# Fragments

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## Why Fragments?

- Android screen Sizes
  - Multiple Screen sizes are available for phones.
  - New form factors emerging
    - Tablet
    - Auto
    - Wear
  - Activity not the best representative of the User Interface
    - Activity treats the whole screen as a representation for a single screen and a single task that the user can accomplish.
    - Activity not a scalable and flexible mechanism for building apps across devices.

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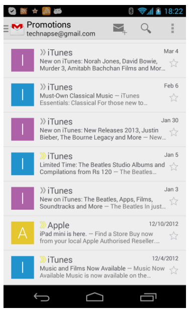
## Why Fragments?

- Activity and Phone
  - Each Screen is represented by an Activity.
  - A user navigates between Activities.
    - On smaller device Activity navigation is fine.

**Email List Activity**


18:22
Promotions
technapse@gmail.com

iTunes — Mar 4
New on iTunes: Norah Jones, David Bowie, Murder 3, Amitabh Bachchan Films and Mor...

iTunes — Feb 6
Must-Own Classical Music — iTunes Essentials: Classical For those new to...

iTunes — Jan 30
New on iTunes: New Releases 2013, Justin Bieber, The Bourne Legacy and More — New...

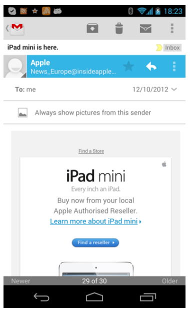
iTunes — Jan 5
Limited Time: The Beatles Studio Albums and Compilations from Rs 120 — The Beatles...

iTunes — Jan 3
New on iTunes: The Beatles, Apps, Films, Soundtracks and More — The Beatles In just...

Apple — 12/10/2012
iPad mini is here. — Find a Store Buy now from your local Apple Authorised Reseller....

iTunes — 12/4/2012
Music and Films Now Available — Music Now Available Music is now available on the...

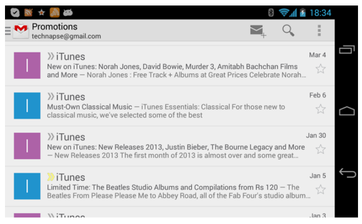
**Email Detail Activity**


18:23
iPad mini is here.
Inbox
Apple
News_Europe@insideapple...
To: me
12/10/2012
Always show pictures from this sender
Find a Store
iPad mini
Every inch an iPad.
Buy now from your local Apple Authorised Reseller.
Learn more about iPad mini
Find a reseller
Newer 29 of 30 Older

## Why Fragments?

- Activity and Tablet
  - On tablets, Activity navigation is not the best use of Screen space

**Email List Activity**


18:34
Promotions
technapse@gmail.com

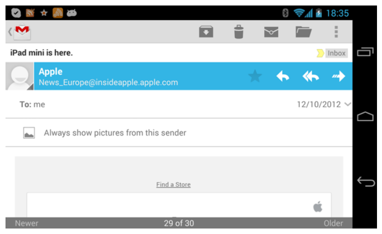
iTunes — Mar 4
New on iTunes: Norah Jones, David Bowie, Murder 3, Amitabh Bachchan Films and More — Norah Jones : Free Track + Albums at Great Prices Celebrate Norah...

iTunes — Feb 6
Must-Own Classical Music — iTunes Essentials: Classical For those new to classical music, we've selected some of the best

iTunes — Jan 30
New on iTunes: New Releases 2013, Justin Bieber, The Bourne Legacy and More — New Releases 2013 The first month of 2013 is almost over and some great...

iTunes — Jan 5
Limited Time: The Beatles Studio Albums and Compilations from Rs 120 — The Beatles From Please Please Me to Abbey Road, all of the Fab Four's studio album...

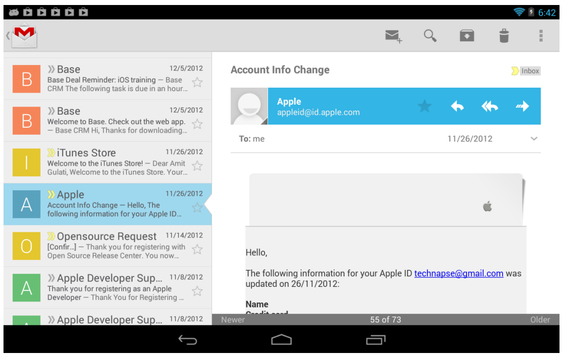
**Email Detail Activity**


18:35
iPad mini is here.
Inbox
Apple
News_Europe@insideapple.apple.com
To: me
12/10/2012
Always show pictures from this sender
Find a Store
Newer 29 of 30 Older

## Why Fragments?

- Activity and Tablet
  - Enough room to display multiple content in the same Screen

**List** **Detail**



» Base 12/5/2012
Base Deal Reminder: iOS training — Base CRM The following task is due in an hour...

» Base 12/5/2012
Welcome to Base. Check out the web app. — Base CRM Hi, Thanks for downloading...

» iTunes Store 11/26/2012
Welcome to the iTunes Store! — Dear Amit Gulati, Welcome to the iTunes Store. Your...

» Apple 11/26/2012
Account Info Change — Hello, The following information for your Apple ID...

» Opensource Request 11/14/2012
[Confir...] — Thank you for registering with Open Source Release Center. You now...

» Apple Developer Sup... 11/8/2012
Thank you for registering as an Apple Developer — Thank You for Registering...

» Apple Developer Sup... 11/8/2012

Account Info Change Inbox

Apple
appleid@id.apple.com

To: me 11/26/2012

Hello,

The following information for your Apple ID technapse@gmail.com was updated on 26/11/2012:

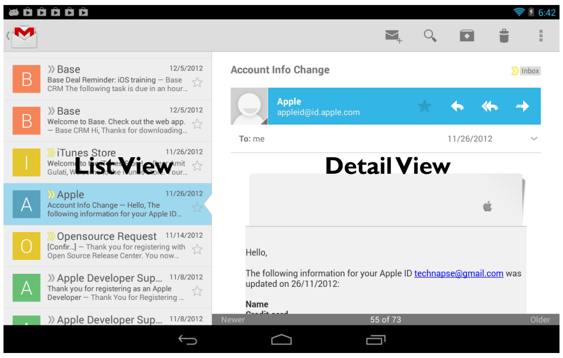
Name

Newer 55 of 73 Older

## Why Fragments?

- Activity and Tablet
  - Split screen configuration also possible via multiple Views in Activity

**Email Split Activity**



» Base 12/5/2012
Base Deal Reminder: iOS training — Base CRM The following task is due in an hour...

» Base 12/5/2012
Welcome to Base. Check out the web app. — Base CRM Hi, Thanks for downloading...

» iTunes Store 11/26/2012

» Apple 11/26/2012
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Apple
appleid@id.apple.com

To: me 11/26/2012

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Name

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## Why Fragments?

- Activity and Tablet
  - Disadvantages of Single Activity – multiple View for configuring split screen.
    - Single Activity class handles the logic for two Screens.
    - Activity code becomes large.
    - Reuse of View (part of the Activity) challenging.
    - Leads to code management issues.
  - What is required is something like a mini-Activity or a sub-Activity
    - So that we will be able to split a Single Activity in to self contained sub-components.

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## What is a Fragment?

- Fragment
  - Represented by android.app.**Fragment** class
  - More like a sub-activity
  - Has its own XML layout, lifecycle, and receives its own input events.

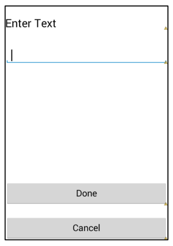
FirstFragment.java

```
public class FirstFragment
        extends Fragment {

    public FirstFragment() {

    }
}
```

fragment_first.xml



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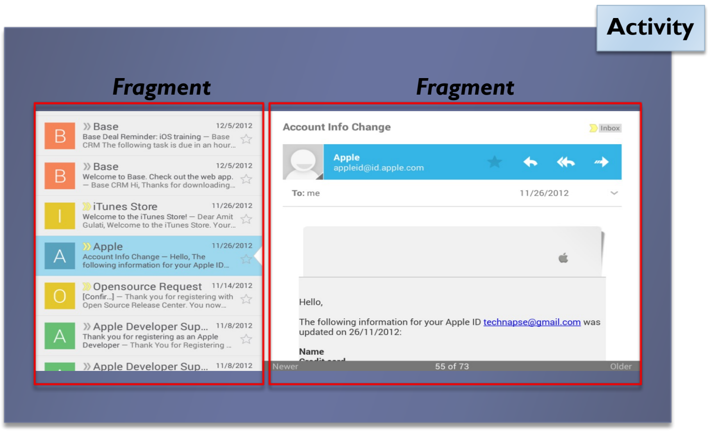
## What is a Fragment?

- Fragment
  - Fragments are always embedded inside an Activity



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Apple
appleid@id.apple.com

To: me 11/26/2012

Hello,

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Name

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## What is a Fragment?

- Fragment
  - Fragments are not independent Android components.
    - Not registered in the manifest.
    - Cannot be launched via Intents.
    - Android Runtime is not even aware of Fragments
  - Fragments are always embedded inside an Activity
    - Activity provides a ViewGroup container in which the View of the Fragment is added.
    - For the Android View/Drawing System, Fragment looses its Identity once it is added to the Activity, as the View tree of Activity gets updated with the Fragments View Tree.

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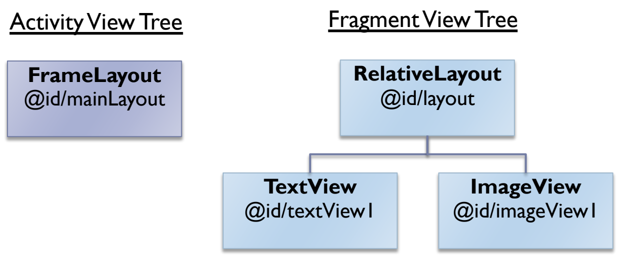
## What is a Fragment?

- Fragment
  - Fragments are always embedded inside an Activity
    - By default Activity View tree and Fragment View tree are independent entitied.



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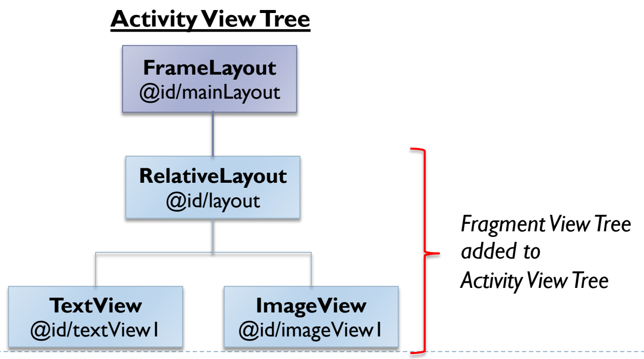
## What is a Fragment?

- Fragment
  - Fragments are always embedded inside an Activity
    - When Fragment is added to activity, activities view tree is updated with the fragment view tree.
    - This is the only way to display Fragment on the Screen



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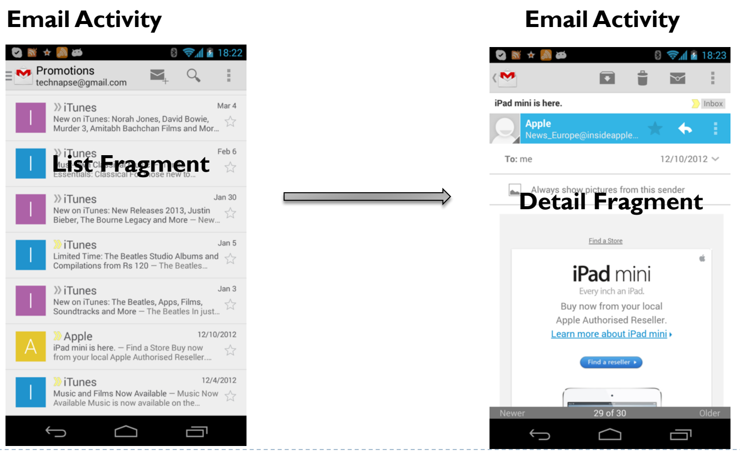
## What is a Fragment?

- Fragment
  - Application running on a phone



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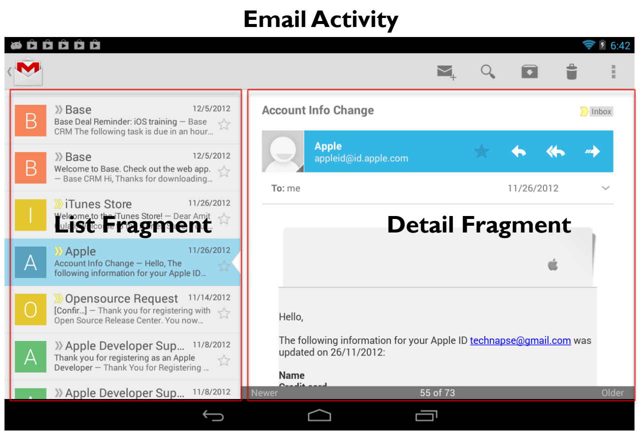
## What is a Fragment?

- Fragment
  - Application running on a tablet



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## Fragments

- Benefits Fragments?
  - Light weight
  - Create flexible UI's that can be configured for Tablets and Handsets.
  - Smaller independent modules which are easier to manage and Re-use
    - Fragment represents an independent modular section of Activity.
    - Independent Fragments can be re-used in multiple projects.

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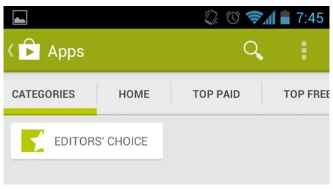
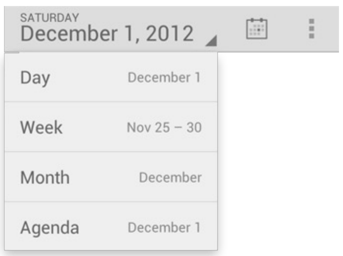
## Android and Fragments

- Fragments are used all over the Android SDK
  - Better Screen Navigation
    - ☐ ViewPager uses Fragments
    - ☐ Create Tabbed UI
    - ☐ Create Navigation List based Interface
  - Dialog Boxes
  - Preferences UI





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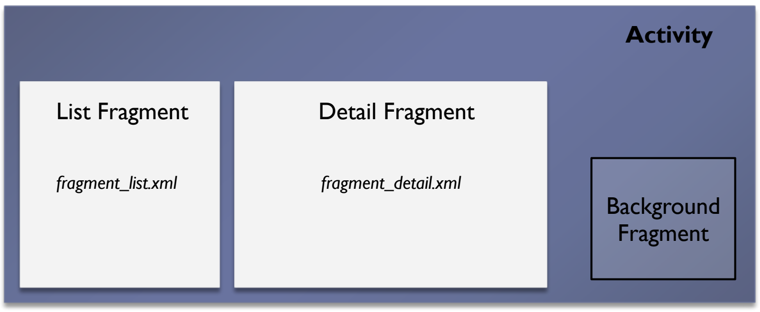
## Fragments

- Types of Fragments
  - **UI Fragments**, present a View on the screen.
  - **Background Fragments** do not present a View on the screen.



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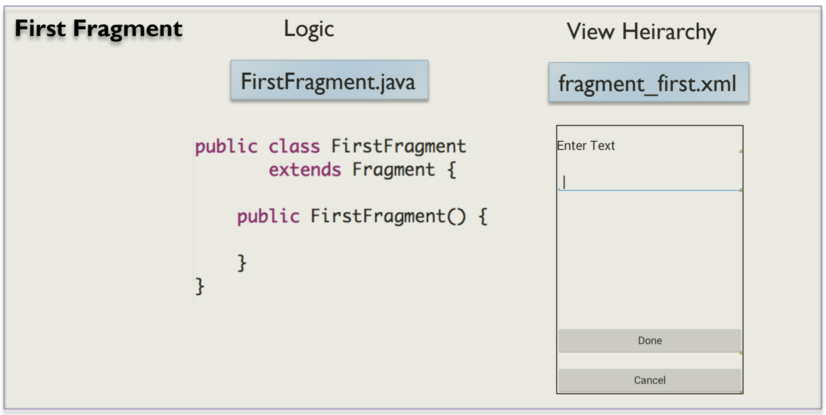
## Fragments

- UI Fragments
  - A UI Fragment requires a Java class and XML Layout.



```
public class FirstFragment
        extends Fragment {

    public FirstFragment() {

    }
}
```

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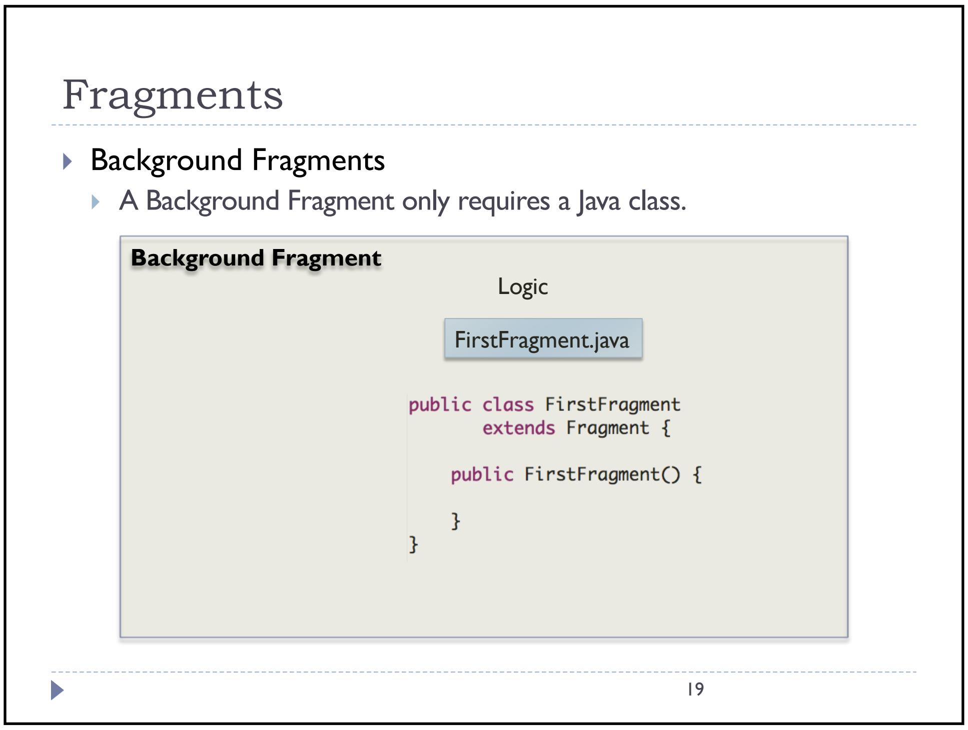

## Fragments

- Background Fragments
  - A Background Fragment only requires a Java class.

**Background Fragment**

Logic

FirstFragment.java

```
public class FirstFragment
       extends Fragment {

    public FirstFragment() {

    }
}
```

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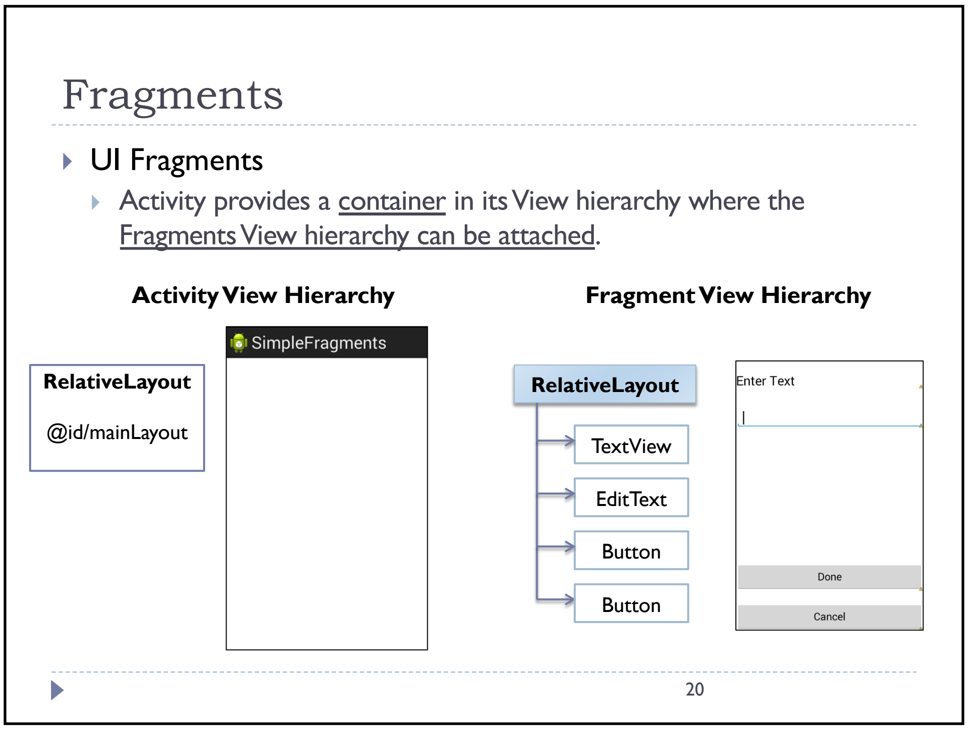

## Fragments

- UI Fragments
  - Activity provides a container in its View hierarchy where the Fragments View hierarchy can be attached.

**Activity View Hierarchy**

**Fragment View Hierarchy**

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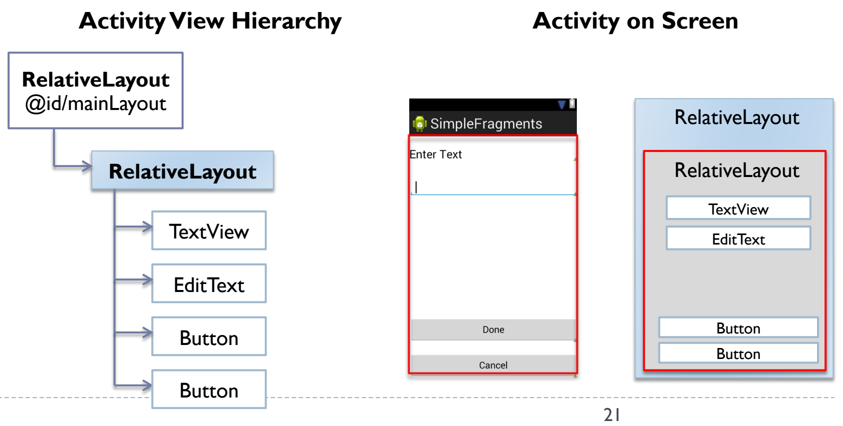
## Fragments

- UI Fragments
  - When a Fragments View is to be displayed on the screen it is **attached** to the Activity's hierarchy.



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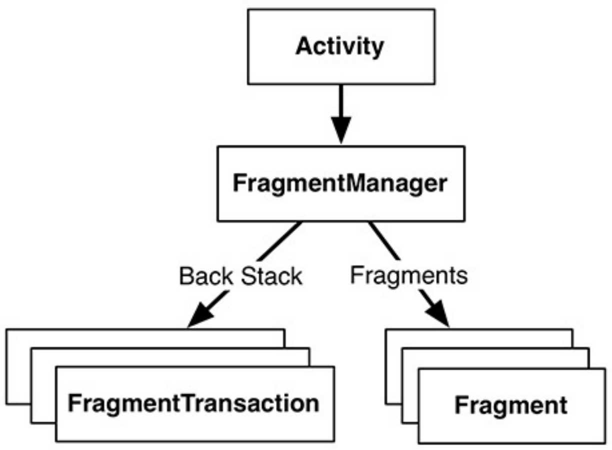
## Managing Fragments

- FragmentManager



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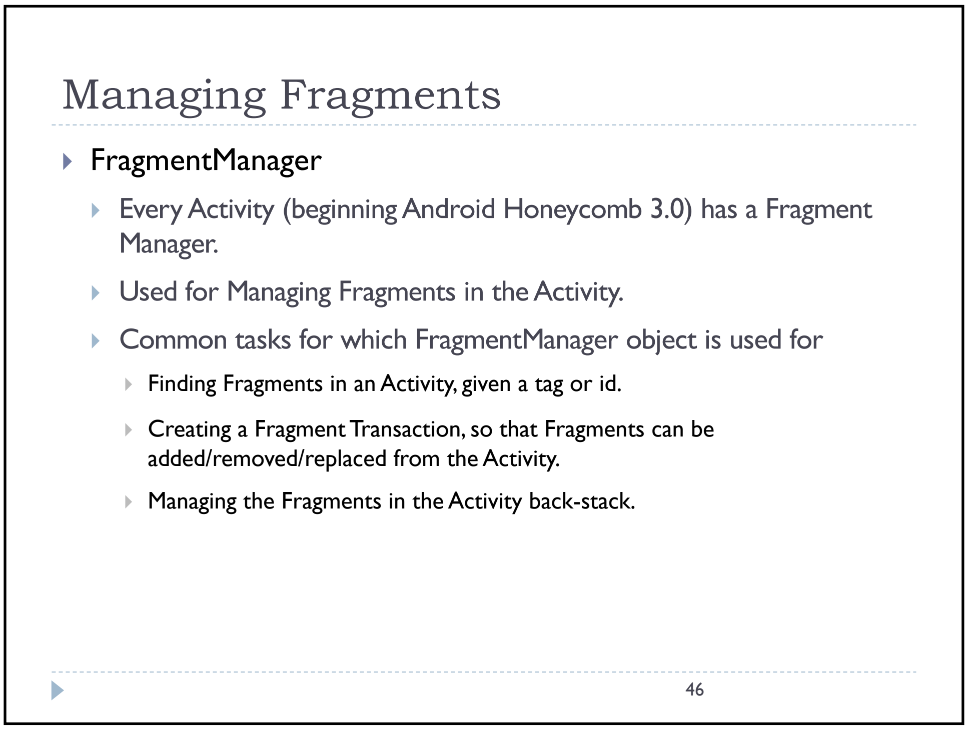

## Managing Fragments

- FragmentManager
  - Every Activity (beginning Android Honeycomb 3.0) has a Fragment Manager.
  - Used for Managing Fragments in the Activity.
  - Common tasks for which FragmentManager object is used for
    - Finding Fragments in an Activity, given a tag or id.
    - Creating a Fragment Transaction, so that Fragments can be added/removed/replaced from the Activity.
    - Managing the Fragments in the Activity back-stack.

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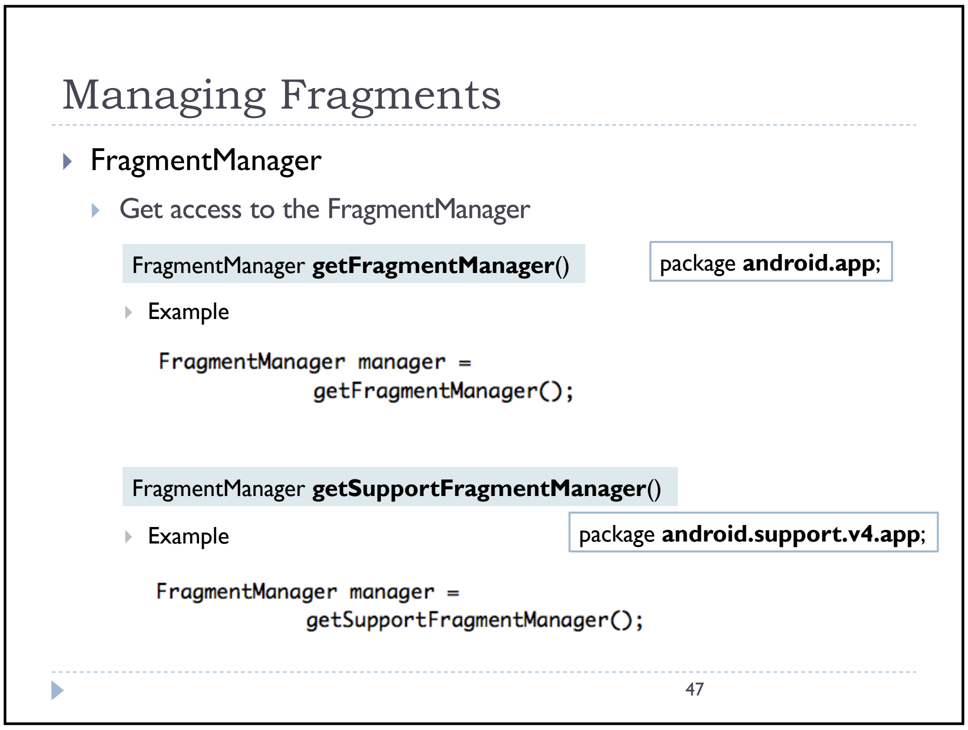

## Managing Fragments

- FragmentManager
  - Get access to the FragmentManager

FragmentManager **getFragmentManager**()

package **android.app**;

- Example

```
FragmentManager manager =
                getFragmentManager();
```

FragmentManager **getSupportFragmentManager**()

- Example

package **android.support.v4.app**;

```
FragmentManager manager =
                getSupportFragmentManager();
```

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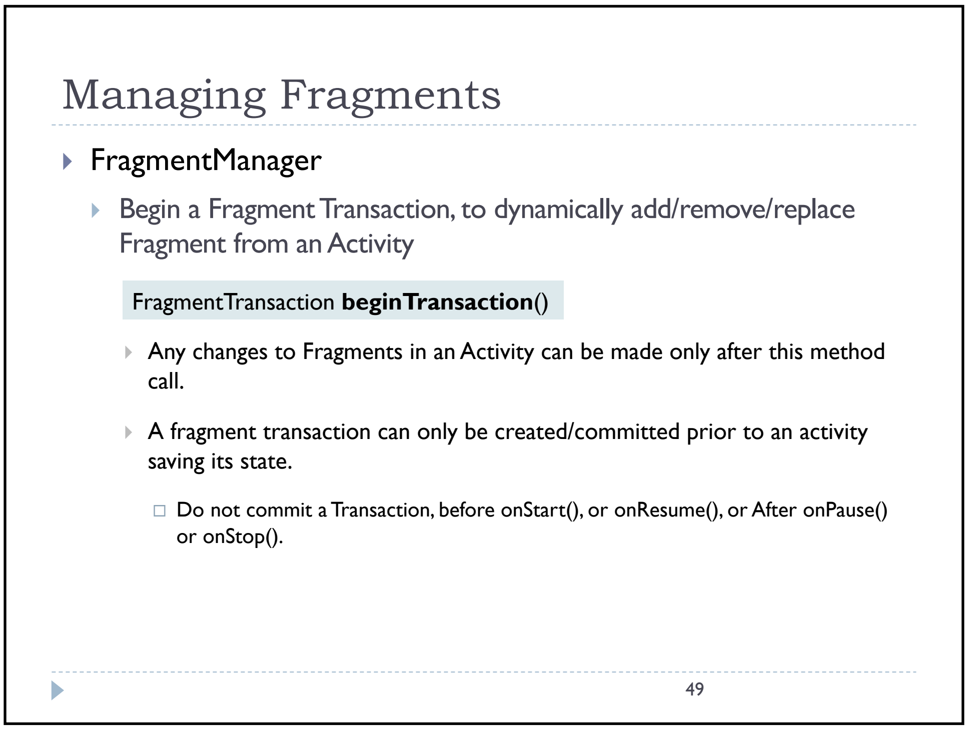

## Managing Fragments

- FragmentManager
  - Begin a Fragment Transaction, to dynamically add/remove/replace Fragment from an Activity

    FragmentTransaction **beginTransaction**()

    - Any changes to Fragments in an Activity can be made only after this method call.
    - A fragment transaction can only be created/committed prior to an activity saving its state.
      - Do not commit a Transaction, before onStart(), or onResume(), or After onPause() or onStop().

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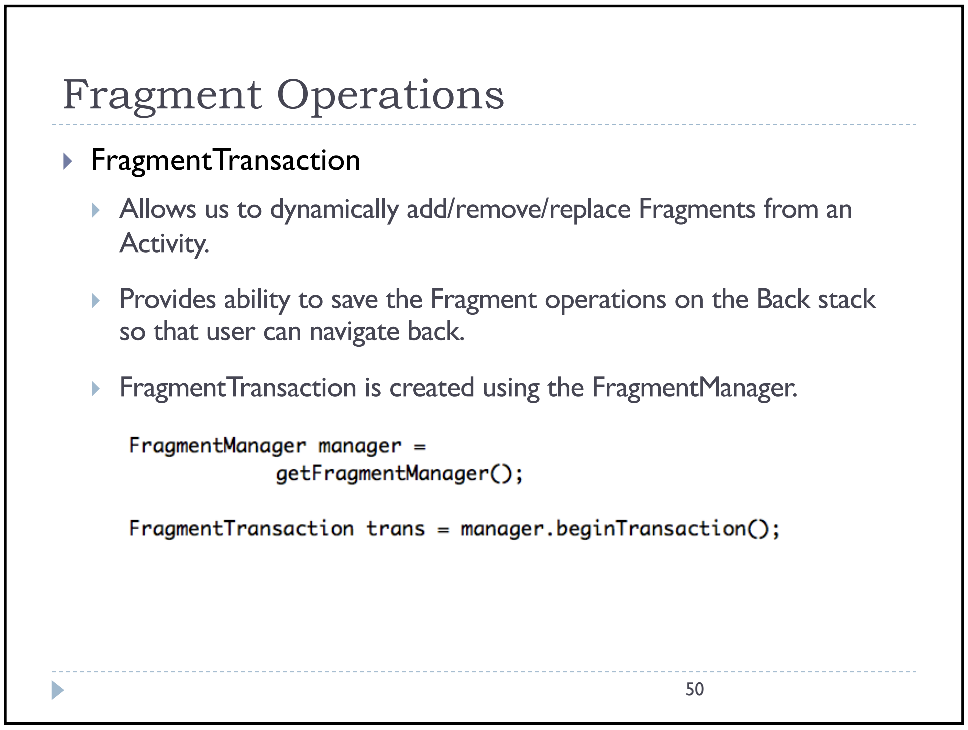

## Fragment Operations

- FragmentTransaction
  - Allows us to dynamically add/remove/replace Fragments from an Activity.
  - Provides ability to save the Fragment operations on the Back stack so that user can navigate back.
  - FragmentTransaction is created using the FragmentManager.

```
FragmentManager manager =
            getFragmentManager();

FragmentTransaction trans = manager.beginTransaction();
```

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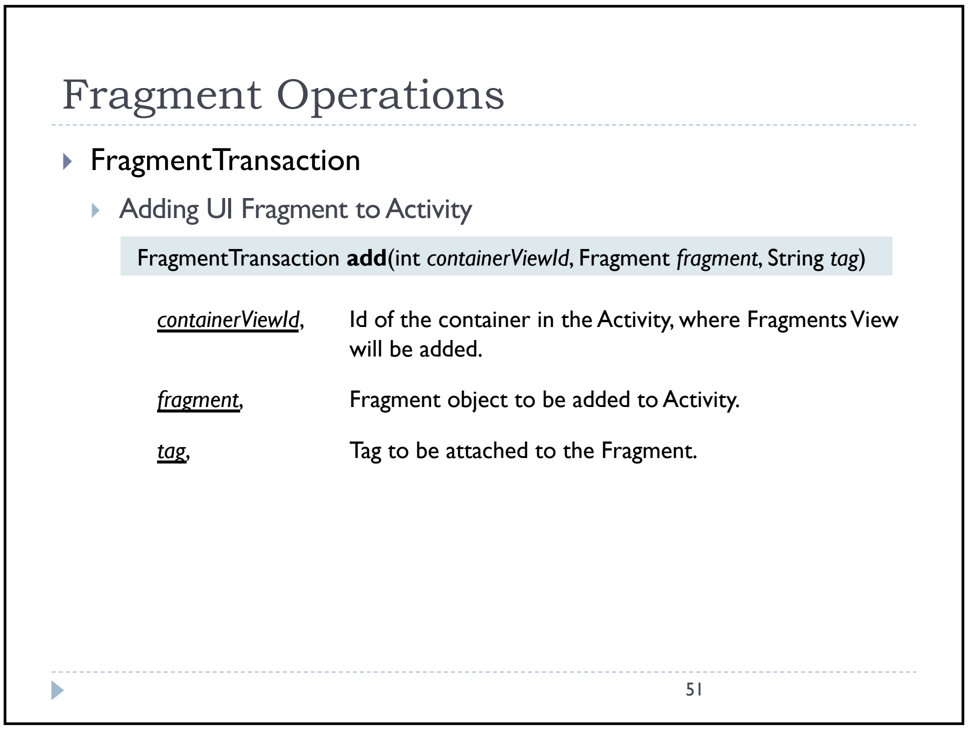

## Fragment Operations

- FragmentTransaction
  - Adding UI Fragment to Activity

FragmentTransaction **add**(int *containerViewId*, Fragment *fragment*, String *tag*)

| | |
|---|---|
| *containerViewId*, | Id of the container in the Activity, where Fragments View will be added. |
| *fragment*, | Fragment object to be added to Activity. |
| *tag*, | Tag to be attached to the Fragment. |

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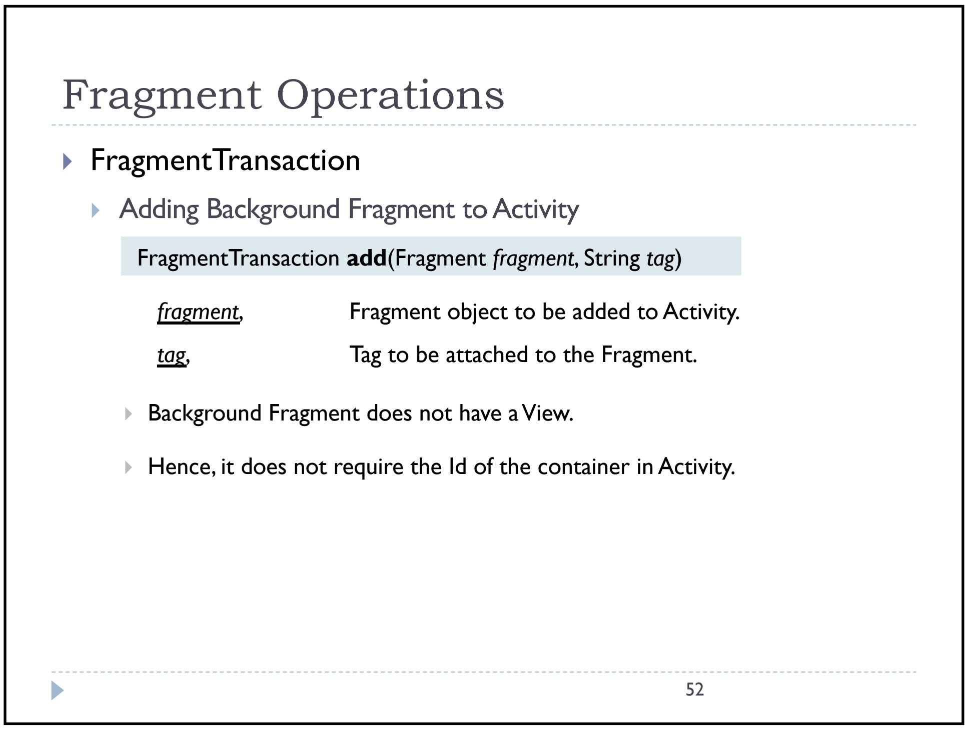

## Fragment Operations

- FragmentTransaction
  - Adding Background Fragment to Activity

FragmentTransaction **add**(Fragment *fragment*, String *tag*)

| | |
|---|---|
| *fragment*, | Fragment object to be added to Activity. |
| *tag*, | Tag to be attached to the Fragment. |

- Background Fragment does not have a View.
- Hence, it does not require the Id of the container in Activity.

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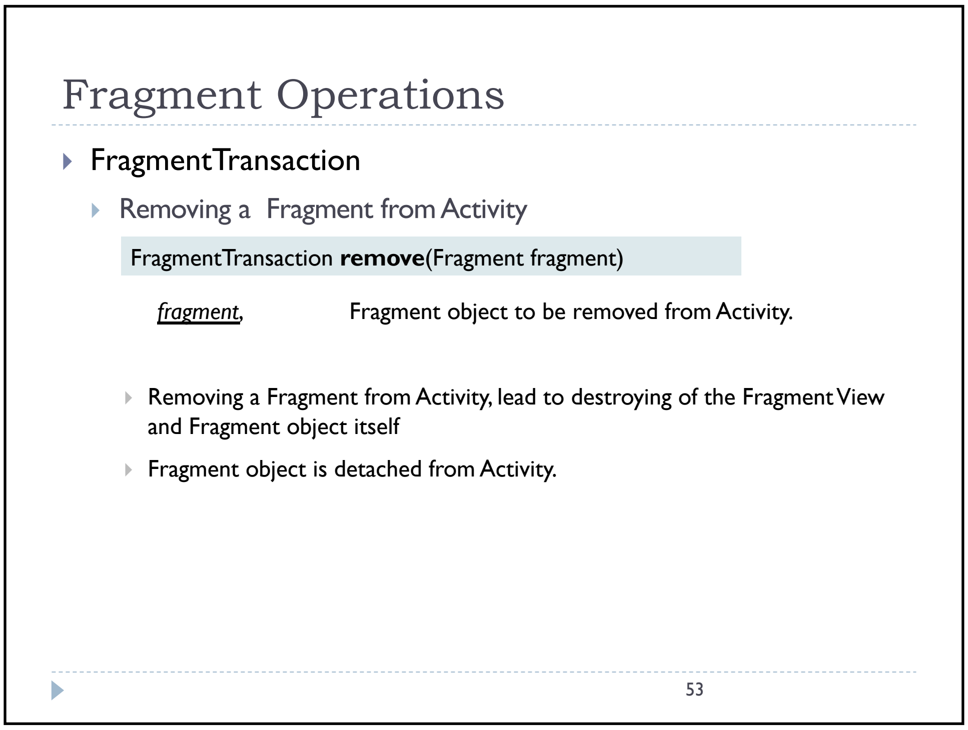

## Fragment Operations

- FragmentTransaction
  - Removing a  Fragment from Activity

FragmentTransaction **remove**(Fragment fragment)

| | |
|---|---|
| *fragment,* | Fragment object to be removed from Activity. |

- Removing a Fragment from Activity, lead to destroying of the Fragment View and Fragment object itself
- Fragment object is detached from Activity.

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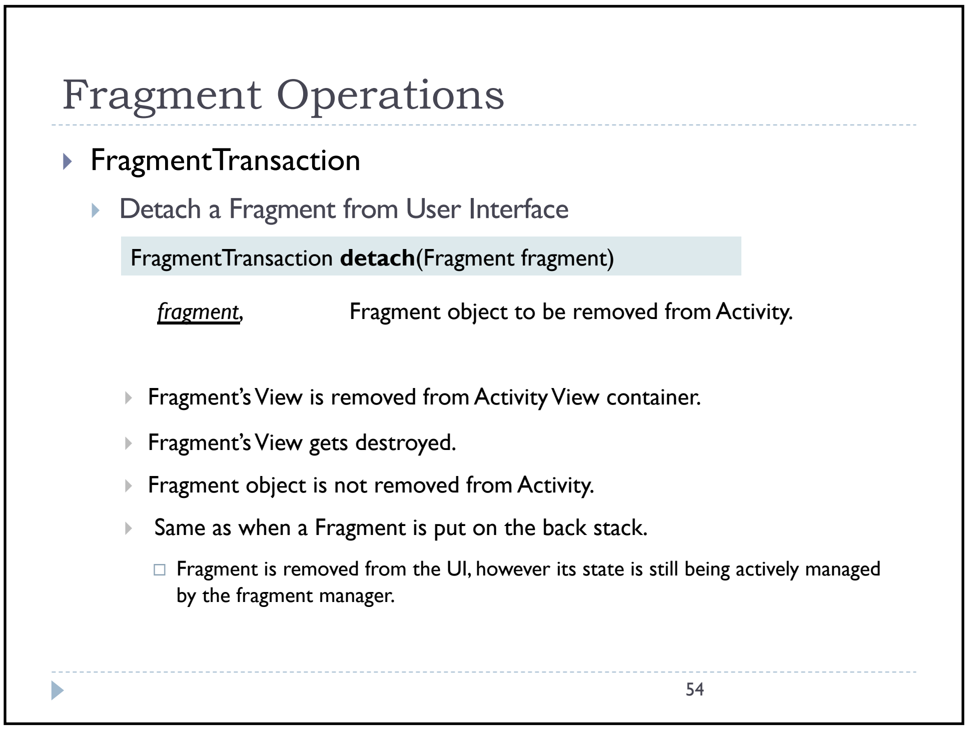

## Fragment Operations

- FragmentTransaction
  - Detach a Fragment from User Interface

FragmentTransaction **detach**(Fragment fragment)

| | |
|---|---|
| *fragment,* | Fragment object to be removed from Activity. |

- Fragment's View is removed from Activity View container.
- Fragment's View gets destroyed.
- Fragment object is not removed from Activity.
- Same as when a Fragment is put on the back stack.
  - Fragment is removed from the UI, however its state is still being actively managed by the fragment manager.

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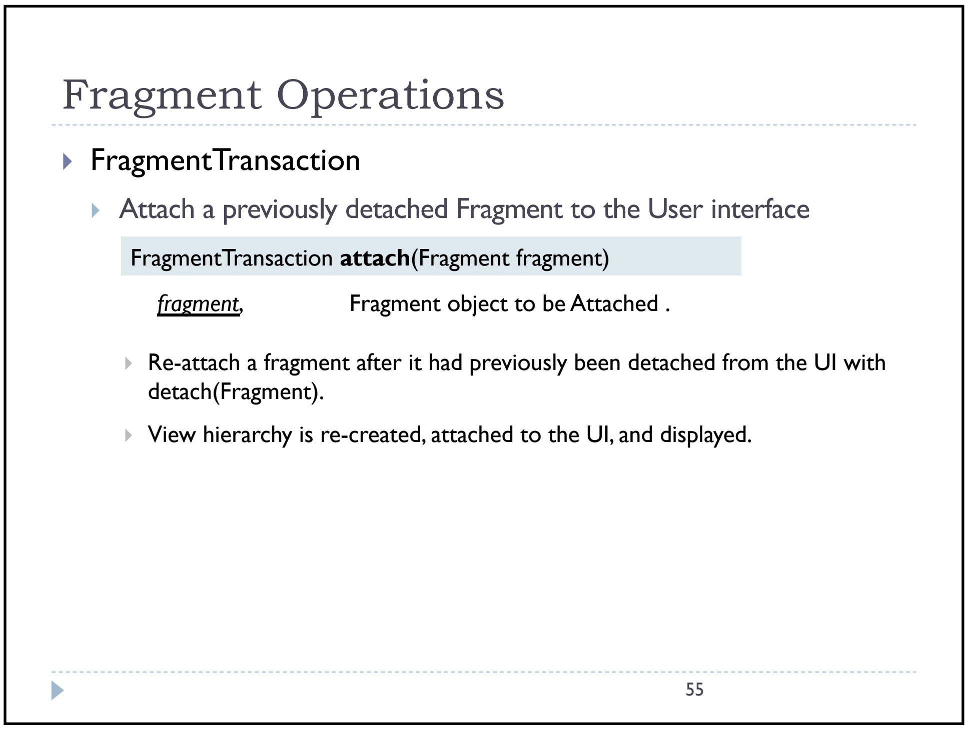

## Fragment Operations

- FragmentTransaction
  - Attach a previously detached Fragment to the User interface

```
FragmentTransaction attach(Fragment fragment)
```

| | |
|---|---|
| *fragment,* | Fragment object to be Attached . |

- Re-attach a fragment after it had previously been detached from the UI with detach(Fragment).
- View hierarchy is re-created, attached to the UI, and displayed.

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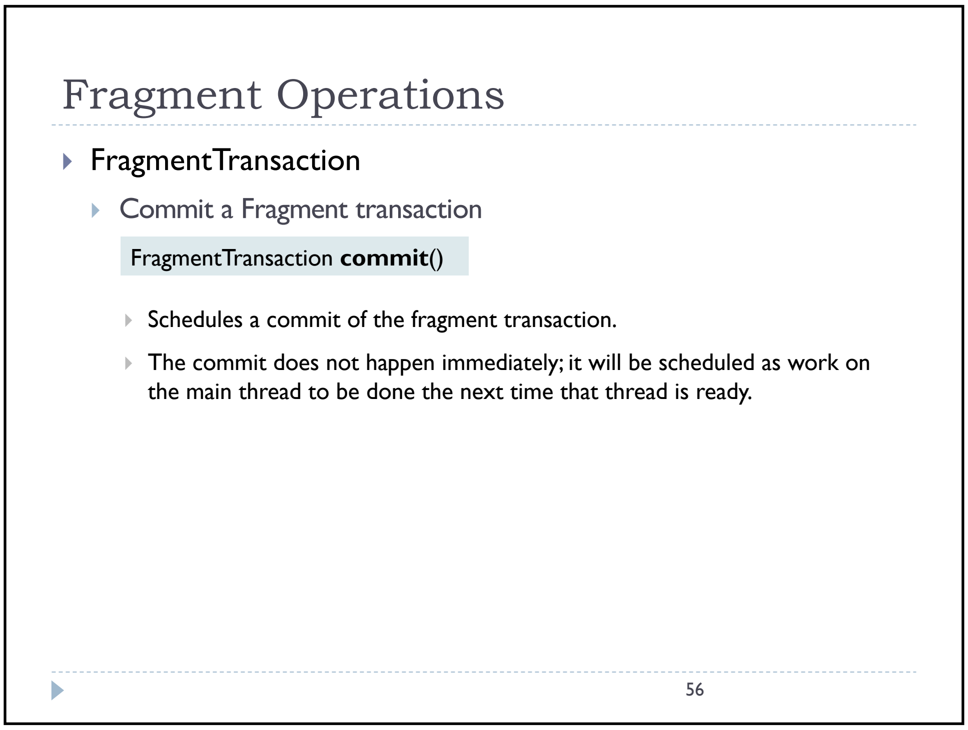

## Fragment Operations

- FragmentTransaction
  - Commit a Fragment transaction

```
FragmentTransaction commit()
```

- Schedules a commit of the fragment transaction.
- The commit does not happen immediately; it will be scheduled as work on the main thread to be done the next time that thread is ready.

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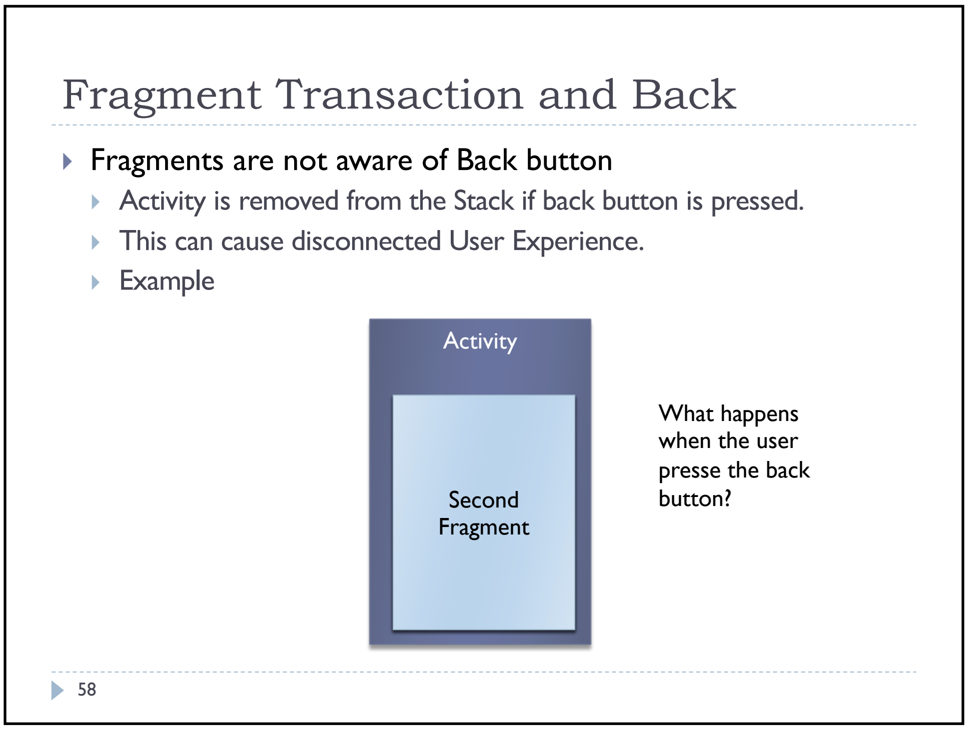
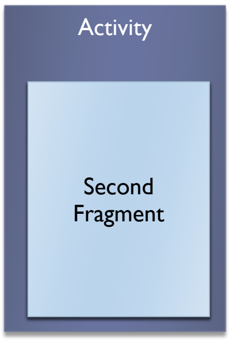


## Fragment Transaction and Back

- Fragments are not aware of Back button
  - Activity is removed from the Stack if back button is pressed.
  - This can cause disconnected User Experience.
  - Example



What happens when the user presse the back button?

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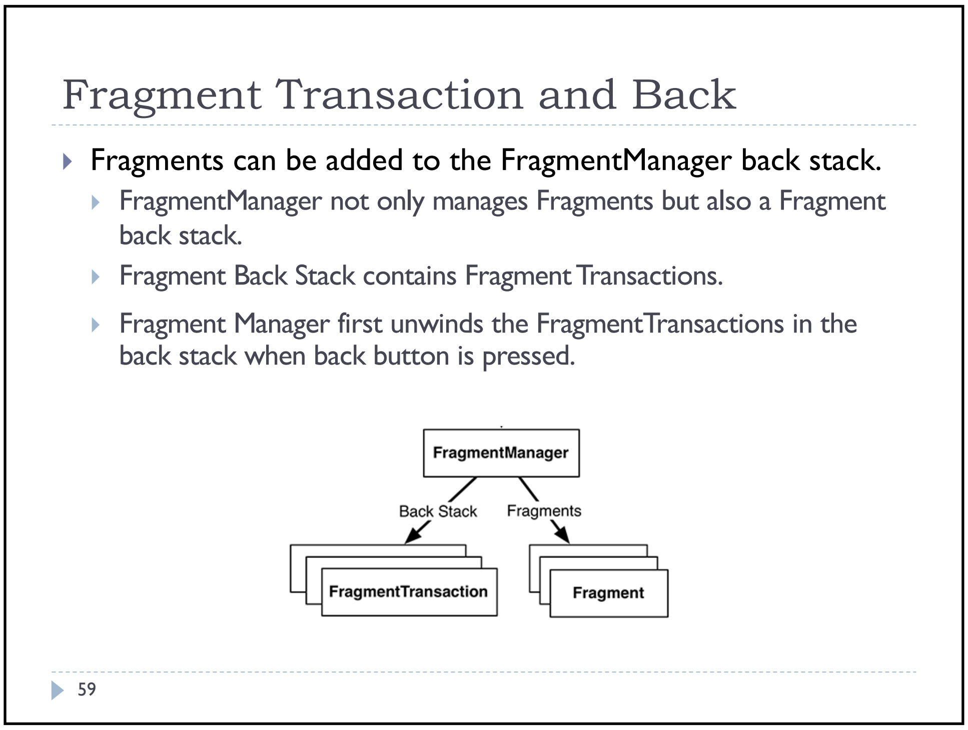
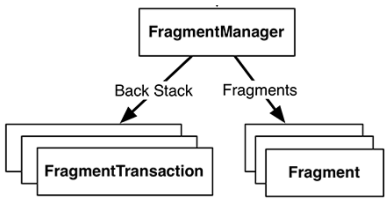


## Fragment Transaction and Back

- Fragments can be added to the FragmentManager back stack.
  - FragmentManager not only manages Fragments but also a Fragment back stack.
  - Fragment Back Stack contains Fragment Transactions.
  - Fragment Manager first unwinds the FragmentTransactions in the back stack when back button is pressed.



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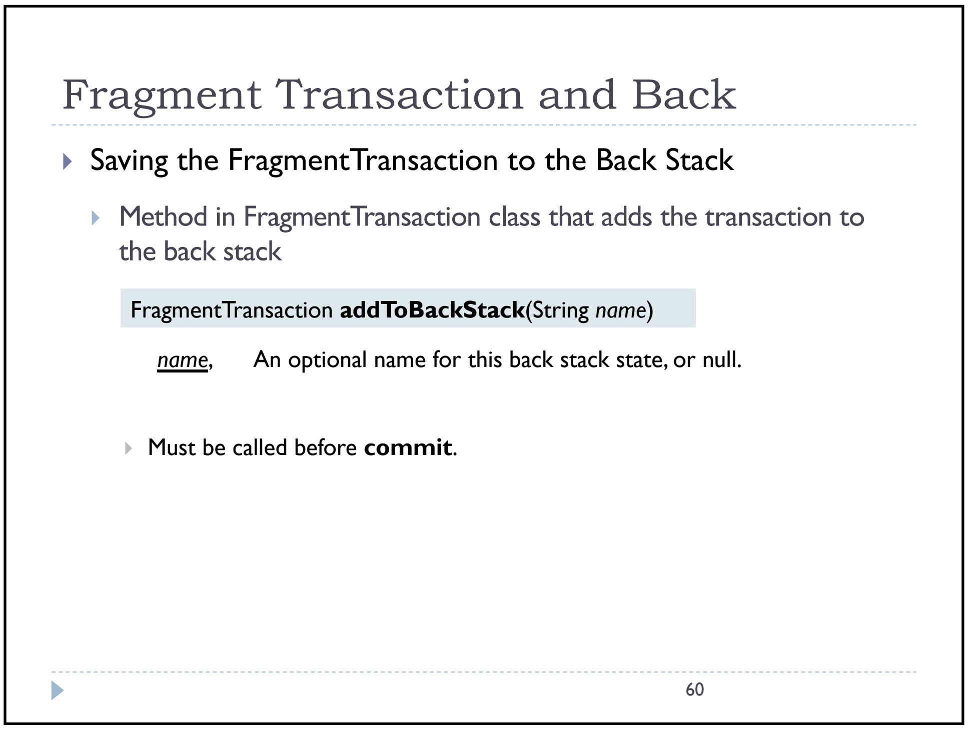

## Fragment Transaction and Back

- Saving the FragmentTransaction to the Back Stack
  - Method in FragmentTransaction class that adds the transaction to the back stack

    FragmentTransaction **addToBackStack**(String *name*)

    *name*, An optional name for this back stack state, or null.

    - Must be called before **commit**.

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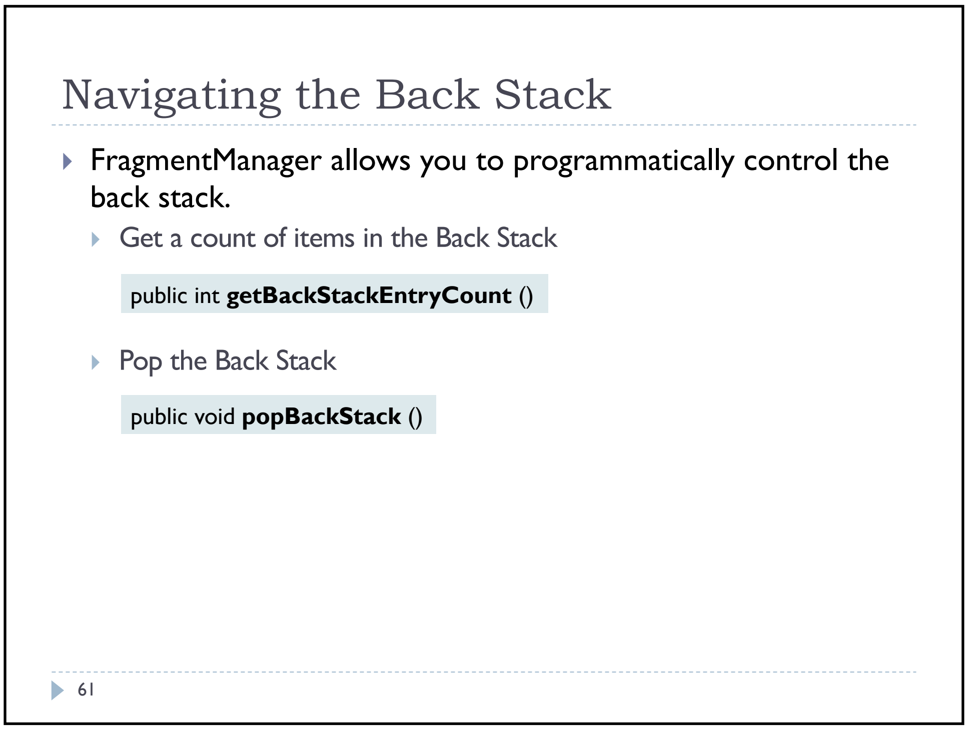

## Navigating the Back Stack

- FragmentManager allows you to programmatically control the back stack.
  - Get a count of items in the Back Stack

    public int **getBackStackEntryCount** ()

  - Pop the Back Stack

    public void **popBackStack** ()

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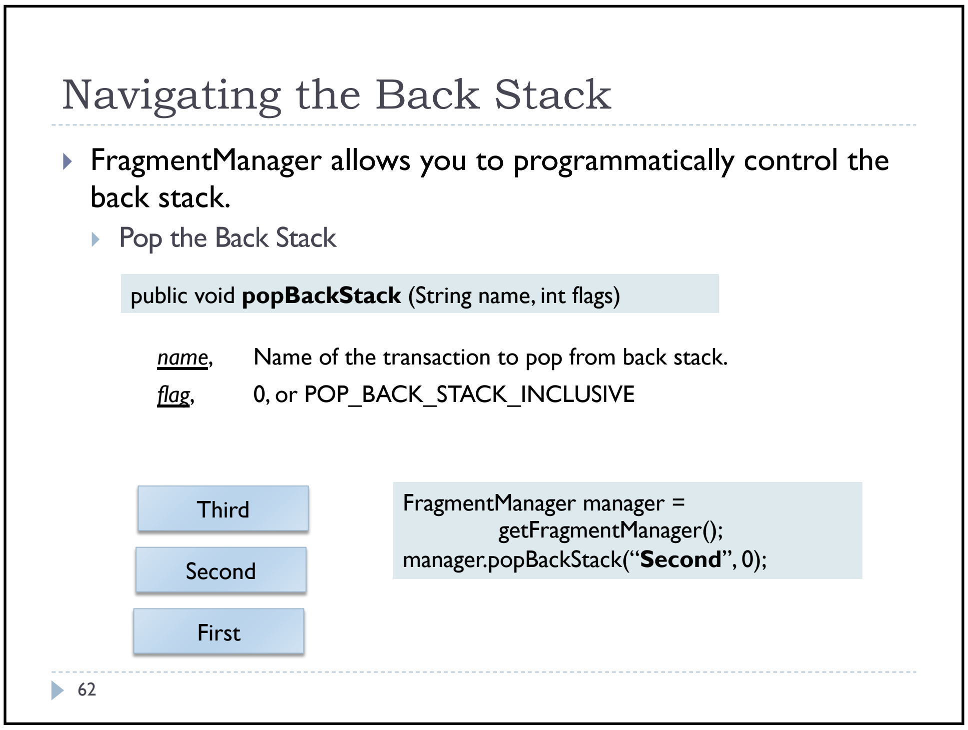

## Navigating the Back Stack

- FragmentManager allows you to programmatically control the back stack.
  - Pop the Back Stack

```
public void **popBackStack** (String name, int flags)
```

| | |
|---|---|
| *name*, | Name of the transaction to pop from back stack. |
| *flag*, | 0, or POP_BACK_STACK_INCLUSIVE |

Third

Second

First

```
FragmentManager manager =
            getFragmentManager();
manager.popBackStack("Second", 0);
```

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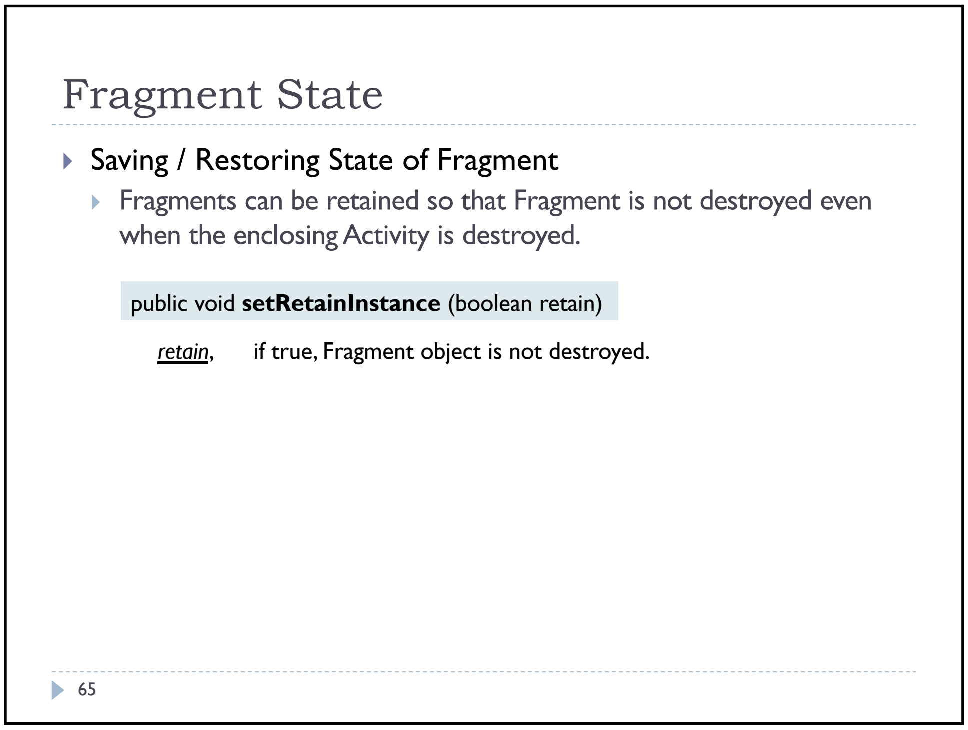

## Fragment State

- Saving / Restoring State of Fragment
  - Fragments can be retained so that Fragment is not destroyed even when the enclosing Activity is destroyed.

```
public void setRetainInstance (boolean retain)
```

| | |
|---|---|
| *retain*, | if true, Fragment object is not destroyed. |

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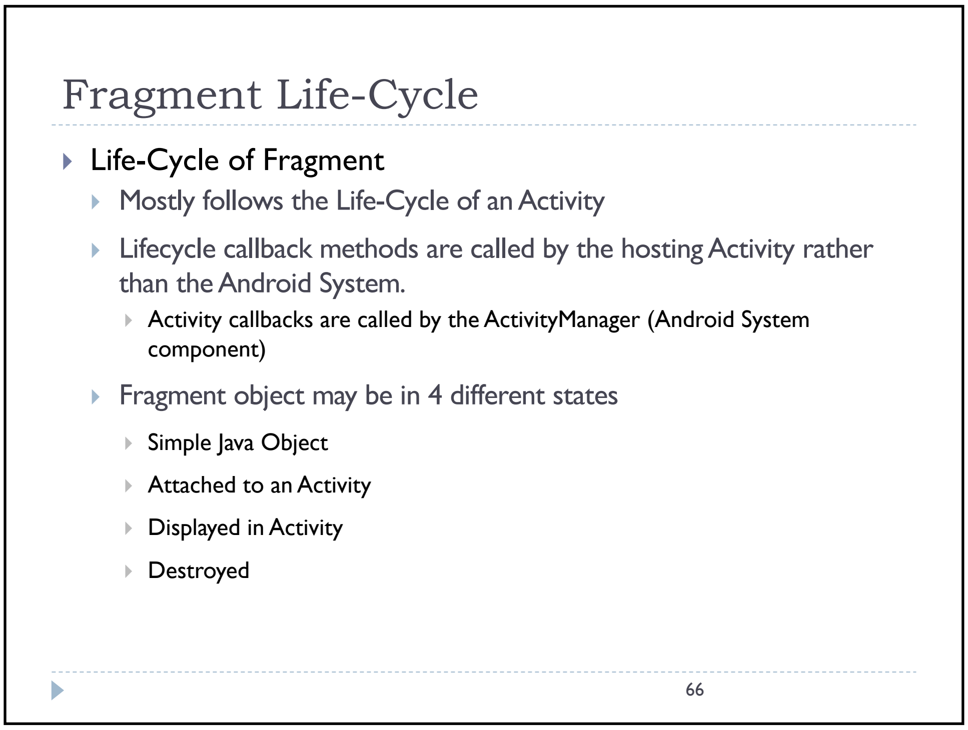

## Fragment Life-Cycle

- Life-Cycle of Fragment
  - Mostly follows the Life-Cycle of an Activity
  - Lifecycle callback methods are called by the hosting Activity rather than the Android System.
    - Activity callbacks are called by the ActivityManager (Android System component)
  - Fragment object may be in 4 different states
    - Simple Java Object
    - Attached to an Activity
    - Displayed in Activity
    - Destroyed

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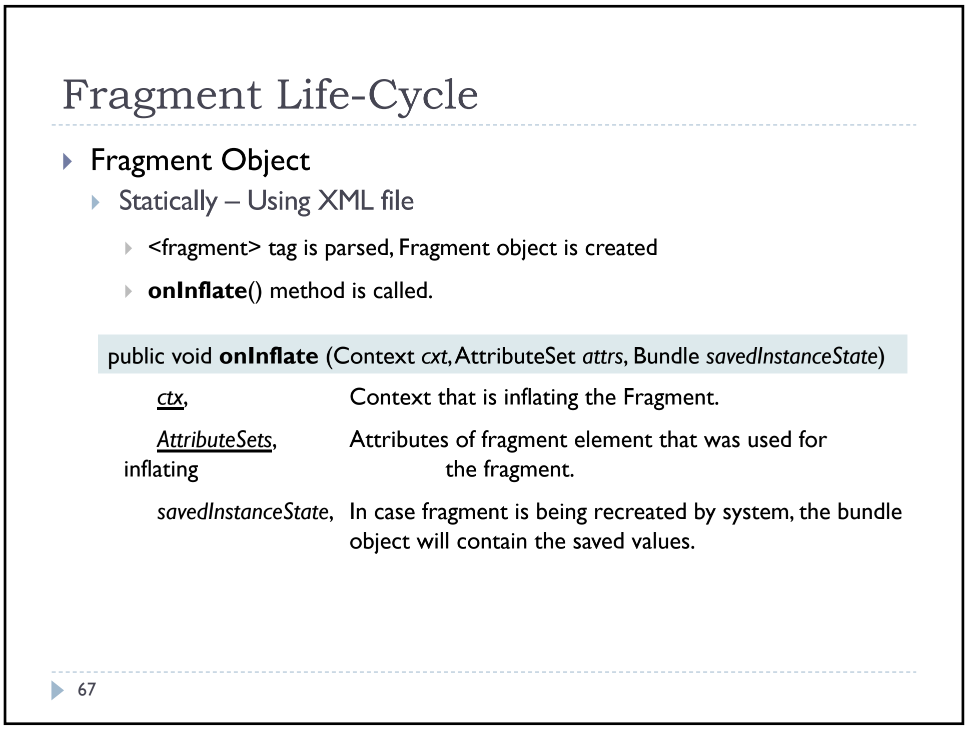

## Fragment Life-Cycle

- Fragment Object
  - Statically – Using XML file
    - <fragment> tag is parsed, Fragment object is created
    - **onInflate**() method is called.

public void **onInflate** (Context *cxt*, AttributeSet *attrs*, Bundle *savedInstanceState*)

| | |
|---|---|
| *ctx*, | Context that is inflating the Fragment. |
| *AttributeSets*, inflating | Attributes of fragment element that was used for the fragment. |
| *savedInstanceState*, | In case fragment is being recreated by system, the bundle object will contain the saved values. |

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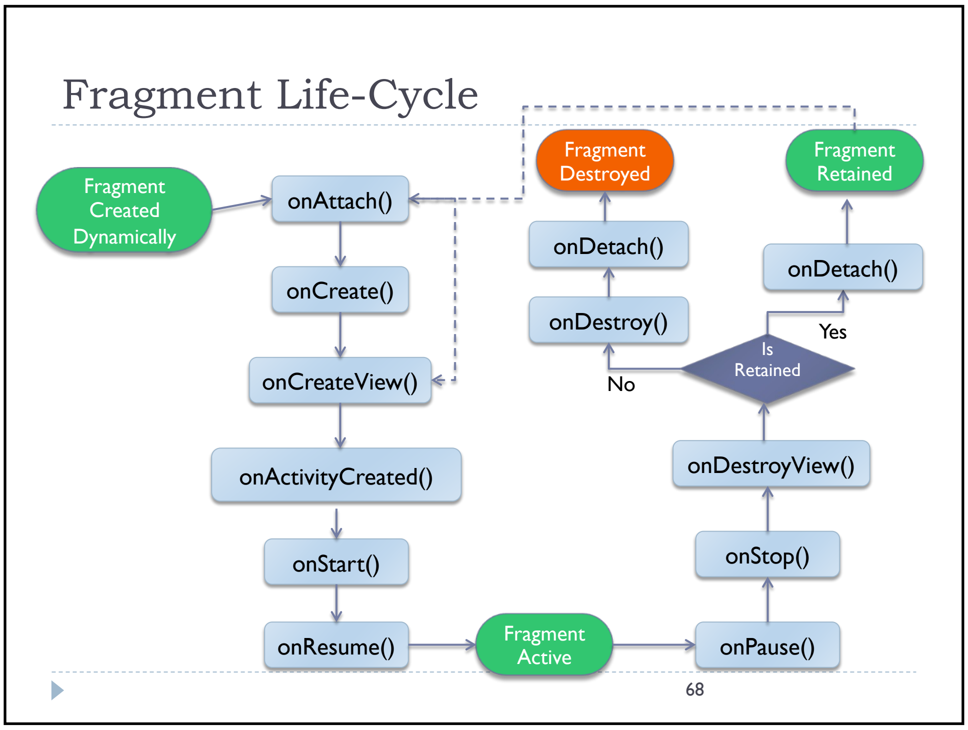

## Fragment Life-Cycle

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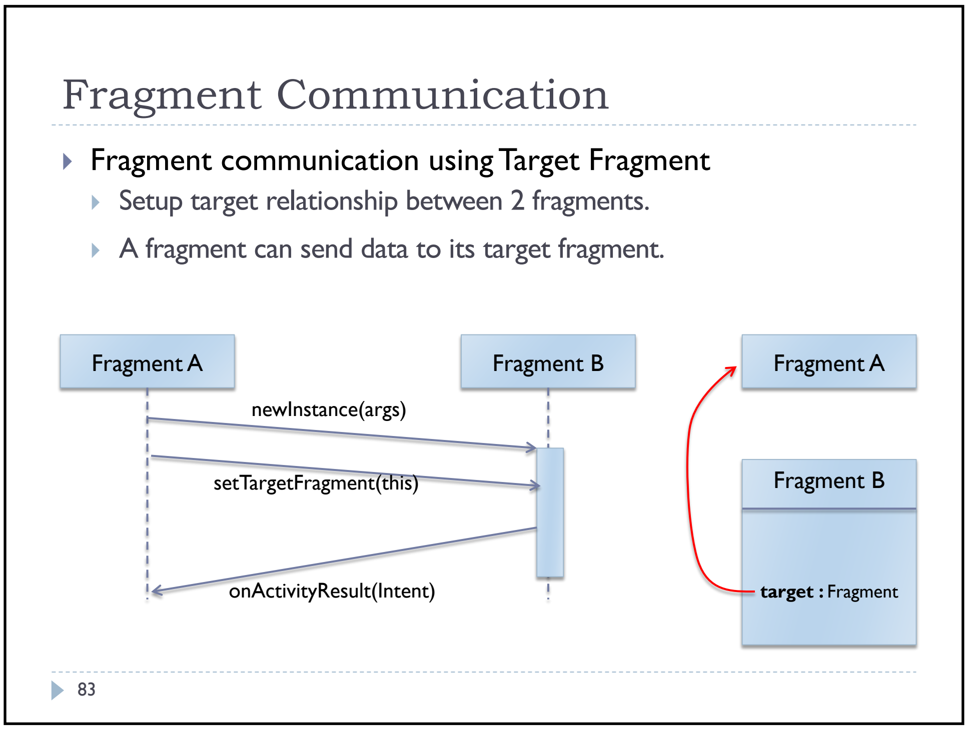

## Fragment Communication

- Fragment communication using Target Fragment
  - Setup target relationship between 2 fragments.
  - A fragment can send data to its target fragment.

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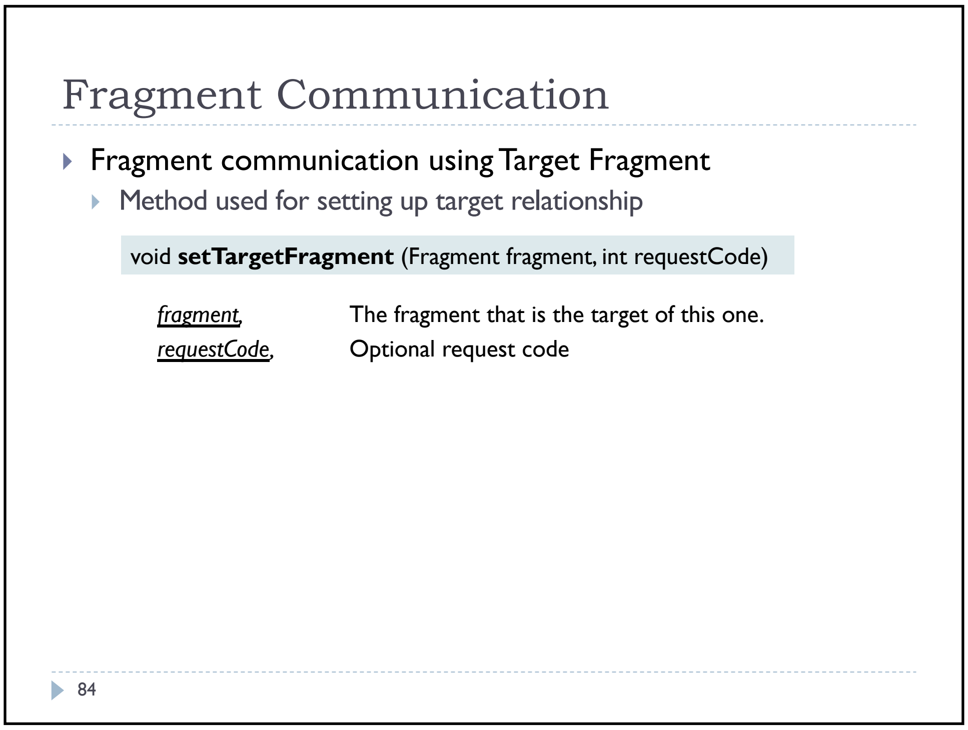

## Fragment Communication

- Fragment communication using Target Fragment
  - Method used for setting up target relationship

void **setTargetFragment** (Fragment fragment, int requestCode)

| | |
|---|---|
| *fragment,* | The fragment that is the target of this one. |
| *requestCode,* | Optional request code |

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