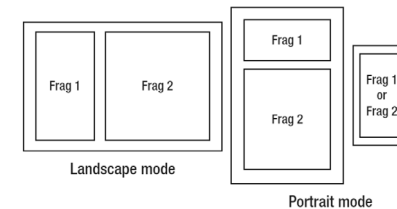


Mobile Computing

Fragments

Fragments (1)

- ❖ Activities are used to define a full screen interface and its functionality
 - That's right for small screen devices (smartphones)
 - In bigger devices we can have more interface elements and functionality
 - e.g. a list of e-mails and the content of the selected item
 - That's difficult to adapt using only activities



- Recent versions of Android defined the fragment interface

Fragments (2)

- ❖ Fragments can be viewed as sub-activities
 - They have their own View hierarchy (layout)
 - They have their own lifecycle, but related to the parent activity lifecycle
 - They can respond to the back button, like activities
 - But fragments are contained inside an activity
 - They use the same thread (the UI thread)
 - They use the same context of the activity
 - Fragments can coexist with other elements of the activity
- The activity layout can contain one or more fragments
- The fragment lifecycle is related with its activity lifecycle
 - Lifecycle callbacks are called intermixed with the activity callbacks and executed by the same thread

Fragment layouts

- ❖ Fragments have their own internal layout
- ❖ Those layouts are included in activity layouts
 - Permanently through the <fragment> tag
 - Dynamically attaching and removing to some ViewGroup in the activity layout
 - The parent ViewGroup is usually a FrameLayout

Example
Activity
layout

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

    <fragment
        android:id="@+id/titles"
        android:name="org.feup.apm.shakespearefragments.TitlesFragment"
        android:layout_width="0dp"
        android:layout_height="match_parent"
        android:layout_weight="1" />

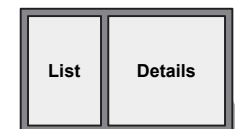
    <FrameLayout
        android:id="@+id/details"
        android:layout_width="0dp"
        android:layout_height="match_parent"
        android:layout_weight="2" />
</LinearLayout>
```

class implementing
the fragment

static

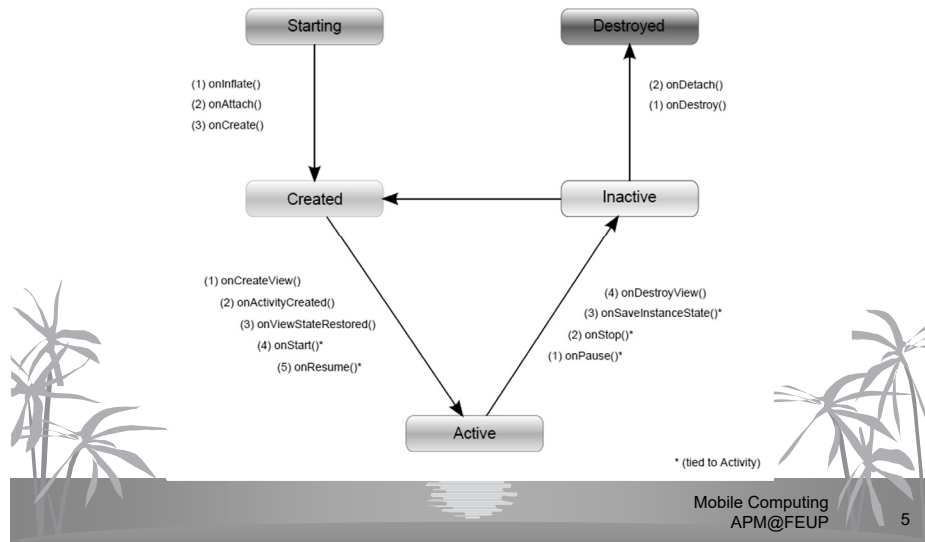
placeholder for
attaching fragments

dynamic



Fragment lifecycle

❖ The fragment lifecycle follows the parent activity



Lifecycle callbacks (1)

Entry sequence callbacks:

onInflate(Activity activity, AttributeSet attrs, Bundle savedInstanceState) – called in the beginning whenever the activity sets its content layout and has a <fragment> in it. The AttributeSet contains the attributes defined in the activity layout. They should be parsed and saved. The fragment is not yet attached to the activity.

onAttach(Activity activity) – The activity containing the fragment is now attached. You can save it, or get it, while the fragment is attached, using getActivity(). You can get the initialization arguments (set by getArguments()) until this point) anytime after with getArguments().

onCreate(Bundle savedInstanceState) – called at the beginning of the owner activity onCreate() callback. Usually the activity View hierarchy is not yet inflated. You can create here another thread to do lengthy data loading operations.

onCreateView(LayoutInflater inflater, ViewGroup container, Bundle savedInstanceState) – Here you should return the inflated View of this fragment. If the container is null you should return null (the fragment will not be displayed). The container is the ViewGroup in the activity layout that will display the fragment. Do not attach the fragment to this container. Some specialized fragments (e.g. ListFragment) do not need this callback.

onActivityCreated(Bundle savedInstanceState) – here the onCreate() method of the activity is now complete. The all interface is now built, including other present fragments.

Lifecycle callbacks (2)

onStart() and **onResume()** – tied with the activity corresponding callbacks.

The exit sequence of callbacks include the following, and they are called when the activity is also exiting or the fragment is being replaced (back button, other actions ...)

onPause() – the first to be called (the fragment can be put on the fragment back stack). You should stop playing sounds, related to this fragment, here.

onStop() – tied with the onStop() callback of the activity. A stopped fragment can go straight to the onStart() callback.

onDestroyView() – when the fragment is being killed or saved this will be called. Here its View hierarchy is already detached from the activity layout.

onDestroy() – is called when the fragment is no longer in use (but still existing in the activity).

onDetach() – here the fragment does not belong anymore to the activity and the interface resources are already freed.

onSaveInstanceState(Bundle outState) – called somewhere before onDestroy(). It should save internal state in the provided Bundle. That Bundle is passed to the entry callbacks.

Fragment creation

❖ Fragments can be constructed by the system

- Whenever the activity inflates its layout and has a <fragment> element in it (static)

❖ They can be built in your code

- If you want to replace or attach a new fragment to some container (dynamic)

- In this case you should write a static factory method in your fragment class (if you need to pass arguments)
- Fragment classes should not have constructors

Example

```

public static MyFragment newInstance(int index) {
    MyFragment f = new MyFragment();
    Bundle args = new Bundle();
    args.putInt("index", index);
    f.setArguments(args);
    return f;
}
    
```

- The standard way to build a Fragment and pass it initialization parameters. They should be 'bundled' and put in the class with setArguments().
- They will be available inside the fragment code with getArguments().
- This arguments bundle is automatically preserved in rotations

FragmentManager

❖ Activities and Fragments can manipulate the active fragments

- That is the task of the **FragmentManager** object
 - It is obtained with `getSupportFragmentManager()` from an Activity or Fragment
 - It can find Fragments
 - It can manipulate the fragment back stack
 - It can save and restore references to fragments and fragment internal state
 - Adding, replacing, removing, hiding and showing existing fragments must be done inside a transaction
 - `beginTransaction()` begins a new transaction and returns a **FragmentTransaction** object
 - **FragmentTransaction** do the stated operations on fragments
 - At the end you should call `commit()` on the **FragmentTransaction**

Example

Suppose we have an activity showing some information, in a fragment, according to a list selection (position).
The fragment, when constructed, is supplied with this position info, and its layout will contain the corresponding data.

The handler for a new selection in the original list could be the following, replacing the visualizing fragment by a new one:

```
// See if there is a fragment displayed already
DetailsFragment details = getSupportFragmentManager().findFragmentByld(R.id.details);
if (details == null || details.getIndexInfo() != position) { // no fragment or not the current data
    // Make a new fragment to show this selection.
    details = DetailsFragment.newInstance(position);

    // Execute a transaction, replacing any existing fragment with the new one.
    FragmentTransaction ft = getSupportFragmentManager().beginTransaction();
    ft.setCustomAnimations(R.animator.slide_in_left, R.animator.slide_out_right);
    ft.replace(R.id.details, details);
    // The transaction is added to the back stack to allow undoing it (with the back button)
    ft.addToBackStack("Details");
    ft.commit();
}
```

Fragment implementation example

```
<ScrollView xmlns:android="http://schemas.android.com/apk/res/android"
    android:id="@+id/scroller"
    android:layout_width="match_parent"
    android:layout_height="match_parent" >
    <TextView
        android:id="@+id/text1"
        android:layout_width="match_parent"
        android:layout_height="wrap_content" />
</ScrollView>
```

The Details fragment internal layout

(for a big TextView (with scroll))

```
public class DetailsFragment extends Fragment {
    private int mIndex = 0;

    public static DetailsFragment newInstance(int index) {
        DetailsFragment df = new DetailsFragment();
        Bundle args = new Bundle();
        args.putInt("index", index);
        df.setArguments(args);
        return df;
    }

    @Override
    public void onCreate(Bundle myBundle) {
        super.onCreate(myBundle);
        mIndex = getArguments().getInt("index", 0);
    }

    public int getShownIndex() {
        return mIndex;
    }
}
```

The Details fragment implementation

(the method that returns the fragment layout)

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

    if(container == null)
        return null;

    // Don't tie this fragment to anything through the inflater.
    View v = inflater.inflate(R.layout.details, container, false);
    TextView text1 = (TextView) v.findViewById(R.id.text1);
    text1.setText(Shakespeare.DIALOGUE[mIndex]); // some text in array
    return v;
}
```

DialogFragment

❖ The method of building dialogs from the Dialog class doesn't take care automatically of lifecycle events, like the destruction and re-creation

- Embedding the dialog in a DialogFragment does that
- It also allows to display the whole dialog in a part of the screen, like a fragment

