Android Developer Fundamentals

Activities and Intents

Lesson 2

2.1 Activities

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)

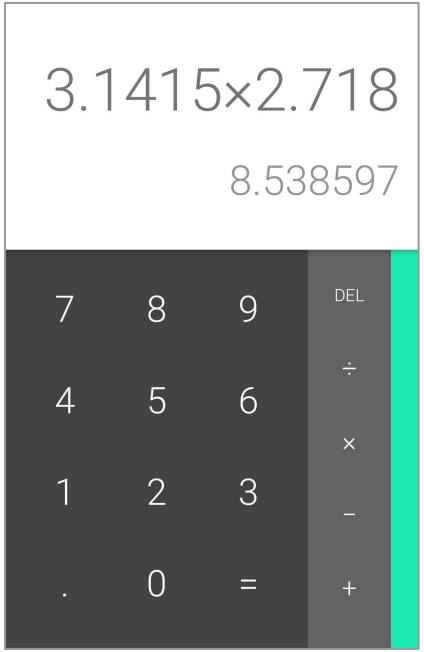
What is an Activity?

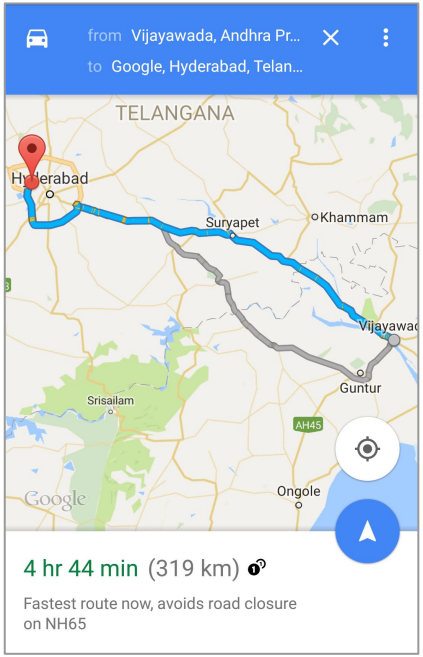
- An `Activity` is an application component
- Represents one window, one hierarchy of views
- Typically fills the screen, but can be embedded in other activity or a appear as floating window
- Java class, typically one activity in one file

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

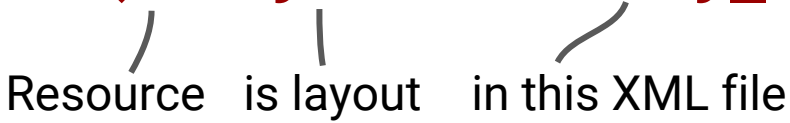
```
<?xml version="1.0" encoding="utf-8"?>
<RelativeLayout
    xmlns:android="http://schemas.android.com/apk/res/android"
    android:layout_width="match_parent"
    android:layout_height="match_parent">
    <TextView
        android:layout_width="wrap_content"
        android:layout_height="wrap_content"
        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

Main Activity needs to include intent to start from launcher icon

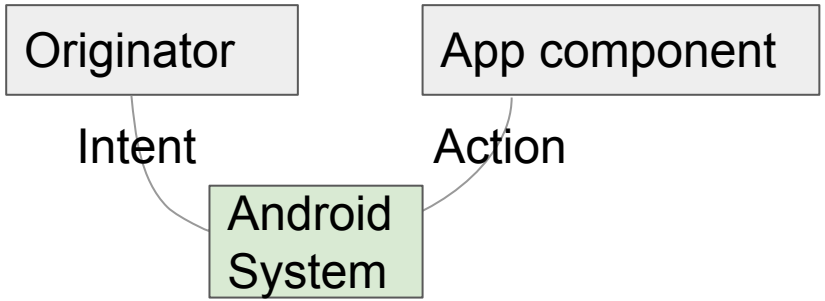
```
<activity android:name=".MainActivity">
    <intent-filter>
        <action android:name="android.intent.action.MAIN" />
        <category android:name="android.intent.category.LAUNCHER" />
    </intent-filter>
</activity>
```

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 activities
  - A button click starts a new activity for text entry
  - Clicking Share opens an app that allows you to post a photo
- Start services
  - Initiate downloading a file in the background
- Deliver broadcasts
  - 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

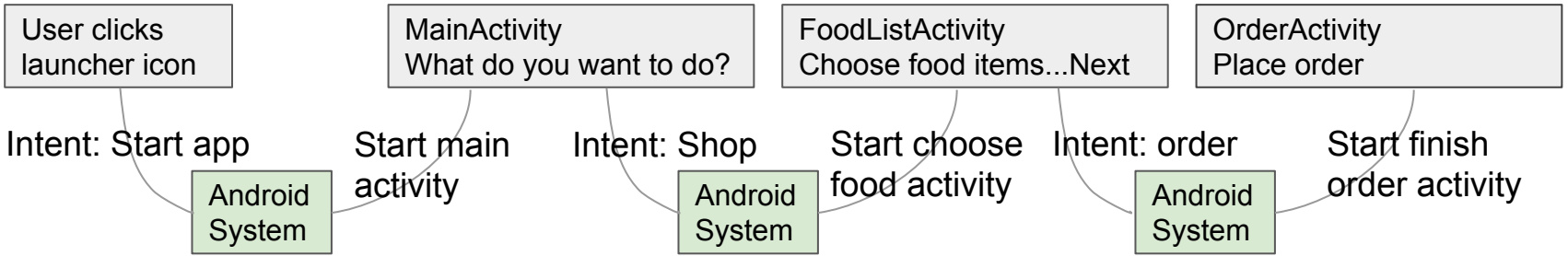
```
Uri uri = Uri.parse("http://www.google.com");
Intent it = new Intent(Intent.ACTION_VIEW,uri);
startActivity(it);
```

Dial a phone number

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

How Activities Run

- All activities 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 `onActivityResult()` 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
 }}}
```

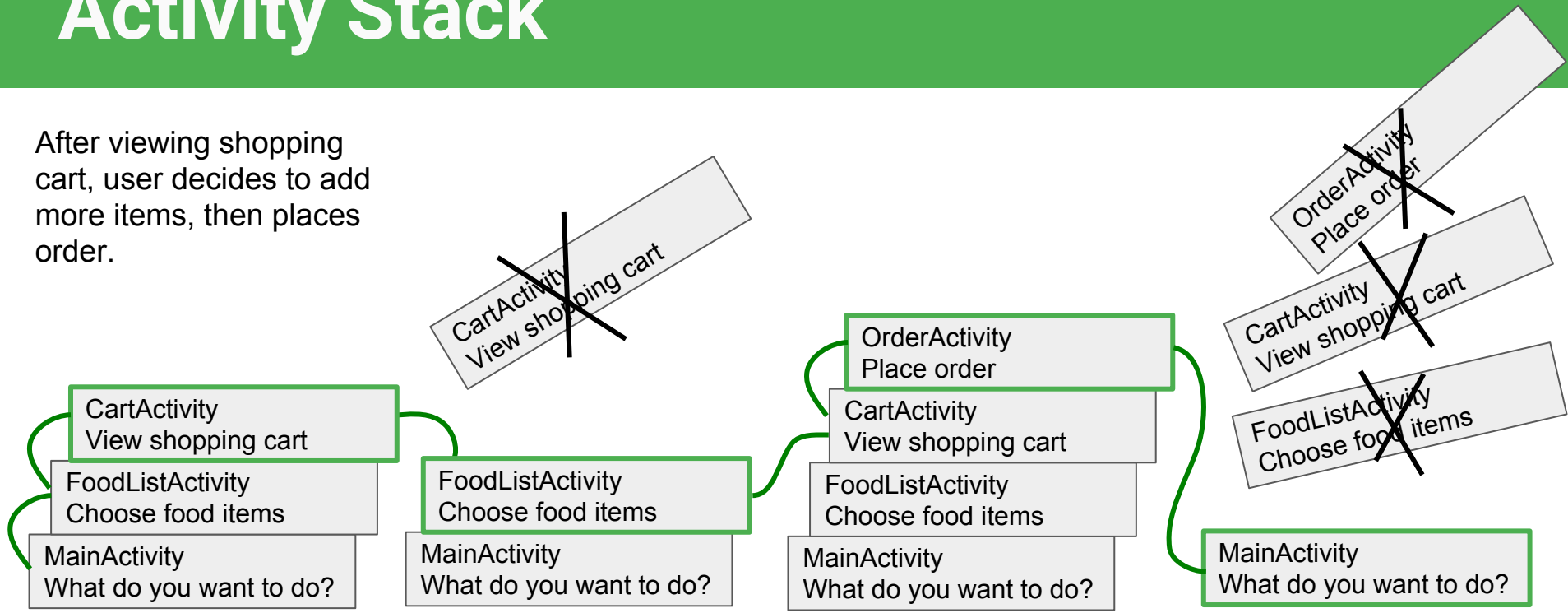
Navigation

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

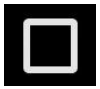
Temporal or back navigation

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

Ancestral or up navigation

- provided by the 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 activities 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
- Launching an activity from the home screen  starts a new task
- Navigate between tasks  with the overview or recent tasks screen

Up navigation

- Goes to parent of current activity
- Define an activity's 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 C Understanding Activities and Intents
- Practical: 2.1 P Create and Start Activities

END