

CSC 240 Computer Graphics

Video 1B: HTML & Javascript

Nick Howe
Smith College

Portions based on slides & content courtesy Sara Mathieson

Intro to HTML

(mostly used as a wrapper for JavaScript)

Intro to HTML

Consider a sample HTML document:

```
<html>
<head>
<title>Canvas Graphics</title>
<script>
  var canvas; // DOM object corresponding to the canvas
  var graphics; // 2D graphics context for drawing on the canvas

  function init() {
    canvas = document.getElementById("theCanvas");
    graphics = canvas.getContext("2d");
    graphics.fillText("Hello World", 10, 20);
  }
</script>
</head>
<body onload="init()">
  <p>The canvas appears below this line.</p>
  <canvas id="theCanvas" width="640" height="480"></canvas>
  <p>The canvas appears above this line.</p>
</body>
</html>
```

Head section
contains
metainformation
and **scripts**

Body section
contains
content (text
and markup)

Intro to HTML

(Hyper Text Markup Language)

```
<!DOCTYPE html>
<html>
<head>
<title>Canvas Graphics</title>
```

Indentation: not required,
but good style

HTML tags (start tag and end tag)

after webpage has loaded (text, images, etc), call this function

```
</head>
<body onload="init()">
  <canvas id="theCanvas" width="640" height="480"></canvas>
</body>
</html>
```

size of the window (you choose)

id: name the element, which we can refer to later

Intro to HTML

Consider a sample HTML document:

```
<html>
<head>
<title>Canvas Graphics</title>
<script>
  var canvas; // DOM object corresponding to the canvas
  var graphics; // 2D graphics context for drawing on the canvas

  function init() {
    canvas = document.getElementById("theCanvas");
    graphics = canvas.getContext("2d");
    graphics.fillText("Hello World", 10, 20);
  }
</script>
</head>
<body onload="init()">
  <p>The canvas appears below this line.</p>
  <canvas id="theCanvas" width="640" height="480"></canvas>
  <p>The canvas appears above this line.</p>
</body>
</html>
```

*In practice, we'll
use the same
HTML every time.*

*Only the parts in
red might change.*



Intro to JavaScript

Intro to JavaScript

```
<!DOCTYPE html>  
<html>  
<head>  
<title>Canvas Graphics</title>
```

JavaScript goes here
(usually within the head)

```
</head>  
<body onload="init()">  
    <canvas id="theCanvas" width="640" height="480"></canvas>  
</body>  
</html>
```


Intro to JavaScript

JavaScript
tags

```
<!DOCTYPE html>
<html>
<head>
<title>Canvas Graphics</title>
<script>
    var canvas;    // DOM object corresponding to the canvas
    var graphics;  // 2D graphics context for drawing on the canvas

    function draw() {
        // draw on the canvas, using the graphics context
        graphics.fillText("Hello World", 10, 20);
    }

    function init() {
        canvas = document.getElementById("theCanvas");
        graphics = canvas.getContext("2d");
        draw(); // draw something on the canvas
    }
</script>
</head>
<body onload="init()">
    <canvas id="theCanvas" width="640" height="480"></canvas>
</body>
</html>
```


Intro to JavaScript

Python:

def init():

JavaScript:

function init() {
}

```
<script>
  var canvas;    // DOM object corresponding to the canvas
  var graphics;  // 2D graphics context for drawing on the canvas

  function draw() {
    // draw on the canvas, using the graphics context
    graphics.fillText("Hello World", 10, 20);
  }

  function init() {
    canvas = document.getElementById("theCanvas");
    graphics = canvas.getContext("2d");
    draw(); // draw something on the canvas
  }
</script>
</head>
<body onload="init()">
  <canvas id="theCanvas" width="640" height="480"></canvas>
</body>
</html>
```

Previously defined here

Call to function **init()**

Intro to JavaScript

Note: neither “var” nor “;” are strictly necessary, but good practice!

Python: `i = 1`

JavaScript: `var i = 1;`

```
<script>
  var canvas; // DOM object corresponding to the canvas
  var graphics; // 2D graphics context for drawing on the canvas

  function draw() {
    // draw on the canvas, using the graphics context
    graphics.fillText("Hello World", 10, 20);
  }

  function init() {
    canvas = document.getElementById("theCanvas");
    graphics = canvas.getContext("2d");
    draw(); // draw something on the canvas
  }
</script>
</head>
<body onload="init()">
  <canvas id="theCanvas" width="640" height="480"></canvas>
</body>
</html>
```

Declare a Javascript variable **canvas**

Associate variable **canvas** with the HTML object **theCanvas**

Create HTML canvas called **theCanvas**

Intro to JavaScript

We'll start by looking at 2D graphics

```
<script>
  var canvas;    // DOM object corresponding to the canvas
  var graphics;  // 2D graphics context for drawing on the canvas

  function draw() {
    // draw on the canvas, using the graphics context
    graphics.fillText("Hello World", 10, 20);
  }

  function init() {
    canvas = document.getElementById("theCanvas");
    graphics = canvas.getContext("2d");
    draw(); // draw something on the canvas
  }
</script>
```

Quick Quiz

Pause the video and respond at
<https://forms.gle/VViU5wYsiBf36nAV9>

- Name all the functions defined in the script
`init()`, `draw()`
- Name all the variables defined in the script
`canvas`, `graphics`
- What is the id of the HTML canvas element?
`theCanvas`

```
<!DOCTYPE html>
<html>
<head>
<title>Canvas Graphics</title>
<script>
    var canvas;    // DOM object corresponding to the canvas
    var graphics;  // 2D graphics context for drawing on the canvas

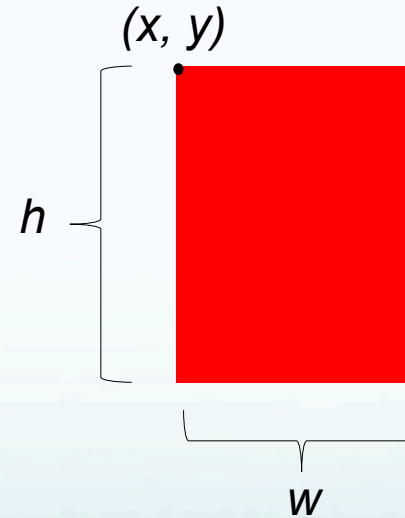
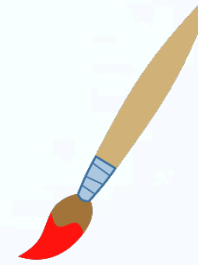
    function draw() {
        // draw on the canvas, using the graphics context
        graphics.fillText("Hello World", 10, 20);
    }

    function init() {
        canvas = document.getElementById("theCanvas");
        graphics = canvas.getContext("2d");
        draw(); // draw something on the canvas
    }
</script>
</head>
<body onload="init()">
    <canvas id="theCanvas" width="640" height="480"></canvas>
</body>
</html>
```

Graphics functions

1) `graphics.fillStyle = "red";` *// pick up paintbrush*

2) `graphics.fillRect(x, y, w, h);` *// paint*



For now: `graphics.fillRect(x, y, 1, 1);` *// color the pixel at (x,y)*



Syntax

For Loops

Python:

```
for i in range(20, 40, 2):  
    print(i)
```

JavaScript:

```
for (var i = 20; i < 40; i += 2) {  
    console.log(i);  
}
```


Conditionals

Python:

```
if x > 0:  
    print("positive")  
elif x < 0:  
    print("negative")  
else:  
    print("zero")
```

JavaScript:

```
if (x > 0) {  
    console.log("positive");  
} else if (x < 0) {  
    console.log("negative");  
} else {  
    console.log("zero");  
}
```

Other Syntax

- Mod: %
- And: &&
- Or: ||
- Comment: //
- Always double check:
 - curly braces { }
 - indent based on { }
 - parenthesis ()

*// Your code editor
can help with these!*

Review

After this video, you should know how to:

- Build a basic HTML page that incorporates a graphics canvas
- Identify open/close tag pairs in HTML & check proper nesting
- Define functions and variables in Javascript
- Write simple loops and conditions in Javascript
- Color individual pixels of the graphics canvas in arbitrary colors