COMP 431/531: Web Development

Lecture 6: jQuery, Storage, Canvas

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https://www.clear.rice.edu/comp431

Announcements & Reminders

- Quiz #1 (JavaScript) is due Thursday, Sept. 18th at 11:59pm

- HW #3 (JavaScript Game) is due Thursday, September 25th at 11:59pm

  classroom hw3 repo: https://classroom.github.com/a/wZT10Yqv

What is jQuery?

- Like Bootstrap, jQuery is yet another tool for helping increase the ease and efficiency of web development.

- Make the developers life better in a few ways:

  - DOM manipulation Quality of Life (QOL) improvements

  - AJAX QOL improvements (keep in mind when AJAX is covered)

  - Browser compatibility QOL built in

  - Really nice animation tools for common animations!

  - Much more, see: https://www.w3schools.com/jquery/jquery_intro.asp

jQuery JavaScript Library

Wrapper around DOM manipulation

Use:

```javascript
$(window).load(function() {

    $("#div1").click(function() {
        $("#div1").hide()
    })

    $("#div2").click(function() {
        $("#div1").show()
    })

})
```

Instead of:

```javascript
window.onload = function() {
    document.getElementById("div1").on
        this.style.display = 'none'
    }

    document.getElementById("div2").onclick = function() {
        document.getElementById("div1").style.display = 'block'
    }

}
```

jQuery uses CSS Selectors

```html
<div id="div1" style="background-color:blue;">
Click to Hide
</div>

<div id="div2" style="background-color:red;">
Click to Show
</div>
```

Selector Rules (the easy ones)

• Tag

```css
body {
    background-color: #FFFFFF;
}
```

• Class

```css
.linkInverted {
    color: #FFFF00;
}
```

• Id

```css
#riceLogo {
    width: 6em;
    margin-top:-1em;
    margin-bottom:-1em;
}
```

• Attribute

```css
[name="fancy"] {
    font-size: 2em;
}
```

```javascript
$("#div1").click(function() {
    $("#div1").hide()
})

$("#div2").click(function() {
    $("#div1").show()
})

})
```

Modifying jQuery Attributes

```
> $('#div1').css('width')
< "480px"

> $('#div1').css('width', '20px')
< [
    <div id="div1" style="display: block; width: 20px;
    background-color: blue;">
    Click to Hide
    </div>
  ]

> $('#div1').css(['width', 'height'])
< Object {width: "20px", height: "111px"}

> $('#div1').html('Some content')
< [
    <div id="div1" style="display: block; width: 20px;
    background-color: blue;">Some content</div>
  ]
```
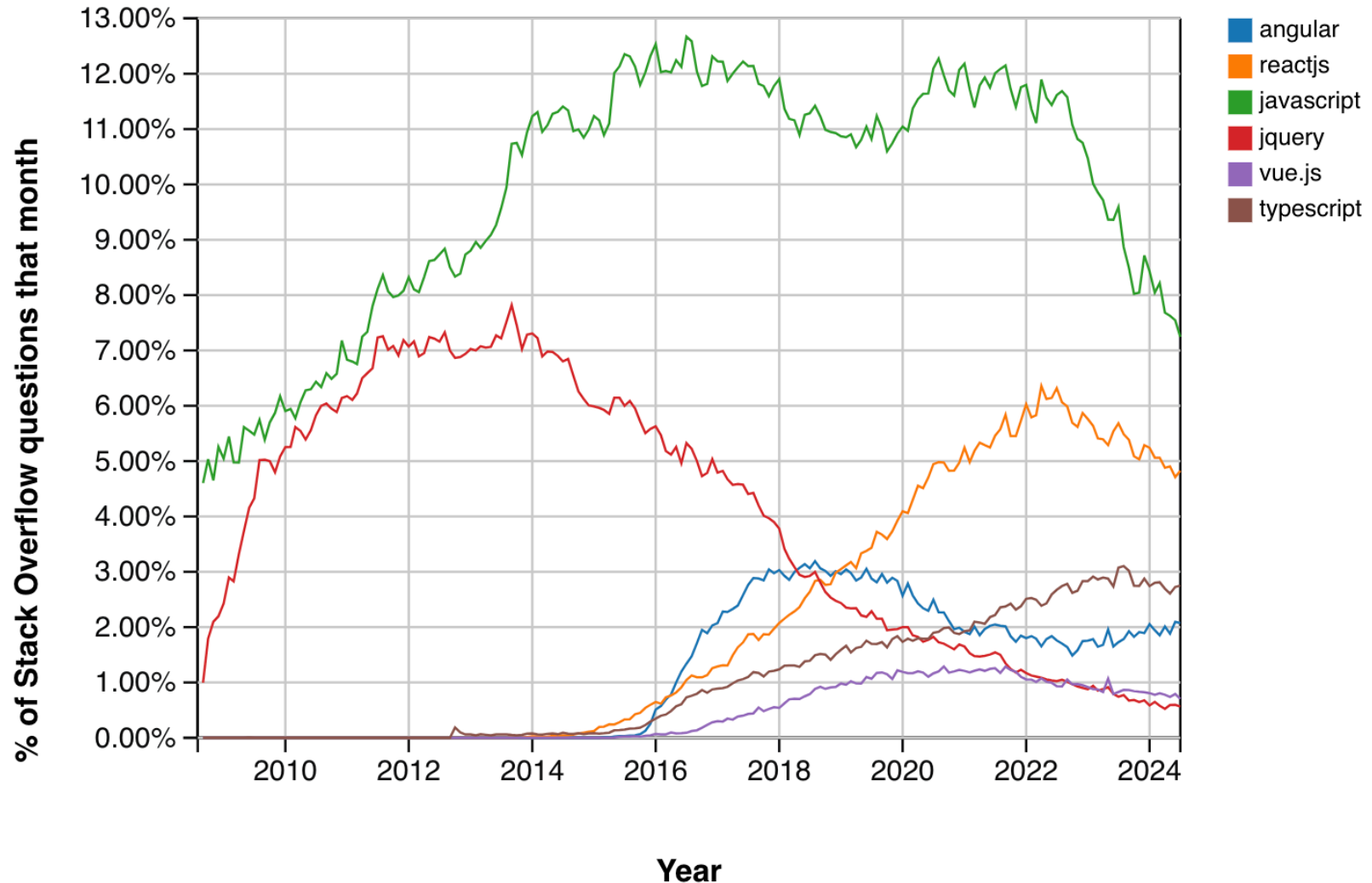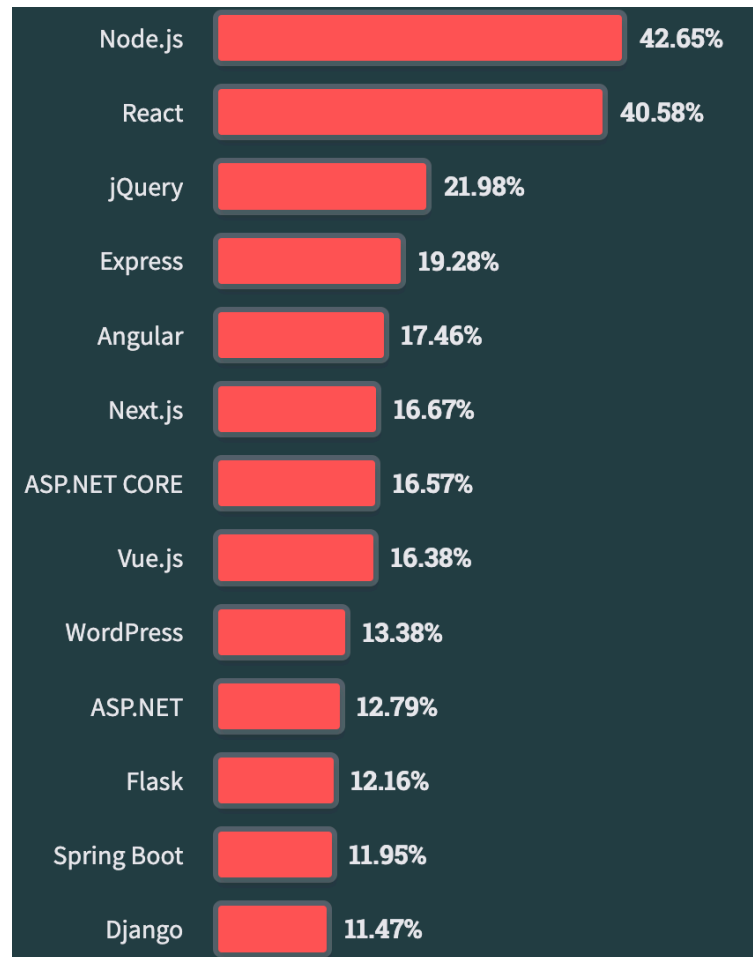
Get jQuery

```
12 |     <script src="https://code.jquery.com/jquery-3.4.1.js"></script>
```

jQuery: Rise and Fall

jQuery still used

https://survey.stackoverflow.co/2023/#most-popular-technologies-webframe

COMP 431/531, Fall 2025 (M.Joyner)

Good Resources on jQuery Past, Present, and Future

- Should you use or learn jQuery in 2025

  - https://flaviocopes.com/jquery/

  - Gives additional details on the progression of web development

  - Hints at potential obsolescence incoming

- The future of jQuery

  - https://www.arroyolabs.com/2019/03/the-future-of-jquery/

  - (source for image on previous slide)

  - "downward trend due to inception of Angular 1 and ReactJs"

  - "almost impossible for jQuery to return to its prominence"

Storage

Stateless Servers

- HTTP is a *stateless* protocol

- Each transaction is independent of previous ones

- There is no implementation in the protocol to retain state

- If you want state, you need to send data back and forth in the payload

Storage

- Cookies and Local Storage

  - W3schools introduction:

  - "Before HTML5, application data had to be stored in cookies"

  - "Web storage is more secure, and large amounts of data can be stored locally, without affecting website performance."

- Client vs server side access to information varies between the different kinds of storage

  - "Unlike cookies, … [local storage] information is never transferred to the server.

Local Storage in HTML5

- Cookies

  - Limited to 4095 bytes

  - Expiration per cookie

  - No expiration = session cookie

- Local Storage

  - 5MB per origin (browser dependent)

  - 50MB with compression

  - No expiration (only cleared by JavaScript, clearing browser cache)

- Session Storage (data stored until browser, tab is closed)

  - How to use local and session storage: https://www.w3schools.com/html/html5_webstorage.asp

Cookies

- First introduced in 1994 (Netscape)

- Key-value pairs with 0 or more attributes

  - Domain, Path - allow you to restrict who sees the cookies

  - Expires - determines how long browser keeps the cookies

  - HTTPOnly - client-side scripts not allowed to access cookies (this is a flag that can be set)

  - Secure - send cookies over an encrypted connection

- Browser retains cookies for the session or until they expire

Wikipedia's Example

```
GET /index.html HTTP/1.1
Host: www.example.org
...
```

```
HTTP/1.0 200 OK
Content-type: text/html
Set-Cookie: theme=light
Set-Cookie: sessionToken=abc123; Expires=Wed, 09 Jun 2021 10:18:14 GMT
...
```

```
GET /spec.html HTTP/1.1
Host: www.example.org
Cookie: theme=light; sessionToken=abc123
...
```

Adding Cookie

```
> document.cookie = "secret=message"
< 'secret=message'
> document.cookie = "another=secret"
< 'another=secret'
> document.cookie
```

'firstname=John; lastname=Smith; secret=message; another=secret; _sharedID=de5a1db2-3734-440e-87b3-2be341e59de9; _sharedID_c
st=TyylLI8srA%3D%3D; _lr_env_src_ats=false; _cc_id=84fd7eb9b04fc6f82a1e91f7f3fea8e1; TAPAD=%7B%22id%22%3A%22bf394008-2fe3-46
05-9d7a-99cc8a0b5fd0%22%7D; panoramaId_expiry=1726576023231; panoramaId=1a71360c30977101b81543a722b416d53938aeaa36cdb318d4bf
be7f2ee95d92; panoramaIdType=panoIndiv; _pubcid=d70696bd-fe1c-40d4-a786-8e0508a96914; __qca=P0-2048620586-1725978897130; _au
_1d=AU1D-0100-001725980950-VNSB5MK6-KB2S; pbjs-unifiedid=%7B%22TDID%22%3A%222ddc317e-28f2-4235-ae09-a974088999b2%22%2C%22TDI
D_LOOKUP%22%3A%22TRUE%22%2C%22TDID_CREATED_AT%22%3A%222024-08-12T12%3A52%3A21%22%7D; pbjs-unifiedid_cst=zix7LPQsHA%3D%3D; ct
o_bidid=4eX7IF9HU0dvZzl5anQxRUtWcXVKWW5UOXZUcERnN1hMOUd1eXVVakF3dU5IYXQ3amNIMkhZZXY3enpUR2trRTRHd0RFc0xKV1hoUHRjYnRzUFdqUE1q
MGxFNzBuNVRJM1E1c0JOdXlUaG5MUG9TYTQ4Vms5dG5FYYNXT0o2bmNnWENITThTMkpZeHZIbDlncG9CWm5EbUxoSmclM0QlM0Q; _sharedID_last=Mon%2C%2
016%20Sep%202024%2021%3A50%3A46%20GMT; _lr_retry_request=true; __gads=ID=2ebd6d141b1a28fb:T=1725328868:RT=1726523448:S=ALNI_
MZAjEUYHxWc2hEnKjDEA5zAktUvNg; __gpi=UID=00000ed9cbff37da:T=1725328868:RT=1726523448:S=ALNI_Ma4KI9kORJyOKWDX9Hl4Y2Pqqi2iw; _
_eoi=ID=c5ce7919de77c5e3:T=1725328868:RT=1726523448:S=AA-AfjYxOaYuDD8PiosWThaGwI34; _pubcid_cst=VyxHLMwsHQ%3D%3D; _ga=GA1.2.
1957291092.1725328867; _gid=GA1.2.946928161.1726523452; cto_bundle=eOvUs18yWkhkYzROcXN6U1V5VURnVVZBRCUyQmNDJTJCYyUyQjBHNmRTZ
095OTZxMWV0UThHHWkpqTE1sc1l3Y3BaTTNOQnQ4dUJNOUxsdDdHb1R5NmUwbUE4b1pHUlFzeTlTMk13VzVyakY2ZUoxVzh2NGwzcUVsdThBa3ZkZmFYTGFkQW9Tc
2slMkZWTUdjYmVEZU81VSUyRjBPMHpQNHV5MFlPQmhOWkxFaFlxZFM3ekpsdldnb2RmN2lNc3FCQ0tvVjRyZ2clMkZRWUJaNW9ONTJmT2tFdzdKb2xrdlZGRnBGS
2dnWTNlemJlciUyQjV3MmttTyUyRjI2diUyQlZobnp0MDR0dElydFJLcWdMc2E1JTJCR0ltazB0MGFKTVZUYWxlOSUyQk5udnlrJTJGYll6aXV5V0M5MDUzTWVvQ
mdZdzF2M1o4JTJGRzZlTnBGMzdoeWc4N2dSSnYwRFglMkY5Q3Bqa2dXY01aYlYlYwcUU5UGVVYnglMkJjbkU4ODRldjdYRzgwUHFpOVklM0Q; _ga_9YNMTB56NB=G
S1.1.1726523446.12.1.1726523544.27.0.0'
```
```

Adding Cookie with Expiration

```
> document.cookie = "stale=crumb; expires=" + expiry.toUTCString()
< 'stale=crumb; expires=Sun, 01 Sep 2024 21:53:15 GMT'
> document.cookie
```

```
< 'firstname=John; lastname=Smith; secret=message; another=secret; _sharedID=de5a1db2-3734-440e-87b3-2be341e59de9; _sharedID_c
st=TyylLI8srA%3D%3D; _lr_env_src_ats=false; _cc_id=84fd7eb9b04fc6f82a1e91f7f3fea8e1; TAPAD=%7B%22id%22%3A%22bf394008-2fe3-46
05-9d7a-99cc8a0b5fd0%22%7D; panoramaId_expiry=1726576023231; panoramaId=1a71360c30977101b81543a722b416d53938aeaa36cdb318d4bf
be7f2ee95d92; panoramaIdType=panoIndiv; _pubcid=d70696bd-fe1c-40d4-a786-8e0508a96914; __qca=P0-2048620586-1725978897130; _au
_1d=AU1D-0100-001725980950-VNSB5MK6-KB2S; pbjs-unifiedid=%7B%22TDID%22%3A%222ddc317e-28f2-4235-ae09-a974088999b2%22%2C%22TDI
D_LOOKUP%22%3A%22TRUE%22%2C%22TDID_CREATED_AT%22%3A%222024-08-12T12%3A52%3A21%22%7D; pbjs-unifiedid_cst=zix7LPQsHA%3D%3D; ct
o_bidid=4eX7IF9HU0dvZzl5anQxRUtWcXVKWW5UOXZUcERnN1hMOUd1eXVVakF3dU5IYXQ3amNIMkhZZXY3enpUR2trRTRHd0RFc0xKV1hoUHRjYnRzUFdqUE1q
MGxFNzBuNVRJM1E1c0JOdXlUaG5U4Q9TYTQ4Vms5dG5FYVNXT0o2bmNnWENITThTMTMkpZeHZIbDlncG9CWm5EbUxoSmclM0QlM0Q; _sharedID_last=Mon%2C%2
016%20Sep%202024%2021%3A50%3A46%20GMT; _lr_retry_request=true; __gads=ID=2ebd6d141b1a28fb:T=1725328868:RT=1726523448:S=ALNI_
MZAjEUYHxWc2hEnKjDEA5zAktUvNg; __gpi=UID=00000ed9cbff37da:T=1725328868:RT=1726523448:S=ALNI_Ma4KI9kORJyOKWDX9Hl4Y2Pqqi2iw; _
_eoi=ID=c5ce7919de77c5e3:T=1725328868:RT=1726523448:S=AA-AfjYxOaYuDD8PiosWThaGwI34; _pubcid_cst=VyxHLMwsHQ%3D%3D; _ga=GA1.2.
1957291092.1725328867; _gid=GA1.2.946928161.1726523452; cto_bundle=eOvUs18yWkhkYzROcXN6U1V5VURnVVZBRCUyQmNDJTJCYyUyQjBHNmRTZ
0950TZxMWV0UThHWkpqTE1sc1l3Y3BaTTNOQnQ4dUJNOUxsdDdHb1R5NmUwbUE4b1pHUlFzeTlTMk13VzVyakY2ZUoxVzh2NGwzcUVsdThGRa3ZkZmFYTGFkQW9Tc
2slMkZWTUdjYmVEZU81VSUyRjBPMHpQNHV5MFlPQmhOWkxFaFlxZFM3ekpsdldnb2RmN2lNc3FCQ0tvVjRyZZ2clMkZRWUJaNW9ONTJmT2tFdzdKb2xrZGlZGRnBGS
2dnWTNlemJlciUyQjV3WmttTTyUyRjI2diUyQlZobnp0MDR0dElydFJLcWdMc2E1JTJCR0lttazB0MGFKTVZUYWxlOSUyQk5udnlrJTJGYll6aXV5V0M5MDUzTWVvQ
mdZdzF2M1o4JTJGRzZlTnBGMzdoeWc4N2dSSnYwRFglMkY5Q3Bqa2dXY01aYlYwcUU5UGVVYnglMkJjbkU4ODRldjdYRzgwUHFp0VklM0Q; _ga_9YNMTB56NB=G
S1.1.1726523446.12.1.1726523544.27.0.0'
```

Cookies

To use a cookie in JavaScript, you have to parse it


```
document.cookie
"secret=message; another=secret"
```

Local Storage Example

```javascript
if (window.localStorage) {
    document.getElementById('save').onclick = function() {
        localStorage.setItem('magic', 'This is my content')
    }

    document.getElementById('load').onclick = function() {
        var content = localStorage.getItem('magic')
        document.getElementById('content').innerHTML = content
    }
} else {
    window.alert('No localStorage support!')
}
```

For more:

Cookies: https://www.w3schools.com/js/js_cookies.asp

HTML5 storage: https://www.w3schools.com/html/html5_webstorage.asp

Host on Surge

1. Download Node.js

2. From command line:

```
>> npm install ——global surge

>> cd [hw3—dir]

>> surge
```

Run JavaScript Everywhere

Node.js® is a free, open-source, cross-platform JavaScript runtime environment that lets developers create servers, web apps, command line tools and scripts.

Get Node.js®

Get security support
for EOL Node.js versions

https://nodejs.org/en

v22.19.0 Latest LTS   v24.7.0 Latest Release   Trademark Policy
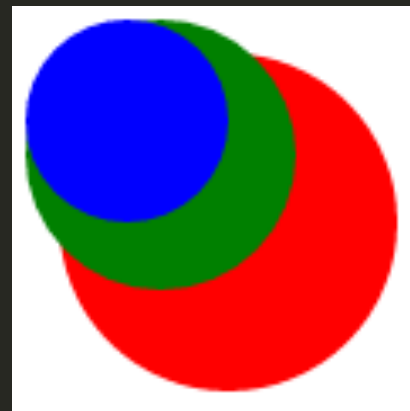
Canvas

Canvas

```
<canvas></canvas>
<script>
var c = document.querySelector("canvas").getContext("2d");

function fillCircle(x, y, r, color) {
  c.fillStyle = color;
  c.beginPath()
  c.arc(x, y, r, 0, 2 * Math.PI, false)
  c.closePath()
  c.fill()
}

fillCircle(60, 60, 50, 'red')
fillCircle(40, 40, 40, 'green')
fillCircle(30, 30, 30, 'blue')
</script>
```

Canvas is a g*ame changer* for web development!

Canvas as a Game Changer: Example

- The <u>Unity game development engine</u> is an extremely powerful development platform that is used for most video game development.

  - Code is written in C# with many very helpful and easy to use libraries.

  - Quoting from the Unity page <u>https://learn.unity.com/tutorial/how-to-publish-for-webgl#5f68a98fedbc2a0020435c0d</u> :

Unity's WebGL build allows you to render 2D and 3D graphics in a web browser without the need for additional tools or plug-ins. When you publish a WebGL build, Unity builds an HTML5/Javascript program. You can deploy the program online for users to access in a web browser.
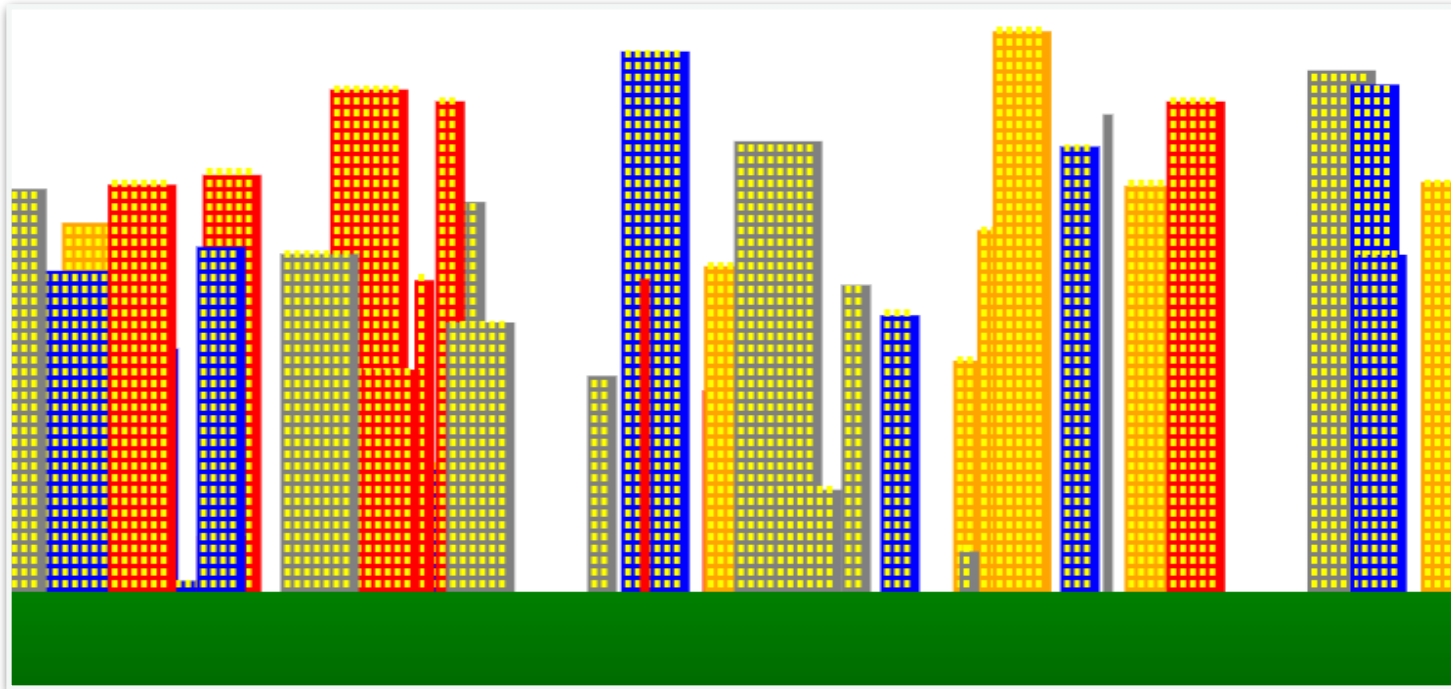
WebGL

- WebGL "enables web content to use an API based on OpenGL ES 2.0 to perform 2D and 3D rendering in an HTML *canvas* in browsers that support it without the use of plug-ins."

  - Source: https://developer.mozilla.org/en-US/docs/Web/API/WebGL_API/Tutorial/Getting_started_with_WebGL

- See https://www.khronos.org/webgl/wiki/Tutorial for examples of WebGL code and what it can do

Canvas Example

See also cool examples of what you can do with: https://cloudinary.com/blog/creating_html5_animations#create-html5-animations

And more animation tips at: https://developer.mozilla.org/en-US/docs/Web/API/Canvas_API/Tutorial/Basic_animations