



ĐẠI HỌC BÁCH KHOA HÀ NỘI
VIỆN CÔNG NGHỆ THÔNG TIN VÀ TRUYỀN THÔNG

Mobile Programming

Chapter 2. Activities and Intents

Note

- ❖ This slide is based on Google Android code labs slides
- ❖ Original slides:
https://drive.google.com/drive/folders/1eu-LXxiHocSktGYpG04PfE9Xmr_pBY5P



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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)

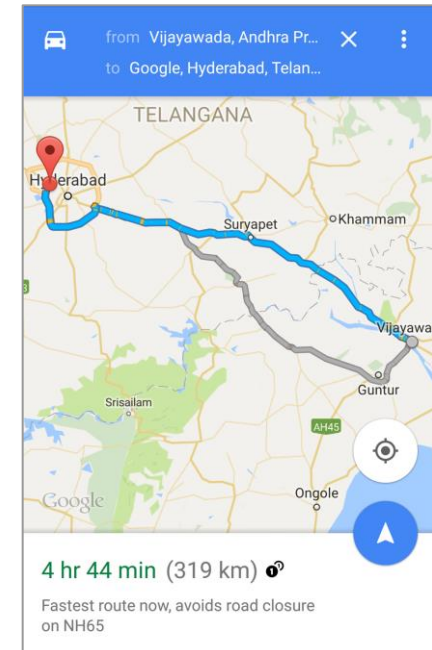
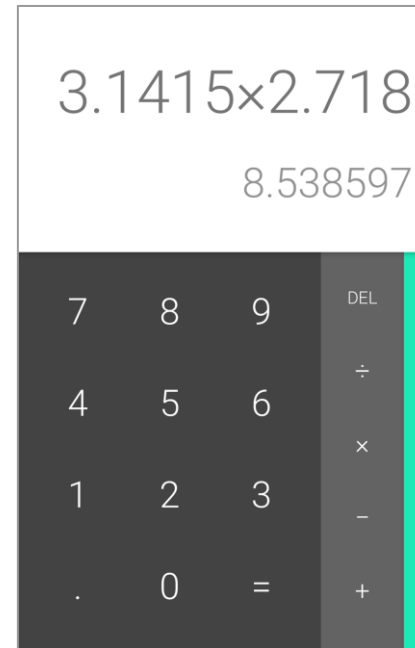
What is an Activity?

- 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 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);  
    }  
}
```

Resource is layout in this XML file

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

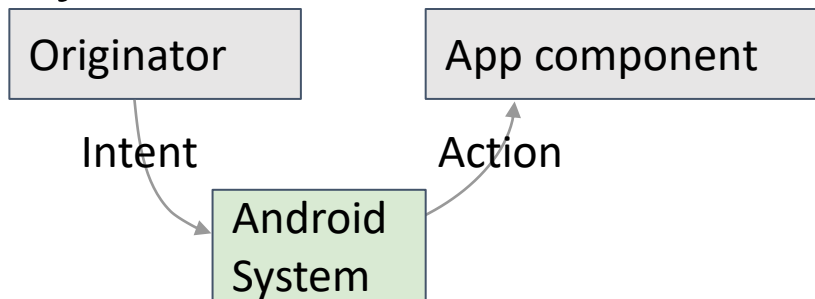
```
<activity android:name=".MainActivity">  
    <intent-filter>  
        <action android:name="android.intent.action.MAIN" />  
        <category android:name="android.intent.category.LAUNCHER" />  
    </intent-filter>  
</activity>
```

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

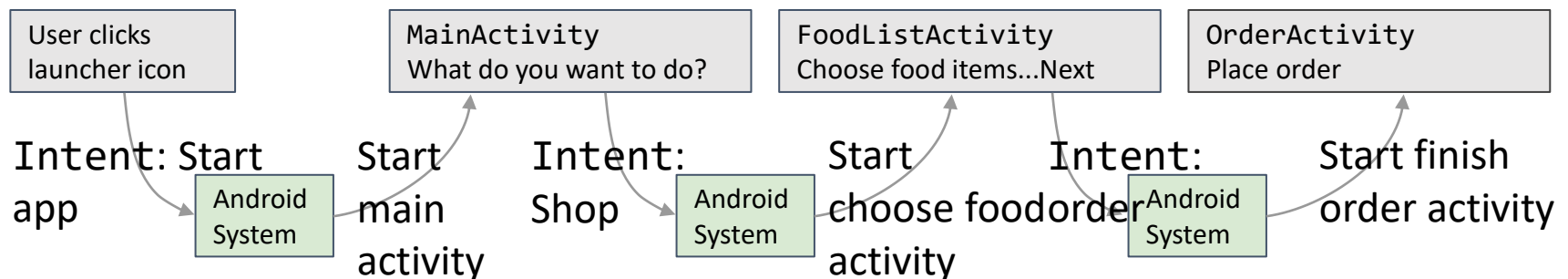
```
Uri uri = Uri.parse("http://www.google.com");  
Intent it = new Intent(Intent.ACTION_VIEW, uri);  
startActivity(it);
```

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();`
- `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
        }
    }
}
```

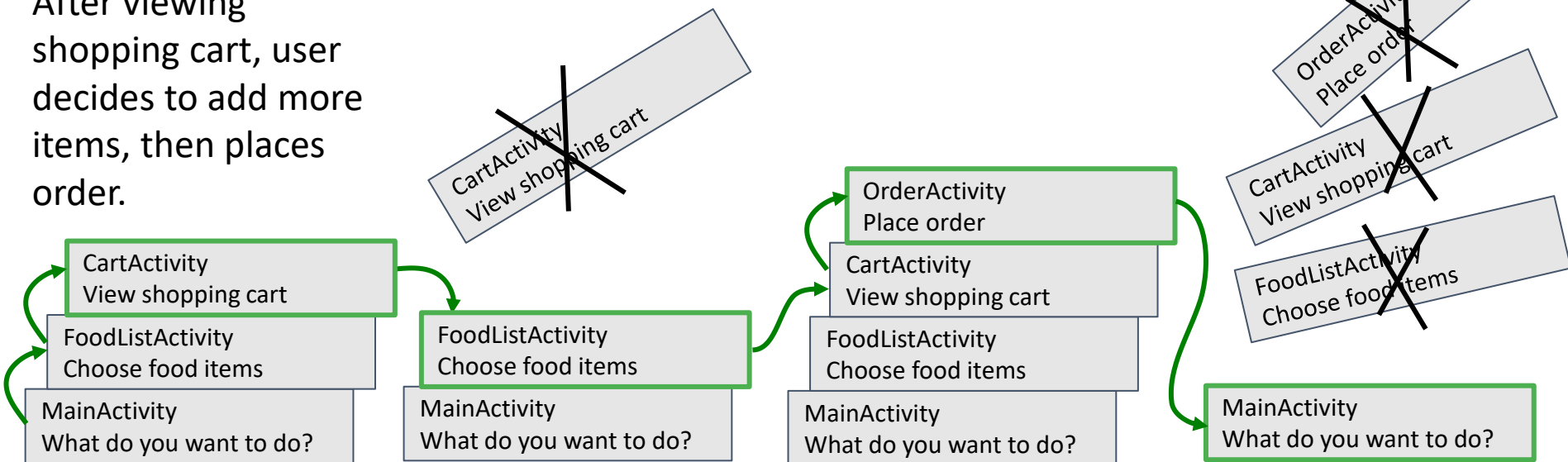
Navigation

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 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

- [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](#)

CODELABS

App Overview

- MainActivity
 - Select photo button
 - Share photo button
 - ImageView to preview the selected photo
- Handle Intent
 - MainActivity intent filter to handle action SEND
 - Type: image/*
 - Display the shared image

Task 1

1. Build the UI

- a. Two buttons
- b. One ImageView

Task 2

1. Declare the Intent filter in manifest file
2. Write code to read shared photos
3. Display preview

Task 3

1. Write code to open photo chooser using an implicit intent
2. Write code for the sharing button