**Lab Assignment #6**

**Due Date**: ***Week 12 (11.59 pm, Sunday)*** **Marks/Weightage:** **30/7%**

**Purpose:** The purpose of this lab assignment is to:

* Develop Android apps that use **Android services**
* Develop Android apps with **Messaging capabilities**

**References:** Textbook, ppt slides and Android tutorials Textbook, ppt slides. This material provides the necessary information that you need to complete the exercises.

**THIS IS A TUTORIAL LAB ASSIGNMENT.**

**Be sure to read the following general instructions carefully:**

- This assignment **MUST be completed in pairs** following **pair programming** rules: <http://www.extremeprogramming.org/rules/pair.html>. You should **use the full names of both team members**.

- You will have to upload the completed assignment on eCentennial through the **assignment link under Assessments**.

**Android Workspace/Project Naming rules:**

You must name your Android Studio workspace and project according to the following rule:

**yourfullname\_COMP304SectionNumber\_Labnumber\_ExerciseNumber**.

***Example***: **JohnSmith\_COMP304Sec001\_Lab6\_Ex1 and each subsequent exercise should be added as JohnSmith\_COMP304Sec001\_Lab6\_Ex2 and so on.**

**Submission rules:**

Submit your projects as **zip files** that are named according to the following rule:

**yourfullname\_COMP304SectionNumber\_Labnumber\_ExerciseNumber.zip**

***Example***: **JohnSmith\_COMP304Sec001\_Lab6\_Ex1.zip**

**Upload your zipped assignment using the assignment link in e-centennial.**

**Exercise #1:** ***[15 marks]***

Write an Android app that allows the user to send and receive a message. Allow the user to type the message in an EditText. Display the received message in a TextView. Just follow the following steps:

|  |
| --- |
|  |

*<?***xml version="1.0" encoding="utf-8"***?>*<**manifest xmlns:android="http://schemas.android.com/apk/res/android"  
 package="com.example.samplelab6\_1"**>  
  
 <**uses-permission android:name="android.permission.RECEIVE\_SMS"**/>  
 <**uses-permission android:name="android.permission.SEND\_SMS"**/>  
 <**uses-permission android:name="android.permission.READ\_PHONE\_STATE"**/>  
  
 <**application  
 android:allowBackup="true"  
 android:icon="@mipmap/ic\_launcher"  
 android:label="@string/app\_name"  
 android:roundIcon="@mipmap/ic\_launcher\_round"  
 android:supportsRtl="true"  
 android:theme="@style/AppTheme"**>  
 <**activity android:name=".MessageActivity"**></**activity**>  
 <**activity android:name=".MainActivity"**>  
 <**intent-filter**>  
 <**action android:name="android.intent.action.MAIN"** />  
  
 <**category android:name="android.intent.category.LAUNCHER"** />  
 </**intent-filter**>  
 </**activity**>  
  
 <**receiver android:name=".SMSReceiver"**>  
 <**intent-filter android:priority="100"**>  
 <**action android:name=  
 "android.provider.Telephony.SMS\_RECEIVED"** />  
 </**intent-filter**>  
 </**receiver**>  
 </**application**>  
  
  
</**manifest**>

<**resources**>  
 <**string name="app\_name"**>My Messaging App V 1.0</**string**>  
  
 <**string name="hello\_world"**>Welcome to Messaging page!</**string**>  
 <**string name="action\_settings"**>Settings</**string**>  
 <**string name="title\_activity\_message"**>MessageActivity</**string**>  
  
 <**string-array name="contacts"**>  
 <**item**>Larry Page</**item**>  
 <**item**>Sergey Brin</**item**>  
 <**item**>Eric Schmidt</**item**>  
 <**item**>Andy Rubin</**item**>  
 <**item**>James Gosling</**item**>  
 <**item**>Anders Hejlsberg </**item**>  
 <**item**>Bjarne Stroustrup</**item**>  
  
 </**string-array**>  
  
</**resources**>

<**LinearLayout xmlns:android="http://schemas.android.com/apk/res/android"  
 xmlns:tools="http://schemas.android.com/tools"  
 android:layout\_width="match\_parent"  
 android:layout\_height="match\_parent"  
 android:paddingLeft="@dimen/activity\_horizontal\_margin"  
 android:paddingRight="@dimen/activity\_horizontal\_margin"  
 android:paddingTop="@dimen/activity\_vertical\_margin"  
 android:paddingBottom="@dimen/activity\_vertical\_margin"  
 tools:context=".MainActivity"**>  
  
 <**ListView  
 android:layout\_height="wrap\_content"  
 android:layout\_width="wrap\_content"  
 android:id="@+id/android\_list"  
 android:entries="@array/contacts"** />  
  
</**LinearLayout**>

<**LinearLayout xmlns:android="http://schemas.android.com/apk/res/android"  
 xmlns:tools="http://schemas.android.com/tools" android:layout\_width="match\_parent"  
 android:layout\_height="match\_parent"  
 android:paddingLeft="@dimen/activity\_horizontal\_margin"  
 android:paddingRight="@dimen/activity\_horizontal\_margin"  
 android:paddingTop="@dimen/activity\_vertical\_margin"  
 android:paddingBottom="@dimen/activity\_vertical\_margin"  
 android:orientation="vertical"  
 tools:context=".MessageActivity"**>  
  
 <**TextView android:text="@string/hello\_world"  
 android:layout\_width="wrap\_content"  
 android:layout\_height="wrap\_content"  
 android:id="@+id/textView"** />  
  
 <**ImageView  
 android:layout\_width="50dp"  
 android:layout\_height="50dp"  
 android:id="@+id/imageView"  
 android:layout\_below="@+id/textView"  
 android:layout\_alignParentLeft="true"  
 android:layout\_alignParentStart="true"** />  
  
 <**TextView  
 android:layout\_width="wrap\_content"  
 android:layout\_height="200dp"  
 android:text="Messages:"  
 android:id="@+id/textMessage"  
 android:maxLines = "10"  
 android:scrollbars = "vertical"** />  
  
 <**EditText  
 android:id="@+id/txtPhone"  
 android:layout\_width="wrap\_content"  
 android:layout\_height="wrap\_content"  
 android:hint="Enter phone number"** />  
  
 <**LinearLayout  
 android:orientation="horizontal"  
 android:layout\_width="match\_parent"  
 android:layout\_height="wrap\_content"  
 android:layout\_below="@+id/textView"**>  
  
 <**EditText  
 android:id="@+id/editText"  
 android:layout\_width="100dp"  
 android:layout\_height="wrap\_content"  
 android:layout\_weight="1"  
 android:hint="Enter message"  
 android:singleLine="false"  
 android:typeface="sans"** />  
  
 <**Button  
 style="?android:attr/buttonStyleSmall"  
 android:layout\_width="wrap\_content"  
 android:layout\_height="wrap\_content"  
 android:text="Send"  
 android:id="@+id/button"  
 android:layout\_weight="1"  
 android:width="50dp"  
 android:onClick="sendMessage"**/>  
  
 </**LinearLayout**>  
  
</**LinearLayout**>

**import** android.content.BroadcastReceiver;  
**import** android.content.Context;  
**import** android.content.Intent;  
**import** android.os.Bundle;  
**import** android.provider.Telephony;  
**import** android.telephony.SmsMessage;  
**import** android.util.Log;  
**import** android.widget.Toast;  
  
**public class** SMSReceiver **extends** BroadcastReceiver  
{  
 @Override  
 **public void** onReceive(Context context, Intent intent)  
 {  
 String str = **"SMS from "**;  
 *//---get the SMS message passed in---* **if** (intent.getAction().equals(Telephony.Sms.Intents.***SMS\_RECEIVED\_ACTION***)) {  
 SmsMessage[] smsMessages = Telephony.Sms.Intents.*getMessagesFromIntent*(intent);  
 **for** (SmsMessage message : smsMessages) {  
 *// Do whatever you want to do with SMS.  
 //---get the sender address/phone number---* str += message.getOriginatingAddress();  
 str += **": "**;  
 *//---get the message body---* str += message.getMessageBody().toString();  
  
 }  
 Toast.*makeText*(context, str, Toast.***LENGTH\_SHORT***).show();  
  
 }  
  
 Log.*d*(**"SMSReceiver"**, str);  
  
 *//---stop the SMS message from being broadcasted---* **this**.abortBroadcast();  
  
 *//---launch the SMSActivity---  
 /\*  
 Intent mainActivityIntent = new Intent(context, MessageActivity.class);  
 mainActivityIntent.setFlags(Intent.FLAG\_ACTIVITY\_NEW\_TASK);  
 context.startActivity(mainActivityIntent);  
 \*/  
  
 //---send a broadcast intent to update the SMS received in the activity---* Intent broadcastIntent = **new** Intent();  
 broadcastIntent.setAction(**"SMS\_RECEIVED\_ACTION"**);  
 broadcastIntent.putExtra(**"sms"**, str);  
 context.sendBroadcast(broadcastIntent);  
  
 }  
}

**import** androidx.appcompat.app.AppCompatActivity;  
**import** androidx.core.app.ActivityCompat;  
  
**import** android.Manifest;  
**import** android.app.Activity;  
**import** android.app.PendingIntent;  
**import** android.content.BroadcastReceiver;  
**import** android.content.Context;  
**import** android.content.Intent;  
**import** android.content.IntentFilter;  
**import** android.os.Bundle;  
**import** android.telephony.SmsManager;  
**import** android.text.method.ScrollingMovementMethod;  
**import** android.view.View;  
**import** android.widget.EditText;  
**import** android.widget.ImageView;  
**import** android.widget.TextView;  
**import** android.widget.Toast;  
  
**public class** MessageActivity **extends** AppCompatActivity {  
 **private static final int *SMS\_RECEIVE\_PERMISSION\_REQUEST*** = 1;  
  
 **private** EditText **eText**, **txtPhone**;  
 **private** TextView **SMSes**;  
 **private** TextView **textMessage**;  
 *//* **public static final** String ***SENT*** = **"SMS\_SENT"**;  
 **public static final** String ***DELIVERED*** = **"SMS\_DELIVERED"**;  
 *//* **private** PendingIntent **sentPI**, **deliveredPI**;  
 **private** BroadcastReceiver **smsSentReceiver**, **smsDeliveredReceiver**;  
 **private** IntentFilter **intentFilter**;  
 *//  
 // receive intents sent by sendBroadcast()* **private** BroadcastReceiver **intentReceiver** = **new** BroadcastReceiver() {  
 @Override  
 **public void** onReceive(Context context, Intent intent) {  
 *//display the SMS received in the TextView* **textMessage** = (TextView) findViewById(R.id.***textMessage***);  
 *//display the content of the received message in text view  
 //SMSes.setText(intent.getExtras().getString("sms"));* **textMessage**.setText(**textMessage**.getText()+**"\n"**+  
 intent.getExtras().getString(**"sms"**));  
 }  
 };  
  
 *//* @Override  
 **protected void** onCreate(Bundle savedInstanceState) {  
 **super**.onCreate(savedInstanceState);  
 setContentView(R.layout.***activity\_message***);  
  
 *//request permissions* ActivityCompat.*requestPermissions*(**this**,  
 **new** String[]{Manifest.permission.***RECEIVE\_SMS***,  
 Manifest.permission.***SEND\_SMS***,  
 Manifest.permission.***READ\_PHONE\_STATE***},  
 ***SMS\_RECEIVE\_PERMISSION\_REQUEST***);  
  
 Bundle extras = getIntent().getExtras();  
 String contactName=**""**;  
 **if**(extras != **null**)  
 contactName = extras.getString(**"contactName"**);  
  
 **textMessage** = (TextView) findViewById(R.id.***textMessage***);  
 **textMessage**.setMovementMethod(ScrollingMovementMethod.*getInstance*());  
 TextView tView = (TextView) findViewById(R.id.***textView***);  
 tView.setText(contactName);  
 *//this.getSupportActionBar().setTitle(contactName);* ImageView imgView = (ImageView) findViewById(R.id.***imageView***);  
 imgView.setImageResource(R.drawable.***contacts***);  
 *//* **eText** = (EditText) findViewById(R.id.***editText***);  
 **txtPhone** = (EditText) findViewById(R.id.***txtPhone***);  
 *//  
 //an action to take in the future with same permission  
 //as your application* **sentPI** = PendingIntent.*getBroadcast*(**this**, 0, **new** Intent(***SENT***), 0);  
  
 **deliveredPI** = PendingIntent.*getBroadcast*(**this**, 0, **new** Intent(***DELIVERED***), 0);  
  
 *//intent to filter the action for SMS messages received* **intentFilter** = **new** IntentFilter();  
 **intentFilter**.addAction(**"SMS\_RECEIVED\_ACTION"**);  
  
 *//---register the receiver---* registerReceiver(**intentReceiver**, **intentFilter**);  
 *//* }  
 *//* @Override  
 **public void** onResume() {  
 **super**.onResume();  
  
 *//---register the receiver---  
 //registerReceiver(intentReceiver, intentFilter);  
  
 //---create the BroadcastReceiver when the SMS is sent---* **smsSentReceiver** = **new** BroadcastReceiver(){  
 @Override  
 **public void** onReceive(Context arg0, Intent arg1) {  
 **switch** (getResultCode()) *//Retrieve the current result code, as set by the previous receiver* {  
 **case** Activity.***RESULT\_OK***:  
 Toast.*makeText*(getBaseContext(), **"SMS sent"**,  
 Toast.***LENGTH\_LONG***).show();  
 **break**;  
 **case** SmsManager.***RESULT\_ERROR\_GENERIC\_FAILURE***:  
 Toast.*makeText*(getBaseContext(), **"Generic failure"**,  
 Toast.***LENGTH\_SHORT***).show();  
 **break**;  
 **case** SmsManager.***RESULT\_ERROR\_NO\_SERVICE***:  
 Toast.*makeText*(getBaseContext(), **"No service"**,  
 Toast.***LENGTH\_SHORT***).show();  
 **break**;  
 **case** SmsManager.***RESULT\_ERROR\_NULL\_PDU***:  
 Toast.*makeText*(getBaseContext(), **"Null PDU"**,  
 Toast.***LENGTH\_SHORT***).show();  
 **break**;  
 **case** SmsManager.***RESULT\_ERROR\_RADIO\_OFF***:  
 Toast.*makeText*(getBaseContext(), **"Radio off"**,  
 Toast.***LENGTH\_SHORT***).show();  
 **break**;  
 }  
 }  
 };  
  
 *//---create the BroadcastReceiver when the SMS is delivered---* **smsDeliveredReceiver** = **new** BroadcastReceiver(){  
 @Override  
 **public void** onReceive(Context arg0, Intent arg1) {  
 **switch** (getResultCode())  
 {  
 **case** Activity.***RESULT\_OK***:  
 Toast.*makeText*(getBaseContext(), **"SMS delivered"**,  
 Toast.***LENGTH\_LONG***).show();  
 **break**;  
 **case** Activity.***RESULT\_CANCELED***:  
 Toast.*makeText*(getBaseContext(), **"SMS not delivered"**,  
 Toast.***LENGTH\_LONG***).show();  
 **break**;  
 }  
 }  
 };  
  
 *//---register the two BroadcastReceivers---* registerReceiver(**smsDeliveredReceiver**, **new** IntentFilter(***DELIVERED***));  
 registerReceiver(**smsSentReceiver**, **new** IntentFilter(***SENT***));  
 }  
  
 @Override  
 **public void** onPause() {  
 **super**.onPause();  
  
 *//---unregister the receiver---  
 //unregisterReceiver(intentReceiver);  
  
 //---unregister the two BroadcastReceivers---* unregisterReceiver(**smsSentReceiver**);  
 unregisterReceiver(**smsDeliveredReceiver**);  
 }  
  
 @Override  
 **protected void** onDestroy() {  
 **super**.onDestroy();  
  
 *//---unregister the receiver---* unregisterReceiver(**intentReceiver**);  
 }  
  
 *//* **public void** sendMessage(View v)  
 {  
 **eText** = (EditText) findViewById(R.id.***editText***);  
 String phoneNumber = **txtPhone**.getText().toString();  
 String message = **eText**.getText().toString();  
 sendSMS(phoneNumber, message);  
 **textMessage**.setText(**textMessage**.getText()+**"\n"**+ **eText**.getText());  
  
 }  
 *//sends an SMS message to another device* **private void** sendSMS(String phoneNumber, String message)  
 {  
 SmsManager sms = SmsManager.*getDefault*();  
 sms.sendTextMessage(phoneNumber, **null**, message, **sentPI**, **deliveredPI**);  
 }  
  
  
}

**import** androidx.appcompat.app.AppCompatActivity;  
**import** androidx.core.app.ActivityCompat;  
  
**import** android.Manifest;  
**import** android.content.Intent;  
**import** android.os.Bundle;  
**import** android.view.View;  
**import** android.widget.AdapterView;  
**import** android.widget.ArrayAdapter;  
**import** android.widget.ListView;  
**import** android.widget.TextView;  
  
**public class** MainActivity **extends** AppCompatActivity {  
 **private static final int *SMS\_RECEIVE\_PERMISSION\_REQUEST*** = 1;  
  
 **private** String[] **contacts**;  
 **private** ListView **lstView**;  
 *//* Intent **intent**;  
 @Override  
 **protected void** onCreate(Bundle savedInstanceState) {  
 **super**.onCreate(savedInstanceState);  
 setContentView(R.layout.***activity\_main***);  
 *//request permissions* ActivityCompat.*requestPermissions*(**this**,  
 **new** String[]{Manifest.permission.***RECEIVE\_SMS***,  
 Manifest.permission.***SEND\_SMS***,  
 Manifest.permission.***READ\_PHONE\_STATE***},  
 ***SMS\_RECEIVE\_PERMISSION\_REQUEST***);  
 **this**.getSupportActionBar().setTitle(**"My Messaging App"**);  
 *//ListView lstView = getListView();* **lstView** = (ListView)findViewById(R.id.***android\_list***);  
 TextView textView = **new** TextView(getApplicationContext());  
 textView.setText(**"My Contacts"**);  
  
 **lstView**.addHeaderView(textView);  
 **lstView**.setChoiceMode(ListView.***CHOICE\_MODE\_NONE***);  
 **lstView**.setTextFilterEnabled(**true**);  
  
 **contacts** = getResources().getStringArray(R.array.***contacts***);  
 ArrayAdapter<String> adapter = **new** ArrayAdapter<String>(**this**,  
 android.R.layout.***simple\_list\_item\_1***, android.R.id.***text1***, **contacts**);  
 *// Assign adapter to ListView* **lstView**.setAdapter(adapter);  
 **intent** = **new** Intent(**this**, MessageActivity.**class**);  
 *// ListView Item Click Listener* **lstView**.setOnItemClickListener(**new** AdapterView.OnItemClickListener() {  
 @Override  
 **public void** onItemClick(AdapterView<?> parent, View view,  
 **int** position, **long** id) {  
  
 *// ListView Clicked item index* **int** itemPosition = position;  
  
 *// ListView Clicked item value* String item = (String) **lstView**.getItemAtPosition(position);  
  
 *// Show Alert* **intent**.putExtra(**"contactName"**,item);  
 startActivity(**intent**);  
  
 }  
  
 });  
  
  
 }  
  
  
}

|  |  |  |
| --- | --- | --- |
|  |  |  |

**Exercise 2:** ***[15 marks]***

Write an Android service. Write an Android app that communicates with your Android service.

Follow the instructions here:

**import** android.app.Service;  
**import** android.content.Intent;  
**import** android.os.IBinder;  
**import** android.widget.Toast;  
  
**public class** SimpleService **extends** Service {

*//replace with your package name*  
 **public static final** String ***INFO\_INTENT*** = **"com.example.inika.samplelab6\_2.INFO\_UPDATE"**;  
 **public** SimpleService() {  
 }  
  
 @Override  
 **public** IBinder onBind(Intent intent) {  
 **return null**;  
 }  
 @Override  
 **public int** onStartCommand(Intent intent, **int** flags, **int** startId) {  
  
 }  
 @Override  
 **public void** onDestroy() {  
 **super**.onDestroy();  
 Toast.*makeText*(**this**, **"Service Destroyed"**, Toast.***LENGTH\_LONG***).show();  
 }  
  
}

**Claim the SimpleService in manifest**

<manifest ... >

  ...

  <application ... >

      <service android:name="SimpleService" />

      ...

  </application>

</manifest>

**import** androidx.appcompat.app.AppCompatActivity;  
  
**import** android.content.BroadcastReceiver;  
**import** android.content.Context;  
**import** android.content.Intent;  
**import** android.content.IntentFilter;  
**import** android.os.Bundle;  
**import** android.view.View;  
**import** android.widget.TextView;

**public class** ServicesActivity **extends** AppCompatActivity {  
 **private** TextView **textView**;  
*//replace with your package name*  
 **public static final** String ***INFO\_INTENT*** = **"com.example.inika.samplelab6\_2.INFO\_UPDATE"**;  
  
   
 @Override  
 **protected void** onCreate(Bundle savedInstanceState) {  
 **super**.onCreate(savedInstanceState);  
 setContentView(R.layout.***activity\_services***);  
 **textView** = (TextView) findViewById(R.id.***textView***);  
 }  
 *//* **public void** startService(View view) {  
 startService(**new** Intent(getBaseContext(), SimpleService.**class**));  
  
 }  
  
 **public void** stopService(View view) {  
 stopService(**new** Intent(getBaseContext(),  
 SimpleService.**class**));  
 }  
   
}

*<?***xml version="1.0" encoding="utf-8"***?>*<**LinearLayout xmlns:android="http://schemas.android.com/apk/res/android"  
 android:layout\_width="fill\_parent"  
 android:layout\_height="fill\_parent"  
 android:orientation="vertical"** >  
  
 <**Button android:id="@+id/btnStartService"  
 android:layout\_width="fill\_parent"  
 android:layout\_height="wrap\_content"  
 android:text="Start Service"  
 android:onClick="startService"**/>  
  
 <**Button android:id="@+id/btnStopService"  
 android:layout\_width="fill\_parent"  
 android:layout\_height="wrap\_content"  
 android:text="Stop Service"  
 android:onClick="stopService"** />  
  
 <**TextView  
 android:layout\_width="fill\_parent"  
 android:layout\_height="wrap\_content"  
 android:id="@+id/textView"** />  
  
</**LinearLayout**>

1. In **SimpleService** class, in **onStartCommand** method create an **Intent** object to broadcast some information to the activity. To do that, at the top of the class create a final String: **public static final** String ***INFO\_INTENT*** = **"com.example.inika.samplelab6\_2.INFO\_UPDATE"**;

//replace with your package name

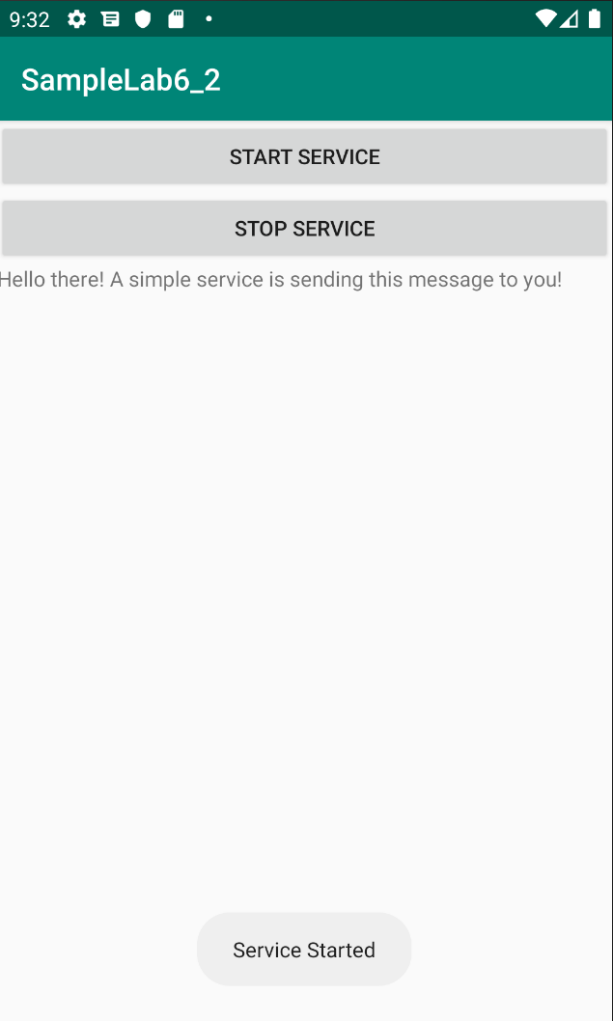
In **onStartCommand** method add:

*/ We want this service to continue running until it is explicitly  
// stopped, so return sticky.*Toast.*makeText*(**this**, **"Service Started"**, Toast.***LENGTH\_LONG***).show();  
  
Intent broadcastIntent = **new** Intent();  
broadcastIntent.setAction(***INFO\_INTENT***);  
broadcastIntent.putExtra(***INFO\_INTENT***,  
 **"Hello there! A simple service is sending this message to you!"**);  
**this**.sendBroadcast(broadcastIntent);  
  
*//***return *START\_STICKY***;

**public static final** String ***INFO\_INTENT*** = **"com.example.inika.samplelab6\_2.INFO\_UPDATE"**;

*//This will handle the broadcast***public** BroadcastReceiver **receiver** = **new** BroadcastReceiver() {  
 *//@Override* **public void** onReceive(Context context, Intent intent) {  
 *//textView.setText("Here");* String action = intent.getAction();  
 **if** (action.equals(SimpleService.***INFO\_INTENT***)) {  
 String info = intent.getStringExtra(***INFO\_INTENT***);  
 **textView**.setText(info);  
 }  
 }  
};

**public void** onResume()  
{  
 **super**.onResume();  
 *//This needs to be in the activity that will end up receiving the broadcast* registerReceiver(**receiver**, **new** IntentFilter(***INFO\_INTENT***));  
  
}



**Evaluation/Rubric:**

|  |  |
| --- | --- |
| **Functionalities**:  All working, proper naming of activities, services, variables, and methods. Provide comments. | 75% |
| **UI friendliness** (proper layout, controls, styles, themes, images) | 10% |
| **Declaring resources** in proper resource files | 5% |
| **Innovative features/effective way of coding** | 10% |
| **Total** | **100%** |