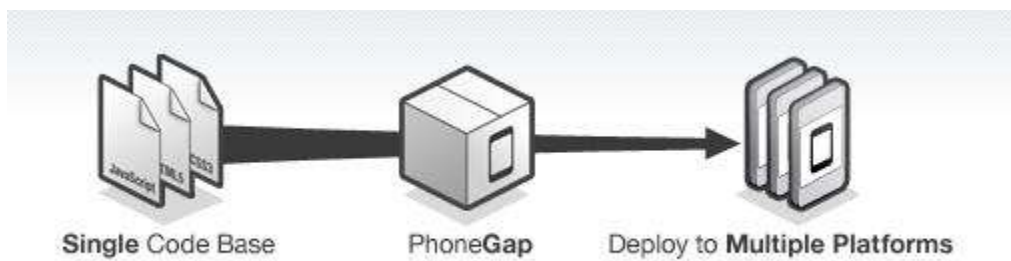




# MAKE PUZZLE WITH PHONEGAP AND JQUERY



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## Introduction

Mobile web and native apps are choices that you can choose to develop an application on the smart phone. There are advantages and disadvantages for each choice.

Disadvantages for mobile web such as :

- No Camera
- No Push Notification
- No Filesystem access
- No Audio Recording
- No Contacts

Disadvantages for native apps such as :

- Rewrite same UI code over and over again
- Solve the same bugs
- Maintainability nightmare

However, there is another choice. That choice called Hybrid apps. What is hybrid apps?

- A native app with an embedded web view
- Runs mobile web code “in the box”
- Runs native code “in the frame”

Advantages for Hybrid apps such as :

- Most of the app is written once in HTML/JS
- Native parts are written in platform specific code
- (Objective C, Java, etc.)

- Works like a native app - can send to app store
- Developer controls native code - can use native APIs

Disadvantages for Hybrid apps such as :

- Complex code
- Requires many programming languages and data transfer between them
- Hard to debug

## What is PhoneGap?

**PhoneGap** is an HTML5 app platform that allows you to author native applications with web technologies and get access to APIs and app stores. PhoneGap leverages web technologies developers already know best. There are already many API references that you can use. PhoneGap also can be described as Open Source “connecting” solution from mobile web to native. PhoneGap exports native APIs to JS code using plugins

## Why use PhoneGap?

PhoneGap is a mobile framework that support 7 platforms, such as ios, android, blackberry, WebOs, Symbian, windows phone 7, bada. PhoneGap is also an open source framework, so it's free to use and modified. It's really help when you want to make an application that works on many platforms. With this framework, you don't have to waste your time to rebuild application. But, there are also some API that doesn't work on all platforms.

Supported Platforms

iOS



webOS

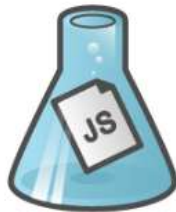
symbian

bada

With **PhoneGap** you can,



Take advantage of **HTML5**  
and **CSS3**



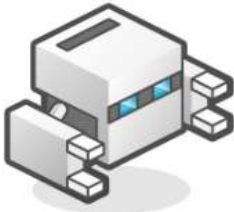
Use **JavaScript** to write  
your code



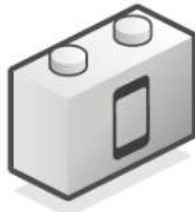
Access **Native Features**



Deploy your app to  
**Multiple Platforms**



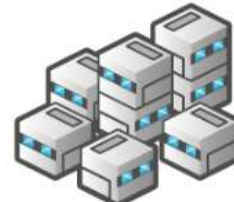
Take advantage of  
**PhoneGap Build**



Add **PhoneGap Plugins**  
to your project



Use **Tools** from the  
community



Get help from the growing  
**Community**

## 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.

## Getting started on android

### 1. Requirements

- Eclipse 3.4+

There is also a [Terminal](#) version of this tutorial that doesn't use Eclipse.

### 2. Install SDK + PhoneGap



Download and install [Eclipse Classic](#)



Download and install [Android SDK](#)



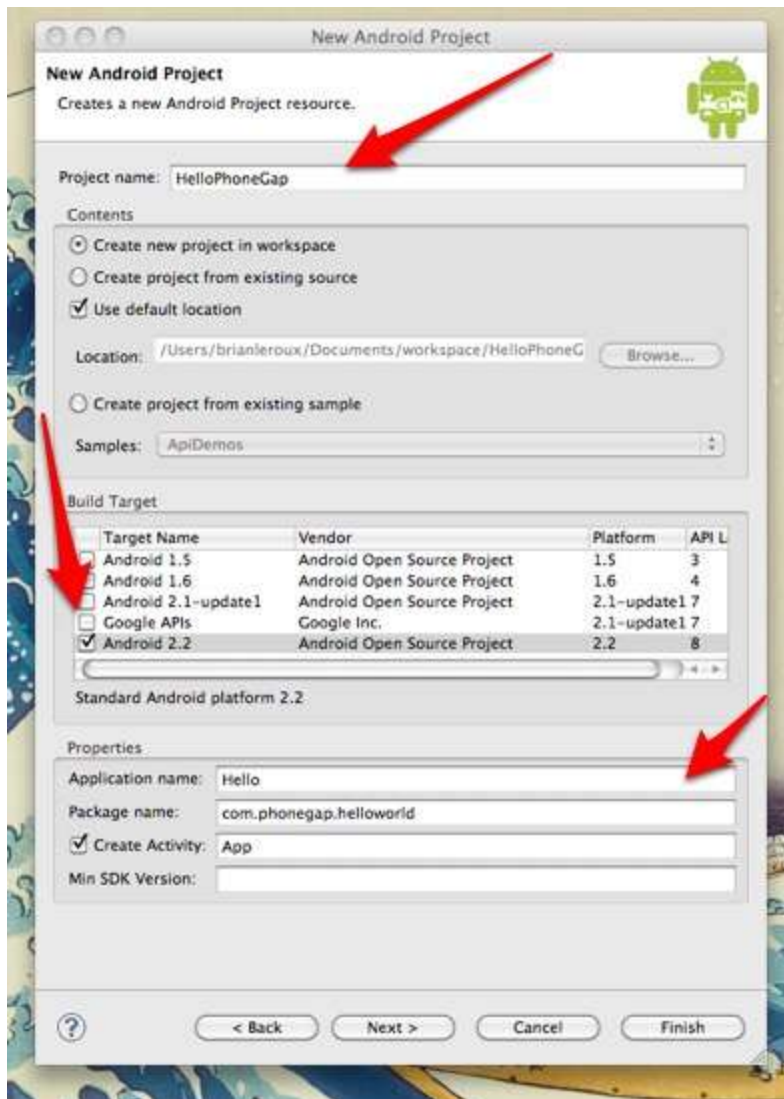
Download and install [ADT Plugin](#)



[Download](#) the latest copy of PhoneGap and extract its contents. We will be working with the Android directory.

### 3. Setup New Project

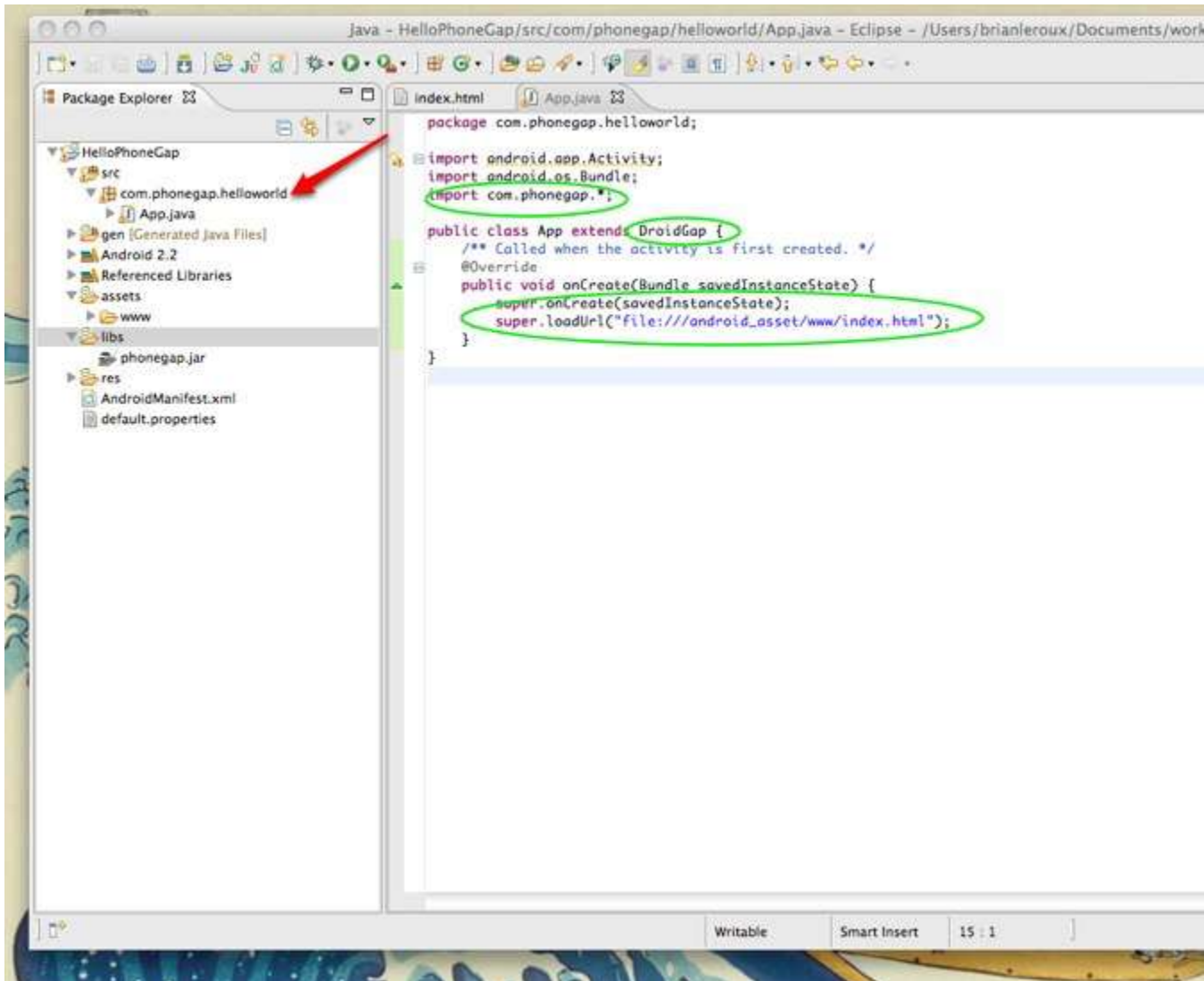
- Launch Eclipse, then under the File menu select **New > Android Project**



- In the root directory of the project, create two new directories:
  - /libs
  - /assets/www
- Copy phonegap.js from your PhoneGap download earlier to /assets/www
- Copy phonegap.jar from your PhoneGap download earlier to /libs
- Copy xml folder from your PhoneGap download earlier to /res
- Make a few adjustments too the project's main Java file found in the src folder in Eclipse: (view image below)
  - Change the class's extend from **Activity** to **DroidGap**



- Replace the `setContentView()` line with `super.loadUrl("file:///android_asset/www/index.html");`
- Add `import com.phonegap.*;`
- Remove `import android.app.Activity;`



- You might experience an error here, where Eclipse can't find phonegap-1.0.0.jar. In this case, right click on the /libs folder and go to Build Paths/ > Configure Build Paths. Then, in the Libraries tab, add phonegap-1.0.0.jar to the Project. If Eclipse is being temperamental, you might need to refresh (F5) the project once again.
- Right click on AndroidManifest.xml and select **Open With > Text Editor**

- Paste the following permissions under versionName: (view image below)

```
<supports-screens
android:largeScreens="true"
android:normalScreens="true"
android:smallScreens="true"
android:resizeable="true"
android:anyDensity="true"
/>
<uses-permission android:name="android.permission.CAMERA" />
<uses-permission android:name="android.permission.VIBRATE" />
<uses-permission android:name="android.permission.ACCESS_COARSE_LOCATION" />
<uses-permission android:name="android.permission.ACCESS_FINE_LOCATION" />
<uses-permission
android:name="android.permission.ACCESS_LOCATION_EXTRA_COMMANDS" />
<uses-permission android:name="android.permission.READ_PHONE_STATE" />
<uses-permission android:name="android.permission.INTERNET" />
<uses-permission android:name="android.permission.RECEIVE_SMS" />
<uses-permission android:name="android.permission.RECORD_AUDIO" />
<uses-permission android:name="android.permission.MODIFY_AUDIO_SETTINGS" />
<uses-permission android:name="android.permission.READ_CONTACTS" />
<uses-permission android:name="android.permission.WRITE_CONTACTS" />
<uses-permission android:name="android.permission.WRITE_EXTERNAL_STORAGE" />
<uses-permission android:name="android.permission.ACCESS_NETWORK_STATE" />
<uses-permission android:name="android.permission.GET_ACCOUNTS" />
```

- Add android:configChanges="orientation|keyboardHidden" to the activity tag in AndroidManifest. (view image below)
- Add a second activity under you application tag in AndroidManifest. (view image below)

```
<activity android:name="com.phonegap.DroidGap" android:label="@string/app_name"
android:configChanges="orientation|keyboardHidden"> <intent-filter> </intent-filter>
</activity>
```

```

<?xml version="1.0" encoding="utf-8"?>
<manifest xmlns:android="http://schemas.android.com/apk/res/android" android:windowSoftInputMode="adjustPan"
    package="com.phonegap" android:versionName="1.1" android:versionCode="5">
    <supports-screens
        android:largeScreens="true"
        android:normalScreens="true"
        android:smallScreens="true"
        android:xlargeScreens="true"
        android:resizeable="true"
        android:anyDensity="true"
    />

    <uses-permission android:name="android.permission.CAMERA" />
    <uses-permission android:name="android.permission.VIBRATE" />
    <uses-permission android:name="android.permission.ACCESS_COARSE_LOCATION" />
    <uses-permission android:name="android.permission.ACCESS_FINE_LOCATION" />
    <uses-permission android:name="android.permission.ACCESS_LOCATION_EXTRA_COMMANDS" />
    <uses-permission android:name="android.permission.INTERNET" />
    <uses-permission android:name="android.permission.RECEIVE_SMS" />
    <uses-permission android:name="android.permission.RECORD_AUDIO" />
    <uses-permission android:name="android.permission.RECORD_VIDEO" />
    <uses-permission android:name="android.permission.MODIFY_AUDIO_SETTINGS" />
    <uses-permission android:name="android.permission.READ_CONTACTS" />
    <uses-permission android:name="android.permission.WRITE_CONTACTS" />
    <uses-permission android:name="android.permission.WRITE_EXTERNAL_STORAGE" />
    <uses-permission android:name="android.permission.ACCESS_NETWORK_STATE" />
    <uses-permission android:name="android.permission.GET_ACCOUNTS" />
    <uses-permission android:name="android.permission.BROADCAST_STICKY" />

    <uses-feature android:name="android.hardware.camera" />
    <uses-feature android:name="android.hardware.camera.autofocus" />

    <application android:icon="@drawable/icon" android:label="@string/app_name"
        android:debuggable="true">
        <activity android:name=".test"
            android:label="@string/app_name" android:configChanges="orientation|keyboardHidden">
            <intent-filter>
                <action android:name="android.intent.action.MAIN" />
                <category android:name="android.intent.category.LAUNCHER" />
            </intent-filter>
        </activity>
        <activity android:name="com.phonegap.DroidGap" android:label="@string/app_name"
            android:configChanges="orientation|keyboardHidden">
            <intent-filter>
            </intent-filter>
        </activity>
    </application>

    <uses-sdk android:minSdkVersion="2" />
</manifest>

```

## 4. Hello World

Now create and open a new file named **index.html** in the **/assets/www** directory. Paste the following code:

```
<!DOCTYPE HTML>
<html>
<head>
<title>PhoneGap</title>
<script type="text/javascript" charset="utf-8" src="phonegap.js"></script>
</head>
<body>
<h1>Hello World</h1>
</body>
</html>
```

\*phonegap.js might need to be replaced with phonegap.<VERSION NUMER>.js

### 5A. Deploy to Simulator

- Right click the project and go to **Run As** and click **Android Application**
- Eclipse will ask you to select an appropriate AVD. If there isn't one, then you'll need to create it.

### 5B. Deploy to Device

- Make sure USB debugging is enabled on your device and plug it into your system.  
(Settings > Applications > Development)
- Right click the project and go to **Run As** and click **Android Application**

## How to use camera API from PhoneGap

There are already many API references on PhoneGap. One of them is about camera, with this API, we can make our application to take picture, get picture from photo library or photo album. We can also config quality, pixel width and height, etc.

### Supported Platforms

- Android
- Blackberry WebWorks (OS 5.0 and higher)
- iPhone
- Windows Phone 7 ( Mango )

### Simple example

Take photo and retrieve Base64-encoded image:

```
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);
}
```

If you want take image file, you can use :

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

function onSuccess(imageURI) {
  var image = document.getElementById('myImage');
  image.src = imageURI;
}

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

## Full example

```
<!DOCTYPE html>
<html>
<head>
  <title>Capture Photo</title>

  <script type="text/javascript" charset="utf-8" src="phonegap.js"></script>
  <script type="text/javascript" charset="utf-8">

    var pictureSource; // picture source
    var destinationType; // sets the format of returned value

    // Wait for PhoneGap to connect with the device
    //
    document.addEventListener("deviceready",onDeviceReady,false);

    // PhoneGap is ready to be used!
```

```
//  
function onDeviceReady() {  
    pictureSource=navigator.camera.PictureSourceType;  
    destinationType=navigator.camera.DestinationType;  
}  
  
// Called when a photo is successfully retrieved  
//  
function onPhotoDataSuccess(imageData) {  
    // Uncomment to view the base64 encoded image data  
    // console.log(imageData);  
  
    // Get image handle  
    //  
    var smallImage = document.getElementById('smallImage');  
  
    // Unhide image elements  
    //  
    smallImage.style.display = 'block';  
  
    // Show the captured photo  
    // The inline CSS rules are used to resize the image  
    //  
    smallImage.src = "data:image/jpeg;base64," + imageData;  
}  
  
// Called when a photo is successfully retrieved  
//  
function onPhotoURISuccess(imageURI) {  
    // Uncomment to view the image file URI  
    // console.log(imageURI);  
  
    // Get image handle  
    //  
    var largeImage = document.getElementById('largeImage');
```



```
// Unhide image elements
//
largelImage.style.display = 'block';

// Show the captured photo
// The inline CSS rules are used to resize the image
//
largelImage.src = imageURI;
}

// A button will call this function
//
function capturePhoto() {
    // Take picture using device camera and retrieve image as base64-encoded string
    navigator.camera.getPicture(onPhotoDataSuccess, onFail, { quality: 50 });
}

// A button will call this function
//
function capturePhotoEdit() {
    // Take picture using device camera, allow edit, and retrieve image as base64-encoded string
    navigator.camera.getPicture(onPhotoDataSuccess, onFail, { quality: 20, allowEdit: true });
}

// A button will call this function
//
function getPhoto(source) {
    // Retrieve image file location from specified source
    navigator.camera.getPicture(onPhotoURISuccess, onFail, { quality: 50,
        destinationType: destinationType.FILE_URI,
        sourceType: source });
}

// Called if something bad happens.
```

```
//  
function onFail(message) {  
    alert('Failed because: ' + message);  
}  
  
</script>  
</head>  
<body>  
    <button onclick="capturePhoto();">Capture Photo</button> <br>  
    <button onclick="capturePhotoEdit();">Capture Editable Photo</button> <br>  
    <button onclick="getPhoto(pictureSource.PHOTOLIBRARY);">From Photo Library</button><br>  
    <button onclick="getPhoto(pictureSource.SAVEDPHOTOALBUM);">From Photo Album</button><br>  
    <img style="display:none;width:60px;height:60px;" id="smallImage" src="" />  
    <img style="display:none;" id="largeImage" src="" />  
</body>  
</html>
```

There are also quirks on the platforms. Example, for camera API references, android quirks are ignores the allowEdit parameter, Camera.EncodingType is not supported and etc.

## How to make puzzle using PhoneGap

### Jquery ( Write less, Do more)

jQuery is a fast and concise JavaScript Library that simplifies HTML document traversing, event handling, animating, and Ajax interactions for rapid web development.

With jquery we can use javascript in easier way. In the phonegap, we use jquery to select element and set its style.

### Crop Image

The technique that is used in this tutorial to crop image is using combination of background-image and image. This tutorial use background image to display image in different appearance, and by setting different background position, we can crop image as we want.

Example code :

```
var puzzle_piece = document.createElement('div');

puzzle_piece.setStyles({
    border: 3+'px solid '+'black',
    'background-image': 'url('+document.getElementsByTagName("img")[0].src+')',
    'background-position': b_x +'px ' +b_y+ 'px',
    'overflow': 'hidden',
    'position': 'absolute',
    'width': Puzzle.width + 'px',
    'margin-left': (m_x*-1) + 'px',
    'margin-top': (m_y*-1) + 'px',
    'height': Puzzle.height + 'px'
});
```

In that code, we can see that background-position value is dynamic because the value is according to variable b\_x and b\_y , so by changing the value we use for background-position, we can get different crop image.

## Make the Puzzle

To make the puzzle we use looping on our image. Then we change the value of background-position and margin. So, from 1 image, we looping the image to the number we want. Then, we crop the image to the size we want, and by changing the value of background-position we get different piece of image.

Example code for random the value :

```

var hasilRandom = new Array();
function randomMap() {
    //var posisi=new Array();

    for(var i=0,j=0;j<9;i++){
        //random 0-8
        angka=(Math.floor(Math.random()*9));
        flag=0;

        for(var x=0;x<j;x++){
            if(angka==hasilRandom[x])
                flag=1;
        }

        if(flag==0){
            hasilRandom[j]=angka;
            j++;
        }
    }
}

```

This will give the value for hasilRandom variable from 0-8. We will use this number later to random the pieces of puzzle we have.

Example code to get random pieces positions :

```

piece_arr = new Array();
var posisi=new Array( "0,0",
    "0,1",
    "0,2",
    "1,0",
    "1,1",
    "1,2",
    "2,0",
    "2,1",
    "2,2"
);

```

So, with this we get the positions for pieces filled with random value.

Then, we need to declare the value for puzzle width and height.

Example code :

```

puzWidth = Math.round(((256-12) / 3));
puzHeight = Math.round(((192-12) / 3));
var puz = document.getElementById('puzzle');
ab=0;var nomor = 0;

```

After that, we need to make the puzzle pieces by looping the value and keep changing the value for background-position and margin so we get full image with different position for each pieces.

Example code :

```

for(var a =0;a<3;a++){
    for(var b =0;b<3;b++){
        x=parseInt(posisi[hasilRandom[ab]].split(',')[0]);
        y=parseInt(posisi[hasilRandom[ab]].split(',')[1]);
        var b_x = ((puzWidth + 3) * y * -1);
        var b_y = ((puzHeight + 3) * x * -1);
        var m_x = ((puzWidth + 3) * b * -1);
        var m_y = ((puzHeight + 3) * a * -1);
        var puzzle_piece = document.createElement('div');
        puzzle_piece.setProperty('nomor', nomor);
        puzzle_piece.setProperty('x', x);
        puzzle_piece.setProperty('y', y);
        puzzle_piece.id=ab;
        puzzle_link= document.createElement('a');
        puzzle_link.setAttribute('href', '#');
        puzzle_link.setAttribute('id', 'a'+ab);
    }
}

```

```

puzzle_link.setStyles({
  'display': 'block',
  'width': puzWidth + 'px',
  'height': puzHeight + 'px'
});

puzzle_piece.setStyles({
  border: 3+'px solid '+'black',
  'background-image': 'url('+document.getElementsByTagName("img")[0].src+')',
  'background-position': b_x +'px ' +b_y+ 'px',
  'overflow': 'hidden',
  'position': 'absolute',
  'width': puzWidth + 'px',
  'margin-left': (m_x*-1) + 'px',
  'margin-top': (m_y*-1) + 'px',
  'height': puzHeight + 'px'
});
puzzle_piece.appendChild(puzzle_link);
puz.appendChild(puzzle_piece);

ab++;
piece_arr.push(nomor);
nomor++;
}

```

So, by changing the value for b\_x, b\_y, m\_x, and m\_y, we get different image display, and by doing the random value, we get different result.

## Shuffle Image

What we do when we shuffle the image are changing the margin value for the exchanged puzzle piece, changing the id that we create before and change the property value for each piece. In this tutorial, we shuffle the image according to user click, the first image that is clicked will exchange the second image that is clicked.

Example code :

```
puzzle_link.onclick = function(){
    if(c==1){
        document.getElementById(this.getParent().id).style.opacity =0.4;
        c=200;
        count=this.getParent().id;
    }
    else {
        document.getElementById(count).style.opacity =1;
        t_x1=document.getElementById(count).getProperty('x').toInt();
        t_y1=document.getElementById(count).getProperty('y').toInt();
        t_z1=document.getElementById(count).getProperty('nomor').toInt();
        t_x2=document.getElementById(this.getParent().id).getProperty('x').toInt();
        t_y2=document.getElementById(this.getParent().id).getProperty('y').toInt();
        t_z2=document.getElementById(this.getParent().id).getProperty('nomor').toInt();
        t_margin_left1=document.getElementById(count).style.marginLeft;
        t_margin_top1=document.getElementById(count).style.marginTop;
        t_margin_left2=document.getElementById(this.getParent().id).style.marginLeft;
        t_margin_top2=document.getElementById(this.getParent().id).style.marginTop;

        document.getElementById(this.getParent().id).setProperty('x',t_x1);
        document.getElementById(this.getParent().id).setProperty('y',t_y1);
        document.getElementById(this.getParent().id).setProperty('nomor',t_z1);

        document.getElementById(count).setProperty('x',t_x2);
        document.getElementById(count).setProperty('y',t_y2);
        document.getElementById(count).setProperty('nomor',t_z2);

        document.getElementById(this.getParent().id).style.marginLeft=t_margin_left1;
        document.getElementById(this.getParent().id).style.marginTop=t_margin_top1;
        document.getElementById(count).style.marginLeft=t_margin_left2;
        document.getElementById(count).style.marginTop=t_margin_top2;
        c=-1;
    }
}
```



```

status=1;
for(i=0;i<9;i++){
    if(document.getElementById(i).getProperty('nomor') != hasilRandom[i]){
        status=0;
        break;
    }

count=-1;

}
if(status==1){
    alert("Congratz, you win !");
}

return false;
};

```

For the first clicked, there is a change on the opacity on the element. It's just for user to remember what he/she already click.

### Solve puzzle

To win the game, user needs to make the image back its to normal position by swap the puzzle around. If the user already win, give some notification to let the user realize that he/she already has finished the game. In the code, we need to make some flag to check winning condition for user. In this tutorial, first, we store the value we use to random the image. Then, every time the image being swap, we checked if the image is already same with the first image. It's sound easy with the logic, but we need to be more careful with the code because the value we set for the image id must be also swapped when we swap the image.

Example code to check winning condition :

```
status=1;
for(i=0;i<9;i++){
    if(document.getElementById(i).getProperty('nomor') != hasilRandom[i]){
        status=0;
        break;
    }
}

count=-1;
c=-1;
}
if(status==1){
    alert("Congratz, you win !");
}
```

If the user win, this program will give alert notification "Congratz, you win !"

## References

<http://phonegap.com/>

<http://www.nuff-respec.com/technology/slide-puzzle-javascript-mootools>

<http://www.slideshare.net/YnonPerek/07-phonegap>