CS378 - Mobile Computing

Web - WebView and Web Services
WebView

• A View that display web pages
  – basis for creating your own web browser
  – OR just display some online content inside of your Activity
• Uses WebKit rendering engine
  – http://www.webkit.org/
WebView

• Built in functionality to:
• display page
• navigate forward and backwards through a history
• zoom in and out
• perform searches
• and more. some examples:
  — capture images of page, search page for string,
    deal with cookies on a per application basis,
WebView Example

- Simple app to view and navigate web pages - demo WebView class
- res/layout/main.xml
WebView Activity

- override `onCreate`
- go to UT mobile site

```java
public class HelloWebView extends Activity {

    private WebView mWebView;

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

        mWebView = (WebView) findViewById(R.id.webview);
        mWebView.getSettings().setJavaScriptEnabled(true);
        mWebView.loadUrl("http://m.utexas.edu");
    }
}
```
WebView Example

• Must add permission for app to use Internet

• Also change style so no title bar
Current Result

Clicking link actually leads to the default Android browser
Handling URL Requests

- To enable activity to handle its own URL requests create an inner class that extends WebViewClient

```java
private class HelloWebViewClient extends WebViewClient {
    @Override
    public boolean shouldOverrideUrlLoading(WebView view, String url) {
        view.loadUrl(url);
        return true;
    }
}
```

- set client for mWebView

```java
mWebView.setWebViewClient(new HelloWebViewClient());
```
Navigating

- Making previous changes disables the back button
- Must override onKeyDown method
- Use WebView object to see if possible to go back

```java
@Override
public boolean onKeyDown(int keyCode, KeyEvent event) {
    if ((keyCode == KeyEvent.KEYCODE_BACK)
        && mWebView.canGoBack()) {
        mWebView.goBack();
        return true;
    }
    return super.onKeyDown(keyCode, event);
}
```
Using Built In Browser

• To simply use the built in browser create an Intent and start the Activity
• Like the Top Ten List App

```java
public void showTop10(View v) {
    int day = datePicker.getDayOfMonth();
    int month = datePicker.getMonth() + 1;
    int year = datePicker.getYear();
    Log.d(TAG, "date: " + day + "\\" + month + "\\" + year);

    Intent i = new Intent(Intent.ACTION_VIEW,
                 Uri.parse("http://www.cbs.com/late_night" +
                 "/late_show/top_ten/" +
                 "top_ten_update_by_date.php?year="+year
                 +"&month=" + month + "&day=" + day));
    startActivity(i);
```
More on WebView

• Scenarios for using WebView in app instead of built in browser:
  • provide info the app might need to update such as end user agreement or user guide (instead of doing app update)
    – display documents hosted online
  • OR application provides data that ALWAYS requires internet connect to retrieve data
    – as opposed to performing network request and parsing data to display in Android layout
• http://developer.android.com/guide/webapps/webview.html
Web Services

• "Web services are a means of exposing an API over a technology-neutral network endpoint.

• They are a means to call a remote method or operation that's not tied to a specific platform or vendor and get a result."

—Android in Action 3rd edition
Web Services Sources


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WeatherBug Example

• From Deitel Android Programmers: An App-Driven Approach

• Example for Tablets
  – Fragments
  – tabbed navigation in Action Bar
  – Widget for home screen

• Are focus is on the use of Web Services
WeatherBug API

Build your own weather application using WeatherBug API tools

WeatherBug API lets novice to advanced developers create amazing weather applications using WeatherBug data.
WeatherView App - Current

Round Rock TX, 78681 United States

Temperature: 79°F
Feels like: 79°F
Humidity: 52%
Chance of Precipitation: 0%
WeatherView App - Five Day Forecast

Round Rock TX, 78681 United States

**Wednesday**
Cloudy in the morning then becoming partly sunny. Highs in the upper 70s. South winds 5 to 10 mph.
High: 81
Low: 60

**Thursday**
Cloudy in the morning then becoming partly sunny. A 20 percent chance of showers and thunderstorms. Highs in the upper 70s. South winds 5 to 10 mph.
High: 78
Low: 62

**Friday**
Cloudy with a 50 percent chance of showers and thunderstorms. Highs in the mid 70s.
High: 78
Low: 62

**Saturday**
Partly sunny with a 20 percent chance of showers and thunderstorms. Highs in the lower 80s.
High: 81
Low: 62

**Sunday**
Partly cloudy. Lows in the lower 60s. Highs in the lower 80s.
High: 82
Low: 62
Use of API

• many API's require registration and a key value
• key used in requests

```java
// construct Weatherbug API URL
URL url = new URL(resources.getString(
    R.string.location_url_pre_zipcode) + zipcodeString +
    "&api_key=A5559065586");
```
WeatherBug Web Services

- Three classes deal with making requests via the WeatherBug API in WeatherView
  - ReadLocationTask
    - based on zip get location information
  - ReadForecastTask
    - read current forecast for given zip code
  - ReadFiveDayForecastTask
    - get forecast for next five days for given zip code
Tasks

• All three class extend AsyncTask
• constructors
• override doInBackground method
• override onPostExecute method
• define their own listeners
• Keep the UI thread responsive by using AsyncTask to perform potentially slow tasks
AsynchTask

• "AsyncTask allows you to perform asynchronous work on your user interface. It performs the blocking operations in a worker thread and then publishes the results on the UI thread, without requiring you to handle threads and/or handlers yourself."

• Task started by invoking the execute method

ReadLocationTask

• Created with Context, zip code, and Listener

• Listener updated in postExecute method

```java
public ReadLocationTask(String zipCodeString,
                        Context context,
                        LocationLoadedListener listener) {
    this.zipcodeString = zipCodeString;
    this.context = context;
    this.resources = context.getResources();
    this.weatherLocationLoadedListener = listener;
}
```
ReadLocationTask - doInBackground

• Creates URL using zip and key for API

```java
// load city name in background thread
@Override
protected String doInBackground(Object... params) {
    try {
        // construct Weatherbug API URL
        URL url = new URL(resources.getString(
            R.string.location_url_pre_zipcode) + zipcodeString +
            "&api_key=A5559065586");

        Reader forecastReader = new InputStreamReader(
            url.openStream());
```
JSON

- JavaScript Object Notation
- A way to represent JavaScript objects as Strings
- Alternative to XML for passing data between servers and clients
- Design for data interchange format that humans can also read and write
JSON Format

- Built on two structures
  - collection of name value pairs: a.k.a. objects, records, structs, etc.
  - an ordered list of values: a.k.a. an array

- objects
JSON Format

- arrays

- values
  - string, number, object, array, true, false, null
JSON Examples

• value:
  – "Round Rock"

• array:
  – ["Round Rock", "Dallas", "Houston"]

• object
  –{"height":70,"weight":165}
Results For ReadLocationTask

• [http://i.wxbug.net/REST/Direct/GetLocation.ashx?zip=78681&api_key=xxxxx](http://i.wxbug.net/REST/Direct/GetLocation.ashx?zip=78681&api_key=xxxxx) – where xxxxx is your API key

• Result:

  ```json
  ```
Parsing JSON

- JsonReader class in Android API
- Read JSON encoded values as a stream of tokens
- In example used by ReadLocationTask to parse the JSON returned by the web request
- Pulls out city, state, and country string to display in View
Creating JsonReader

• and checking it is a location

JsonReader forecastJsonReader = new JsonReader(forecastReader);
forecastJsonReader.beginObject(); // read the first Object

String name = forecastJsonReader.nextName();

// if the name indicates that the next item describes the // zipcode's location
if (name.equals(resources.getString(R.string.Location))) {
    forecastJsonReader.beginObject();
    String nextNameString;
while (forecastJsonReader.hasNext()) {
    nextNameString = forecastJsonReader.nextName();
    // if the name indicates that the next item describes the
    // zipcode's corresponding city name
    if ((nextNameString).equals(
            resources.getString(R.string.city))
        cityString = forecastJsonReader.nextString();
    else if ((nextNameString).equals(resources.
            getString(R.string.state))
        stateString = forecastJsonReader.nextString();
    else if ((nextNameString).equals(resources.
            getString(R.string.country))
        countryString = forecastJsonReader.nextString();
    else
        forecastJsonReader.skipValue();
}

forecastJsonReader.close();
onPostExecute

- Send the city, state, and country data to the listener

```java
// executed back on the UI thread after the city name loads
protected void onPostExecute(String nameString) {
    if (cityString != null)
        weatherLocationLoadedListener.onLocationLoaded(cityString,
                                                                stateString,
                                                                countryString);
    else {
        Toast errorToast = Toast.makeText(context, resources.getString(R.string.invalid_zipcode_error), Toast.LENGTH_LONG);
        errorToast.setGravity(Gravity.CENTER, 0, 0);
        errorToast.show();
    }
}
```
ReadForecastTask

• Similar in nature to ReadLocationTask, but different url for different data

• 

```json
{"forecastHourlyList":
 [{"chancePrecip": "10", "dateTime": 1332882000000, "desc": "Partly Cloudy", "dewPoint": 64, "feelsLike": 73, "feelsLikeLabel": "Heat Index", "humidity": "74", "icon": "cond002", "skyCover": null, "temperature": 73, "windDir": null, "windSpeed": 10},
 {"chancePrecip": "10", "dateTime": 1332885600000, "desc": "Partly Cloudy", "dewPoint": 64, "feelsLike": 70, "feelsLikeLabel": "Heat Index", "humidity": "81", "icon": "cond002", "skyCover": null, "temperature": 70, "windDir": null, "windSpeed": 11},
...
and on for another 158 hours
```
ReadForecastTask

• Also downloads image for current condition

```java
// get the sky condition image Bitmap
public static Bitmap getIconBitmap(String conditionString,
    Resources resources, int bitmapSampleSize) {
    Bitmap iconBitmap = null;
    try {
        // create a URL pointing to the image on WeatherBug's site
        URL weatherURL = new URL(resources.getString(
            R.string.pre_condition_url) + conditionString +
            resources.getString(R.string.post_condition_url));

        Log.d(TAG, weatherURL.toString());

        BitmapFactory.Options options = new BitmapFactory.Options();
        if (bitmapSampleSize != -1)
            options.inSampleSize = bitmapSampleSize;

        // save the image as a Bitmap
        iconBitmap = BitmapFactory.decodeStream(weatherURL.
            openStream(), null, options);
    }
```
Icons Obtained From WeatherBug
ReadFiveDayForecastTask

- {"dateTime":1332892800000, "dayDesc":"Partly Cloudy","dayIcon":"cond003","dayPred":"Cloudy in the morning...becoming partly cloudy. Patchy fog in the morning. Highs 61 to 66. Light winds becoming west 15 mph with gusts to 25 mph in the afternoon.", "dayTitle":"Wednesday","hasDay":true, "hasNight":true,"high":"66","hourly":null,"low":"54","nightDesc":"Drizzle","nightIcon":"cond162","nightPred":"Partly cloudy in the evening...becoming cloudy. Patchy fog and patchy drizzle overnight. Lows 49 to 55. Areas of winds northwest 15 to 20 mph with gusts to 25 mph in the evening becoming light.", "nightTitle":"WednesdayNight","title":"Wednesday"}
Displaying Data

• App does not try and display all data, just chooses "most important"
  • icon
  • day of week
  • day prediction
  • high temp
  • low temp