Intents & Intent Filters

Programming the Android Platform

The Intent Class

- An Intent is a data structure that specifies
  - An operation to be performed
  - An event that has occurred
- Broadcast by one component
- Received by 0 or more components
- This lectures focuses on using Intents to represent operations, rather than events

Action

- String representing the operation
- Examples:

Constant	Target component	Action
ACTION_CALL	activity	Initiate a phone call.
ACTION_EDIT	activity	Display data for the user to edit.
ACTION_MAIN	activity	Start up as the initial activity of a task, with no data input and no returned output.
ACTION_SYNC	activity	Synchronize data on a server with data on the mobile device.

Action (cont.)

- Setting the Intent Action

```
new Intent(Intent.ACTION_VIEW);

Intent newInt = new Intent();
newInt.setAction(Intent.ACTION_VIEW);
```

Data

- Data associated with the Intent
  - Formatted as a Uniform Resource Identifier (URI)
- Examples:
  - Data to view on a map
    - geo:0,0?q=1600+Pennsylvania+Ave
      +Washington+DC
  - Number to dial in the phone dialer
    - tel:+15555555555

Data (cont.)

- Setting the Intent data

```
new Intent(Intent.ACTION_VIEW,
                    Uri.parse("tel:+15555555555"));

Intent newInt = new Intent(Intent.ACTION_VIEW);
newInt.setData(Uri.parse("tel:+15555555555"));
```

Category

- Additional information about the components that handle the intent
- Examples:

Constant	Meaning
CATEGORY_BROWSABLE	The target activity can be safely invoked by the browser to display data referenced by a link — for example, an image or an e-mail message.
CATEGORY_GADGET	The activity can be embedded inside of another activity that hosts gadgets.
CATEGORY_HOME	The activity displays the home screen, the first screen the user sees when the device is turned on or when the HOME key is pressed.
CATEGORY_LAUNCHER	The activity can be the initial activity of a task and is listed in the top-level application launcher.
CATEGORY_PREFERENCE	The target activity is a preference panel.

Type

- Sets the MIME type of the Intent data
  - E.g., "image/*"
- If unspecified, Android will infer the type

- Setting the mime type
  Intent.setType(String type)
  Intent.setDataAndType(Uri data, String type)

Component

- The component to receive this intent
- Setting the component

```
Intent(Context packageContext, Class<?> cls);

Intent newInt = new Intent ();
newInt.setComponent(ComponentName) ;
newInt.setClass(Context, Class));
```

Extras

- Additional information associated with Intent
  - Treated as a map (key-value pairs)
- Setting the Extra attribute
  - Several forms depending on data types, e.g.,
    - putExtra(String name, String value);
    - putExtra(String name, float[] value);

Extras (cont.)

- EXTRA_EMAIL: List of email recipients

```
Intent newInt= new Intent(Intent.ACTION_SEND);
newInt.putExtra ( android.content.Intent.EXTRA_EMAIL,
    new String[]{
                aporter@cs.umd.edu, billg@microsoft.com,
                ohhdl@dalailama.com, ladygaga@musician.org
            }
);
```

Flags

- Specify how Intent should be handled
- Examples:
  - FLAG_ACTIVITY_NO_HISTORY
    - Don't put this Activity in the History stack
  - FLAG_DEBUG_LOG_RESOLUTION
    - Causes extra logging information to be printed when this Intent is processed

Flags (cont.)

```
Intent newInt= new Intent(Intent.ACTION_SEND);
newInt.setFlags(Intent.FLAG_ACTIVITY_NO_HISTORY);
```

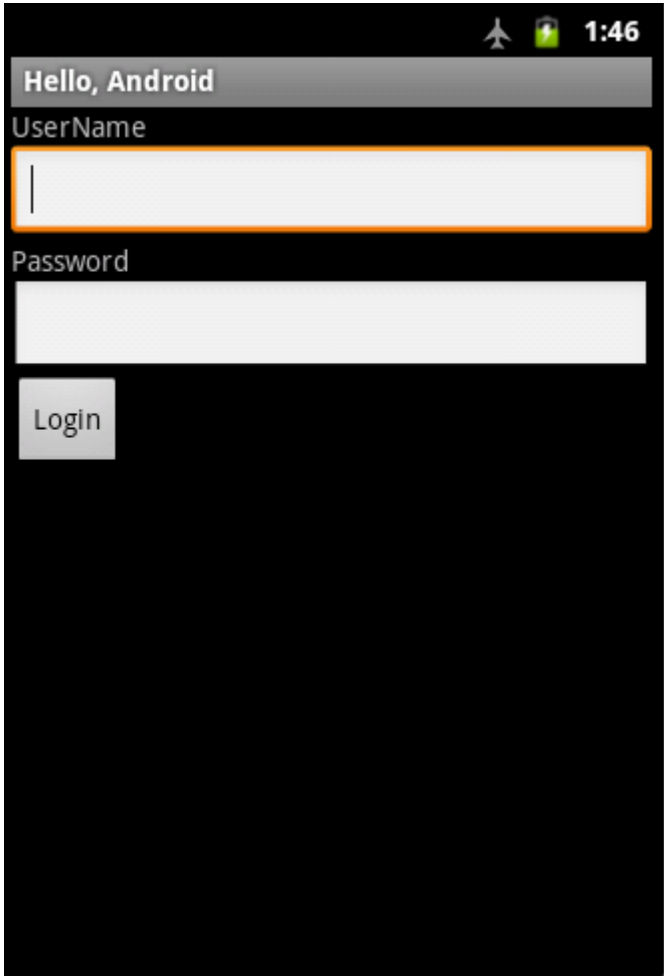
Using Intents to Activate Activities

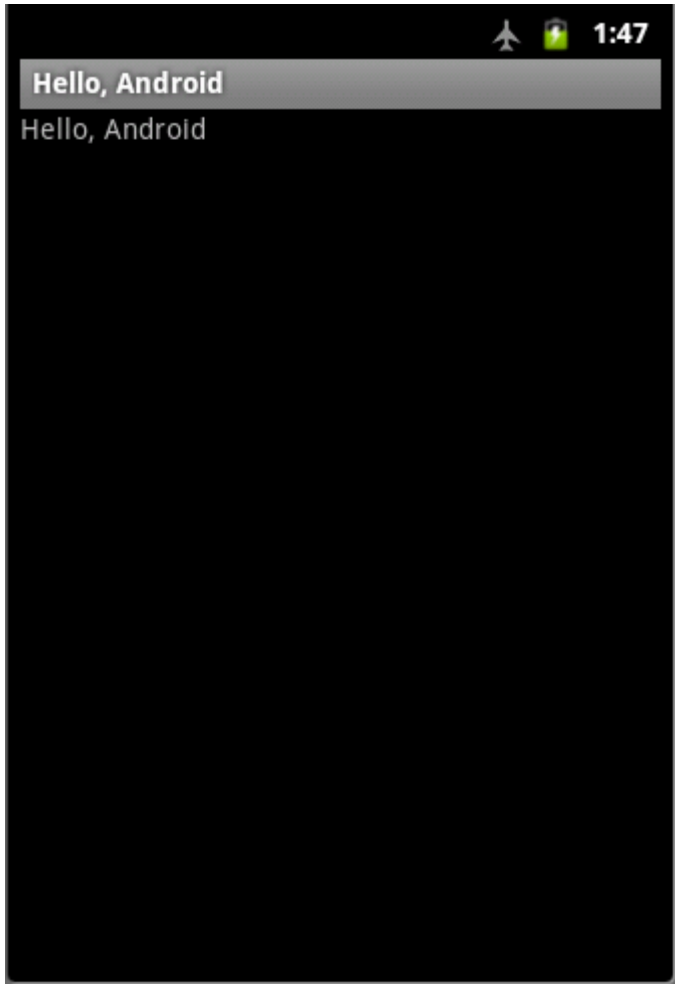
- Intents can be used to activate Activities
  - startActivity(Intent intent)
  - startActivityForResult(Intent intent, …)
- The target Activity can be
  - Named explicitly in the Intent, or
  - Determined implicitly via intent resolution

Explicit Activation

- HelloWorldWithLogin
  - Users must authenticate before they can view the "Hello, Android" screen
- LoginActivity
  - Accepts username & password
  - If password correct, starts HelloAndroid Activity

Activating an Activity (cont.)





Activating an Activity (cont.)

```
public class LoginScreen extends Activity {
 public void onCreate(Bundle savedInstanceState) {
 ...
  loginButton.setOnClickListener(new OnClickListener() {
   public void onClick(View v) {
     if (checkPassword(uname.getText(), passwd.getText())){
      Intent helloAndroidIntent =
        new Intent(LoginScreen.this, HelloAndroid.class);
      startActivity(helloAndroidIntent);
     }
   }
  });
}
```

Implicit Activation

- When the Activity to be activated is not named, the system attempts to find Activities that match the Intent
  - Called Intent Resolution

Intent Resolution

- A process for matching Intents with Activities that want to receive them
- Intent Filters describe which Intents an Activity can handle
  - Usually specified in an AndroidManifest.xml file
- Intent Resolution only matches
  - Action
  - Data (both URI and mime data type)
  - Category

Specifying IntentFilters in AndroidManifest.xml

```
<activity ....>
 <intent-filter
    android:icon="drawable resource”
    android:label="string resource”
    android:priority="integer”
    . . .
   <action android:name=”actionName" />
   ...
</intent-filter>
...
</activity>
```

Specifying IntentFilters in AndroidManifest.xml

- android:icon – Icon representing the activity
- android:label - User-readable label for the parent component
- android:priority – Priority given to the parent component when handling matching Intents
  - Causes Android to prefer one activity over another
  - Higher values represent higher priorities

Adding data to an IntentFilter

```
<intent-filter ...>
   ...
   <data android:host="string"
    android:mimeType="string"
    android:path="string"
    android:pathPattern="string"
    android:pathPrefix="string"
    android:port="string"
    android:scheme="string" />
   ...
</intent-filter>
```

Adding a Category to an IntentFilter

```
<intent-filter ...>
   . . .
   <category android:name="string" />
   ...
</intent-filter>
```

Example: Map Application

```
<intent-filter ...>
   <action android:name=
                "android.intent.action.VIEW" />
   <category android:name=
                "android.intent.category.DEFAULT" />
   <category android:name=
                "android.intent.category.BROWSABLE" />
   <data android:scheme="geo”/>
<intent-filter>
```

Receiving Implicit Intents

- Note: to receive implicit intents an Activity must specify an IntentFilter with the category
  - "android.intent.category.DEFAULT" category

CheckIntents

```
public class CheckIntents extends Activity {
    ...
    public void onCreate(Bundle savedInstanceState) {
    ...
    checkButton.setOnClickListener(new OnClickListener() {
     public void onClick(View v) {
       List<String> acts = CheckIntents.getActivitiesForAction(
                                                CheckIntents.this,
                                                intentText.getText().toString())
       // output results
     }
  });
}
```

CheckIntents

```
public static List<String> getActivitiesForAction(
                                        Context context,String action) {
  final PackageManager packageManager =
                                        context.getPackageManager();
  final Intent intent = new Intent(action);
  final List<ResolveInfo> list =
              packageManager.queryIntentActivities(intent, 0);
  final List<String> acts = new ArrayList<String>();
  for (ResolveInfo ri : list) { acts.add(ri.activityInfo.name); }
  return acts;
}
...
```

From Command Line

- Show application info
  - % adb shell dumpsys package

Lab Assignment

Source Code Examples

- HelloAndroidWithLogin
- CheckActivityIntents