Lesson 10

Android Intents

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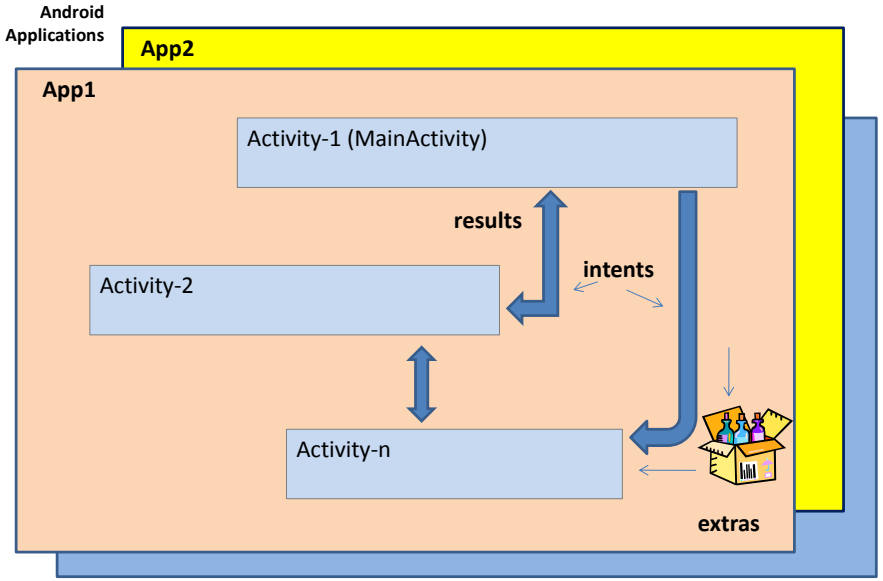
Applications, Activities and Intents

- An Android **application** could include any number of **activities**.
- The app's Manifest designates one of the activities as the first one that should be shown to the user when the application is launched (`android.intent.action.MAIN`).
- Usually, each activity is assocaited to a single screen.
- An *activity* uses the *setContentView*(...) method to show a given UI.
- Activities are independent of each other; however they usually cooperate exchanging data and actions.
- Activities interact with each other in an **asynchronous** mode.
- Passing control and data from one activity to another is accomplished by asking the current activity to execute an **intent**.



Activities call each other using Intents. An intent may include basic and extra data elements. The called activity may return a result to the caller.

Invoking Intents for Execution

Intents are roughly equivalent to a procedure call in Java (however the caller does not wait for the subroutine to complete).

Intents are invoked using the following options

`startActivity (intent)`	launches an activity
`sendBroadcast (intent)`	sends an intent to any interested BroadcastReceivers

`startService(intent)`
`or`
`bindService(intent, …)`
	communicates with a background service.

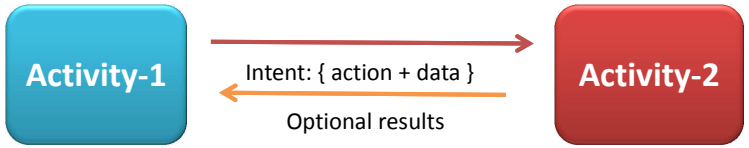
Android Intents

Parts of an Intent

The two main components of an Intent are:

Action The built-in action to be performed, such as
`ACTION_VIEW, ACTION_EDIT, ACTION_CALL, ACTION_SENDTO,...`
or a *user-created-activity*

Data Basic argument needed by the intent to work. For instance: a phone number to be called , a picture to be shown, a message to be sent, etc.



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Parts of an Intent

Data Data is supplied as an **URI**, i.e. a string whose prefix indicates the composition of the data item. For instance:

tel://,
http://,
mailto://,
file://,
content://,
geo:,
audio/,
media/,
vnd.android.cursor.dir

are common URIs used by Android (For a detailed list of all Intents see http://www.openintents.org/intentsregistry/)

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Initiating an Intent

Primary data (as an URI)
tel://
http://
sendto://

Typically an intent is called as follows:

```
Intent  myOtherActivity = new Intent (action, data);

startActivity (myOtherActivity);
```

Built-in or
user-created activity

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Examples of action/data pairs:

ACTION_DIAL ***tel://5551234*** or ***tel:5551234***
Display the phone dialer with the given number filled in.

ACTION_VIEW ***http://www.google.com***
Show Google page in a browser view.

ACTION_EDIT ***content://contacts/people/2***
Edit information about the contact person whose identifier is "2".

ACTION_VIEW ***content://contacts/people/2***
Used to start an activity to display contact person whose identifier is “2”.

ACTION_VIEW ***content://contacts/*** **people/**
Display a list of people, which the user can browse hrough. Selecting a particular person to view would result in a new intent

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Common Built-in Android Actions

List of common actions that Intents can use for launching built-in activities [usually through *startActivity(Intent)*]

ACTION_MAIN	ACTION_ANSWER
ACTION_VIEW	ACTION_INSERT
ACTION_ATTACH_DATA	ACTION_DELETE
ACTION_EDIT	ACTION_RUN
ACTION_PICK	ACTION_SYNC
ACTION_CHOOSER	ACTION_PICK_ACTIVITY
ACTION_GET_CONTENT	**ACTION_SEARCH**
ACTION_DIAL	**ACTION_WEB_SEARCH**
ACTION_CALL	ACTION_FACTORY_TEST
ACTION_SEND	
ACTION_SENDTO	

See Appendix A for a detailed list of selected built-in actions.

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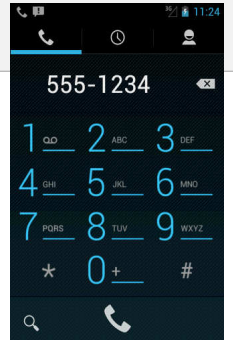
Example 1A: ACTION_DIAL

ACTION_DIAL Display the phone dialer with the given number filled in.

```
String myPhoneNumberUri = "tel:555-1234";

Intent myActivity2 = new Intent(Intent.ACTION_DIAL,
                                Uri.parse(myPhoneNumberUri));
startActivity(myActivity2);
```

Images captured from emulator and device respectively



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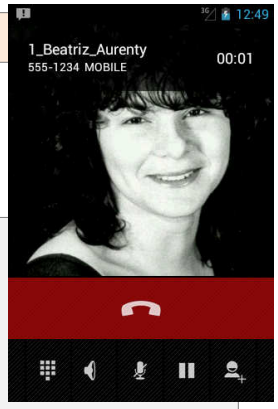
Example 1B: ACTION_CALL

Placing an immediate phone call




```
String myData = "tel:555-1234";

Intent myActivity2 = new Intent(
                        Intent.ACTION_CALL,
                        Uri.parse(myData));

startActivity(myActivity2);
```

Needs Permission:

```
<uses-permission android:name="android.permission.CALL_PHONE" />
```


Intents - Secondary Attributes

In addition to the primary *action/data* attributes, there are ***secondary attributes*** that you can also include with an intent, such as: **Category**, **Components**, **Type**, and **Extras**.

Type

Set an explicit **MIME** data type
- contacts/people
- images/pictures
- images/video
- audio/mp3

MIME - Multipurpose Internet Mail Extensions

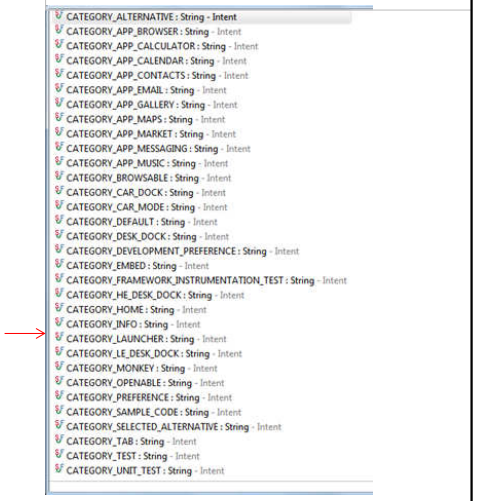
Extras

This is a Bundle of any additional information. Typical methods include:

```
bundle.putInt(key, value)
bundle.getInt(key)
```

Category

additional information about the action to execute



Component

Explicit name of a component class to use for the intent (eg. “MyMethod2”)

Example 2: ACTION_WEB_SEARCH

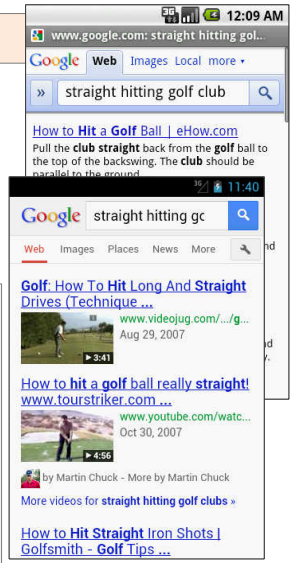
Using Secondary Attributes

Passing a string as an ***Extra*** argument for a Google Search. The string is a 'human' query with keywords.

Goal: searching for golf clubs

```
Intent intent = new Intent(

        Intent.ACTION_WEB_SEARCH);

intent.putExtra(SearchManager.QUERY,
               "straight hitting golf clubs");

startActivity(intent);
```

Secondary data



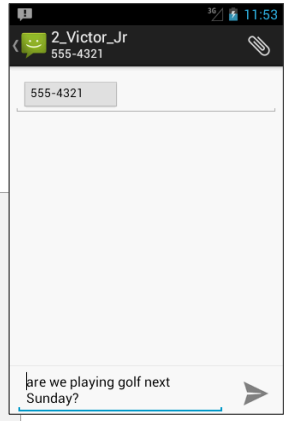
Apparently Google's answer to 'how to hit long and straight' is 'none'

Example 3: ACTION_SENDTO

Using Secondary Attributes

Preparing an SMS. The text is supplied as an **Extra** element. The intent expects such a value to be called "sms_body"

```
Intent intent = new Intent(
                Intent.ACTION_SENDTO,
                Uri.parse("smsto:555-4321"));

intent.putExtra("sms_body",
        "are we playing golf next Sunday?");

startActivity(intent);
```



Example 4: ACTION_GET_CONTENT (Pictures)

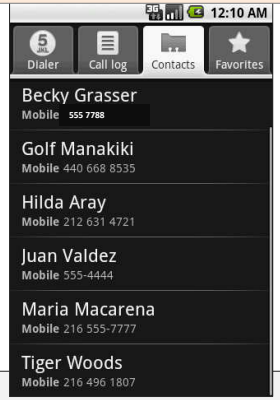
Using Secondary Attributes

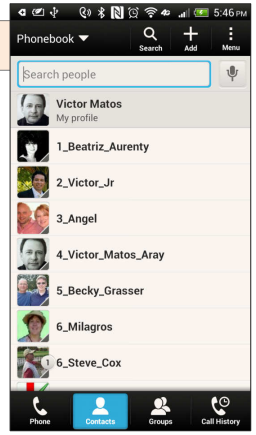
Displaying the *pictures* contained in the device's external storage. The content to be sought is determined by the MIME type given in `.setType(…)`

```
Intent intent = new Intent();

intent.setType("image/pictures/*");
intent.setAction(Intent.ACTION_GET_CONTENT);

startActivity(intent);
```

Example 5: ACTION_VIEW (Contacts)

Showing all Contacts stored in your device






```
String myData = "content://contacts/people/";

Intent myActivity2 = new Intent(Intent.ACTION_VIEW,
                                 Uri.parse(myData));

startActivity(myActivity2);
```

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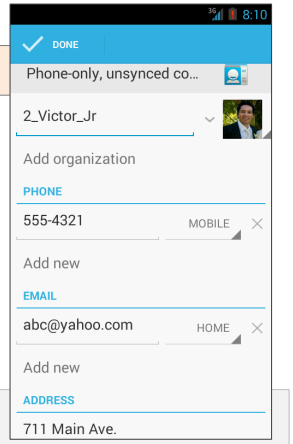
Example 6: ACTION_EDIT (Contacts)



Select a particular person (ID 2) from the contact list for editing purposes.

Later in this lesson we will learn how to obtain the ID of stored contacts (music tracks, pictures, etc).

```
String myData = ContactsContract.Contacts
                .CONTENT_URI + "/" + "2";

Intent myActivity2 = new Intent(Intent.ACTION_EDIT,
                                Uri.parse(myData));

startActivity(myActivity2);
```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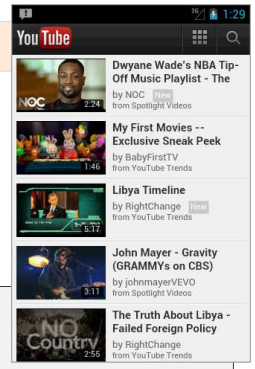
Example 7: ACTION_VIEW (Web page)



Viewing a web page. The user provides a valid URL pointing to the page.

```
String myUriString = "http://www.youtube.com";

Intent myActivity2 = new Intent(Intent.ACTION_VIEW,
                                Uri.parse(myUriString));
startActivity(myActivity2);
```

Try later with URI:
"http://www.youtube.com/results?search_query=ping pong"

Caution. Must add to the Manifest a request for permission to use the Internet:

```
<uses-permission android:name="android.permission.INTERNET" />
```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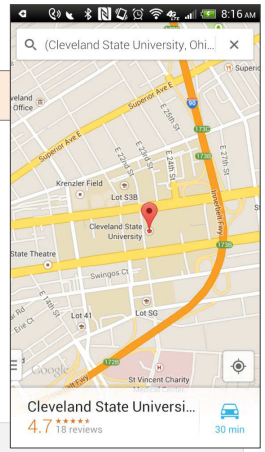
Example 8: ACTION_VIEW (Maps - landmark)



Geo Mapping an Address / Place

Provide a *GeoCode* expression holding a street address (or place, such as 'golden gate ca')

```
// (you may get multiple results...)
String thePlace = "Cleveland State University, Ohio";
Intent intent = new Intent(android.content.Intent.ACTION_VIEW,
                Uri.parse("geo:0,0?q=(" + thePlace + ")"));
startActivity(intent);
```

Modify the Manifest adding the following requests:

```
<uses-permission android:name="android.permission.ACCESS_COARSE_LOCATION" />
<uses-permission android:name="android.permission.INTERNET" />
```

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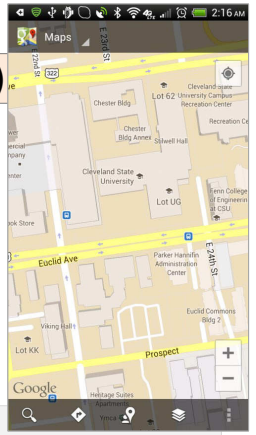
Example 9: ACTION_VIEW (Maps - Coordinates)



Geo Mapping Coordinates (latitude, longitude)

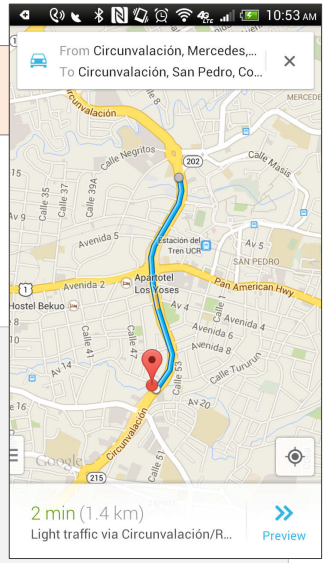
Provide a GeoCode holding latitude and longitude
(also an addittional zoom '**&z=xx**' with xx in range 1..23)

```
// map is centered aroung given Lat, Long
String geoCode = "geo:41.5020952,-81.6789717&z=16";
Intent intent = new Intent(Intent.ACTION_VIEW,
                           Uri.parse(geoCode));
startActivity(intent);
```

Modify the Manifest adding the following requests:

```
<uses-permission android:name="android.permission.ACCESS_COARSE_LOCATION" />
<uses-permission android:name="android.permission.INTERNET" />
```

Example 10: ACTION_VIEW (Maps - Directions)

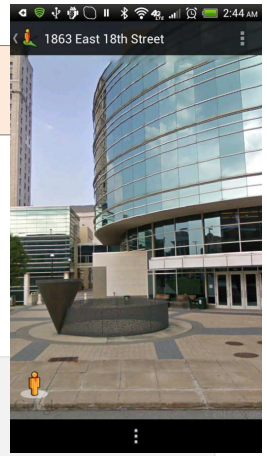


Getting driving directions

User provides GeoCodes (latitude,Longitude) for the starting and ending locations

```
Intent intent = new Intent(
        android.content.Intent.ACTION_VIEW,
        Uri.parse(
          "http://maps.google.com/maps?"
        + "saddr=9.938083,-84.054430&"
        + "daddr=9.926392,-84.055964"));
startActivity(intent);
```


Example 10: ACTION_VIEW (Maps - StreetView)



GeoCode Uri structure:
google.streetview:cbll=***latitude,longitude***
&cbp=1,*yaw*,,*pitch*,*zoom*&mz=*mapZoom*

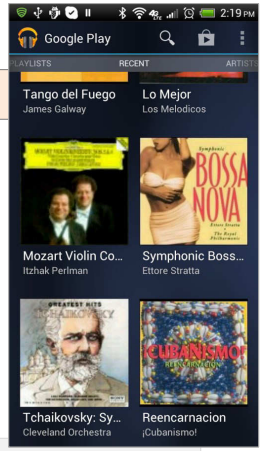
Reference: http://developer.android.com/guide/appendix/g-app-intents.html

```
String geoCode = "google.streetview:"
               + "cbll=41.5020952,-81.6789717&"
               + "cbp=1,270,,45,1&mz=7";
Intent intent = new Intent(Intent.ACTION_VIEW,
                           Uri.parse(geoCode));
startActivity(intent);
```

Modify the Manifest adding the following requests:

```
<uses-permission android:name="android.permission.ACCESS_COARSE_LOCATION" />
<uses-permission android:name="android.permission.INTERNET" />
```


Example 12: ACTION_MUSIC_PLAYER



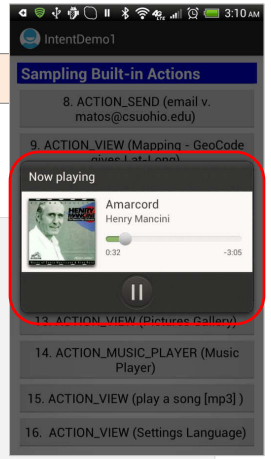
Launching the Music Player

Reference: http://developer.android.com/guide/appendix/g-app-intents.html

```
Intent myActivity2 = new Intent(
                        "android.intent.action.MUSIC_PLAYER");

startActivity(myActivity2);
```


Example 13: ACTION_VIEW (Music)



Playing a song stored in the SD card

Reference: http://developer.android.com/guide/appendix/g-app-intents.html

```
Intent myActivity2 = new Intent(
                        Intent.ACTION_VIEW);
Uri data = Uri.parse("file://"
               + Environment
                  .getExternalStorageDirectory()
               .getAbsolutePath()
               + "/Music/Amarcord.mp3");

myActivity2.setDataAndType(data, "audio/mp3";);

startActivity(myActivity2);
```

Add to Manifest:

```
<uses-permission android:name="android.permission.READ_EXTERNAL_STORAGE"/>
```

Example 14: ACTION_SEND (Email)

Sending Email

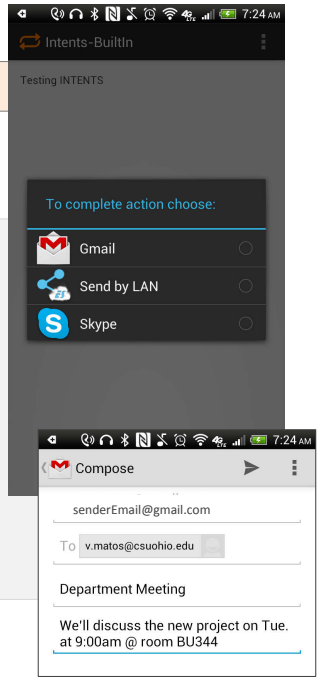
Reference: http://developer.android.com/guide/appendix/g-app-intents.html

```
// send email
String emailSubject = "Department Meeting";
String emailText = "We'll discuss the new project "
                 + "on Tue. at 9:00am @ room BU344";
String[] emailReceiverList = {"v.matos@csuohio.edu"};

Intent intent = new Intent(Intent.ACTION_SEND);

intent.setType("vnd.android.cursor.dir/email");
intent.putExtra(Intent.EXTRA_EMAIL, emailReceiverList);
intent.putExtra(Intent.EXTRA_SUBJECT, emailSubject);
intent.putExtra(Intent.EXTRA_TEXT, emailText);

startActivity(Intent.createChooser(intent,
                    "To complete action choose:"));
```



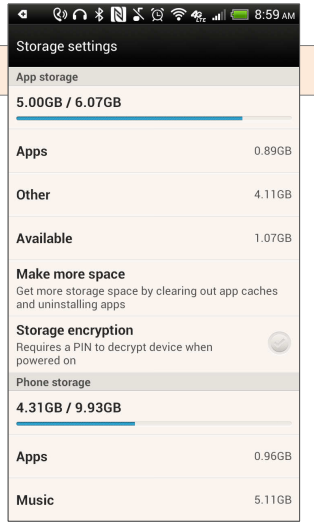
Example 15: Device Settings

System Settings

Almost all configurable features of an Android device can be accessed through built-in actions. For example ,an intent using

android.provider.Settings.XXX

where **XXX** is as in Appendix A, invokes an app where the corresponding set of parameters defining XXX-settings could be adjusted. For a list of selected built-in actions see Appendix A.




```
startActivity(new Intent(
              android.provider.Settings.ACTION_INTERNAL_STORAGE_SETTINGS
             ));
```

Reference: http://developer.android.com/reference/android/provider/Settings.html

Inter-Process Communication.

- A typical Java program runs in a single thread. There, the program calls its methods using a synchronous stop-and-go protocol. Parameters are supplied to a called function, the caller passes control to the sub-routine, and waits for the function to complete. When it finally ends, the caller grabs any returned values , and proceeds with the rest of its work.
- Android apps may include several independent but usually cooperative activities. Each activity works in its own thread with one of them designated as the Main.
- Android uses The **`startActivity(Intent)`** method to initiate an activity, which will become active and (perhaps) visible; however the caller continues to execute in its own thread.
- The next examples illustrate the basic inter-process communication mechanism used in Android for apps that consists of several collaborative activities. We will see how the calls are made, how input data is supplied to the called activity, and how results are returned to the caller.

Starting Activities and Getting Results

- In order for a parent activity to trigger the execution of a child activity, and eventually get results back we use the method

  `startActivityForResult ( Intent, requestCodeID )`

  Where *requestCodeID* is an arbitrary value you choose to identify the caller (similar to a 'nickname').

- The results returned by the child-activity (if any) could be asynchronously picked up by a listener method defined in the parent activity

  `onActivityResult ( requestCodeID, resultCode, Intent )`

Starting Activities and Getting Results

- When the called activity is ready to finish, it could return an optional *resultCode* to the caller to summarize the success of its execution

```
setResult(resultCode)
```

- Standard resultCodes include

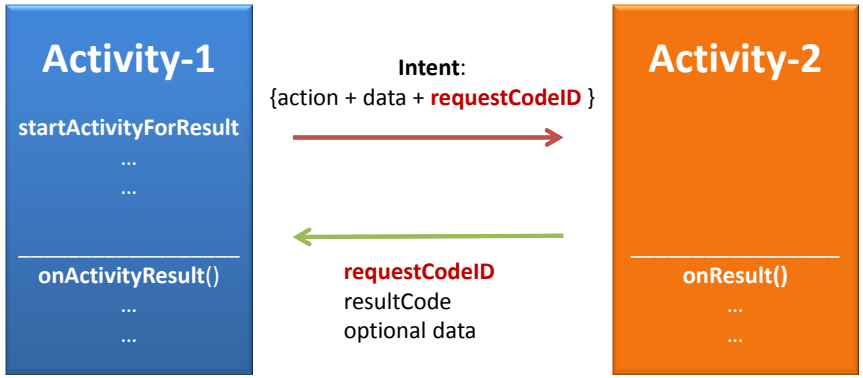
```
Activity.RESULT_CANCELED   (something bad happened),
Activity.RESULT_OK         (a happy ending),
```

or any custom values.

- The brief resultCode as well as any additional extra data can be collected back on the parent's using

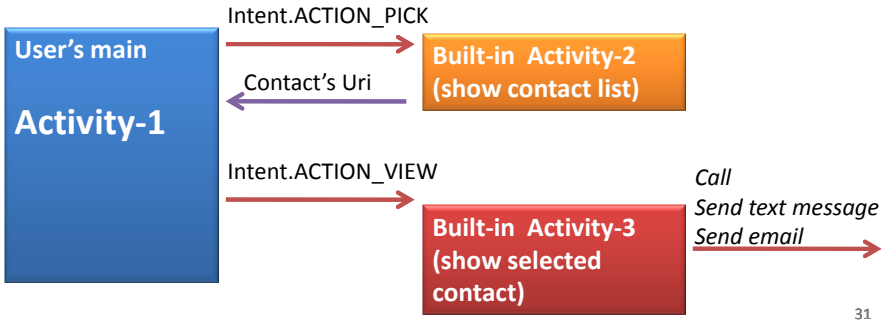
```
onActivityResult (int requestCodeID,
                  int resultCode,
                  Intent data)
```


Starting Activities and Getting Results



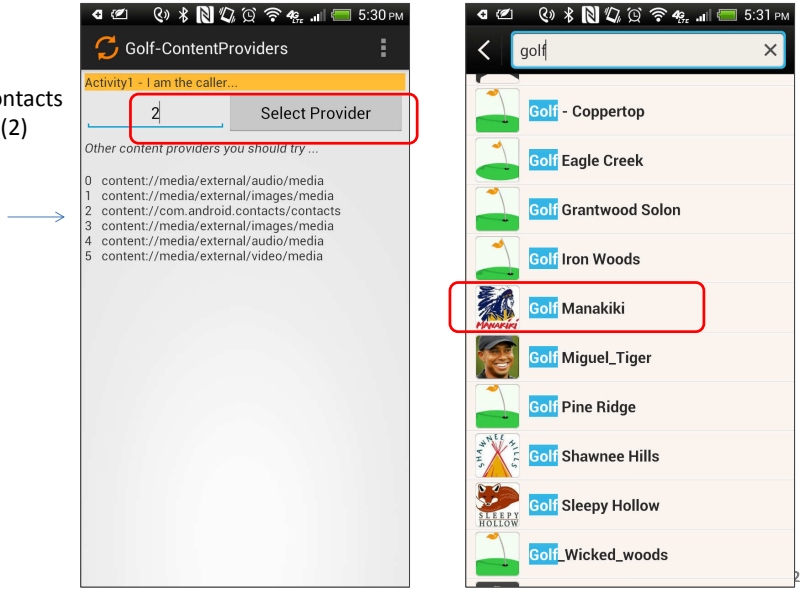
Example 16. Let's play golf - Call for a tee-time.

1. Show all our contacts and pick a particular golf course using the ***Intent.ACTION_PICK*** on the URI :
   `android.provider.ContactsContract.Contacts.CONTENT_URI`
2. Use the returned URI identifying the place we want to call for a tee-time reservation.
3. 'Nicely' show the selected contact's entry allowing calling, texting, emailing actions (use **Intent.ACTION_VIEW**).



Example 16. Let's play golf - Call for a tee-time.

Select Contacts Provider (2)



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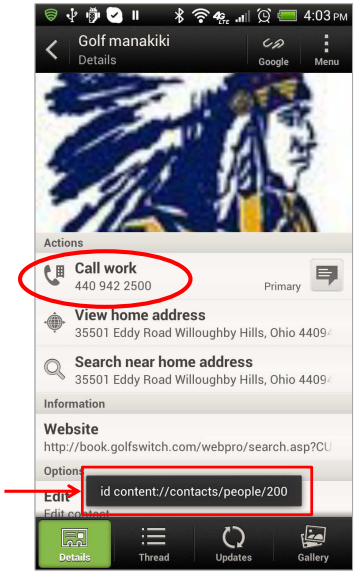
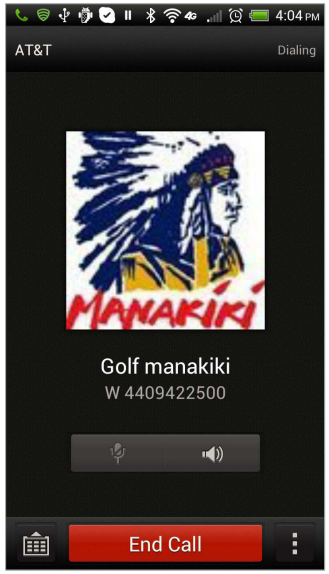
Example 16. Let's play golf - Call for a tee-time.

Complete the Phone call





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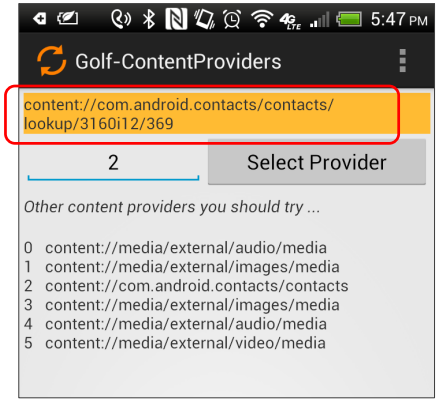
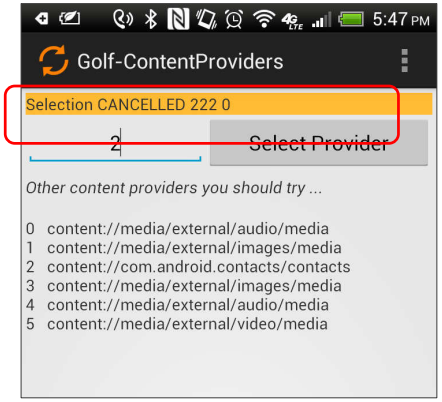
Example 16. Let's play golf - Call for a tee-time.



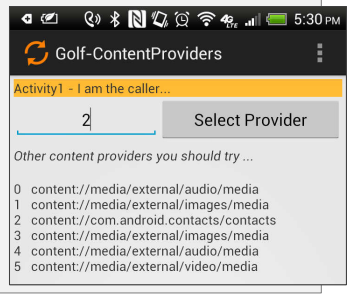


The image on the left shows the URI returned from the interaction with the content provider. The path allows a lookup operation targeting the selected golf course. The image on the right shows the result of cancelling the search for data in the contact list.

Android Intents

Example 16. XML Layout – activity_main.xml

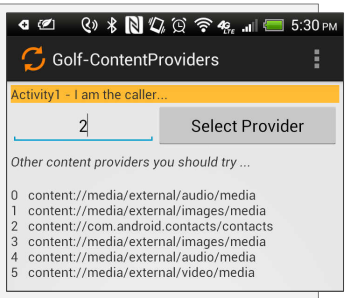
```
<?xml version="1.0" encoding="utf-8"?>
<LinearLayout xmlns:android="http://schemas.android.com/apk/res/android"
    android:id="@+id/LinearLayout1"
    android:layout_width="match_parent"
    android:layout_height="match_parent"
    android:orientation="vertical"
    android:padding="4dp" >

    <TextView
        android:id="@+id/txtMsg"
        android:layout_width="match_parent"
        android:layout_height="wrap_content"
        android:background="@android:color/holo_orange_light"
        android:text="Activity1 - I am the caller..." />

    <LinearLayout
        android:layout_width="match_parent"
        android:layout_height="wrap_content" >

        <EditText
            android:id="@+id/txtProviderOption"
            android:layout_width="wrap_content"
            android:layout_height="wrap_content"
            android:layout_weight="1"
            android:ems="5"
            android:gravity="center_horizontal"
            android:inputType="number"
            android:text="2" >
```



Android Intents

Example 16. XML Layout – activity_main.xml

```
            <requestFocus />
        </EditText>

        <Button
            android:id="@+id/btnOption"
            android:layout_width="wrap_content"
            android:layout_height="wrap_content"
            android:layout_weight="1"
            android:text="Select Provider" />
    </LinearLayout>

    <TextView
        android:layout_width="match_parent"
        android:layout_height="wrap_content"
        android:layout_marginTop="5dp"
        android:text="Other content providers you should try ..."
        android:textStyle="italic" />

    <TextView
        android:id="@+id/txtProviders"
        android:layout_width="match_parent"
        android:layout_height="wrap_content"
        android:text="" />

</LinearLayout>
```



Example 16. MainActivity.java

```
public class MainActivity extends Activity {
  TextView txtMsg;
  EditText txtProvider;
  EditText txtExample;
  Button btnCallActivity2;

  Uri[] uriProvider = {
      Uri.parse("content://media/external/audio/media"),
      Uri.parse("content://media/external/images/media"),
1 →   android.provider.ContactsContract.Contacts.CONTENT_URI,
      android.provider.MediaStore.Images.Media.EXTERNAL_CONTENT_URI,
      android.provider.MediaStore.Audio.Media.EXTERNAL_CONTENT_URI,
      android.provider.MediaStore.Video.Media.EXTERNAL_CONTENT_URI
  };

  @SuppressLint("NewApi")
  @Override
  public void onCreate(Bundle savedInstanceState) {
    super.onCreate(savedInstanceState);
    setContentView(R.layout.main);
```


Example 16. MainActivity.java

```
try {

    txtMsg = (TextView) findViewById(R.id.txtMsg);
    txtProvider = (EditText) findViewById(R.id.txtProviderOption);

    // show some examples of built-in content providers
    txtExample = (EditText) findViewById(R.id.txtExamples);
    for (int i=0; i<uriProvider.length; i++)
      txtExample.append( "\n" + i + "   "
                         + uriProvider[i].toString());

    btnCallActivity2 = (Button) findViewById(R.id.btnOption);
    btnCallActivity2.setOnClickListener(new ClickHandler());

  } catch (Exception e) {
    Toast.makeText(getApplicationContext(), e.getMessage(), Toast.LENGTH_LONG)
        .show();
  }

}// onCreate
```


Example 16. MainActivity.java

```
private class ClickHandler implements OnClickListener {
  @Override
  public void onClick(View v) {
    try {
      // start myActivity2.  Tell it that my nickname is 222

      int option = Integer.parseInt(txtProvider.getText().toString());

2 →   Intent myActivity2 = new Intent( Intent.ACTION_PICK,
                                       uriProvider[option]);

3 →   startActivityForResult(myActivity2, 222);

    } catch (Exception e) {
      Toast.makeText( getBaseContext(), e.getMessage(),
                      Toast.LENGTH_LONG).show();
    }
  }// onClick
}// ClickHandler
```


Example 16. MainActivity.java

```
@Override
protected void onActivityResult(int requestCode, int resultCode, Intent data) {
  super.onActivityResult(requestCode, resultCode, data);
  try {
    // use requestCode to find out who is talking to us
    switch (requestCode) {
4 →   case (222): {
      // 222 is our friendly contact-picker activity
      if (resultCode == Activity.RESULT_OK) {

5 →     String returnedData = data.getDataString();

        Toast.makeText(getApplication(), "id " + returnedData, 1).show();

        // it will return an URI that looks like:
        // content://contacts/people/n
        // where n is the selected contact's ID
        txtMsg.setText(returnedData.toString());

        // show a 'nice' screen with the selected contact
        Toast.makeText( getApplication(), "Nice UI for\n "
                        + returnedData, 1).show();
```

Example 16. MainActivity.java

```
          Intent myAct3 = new Intent( Intent.ACTION_VIEW,
6 →                                   Uri.parse(returnedData) );
          startActivity(myAct3);

        } else {
          // user pressed the BACK button to end called activity
          txtMsg.setText("Selection CANCELLED " + requestCode + " "
                         + resultCode);
        }
        break;
      }
      }// switch
    } catch (Exception e) {
      Toast.makeText(getBaseContext(), e.getMessage(), Toast.LENGTH_LONG)
          .show();
    }
  }// onActivityResult

}// IntentDemo2
```

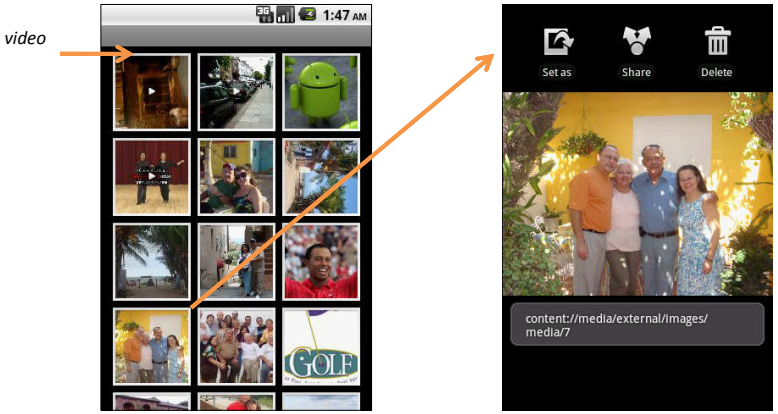

Example 16. MainActivity.java

Comments

1. The app offers a list of content providers to choose from (Contacts can be reached from: `android.provider.ContactsContract.Contacts.CONTENT_URI`)
2. An intent object is assembled combining **ACTION_PICK** with the chosen URI.
3. The caller app identifies itself with the requestCode **222**, starts the intent and waits for ACTION_PICK to send results back to it.
4. The app's listener **onActivityResult** verifies that a resultCode was sent back to itself (222). Then it checks that ACTION_PICK satisfactorily completed its work and returnrd an **`Activity.RESULT_OK`** completion code.
5. The URI string coming back from ACTION_PICK can be obtained from the returned intent with `data.getDataString()`.
6. The previous result URI that can be passed to other actions, such as ACTION_VIEW. This will complete the user's request.

Example 16. Screenshots

Showing Pictures and Video - For this example we selected:
ACTION_PICK & *content://media/external/images/media*
followed by
ACTION_VIEW & *content://media/external/images/media/media7*



Using BUNDLES to Pass Data

- A **Bundle** is an Android data-exchange mechanism used for efficient interprocess communications on either in-process or cross-process calls.
- A **Bundle** is conceptually similar to a Java HashMap. It associates a string key to a parcelable (exchangeable) data element. Data could be either primitive data types or object-references. Bundles are functionally equivalent to a collection of **<name, value>** pairs.
- There is a set of ***putXXX*** and ***getXXX*** methods to store and retrieve (single and array) values of primitive data types from/to the bundles. For example

```
Bundle myBundle = new Bundle();
myBundle.putDouble ("var1", 3.1415);
...
Double v1 = myBundle.getDouble("var1");
```

Android Intents and Bundles - Calling a Receiver

A single Bundle could contain an unlimited number of <key,value> items. They offer an elegant solution to Android IPC exchanges; observe it is sufficient to attach a single extra bundle to an intent for two interacting activities to move any amount of data.

Activity1: Sender → **Activity2: Receiver**

```
Intent myIntentA1A2 = new Intent  (Activity1.this, Activity2.class);

Bundle myBundle1 = new Bundle();

myBundle1.putInt ("val1", 123);

myIntentA1A2.putExtras(myBundle1);

startActivityForResult(myIntentA1A2, 1122);
```

INTENT
Sender class / Receiver class
requestCode (**1122**)
resultCode
Extras: { val1 = **123** }

Android Intents and Bundles - Receiver is awoken

Activity1: Sender **Activity2: Receiver**

```
Intent myCallerIntent = getIntent();

Bundle myBundle = myCallerIntent.getExtras();

int val1 = myBundle.getInt("val1");
```

INTENT
Sender class / Receiver class
requestCode (**1122**)
resultCode
Extras: { val1 = **123** }

Android Intents and Bundles - Receiver Returns Results

Activity1: Sender ← **Activity2: Receiver**

```
myBundle.putString("val1", 456 );

myCallerIntent.putExtras(myBundle);

setResult(Activity.RESULT_OK,
          myCallerIntent);
```

INTENT
Sender class / Receiver class
requestCode (**1122**)
resultCode (**OK**)
Extras: { val1 = **456** }

Common Bundle Methods

.clear()
Removes all elements from the mapping of this Bundle.

.clone()
Clones the current Bundle.

.containsKey(String key)
Returns true if the given key is contained in the mapping of this Bundle.

.putIntArray(String key, int[] value) **.getIntArray(String key)**
Inserts/replaces /retrieves an int array value into the mapping of this Bundle

.putString(String key, String value) **.getString(String key)**
Inserts /replaces/retrieves a String value into the mapping of this Bundle

.putStringArray(String key, String[] value) **.getStringArray(String key)**
Inserts /replaces/retrieves a String array value into the mapping of this Bundle

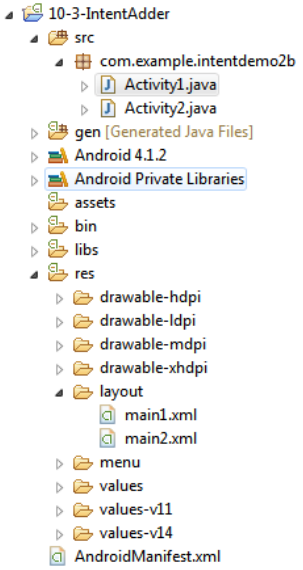
.putStringArrayList(String key, ArrayList<String> value)
Inserts/replaces an ArrayList value into the mapping of this Bundle.

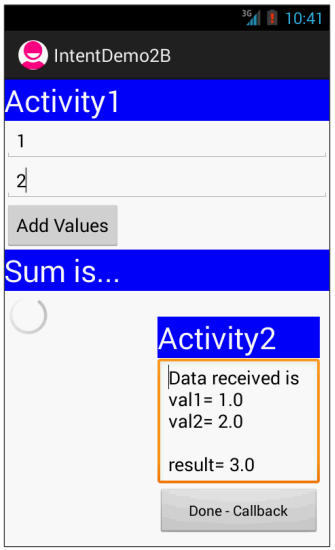
.remove(String key)
Removes any entry with the given key from the mapping of this Bundle.

. size()
Returns the number of mappings contained in this Bundle.

Reference: http://developer.android.com/reference/android/os/Bundle.html

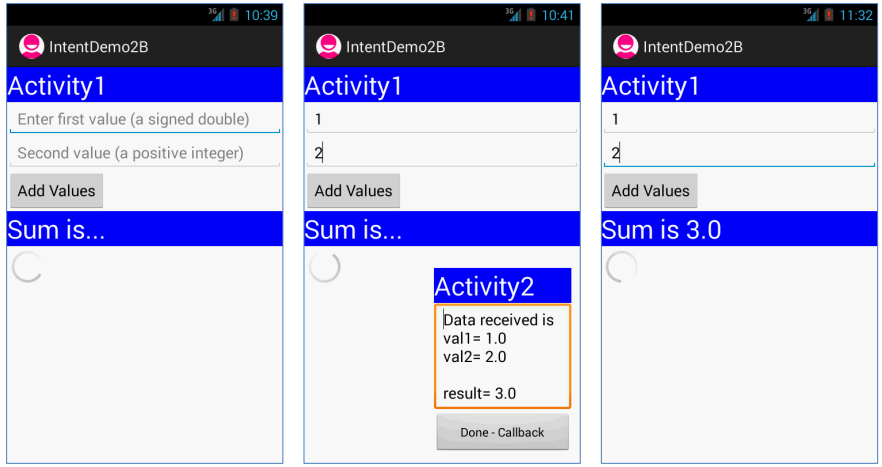
Example 17. XML Layout – activity_main.xml





In this example **Activity1** passes two numbers to **Activity2** which will add them up and return the result. All data is passed back and forth in a Bundle.

Example 17. Screenshots

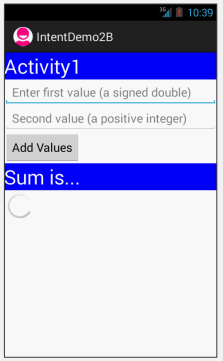


Data values collected by Activity1 are placed into a bundle and sent to Activity2. Observe that progress bar in Activity1 remains active however this process has no focus (its button and textboxes do not respond) Activity2 is visible and has focus.

Activity1 receives the result of the operation carried out by Activity2.

Example 17. XML Layout – main1.xml (Activity1)

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

    <TextView
        android:layout_width="match_parent"
        android:layout_height="wrap_content"
        android:background="#ff0000ff"
        android:text="Activity1"
        android:textColor="#ffffffff"
        android:textSize="30sp" />

    <EditText
        android:id="@+id/EditText01"
        android:layout_width="match_parent"
        android:layout_height="wrap_content"
        android:hint="Enter first value (a signed double)"
        android:inputType="numberDecimal|numberSigned|number" />

    <EditText
        android:id="@+id/EditText02"
        android:layout_width="match_parent"
        android:layout_height="wrap_content"
```



Example 17. XML Layout – main1.xml (Activity1)

```
        android:hint="Second value (a positive integer)"
        android:inputType="number" />

    <Button
        android:id="@+id/btnAdd"
        android:layout_width="wrap_content"
        android:layout_height="wrap_content"
        android:text="Add Values" />

    <TextView
        android:id="@+id/txtResult"
        android:layout_width="match_parent"
        android:layout_height="wrap_content"
        android:background="#ff0000ff"
        android:text="Sum is..."
        android:textColor="#ffffffff"
        android:textSize="30sp" />

1→  <ProgressBar
        android:id="@+id/progressBar1"
        android:layout_width="wrap_content"
        android:layout_height="wrap_content" />

</LinearLayout>
```

Example 17. XML Layout – main2.xml (Activity2)

```
<?xml version="1.0" encoding="utf-8"?>
<LinearLayout xmlns:android="http://schemas.android.com/apk/res/android"
    android:layout_width="wrap_content"
    android:layout_height="wrap_content"
    android:layout_gravity="right|bottom"
    android:layout_margin="10dp"
2 → android:background="@android:color/transparent"
    android:orientation="vertical" >

    <TextView
        android:layout_width="match_parent"
        android:layout_height="wrap_content"
        android:background="#ff0000ff"
        android:text="Activity2"
        android:textColor="#ffffffff"
        android:textSize="30sp" />

    <EditText
        android:id="@+id/etDataReceived"
        android:layout_width="match_parent"
        android:layout_height="wrap_content"
        android:text="Data reveived..." />

    <Button
        android:id="@+id/btnDone"
        android:layout_width="match_parent"
        android:layout_height="wrap_content"
        android:text="Done - Callback" />
</LinearLayout>
```

Example 17. Acivity1.java

```
package com.example.intentdemo2b;
// Multi-Activity Application
// Activity1: collects two data items from the user's UI, places
// them into a Bundle, and calls Activity2
// Activity2: accepts two data items, adds them, returns result

public class Activity1 extends Activity {
    EditText txtValue1;
    EditText txtValue2;
    TextView txtResult;
    Button   btnAdd;

    @Override
    public void onCreate(Bundle savedInstanceState) {
        super.onCreate(savedInstanceState);
        setContentView(R.layout.main1);
        txtValue1 = (EditText)findViewById(R.id.EditText01);
        txtValue2 = (EditText)findViewById(R.id.EditText02);
        txtResult = (TextView) findViewById(R.id.txtResult);

        btnAdd = (Button) findViewById(R.id.btnAdd);
        btnAdd.setOnClickListener(new OnClickListener() {
```


Example 17. Acivity1.java cont. 1

```
    @Override
       public void onClick(View v) {
          // get values from the UI
          Double v1 = Double.parseDouble(txtValue1.getText().toString());
          Double v2 = Double.parseDouble(txtValue2.getText().toString());

          // create intent to call Activity2
          Intent myIntentA1A2 = new Intent (Activity1.this,
                                  Activity2.class);
          // create a Bundle (MAP) container to ship data
3 →       Bundle myDataBundle = new Bundle();

          // add <key,value> data items to the container
          myDataBundle.putDouble("val1", v1);
          myDataBundle.putDouble("val2", v2);

          // attach the container to the intent
          myIntentA1A2.putExtras(myDataBundle);

          // call Activity2, tell your local listener to wait a
          // response sent to a listener known as 101
4 →       startActivityForResult(myIntentA1A2, 101);

       }
    });
   }//onCreate
```


Example 17. Acivity1.java cont. 2

```
  // local listener receives callbacks from other activities
   @Override
   protected void onActivityResult(int requestCode, int resultCode, Intent data)
     {
      super.onActivityResult(requestCode, resultCode, data);

      try   {
         if ((requestCode == 101 ) && (resultCode == Activity.RESULT_OK)){
5 →         Bundle myResultBundle = data.getExtras();
            Double myResult = myResultBundle.getDouble("vresult");
            txtResult.setText("Sum is " + myResult);
         }
      }
      catch (Exception e) {
         txtResult.setText("Problems - " + requestCode + " " + resultCode);
      }
   }//onActivityResult

}//Activity1
```

Example 17. Acivity2.java

```
public class Activity2 extends Activity implements OnClickListener{
   EditText dataReceived;
   Button  btnDone;

   @Override
   protected void onCreate(Bundle savedInstanceState) {
      super.onCreate(savedInstanceState);
      setContentView(R.layout.main2);
      dataReceived = (EditText) findViewById(R.id.etDataReceived);
      btnDone = (Button) findViewById(R.id.btnDone);
      btnDone.setOnClickListener(this);

      // pick call made to Activity2 via Intent
      Intent myLocalIntent = getIntent();

      // look into the bundle sent to Activity2 for data items
      Bundle myBundle =  myLocalIntent.getExtras();
      Double v1 = myBundle.getDouble("val1");
      Double v2 = myBundle.getDouble("val2");

      // operate on the input data
      Double vResult =  v1 + v2;
```

6 →

Example 17. Acivity2.java cont 1.

```
      // for illustration purposes. show data received & result
      dataReceived.setText("Data received is \n"
            + "val1= " + v1 + "\nval2= " + v2
            + "\n\nresult= " + vResult);

      // add to the bundle the computed result
      myBundle.putDouble("vresult", vResult);

      // attach updated bumble to invoking intent
      myLocalIntent.putExtras(myBundle);

      // return sending an OK signal to calling activity
      setResult(Activity.RESULT_OK, myLocalIntent);

      // experiment: remove comment
      // finish();

   }//onCreate

   @Override
   public void onClick(View v) {
         // close current screen - terminate Activity2
        finish();
   }
}
```

7 →

8 →

Example 17. Manifest

```
<manifest xmlns:android="http://schemas.android.com/apk/res/android"
    package="com.example.intentdemo2b"
    android:versionCode="1"
    android:versionName="1.0" >

    <uses-sdk
        android:minSdkVersion="14"
        android:targetSdkVersion="18" />

    <application
        android:icon="@drawable/ic_launcher"
        android:label="@string/app_name"
        android:theme="@style/AppTheme" >
        <activity
            android:name=".Activity1"
            android:label="@string/title_activity_intent_demo2_b" >
            <intent-filter>
                <action android:name="android.intent.action.MAIN" />
                <category android:name="android.intent.category.LAUNCHER" />
            </intent-filter>
        </activity>

        <activity
           android:name=".Activity2"
           android:theme="@android:style/Theme.Translucent.NoTitleBar" >
        </activity>

    </application>
</manifest>
```

1

2

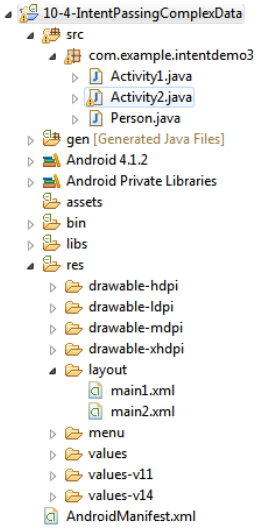
9 →

Example 17.

Comments

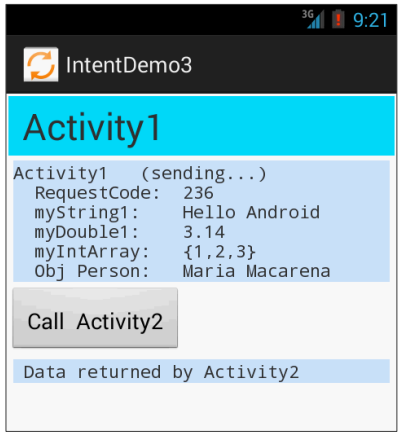
1. The continuous rotation of this circular progress bar will visibly indicate the working state of Activity1.
2. Activity2 has a small layout and a transparent background. When displayed it will be partially super-imposed on top of Activity1's screen.
3. Activity1 prepares an Intent to invoke Activity2. The statement `myIntentA1A2.putExtras(myDataBundle)` attaches the bundle to the intent.
4. `startActivityForResult`(…) passes the intent and its id 101 to Activity2.
5. The listener in Activity1 waits for the result wrapped into an extra bundle. When it arrives it is extracted and displayed to the user.
6. Activity2 issues `.getIntent()` to grab the incoming intent and the extra bundle it carries. The two numeric variables are combined to produce a result (vResult).
7. Activity2 issues .putDouble(…) to store the result into the outgoing bundle.
8. Activity2 releases the outgoing bundle together with a RESULT_OK flag.
9. The manifest defines both activities and applies a *translucent*, *NoTitleBar* theme to Activity2.

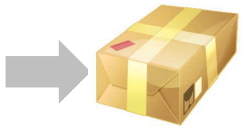
Example 18. Exchanging data between two activities in the same app.



In this example the caller **Activity1** sends a variety of arguments to **Activity2** including simple types, arrays, and serialized objects. Activity2 applies changes on the input data and returns new values.

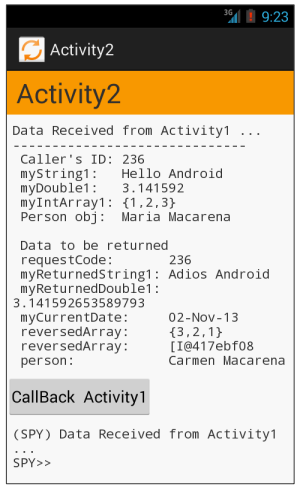
Both activities are part of the same app.





Send all of these items to **Activity2** and wait for results

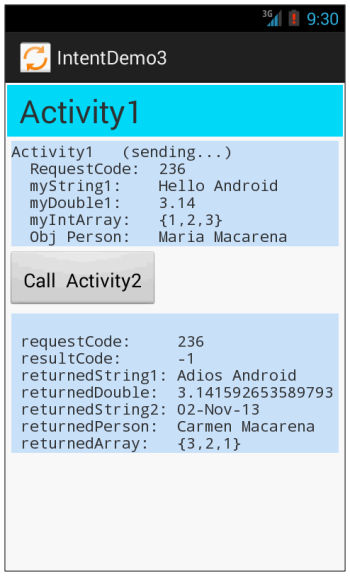
Example 18. Exchanging data between two activities in the same app.



Echo data received
Do local operations (reverse array, change Person's name, return PI and current date)

Explore Bundle to obtain: keyName, keyValue, and keyType of each arriving item

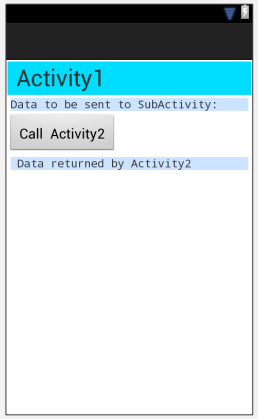
Example 18. Exchanging data between two activities in the same app.



Returned values sent back from **Activity2**

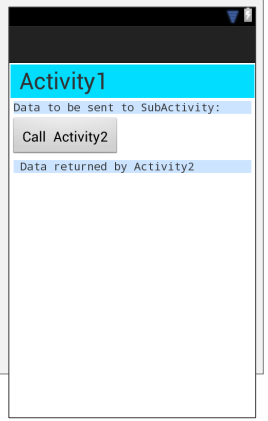
Example 18. XML Layout – main1.xml (Activity1)

```
<?xml version="1.0" encoding="utf-8"?>
<ScrollView xmlns:android="http://schemas.android.com/apk/res/android"
    android:layout_width="match_parent"
    android:layout_height="match_parent"
    android:layout_margin="2dp" >

    <LinearLayout
        android:layout_width="match_parent"
        android:layout_height="wrap_content"
        android:orientation="vertical" >

        <TextView
            android:layout_width="match_parent"
            android:layout_height="wrap_content"
            android:background="@color/holo_blue_bright"
            android:padding="4sp"
            android:text=" Activity1 "
            android:textSize="30sp" />

        <TextView
            android:id="@+id/txtTop"
            android:layout_width="match_parent"
            android:layout_height="wrap_content"
            android:layout_margin="4dip"
            android:background="#330077ff"
            android:text="Data to be sent to SubActivity:"
            android:typeface="monospace" />
```



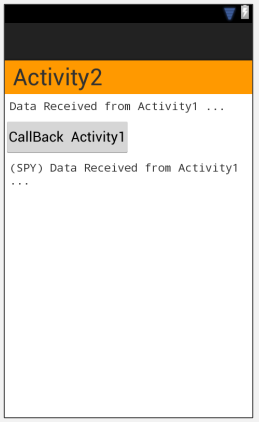
Example 18. XML Layout – main1.xml (Activity1)

```
        <Button
            android:id="@+id/btnCallActivity2"
            android:layout_width="wrap_content"
            android:layout_height="wrap_content"
            android:background="@android:drawable/btn_default"
            android:padding="15dp"
            android:text="Call  Activity2" />

        <TextView
            android:id="@+id/txtReturnedValues"
            android:layout_width="match_parent"
            android:layout_height="wrap_content"
            android:layout_margin="4dip"
            android:background="#330077ff"
            android:text=" Data returned by Activity2"
            android:typeface="monospace" />
    </LinearLayout>

</ScrollView>
```



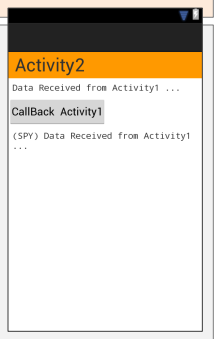
Example 18. XML Layout – main2.xml (Activity2)

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

    <LinearLayout
        android:layout_width="match_parent"
        android:layout_height="match_parent"
        android:background="#ffffffff"
        android:orientation="vertical" >

        <TextView
            android:layout_width="match_parent"
            android:layout_height="wrap_content"
            android:background="#ffff9900"
            android:padding="4sp"
            android:text=" Activity2"
            android:textSize="30sp" />

        <TextView
            android:id="@+id/txtIncomingData"
            android:layout_width="match_parent"
            android:layout_height="wrap_content"
            android:layout_margin="7dip"
            android:text="Data Received from Activity1 ..."
            android:typeface="monospace" />
```



Example 18. XML Layout – main2.xml (Activity2)

```
        <Button
            android:id="@+id/btnCallActivity1"
            android:layout_width="wrap_content"
            android:layout_height="wrap_content"
            android:padding="6sp"
            android:text="CallBack  Activity1" />

        <TextView
            android:id="@+id/spyBox"
            android:layout_width="match_parent"
            android:layout_height="wrap_content"
            android:layout_margin="7dip"

            android:text="(SPY) Data Received from Activity1 ..."
            android:typeface="monospace" />
    </LinearLayout>

</ScrollView>
```



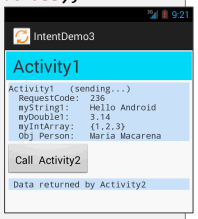
Example 18. Activity1.java (This is the Caller)

```
public class Activity1 extends Activity {
   TextView txtTop;
   TextView txtReturnedValues;
   Button btnCallActivity2;
   // arbitrary interprocess communication ID (just a nickname!)
   private final int IPC_ID = (int) (10001 * Math.random());

   @Override
   public void onCreate(Bundle savedInstanceState) {
      super.onCreate(savedInstanceState);
      try {
         setContentView(R.layout.main1);
         txtTop = (TextView) findViewById(R.id.txtTop);
         txtReturnedValues = (TextView) findViewById(R.id.txtReturnedValues);
         btnCallActivity2 = (Button) findViewById(R.id.btnCallActivity2);
         btnCallActivity2.setOnClickListener(new Clicker1());
         // for demonstration purposes- show in top textBox
         txtTop.setText("Activity1   (sending...) "
               + "\n RequestCode:  " + IPC_ID
               + "\n myString1:    Hello Android"
               + "\n myDouble1:    3.14 "
               + "\n myIntArray:   {1,2,3} "
               + "\n Person:       Maria Macarena");
      } catch (Exception e) {
         Toast.makeText(getBaseContext(), e.getMessage(), Toast.LENGTH_LONG).show();
      }
   }// onCreate
```

Android Intents

Example 18. Activity1.java cont 1.

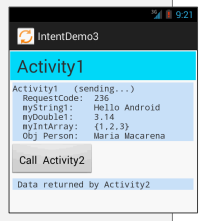
```
private class Clicker1 implements OnClickListener {
   public void onClick(View v) {
      try {
         // create an Intent to talk to Activity2
         Intent myIntentA1A2 = new Intent(Activity1.this,  Activity2.class);

         // prepare a Bundle and add the data pieces to be sent
         Bundle myData = new Bundle();
         myData.putInt("myRequestCode", IPC_ID);
         myData.putString("myString1", "Hello Android");
         myData.putDouble("myDouble1", 3.141592);
         int [] myLittleArray = { 1, 2, 3 };
         myData.putIntArray("myIntArray1", myLittleArray);

         // creating an object and passing it into the bundle
         Person p1 = new Person("Maria", "Macarena");
         myData.putSerializable("person", p1);

         // bind the Bundle and the Intent that talks to Activity2
         myIntentA1A2.putExtras(myData);

         // call Activity2 and wait for results
         startActivityForResult(myIntentA1A2, IPC_ID);

      } catch (Exception e) {
         Toast.makeText(getBaseContext(), e.getMessage(), Toast.LENGTH_LONG).show();
      }
   }// onClick
}// Clicker1
```



Android Intents

Example 18. Activity1.java cont 2.

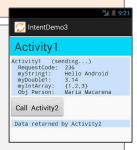
```
@Override
protected void onActivityResult(int requestCode, int resultCode, Intent data) {
  super.onActivityResult(requestCode, resultCode, data);
  try {
    // check that these results are for me
    if (IPC_ID == requestCode) {

      // Activity2 is over - see what happened
      if (resultCode == Activity.RESULT_OK) {

        // good - we have some data sent back from Activity2
        Bundle myReturnedData = data.getExtras();

        String myReturnedString1 = myReturnedData
                                   .getString("myReturnedString1");
        Double myReturnedDouble1 = myReturnedData
                                   .getDouble("myReturnedDouble1");
        String myReturnedDate = myReturnedData

                                .getString("myCurrentDate");
        Person myReturnedPerson = (Person) myReturnedData
                                  .getSerializable("person");

        int[]  myReturnedReversedArray = myReturnedData
                                  .getIntArray("myReversedArray");
```



Android Intents

Example 18. Activity1.java cont 3.

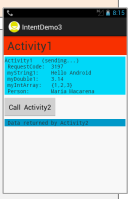
```
        // display in the bottom label
        txtReturnedValues.setText(
            "\n requestCode:      " + requestCode
          + "\n resultCode:       " + resultCode
          + "\n returnedString1: " + myReturnedString1
          + "\n returnedDouble:   " + Double.toString(myReturnedDouble1)
          + "\n returnedString2: " + myReturnedDate
          + "\n returnedPerson:   " + myReturnedPerson.getFullName()
          + "\n returnedArray:    "
          + Activity1.myConvertArray2String(myReturnedReversedArray));
      } else {
        // user pressed the BACK button
        txtTop.setText("Selection CANCELLED!");
      }

    }

  } catch (Exception e) {
    Toast.makeText(getBaseContext(), e.getMessage(), Toast.LENGTH_LONG)
        .show();
  }// try
}// onActivityResult
```



Android Intents

Example 18. Activity1.java cont 4.

```
static String myConvertArray2String(int[] intArray ) {

   if ( intArray == null)
      return "NULL";

   String array2Str =  "{" + Integer.toString( intArray[0] );

   for (int i=1; i<intArray.length;  i++) {

      array2Str = array2Str + "," + Integer.toString( intArray[i] );
   }
   return array2Str + "}";
}

}// AndroIntent1
```



Android Intents

Example 18. Activity2.java (This is the Receiver)


```
public class Activity2 extends Activity {
    TextView txtIncomingData;
    TextView spyBox;
    Button   btnCallActivity1;

    @Override
    public void onCreate(Bundle savedInstanceState) {
        super.onCreate(savedInstanceState);
        setContentView(R.layout.main2);
        //bind UI variables to Java code
        txtIncomingData = (TextView)findViewById(R.id.txtIncomingData);
        spyBox = (TextView)findViewById(R.id.spyBox);
        btnCallActivity1 = (Button)findViewById(R.id.btnCallActivity1);
        btnCallActivity1.setOnClickListener(new Clicker1());

        // create a local Intent handler – we have been called!
4 ->    Intent myCallerIntentHandler = getIntent();

        // grab the data package with all the pieces sent to us
5 ->    Bundle myBundle = myCallerIntentHandler.getExtras();

        // extract the individual data parts from the bundle
        // observe you know the individual keyNames
        int    paramInt = myBundle.getInt("myRequestCode");
        String paramString = myBundle.getString("myString1");
        double paramDouble = myBundle.getDouble("myDouble1");
        int[]  paramArray = myBundle.getIntArray("myIntArray1");
        Person paramPerson = (Person) myBundle.getSerializable("person");
        String personName = paramPerson.getFullName();
```

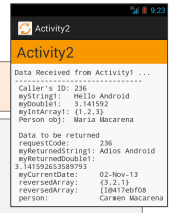

Android Intents

Example 18. Activity2.java cont 1.


```
        //for debugging purposes - show arriving data
        txtIncomingData.append("\n------------------------------ "
            + "\n Caller's ID: " + paramInt
            + "\n myString1:   " + paramString
            + "\n myDouble1:   " + Double.toString(paramDouble)
            + "\n myIntArray1: " + Activity1.myConvertArray2String(paramArray)
            + "\n Person obj:  " + paramPerson.getFullName()
              );

        // next method assumes you do not know the data-items keyNames
        String spyData = extractDataFromBundle( myBundle );
        spyBox.append(spyData);

        // ++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
        // do here something with the extracted data. For example,
        // reverse the values stored in the incoming integer array

        //int[] intReversedArray = myIntReverseArray( paramArray );
        int[] intReversedArray = myIntReverseArray( paramArray );
        String strReversedArray =
                              Activity1.myConvertArray2String(intReversedArray);
        myBundle.putIntArray("myReversedArray", intReversedArray);

        // change the person's firstName
        paramPerson.setFirstName("Carmen" );
        myBundle.putSerializable("person", paramPerson);
```

Android Intents

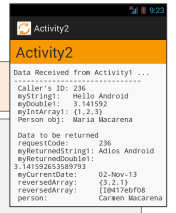
Example 18. Activity2.java cont 2.




```
        // Returning Results.
        // Go back to myActivity1 with some new data made/change here.
        myBundle.putString("myReturnedString1", "Adios Android");
        myBundle.putDouble("myReturnedDouble1", Math.PI);
        SimpleDateFormat formatter = new SimpleDateFormat("dd-MMM-yy");
        String now = formatter.format(new Date());
        myBundle.putString("myCurrentDate", now );

6 ->    myCallerIntentHandler.putExtras(myBundle);

        // just debugging - show returning data
        txtIncomingData.append("\n\n Data to be returned  "
             + "\n requestCode:       " + paramInt
             + "\n myReturnedString1: " + myBundle.getString("myReturnedString1")
             + "\n myReturnedDouble1: " + myBundle.getDouble("myReturnedDouble1")
             + "\n myCurrentDate:     " + myBundle.getString("myCurrentDate")
             + "\n reversedArray:     " + strReversedArray
             + "\n reversedArray:     " + myBundle.getIntArray("myReversedArray")
             + "\n person:            " + ((Person) myBundle
                                            .getSerializable("person"))
                                            .getFullName()  );
        // all done!
7 ->    setResult(Activity.RESULT_OK, myCallerIntentHandler);
    }//onCreate
```

Android Intents

Example 18. Activity2.java cont 3.




```
  private class Clicker1 implements OnClickListener {
    public void onClick(View v) {
      //clear Activity2 screen so Activity1 could be seen
      finish();
    }//onClick
  }//Clicker1

 // ////////////////////////////////////////////////////////////////
  private int[] myIntReverseArray( int[] theArray ) {
    int n = theArray.length;

    int[] reversedArray =  new int[n];
        for (int i=0; i< theArray.length; i++ ) {
          reversedArray[i] = theArray[n -i -1];
        }
        return reversedArray;
  }
```

Example 18. Activity2.java cont 4.

```
    // ////////////////////////////////////////////////////////////////
    private String extractDataFromBundle(Bundle myBundle) {
        // +++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
        // What if I don't know the key names?
        // what types are in the bundle?. This fragment shows
        // how to use bundle methods to extract its data.
        // SOME ANDROID TYPES INCLUDE:
        // class [I (array integers)
        // class [J (array long)
        // class [D (array doubles)
        // class [F (array floats)
        // class java.lang.xxx   (where xxx= Integer, Double, ...)
        // +++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
        // Remember, the Bundle is a set of <keyName, keyValue> pairs
        String spy = "\nSPY>>\n";

        Set<String> myKeyNames = myBundle.keySet();  //get all keyNames

        for (String keyName : myKeyNames){

         Serializable keyValue =  myBundle.getSerializable(keyName);

         String keyType = keyValue.getClass().toString();
         if (keyType.equals("class java.lang.Integer")){
           keyValue = Integer.parseInt(keyValue.toString());
         }
```

Example 18. Activity2.java cont 5.

```
        else if (keyType.equals("class java.lang.Double")){
          keyValue = Double.parseDouble(keyValue.toString());
        }
        else if (keyType.equals("class java.lang.Float")){
          keyValue = Float.parseFloat(keyValue.toString());
        }
        else if (keyType.equals("class [I")){
          int[] arrint = myBundle.getIntArray(keyName);
          int n = arrint.length;
          keyValue = arrint[n-1]; // show only the last!
        }
        else {
           keyValue = (String)keyValue.toString();
        }
        spy  +=  "\n\nkeyName..." + keyName
             +   "  \nKeyValue.." + keyValue
             +   "  \nKeyType..." + keyType ;
       }

       return spy;

  }//extractDataFromBundle

}//Activity2
```

Example 18. Activity2.java cont 6.

```
public class Person implements Serializable {

   private static final long serialVersionUID = 1L;
   private String firstName;
   private String lastName;

   public Person(String firstName, String lastName) {
      super();
      this.firstName = firstName;
      this.lastName = lastName;
   }

   public String getFirstName() {
      return  firstName;
   }

   public void setFirstName(String value) {
      this.firstName = value;
   }

   public String getFullName() {
      return  firstName + " " + lastName;
   }

}
```

Example 18. Manifest

```
<manifest xmlns:android="http://schemas.android.com/apk/res/android"
    package="com.example.intentdemo3"
    android:versionCode="1"
    android:versionName="1.0" >

    <uses-sdk
        android:minSdkVersion="14"
        android:targetSdkVersion="17" />
    <application
        android:icon="@drawable/ic_launcher"
        android:label="@string/app_name"
        android:theme="@style/AppTheme" >
        <activity
            android:name=".Activity1"
            android:label="Activity1" >
            <intent-filter>
                <action android:name="android.intent.action.MAIN" />
                <category android:name="android.intent.category.LAUNCHER" />
            </intent-filter>
        </activity>
        <activity
            android:name=".Activity2"
            android:label="Activity2" >
        </activity>
    </application>
</manifest>
```

Example 18.

Comments

1. Various data items are inserted into an outgoing bundle, including simple types, an array, and a serialized object.
2. Activity1 invokes Activity2 and waits for its results.
3. The listener in Activity1 issues the statement `data.getExtras()` to get the returning bundle. Data items are extracted and displayed.
4. Activity2 uses `getIntent()` to capture the incoming intent request.
5. The arriving bundle is picked up and its data items are extracted. Observe the use of **.getSerializable(…)** to grab the object argument.
6. After operating on the input data, Activity2 packs all the outgoing extra items in a bundle and attaches it to the original intent.
7. Activity2 finishes with a **RESULT_OK t**ermination code.
8. The method `extractDataFromBundle` is used to get all the <key,value> pairs packed in a bundle.
9. This fragment defines a simple **Person** class, with is private data members, constructor, accessors, and custom method.

Questions ?

Appendix A. Built-In Intent Actions

A complete list of built-in, broadcast, service actions, categories, and features for a particular SDK can be found in the folders:

`.../android-sdk/platforms/platform-YYY/data/`

android.app.action.
ACTION_PASSWORD_CHANGED
ACTION_PASSWORD_EXPIRING
ACTION_PASSWORD_FAILED
ACTION_PASSWORD_SUCCEEDED
ADD_DEVICE_ADMIN
DEVICE_ADMIN_DISABLE_REQUESTED
DEVICE_ADMIN_DISABLED
DEVICE_ADMIN_ENABLED
SET_NEW_PASSWORD
START_ENCRYPTION

android.bluetooth.a2dp.profile.action.
CONNECTION_STATE_CHANGED
PLAYING_STATE_CHANGED

android.bluetooth.adapter.action.
CONNECTION_STATE_CHANGED
DISCOVERY_FINISHED
DISCOVERY_STARTED
LOCAL_NAME_CHANGED
REQUEST_DISCOVERABLE
REQUEST_ENABLE
SCAN_MODE_CHANGED
STATE_CHANGED

android.bluetooth.device.action.
ACL_CONNECTED
ACL_DISCONNECT_REQUESTED
ACL_DISCONNECTED
BOND_STATE_CHANGED
CLASS_CHANGED
FOUND
NAME_CHANGED
UUID

android.bluetooth.devicepicker.action.
DEVICE_SELECTED
LAUNCH

Appendix A. Built-In Intent Actions cont. 1

android.bluetooth.headset.
action.VENDOR_SPECIFIC_HEADSET_EVENT
profile.action.AUDIO_STATE_CHANGED
profile.action.CONNECTION_STATE_CHANGED

android.hardware.action.
NEW_PICTURE
NEW_VIDEO
input.action.QUERY_KEYBOARD_LAYOUTS

android.intent.action.
ACTION_POWER_CONNECTED
ACTION_POWER_DISCONNECTED
ACTION_SHUTDOWN
AIRPLANE_MODE
ALL_APPS
ANSWER
APP_ERROR
ASSIST
ATTACH_DATA
BATTERY_CHANGED
BATTERY_LOW
BATTERY_OKAY
BOOT_COMPLETED
BUG_REPORT
CALL
CALL_BUTTON
CAMERA_BUTTON
CHOOSER
CONFIGURATION_CHANGED
CREATE_LIVE_FOLDER
CREATE_SHORTCUT
DATE_CHANGED
DELETE
DEVICE_STORAGE_LOW
DEVICE_STORAGE_OK
DIAL
DOCK_EVENT
DREAMING_STARTED
DREAMING_STOPPED
EDIT

Appendix A. Built-In Intent Actions cont. 2

android.intent.action.
EVENT_REMINDER
EXTERNAL_APPLICATIONS_AVAILABLE
EXTERNAL_APPLICATIONS_UNAVAILABLE
FETCH_VOICEMAIL
GET_CONTENT
GTALK_CONNECTED
GTALK_DISCONNECTED
HEADSET_PLUG
INPUT_METHOD_CHANGED
INSERT
INSERT_OR_EDIT
INSTALL_PACKAGE
LOCALE_CHANGED
MAIN
MANAGE_NETWORK_USAGE
MANAGE_PACKAGE_STORAGE
MEDIA_BAD_REMOVAL
MEDIA_BUTTON
MEDIA_CHECKING
MEDIA_EJECT
MEDIA_MOUNTED
MEDIA_NOFS
MEDIA_REMOVED
MEDIA_SCANNER_FINISHED
MEDIA_SCANNER_SCAN_FILE
MEDIA_SCANNER_STARTED
MEDIA_SEARCH
MEDIA_SHARED
MEDIA_UNMOUNTABLE
MEDIA_UNMOUNTED
MUSIC_PLAYER
MY_PACKAGE_REPLACED
NEW_OUTGOING_CALL
NEW_VOICEMAIL
PACKAGE_ADDED
PACKAGE_CHANGED
PACKAGE_DATA_CLEARED
PACKAGE_FIRST_LAUNCH
PACKAGE_FULLY_REMOVED

Appendix A. Built-In Intent Actions cont. 3

android.intent.action.
PACKAGE_INSTALL
PACKAGE_NEEDS_VERIFICATION
PACKAGE_REMOVED
PACKAGE_REPLACED
PACKAGE_RESTARTED
PACKAGE_VERIFIED
PASTE
PHONE_STATE
PICK
PICK_ACTIVITY
POWER_USAGE_SUMMARY
PROVIDER_CHANGED
PROXY_CHANGE
REBOOT
RESPOND_VIA_MESSAGE
RINGTONE_PICKER
RUN
SCREEN_OFF
SCREEN_ON
SEARCH
SEARCH_LONG_PRESS
SEND
SEND_MULTIPLE
SENDTO
SET_ALARM
SET_WALLPAPER
SYNC
SYSTEM_TUTORIAL
TIME_SET
TIME_TICK
TIMEZONE_CHANGED
UID_REMOVED
UNINSTALL_PACKAGE
USER_PRESENT
VIEW
VOICE_COMMAND
WALLPAPER_CHANGED
WEB_SEARCH

Appendix A. Built-In Intent Actions cont. 4

android.media.
action.CLOSE_AUDIO_EFFECT_CONTROL_SESSION
action.DISPLAY_AUDIO_EFFECT_CONTROL_PANEL
action.OPEN_AUDIO_EFFECT_CONTROL_SESSION
ACTION_SCO_AUDIO_STATE_UPDATED
AUDIO_BECOMING_NOISY
RINGER_MODE_CHANGED
SCO_AUDIO_STATE_CHANGED
VIBRATE_SETTING_CHANGED

android.net.
conn.BACKGROUND_DATA_SETTING_CHANGED
conn.CONNECTIVITY_CHANGE
nsd.STATE_CHANGED
wifi.action.REQUEST_SCAN_ALWAYS_AVAILABLE
wifi.NETWORK_IDS_CHANGED
wifi.p2p.CONNECTION_STATE_CHANGE
wifi.p2p.DISCOVERY_STATE_CHANGE
wifi.p2p.PEERS_CHANGED
wifi.p2p.STATE_CHANGED
wifi.p2p.THIS_DEVICE_CHANGED
wifi.PICK_WIFI_NETWORK
wifi.RSSI_CHANGED
wifi.SCAN_RESULTS
wifi.STATE_CHANGE
wifi.supplicant.CONNECTION_CHANGE
wifi.supplicant.STATE_CHANGE
wifi.WIFI_STATE_CHANGED

android.nfc.action.
ADAPTER_STATE_CHANGED
NDEF_DISCOVERED
TAG_DISCOVERED
TECH_DISCOVERED

Appendix A. Built-In Intent Actions cont. 5

android.settings.
ACCESSIBILITY_SETTINGS
ADD_ACCOUNT_SETTINGS
AIRPLANE_MODE_SETTINGS
APN_SETTINGS
APPLICATION_DETAILS_SETTINGS
APPLICATION_DEVELOPMENT_SETTINGS
APPLICATION_SETTINGS
BLUETOOTH_SETTINGS
DATA_ROAMING_SETTINGS
DATE_SETTINGS
DEVICE_INFO_SETTINGS
DISPLAY_SETTINGS
DREAM_SETTINGS
INPUT_METHOD_SETTINGS
INPUT_METHOD_SUBTYPE_SETTINGS
INTERNAL_STORAGE_SETTINGS
LOCALE_SETTINGS
LOCATION_SOURCE_SETTINGS
MANAGE_ALL_APPLICATIONS_SETTINGS
MANAGE_APPLICATIONS_SETTINGS
MEMORY_CARD_SETTINGS
NETWORK_OPERATOR_SETTINGS
NFC_SETTINGS
NFCSHARING_SETTINGS
PRIVACY_SETTINGS
QUICK_LAUNCH_SETTINGS
SECURITY_SETTINGS
SETTINGS
SOUND_SETTINGS
SYNC_SETTINGS
USER_DICTIONARY_SETTINGS
WIFI_IP_SETTINGS
WIFI_SETTINGS
WIRELESS_SETTINGS

android.speech.tts.
engine.CHECK_TTS_DATA
engine.GET_SAMPLE_TEXT
engine.INSTALL_TTS_DATA
engine.TTS_DATA_INSTALLED
TTS_QUEUE_PROCESSING_COMPLETED