

CS 696 Emerging Web and Mobile Technologies
Spring Semester, 2011
Doc 8 Canvas, Video & Websockets
Feb 17, 2011

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References

Dive into HTML5, Mark Pilgrim, <http://diveintohtml5.org/>

HTML5 & CSS3 Develop with Tomorrow's Standards Today, Hogan, Pragmatic Programmers

Various Web pages as indicated on individual slides

Video Codec

Software or hardware algorithm that compresses/decompresses video

HTML 5 Video Codec Support

Browser	Ogg Theora (VP3)	H.264	VP8 (WebM)
IE	No	in IE 9	Future Google plugin
FireFox	Yes	No	in FireFox 4
Chrome	Yes	Yes/No	Yes
Safari	No	Yes	Future Google plugin
Opera	Yes	No	Yes

Containers

Supports multiple codec/formats

QuickTime player

Ogg

HTML 5 Video & Audio support

Native Browser support for playing & controlling video & audio

No need for Flash

What is Wrong with Flash?

What some people claim

Buggy
Slow

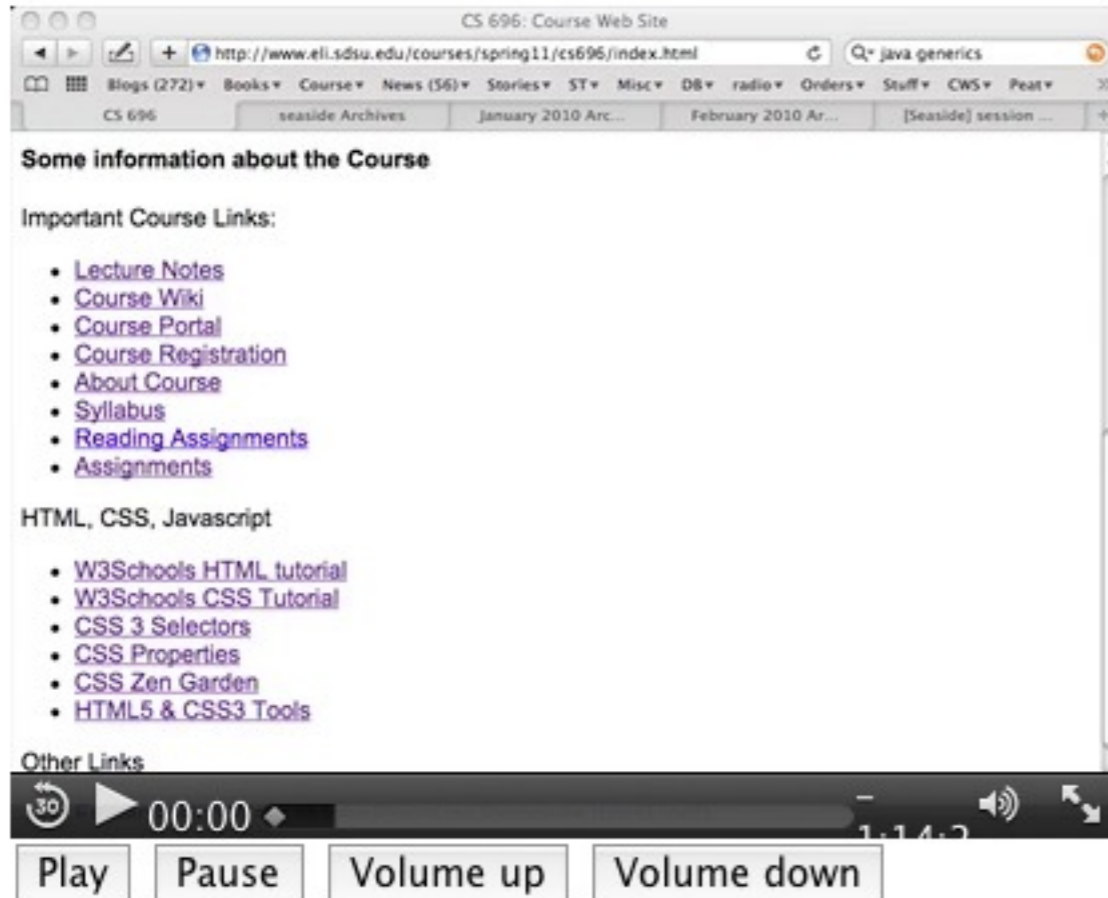
Flash & Mobile

Many Flash sites use hover

iOS does not support flash

HTML5 Video Support

Playing Class Video in Safari



Source

```
<head>
<meta charset="UTF-8" />
<title>Video</title>
</head>
<body>

<video id="player" controls>
<source src="http://www-rohan.sdsu.edu/~whitney/audio/courses/spring11/cs696/
cs696_01_25_11.mov"></source>
</video><br/>
<button onclick="document.getElementById('player').play()">Play</button>
<button onclick="document.getElementById('player').pause()">Pause</button>
<button onclick="document.getElementById('player').volume+=0.1">Volume up</button>
<button onclick="document.getElementById('player').volume-=0.1">Volume down</button>
</body>
</html>
```


Advantages

Works on iOS

Can control video from Javascript

Don't need to interact with Flash Player

Disadvantages

Chrome & Firefox will not support H.264

Currently on Opera & Chrome support WebM

Workaround 1

Record video in multiple formats
Let browser select correct format

```
<video id="player" controls>  
  <source src="http://www-rohan.sdsu.edu/~whitney/audio/courses/spring11/cs696/  
cs696_01_25_11.mov"></source>  
  <source src="http://www-rohan.sdsu.edu/~whitney/audio/courses/spring11/cs696/  
cs696_01_25_11.ogg"></source>  
</video>
```

Workaround 2

Use flash

HTML5 Audio

Native support for streaming audio

Format	IE 8	Firefox 3.5	Opera 10.5	Chrome 3.0	Safari 3.0
Ogg Vorbis	No	Yes	Yes	Yes	No
MP3	No	No	No	Yes	Yes
Wav	No	Yes	Yes	No	Yes

Audio Example

```
<article class="sample">
  <header>
    <h2>Drums</h2>
  </header>
  <audio id="drums" controls>
    <source src="sounds/ogg/drums.ogg" type="audio/ogg">
    <source src="sounds/mp3/drums.mp3" type="audio/mpeg">
    <a href="sounds/mp3/drums.mp3">Download drums.mp3</a>
  </audio>
</article>
```

Audio Example - Streeme

<http://code.google.com/p/streeme/>

Streams your music from your computer

Client - any browser that supports HTML5 audio

Canvas

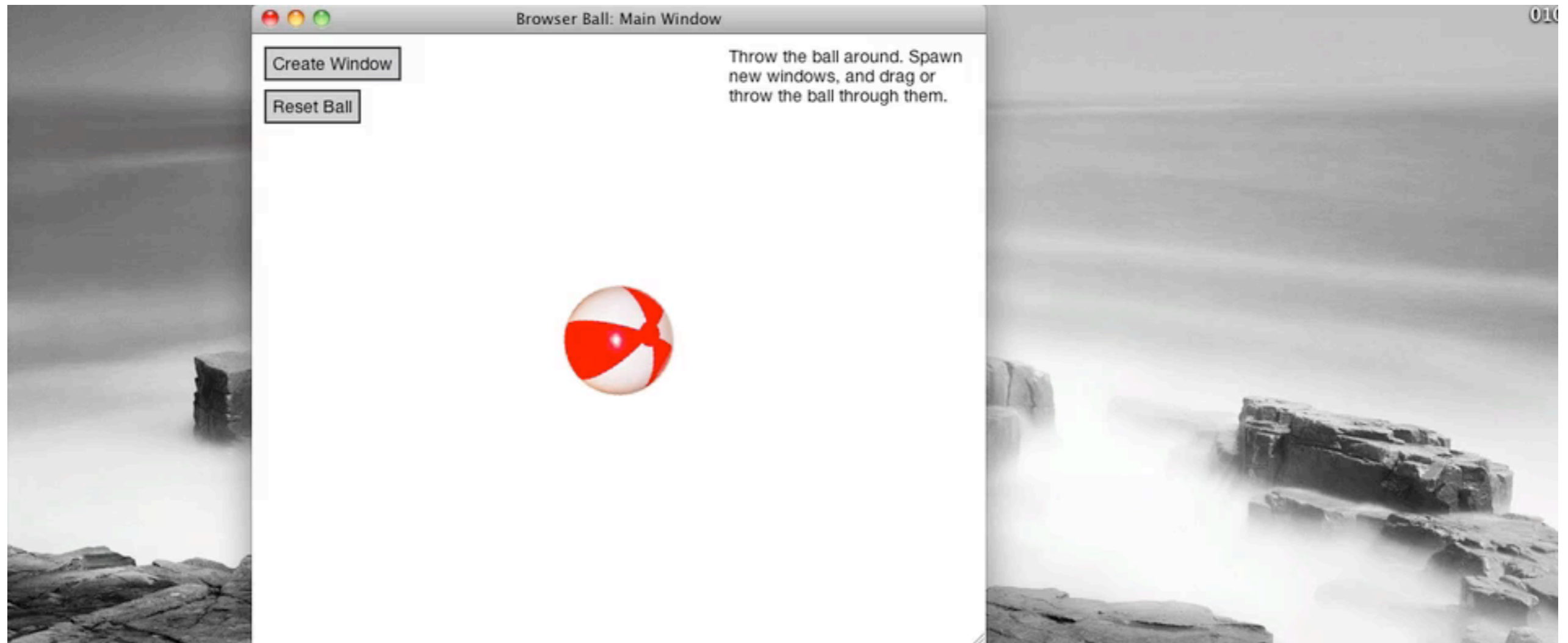
Canvas

Native 2D graphic in browser

Supported in
IE 7.0+ (needs plugin)
FireFox 3.0+
Safari 3.0+
Chrome 3.0+
Opera 10.0+
iPhone 1.0+
Android 1.0+

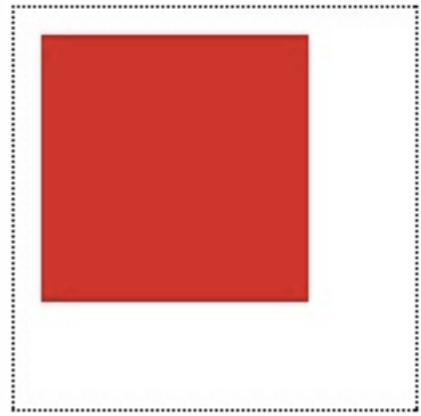
Examples

<http://www.devlounge.net/code/10-awesome-html5-canvas-examples>



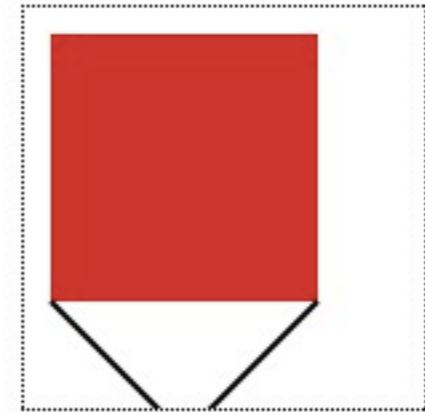
Canvas

```
<!DOCTYPE html> <html lang="en">
<head>
  <meta charset="utf-8" />
  <script type="text/javascript">
function drawExample() {
    var canvas = document.getElementById('draw');
    if (!canvas.getContext){ return false; }
    var context = canvas.getContext('2d');
    context.fillStyle = "rgb(200,0,0)";
    context.fillRect (10, 10, 100, 100);
  }
</script>
</head>
<body onload="drawExample()">
  <canvas id="draw" width="150" height="150" style="border:1px dotted">
    Fallback content here
  </canvas>
</body>
</html>
```



Drawing Lines

```
function drawExample() {  
  var canvas = document.getElementById('draw');  
  if (!canvas.getContext){  
    alert("No canvas");  
    return false;  
  }  
  var context = canvas.getContext('2d');  
  context.fillStyle = "rgb(200,0,0)";  
  context.fillRect (10, 10, 100, 100);  
  context.lineWidth = 2;  
  context.beginPath();  
  context.moveTo(10, 110);  
  context.lineTo(60,160);  
  context.lineTo(110, 110 );  
  context.stroke();  
  context.closePath();  
}  
</script>
```



```
<canvas id="draw" width="150" height="150"  
style="border:1px dotted">  
Fallback content here  
</canvas>
```

Canvas method

Low level drawing methods

Good tutorial

<http://diveintohtml5.org/canvas.html#divingin>

List of all Canvas methods

<http://blog.nihilogic.dk/2009/02/html5-canvas-cheat-sheet.html>

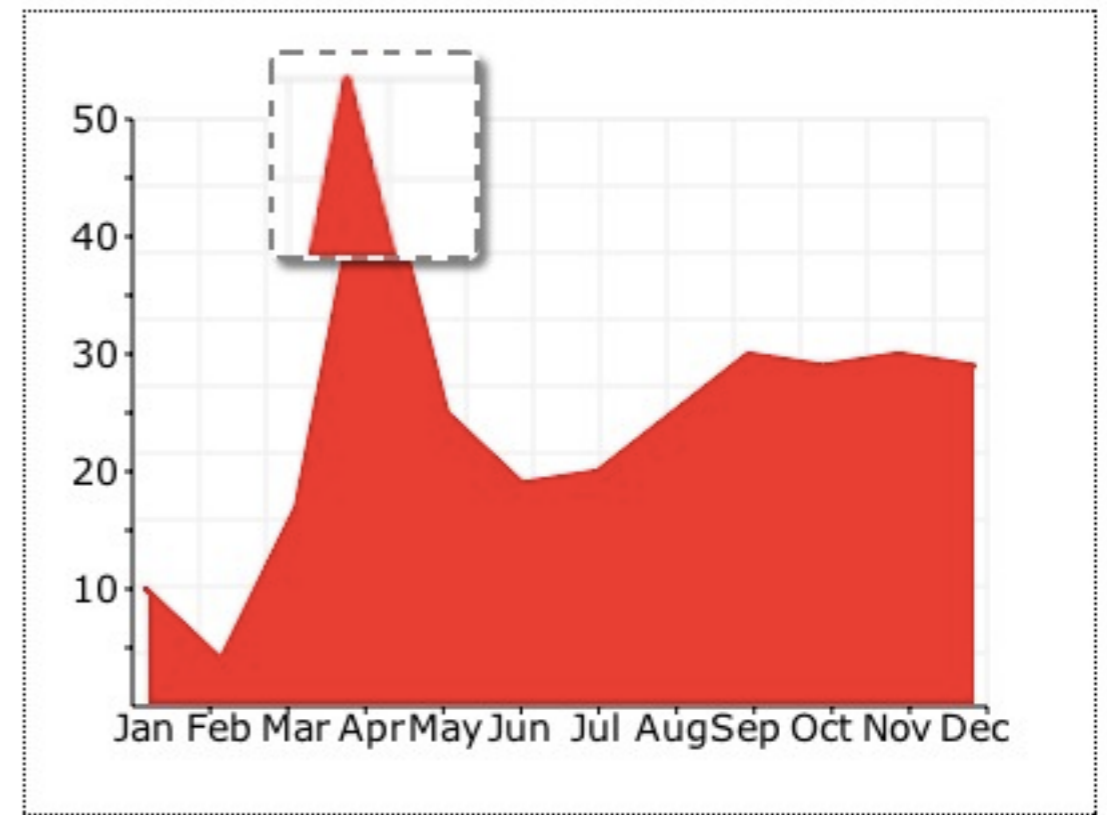
RGraph

JavaScript Library for graphs using canvas

<http://www.rgraph.net/>

Provide data for graph

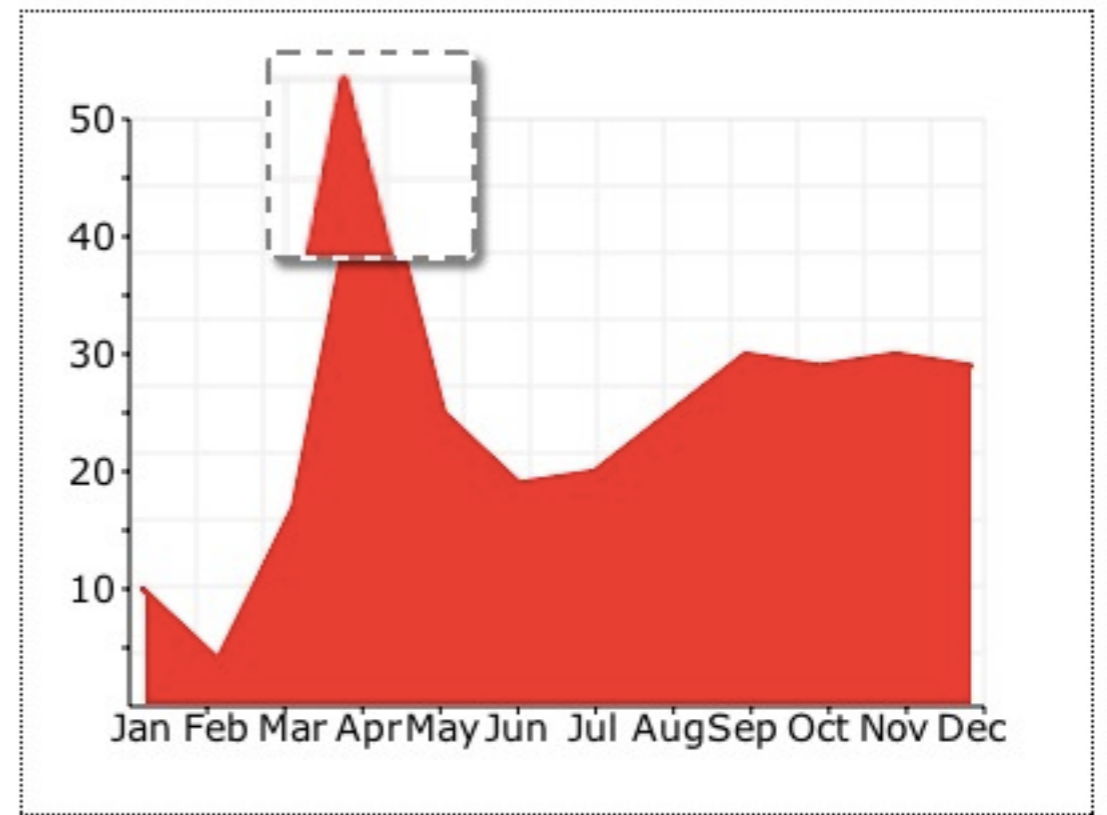
Configure graph settings



Example

```
window.onload = function ()  
{  
  var data = [10,4,17,50,25,19,20,25,30,29,30,29];
```

```
  var line = new RGraph.Line("chart", data);  
  line.Set('chart.background.barcolor1', 'rgba(255,255,255,1)');  
  line.Set('chart.background.barcolor2', 'rgba(255,255,255,1)');  
  line.Set('chart.background.grid.color', 'rgba(238,238,238,1)');  
  line.Set('chart.colors', ['rgba(255,0,0,1)']);  
  line.Set('chart.linewidth', 2);  
  line.Set('chart.filled', true);  
  line.Set('chart.hmargin', 5);  
  line.Set('chart.labels', ['Jan', 'Feb', 'Mar', 'Apr', 'May', 'Jun', 'Jul', 'Aug', 'Sep', 'Oct', 'Nov', 'Dec']);  
  line.Set('chart.gutter', 40);  
  line.Set('chart.zoom.mode', 'thumbnail');  
  line.Draw();  
}
```



Other Tools

Processing.js

<http://processingjs.org/>

JavaScript implementation of Processing

Language for creating images, animations, and interactions

MooTools Canvas Library

<http://forvar.de/js/mcl/>

Supports

Layers

Threads

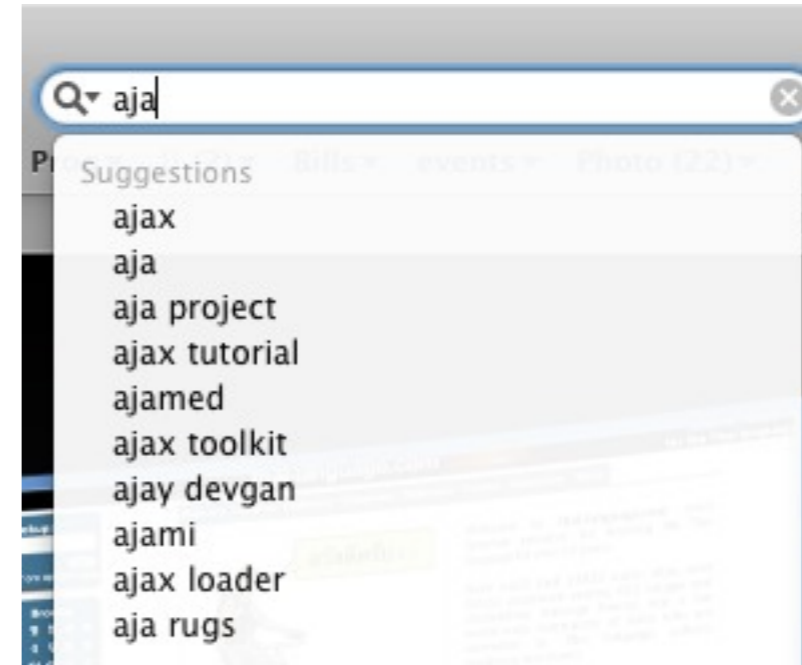
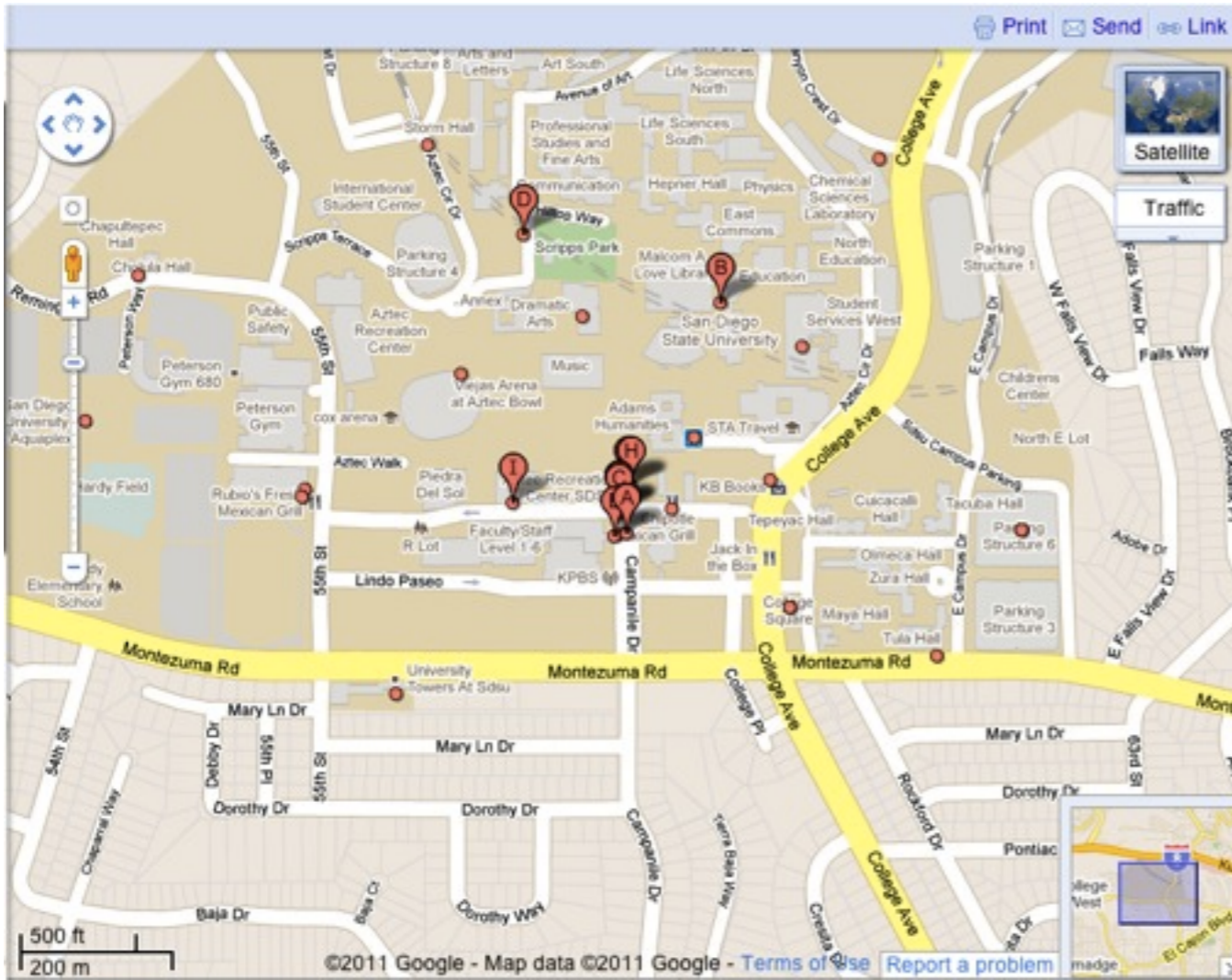
Items

Animations

WebSockets

The Problem

How can browser get data from server without reloading a page



AJAX - Asynchronous JavaScript and XML

1998 - Microsoft implements xmlhttp

Makes independent request to server

Has nothing to do with XML

2002 - Mozilla implements XMLHttpRequest

2005 - Google maps uses xmlhttp

Sample xmlhttp JavaScript Code

```
xmlhttp.onreadystatechange=function()  
{  
  if (xmlhttp.readyState==4 && xmlhttp.status==200)  
  {  
    document.getElementById("myDiv").innerHTML=xmlhttp.responseText;  
  }  
}  
xmlhttp.open("GET","ajax_info.txt",true);  
xmlhttp.send();
```

Ajax Issue

Server can not send data to client

Client has to request data

How to build a chat client as web page

When you send message can send it to server via xmlhttp

How does server send message to other person?

Polling

Client can continually ask server if it has data

Consumes resources on client and server side

Comet

Allows server to push data to client

Uses 2 connections and hidden iframe

Send data to server via normal xmlhttp

Another xmlhttp request to server for push

Connection kept open until server has data

Server sends data

Connection stays open

In some situations client may have to reopen connection

CometD

<http://cometd.org/>

Commonly used library for comet

Javascript, java, perl, python

Comet Issues

Resource consumption

- 2 connections

- HTTP 1.1 allows only 2 connection to a server

Protocol not standard

Complications due to browser differences

Problems in keeping HTTP request open

Websockets

Simple bidirectional connect between client & server
Uses one network connection

Client Side Interface

Constructor

```
new WebSocket("ws:host address")
```

Methods

```
void send(in DOMString data);  
void close();
```

Events

```
onopen  
onmessage  
onerror  
onclose
```

Basic Operation

You need a server that implements the WebSocket protocol

```
var socket;  
var host = "ws://localhost/some/server";  
  
var socket = new WebSocket(host);  
  
socket.onmessage = function(message){  
    alert(message);  
}  
  
socket.send("Hello server");
```

Support & Problems

Limited browser support

Google found security hole

Same issue affects Flash & Java

Supporting Browsers

Chrome 4

Safari 4

iOS 4.2

Browser turned off Websockets

Firefox 4

Opera 11

Socket.IO

JavaScript library that supports
WebSocket
Adobe Flash Socket
AJAX long polling (Comet)
AJAX multipart streaming
Forever Iframe
JSONP Polling

One interface

Library selects actual protocol

WebSockets

<http://net.tutsplus.com/tutorials/javascript-ajax/start-using-html5-websockets-today/>