KCL Tech Build X: Android

Lecture Two: Events, Intents and the Activity Lifecycle

- Recap of Last Week (quick)
- Listening to View Actions
- Using Intents
- The Activity Lifecycle

Recap of Last Week

Progress So Far

- You should have Android Studio installed and set up, ready to run on your machine.
- You should have the blank project downloaded and opened.
- You should have adapted the “Hello World” activity to look like the “Edit Task” activity.

Layouts, Views and View Groups

- A **layout** is a specific resource that tells Android how part of your app is structured and how it looks.
- A **view** is an individual component of a layout, like a button or an image.
- A **view group** is a special type of view that can hold and organise other views inside it.

Listening to View Actions

Views are pretty, but they’re also **useless** if we can’t do anything with them. Many of them exist for users to interact with, so let’s listen for an action. We’ll **start simple** by doing something when a user clicks a button.

First we need to **get a reference** to the button. First we **give the view an ID** by adding this attribute: `android:id="@+id/my_button"`. Then we can tie the button to a variable in Java like this:

```
Button myButton = (Button) findViewById(R.id.my_button);
```

Now that we have `myButton` as a variable, we can do things with it. We want to listen out for click events, so we’re going to add an `OnClickListener`, like this:

```
myButton.setOnClickListener(new OnClickListener() {
    public void onClick(View v) {
        // do something!
    }
});
```

When the button is clicked, the code inside `onClick` will run. Here are a few options you could try out:

`Toast.makeText(getApplicationContext(), "Hello!", Toast.LENGTH_SHORT).show();`
This will display a small pop-up, or “toast”, with the message “Hello!”.

`finish();`
This will close or “finish” the activity you are using.

`v.setVisibility(View.GONE);`
The variable `v` represents our button, so this will hide it completely.

Intents

An intent represents an app's **intent to do something**. Starting an intent tells the operating system (Android) "hey, I want to do something now". You app can "intend to do" any number of actions: go to a new activity, share a photo, send a message, etc. You can even define your own custom actions!

We'll jump right into it and **start simple**: we'll make an intent that starts another activity.

```
Intent intent = new Intent(CurrentActivity.this, TargetActivity.class);
```

Important: at the top of your Java file don't forget to add `import android.content.Intent;` otherwise you'll get errors about not being able to resolve a symbol! In Android Studio, press `Alt + Enter` (or `Option + enter` on Mac) to import missing classes automatically.

Just creating an intent won't actually do anything. You need to **start** it first! Doing so is really easy - in this case you just call the method `startActivity()` and pass your intent as a parameter. See below:

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

Sending Extras

What if you wanted to **send some information** with that intent? Easy - you can send **extras** with any intent.

Any extra is a simple **key/value pair** - you can specify a **value** and a **name (key)** to associate with it. The key will always be a **string**, the value can be any **primitive type** (that means a string, a number or a boolean). The value can actually be a couple of other things, but we won't be covering them yet.

Adding an extra to an intent is easy:

```
Intent intent = new Intent(CurrentActivity.this, TargetActivity.class);
intent.putExtra("my_key_1", "value 1");  // adding a string extra
intent.putExtra("my_key_2", 42);          // adding a number extra
intent.putExtra("my_key_3", true);        // adding a boolean extra
startActivity(intent);
```

There are a few **predefined keys** that you can use with internal intents, such as `EXTRA_MESSAGE`.

Reading Extras

Once you've sent an intent with some extra data, how you need to **read them back** to be able to use them.

No matter how they're invoked (by the user or by the system), **every activity** is launched with an intent. You can get the intent that an activity was started with from the `getIntent()` method. A good place to call this is in the activity's `onCreate()` method (more on that in the next section).

Once you have the intent, you can use the method `getExtras()` to get all of the extras that were sent with the intent. This method returns a `Bundle` object, which contains all of the key/value pairs that were sent. The `Bundle` class is widely used in Android, so it's worth reading up on the documentation for it (see link on [http://android.kcl.tech].

Caution! The return from `getExtras()` could be null, so you need to check for that!

To retrieve the values from your bundle, you can use the following methods:

```
Intent intent = getIntent();
Bundle extras = intent.getExtras();
if (extras != null) {
    String myValue1 = extras.getString("my_key_1");
    int myValue2 = extras.getInt("my_key_2");
    boolean myValue3 = extras.getBoolean("my_key_3");
}
```

The Activity Lifecycle

Reminder: an activity is analogous to a "page" within your app. You create an activity by creating a Java class that extends `Activity`, `AppCompatActivity`, or some other class from the `Activity` family.

Why Does an Activity Need a Lifecycle?

Activities are, usually, the biggest and **most widely-used building blocks** in an application. You users will spend the vast majority of their time in your app interacting with an activity, and they tend to be responsible for a lot of complex operations.

Because of all that, it's important that your activities know **exactly what's happening** to them. It's no good if your activity keeps playing a video after the user closes it, or if it doesn't know how to start a game when the user opens it!

What *is* the Lifecycle?

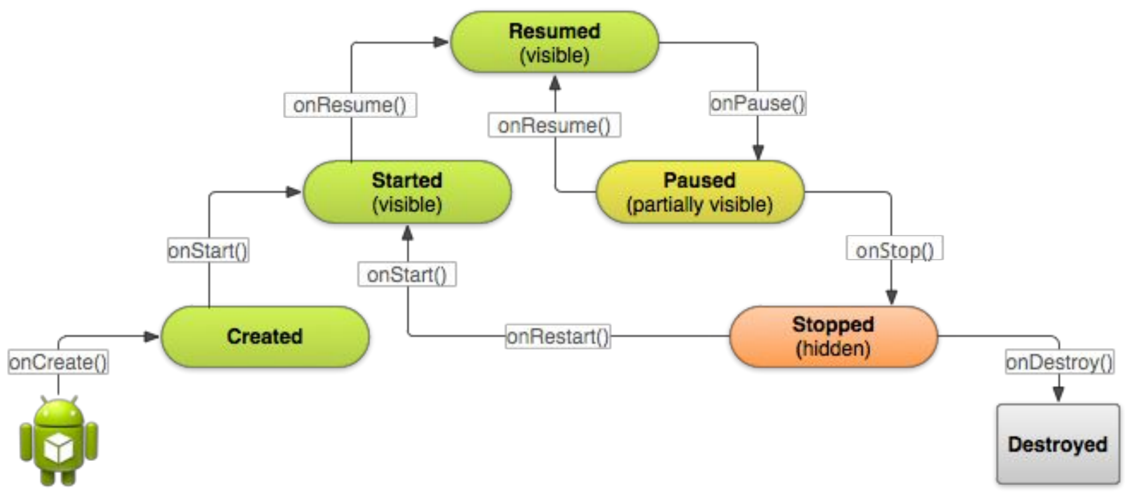
During its lifetime, an activity will move between several **states**. Each time an activity switches from one state to another, it will **call a method** to tell you about the state it's entering. For example, when the activity enters the state "paused", it will call the method `onPause()`.

What does *"state"* mean? The easiest way to grasp the concept of a *state* is with examples. Consider a light bulb; it has two states: "on" and "off". Your laptop probably has around three states: "on", "standby" and "off". Activity states are the same, except there are more of them.

We're interested in the following states of an activity:

- Created
- Started
- Resumed
- Paused
- Stopped
- Destroyed

The movement between states is depicted in the diagram on the next page.



Source: [https://android.developer.com]

There are several flows through this system, depending on what the user is doing. Each stage will be explained on the slides, but here are some example flows:

- When opening the app:
  `onCreate()` → `onStart()` → `onResume()`
- When the back button is pressed and the app is exited:
  `onPause()` → `onStop()` → `onDestroy()`
- When the home button is pressed:
  `onPause()` → `onStop()`
- After the home button is pressed and the app is opened from recents list or the icon:
  `onRestart()` → `onStart()` → `onResume()`
- When another app is opened from the notification bar:
  `onPause()` → `onStop()`
- When the back button is pressed from another app and our app comes back into view:
  `onRestart()` → `onStart()` → `onResume()`
- When any dialog opens on the screen:
  `onPause()`
- After dismissing the dialog:
  `onResume()`
- When the phone screen is turned off:
  `onPaused()` → `onStop()`
- When the screen comes on again:
  `onRestart()` → `onStart()` → `onResume()`