DEVELOPING APPLICATIONS FOR ANDROID USING JAVA

Marian CAȚĂ[1]
[1] Lieutenant Commander Assistant Lecturer, Head of the IT Center, "Mircea cel Batran" Naval Academy

Abstract:
In this paper I intend to present how to create some applications for Android smartphones using Eclipse IDE for Java Developers. As a case study, I have created a special application for our academy students.
Keywords: *Android, Java, Eclipse, smartphone*

INTRODUCTION

With the advent of the smartphones, software developers were forced to migrate to new platforms such as iOS, Android, Symbian or Windows Phone, both in financial terms and as a challenge.

"Android is a Linux-based operating system designed primarily for touchscreen mobile devices such as smartphones and tablet computers" [1]. In late September 2012, in Google Play Store (formerly Android Market) were 675,000 apps with 25 billion downloads compared to 700,000 apps for the Apple's App Store [2].

Therefore it is not surprising that Karen North, expert in social media at University of Southern California in Los Angeles recently said "People are constantly looking down to check their phones. They can't stop".

PREPARING THE DEVELOPMENT ENVIRONMENT

For Windows developers, the steps for preparing the development environment are following:

a) Install Java JDK v7: open the Java 7 JDK download link, select corresponding item in the platforms list, download the file and install it.

b) Install the Android Software Development Kit (SDK) and a platform: from the Android SDK download page (http://developer.android.com/sdk/index.html), choose the version that is correct for your operating system and install it in a path without spaces, like C://Android [3].

c) Install and configure Eclipse IDE for Java Developers: from the Eclipse download page (http://www.eclipse.org/downloads/) choose the "Eclipse IDE for Java Developers", unzip and move to a folder like C://Eclipse [4].

d) Install the Android Development Tools (ADT) plug-in for Eclipse from "Help" > "Install New Software …" and restart Eclipse when prompted to.

e) Connect Android SDK with Eclipse IDE: select "Window" > "Preferences" > "Android" and enter the location of the Android SDK

f) Additional Android/Eclipse configuration (optional): select "Window" > "Preferences" > "Android" > "DDMS" and change the "Logging Level" settings to "Verbose" for see everything that goes on while developing

g) Install Android SDK Components: select "Window" > "Android SDK Manager" and select the platforms you want to support (should use API 10 or above).

h) Create the Android Virtual Devices (AVDs) (Android Emulators for running and testing the Android applications on the local computer): select "Window" > "AVD Manager" > "New…"

CASE STUDY: THE "ANMB" APPLICATION

The application is designed for military and civilian students of "Mircea cel Batran" Naval Academy.

The facilities of "ANMB" are:

- presentation of the institution: short history, faculties and departments, training ships

- images: for Navy Faculty and Merchant Marine Faculty, sport complex, library, museum, naval training center and nautical sports Palazu Mare, training ship "Mircea" and training ship "Albatros"

- campus: academic year structure, schedule, planning exams, online library, e-Learning platform, check taxes, notes and especially for first year military students: military ranks and some specific songs

- maps: geographical position of the institution in Constanta, campus, educational facilities, public transportation map of Constanta city.In the future this application will include more facilities like as: RSS feed, Notification status bar and many others. This application can be downloaded from Google Play on the web and some screenshots are shown below.
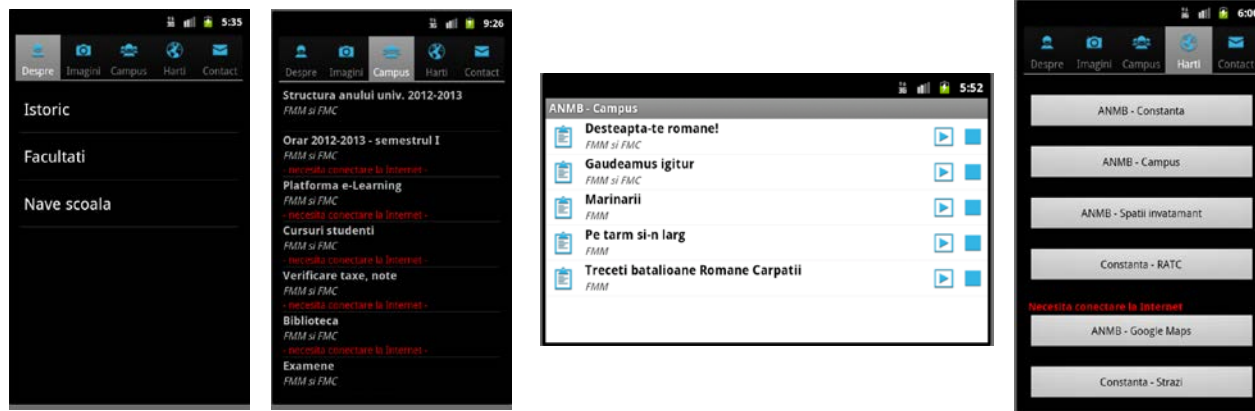

Figure 1 Screenshots of the "ANMB" application

As an example, to create a main top menu formed by 5 items and a bottom menu (only top menu should be visible all the time) need to write code in minimum three different places:

a) in a layout file from "res/layout" folder (the visual structure for a user interface can be defined by a layout)

b) in a java file from "src/*package_name*" folder

c) in the AndroidManifest.xml file

In this case, the activity_anmb.xml file from "res/layout" folder is:

```xml
<?xml version="1.0" encoding="utf-8"?>
<TabHost xmlns:android="http://schemas.android.com/apk/res/android"
   android:id="@android:id/tabhost"
   android:layout_width="fill_parent"
   android:layout_height="fill_parent"
   android:tabStripEnabled="false">
   <LinearLayout
      android:orientation="vertical"
      android:layout_width="fill_parent"
      android:layout_height="fill_parent"
      android:padding="5dp" >
      <TabWidget
         android:id="@android:id/tabs"
         android:layout_width="fill_parent"
         android:layout_height="wrap_content" />
      <FrameLayout
         android:id="@android:id/tabcontent"
         android:layout_width="fill_parent"
         android:layout_height="fill_parent"
         android:padding="5dp" />
   </LinearLayout>
</TabHost>
```

The ANMB.java file from "src/com.anmb.ANMB" folder is:

```java
package com.anmb.ANMB;

import android.os.Bundle;
import android.app.Dialog;
import android.content.Intent;
import android.text.Html;
import android.view.Menu;
import android.view.MenuInflater;
import android.view.MenuItem;
import android.widget.ImageView;
import android.widget.TextView;
import android.app.TabActivity;
import android.content.res.Resources;
import android.widget.TabHost;
import android.widget.TabHost.TabSpec;

public class ANMB extends TabActivity {

        public void onCreate(Bundle savedInstanceState) {
                super.onCreate(savedInstanceState);
                setContentView(R.layout.activity_anmb);

                Resources ressources = getResources();
                TabHost th = getTabHost();

                // About tab
                Intent intentAbout = new Intent().setClass(this, About.class);
                TabSpec tsAbout = th.newTabSpec("About").setIndicator("Despre",
                ressources.getDrawable(R.drawable.about)).setContent(intentAbout);

                // Images tab
                Intent intentImages = new Intent().setClass(this, Images.class);
                TabSpec tsImages = th.newTabSpec("Images").setIndicator("Imagini",
                ressources.getDrawable(R.drawable.foto)).setContent(intentImages);

                // Campus tab
                Intent intentCampus = new Intent().setClass(this, Campus.class);
```

```java
        TabSpec tsCampus = th.newTabSpec("Campus").setIndicator("Campus",
        ressources.getDrawable(R.drawable.camp)).setContent(intentCampus);

        // Maps tab
        Intent intentMaps = new Intent().setClass(this, Maps.class);
        TabSpec tsMaps = th.newTabSpec("Maps").setIndicator("Harti",
        ressources.getDrawable(R.drawable.maps)).setContent(intentMaps);

        // Contact tab
        Intent intentContact = new Intent().setClass(this, HtmlContact.class);
        TabSpec tsContact = th.newTabSpec("Contact").setIndicator("Contact",
        ressources.getDrawable(R.drawable.mail)).setContent(intentContact);

        // Add all tabs
        th.addTab(tsAbout);
        th.addTab(tsImages);
        th.addTab(tsCampus);
        th.addTab(tsMaps);
        th.addTab(tsContact);

        //Set About tab as default
        th.setCurrentTab(0);
    }

    @Override
    public boolean onCreateOptionsMenu(Menu menu) {
        MenuInflater inflater = getMenuInflater();
        inflater.inflate(R.menu.menu, menu);
        return true;
    }

    @Override
    public boolean onOptionsItemSelected(MenuItem item) {
        switch (item.getItemId()) {
        case R.id.men1:    Dialog dialog = new Dialog(this);
                            dialog.setContentView(R.layout.about_dlg);
                            dialog.setTitle("ANMB v1.2");
                            dialog.setCancelable(true);
                            TextView text = (TextView) dialog.findViewById(R.id.text);
                            text.setText(
                                Html.fromHtml(
                        "Academia Navala \"Mircea cel Batran\" Constanta <br /><br />"
                        +"Trimiteti sugestii la adresa: <br />"
                        +"<a href=\"mailto:marian.cata@anmb.ro\">marian.cata@anmb.ro</a><br /><br />"));
                            ImageView image = (ImageView) dialog.findViewById(R.id.image);
                            image.setImageResource(R.drawable.ic_launcher);
                            dialog.show();
                            break;
        case R.id.men2:    Intent intent = new Intent(android.content.Intent.ACTION_SEND);
                            intent.setType("text/plain");
                            intent.addFlags(Intent.FLAG_ACTIVITY_CLEAR_WHEN_TASK_RESET);
                            intent.putExtra(android.content.Intent.EXTRA_TEXT, "http://www.anmb.ro");
                            intent.putExtra(android.content.Intent.EXTRA_SUBJECT, "ANMB - android");
                            startActivity(Intent.createChooser(intent, "Share via"));
        break;
        case R.id.men3:        int prid = android.os.Process.myPid();
                            android.os.Process.killProcess(prid);
                            break;
        }
        return true;
    }
}
```

For any new activity the developer must modify the AndroidManifest.xml file to register it. For example, he must add a new activity tag like below for About.java file:

```xml
<manifest xmlns:android="http://schemas.android.com/apk/res/android"
    package="com.anmb.ANMB"
    android:versionCode="2"
    android:versionName="1.2" >
```

```xml
<uses-sdk
    android:minSdkVersion="9"
    android:targetSdkVersion="15" />

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

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

<activity
      android:name=".About"
      android:label="@string/about_name" >
      <intent-filter>
         <action android:name="android.intent.action.ABOUT" />
         <category android:name="android.intent.category.LAUNCHER" />
      </intent-filter>
</activity>
…
…
</application>
</manifest>
```
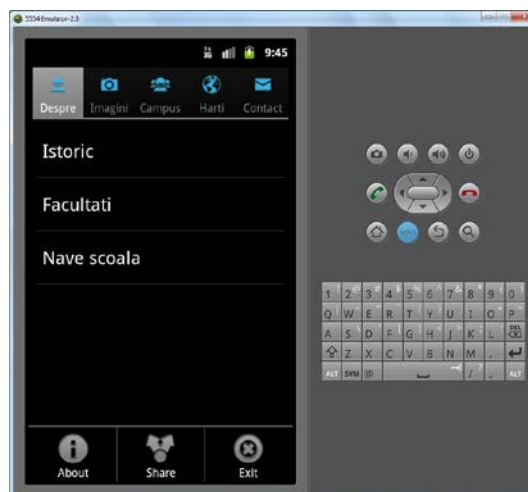

Figure 2 The result of the ANMB.java and About.java files

The icon files can by generated very fast by the Android Asset Studio (http://android-ui-utils.googlecode.com/hg/asset-studio/dist/index.html) that is an online Google Code project used for creating, sizing and managing assets.

CONCLUSIONS

With software instruments like Eclipse IDE for Java, we can make a lot of usefully applications for smartphones or tablets on Android platform. Applications for activities like checking emails, getting right direction, sharing a picture with friends or making office documents are now an indispensable part of our life. At this point "ANMB" application for Android is one of the first educational applications in Romania. I am convinced that in the near future other Romanian universities will develop similar applications for their students too.

BIBLIOGRAPHY
1. http://en.wikipedia.org/wiki/Android_(operating_system)
2. http://gigaom.com/mobile/google-play-reaches-25-billion-downloads-675000-apps/
3. http://developer.android.com
4. http://www.eclipse.org