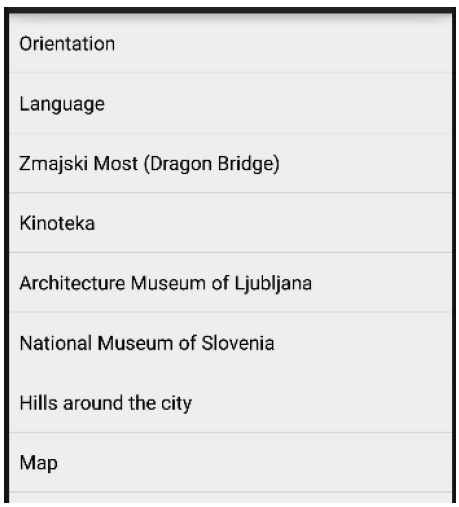
Lab 3 - Fragments, Orientation Changes, Google Map

Based on http://developer.android.com/guide/components/fragments.html

In this assignment you will create an app that combines Activities and Fragments. Fragment is a self-contained component with its own UI and lifecycle; it can be-reused in different parts of an application's user interface depending on the desired UI flow for a particular device or screen. We will first work with very simple Fragments containing only textual information. In the end, we will add a Fragment that contains map to our application.

According to the Android developer's website: "A Fragment represents a behavior or a portion of user interface in an Activity. You can combine multiple fragments in a single activity to build a multi-pane UI and reuse a fragment in multiple activities. You can think of a fragment as a modular section of an activity, which has its own lifecycle, receives its own input events, and which you can add or remove while the activity is running (sort of like a "sub activity" that you can reuse in different activities)." The easiest way to start understanding this is to see Fragments in action. In this lab, we will use Fragments to adapt the user interface according to the orientation of the screen. We will create an app for tourists in Ljubljana, and we will show the main menu of the app 1) on a separate screen from the content of the selected item, in case the device is set in the portrait mode, or 2) on the same screen as the content of the selected item, in case the device is set in the landscape mode. See the figures below:



In the the portrait mode, the user will see one screen with the options (see screenshot on the left), and after clicking any of the options will be shown a screen with the relevant information only (see screenshot on the right). To select another option, the user has to hit "BACK" button, which reverts back to the options screen.

In the landscape mode, the user will see only one screen at all times. The right side of that screen, however, will change according to the option selected on the right.

Let's code this!
First, create an empty project, without any classes. Create `MainActivity.java` in the main `src` folder, make it extend `AppCompatActivity` class. **MainActivity** needs two layouts - one for portrait, the other for landscape mode. By default Android will look for portrait layouts in `res/layout` folder, and for landscape layouts in `res/layout-land` . Create those folders, and add `activity_main.xml` to both. At runtime, the app will show one or another depending on the orientation.

Let's populate `activity_main.xml` in `layout` folder.Add `FrameLayout` to `activity_main.xml` and within it add `Fragment`. The fragment should have `"android:class"` property set to `"PACKAGE_NAME.TitlesFragment"`, where `PACKAGE_NAME` is the name of your app's package. This means the layout will show a frame (like a picture frame), within which a Fragment will be shown. That Fragment will be of type **TitleFragment**. We haven't created that class yet.

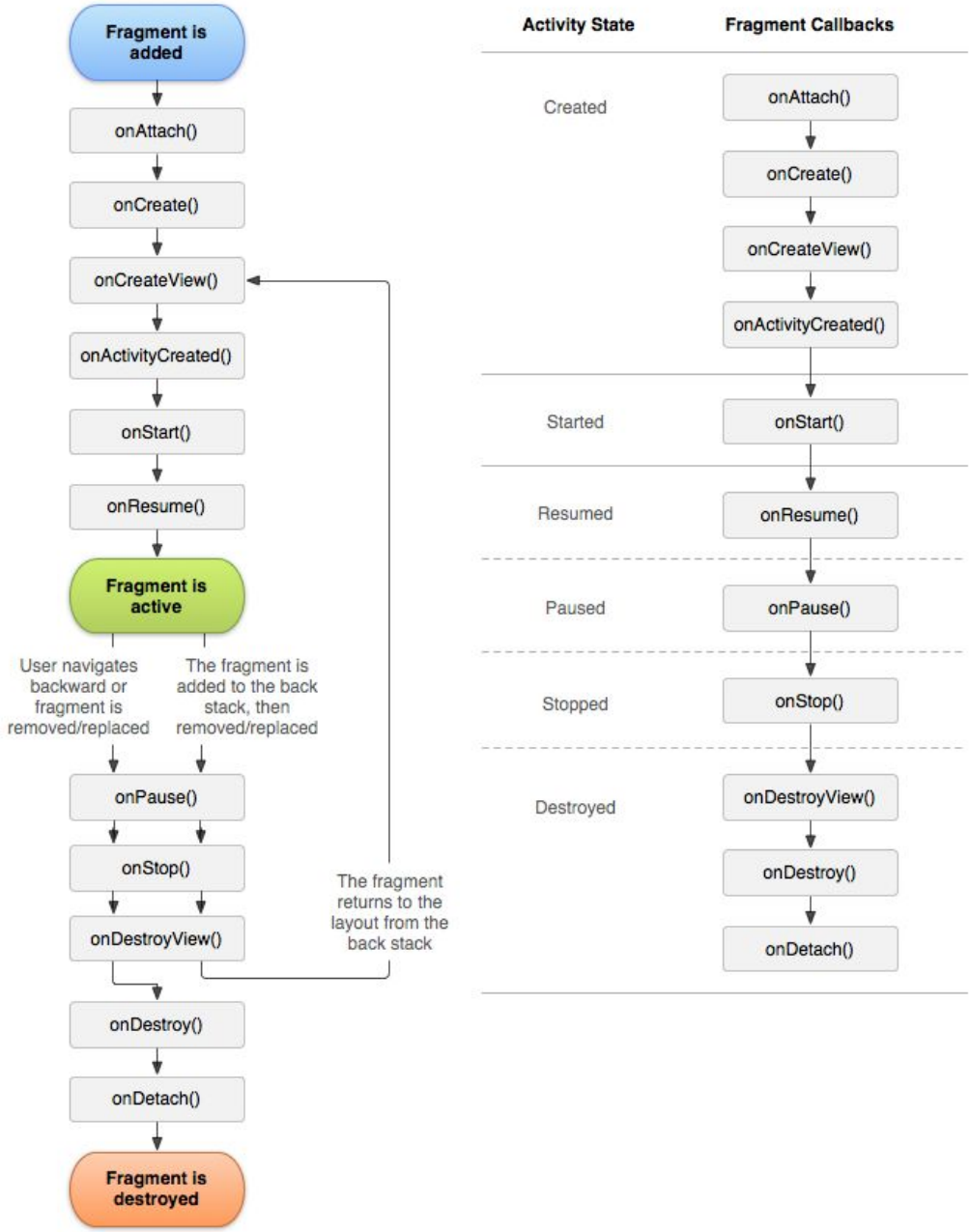
Now, let's populate the other `activity_main.xml`, the one that is located in `res/layout-land`. In this one add `LinearLayout`, with android:orientation set to "horizontal" and add, as its children a `Fragment` and a `FrameLayout`. The Fragment tag should have `"android:class"` property set to `"PACKAGE_NAME.TitlesFragment"`. For the `FrameLayout` element, ensure that it has its `"android:id"` set to `"@+id/details"`. This means that the layout will show two elements one by one, horizontally, and that these elements are a **TitlesFragment**, and a frame (that we are yet to populate).

At this point we have our layouts defined, we should write some Java code to ensure that the layouts are drawn as needed, and populated with the tourist info.

First, let's go to **MainActivity**, override `onCreate` and set content view to `R.id.activity_main`. The good thing here is that we do not have to specify which exact layout will be shown. Instead, Android will decide which one to show at the time the activity is created, depending on the phone's orientation.

Second, we need to provide a list of options. Create a static class **Ljubljana** and copy-paste the content of Ljubljana.java from ucilnica. These are a few excerpts from the Ljubljana Wikitravel page (http://wikitravel.org/en/Ljubljana). Then, create **TitlesFragment** class and make it extend **ListFragment**. There are two **ListFragment** classes that you can extend from: android.app.ListFragment and android.support.v4.app.ListFragment. Use the latter, as it supports a wider range of devices (to learn more about Android support library: http://developer.android.com/tools/support-library/index.html). **ListFragment** is just like a regular Fragment class but with a built in support for list sources. We will use a list of entries to populate the fragment, so extending from **ListFragment** makes sense.

Now is a good time to examine the Fragment lifecycle. Carefully analyse the figure below. Fragment lifecycle is similar to Activity lifecycle. However, a Fragment lifecycle kicks in only if it is attached to an Activity. A Fragment is visible (resumed) only when it is connected to a resumed Activity.



Therefore, in the **TitlesFragment** class we override `onActivityCreated` and populate it with the following code:

```
        super.onActivityCreated(savedState);

        // Populate list with our static array of titles.
        setListAdapter(new ArrayAdapter<String>(getActivity(),
                R.layout.support_simple_spinner_dropdown_item,
                Ljubljana.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;
```

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

We will also create two private fields in the **TitlesFragment** class:

```
boolean mDualPane;
int mCurCheckPosition = 0;
```

`mDualPane` will helps us track whether we can show two panes one by one. It is set to true only if `R.id.details` is shown. The other variable `mCurCheckPosition` keeps track of the currently checked list entry.

When a user clicks on an entry in the landscape mode we want to show the corresponding text in "details" frame. We will override `onListItemClick` and call `showDetails` function. `OnListItemClick` gives us an index of the clicked element, so we will just pass that index to `showDetails`. Let's write `showDetails`:

```
void showDetails(int index) {
        mCurCheckPosition = index;

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

            // Check what fragment is shown, replace if needed.
            DetailsFragment details = (DetailsFragment)
                    getFragmentManager().findFragmentById(R.id.details);
            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_CLOSE);
                ft.commit();
            }

        } else {
            // Otherwise we need to launch a new activity to display
            // the details fragment with selected text.
            Intent intent = new Intent();
            intent.setClass(getActivity(), DetailsActivity.class);
```

```
            intent.putExtra("index", index);
            startActivity(intent);
        }
    }
```

What does the above function do? First, it checks `mDualPane` to see if it needs to operate in the landscape mode or not. If so, it will find a spot for a **DetailsFragment** in `R.id.details` (a frame, like a picture frame), and then it will either keep the original content, or create a new **DetailsFragment** based on the selected list index. This new instance will then replace the old details. **FragmentManager** is used for switching fragments in and out. Don't forget to call commit when you want to finalise the changes. If the app does not operate in the landscape mode, we don't show the selection fragment on the same screen as a details fragment, so we can use separate Activities. Thus, in this case the app launches a new activity (**DetailsActivity**) and passes the index in the extras.

Now, we need that **DetailsFragment**. Create a new class and make it extend Fragment (from the support library). We will create this fragment via **TitlesFragment**, which passes the index of the entry that the user has selected. To capture this, we will use `newInstance(int)` as a factory function for creating **DetailsFragment**, like this:

```
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;
}
```

This creates a new **DetailsFragment** and saves the index in Fragment's arguments. Each fragment has the ability to save arguments, and these arguments are preserved in case, for example, the orientation changes. We can, therefore, think of our **DetailsFragments** as cards with different tourist info entries for Ljubljana that we will dynamically show to the user as she selects titles from **TitlesFragment**. OK, so let's proceed with showing the data. Add the following two methods:

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

@Override
public View onCreateView(LayoutInflater inflater,
                         ViewGroup container, Bundle savedInstanceState) {
    if (container == null) {
        // Currently in a layout without a container, so no
        // reason to create our view.
        return null;
    }

    ScrollView scroller = new ScrollView(getActivity());
```

```
    TextView text = new TextView(getActivity());
    int padding = (int) TypedValue.applyDimension(
            TypedValue.COMPLEX_UNIT_DIP,
            4, getActivity().getResources().getDisplayMetrics());
    text.setPadding(padding, padding, padding, padding);
    scroller.addView(text);
    text.setText(Ljubljana.DESCRIPTION[getShownIndex()]);
    return scroller;
}
```

This completes the landscape portion of our app. The next step is to create **DetailsActivity**, extending **AppCompatActivity**, which will show the right content to the user in case of the portrait mode. Override `onCreate` and ensure that the Activity changes fragments as needed, by putting the following code somewhere in the method:

```
   DetailsFragment details = new DetailsFragment();
   details.setArguments(getIntent().getExtras());
   getSupportFragmentManager().beginTransaction().add(android.R.id.content,
details).commit();
```

Also, make sure that the Activity is destroyed if we go to the landscape mode (we don't need it any more in that case, as we can show everything via the MainActivity and fragments):

```
  if (getResources().getConfiguration().orientation
          == Configuration.ORIENTATION_LANDSCAPE) {
     // If the screen is now in landscape mode, we can show the
     // details in-line so we don't need this activity.
          finish();
         return;
    }
```

Now test your app and try to improve it. Here is one suggestion: save a user's choice in the TitlesFragment so it is not lost when the Fragment is destroyed.

Adding Google Map Fragment

Google maps are a powerful tool that allows you to show the user his/her location, provide directions, or get more information about a selected point on the map. These services are provided via Google Play Map Services which you need to add via the SDK manager. So go to the Android Studio SDK manager, and install Google Play Services. Next, you need to register yourself and your app for using Google Play Services. The instructions are here:
https://developers.google.com/maps/documentation/android-api/signup
If Everything worked well you have to add the key to `AndroidManifest.xml`:

```
<meta-data
          android:name="com.google.android.geo.API_KEY"
          android:value="YOUR_API_KEY"/>
```

And your app is ready to use google play services.

Google maps can be added in different ways. Here we will use one of the most flexible ways which is via the SupportMapFragment. Create a new class, call it **TouristMapFragment**, and make it extend SupportMapFragment. Now we need to attach this fragment to an activity. First, go to **TitlesFragment** and modify its `showDetails` method. You will not be given full instructions here, but let's just say that you need to recognise when index number 7 is clicked on, and you need to create a new map using: `details = NiceMapFragment.newInstance();` Swapping fragments will, as before happen through:

```
FragmentTransaction ft
                = getFragmentManager().beginTransaction();
    ft.replace(R.id.details, details);
    ft.setTransition(FragmentTransaction.TRANSIT_FRAGMENT_CLOSE);
    ft.commit();
```

Happy coding!