActivity" >

    <TextView
        android:id="@+id/txtMsg"
        android:layout_width="match_parent"
        android:layout_height="wrap_content"
        android:background="#ffff00"
        android:text="@string/hello_world" />

    <Spinner
        android:id="@+id/spinner1"
        android:layout_width="match_parent"
        android:layout_height="wrap_content" />

</LinearLayout>
```



Using the Spinner Widget

Example2: Spinner Demo - MainActivity 1 of 2

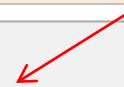
```
public class MainActivity extends Activity
{
    // GUI objects
    TextView txtMsg;
    Spinner spinner;

    // options to be offered by the spinner
    String[] items = { "Data-0", "Data-1", "Data-2", "Data-3", "Data-4",
                       "Data-5", "Data-6", "Data-7" };

    @Override
    protected void onCreate(Bundle savedInstanceState) {
        super.onCreate(savedInstanceState);
        setContentView(R.layout.activity_main);
        txtMsg = (TextView) findViewById(R.id.txtMsg);

        spinner = (Spinner) findViewById(R.id.spinner1);

        // use adapter to bind items array to GUI layout
        ArrayAdapter<String> adapter = new ArrayAdapter<String>(
            this,
            android.R.layout.simple_spinner_dropdown_item,
            items);
    }
}
```



Using the Spinner Widget

Example2: Spinner Demo - MainActivity 2 of 2

```
// bind everything together
spinner.setAdapter(adapter);

// add spinner a listener so user can meake selections by tapping an item
spinner.setOnItemSelectedListener(this);

}

// next two methods implement the spinner's listener
@Override
public void onItemSelected(AdapterView<?> parent, View v, int position,
    long id) {
    // echo on the textbox the user's selection
    txtMsg.setText(items[position]);
}

@Override
public void onNothingSelected(AdapterView<?> arg0) {
    // TODO do nothing - needed by the interface
}

}
```

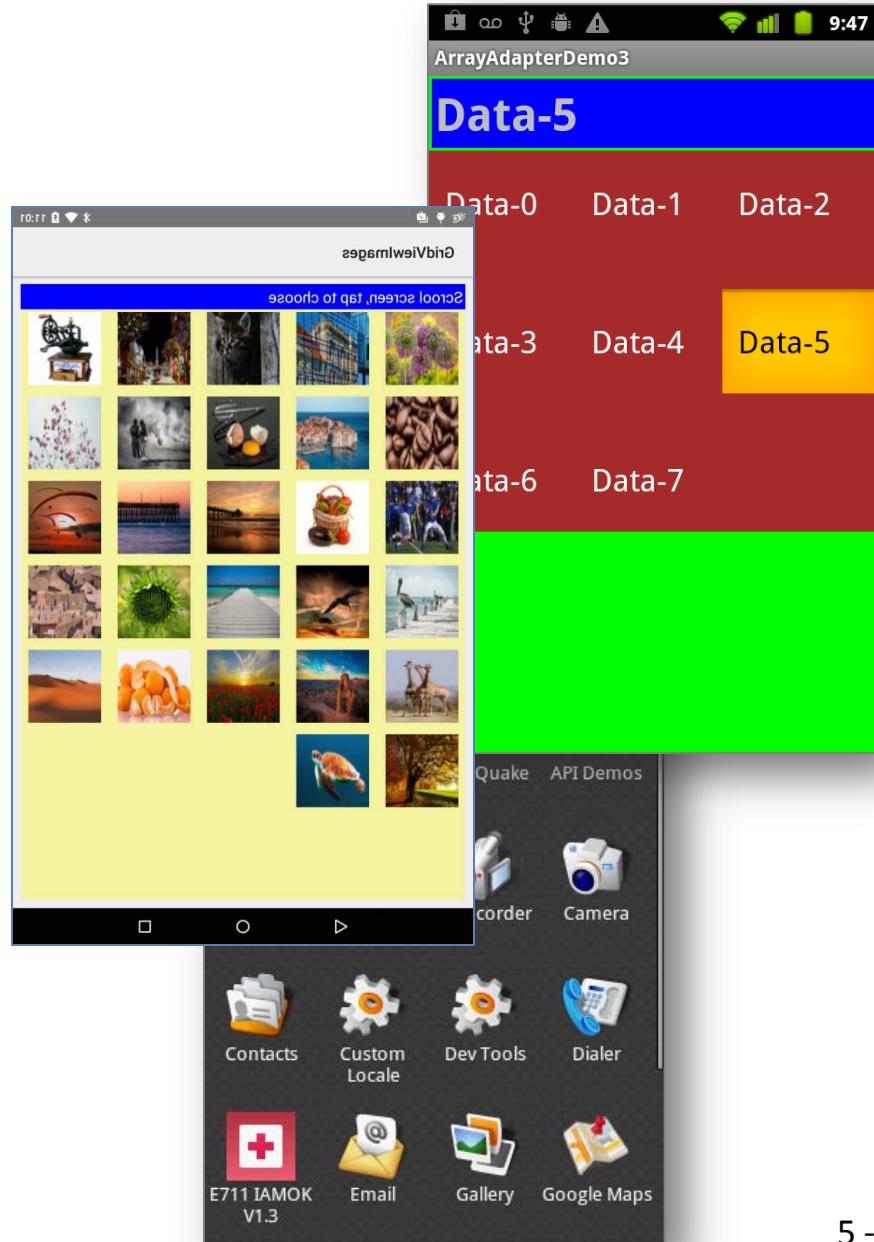
The GridView Widget

GridView

GridView is a ViewGroup that displays items in a two-dimensional, scrollable grid.

Data items shown by the grid are supplied by a data adapter.

Grid cells can show text and/or images



The GridView Widget

GridView: Useful Properties

Some properties used to determine the number of columns and their sizes:

- **android:numColumns**
indicates how many columns to show. When used with option “auto_fit”, Android determines the number of columns based on available space and the properties listed below.
- **android:verticalSpacing** and **android:horizontalSpacing**
indicate how much free space should be set between items in the grid.
- **android:columnWidth**
column width in **dips**.
- **android:stretchMode**
indicates how to modify image size when there is available space not taken up by columns or spacing .

The GridView Widget

GridView: Fitting the View to the Screen

Suppose the screen is **320** (dip) pixels wide, and we have

android:columnWidth set to **100dip** and
android:horizontalSpacing set to **5dip**.

The user would see three columns taking **310** pixels (three columns of 100 pixels and two separators of 5 pixels).

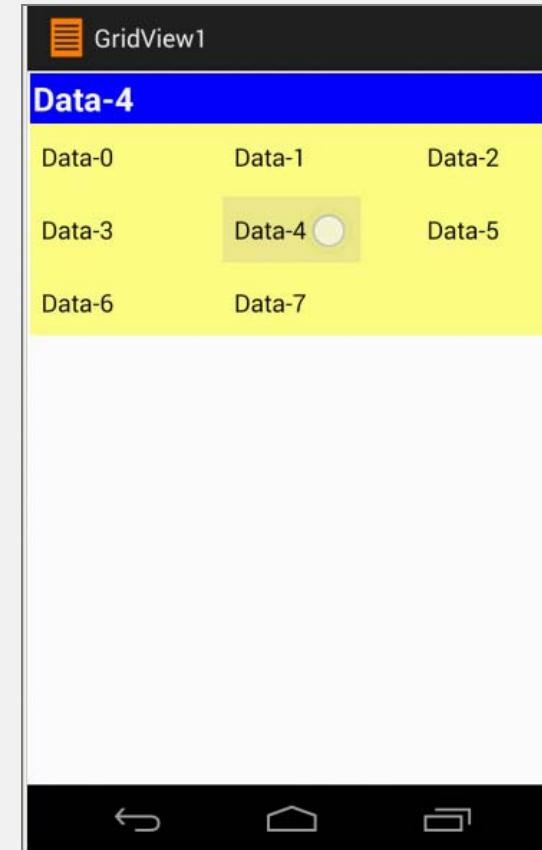
With **android:stretchMode** set to *columnWidth*, the three columns will each expand by 3-4 pixels to use up the remaining 10 pixels.

With **android:stretchMode** set to *spacingWidth*, the two internal whitespaces will each grow by 5 pixels to consume the remaining 10 pixels.

The GridView Widget

Example3A: GridView Demo - Layout

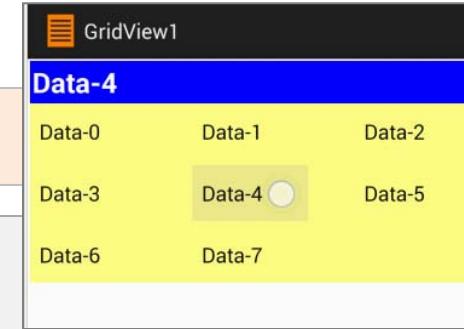
```
<LinearLayout xmlns:android="http://schemas.android.com/apk/res/android"
    xmlns:tools="http://schemas.android.com/tools"
    android:id="@+id/LinearLayout1"
    android:layout_width="match_parent"
    android:layout_height="match_parent"
    android:orientation="vertical"
    android:padding="2dp"
    tools:context=".MainActivity" >
    <TextView
        android:id="@+id/txtMsg"
        android:layout_width="match_parent"
        android:layout_height="wrap_content"
        android:background="#ff0000ff"
        android:textSize="24sp"
        android:textStyle="bold"
        android:textColor="#ffffffff"
        android:padding="2dip"    />
    <GridView
        android:id="@+id/grid"
        android:background="#77ffff00"
        android:layout_width="match_parent"
        android:layout_height="wrap_content"
        android:verticalSpacing="5dip"
        android:horizontalSpacing="5dip"
        android:numColumns="auto_fit"
        android:columnWidth="100dip"
        android:stretchMode="spacingWidth"    />
</LinearLayout>
```



The GridView Widget

Example3A: GridView Demo – MainActivity 1 of 2

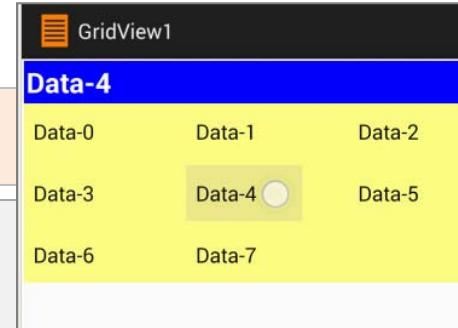
```
public class ArrayAdapterDemo3 extends Activity {  
  
    TextView txtMsg;  
  
    String[] items = { "Data-0", "Data-1", "Data-2", "Data-3",  
                      "Data-4", "Data-5", "Data-6", "Data-7" };  
    @Override  
    public void onCreate(Bundle savedInstanceState) {  
        super.onCreate(icicle);  
        setContentView(R.layout.activity_main);  
  
        txtMsg = (TextView) findViewById(R.id.txtMsg);
```



The GridView Widget

Example3A: GridView Demo – MainActivity 2 of 2

```
GridView grid = (GridView) findViewById(R.id.grid);  
  
ArrayAdapter<String> adapter = new ArrayAdapter<String>(  
    this,  
    android.R.layout.simple_list_item_1,  
    items );  
  
grid.setAdapter(adapter);  
  
grid.setOnItemClickListener(new OnItemClickListener() {  
  
    @Override  
    public void onItemClick(AdapterView<?> container, View v,  
        int position, long id) {  
        txtMsg.setText(items[position]);  
    }  
});  
  
}//onCreate  
  
}// class
```



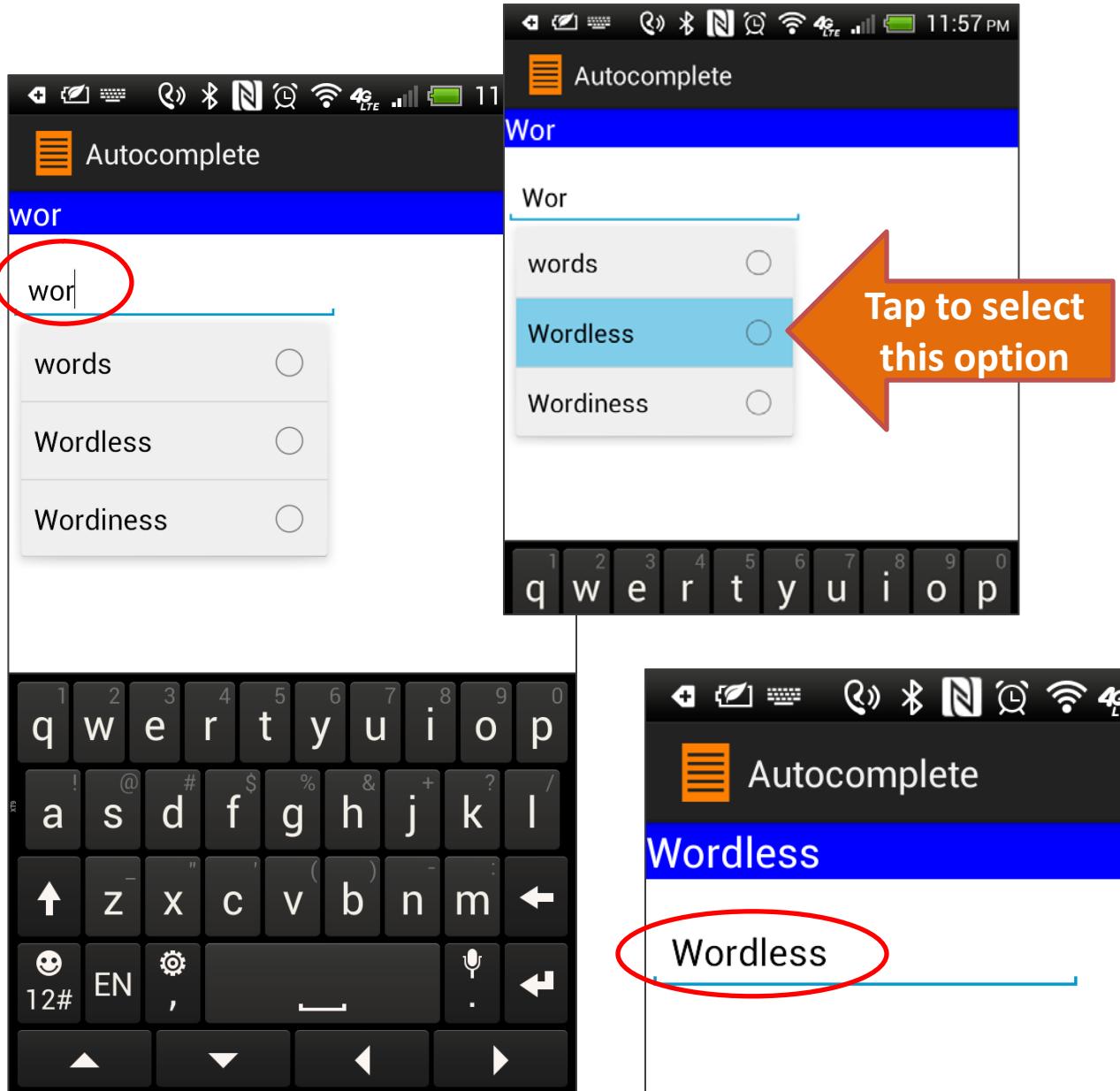
The AutoComplete TextView Widget

AutoComplete TextView

- An **AutoComplete** box is a more specialized version of the **EditText** view.
- Characters typed so far are compared with the beginning of words held in a user-supplied list of *suggested* values.
- Suggestions matching the typed prefix are shown in a *selection list*.
- The user can choose from the suggestion list or complete typing the word.
- The **android:completionThreshold** property is used to trigger the displaying of the suggestion list. It indicates the number of characters to watch for in order to match prefixes.

NOTE: For other features of the TextView control see Appendix B

The AutoComplete TextView Widget



Example 4.

A list of selected words beginning with “wor” or “set” is being watched.

If any of these prefixes (3 letters) are entered the TextWatcher mechanism shows an option list.

The AutoComplete TextView Widget

Example4: AutoComplete Demo - 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" >

    <TextView
        android:id="@+id/txtMsg"
        android:layout_width="match_parent"
        android:layout_height="wrap_content"
        android:textSize="20sp"
        android:textColor="#ffffffff"
        android:background="#ff0000ff" >
    </TextView>

    <AutoCompleteTextView
        android:id="@+id/autoCompleteTextView1"
        android:hint="type here..."
        android:completionThreshold="3"
        android:layout_width="wrap_content"
        android:layout_height="wrap_content"
        android:layout_below="@+id/txtMsg"
        android:layout_marginTop="15dp"
        android:ems="10" />

</RelativeLayout>
```

Wait 3 chars to work

The AutoComplete TextView Widget

Example4: AutoComplete Demo – MainActivity 1 of 2



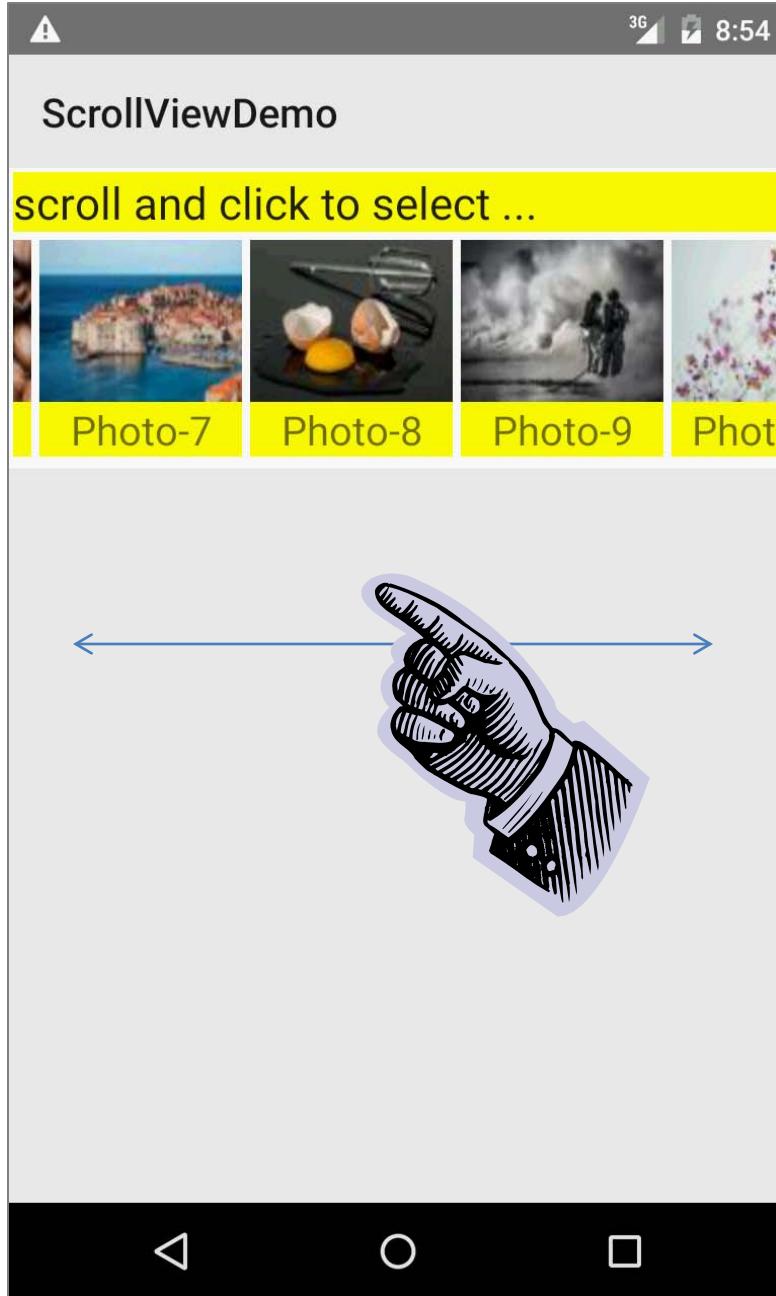
```
public class ArrayAdapterDemo4 extends Activity implements TextWatcher{  
  
    TextView txtMsg;  
  
    AutoCompleteTextView txtAutoComplete;  
  
    String[] items = { "words", "starting", "with", "set", "Setback",  
        "Setline", "Setoffs", "Setouts", "Setters", "Setting",  
        "Settled", "Settler", "Wordless", "Wordiness", "Adios" };  
  
    @Override  
    public void onCreate(Bundle savedInstanceState) {  
        super.onCreate(savedInstanceState);  
  
        setContentView(R.layout.activity_main);  
  
        txtMsg = (TextView) findViewById(R.id.txtMsg);
```

The AutoComplete TextView Widget

Example4: AutoComplete Demo – MainActivity 2 of 2

```
txtAutoComplete = (AutoCompleteTextView) findViewById(  
                    R.id.autoCompleteTextView1);  
  
txtAutoComplete.addTextChangedListener(this);  
  
txtAutoComplete.setAdapter(new ArrayAdapter<String>(  
        this,  
        android.R.layout.simple_list_item_single_choice,  
        items));  
}  
//onCreate  
  
public void onTextChanged(CharSequence s, int start, int before, int count) {  
    txtMsg.setText(txtAutoComplete.getText());  
}  
  
public void beforeTextChanged(CharSequence s, int start, int count, int after) {  
    // needed for interface, but not used  
}  
  
public void afterTextChanged(Editable s) {  
    // needed for interface, but not used  
}  
}  
//class
```

The HorizontalScrollView Widget



HorizontalScrollViews allow the user to graphically select an option from a set of small images called *thumbnails* ⁺.

The user interacts with the viewer using two simple actions:

1. Scroll the list (left ↔ right)
2. Click on a thumbnail to pick the option it offers.

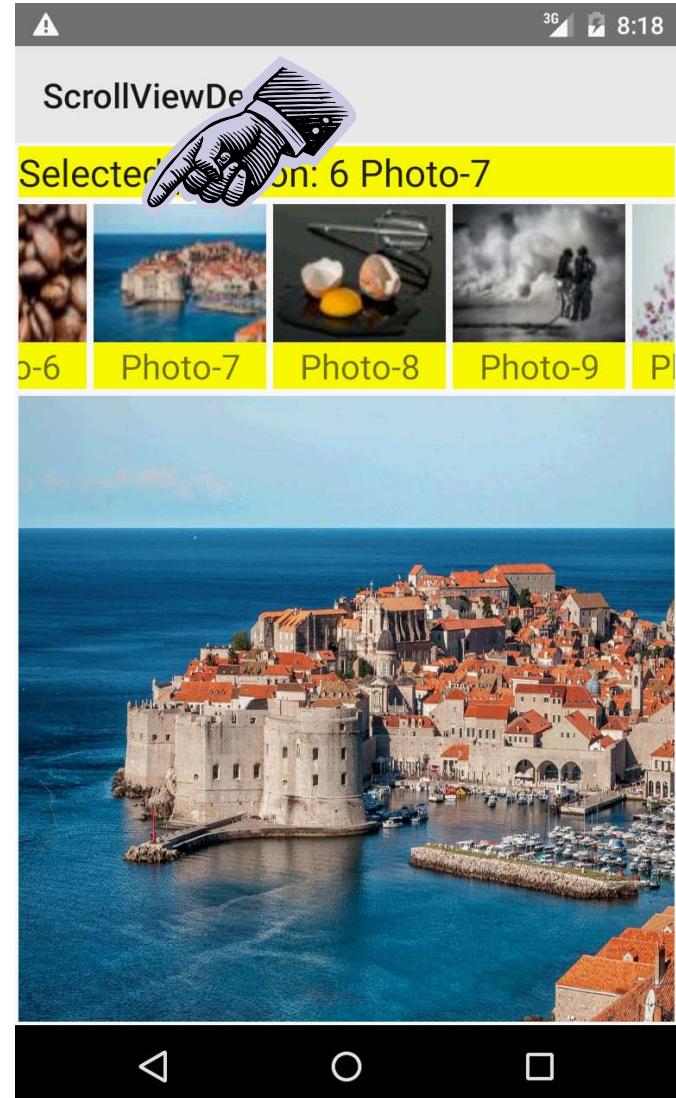
In our example, when the user clicks on a thumbnail the app responds by displaying a high-resolution version of the image

- + A typical thumbnail size is 100x100 pixels (or less).

The HorizontalScrollView Widget

Example5: HorizontalScrollView Demo

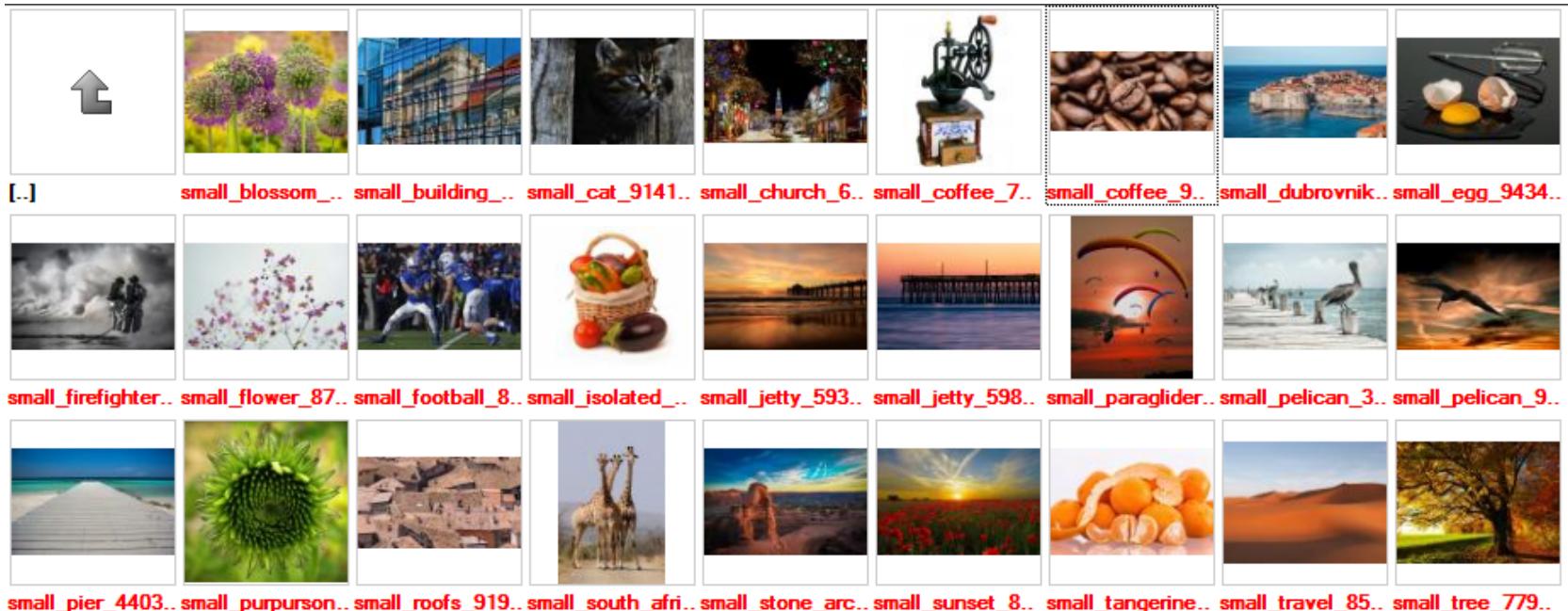
- In this example we place a **HorizontalScrollView** at the top of the screen, this view will show a set of thumbnail options.
- The user may scroll through the images and finally tap on a particular selection.
- A better quality version of the selected picture will be displayed in an **ImageView** widget placed below the horizontal scroller.



The HorizontalScrollView Widget

Example5: How to make a thumbnail ?

- **Option-1.** The 100x100 thumbnails shown below were made visiting the site:
<http://makeathumbnail.com>
- **Option-2.** Upload individual images to the Android_Asset_Studio_Tool
<http://android-ui-utils.googlecode.com/hg/asset-studio/dist/index.html>



The free high quality images used in this example were obtained from <https://pixabay.com/>

The HorizontalScrollView Widget

Example5: Populating The HorizontalScrollView Widget

1. Our **HorizontalScrollView** will expose a list of frames, each containing an *icon* and a *caption* below the icon.
2. The *frame_icon_caption.xml* layout describes the formatting of icon and its caption. This layout will be **inflated** in order to create run-time GUI objects.
3. After the current *frame* is filled with data, it will be added to the growing set of views hosted by the *scrollViewgroup* container (*scrollViewgroup* is nested inside the horizontal scroller).
4. Each *frame* will receive an **ID** (its current position in the *scrollViewgroup*) as well as an individual **onClick** listener.

The HorizontalScrollView Widget

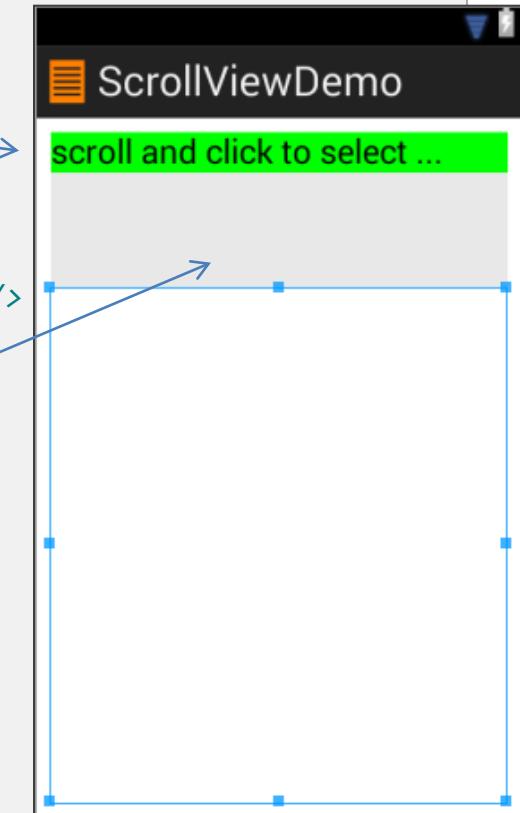
Example5: HorizontalScrollView Demo – Layout 1 of 2

```
<?xml version="1.0" encoding="UTF-8"?>
<LinearLayout xmlns:android="http://schemas.android.com/apk/res/android"
    android:layout_width="match_parent"
    android:layout_height="wrap_content"
    android:background="#ffffffff"
    android:orientation="vertical"
    android:padding="2dp" >

    <TextView
        android:id="@+id/txtMsg"
        android:layout_width="match_parent"
        android:layout_height="wrap_content"
        android:background="#ff00ff00"
        android:text="scroll and click to select ..."
        android:textAppearance="?android:attr/textAppearanceLarge" />

    <HorizontalScrollView
        android:layout_width="match_parent"
        android:layout_height="wrap_content"
        android:background="#44aaaaaa" >

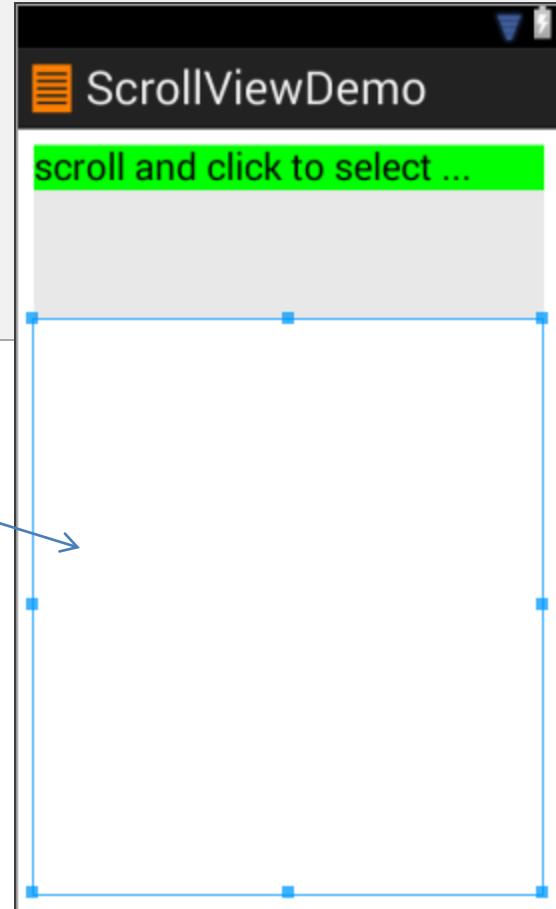
        <LinearLayout
            android:id="@+id/viewgroup"
            android:layout_width="wrap_content"
            android:layout_height="wrap_content"
            android:orientation="horizontal"
            android:padding="10dip" >
            </LinearLayout>
    </HorizontalScrollView>
```



The HorizontalScrollView Widget

Example5: HorizontalScrollView Demo – Layout 2 of 2

```
<ImageView  
    android:id="@+id/imageSelected"  
    android:layout_width="wrap_content"  
    android:layout_height="wrap_content"  
    android:layout_weight="2" />  
  
</LinearLayout>
```



The HorizontalScrollView Widget

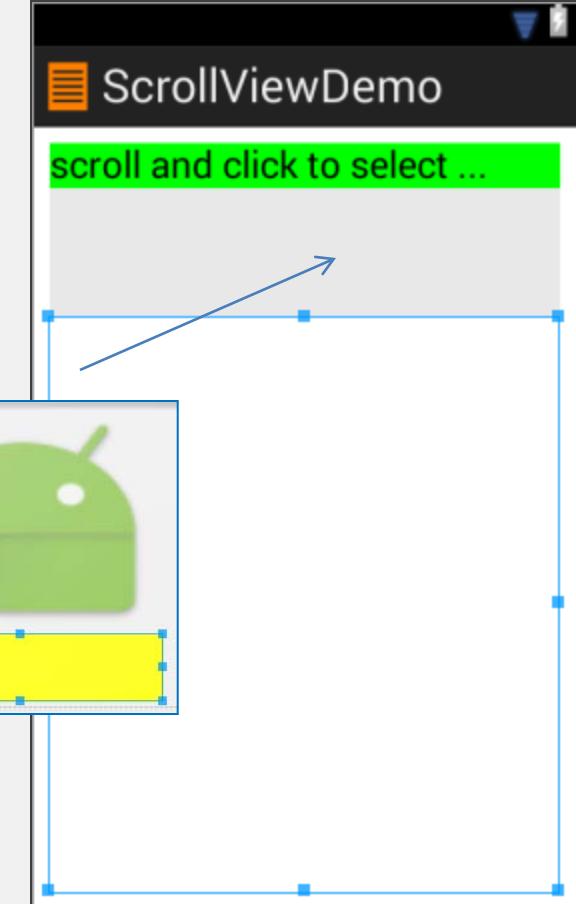
Example5: Layout: *frame_icon_caption.xml*

```
<?xml version="1.0" encoding="UTF-8"?>
<LinearLayout
    xmlns:android="http://schemas.android.com/apk/res/android"
    android:layout_width="match_parent"
    android:layout_height="wrap_content"
    android:padding="2dp"
    android:orientation="vertical" >

    <ImageView
        android:id="@+id/icon"
        android:layout_width="100dp"
        android:layout_height="80dp"
        android:scaleType="fitXY"
        android:src="@mipmap/ic_launcher" />

    <TextView
        android:id="@+id/caption"
        android:layout_width="100dp"
        android:layout_height="wrap_content"
        android:background="#33ffff00"
        android:gravity="center"
        android:textSize="20sp" />

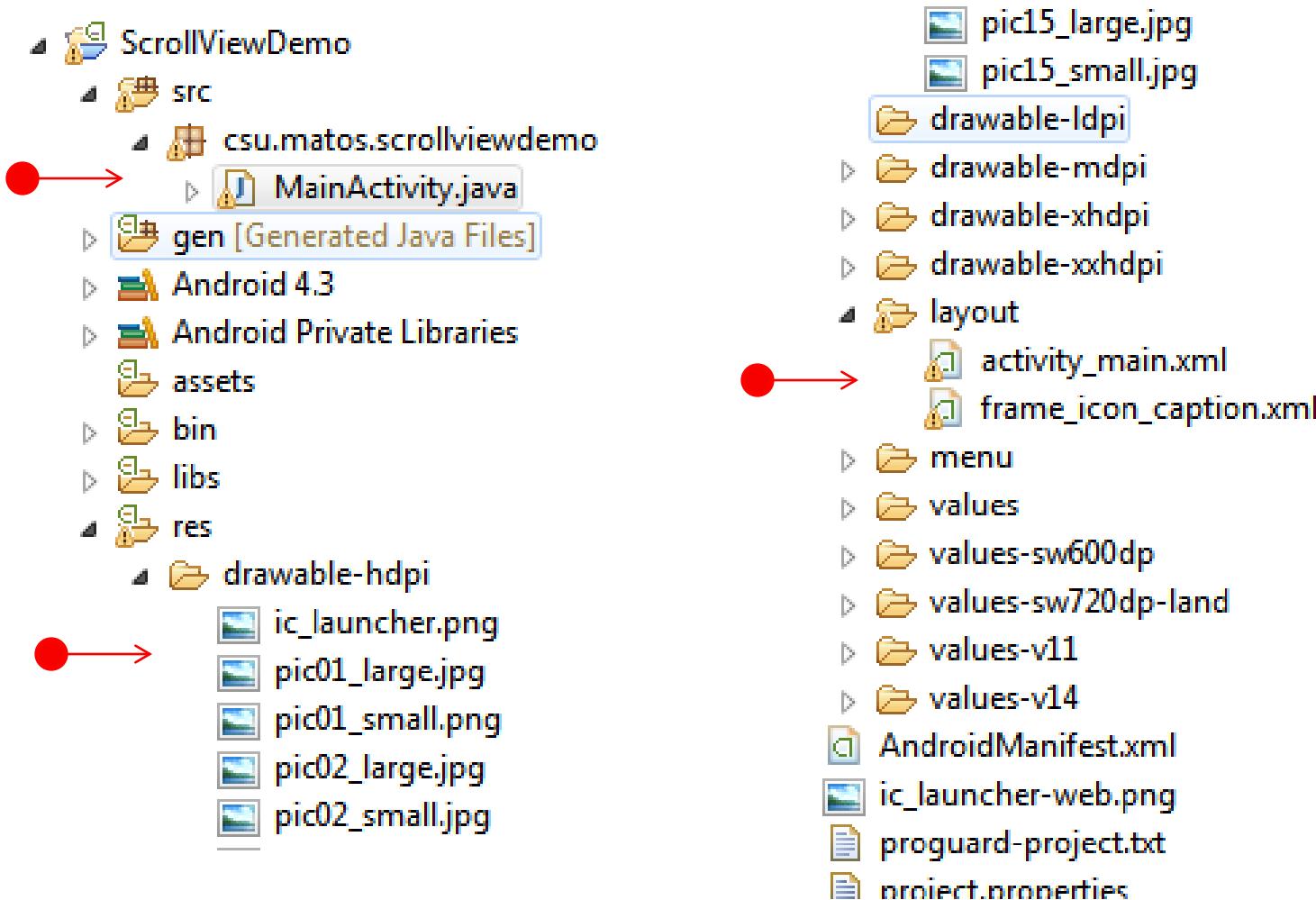
</LinearLayout>
```



This layout will be used by an **inflater** to dynamically create new views. These views will be added to the linear layout contained inside the HorizontalScrollView.

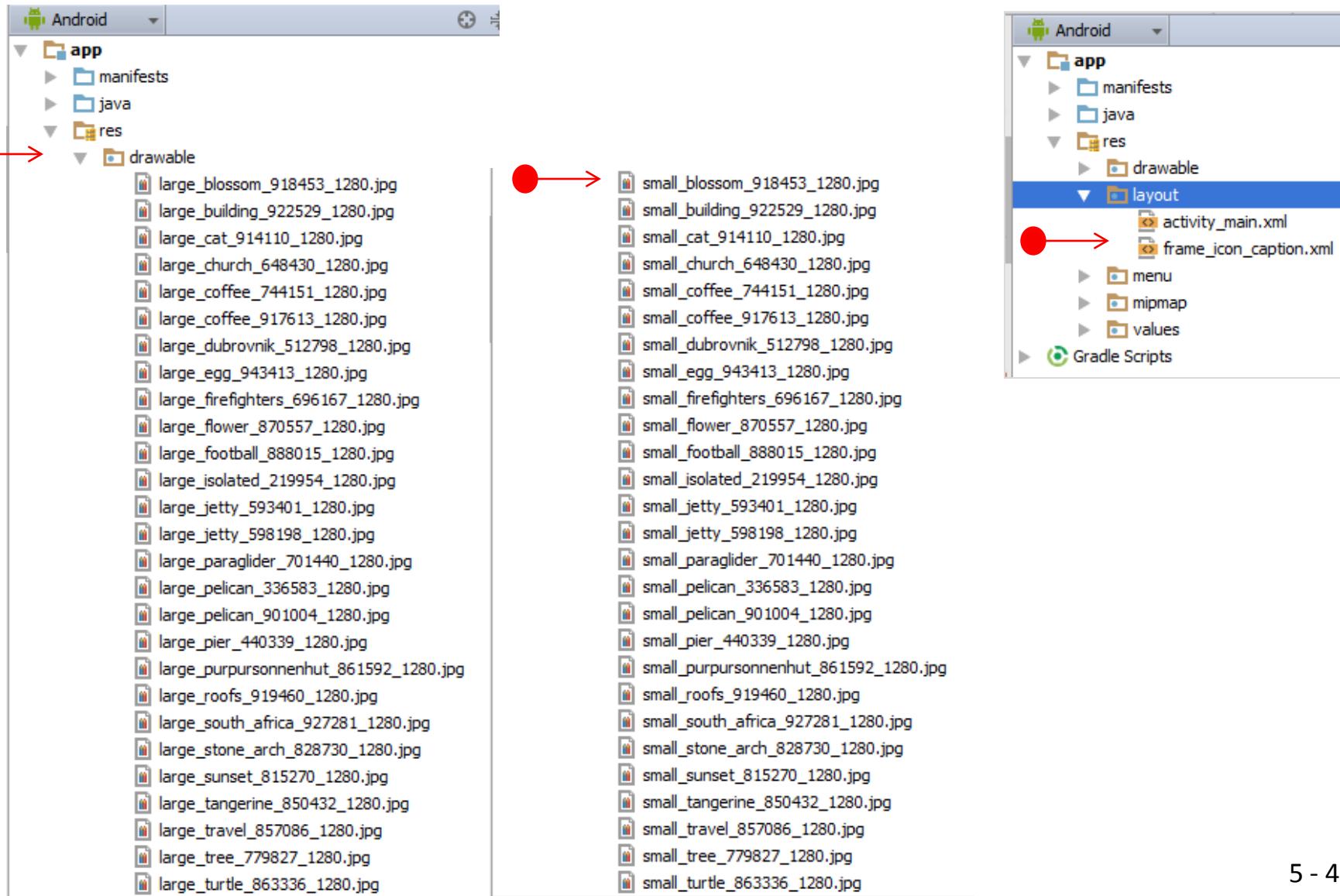
The HorizontalScrollView Widget

Example5: App's Structure - Eclipse's Package Explorer



The HorizontalScrollView Widget

Example5: App's Structure - Android Studio Package Explorer



The HorizontalScrollView Widget

Example5: HorizontalScrollView Demo – MainActivity 1 of 5

```
public class MainActivity extends Activity {  
  
    //GUI controls  
    TextView txtMsg;  
    ViewGroup scrollViewgroup;  
  
    //each frame in the HorizontalScrollView has [icon, caption]  
    ImageView icon;  
    TextView caption;  
  
    //large image frame for displaying high-quality selected image  
    ImageView imageSelected;  
  
    //frame captions  
    String[] items = {"Photo-1", "Photo-2", "Photo-3", "Photo-4", "Photo-5",  
        "Photo-6", "Photo-7", "Photo-8", "Photo-9", "Photo-10", "Photo-11",  
        "Photo-12", "Photo-13", "Photo-14", "Photo-15", "Photo-16", "Photo-17",  
        "Photo-18", "Photo-19", "Photo-20", "Photo-21", "Photo-22", "Photo-23",  
        "Photo-24", "Photo-25", "Photo-26", };  
}
```



The HorizontalScrollView Widget

Example5: HorizontalScrollView Demo – MainActivity 2 of 5

```
//frame-icons ( 100X100 thumbnails )
Integer[] thumbnails = {R.drawable.small_blossom_918453_1280
    , R.drawable.small_building_922529_1280
    , R.drawable.small_cat_914110_1280
    , R.drawable.small_church_648430_1280
    , R.drawable.small_coffee_744151_1280
    , R.drawable.small_coffee_917613_1280
    , R.drawable.small_dubrovnik_512798_1280
    , R.drawable.small_egg_943413_1280
    , R.drawable.small_firefighters_696167_1280
    , R.drawable.small_flower_870557_1280
    , R.drawable.small_football_888015_1280
    , R.drawable.small_isolated_219954_1280
    , R.drawable.small_jetty_593401_1280
    , R.drawable.small_jetty_598198_1280
    , R.drawable.small_paraglider_701440_1280
    , R.drawable.small_pelican_336583_1280
    , R.drawable.small_pelican_901004_1280
    , R.drawable.small_pier_440339_1280
    , R.drawable.small_purpuronnenhut_861592_1280
    , R.drawable.small_roofs_919460_1280
    , R.drawable.small_south_africa_927281_1280
    , R.drawable.small_stone_arch_828730_1280
    , R.drawable.small_sunset_815270_1280
    , R.drawable.small_tangerine_850432_1280
    , R.drawable.small_travel_857086_1280
    , R.drawable.small_tree_779827_1280
    , R.drawable.small_turtle_863336_1280};
```



The HorizontalScrollView Widget

Example5: HorizontalScrollView Demo – MainActivity 3 of 5

```
//frame-icons ( 100X100 thumbnails )
Integer[] largeImages = {R.drawable.large_blossom_918453_1280
    , R.drawable.large_building_922529_1280
    , R.drawable.large_cat_914110_1280
    , R.drawable.large_church_648430_1280
    , R.drawable.large_coffee_744151_1280
    , R.drawable.large_coffee_917613_1280
    , R.drawable.large_dubrovnik_512798_1280
    , R.drawable.large_egg_943413_1280
    , R.drawable.large_firefighters_696167_1280
    , R.drawable.large_flower_870557_1280
    , R.drawable.large_football_888015_1280
    , R.drawable.large_isolated_219954_1280
    , R.drawable.large_jetty_593401_1280
    , R.drawable.large_jetty_598198_1280
    , R.drawable.large_paraglider_701440_1280
    , R.drawable.large_pelican_336583_1280
    , R.drawable.large_pelican_901004_1280
    , R.drawable.large_pier_440339_1280
    , R.drawable.large_purpuronnenhut_861592_1280
    , R.drawable.large_roofs_919460_1280
    , R.drawable.large_south_africa_927281_1280
    , R.drawable.large_stone_arch_828730_1280
    , R.drawable.large_sunset_815270_1280
    , R.drawable.large_tangerine_850432_1280
    , R.drawable.large_travel_857086_1280
    , R.drawable.large_tree_779827_1280
    , R.drawable.large_turtle_863336_1280};
```



The HorizontalScrollView Widget

Example5: HorizontalScrollView Demo – MainActivity 4 of 5

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

    //bind GUI controls to Java classes
    txtMsg = (TextView) findViewById(R.id.txtMsg);
    imageSelected = (ImageView) findViewById(R.id.imageSelected);

    // this layout goes inside the HorizontalScrollView
    scrollViewgroup = (ViewGroup) findViewById(R.id.viewgroup);

    // populate the ScrollView
    for (int i = 0; i < items.length; i++) {
        //create single frames [icon & caption] using XML inflater
        final View singleFrame = getLayoutInflater().inflate(
            R.layout.frame_icon_caption, null);
        //frame: 0, frame: 1, frame: 2, ... and so on
        singleFrame.setId(i);
        //internal plumbing to reach elements inside single frame
        TextView caption = (TextView) singleFrame.findViewById(R.id.caption);
        ImageView icon = (ImageView) singleFrame.findViewById(R.id.icon);

        //put data [icon, caption] in each frame
        icon.setImageResource(thumbnails[i]);
        caption.setText(items[i]);
        caption.setBackgroundColor(Color.YELLOW);

        //add frame to the scrollView
        scrollViewgroup.addView(singleFrame);
    }
}
```



The HorizontalScrollView Widget

Example5: HorizontalScrollView Demo – MainActivity 5 of 5

```
//each single frame gets its own click listener
singleFrame.setOnClickListener(new View.OnClickListener() {
    @Override
    public void onClick(View v) {

        String text = "Selected position: " + singleFrame.getId()
            + " " + items[singleFrame.getId()];
        txtMsg.setText(text);
        showLargeImage(singleFrame.getId());
    }
}); // listener

}// for - populating ScrollView

}//onCreate

//display a high-quality version of the image selected using thumbnails
protected void showLargeImage(int frameId) {
    Drawable selectedLargeImage = getResources()
        .getDrawable(largeImages[frameId], getTheme()); //API-21 or newer
    imageSelected.setBackground(selectedLargeImage);

}

}
```

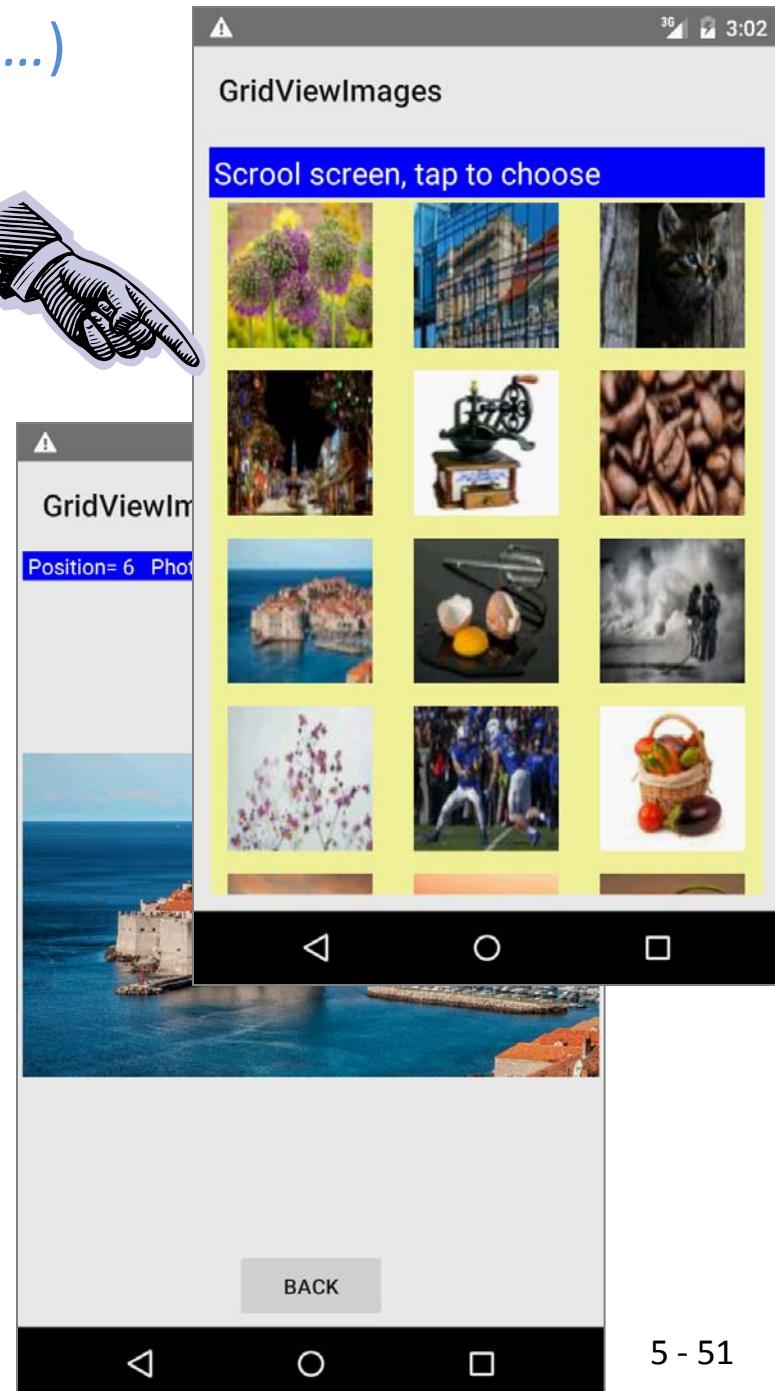


Image-Based GridViews (again...)

Perhaps a more interesting version of the **GridView** control involves the displaying of *images* instead of *text*.

The following example illustrates how to use this control:

1. A screen shows an array of thumbnails.
2. The user makes her selection by tapping on one of them.
3. The app displays on a new screen a bigger & better image of the selected option.
4. The programmer must provide a custom data adapter to manage the displaying of thumbnails from the data set.



This example is based on the tutorial:

<http://developer.android.com/guide/topics/ui/layout/gridview.html>

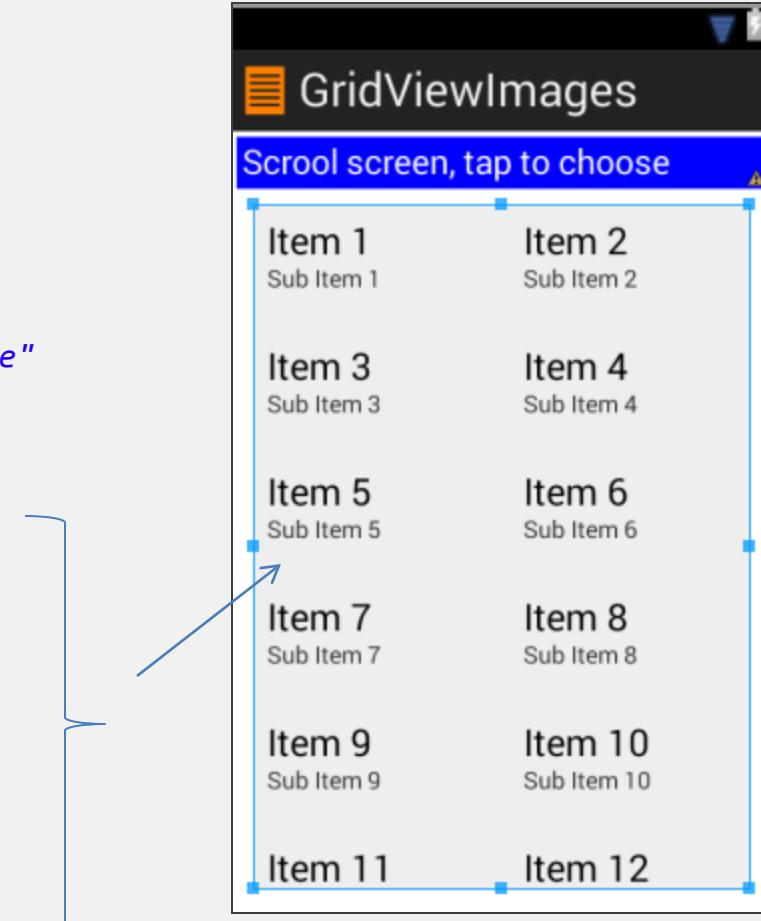
Using The GridView Widget to Show Images

Example6: GridView Images Demo – Layout1 (activity_main)

```
<?xml version="1.0" encoding="utf-8"?>
<LinearLayout xmlns:android="http://schemas.android.com/apk/res/android"
    android:layout_width="match_parent"
    android:layout_height="match_parent"
    android:orientation="vertical"
    android:padding="3dp" >

    <TextView
        android:layout_width="match_parent"
        android:layout_height="wrap_content"
        android:background="#ff0000ff"
        android:padding="3dp"
        android:text="Scrool screen, tap to choose"
        android:textColor="#ffffffff"
        android:textSize="20sp" />

    <GridView
        android:id="@+id/gridview"
        android:layout_width="match_parent"
        android:layout_height="match_parent"
        android:layout_margin="1dp"
        android:columnWidth="100dp"
        android:gravity="center"
        android:horizontalSpacing="5dp"
        android:numColumns="auto_fit"
        android:stretchMode="columnWidth"
        android:verticalSpacing="10dp" />
</LinearLayout>
```



Using The GridView Widget to Show Images

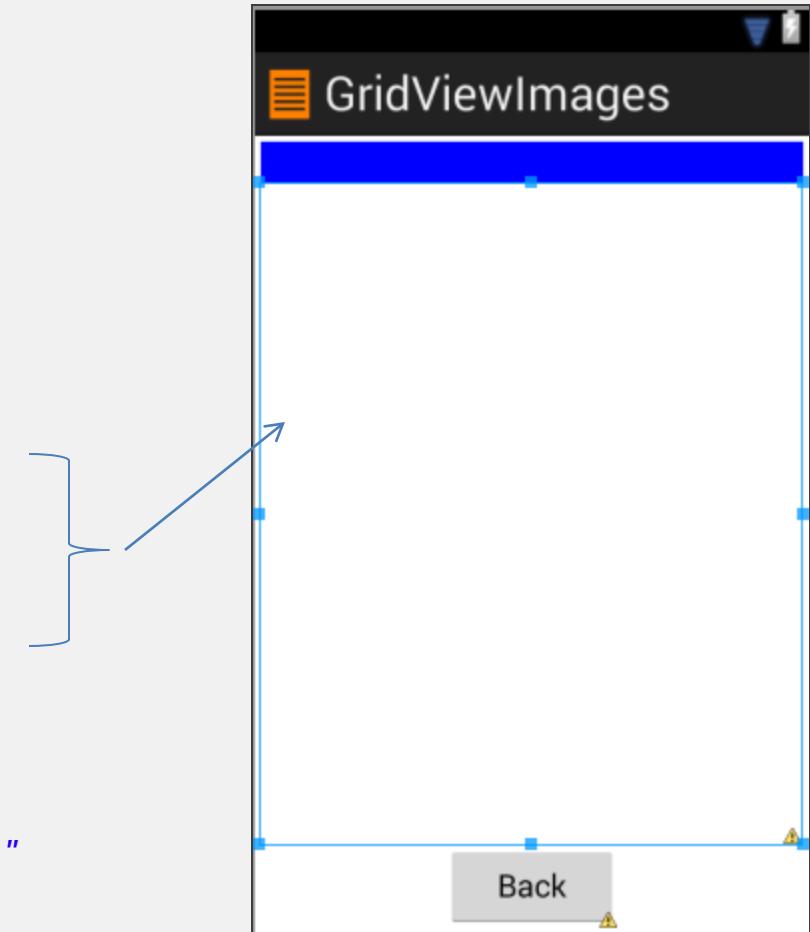
Example6: GridView Images Demo – Layout2 (solo_picture)

```
<?xml version="1.0" encoding="utf-8"?>
<LinearLayout xmlns:android="http://schemas.android.com/apk/res/android"
    android:layout_width="match_parent"
    android:layout_height="match_parent"
    android:padding="3dp"
    android:orientation="vertical" >

    <TextView
        android:id="@+id/txtSoloMsg"
        android:layout_width="match_parent"
        android:layout_height="wrap_content"
        android:textColor="@android:color/white"
        android:background="#ff0000ff" />

    <ImageView
        android:id="@+id/imgSoloPhoto"
        android:layout_width="match_parent"
        android:layout_height="0dip"
        android:layout_gravity="center_fill"
        android:layout_weight="2" />

    <Button
        android:id="@+id/btnSoloBack"
        android:layout_width="100dip"
        android:layout_height="wrap_content"
        android:layout_gravity="center_horizontal"
        android:text="Back" />
</LinearLayout>
```



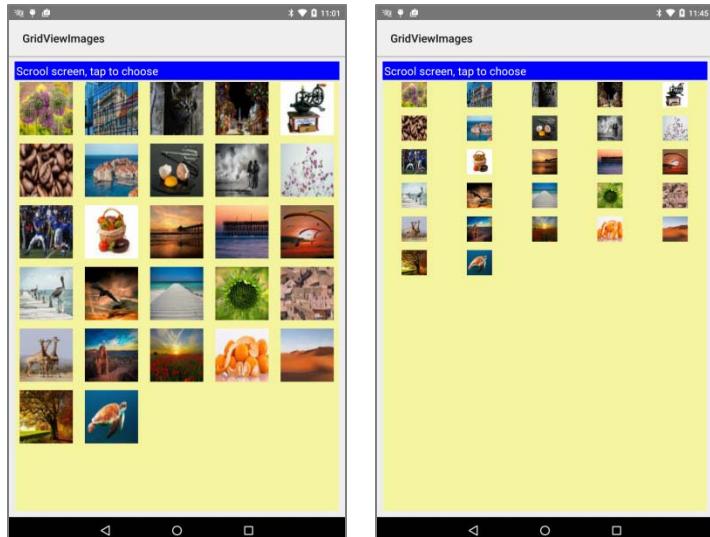
Using The GridView Widget to Show Images

Example6: GridView Images Demo – res/values/dimens/

```
<resources>
    <!-- Default screen margins, per the Android Design guidelines. -->
    <dimen name="activity_horizontal_margin">16dp</dimen>
    <dimen name="activity_vertical_margin">16dp</dimen>

    <dimen name="gridview_size">100dp</dimen>
</resources>
```

Best Practice: Defining the GridView's high and width dimensions on **dips** is safer than in pixels.
Later on, images can be automatically scaled to devices of various densities.



On the left:

```
int gridsize = context.getResources()
    .getDimensionPixelOffset(R.dimen.gridview_size);
imageView.setLayoutParams(new
    GridView.LayoutParams(gridsize, gridsize));
```

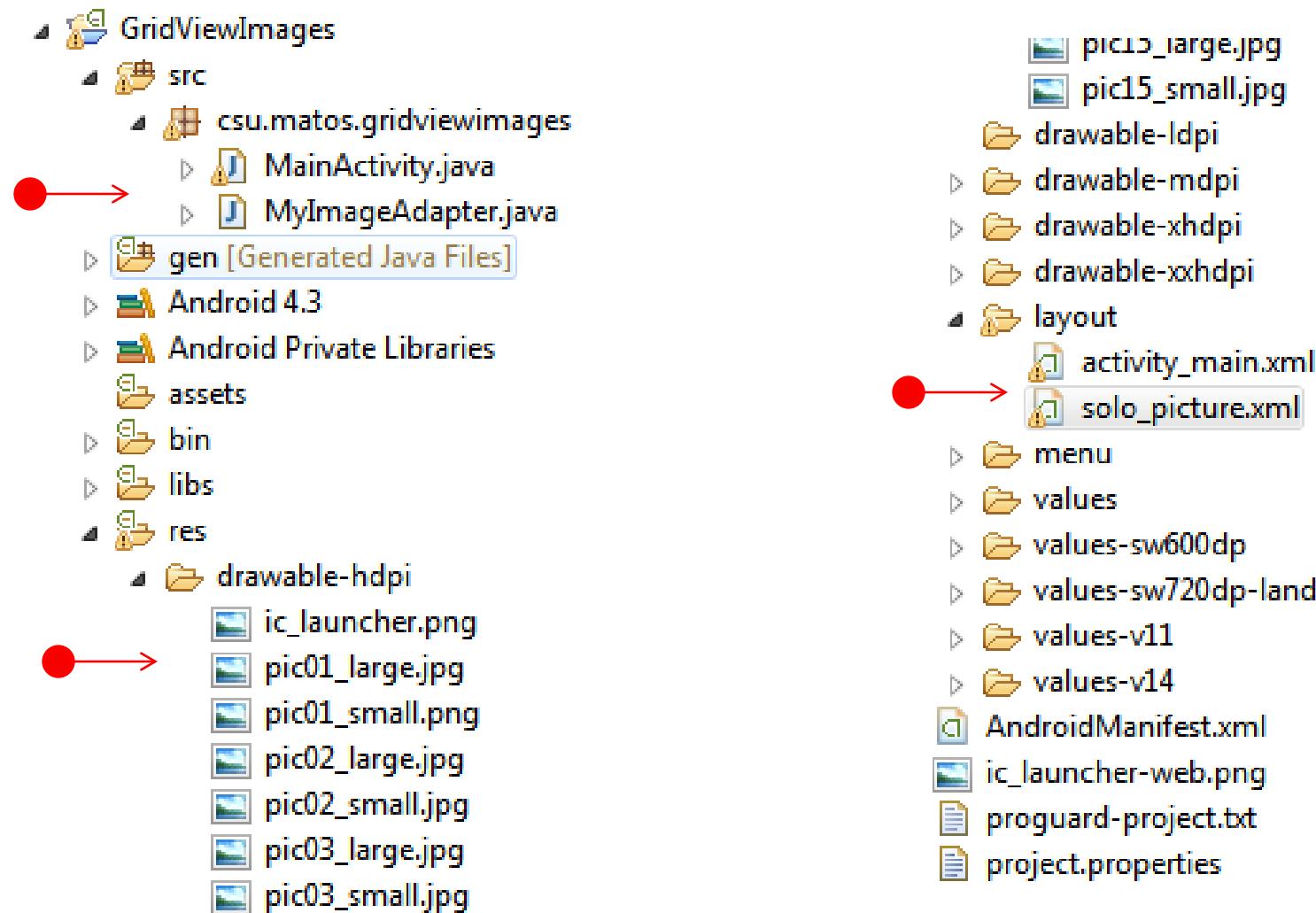
On the right:

```
imageView.setLayoutParams(new
    GridView.LayoutParams(100, 100));
```

(see class MyImageAdapter)

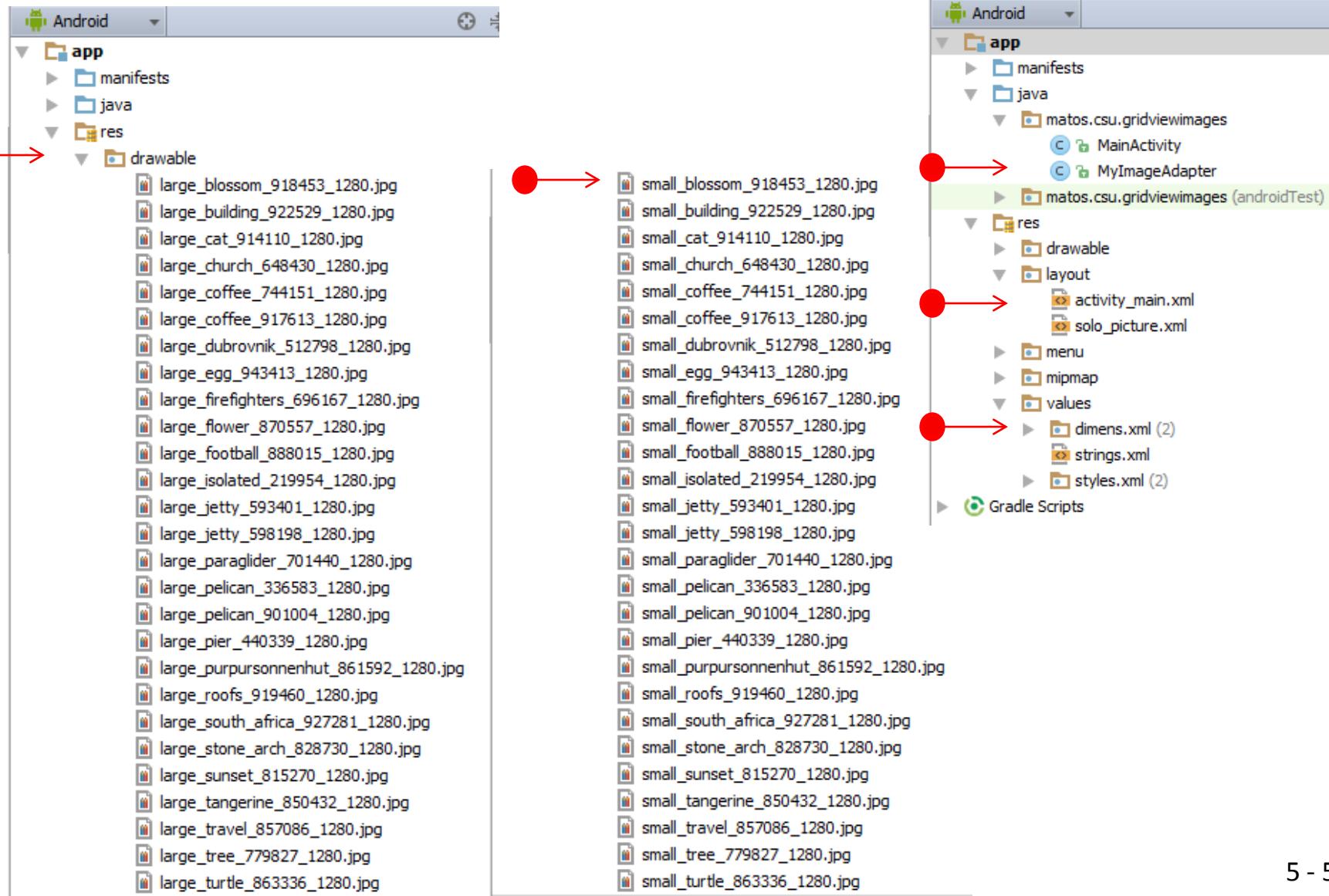
Using The GridView Widget to Show Images

Example6: App's Structure – Eclipse's Package Explorer



Using The GridView Widget to Show Images

Example6: App's Structure – Android Studio



Using The GridView Widget to Show Images

Example6: MainActivity 1 of 5

```
public class MainActivity extends Activity {  
  
    //GUI control bound to screen1 (holding GridView)  
    GridView gridview;  
  
    //GUI controls bound to screen2 (holding single ImageView)  
    TextView txtSoloMsg;  
    ImageView imgSoloPhoto;  
    Button btnSoloBack;  
  
    //in case you want to use-save state values  
    Bundle myOriginalMemoryBundle;  
  
    //frame captions  
    String[] items = {"Photo-1", "Photo-2", "Photo-3", "Photo-4", "Photo-5",  
        "Photo-6", "Photo-7", "Photo-8", "Photo-9", "Photo-10", "Photo-11",  
        "Photo-12", "Photo-13", "Photo-14", "Photo-15", "Photo-16", "Photo-17",  
        "Photo-18", "Photo-19", "Photo-20", "Photo-21", "Photo-22", "Photo-23",  
        "Photo-24", "Photo-25", "Photo-26", };  
}
```



Using The GridView Widget to Show Images

Example6: MainActivity 2 of 5

```
//frame-icons ( 100X100 thumbnails )
Integer[] thumbnails = {R.drawable.small_blossom_918453_1280
    , R.drawable.small_building_922529_1280
    , R.drawable.small_cat_914110_1280
    , R.drawable.small_church_648430_1280
    , R.drawable.small_coffee_744151_1280
    , R.drawable.small_coffee_917613_1280
    , R.drawable.small_dubrovnik_512798_1280
    , R.drawable.small_egg_943413_1280
    , R.drawable.small_firefighters_696167_1280
    , R.drawable.small_flower_870557_1280
    , R.drawable.small_football_888015_1280
    , R.drawable.small_isolated_219954_1280
    , R.drawable.small_jetty_593401_1280
    , R.drawable.small_jetty_598198_1280
    , R.drawable.small_paraglider_701440_1280
    , R.drawable.small_pelican_336583_1280
    , R.drawable.small_pelican_901004_1280
    , R.drawable.small_pier_440339_1280
    , R.drawable.small_purpursonnenhut_861592_1280
    , R.drawable.small_roofs_919460_1280
    , R.drawable.small_south_africa_927281_1280
    , R.drawable.small_stone_arch_828730_1280
    , R.drawable.small_sunset_815270_1280
    , R.drawable.small_tangerine_850432_1280
    , R.drawable.small_travel_857086_1280
    , R.drawable.small_tree_779827_1280
    , R.drawable.small_turtle_863336_1280 };
```



Using The GridView Widget to Show Images

Example6: MainActivity 3 of 5

```
//large images (high quality pictures)
Integer[] largeImages = {R.drawable.large_blossom_918453_1280
    , R.drawable.large_building_922529_1280
    , R.drawable.large_cat_914110_1280
    , R.drawable.large_church_648430_1280
    , R.drawable.large_coffee_744151_1280
    , R.drawable.large_coffee_917613_1280
    , R.drawable.large_dubrovnik_512798_1280
    , R.drawable.large_egg_943413_1280
    , R.drawable.large_firefighters_696167_1280
    , R.drawable.large_flower_870557_1280
    , R.drawable.large_football_888015_1280
    , R.drawable.large_isolated_219954_1280
    , R.drawable.large_jetty_593401_1280
    , R.drawable.large_jetty_598198_1280
    , R.drawable.large_paraglider_701440_1280
    , R.drawable.large_pelican_336583_1280
    , R.drawable.large_pelican_901004_1280
    , R.drawable.large_pier_440339_1280
    , R.drawable.large_purpursonnenhut_861592_1280
    , R.drawable.large_roofs_919460_1280
    , R.drawable.large_south_africa_927281_1280
    , R.drawable.large_stone_arch_828730_1280
    , R.drawable.large_sunset_815270_1280
    , R.drawable.large_tangerine_850432_1280
    , R.drawable.large_travel_857086_1280
    , R.drawable.large_tree_779827_1280
    , R.drawable.large_turtle_863336_1280 };
```



Using The GridView Widget to Show Images

Example6: MainActivity 4 of 5

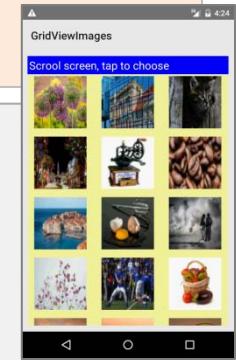
```
protected void onCreate(Bundle savedInstanceState) {
    super.onCreate(savedInstanceState);
    setContentView(R.layout.activity_main);
    myOriginalMemoryBundle = savedInstanceState;

    // setup GridView with its custom adapter and listener
    gridview = (GridView) findViewById(R.id.gridview);

    gridview.setAdapter(new MyImageAdapter(this, thumbnails));

    gridview.setOnItemClickListener(new AdapterView.OnItemClickListener() {
        @Override
        public void onItemClick(AdapterView<?> parent, View view, int position, long id) {
            showBigScreen(position);
        }
    });
}

//onCreate
```



Using The GridView Widget to Show Images

Example6: MainActivity 5 of 5

```
private void showBigScreen(int position) {
    // show the selected picture as a single frame in the second layout
    setContentView(R.layout.solo_picture);

    // plumbing - second layout
    txtSoloMsg = (TextView) findViewById(R.id.txtSoloMsg);
    imgSoloPhoto = (ImageView) findViewById(R.id.imgSoloPhoto);

    // set caption-and-large picture
    txtSoloMsg.setText(" Position= " + position + "    " + items[position]);
    imgSoloPhoto.setImageResource( largeImages[position] );

    // set GO BACK button to return to layout1 (GridView)
    btnSoloBack = (Button) findViewById(R.id.btnSoloBack);
    btnSoloBack.setOnClickListener(new View.OnClickListener() {

        @Override
        public void onClick(View v) {
            // redraw the main screen showing the GridView
            onCreate(myOriginalMemoryBundle);
        }
    });

});
```

// showBigScreen

}//Activity



Using The GridView Widget to Show Images

Example6: Custom Adapter - MyImageAdapter 1 of 2

```
// This custom adapter populates the GridView with a visual
// representation of each thumbnail in the input data set.
// It also implements a method -getView()- to access
// individual cells in the GridView.

public class MyImageAdapter extends BaseAdapter{

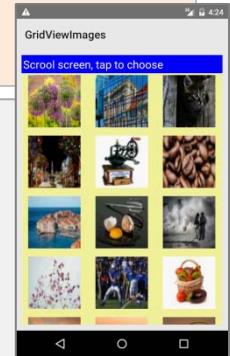
    private Context context;    // main activity's context
    Integer[] smallImages;     // thumbnail data set

    public MyImageAdapter(Context maiActivityContext,
                          Integer[] thumbnails) {
        context = maiActivityContext;
        smallImages = thumbnails;
    }

    // how many entries are there in the data set?
    public int getCount() {
        return smallImages.length;
    }

    // what is in a given 'position' in the data set?
    public Object getItem(int position) {
        return smallImages[position];
    }

    // what is the ID of data item in given 'position'?
    public long getItemId(int position) {
        return position;
    }
}
```



Using The GridView Widget to Show Images

Example6: Custom Adapter - MyImageAdapter 2 of 2

```
// create a view for each thumbnail in the data set
public View getView(int position, View convertView, ViewGroup parent) {

    ImageView imageView;

    // if possible, reuse (convertView) image already held in cache
    if (convertView == null) {
        // new image in GridView formatted to:
        // 100x75 pixels (its actual size)
        // center-cropped, and 5dp padding all around

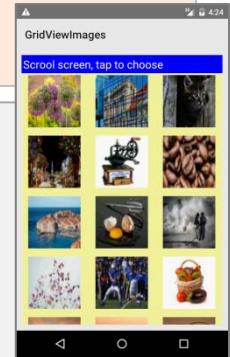
        imageView = new ImageView(context);
        imageView.setLayoutParams( new GridView.LayoutParams(100, 75) );
        imageView.setScaleType(ImageView.ScaleType.CENTER_CROP);
        imageView.setPadding(5, 5, 5, 5);

    } else {
        imageView = (ImageView) convertView;
    }

    imageView.setImageResource(smallImages[position]);

    return imageView;
}

}//MyImageAdapter
```



Using The GridView Widget to Show Images

Example6: Custom Adapter - MyImageAdapter 2 of 2

```
// create a view for each thumbnail in the data set, add it to gridview
public View getView(int position, View convertView, ViewGroup parent) {

    ImageView imageView;

    // if possible, reuse (convertView) image already held in cache
    if (convertView == null) {
        // no previous version of thumbnail held in the scrapview holder
        // define entry in res/values/dimens.xml for grid height,width in dips
        // <dimen name="gridview_size">100dp</dimen>
        // setLayoutParams will do conversion to physical pixels

        imageView = new ImageView(context);
        int gridsize = context.getResources().getDimensionPixelOffset(R.dimen.gridview_size);
        imageView.setLayoutParams(new GridView.LayoutParams(gridsize, gridsize));
        //imageView.setLayoutParams(new GridView.LayoutParams(100, 100)); //NOT a good practice
        imageView.setScaleType(ImageView.ScaleType.FIT_XY);
        imageView.setPadding(5, 5, 5, 5);

    } else {
        imageView = (ImageView) convertView;
    }

    imageView.setImageResource(smallImages[position]);
    imageView.setId(position);

    return imageView;
}//getView

}//MyImageAdapter
```



Using The GridView Widget to Show Images

Results generated by Example6 running on different devices

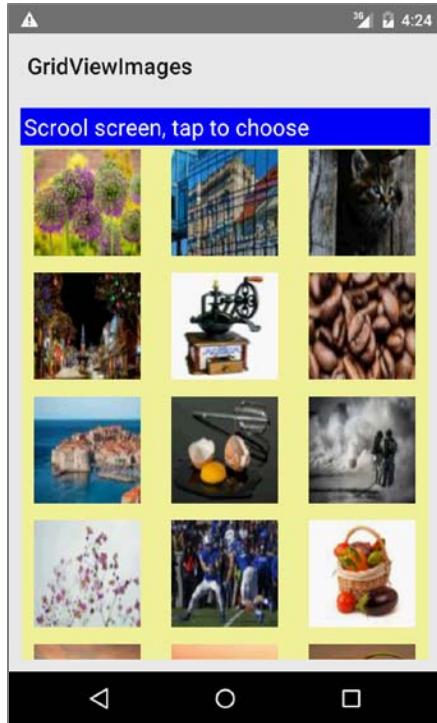


Image taken from the Emulator

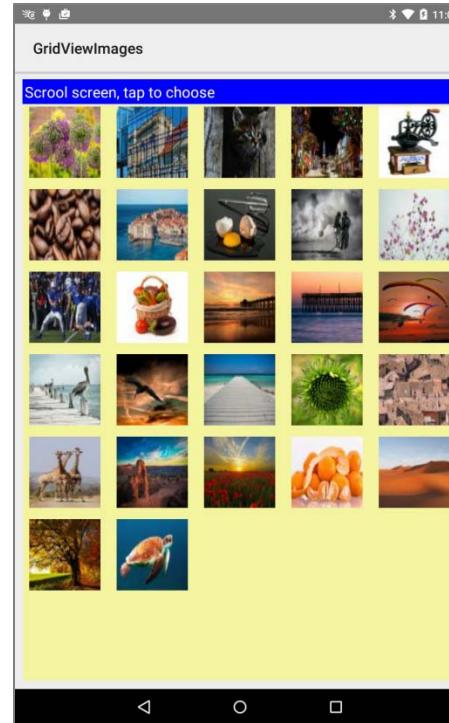


Image displayed on a Nexus7 (1028x728) tablet.
The GridView's clause:

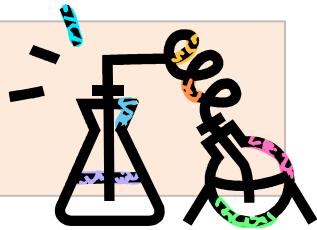
`android:numColumns="auto_fit"`

determines the best way to fill up each row.

Using The GridView Widget to Show Images

Example6B:

An Experiment - Changing from GridView to ListView



Modify the previous example to show the set of thumbnails in a **ListView** instead of a **GridView**. As before when a thumbnail is tapped a high-quality image is shown in a new screen.

STEPS

1. Modify the layout **activity_main.xml**. Change the tag **<GridView ...** to **<ListView**. Leave the rest unchanged.
2. In the main Java class, replace each reference to the GridView type with ListView. The new statements should be:

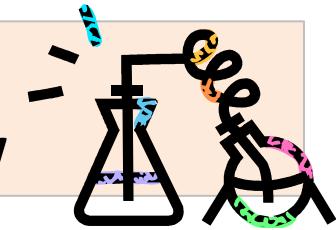
```
ListView gridview;  
...  
gridview = (ListView) findViewById(R.id.gridview);
```

3. In the custom Image adapter make the following change to indicate the new imageView should be added to a ListView (instead that a GridView)
imageView.setLayoutParams(new ListView
.LayoutParams(100, 75));
4. Keep the rest of the adapter code unchanged.

Using The GridView Widget to Show Images

Example6B:

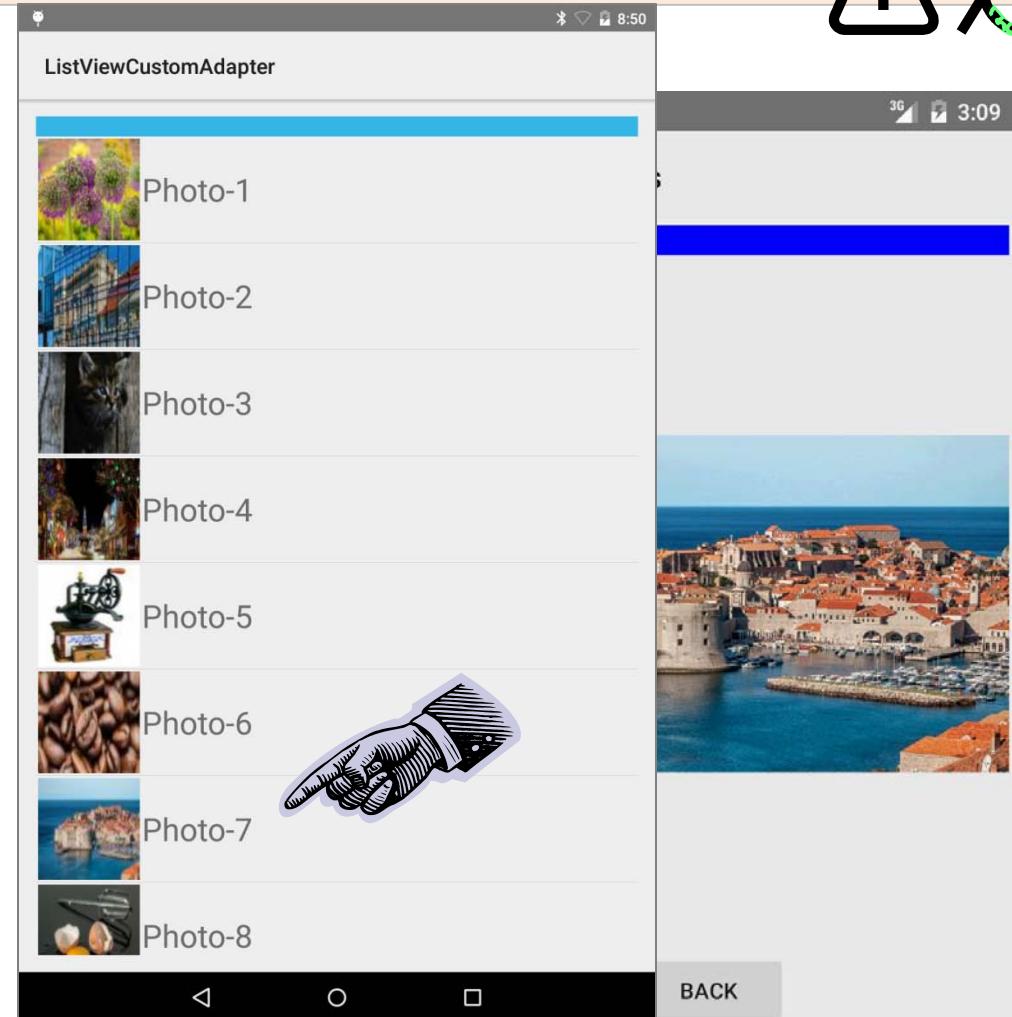
An Experiment - Changing from GridView to ListView



The new app should display the following screens.

Observe the main screen arranges the thumbnails in a ListView container.

More on this issue on Example 8.

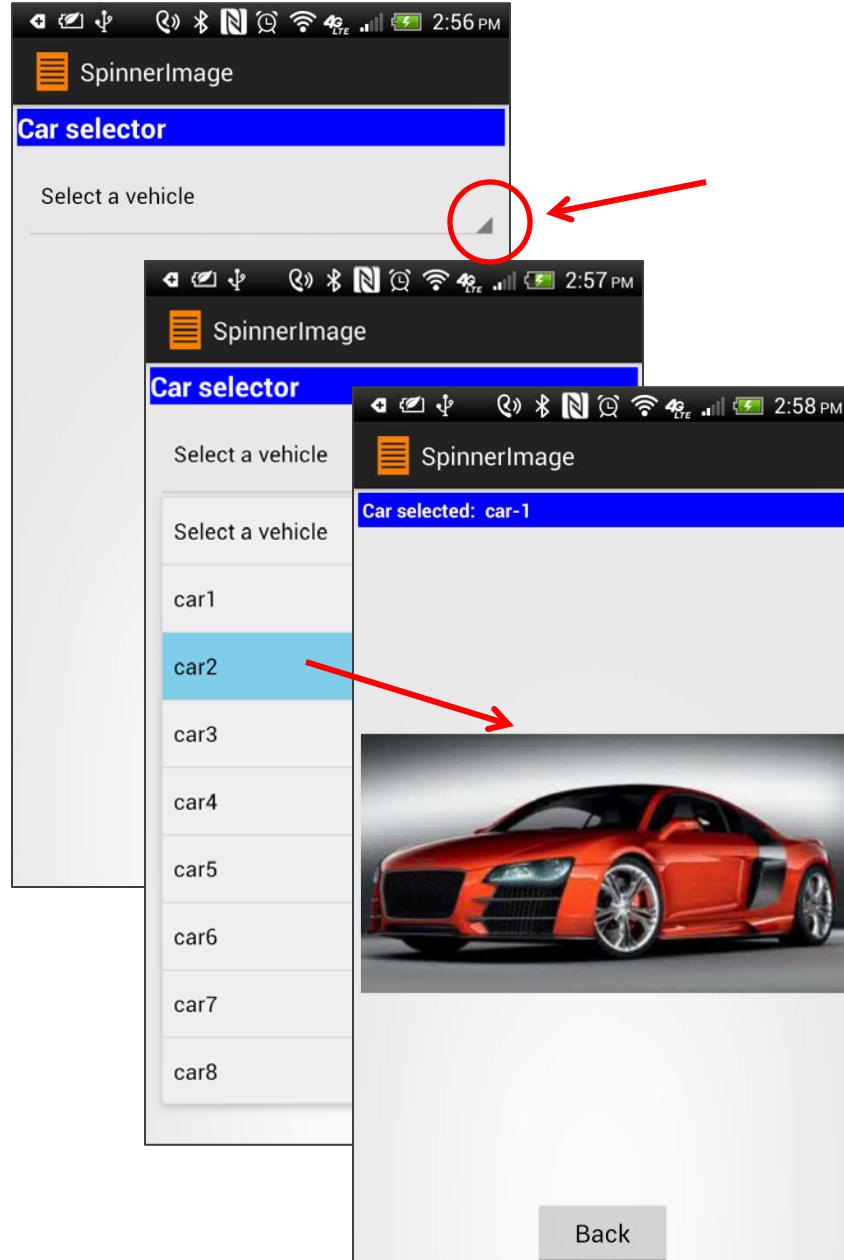


Using The Spinner Widget (again...)

This is a simple variation of the previous example.

A list of choices is offered through a drop-down spinner control.

The user taps on a row and an image for the selected choice is displayed on a new screen.



Using The Spinner Widget (again...)

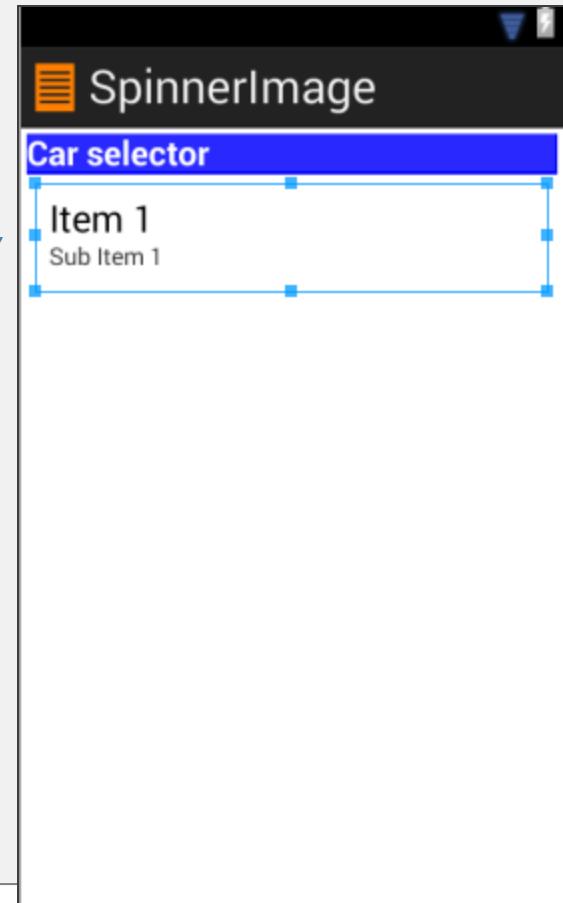
Example7: Spinner Demo2 - Layout1 (activity_main)

```
<?xml version="1.0" encoding="utf-8"?>
<LinearLayout xmlns:android="http://schemas.android.com/apk/res/android"
    android:layout_width="match_parent"
    android:layout_height="match_parent"
    android:orientation="vertical"
    android:padding="3dp" >

    <TextView
        android:layout_width="match_parent"
        android:layout_height="wrap_content"
        android:background="#ff0000ff"
        android:text="Car selector"
        android:textColor="#ffffffff"
        android:textSize="20sp"
        android:textStyle="bold" />

    <Spinner
        android:id="@+id/spinner"
        android:layout_width="match_parent"
        android:layout_height="wrap_content"
        android:layout_margin="5dip" />

</LinearLayout>
```



Using The Spinner Widget (again...)

Example7: Spinner Demo2 - Layout2 (solo_picture)

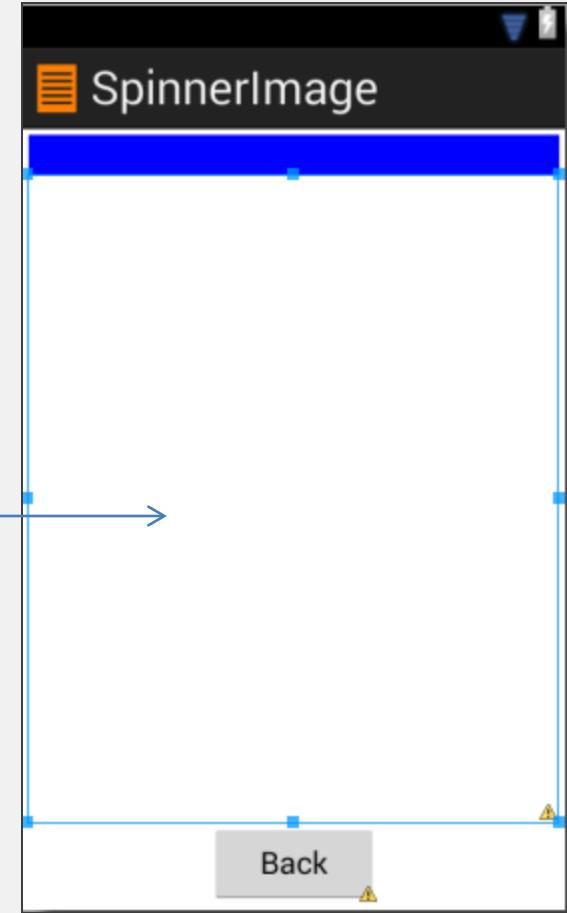
```
<?xml version="1.0" encoding="utf-8"?>
<LinearLayout xmlns:android="http://schemas.android.com/apk/res/android"
    android:layout_width="match_parent"
    android:layout_height="match_parent"
    android:padding="3dp"
    android:orientation="vertical" >

    <TextView
        android:id="@+id/txtSoloMsg"
        android:layout_width="match_parent"
        android:layout_height="wrap_content"
        android:textStyle="bold"
        android:textColor="#FFFFFF"
        android:padding="3dp"
        android:background="#ff0000ff" />

    <ImageView
        android:id="@+id/imgSoloPhoto"
        android:layout_width="match_parent"
        android:layout_height="0dip"
        android:layout_gravity="center(fill"
        android:layout_weight="2" />

    <Button
        android:id="@+id/btnBack"
        android:layout_width="100dip"
        android:layout_height="wrap_content"
        android:layout_gravity="center_horizontal"
        android:text="Back" />

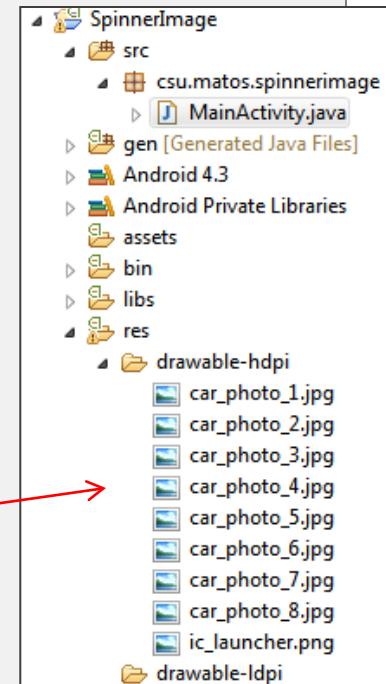
</LinearLayout>
```



Using The Spinner Widget (again...)

Example7: Spinner Demo2 - MainActivity 1 of 3

```
public class MainActivity extends Activity implements AdapterView.OnItemSelectedListener {  
  
    // GUI controls in the main screen  
    Spinner spinner;  
  
    // GUI controls in the solo_picture screen  
    TextView txtSoloMsg;  
    ImageView imageSelectedCar;  
    Button btnBack;  
  
    // captions to be listed by the spinner  
    String[] items = { "Select a vehicle", "car1", "car2", "car3", "car4",  
                      "car5", "car6", "car7", "car8" };  
    // object IDs of car pictures  
    Integer[] carImageArray = new Integer[] { R.drawable.car_photo_1,  
                                              R.drawable.car_photo_2, R.drawable.car_photo_3,  
                                              R.drawable.car_photo_4, R.drawable.car_photo_5,  
                                              R.drawable.car_photo_6, R.drawable.car_photo_7,  
                                              R.drawable.car_photo_8, };  
    Bundle myStateInfo;  
  
    @Override  
    protected void onCreate(Bundle savedInstanceState) {  
        super.onCreate(savedInstanceState);  
        myStateInfo = savedInstanceState;  
  
        setContentView(R.layout.activity_main);  
    }  
}
```



Using The Spinner Widget (again...)

Example7: Spinner Demo2 - MainActivity 2 of 3

```
spinner = (Spinner) findViewById(R.id.spinner);
spinner.setAdapter(new ArrayAdapter<String>(this,
                                         android.R.layout.simple_spinner_dropdown_item,
                                         items));
spinner.setOnItemSelectedListener(this);

}// onCreate

// display screen showing image of the selected car
private void showBigImage(int position) {
    // show the selected picture as a single frame
    setContentView(R.layout.solo_picture);
    txtSoloMsg = (TextView) findViewById(R.id.txtSoloMsg);
    imageSelectedCar = (ImageView) findViewById(R.id.imgSoloPhoto);
    txtSoloMsg.setText("Car selected: car-" + position);

    imageSelectedCar.setImageResource(carImageArray[position]);

    btnBack = (Button) findViewById(R.id.btnBack);
    btnBack.setOnClickListener(new OnClickListener() {
        @Override
        public void onClick(View v) {
            // redraw the main screen showing the spinner
            onCreate(myStateInfo);
        }
    });
}

// showBigScreen
```

Using The Spinner Widget (again...)

Example7: Spinner Demo2 - MainActivity 3 of 3

```
// next two methods implement the spinner listener
@Override
public void onItemSelected(AdapterView<?> parent, View v, int position, long id) {

    //ignore position 0. It holds just a label ("SELECT A VEHICLE...")
    if (position > 0) {
        showBigImage(position - 1);
    }
}

@Override
public void onNothingSelected(AdapterView<?> parent) {
    // DO NOTHING - needed by the interface
}

}
```

Custom-made ListViews

Example8: Defining your own ListViews

- Android provides several predefined row layouts for displaying simple lists (such as:
`android.R.layout.simple_list_item_1,`
`android.R.layout.simple_list_item_2, etc).`
- However, there are occasions in which you want a particular disposition and formatting of elements displayed in each list-row.
- In those cases, you should ***create your own subclass of a Data Adapter.***
- The next example shows how to do that.

Custom-made ListViews

Example8: Create your own DataAdapter

In order to customize a Data Adapter, you need to:

1. Create a class extending the concrete `ArrayAdapter` class
2. Override its `getView()`, and
3. Construct (`inflate`) your rows yourself.

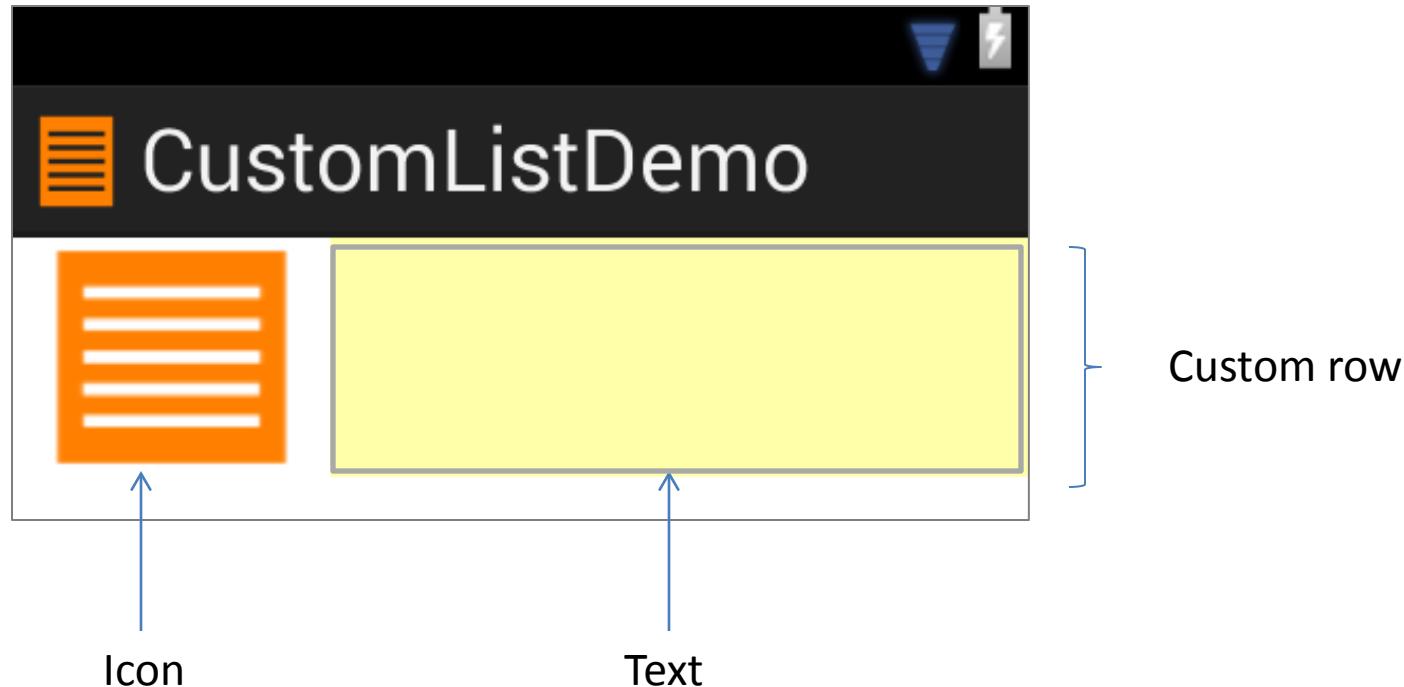
```
public class MyCustomAdapter extends ArrayAdapter{  
  
    // class variables go here ...  
  
    public MyCustomAdapter(...) { }  
  
    public View getView(...) { }  
}  
//MyCustomAdapter
```

For each data element supplied by the adapter, the method `getView()` returns its 'visible' View.

Custom-made ListViews

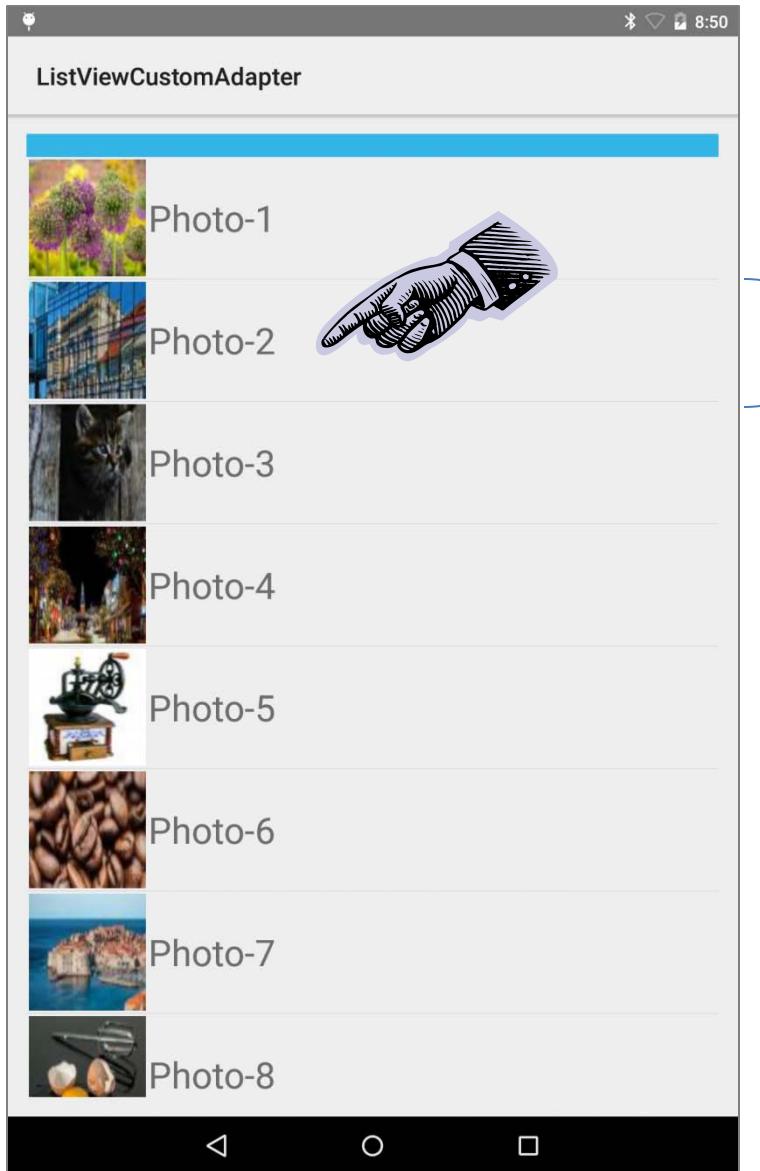
Example8: Designing Custom-Rows

In our example each UI row will show an icon (on the left side) and text following the icon to its right side.



Custom-made ListViews

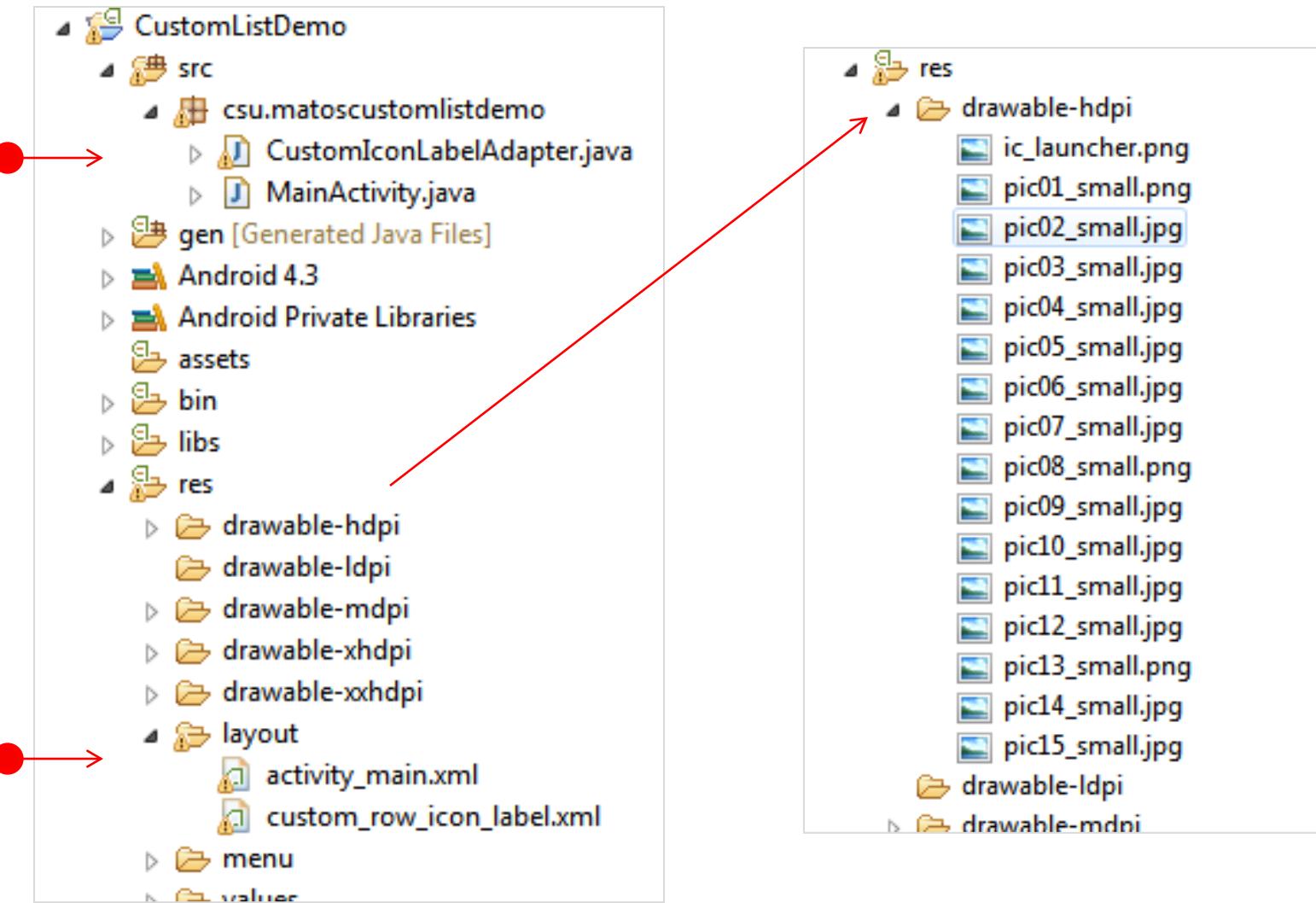
Example8: Designing Custom-Rows



Custom row consists
of icon & text

Custom-made ListViews

Example8: Custom ListView Demo - App's Structure



Custom-made ListViews

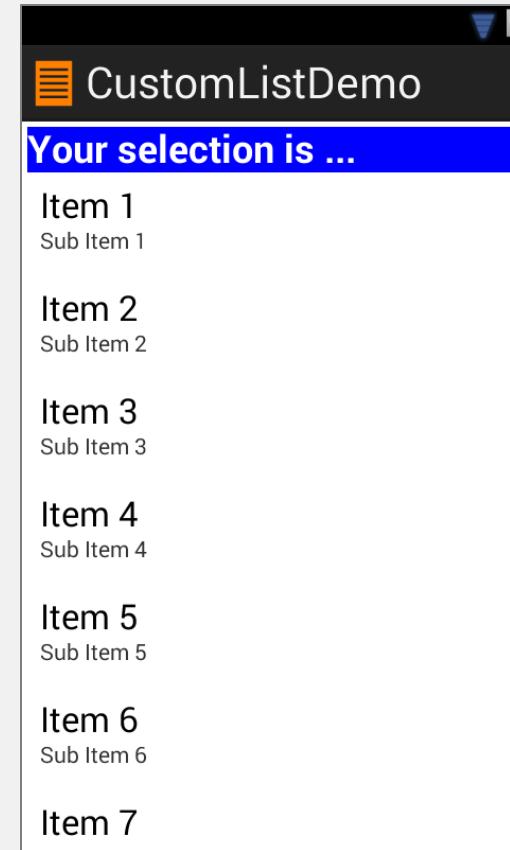
Example8: Layout1 – activity_main.xml

```
<?xml version="1.0" encoding="utf-8"?>
<LinearLayout xmlns:android="http://schemas.android.com/apk/res/android"
    android:layout_width="match_parent"
    android:layout_height="match_parent"
    android:padding="3dp"
    android:orientation="vertical" >

    <TextView
        android:id="@+id/txtMsg"
        android:layout_width="match_parent"
        android:layout_height="wrap_content"
        android:background="#ff0000ff"
        android:text="Your selection is ..."
        android:textColor="#ffffffff"
        android:textSize="24sp"
        android:textStyle="bold" />

    <ListView
        android:id="@+id>List"
        android:layout_width="match_parent"
        android:layout_height="match_parent" >
    </ListView>

</LinearLayout>
```



Custom-made ListViews

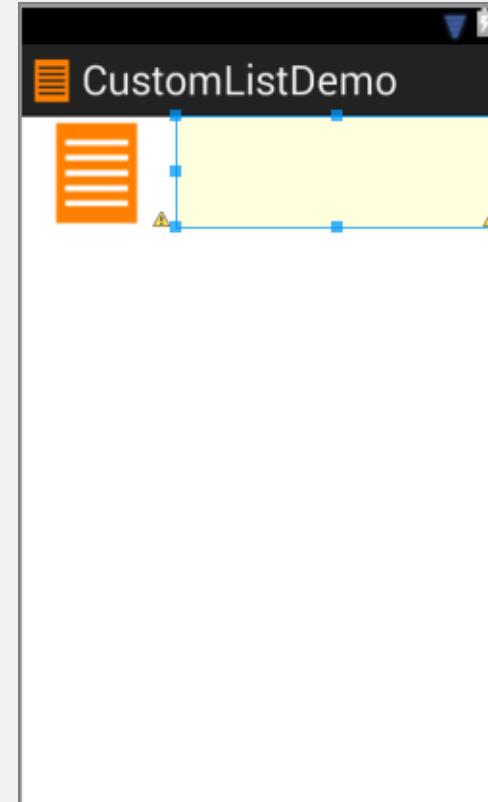
Example8: Layout2 – custom_row_icon_label.xml

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

    <ImageView
        android:id="@+id/icon"
        android:layout_width="100dp"
        android:layout_height="75dp"
        android:layout_marginRight="3dp"
        android:src="@drawable/ic_launcher" />

    <TextView
        android:id="@+id/label"
        android:layout_width="match_parent"
        android:layout_height="75dp"
        android:background="#22ffff00"
        android:textSize="20sp" />

</LinearLayout>
```



Custom-made ListViews

Example8: Custom ListView Demo – MainActivity 1 of 3

```
public class MainActivity extends ListActivity {  
    TextView txtMsg;  
    // The n-th row in the list will consist of [icon, label]  
    // where icon = thumbnail[n] and label=items[n]  
    String[] items = { "Data-1", "Data-2", "Data-3", "Data-4", "Data-5",  
                      "Data-6", "Data-7", "Data-8", "Data-9", "Data-10", "Data-11",  
                      "Data-12", "Data-13", "Data-14", "Data-15" };  
  
    Integer[] thumbnails = { R.drawable.pic01_small, R.drawable.pic02_small,  
                            R.drawable.pic03_small, R.drawable.pic04_small,  
                            R.drawable.pic05_small, R.drawable.pic06_small,  
                            R.drawable.pic07_small, R.drawable.pic08_small,  
                            R.drawable.pic09_small, R.drawable.pic10_small,  
                            R.drawable.pic11_small, R.drawable.pic12_small,  
                            R.drawable.pic13_small, R.drawable.pic14_small,  
                            R.drawable.pic15_small };  
  
    @Override  
    protected void onCreate(Bundle savedInstanceState) {  
        super.onCreate(savedInstanceState);  
        setContentView(R.layout.activity_main);  
        txtMsg = (TextView) findViewById(R.id.txtMsg);
```

Custom-made ListViews

Example8: Custom ListView Demo – MainActivity 2 of 3

```
// the arguments of the custom adapter are:  
// activityContex, layout-to-be-inflated, labels, icons  
CustomIconLabelAdapter adapter = new CustomIconLabelAdapter(  
    this,  
    R.layout.custom_row_icon_label,  
    items,  
    thumbnails);  
// bind intrinsic ListView to custom adapter  
setListAdapter(adapter);  
  
}//onCreate  
  
// react to user's selection of a row  
@Override  
protected void onListItemClick(ListView l, View v, int position, long id) {  
    super.onListItemClick(l, v, position, id);  
    String text = " Position: " + position + " " + items[position];  
    txtMsg.setText(text);  
} //listener  
  
}//class
```

Custom-made ListViews

Example8: Custom ListView Demo – MainActivity 3 of 3

```
class CustomIconLabelAdapter extends ArrayAdapter <String> {
    Context context;
    Integer[] thumbnails;
    String[] items;

    public CustomIconLabelAdapter( Context context, int layoutToBeInflated,
                                   String[] items, Integer[] thumbnails) {
        super(context, R.layout.custom_row_icon_label, items);
        this.context = context;
        this.thumbnails = thumbnails;
        this.items = items;
    }
    @Override
    public View getView(int position, View convertView, ViewGroup parent) {


        LayoutInflator inflater = ((Activity) context).getLayoutInflator();
        View row = inflater.inflate(R.layout.custom_row_icon_label, null);
        TextView label = (TextView) row.findViewById(R.id.label);
        ImageView icon = (ImageView) row.findViewById(R.id.icon);

        label.setText(items[position]);
        icon.setImageResource(thumbnails[position]);

        return (row);
    }
} // CustomAdapter
```

Custom-made ListViews

Example8: The LayoutInflater Class

- The **LayoutInflater** class converts an XML layout specification into an actual tree of View objects. The objects inflated by code are appended to the selected UI view. It typically works in cooperation with an **ArrayAdapter**.
- A basic **ArrayAdapter** requires three arguments: current **context**, **layout** on which output rows are shown, source data **items** (data to feed the rows).
 - The overridden **getView()** method inflates the row layout by custom allocating *icons* and *text* taken from data source in the user designed row.
 - Once assembled, the View (row) is returned.
 - This process is repeated for each item supplied by the **ArrayAdapter**.
 - See Appendix C for an example of a better built custom-adapter using the **ViewHolder** design strategy.

Using the SD card



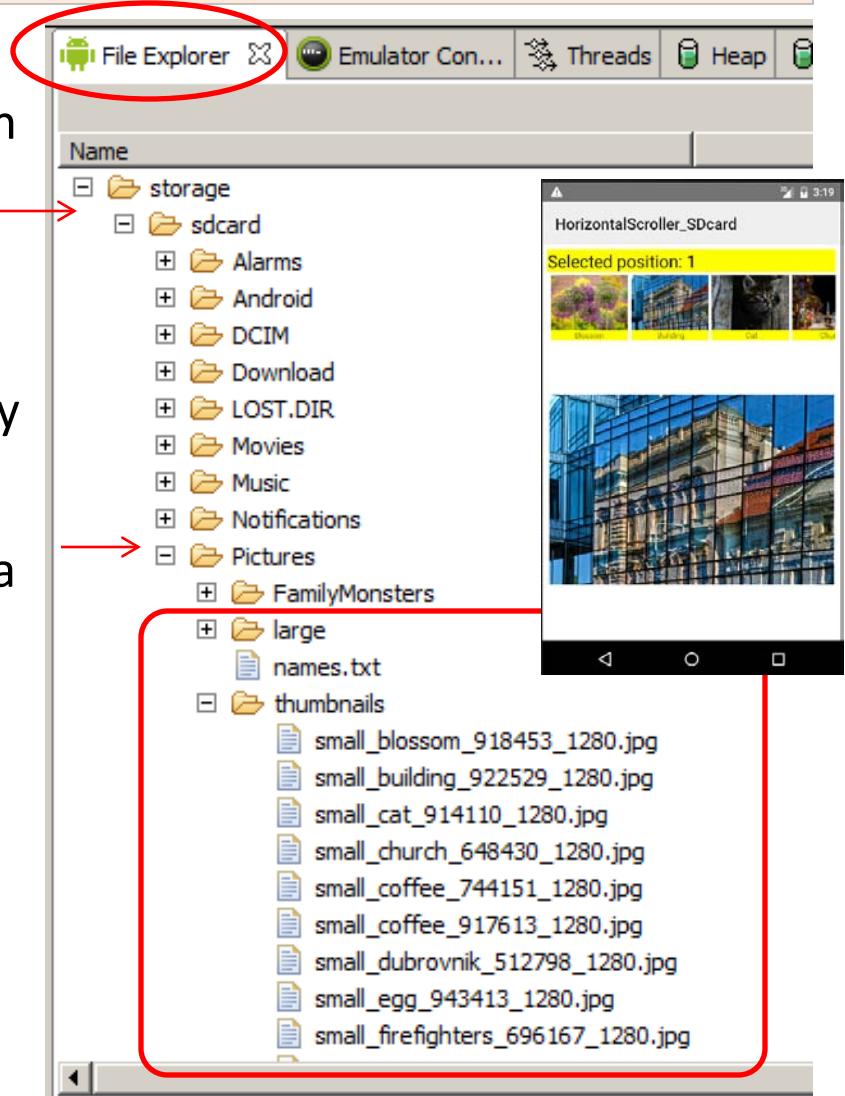
Example 9: Storing Images on the SD card

(A Variation on Example5)

In previous examples, images were kept in main storage using the application's memory space.

This time we will use the external disk (**SD-card**) to store the app's data (arguably a better space/speed tradeoff practice).

Assume the user has already transferred a copy of the pictures to the SD folder **/Pictures/thumbnails/**



Using the SD card

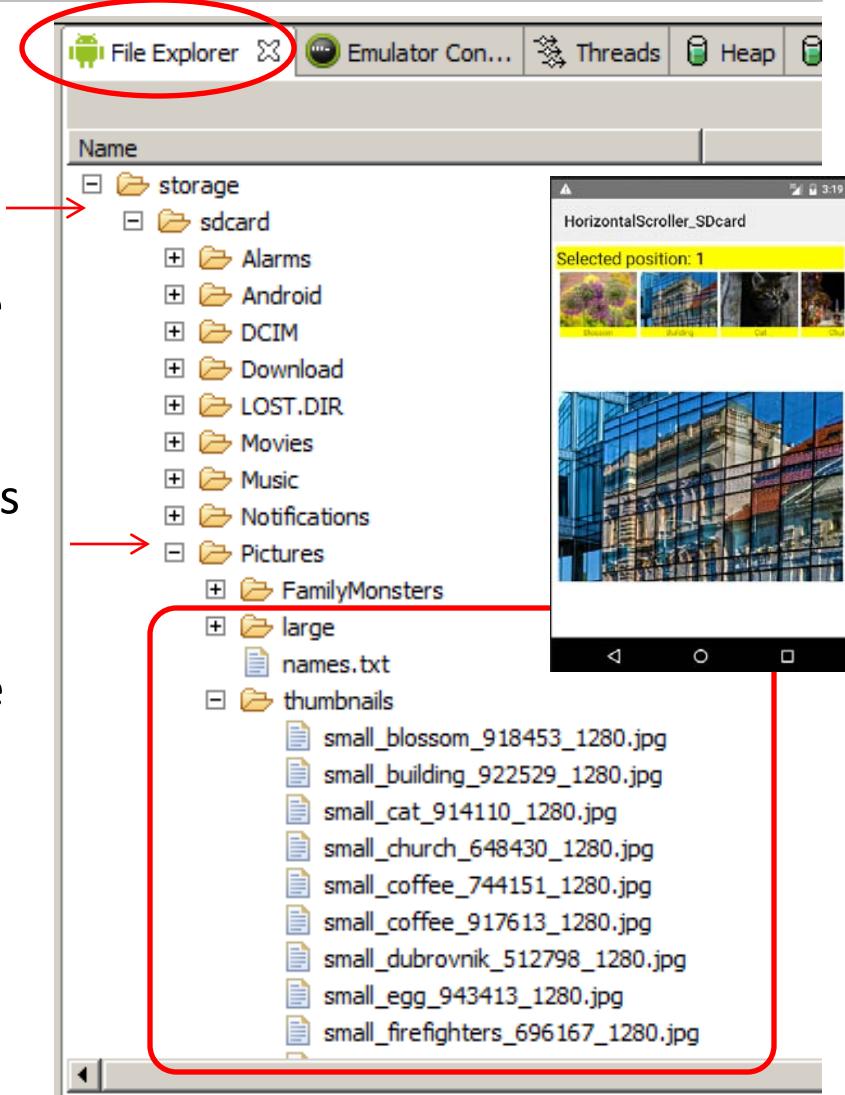


Example 9: Storing Images on the SD card

(A Variation on Example5)

The folder **/Pictures/large/** contains a high-quality image for each thumbnail. These larger pictures are shown after the user makes a selection using the *scroller*.

The text file **/Pictures/names.txt** contains the caption associated to each picture. Data has been entered as a single line of comma separated strings (Something like Blossom, Building, Cat, Church, Coffee, ...).



Using the SD card

In this app we use the same layouts already introduced in Example5

Example 9: SD card Demo – MainActivity 1 of 4

```
public class MainActivity extends Activity {  
  
    //GUI controls  
    TextView txtMsg;  
    ViewGroup scrollViewgroup;  
  
    //each frame in the HorizontalScrollView has [icon, caption]  
    ImageView icon;  
    TextView caption;  
  
    //large image frame for displaying high-quality selected image  
    ImageView imageSelected;  
  
    String[] items;  
    int index;  
  
    @Override  
    protected void onCreate(Bundle savedInstanceState) {  
        super.onCreate(savedInstanceState);  
        setContentView(R.layout.activity_main);  
  
        //plumbing: bind GUI controls to Java classes  
        txtMsg = (TextView) findViewById(R.id.txtMsg);  
        imageSelected = (ImageView) findViewById(R.id.imageSelected);  
  
        // this layout goes inside the HorizontalScrollView  
        scrollViewgroup = (ViewGroup) findViewById(R.id.viewgroup);
```



Using the SD card

In this app we use the same layouts already introduced in Example5

Example 9: SD card Demo – MainActivity 2 of 4

```
try {  
    // Environment class allows access to your 'MEDIA' variables  
    String absolutePath2SdCard = Environment.getExternalStorageDirectory()  
        .getAbsolutePath();  
  
    //photo captions are held in a single-line comma-separated file  
    String pathPictureCaptionFile = absolutePath2SdCard + "/Pictures/names.txt";  
    File nameFile = new File(pathPictureCaptionFile);  
    Scanner scanner = new Scanner(nameFile);  
    String line = scanner.nextLine();  
    items = line.split(",");  
  
    //get access to the small thumbnails - polulate the horizontal scroller  
    String pathThumbnailsFolder = absolutePath2SdCard + "/Pictures/thumbnails/";  
  
    File sdPictureFiles = new File(pathThumbnailsFolder);  
    File[] thumbnailArray = sdPictureFiles.listFiles();  
  
    txtMsg.append("\nNum files: " + thumbnailArray.length);  
  
    File singleThumbnailFile;  
  
    for (index = 0; index < thumbnailArray.length; index++) {  
  
        singleThumbnailFile = thumbnailArray[index];  
        final View frame = getLayoutInflater().inflate(R.layout.frame_icon_caption, null);  
    }  
}
```



Using the SD card

In this app we use the same layouts already introduced in Example5

Example 9: SD card Demo – MainActivity 3 of 4



```
TextView caption = (TextView) frame.findViewById(R.id.caption);
ImageView icon = (ImageView) frame.findViewById(R.id.icon);

// convert (jpg, png,...) file into a drawable
icon.setImageDrawable(Drawable.createFromPath(
    singleThumbnailFile.getAbsolutePath()));

caption.setText(items[index]);
scrollViewgroup.addView(frame);

frame.setId(index);

frame.setOnClickListener(new View.OnClickListener() {
    @Override
    public void onClick(View v) {
        String text = "Selected position: " + frame.getId();
        txtMsg.setText(text);
        showLargeImage(frame.getId());
    }
}); // listener

} // for

} catch (Exception e) {
    txtMsg.append("\nError: " + e.getMessage());
}

}//onCreate
```

A **ViewGroup** is a special view that can contain other views (called children). The superclass **ViewGroup** is the base class for layouts and views containers [From Android Documentation].



Using the SD card

In this app we use the same layouts already introduced in Example5

Example 9: SD card Demo – MainActivity 4 of 4

```
//display a high-quality version of the selected thumbnail image
protected void showLargeImage(int frameId) {

    String pathLargePictureFolder = Environment.getExternalStorageDirectory()
        .getAbsolutePath() + "/Pictures/large/";

    // convert SD image file(jpg, png,...) into a drawable, then show into ImageView
    File sdLargePictureFolder = new File(pathLargePictureFolder);
    File[] largePictureArray = sdLargePictureFolder.listFiles();
    File largeImageFile = largePictureArray[frameId];

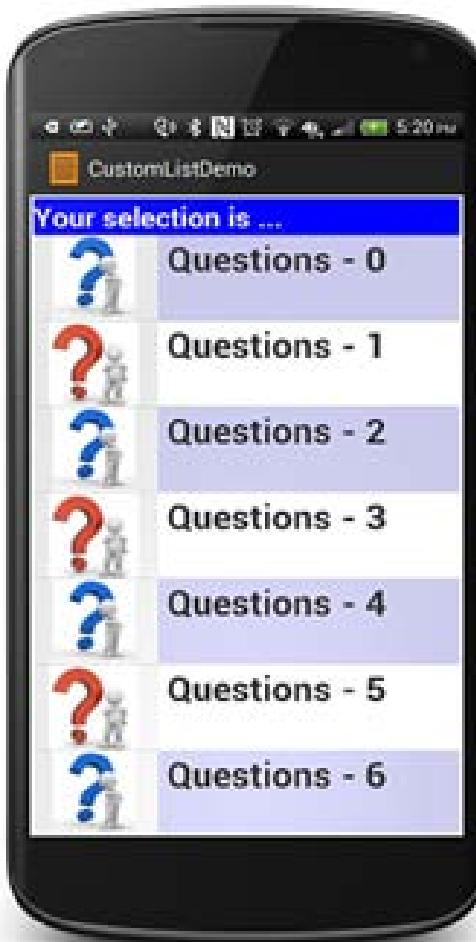
    imageSelected.setImageDrawable(Drawable.createFromPath(
        largeImageFile.getAbsolutePath()));

} //ShowLargeImage

}//Activity
```



List-Based Widgets



Images made with the “Device Frame Generator Tool”, available at
<http://android-ui-utils.googlecode.com/hg/asset-studio/dist/device-frames.html>

Appendix A: Predefined Android Resources

Android SDK includes a number of predefined layouts & styles. Some of those resources can be found in the folders:

C:\ Your-Path \Android\android-sdk\platforms\android-xx\data\res\layout

C:\ Your-Path \Android\android-sdk\platforms\android-xx\data\res\values\styles.xml

Example:

The following is the definition of the layout called:

android.R.layout.simple_list_item_1. It consists of a single TextView field named “text1”, its contents are centered, large font, and some padding.

```
<!-- Copyright (C) 2006 The Android Open Source Project Licensed under the Apache License, Version 2.0 (the "License"); you may not use this file except in compliance with the License. You may obtain a copy of the License at http://www.apache.org/licenses/LICENSE-2.0 Unless required by applicable law or agreed to in writing, software distributed under the License is distributed on an "AS IS" BASIS, WITHOUT WARRANTIES OR CONDITIONS OF ANY KIND, either express or implied. See the License for the specific language governing permissions and limitations under the License. -->
```

```
<?xml version="1.0" encoding="utf-8"?>
<TextView xmlns:android="http://schemas.android.com/apk/res/android"
    android:id="@+id/text1"
    android:layout_width="match_parent"
    android:layout_height="wrap_content"
    android:gravity="center_vertical"
    android:minHeight="?android:attr/listPreferredItemHeight"
    android:paddingLeft="6dip"
    android:textAppearance="?android:attr/textAppearanceLarge" />
```

Appendix A: Predefined Android Resources

Android's Predefined Layouts

This is the definition of: *simple_spinner_dropdown_item* in which a single row holding a radio-button and text is shown.

Link:

http://code.google.com/p/pdn-slatedroid/source/browse/trunk/eclair/frameworks/base/core/res/res/layout/simple_spinner_dropdown_item.xml?r=44

```
<?xml version="1.0" encoding="utf-8"?>
<!--
** Copyright 2008, The Android Open Source Project
** etc...
-->
<CheckedTextView
    xmlns:android="http://schemas.android.com/apk/res/android"
    android:id="@+id/text1"
    style="?android:attr/spinnerDropDownItemStyle"
    android:singleLine="true"
    android:layout_width="match_parent"
    android:layout_height="?android:attr/listPreferredItemHeight"
    android:ellipsize="marquee" />
```

Appendix B: EditText Boxes & Keyboarding

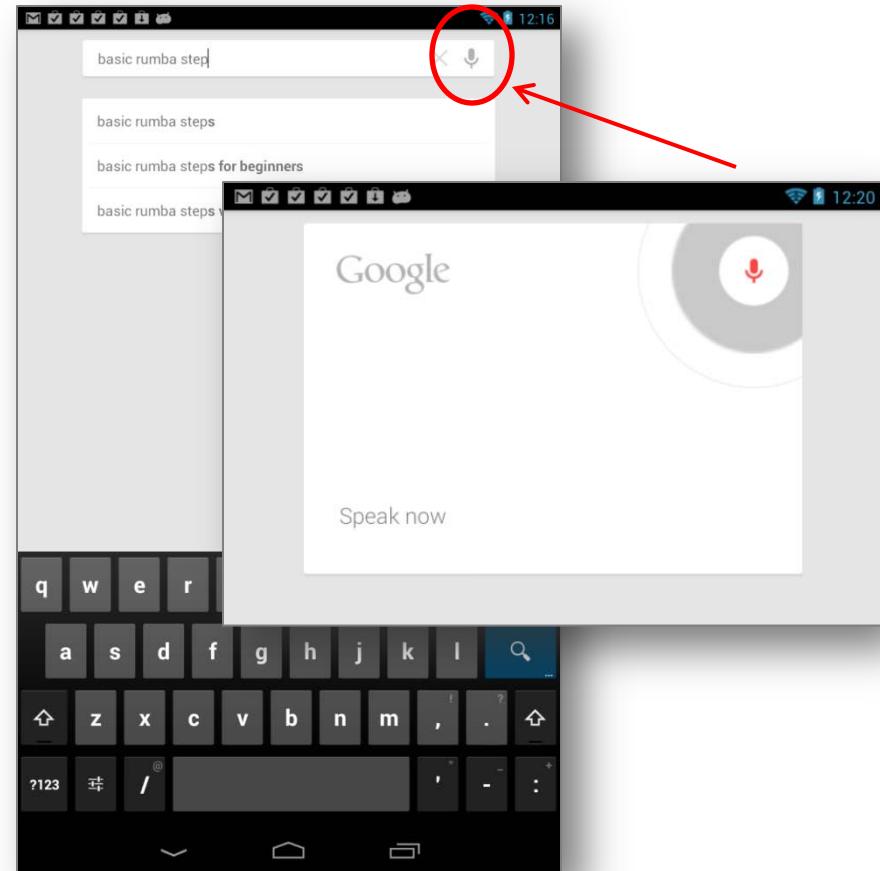
Keyboarding data into Android's applications is functionally dependent of the hardware present in the actual device.



Sliding Window in this unit exposes a hard keyboard.



This device has a permanently exposed hard keyboard and Stylus pen appropriate for handwriting



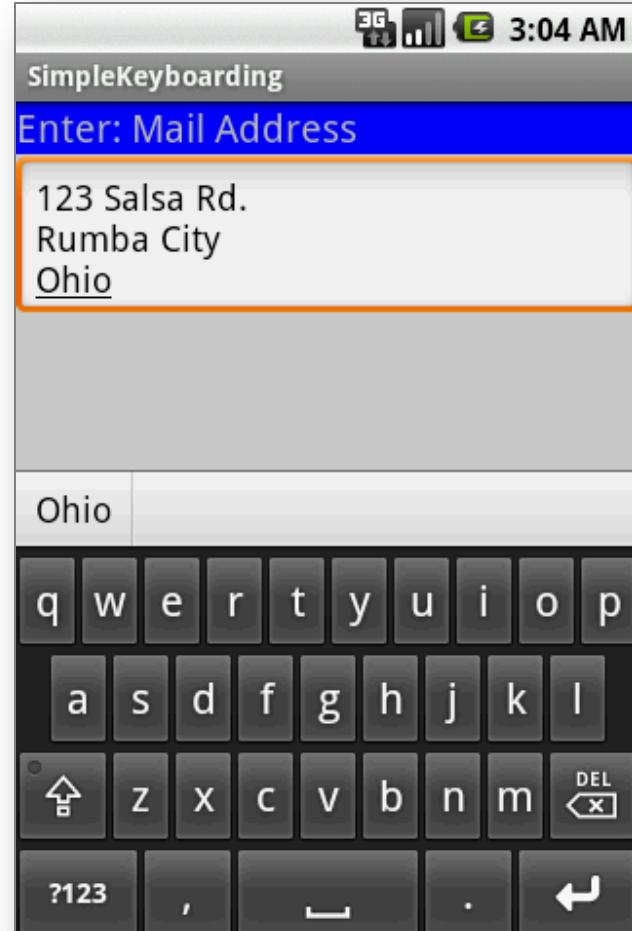
Input accepted from Virtual keyboard and/or voice recognition

Appendix B: EditText Boxes & Keyboarding

When the user taps on an **EditText** box, the Input Media Framework (**IMF**) provides access to

1. a hard (or *real*) keyboard (if one is present) or
2. a soft (or virtual) keyboard known as IME that is the most appropriated for the current input type.

You may close the virtual keyboard by tapping the hardware **BackArrow** key.



IME Soft
Keyboard

IME: Input Media Editor

Appendix B: EditText Boxes & Keyboarding

Telling Android what data to expect

TextViews can use either **XML** elements or **Java** code to tell the type of textual data they should accept. For example:

XML

```
android:inputType="phone"
```

Java

```
editTextBox.setInputType(  
    android.text.InputType.TYPE_CLASS_PHONE);
```

Knowing the `inputType` has an impact on virtual keyboards (the software can expose the *best* layout for the current input class)

Appendix B: EditText Boxes & Keyboarding

Java Usage – inputType Classes

`editTextBox.setInputType(android.text.InputType.XXX);`

```
SF TYPE_CLASS_DATETIME : int - InputType
SF TYPE_CLASS_NUMBER : int - InputType
SF TYPE_CLASS_PHONE : int - InputType
SF TYPE_CLASS_TEXT : int - InputType
SF TYPE_DATETIME_VARIATION_DATE : int - InputType
SF TYPE_DATETIME_VARIATION_NORMAL : int - InputType
SF TYPE_DATETIME_VARIATION_TIME : int - InputType
SF TYPE_MASK_CLASS : int - InputType
SF TYPE_MASK_FLAGS : int - InputType
SF TYPE_MASK_VARIATION : int - InputType
SF TYPE_NULL : int - InputType
SF TYPE_NUMBER_FLAG_DECIMAL : int - InputType
SF TYPE_NUMBER_FLAG_SIGNED : int - InputType
SF TYPE_NUMBER_VARIATION_NORMAL : int - InputType
SF TYPE_NUMBER_VARIATION_PASSWORD : int - InputType
SF TYPE_TEXT_FLAG_AUTO_COMPLETE : int - InputType
SF TYPE_TEXT_FLAG_AUTO_CORRECT : int - InputType
SF TYPE_TEXT_FLAG_CAP_CHARACTERS : int - InputType
SF TYPE_TEXT_FLAG_CAP_SENTENCES : int - InputType
SF TYPE_TEXT_FLAG_CAP_WORDS : int - InputType
```

FLAG ime_MULTI_LINE : int - InputType
FLAG_MULTI_LINE : int - InputType
FLAG_NO_SUGGESTIONS : int - InputType
VARIATION_EMAIL_ADDRESS : int - InputType
VARIATION_EMAIL_SUBJECT : int - InputType
VARIATION_FILTER : int - InputType
VARIATION_LONG_MESSAGE : int - InputType
VARIATION_NORMAL : int - InputType
VARIATION_PASSWORD : int - InputType
VARIATION_PERSON_NAME : int - InputType
VARIATION_PHONETIC : int - InputType
VARIATION_POSTAL_ADDRESS : int - InputType
VARIATION_SHORT_MESSAGE : int - InputType
VARIATION_URI : int - InputType
VARIATION_VISIBLE_PASSWORD : int - InputType
VARIATION_WEB_EDIT_TEXT : int - InputType

Appendix B: EditText Boxes & Keyboarding

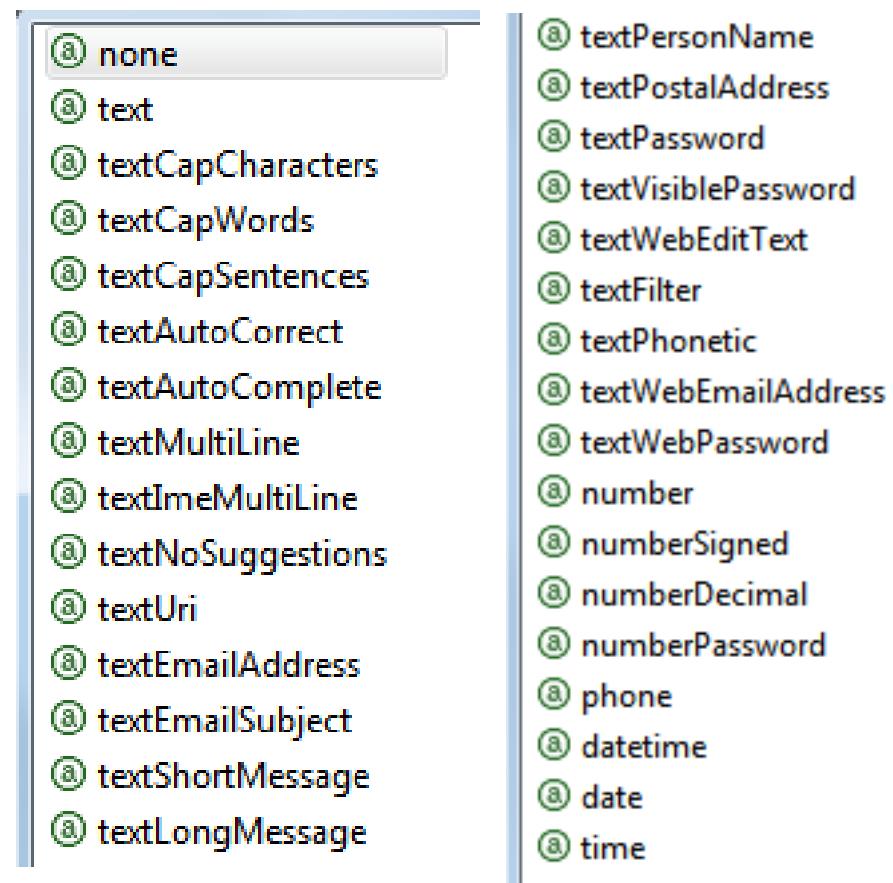
XML Usage – inputType Classes

<EditText

...

 android:inputType="numberSigned|numberDecimal"

...



Reference:

http://developer.android.com/reference/android/R.styleable.html#TextView_inputType

Appendix B: EditText Boxes & Keyboarding

Example10: Using multiple XML attributes

android:inputType="text|textCapWords"

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

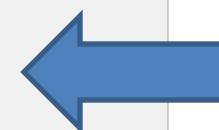
    <TextView
        android:layout_width="match_parent"
        android:layout_height="wrap_content"
        android:background="#ff0000ff"
        android:text="inputType: text/textCapWords"
        android:textStyle="bold"
        android:textSize="22sp" />

    <EditText
        android:id="@+id/editTextBox"
        android:layout_width="match_parent"
        android:layout_height="wrap_content"
        android:padding="5dip"
        android:textSize="18sp"
        android:inputType="text/textCapWords"    />
</LinearLayout>
```

Use “**pipe**” symbol | to separate the options.

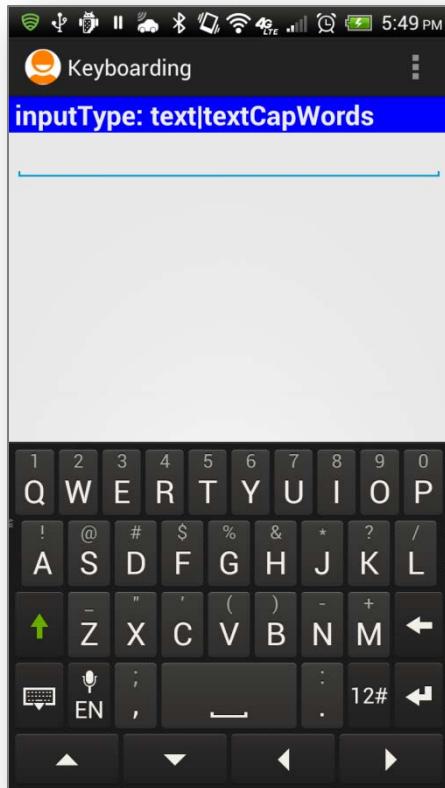
In this example a soft **text keyboard** will be used.

Each word will be capitalized.

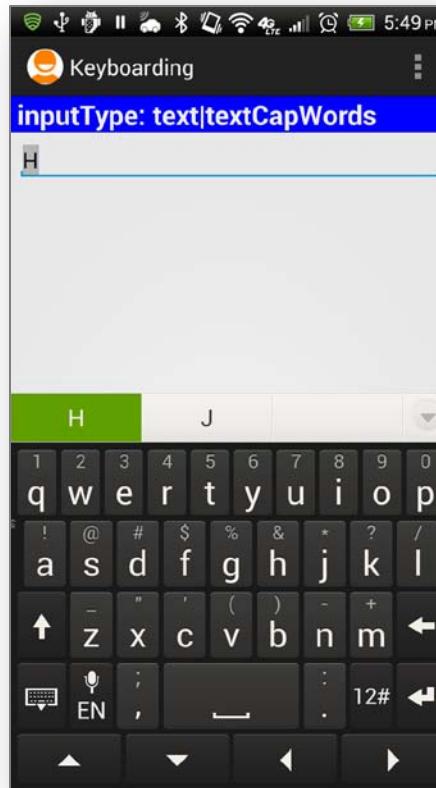


Appendix B: EditText Boxes & Keyboarding

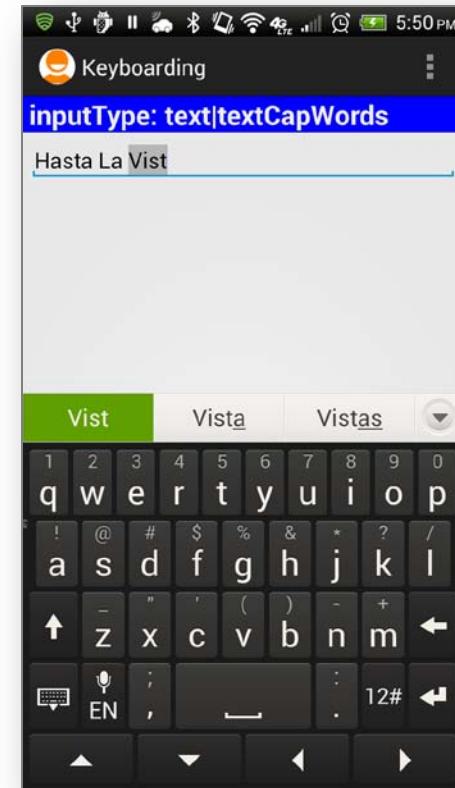
Example10: Using `android:inputType= "text|textCapWords"`



After tapping the EditText box to gain focus, a soft keyboard appears showing CAPITAL letters



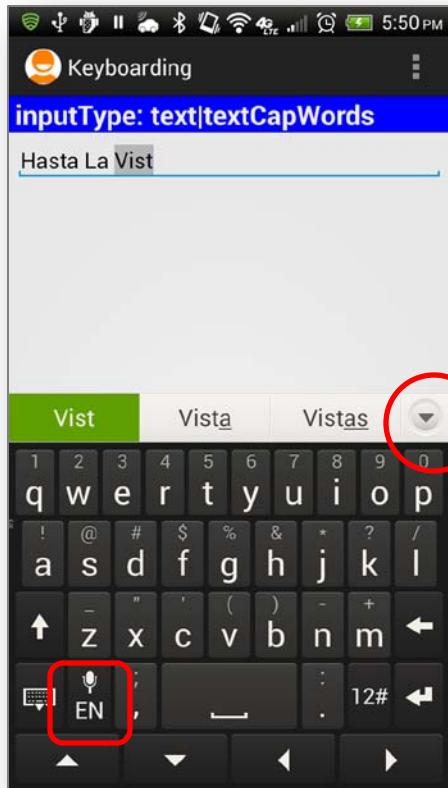
After first letter is typed the keyboard automatically switches to LOWER case mode



After entering *space* the keyboard repeats cycle beginning with UPPER case, then LOWER case letters.

Appendix B: EditText Boxes & Keyboarding

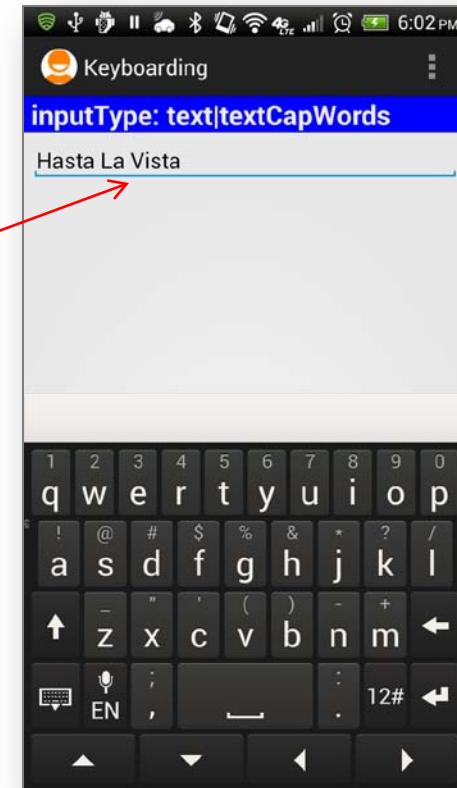
Example10: Using `android:inputType= "text|textCapWords"`



English and Spanish are the user's selected languages in this device



You may speed up typing by tapping on an option from the list of suggested words (bilingual choices)

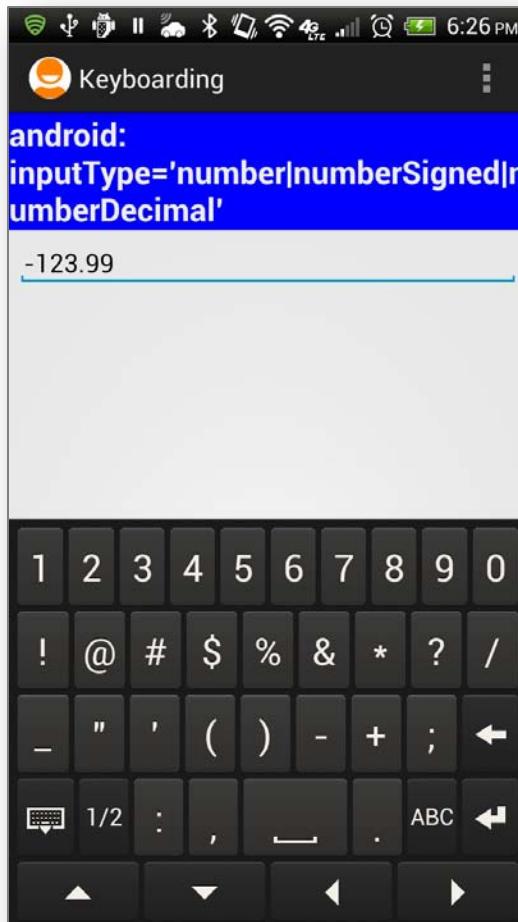


Selected word is introduced in the EditText box

Appendix B: EditText Boxes & Keyboarding

Example 11: Using

`android:inputType="number|numberSigned|numberDecimal"`



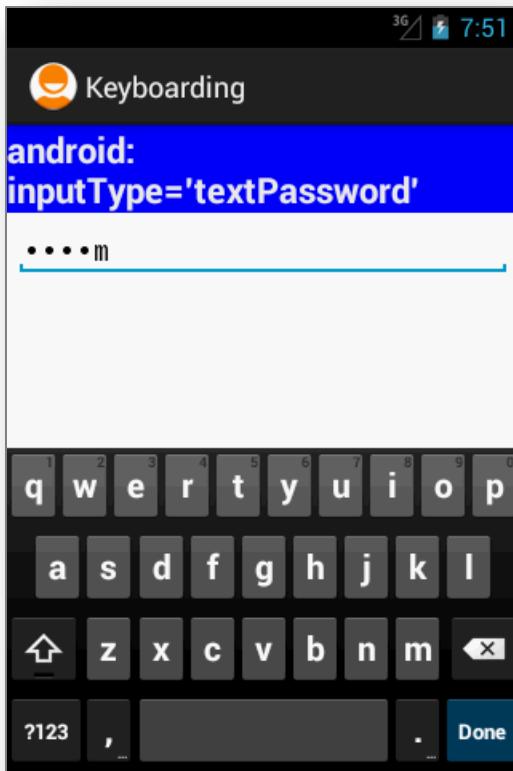
1. The keyboard displays numbers.
2. *Non-numeric* keys (such as `!@#$%&*?/_`) are visible but disable.
3. Only valid numeric expressions can be entered.
4. Type **number|numberSigned** accepts integers.
5. Type **numberDecimal** accepts real numbers.

Assume the EditText field is named: `editTextBox`,
In Java code we could at run-time set the input
method by issuing the command:

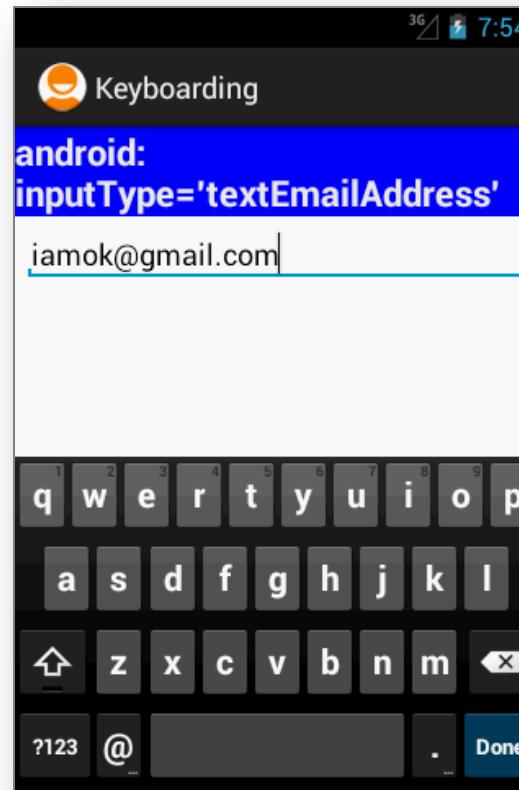
```
editTextBox.setInputType(  
    android.text.InputType.TYPE_CLASS_NUMBER |  
    android.text.InputType.TYPE_NUMBER_FLAG_SIGNED);
```

Appendix B: EditText Boxes & Keyboarding

Example 12: Using `android:inputType="textPassword"`



Example 13: Using `android:inputType="textEmailAddress"`



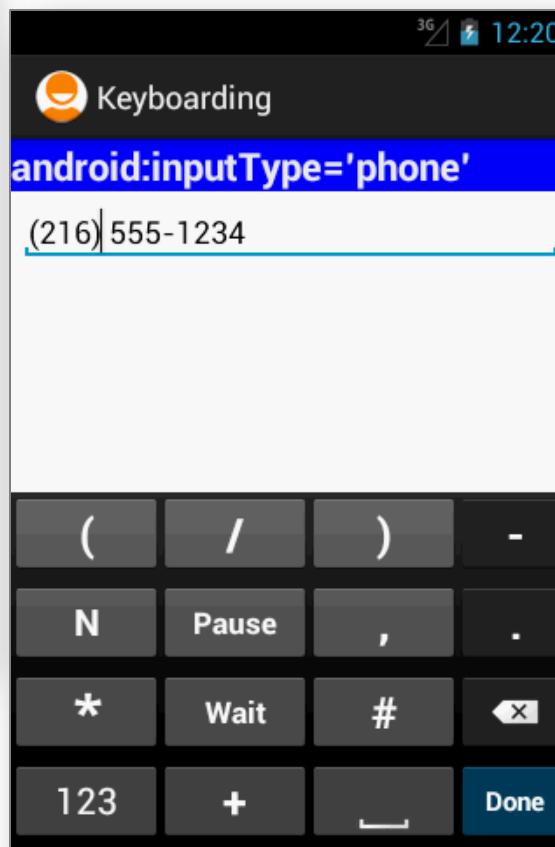
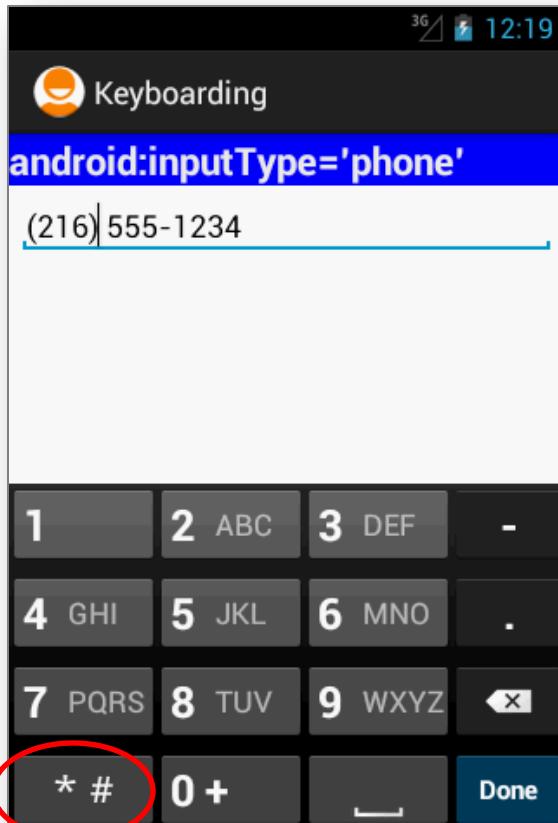
Soft keyboard shows characters used in email addresses (such as letters, @, dot).

Click on [?123] key (lower-left) for additional characters

- The keyboard displays all possible keys.
- Current character is briefly displayed for verification purposes.
- The current character is hidden and a *heavy-dot* is displayed.

Appendix B: EditText Boxes & Keyboarding

Example 14: Using `android:inputType="phone"`



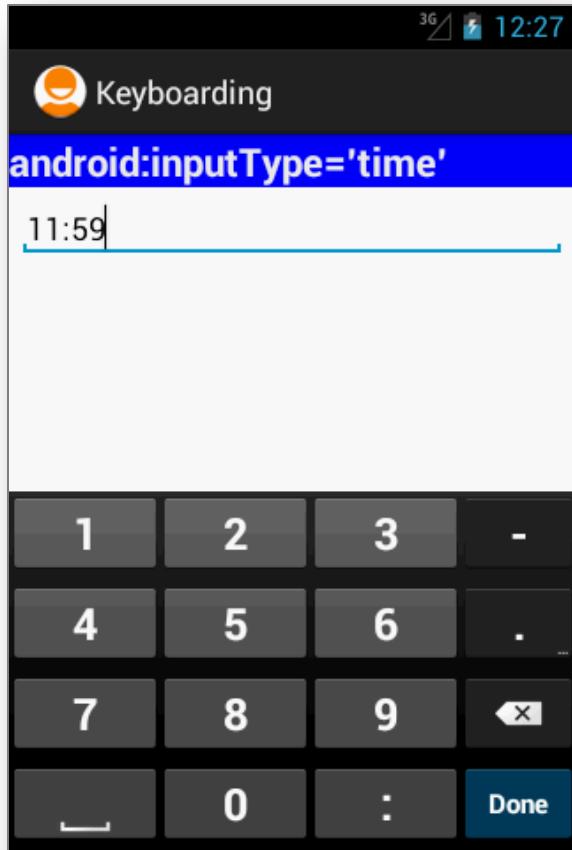
Soft keyboard displays the layout of a typical *phone keypad* plus additional non digit symbols such as:

() . / Pause Wait # - +

Additional symbols

Appendix B: EditText Boxes & Keyboarding

Example 15: Using `android:inputType="time"`



Soft keyboard displays a numerical layout.

Only digits and colon-char ":" can be used.

Appendix B: EditText Boxes & Keyboarding

Example 16: Using `android:inputType="time"`



When clicked, the **Auxiliary** button **DONE** will remove the keyboard from the screen (default behavior).

You may change the button's caption and set a listener to catch the click event on the Auxiliary button. To do that add the following entry to your XML specification of the EditText box:

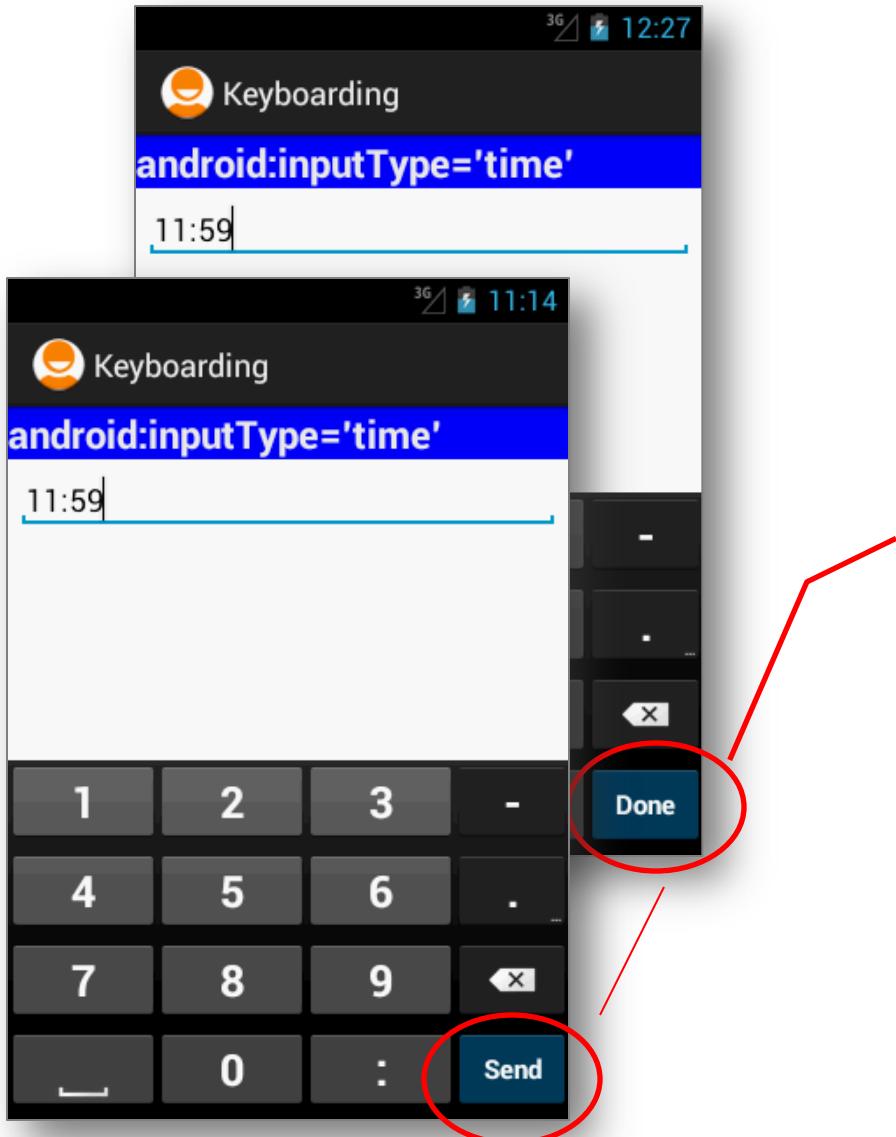
`android:imeAction="actionSend"`

Later, your Java code could provide an implementation of the method:

```
editTextBox  
    .setOnEditorActionListener()  
to do something with the event.
```

Appendix B: EditText Boxes & Keyboarding

Example 16: Using `android:inputType="time"`



Other options for
`android:imeAction=". . ."`

are

- ⑧ "normal"
- ⑧ "actionUnspecified"
- ⑧ "actionNone"
- ⑧ "actionGo"
- ⑧ "actionSearch"
- ⑧ "actionSend"
- ⑧ "actionNext"
- ⑧ "actionDone"
- ⑧ "actionPrevious"
- ⑧ "flagNoFullscreen"
- ⑧ "flagNavigatePrevious"
- ⑧ "flagNavigateNext"
- ⑧ "flagNoExtractUi"
- ⑧ "flagNoAccessoryAction"
- ⑧ "flagNoEnterAction"
- ⑧ "flagForceAscii"

Appendix B: EditText Boxes & Keyboarding

Example 17: Using `android:inputType="datetime"`



Soft keyboard displays a numerical layout.

Only digits and date/time valid characters are allowed.

Examples of valid dates are:

`12/21/2012 12:12`

`12/31/2011`

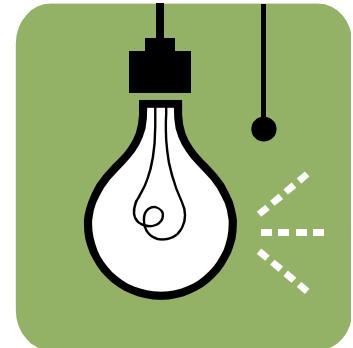
`12:30`

Appendix B: EditText Boxes & Keyboarding

Disable Soft Keyboarding on an EditText View

- To **disable** the action of the soft keyboard on an EditText you should set its input type to null, as indicated below:

```
editTextBox.setInputType( InputType.TYPE_NULL );
```



- To temporarily **hide** the virtual keyboard, call the following method:

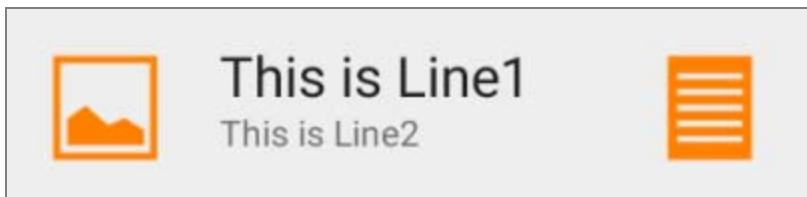
```
public void hideVirtualKeyboard() {  
    Context context = getActivity().getApplicationContext();  
    ((InputMethodManager) context  
        .getSystemService(Activity.INPUT_METHOD_SERVICE))  
        .toggleSoftInput(InputMethodManager.SHOW_IMPLICIT, 0);  
}
```

- To **display** the virtual keyboard, call the method:

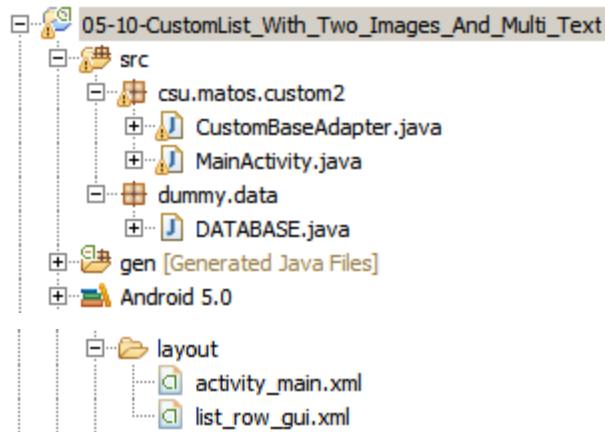
```
public void showVirtualKeyboard() {  
    Context context = getActivity().getApplicationContext();  
    ((InputMethodManager) context  
        .getSystemService(Activity.INPUT_METHOD_SERVICE))  
        .toggleSoftInput(InputMethodManager.SHOW_IMPLICIT, 0);  
}
```

Appendix C. Custom List Supported by a BaseAdapter

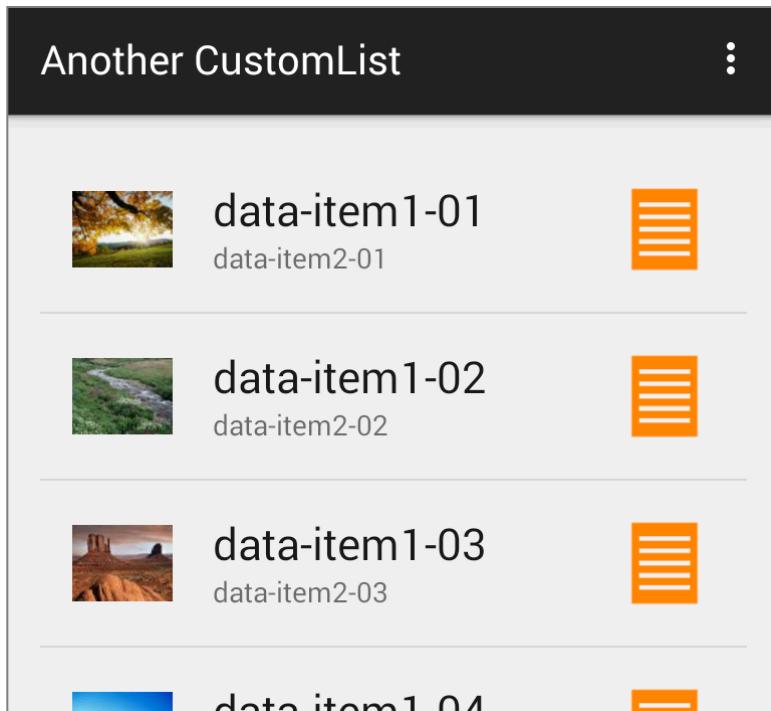
In this example a list holding rows showing multiple lines of text and images, is populated with a custom made BaseAdapter that uses the **ViewHolder** strategy for better performance.



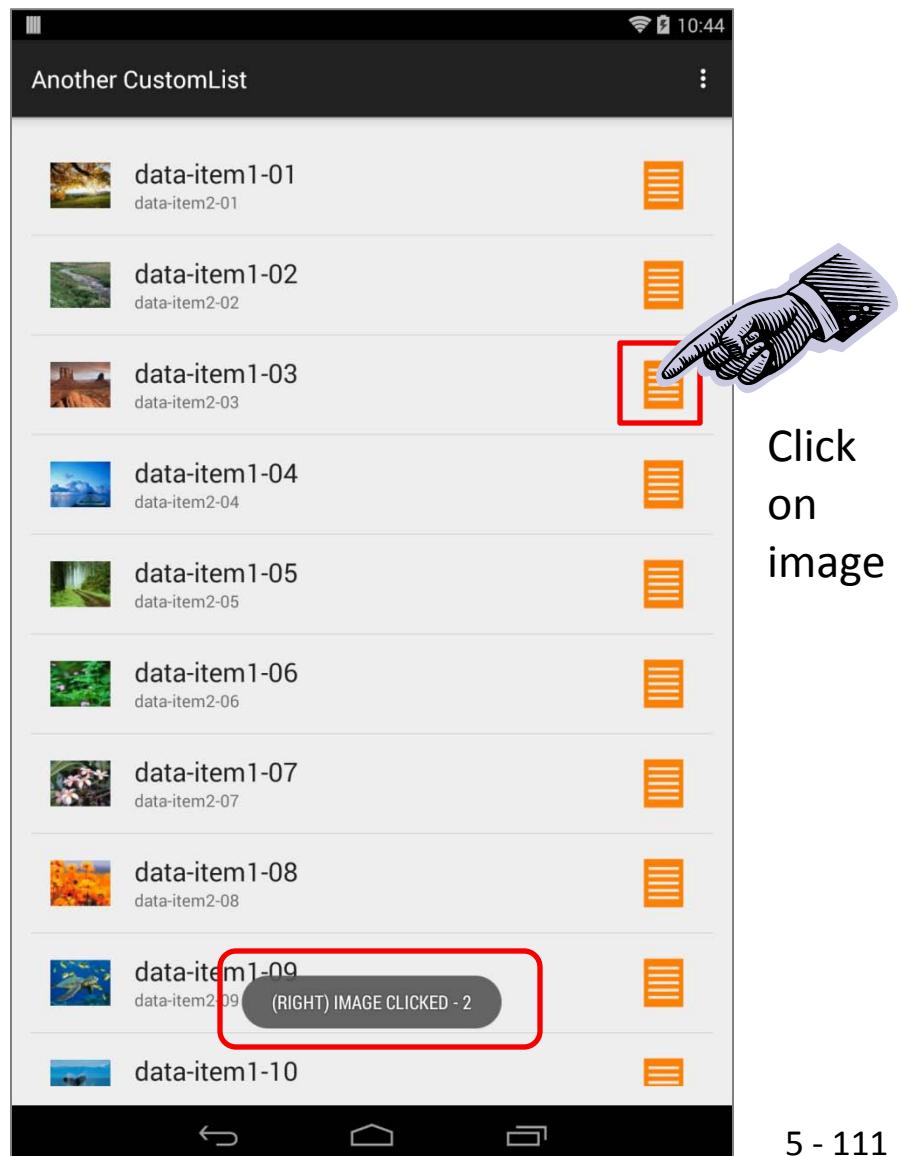
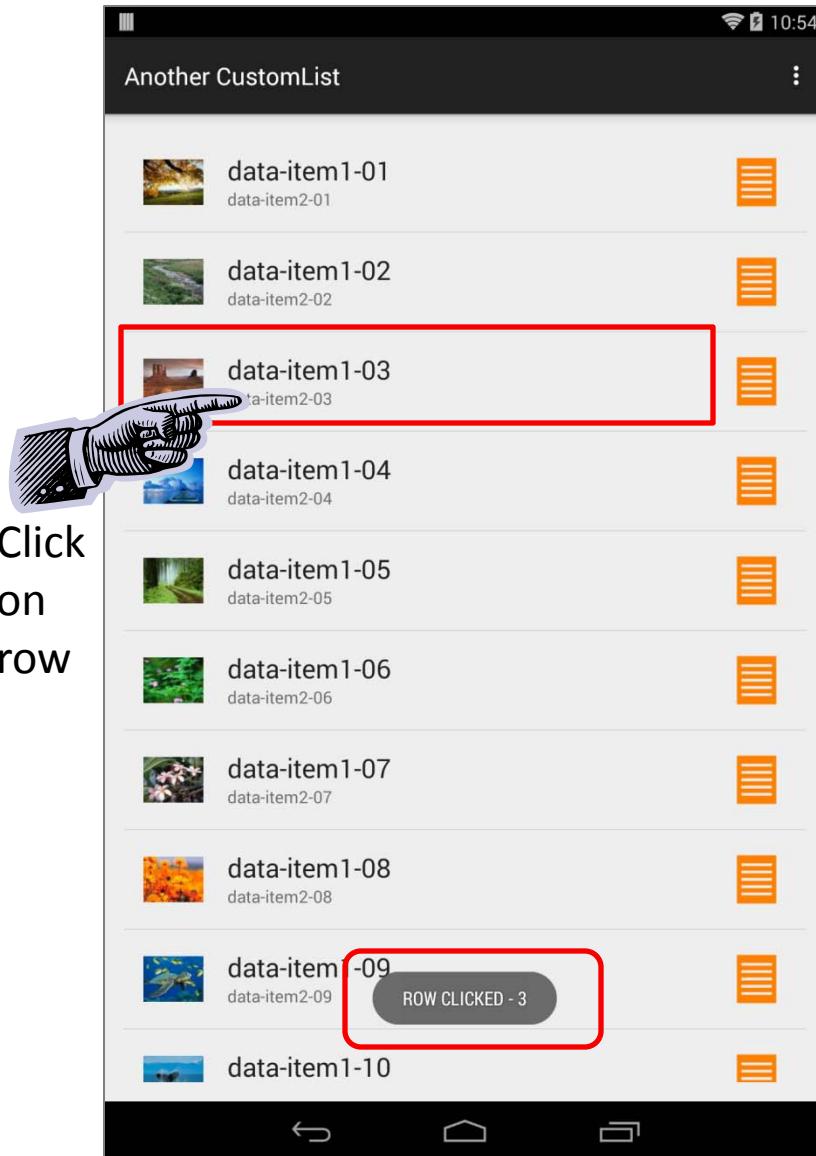
An **onClick** listener is set to recognize the user's tapping on the image to the right side, and another listener is set for clicking anything from the rest of the row.



The app consists of two classes: **MainActivity** and **CustomBaseAdapter**. It has two layouts: *activity_main* showing the list (see image on the right) and *list_row_gui* describing the structure of individual rows. Test data is placed in a separate class called **DATABASE**.



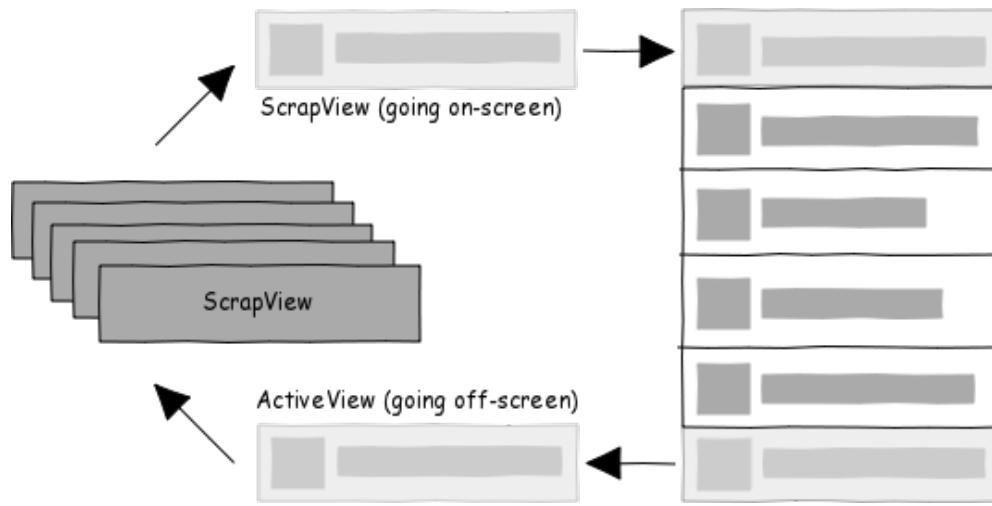
Appendix C. Custom List Supported by a BaseAdapter



Appendix C. Custom List – ViewHolder Pattern

The figure below is from “**Performance Tips for Android’s ListView**” by Lucas Rocha
<http://lucaskr.org/2012/04/05/performance-tips-for-androids-listview/> [Dec, 2014].

It shows a set of rows presented to the user inside a ListView container.



When a row gets out of sight, the memory of its layout is saved in a **scrapview** collection silently kept by the ListView.

If the row comes back to a visible state, you may reuse its scrapview skeleton instead of redoing the row from scratch.

The strategy of reusing these scrapviews is known as the **ViewHolder Design Pattern**. It cuts down on the number of times you have to inflate a row-layout and then get access to its internal widgets by calling the ‘findViewById()’ method.

When reusing the scrapviews (made available as ‘convertView’) all you need to do is move the appropriate data to the internal widgets and set their onClick listeners.

Appendix C. Custom List – activity_main.xml

Layout *activity_main.xml* shows a ListView.

```
<LinearLayout 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:orientation="vertical"  
    android:padding="16dp" >  
  
    <ListView  
        android:id="@+id/listView1"  
        android:layout_width="match_parent"  
        android:layout_height="wrap_content" >  
    </ListView>  
  
</LinearLayout>
```



Appendix C. Custom List – list_row_gui.xml

1 of 2

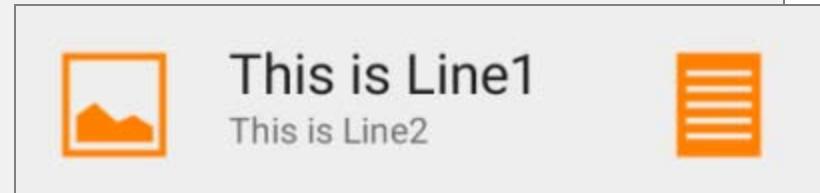
Layout *list_gui_row.xml* shows a custom-made row holding two lines of text and two images.

```
<LinearLayout 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:orientation="horizontal"
    android:padding="16dp" >

    <ImageView
        android:id="@+id/rowImageView1"
        android:layout_width="50dp"
        android:layout_height="50dp"
        android:contentDescription="@string/image_left"
        android:src="@drawable/ic_pic_left" />

    <LinearLayout
        android:layout_width="0dp"
        android:layout_height="match_parent"
        android:layout_marginLeft="20dp"
        android:layout_weight="2"
        android:orientation="vertical" >

        <TextView
            android:id="@+id/rowTextView1"
            android:layout_width="wrap_content"
            android:layout_height="wrap_content"
            android:text="@string/text1"
            android:textAppearance="?android:attr/textAppearanceLarge" />
    
```

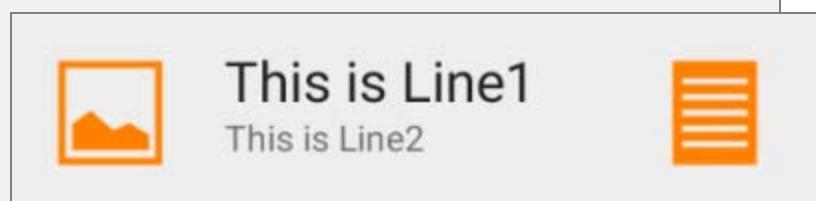


Appendix C. Custom List – list_row_gui.xml

2 of 2

Layout *list_gui_row.xml* shows a custom-made row holding two lines of text and two images.

```
<TextView  
    android:id="@+id/rowTextView2"  
    android:layout_width="wrap_content"  
    android:layout_height="wrap_content"  
    android:text="@string/text2"  
    android:textAppearance="?android:attr/textAppearanceSmall" />  
  
</LinearLayout>  
  
<ImageView  
    android:id="@+id/rowImageView2"  
    android:layout_width="50dp"  
    android:layout_height="50dp"  
    android:contentDescription="@string/image_right"  
    android:src="@drawable/ic_launcher" />  
  
</LinearLayout>
```



Appendix C. Custom List – MainActivity.java

1 of 1

The main activity exposes a ListView. A custom adapter is tied to the ListView. The adapter gets a reference to a test ‘database’ and the custom row layout.

```
public class MainActivity extends ActionBarActivity {  
    DATABASE database_records;  
  
    @Override  
    protected void onCreate(Bundle savedInstanceState) {  
        super.onCreate(savedInstanceState);  
        setContentView(R.layout.activity_main);  
  
        ListView listview = (ListView) findViewById(R.id.ListView1);  
  
        //create an instance of our fake database: {[text1, text2, icon]}  
        List database = new DATABASE().dbList;  
  
        CustomBaseAdapter adapter = new CustomBaseAdapter(this,  
                database,  
                R.layout.list_row_gui  
        );  
        listview.setAdapter(adapter);  
    } //onCreate
```



Appendix C. Custom List – CustomBaseAdapter.java

1 of 5

The **getView** method in this extended BaseAdapter inflates a supplied row layout, gets access to its internal widgets, fills them with data and set listeners on some of them.

```
public class CustomBaseAdapter extends BaseAdapter {  
  
    Context context;  
    int layoutToBeInflated;  
    List<DATABASE.DbRecord> dbList;  
  
    public CustomBaseAdapter(Context context, List<DATABASE.DbRecord>  
                           databaseList, int resource) {  
        this.context = context;  
        this.dbList = databaseList;  
        layoutToBeInflated = resource;  
    }  
  
    @Override  
    public int getCount() {  
        return dbList.size();  
    }  
  
    @Override  
    public DATABASE.DbRecord getItem(int position) {  
        return dbList.get(position);  
    }  
}
```

Appendix C. Custom List – CustomBaseAdapter.java

2 of 5

```
@Override  
public long getItemId(int position) {  
    return position;  
}  
  
@Override  
public View getView(final int position, View convertView, ViewGroup parent) {  
  
    // use View-Holder pattern to reduce calls to inflate, findViewById  
    // holder is a POJO for the GUI rows [textview1, textview2, img1, img2]  
    MyViewHolder holder;  
  
    // hopefully convertView is a scrapview already made (but out of sight)  
    View row = convertView;  
  
    // has this row-layout been already created?  
    if (row == null) {  
        // first time this row has to be created: (1) inflate custom layout  
        // holding images and text, (2) invoke findViewById to access its  
        // sub-components  
        LayoutInflator inflater = ((Activity) context).getLayoutInflator();  
  
        row = inflater.inflate(layoutToBeInflated, null);  
  
        holder = new MyViewHolder();  
    }  
    else {  
        holder = (MyViewHolder) row.getTag();  
    }  
  
    // set the data for this row  
    holder.textview1.setText("Text " + position);  
    holder.textview2.setText("Text " + position);  
    holder.img1.setImageResource(R.drawable.ic_launcher);  
    holder.img2.setImageResource(R.drawable.ic_launcher);  
}
```



Appendix C. Custom List – CustomBaseAdapter.java

3 of 5

```
// plumbing - provide access to each widget in the inflated layout
// (two images & two lines of text)
holder = new MyViewHolder();
holder.textview1 = (TextView) row.findViewById(R.id.rowTextView1);
holder.textview2 = (TextView) row.findViewById(R.id.rowTextView2);
holder.imageview1 = (ImageView) row.findViewById(R.id.rowImageView1);
holder.imageview2 = (ImageView) row.findViewById(R.id.rowImageView2);

// identify this row with the POJO holder just created
row.setTag(holder);

} else {
    // row was already created- no need to inflate and invoke findViewById
    // getTag() returns the object originally stored in this view
    holder = (MyViewHolder) row.getTag();
}

// enter(or restore) data that goes in this frame (from database 'position')
DATABASE.DbRecord dbRec = getItem(position);
holder.textview1.setText(dbRec.text1);
holder.textview2.setText(dbRec.text2);
holder.imageview1.setImageResource(dbRec.img1);
holder.imageview2.setImageResource(R.drawable.ic_launcher);
```



Appendix C. Custom List – CustomBaseAdapter.java

4 of 5



```
// EXTRA: individual listeners go here - if you need only a single
// listener for the entire row, put it into ActivityMain.

// This is a CLICK listener on top of the right icon (imageview2)
// (for example, here you start an intent to call phone[position])
holder.imageview2.setOnClickListener(new OnClickListener() {
    @Override
    public void onClick(View v) {
        Toast.makeText(context,
                    "(RIGHT) IMAGE CLICKED - " + position, 1).show();
    }
});

// row listener (user clicks on any other part of the row)
row.setOnClickListener(new OnClickListener() {
    @Override
    public void onClick(View v) {
        Toast.makeText(context,
                    "ROW CLICKED - " + position, 1).show();
    }
});

return row;

}// getView
```

Appendix C. Custom List – CustomBaseAdapter.java

5 of 5

```
// A humble POJO holding references to GUI widgets that are part of rows  
// shown by the list. They have already been made and their IDs are known,  
// therefore there is no need to issue 'findViewById' calls again.  
  
public class MyViewHolder {  
    TextView textview1;  
    TextView textview2;  
    ImageView imageview1;  
    ImageView imageview2;  
}  
  
}// CustomMadeListener
```

Appendix C. Custom List – DATABASE.java

1 of 2

```
public class DATABASE {    // TEST DATABASE
    public String[] text1array = { "data-item1-01", "data-item1-02",
        "data-item1-03", "data-item1-04", "data-item1-05", "data-item1-06",
        "data-item1-07", "data-item1-08", "data-item1-09", "data-item1-10",
        "data-item1-11", "data-item1-12", "data-item1-13", "data-item1-14",
        "data-item1-15" };
    public String[] text2array = { "data-item2-01", "data-item2-02",
        "data-item2-03", "data-item2-04", "data-item2-05", "data-item2-06",
        "data-item2-07", "data-item2-08", "data-item2-09", "data-item2-10",
        "data-item2-11", "data-item2-12", "data-item2-13", "data-item2-14",
        "data-item2-15" };
    public Integer[] icon1array = { csu.matos.custom2.R.drawable.pic01_small,
        csu.matos.custom2.R.drawable.pic02_small,
        csu.matos.custom2.R.drawable.pic03_small,
        csu.matos.custom2.R.drawable.pic04_small,
        csu.matos.custom2.R.drawable.pic05_small,
        csu.matos.custom2.R.drawable.pic06_small,
        csu.matos.custom2.R.drawable.pic07_small,
        csu.matos.custom2.R.drawable.pic08_small,
        csu.matos.custom2.R.drawable.pic09_small,
        csu.matos.custom2.R.drawable.pic10_small,
        csu.matos.custom2.R.drawable.pic11_small,
        csu.matos.custom2.R.drawable.pic12_small,
        csu.matos.custom2.R.drawable.pic13_small,
        csu.matos.custom2.R.drawable.pic14_small,
        csu.matos.custom2.R.drawable.pic15_small, };
```

Appendix C. Custom List – DATABASE.java

2 of 2

```
public class DbRecord {  
    public String text1;  
    public String text2;  
    public Integer img1;  
  
    public DbRecord(String text1, String text2, Integer img1) {  
        this.text1 = text1;  
        this.text2 = text2;  
        this.img1 = img1;  
    }  
}//dbRecord  
  
// dbList is a 'database' holding a list of DbRecods:[string,string,int]  
public ArrayList<DbRecord> dbList = new ArrayList<DbRecord>();  
  
// populate the 'database' with data items  
public DATABASE () {  
    for(int i=0; i<text1array.length; i++){  
        dbList.add(new DbRecord(text1array[i], text2array[i], icon1array[i]));  
    }  
}  
}  
  
}// DATABASE
```

