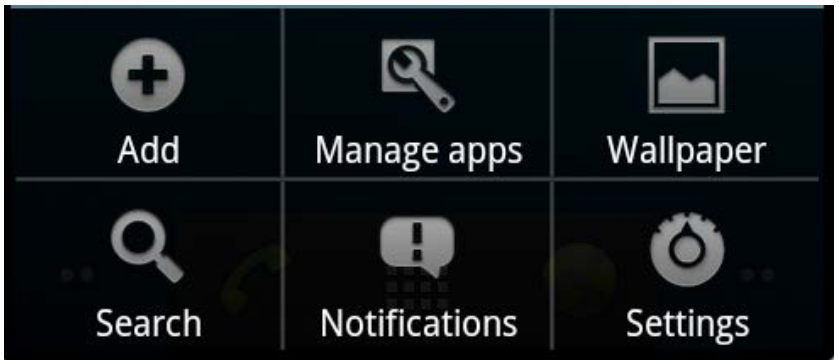
More UI

Action Bar, Navigation, and Fragments

ACTION BAR

Options Menu and Action Bar

- prior to Android 3.0 / API level 11 Android devices required a dedicated menu button
- Pressing the menu button brought up the options menu

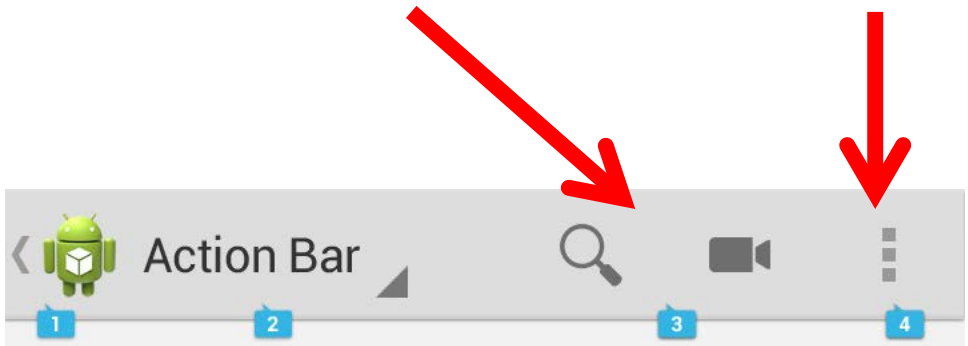


menu

action bar

- menu button no longer required
- shift options menu to action bar
- action bar is a combination of on-screen action items and overflow options

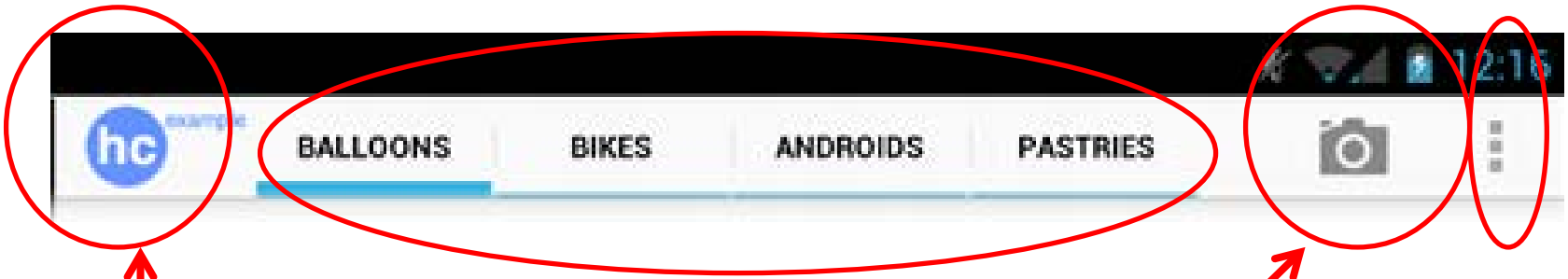
Action items overflow options overflow menu



action bar

Action Bar

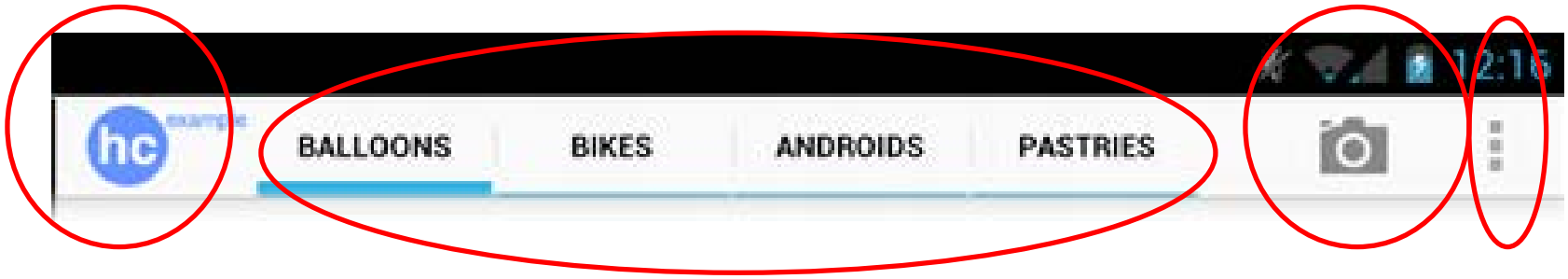
- identify app and users location in app
- display important actions
  - old options menu
- support consistent navigation and view switching within the app



Action Bar

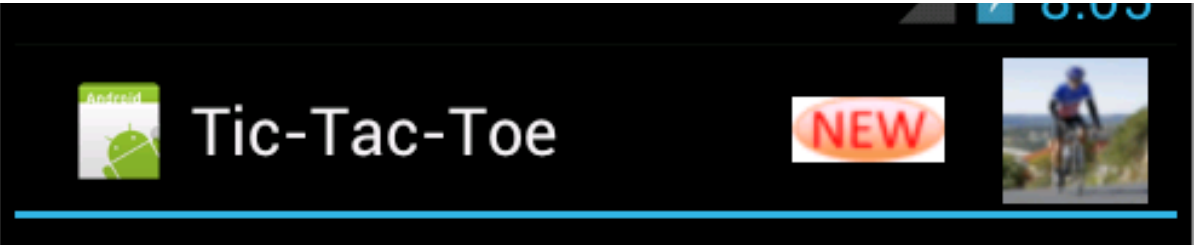
- ActionBar items declared in menu.xml

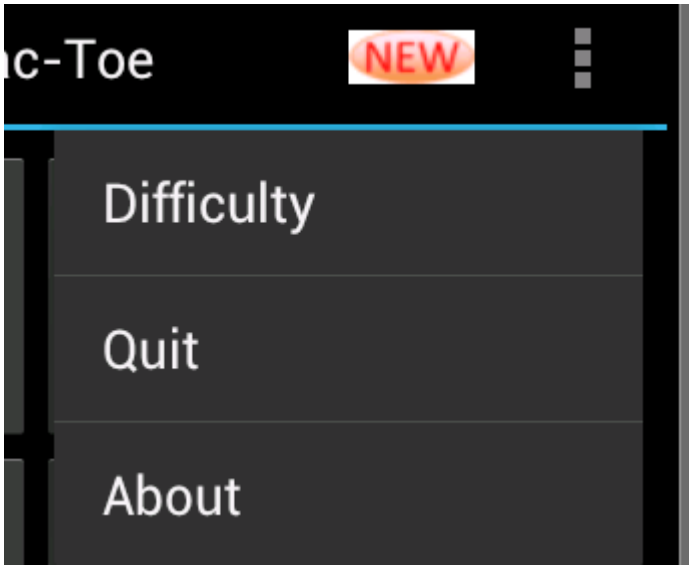
```
<menu xmlns:android="http://schemas.android.com/apk/res/android" >

    <item
        android:id="@+id/new_game"
        android:icon="@drawable/new_game"
        android:title="New Game"
        android:showAsAction="ifRoom|withText" />
```



Action Bar

- If menu items declared in xml, added to menu in order they appear
- Extra items brought up with overflow button





Action Bar

- When activity starts
- Action Bar populated by a call to Activity's onCreateOptionsMenu method
- This method inflates (converts XML into runtime objects) the menu resource that defines all the action items

Action Bar Items in XML

res/menu/main_activity_actions.xml

```
<menu xmlns:android="http://schemas.android.com/apk/res/android"
    <item android:id="@+id/action_search"
          android:icon="@drawable/ic_action_search"
          android:title="@string/action_search"/>
    <item android:id="@+id/action_compose"
          android:icon="@drawable/ic_action_compose"
          android:title="@string/action_compose" />
</menu>
```

sample onCreateOptionsMenu()

```
@Override
public boolean onCreateOptionsMenu(Menu menu) {
    // Inflate the menu items for use in the action bar
    MenuInflater inflater = getMenuInflater();
    inflater.inflate(R.menu.main_activity_actions, menu);
    return super.onCreateOptionsMenu(menu);
}
```

Request item be shown on Action Bar
(instead of overflow menu) with ifRoom attribute

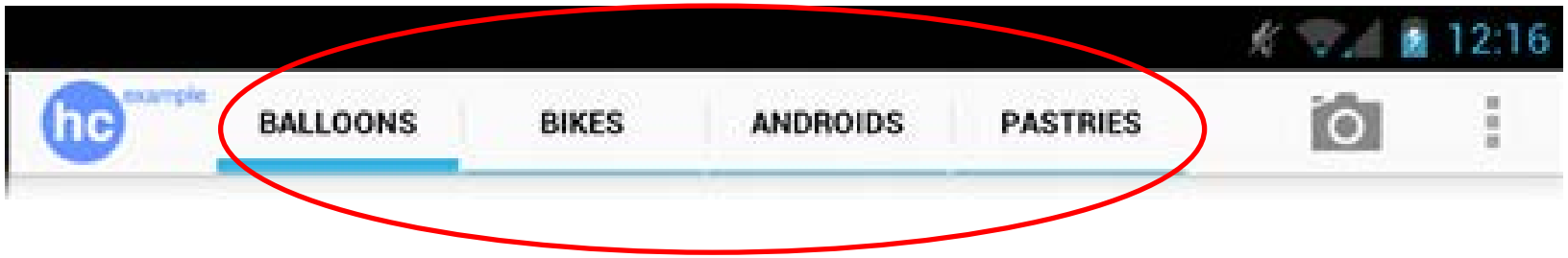
```
android:showAsAction="ifRoom|withText"
```

Split Action Bar

- Split Action Bar between top and bottom of screen
  - especially if narrow screen
  - more room for action items
  - declartion in manifest file

Navigation Tabs

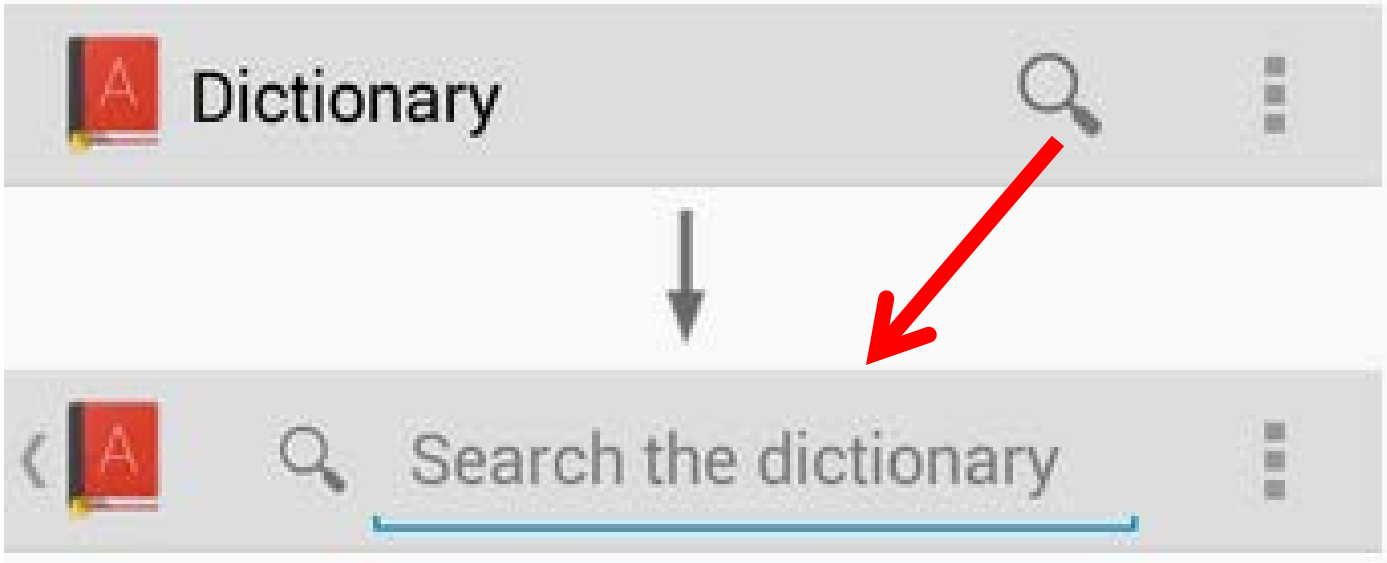
- Used to switch between fragments



- http://developer.android.com/guide/topics/fundamentals/fragments.html

Action Views

- Action views appear in the action bar in place of action buttons
- Accomplish some common action
- Such as searching

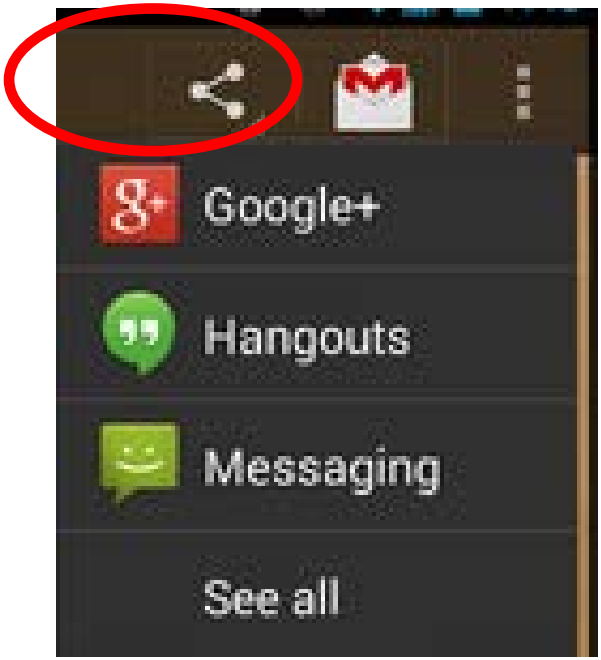


Enabling ActionViews

- use either the actionLayout or actionViewClass attribute
- specify either a layout resource or widget class to use, respectively

```
<?xml version="1.0" encoding="utf-8"?>
<menu xmlns:android="http://schemas.android.com/apk/res/android"
      xmlns:yourapp="http://schemas.android.com/apk/res-auto" >
    <item android:id="@+id/action_search"
          android:title="@string/action_search"
          android:icon="@drawable/ic_action_search"
          yourapp:showAsAction="ifRoom|collapseActionView"
          yourapp:actionViewClass="android.support.v7.widget.SearchView" />
</menu>
```

ActionProviders



- Similar to ActionView in that it replaces an action button with a customized layout
- but can also display a submenu
- create your own subclass of ActionProvider
- or use a prebuilt ActionProvider such as ShareActionProvider (shown above) or MediaRouteActionProvider

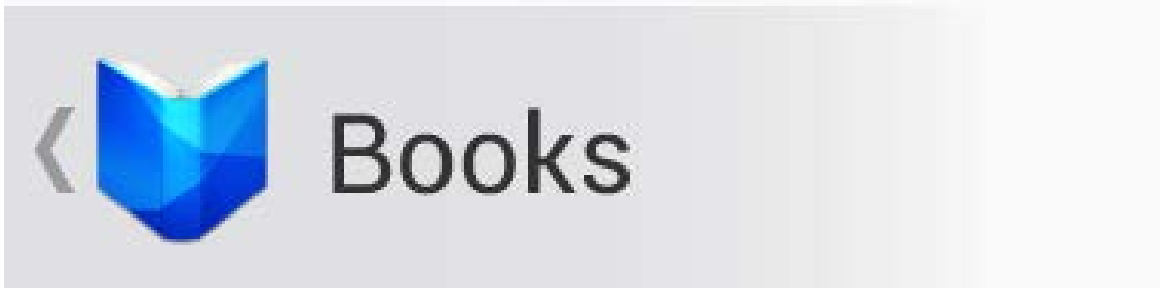
ACTION BAR NAVIGATION

Back and Up

- Android design and developer documentation stress the desire for consistent global navigation for and between apps
- Android 2.3 and earlier relied on the *Back* button for navigation within app

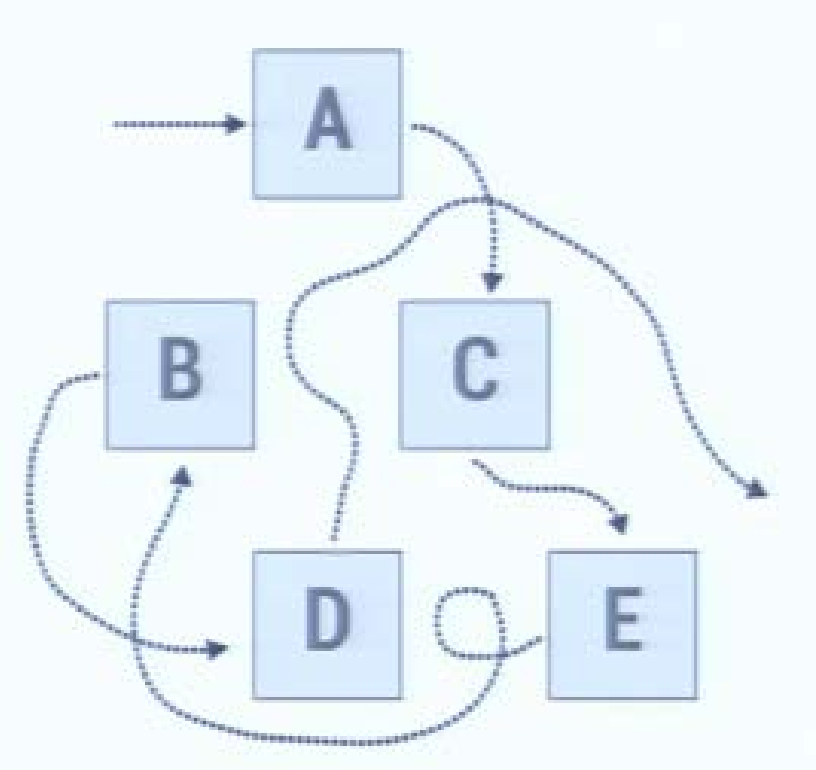
Action Bar Navigation

- With addition of the action bar another navigation option was added
- Up
- App icon and left pointing caret

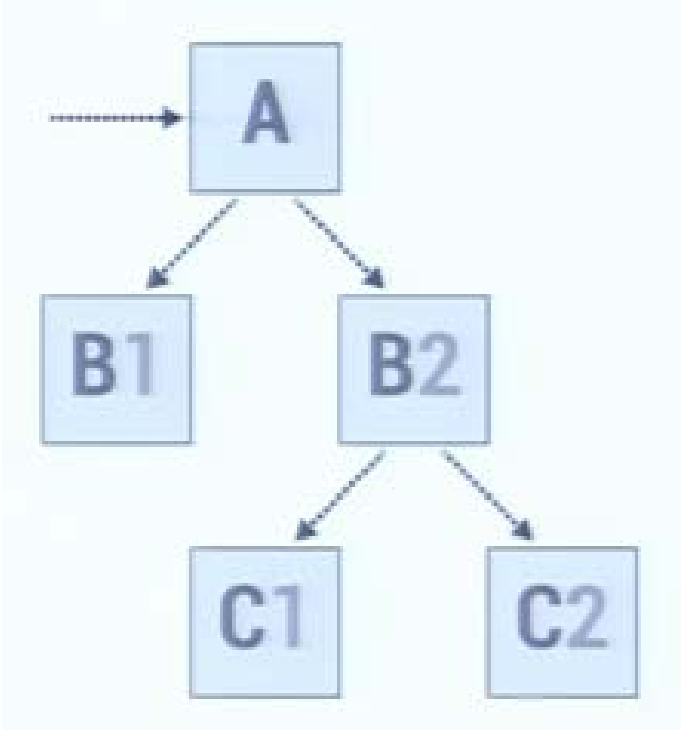


Activity Hierarchy Within Apps

- from Google IO 2012



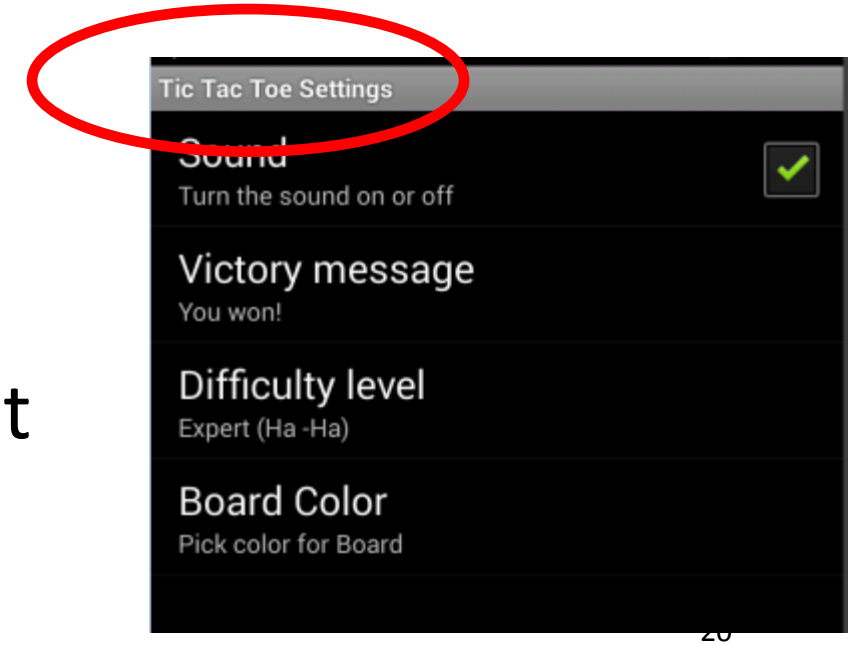
The bag of Activities



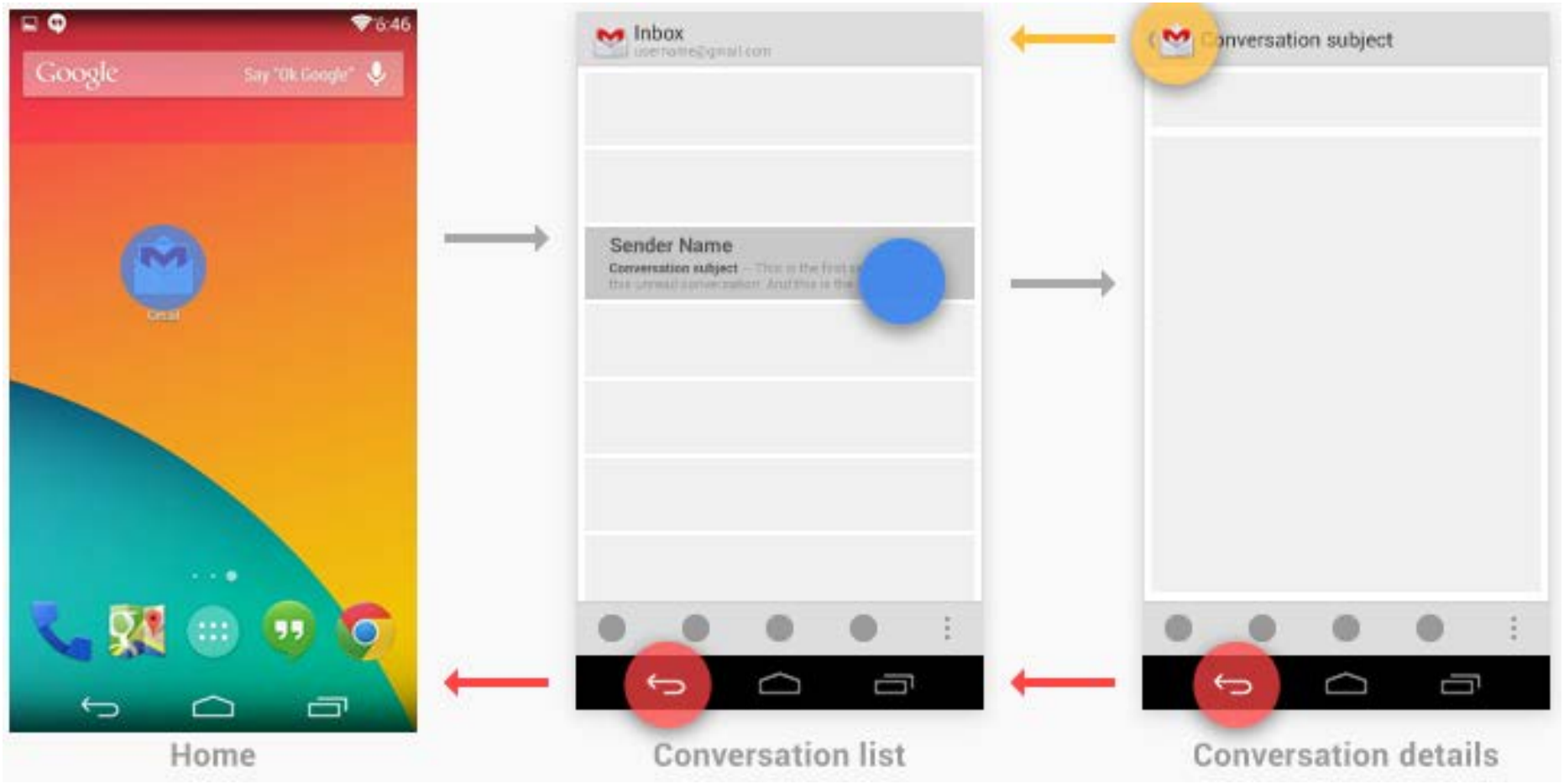
Activities with defined parents

Up vs. Back

- Up is used to navigate between screens / activities within an app
- Up is to move through the hierarchy of screens within an app
- Example: Tic Tac Toe
  - Settings Activity
  - should offer icon and Up option on action bar to get back to main Tic Tac Toe screen



Up vs. Back



http://developer.android.com/design/patterns/navigation.html

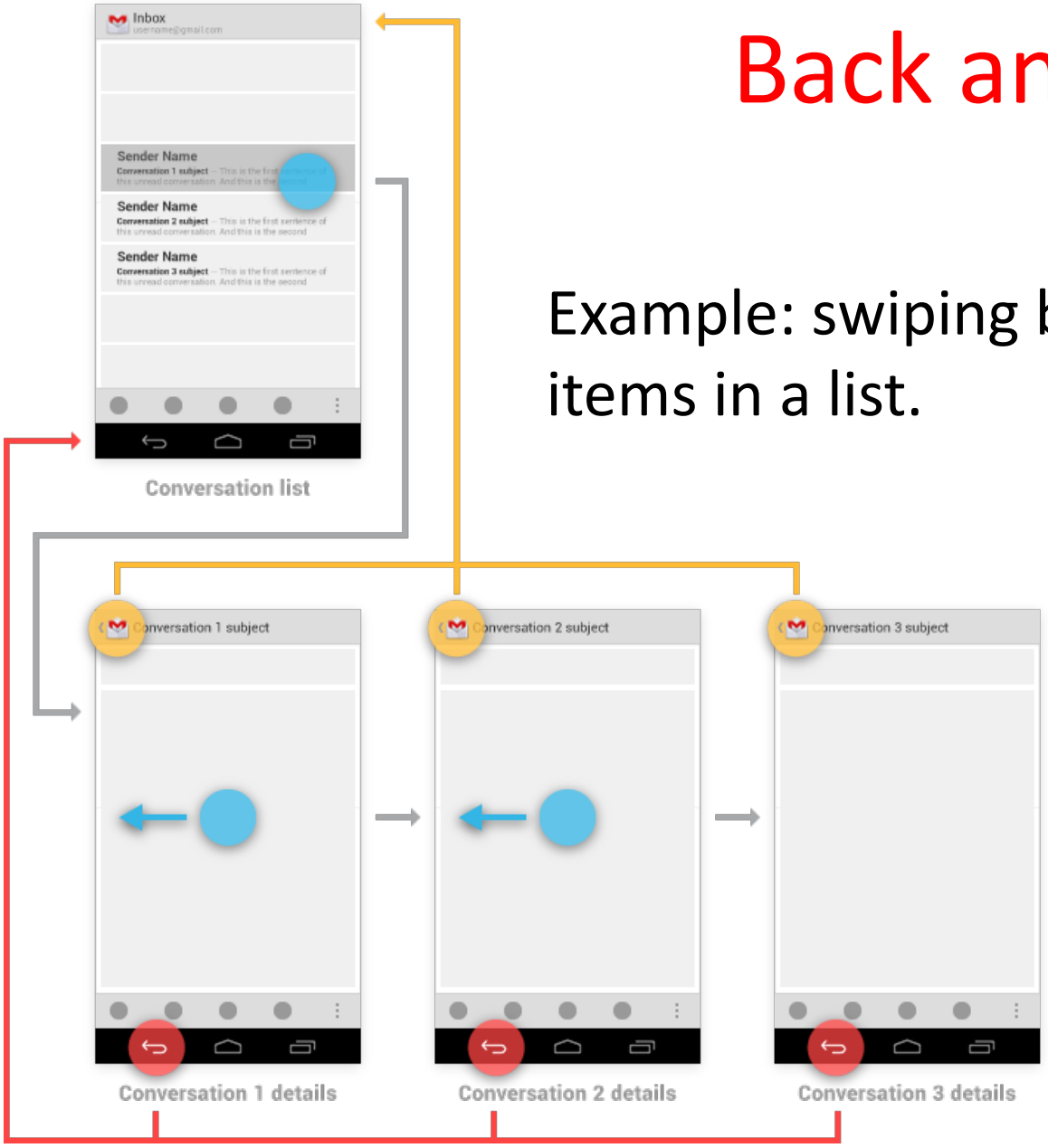
Back Button Actions

- Back still used to move through apps in reverse time order
- Back button also:
- dismissed floating windows such as dialogs or popups
- dismisses contextual action bars
- hides the onscreen keyboard

Back vs. Up

- Many times Up functions exactly like Back
- If a screen / activity accessible from multiple other screens in app
- Up takes user from screen to previous screen
- same as back

Back and Up



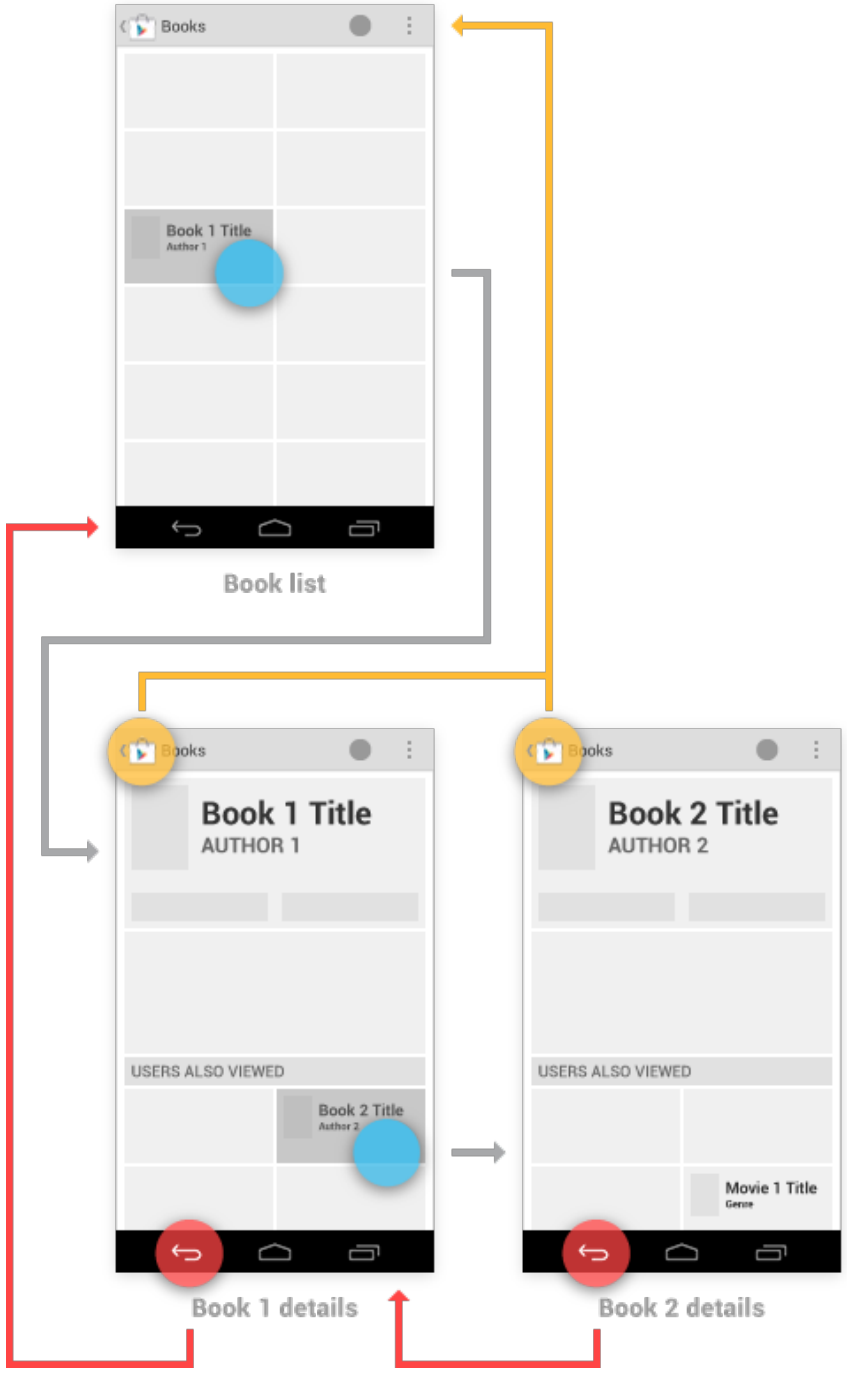
Example: swiping between items in a list.

http://developer.android.com/design/patterns/navigation.html

Back vs. Up

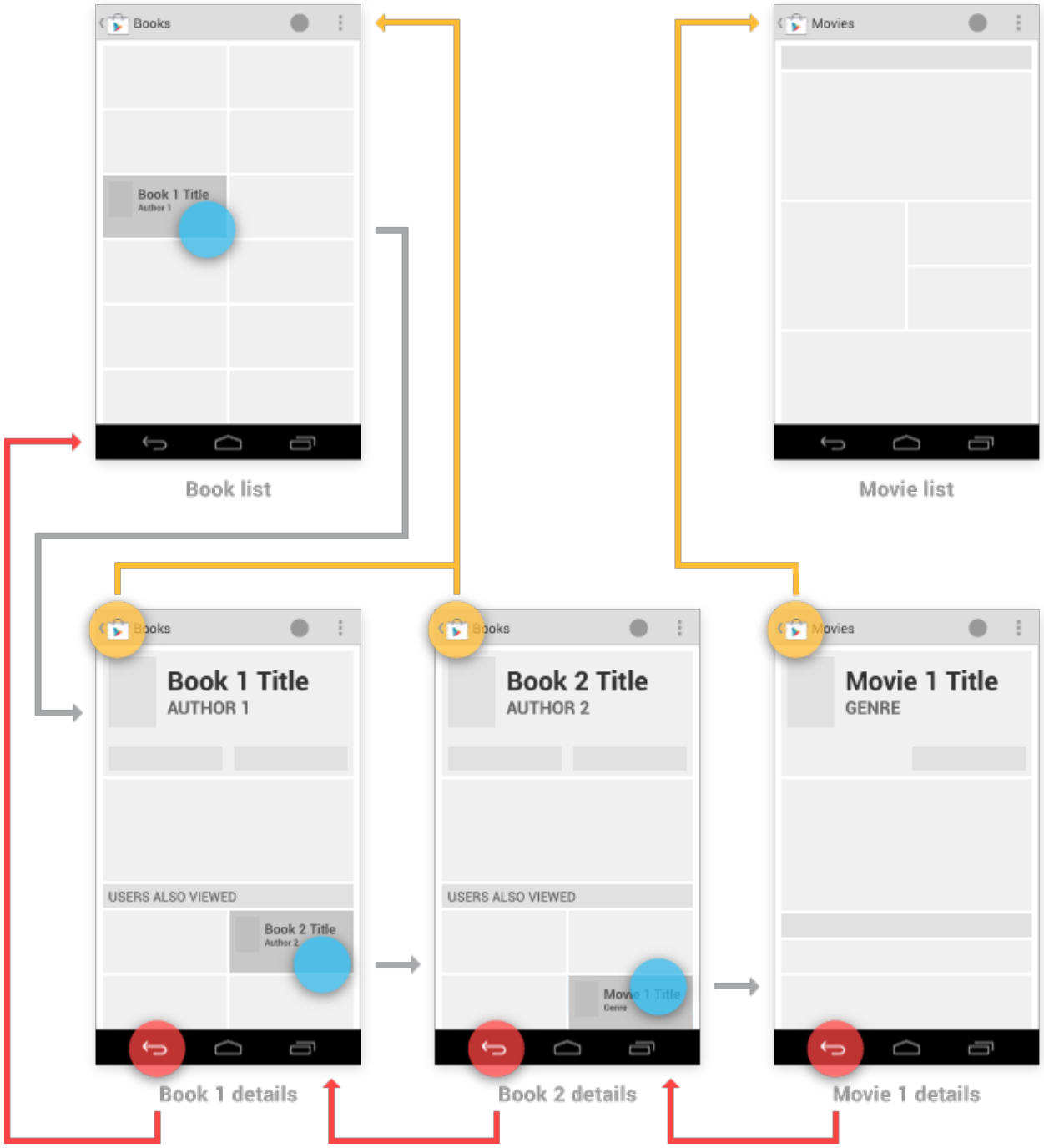
- Sometimes back and up lead to different behavior
- Browsing related detailed views not tied together by list view up hierarchy
- Google Play - albums by same artist or apps by the same developer

Back vs. Up


Books
Book 1 Title
Author 1
Book list
Books
Book 1 Title
AUTHOR 1
USERS ALSO VIEWED
Book 2 Title
Author 2
Book 1 details
Books
Book 2 Title
AUTHOR 2
USERS ALSO VIEWED
Movie 1 Title
Genre
Book 2 details

books

movies



Back vs. Up

- Another instance where Back and Up are not the same
- Widgets on home screen, notifications, or pop up notifications may take user deep into application
- In this case Up should take user to the logical parent of the screen / view / UI

Specifying Up Button Behavior

- Done in the manifest file for Android 4.0 and higher

```
<application ... >
    ...
    <!-- The main/home activity (it has no parent activity) -->
    <activity
        android:name="com.example.myfirstapp.MainActivity" ...>
        ...
    </activity>
    <!-- A child of the main activity -->
    <activity
        android:name="com.example.myfirstapp.DisplayMessageActivity"
        android:label="@string/title_activity_display_message"
        android:parentActivityName="com.example.myfirstapp.MainActivity" >
        <!-- Parent activity meta-data to support 4.0 and lower -->
        <meta-data
            android:name="android.support.PARENT_ACTIVITY"
            android:value="com.example.myfirstapp.MainActivity" />
    </activity>
</application>
```

Specifying Up Button Behavior

- Adding Up Action, in onCreate of Activity

```
@Override
public void onCreate(Bundle savedInstanceState) {
    ...
    getActionBar().setDisplayHomeAsUpEnabled(true);
}
```

- When icon pressed onOptionsItemSelected called

```
@Override
public boolean onOptionsItemSelected(MenuItem item) {
    switch (item.getItemId()) {
    // Respond to the action bar's Up/Home button
    case android.R.id.home:
        NavUtils.navigateUpFromSameTask(this);
        return true;
    }
    return super.onOptionsItemSelected(item);
}
```

Specifying Up Behavior - Other App Started

```
@Override
public boolean onOptionsItemSelected(MenuItem item) {
    switch (item.getItemId()) {
    // Respond to the action bar's Up/Home button
    case android.R.id.home:
        Intent upIntent = NavUtils.getParentActivityIntent(this);
        if (NavUtils.shouldUpRecreateTask(this, upIntent)) {
            // This activity is NOT part of this app's task, so create a new task
            // when navigating up, with a synthesized back stack.
            TaskStackBuilder.create(this)
                    // Add all of this activity's parents to the back stack
                    .addNextIntentWithParentStack(upIntent)
                    // Navigate up to the closest parent
                    .startActivities();
        } else {
            // This activity is part of this app's task, so simply
            // navigate up to the logical parent activity.
            NavUtils.navigateUpTo(this, upIntent);
        }
        return true;
    }
    return super.onOptionsItemSelected(item);
}
```

MORE ACTION BAR NAVIGATION

Action Bar Navigation

- Action Bar can also be used for in app navigation beyond the Up button
- Two Options:
- Navigation Tabs
- Drop Down Navigation

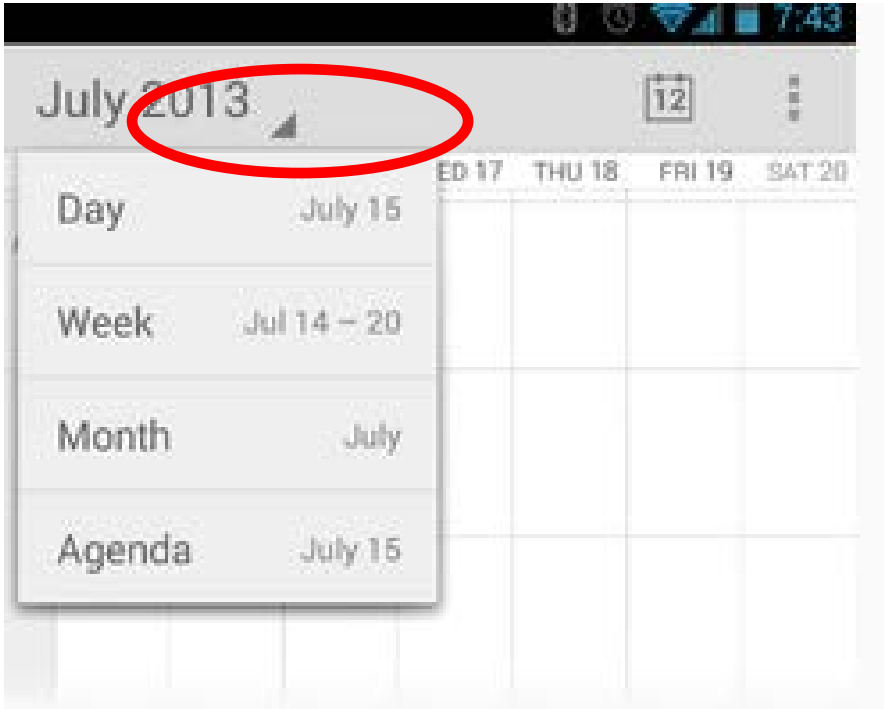
Action Bar Navigation Tabs

- wide screen action bar

- narrow screen stacked action bar

Action Bar Drop Down Navigation

- Alternative to tabbed navigation in action bar
- Create a spinner drop down list that is accessed with "down triangle"



Action Bar on pre Android 3.0

- pre 3.0 a little more than 25% of Android OS versions as of November 2013
- Support library includes provides code and classes to allow ***some*** newer features of Android to be used on older versions
- Example: ActionBar
- 3rd Party tool - ActionBarSherlock
  - deal with Action Bar via single API
  - http://actionbarsherlock.com/

OTHER MENUS

Menus

- Three types of menus:
- options menu or action bar
- context menu and contextual action mode
- popup menu

ContextMenu

- pre 3.0, aka Floating Menus
- subtype of Menu
- display when a long press is performed on a View
  - Activity is a descendant of View
  - Activity may be broken up into multiple views
- implement `onCreateContextMenu` method
- must call `registerForContextMenu` method and pass View

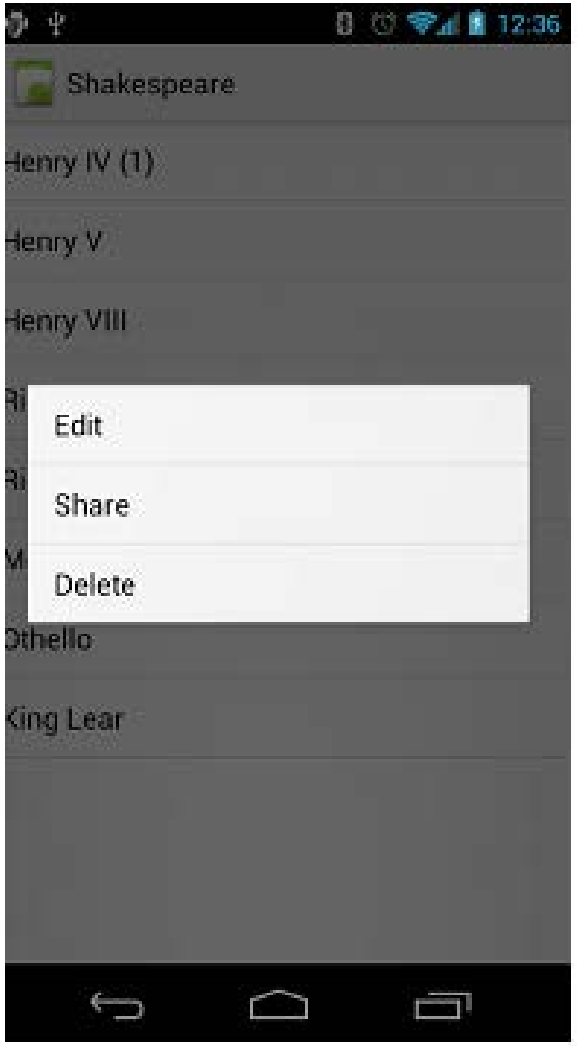
ContextMenu

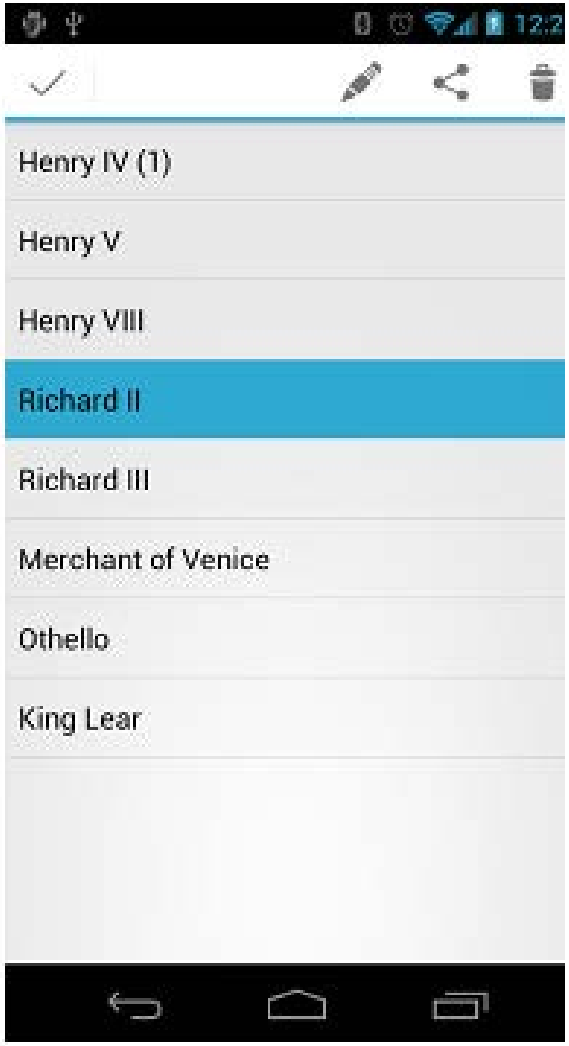
- From Tip Calculator
- Long press on total amount EditText
- Default behavior for EditText
- Nothing added in TipCalculator to create this

Contextual Action Mode

- Android 3.0 and later
- Menu that affects a specific item in the UI
  - typically a View
  - used most often for elements in ListView or GridView

floating context menu





http://developer.android.com/guide/topics/ui/menus.html#CAB

floating context menu

- register View with Activity.registerForContextMenu()
- can send ListView or GridView to method to register all elements
- Implement View.OnCreateContextMenuListener
  - long click leads to method call
  - inflate menu (like action items/ options menu)
- Implement Activity.onContextItemSelected

contextual action mode

- alternative to floating context menu
- causes contextual action bar to appear at top of screen
- independent of regular action bar but, does overtake position of action bar
- For Android 3.0 and higher preferred to floating context menus
- Implement ActionMode.Callback interface
  - similar to options menu methods

FRAGMENTS

Fragments

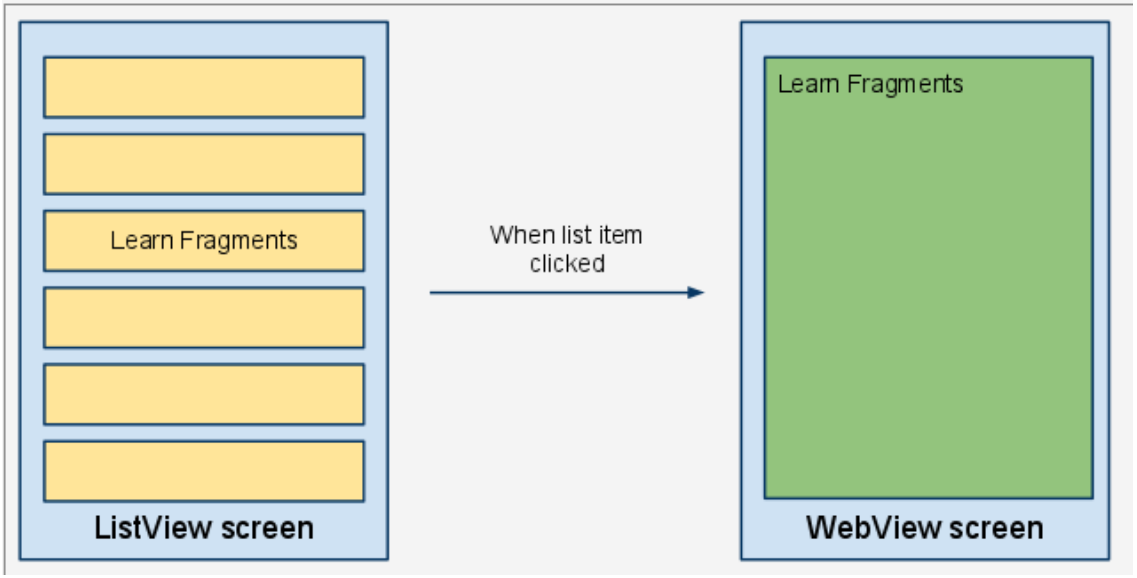
- Added in Android 3.0, a release aimed at tablets
- A fragment is a portion of the UI in an Activity
- multiple fragments can be combined into multi-paned UI
- fragments can be used in multiple activities

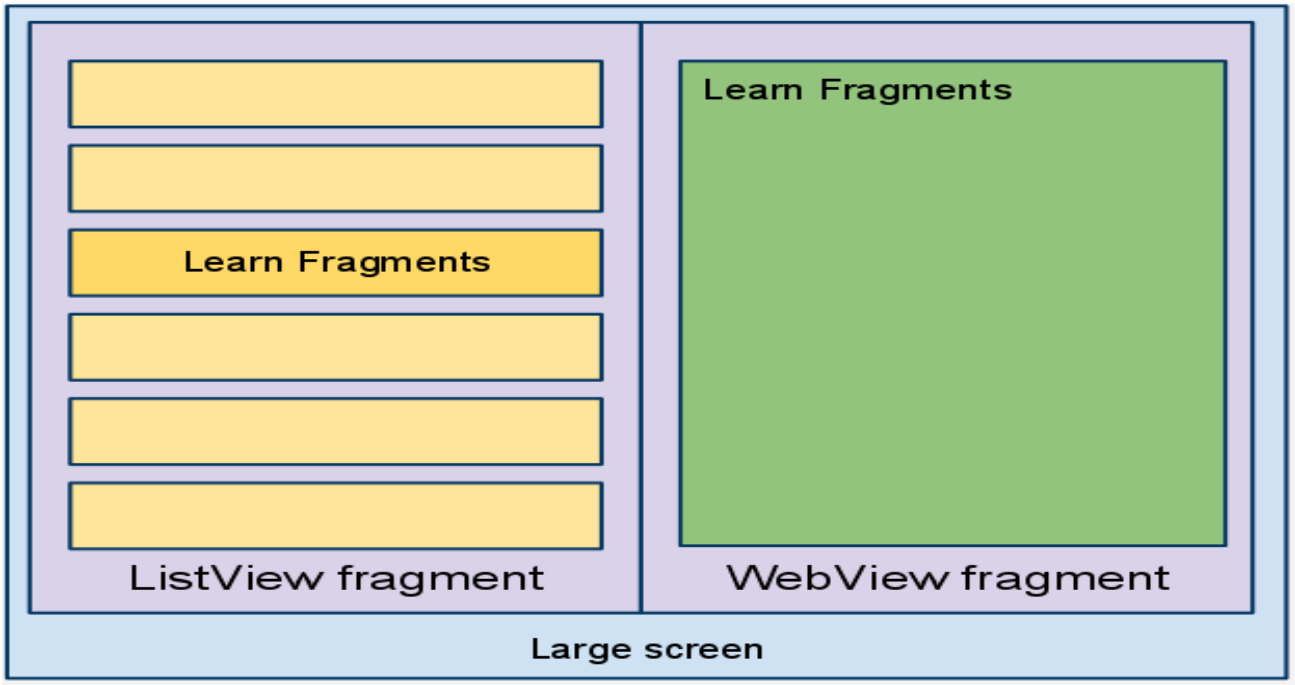
Fragments

- Part of an activity
  - directly affected by Activity's lifecycle
- Fragments can be swapped into and out of activities without stopping the activity
- On a handset one with limited screen space, common for app to switch from one activity to another
  - with a larger screen swap fragments in and out

Fragments

old





new

Use of Fragments

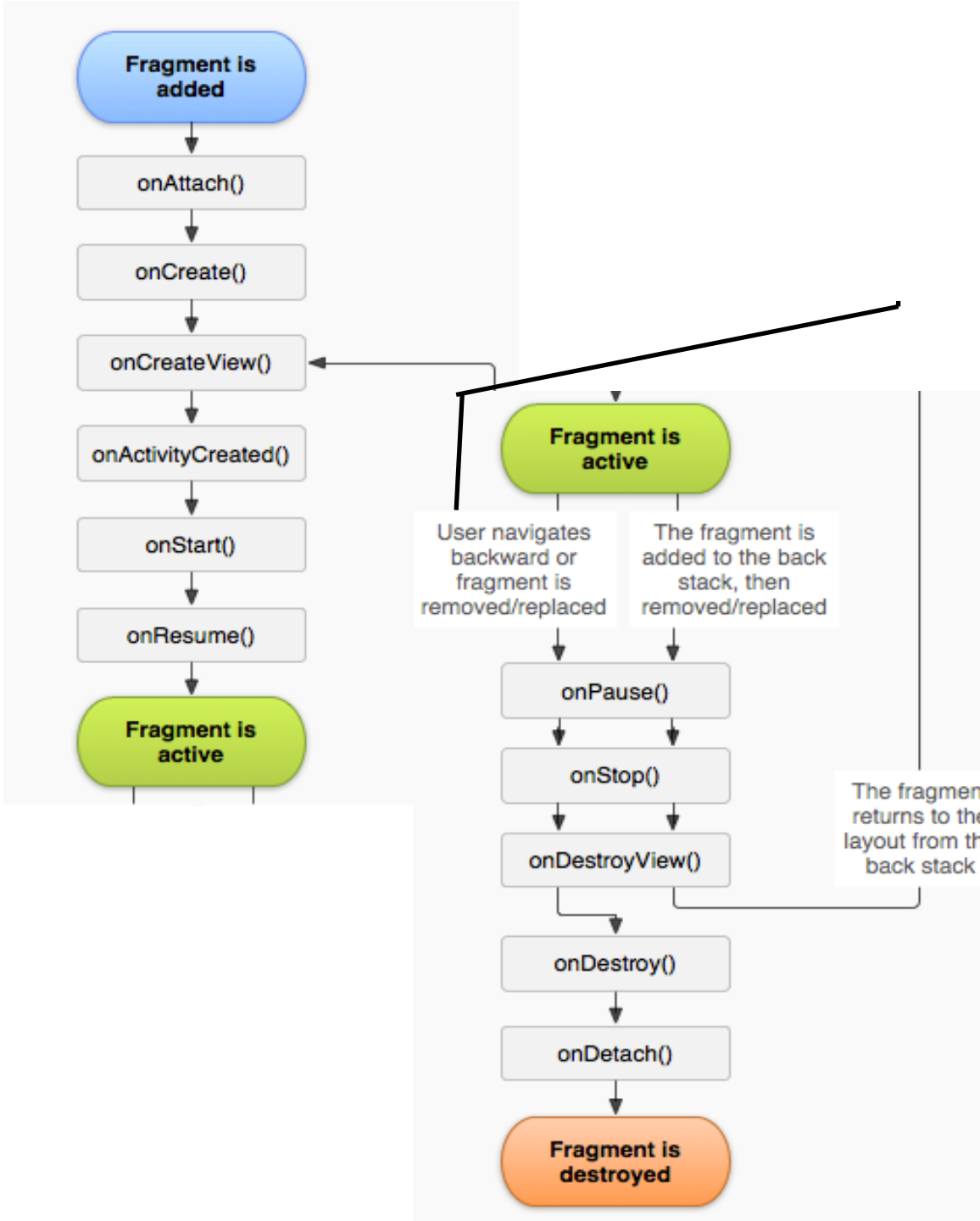
- Android development documents recommend ALWAYS using Fragments
- Provide for flexibility of UIs
- Activity tightly coupled with its View
- Fragments provide flexibility, looser coupling between Activity and UI Views
  - fragment becomes a building block
- downside, more complexity in code, more moving parts

Fragments

- Fragments can typically control a UI
  - fragment has view that is inflated from a layout file
- Activity will specify spots for fragments
  - in some instances one fragment
  - in other instance multiple fragments
  - *can change on the fly*

Fragments

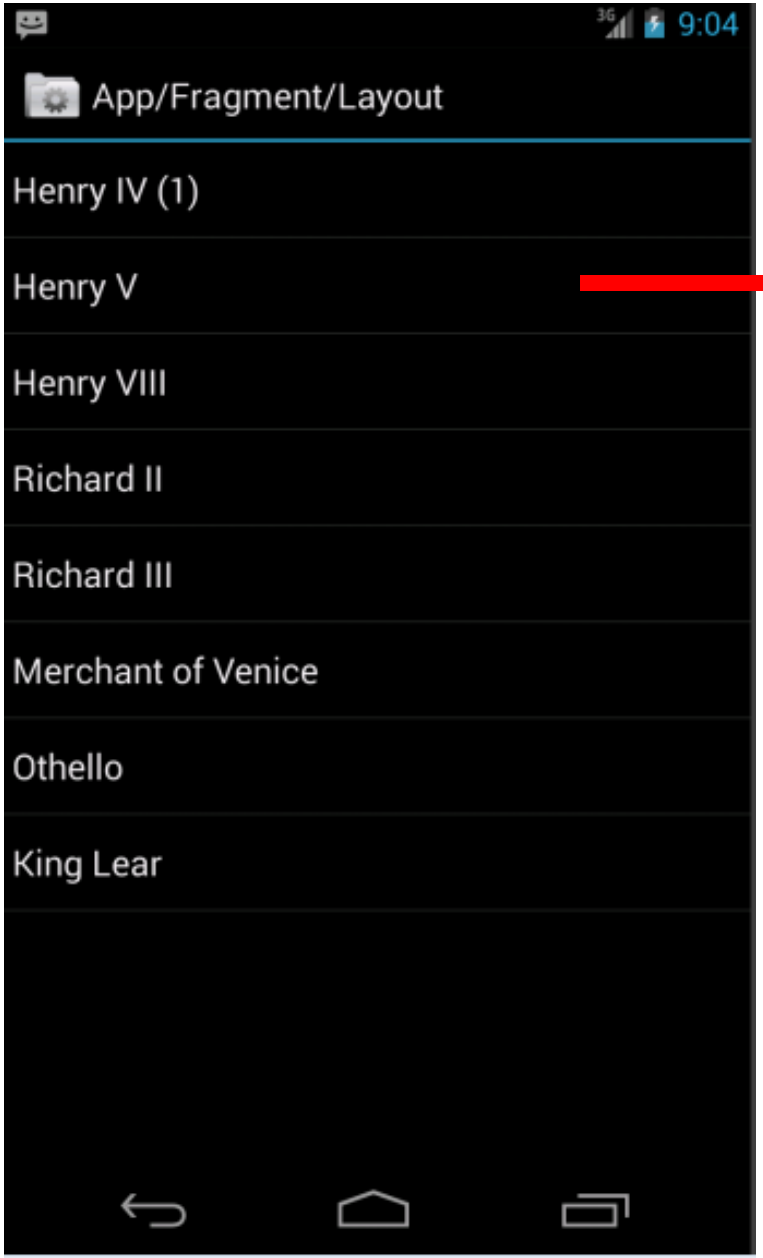
- Have a life cycle similar to Activities
- But, Fragment lifecycle controlled by Activity not by the system
  - more complex, but more flexible

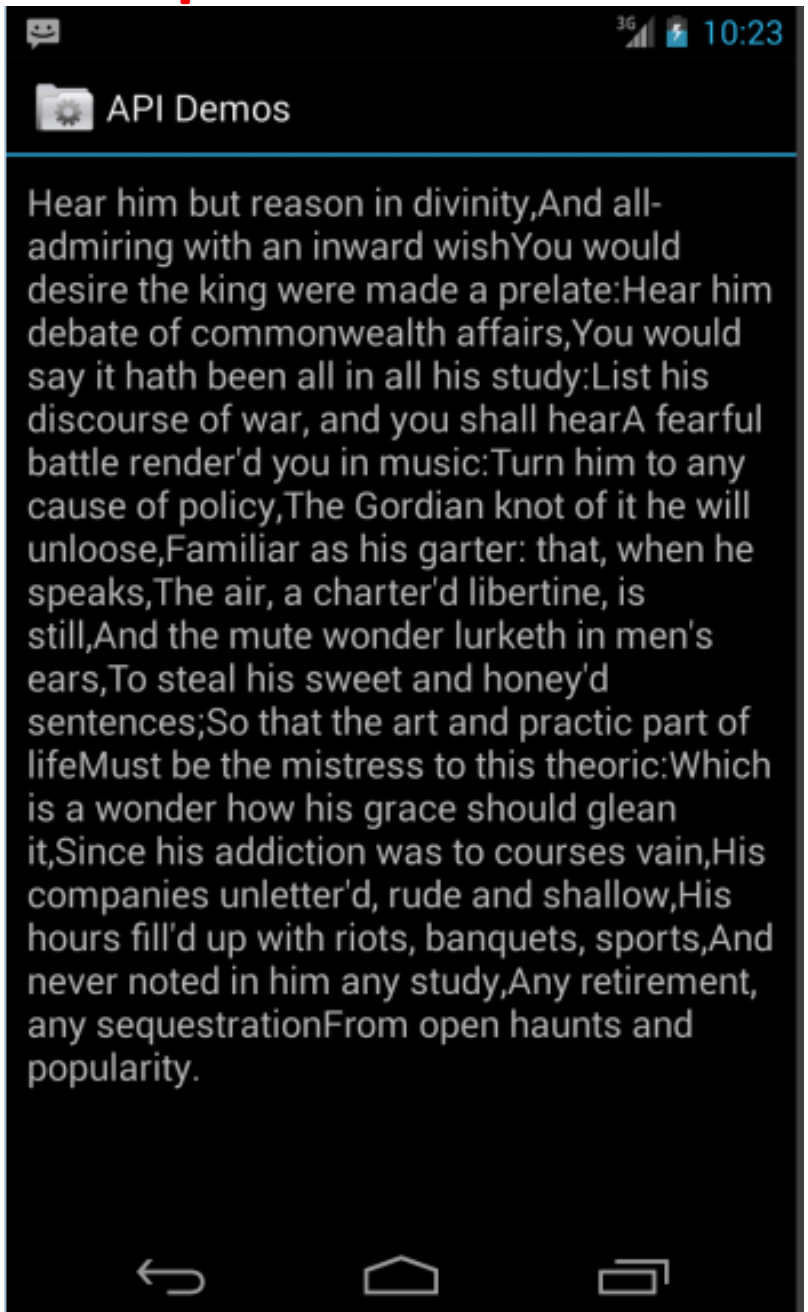


Fragment Example

- From the apiDemos app on the emulator
  - part of the sample code with Android SDK
- Displays Shakespeare play titles in a List
- Clicking on a title displays a sample from the play
- com.example.android.apis.app
  - FragmentLayout.java

Fragment Example





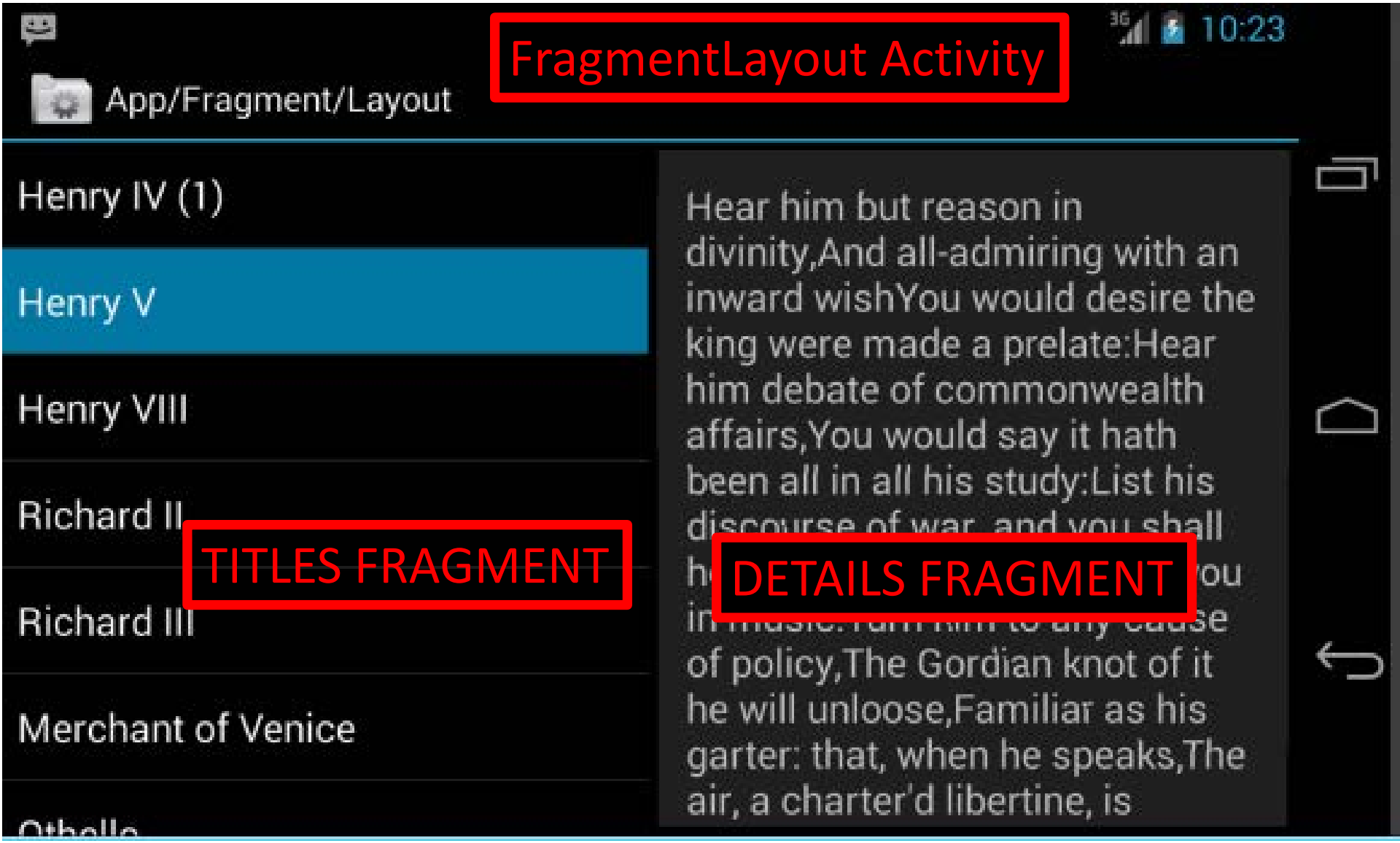
Portrait

- In portrait view app behaves as you would expect
- the play titles are in a list
  - old approach, would be a ListView inside of an Activity
- clicking a list items creates an Intent that starts another Activity with a TextView inside of a ScrollView
- Click back button to go back to list

Landscape

- When switched to landscape enough real estate to display list and summary side by side
  - imagine an app that looks one way on phone another way on a tablet

Landscape


FragmentLayout Activity
10:23
App/Fragment/Layout
Henry IV (1)
Henry V
Henry VIII
Richard II
Richard III
Merchant of Venice
TITLES FRAGMENT
Hear him but reason in divinity,And all-admiring with an inward wishYou would desire the king were made a prelate:Hear him debate of commonwealth affairs,You would say it hath been all in all his study:List his
of policy,The Gordian knot of it he will unloose,Familiar as his garter: that, when he speaks,The air, a charter'd libertine, is
DETAILS FRAGMENT

TitlesFragment

- extends the ListFragment class
  - other useful subclasses of Fragment
  - DialogFragment
  - PreferenceFragment
  - WebViewFragment
- Displays a list of Shakespeare play titles

Summary - Detail Fragment

- Displays some prose from the play
- A subclass of Fragment
- Sometimes displayed in the FragmentLayout Activity
  - landscape
- Sometimes displayed in a DetailsActivity Activity
  - portrait

General approach for creating a Fragment:

1. Create user interface by defining widgets in a layout file
2. create Fragment class and set view to be defined layout
   - in the onCreateView method
3. wire up widgets in the fragment when inflated from layout code

From *Android Programming - The Big Nerd Ranch Guide*

Detail Fragment Layout File

```
<?xml version="1.0" encoding="utf-8"?>
<ScrollView xmlns:android="http://schemas.android.co
    android:layout_width="match_parent"
    android:layout_height="match_parent" >

    <TextView
        android:id="@+id/text_view_fragment_detail"
        android:padding="10dp"
        android:layout_width="match_parent"
        android:layout_height="wrap_content"
        android:textSize="18sp"
        android:orientation="vertical" >
    </TextView>

</ScrollView>
```

DetailsFragment

```
public static class DetailsFragment extends Fragment {
```

- If necessary override onCreate(Bundle)
- DO NOT inflate the View in onCreate
  - just complete any items for Fragment to get ready other than the View
  - internal logic / object data for example

DetailFragment

- onCreateView method used to inflate View
  - generally must override this method

```
@Override
public View onCreateView(LayoutInflater inflater, ViewGroup container
        Bundle savedInstanceState) {

    View v = inflater.inflate(R.layout.detail_fragment_layout,
            container, false);
    Log.d("FRAGMENT", "" + v);
    TextView tv =
            (TextView) v.findViewById(R.id.text_view_fragment_detail)

    tv.setText(Shakespeare.DIALOGUE[getShownIndex()]);
    return v;
```

getShownIndex

- In the DetailsFragment
- returns int corresponding to which play is currently displayed

```
public int getShownIndex() {
    return getArguments().getInt("index", 0);
}
```

- used in DetailsFragment onCreateView to find proper text and in TitlesFragment to decide if new Fragment needed

getArguments

- Fragments can have a Bundle object attached to them
- referred to as ***arguments***
- Create Bundle and attach after fragment created, but before fragment added to Activity
- convention: create static method **`newInstance`** that creates Fragment and bundles up arguments

getArguments

```
/**
 * Create a new instance of DetailsFragment, initialize
 * show the text at 'index'.
 */
public static DetailsFragment newInstance(int index) {
    DetailsFragment f = new DetailsFragment();

    // Supply index input as an argument.
    Bundle args = new Bundle();
    args.putInt("index", index);
    f.setArguments(args);

    return f;
}
```

index from Activity creating Fragment

List of Titles

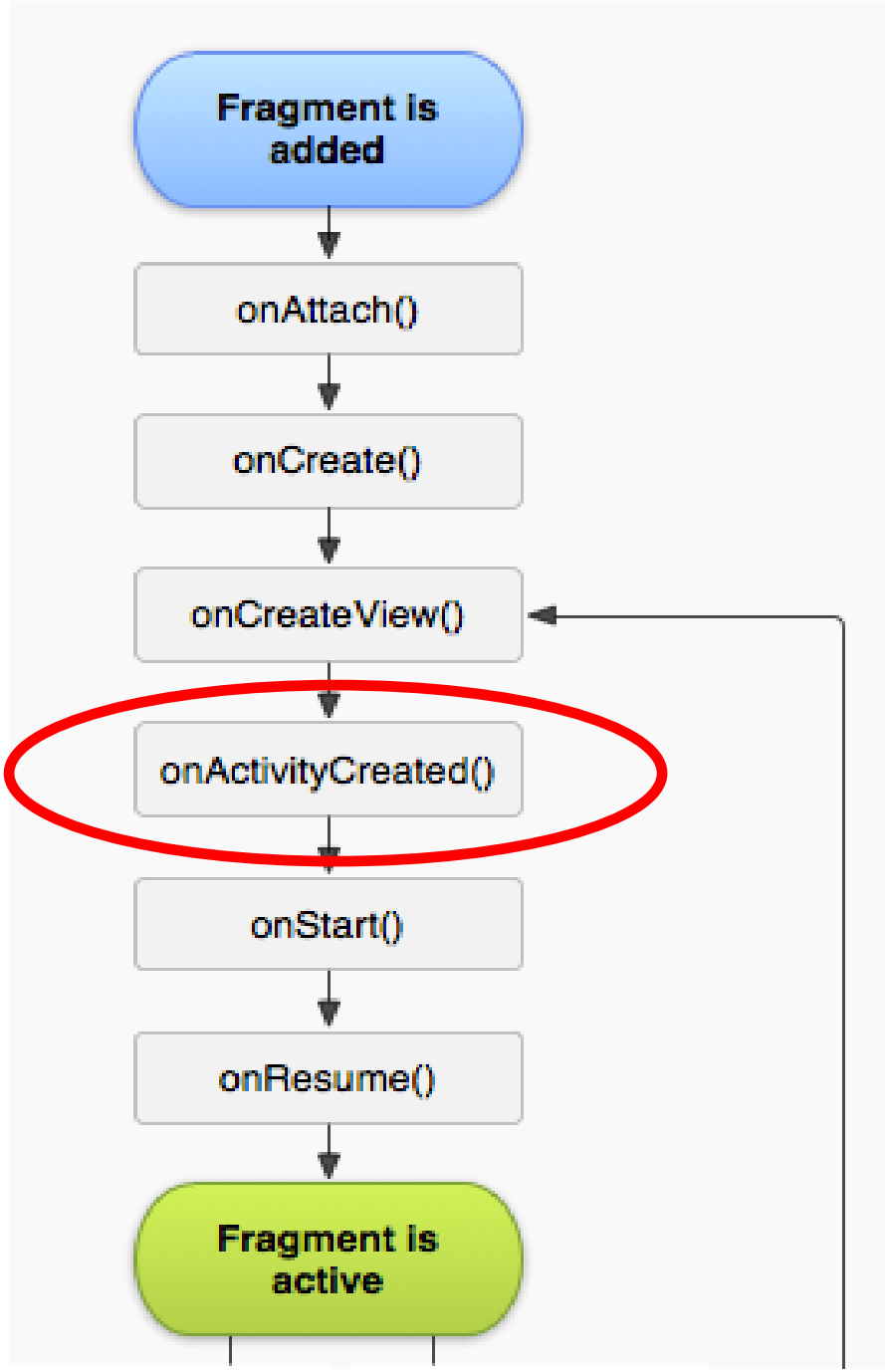
- Uses a ListFragment
  - analogous to a ListActivity

```
public static class TitlesFragment extends ListFragment {

    boolean mDualPane;
    int mCurCheckPosition = 0;
```

- Top level fragment in example

ListFragment

- No layout necessary as ListFragments have a default layout with a single ListView
- Set up done for this Fragment done in onActivityCreated



TitlesFragment onActivityCreated

Called when the Activity that holds this Fragment has completed its onCreate method

```
@Override
public void onActivityCreated(Bundle savedInstanceState) {
    super.onActivityCreated(savedInstanceState);

    // Populate list with our static array of titles.
    setListAdapter(new ArrayAdapter<String>(getActivity(),
            android.R.layout.simple_list_item_activated_1,
            Shakespeare.TITLES));

    // Check to see if we have a frame in which to embed the details
    // fragment directly in the containing UI.
    View detailsFrame = getActivity().findViewById(R.id.details);
    mDualPane = detailsFrame != null
            && detailsFrame.getVisibility() == View.VISIBLE;
```

TitlesFragment onActivityCreated

```
if (savedInstanceState != null) {
    // Restore last state for checked position.
    mCurCheckPosition
            = savedInstanceState.getInt("curChoice", 0);
}

if (mDualPane) {
    // In dual-pane mode, the list view highlights the selecte
    getListView().setChoiceMode(ListView.CHOICE_MODE_SINGLE);
    // Make sure our UI is in the correct state.
    showDetails(mCurCheckPosition);
}
```

showDetails

- used to show portion of play selected from the list fragment
- in portrait mode, starts a new Activity
  - DetailsActivity that hosts a DetailsFragment
  - similar to what we have seen before, one Activity, starting another Activity with an Intent
- in landscape mode (mDualPane) if the DetailsFragment does not exist or is a different play, a new DetailsFragments is created

TitlesFragment ShowDetails

- Portrait mode - !mDualPane
- traditional start another Activity via an Intent

```
} else {
    // Otherwise we need to launch a new activity to disp
    // the dialog fragment with selected text.
    Intent intent = new Intent();
    intent.setClass(getActivity(), DetailsActivity.class)
    intent.putExtra("index", index);
    startActivity(intent);
}
```

TitlesFragment ShowDetails

- DetailsFragment placed side by side with titles

```
if (mDualPane) {
    // We can display everything in-place with fragments, so updat
    // the list to highlight the selected item and show the data.
    getListView().setItemChecked(index, true);

    // Check what fragment is currently shown, replace if needed.
    DetailsFragment details = (DetailsFragment)
            getFragmentManager().findFragmentById(R.id.details);
```

TitlesFragment ShowDetails

- rest of dual pane logic

```
if (details == null || details.getShownIndex() != index) {
    // Make new fragment to show this selection.
    details = DetailsFragment.newInstance(index);

    // Execute a transaction, replacing any existing fragment
    // with this one inside the frame.
    FragmentTransaction ft
            = getFragmentManager().beginTransaction();

    ft.replace(R.id.details, details);
    ft.setTransition(FragmentTransaction.TRANSIT_FRAGMENT_FADE);
    ft.commit();
}
```

Using the Fragments

- Activities add Fragments in two ways:
  1. As part of the layout file (hard coded, less flexible)
  2. Programmatically (in the code, more flexible)

Shakespeare Example

- Titles Fragment in the layout file, hard coded
- One layout file for portrait, single fragment
- In landscape layout file:
  - the other fragment, the details fragment, is added programmatically

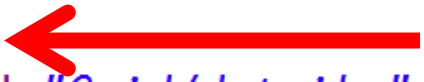
Shakespeare Portrait Layout

```
<FrameLayout xmlns:android="http://schemas.android.com/apk/res/a
    android:layout_width="match_parent"
    android:layout_height="match_parent">
    <fragment class="com.example.android.apis.app.FragmentLayout
            android:id="@+id/titles"
            android:layout_width="match_parent"
            android:layout_height="match_parent" />
</FrameLayout>
```

Name of Fragment class:
FragementLayout$TitlesFragment
an inner class

Shakespeare Landscape Layout

```
<LinearLayout xmlns:android="http://schemas.android.com/apk/res/android"
    android:layout_width="match_parent"
    android:layout_height="match_parent"
    android:orientation="horizontal" >

    <fragment
        android:id="@+id/titles"
        android:layout_width="0px"
        android:layout_height="match_parent"
        android:layout_weight="1"
        class="com.example.android.apis.app.FragmentLayout$TitlesFragmen

    <FrameLayout
        android:id="@+id/details"
        android:layout_width="0px"
        android:layout_height="match_parent"
        android:layout_weight="1"
        android:background="?android:attr/detailsElementBackground" />

</LinearLayout>
```



FrameLayout to hold details fragment

Adding Fragment Programmatically

- Back to TitleFragment showDetails method

```
if (mDualPane) {
    // We can display everything in-place with fragments, so updat
    // the list to highlight the selected item and show the data.
    getListView().setItemChecked(index, true);

    // Check what fragment is currently shown, replace if needed.
    DetailsFragment details = (DetailsFragment)
            getFragmentManager().findFragmentById(R.id.details);
```

Adding Fragment Programmatically

```
if (details == null || details.getShownIndex() != index) {
    // Make new fragment to show this selection.
    details = DetailsFragment.newInstance(index);

    // Execute a transaction, replacing any existing fragment
    // with this one inside the frame.
    FragmentTransaction ft
            = getFragmentManager().beginTransaction();

    ft.replace(R.id.details, details);
    ft.setTransition(FragmentTransaction.TRANSIT_FRAGMENT_FAD
    ft.commit();
}
```

Adding a Fragment

- To add fragment to an Activity during runtime:
- must specify a ViewGroup in the Activity's layout to place the fragment
- In Shakespeare Activity it is the FrameLayout, second element in LinearLayout in the portrait layout file

Adding a Fragment

- To actually add the Fragment must get the *FragmentManager* for the Activity
- and perform a *FragmentTransaction*
- Activity.getFragmentManager() and Fragment.getFragmentManager()

```
// Check what fragment is currently shown, replace i
DetailsFragment details = (DetailsFragment)
        getFragmentManager().findFragmentById(R.id.a
```

FragmentManager

- In example:
- A little odd that it is the TitleFragment, not the Activity managing the DetailsFragment
- Fragment manager used to determine if fragment already exists
- uses id for layout
  - for Fragments without a layout findFragmentByTag method

FragmentManager

- maintains a *Back Stack* of fragment transactions
- analogous to the Activity Stack
- allows Activity to go back through changes to fragments, like back button and activities themselves
- methods to get Fragments, work with back stack, register listeners for changes to back stack

FragmentTransaction

- Make changes to fragments via FragmentTransactions
- obtained via FragmentManager
- used to add, replace, remove Fragments

no details fragment or wrong one

```
if (details == null || details.getShownIndex() != index) {
    // Make new fragment to show this selection.
    details = DetailsFragment.newInstance(index);

    // Execute a transaction, replacing any existing fragment
    // with this one inside the frame.
    FragmentTransaction ft
            = getFragmentManager().beginTransaction();

    ft.replace(R.id.details, details);
    ft.setTransition(FragmentTransaction.TRANSIT_FRAGMENT_FADE);
    ft.commit();
}
```

Inter Fragment Communication

- In an Activity with multiple Fragments, the Fragments sometimes have to send information back and forth
- Fragment to Fragment communication is frowned upon
- Instead use the Activity that holds the Fragments to pass messages around
- Create your own interface with call back methods
  - fragment defines the interface
  - Activity implements the interface

STYLES

Styles

- Defined in XML file
- res/values/style
- similar to a cascading style sheet as used in html
- group layout attributes in a style and apply to various View objects (TextView, EditText, Button)

Sample Styles, in styles.xml

```
<style name="sample1">
    <item name="android:textSize">20pt</item>
    <item name="android:textColor">@color/Orange</item>
    <item name="android:textStyle">bold</item>
    <item name="android:gravity">center</item>
    <item name="android:padding">10dp</item>
</style>

<style name="sample2">
    <item name="android:textSize">8pt</item>
    <item name="android:textColor">@color/AliceBlue</item>
    <item name="android:textStyle">italic</item>
    <item name="android:gravity">right</item>
    <item name="android:padding">2dp</item>
</style>
```

Apply Style - in main xml

```
<TextView
    android:id="@+id/textView1"
    style="@style/sample2"
    android:layout_width="wrap_content"
    android:layout_height="wrap_content"
    android:text="field number 1" />

<EditText
    android:id="@+id/editText1"
    style="@style/sample1"
    android:layout_width="fill_parent"
    android:layout_height="wrap_content"
    android:inputType="textCapWords"
    android:text="First Edit Text" />

<TextView
    android:id="@+id/textView2"
    style="@style/sample2"
    android:layout_width="wrap_content"
    android:layout_height="wrap_content"
    android:text="field number 2" />
```

Result of Styles

- can override elements of style
  - bottom edit text overrides color
- one style can inherit from another
- use UI editor to create view and then extract to style