App Development for Smart Devices

CS 495/595 – Fall 2013

Lec #9: Advanced Topics

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Objective

• Web Browsing
• Android Backup
• Android Animation
• Publishing Your Application

• Student Presentations
  – Amarino: a toolkit for the rapid prototyping of mobile ubiquitous computing
    • Presenter: Ben Pitts
    • Nick Waytowich
Web Browsing
Objectives

• Show how to launch the built-in Browser application in three ways.
  ➤ Launch the browser to a specific URL.
  ➤ Create text with links.
  ➤ Launch a Google web search and specify the search criteria.

• You will achieve these goals by creating and configuring the appropriate Intents within your application’s Activity class.
Launch the Browser

• Working with URIs:
  ➤ Use Uri objects to identify the unique location of a piece of data.
  ➤ Create a Uri object from a web URL using the `parse()`

```java
Uri uriUrl = Uri.parse("http://www.google.com/");
```

• Creating the Intent:
  ➤ Use `android.content.Intent.ACTION_VIEW` to view HTML
  ➤ Specify the URI in the intent

```java
Intent launchBrowser = new Intent(Intent.ACTION_VIEW, uriUrl);
```

• Launching the Intent:
  ➤ Call the `startActivity()` method, passing in your Intent

```java
startActivity(launchBrowser);
```
Text with Links

• Another easy is simply by including links within text on the screen.

• The TextView object can be configured to find these and turn them into clickable links
  ➤ No special formatting commands or tags are needed within the string.

• Example:

```xml
<TextView
    android:layout_width="fill_parent"
    android:layout_height="wrap_content"
    android:text="@string/contains_links"
    android:textSize="14dp"
    android:autoLink="web" />
```
Google web search

• Enabling Web Searches
  ➤ If content with a Google search, use web search Intent
  `android.content.Intent.ACTION_WEB_SEARCH`.

```java
Intent search = new Intent(Intent.ACTION_WEB_SEARCH);
```

• Supplying Search Criteria
  ➤ Uses `SearchManager.QUERY` intent extra field for search criteria

```java
Intent search = new Intent(Intent.ACTION_WEB_SEARCH);
search.putExtra(SearchManager.QUERY, "pygmy goats");
startActivity(search);
```
Becoming a Browser

• For more fine control over web content, use the WebView control.
  ➤ This special view allows fine control over rendering of web content.

• In the following, we describe:
  ➤ How you can embed an Android WebView in your application with the WebKit engine.
  ➤ How to both load an external URL and render custom markup that you supply in-app.
Becoming a Browser

• Setting up the WebView Widget
  ➤ Declare it in a layout file
  ➤ Access it from an Activity and tell it what to do.

```xml
<?xml version="1.0" encoding="utf-8"?>
<LinearLayout xmlns:android="http://schemas.android.com/apk/res/android"
  android:orientation="vertical"
  android:layout_width="fill_parent"
  android:layout_height="fill_parent"
>
  <WebView android:id="@+id/web_engine"
    android:layout_width="fill_parent"
    android:layout_height="fill_parent"
  />
</LinearLayout>
```
Becoming a Browser

• Requesting Internet Permission
  
  ```xml
  <uses-permission android:name="android.permission.INTERNET" />
  ```

• Load a Web Page
  ➢ In your main activity, add the following code into the onCreate():

  ```java
  WebView engine = (WebView) findViewById(R.id.web_engine);
  engine.loadUrl("http://mobile.tutsplus.com");
  ```
Becoming a Browser

• Render Custom Markup

➤ Replace the loadUrl() call with loadData(), which takes three arguments: String htmlData, String mimeType, String encoding

String data = "<html>" +
"<body><h1>Yay, Mobiletuts+!</h1></body>" +
"</html>";
engine.loadData(data, "text/html", "UTF-8");

• Note

➤ JavaScript should be enabled:

engine.getSettings().setJavaScriptEnabled(true);
Becoming a Browser

• Extra features
  ➤ `reload()`: Refreshes and re-renders the page.
  ➤ `goForward()`: Goes one step forward in browser history.
  ➤ `goBack()`: Goes one step back in browser history.

• Use `WebSettings` class to define the features of the browser.

```
WebSettings webSettings = webView.getSettings();
```

➤ `setBlockNetworkImage()`: Block network images to reduce the data loading using the method.
➤ `setDefaultFontSize()`: Set font size of the displayed web content

➤ Other methods: `setSaveFormData()`, `setJavaScriptEnabled()`, `setSavePassword()`, `setSaveFormData()`, `setJavaScriptEnabled()`, `setSupportZoom()`
Android Backup
Overview

• Users store a lot of data on different applications like notes, game data, application settings, address book entries, …
  ➤ All these data cannot be recovered after they are gone.
  ➤ Backup service hosted by Google was introduced in Android 2.2.
  ➤ All the application data can use the backup service to store any data to the cloud.
Creating a Backup of Runtime Data

- Use **BackupManager** class to notify the Backup service to do backup and restore operations.
  - ➤ After the notification is received, the backup manager requests backup data from the application and delivers it to a cloud storage server during backup.
  - ➤ It also retrieves backup data from the backup transport and returns it to applications during a restore process.

- A backup agent is the interface where the BackupManager communicates with the applications.
  - ➤ Extend the **BackupAgent** in their class.
  - ➤ Two methods need to be overridden:
    - **onBackup()**: triggered whenever there is a dataChanged() method call.
    - **onRestore()**: triggered whenever there is a requestRestore()
Creating a Backup of Runtime Data

• **onBackup()** has three parameters:
  ➤ **oldState**—Return the state from the last backup.
  ➤ **data**—The data that is backed up
  ➤ **newState**—Write the current state of the backup, which becomes the **oldState** for the next backup

• **onRestore()** has three parameters:
  ➤ **data**—The data from the last backup.
  ➤ **appVersionCode**—The application’s version code during the backup operation. The version code is defined as the attribute **android:versionCode** in the Android-Manifest XML file.
  ➤ **newState**—Write the current state as the restore point.
Creating a Backup of Runtime Data

public class MyBackupAgent extends BackupAgent {
    @Override
    public void onCreate() {
        ...
    }

    @Override
    public void onBackup(ParcelFileDescriptor oldState, BackupDataOutput data, ParcelFileDescriptor newState){
        ...
    }

    @Override
    public void onRestore(BackupDataInput data, int appVersionCode, ParcelFileDescriptor newState){
        ...
    }
}
Backing Up Files to the Cloud

- **BackupAgent** is intended to save application run-time data.
- **BackupAgentHelper** is intended to save files
  - Wrapper class for the backup agent class.
  - Supports two different kinds of backup helpers
    - **SharedPreferencesBackupHelper** to backupSharedPreferences files
    - **FileBackupHelper** to backup file
Triggering Backup and Restore

- To define Backup agent, add `android:backupAgent` attribute inside the application manifest file
  
  `<application android:label="Backup/Restore" android:backupAgent="myBackupAgent">`

- Anytime the application triggers a backup or restore to the BackupManager, it initiates with the identified backup agent.

```java
public class MyBandRActivity extends Activity {
    BackupManager mBackupManager;
    @Override
    public void onCreate(Bundle savedInstanceState) {
        super.onCreate(savedInstanceState);
        mBackupManager = new BackupManager(this);
    }
    void dataUpdate() {
        ...
        mBackupManager.dataChanged(); // use BackupAgent defined in manifest file
    }
}
```
Triggering Backup and Restore

• Use `requestRestore()` of the BackupManager to trigger restore.
  ➤ triggers a call to the backup agent’s `onRestore()` method

• Also, a factory data reset or when the application is reinstalled trigger restore for the application.

• Android provides a command-line script `bmgr` that can trigger backup/restore
  ➤ Back trigger: “> `adb shell bmgr backup <package>`”
  ➤ Restore trigger: “> `adb shell bmgr restore <package>`”
  ➤ To force the BackupManager to do the backup right away:
    “> `adb shell bmgr run`”
Android Animation
Android Animation

• Two types of animation: frame-by-frame and Tween animation.
• Frame-by-frame animation needs an animation-list element in the layout file
  ➢ Containing a list of item elements specifying an ordered list of the different pictures to display.
  ➢ `oneshot` attribute specifies whether the animation is played only once or repeatedly
  ➢ Example: `res/anim/animated.xml`

```xml
<?xml version="1.0" encoding="utf-8"?>
<animation-list xmlns:android="http://schemas.android.com/apk/res/android"
  android:oneshot="false">
  <item android:drawable="@drawable/anddev1" android:duration="200" />
  <item android:drawable="@drawable/anddev2" android:duration="200" />
  <item android:drawable="@drawable/anddev3" android:duration="200" />
</animation-list>
```
Android Animation

• To display the frame-by-frame animation,
  ➤ set the animation to a view’s background
  ➤ a drawable can be retrieved by calling getBackground() and casting it to AnimationDrawable.
  ➤ calling the start() method starts the animation.

```
ImageView im = (ImageView) this.findViewById(R.id.myanimated);
im.setBackgroundResource(R.anim.animated);
AnimationDrawable ad = (AnimationDrawable)im.getBackground();
ad.start();
```
Android Animation

• Tween animation uses a different approach that creates an animation by performing a series of transformations on a single image.

• Android provides access to the following classes that are the basis for all the animations
  ➤ AlphaAnimation—Controls transparency changes
  ➤ RotateAnimation—Controls rotations
  ➤ ScaleAnimation—Controls growing or shrinking
  ➤ TranslateAnimation—Controls position changes

• Used for transitions between activities, layouts, views, etc.

• Defined in the layout XML file as <alpha>, <rotate>, <scale>, and <translate>.
Example

- Creates a new mail animation that can be used when mail is received.

- Layout file: res/layout/main.xml

```
<LinearLayout xmlns:android="http://schemas.android.com/apk/res/android"
    android:orientation="vertical"
    android:layout_width="fill_parent"
    android:layout_height="fill_parent"
    android:gravity="center"
>
    <ImageView
        android:id="@+id/myanimated"
        android:layout_width="wrap_content"
        android:layout_height="wrap_content"
        android:src="@drawable/mail"
    />

    <Button
        android:id="@+id/startAnimated"
        android:layout_width="wrap_content"
        android:layout_height="wrap_content"
        android:text="you've got mail"
    />
</LinearLayout>
```
Example

- Animation file: res/anim/animated.xml

```xml
<?xml version="1.0" encoding="utf-8"?>
<set xmlns:android="http://schemas.android.com/apk/res/android"
     android:interpolator="@android:anim/accelerate_interpolator">
  <translate android:fromXDelta="100%p" android:toXDelta="0" android:duration="5000" />
  <alpha android:fromAlpha="0.0" android:toAlpha="1.0" android:duration="3000" />
  <rotate android:fromDegrees="0" android:toDegrees="-45"
          android:fromYScale="0.0" android:pivotX="50%"
          android:pivotY="50%" android:startOffset="700"
          android:duration="3000" />
  <scale android:fromXScale="0.0" android:toXScale="1.4"
         android:fromYScale="0.0" android:toYScale="1.0"
         android:pivotX="50%" android:pivotY="50%"
         android:startOffset="700" android:duration="3000"
         android:fillType="false" />
</set>
```
Example

- **Main Activity**

```java
package edu.odu.cs.cs495.animation;
import android.app.Activity;
import android.os.Bundle;
import android.view.View;
import android.view.View.OnClickListener;
import android.view.animation.Animation;
import android.view.animation.AnimationUtils;
import android.widget.Button;
import android.widget.ImageView;

public class myanimation extends Activity {
    /** Called when the activity is first created. */
    @Override
    public void onCreate(Bundle savedInstanceState) {
        super.onCreate(savedInstanceState);
        setContentView(R.layout.main);
        final ImageView im = (ImageView) findViewById(R.id.myanimated);
        final Animation an = AnimationUtils.loadAnimation(this, R.anim.animated);
        im.setVisibility(View.INVISIBLE);
        Button bt = (Button) findViewById(R.id.startAnimated);
        bt.setOnClickListener(new OnClickListener(){
            public void onClick(View view){
                im.setVisibility(View.VISIBLE);
                im.startAnimation(an);
            }
        });
    }
}
```
Publish to Android Market
The Checklist

• Have I tested my application extensively?
  ➤ Emulator + Physical device
  ➤ Multiple hardware devices running different Android versions.

• Does my application perform well?
  ➤ Performance is really important especially in games

• Have I decided on SDK compatibility?
  ➤ Android 2.2 & 2.3 dominate?

![Most common SDK versions, August 25, 2011]

- 1.5 (Cupcake)
- 1.6 (Donut)
- 2.1 (Eclair)
- 2.2 (Froyo)
- 2.3 (Gingerbread)
- 3.0/3.1 (Honeycomb)
Getting your application ready

• Step 1: Request necessary Android permissions
  ➤ Make sure that you’re requesting all necessary permissions, otherwise your application won’t work.

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

• Step 2: Specify a name and icon
  ➤ Name your application and give it an icon using the `android:label` and `android:icon` attribute in the application tag

```
<application android:label="@string/app_name" android:icon="@drawable/myIcon">
```
Getting your application ready

- Step 3: Configure version manifest data
  - Pick a version your application using `android:versionCode` and `android:versionName`.
  - `versionCode` is an integer that *must* increment for every update.
  - `versionName` is a user-friendly value (e.g., 0.1 or 1.0b or 2.4.1)

```xml
<manifest xmlns:android="http://schemas.android.com/apk/res/android"
  package="com.example" android:versionCode="1"
  android:versionName="1.0.0">`
```
Getting your application ready

• Step 4: Set compatibility options
  ➤ If you’re utilizing Android features that aren’t available in older versions → specify a set of version requirements within `uses-sdk`.
  ➤ `android:minSdkVersion` The minimum Android platform API level on which your application will be able to run.
  ➤ `android:targetSdkVersion` The API level that your application was designed to run on.
  ➤ `android:maxSdkVersion` An upper limit for compatibility. Don’t set this unless you have a very good reason to.

• Step 5: Cleanup files and remove logging
Getting your application ready

- Step 6: Sign and ZIP-align your application
  - Android applications must be digitally signed with a certificate that the developer holds to ensure the authenticity.
  - Pick a strong password for your private key and ensure to keep it safe.
  - Eclipse by default signs compiled apps with debug key.
  - Use Export Wizard:
    1. Select the project and select File > Export.
    2. Open the Android drop-down and select Export Android Application.
    3. Follow the wizard’s steps to compile, sign and ZIP-align your application.

Your validity period must extend 2033 or else the Android Market will reject your app!
Becoming a Market publisher

• Registration
  1. Register as a publisher and setup your profile.
     ➤ http://market.android.com/publish and sign in with your Google account
     ➤ Fill out all the required information along with your real phone number
     ➤ Note: you can always change “developer name” later via your profile page

  2. Read and agree to the Android Market Developer Distribution Agreement.

     ➤ Click the Google Checkout button and pay the one-time registration fee
Becoming a Market publisher

• Uploading an application
  ➤ Login to your publisher account and click “Upload an Application”.
  ➤ Fill in all of the form data and include screenshots if you can and provide a precise, short and well-formatted description.
  ➤ You can also choose whether or not you want to release it as a free or paid app.
  ➤ Click “Publish.”

Congratulations, you’ve just successfully published an application to the Android Market!
Questions?
To DO

• Examples –
  • Social Networking - Tweeter:  
    http://www.cs.odu.edu/~cs495/materials/Lec-9_Tweeter_Example.pdf