

Delivering Mobile Applications for the iPhone and Android Devices Using Java Technologies

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Agenda

- Quick overview of mobile development from browser only implementations (using WURFL-Wireless Universal Resource FiLe, WNG and iui to deliver a mobile friendly browser interface, but will also dive into using technologies including PhoneGap, GWT and iui to deliver a hybrid native application that you can publish to Apple application store and the Android Marketplace. Some points that we will cover:
 - Using WURLF in a J2EE environment
 - The different css frameworks that one can use (nokia, iui) for mobile
 - Introduction to PhoneGap and how it works. Cover phonegap api's such as GeoLocation and the Camera device
 - How to extend PhoneGap, will cover integration with Facebook Login as an example.
 - Brief overview of GWT and how it fits with PhoneGap in mobile space.
 - Introduction to Phillip's GWT/PhoneGap library which allows you to work with PhoneGap via GWT
 - Overview of build process leveraging ant and maven
 - We will finish up by pushing a PhoneGap app to the Apple store and to the Android marketplace.
-
-

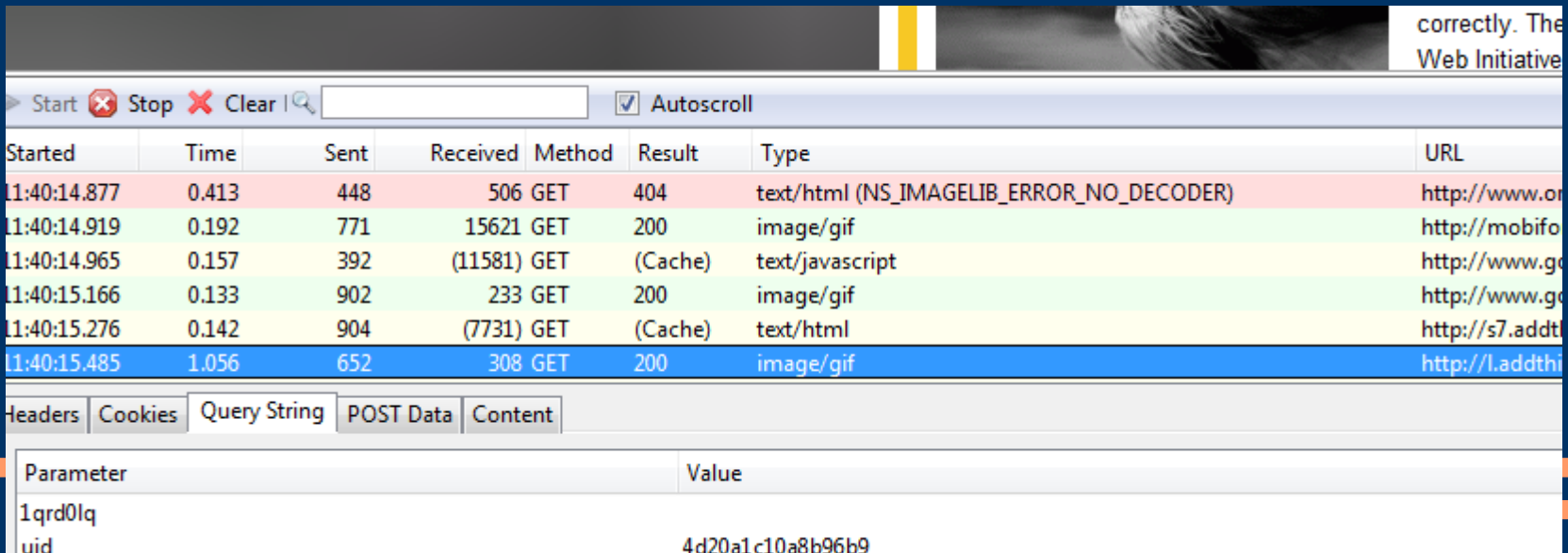
WURFL

- WURFL- stands for “the Wireless Universal Resource File”
- It's a huge XML file (over 10 megs) that lists every kind of wireless device with it's “capabilities”
- Capabilities are what the device can do, such as if it supports html4, can display images, has a camera, etc..



How's wurfl work?

- Every browser sends headers to the HTTP server. One of the headers is called a “user-agent” The “user-agent” is typically set by your browser to indicate the type of browser it is (Firefox vs. IE) (v4 v. v5)
- An excellent tool to check out http headers is a firefox plugin called “http fox”



The screenshot shows the 'http fox' plugin interface. At the top, there are buttons for 'Start', 'Stop', and 'Clear', along with an 'Autoscroll' checkbox. Below this is a table listing network requests. The selected request is highlighted in blue. Below the table, there are tabs for 'Headers', 'Cookies', 'Query String', 'POST Data', and 'Content'. The 'Query String' tab is active, showing a table with 'Parameter' and 'Value' columns.

Started	Time	Sent	Received	Method	Result	Type	URL
11:40:14.877	0.413	448	506	GET	404	text/html (NS_IMAGELIB_ERROR_NO_DECODER)	http://www.or
11:40:14.919	0.192	771	15621	GET	200	image/gif	http://mobifo
11:40:14.965	0.157	392	(11581)	GET	(Cache)	text/javascript	http://www.g
11:40:15.166	0.133	902	233	GET	200	image/gif	http://www.g
11:40:15.276	0.142	904	(7731)	GET	(Cache)	text/html	http://s7.addt
11:40:15.485	1.056	652	308	GET	200	image/gif	http://l.addthi

Parameter	Value
1qrd0lq	
uid	4d20a1c10a8b96b9

Another plugins (for browser testing)

- User Agent Switcher, let's you impersonate an iphone, android mobile device.
- Sometimes you may need to send other headers.



WURFL Usage

- Configure via servlet mapping or spring config

wurfl-default-ctx.xml

```
<bean id="wurflModel"
  class="net.sourceforge.wurfl.core.resource.DefaultWURFLModel" >
  <constructor-arg index="0">
    <bean class="net.sourceforge.wurfl.core.resource.SpringXMLResource">
      <constructor-arg value="/WEB-INF/wurfl.zip" />
    </bean>
  </constructor-arg>
  <constructor-arg index="1">
    <bean class="net.sourceforge.wurfl.core.resource.WURFLResources">
      <constructor-arg>
        <list>
          <bean class="net.sourceforge.wurfl.core.resource.SpringXMLResource">
            <constructor-arg value="/WEB-INF/web_browsers_patch.xml" />
          </bean>
        </list>
      </constructor-arg>
    </bean>
  </constructor-arg>
</bean>
```

WURFL Usage

```
WURFLHolder wurflHolder = (WURFLHolder) getServletContext()
    .getAttribute("net.sourceforge.wurfl.core.WURFLHolder");

WURFLManager wurfl = wurflHolder.getWURFLManager();

Device device = wurfl.getDeviceForRequest(request);

log.debug("Device: " + device.getId());

Markup markUp = device.getMarkup();

String jspView = null;

if (Markup.XHTML_ADVANCED.equals(markUp)) {
    jspView = XHTML_ADV;
} else if (Markup.XHTML_SIMPLE.equals(markUp)) {
    jspView = XHTML_SIMPLE;
} else if (Markup.CHTML.equals(markUp)) {
    jspView = CHTML;
} else if (Markup.WML.equals(markUp)) {
    jspView = WML;
}
```

CSS Frameworks for Mobile

- You can achieve a lot through the use of CSS

- Three major (IMHO) css libraries for mobile
 - Nokia
 - Iui
 - yui

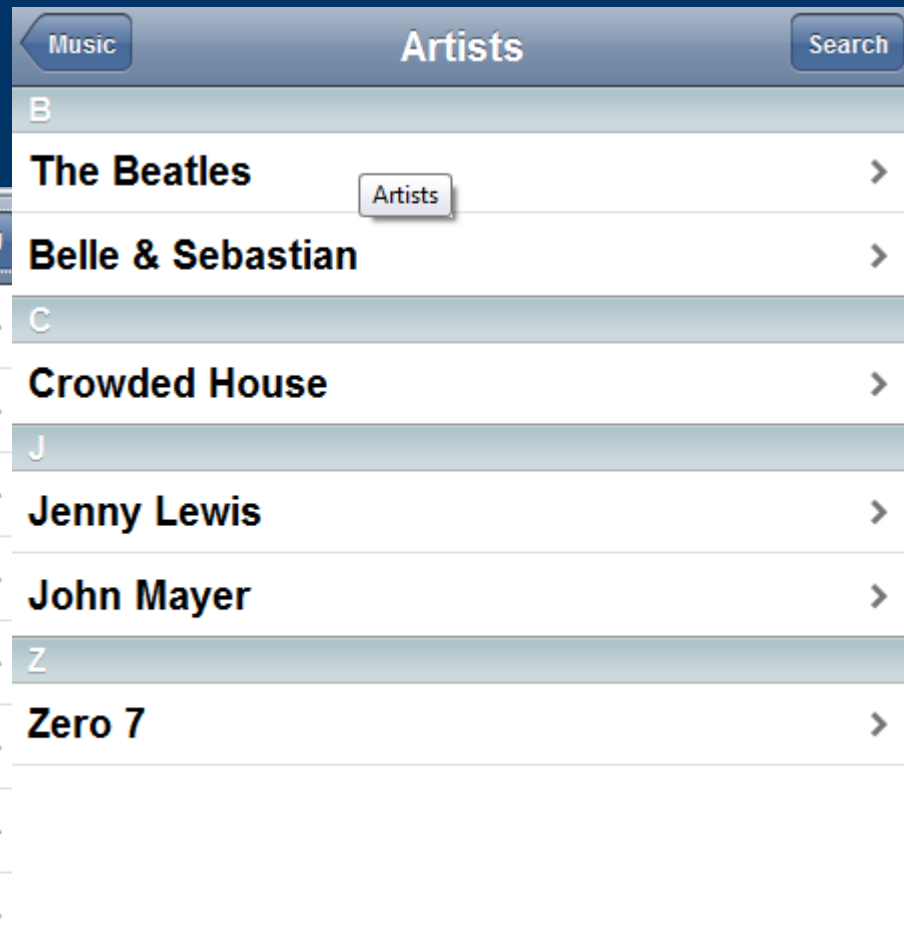
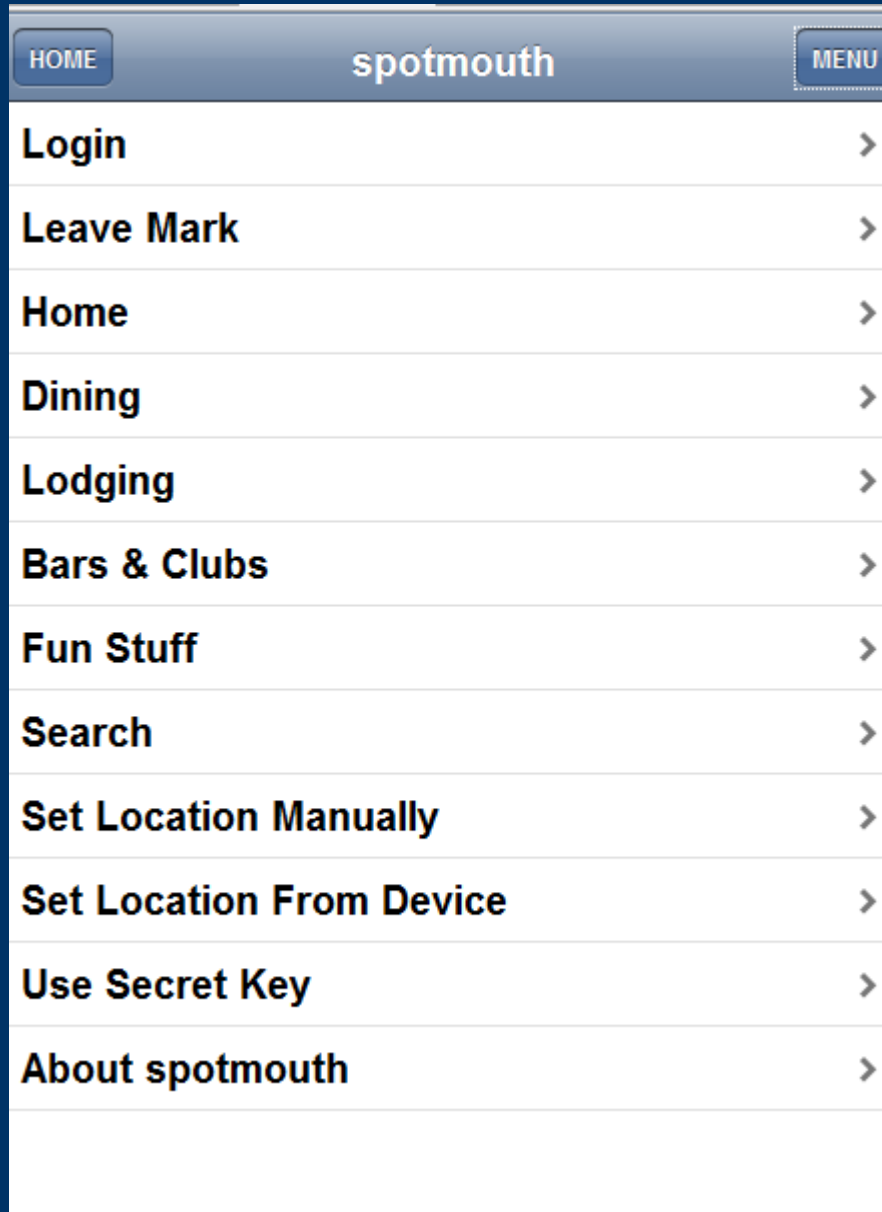


CSS in 30 seconds

“Selectors” are part of CSS rules that select the DOM elements that you want to apply CSS rules to. There are two types of selectors

- Class Selector: `.makemeyellow {color:yellow;}` The “.h2” is the selector and it's going to select anything in your DOM structure that has a css class of “makemeyellow” it it (i.e. `<div class=”makemeyellow”>I am yellow</div>`)
- ID Selector: Id's are created by using an “id”. Should be unique within DOM. `<div id=”makemeyellow”>I am yellow</div>`
- `#makemeyellow {color:yellow;}`

Iui Example



GWT Overview



- You write in Java. The Java you write is compiled to Javascript

When you are developing, the compilation of Java to javascript is done on the fly using the development tools that GWT provides.

When you deploy, the GWT will compile X number of versions of your program to javascript for the different browsers out there. It handles which version to server to the browser automatically.



GWT



Download it

(<http://code.google.com/webtoolkit/>)

Unzip it

Add it to your path

Run the “webAppCreator”

```
webAppCreator -out MyWebApp  
com.mycompany.mywebapp.MyWebApp
```

Import into eclipse (or whatever IDE) if you want.

```
“ant devmode”
```

GWT Libraries



- Tons of libraries out there.
 - Key thing, the GWT compiler needs the source code of the library in order for your application to use it.
 - Most of the core Java stuff you can use, but some outliers (Calendar) that you can use third party plugins for
 - Coding in Java/But not java. Not all the functions
-
-

GWT Library Packaging with MVN

```
<resources>
  <resource>
    <directory>src/main/java</directory>
    <includes>
      <include>**/*.xml</include>
    </includes>
  </resource>
  <resource>
    <directory>src/main/java</directory>
    <includes>
      <include>**/*.java</include>
    </includes>
  </resource>
</resources>
```

```
<?xml version="1.0" encoding="UTF-8"?>
<module rename-to='camera'>
  <!-- Inherit the core Web Toolkit stuff. -->
  <inherits name='com.google.gwt.user.User' />
  <!-- Inherit the default GWT style sheet. You can change -->
  <!-- the theme of your GWT application by uncommenting -->
  <!-- any one of the following lines. -->
  <!-- <inherits name='com.google.gwt.user.theme.chrome.Chrome' /> -->
  <!-- <inherits name='com.google.gwt.user.theme.dark.Dark' /> -->
  <!-- Other module inherits -->
  <!-- Specify the paths for translatable code -->
  <source path='client' />
  <source path='shared' />
</module>
```

JavaScript Native Interface (JSNI) in GWT

```
public native Camera getCamera() /*-{  
    return $wnd.navigator.camera;  
}-*/;
```



GWT Server Communication

- Easiest is to use RPC that will automatically marshall/unmarshall JSON for you

For the anxious and impatient, here's a quick table overview.

Method	To server	From server	Cross domain	Payload length	Notes
HTTP request	yes	yes	no	unlimited (post)	developer responsible for making sense of data
GWTRPC	yes	yes	no	unlimited (post)	only works with java server on the backend
JSON	yes	yes	yes	limited by URL length (2048)	hard to determine when data is loaded
JSONP	yes	yes	yes	limited by URL length (2048)	
Form	yes	yes/no	yes	unlimited payload	no server response available if posting cross domain
Iframe	yes	yes	no	limited by URL length	cross domain fails

SOP (Same origin policy) does not apply when DEPLOYED, but when developing

Firefox will block access, but not when running from filesystem using safari (WEBKIT) browser.

Firefox is best for development/but safari works. Catch 22

source <http://www.mooreds.com/wordpress/archives/000500>

Crazy Dependencies

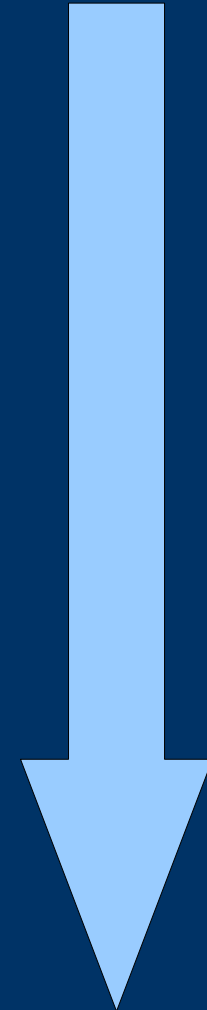
PhoneGap-GWT
MVN Build

Ant script that deploys
GWT libs to your GWT apps

You GWT Application
Ant script compiles
your Java to javascript

Ant script that deploys your compile GWT application
to your phonegap apps (mac and android, etc)

Your phonegap application
(emulator or device)



Ant favs

```
Copy my gwt lib to my gwt app.  
<target name="deploy">
```

```
  <copy verbose="true" overwrite="true" file="./target/phonegap-gwt-1.0-SNAPSHOT.jar"  
  todir="/project_workspaces/georepo_workspace/MyWebApp/war/WEB-INF/lib"/>
```

```
</target>
```

```
Copy my compiled gwt app to my android workspace  
<property file="${user.home}/ant-global.properties"/>
```

```
<target name="android" depends="build">
```

```
  <property name="myprojectdir" location="C:/usr/local/phonegap/phonegap-phonegap-android-f090f9a/spotmouth/assets" />  
  <delete includeemptydirs="true">
```

```
    <fileset dir="${myprojectdir}/www" includes="**/*"/>
```

```
</delete>
```

```
<copy todir="${myprojectdir}/www">
```

```
  <fileset dir="C:\project_workspaces\georepo_workspace\MyWebApp\war">
```

```
    <exclude name="**/WEB-INF/**"/>
```

```
    <exclude name="**/phonegap.js"/>
```

```
  </fileset>
```

```
</copy>
```

```
<copy todir="${myprojectdir}/www" overwrite="true">
```

```
  <fileset dir="C:\project_workspaces\georepo_workspace\MyWebApp\war\android">
```

```
  </fileset>
```

```
</copy>
```

```
</target>
```

Ant fav (continued)

Copy from my laptop to my mac.

```
<target name="iphone" depends="build">

  <sshexec host="phillipmac" trust="true"
username="prhodes"
password="xxx"
command="rm -Rf /Users/prhodes/project_workspaces/georepo_workspace/iphone/spotmouth/www/*"/>

  <scp trust="true"
todir="prhodes:xxx@phillipmac:/Users/prhodes/project_workspaces/georepo_workspace/iphone/spotmouth/www">
    <fileset dir="C:\project_workspaces\georepo_workspace\MyWebApp\war">
      <exclude name="**/WEB-INF/**"/>
    </fileset>
  </scp>

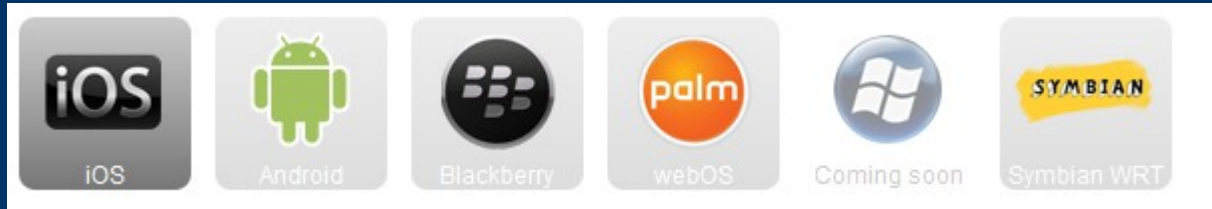
  <!--
this is just for iphone.js, childbrowser.js, etc...
this is not overwriting the ones in the root, so i am just going to use the ones in the root
so i only have to maintain one set

part 2, we need to overwrite these suckers

-->
  <scp verbose="true" trust="true"
todir="prhodes:xxx@phillipmac:/Users/prhodes/project_workspaces/georepo_workspace/iphone/spotmouth/www">
    <fileset dir="C:\project_workspaces\georepo_workspace\MyWebApp\war\iphone"/>
  </scp>

</target>
```

phonegap

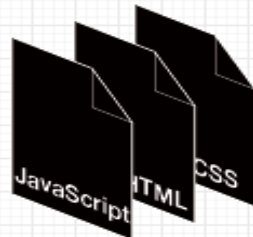


It's a framework for building and deploying mobile applications. Several in this space.

For each platform (i.e. ios), there's native code that implements the functionality/feature. The “native code” works with the embedded webkit-based browser so that calls to the javascript functions are delegated to the native implementations.

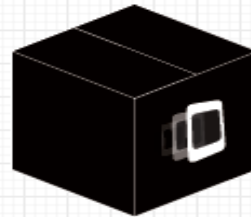
phonegap

How PhoneGap Works



➤ Build your app once with **web-standards**

Based on HTML5, PhoneGap leverages web technologies developers already know best... HTML and JavaScript.



➤ Wrap it with **PhoneGap**

Using the free open source framework or PhoneGap build you can get access to native APIs.



➤ Deploy to **multiple** platforms!

PhoneGap uses standards-based web technologies to bridge web applications and mobile devices.

Phonegap-wikipedia desc

PhoneGap is an open-source mobile development framework developed by Nitobi Software and IBM[1]. It enables software programmers to build applications for mobile devices using JavaScript, HTML and CSS, instead of less-popular languages such as Objective-C[2]. The resulting applications are hybrid, meaning that they are neither truly native (all layout rendering is done via the webview as opposed to Objective C or Corona apps) nor purely web based (much of the functionalities would be supported by HTML5). Disadvantages - hybrid applications have no 100% access to device API.

PhoneGap currently supports development for the iPhone, HP webOS, Google Android, Windows Mobile, Symbian OS[3] and BlackBerry operating systems. Support for recent versions, such as BlackBerry 5 and 6 and Windows Phone 7, is being implemented now[4] [5]. Bada (the operating system used by the new Samsung Wave) support is "coming soon"[6].

First developed at an iPhoneDevCamp event in San Francisco[7], PhoneGap went on to win the People's Choice Award at O'Reilly Media's 2009 Web 2.0 Conference[8].

The framework has been used to develop many apps.[9]

Apple Inc. has confirmed that the framework has its approval, even with the new 4.0 developer license agreement changes[10].

PhoneGap plugins

There is a community of developers that that put up a repository
<https://github.com/purplecabbage/phonegap-plugins>

name	age	message
Android/	..	
BlackBerry	AdPlugin/	February 24, 2011 Fix for 4.2 changes. Frames vs Bounds and all ... [purplecabbage]
Palm/	Badge/	January 13, 2011 Fix a typo in the Badge plugin [Matt Kane]
iPhone/	BarcodeScanner/	January 20, 2011 Add method sig [ascorbic]
.gitignore	ChildBrowser/	October 31, 2010 Example usage [purplecabbage]
README	ClipboardPlugin/	October 06, 2010 Turned it all inside out. In prep for other pla... [purplecabbage]
	EmailComposer/	December 10, 2010 Missed a \ [purplecabbage]
	FileUploader/	February 17, 2011 Fix README. Add an example. [ascorbic]
	GapSocket/	October 06, 2010 Turned it all inside out. In prep for other pla... [purplecabbage]
	InAppPurchaseManager/	February 23, 2011 Add InAppPurchaseManager plugin [ascorbic]
	Keychain/	November 18, 2010 Fixed typo in plugin namespace [shazron]
	MapKitPlug/	January 20, 2011 Fix a couple of leaks [ascorbic]
	NativeControls/	December 08, 2010 removed import to non-existent class [purplecabbage]
	PayPalPlugin/	October 11, 2010 Fixed javascript to not be in global scope. [shazron]
	SMSComposer/	January 14, 2011 added plugin for composing, addressing and send... [grantsanders]

Phonegap api overview

Accelerometer

Tap into the device's motion sensor.

Contacts

Work with the devices contact database.

File

Hook into native file system through JavaScript.

Network

Quickly check the network state.

Camera

Capture a photo using the device's camera.

Device

Gather device specific information.

Geolocation

Make your application location aware.

Notification

Visual, audible, and tactile device notifications.

Compass

Obtain the direction that the device is pointing.

Events

Hook into native events through JavaScript.

Media

Record and play back audio files.

Storage

Hook into the devices native storage options.

Camera-API

- PhoneGap javascript
- Android Implementation
- IOS Implementation
- GWT Implementation
- Application usage



Camera-PhoneGap javascript

```
navigator.camera.getPicture(onSuccess, onFail,  
{ quality: 50 });
```

```
function onSuccess(imageData) {  
    var image =  
document.getElementById('myImage');  
    image.src = "data:image/jpeg;base64," +  
imageData;  
}
```

```
function onFail(message) {  
    alert('Failed because: ' + message);  
}
```

Camera-Android Implementation

```
public PluginResult execute(String action, JSONArray args, String callbackId) {
    PluginResult.Status status = PluginResult.Status.OK;
    String result = "";
    this.callbackId = callbackId;

    try {
        if (action.equals("takePicture")) {
            int destType = DATA_URL;
            if (args.length() > 1) {
                destType = args.getInt(1);
            }
            int srcType = CAMERA;
            if (args.length() > 2) {
                srcType = args.getInt(2);
            }
            if (srcType == CAMERA) {
                this.takePicture(args.getInt(0), destType);
            }
            else if ((srcType == PHOTOLIBRARY) || (srcType == SAVEDPHOTOALBUM)) {
                this.getImage(args.getInt(0), srcType, destType);
            }
            PluginResult r = new PluginResult(PluginResult.Status.NO_RESULT);
            r.setKeepCallback(true);
            return r;
        }
        return new PluginResult(status, result);
    } catch (JSONException e) {
        e.printStackTrace();
        return new PluginResult(PluginResult.Status.JSON_EXCEPTION);
    }
}
```

Camera-IOS Implementation

```
- (void) postImage:(UIImage*)anImage withFilename:(NSString*)filename toUrl:(NSURL*)url
{
    NSString *boundary = @"----BOUNDARY_IS_I";

    NSMutableURLRequest *req = [NSMutableURLRequest requestWithURL:url];
    [req setHTTPMethod:@"POST"];

    NSString *contentType = [NSString stringWithFormat:@"multipart/form-data; boundary=%@", boundary];
    [req setValue:contentType forHTTPHeaderField:@"Content-type"];

    NSData *imageData = UIImagePNGRepresentation(anImage);

    // adding the body
    NSMutableData *postBody = [NSMutableData data];

    // first parameter an image
    [postBody appendData:[NSString stringWithFormat:@"%r\n--%r\n", boundary] dataUsingEncoding:NSUTF8StringEncoding];
    [postBody appendData:[NSString stringWithFormat:@"Content-Disposition: form-data; name=\"upload\"; filename=\"%s\"%r\n", filename] dataUsingEncoding:NSUTF8StringEncoding]];
    [postBody appendData:[@"Content-Type: image/png%r\n%r\n" dataUsingEncoding:NSUTF8StringEncoding]];
    [postBody appendData:imageData];

    // // second parameter information
    // [postBody appendData:[NSString stringWithFormat:@"%r\n--%r\n", boundary] dataUsingEncoding:NSUTF8StringEncoding]];
    // [postBody appendData:[@"Content-Disposition: form-data; name=\"some_other_name\"%r\n%r\n" dataUsingEncoding:NSUTF8StringEncoding]];
    // [postBody appendData:[@"some_other_value" dataUsingEncoding:NSUTF8StringEncoding]];
    // [postBody appendData:[NSString stringWithFormat:@"%r\n--%r\n%r\n",boundary] dataUsingEncoding:NSUTF8StringEncoding]];

    [req setHTTPBody:postBody];

    NSURLResponse* response;
    NSError* error;
    [NSURLConnection sendSynchronousRequest:req returningResponse:&response error:&error];

    // NSData* result = [NSURLConnection sendSynchronousRequest:req returningResponse:&response error:&error];
    // NSString * resultStr = [[[NSString alloc] initWithData:result encoding:NSUTF8StringEncoding] autorelease];
}
```

☰ *Camera-GWT Implementation*

```
protected native void _getPicture(Camera camera,
    CameraCallback callback, CameraOptions options) /*-{
    camera.getPicture(
        function(picture) {
            @com.phonegap.gwt.camera.client.impl.CameraImpl::handleSuccess(Lcom/phonegap/gwt/camera/client/CameraCallback;Ljava/lang/String;) (callback, picture);
        },
        function(error) {
            @com.phonegap.gwt.camera.client.impl.CameraImpl::handleError(Lcom/phonegap/gwt/camera/client/CameraCallback;Ljava/lang/String;) (callback, error);
        },
        options
    );
} */;
```

./phonegap-gwt/src/main/java/com/phonegap/gwt/camera/client/impl/CameraImpl.java

Camera-Application Usage

LeaveMarkForm

```
final Button cameraButton = new Button("Camera");
cameraButton.addClickHandler(cameraHandler);
cameraButton.setStyleName("whiteButton");

    if (Camera.isSupported()) {
verticalPanel.add(cameraButton);
verticalPanel.add(libraryButton);
    }
}
```

```
// Create a handler for the sendButton and nameField
class CameraHandler implements ClickHandler {
    /**
     * Fired when the user clicks on the sendButton.
     */
    public void onClick(ClickEvent event) {
        // sendNameToServer();
        Camera c = Camera.getCamera();
        if (!Camera.isSupported()) {
            GWT.log("Camera not supported!");

            return;
        }
        c.getPictureFromCamera(new CameraCallback() {
            public void onSuccess(String picture) {
                GWT.log("picture=" + picture);
                pictureDataHidden.setValue(picture);
                image.setUrl("data:image/jpeg;base64," + picture);
            }

            public void onFailure(String error) {
                GWT.log("getPictureFromCamera" + error.toString());
            }
        });
    }
}
```

Phonégap, childbrowser plugin

“ios” childbrowser implementation a lot more powerful than android version.

```
- (void)webViewDidFinishLoad:(UIWebView *)sender
{
    NSURLRequest *request = webView.request;
    NSLog(@"New Address is : %@", request.URL.absoluteString);
    addressLabel.text = request.URL.absoluteString;
    backBtn.enabled = webView.canGoBack;
    fwdBtn.enabled = webView.canGoForward;
    [ spinner stopAnimating ];

    if(delegate != NULL)
    {
        [delegate onChildLocationChange:request.URL.absoluteString];
    }
}
```

Childbrowser android

<https://github.com/purplecabbage/phonegap-plugins/blob/master/Android/ChildBrowser/ChildBrowser.java>

- This childbrowser is a dummy, can only display html, no way to invoke javascript

```
* @param callbackId    the callback id used when calling back into Javascript.  
* @return              A PluginResult object with a status and message.  
*/  
public PluginResult execute(String action, JSONArray args, String callbackId) {  
    PluginResult.Status status = PluginResult.Status.OK;  
    String result = "";  
  
    try {  
        if (action.equals("showWebPage")) {  
            result = this.showWebPage(args.getString(0), args.optBoolean(1));  
            if (result.length() > 0) {  
                status = PluginResult.Status.ERROR;  
            }  
        }  
        return new PluginResult(status, result);  
    } catch (JSONException e) {  
        return new PluginResult(PluginResult.Status.JSON_EXCEPTION);  
    }  
}
```

```
/**
```

Childbrowser work-around

Write a custom plugin for android.

This uses the facebook android library.

`com.facebook.android.Facebook`

```
public PluginResult execute(String action, JSONArray args, String callbackId) {
    System.out.println("in FacebookLogin plugin, execute callbackId=" + callbackId);
    this.callbackId = callbackId;
    PluginResult.Status status = PluginResult.Status.OK;
    String result = "";

    try {
        if (action.equals("connect")) {
            this.dologin(args.getString(0));
            //result = this.showWebPage(args.getString(0), args.optBoolean(1));
        } else if (action.equals("logout")) {
            Facebook mFacebook = new Facebook(args.getString(0));
            mFacebook.logout(super.ctx);
        }
    }
    PluginResult r = new PluginResult(PluginResult.Status.NO_RESULT);
    r.setKeepCallback(true);
    return r;
    } catch (Exception e) {
        e.printStackTrace();
        return new PluginResult(PluginResult.Status.ERROR);
    }
}

private String appId;
public void dologin(String appId) {
    this.appId = appId;
    // Display camera
    Intent intent = new Intent().setClass(this.ctx, com.facebook.android.LoginActivity.class);

    intent.putExtra("facebookAppId", appId);

    this.ctx.startActivityForResult((Plugin) this, intent, 0);
}
C:\usr\local\phonegap\phonegap-phonegap-android-
f090f9a\spotmouth\src\com\phonegap\plugins\facebook\FBConnect.java
```

Android facebook login

Need to edit the AndroidManifest.xml for your phonegap android project

```
<activity android:name="com.facebook.android.LoginActivity" android:label="@string/app_name">  
<intent-filter>  
</intent-filter>  
</activity>
```



Android deployment

to release new version of android app (from my personal notes updated 01/24/2011)

- In eclipse, choose android tools, and export signed application package
- Choose file for keystore: C:\projects\spotmouth\android\my-release-key.keystore with password
- Choose C:\projects\spotmouth\android\spotmouth.apk
- Ready to update, no need to do zipalign, android adt does this for you
- <http://market.android.com/publish/Home> to publish it



Iphone deployment

- increment the release number in the `spotmouth-info.plist`, this is the "bundle version". This is required for application loader will barf on you.
 - switch the xcode target to device/distribution
 - build it, compiled file is in `/Users/prhodes/project_workspace/iphone/spotmout/build/Distribution/iphoneos/spotmouth.app`
 - select above file and compress it from context menu
 - go into itunes connect and add a new version of the application using webapp
 - start ApplicationLoader (downloaded from apple) itunes connect
 - ApplicationLoader is `/Developer/Applications/Utilities/Application Loader`
 - select your zip file and continue
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Mobile4j- conclusion



- Feel free to contact me with any questions at rhodebump@gmail.com