

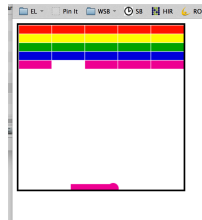
Canvas Tutorial 2D Canvas (be sure to follow the links)

From Simple HTML to 2D Platform Game

Sub goals: Shorter Term

◎ We will start from the very beginning...

- + Learn HTML/ Some JavaScript
- + Starting from a simple html page
- + Draw on a canvas
- + Animate
- + Simple Shooter
- + Breakout (Tuesday next week)



A simple and basic page

```
<html>
<body>
  <h1>This a Heading</h1>
  <p>This is a paragraph.</p>
  <p>This is another paragraph.</p>
</body>
</html>
```

This a Heading

This is a paragraph.
This is another paragraph.

- ◎ Page full of 'tags'
- + <tagname> content </tagname>
- + HTML tags normally come in pairs like <p> This is a paragraph </p>
- + The first tag in a pair is the start tag, the second tag is the end tag
- + The end tag is written like the start tag, but with a slash before the tag name

[0-mozilla-html-skeleton-no-canvas-00.html](#)

Goal: next 2-3 weeks

- ◎ Create a platform game (side scrolling game) leveraging
 - + HTML
 - + HTML5
 - + CSS, and
 - + JavaScript
- ◎ Final product (after 2-3 Weeks)
 - + Jumping player entity
 - + Scrolling background
 - + Parallax
 - + Gamification elements: points, timer



The Basics "HTML" Pages

◎ The language of the web,

- + A browser languages, enables browser to display webpages according to specified formats.
 - Fonts, color, tables, paragraphs
 - Basic Document:
 - Heading
 - Paragraph
 - Another Paragraph
- + A markup language is a set of markup tags
 - The tags describes the document content
 - HTML documents contain HTML tags and plain text
 - HTML documents are simply called web pages

◎ A Simple Example of a BASIC HTML document ... next.

Anatomy of a web page

```
<!DOCTYPE html>
<html>
  <head>
    <title>Page Title</title>
  </head>
  <body>
    <h1>My Second Heading</h1>
    <p> My Third paragraph.</p>
  </body>
</html>
```

0-mozilla-html-skeleton-no-canvas-01.html



- ◎ The DOCTYPE declaration defines the document type to be HTML
- ◎ The text between <html> and </html> describes an HTML document
- ◎ The text between <head> and </head>
 - + provides information about the document (preamble)
- ◎ The text between <title> and </title> provides a title for the document
 - + Some browser put this text on the 'title bar'
- ◎ The text between <body> and </body> describes the visible page content
 - + The text between <h1> and </h1> describes a heading
 - + The text between <p> and </p> describes paragraph

The <!DOCTYPE> Declaration

- ⦿ Denote which language you use
 - ✦ DOCTYPE html is for the
 - Old school html, and the newer HTML5
 - ✦ <!DOCTYPE html>

Comments

- ⦿ Comments in code, use a
 - ✦ <!--
 - 2 dashes
 - tag to denote the beginning of a comment, a comment
 - ✦ -->
 - concluded or 'closed' by a --> tag, see above:
 - ✦ A comment:
 - <!-- A COMMENT -->
 - ✦ Another comment:
 - <!--
Another COMMENT,
that spans multiple lines
-->

Example Comment

```
<!DOCTYPE html>
<html lang="en">
<head>
  <meta charset="utf-8" />
  <title>A tiny document</title>
</head>
<body>
  <h1>Main heading in my document</h1>
  <!-- COMMENT -->
  <!-- Note that it is "h" + "1", not "h" + the letter "one" -->
  <p>Hey!!!! I am coding in (Hyper Text Markup Language)HTML.</p>
</body>
</html>
```



0-mozilla-html-skeleton-no-canvas-comment.html

HTML more in-depth

- ⦿ Some great tutorials are available, one of my favorites, that have nice WYSIWYG interfaces:
 - ✦ <http://www.w3schools.com/html/default.asp>
- ⦿ Need a good editor:
 - ✦ Simple:
 - vi, notepad, text edit, emacs
 - ✦ Professional:
 - Dreamweaver (expensive)
 - ✦ We will use simple ones – and I will use vi.
 - ✦ Webstorm's jetbrain? (will try to see if I can get a educational license for this one)

HTML5

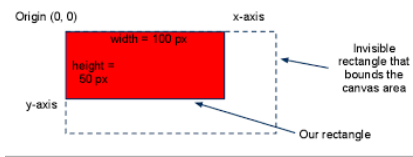
- ⦿ As of October 2014 this is the new HTML standard:
 - ✦ Adds syntactic features to HTML:
 - ✦ new <video>, <audio> and the <canvas> elements
 - Handle Graphical and multimedia content without resorting to plug-ins, and new APIs
 - ✦ <canvas> is for graphics, and we use graphics for animation, and gaming.
 - It can draw graphics using scripting (usually javascript)
- ⦿ It was a HTML5 before October 2014?
 - ✦ Yes, but now it is official, and it is standard.

<http://en.wikipedia.org/wiki/HTML5>

What is a <canvas>?

- ⦿ A container for hosting graphics.
 - ✦ Can render Bitmap images (JavaScript)
- ⦿ A rectangular area on an HTML page.
- ⦿ Canvas has several methods for drawing:
 - ✦ Lines, paths, boxes, circles, text, and graphic images.
 - ✦ Defined by JavaScript methods (APIs) for drawing the graphics (lines, paths, boxes, circles, shapes).
 - ✦ JavaScript API
- ⦿ Also for text, animation, and interaction
- ⦿ ... and games!

```
<canvas id= "drawing" width= "400" height= "200" style= "border:1px solid black"> </canvas>
```



© http://www.w3schools.com/tags/ref_canvas.asp

© <http://www.pageresource.com/html5/canvas-2d-interface-reference/>

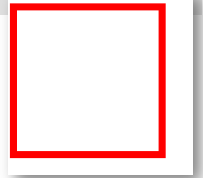
Simple Canvas

```
<!DOCTYPE html> 1-mozilla-canvas-skeleton-00-nojavascript.html
<html>
<body>

<canvas id="myCanvas" width="200" height="200" style="border:10px solid #FF0000;">
  Your browser does not support the HTML5 canvas tag.
</canvas>

</body>
</html>
```

- © No JavaScript (yet)
- © http://www.w3schools.com/html/html5_canvas.asp



Canvas Images

Background:

- © After drawing a 'shape' on canvas it is 'gone' canvas does not know of the element anymore (bitmap, raster images)
- © Fixed Sets of Dots
- © This is in contrast to Scalable Vector Graphics (SVG), where you can manipulate the spaces

http://en.wikipedia.org/wiki/Scalable_Vector_Graphics

Strategy of Drawing Images on Canvas

Done by JavaScript in 3 steps:

1. Obtain a reference to the canvas element.
2. Obtain a 2D context from the canvas element.
3. Draw graphics using the draw functions of 2D context.
4. (not a 4th step)

Drawing on the Canvas with JavaScript

```
<!DOCTYPE html>
<html>
<body>

<canvas id="myCanvas" width="200" height="200" style="border:10px solid #2200c3;">
  Your browser does not support the canvas element.
</canvas>

<script>
  var canvas = document.getElementById("myCanvas"); // find the canvas element
  var ctx = canvas.getContext("2d"); // get 2D object ctx
  ctx.fillStyle = "#FF00CC"; // now can draw
  ctx.fillRect(0,0,150,75); // using the methods of ctx
</script>

</body>
```

What does this look like?

Drawing on the Canvas with JavaScript

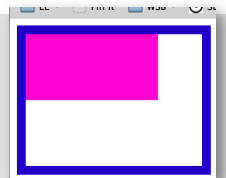
```
<!DOCTYPE html>
<html>
<body>

<canvas id="myCanvas" width="200" height="200" style="border:10px solid #2200c3;">
  Your browser does not support the canvas element.
</canvas>

<script>
  var canvas = document.getElementById("myCanvas"); // find the canvas element
  var ctx = canvas.getContext("2d"); // get 2D object ctx
  ctx.fillStyle = "#FF00CC"; // now can draw
  ctx.fillRect(0,0,150,75); // using the methods of ctx
</script>

</body>
```

1-mozilla-canvas-skeleton-1-js-.html



Drawing on the Canvas with 'external' JavaScript

⦿ How about modularization?

- ✦ Pull out the javascript and put it elsewhere?

```
<!DOCTYPE html>
<html>
<body>

<canvas id="myCanvas" width="200" height="200"
  style="border:10px solid #2200c3;">
  Your browser does not support the canvas element.
</canvas>

<script src="js/drawRectangle.js"></script>

</body>
```

1-mozilla-canvas-skeleton-1-js-ex.html

- ⦿ Standard to have a subdirectory "js" for javascript.

CSS & canvas on-load

```
<html>
<head>
<title>Canvas tutorial</title>

<script type="text/javascript">
  function draw(){
    var canvas = document.getElementById('tutorial');
    if (canvas.getContext){
      var ctx = canvas.getContext('2d');
    }
  }
</script>

<style type="text/css">
  canvas { border: 10px solid blue; }
</style>
</head>

<body onload="draw();" >
  <canvas id="tutorial" width="150" height="150"></canvas>
</body>
</html>
```

1-mozilla-canvas-skeleton-2-css.html

- ⦿ http://www.w3schools.com/canvas/canvas_clock.asp

Simple Graphics

⦿ Examples

- ✦ Drawing
- ✦ Color
- ✦ Opacity
- ✦ Mouse
- ✦ Keyboard

- ⦿ <http://www.html5-tutorials.org>
- ⦿ <http://www.w3schools.com/html/default.asp>
- ⦿ <http://en.wikipedia.org/wiki/HTML5>
- ⦿ http://www.w3schools.com/canvas/canvas_clock.asp

- ⦿ <http://tutorials.jenkov.com/html5-canvas/overview.html>

- ⦿ HTML, XML, XHTML, HTML5, HTML5 and Canvas, CCS, JavaScript