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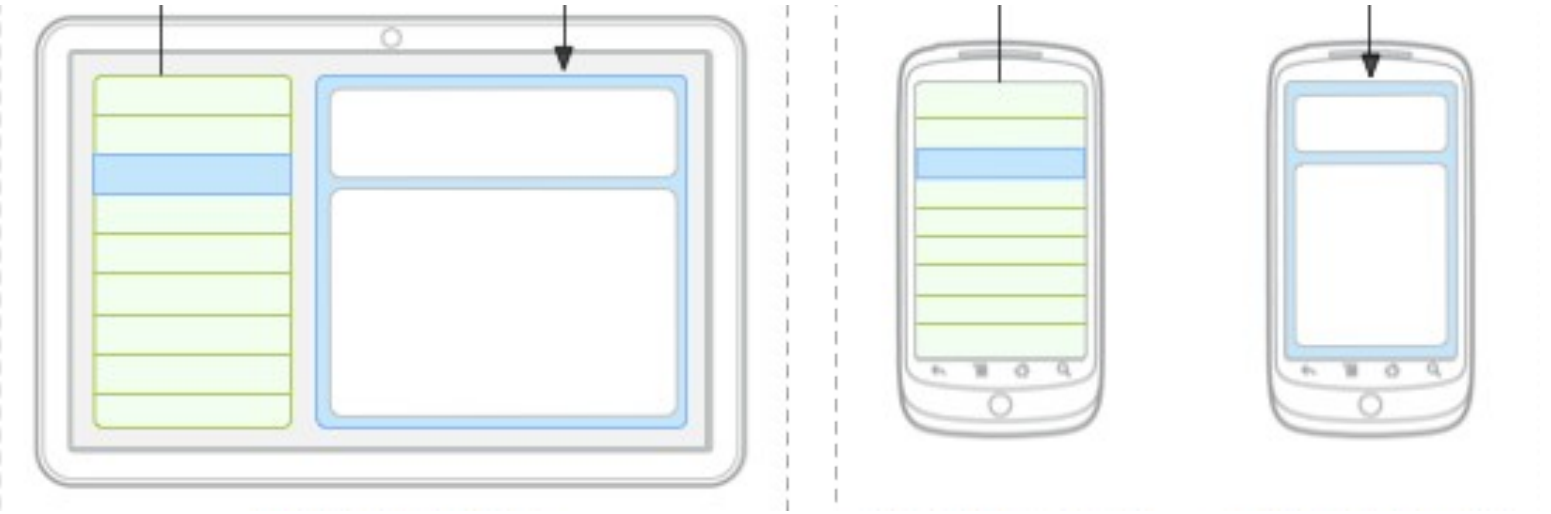
Fragments

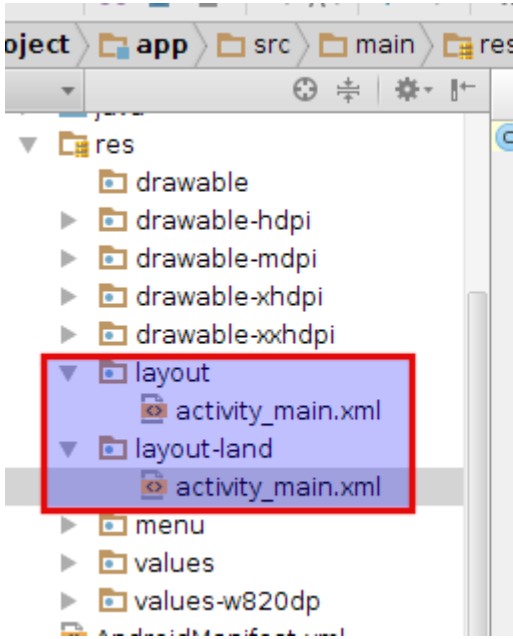
Situational layouts

- Your app can use different layout in different situations:
  - different device type (tablet vs phone vs watch)
  - different screen size
  - different orientation (portrait vs. landscape)
  - different country or locale (language, etc.)



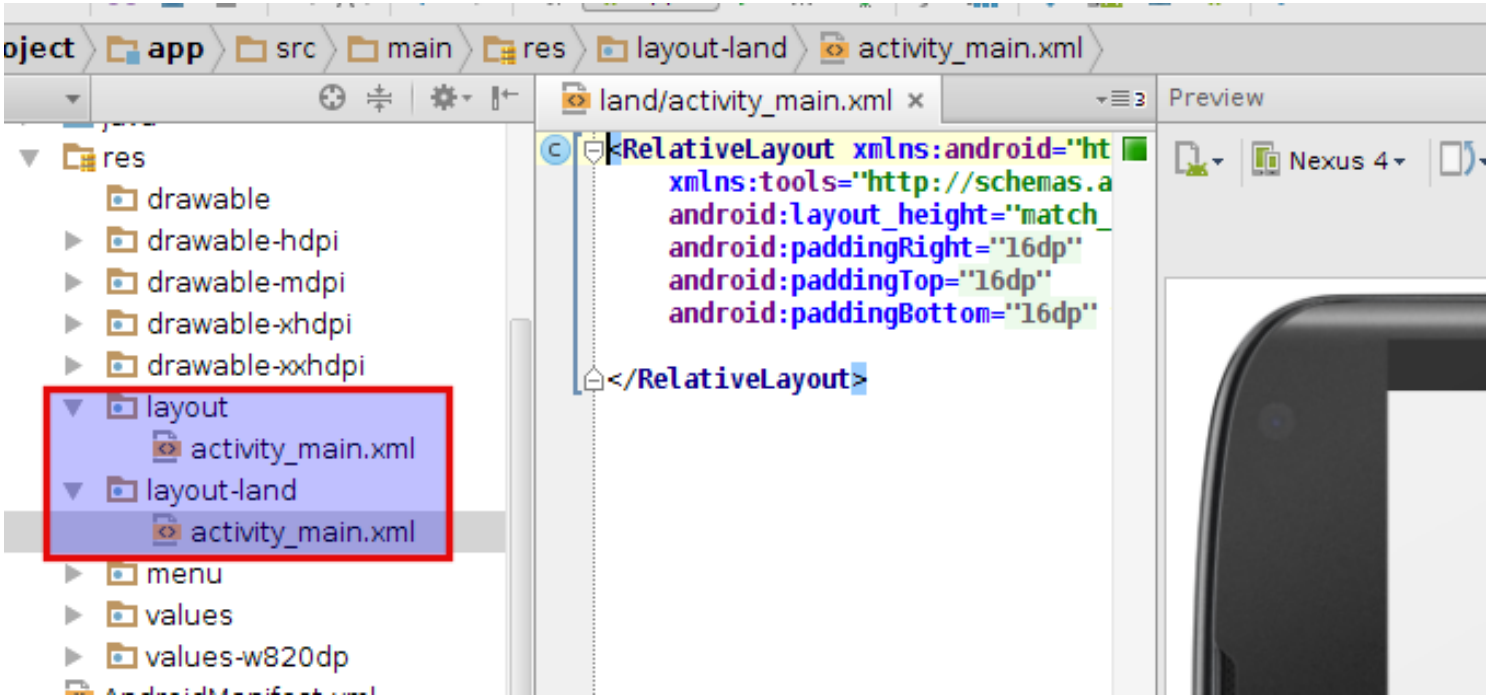
Situation-specific folders

- Your app will look for resource folder names with suffixes:
  - screen density (e.g. **drawable-hdpi**) (link)
    - xhdpi: 2.0 (twice as many pixels/dots per inch)
    - hdpi: 1.5
    - mdpi: 1.0 (baseline)
    - ldpi: 0.75
  - screen size (e.g. layout-large) (link)
    - small, normal, large, xlarge
  - orientation (e.g. layout-land)
    - portrait (), land (landscape)



Portrait vs landscape layout

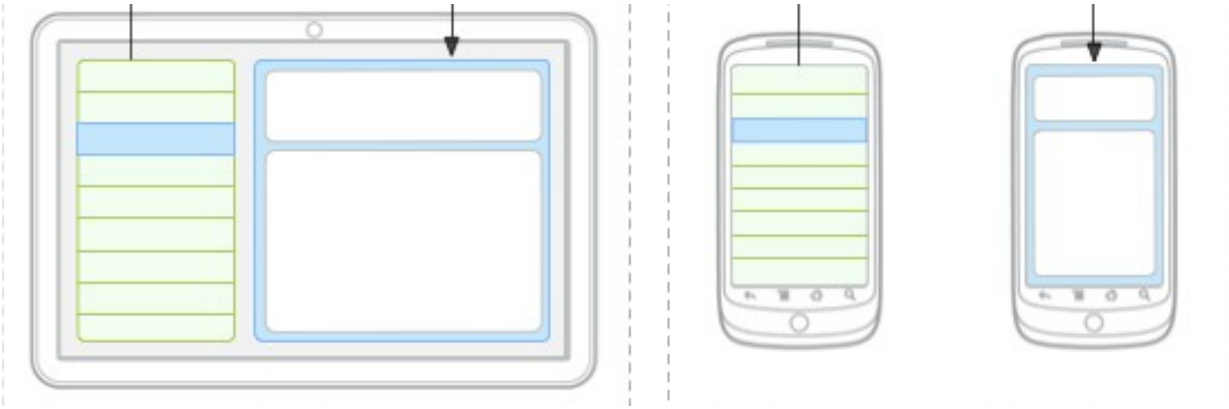
- To create a different layout in landscape mode:
  - create a folder in your project called **res/layout-land**
  - place another copy of your activity's **layout XML file** there
  - modify it as needed to represent the differences



Problem: redundant layouts

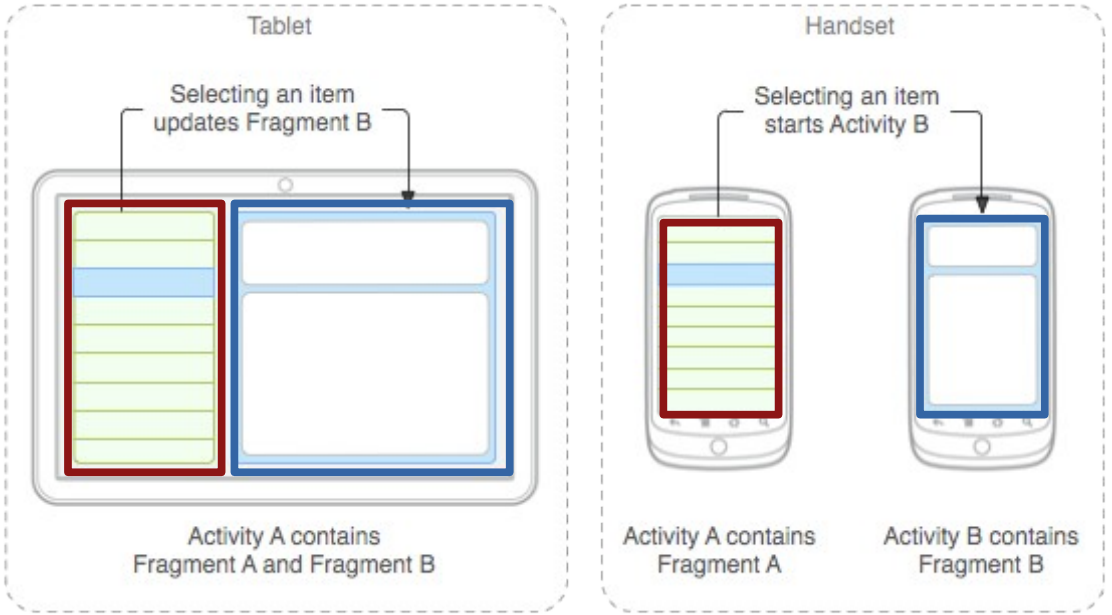
- With situational layout you begin to encounter **redundancy**.
  - The layout in one case (e.g. portrait or medium) is very similar to the layout in another case (e.g. landscape or large).
  - You don't want to represent the same XML or Java code multiple times in multiple places.

- You sometimes want your code to behave **situationally**.
  - In portrait mode, clicking a button should launch a new **activity**.
  - In landscape mode, clicking a button should launch a new **view**.



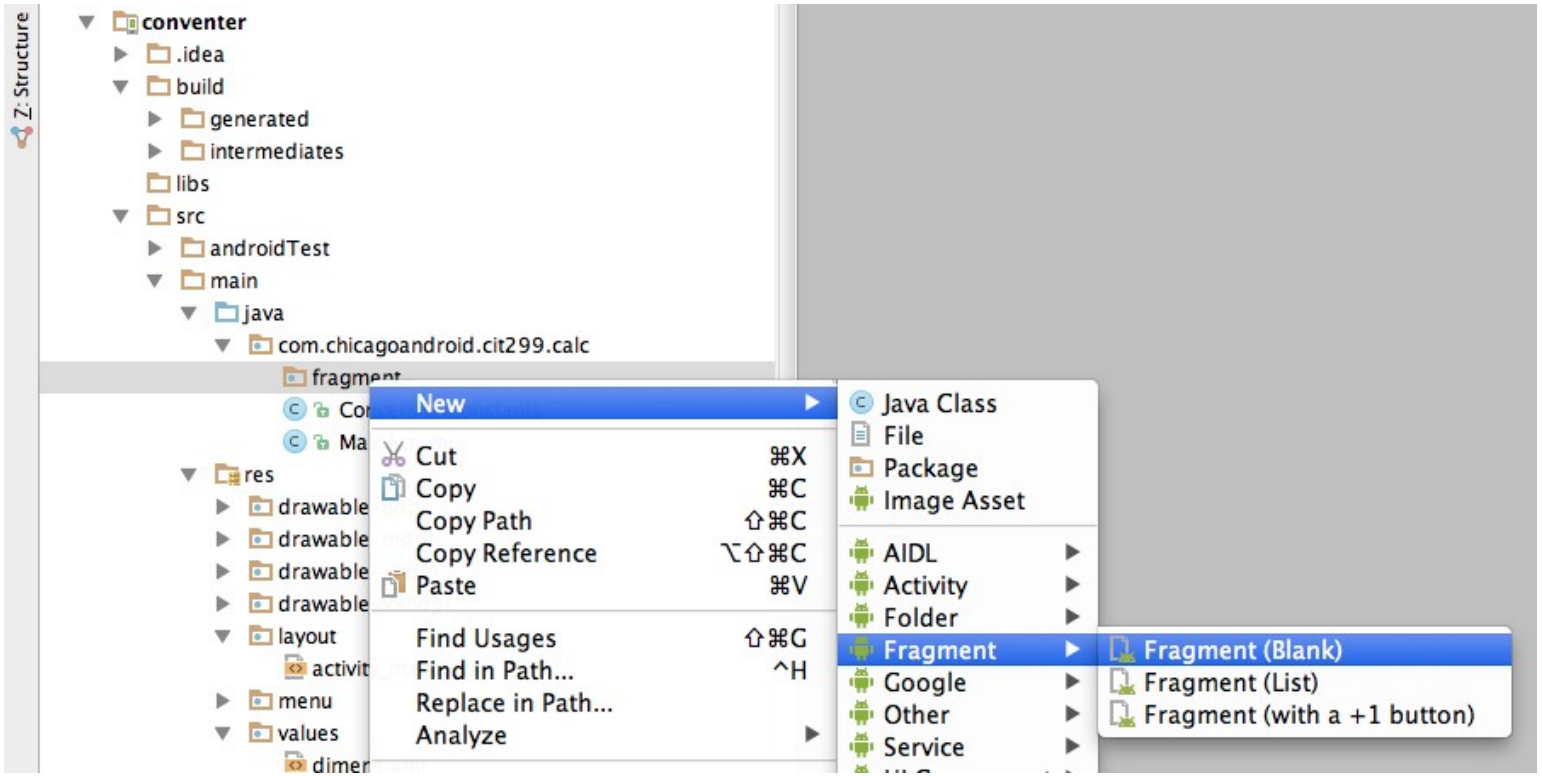
Fragments (link)

- **fragment**: A reusable segment of Android UI that can appear in an activity.
  - can help handle different devices and screen sizes
  - can reuse a common fragment across multiple activities
  - first added in Android 3.0 *(usable in older versions if necessary)*



Creating a fragment

- In Android Studio, right-click app, click:
  New → Fragment → Fragment (blank)
  - un-check boxes about "Include __ methods"
  - now create layout XML and Java event code as in an `Activity`



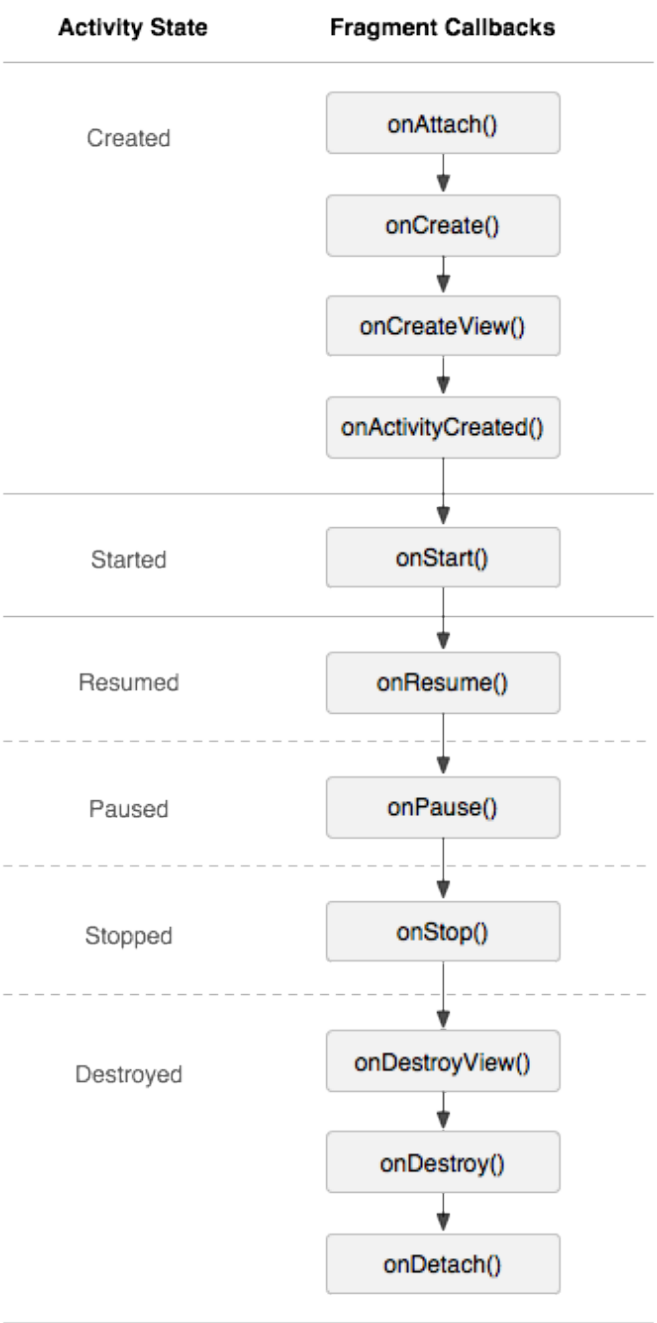
Using fragments in activity XML

- Activity layout XML can include fragments.

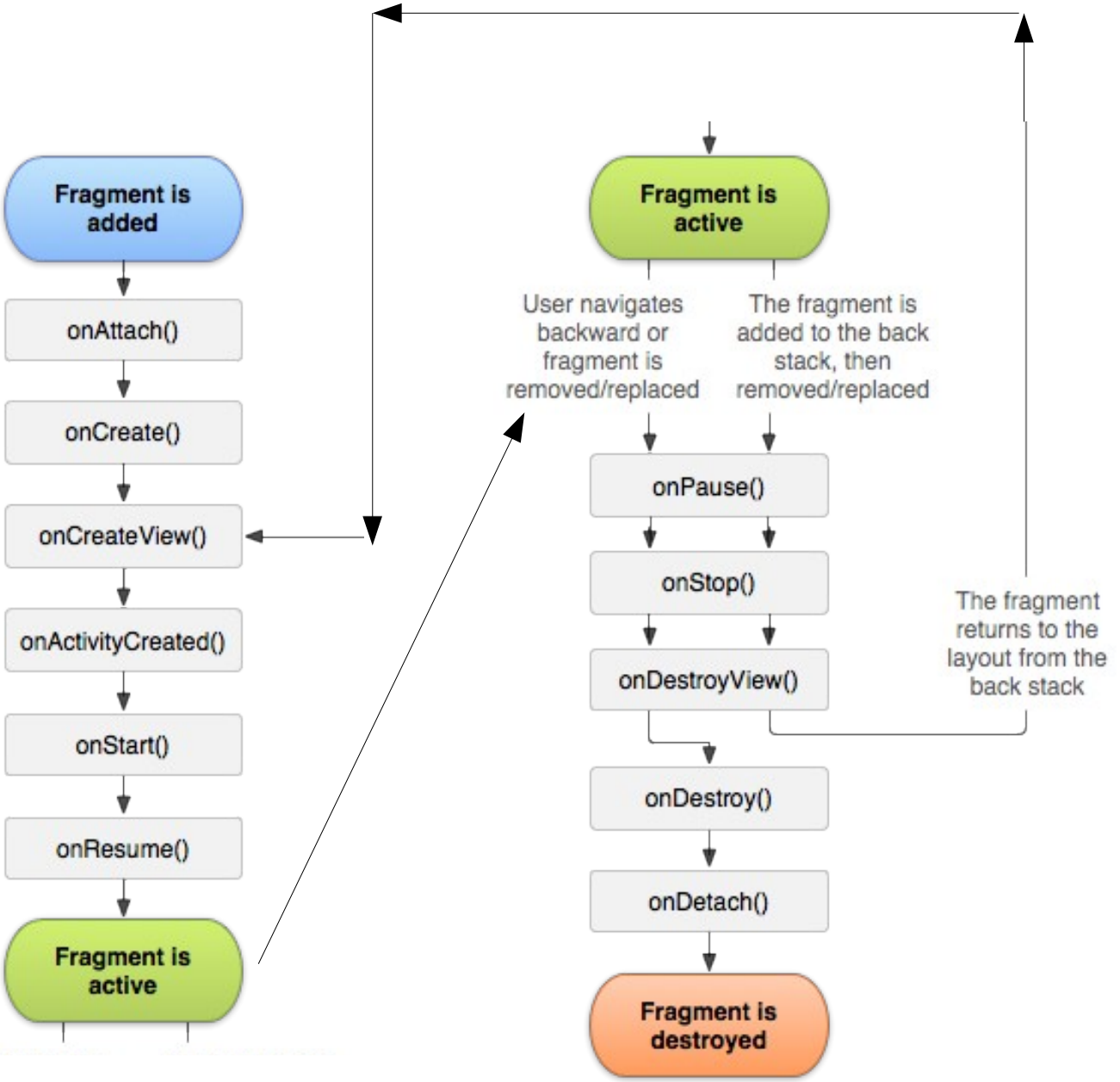
```
<!-- activity_name.xml -->
<LinearLayout ...>
    <fragment ...
        android:id="@+id/id1"
        android:name="ClassName1"
        tools:layout="@layout/name1" />
    <fragment ...
        android:id="@+id/id2"
        android:name="ClassName2"
        tools:layout="@layout/name2" />
</LinearLayout>
```

Fragment life cycle

- Fragments have a similar **life cycle** and events as activities.
- Important methods:
  - **onAttach** to glue fragment to its surrounding activity
  - **onCreate** when fragment is loading
  - **onCreateView** method that must return fragment's root UI view
  - **onActivityCreated** method that indicates the enclosing activity is ready
  - **onPause** when fragment is being left/exited
  - **onDetach** just as fragment is being deleted



Another fragment lifecycle view



Fragment template

```
public class Name extends Fragment {
    @Override
    public View onCreateView(LayoutInflater inflater,
            ViewGroup vg, Bundle bundle) {
        // load the GUI layout from the XML
        return inflater.inflate(R.layout.id, vg, false);
    }

    public void onActivityCreated(Bundle savedState) {
        super.onActivityCreated(savedState);
        // ... any other GUI initialization needed
    }

    // any other code (e.g. event-handling)
}
```

Fragment vs. activity

- Fragment code is similar to activity code, with a few changes:
  - Many activity methods aren't present in the fragment, but you can call **`getActivity`** to access the activity the fragment is inside of.

```
~~Button b = (Button) findViewById(R.id.but);~~
Button b = (Button) getActivity().findViewById(R.id.but);
```

  - Sometimes also use `getView` to refer to the activity's layout
  - Event handlers cannot be attached in the XML any more. :-(
    - Must be attached in Java code instead.
  - Passing information to a fragment (via Intents/Bundles) is trickier.
    - The fragment must ask its enclosing activity for the information.
  - Fragment initialization code must be mindful of order of execution.
    - Does it depend on the surrounding activity being loaded? Etc.
    - Typically move `onCreate` code to `onActivityCreated`.

Fragment onClick listener

- Activity:

```
<Button android:id="@+id/b1"
        android:onClick="onClickB1" ... />
```

- Fragment:

```
<Button android:id="@+id/b1" ... />

// in fragment's Java file
Button b = (Button) getActivity().findViewById(r.id.b1);
b.setOnClickListener(new View.OnClickListener() {
    @Override public void onClick(View view) {
        // whatever code would have been in onClickB1
    }
});
```

Activity that accepts parameters

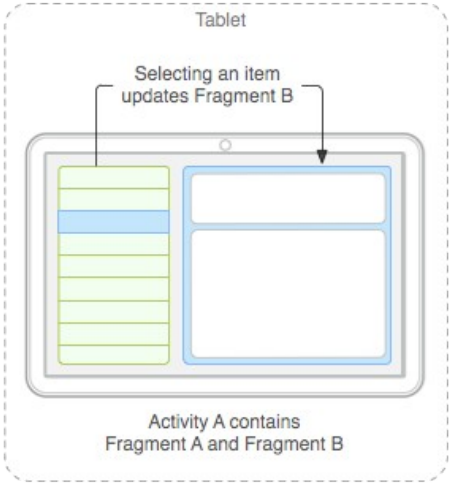
```
public class Name extends Activity {
    @Override
    protected void onCreate(Bundle savedInstanceState) {
        super.onCreate(savedInstanceState);
        setContentView(R.layout.name);

        // extract parameters passed to activity from intent
        Intent intent = getIntent();
        int name1 = intent.getIntExtra("id1", default);
        String name2 = intent.getStringExtra("id2", "default");

        // use parameters to set up the initial state
        ...
    }
    ...
}
```

Fragment that accepts parameters

```
public class Name extends Fragment {
    @Override
    public View onCreateView(LayoutInflater inflater,
            ViewGroup container, Bundle savedInstanceState) {
        return inflater.inflate(R.layout.name, container, false);
    }

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

        // extract parameters passed to activity from intent
        Intent intent = getActivity().getIntent();
        int name1 = intent.getIntExtra("id1", default);
        String name2 = intent.getStringExtra("id2", "default");

        // use parameters to set up the initial state
        ...
    }
```

Communication between fragments

- One activity might contain multiple fragments.
- The fragments may want to talk to each other.
  - Use activity's `getFragmentManager` method.
  - its `findFragmentById` method can access any fragment that has an id.



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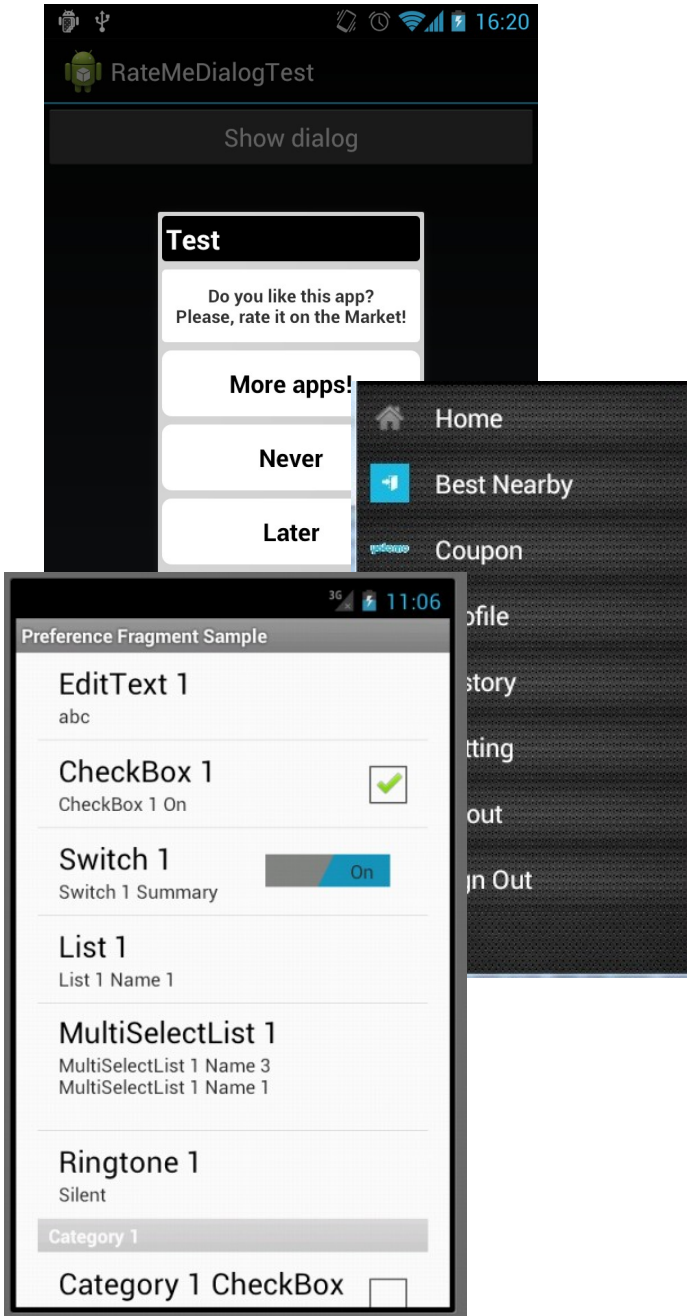
```
Activity act = getActivity();
if (act.getResources().getConfiguration().orientation ==
      Configuration.ORIENTATION_LANDSCAPE) {
      // update other fragment within this same activity
      FragmentClass fragment= (FragmentClass)
      act.getFragmentManager().findFragmentBy(R.id.id);
      fragment.methodName(parameters);
```

Fragment subclasses

- `DialogFragment` - a fragment meant to be shown as a dialog box that pops up on top of the current activity.
- `ListFragment` - a fragment that shows a list of items as its main content.
- `PreferenceFragment` - a fragment whose main content is meant to allow the user to change settings for the app.



Create a fragment: Step 1

```
import android.support.v4.app.Fragment;
public static class ExampleFragment extends Fragment {

    @Override
    public View onCreateView(LayoutInflater inflater, ViewGroup
                                container, Bundle savedInstanceState) {
        // Inflate the layout for this fragment
        return inflater.inflate(R.layout.example_fragment, container, false);
    }
}
```

Activity parent's ViewGroup

Bundle that provides data about the previous instance of the fragment, if the fragment is being resumed

Have *example_fragment.xml* file that contains the layout

Create a fragment: Step 2 (Option 1)

- Adding fragment to an Activity via Activity layout XML

```
<?xml version="1.0" encoding="utf-8"?>
<LinearLayout
xmlns:android="http://schemas.android.com/apk/res/android"
    android:orientation="horizontal"
    android:layout_width="match_parent"
    android:layout_height="match_parent">
    <fragment
            android:name="com.example.news.ArticleListFragment"
          android:id="@+id/list"
          android:layout_weight="1"
          android:layout_width="0dp"
          android:layout_height="match_parent" />
    <fragment
            android:name="com.example.news.ArticleReaderFragment"
          android:id="@+id/viewer"
          android:layout_weight="2"
          android:layout_width="0dp"
          android:layout_height="match_parent" />
</LinearLayout>
```

Create a fragment: Step 2 (Option 2)

- Adding Fragment inside Activity code (dynamically anywhere or in onCreate() callback)

```
//get FragmentTransaction associated with this Activity
FragmentManager manager = getSupportFragmentManager( );
FragmentTransaction transaction = manager.beginTransaction( );

//Create instance of your Fragment
ExampleFragment fragment = new ExampleFragment();


//Add Fragment instance to your Activity
transaction.add(R.id.fragment_container, fragment);Add tag here if needed
transaction.commit();
```

This points to the Activity ViewGroup in which the fragment should be placed, specified by resource ID

Create a fragment: Step 2

- Note: When you add a fragment to an activity layout by defining the fragment in the layout XML file, you cannot remove the fragment at runtime.

- If you plan to swap your fragments in and out during user interaction, you must add the fragment to the activity dynamically when the activity first starts

Managing Fragments

FragmentManager methods:

- Get fragments that exist in Activity
  - findFragmentById( ) (for fragments that provide a UI in the activity layout)
- Pop fragments off the back stack,
  - popBackStack() (simulating a *Back* command by the user).
- Register a listener for changes to the back stack,
  - addOnBackStackChangedListener().

Fragment Transactions – adding, removing and replacing dynamically

```
// Create new fragment and transaction
 Fragment newFragment = new ExampleFragment();
 FragmentTransaction transaction =
getFragmentManager().beginTransaction();

// Replace whatever is in the fragment_container view with this fragment
// and add the transaction to the back stack
  transaction.replace(R.id.fragment_container, newFragment);
  transaction.addToBackStack(null);

// Commit the transaction
   transaction.commit();
```

Add this transaction to the back stack. This means that the transaction will be remembered after it is committed, and will reverse its operation when later popped off the stack (back button)