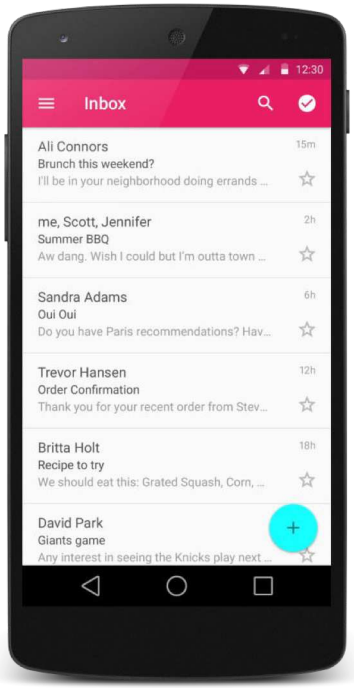
7. Lists

ListView

An ordered collection of selectable choices



- key attributes in XML:

`android:clickable="`***`bool`***`"`	set to false to disable the list
`android:id="@+id/`***`theID`***`"`	unique ID for use in Java code
`android:entries="@array/`***`array`***`"`	set of options to appear in the list (must match an array in `strings.xml`)

Static lists

- **static list**: Content is fixed and known before the app runs.
  - Declare the list elements in the **strings.xml** resource file.

```
<!-- res/values/strings.xml -->
<resources>
    <string-array name="oses">
        <item>Android</item>
        <item>iPhone</item>
        ...
        <item>Max OS X</item>
    </string-array>
</resources>

<!-- res/layout/activity_main.xml -->
<ListView ... android:id="@+id/mylist"
    android:entries="@array/oses" />
```

Dynamic lists

- **dynamic list**: Content is read or generated as the program runs.
  - Comes from a data file, or from the internet, etc.
  - Must be set in the Java code.

  - Suppose we have the following file and want to make a list from it:

```
// res/raw/oses.txt Android
iPhone
...
Max OS X
```

List adapters

- **adapter**: Helps turn list data into list view items.
  - common adapters: `ArrayAdapter`, `CursorAdapter`

- Syntax for creating an adapter:

```
ArrayAdapter<String> name =
  new ArrayAdapter<String>(activity, layout, array);
```

  - the ***activity*** is usually `this`
  - the default ***layout*** for lists is `android.R.layout.simple_list_item_1`
  - get the ***array*** by reading your file or data source of choice
    (it can be an array like `String[]`, or a list like `ArrayList<String>`)

  - Once you have an adapter, you can attach it to your list by calling the `setAdapter` method of the `ListView` object in the Java code.

List adapter example

```
ArrayList<String> myArray = ...;  // load data from file

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

ListView list = (ListView) findViewById(R.id.mylist);
list.setAdapter(myAdapter);
```

Handling list events

- Unfortunately lists don't use a simple `onClick` event.
  - Several fancier GUI widgets use other kinds of events.
  - The event listeners must be attached in the Java code, not in the XML.
  - Understanding how to attach these event listeners requires the use of Java **anonymous inner classes**.

- **anonymous inner class**: A shorthand syntax for declaring a small class without giving it an explicit name.
  - The class can be made to extend a given super class or implement a given interface.
  - Typically the class is declared and a single object of it is constructed and used all at once.

Attaching event listener in Java

```
<!-- activity_main.xml -->
<Button ... android:onClick="mybuttonOnClick" />
<Button ... android:id="@+id/mybutton" />

// MainActivity.java
public void mybuttonOnClick() { ... }
Button button = (Button) findViewById(R.id.mybutton);
button.setOnClickListener(new View.OnClickListener() {
    public void onClick(View v) {
        // code to run when the button gets clicked
    }
});

// this was the required style for event listeners
// in older versions of Android :-/
```

List events

- List views respond to the following events:
  - **setOnItemClickListener**(AdapterView.OnItemClickListener)

    Listener for when an item in the list has been clicked.

  - **setOnItemLongClickListener**(AdapterView.OnItemLongClickListener)

    Listener for when an item in the list has been clicked and held.

  - **setOnItemSelectedListener**(AdapterView.OnItemSelectedListener)

    Listener for when an item in the list has been selected.

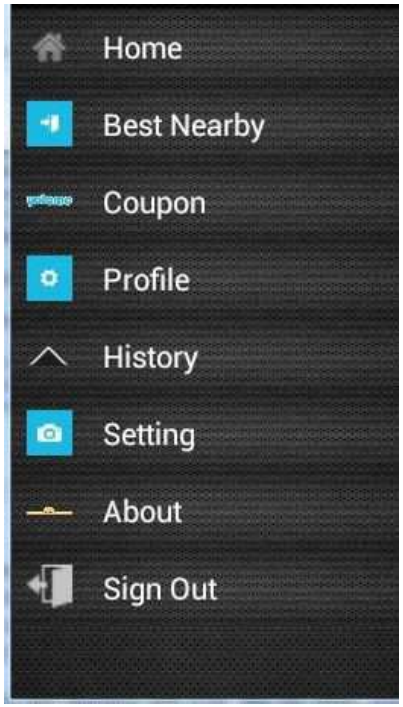
- Others:
  - onDrag, onFocusChanged, onHover, onKey, onScroll, onTouch, ...

List event listener example

```
ListView list = (ListView) findViewById(R.id.id);
list.setOnItemClickListener(
    new AdapterView.OnItemClickListener() {
        @Override
        public void onItemClick(AdapterView<?> list,
                                View row,
                                int index,
                                long rowID) {
            // code to run when user clicks that item
            ...
        }
    }
);
```

Custom list layouts

- If you want your list to look different than the default appearance (of just a text string for each line), you must:
  - Write a short **layout XML file** describing the layout for each row.
  - Write a **subclass of `ArrayAdapter`** that overrides the **`getView`** method to describe what view must be returned for each row.



Custom list layout XML

```
<!-- res/layout/mylistlayout.xml -->
<?xml version="1.0" encoding="utf-8"?>
<LinearLayout ... android:orientation="horizontal">
     <ImageView ... android:id="@+id/list_row_image"
          android:layout_width="100dp"
          android:layout_height="100dp"
          android:src="@drawable/smiley" />

     <TextView ... android:id="@+id/list_row_text"
          android:textStyle="bold"
          android:textSize="22dp"
          android:text=""
          android:background="#336699" />
</LinearLayout>
```

Custom list layout Java

```
// MyAdapter.java
public class MyAdapter extends ArrayAdapter<String> {
    private int layoutResourceId;
    private List<String> data;

    public MyAdapter(Context context, int layoutId, List<String> list) {
        super(context, layoutId, data);
        layoutResourceId = layoutId;
        data = list;
    }

    @Override
    public View getView(int index, View row, ViewGroup parent) {
        row = getLayoutInflater().inflate(layoutResourceId, parent, false);
        TextView text = (TextView) row.findViewById(R.id.list_row_text);
        text.setText(data.get(index));
        return row;
    }
}
```