Part 1 - Creating A Fragment

To create a Fragment, a class must inherit from `Android.App.Fragment` and then override the `OnCreateView` method. `OnCreateView` will be called by the hosting Activity when it is time to put the Fragment on the screen, and will return a `View`. A typical `OnCreateView` will create this `View` by inflating a layout file and then attaching it to a parent container. The container's characteristics are important as Android will apply the layout parameters of the parent to the UI of the Fragment. The following example illustrates this:

```
public override View OnCreateView(LayoutInflater inflater, ViewGroup container,
Bundle savedInstanceState)
{
    return inflater.Inflate(Resource.Layout.Example_Fragment, container,
false);
}
```

The code above will inflate the view `Resource.Layout.Example_Fragment`, and add it as a child view to the `ViewGroup` container.

Note: Fragment sub-classes must have a public default no argument constructor.

Adding a Fragment to an Activity

There are two ways that a Fragment may be hosted inside an Activity:

- **Declaratively** – Fragments can be used declaratively within `.axml` layout files by using the `<Fragment>` tag.
- **Programmatically** – Fragments can also be instantiated dynamically by using the `FragmentManager` class's API.

Programmatic usage via the `FragmentManager` class will be discussed later in this guide.

Using a Fragment Declaratively

Adding a Fragment inside the layout requires using the `<fragment>` tag and then identifying the Fragment by providing either the `class` attribute or the `android:name` attribute. The following snippet shows how

to use the `class` attribute to declare a `fragment`:

```
<?xml version="1.0" encoding="utf-8"?>
<fragment class="com.xamarin.sample.fragments.TitlesFragment"
            android:id="@+id/titles_fragment"
            android:layout_width="fill_parent"
            android:layout_height="fill_parent" />
```

This next snippet shows how to declare a `fragment` by using the `android:name` attribute to identify the Fragment class :

```
<?xml version="1.0" encoding="utf-8"?>
<fragment android:name="com.xamarin.sample.fragments.TitlesFragment"
            android:id="@+id/titles_fragment"
            android:layout_width="fill_parent"
            android:layout_height="fill_parent" />
```

When the Activity is being created, Android will instantiate each Fragment specified in the layout file and insert the view that is created from `OnCreateView` in place of the `Fragment` element. Fragments that are declaratively added to an Activity are static and will remain on the Activity until it is destroyed; it is not possible to dynamically replace or remove such a Fragment during the lifetime of the Activity to which it is attached.

Each Fragment must be assigned a unique identifier:

- **android:id** – As with other UI elements in a layout file, this is a unique ID.
- **android:tag** – This attribute is a unique string.

If neither of the previous two methods is used, then the Fragment will assume the ID of the container view. In the following example where neither `android:id` nor `android:tag` is provided, Android will assign the ID `fragment_container` to the Fragment:

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

        <fragment class="com.example.android.apis.app.TitlesFragment"
                android:layout_width="match_parent"
```

```
                android:layout_height="match_parent" />
</LinearLayout>
```

Note:

Android does not allow for uppercase characters in package names; it will throw an exception when trying to inflate the view if a package name contains an uppercase character. However, Xamarin.Android is more forgiving, and will tolerate uppercase characters in the namespace.

For example, both of the following snippets will work with Xamarin.Android. However, the second snippet will cause an `android.view.InflateException` to be thrown by a pure Java-based Android application.

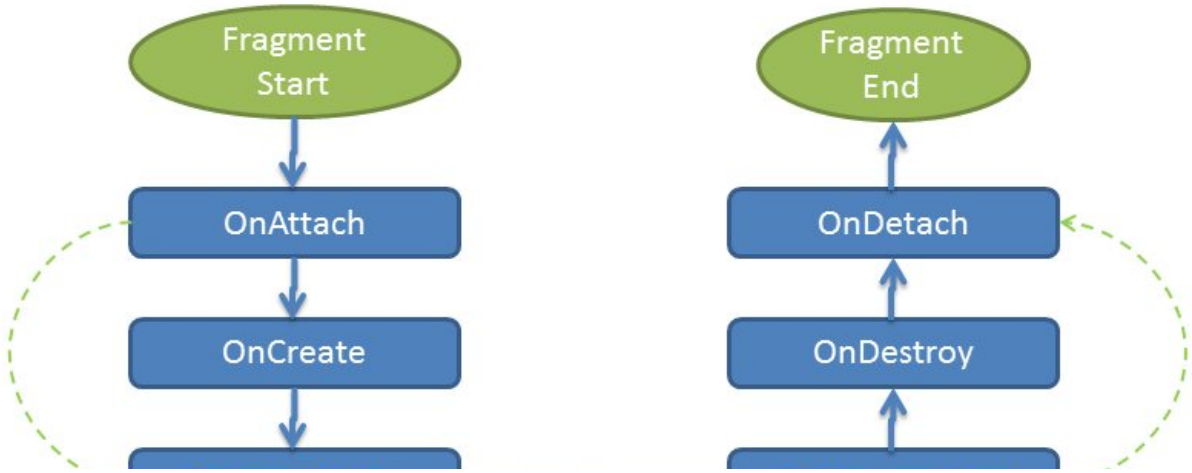
```
<fragment class="com.example.DetailsFragment"
android:id="@+id/fragment_content" android:layout_width="match_parent"
android:layout_height="match_parent" />
```

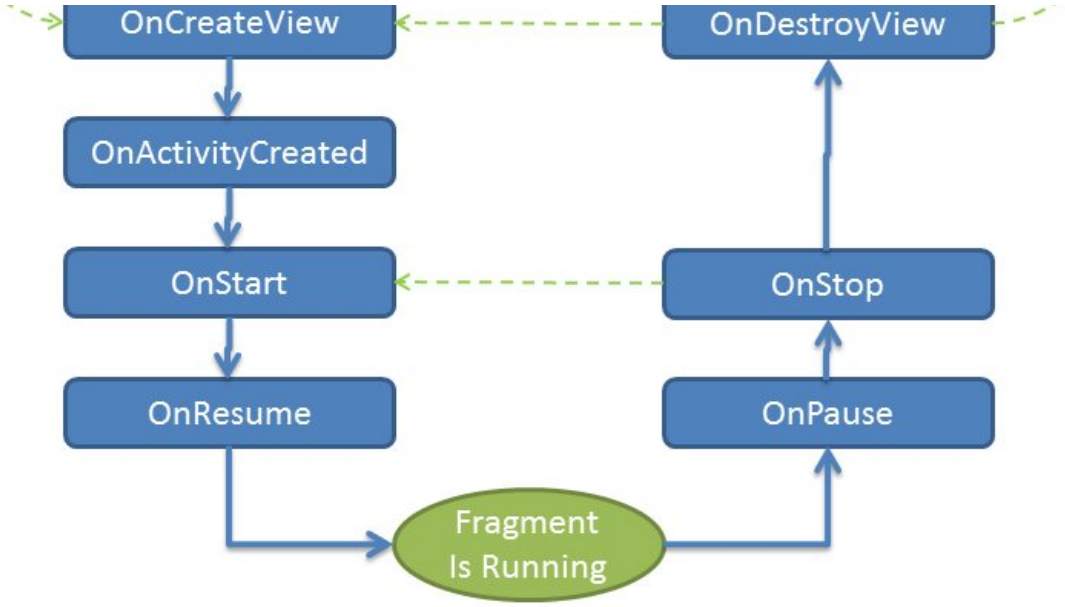
OR

```
<fragment class="Com.Example.DetailsFragment"
android:id="@+id/fragment_content" android:layout_width="match_parent"
android:layout_height="match_parent" />
```

Fragment Lifecycle

Fragments have their own lifecycle that is somewhat independent of, but still affected by, the lifecycle of the hosting Activity. For example, when an Activity pauses, all of its associated Fragments are paused. The following diagram outlines the lifecycle of the Fragment.





Fragment Creation Lifecycle Methods

The table below shows the flow of the various callbacks in the lifecycle of a Fragment as it is being created:

Lifecycle Method	Activity State
OnInflate()	Called when the Fragment is being created as part of a view layout. This may be called immediately after the Fragment is created declaratively from an XML layout file. The Fragment is not associated with its Activity yet, but the Activity, Bundle, and AttributeSet from the view hierarchy are passed in as parameters. This method is best used for parsing the AttributeSet and for saving the attributes that might be used later by the Fragment.
OnAttach()	Called after the Fragment is associated with the Activity. This is the first method to be run when the Fragment is ready to be used. In general, Fragments should not implement a constructor or override the default constructor. Any components that are required for the Fragment should be initialized in this method.
OnCreate()	Called by the Activity to create the Fragment. When this method is called, the view hierarchy of the hosting Activity may not be

	completely instantiated, so the Fragment should not rely on any parts of the Activity's view hierarchy until later on in the Fragment's lifecycle. For example, do not use this method to perform any tweaks or adjustments to the UI of the application. This is the earliest time at which the Fragment may begin gathering the data that it needs. The Fragment is running in the UI thread at this point, so avoid any lengthy processing, or perform that processing on a background thread. This method may be skipped if SetRetainInstance(true) is called. This alternative will be described in more detail below.
OnCreateView()	Creates the view for the Fragment. This method is called once the Activity's OnCreate() method is complete. At this point, it is safe to interact with the view hierarchy of the Activity. This method should return the view that will be used by the Fragment.
OnActivityCreated()	Called after Activity.OnCreate has been completed by the hosting Activity. Final tweaks to the user interface should be performed at this time.
OnStart()	Called after the containing Activity has been resumed. This makes the Fragment visible to the user. In many cases, the Fragment will contain code that would otherwise be in the OnStart() method of an Activity.
OnResume()	This is the last method called before the user can interact with the Fragment. An example of the kind of code that should be performed in this method would be enabling features of a device that the user may interact with, such as the camera that the location services. Services such as these can cause excessive battery drain, though, and an application should minimize their use in order to preserve battery life.

Fragment Destruction Lifecycle Methods

The next table shows the lifecycle methods that are called as a Fragment is being destroyed:

Lifecycle Method	Activity State
OnPause()	The user is no longer able to interact with the Fragment. This situation exists because some other Fragment operation is modifying this Fragment, or the hosting Activity is paused. It is possible that the Activity hosting this Fragment might still be visible, that is,

	the Activity in focus is partially transparent or does not occupy the full screen. When this method becomes active, it's the first indication that the user is leaving the Fragment. The Fragment should save any changes.
OnStop()	The Fragment is no longer visible. The host Activity may be stopped, or a Fragment operation is modifying it in the Activity. This callback serves the same purpose as Activity.OnStop.
OnDestroyView()	This method is called to clean up resources associated with the view. This is called when the view associated with the Fragment has been destroyed.
OnDestroy()	This method is called when the Fragment is no longer in use. It is still associated with the Activity, but the Fragment is no longer functional. This method should release any resources that are in use by the Fragment, such as a SurfaceView that might be used for a camera. This method may be skipped if SetRetainInstance(true) is called. This alternative will be described in more detail below.
OnDetach()	This method is called just before the Fragment is no longer associated with the Activity. The view hierarchy of the Fragment no longer exists, and all resources that are used by the Fragment should be released at this point.

Using SetRetainInstance

It is possible for a Fragment to specify that it should not be completely destroyed if the Activity is being re-created. The `Fragment` class provides the method `SetRetainInstance` for this purpose. If `true` is passed to this method, then when the Activity is restarted, the same instance of the Fragment will be used. If this happens, then all callback methods will be invoked except the `OnCreate` and `OnDestroy` lifecycle callbacks. This process is illustrated in the lifecycle diagram shown above (by the green dotted lines).

Fragment State Management

Fragments may save and restore their state during the Fragment lifecycle by using an instance of a `Bundle`. The Bundle allows a Fragment to save data as key/value pairs and is useful for simple data that

doesn't require much memory. A Fragment can save its state with a call to `OnSaveInstanceState`:

```
public override void OnSaveInstanceState(Bundle outState)
{
    base.OnSaveInstanceState(outState);
    outState.PutInt("current_choice", _currentCheckPosition);
}
```

When a new instance of a Fragment is created, the state saved in the `Bundle` will become available to the new instance via the `OnCreate`, `OnCreateView`, and `OnActivityCreated` methods of the new instance. The following sample demonstrates how to retrieve the value `current_choice` from the `Bundle`:

```
public override void OnActivityCreated(Bundle savedInstanceState)
{
    base.OnActivityCreated(savedInstanceState);
    if (savedInstanceState != null)
    {
        _currentCheckPosition = savedInstanceState.GetInt("current_choice", 0);
    }
}
```

Overriding `OnSaveInstanceState` is an appropriate mechanism for saving transient data in a Fragment across orientation changes, such as the `current_choice` value in the above example. However, the default implementation of `OnSaveInstanceState` takes care of saving transient data in the UI for every view that has an ID assigned. For example, look at an application that has an `EditText` element defined in XML as follows:

```
<EditText android:id="@+id/myText"
        android:layout_width="fill_parent"
        android:layout_height="wrap_content"/>
```

Since the `EditText` control has an `id` assigned, the Fragment automatically saves the data in the widget when `OnSaveInstanceState` is called.

Bundle Limitations

Although using `OnSaveInstanceState` makes it easy to save transient data, use of this method has some limitations:

- If the Fragment is not added to the back stack, then its state will not be restored when the user presses the B ack button.
- When the Bundle is used to save data, that data is serialized. This can lead to processing delays.

Contributing to the Menu

Fragments may contribute items to the menu of their hosting Activity. An Activity handles menu items first. If the Activity does not have a handler, then the event will be passed on to the Fragment, which will then handle it.

To add items to the Activity's menu, a Fragment must do two things. First, the Fragment must implement the method `OnCreateOptionsMenu` and place its items into the menu, as shown in the following code:

```
public override void OnCreateOptionsMenu(IMenu menu, MenuInflater menuInflater)
{
    menuInflater.Inflate(Resource.Menu.menu_fragment_vehicle_list, menu);
    base.OnCreateOptionsMenu(menu, menuInflater);
}
```

The menu in the previous code snippet is inflated from the following XML, located in the file `menu_fragment_vehicle_list.xml`:

```
<?xml version="1.0" encoding="utf-8"?>
<menu xmlns:android="http://schemas.android.com/apk/res/android">
  <item android:id="@+id/add_vehicle"
        android:icon="@drawable/ic_menu_add_data"
        android:title="@string/add_vehicle" />
</menu>
```

Next, the Fragment must call `SetHasOptionsMenu(true)`. The call to this method announces to Android that the Fragment has menu items to contribute to the option menu. Unless the call to this method is made, the menu items for the Fragment will not be added to the Activity's option menu. This is typically done in the lifecycle method `OnCreate ()`, as shown in the next code snippet:

```
public override void OnCreate(Bundle savedState)
{
    base.OnCreate(savedState);
    SetHasOptionsMenu(true);
}
```

The following screen shows how this menu would look: