User Interface Classes

Programming the Android Platform

Outline

- Design Principles
- Views & Layouts
- Event Handling
- Menus
- Dialogs

Android User Interfaces

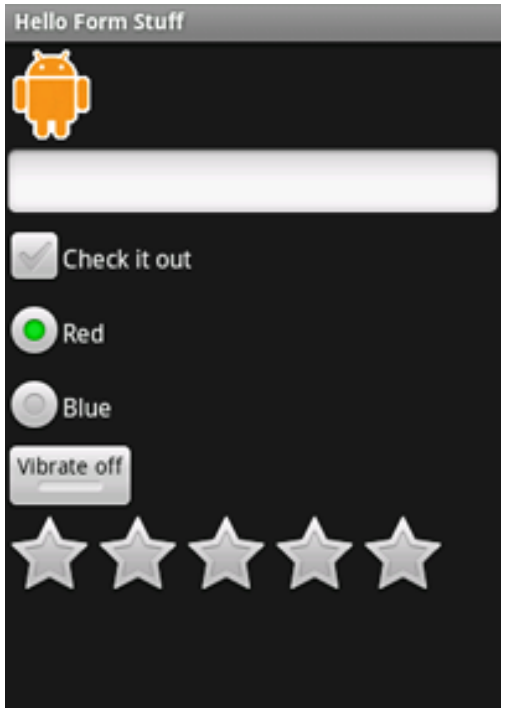
- Activities usually display a user interface
- Android provides many classes for constructing user interfaces

View

- Key building block for UI components
- Views occupy a rectangular space on screen
  - Responsible for drawing themselves and for handling events
- Common operations
  - Set properties: opacity, background, rotation
  - Set focus: allow view to take focus, request focus
  - Attach Listeners: components that should be notified when events occur
  - Set visibility: show or hide view

Widgets

- Many predefined interactive UI components (aka widgets)
  - Buttons
  - Text field
  - Editable text field
  - Check box
  - Radio buttons
  - Toggle Button
  - Rating Bar



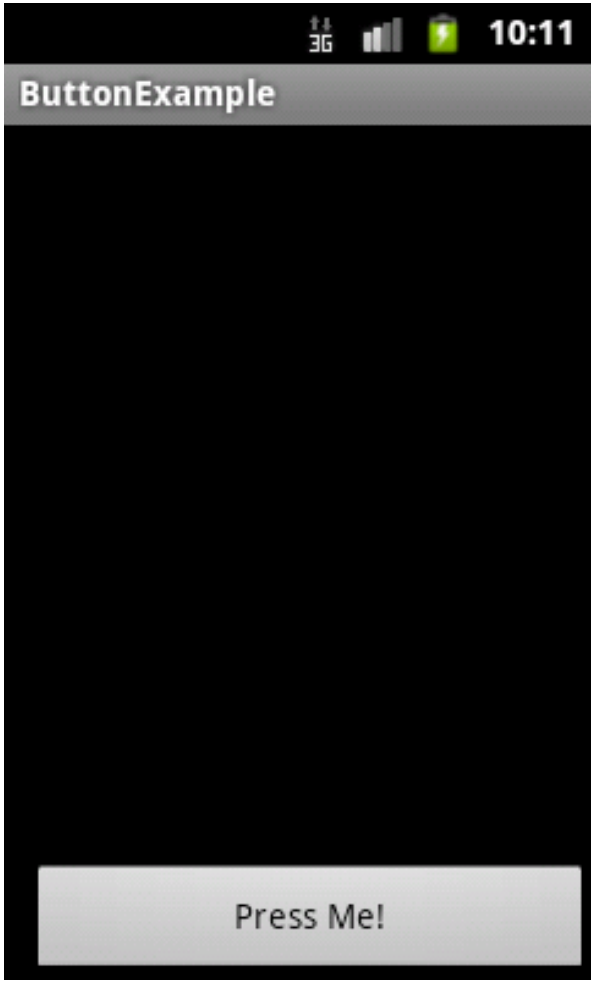
Handling View Events

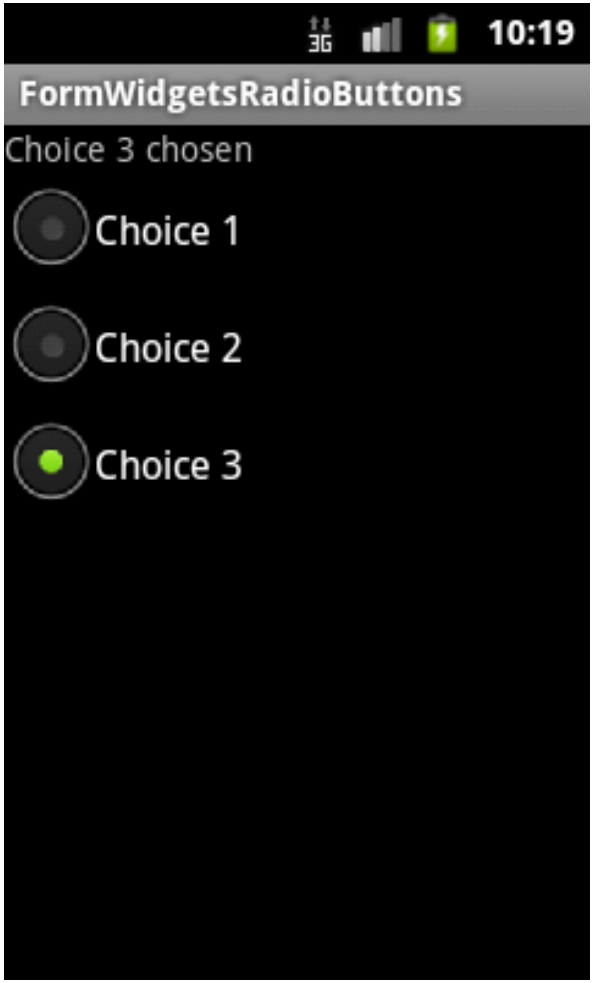
- Can handle event with listeners
  - Listener interfaces defined in View class
- OnClickListener.onClick()
  - View has been clicked
- OnLongClickListener.onLongClick()
  - View has been pressed & held
- OnFocusChangeListener.onFocusChange()
  - View has received or lost focus
- OnKeyListener.onKey()
  - View has received a key press

Handling View Events (cont.)

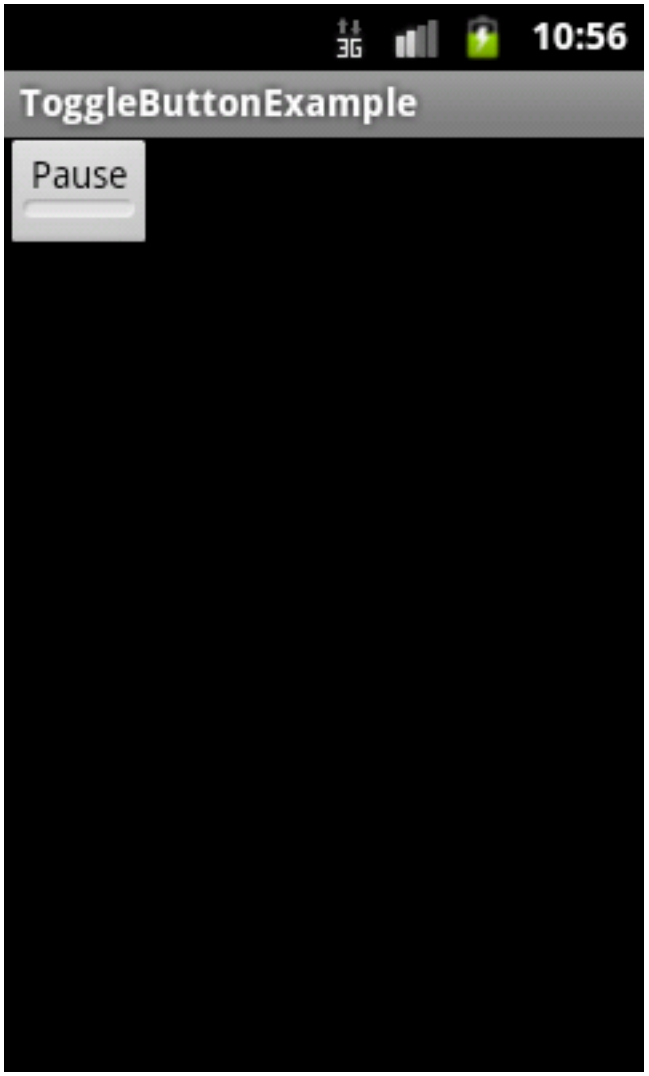
- Can also handle some events in custom View subclasses
- onFinishInflate()
  - View and all children inflated
- onLayout()
  - View must assign a size and position to all its children
- onDraw()
  - View should render its content
- onKeyXXX()
  - A key has been pressed
- onWindowVisibilityChanged()
  - Window containing view has changed its visibility status

Widgets (cont.)





Widgets (cont.)



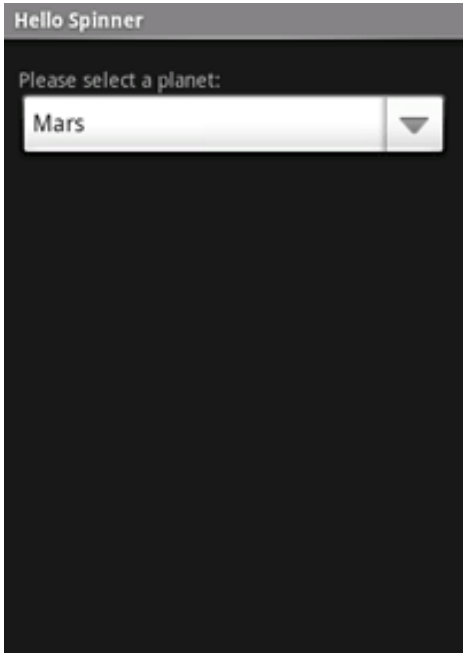
Widgets (cont.)

Date Picker

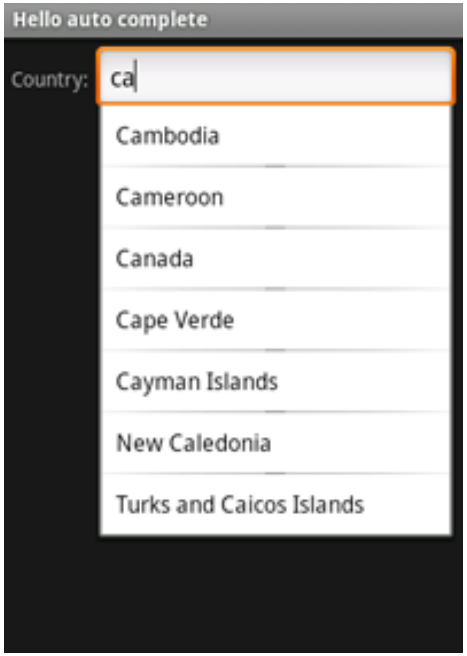
Time Picker

Widgets (cont.)

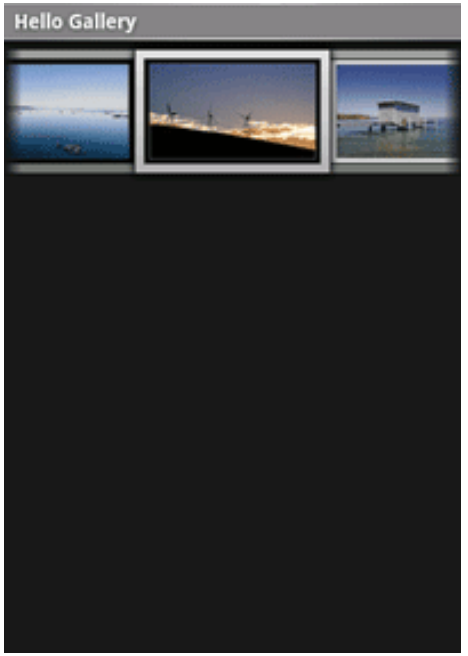
Spinner



Auto Complete



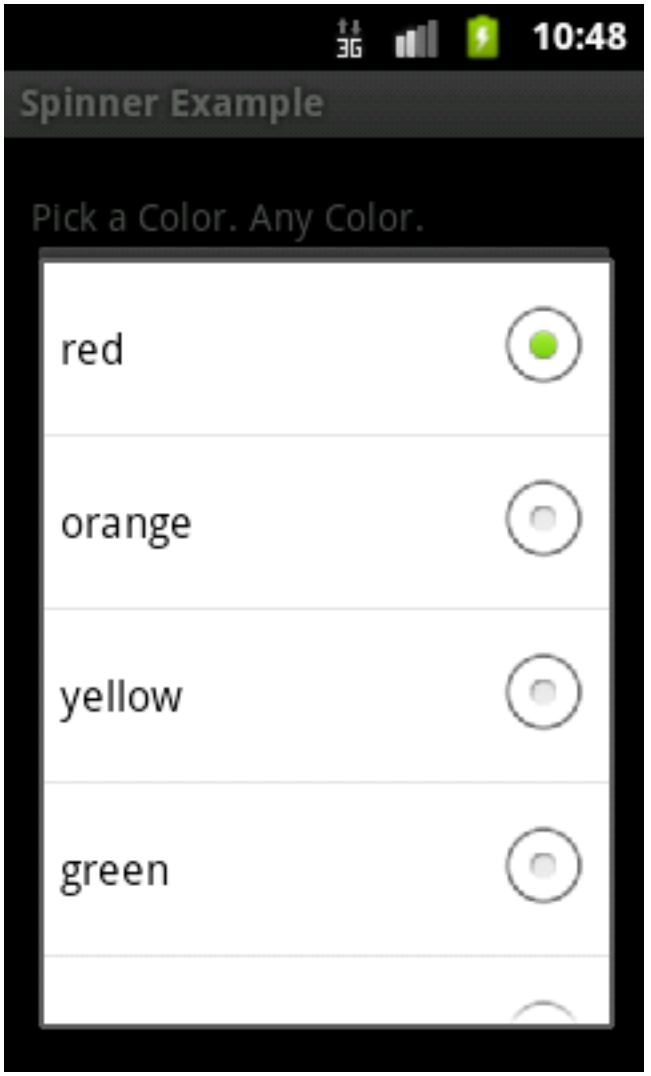
Gallery



Spinner

- Provides a scrollable list of items
- User can select one item at a time
- Items added to Spinner with a ListAdapter

Spinner (cont.)



SpinnerActivity.onCreate()

```
public void onCreate(Bundle savedInstanceState) {
 …
 Spinner spinner = (Spinner) findViewById(R.id.spinner);
 // sets up data & spinner's normal view
  ArrayAdapter<CharSequence> adapter =
   ArrayAdapter.createFromResource(this, R.array.colors,
                                   android.R.layout.simple_spinner_item);
 // sets up spinner's dropdown view
  adapter.setDropDownViewResource(
                  android.R.layout.simple_spinner_dropdown_item);
  spinner.setAdapter(adapter);
 …
```

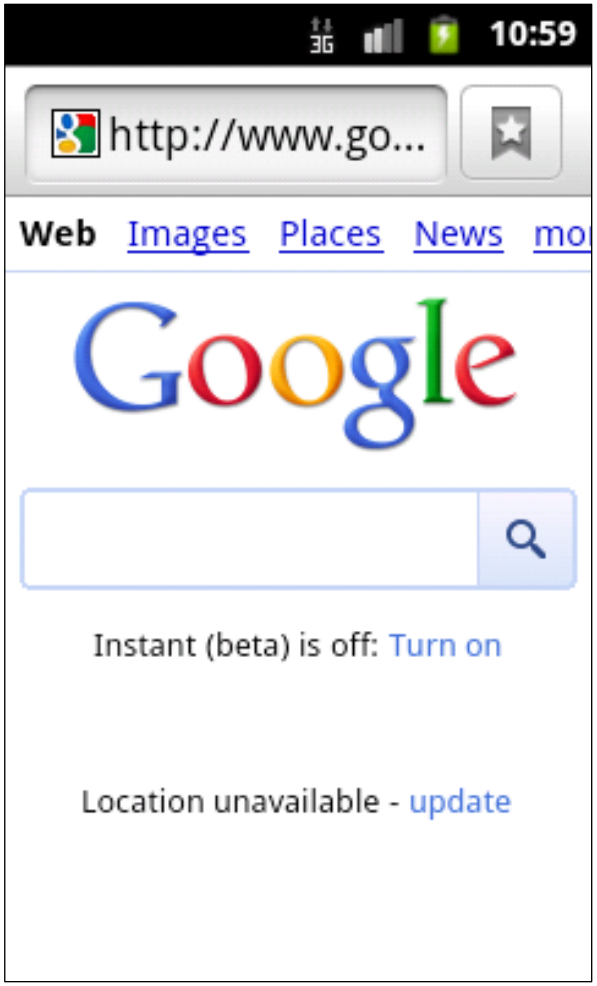
SpinnerActivity.onCreate()

```
spinner.setOnItemSelectedListener(
    new OnItemSelectedListener() {
      public void onItemSelected(AdapterView<?> parent,
                                 View view, int pos, long id) {
       // do something with selection
      }
   …
 };
 …
}
```

Other Views

MapView

Web View

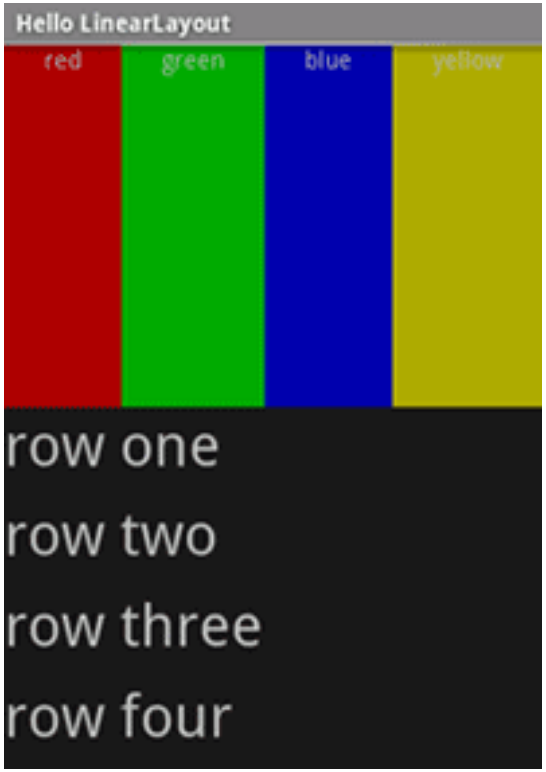


ViewGroup

- An invisible View that contains other views
- Used for grouping & organizing a set of views
- Base class for layouts & view containers

Linear Layout

- Child views arranged in a single horizontal or vertical row



Linear Layout (cont.)

```
<LinearLayout … android:orientation="vertical”>
  <LinearLayout …>
    <TextView … red block />
    …
    <TextView … yellow block />
 </LinearLayout …>
 <LinearLayout …>
    <TextView … row one/>
    …
    <TextView … row four/>
  </LinearLayout …>
</LinearLayout …>
```

Relative Layout

- Child views are positioned relative to each other and to parent view

Relative Layout (cont.)

```
<RelativeLayout…>
   <TextView   android:id="@+id/label”
                     android:text="Type here:” … />
   <EditText   android:layout_below="@id/label” …
Add id field/>
```

Relative Layout (cont.)

```
<Button  android:id="@+id/ok”
        android:layout_below="@id/entry”
        android:layout_alignParentRight="true”
        android:text="OK" … />
<Button android:layout_toLeftOf="@id/ok”
        android:layout_alignTop="@id/ok”
        android:text="Cancel" … />
</RelativeLayout>
```

Table Layout

- Child views arranged into rows & columns

Table Layout (cont.)

```
<TableLayout ...>
  <TableRow>
    <TextView  android:layout_column="1"
      android:text="Open...”  android:padding="3dip" />
    <TextView  android:text="Ctrl-Shift-S"
      android:gravity="right”  android:padding="3dip" />
  </TableRow>
  <View android:layout_height="2dip”
   android:background="#FF909090" />
  ...
```

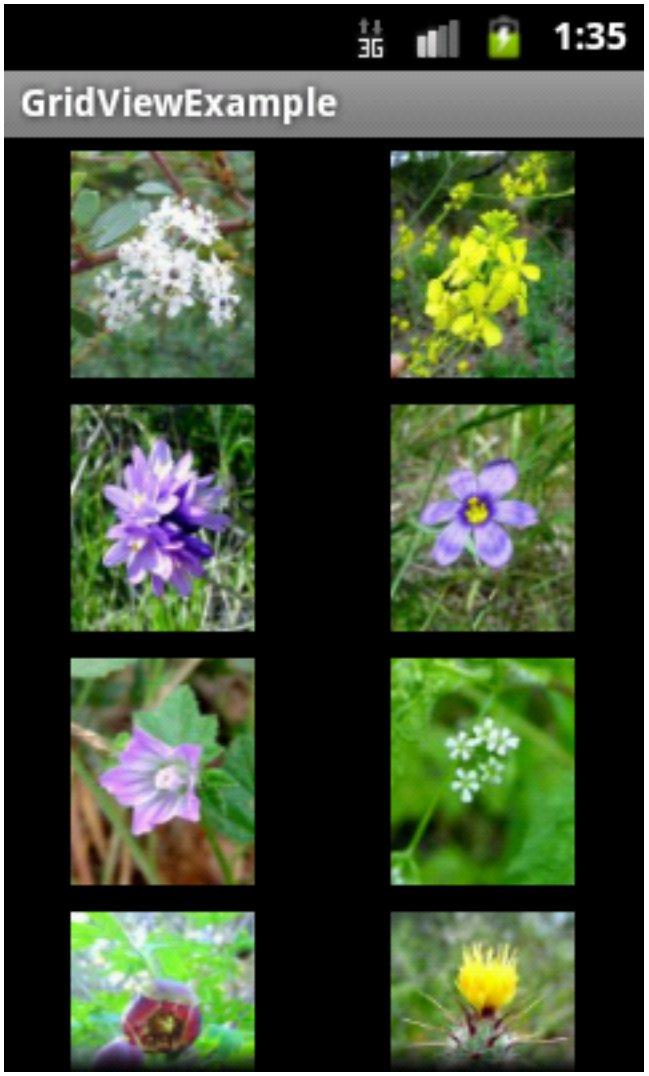
Table Layout (cont.)

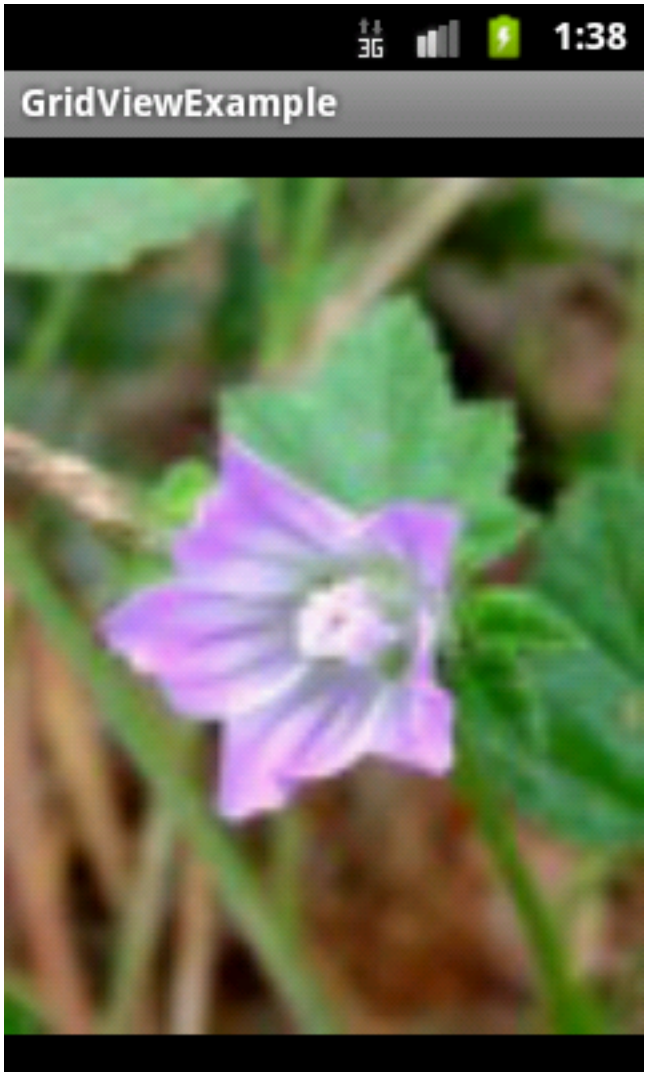
```
<TableRow>
    <TextView android:text="X”  android:padding="3dip" />
    <TextView android:text="Import…”  android:padding="3dip" />
      …
 </TableRow>
 …
</TableLayout>
```

Grid View

- Child views arranged in a two-dimensional, scrollable grid
- Child views added to layout via ListAdapter

Grid View (cont.)

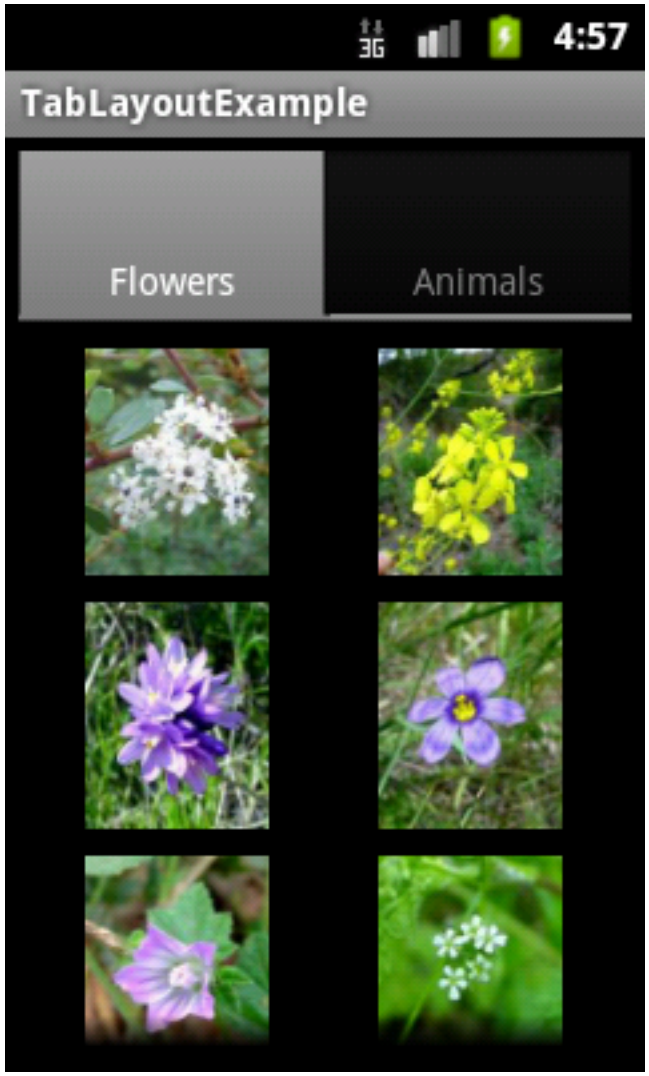


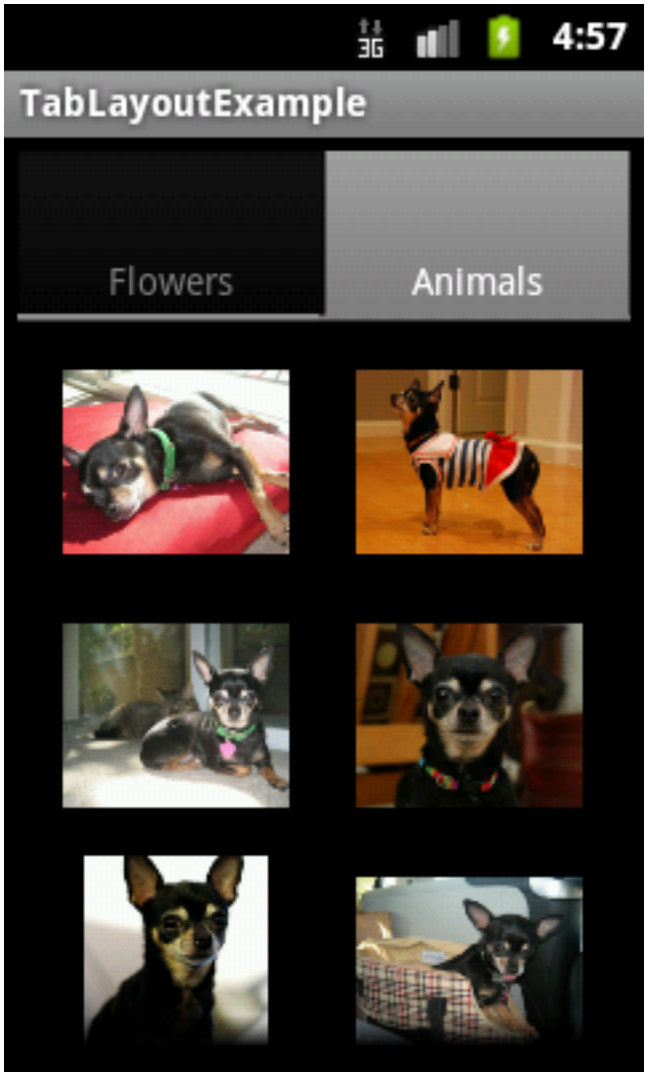


Tab Layout

- Allows multiple Activities to share single content area
- Layout is divided into tab & content areas
- Each tab is associated with one Activity
- Exactly one tab is selected at any given time
- Activity corresponding to the selected tab is visible in the content area

Tab Layout


4:57
TabLayoutExample
Flowers
Animals

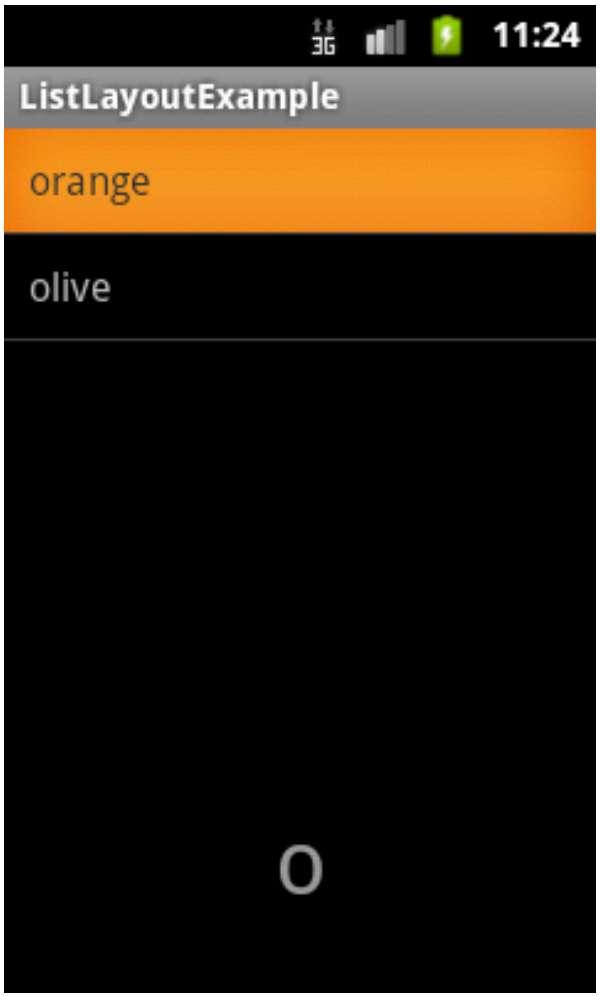

4:57
TabLayoutExample
Flowers
Animals

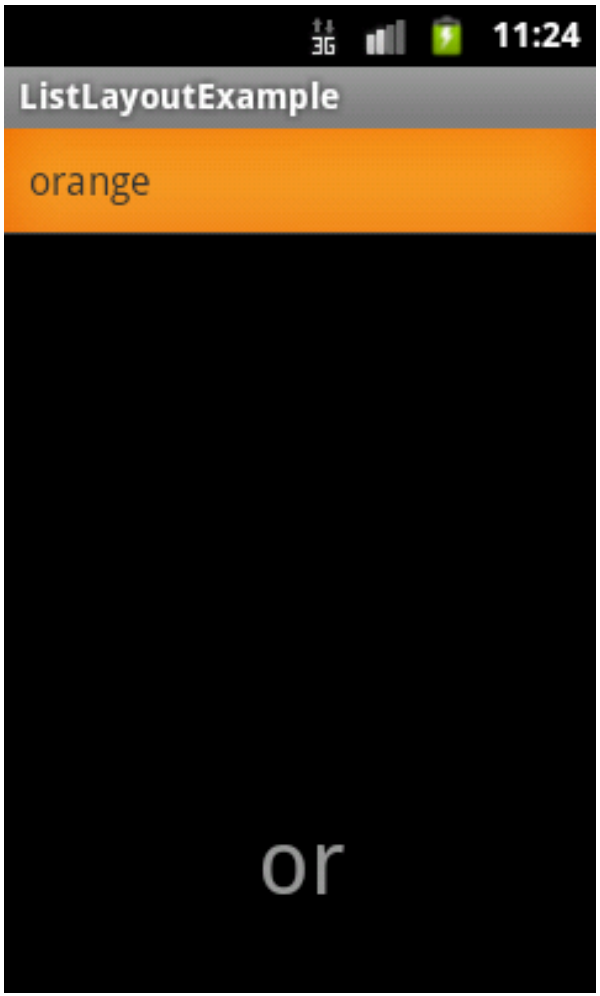
ListView

- ViewGroup containing a scrollable list of selectable items
- ListView can filter the list of items based on text input
- List items inserted using a ListAdapter

List View


11:23
ListLayoutExample
red
orange
yellow
green
blue
indigo
violet
aqua


11:24
ListLayoutExample
orange
olive
o


11:24
ListLayoutExample
orange
or

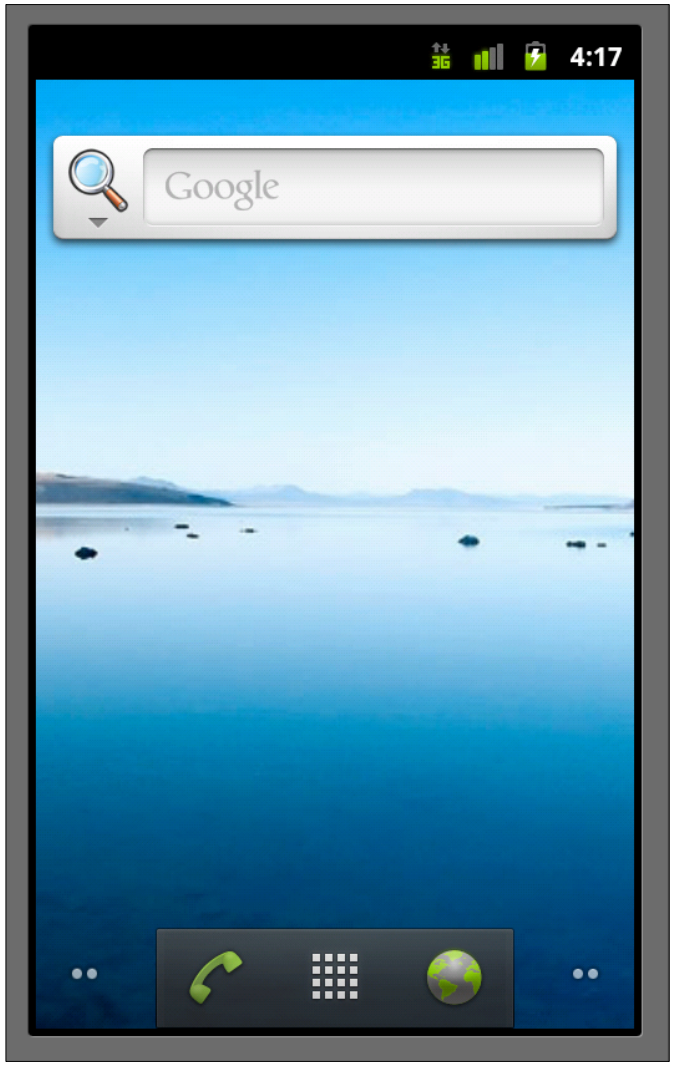
Menus

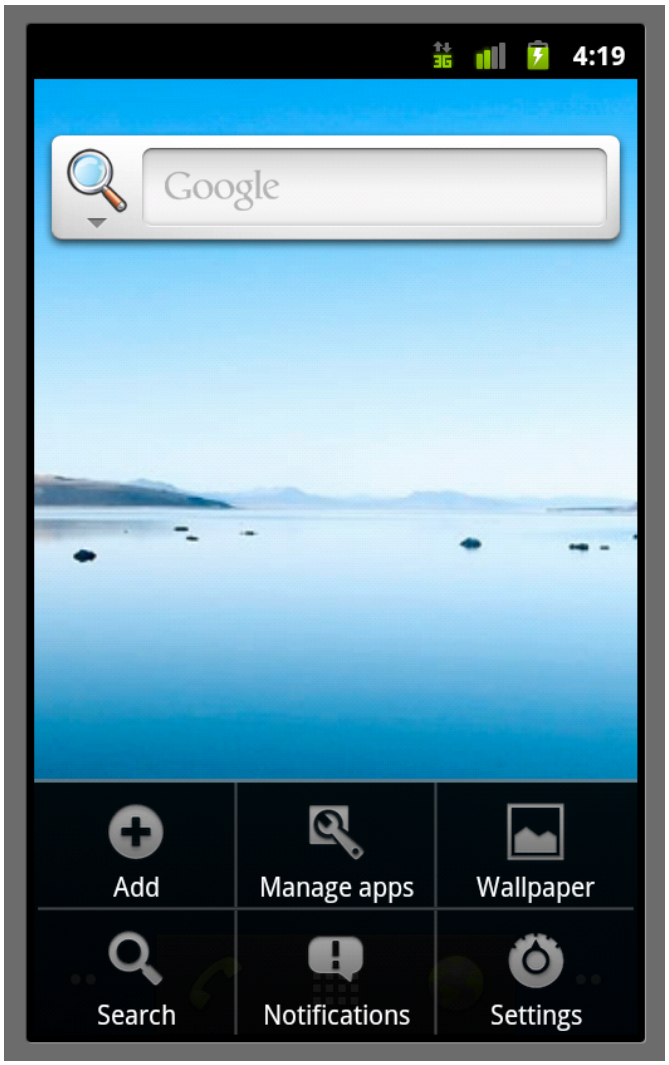
- Activities support menus
- Activities can
  - Add items to a menu
  - handle clicks on the menu items

Menu Types

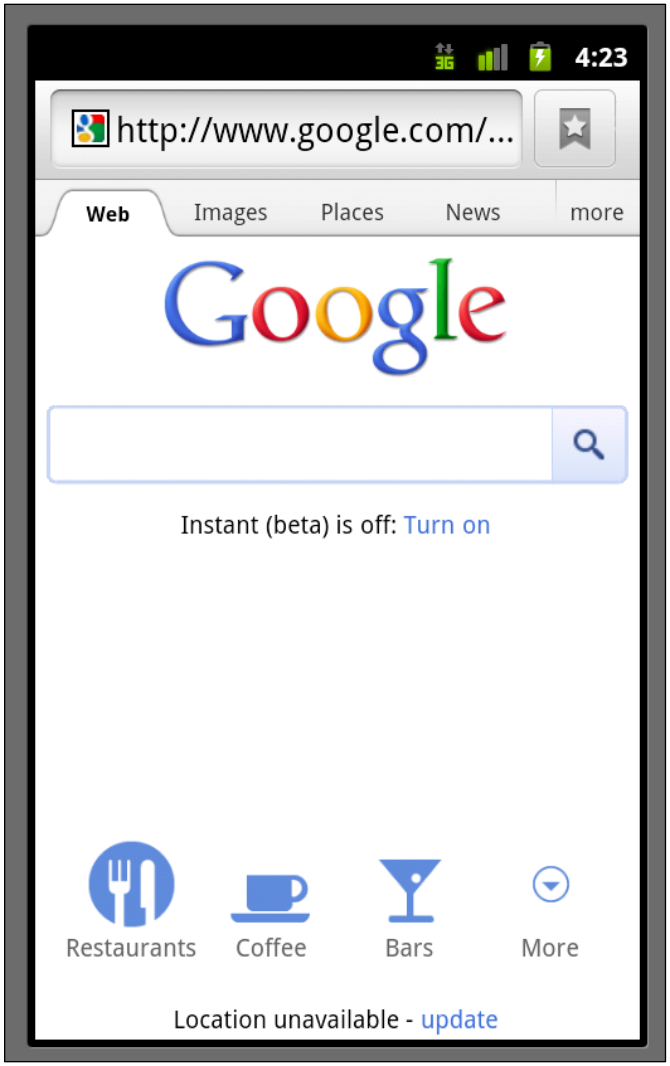
- Options
  - Primary menu shown when user presses the menu button
- Context
  - View-specific menu to be shown when user touches and holds the view
- Submenu
  - A menu activated when user touches a visible menu item

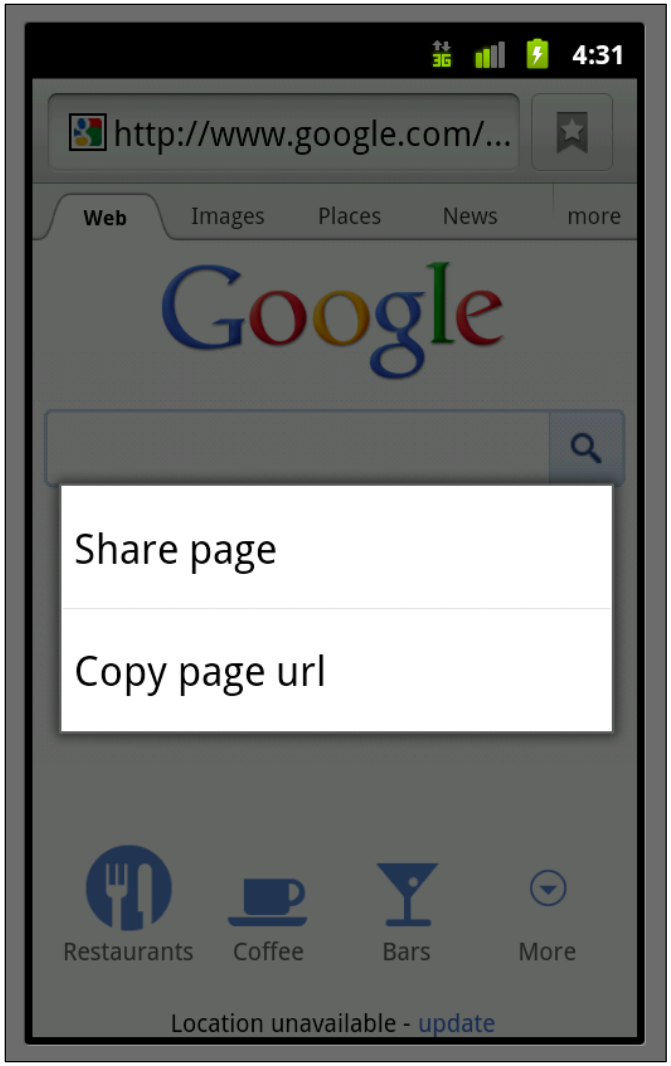
Option Menus



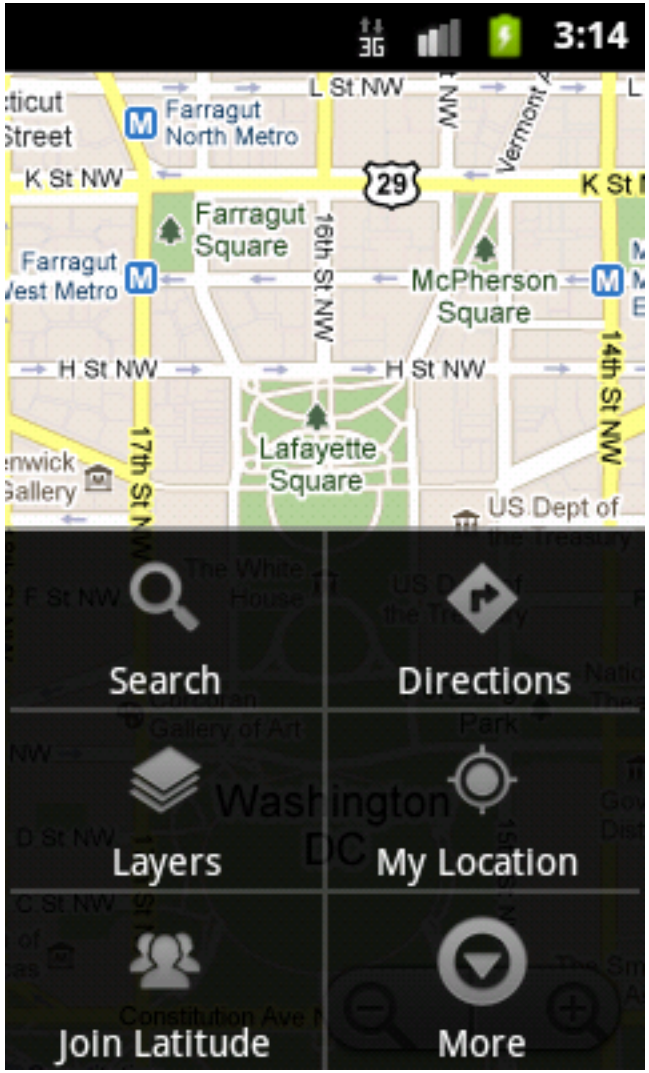


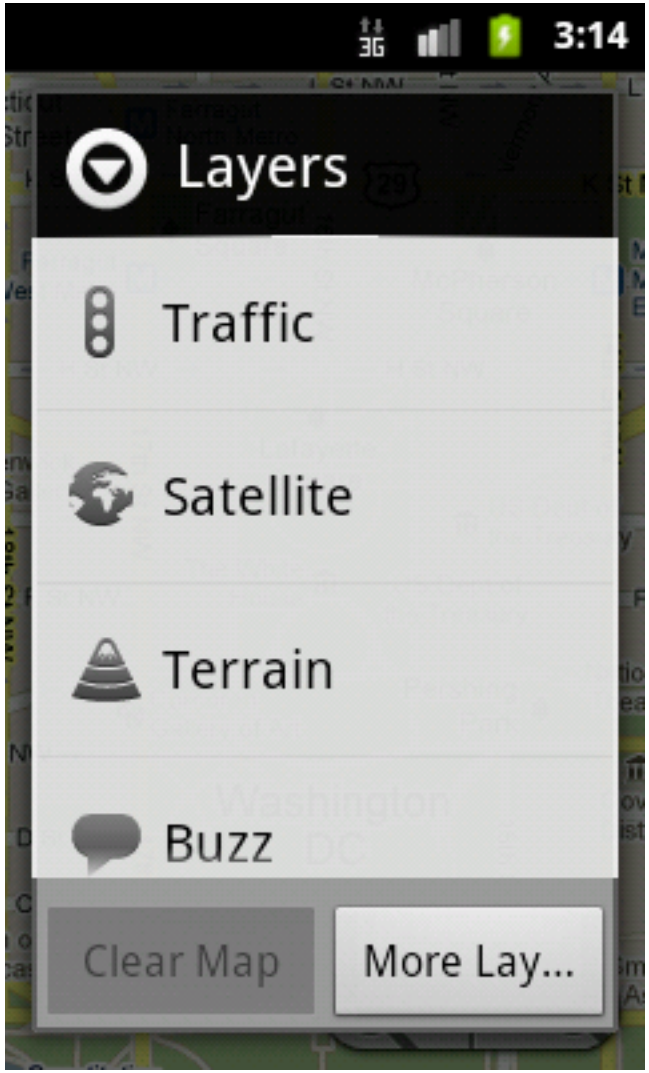
Context Menus





SubMenus

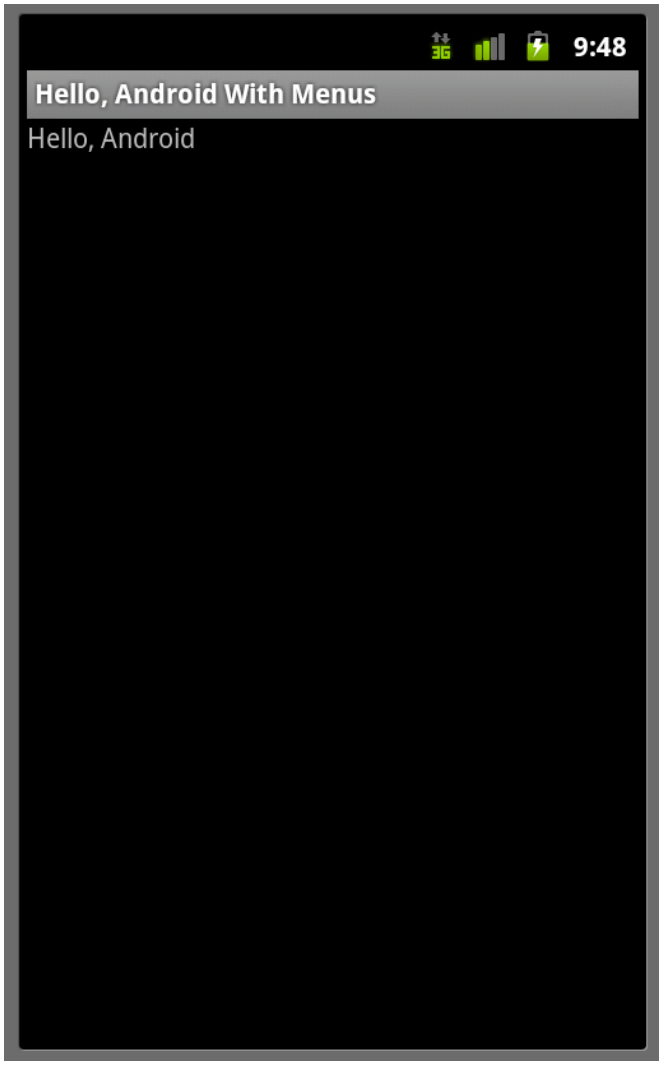

3:14
Farragut North Metro
L St NW
K St NW
29
Farragut Square
Farragut West Metro
McPherson Square
16th St NW
H St NW
14th St NW
17th St NW
Lafayette Square
US Dept of
Search
Directions
Layers
My Location
Join Latitude
More

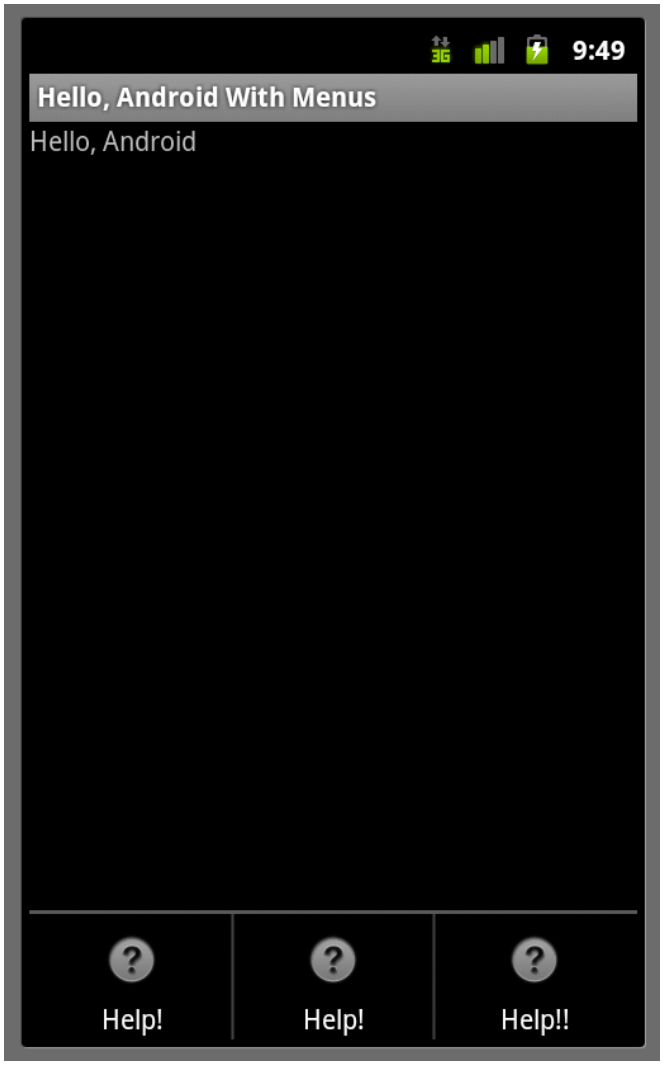

3:14
Layers
Traffic
Satellite
Terrain
Buzz
Clear Map
More Lay...

Creating Menus

- Define menu resource in XML file
  - Store in res/menu/filename.xml
- Inflate menu resource using MenuInflater in appropriate onCreate…Menu() methods
- Handling item selection in appropriate on… ItemsSelected() methods

HelloAndroidWithMenus





Creating Option Menus

```
public boolean onCreateOptionsMenu(Menu menu) {
  MenuInflater inflater = getMenuInflater();
  inflater.inflate(R.menu.top_menu, menu);
  return true;
}
```

top_menu.xml

```
<menu ...>
 <item android:id="@+id/help”
    android:icon="@drawable/ic_menu_help”
    android:title="@string/help" />
 <item android:id="@+id/more_help"
    android:icon="@drawable/ic_menu_help"
    android:title="@string/more_help" />
 // continued
```

top_menu.xml (cont.)

```
...
<item android:id="@+id/even_more_help”
   android:icon="@drawable/ic_menu_help"
   android:title="@string/even_more_help" >
   <menu>
        <item android:id="@+id/give_up"
            android:title="@string/give_up" />
   </menu>
 </item>
</menu>
```

Selecting Option Menu Items

```
public boolean onOptionsItemSelected(MenuItem item) {
 switch (item.getItemId()) {
  case R.id.help:
    // do something
    return true;
  case R.id.more_help:
   // do something
   return true;
 case R.id.even_more_help:
   // do something
   return true;
...
```

Creating Context Menus

```
public void onCreateContextMenu(
        ContextMenu menu, View v, ContextMenuInfo menuInfo) {
  super.onCreateContextMenu(menu, v, menuInfo);
  MenuInflater inflater = getMenuInflater();
  inflater.inflate(R.menu.context_menu, menu);
}
```

Selecting Context Menu Items

```
public boolean onContextItemSelected(MenuItem item) {
  switch (item.getItemId()) {
    case R.id.help_guide:
      // do something
      return true;
    ...
  }
}
```

Registering for Context Menu

```
public void onCreate(Bundle savedInstanceState) {
  ...
  TextView tv = new TextView(this);
  tv.setText("Hello, Android");
  ...
  registerForContextMenu(tv);
}
```

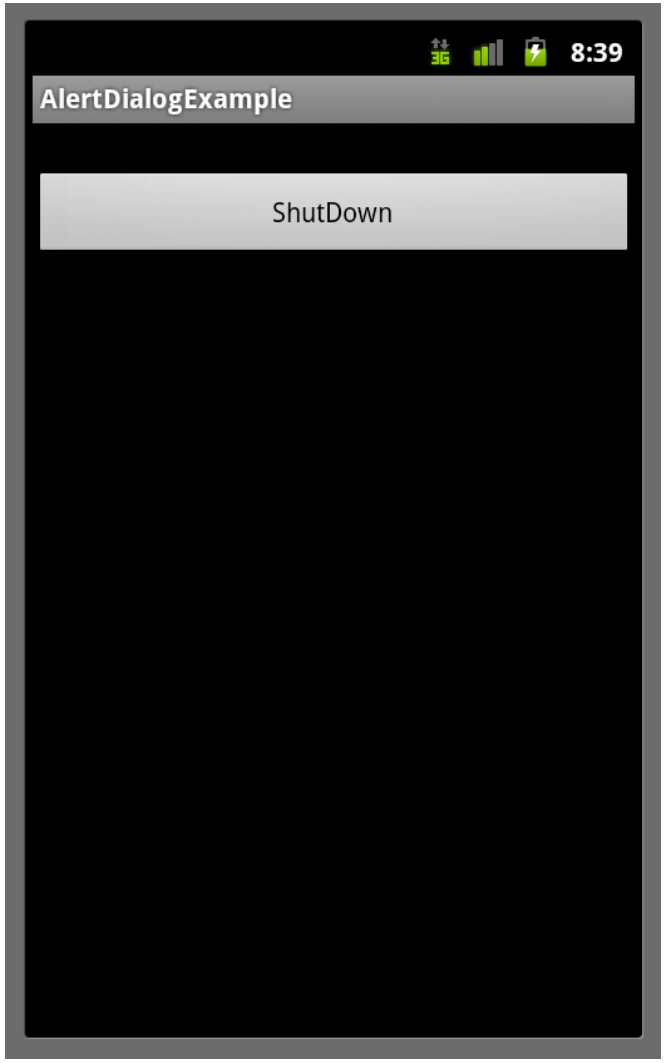
Menus (cont.)

- Many other features supported
  - Grouping menu items
  - Binding shortcut keys to menu items
  - Binding Intents to menu items

Dialogs

- Independent subwindows used by Activities to communicate with user
- Dialog subclasses
  - AlertDialog
  - ProgressDialog
  - DatePickerDialog
  - TimePickerDialog

AlertDialog



AlertDialog (cont.)

```
private final int ALERTTAG = 0, PROGRESSTAG = 1;
...
shutdownButton.setOnClickListener(new OnClickListener() {
  public void onClick(View v) {
    showDialog(ALERTTAG);
  }
});
```

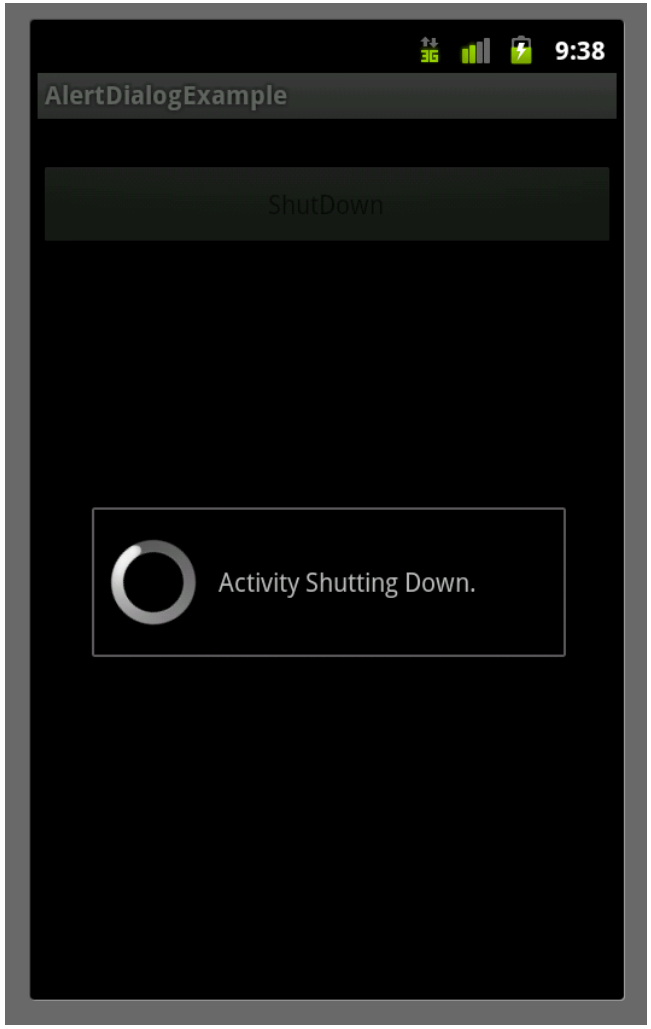
onCreateDialog()

```
protected Dialog onCreateDialog(int id, Bundle args) {
 ...
 case ALERTTAG:
   AlertDialog.Builder builder = new AlertDialog.Builder(this);
   builder.setMessage("Do you really want to exit?")
     .setCancelable(false)
     .setPositiveButton("Yes",
         new DialogInterface.OnClickListener() {
          public void onClick(DialogInterface dialog, int id) {
            dialog.cancel();
            showDialog(PROGRESSTAG);}
     })
//continued
```

onCreateDialog() (cont.)

```
.setNegativeButton("No”,new DialogInterface.OnClickListener() {
    public void onClick(DialogInterface dialog, int id) {
        dialog.cancel();}
 });
```

Process Dialog



onCreateDialog()

```
protected Dialog onCreateDialog(int id, Bundle args) {
 switch (id) {
 ...
 case PROGRESSTAG:
  shutdownButton.setEnabled(false);
  final ProgressDialog dialog = new ProgressDialog(this);
  dialog.setMessage("Activity Shutting Down.");
```

onCreateDialog() (cont.)

```
  ...
  new Thread(new Runnable() {
     public void run() {
         try { Thread.sleep(5000);} catch ...
        dialog.dismiss();
        AlertDialogExample.this.finish();
     }
  }).start();
  return dialog
 ...
  }
}
```

Lab Assignment

Source Code Examples

- FormWidgetRadioGroup
- FormWidgetsButton
- FormWidgetsCheckBox
- FormWidgetsRatingBar
- FormWidgetsSpinner
- FormWidgetsToggleButton
- ListLayoutExample
- GridLayoutExample
- TabLayoutExample
- HelloAndroidWithMenus
- AlertDialogExample