Mobile Application Development

Produced by

Eamonn de Leastar (edeleastar@wit.ie)
Dr. Siobhán Drohan (sdrohan@wit.ie)

Department of Computing, Maths & Physics
Waterford Institute of Technology

http://www.wit.ie

http://elearning.wit.ie

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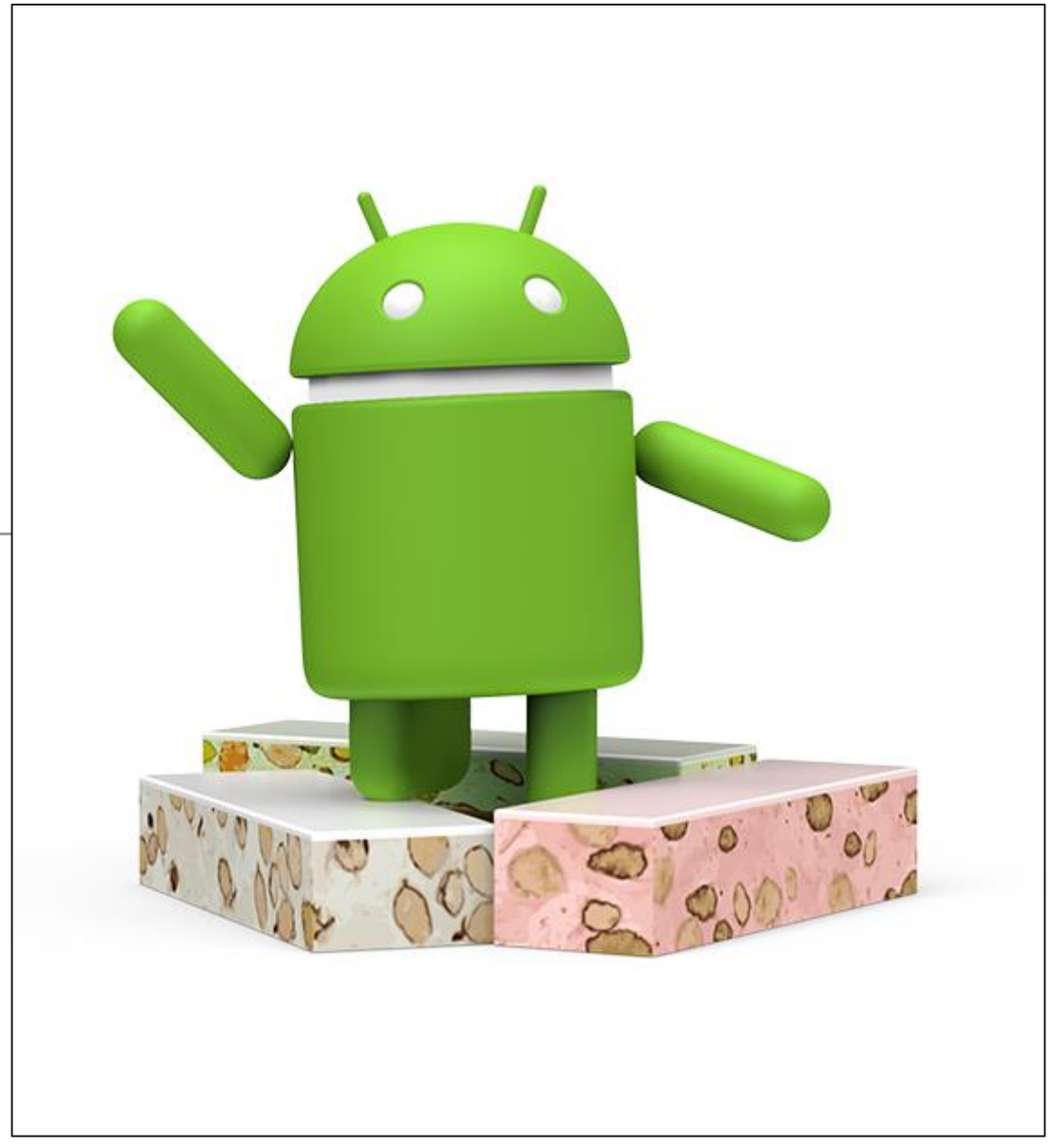
eLearning support unit

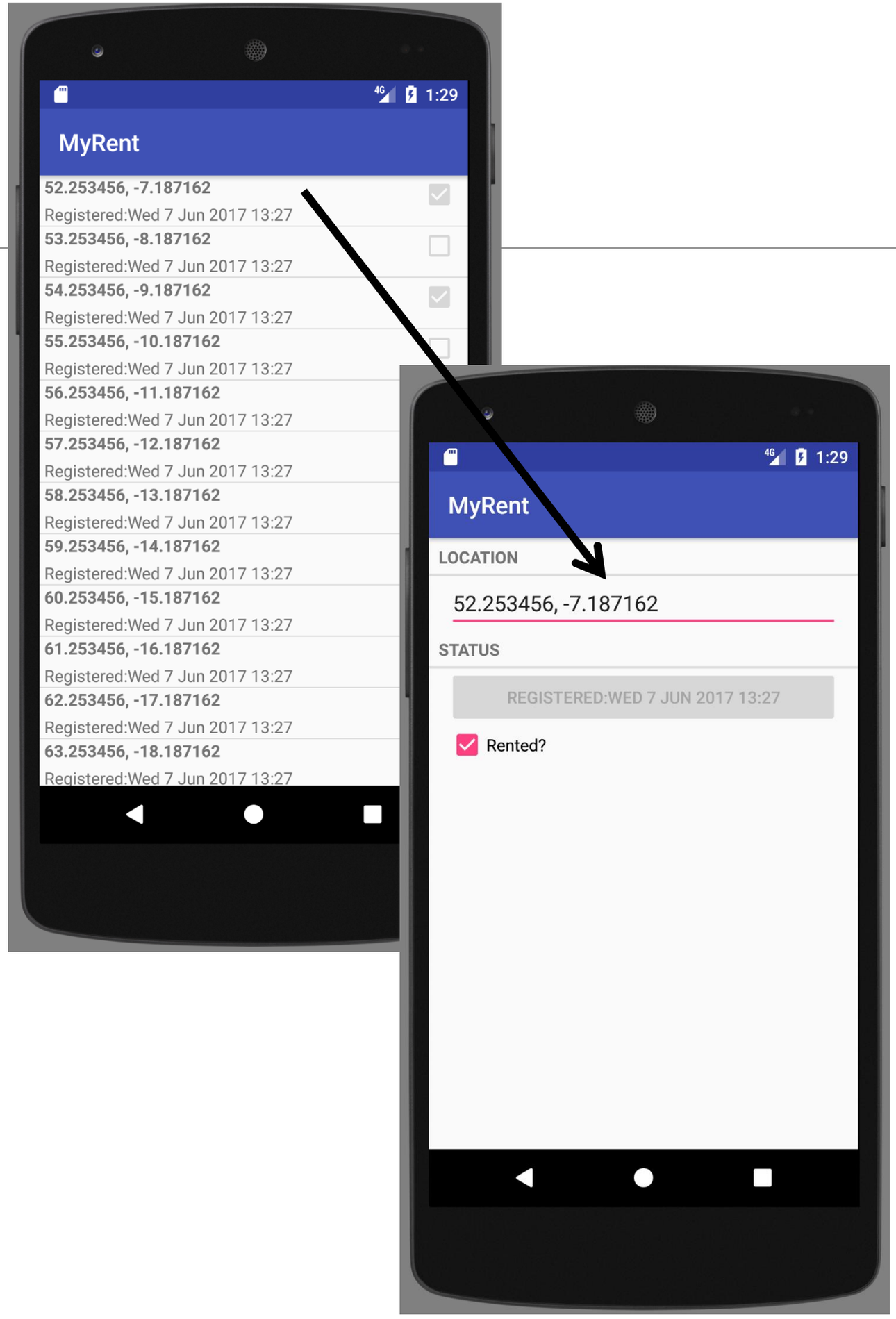
Activities

and the Activity Lifecycle



Activities

- Purpose of an Activity
- Activity Stack
- Activity Lifecycle
- Creating an Activity
- Specifying the UI
- Manifest
- Starting Activities

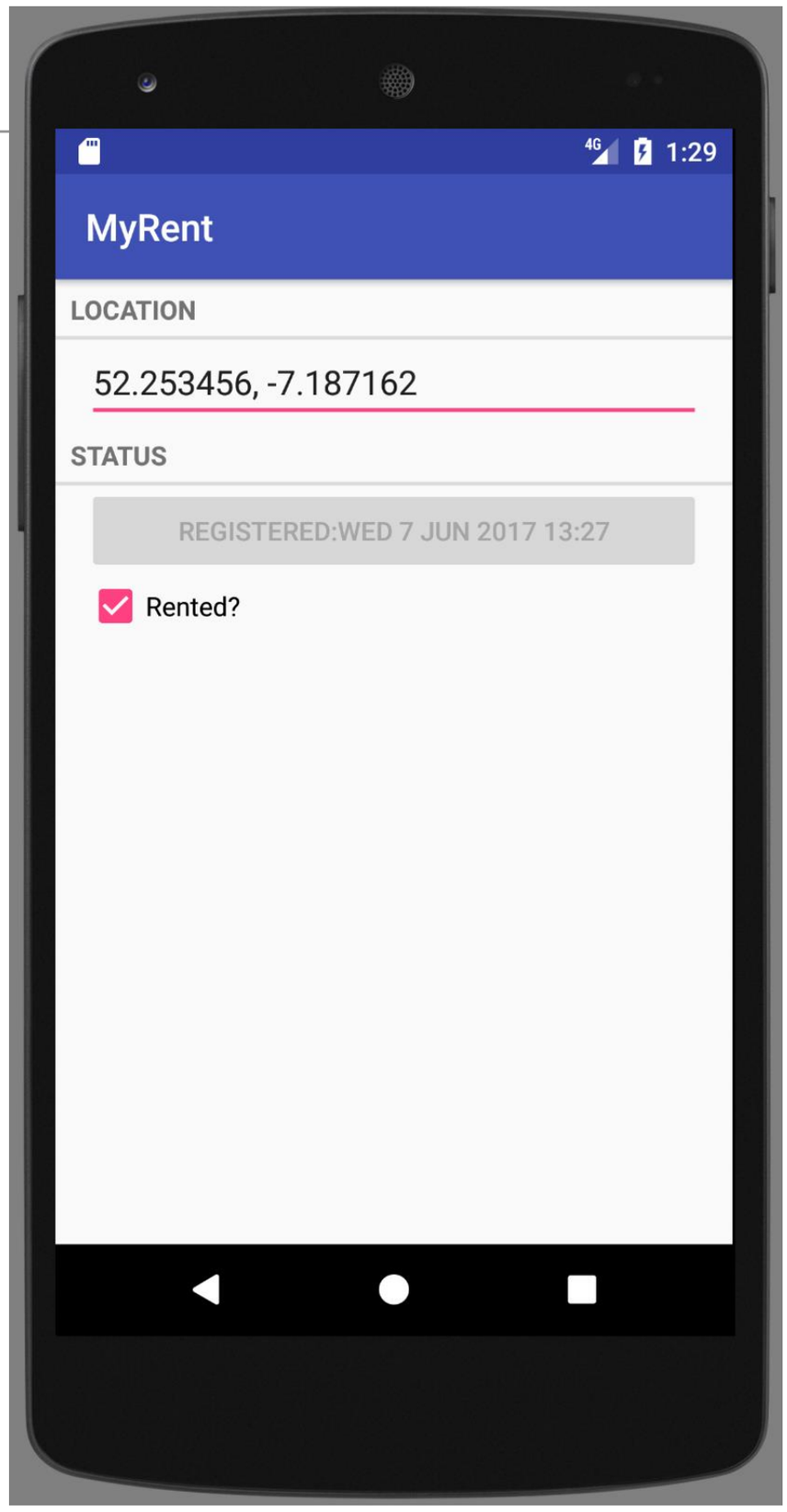


Activities

- An application component that provides a screen with which users can interact in order to do something.

- Each activity is given a window in which to draw its user interface.

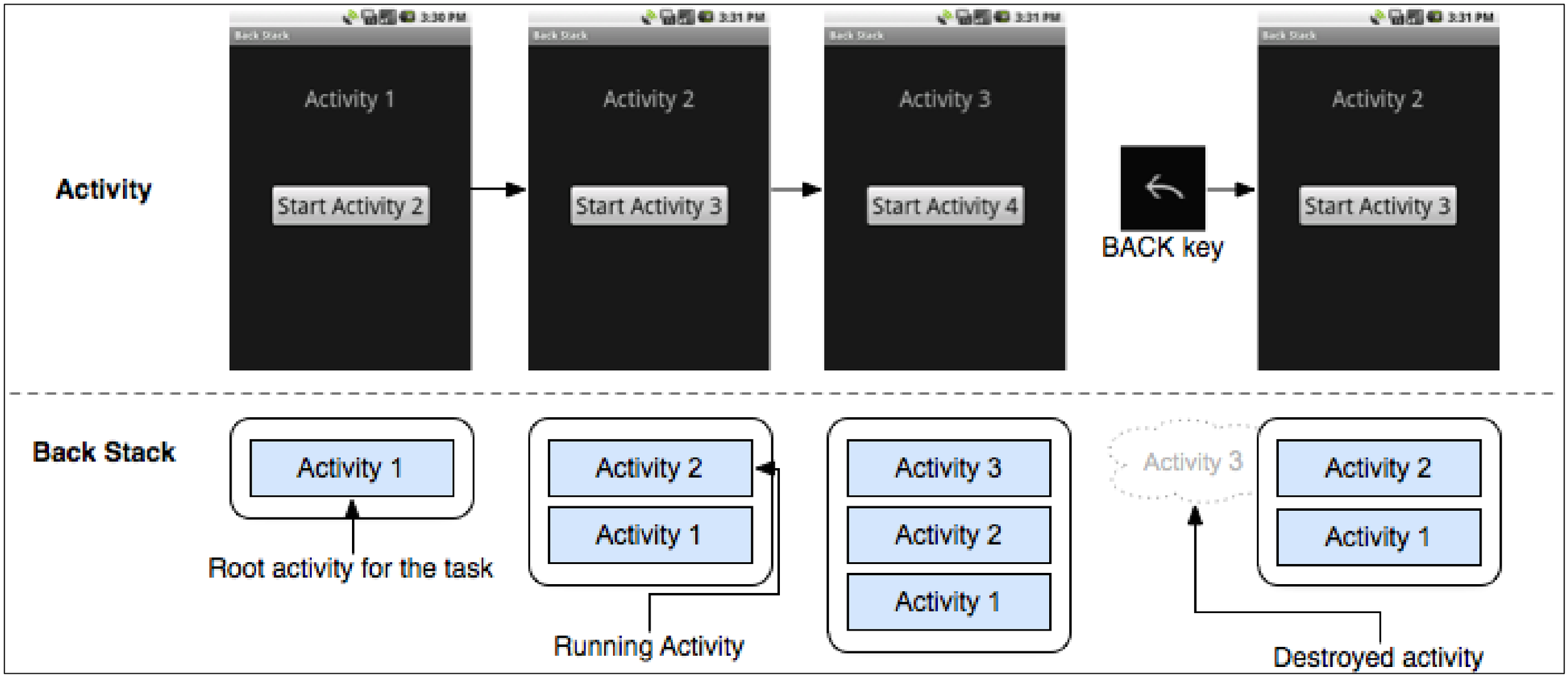
- The window typically fills the screen.



Activity Stack

- An application consists of multiple activities loosely bound to each other.
- One activity in an application is specified as the "main" activity, presented on first launch
- Each activity can then start another activity to perform different actions.

Activity Stack

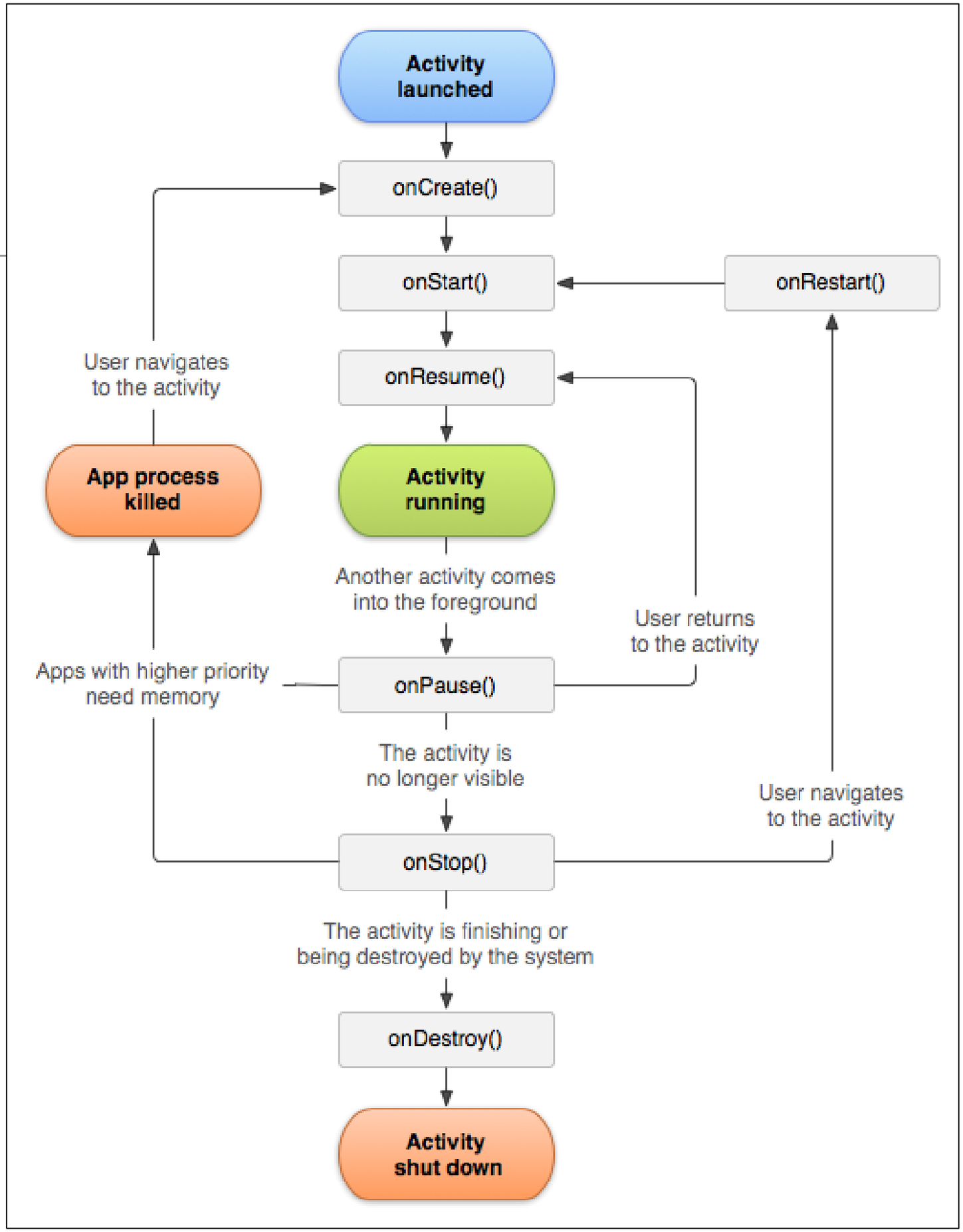


- When an activity starts, the previous activity is stopped, but the system preserves the activity in a stack (the "back stack").
- The back stack abides to the basic "last in, first out" stack mechanism, - when Back button pressed, it is popped from the stack that previous activity resumes.

Activity Lifecycle

Create a subclass of AppCompatActivity.

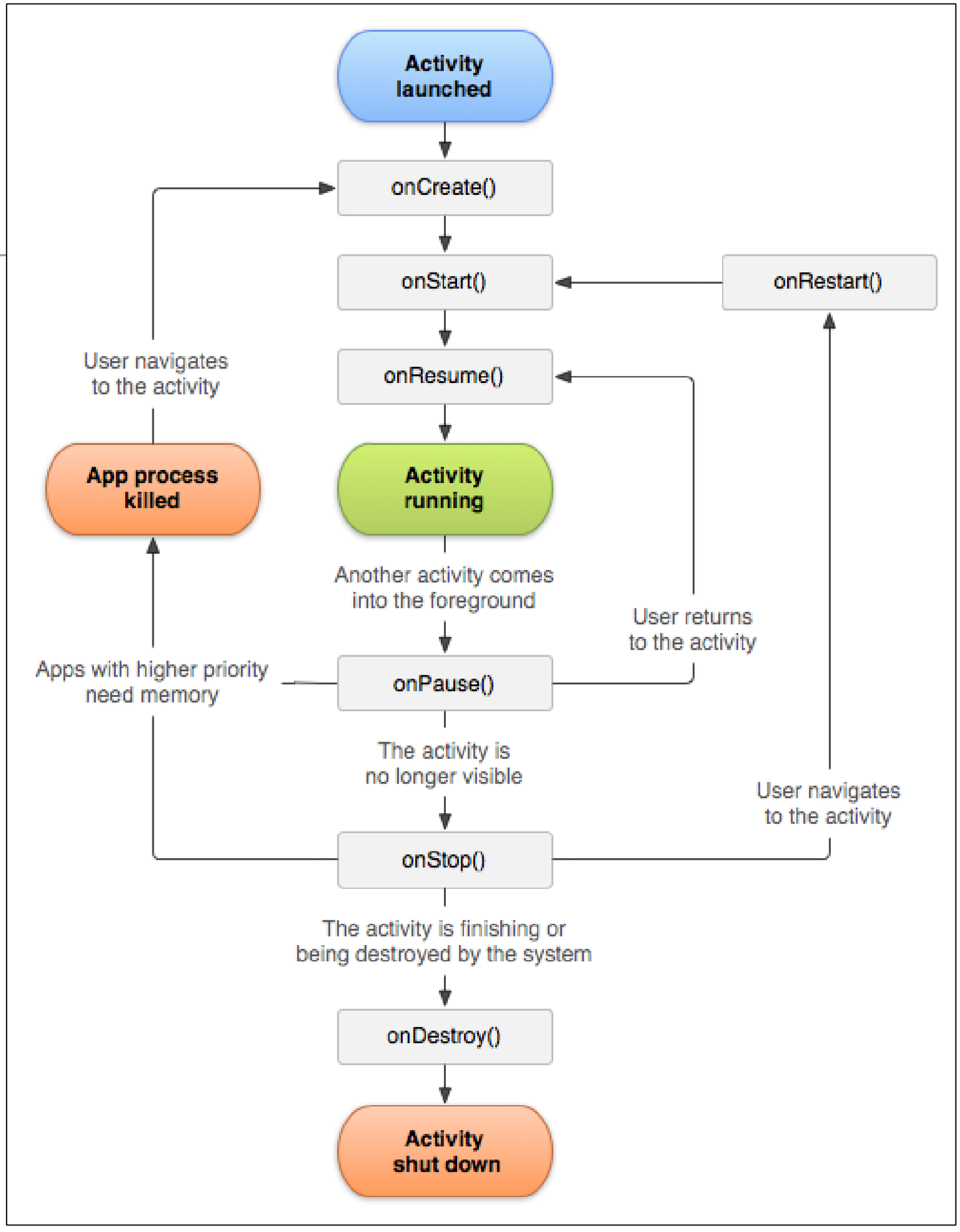
This allows you override any of the callback methods that the system calls when the activity transitions between various states of its lifecycle.



Activity Lifecycle

An Activity has many callback methods.

- Callback methods are triggered when an action to which it is attached is executed.
- You don’t need to implement all of them in each Activity.



https://www.tutorialspoint.com/android/android_acitivities.htm

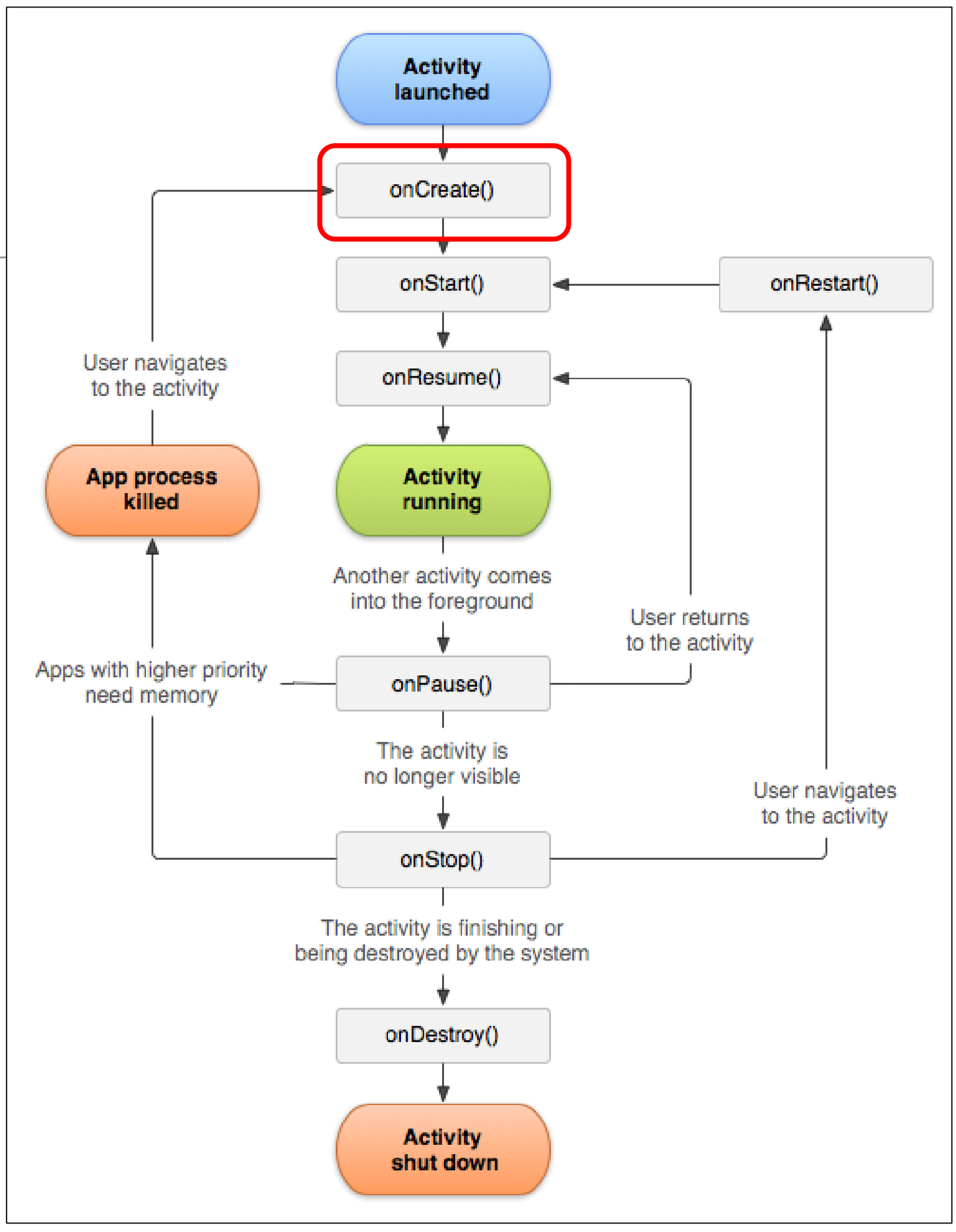
Activity Lifecycle

onCreate()

The system calls this when creating your activity.

Perform basic start-up logic such as initialising the essential components of your activity, usually including a setContentView() call to define the layout for the user interface.

Note: a primary method



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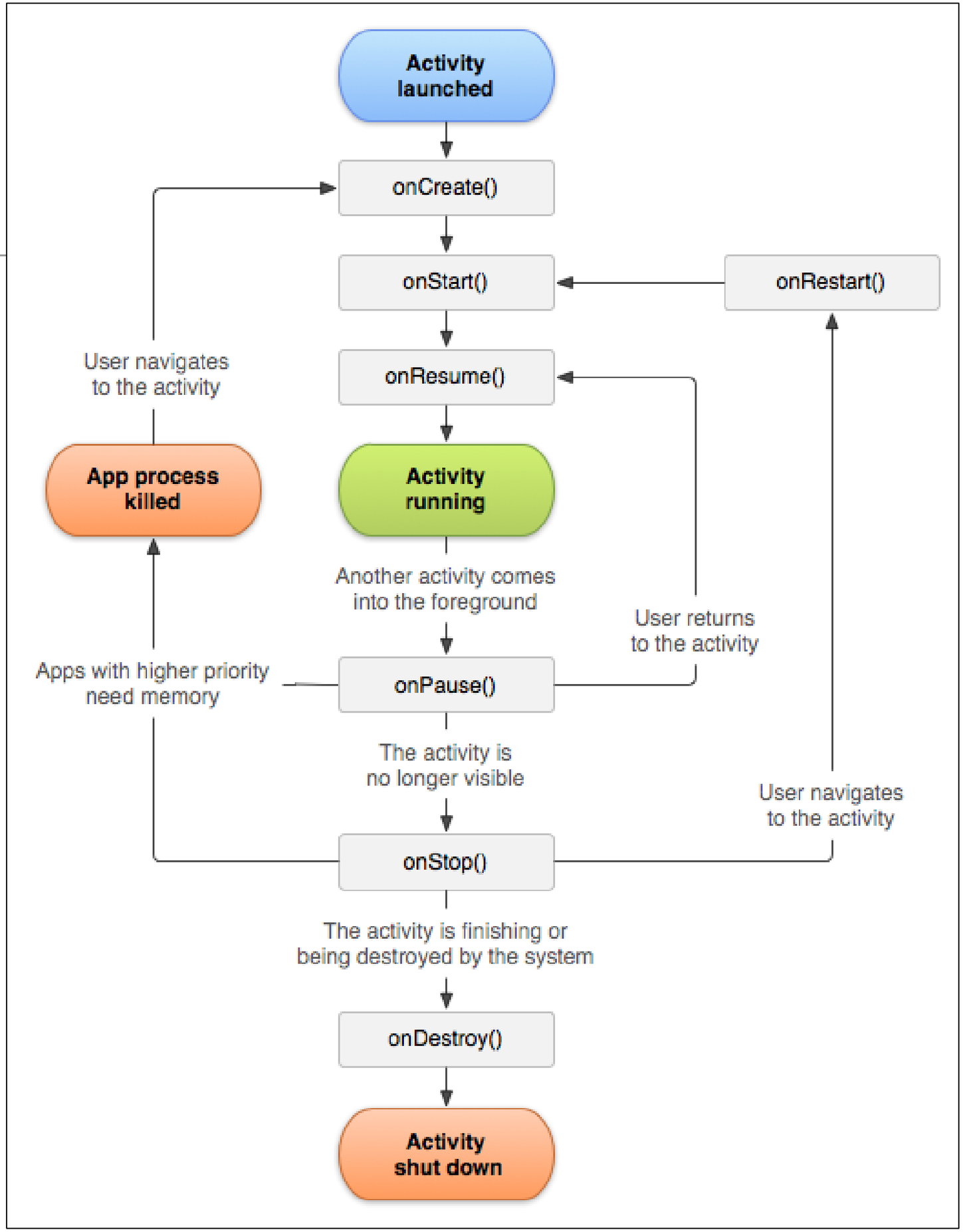
Activity Lifecycle

- Your activity does not reside in the **Created** state
- Once the onCreate() method is finished running, it enters **Started** state and the system calls the onStart() method.

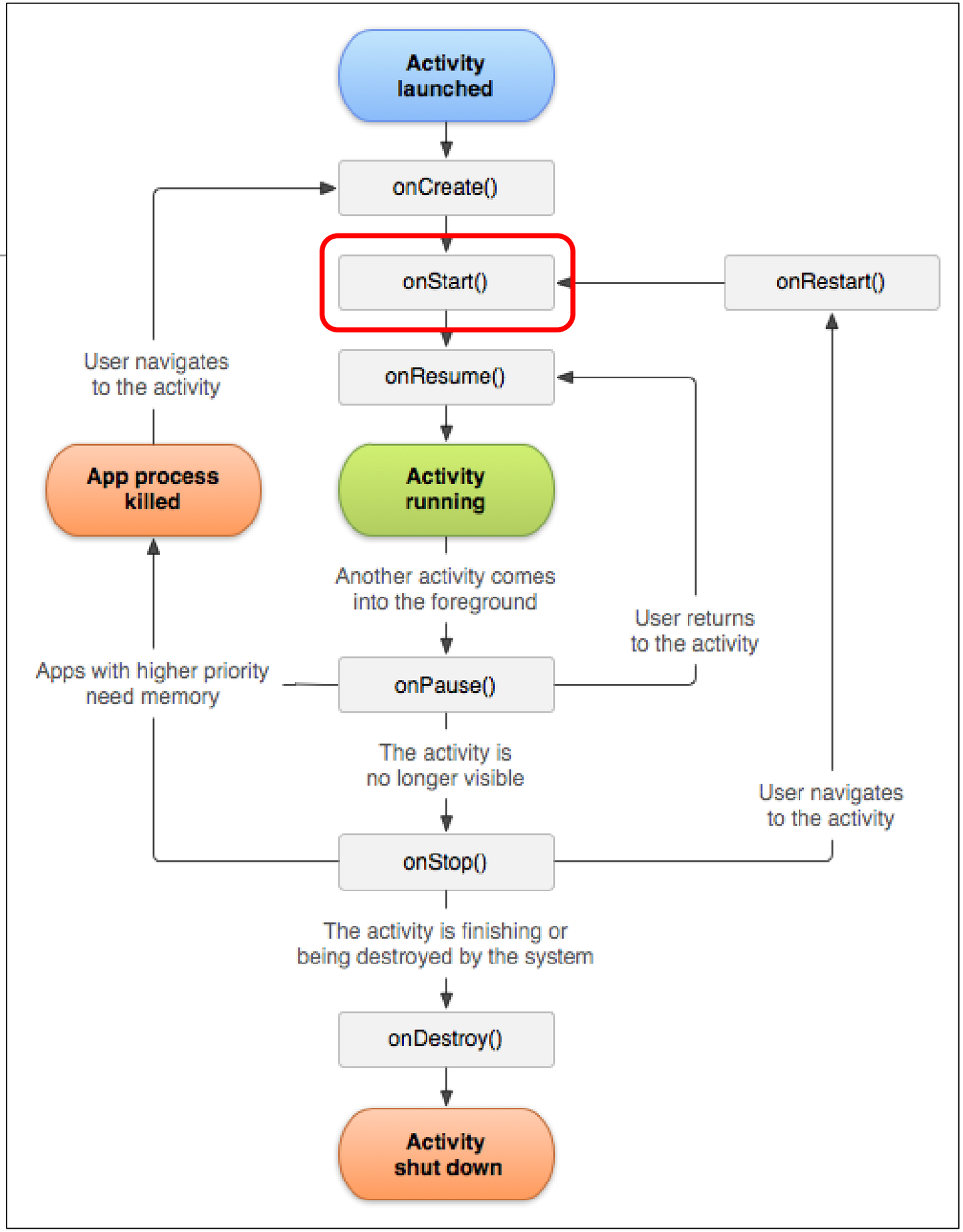


Activity Lifecycle

onStart()

This callback is called when the activity becomes visible to the user and it prepares for becoming interactive.

Once this method is finished running, the Activity doesn't stay in **Started** state either…it moves to **Resumed** state.



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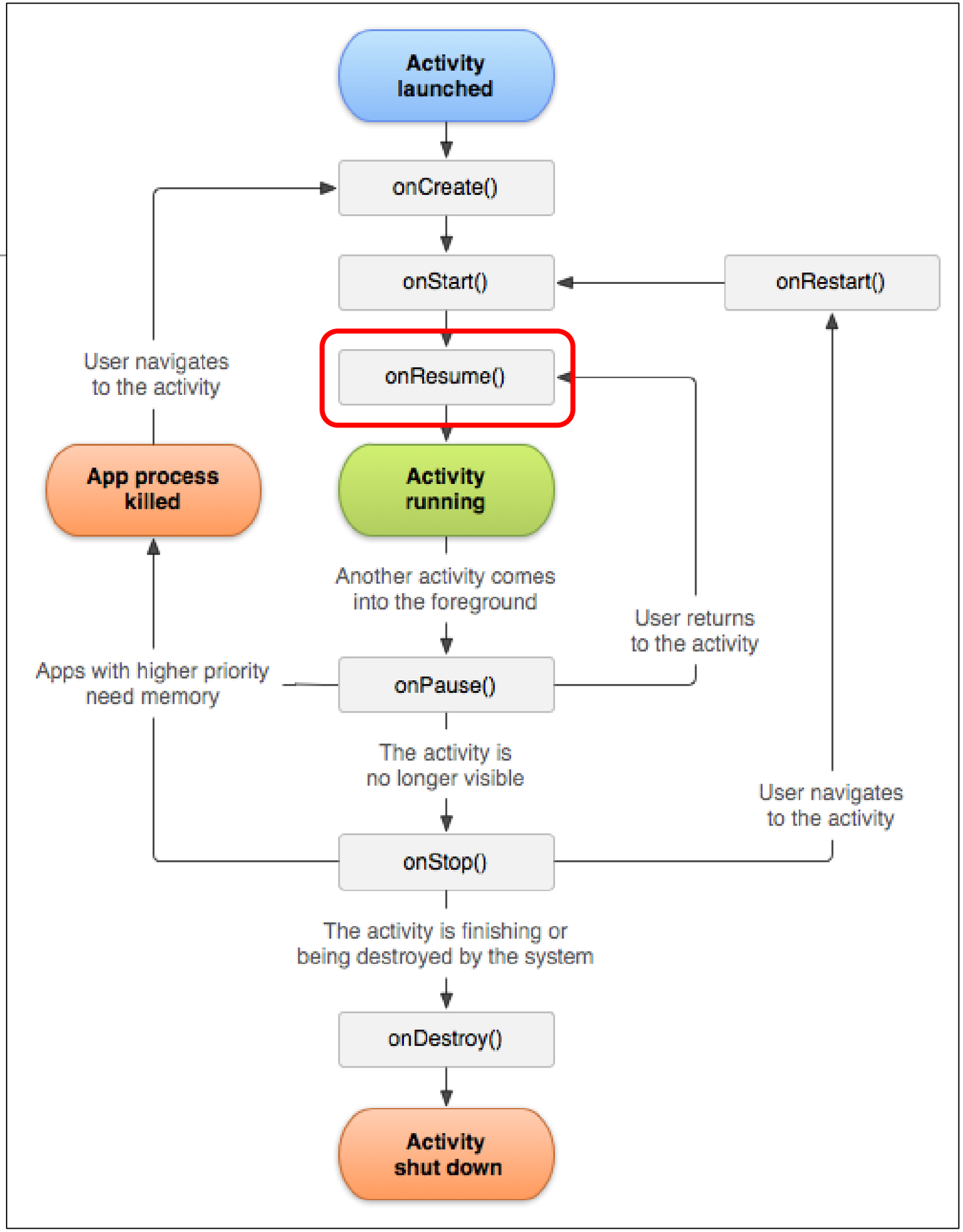
Activity Lifecycle

onResume()

This is called when the user starts interacting with the application.

The activity stays in the **Resumed** state until something happens to take focus away e.g. receiving a phone call, navigating to another activity, etc.



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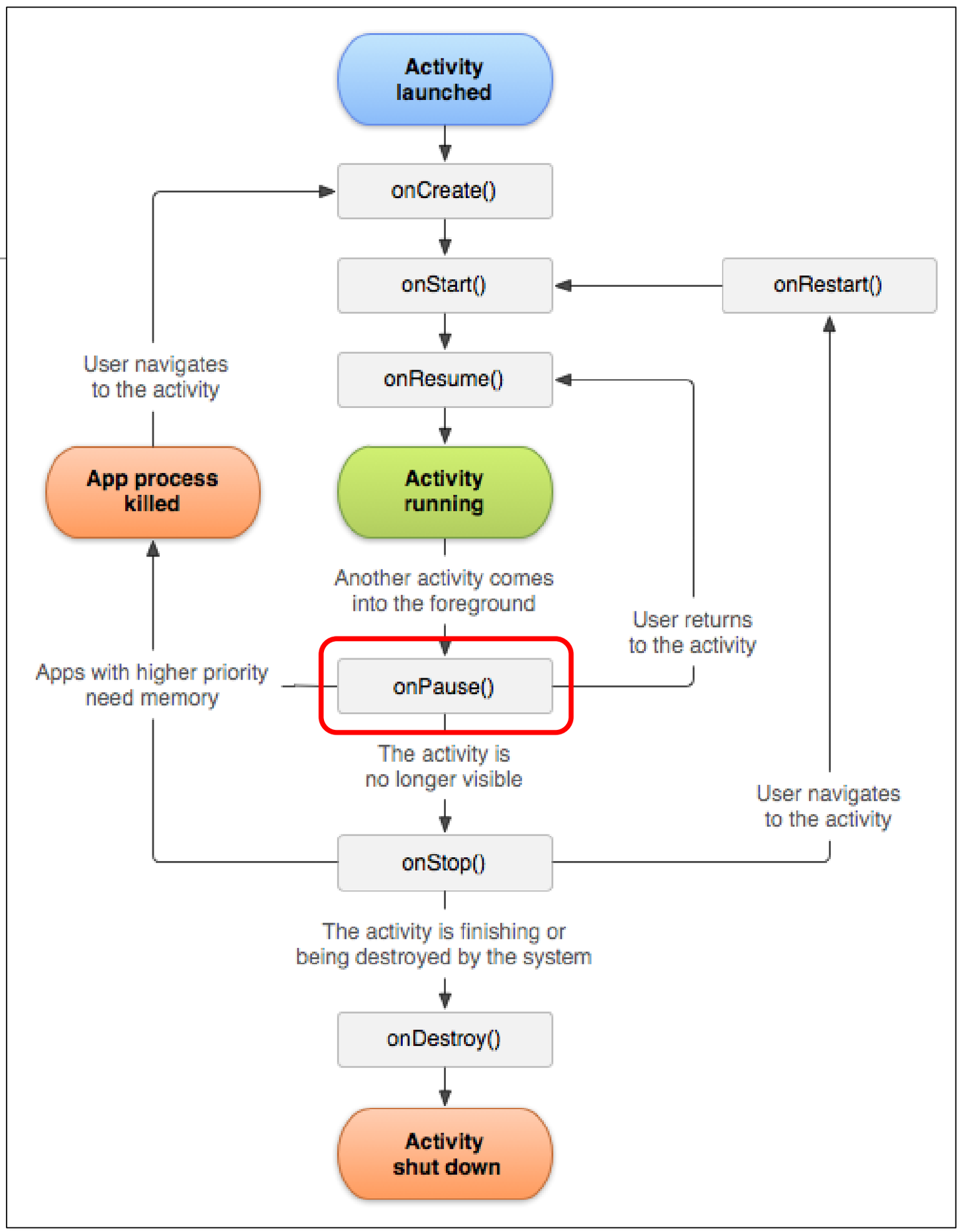
Activity Lifecycle

onPause()

The system calls this method as the first indication that the user is leaving your activity (though it does not always mean the activity is being destroyed) i.e. lost focus.

Pause things such as animations, music, release system resources, etc.

Note: a primary method



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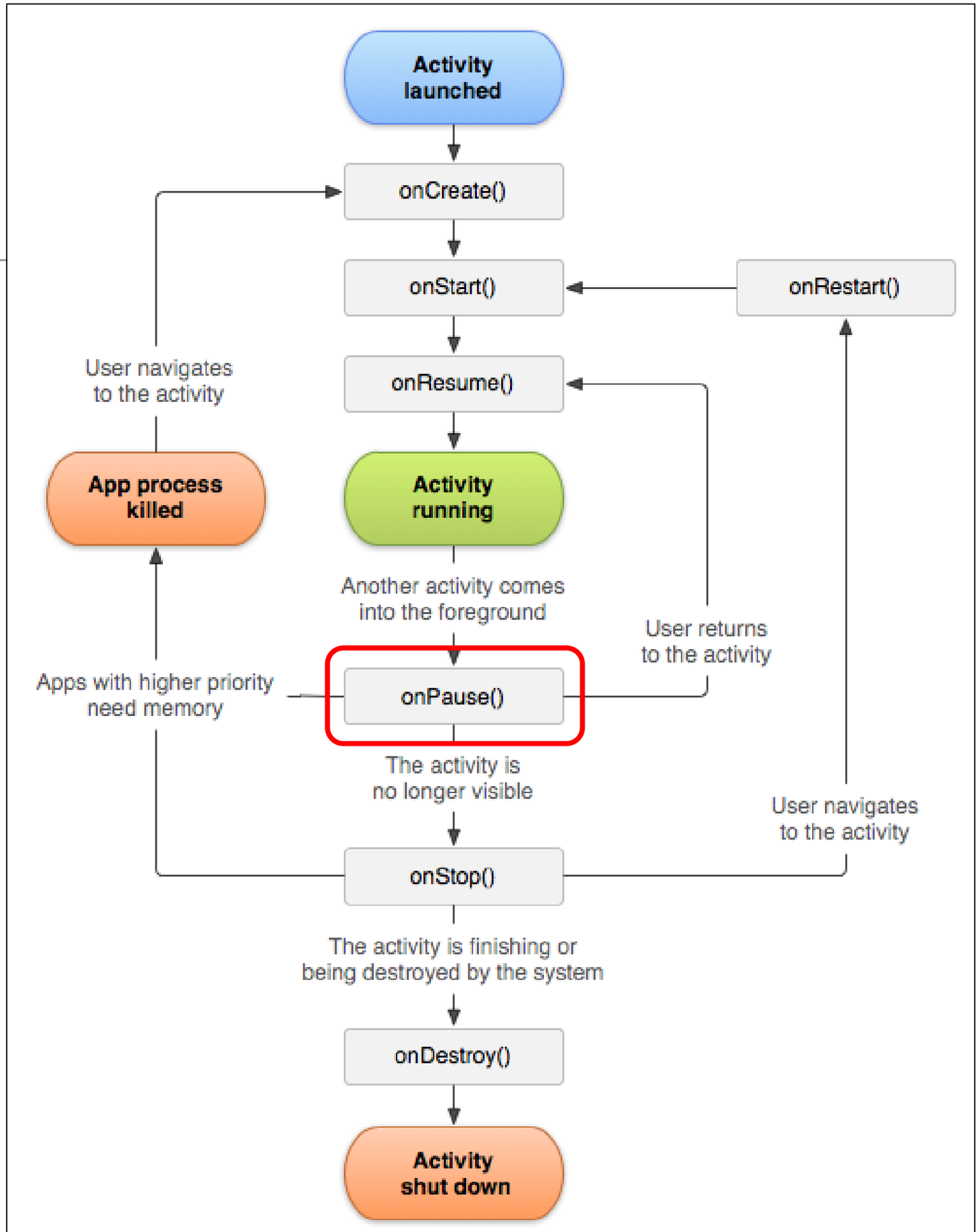
Activity Lifecycle

onPause()

As onPause() method execution is very brief, you shouldn't save application / user data, make network calls, etc…basically don't invoke any task whose execution time could last longer than the onPause() method execution time.

Note: a primary method



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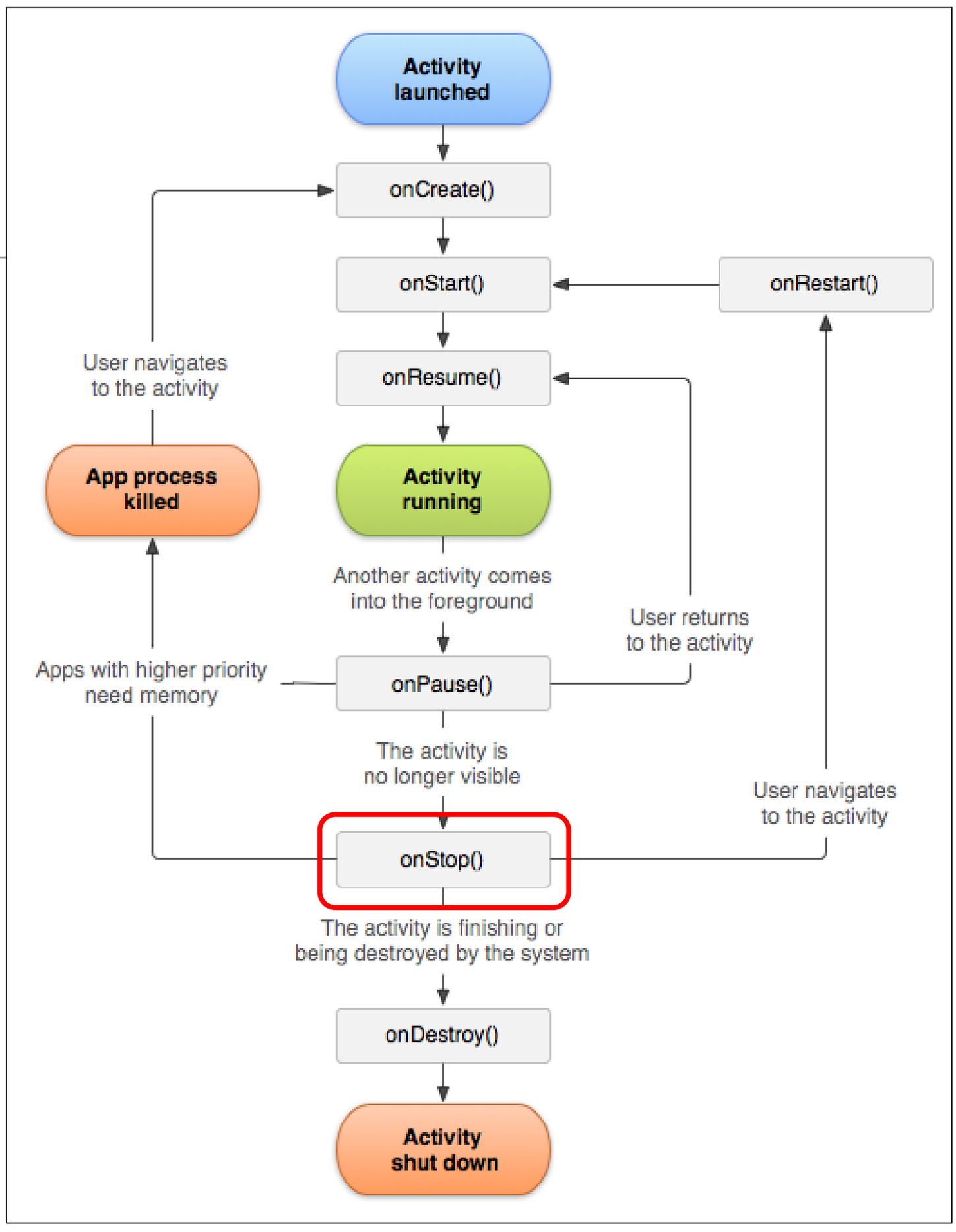
Activity Lifecycle

onStop()

This callback is invoked when the activity is no longer visible e.g. a newly launched activity covers the entire screen.

You should release any large objects (e.g. network or database connections) that the user is not using → avoid resource leaks.



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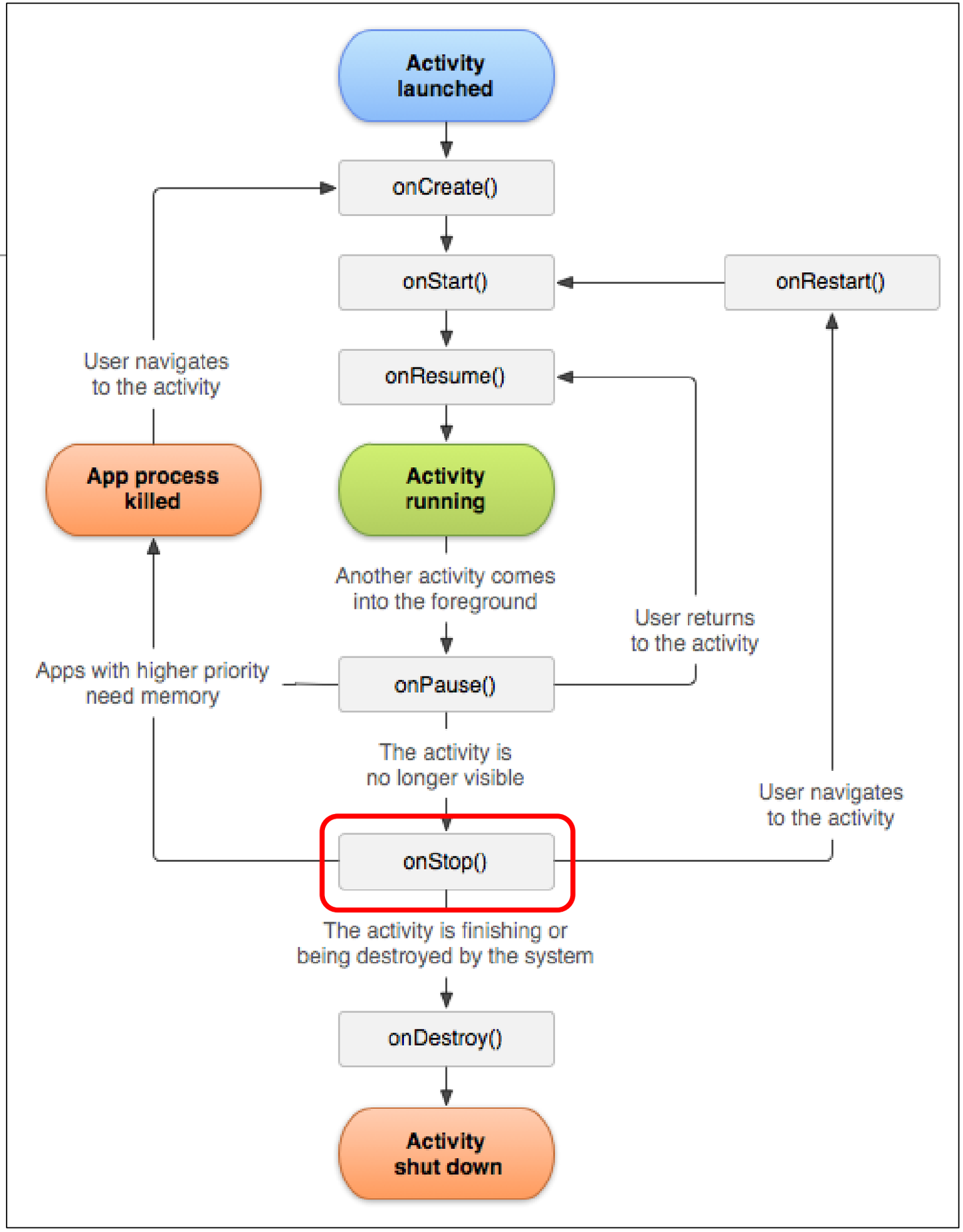
Activity Lifecycle

onStop()

Also use this method to perform CPU intensive operations such as persisting data (if you haven't done so previously).



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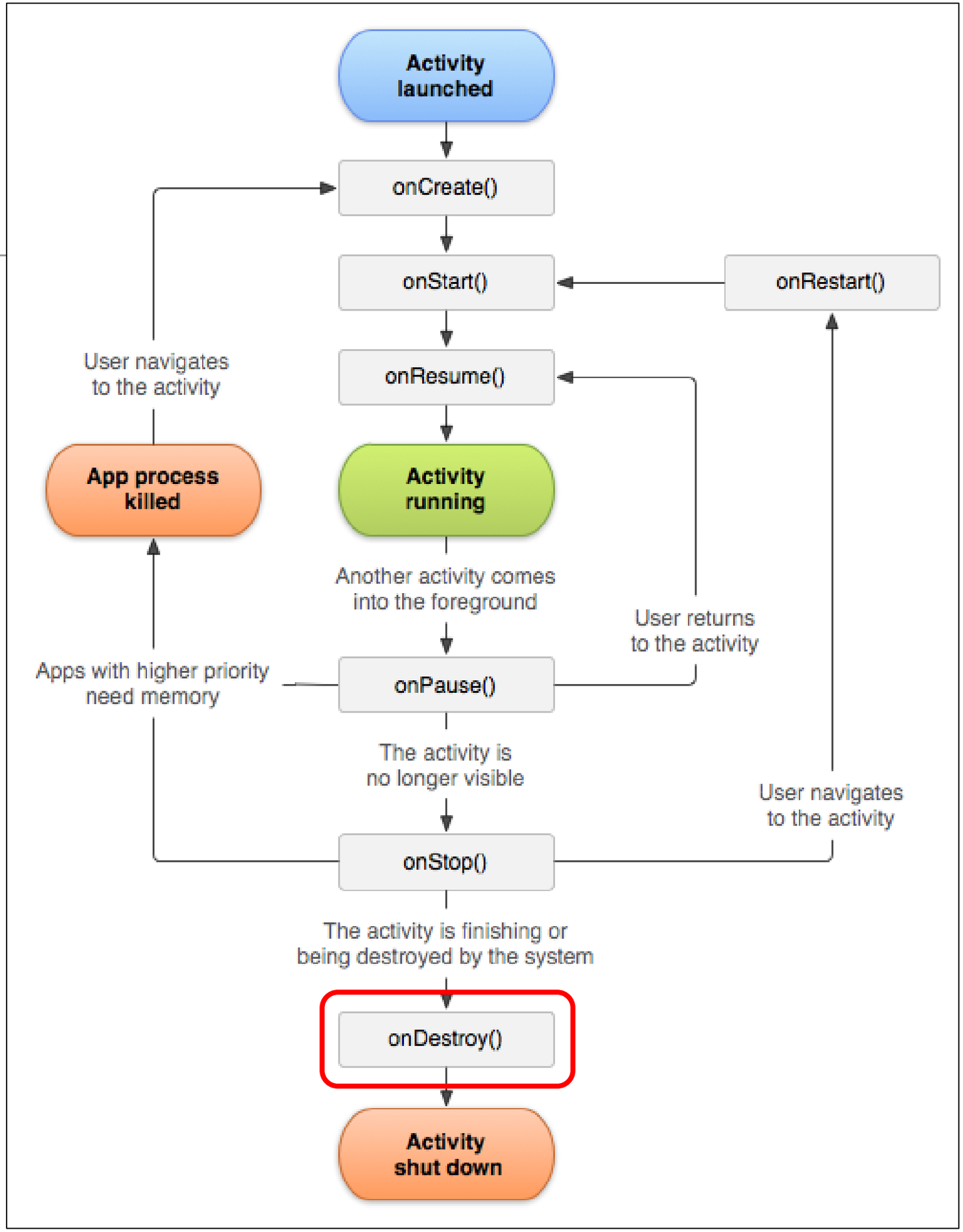
Activity Lifecycle

onDestroy()

This callback is called before the activity is destroyed by the system i.e. the final call that the activity receives.

This method should release any resources that your activity still holds.



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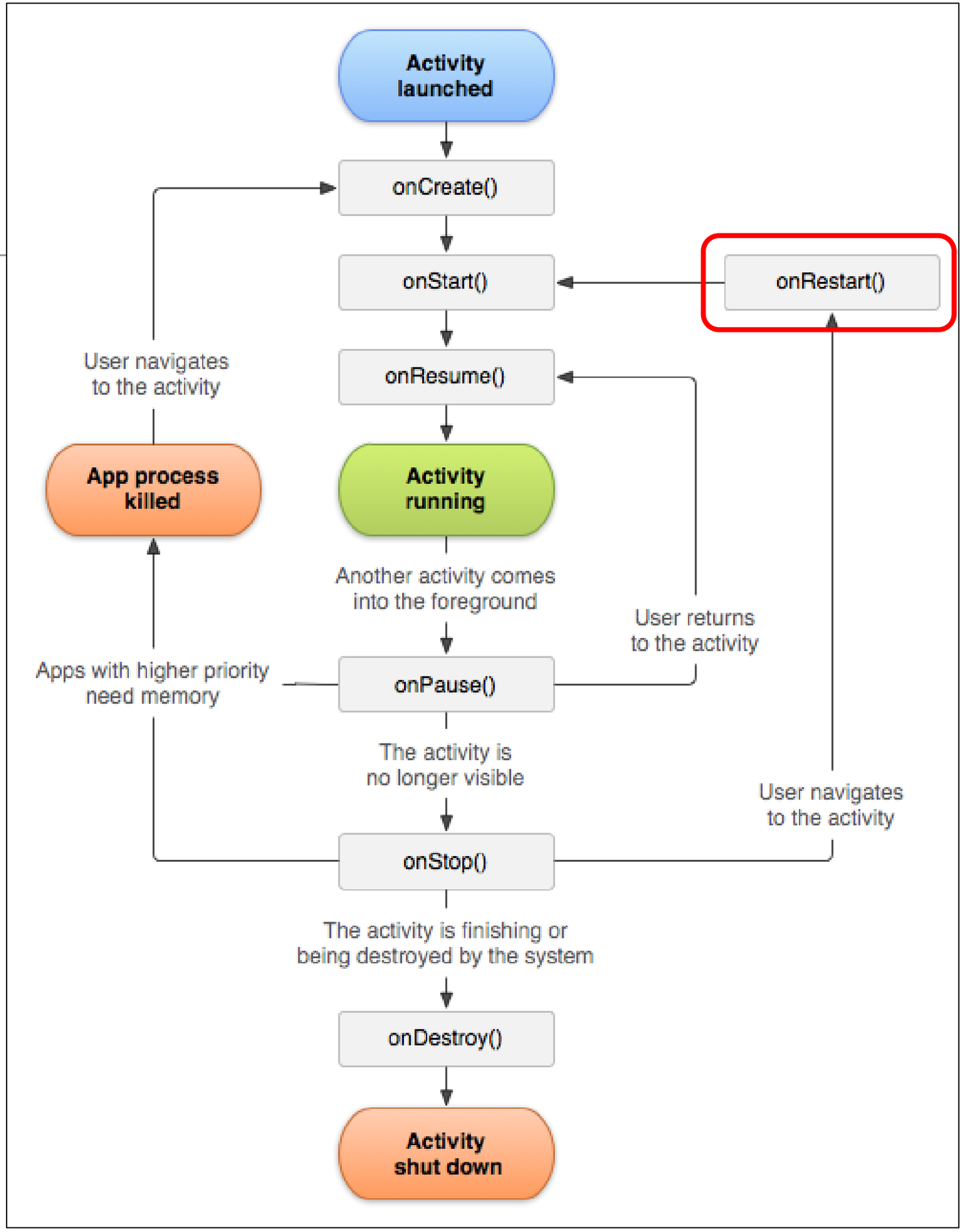
Activity Lifecycle

onRestart()

This callback is called when the activity restarts after stopping it i.e. when the activity is being re-displayed to the user.

Followed by calls to onStart() and onResume().



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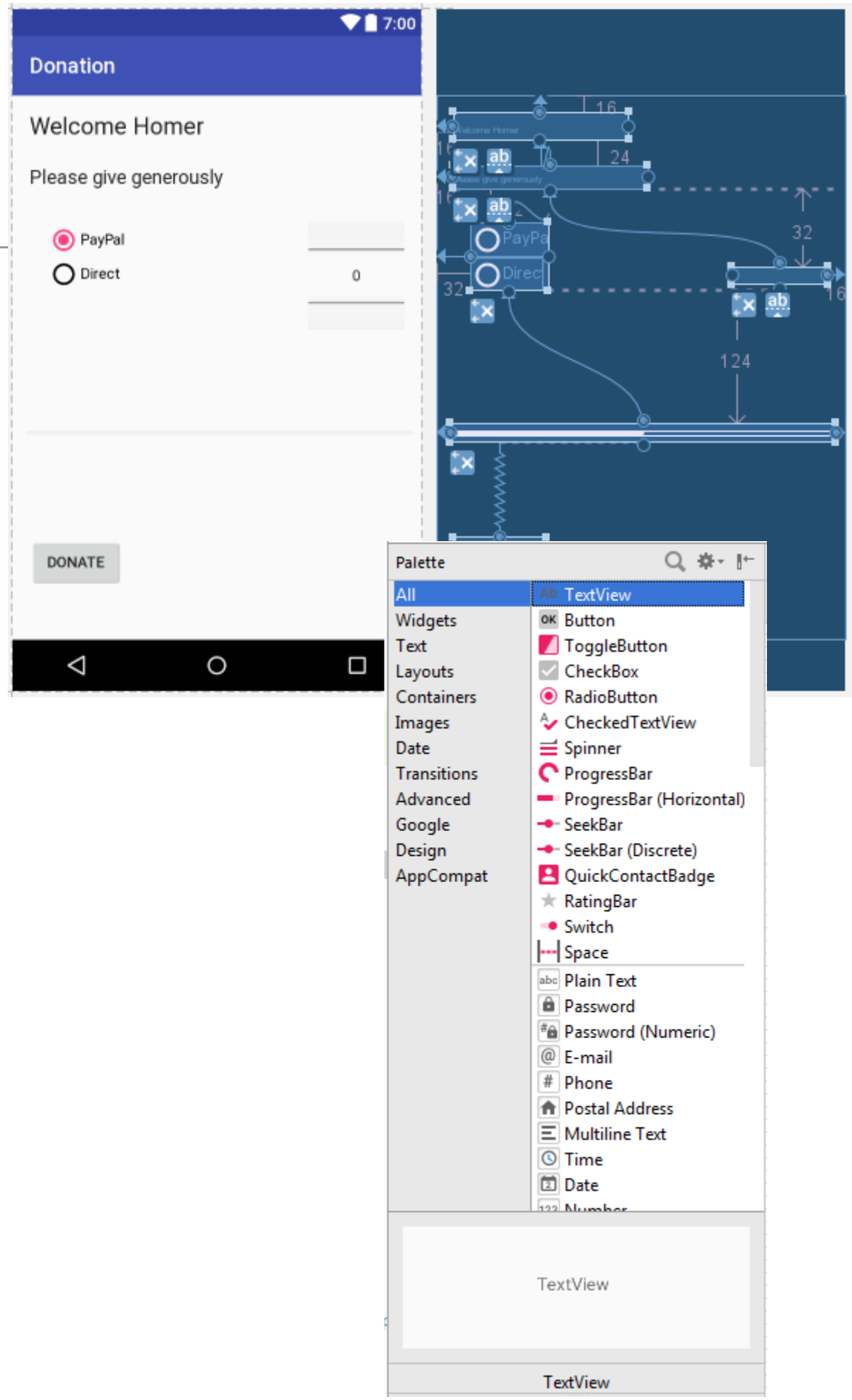
Implementing the UI

- UI for an activity is provided by a hierarchy of views—objects derived from the View class.

- Each view controls a particular rectangular space within the activity's window and can respond to user interaction. They consist of:

- **Layouts:** views derived from ViewGroup that provide a unique layout model for its child views (e.g. linear, grid, relative layout).

- **Widgets:** standard views that provide visual (and interactive) elements for the screen, such as a button, text field, checkbox, or just an image.



XML Layouts

- The most common way to define a layout using views is with an XML layout file saved in your application resources.

- Enables the design of your user interface separately from the source code that defines the activity's behavior.

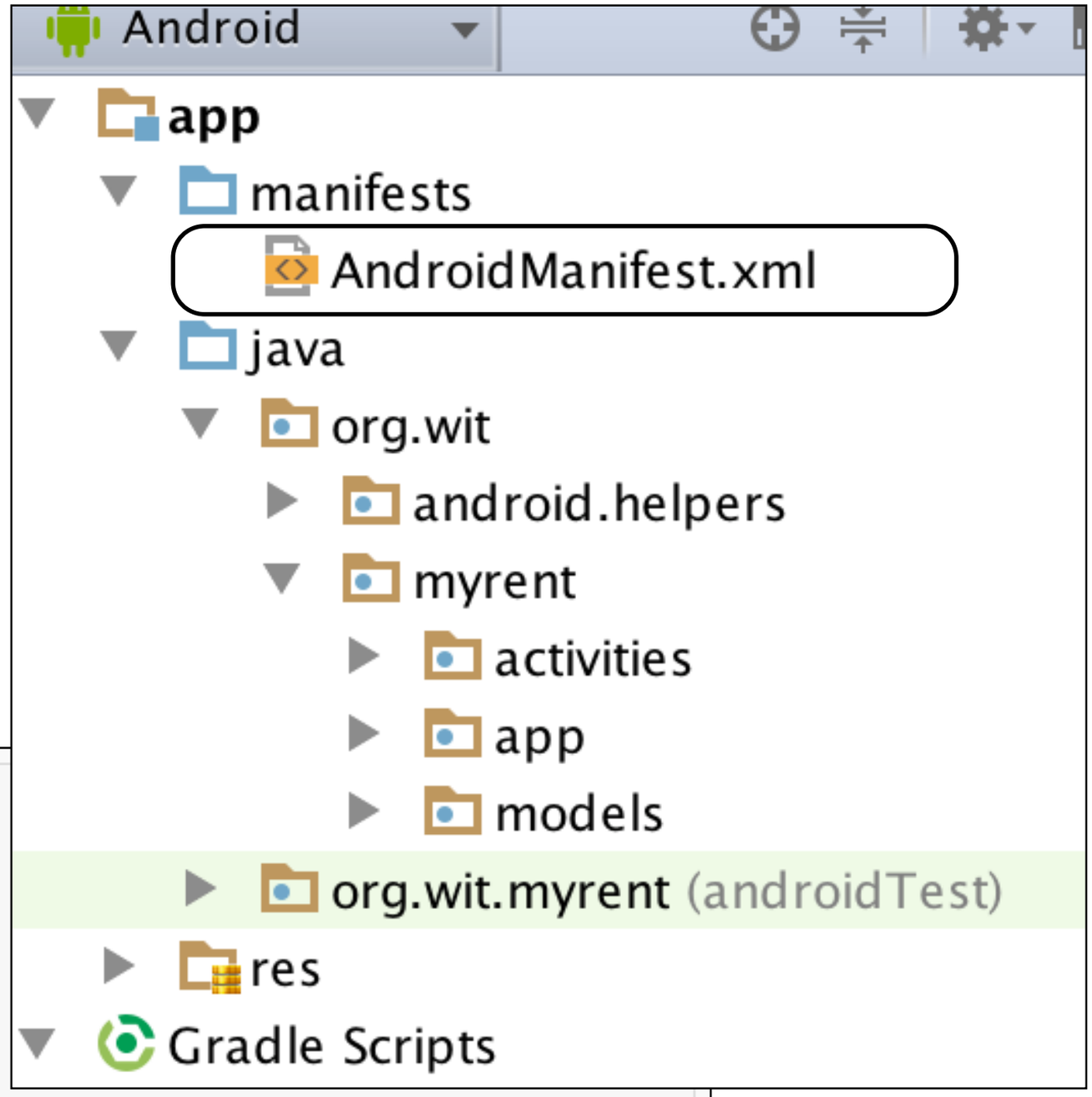
- Set the layout as the UI for your activity with setContentView(), passing the resource ID for the layout.

- Or create new Views in your activity code and build a view hierarchy by inserting new Views into a ViewGroup, then use that layout by passing the root ViewGroup to setContentView().

```
<RelativeLayout xmlns:android="http://schemas.android.com/apk/res/android"
    xmlns:tools="http://schemas.android.com/tools"
    android:layout_width="match_parent"
    android:layout_height="match_parent"
    android:paddingBottom="@dimen/activity_vertical_margin"
    android:paddingLeft="@dimen/activity_horizontal_margin"
    android:paddingRight="@dimen/activity_horizontal_margin"
    android:paddingTop="@dimen/activity_vertical_margin"
    tools:context=".Donate" >

    <TextView
        android:id="@+id/donateTitle"
        android:layout_width="wrap_content"
        android:layout_height="wrap_content"
        android:layout_alignParentLeft="true"
        android:layout_alignParentRight="true"
        android:layout_alignParentTop="true"
        android:text="@string/donateTitle"
        android:textAppearance="?android:attr/textAppearanceLarge" />

    <TextView
        android:id="@+id/donateSubtitle"
        android:layout_width="wrap_content"
        android:layout_height="wrap_content"
        android:layout_alignParentLeft="true"
        android:layout_alignParentRight="true"
        android:layout_below="@+id/donateTitle"
        android:text="@string/donateSubtitle"
        android:textAppearance="?android:attr/textAppearanceMedium" />

</RelativeLayout>
```

Declaring the activity in the manifest

- Declare your activity in the manifest file in order for it to be accessible to the system.




```
<manifest ... >
  <application ... >
      <activity android:name=".ExampleActivity" />
      ...
  </application ... >
  ...
</manifest >
```

Using intent filters

- An <activity> element can also specify various intent filters in order to declare how other application components may activate it.

- The main activity for an app will require an <intent-filter> that declares the activity responds to the "main" action, and should be placed in the "launcher" category:

```
<activity android:name=".ExampleActivity" android:icon="@drawable/app_icon">
    <intent-filter>
        <action android:name="android.intent.action.MAIN" />
        <category android:name="android.intent.category.LAUNCHER" />
    </intent-filter>
</activity>
```

Using intent filters

- The <action> “main” element specifies that this can be used as a top-level entry point to the application i.e. the activity to start when the app launches.
- The <category> “launcher” element specifies that this activity should be listed in the system's application launcher.

```
<activity android:name=".ExampleActivity" android:icon="@drawable/app_icon">
    <intent-filter>
        <action android:name="android.intent.action.MAIN" />
        <category android:name="android.intent.category.LAUNCHER" />
    </intent-filter>
</activity>
```

Starting an Activity

- Start another activity by calling startActivity(), passing it an Intent that describes the activity you want to start.
  - The intent specifies either the exact activity you want to start
  - Or describes the type of action you want to perform (and the system selects the appropriate activity for you, which can even be from a different application).
- An intent can also carry small amounts of data to be used by the activity that is started.

```
Intent intent = new Intent(this, SignInActivity.class);
startActivity(intent);
```

Implicit Intents

- The Activity can respond to “implicit” intents that are delivered from other applications.

- To do this, define additional intent filters for the activity in the manifest.

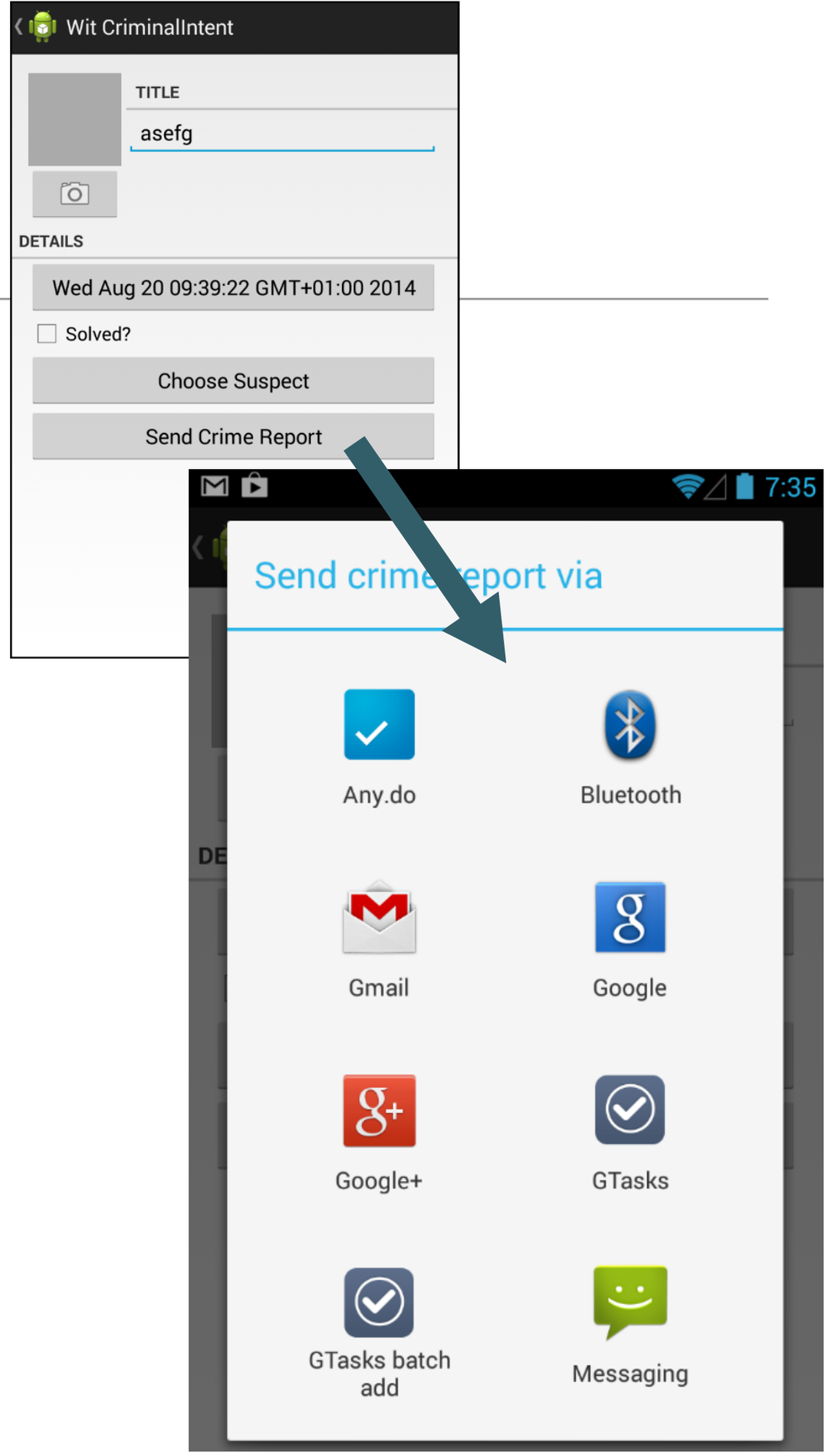
- Include an <intent-filter> that has an <action> element and, optionally, a <category> element and/or a <data> element.

Implicit Intents

- An app may also want to perform some action, such as send an email, text message, or status update,.

- If the application does not have its own activities to perform such actions, leverage the activities provided by other applications on the device, which have declared (using intent filers) that can perform the actions.

- If there are multiple activities that can handle the intent, then the user can select which one to use.

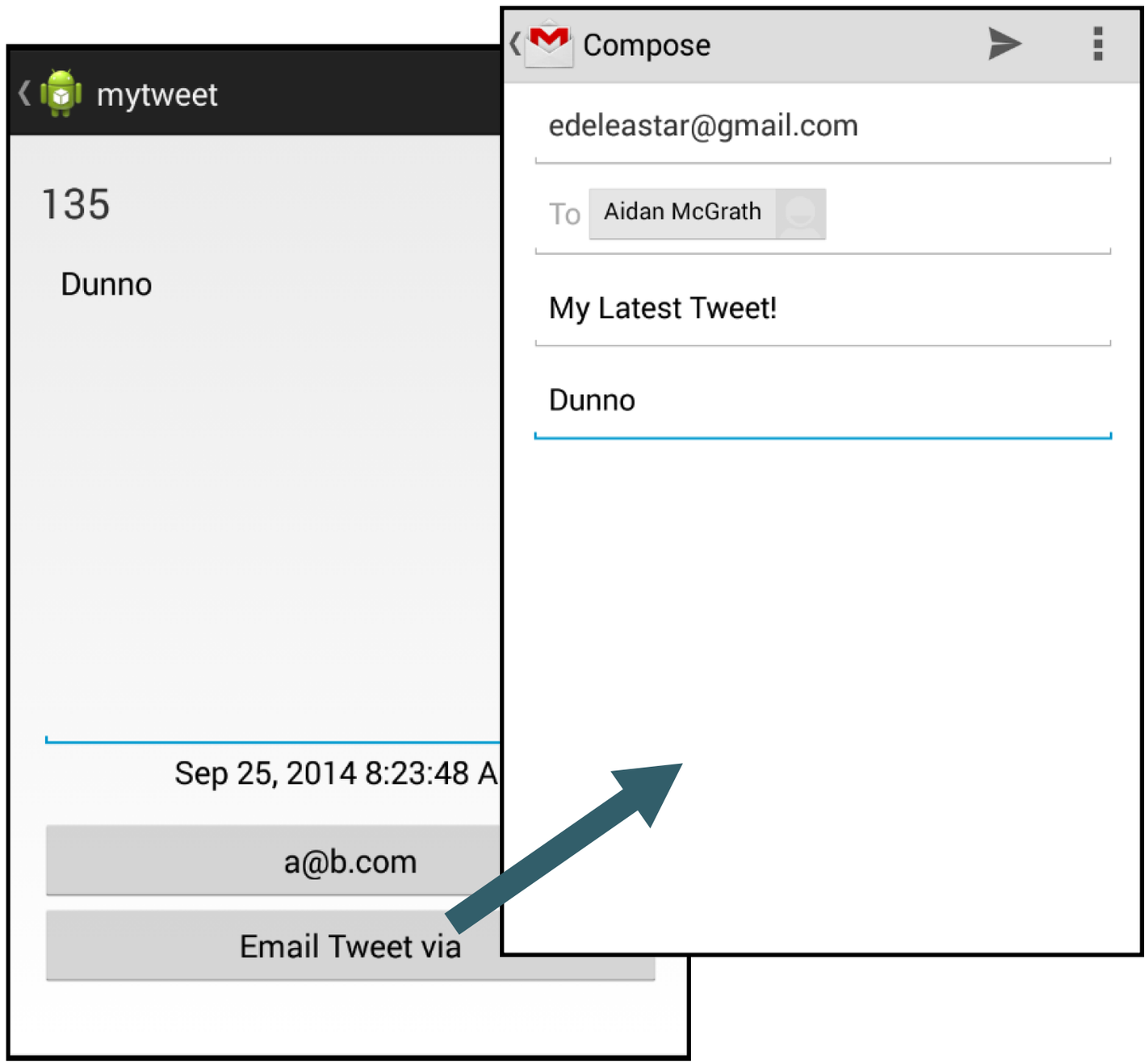


```
Intent intent = new Intent(Intent.ACTION_SEND);
intent.putExtra(Intent.EXTRA_EMAIL, recipientArray);
startActivity(intent);
```

- The EXTRA_EMAIL extra added to the intent is a string array of email addresses to which the email should be sent.

- When an email application responds to this intent, it reads the string array provided in the extra and places them in the "to" field of the email composition form.

- In this situation, the email application's activity starts and when the user is done, your activity resumes.



Starting an activity for a result

- Sometimes, you might want to receive a result from the activity that you start.

- In that case, start the activity by calling startActivityForResult() (instead of startActivity()).

- To then receive the result from the subsequent activity, implement the onActivityResult() callback method.

- When the subsequent activity is done, it returns a result in an Intent to your onActivityResult() method.

```
private void pickContact() {
    // Create an intent to "pick" a contact, as defined by the content provider URI
    Intent intent = new Intent(Intent.ACTION_PICK, Contacts.CONTENT_URI);
    startActivityForResult(intent, PICK_CONTACT_REQUEST);
}

@Override
protected void onActivityResult(int requestCode, int resultCode, Intent data) {
    // If the request went well (OK) and the request was PICK_CONTACT_REQUEST
    if (resultCode == Activity.RESULT_OK && requestCode == PICK_CONTACT_REQUEST) {
        // Perform a query to the contact's content provider for the contact's name
        Cursor cursor = getContentResolver().query(data.getData(),
        new String[] {Contacts.DISPLAY_NAME}, null, null, null);
        if (cursor.moveToFirst()) { // True if the cursor is not empty
            int columnIndex = cursor.getColumnIndex(Contacts.DISPLAY_NAME);
            String name = cursor.getString(columnIndex);
            // Do something with the selected contact's name...
        }
    }
}
```

Check whether the request was successful—if it was, then the resultCode will be RESULT_OK—and whether the request to which this result is responding is known—in this case, the requestCode matches the second parameter sent with startActivityForResult().

```java
private void pickContact() {
    // Create an intent to "pick" a contact, as defined by the content provider URI
    Intent intent = new Intent(Intent.ACTION_PICK, Contacts.CONTENT_URI);
    startActivityForResult(intent, PICK_CONTACT_REQUEST);
}

@Override
protected void onActivityResult(int requestCode, int resultCode, Intent data) {
    // If the request went well (OK) and the request was PICK_CONTACT_REQUEST
    if (resultCode == Activity.RESULT_OK && requestCode == PICK_CONTACT_REQUEST) {
        // Perform a query to the contact's content provider for the contact's name
        Cursor cursor = getContentResolver().query(data.getData(),
        new String[] {Contacts.DISPLAY_NAME}, null, null, null);
        if (cursor.moveToFirst()) { // True if the cursor is not empty
            int columnIndex = cursor.getColumnIndex(Contacts.DISPLAY_NAME);
            String name = cursor.getString(columnIndex);
            // Do something with the selected contact's name...
        }
    }
}
```

From there, the code handles the activity result by querying the data returned in an Intent

Questions?