Android Developer Fundamentals V2

Activities and Intents

Lesson 2

2.1 Activities and Intents

Contents

- Activities
- Defining an `Activity`
- Starting a new `Activity` with an `Intent`
- Passing data between activities with extras
- Navigating between activities

Activities (high-level view)

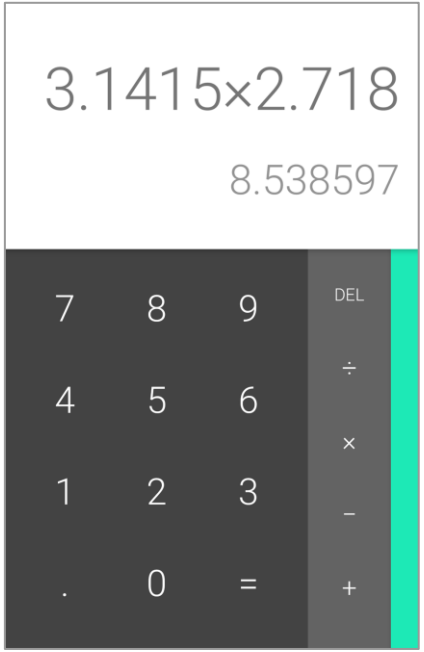
What is an Activity?

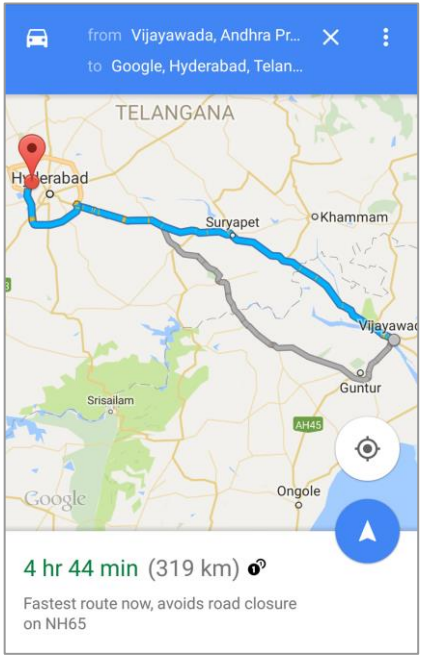
- An `Activity` is an application component
- Represents one window, one hierarchy of views
- Typically fills the screen, but can be embedded in other Activity or a appear as floating window
- Java class, typically one Activity in one file

What does an Activity do?

- Represents an activity, such as ordering groceries, sending email, or getting directions
- Handles user interactions, such as button clicks, text entry, or login verification
- Can start other activities in the same or other apps
- Has a life cycle—is created, started, runs, is paused, resumed, stopped, and destroyed

Examples of activities





Apps and activities

- Activities are loosely tied together to make up an app
- First Activity user sees is typically called "main activity"
- Activities can be organized in parent-child relationships in the Android manifest to aid navigation

Layouts and Activities

- An `Activity` typically has a UI layout
- Layout is usually defined in one or more XML files
- `Activity` "inflates" layout as part of being created

Implementing Activities

Implement new activities

1. Define layout in XML
2. Define `Activity` Java class
    - extends `AppCompatActivity`
3. Connect `Activity` with Layout
    - Set content view in `onCreate()`
4. Declare `Activity` in the Android manifest

1. Define layout in XML

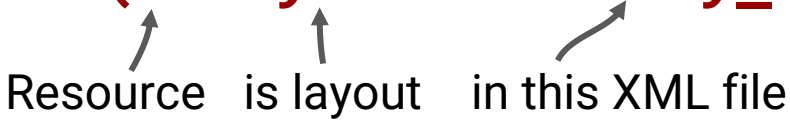
```
<?xml version="1.0" encoding="utf-8"?>
<RelativeLayout
    xmlns:android="http://schemas.android.com/apk/res/android"
    android:layout_width="match_parent"
    android:layout_height="match_parent">
    <TextView
        android:layout_width="wrap_content"
        android:layout_height="wrap_content"
        android:text="Let's Shop for Food!" />
</RelativeLayout>
```

2. Define Activity Java class

```
public class MainActivity extends AppCompatActivity {
    @Override
    protected void onCreate(Bundle savedInstanceState) {
        super.onCreate(savedInstanceState);
    }
}
```

3. Connect activity with layout

```
public class MainActivity extends AppCompatActivity {
    @Override
    protected void onCreate(Bundle savedInstanceState) {
        super.onCreate(savedInstanceState);
        setContentView(R.layout.activity_main);
    }
}
```



4. Declare activity in Android manifest

```
<activity android:name=".MainActivity">
```

4. Declare main activity in manifest

`MainActivity` needs to include `intent-filter` to start from launcher

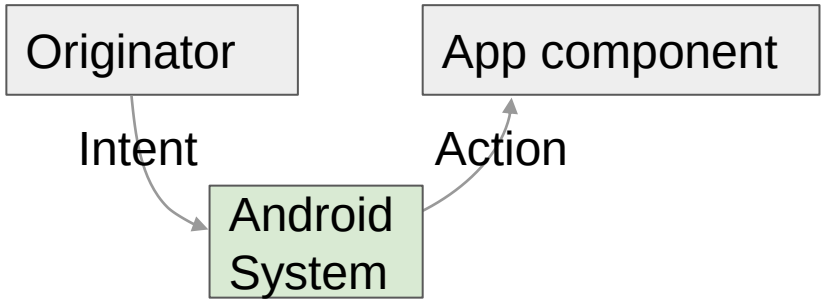
```
<activity android:name=".MainActivity">
    <intent-filter>
        <action android:name="android.intent.action.MAIN" />
        <category android:name="android.intent.category.LAUNCHER" />
    </intent-filter>
</activity>
```

Intents

What is an intent?

An `Intent` is a description of an operation to be performed.

An `Intent` is an object used to request an action from another app component via the Android system.



What can intents do?

- Start an `Activity`
  - A button click starts a new `Activity` for text entry
  - Clicking Share opens an app that allows you to post a photo
- Start an `Service`
  - Initiate downloading a file in the background
- Deliver `Broadcast`
  - The system informs everybody that the phone is now charging

Explicit and implicit intents

Explicit Intent

- Starts a specific `Activity`
  - Request tea with milk delivered by Nikita
  - Main activity starts the `ViewShoppingCart` `Activity`

Implicit Intent

- Asks system to find an `Activity` that can handle this request
  - Find an open store that sells green tea
  - Clicking Share opens a chooser with a list of apps

Starting Activities

Start an Activity with an explicit intent

To start a specific `Activity`, use an explicit `Intent`

1. Create an `Intent`
    - `Intent intent = new Intent(this, ActivityName.class);`
2. Use the `Intent` to start the `Activity`
    - `startActivity(intent);`

Start an Activity with implicit intent

To ask Android to find an `Activity` to handle your request, use an implicit `Intent`

1. Create an `Intent`
    - `Intent intent = new Intent(action, uri);`
2. Use the `Intent` to start the `Activity`
    - `startActivity(intent);`

Implicit Intents - Examples

Show a web page

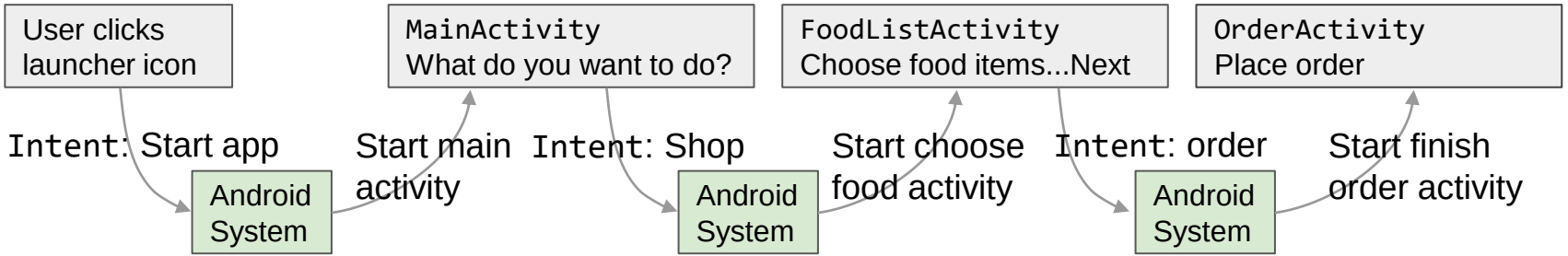
```
Uri uri = Uri.parse("http://www.google.com");
Intent it = new Intent(Intent.ACTION_VIEW,uri);
startActivity(it);
```

Dial a phone number

```
Uri uri = Uri.parse("tel:8005551234");
Intent it = new Intent(Intent.ACTION_DIAL, uri);
startActivity(it);
```

How Activities Run

- All `Activity` instances are managed by the Android runtime
- Started by an "`Intent`", a message to the Android runtime to run an activity



Sending and Receiving Data

Two types of sending data with intents

- Data—one piece of information whose data location can be represented by an URI

- Extras—one or more pieces of information as a collection of key-value pairs in a `Bundle`

Sending and retrieving data

In the first (sending) `Activity`:

1. Create the `Intent` object
2. Put data or extras into that `Intent`
3. Start the new `Activity` with `startActivity()`

In the second (receiving) `Activity`:

1. Get the `Intent` object, the `Activity` was started with
2. Retrieve the data or extras from the `Intent` object

Putting a URI as intent data

```
// A web page URL
intent.setData(
    Uri.parse("http://www.google.com"));

// a Sample file URI
intent.setData(
     Uri.fromFile(new
File("/sdcard/sample.jpg")));
```

Put information into intent extras

- `putExtra(String name, int value)`
  ⇒ `intent.putExtra("level", 406);`
- `putExtra(String name, String[] value)`
  ⇒
```
String[] foodList = {"Rice", "Beans", "Fruit"};
intent.putExtra("food", foodList);
```
- `putExtras(bundle);`
  ⇒ if lots of data, first create a bundle and pass the bundle.
- See documentation for all

Sending data to an activity with extras

```
public static final String EXTRA_MESSAGE_KEY =
    "com.example.android.twoactivities.extra.MESSAGE";

Intent intent = new Intent(this,
SecondActivity.class);

String message = "Hello Activity!";

intent.putExtra(EXTRA_MESSAGE_KEY, message);

startActivity(intent);
```

Get data from intents

- `getData();`
  `⇒ Uri locationUri = intent.getData();`
- `int getIntExtra (String name, int defaultValue)`
  `⇒ int level = intent.getIntExtra("level", 0);`
- `Bundle bundle = intent.getExtras();`
  ⇒ Get all the data at once as a bundle.
- See documentation for all

Returning data to the starting activity

1. Use `startActivityForResult()` to start the second `Activity`
2. To return data from the second `Activity`:
   - Create a ***new*** `Intent`
   - Put the response data in the `Intent` using `putExtra()`
   - Set the result to `Activity.RESULT_OK` or `RESULT_CANCELED`, if the user cancelled out
   - call `finish()` to close the `Activity`

1. Implement `onActivityResult()` in first `Activity`

startActivityForResult()

`startActivityForResult(intent, requestCode);`

- Starts `Activity` (`intent`), assigns it identifier (`requestCode`)
- Returns data via `Intent` extras
- When done, pop stack, return to previous `Activity`, and execute on`ActivityResult()` callback to process returned data
- Use `requestCode` to identify which `Activity` has "returned"

1. startActivityForResult() Example

```
public static final int CHOOSE_FOOD_REQUEST = 1;

Intent intent = new Intent(this, ChooseFoodItemsActivity.class);
startActivityForResult(intent, CHOOSE_FOOD_REQUEST);
```

2. Return data and finish second activity

```
 // Create an intent
Intent replyIntent = new Intent();

// Put the data to return into the extra
replyIntent.putExtra(EXTRA_REPLY, reply);

// Set the activity's result to RESULT_OK
setResult(RESULT_OK, replyIntent);

// Finish the current activity
finish();
```

3. Implement onActivityResult()

```
public void onActivityResult(int requestCode,
                             int resultCode, Intent data) {
  super.onActivityResult(requestCode, resultCode, data);
  if (requestCode == TEXT_REQUEST) { // Identify activity
    if (resultCode == RESULT_OK) { // Activity succeeded
      String reply =
data.getStringExtra(SecondActivity.EXTRA_REPLY);
      // … do something with the data
 }}}
```

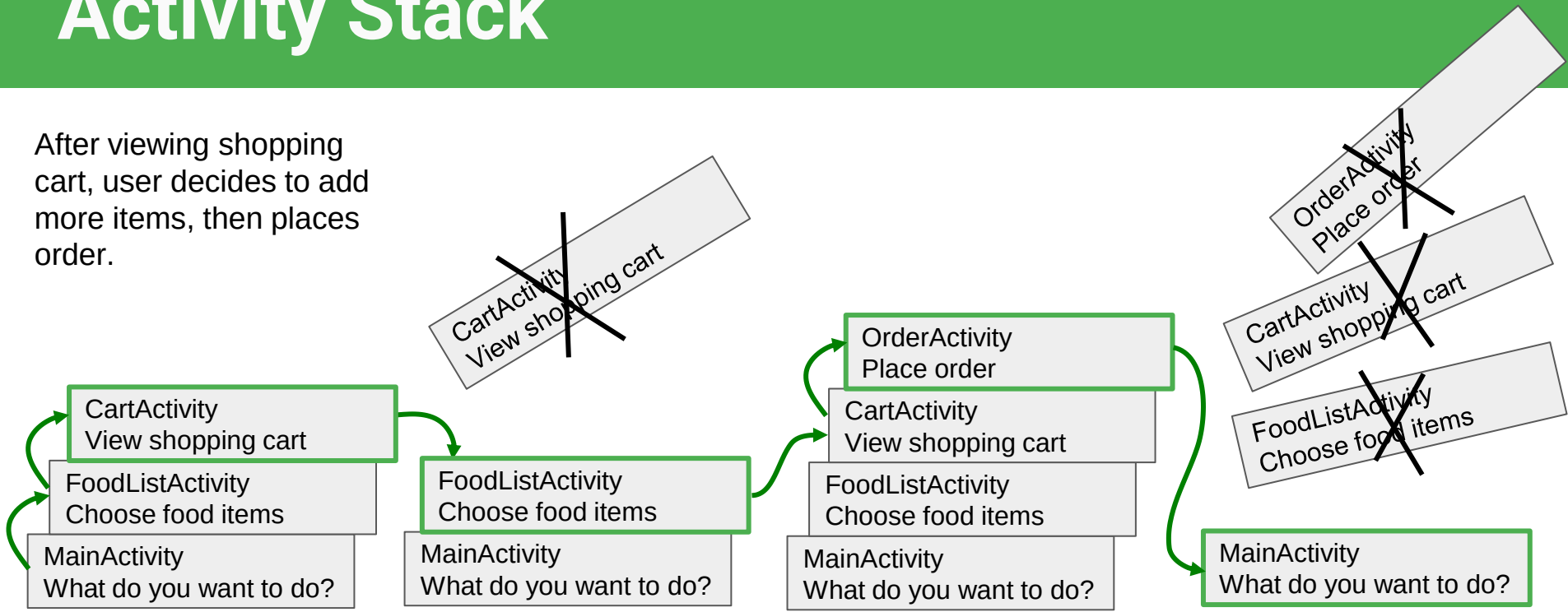
Navigation

Activity stack

- When a new `Activity` is started, the previous `Activity` is stopped and pushed on the `Activity` back stack
- Last-in-first-out-stack—when the current `Activity` ends, or the user presses the Back button, it is popped from the stack and the previous `Activity` resumes

Activity Stack

After viewing shopping cart, user decides to add more items, then places order.



Two forms of navigation

Temporal or back navigation

- provided by the device's Back button
- controlled by the Android system's back stack

Ancestral or up navigation

- provided by the Up button in app's action bar
- controlled by defining parent-child relationships between activities in the Android manifest

Back navigation

- Back stack preserves history of recently viewed screens
- Back stack contains all the `Activity` instances that have been launched by the user in reverse order *for the current task*
- Each task has its own back stack
- Switching between tasks activates that task's back stack

Up navigation

- Goes to parent of current `Activity`
- Define an `Activity` parent in Android manifest
- Set `parentActivityName`

```
<activity
    android:name=".ShowDinnerActivity"
    android:parentActivityName=".MainActivity" >
</activity>
```

Learn more

Learn more

- Android Application Fundamentals
- Starting Another `Activity`
- `Activity` (API Guide)
- `Activity` (API Reference)
- `Intents and Intent Filters` (API Guide)
- `Intent` (API Reference)
- Navigation

What's Next?

- Concept Chapter: 2.1 Activities and Intents
- Practical: 2.1 Activities and intents

END