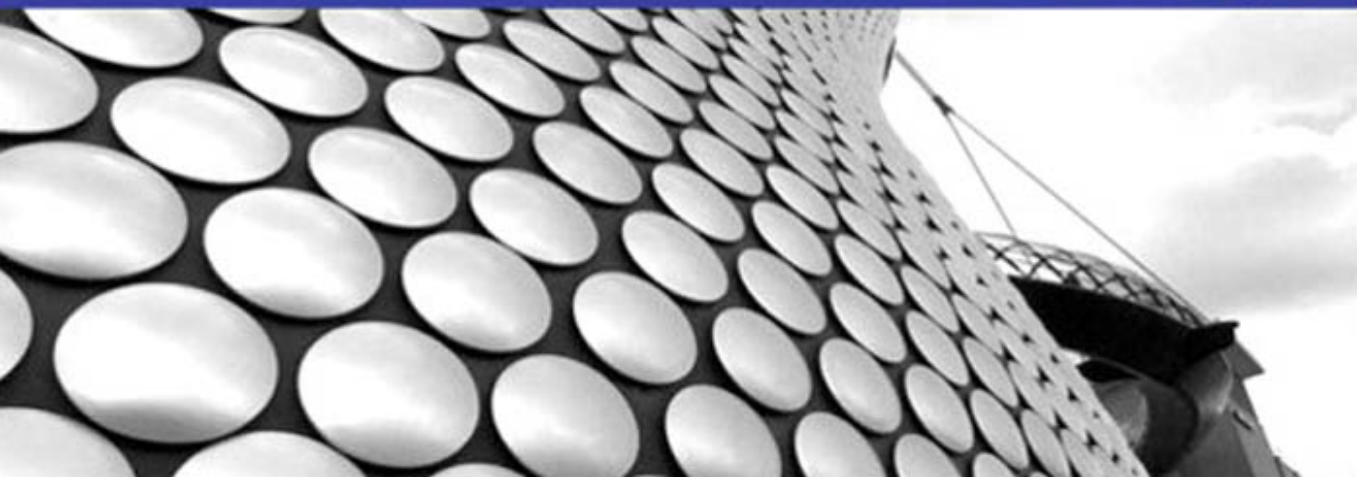
Ronan Schwarz
Phil Dutson
James Steele
Nelson To

Second Edition

The Android™ Developer's Cookbook

Building Applications with the Android SDK

Developer's Library



FREE SAMPLE CHAPTER

Praise for *The Android™ Developer's Cookbook, Second Edition*

"*The Android™ Developer's Cookbook, Second Edition*, contains the recipes for developing and marketing a successful Android application. Each recipe in the book contains detailed explanations and examples of the right way to write your applications to become a featured app in the Google Play Store. From understanding the basic features of different versions of Android to designing and building a responsive UI, this cookbook gives you the recipes for success. You will learn to work with Android on every level—from hardware interfaces (like NFC and USB), to networking interfaces that will show you how to use mobile data efficiently, and even how to take advantage of Google's powerful billing interface. The authors do an incredible job of providing useful and real-life code examples for every concept in the book that can easily be built on and adapted to any situation and makes this book an essential resource for all Android developers."
—David Brown, information data manager and application developer, San Juan School District

"Easy to read and easy to understand but not lacking features. This is one of the best books I have read on Android development. If you have the basics down, the recipes in the book will take you to mastery."
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"This book has something for everyone. I've been programming Android since 1.0 and I learned some things that are completely new to me."
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The Android™ Developer's Cookbook

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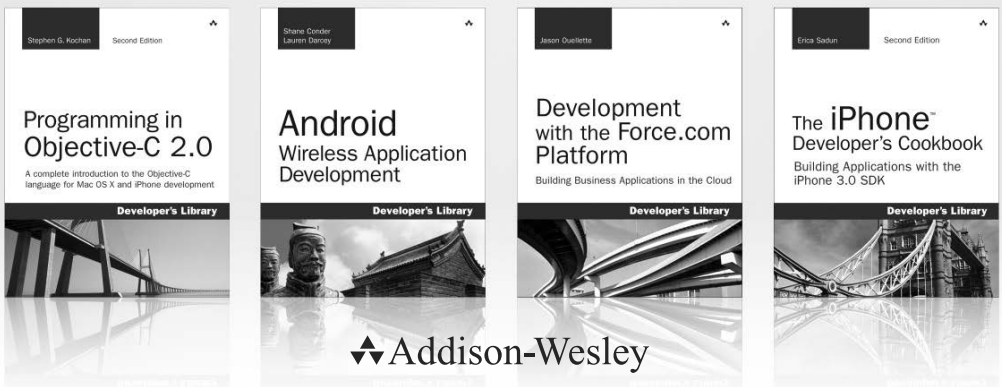

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To my beloved wife Susan and the OpenIntents Community:
Thank you for your support

—Ronan

To Martin Simonnet and the Niantic Project for all the fun they have provided

—Phil

To Wei with love

—Jim

To my dear mom

—Nelson

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Preface

Android is the fastest growing mobile operating system (OS). With more than 800,000 applications available in the Google Play store, the Android ecosystem is growing as well. There is enough diversity in device features and wireless carriers to appeal to just about anyone.

Netbooks have always been a natural platform to adopt Android, but the liveliness behind Android has fed the growth further into tablets, televisions, and even automobiles. Many of the world's largest corporations—from banks to fast food chains to airlines—have established a presence in Android and offer compatible services. Android developers have many opportunities, and relevant apps reach more people than ever before, increasing the satisfaction of creating a relevant app.

Why an Android Cookbook?

The Android OS is simple to learn, and Google provides many libraries to make it easy to implement rich and complex applications. The only aspect lacking, as mentioned by many in the Android developer community, is clear and well-explained documentation. The fact that Android is open source means anyone can dive in and reverse engineer some documentation. Many developer bulletin boards have excellent examples that were deduced using exactly this method. Still, a book that has a consistent treatment across all areas of the OS is useful.

In addition, a clear working example is worth a thousand words of documentation. Developers faced with a problem usually prefer to do a form of extreme programming; that is, they find examples of working code that does something close to the solution and modify or extend it to meet their needs. The examples also serve as a way to see the coding style and help to shape other parts of the developer's code.

This Android cookbook fills a need by providing a variety of self-contained recipes. As each recipe is introduced, the main concepts of the Android OS are also explained.

Who Should Read This Book?

Users who are writing their own Android applications will get the most out of this cookbook. Basic familiarity with Java and the Eclipse development environment is assumed but not required for the majority of the book. Java is a modular language, and

most (if not all) of the example recipes can be incorporated with minimal change into the reader's own Android project. The motivation and coverage of each topic in this book make it usable as an Android course supplement.

Using the Recipes

In general, the code recipes in this cookbook are self-contained and include all the information necessary to run a working application on an Android device. Chapters 1 and 2 give an introduction to the overall use of Android, but feel free to jump around and start using whatever is necessary.

This book is written first as a reference, providing knowledge mostly by example with the greatest benefits through implementation of the recipes of interest. The main technique introduced in each recipe is specified in the section heading. However, additional techniques are included in each recipe as needed to support the main recipe.

After reading this book, a developer should

- Be able to write an Android Application from scratch
- Be able to write code that works across multiple versions of Android
- Be able to use the various Application Programming Interfaces (APIs) provided in Android
- Have a large reference of code snippets to quickly assimilate into applications
- Appreciate the various ways to do the same task in Android and the benefits of each
- Understand the unique aspects of Android programming techniques

Book Structure

- Chapter 1, "Overview of Android," provides an introduction to all aspects of Android outside of the code itself. It is the only chapter that doesn't include recipes, but it provides useful background material.
- Chapter 2, "Application Basics: Activities and Intents," provides an overview of the four Android components and an explanation of how an Android project is organized. It also focuses on the activity as a main application building block.
- Chapter 3, "Threads, Services, Receivers, and Alerts," introduces background tasks such as threads, services, and receivers, as well as notification methods for these background tasks using alerts.
- Chapter 4, "Advanced Threading Techniques," covers using AsyncTasks and using loaders.
- Chapter 5, "User Interface Layout," covers the user interface screen layout and views.

- Chapter 6, "User Interface Events," covers user-initiated events such as touch events and gestures.
- Chapter 7, "Advanced User Interface Techniques," covers creating a custom view, using animation, offering accessibility options, and working with larger screens.
- Chapter 8, "Multimedia Techniques," covers multimedia manipulation and record and playback of audio and video.
- Chapter 9, "Hardware Interface," introduces the hardware APIs available on Android devices and how to use them.
- Chapter 10, "Networking," discusses interaction outside of the Android device with SMS, web browsing, and social networking.
- Chapter 11, "Data Storage Methods," covers various data storage techniques available in Android, including SQLite.
- Chapter 12, "Location-Based Services," focuses on accessing the location through various methods such as GPS and using services such as the Google Maps API.
- Chapter 13, "In-App Billing," provides an instruction set on including in-app billing in your application using Google Play services.
- Chapter 14, "Push Messages," covers how to use GCM for handling push messages with an application.
- Chapter 15, "Native Android Development," discusses the components and structure used for native development.
- Chapter 16, "Debugging," provides the testing and debugging framework useful throughout the development cycle.

Additional References

There are many online references for Android. A few essential ones are

- Android Source Code: http://source.android.com/
- Android Developer Pages: http://developer.android.com/
- Open Source Directory: http://osdir.com/
- Stack Overflow Discussion Threads: http://stackoverflow.com/
- Talk Android Developer Forums: www.talkandroid.com/android-forums/

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About the Authors

Ronan "Zero" Schwarz is cofounder of OpenIntents, a Europe-based open source company specializing in Android development. Ronan has more than fifteen years of programing experience in a wide variety of fields such as augmented reality, web, robotics, and business systems, as well as different programing languages, including C, Java, and Assembler. He has been working on the Android Platform since 2007 and, among other things, has helped create SplashPlay and Droidspray, both top finalists of the Google Android Developer Challenge I and II.

Phil Dutson is the lead UX and mobile developer for ICON Health and Fitness. He has worked on projects and solutions for NordicTrack, ProForm, Freemotion, Sears, Costco, Sam's Club, and others. Through the years he has been using, tweaking, and writing programs for mobile devices from his first Palm Pilot 5000 to his current collection of iOS and Android devices. Phil has also authored *jQuery, JQuery UI, and jQuery Mobile*; *Sams Teach Yourself jQuery Mobile in 24 Hours*; and *Creating QR and Tag Codes*.

James Steele was doing postdoctoral work in physics at MIT when he decided to join a start-up in Silicon Valley. Fifteen years later he continues to innovate, bringing research projects to production in both the consumer and mobile markets. He actively presents at and participates in various Silicon Valley new technology groups. Jim is VP of Engineering at Sensor Platforms.

Nelson To has more than ten applications of his own in the Android Market. He has also worked on enterprise Android applications for Think Computer, Inc. (PayPhone), AOL (AIM), Stanford University (Education App), and Logitech (Google TV). He also assists in organizing the Silicon Valley Android Meetup Community and teaches Android classes in both the Bay Area and China.

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Networking

Network-based applications provide increased value for a user, in that content can be dynamic and interactive. Networking enables multiple features, from social networking to cloud computing.

This chapter focuses on the network state, short message service (SMS), Internet resource-based applications, and social networking applications. Knowing the network state is important to applications that fetch or update information that is available through a network connection. SMS is a communication service component that enables the exchange of short text messages between mobile phone devices. Internet resource-based applications rely on web content such as HTML (HyperText Markup Language), XML (eXtensible Markup Language), and JSON (JavaScript Object Notation). Social networking applications, such as Twitter, are important methods for people to connect with each other.

Reacting to the Network State

Knowing how and if a device is connected to a network is a very important facet of Android development. Applications that stream information from a network server may need to warn users about the large amount of data that may be charged to their accounts. Application latency issues may also be a concern. Making some simple queries enables users to find out if they are currently connected through a network device and how to react when the connection state changes.

Recipe: Checking for Connectivity

The `ConnectivityManager` is used for determining the connectivity of a device. This recipe can be used to determine what network interfaces are connected to a network. Listing 10.1 uses the `ConnectivityManager` to display if the device is connected via Wi-Fi or Bluetooth.

Listing 10.1 **src/com/cookbook/connectivitycheck/MainActivity.java**

```
package com.cookbook.connectivitycheck;

import android.app.Activity;
import android.content.Context;
import android.net.ConnectivityManager;
import android.net.NetworkInfo;
import android.os.Bundle;
import android.widget.TextView;

public class MainActivity extends Activity {
  TextView tv;

  @Override
  protected void onCreate(Bundle savedInstanceState) {
    super.onCreate(savedInstanceState);
    setContentView(R.layout.activity_main);
    tv = (TextView) findViewById(R.id.tv_main);
    try {
      String service = Context.CONNECTIVITY_SERVICE;
      ConnectivityManager cm = (ConnectivityManager)getSystemService(service);
      NetworkInfo activeNetwork = cm.getActiveNetworkInfo();

      boolean isWiFi = activeNetwork.getType() == ConnectivityManager.TYPE_WIFI;
      boolean isBT = activeNetwork.getType() == ConnectivityManager.TYPE_BLUETOOTH;

      tv.setText("WiFi connected: "+isWiFi+"\nBluetooth connected: "+isBT);
    } catch(Exception nullPointerException)  {
      tv.setText("No connected networks found");
    }
  }
}
```

Listing 10.1 uses the constants `TYPE_WIFI` and `TYPE_BLUETOOTH` to check for connectivity on these networks. In addition to `TYPE_WIFI` and `TYPE_BLUETOOTH`, the following constants can also be used to determine connectivity:

- `TYPE_DUMMY`—For dummy data connections
- `TYPE_ETHERNET`—For the default Ethernet connection
- `TYPE_MOBILE`—For the default mobile data connection
- `TYPE_MOBILE_DUN`—For DUN-specific mobile data connections
- `TYPE_MOBILE_HIPRI`—For high-priority mobile data connections
- `TYPE_MOBILE_MMS`—For an MMS-specific mobile data connection
- `TYPE_MOBILE_SUPL`—For an SUPL-specific mobile data connection
- `TYPE_WIMAX`—For the default WiMAX data connection

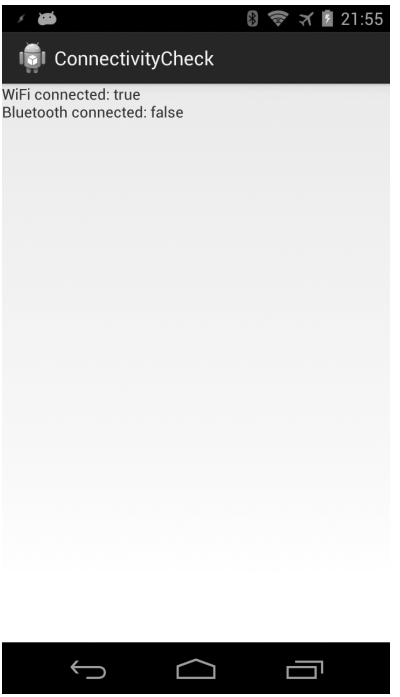

Figure 10.1 Checking for device connectivity

Figure 10.1 shows an application running with the code from Listing 10.1. Even though Bluetooth has been enabled, it reports false for being connected because it does not currently have an active connection.

Recipe: Receiving Connectivity Changes

A broadcast receiver can be used to check the status of network connectivity when it is necessary to react to changes in connectivity status.

A broadcast receiver can be declared in the application manifest, or it can be a subclass inside the main activity. While both are accessible, this recipe uses a subclass in conjunction with the `onCreate()` and `onDestroy()` methods to register and unregister the receiver.

As this recipe checks for connectivity, the following permissions need to be added to the application manifest:

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

Listing 10.2 shows the code needed to check for connectivity changes. When a change is detected, the application will display a toast message informing the user of the change.

Listing 10.2 **src/com/cookbook/connectivitychange/MainActivity.java**

```
package com.cookbook.connectivitychange;

import android.app.Activity;
import android.content.BroadcastReceiver;
import android.content.Context;
import android.content.Intent;
import android.content.IntentFilter;
import android.net.ConnectivityManager;
import android.net.NetworkInfo;
import android.os.Bundle;
import android.widget.Toast;

public class MainActivity extends Activity {

  private ConnectivityReceiver receiver = new ConnectivityReceiver();

  @Override
  protected void onCreate(Bundle savedInstanceState) {
    super.onCreate(savedInstanceState);
    setContentView(R.layout.activity_main);

    IntentFilter filter = new IntentFilter(ConnectivityManager.CONNECTIVITY_ACTION);
        receiver = new ConnectivityReceiver();
        this.registerReceiver(receiver, filter);
  }

  @Override
    public void onDestroy() {
        super.onDestroy();
        if (receiver != null) {
            this.unregisterReceiver(receiver);
        }
    }

  public class ConnectivityReceiver extends BroadcastReceiver {

    @Override
    public void onReceive(Context context, Intent intent) {
      ConnectivityManager conn =
(ConnectivityManager)context.getSystemService(Context.CONNECTIVITY_SERVICE);
      NetworkInfo networkInfo = conn.getActiveNetworkInfo();

      if (networkInfo != null && networkInfo.getType() == ConnectivityManager.
➥TYPE_WIFI) {
        Toast.makeText(context, "WiFi is connected", Toast.LENGTH_SHORT).show();
      } else if (networkInfo != null) {
         Toast.makeText(context, "WiFi is disconnected", Toast.LENGTH_SHORT).show();
```

```
        } else {
          Toast.makeText(context, "No active connection", Toast.LENGTH_SHORT).show();
        }
        }
    }
}
```

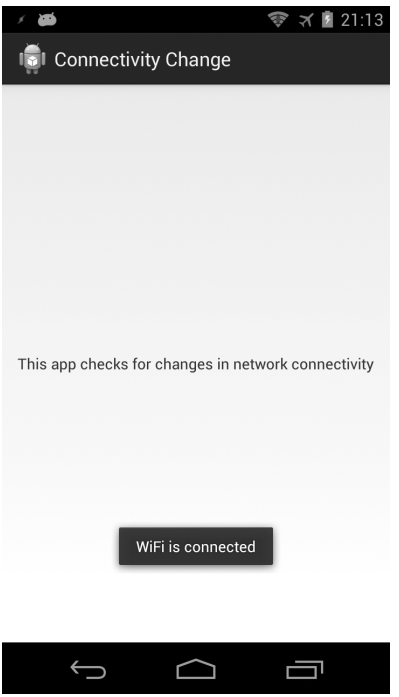

Figure 10.2 When Wi-Fi is enabled, a toast message appears informing the user of the connection

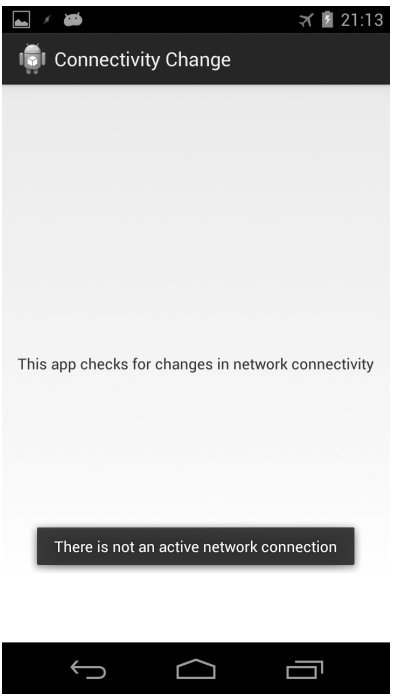

Figure 10.3 Wi-Fi and mobile data are disabled, so a toast informing the user of the lack of network connectivity is displayed

Figure 10.2 shows the message that appears when Wi-Fi is connected. Figure 10.3 shows the message that appears when both Wi-Fi and mobile data have been disconnected.

Using SMS

The Android Framework provides full access to SMS functionality using the `SmsManager` class. Early versions of Android placed `SmsManager` in the `android.telephony.gsm` package. Since Android 1.5, where `SmsManager` supports

both GSM and CDMA mobile telephony standards, the `SmsManager` class is now placed in the `android.telephony` package.

Sending an SMS through the `SmsManager` class is fairly straightforward:

1. Set the permission in the **AndroidManifest.xml** file to send SMS:

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

2. Use the `SmsManager.getDefault()` static method to get an SMS manager instance:

```
SmsManager mySMS = SmsManager.getDefault();
```

3. Define the destination phone number and the message that is to be sent. Use the `sendTextMesssage()` method to send the SMS to another device:

```
String destination = "16501234567";

String msg = "Sending my first message";

mySMS.sendTextMessage(destination, null, msg, null, null);
```

This is sufficient to send an SMS message. However, the three additional parameters in the previous call set to `null` can be used as follows:

- The second parameter is the specific SMS service center to use. Set this to `null` to use the default service center from the carrier.
- The fourth parameter is a `PendingIntent` to track if the SMS message was sent.
- The fifth parameter is a `PendingIntent` to track if the SMS message was received.

To use the fourth and fifth parameters, a sent message and a delivered message intent need to be declared:

```
String SENT_SMS_FLAG = "SENT_SMS";
String DELIVER_SMS_FLAG = "DELIVER_SMS";

Intent sentIn = new Intent(SENT_SMS_FLAG);
PendingIntent sentPIn = PendingIntent.getBroadcast(this,0,sentIn,0);

Intent deliverIn = new Intent(SENT_SMS_FLAG);
PendingIntent deliverPIn
                  = PendingIntent.getBroadcast(this,0,deliverIn,0);
```

Then, a `BroadcastReceiver` class needs to be registered for each `PendingIntent` to receive the result:

```
BroadcastReceiver sentReceiver = new BroadcastReceiver(){
     @Override public void onReceive(Context c, Intent in) {
         switch(getResultCode()){
             case Activity.RESULT_OK:
                 //sent SMS message successfully;
```

```
                break;
            default:
                //sent SMS message failed
                break;
          }
      }
};
BroadcastReceiver deliverReceiver = new BroadcastReceiver(){
     @Override public void onReceive(Context c, Intent in) {
         //SMS delivered actions
     }
};

 registerReceiver(sentReceiver, new IntentFilter(SENT_SMS_FLAG));
 registerReceiver(deliverReceiver, new IntentFilter(DELIVER_SMS_FLAG));
```

Most SMSs are restricted to 140 characters per text message. To make sure the message is within this limitation, use the `divideMessage()` method that divides the text into fragments in the maximum SMS message size. Then, the method `sendMultipartTextMessage()` should be used instead of the `sendTextMessage()` method. The only difference is the use of an `ArrayList` of messages and pending intents:

```
ArrayList<String> multiSMS = mySMS.divideMessage(msg);
ArrayList<PendingIntent> sentIns = new ArrayList<PendingIntent>();
ArrayList<PendingIntent> deliverIns = new ArrayList<PendingIntent>();

for(int i=0; i< multiSMS.size(); i++){
    sentIns.add(sentIn);
    deliverIns.add(deliverIn);
}

mySMS.sendMultipartTextMessage(destination, null,
                               multiSMS, sentIns, deliverIns);
```

Recipe: Autosending an SMS Based on a Received SMS

Because most SMS messages are not read by the recipient until hours later, this recipe sends an autoresponse SMS when an SMS is received. This is done by creating an Android service in the background that can receive incoming SMSs. An alternative method is to register a broadcast receiver in the **AndroidManifest.xml** file.

The application must declare permission to send and receive SMSs in the **AndroidManifest.xml** file, as shown in Listing 10.3. It also declares a main activity `SMSResponder` that creates the autoresponse and a service `ResponderService` to send the response when an SMS is received.

Listing 10.3 **AndroidManifest.xml**

```
<?xml version="1.0" encoding="utf-8"?>
<manifest xmlns:android="http://schemas.android.com/apk/res/android"
       package="com.cookbook.SMSResponder"
       android:versionCode="1"
       android:versionName="1.0">
     <application android:icon="@drawable/icon"
                  android:label="@string/app_name">
         <activity android:name=".SMSResponder"
                    android:label="@string/app_name">
             <intent-filter>
               <action android:name="android.intent.action.MAIN" />
               <category android:name="android.intent.category.LAUNCHER" />
             </intent-filter>
         </activity>
         <service android:enabled="true" android:name=".ResponderService">
         </service>
     </application>

     <uses-permission android:name="android.permission.RECEIVE_SMS"/>
     <uses-permission android:name="android.permission.SEND_SMS"/>
</manifest>
```

The main layout file shown in Listing 10.4 contains a `LinearLayout` with three views: a `TextView` to display the message used for the autoresponse, `Button` used to commit changes on the reply message inside the application, and `EditText` where the user can enter a reply message.

Listing 10.4 **res/layout/main.xml**

```
<?xml version="1.0" encoding="utf-8"?>
<LinearLayout xmlns:android="http://schemas.android.com/apk/res/android"
     android:orientation="vertical"
     android:layout_width="match_parent"
     android:layout_height="match_parent">
          <TextView android:id="@+id/display"
          android:layout_width="match_parent"
          android:layout_height="wrap_content"
          android:text="@string/hello"
          android:textSize="18dp"
          />
          <Button android:id="@+id/submit"
          android:layout_width="wrap_content"
          android:layout_height="wrap_content"
          android:text="Change my response"
          />
          <EditText android:id="@+id/editText"
          android:layout_width="match_parent"
          android:layout_height="match_parent"
          />
</LinearLayout>
```

The main activity is shown in Listing 10.5. It starts the service that listens and auto-responds to SMS messages. It also allows the user to change the reply message and save it in `SharedPreferences` for future use.

Listing 10.5 **src/com/cookbook/SMSresponder/SMSResponder.java**

```
package com.cookbook.SMSresponder;

import android.app.Activity;
import android.content.Intent;
import android.content.SharedPreferences;
import android.content.SharedPreferences.Editor;
import android.os.Bundle;
import android.preference.PreferenceManager;
import android.util.Log;
import android.view.View;
import android.view.View.OnClickListener;
import android.widget.Button;
import android.widget.EditText;
import android.widget.TextView;

public class SMSResponder extends Activity {
    TextView tv1;
    EditText ed1;
    Button bt1;
    SharedPreferences myprefs;
    Editor updater;
    String reply=null;

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

        myprefs = PreferenceManager.getDefaultSharedPreferences(this);
        tv1 = (TextView) this.findViewById(R.id.display);
        ed1 = (EditText) this.findViewById(R.id.editText);
        bt1 = (Button) this.findViewById(R.id.submit);

        reply = myprefs.getString("reply",
                "Thank you for your message. I am busy now."
                + "I will call you later");
        tv1.setText(reply);

        updater = myprefs.edit();
        ed1.setHint(reply);
        bt1.setOnClickListener(new OnClickListener() {
            public void onClick(View view) {
                updater.putString("reply", ed1.getText().toString());
                updater.commit();
                SMSResponder.this.finish();
            }
        });

        try {
```

```
            // Start service
            Intent svc = new Intent(this, ResponderService.class);
            startService(svc);
        }
        catch (Exception e) {
            Log.e("onCreate", "service creation problem", e);
        }
    }
}
```

The majority of code is contained in the service, as shown in Listing 10.6. It retrieves `SharedPreferences` for this application first. Then, it registers a broadcast receiver for listening to incoming and outgoing SMS messages. The broadcast receiver for outgoing SMS messages is not used here but is shown for completeness.

The incoming SMS broadcast receiver uses a bundle to retrieve the protocol description unit (PDU), which contains the SMS text and any additional SMS metadata, and parses it into an `Object` array. The method `createFromPdu()` converts the `Object` array into an `SmsMessage`. Then the method `getOriginatingAddress()` can be used to get the sender's phone number, and `getMessageBody()` can be used to get the text message.

In this recipe, after the sender address is retrieved, the `respond()` method is called. This method tries to get the data stored inside `SharedPreferences` for the auto-respond message. If no data is stored, it uses a default value. Then, it creates two `PendingIntents` for sent status and delivered status. The method `divideMessage()` is used to make sure the message is not oversized. After all the data is managed, it is sent using `sendMultiTextMessage()`.

Listing 10.6 **src/com/cookbook/SMSresponder/ResponderService.java**

```
package com.cookbook.SMSresponder;

import java.util.ArrayList;

import android.app.Activity;
import android.app.PendingIntent;
import android.app.Service;
import android.content.BroadcastReceiver;
import android.content.Context;
import android.content.Intent;
import android.content.IntentFilter;
import android.content.SharedPreferences;
import android.os.Bundle;
import android.os.IBinder;
import android.preference.PreferenceManager;
import android.telephony.SmsManager;
import android.telephony.SmsMessage;
import android.util.Log;
import android.widget.Toast;

public class ResponderService extends Service {
```

```
//the action fired by the Android system when an SMS was received
private static final String RECEIVED_ACTION =
                          "android.provider.Telephony.SMS_RECEIVED";
private static final String SENT_ACTION="SENT_SMS";
private static final String DELIVERED_ACTION="DELIVERED_SMS";

String requester;
String reply="";
SharedPreferences myprefs;

@Override
public void onCreate() {
    super.onCreate();
    myprefs = PreferenceManager.getDefaultSharedPreferences(this);

    registerReceiver(sentReceiver, new IntentFilter(SENT_ACTION));
    registerReceiver(deliverReceiver,
                     new IntentFilter(DELIVERED_ACTION));

    IntentFilter filter = new IntentFilter(RECEIVED_ACTION);
    registerReceiver(receiver, filter);

    IntentFilter attemptedfilter = new IntentFilter(SENT_ACTION);
    registerReceiver(sender,attemptedfilter);
}

private BroadcastReceiver sender = new BroadcastReceiver(){
    @Override
    public void onReceive(Context c, Intent i) {
        if(i.getAction().equals(SENT_ACTION)) {
            if(getResultCode() != Activity.RESULT_OK) {
                String recipient = i.getStringExtra("recipient");
                requestReceived(recipient);
            }
        }
    }
};
BroadcastReceiver sentReceiver = new BroadcastReceiver() {
    @Override public void onReceive(Context c, Intent in) {
        switch(getResultCode()) {
            case Activity.RESULT_OK:
                //sent SMS message successfully;
                smsSent();
                break;
            default:
                //sent SMS message failed
                smsFailed();
                break;
        }
     }
};

public void smsSent() {
    Toast.makeText(this, "SMS sent", Toast.LENGTH_SHORT);
}
public void smsFailed() {
    Toast.makeText(this, "SMS sent failed", Toast.LENGTH_SHORT);
```

```
}
public void smsDelivered() {
    Toast.makeText(this, "SMS delivered", Toast.LENGTH_SHORT);
}

BroadcastReceiver deliverReceiver = new BroadcastReceiver() {
    @Override public void onReceive(Context c, Intent in) {
        //SMS delivered actions
        smsDelivered();
    }
};

public void requestReceived(String f) {
    Log.v("ResponderService","In requestReceived");
    requester=f;
}

BroadcastReceiver receiver = new BroadcastReceiver() {
    @Override
    public void onReceive(Context c, Intent in) {
        Log.v("ResponderService","On Receive");
        reply="";
        if(in.getAction().equals(RECEIVED_ACTION)) {
            Log.v("ResponderService","On SMS RECEIVE");

            Bundle bundle = in.getExtras();
            if(bundle!=null) {
                Object[] pdus = (Object[])bundle.get("pdus");
                SmsMessage[] messages = new SmsMessage[pdus.length];
                for(int i = 0; i<pdus.length; i++) {
                    Log.v("ResponderService","FOUND MESSAGE");
                    messages[i] =
                            SmsMessage.createFromPdu((byte[])pdus[i]);
                }
                for(SmsMessage message: messages) {
                    requestReceived(message.getOriginatingAddress());
                }
                respond();
            }
        }
    }
};

@Override
public void onStart(Intent intent, int startId) {
    super.onStart(intent, startId);
}

public void respond() {
    Log.v("ResponderService","Responding to " + requester);
    reply = myprefs.getString("reply",
                    "Thank you for your message. I am busy now."
                    + "I will call you later.");
    SmsManager sms = SmsManager.getDefault();
    Intent sentIn = new Intent(SENT_ACTION);
    PendingIntent sentPIn = PendingIntent.getBroadcast(this,
                                                       0,sentIn,0);
```

```
        Intent deliverIn = new Intent(DELIVERED_ACTION);
        PendingIntent deliverPIn = PendingIntent.getBroadcast(this,
                                                              0,deliverIn,0);
        ArrayList<String> Msgs = sms.divideMessage(reply);
        ArrayList<PendingIntent> sentIns = new ArrayList<PendingIntent>();
        ArrayList<PendingIntent> deliverIns =
                                        new ArrayList<PendingIntent>();

        for(int i=0; i< Msgs.size(); i++) {
            sentIns.add(sentPIn);
            deliverIns.add(deliverPIn);
        }

        sms.sendMultipartTextMessage(requester, null,
                                       Msgs, sentIns, deliverIns);
    }

    @Override
    public void onDestroy() {
        super.onDestroy();
        unregisterReceiver(receiver);
        unregisterReceiver(sender);
    }

    @Override
    public IBinder onBind(Intent arg0) {
        return null;
    }
}
```

Using Web Content

To launch an Internet browser to display web content, the implicit intent `ACTION_VIEW` can be used as discussed in Chapter 2, "Application Basics: Activities and Intents," for example:

```
Intent i = new Intent(Intent.ACTION_VIEW);
i.setData(Uri.parse("http://www.google.com"));
startActivity(i);
```

It is also possible for developers to create their own web browser by using `WebView`, which is a `View` that displays web content. As with any view, it can occupy the full screen or only a portion of the layout in an activity. `WebView` uses WebKit, the open source browser engine used in Apple's Safari, to render web pages.

Recipe: Customizing a Web Browser

There are two ways to obtain a `WebView` object. It can be instantiated from the constructor:

```
WebView webview = new WebView(this);
```

Alternatively, a WebView can be used in a layout and declared in the activity:

```
WebView webView = (WebView) findViewById(R.id.webview);
```

After the object is retrieved, a web page can be displayed using the loadURL() method:

```
webview.loadUrl("http://www.google.com/");
```

The WebSettings class can be used to define the features of the browser. For example, network images can be blocked in the browser to reduce the data loading using the setBlockNetworkImage() method. The font size of the displayed web content can be set using the setDefaultFontSize() method. Some other commonly used settings are shown in the following example:

```
WebSettings webSettings = webView.getSettings();
webSettings.setSaveFormData(false);
webSettings.setJavaScriptEnabled(true);
webSettings.setSavePassword(false);
webSettings.setSupportZoom(true);
```

Recipe: Using an HTTP GET

Besides launching a browser or using the WebView widget to include a WebKit-based browser control in an activity, developers might also want to create native Internet-based applications. This means the application relies on only the raw data from the Internet, such as images, media files, and XML data. Just the data of relevance can be loaded. This is important for creating social networking applications. Two packages are useful in Android to handle network communication: java.net and android.net.

In this recipe, an HTTP GET is used to retrieve XML or JSON data (see www.json.org/ for an overview). In particular, the Google search Representational State Transfer (REST) API is demonstrated, and the following query is used:

```
http://ajax.googleapis.com/ajax/services/search/web?v=1.0&q=
```

To search for any topic, the topic just needs to be appended to the query. For example, to search for information on the National Basketball Association (NBA), the following query returns JSON data:

```
http://ajax.googleapis.com/ajax/services/search/web?v=1.0&q=NBA
```

The activity needs Internet permission to run. So, the following should be added to the **AndroidManifest.xml** file:

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

The main layout is shown in Listing 10.7. It has three views: EditText for user input of the search topic, Button to trigger the search, and TextView to display the search result.

Listing 10.7 **res/layout/main.xml**

```
<?xml version="1.0" encoding="utf-8"?>
<LinearLayout xmlns:android="http://schemas.android.com/apk/res/android"
     android:orientation="vertical"
     android:layout_width="match_parent"
     android:layout_height="match_parent"
     >
             <EditText
             android:id="@+id/editText"
             android:layout_width="match_parent"
             android:layout_height="wrap_content"
             android:singleLine="true"
              />
              <Button
                android:id="@+id/submit"
              android:layout_width="wrap_content"
              android:layout_height="wrap_content"
              android:text="Search"
              />
              <TextView
              android:id="@+id/display"
              android:layout_width="match_parent"
              android:layout_height="match_parent"
              android:text="@string/hello"
              android:textSize="18dp"
              />
</LinearLayout>
```

The main activity is shown in Listing 10.8. It initiates the three layout elements in `onCreate()`. Inside the `OnClickListener` class for the button, it calls `searchRequest()`. This composes the search item using the Google REST API URL and then initiates a URL class instance. The URL class instance is then used to get an `HttpURLConnection` instance.

The `HttpURLConnection` instance can retrieve the status of the connection. When `HttpURLConnection` returns a result code of `HTTP_OK`, it means the whole HTTP transaction went through. Then, the JSON data returned from the HTTP transaction can be dumped into a string. This is done using an `InputStreamReader` passed to a `BufferReader` to read the data and create a `String` instance. After the result from HTTP is obtained, it uses another function `processResponse()` to parse the JSON data.

Listing 10.8 **src/com/cookbook/internet/search/GoogleSearch.java**

```
package com.cookbook.internet.search;

import java.io.BufferedReader;
import java.io.IOException;
import java.io.InputStreamReader;
import java.net.HttpURLConnection;
import java.net.MalformedURLException;
```

```
import java.net.URL;
import java.security.NoSuchAlgorithmException;

import org.json.JSONArray;
import org.json.JSONException;
import org.json.JSONObject;

import android.app.Activity;
import android.os.Bundle;
import android.util.Log;
import android.view.View;
import android.view.View.OnClickListener;
import android.widget.Button;
import android.widget.EditText;
import android.widget.TextView;

public class GoogleSearch extends Activity {
    /** called when the activity is first created */
    TextView tv1;
    EditText ed1;
    Button bt1;
    static String url =
"http://ajax.googleapis.com/ajax/services/search/web?v=1.0&q=";

    @Override
    public void onCreate(Bundle savedInstanceState) {
        super.onCreate(savedInstanceState);
        setContentView(R.layout.main);
        tv1 = (TextView) this.findViewById(R.id.display);
        ed1 = (EditText) this.findViewById(R.id.editText);
        bt1 = (Button) this.findViewById(R.id.submit);

        bt1.setOnClickListener(new OnClickListener() {
            public void onClick(View view) {
                    if(ed1.getText().toString()!=null) {
                        try{
                            processResponse(
                              searchRequest(ed1.getText().toString()));
                        } catch(Exception e) {
                            Log.v("Exception Google search",
                                "Exception:"+e.getMessage());
                        }
                    }
                    ed1.setText("");
            }
        });
    }

    public String searchRequest(String searchString)
                            throws MalformedURLException, IOException {
        String newFeed=url+searchString;
        StringBuilder response = new StringBuilder();
        Log.v("gsearch","gsearch url:"+newFeed);
        URL url = new URL(newFeed);

        HttpURLConnection httpconn
                                = (HttpURLConnection) url.openConnection();
```

```
        if(httpconn.getResponseCode()==HttpURLConnection.HTTP_OK) {
            BufferedReader input = new BufferedReader(
                    new InputStreamReader(httpconn.getInputStream()),
                    8192);
            String strLine = null;
            while ((strLine = input.readLine()) != null) {
                response.append(strLine);
            }
            input.close();
        }
        return response.toString();
    }

    public void processResponse(String resp) throws IllegalStateException,
                    IOException, JSONException, NoSuchAlgorithmException {
        StringBuilder sb = new StringBuilder();
        Log.v("gsearch","gsearch result:"+resp);
        JSONObject mResponseObject = new JSONObject(resp);
        JSONObject responObject
                            = mResponseObject.getJSONObject("responseData");
        JSONArray array = responObject.getJSONArray("results");
        Log.v("gsearch","number of results:"+array.length());
        for(int i = 0; i<array.length(); i++) {
            Log.v("result",i+"] "+array.get(i).toString());
            String title = array.getJSONObject(i).getString("title");
            String urllink = array.getJSONObject(i)
                                    .getString("visibleUrl");
            sb.append(title);
            sb.append("\n");
            sb.append(urllink);
            sb.append("\n");
        }
        tv1.setText(sb.toString());
    }
}
```

The detailed mechanism used requires an understanding of the incoming JSON data structure. In this case, the Google REST API provides all the result data under the results `JSONArray`. Figure 10.4 shows the search result for NBA.

Note that this recipe will run on Android projects only prior to API Level 11. This is due to running network requests on the main thread. The next recipe, "Using HTTP `POST`," uses an `AsyncTask` to fix the `NetworkOnMainThreadException` that is thrown.

Recipe: Using HTTP `POST`

Sometimes, raw binary data needs to be retrieved from the Internet such as an image, video, or audio file. This can be achieved with the HTTP `POST` protocol by using `setRequestMethod()`, such as:

```
httpconn.setRequestMethod(POST);
```

Figure 10.4 The search result from the Google REST API query

Accessing data through the Internet can be time-consuming and unpredictable. Therefore, a separate thread should be spawned anytime network data is required.

In addition to the methods shown in Chapter 3, "Threads, Services, Receivers, and Alerts," there is a built-in Android class called `AsyncTask` that allows background operations to be performed and publishes results on the UI thread without needing to manipulate threads or handlers. So, the `POST` method can be implemented asynchronously with the following code:

```
private class MyGoogleSearch extends AsyncTask<String, Integer, String> {

        protected String doInBackground(String... searchKey) {

            String key = searchKey[0];

            try {
                return searchRequest(key);
            } catch(Exception e) {
                Log.v("Exception Google search",
                      "Exception:"+e.getMessage());
                return "";
            }
        }
```

```
        protected void onPostExecute(String result) {
            try {
                processResponse(result);
            } catch(Exception e) {
                Log.v("Exception Google search",
                      "Exception:"+e.getMessage());
            }
        }
    }
```

This excerpt can be added to the end of the **GoogleSearch.java** activity in Listing 10.8. It provides the same result with one additional change to the code inside the button `OnClickListener` to

```
new MyGoogleSearch().execute(ed1.getText().toString());
```

Recipe: Using WebViews

WebViews are useful for displaying content that may change on a semiregular basis, or for data that may need to be changed without having to force an update to the application. WebViews can also be used to allow web applications access to some client-side features of the Android system such as using the toast messaging system.

To add a WebView to an application, the following should be added to the layout XML:

```
<WebView   xmlns:android="http://schemas.android.com/apk/res/android"
  android:id="@+id/webview"
  android:layout_width="match_parent"
  android:layout_height="match_parent" />
```

The following permission must also be added to the application manifest:

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

To create a simple page without any user interaction, add the following to the `onCreate()` method of the main activity:

```
WebView myWebView = (WebView) findViewById(R.id.webview);
myWebView.loadUrl("http://www.example.com/");
```

In order to enable JavaScript on the page inside of the WebView, the WebSettings must be changed. This can be done using the following:

```
WebSettings webSettings = myWebView.getSettings();
webSettings.setJavaScriptEnabled(true);
```

To trigger native methods from JavaScript, a class that can be used as an interface needs to be created. Listing 10.9 shows an activity with all of the pieces put together.

Listing 10.9 **src/com/cookbook/viewtoaweb/MainActivity.java**

```
package com.cookbook.viewtoaweb;

import android.app.Activity;
import android.content.Context;
import android.os.Bundle;
import android.webkit.JavascriptInterface;
import android.webkit.WebSettings;
import android.webkit.WebView;
import android.widget.Toast;

public class MainActivity extends Activity {

  @Override
  protected void onCreate(Bundle savedInstanceState) {
    super.onCreate(savedInstanceState);
    setContentView(R.layout.activity_main);

    WebView myWebView = (WebView) findViewById(R.id.webview);
    WebSettings webSettings = myWebView.getSettings();
    webSettings.setJavaScriptEnabled(true);
    myWebView.addJavascriptInterface(new WebAppInterface(this), "Android");
    myWebView.loadUrl("http://www.devcannon.com/androidcookbook/chapter10/webview/");
  }

  public class WebAppInterface {
      Context context;

      WebAppInterface(Context c) {
          context = c;
      }

      @JavascriptInterface
      public void triggerToast(String toast) {
          Toast.makeText(context, toast, Toast.LENGTH_SHORT).show();
      }
  }
}
```

The following HTML is used to trigger the code from Listing 10.9:

```
<input type="text" name="toastText" id="toastText" />
<button id="btn" onClick="androidToast()">Toast it</button>
```

The following JavaScript is used to trigger the code:

```
function androidToast() {
  var input = document.getElementById('toastText');
  Android.triggerToast(input.value);
}
```

Figure 10.5 displays the WebView with a toast that was launched from the page being viewed.

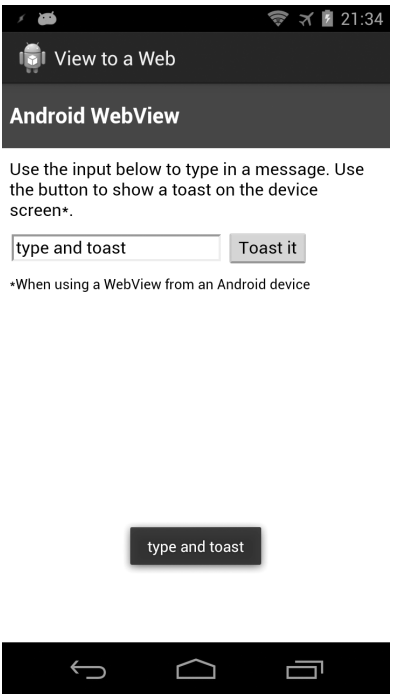

Figure 10.5 Triggering a toast message from a page inside a WebView

Recipe: Parsing JSON

JSON is a very popular format for data transfer, especially when used with web services. Android has included a set of classes in the `org.json` package that can be imported into code to allow manipulation of JSON data.

To get started parsing, first a JSON object needs to be created; this can be done like so:

```
private JSONObject jsonObject;
```

Some data in JSON format is also needed. The following creates a string containing some JSON data:

```
private String jsonString =
"{\"item\":{\"name\":\"myName\",\"numbers\":[{\"id\":\"1\"},{\"id\":\"2\"}]}}";
```

Because a string is not a JSON object, one will need to be created that contains the value of the string. This can be done like so:

```
jsonObject = new JSONObject(jsonString);
```

Now that there is an object to manipulate, data can be gotten from it. If the `getString()` method were used to pull data from an "object" that is inside the

jsonObject, a JSONException would be thrown. This is because it is not a string. To pull a specific value, another object must be set up that contains the desired string, like so:

```
JSONObject itemObject = jsonObject.getJSONObject("item");
```

The value of "name" can be gotten by using the following:

```
String jsonName = itemObject.getString("name");
```

A loop may be used to get the information stored in the "numbers" section of jsonObject. This can be done by creating a JSONArray object and looping through it, as follows:

```
JSONArray numbersArray = itemObject.getJSONArray("numbers");


for(int i = 0;i < numbersArray.length();i++){
  numbersArray.getJSONObject(i).getString("id");
}
```

Listing 10.10 shows how parsing may be put together inside an activity and displayed in a TextView. Note that when pulling JSON data from a remote location, such as through a web service, a separate class or AsyncTask must be used so that the main UI thread is not blocked.

Listing 10.10 **src/com/cookbook/parsejson/MainActivity.java**

```
package com.cookbook.parsejson;

import org.json.JSONArray;
import org.json.JSONException;
import org.json.JSONObject;

import android.app.Activity;
import android.os.Bundle;
import android.widget.TextView;

public class MainActivity extends Activity {

  TextView tv;
  private JSONObject jsonObject;
  private String jsonString =
"{\"item\":{\"name\":\"myName\",\"numbers\":[{\"id\":\"1\"},{\"id\":\"2\"}]}}";

  @Override
  protected void onCreate(Bundle savedInstanceState) {
    super.onCreate(savedInstanceState);
    setContentView(R.layout.activity_main);
    tv = (TextView) findViewById(R.id.tv_main);

    try {
      jsonObject = new JSONObject(jsonString);
      JSONObject itemObject = jsonObject.getJSONObject("item");
      String jsonName = "name: " +itemObject.getString("name");
```

```
        JSONArray numbersArray = itemObject.getJSONArray("numbers");
        String jsonIds = "";

        for(int i = 0;i < numbersArray.length();i++){
          jsonIds += "id: " +
               numbersArray.getJSONObject(i).getString("id").toString() + "\n";
        }

        tv.setText(jsonName+"\n"+jsonIds);

      } catch (JSONException e) {
        e.printStackTrace();
      }
    }

}
```

Recipe: Parsing XML

The official Android documentation recommends the use of `XmlPullParser` for parsing XML data. You may use any method you prefer to get XML data; however, for this recipe, a simple one-node XML string will be used. Listing 10.11 shows an activity that will display the process of reading the XML document, including the node and text value, into a TextView.

The XML data is processed one line at a time, with the `next()` method moving to the next line. In order to parse for specific nodes inside the XML data, an `if else` statement must be added for them in the `while` loop.

Listing 10.11 **src/com/cookbook/parsexml/MainActivity.java**

```
package com.cookbook.parsexml;

import java.io.IOException;
import java.io.StringReader;

import org.xmlpull.v1.XmlPullParser;
import org.xmlpull.v1.XmlPullParserException;
import org.xmlpull.v1.XmlPullParserFactory;

import android.app.Activity;
import android.os.Bundle;
import android.widget.TextView;

public class MainActivity extends Activity {

  TextView tv;

  @Override
  protected void onCreate(Bundle savedInstanceState) {
    super.onCreate(savedInstanceState);
    setContentView(R.layout.activity_main);
    tv = (TextView) findViewById(R.id.tv_main);
```

```
    String xmlOut = "";
    XmlPullParserFactory factory = null;
    try {
      factory = XmlPullParserFactory.newInstance();
    } catch (XmlPullParserException e) {
      e.printStackTrace();
    }
    factory.setNamespaceAware(true);
    XmlPullParser xpp = null;
    try {
      xpp = factory.newPullParser();
    } catch (XmlPullParserException e) {
      e.printStackTrace();
    }

    try {
      xpp.setInput(new StringReader("<node>This is some text</node>"));
    } catch (XmlPullParserException e) {
      e.printStackTrace();
    }

    int eventType = 0;
    try {
      eventType = xpp.getEventType();
    } catch (XmlPullParserException e) {
      e.printStackTrace();
    }

    while (eventType != XmlPullParser.END_DOCUMENT) {
      if(eventType == XmlPullParser.START_DOCUMENT) {
        xmlOut += "Start of XML Document";
      } else if (eventType == XmlPullParser.START_TAG) {
        xmlOut += "\nStart of tag: "+xpp.getName();
      } else if (eventType == XmlPullParser.END_TAG) {
        xmlOut += "\nEnd of tag: "+xpp.getName();
      } else if (eventType == XmlPullParser.TEXT) {
        xmlOut += "\nText: "+xpp.getText();
      }
      try {
        eventType = xpp.next();
      } catch (XmlPullParserException e) {
        e.printStackTrace();
      } catch (IOException e) {
        e.printStackTrace();
      }
    }
    xmlOut += "\nEnd of XML Document";

    tv.setText(xmlOut);
  }

}
```

Social Networking

Twitter is a social networking and microblogging service that enables its users to send and read messages known as tweets. Twitter is described as the "SMS of the Internet," and indeed, each tweet cannot exceed 140 characters (although links are converted to shorter links and not counted against the 140-character limit). Twitter users can follow other people's tweets or be followed by others.

Recipe: Reading the Owner Profile

Starting with API Level 14 (Ice Cream Sandwich), developers are able to access the owner profile. This is a special contact that stores `RawContact` data. To read the owner profile of a device, the following permission must be added to the **AndroidManifest.xml** file:

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

The following enables access to profile data:

```
// sets the columns to retrieve for the owner profile - RawContact data
String[] mProjection = new String[]
    {
        Profile._ID,
        Profile.DISPLAY_NAME_PRIMARY,
        Profile.LOOKUP_KEY,
        Profile.PHOTO_THUMBNAIL_URI
    };

// retrieves the profile from the Contacts Provider
Cursor mProfileCursor =
    getContentResolver().query(Profile.CONTENT_URI,mProjection,null,null,null);
// Set the cursor to the first entry (instead of -1)
boolean b = mProfileCursor.moveToFirst();
for(int i = 0, length = mProjection.length;i < length;i++) {
  System.out.println("*** " +
      mProfileCursor.getString(mProfileCursor.getColumnIndex(mProjection[i])));
}
```

Note that where `System.out.println()` is used is the place where logic can be inserted to process the profile information. It is also worth mentioning that the output will be shown in LogCat, even though it is not a method from `Log.*`.

Recipe: Integrating with Twitter

Some third-party libraries exist to assist in integrating Twitter into Android applications (from http://dev.twitter.com/pages/libraries#java):

- Twitter4J by Yusuke Yamamoto—An open source, Mavenized, and Google App Engine-safe Java library for the Twitter API, released under the BSD license
- Scribe by Pablo Fernandez—OAuth module for Java, Mavenized, and works with Facebook, LinkedIn, Twitter, Evernote, Vimeo, and more

For this recipe, the Twitter4J library by Yusuke Yamamoto is used, which has documentation at http://twitter4j.org/en/javadoc/overview-summary.html. The recipe enables users to log in to Twitter by using OAuth and make a tweet.

Twitter has made changes to its authentication system that now require applications to register in order to access the public feed. To get started, an application has to be registered at https://dev.twitter.com/apps/new. During the registration process, OAuth public and private keys will be generated. They will be used in this recipe, so take note of them.

As this application will be accessing the Internet, it will need the `INTERNET` permission. There will also be a check to make sure that the device is connected to a network, so the `ACCESS_NETWORK_STATE` permission is also required. This is done by editing the **AndroidManifest.xml** file, as shown in Listing 10.12.

Listing 10.12 **AndroidManifest.xml**

```
<?xml version="1.0" encoding="utf-8"?>
<manifest xmlns:android="http://schemas.android.com/apk/res/android"
    package="com.cookbook.tcookbook"
    android:versionCode="1"
    android:versionName="1.0" >

    <uses-sdk
        android:minSdkVersion="9"
        android:targetSdkVersion="17" />

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

    <application
        android:allowBackup="true"
        android:icon="@drawable/ic_launcher"
        android:label="@string/app_name"
        android:theme="@style/AppTheme" >
        <activity
            android:name="com.cookbook.tcookbook.MainActivity"
            android:label="@string/app_name" >
            <intent-filter>
                <action android:name="android.intent.action.MAIN" />

                <category android:name="android.intent.category.LAUNCHER" />
            </intent-filter>
            <intent-filter>
                <action android:name="android.intent.action.VIEW" />
                <category android:name="android.intent.category.DEFAULT" />
                <category android:name="android.intent.category.BROWSABLE" />
                <data android:scheme="oauth" android:host="tcookbook"/>
```

```
            </intent-filter>
        </activity>
    </application>
</manifest>
```

For the layout of the application, everything will be put into the **activity_main.xml** file. This file will contain a button that is visible on page load and then several buttons, TextViews, and an `EditText` widget. Note that some of these will be hidden with `android:visibility="gone"`. Listing 10.13 shows the contents of the **activity_main.xml** file.

Listing 10.13 **res/layout/activity_main.xml**

```
<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:orientation="vertical" >
    tools:context=".MainActivity" >

    <Button android:id="@+id/btnLoginTwitter"
        android:layout_width="match_parent"
        android:layout_height="wrap_content"
        android:text="Login with OAuth"
        android:layout_marginLeft="10dip"
        android:layout_marginRight="10dip"
        android:layout_marginTop="30dip"/>

    <TextView android:id="@+id/lblUserName"
        android:layout_width="match_parent"
        android:layout_height="wrap_content"
        android:padding="10dip"
        android:layout_marginTop="30dip"/>

    <TextView android:id="@+id/lblUpdate"
        android:text="Enter Your Tweet:"
        android:layout_width="match_parent"
        android:layout_height="wrap_content"
        android:layout_marginLeft="10dip"
        android:layout_marginRight="10dip"
        android:visibility="gone"/>

    <EditText android:id="@+id/txtUpdateStatus"
        android:layout_width="match_parent"
        android:layout_height="wrap_content"
        android:layout_margin="10dip"
        android:visibility="gone"/>

    <Button android:id="@+id/btnUpdateStatus"
        android:layout_width="match_parent"
        android:layout_height="wrap_content"
        android:text="Tweet it!"
        android:layout_marginLeft="10dip"
```

```
        android:layout_marginRight="10dip"
        android:visibility="gone"/>

    <Button android:id="@+id/btnLogoutTwitter"
        android:layout_width="match_parent"
        android:layout_height="wrap_content"
        android:text="Logout/invalidate OAuth"
        android:layout_marginLeft="10dip"
        android:layout_marginRight="10dip"
        android:layout_marginTop="50dip"
        android:visibility="gone"/>
</LinearLayout>
```

One activity is used in the application, and two classes are used: one to help with connection detection and one to display an alert message when the wrong application OAuth keys are used.

In the main activity, several constants are set up for use. These include the OAuth Consumer key and Consumer secret. A connectivity check is run to make sure that the user can reach Twitter. Several `OnClickListener` classes are also registered to trigger logic such as login, logout, and update when clicked.

As Twitter handles authentication for the user, the information passed back is saved in application preferences and is checked again when the user attempts to log in to the application. An `AsyncTask` is also used to move any tweets made to a background thread.

Listing 10.14 shows the contents of the activity in full.

Listing 10.14 **src/com/cookbook/tcookbook/MainActivity.java**

```
package com.cookbook.tcookbook;

import twitter4j.Twitter;
import twitter4j.TwitterException;
import twitter4j.TwitterFactory;
import twitter4j.User;
import twitter4j.auth.AccessToken;
import twitter4j.auth.RequestToken;
import twitter4j.conf.Configuration;
import twitter4j.conf.ConfigurationBuilder;
import android.app.Activity;
import android.app.ProgressDialog;
import android.content.Intent;
import android.content.SharedPreferences;
import android.content.SharedPreferences.Editor;
import android.content.pm.ActivityInfo;
import android.net.Uri;
import android.os.AsyncTask;
import android.os.Build;
import android.os.Bundle;
import android.os.StrictMode;
import android.text.Html;
import android.util.Log;
```

```
import android.view.View;
import android.widget.Button;
import android.widget.EditText;
import android.widget.TextView;
import android.widget.Toast;

public class MainActivity extends Activity {

    // Replace the following value with the Consumer key
    static String TWITTER_CONSUMER_KEY = "01189998819991197253";
    // Replace the following value with the Consumer secret
    static String TWITTER_CONSUMER_SECRET =
       "616C6C20796F757220626173652061726520652062656C6F6E6720746F207573";

    static String PREFERENCE_NAME = "twitter_oauth";
    static final String PREF_KEY_OAUTH_TOKEN = "oauth_token";
    static final String PREF_KEY_OAUTH_SECRET = "oauth_token_secret";
    static final String PREF_KEY_TWITTER_LOGIN = "isTwitterLoggedIn";

    static final String TWITTER_CALLBACK_URL = "oauth://tcookbook";

    static final String URL_TWITTER_AUTH = "auth_url";
    static final String URL_TWITTER_OAUTH_VERIFIER = "oauth_verifier";
    static final String URL_TWITTER_OAUTH_TOKEN = "oauth_token";

    Button btnLoginTwitter;
    Button btnUpdateStatus;
    Button btnLogoutTwitter;
    EditText txtUpdate;
    TextView lblUpdate;
    TextView lblUserName;

    ProgressDialog pDialog;

    private static Twitter twitter;
    private static RequestToken requestToken;

    private static SharedPreferences mSharedPreferences;

    private ConnectionDetector cd;

    AlertDialogManager adm = new AlertDialogManager();

    @Override
    public void onCreate(Bundle savedInstanceState) {
      super.onCreate(savedInstanceState);
      setContentView(R.layout.activity_main);
      // used for Android 2.3+
      if (Build.VERSION.SDK_INT > Build.VERSION_CODES_GINGERBREAD) {
        StrictMode.ThreadPolicy policy =
             new StrictMode.ThreadPolicy.Builder().permitAll().build();
        StrictMode.setThreadPolicy(policy);
      }

      setRequestedOrientation(ActivityInfo.SCREEN_ORIENTATION_PORTRAIT);

      cd = new ConnectionDetector(getApplicationContext());
```

```
if (!cd.isConnectingToInternet()) {
  adm.showAlertDialog(MainActivity.this, "Internet Connection Error",
      "Please connect to working Internet connection", false);
  return;
}

if(TWITTER_CONSUMER_KEY.trim().length() == 0 ||
    TWITTER_CONSUMER_SECRET.trim().length() == 0){
  adm.showAlertDialog(MainActivity.this,
      "Twitter OAuth tokens",
      "Please set your Twitter OAuth tokens first!", false);
  return;
}

btnLoginTwitter = (Button) findViewById(R.id.btnLoginTwitter);
btnUpdateStatus = (Button) findViewById(R.id.btnUpdateStatus);
btnLogoutTwitter = (Button) findViewById(R.id.btnLogoutTwitter);
txtUpdate = (EditText) findViewById(R.id.txtUpdateStatus);
lblUpdate = (TextView) findViewById(R.id.lblUpdate);
lblUserName = (TextView) findViewById(R.id.lblUserName);

mSharedPreferences = getApplicationContext().getSharedPreferences("MyPref", 0);

btnLoginTwitter.setOnClickListener(new View.OnClickListener() {
  @Override
  public void onClick(View arg0) {
    // Call login Twitter function
    loginToTwitter();
  }
});

btnUpdateStatus.setOnClickListener(new View.OnClickListener() {
  @Override
  public void onClick(View v) {
    String status = txtUpdate.getText().toString();

    if (status.trim().length() > 0) {
      new updateTwitterStatus().execute(status);
    } else {
      Toast.makeText(getApplicationContext(),
          "Please enter status message", Toast.LENGTH_SHORT).show();
    }
  }
});

btnLogoutTwitter.setOnClickListener(new View.OnClickListener() {
  @Override
  public void onClick(View arg0) {
    // Call logout Twitter function
    logoutFromTwitter();
  }
});

if (!isTwitterLoggedInAlready()) {
  Uri uri = getIntent().getData();
```

```
        if (uri != null && uri.toString().startsWith(TWITTER_CALLBACK_URL)) {
          String verifier = uri.getQueryParameter(URL_TWITTER_OAUTH_VERIFIER);

          try {
            AccessToken accessToken = twitter.getOAuthAccessToken(requestToken,
➥verifier);

            Editor e = mSharedPreferences.edit();

            e.putString(PREF_KEY_OAUTH_TOKEN, accessToken.getToken());
            e.putString(PREF_KEY_OAUTH_SECRET,accessToken.getTokenSecret());
            e.putBoolean(PREF_KEY_TWITTER_LOGIN, true);
            e.commit();

//            Log.e("Twitter OAuth Token", "> " + accessToken.getToken());

            btnLoginTwitter.setVisibility(View.GONE);

            lblUpdate.setVisibility(View.VISIBLE);
            txtUpdate.setVisibility(View.VISIBLE);
            btnUpdateStatus.setVisibility(View.VISIBLE);
            btnLogoutTwitter.setVisibility(View.VISIBLE);

            long userID = accessToken.getUserId();
            User user = twitter.showUser(userID);
            String username = user.getName();

            lblUserName.setText(Html.fromHtml("<b>Welcome " + username + "</b>"));
          } catch (Exception e) {
            Log.e("***Twitter Login Error: ",e.getMessage());
          }
        }
      }

    }

    private void loginToTwitter() {
      if (!isTwitterLoggedInAlready()) {
        ConfigurationBuilder builder = new ConfigurationBuilder();
        builder.setOAuthConsumerKey(TWITTER_CONSUMER_KEY);
        builder.setOAuthConsumerSecret(TWITTER_CONSUMER_SECRET);
        Configuration configuration = builder.build();

        TwitterFactory factory = new TwitterFactory(configuration);
        twitter = factory.getInstance();

        if(!(Build.VERSION.SDK_INT >= Build.VERSION_CODES.HONEYCOMB)) {
          try {
            requestToken = twitter.getOAuthRequestToken(TWITTER_CALLBACK_URL);
            this.startActivity(new Intent(Intent.ACTION_VIEW,
                Uri.parse(requestToken.getAuthenticationURL())));
          } catch (TwitterException e) {
            e.printStackTrace();
          }
          } else {
          new Thread(new Runnable() {
```

```
            public void run() {
              try {
                requestToken = twitter.getOAuthRequestToken(TWITTER_CALLBACK_URL);
                MainActivity.this.startActivity(new Intent(Intent.ACTION_VIEW,
                    Uri.parse(requestToken.getAuthenticationURL())));
              } catch (TwitterException e) {
                e.printStackTrace();
              }
            }
          }).start();
        }
      } else {
        Toast.makeText(getApplicationContext(),"Already logged into Twitter",
            Toast.LENGTH_LONG).show();
      }
    }

    class updateTwitterStatus extends AsyncTask<String, String, String> {
      @Override
      protected void onPreExecute() {
        super.onPreExecute();
        pDialog = new ProgressDialog(MainActivity.this);
        pDialog.setMessage("Updating to Twitter...");
        pDialog.setIndeterminate(false);
        pDialog.setCancelable(false);
        pDialog.show();
      }

      protected String doInBackground(String... args) {
//        Log.d("*** Text Value of Tweet: ",args[0]);
        String status = args[0];
        try {
          ConfigurationBuilder builder = new ConfigurationBuilder();
          builder.setOAuthConsumerKey(TWITTER_CONSUMER_KEY);
          builder.setOAuthConsumerSecret(TWITTER_CONSUMER_SECRET);

          String access_token =
              mSharedPreferences.getString(PREF_KEY_OAUTH_TOKEN, "");
          String access_token_secret =
              mSharedPreferences.getString(PREF_KEY_OAUTH_SECRET, "");

          AccessToken accessToken =
              new AccessToken(access_token, access_token_secret);
          Twitter twitter =
              new TwitterFactory(builder.build()).getInstance(accessToken);

          twitter4j.Status response = twitter.updateStatus(status);

//          Log.d("*** Update Status: ",response.getText());
        } catch (TwitterException e) {
          Log.d("*** Twitter Update Error: ", e.getMessage());
        }
        return null;
      }
```

```
        protected void onPostExecute(String file_url) {
            pDialog.dismiss();
            runOnUiThread(new Runnable() {
                @Override
                public void run() {
                    Toast.makeText(getApplicationContext(),
                         "Status tweeted successfully", Toast.LENGTH_SHORT).show();
                    txtUpdate.setText("");
                }
            });
        }

    }

    private void logoutFromTwitter() {
        Editor e = mSharedPreferences.edit();
        e.remove(PREF_KEY_OAUTH_TOKEN);
        e.remove(PREF_KEY_OAUTH_SECRET);
        e.remove(PREF_KEY_TWITTER_LOGIN);
        e.commit();

        btnLogoutTwitter.setVisibility(View.GONE);
        btnUpdateStatus.setVisibility(View.GONE);
        txtUpdate.setVisibility(View.GONE);
        lblUpdate.setVisibility(View.GONE);
        lblUserName.setText("");
        lblUserName.setVisibility(View.GONE);

        btnLoginTwitter.setVisibility(View.VISIBLE);
    }

    private boolean isTwitterLoggedInAlready() {
        return mSharedPreferences.getBoolean(PREF_KEY_TWITTER_LOGIN, false);
    }

    protected void onResume() {
        super.onResume();
    }

}
```

More information on using Twitter4j can be found in the following resources:

- www.androidhive.info/2012/09/android-twitter-oauth-connect-tutorial/ by Ravi Tamada
- http://blog.doityourselfandroid.com/2011/08/08/improved-twitter-oauth-android/ by Do-it-yourself Android
- http://davidcrowley.me/?p=410 by David Crowley
- https://tutsplus.com/tutorials/?q=true&filter_topic=90 by Sue Smith
- http://blog.blundell-apps.com/sending-a-tweet/ by Blundell

Recipe: Integrating with Facebook

Facebook has changed rapidly in the last couple of years, and it remains one of the top social networking sites. One thing the Facebook team has done recently is to clean up their documentation to help developers. The official documentation can be found at https://developers.facebook.com/docs/getting-started/facebook-sdk-for-android/3.0/.

To get started with Facebook development, first download the Facebook SDK and the Facebook android package (APK) from https://developers.facebook.com /resources/facebook-android-sdk-3.0.zip. The APK is provided as a means of authentication without having to use a WebView. If the Facebook application is already installed on the phone, the APK file need not be installed.

Next, add the Facebook SDK as a library project to the Eclipse installation. This is done by choosing **File → Import** and then **General → Existing Projects into Workspace**. Note that Facebook warns against using the "Copy projects into workspace" options, as this may build incorrect filesystem paths and cause the SDK to function incorrectly.

After the Facebook SDK has been imported, the sample projects are available for experimentation. Note that most of the projects require the generation of a key hash that will be used to sign applications and that developers can add to their Facebook developer profile for quick SDK project access.

The key is generated by using the `keytool` utility that comes with Java. Open a terminal or command prompt and type the following to generate the key:

OS X:

```
keytool -exportcert -alias androiddebugkey -keystore ~/.android/debug.keystore |
[ccc]openssl sha1 -binary | openssl base64
```

Windows:

```
keytool -exportcert -alias androiddebugkey -keystore %HOMEPATH%\.android\debug.
keystore [ccc]| openssl sha1 -binary | openssl base64
```

The command should be typed in a single line, although terminals or command prompt windows may show it breaking into multiple lines. When the command is executed, a password prompt should appear. The password to enter is **android**. After the key has been generated successfully, it will be displayed. Note that if a "`'keytool' is not recognized as an internal or external command . . .`" error is generated, move to the **bin** directory of the JRE installation directory and try again. If there is a similar error for "openssl," download OpenSSL from http://code.google .com/p/openssl-for-windows/. If there are still errors, make sure that the **bin** directories have been added to the system path or that the exact directories are being used instead of **%HOMEPATH%**.

If more than one computer will be used for development, a hash must be generated for each one and added to the developer profile at https://developers.facebook.com/.

Once that is done, dig into the sample applications and log in with them. The showcase example project, called **HelloFacebookSample**, demonstrates how to access a profile, update a status, and even upload photos.

The last step in creating an application that integrates with Facebook is to create a Facebook app that will then be tied to the Android application by using a generated key hash. This will take care of integration and allow users to authenticate themselves while using the application.

The developer site gives a terrific breakdown of all the pieces needed to get started. Be sure to read the official Scrumptious tutorial, which can be found at http://developers.facebook.com/docs/tutorials/androidsdk/3.0/scrumptious/.

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