



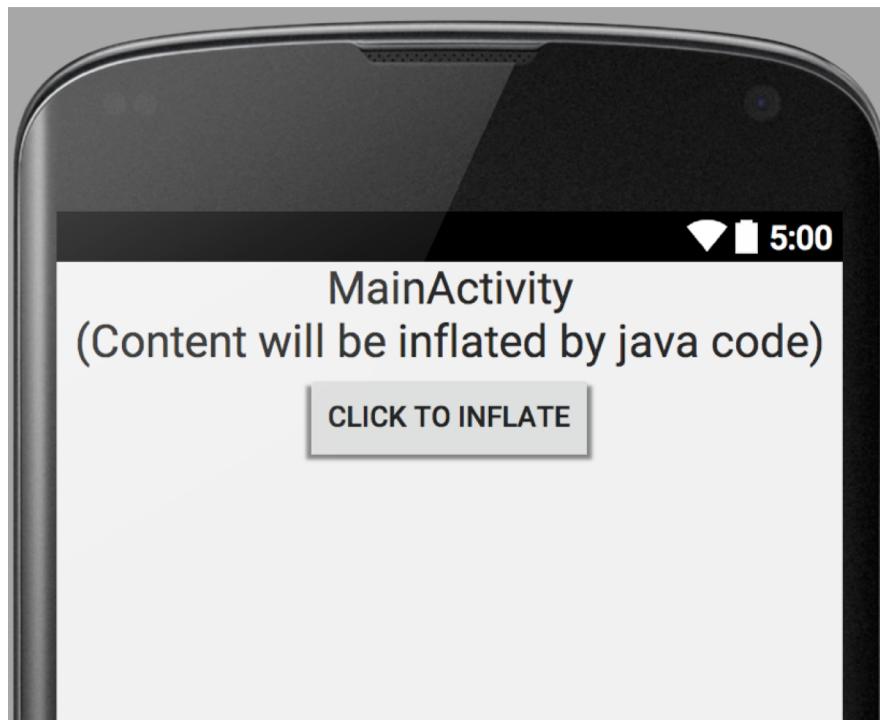
List-Based Widgets (Continued)

ListView Widget

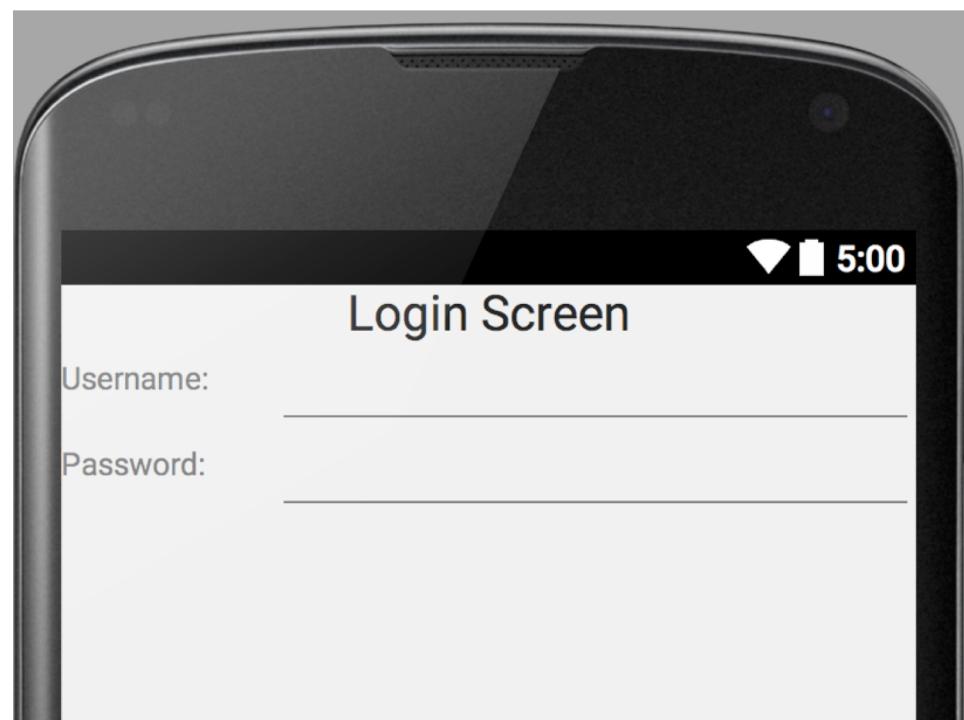
- **LayoutInflater**
- Advance custom-made ListView
 - ArrayAdapter
 - BaseAdapter
 - Refresh Data Change
- Spinner
- ExpandableListView

LayoutInflater

- The LayoutInflater class converts an XML layout specification into an actual tree of View objects.



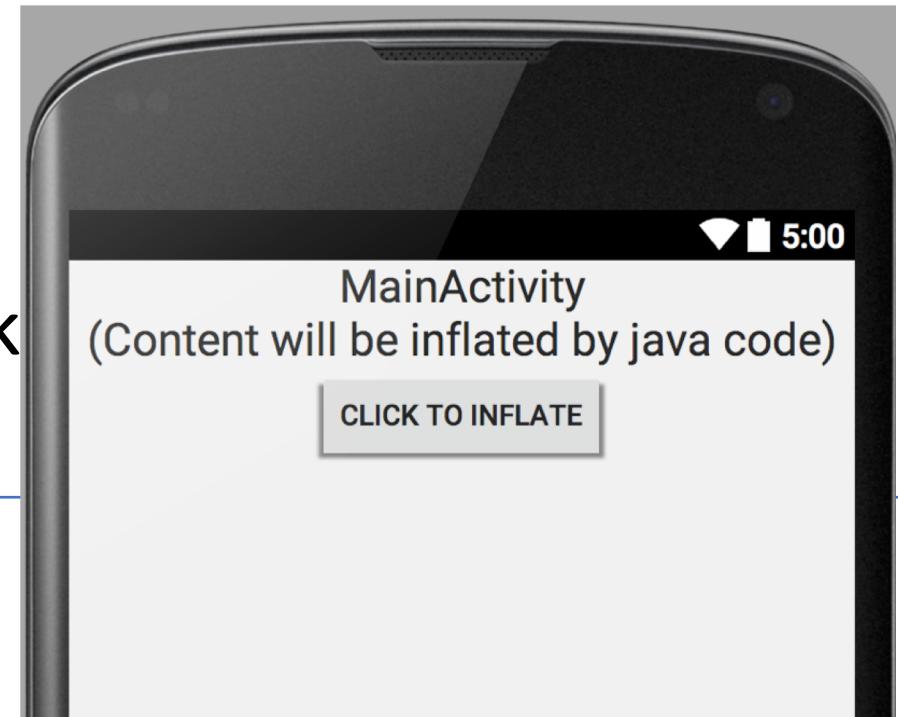
main_activity.xml



layout_to_inflate.xml

LayoutInflater

```
<?xml version="1.0" encoding="utf-8"?>
<LinearLayout
    ....
    android:id="@+id/main_activity_container">
    <TextView ... />
    <TextView ... />
    <Button ...
        android:onClick
</LinearLayout>
```



LayoutInflater

```
public void buttonClickHandler(View button) {  
    ViewGroup root = (ViewGroup) findViewById(  
        R.id.main_activity_container);  
    LayoutInflater inflater =  
        getLayoutInflater();  
    inflater.inflate(  
        R.layout.layout_to_inflate,  
        root);  
}
```

LayoutInflater

```
public void buttonClickHandler(View button) {  
    ViewGroup root = (ViewGroup) findViewById(  
        R.id.main_activity_container);  
    LayoutInflater inflater =  
        getLayoutInflater();  
    View childView = inflater.inflate(  
        R.layout.layout_to_inflate,  
        null);  
    root.addView(childView);  
}
```

Exercise 1



Android Add Remove View

Add View

Remove View



Android Add Remove View

Add View

Remove View

This is not the original Text defined in the XML layout !

- CheckBox1
- CheckBox2
- CheckBox3
- Radio Button1 Radio Button2 Radio Button3

ListView Widget

- LayoutInflater
- **Advance custom-made ListView**
 - ArrayAdapter
 - BaseAdapter
 - Refresh Data Change
- Spinner
- ExpandableListView

Custom-made List-Based Widgets (Create your own Data Adapter)

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

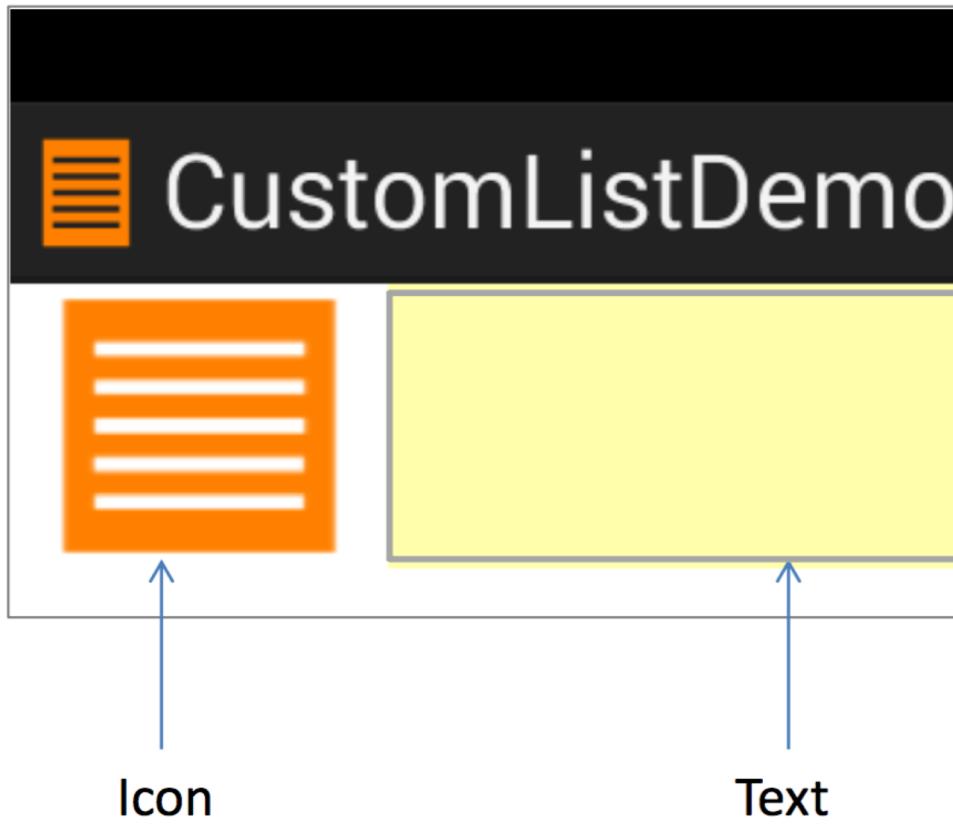
1. Create a class extending the concrete **ArrayAdapter** class
2. Override its **getView()**, and
3. Construct (inflate) your rows yourself.

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

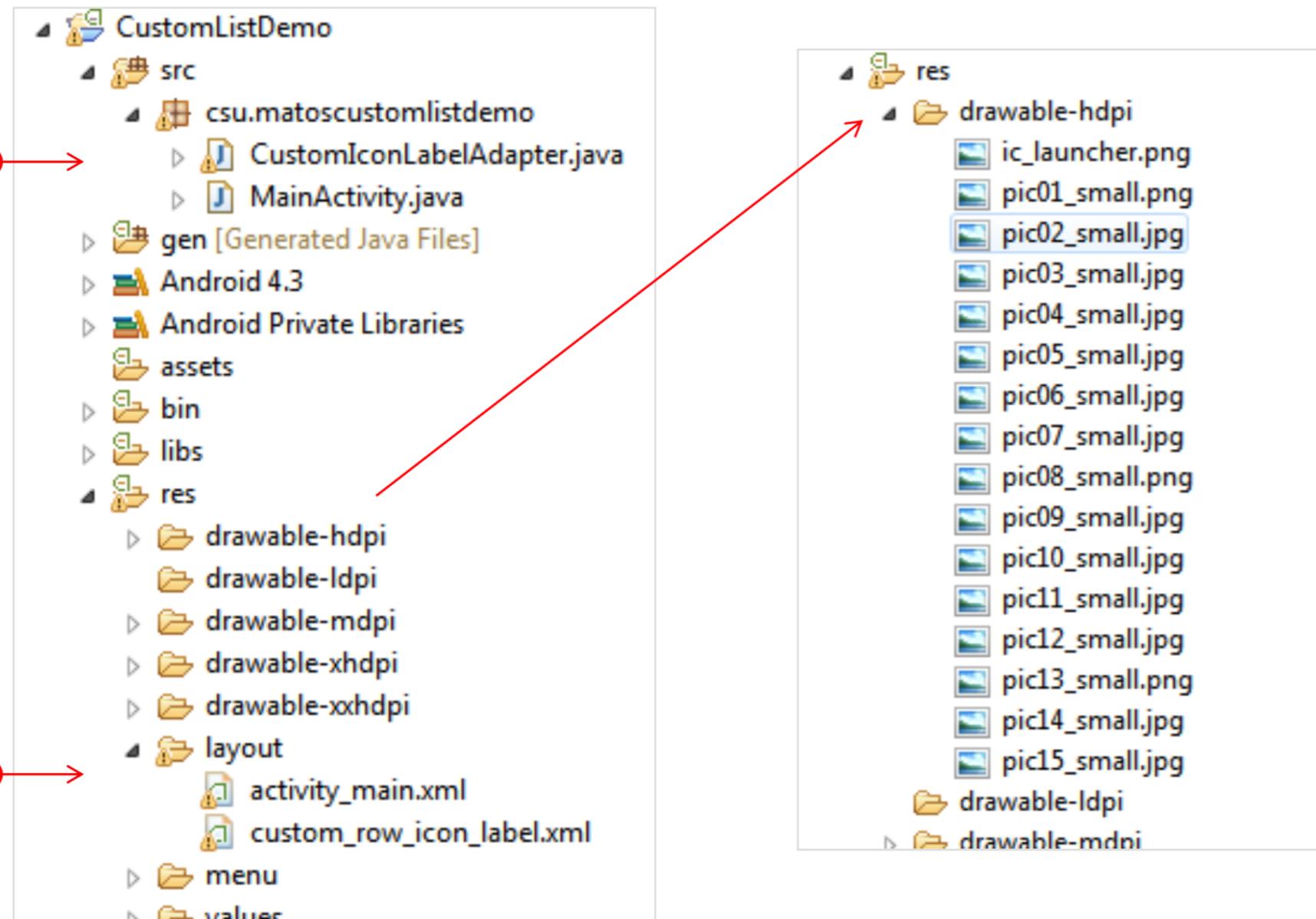
For each data element supplied by the adapter, the **getView()** method returns its corresponding 'visible' View.

Custom-made List-Based Widget (Designing Custom Rows)

- Each UI row will show an icon (on the left) and text (on the right).



Custom-made List-Based Widgets (APP's Structure)



Custom-made List-Based Widgets

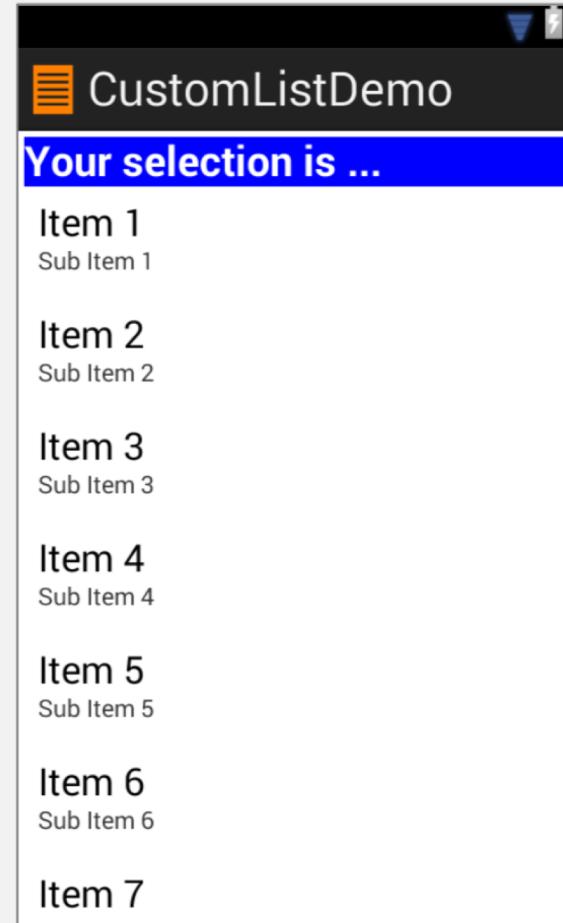
1. XML Layout: *activity_main.xml*

```
<?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 List-Based Widgets

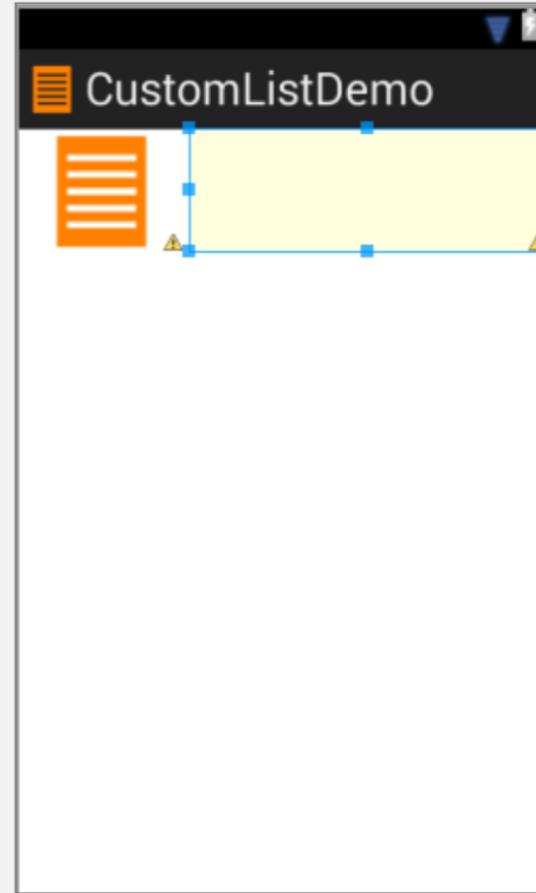
2. XML Layout: *custom_row_icon_label.xml*

```
<?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 List-Based Widgets (MainActivity Class)

```
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 List-Based Widgets (MainActivity Class - continued)



```
// the arguments of the custom adapter are:  
// activityContext, 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 List-Based Widgets (CustomIconLabelAdapter Class)

```
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) {
        LayoutInflater inflater = ((Activity) context).getLayoutInflater();
        View row = inflater.inflate(R.layout.custom_row_icon_label, null);

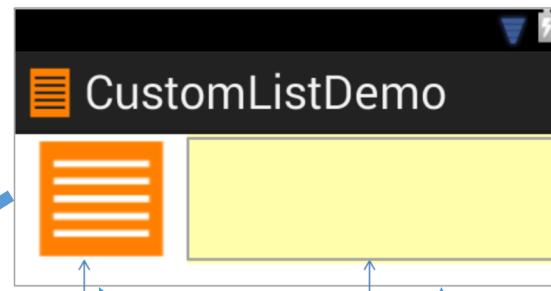
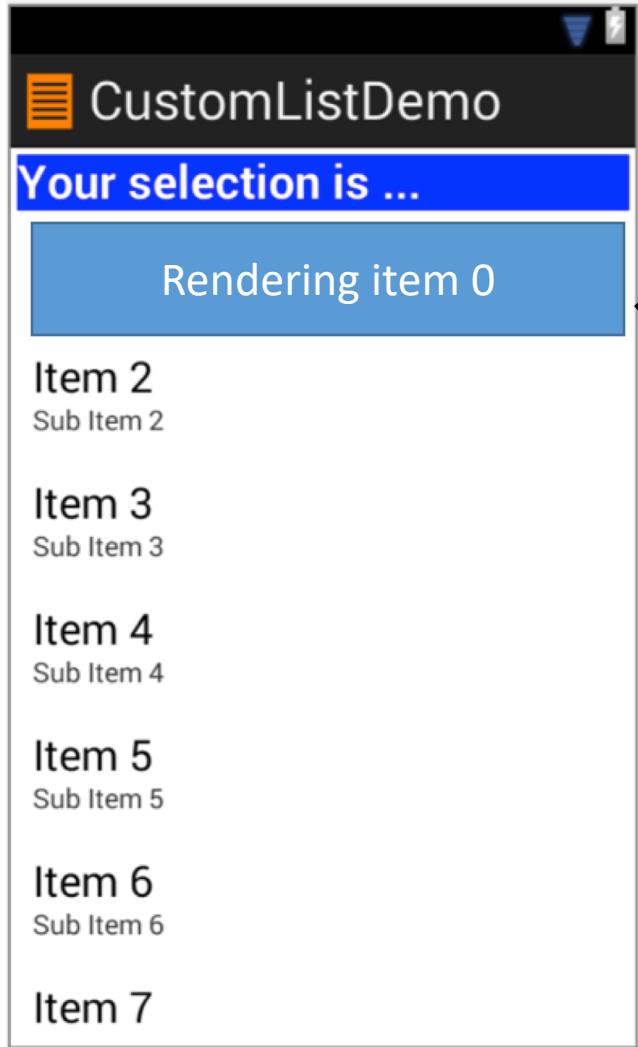
        TextView label = (TextView) row.findViewById(R.id.Label);
        ImageView icon = (ImageView) row.findViewById(R.id.icon);

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

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

Custom-made List-Based Widgets (CustomIconLabelAdapter Class - getView)

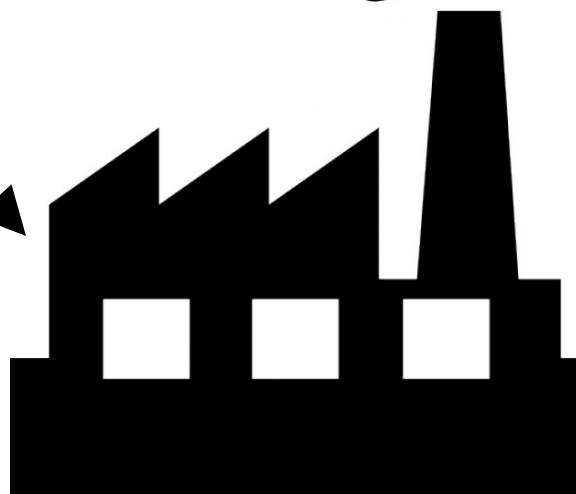
- position
- convertView
- parent



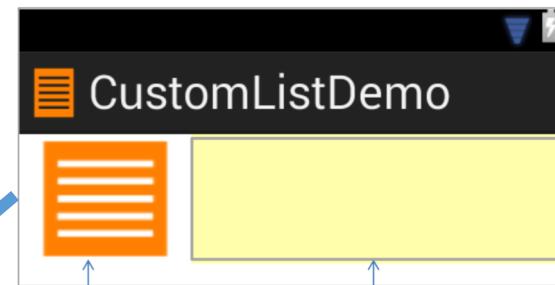
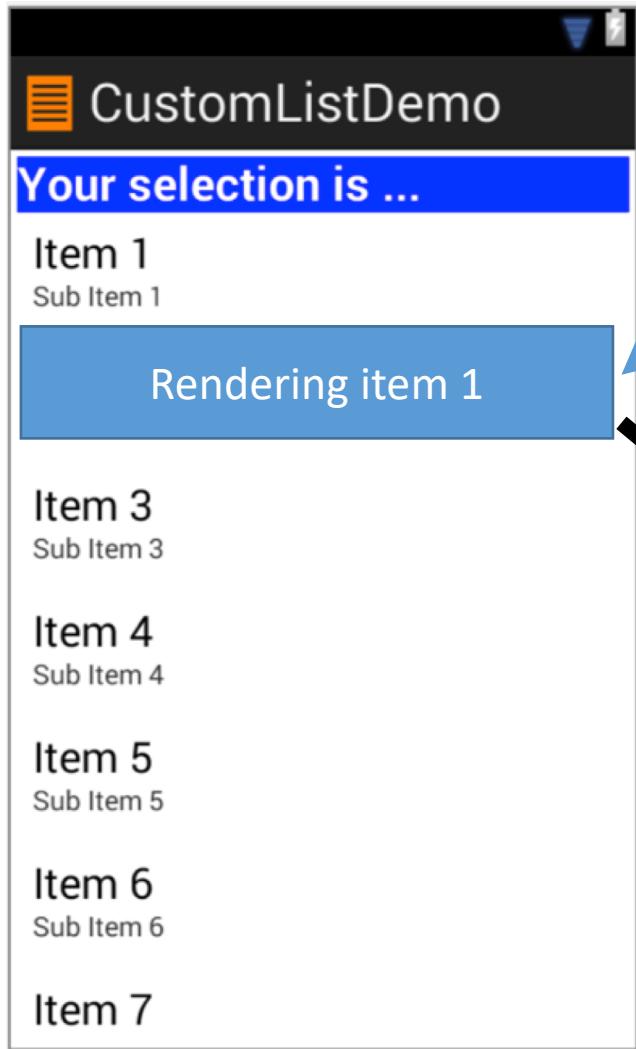
Replace actual icon

Replace actual text

Call `getView(..)`
Position = 0
`convertView = null`

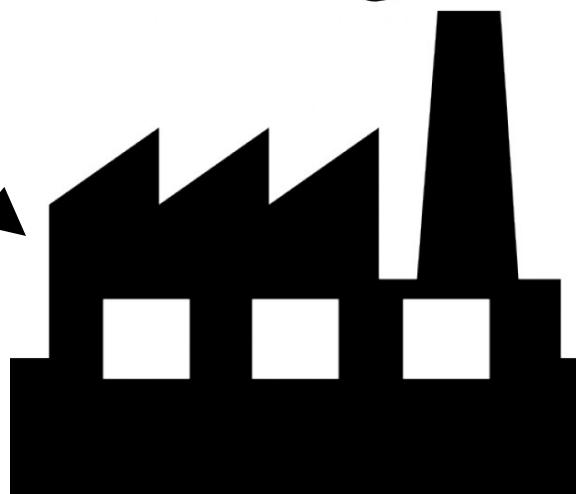


CustomIconLabelAdapter



Replace actual icon
Replace actual text

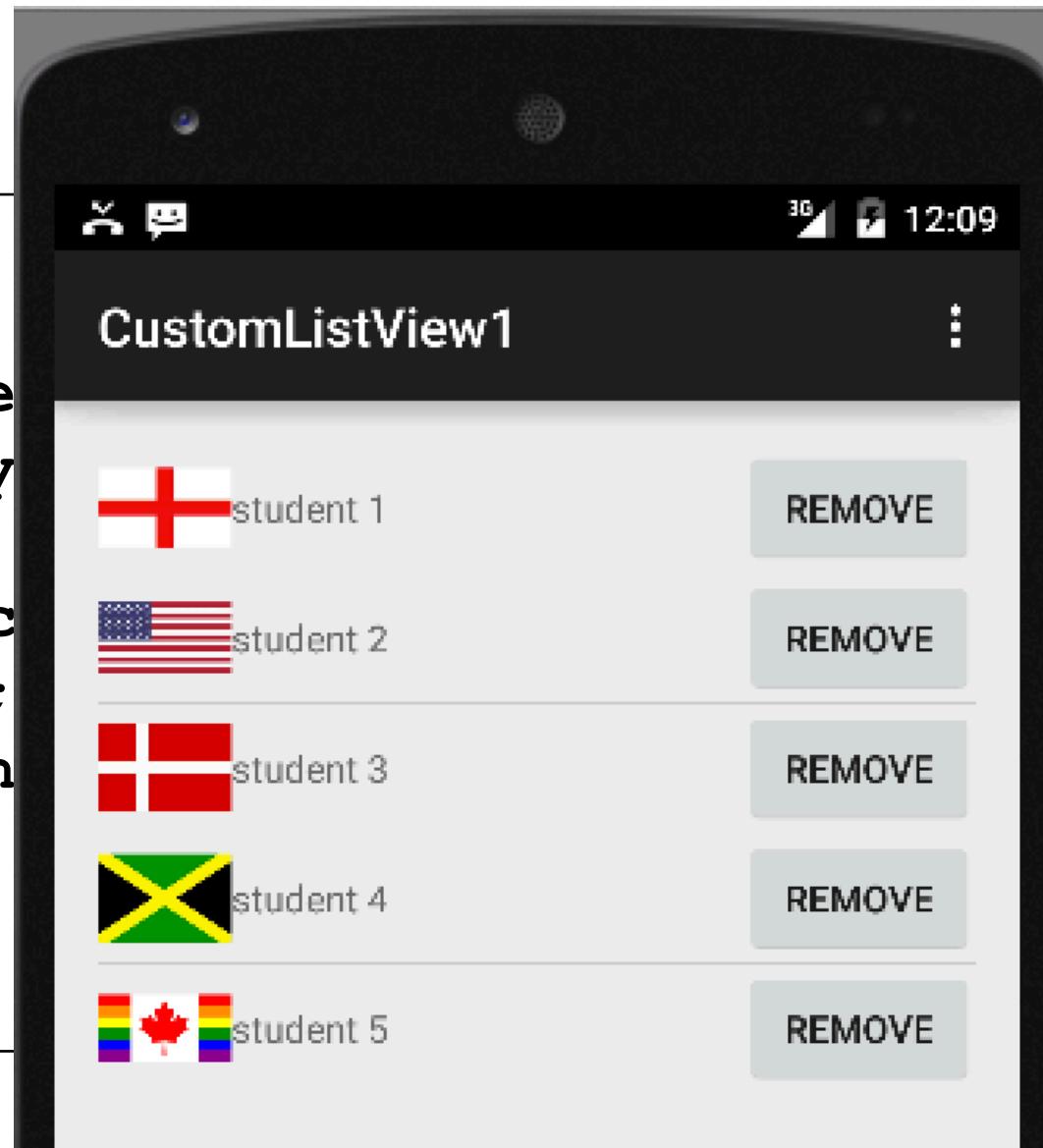
Call `getView(...)`
Position = 1
`convertView=null`



CustomIconLabelAdapter

Exercise 2

```
public class Student  
    private int id;  
    private String name;  
    private int country;  
    public Student(int id,  
                  String name,  
                  int country)  
    {  
        this.id = id;  
        this.name = name;  
        this.country = country;  
    }
```

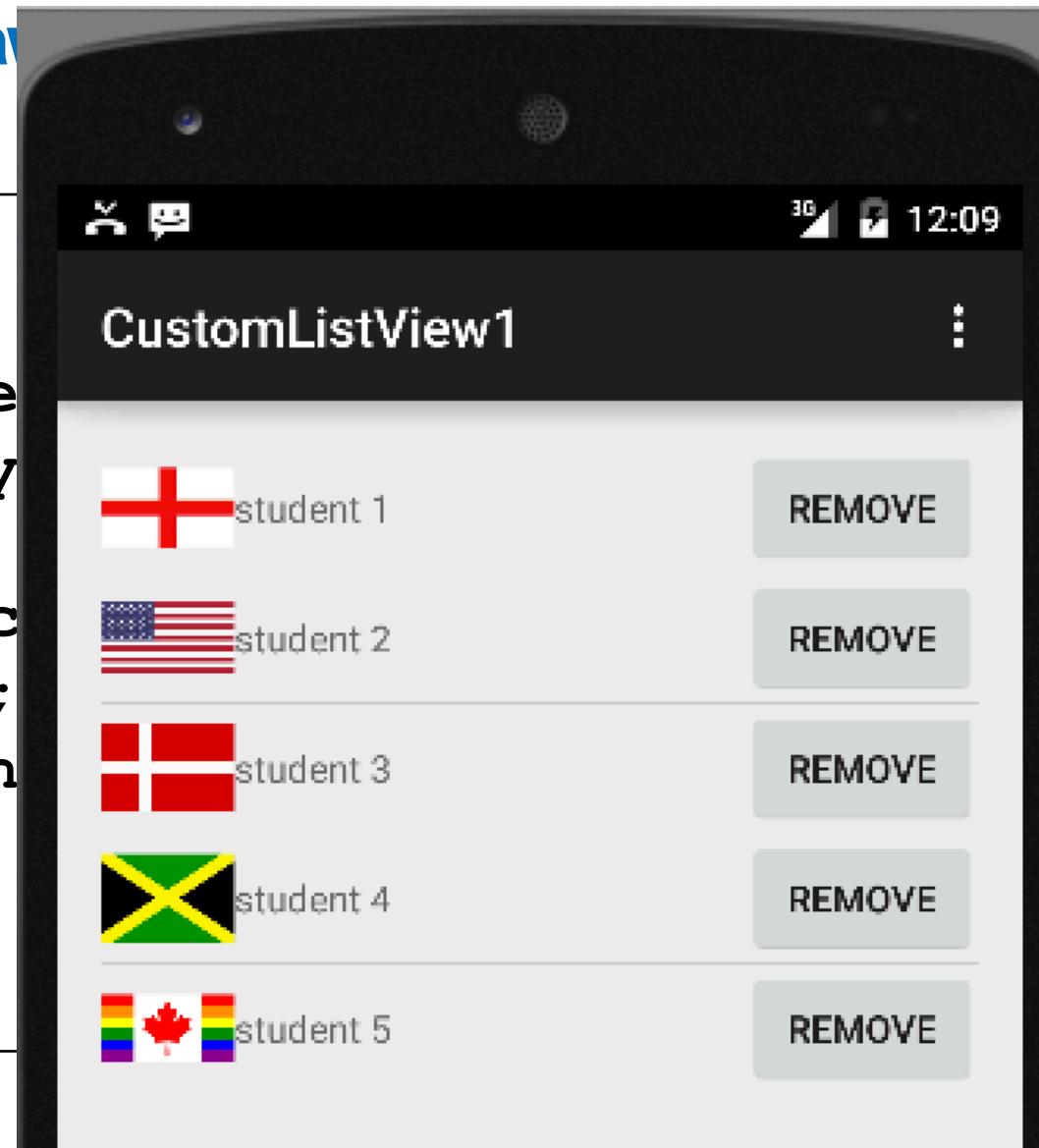


ListView Widget

- LayoutInflater
- **Advance custom-made ListView**
 - ArrayAdapter
 - **BaseAdapter**
 - Refresh Data Change
- Spinner
- ExpandableListView

Customize ListView (BaseAdapter – Activity Java)

```
public class Student
    private int id;
    private String name;
    private int country;
    public Student(int id, String name, int country) {
        this.id = id;
        this.name = name;
        this.country = country;
    }
}
```



Custom-made List-Based Widgets (BaseAdapter – CustomAdapter class)

```
public class MyAdapter extends BaseAdapter {  
    public int getCount() { }  
    public Object getItem(...) { }  
    public long getItemId(...) { }  
    public View getView(...) { }  
}
```

Custom-made List-Based Widgets (BaseAdapter – MainActivity.java)

```
public class MainActivity extends Activity {  
    private ListView listView;  
    private ArrayList<Student> dataProvider;
```

Custom-made List-Based Widgets (BaseAdapter – MainActivity.java)

```
dataProvider = new ArrayList<Student>();  
dataProvider.add(new Student(1,  
        "student 1", R.drawable.flag1));  
dataProvider.add(new Student(2,  
        "student 2", R.drawable.flag2));  
dataProvider.add(new Student(3,  
        "student 3", R.drawable.flag3));  
dataProvider.add(new Student(4,  
        "student 4", R.drawable.flag4));  
dataProvider.add(new Student(5,  
        "student 5", R.drawable.flag5));
```

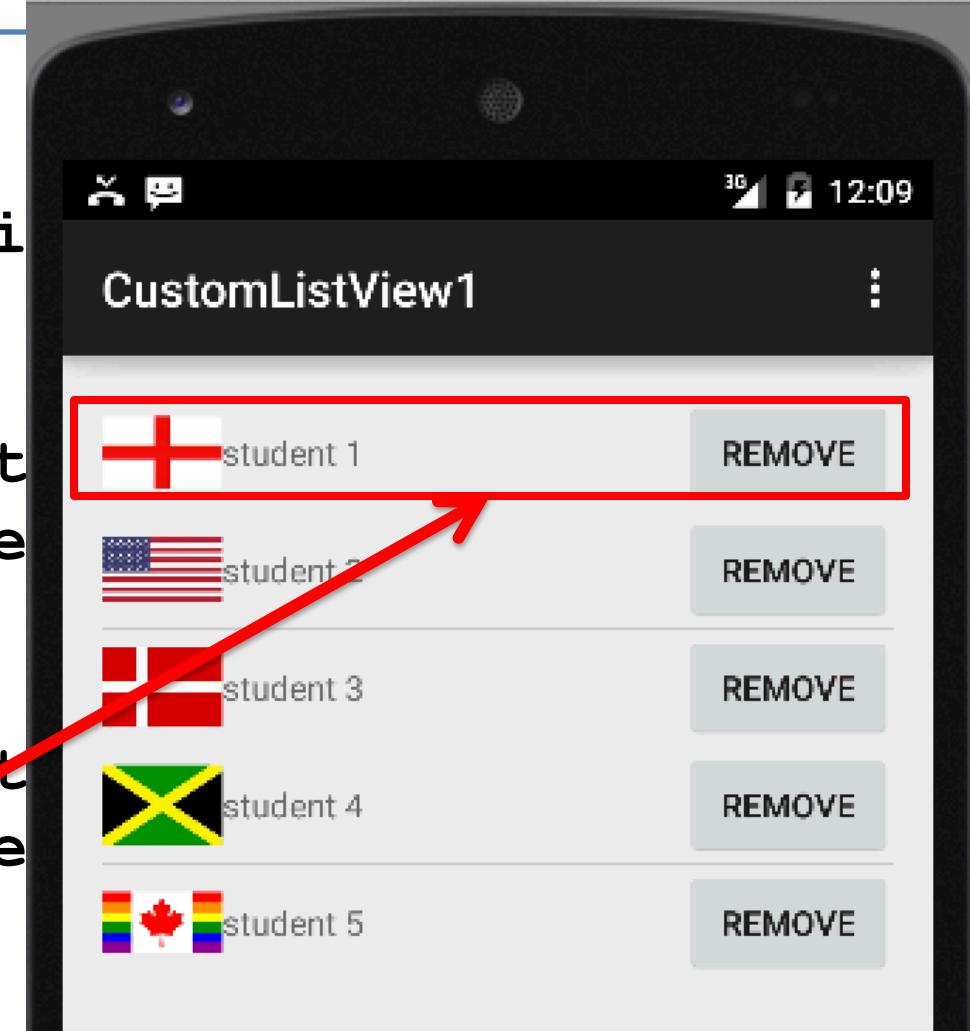
Custom-made List-Based Widgets (BaseAdapter – MainActivity.java)

```
listView = (ListView)  
        findViewById(R.id.listView1);  
  
MyAdapter adapter =  
    new MyAdapter(this, dataProvider);  
listView.setAdapter(adapter);
```

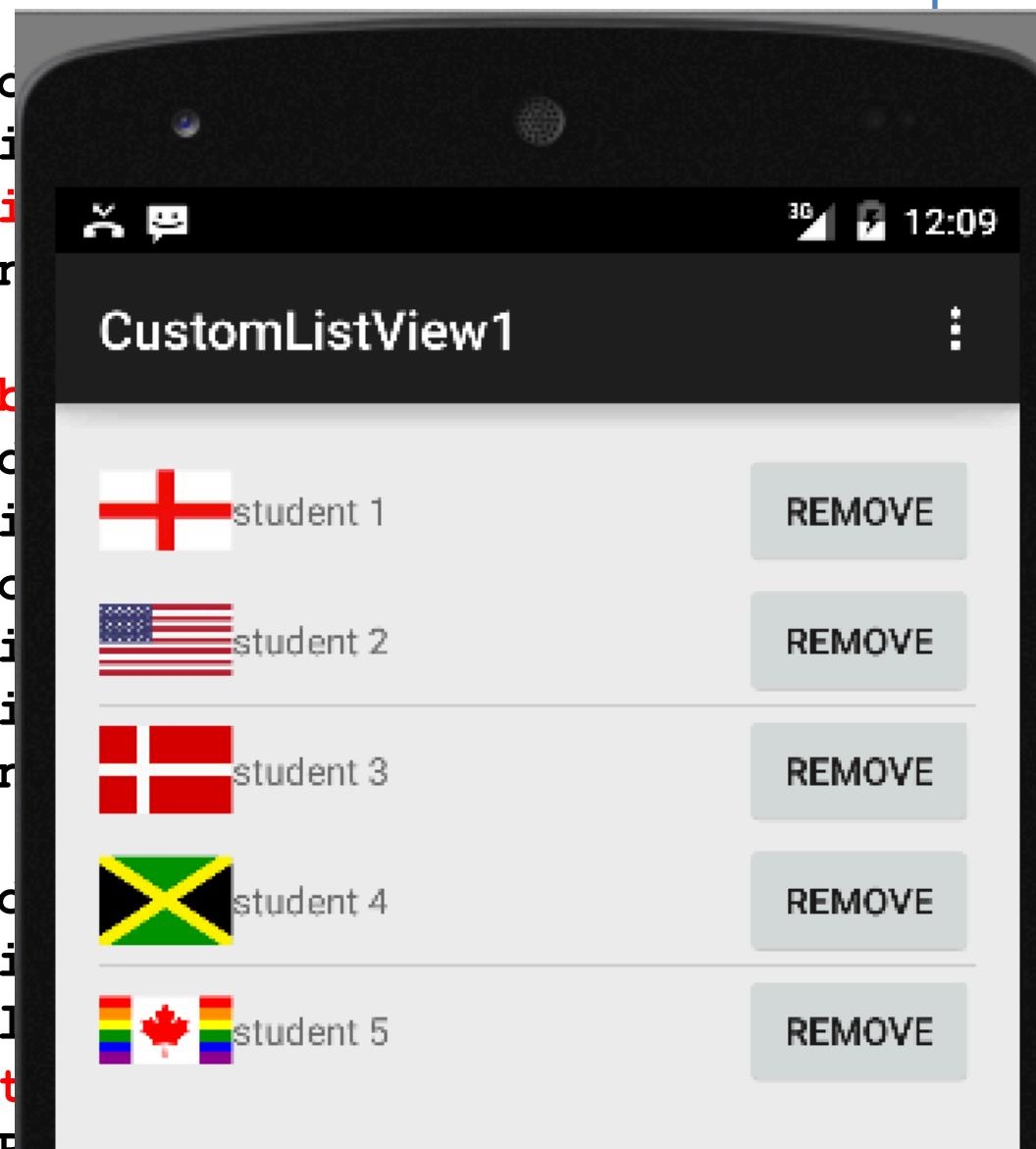
Customize ListView (BaseAdapter)

```
public class MyAdapter extends BaseAdapter {  
    private Context context;  
    private List<Student> dataProvider;  
    public MyAdapter(  
        Context context,  
        List<Student> dataProvider) {  
        this.context = context;  
        this.dataProvider = dataProvider;  
    }
```

```
@Override  
public int getCount() {  
    return dataProvider.size();  
}  
  
@Override  
public Object getItem(int position) {  
    return dataProvider.get(position);  
}  
  
@Override  
public long getItemId(int position) {  
    return dataProvider.getItemId(position);  
}  
  
@Override  
public View getView(int position,  
    View convertView, ViewGroup parent) {  
    ...  
}
```



```
<RelativeLayout >
    <ImageView
        android:layout_width="wrap_content"
        android:layout_height="wrap_content"
        android:id="@+id/imageView1"
        android:layout_centerHorizontal="true"/>
    <Button
        android:id="@+id/button1"
        android:layout_width="wrap_content"
        android:layout_height="wrap_content"
        android:text="Remove"
        android:layout_alignLeft="@+id/imageView1"
        android:layout_alignTop="@+id/textView1"
        android:layout_centerVertical="true"/>
    <TextView
        android:layout_width="wrap_content"
        android:layout_height="wrap_content"
        android:text="Title"
        android:id="@+id/textView1"
        android:layout_toRightOf="@+id/imageView1"
        android:layout_toLeftOf="@+id/button1"
        android:layout_alignParentTop="true"/>
```



```
@Override
public View getView(int position,
                    View convertView,
                    ViewGroup parent) {
    ImageView image;
    TextView textView;
    Student student = dataProvider.get(position);
    LayoutInflater inflater =
        LayoutInflater.from(context);
    View row = inflater.inflate(
        R.layout.custom_list_item_1, null);
    image = (ImageView)
        row.findViewById(R.id.imageView);
    textView = (TextView)
        row.findViewById(R.id.textView);
    image.setImageResource(student.getCountry());
    textView.setText(student.getName());
    return row;
}
```

ListView Widget

- LayoutInflater
- **Advance custom-made ListView**
 - ArrayAdapter
 - BaseAdapter
 - **Refresh Data Change**
- Spinner
- ExpandableListView

```
public class MyAdapter extends BaseAdapter {  
    ...  
    @Override  
    public View getView(final int position,  
                        View convertView, ViewGroup parent) {  
        View row = ...  
        Button button = (Button)  
            row.findViewById(R.id.button1);  
        button.setOnClickListener(  
            new View.OnClickListener() {  
                @Override  
                public void onClick(View v) {  
                    dataProvider.remove(position);  
                    MyAdapter.this.notifyDataSetChanged();  
                }  
            } );  
        ...  
    }  
}
```

Exercise 3



ListView Widget

- LayoutInflater
- Advance custom-made ListView
 - ArrayAdapter
 - BaseAdapter
 - Refresh Data Change
- **Spinner**
 - Simple Spinner
 - Custom Spinner 1
 - Custom Spinner 2
- ExpandableListView

Spinner (Simple Spinner)

```
public class SimpleSpinner extends Activity {  
    private Spinner spinner;  
    private ArrayList<String> dataProvider;  
    private ArrayAdapter adapter;  
    ...
```

Spinner (Simple Spinner)

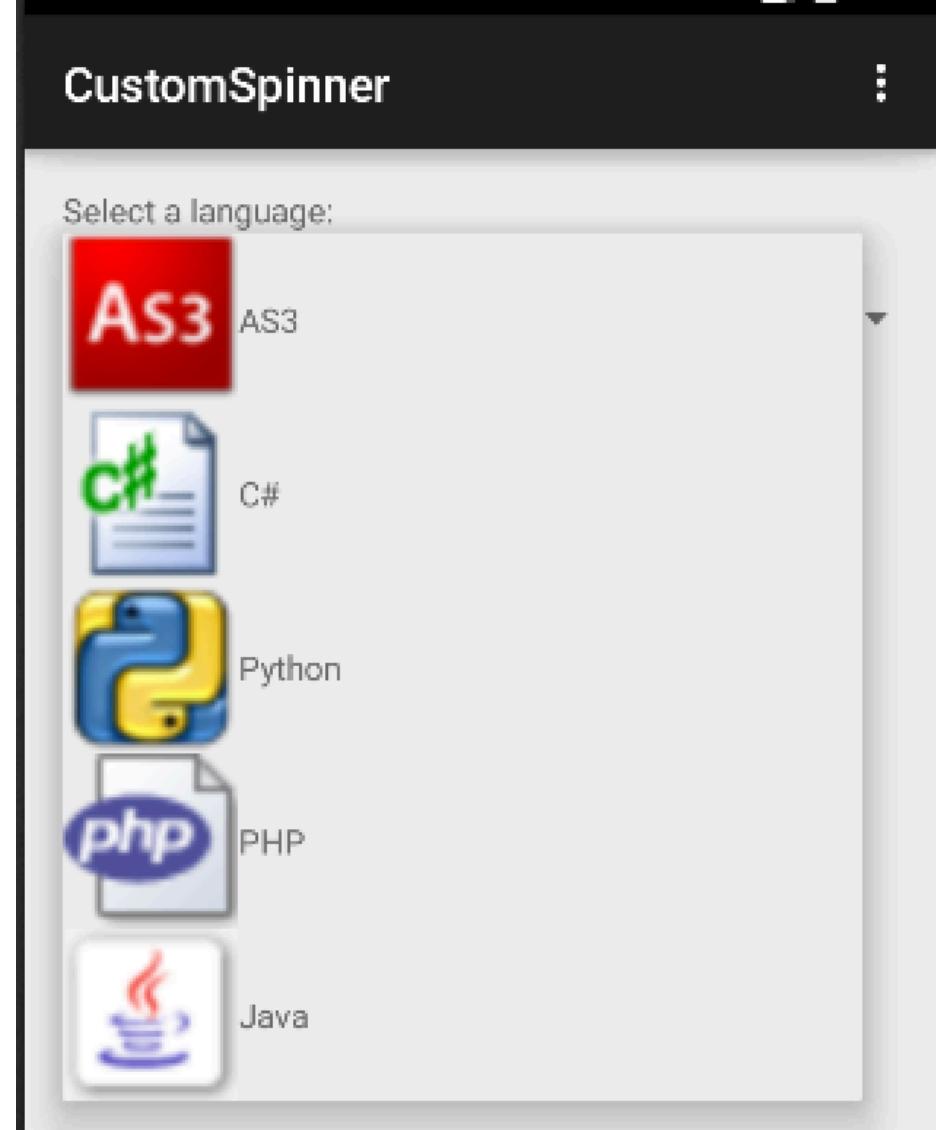
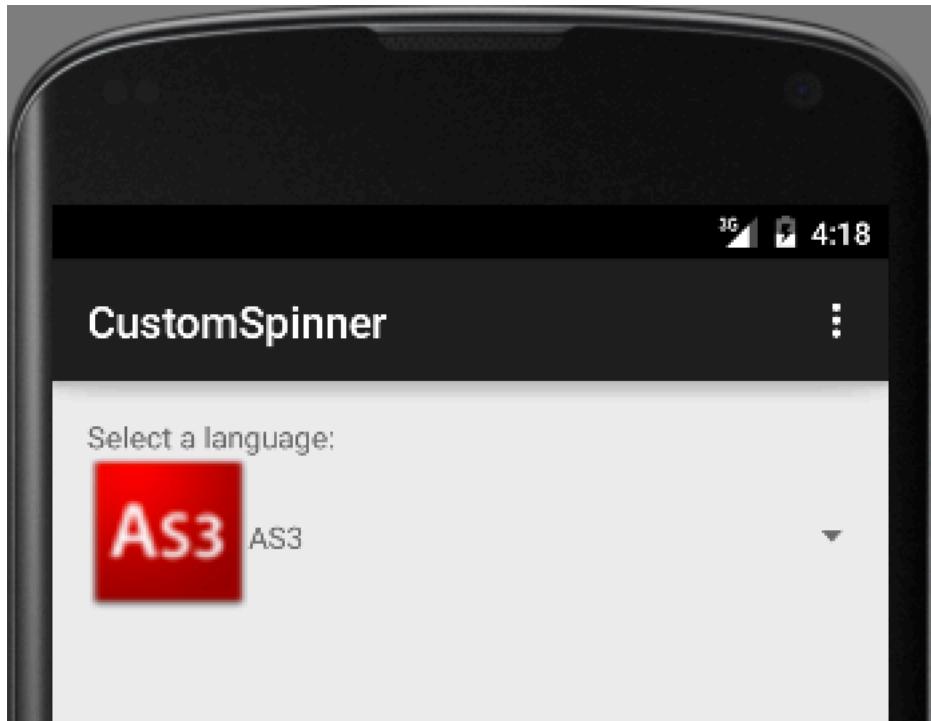
```
@Override
protected void onCreate(Bundle savedInstanceState) {
    super.onCreate(savedInstanceState);
    setContentView(R.layout.activity_simple_spinner);

    dataProvider = new ArrayList<>(Arrays.asList(
        "Ha Noi", "Ho Chi Minh", "Binh Duong",
        "Da Nang", "Quang Ngai", "Hai Phong",
        "Binh Phuoc"));
    spinner = (Spinner) findViewById(R.id.spinner);
    adapter = new ArrayAdapter(this,
        android.R.layout.simple_spinner_item,
        dataProvider);
    spinner.setAdapter(adapter);
}
```

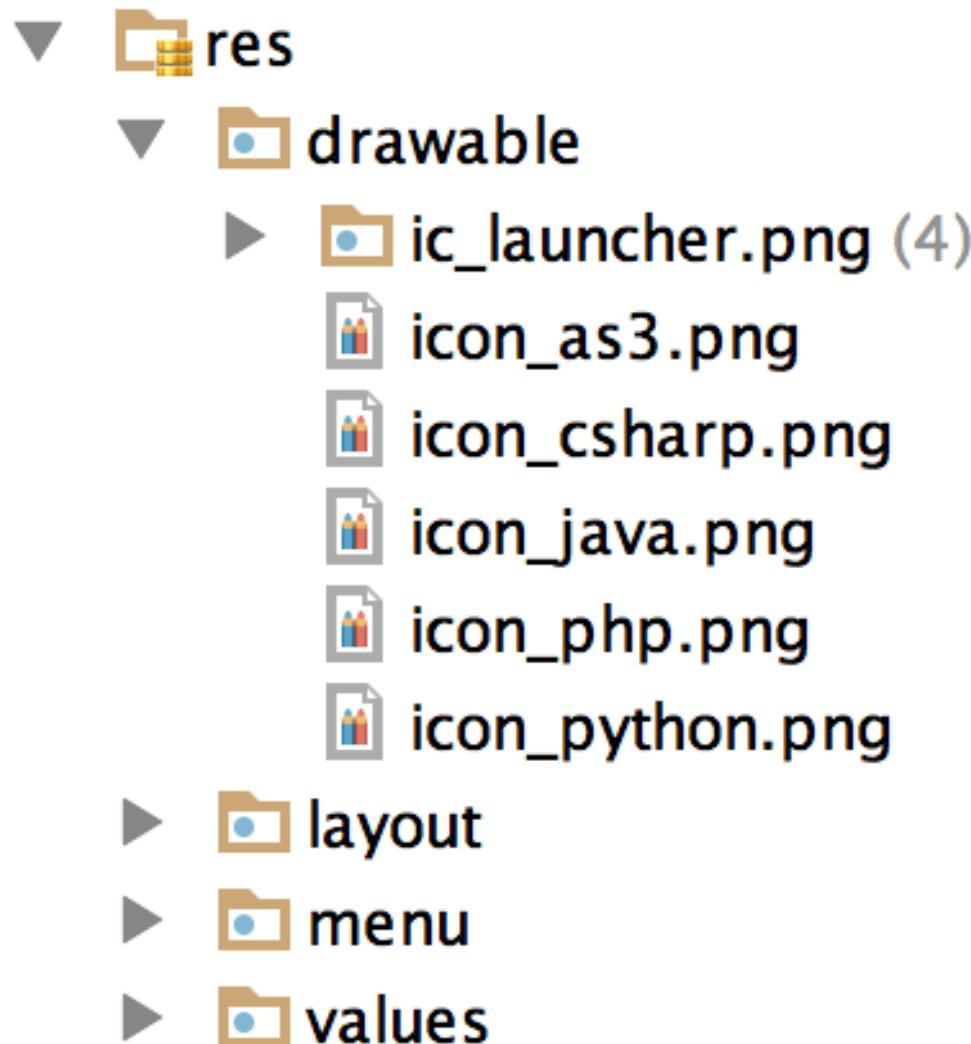
ListView Widget

- LayoutInflater
- Advance custom-made ListView
 - ArrayAdapter
 - BaseAdapter
 - Refresh Data Change
- **Spinner**
 - Simple Spinner
 - **Custom Spinner 1**
 - Custom Spinner 2
- ExpandableListView

Custom Spinner 1



Custom Spinner 1



Custom Spinner 1

```
public class LanguageInfo {  
    private String name;  
    private int icon;  
    public LanguageInfo(String name, int icon) {  
        this.name = name;  
        this.icon = icon;  
    }  
    ... Getter/Setter here ...  
    @Override  
    public String toString() {  
        return name;  
    }  
}
```

Custom Spinner 1 (CustomSpinner.java)

```
public class CustomSpinner
    extends ActionBarActivity {
    private Spinner spinner;
    private ArrayList<LanguageInfo> dataProvider;
    private CustomAdapter adapter;
    . . .
```

Custom Spinner 1 (onCreate – CustomSpinner.java)

```
dataProvider = new ArrayList<>(Arrays.asList(  
    new LanguageInfo("AS3",  
        R.drawable.icon_as3),  
    new LanguageInfo("C#",  
        R.drawable.icon_csharp),  
    new LanguageInfo("Python",  
        R.drawable.icon_python),  
    new LanguageInfo("PHP",  
        R.drawable.icon_php),  
    new LanguageInfo("Java",  
        R.drawable.icon_java)  
));  
spinner = (Spinner) findViewById(R.id.spinner);  
adapter = new CustomAdapter(dataProvider, this);  
spinner.setAdapter(adapter);
```

Custom Spinner 1 (CustomAdapter.java)

```
@Override
public View getView(int position,
                     View convertView, ViewGroup parent) {
    LayoutInflator inflater =
        LayoutInflater.from(context);
    View row = inflater.inflate(
        R.layout.custom_spinner_item_1, null);
    LanguageInfo info = dataProvider.get(position);
    ImageView imageView = (ImageView)
        row.findViewById(R.id.imagePlaceHolder);
    TextView textView = (TextView)
        row.findViewById(R.id.textPlaceHolder);
    imageView.setImageResource(info.getIcon());
    textView.setText(info.getName());
    return row;
}
```

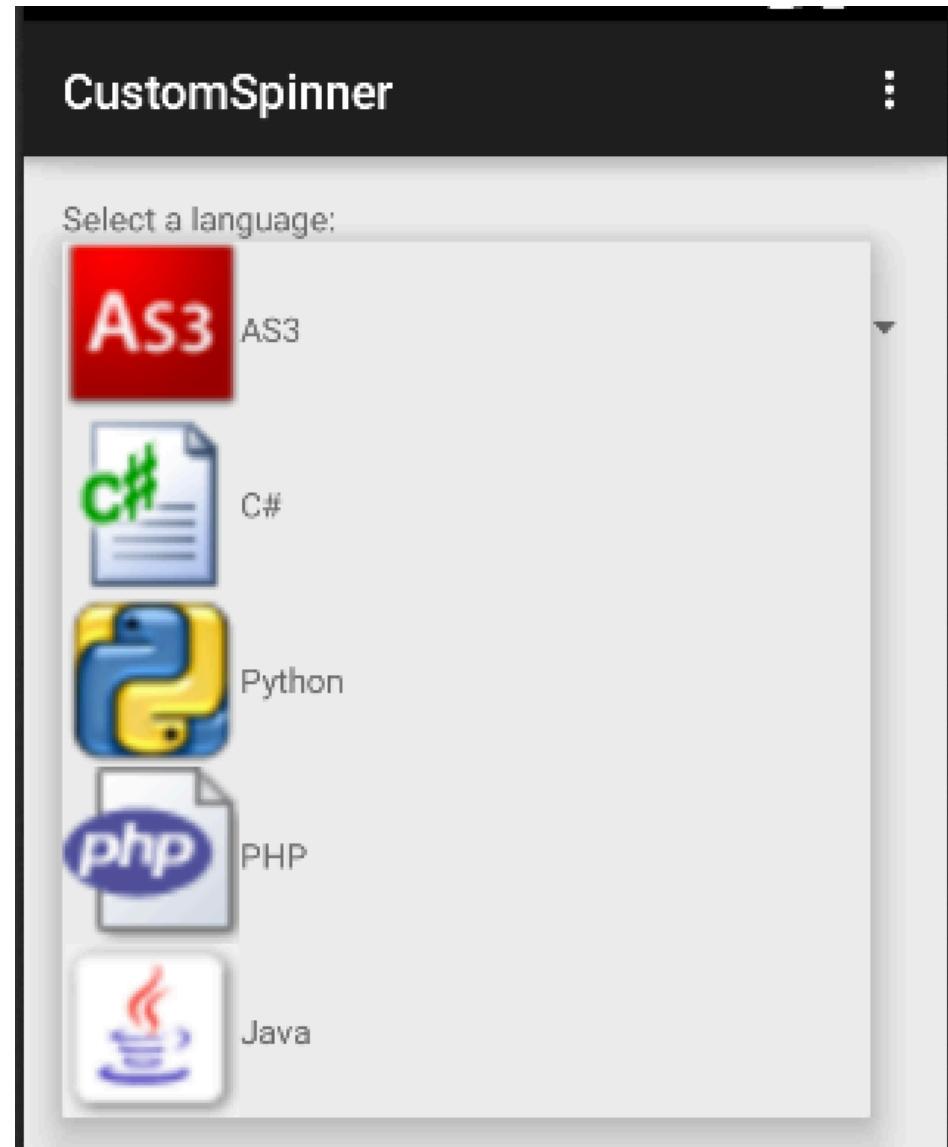
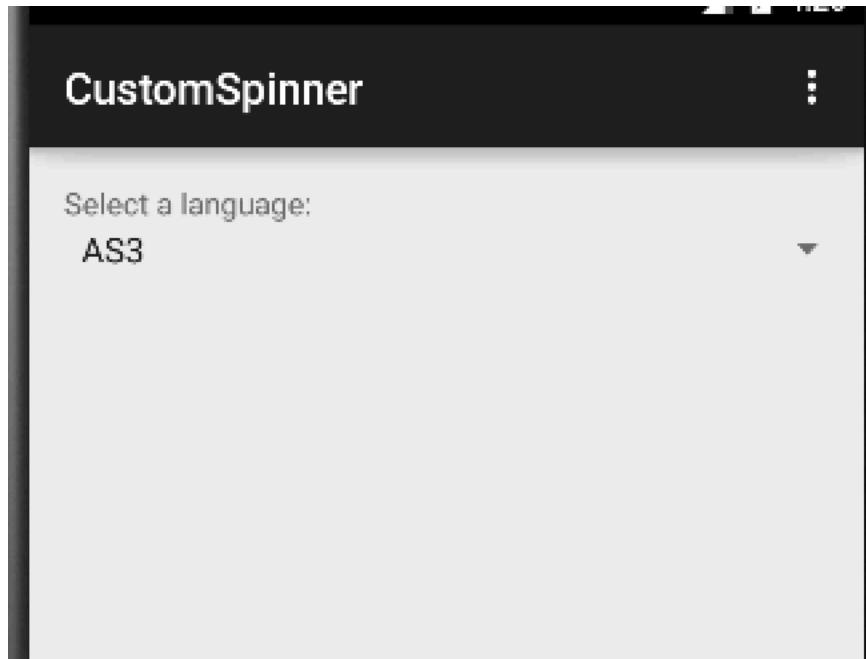
Custom Spinner 1 (layout_main.xml)

```
<?xml version="1.0" encoding="utf-8"?>
<LinearLayout>
    <ImageView
        android:layout_width="74dp"
        android:layout_height="73dp"
        android:id="@+id/imagePlaceHolder"
        android:layout_gravity="center_vertical"/>
    <TextView
        android:layout_width="0dp"
        android:layout_height="wrap_content"
        android:layout_weight="1"
        android:text="Text will be replaced here"
        android:id="@+id/textPlaceHolder"
        android:layout_gravity="center_vertical" />
</LinearLayout>
```

ListView Widget

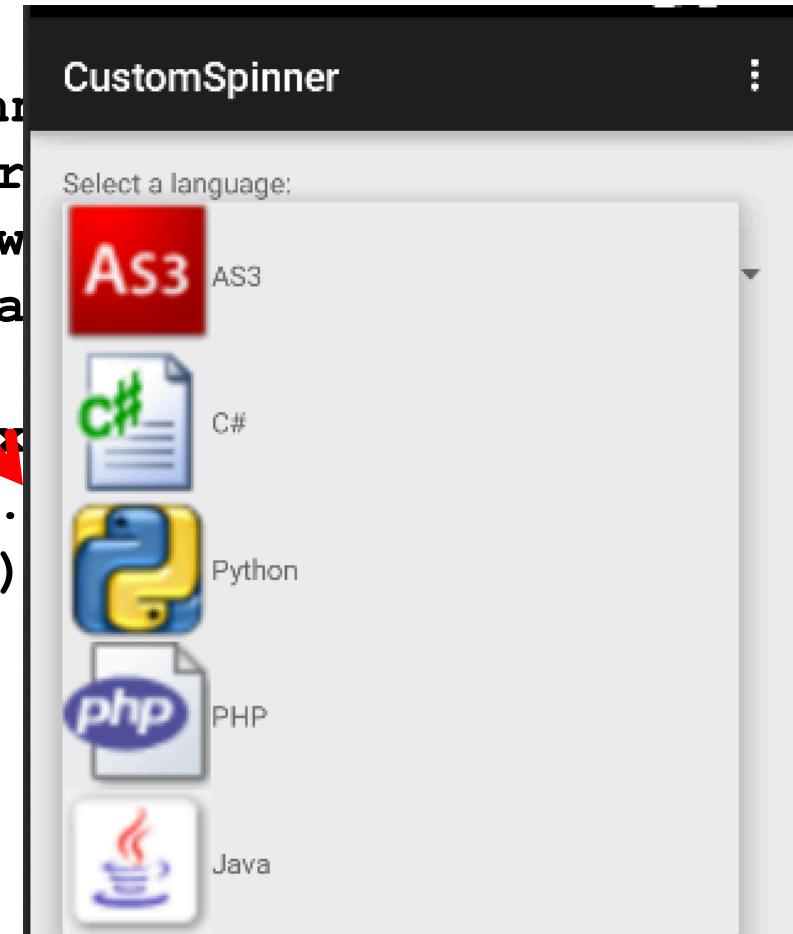
- LayoutInflater
- Advance custom-made ListView
 - ArrayAdapter
 - BaseAdapter
 - Refresh Data Change
- **Spinner**
 - Simple Spinner
 - Custom Spinner 1
 - **Custom Spinner 2**
- ExpandableListView

Custom Spinner 2



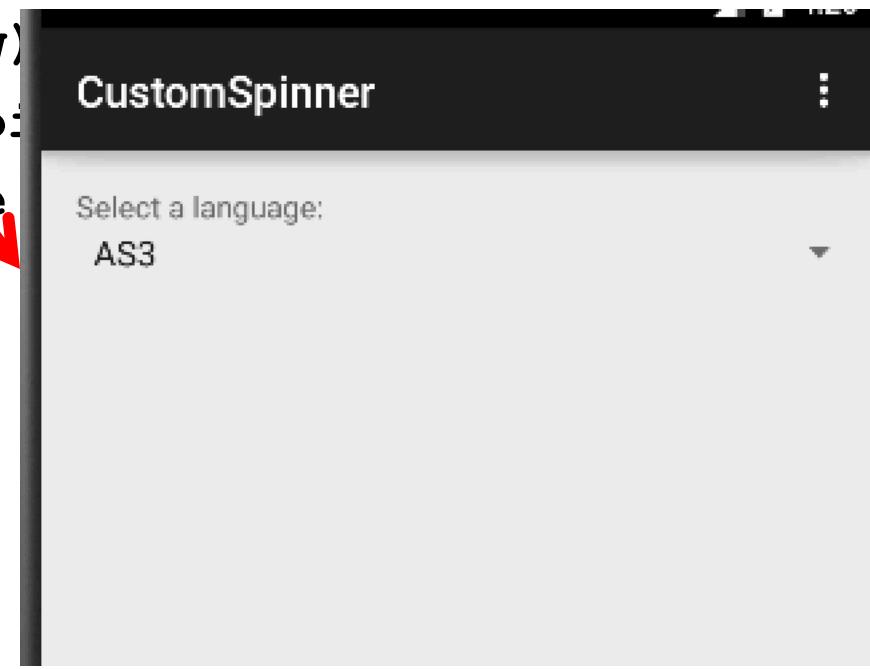
Custom Spinner 2 (CustomAdapter.java)

```
@Override
public View getDropDownView(int position,
                            View convertView, ViewGroup parent) {
    LayoutInflator inflater = LayoutInflator.from(context);
    View row = inflater.inflate(
        R.layout.custom_spinner_row, null);
    LanguageInfo info = dataProvider.getLanguage(position);
    ImageView imageView = (ImageView)
        row.findViewById(R.id.image);
    textView = (TextView)
        row.findViewById(R.id.text);
    imageView.setImageResource(info.getImageResource());
    textView.setText(info.getName());
    return row;
}
```



Custom Spinner 2 (CustomAdapter.java)

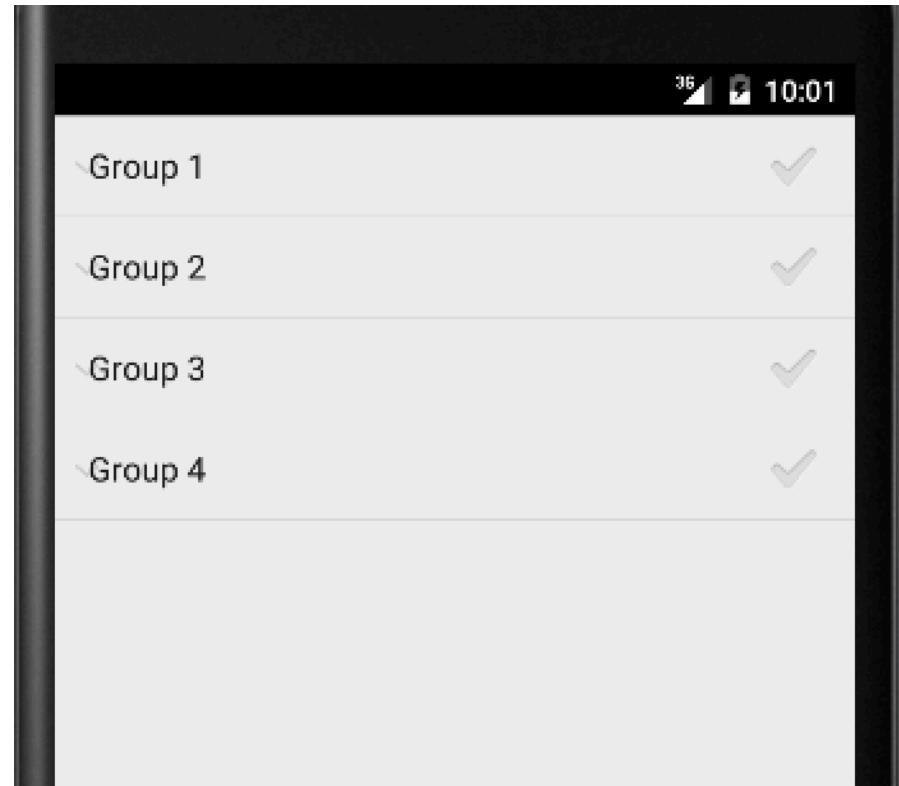
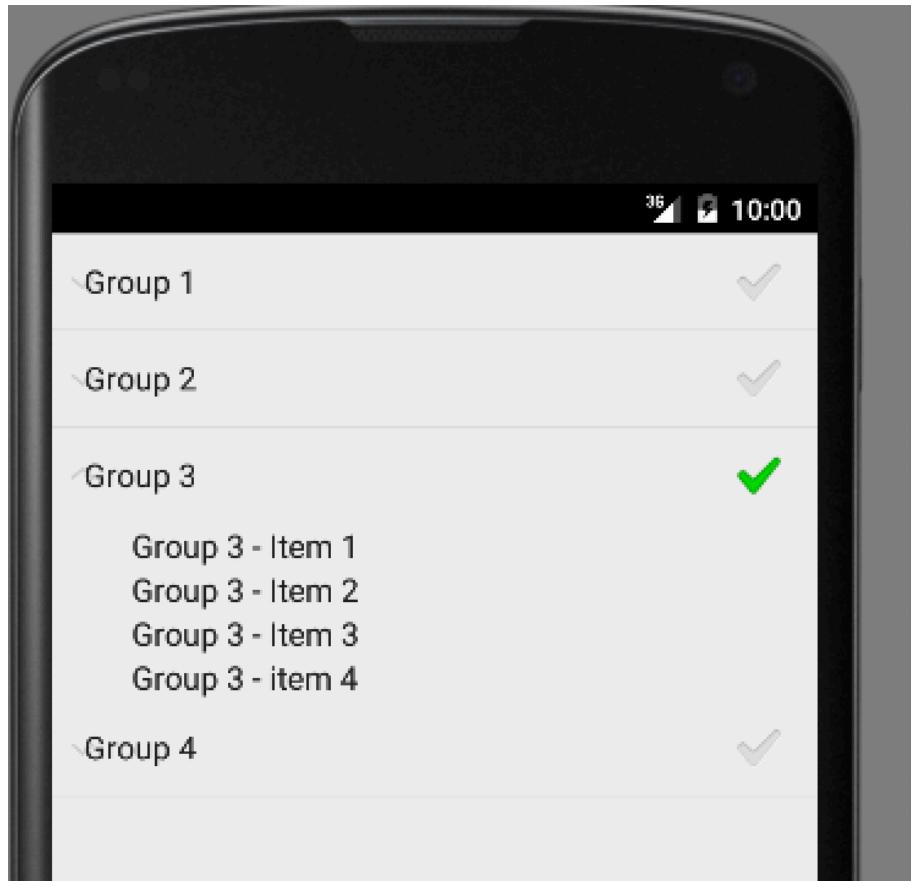
```
@Override  
public View getView(int position,  
                     View convertView, ViewGroup parent) {  
    LayoutInflater inflater = LayoutInflater.from(context);  
    View row = inflater.inflate(  
        android.R.layout.simple_spinner_item, null);  
    LanguageInfo info = dataProvider.get(position);  
    TextView textView = (TextView)  
        row.findViewById(android.R.id.text1);  
    textView.setText(info.getName());  
    return row;  
}
```



ListView Widget

- LayoutInflater
- Advance custom-made ListView
 - ArrayAdapter
 - BaseAdapter
 - Refresh Data Change
- Spinner
 - Simple Spinner
 - Custom Spinner 1
 - Custom Spinner 2
- **ExpandableListView**

ExpandableListView



ExpandableListView (ExpandableList.java)

```
public class ExpandableList extends ExpandableListActivity {  
  
    private static ArrayList<String> groups;  
    private static ArrayList<ArrayList<String>> groupItems;  
    private MyExpandableListAdapter adapter;
```

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

ExpandableListView (ExpandableList.java – static block)

```
static {
    groups = new ArrayList<>(Arrays.asList("Group 1", "Group 2",
        "Group 3", "Group 4"));
    groupItems = new ArrayList<>();
    groupItems.add(new ArrayList<String>(Arrays.asList(
        "Group 1 - Item 1", "Group 1 - Item 2",
        "Group 1 - Item 3", "Group 1 - item 4")));
    groupItems.add(new ArrayList<String>(Arrays.asList(
        "Group 2 - Item 1", "Group 2 - Item 2",
        "Group 2 - Item 3", "Group 2 - item 4")));
    groupItems.add(new ArrayList<String>(Arrays.asList(
        "Group 3 - Item 1", "Group 3 - Item 2",
        "Group 3 - Item 3", "Group 3 - item 4")));
    groupItems.add(new ArrayList<String>(Arrays.asList(
        "Group 4 - Item 1", "Group 4 - Item 2",
        "Group 4 - Item 3", "Group 4 - item 4")));
}
```

ExpandableListView (ExpandableList.java – onCreate)

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

    adapter = new MyExpandableListAdapter(this, groups, groupItems);
    this.setListAdapter(adapter);
}
```

```
public class MyExpandableListAdapter extends BaseExpandableListAdapter{
    private Context context;
    private ArrayList<String> groups;
    private ArrayList<ArrayList<String>> groupItems;

    public MyExpandableListAdapter(Context context,
                                  ArrayList<String> groups,
                                  ArrayList<ArrayList<String>> groupItems) {
        this.context = context;
        this.groups = groups;
        this.groupItems = groupItems;
    }
}
```

ExpandableListView (Adapter)

```
@Override
public View getGroupView(int groupPosition,
                         boolean isExpanded,
                         View convertView,
                         ViewGroup parent) {
    LayoutInflator inflater = LayoutInflator.from(context);
    CheckedTextView row = (CheckedTextView)
        inflater.inflate(android.R.layout.simple_list_item_checked, null);
    row.setChecked(isExpanded);
    row.setText(groups.get(groupPosition));
    return row;
}
```

```
@Override
public View getChildView(int groupPosition,
                        int childPosition,
                        boolean isLastChild,
                        View convertView,
                        ViewGroup parent) {
    LayoutInflator inflater = LayoutInflator.from(context);
    TextView row = (TextView)
        inflater.inflate(android.R.layout.simple_expandable_list_item_1, null);
    row.setText(groupItems.get(groupPosition).get(childPosition));
    return row;
}
```