

GENERATE **ART**

EVERYWHERE

(with web components)

AND **FAST!**

(with web workers)

@trentmwillis | #NEJSConf

Have you ever been a part of
an **online forum community**?



It is currently Wed Jul 03, 2019 2:39 am

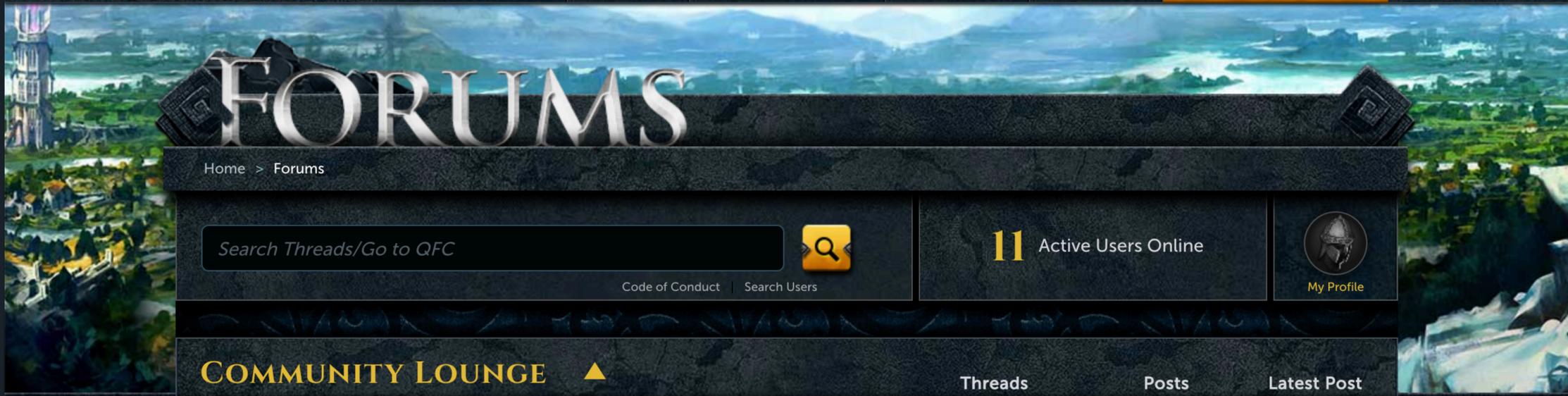
GENERAL	TOPICS	POSTS	LAST POST
Announcements Read me first before posting anywhere! Subscribe to the feed, available in Atom or RSS format.	430	645	phpBB 3.2.7 Release by Marc Sun May 05, 2019 8:18 am
Area 51 Development Board Visit the Area 51 development board, phpBB's testing ground of bleeding edge developmental code, to discuss development & code changes, RFCs, future versions of phpBB, and also take a peek at the currently available development version of phpBB, if one is available.	Total redirects: 441930		

SUPPORT FORUMS	TOPICS	POSTS	LAST POST
[3.2.x] Support Forum Get help with installation and running phpBB 3.2.x here. Please do not post bug reports, feature requests, or extension related questions here. Subforums: [3.2.x] Convertors , [3.2.x] Translations	8339	52780	Re: Php errors on my website by thecoalman Wed Jul 03, 2019 1:02 am
Custom BBCode Development and Requests Get help developing custom BBCodes or request one. Subforum: Validated BBCodes	593	7103	Re: Twitter bbcode - embed tw... by Mick Mon Jul 01, 2019 10:36 pm

EXTENSIONS FORUMS	TOPICS	POSTS	LAST POST
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- SHOP ▾
- PLAY NOW ▶



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Code of Conduct | Search Users

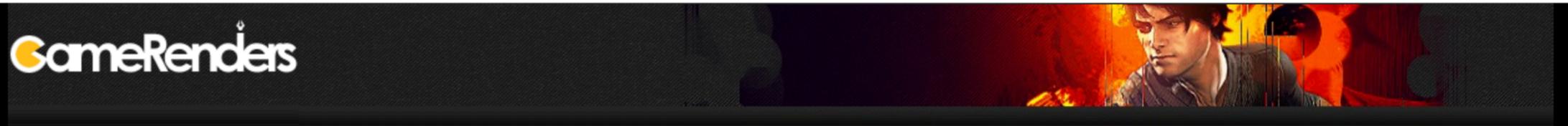
11 Active Users Online



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COMMUNITY LOUNGE ▲

	Threads	Posts	Latest Post
Community Home Find out what's going on across the RuneScape community	614	218,456	03/07/19 01:50
Events and Competitions Advertise your events, join in Jmod events and Jagex Competitions!	619,535	9,278,889	02/07/19 23:16
General For any RuneScape topic not covered by the other forums	2,721,019	25,806,445	03/07/19 03:53
Website and Forums	13,128	189,762	02/07/19 23:50



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Forums



GameRenders Forums

Community

I'm new here! Introduce yourself here and get the love you deserve!	16,629 THREADS	51,205 POSTS	Latest: Iam new here ! crystaldemo, May 4, 2019
General Discussion Chat about any topic you can think about. Discussion topics only!	11,353 THREADS	219,707 POSTS	Latest: The "GFX" community is... Mycro, Thursday at 4:23 PM
Spam Heaven A place to talk about everything or nothing	8,281 THREADS	140,628 POSTS	Latest: 10 Year Club xlink, Jun 13, 2019
Graphics discussion Got questions regarding graphics? Report here.	79 THREADS	54,607 POSTS	Latest: Any advice on transferin... 3dtech, Jul 21, 2017

Sign up now!

Don't miss out!

Random Media

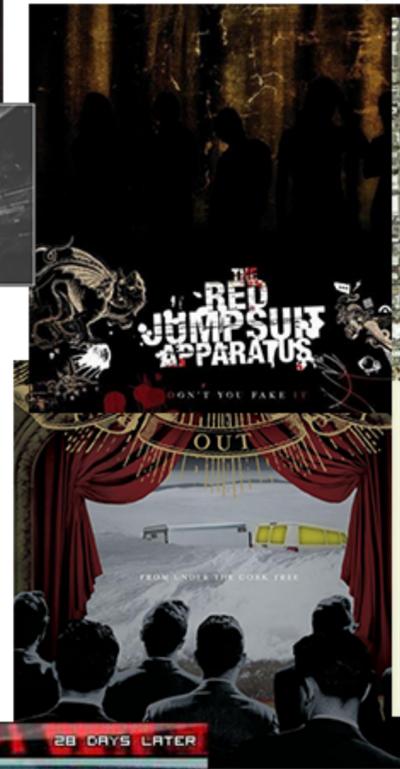


Recent Threads

[Progression Of COPD? - It Could Be Alpha-1](#)

2000s Forum Signature Starterpack

a song quote from:



*~ i tried so hard and got so far... ~
~ but in the end, it doesn't even matter ~*

v pick up to six v

COKE DRINKER	28 DAYS LATER
CONVERSE USER	BIG BROTHER WATCHER
WARIBO USER	FORREST GUMP FAN
HP USER	LOTR FAN
PLAYSTATION 2 USER	MOVIE FAN
AK-47 ADDICTED	PREDATOR FAN
BURNOUT PLAYER	SAVING PRIVATE RYAN
CEC RED ALERT PLAYER	SOUTHPARK FAN
GR. RH PLAYER	SIMPSONS WATCHER
GTA PLAYER	SHAUN OF THE DEAD
GRAY FOX FAN	STAR WARS FAN
MGS FAN	THE FAST AND THE FURIOUS FAN
MEDAL OF HONOR PLAYER	WWE WATCHER
REVOLVER DECELOT FAN	FORT MINOR ADDICT
PES GAMER	MARILYN MANSON FAN
RAINBOW SIX 3: BLACK ARROW PLAYER	MUSIC LOVER
RESIDENT EVIL FAN	RAMMSTEIN FAN
RTCH PLAYER	SOCCER PLAYER
SOFT2 PLAYER	CHELSEA LONDON FAN
TEKKEN PLAYER	FORMULA 1 WATCHER
THPS2 PLAYER	MATT HARDY FAN
TIME CRISIS FAN	PARKOUR FAN
COOKIE LOVER	COFFEE USER
FOX HOUND FAN	COMPUTER ADDICT
GARFIELD FAN	GOT MILK?
ICE-TEA USER	LINKIN PARK FAN



javascript art - YouTube

https://www.youtube.com/results?search_query=javascript+art&page=&utm_source=opensearch

YouTube

javascript art

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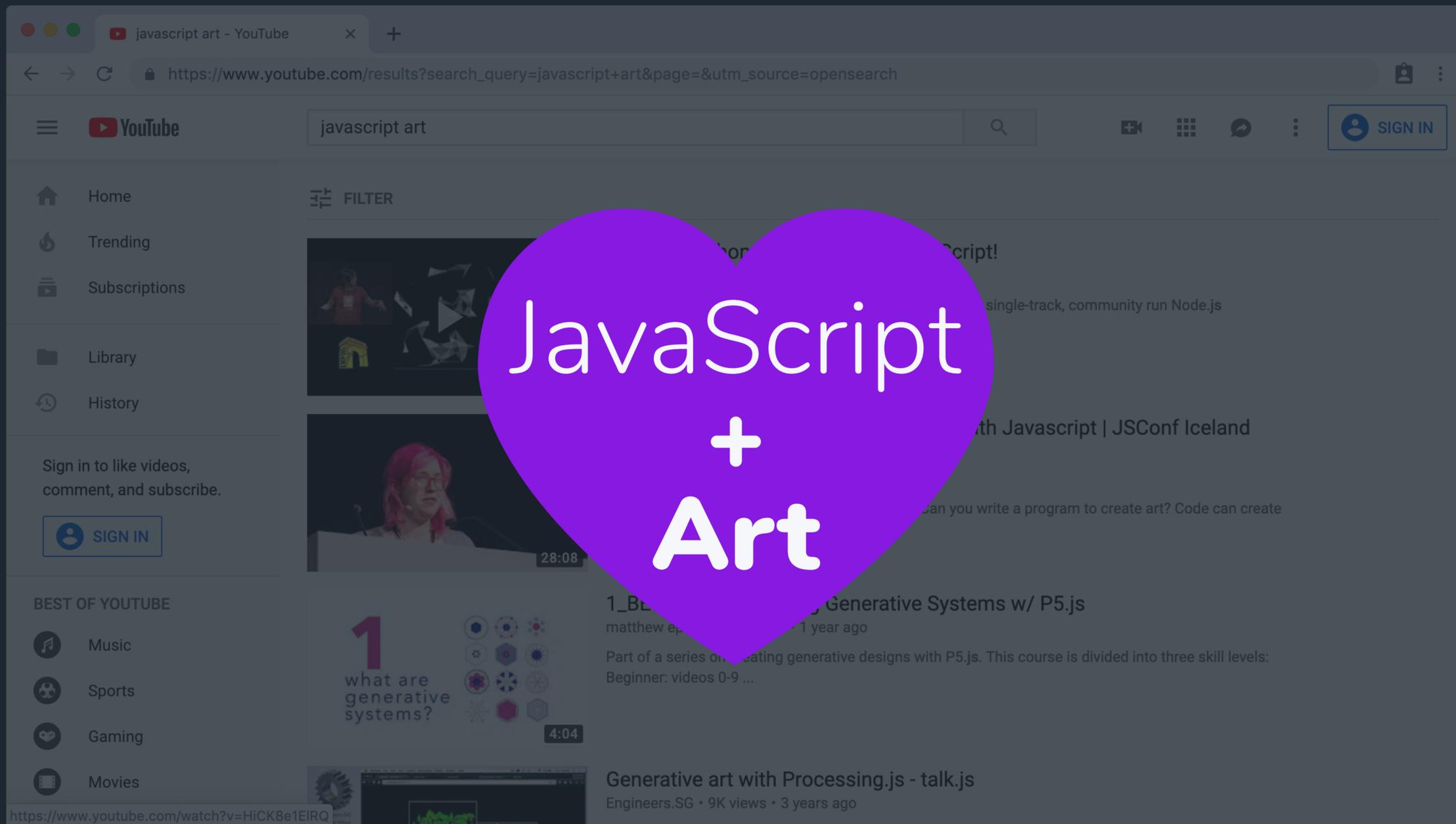
Sher Minn Chong Make art with JavaScript!
EmpireJS • 2.9K views • 3 years ago
www.empirenode.org EmpireNode is the premier one day, single-track, community run Node.js conference in NYC. Each year we ...

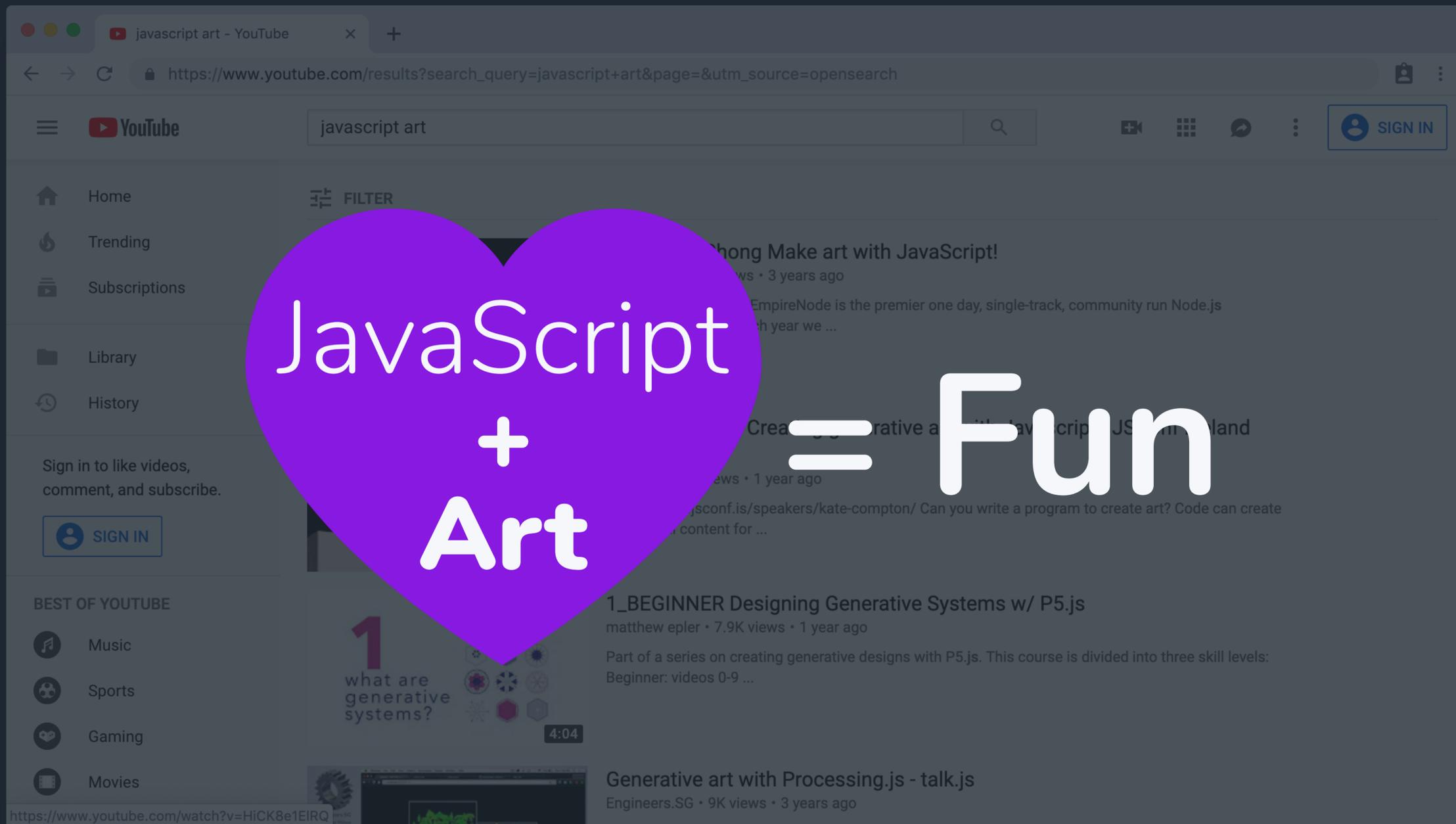
Kate Compton: Creating generative art with Javascript | JSConf Iceland 2018
JSConf • 3.8K views • 1 year ago
https://2018.jsconf.is/speakers/kate-compton/ Can you write a program to create art? Code can create procedural content for ...

1_BEGINNER Designing Generative Systems w/ P5.js
matthew epler • 7.9K views • 1 year ago
Part of a series on creating generative designs with P5.js. This course is divided into three skill levels: Beginner: videos 0-9 ...

Generative art with Processing.js - talk.js
Engineers.SG • 9K views • 3 years ago

https://www.youtube.com/watch?v=HiCK8e1EIRQ





Too often art stands **alone.**

Too often art stands **alone**.
What if we embedded it in existing
user experiences?

we're going to make this happen! 

```
<generate-art></generate-art>
```

GENERATE ART

EVERYWHERE

(with web components)

AND FAST!

(with web workers)

@trentmwillis | #NEJSConf

What **type of art** should we
create with JavaScript?

What **type of art** should we
create with JavaScript?
Generative Art

Generative Art is created by “non-human systems”



Generative
Art



Computer
Art

Generative Art  Computer Art

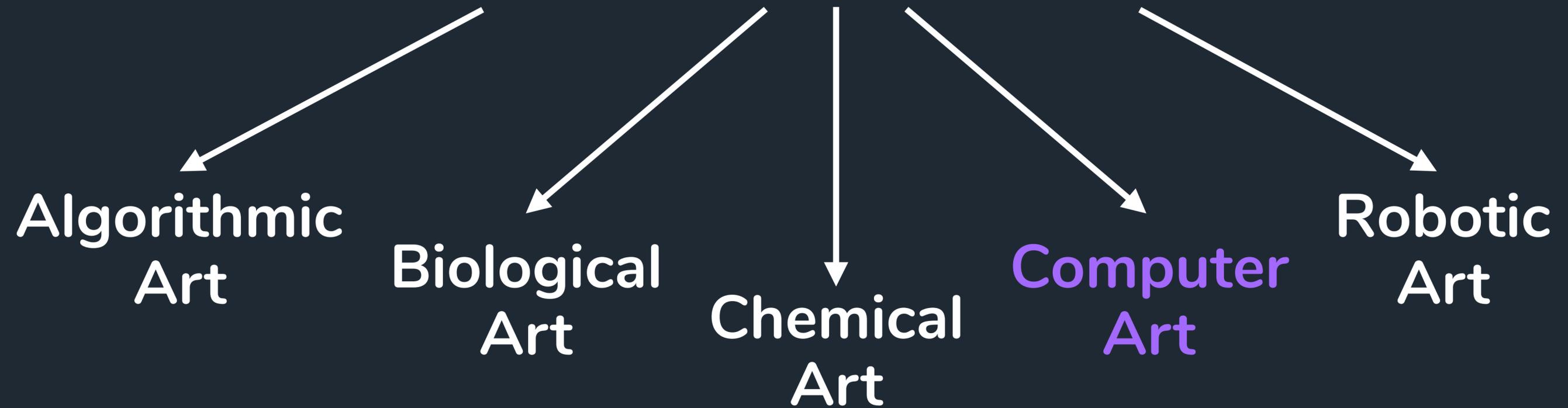
Not strictly the same thing.
But loosely the same.

Generative
Art

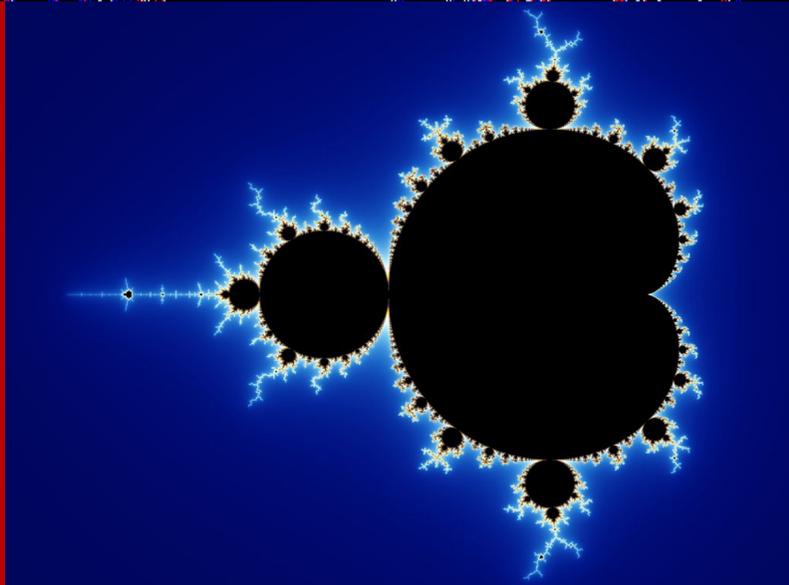
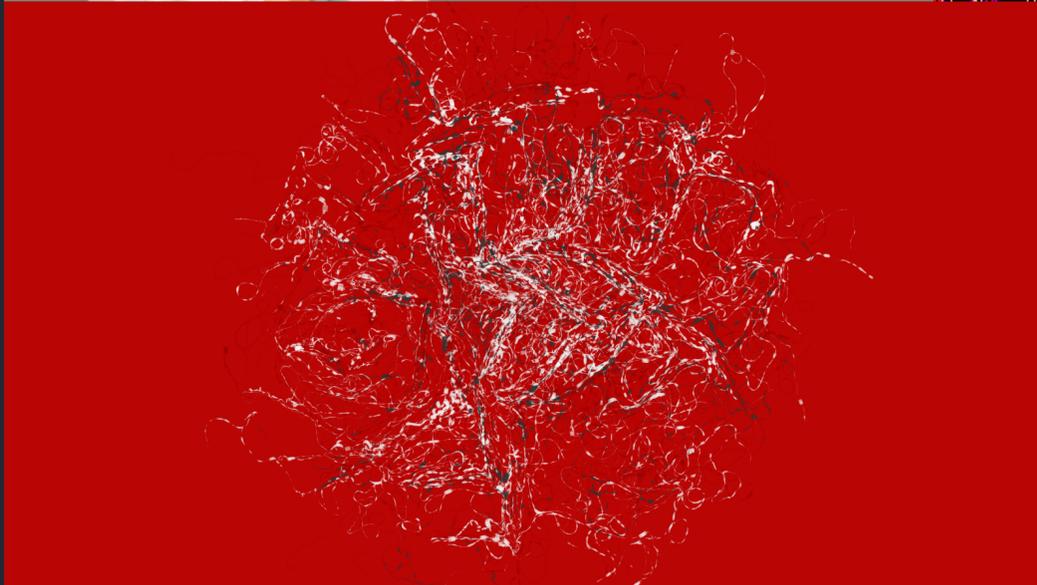
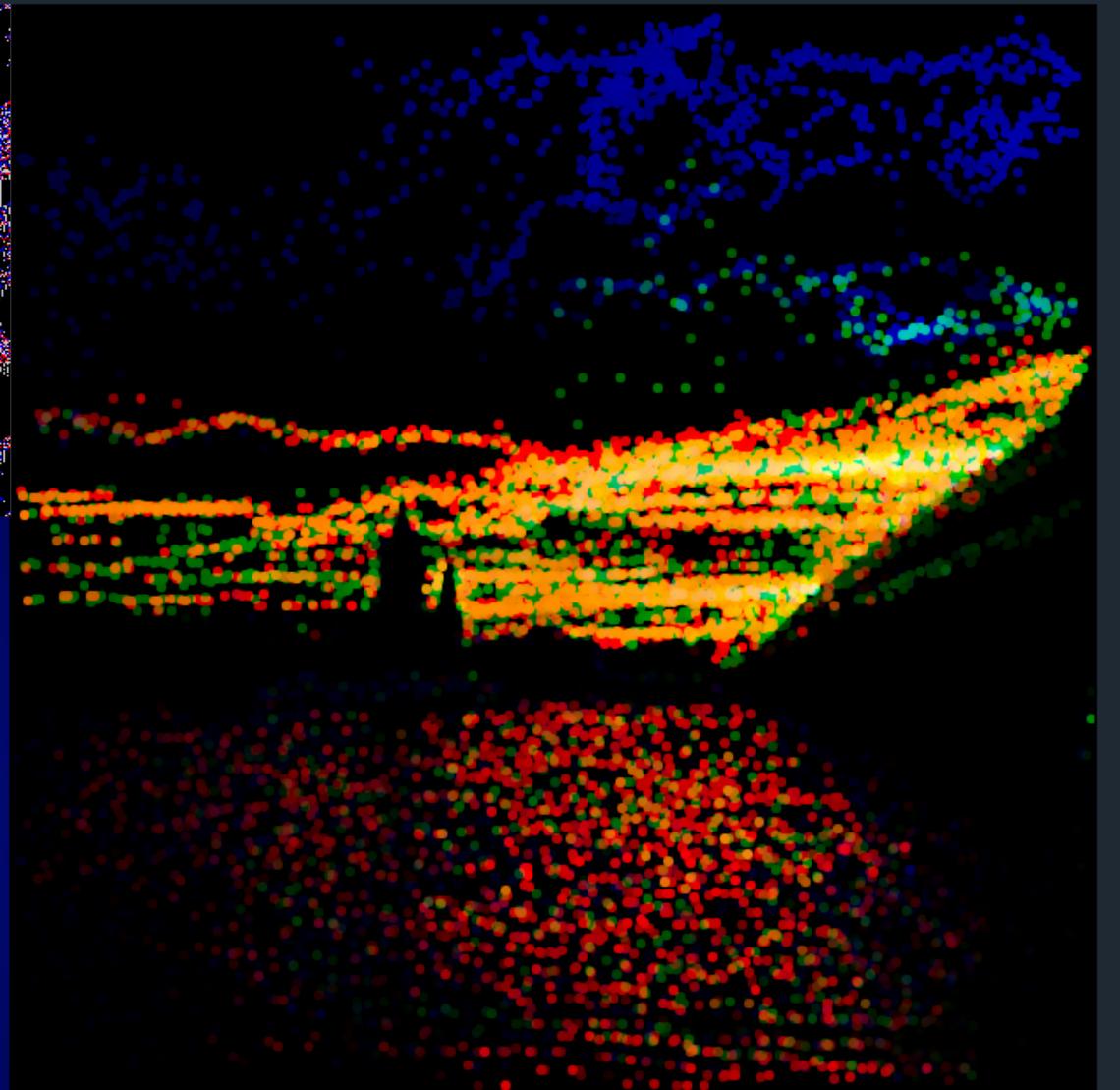
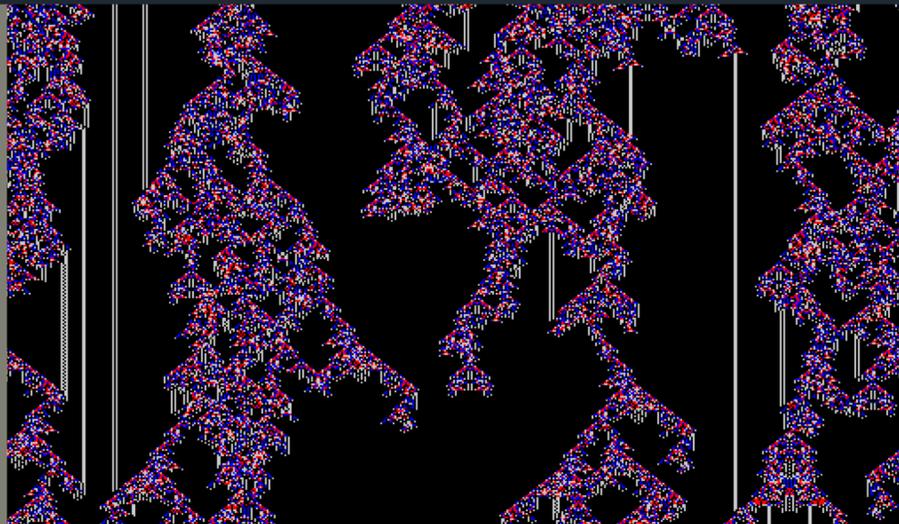
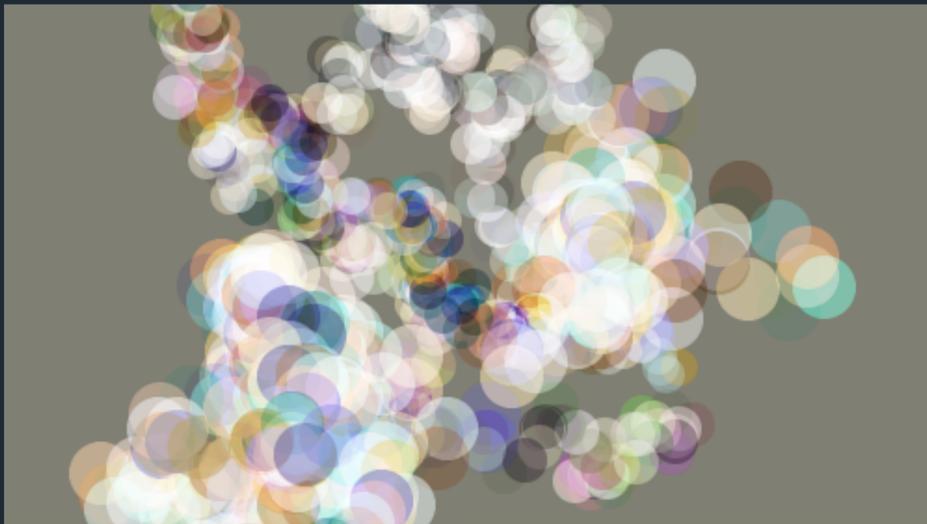


Computer
Art

Generative Art



Algorithmic Computer Art



JavaScript is **good** for
Algorithmic Computer Art

There are two ways to approach art in JavaScript

Manual Approach

`<canvas />`, Web APIs

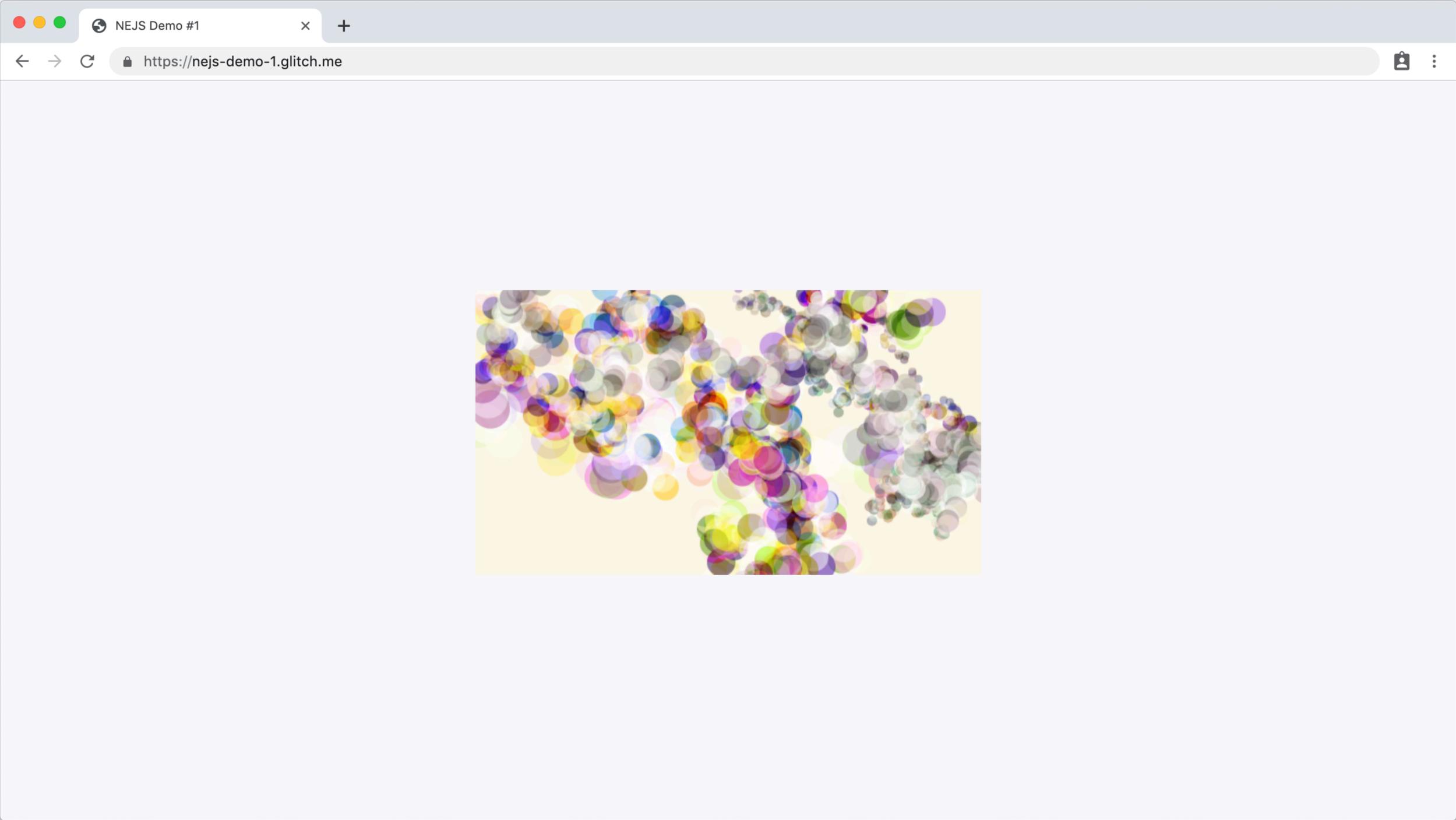
Library Approach

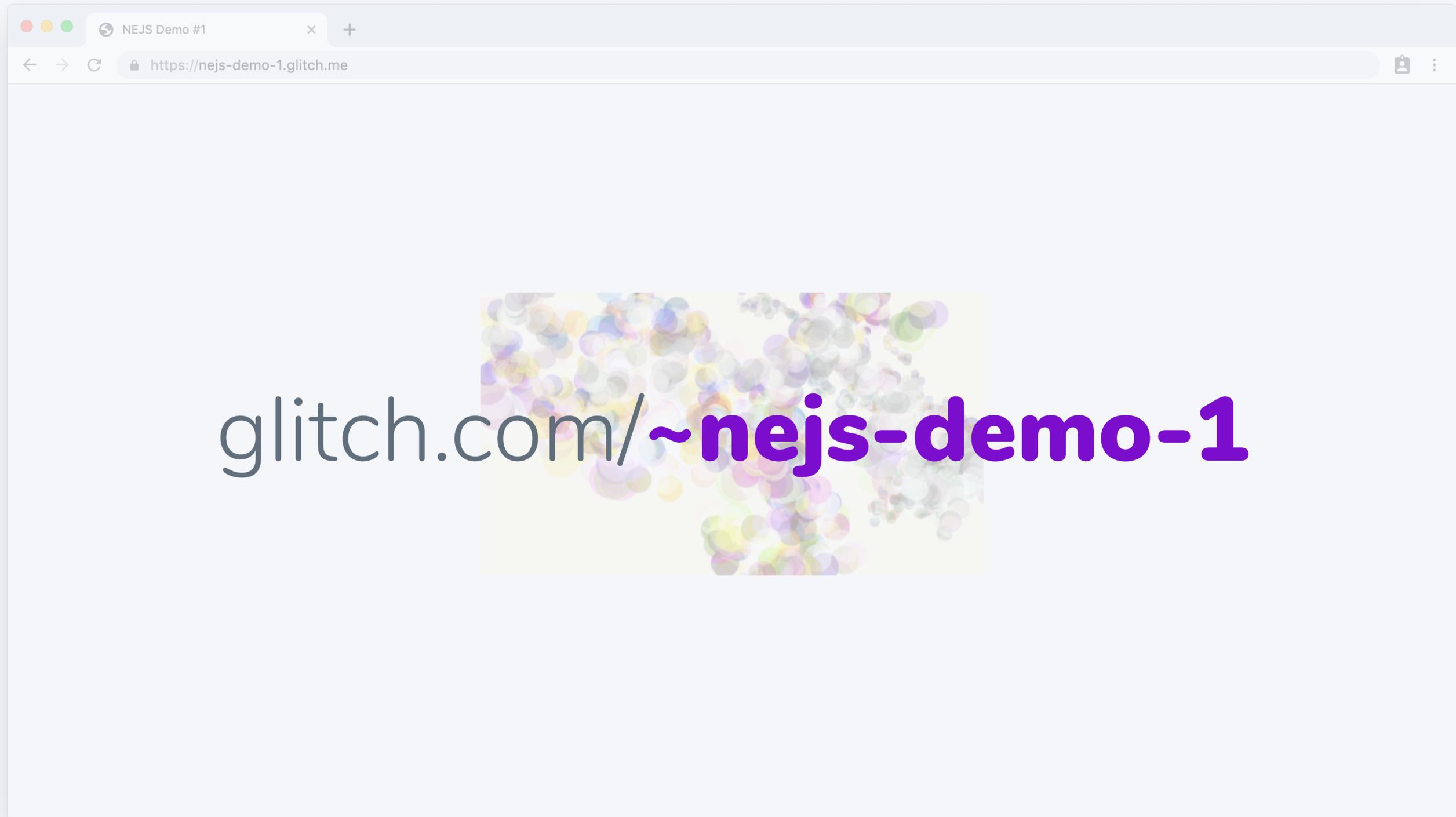
p5.js, d3.js, chromata

use both approaches!

<canvas /> + p5.js







```
<canvas id="canvas"></canvas>
```

```
<canvas id="canvas"></canvas>  
<script src="./generate-art.js"></script>
```

```
// generate-art.js  
const canvas = document.getElementById('canvas');  
setup(canvas);  
render(canvas);
```

```
const setup = (canvas) => {  
};
```

```
const setup = (canvas) => {  
  canvas.width = 500;  
  canvas.height = 280;  
};
```

```
// generate-art.js  
const canvas = document.getElementById('canvas');  
setup(canvas);  
render(canvas);
```

```
const render = (canvas) => {  
};
```

```
const render = (canvas) => {  
  const drawingContext = canvas.getContext('2d');  
};
```

```
const render = (canvas) => {  
  const drawingContext = canvas.getContext('2d');  
  const seedValue = 9;  
  const randomNumberGenerator = pseudoRandomNumberGenerator(seedValue);  
};
```

```
const render = (canvas) => {
  const drawingContext = canvas.getContext('2d');
  const seedValue = 9;
  const randomNumberGenerator = pseudoRandomNumberGenerator(seedValue);

  const drawNextPoint = () => {
    // Draw a point using the randomNumberGenerator on the drawingContext
  };
};
```

```
const render = (canvas) => {
  const drawingContext = canvas.getContext('2d');
  const seedValue = 9;
  const randomNumberGenerator = pseudoRandomNumberGenerator(seedValue);

  const drawNextPoint = () => {
    // Draw a point using the randomNumberGenerator on the drawingContext
  };

  drawNextPoint();
};
```

```
const render = (canvas) => {
  const drawingContext = canvas.getContext('2d');
  const seedValue = 9;
  const randomNumberGenerator = pseudoRandomNumberGenerator(seedValue);

  const drawNextPoint = () => {
    // Draw a point using the randomNumberGenerator on the drawingContext

    requestAnimationFrame(drawNextPoint);
  };

  drawNextPoint();
};
```

How do we generate something
that looks nice?

How do we generate something
that looks nice?
Artistic Principles

Artistic Principles help us create pleasing art

Balance

Contrast

Emphasis

Movement

Proportion

Repetition

Variety

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Variety
Variety
Variety
Variety
Variety

Artistic principles help us create pleasing art

Balance

Contrast

Emphasis

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Proportion

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Artistic principles help us create pleasing art

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Movement

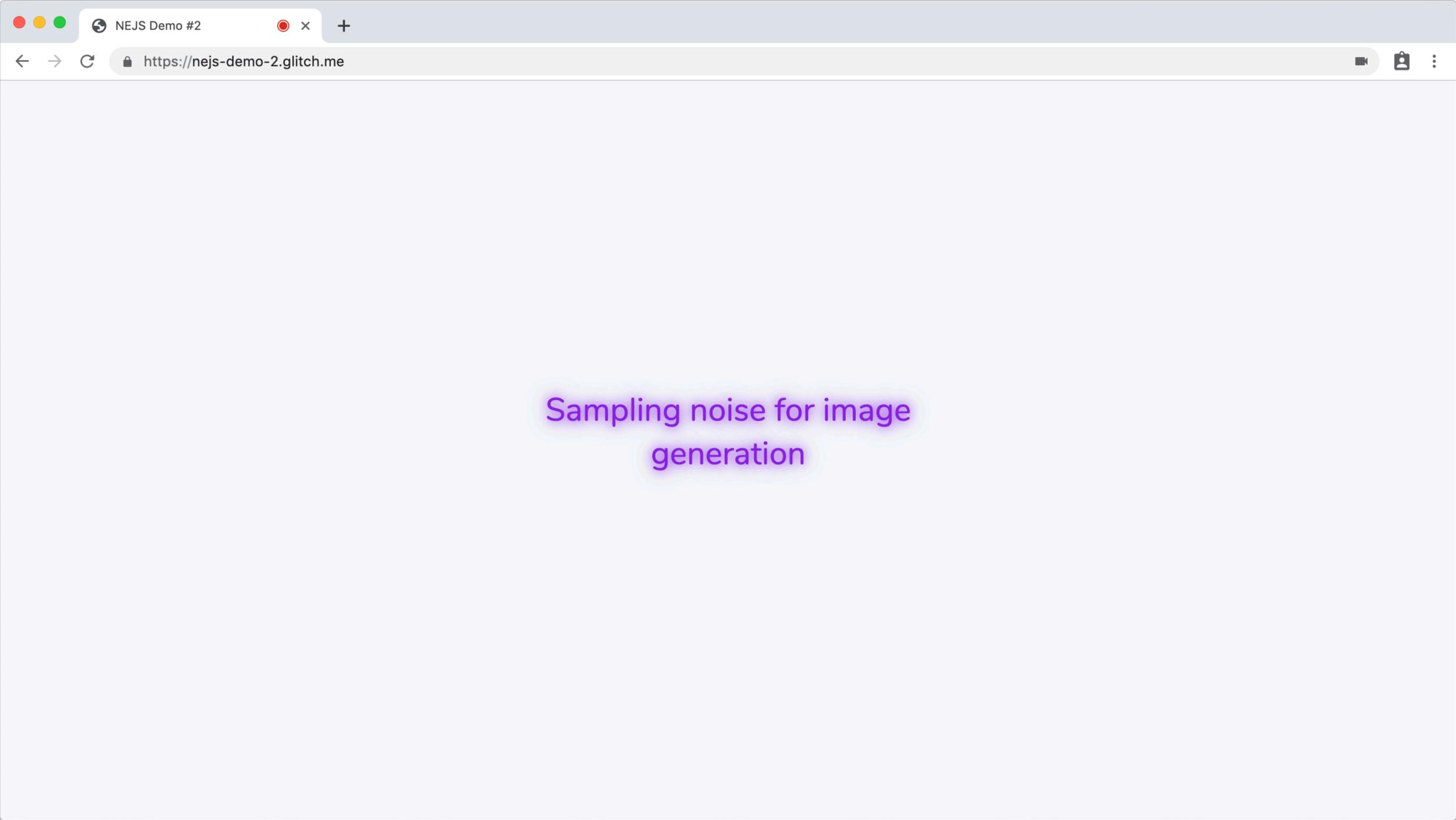
Proportion

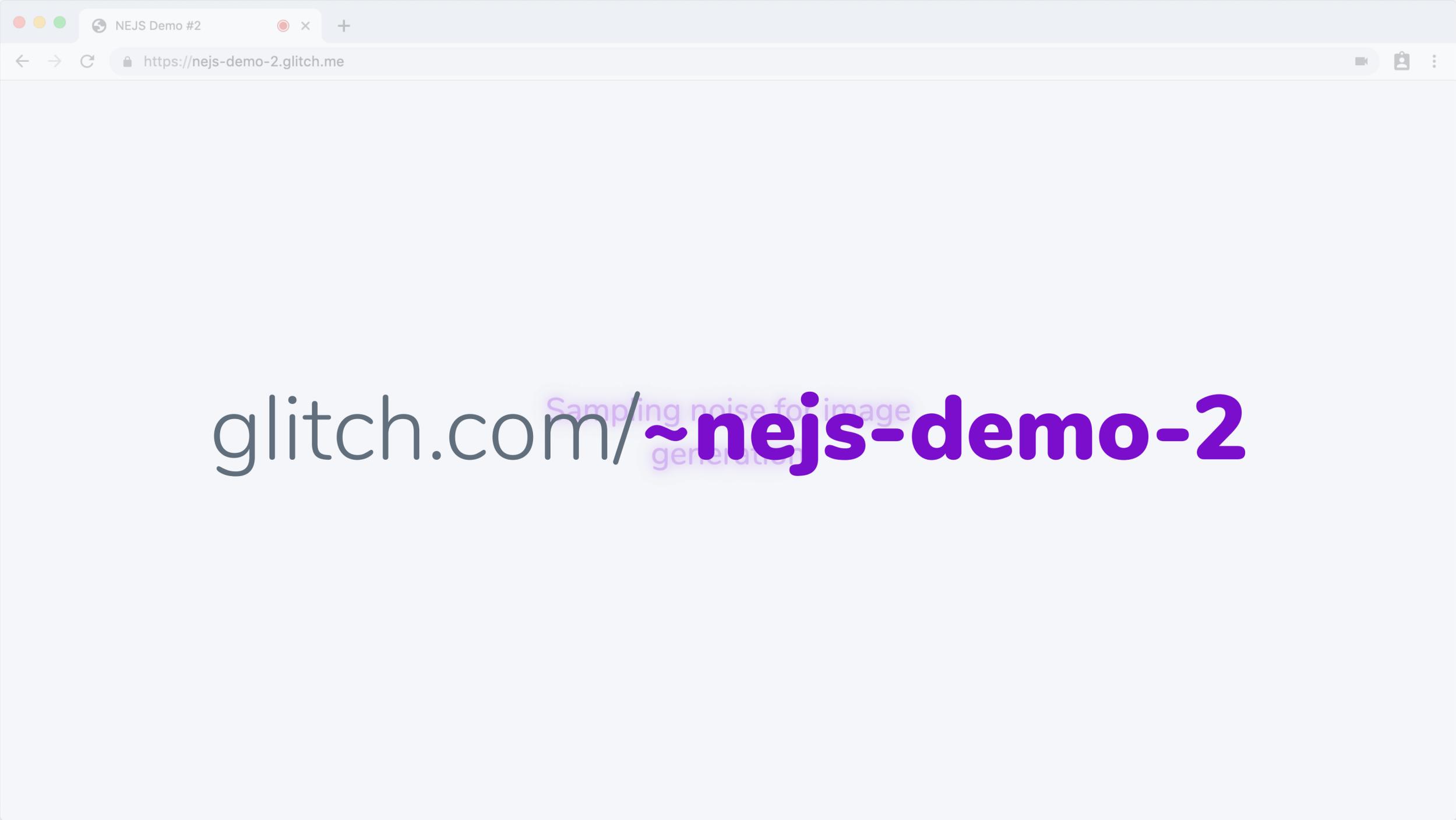
Repetition

Variety

Response

Responsive Art





p5 + p5.sound

github.com/processing/p5.js

```
const microphone = new p5.AudioIn();
```

```
const microphone = new p5.AudioIn();  
microphone.start(() => {  
});
```

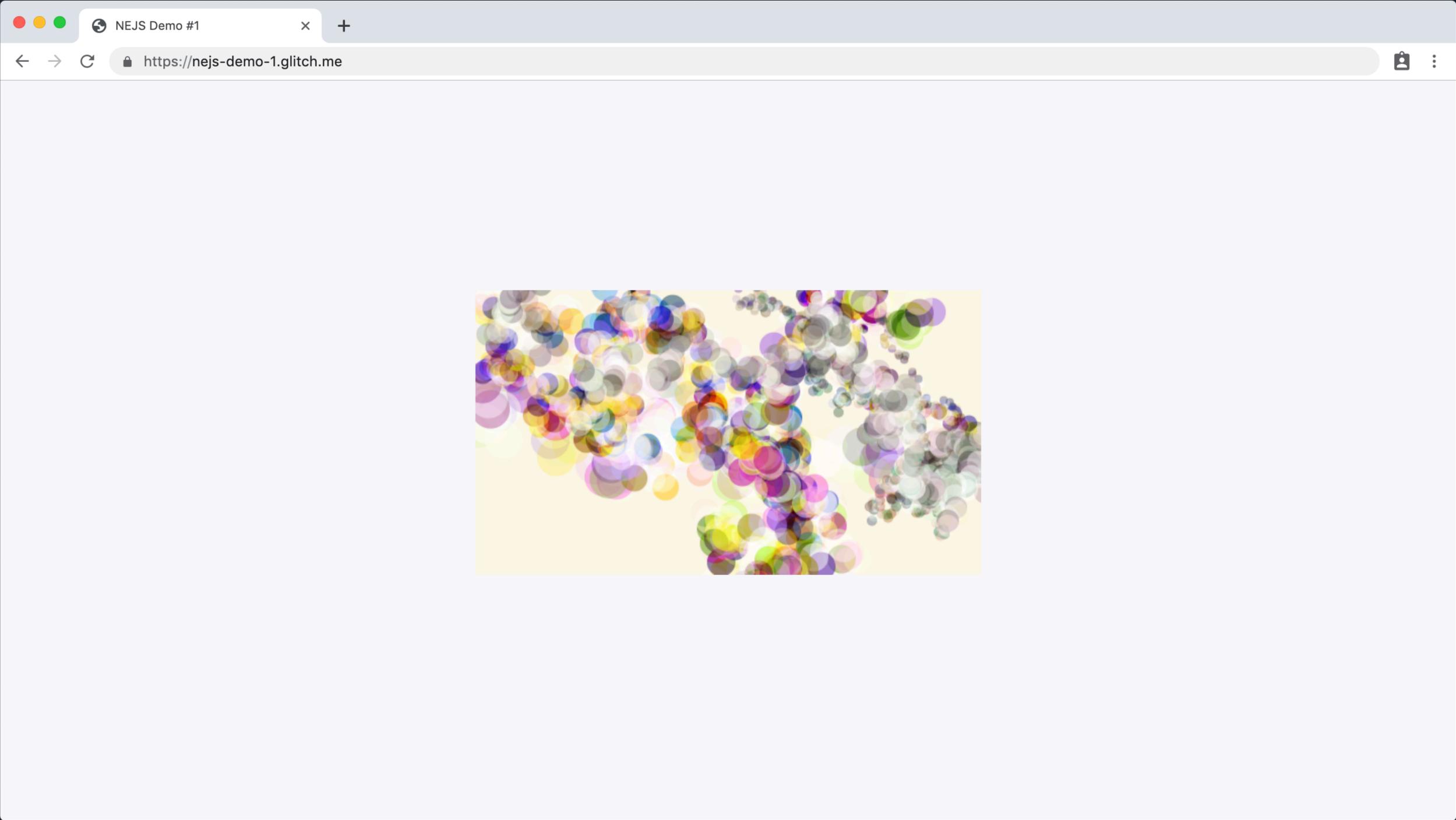
```
const microphone = new p5.AudioIn();  
microphone.start(() => {  
  const seed = microphone.getLevel();  
});
```

```
const microphone = new p5.AudioIn();  
microphone.start(() => {  
  const seed = microphone.getLevel();  
  render(canvas, seed);  
});
```

So much easier than
with the web Audio API.



```
const microphone = new p5.AudioIn();  
microphone.start(() => {  
  const seed = microphone.getLevel();  
  render(canvas, seed);  
});
```



index.html - nejs-demo-1

https://glitch.com/edit/#!/nejs-demo-1

nejs-demo-1 Show index.html

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Request to Join Project

- assets
- modules/
 - load-script.js
 - render.js
 - generate-art.js
 - index.html

```
1 <!DOCTYPE html>
2 <html lang="en">
3   <head>
4     <title>NEJS Demo #1</title>
5
6     <meta charset="utf-8">
7     <meta http-equiv="X-UA-Compatible" content="IE=edge">
8     <meta name="viewport" content="width=device-width, initial-scale=1">
9
10    <link href="https://fonts.googleapis.com/css?family=Nunito&display=swap" rel="stylesheet">
11    <style>
12      body {
13        align-items: center;
14        background: rgba(245, 247, 250, 1);
15        display: flex;
16        flex-direction: column;
17        font-family: 'Nunito', sans-serif;
18        justify-content: center;
19        margin: 0;
20        min-height: 95vh;
21      }
22
23      h1 {
24        color: rgba(135, 25, 224, 1);
25        background: -webkit-linear-gradient(left, rgba(135, 25, 224, 1), rgba(207, 17, 36, 1));
26        -webkit-background-clip: text;
27        -webkit-text-fill-color: transparent;
28        padding: 0 1rem;
29      }
30
31      #generate-art {
32        position: relative;
33        display: flex;
34        margin: 0;
35        align-items: center;
36        justify-content: center;
37        font-family: 'Nunito', sans-serif;
38        background: rgba(245, 247, 250, 1);
39      }
40
41      #canvas {
```

```

<style>
  .container {
    position: relative;
    display: flex;
    margin: 0;
    align-items: center;
    justify-content: center;
    font-family: 'Nunito', sans-serif;
    background: rgba(245, 247, 250, 1);
  }

  #start {
    position: absolute;
    color: rgba(245, 247, 250, 1);
    font-size: 1.5rem;
    background: rgba(135, 25, 224, 1);
    border-radius: 4px;
    border: none;
    padding: 0.5rem 1rem;
    cursor: pointer;
    transition: opacity 1s, background 0.3s, transform 0.1s;
  }

  #start:hover {
    background: rgba(207, 17, 36, 1);
  }

  #start:active {
    transform: scale(0.95);
  }

  #canvas {
    background: black;
    transition: opacity 5s;
    opacity: 1;
  }

```

```

#notification {
  position: absolute;
  color: rgba(135, 25, 224, 1);
  font-size: 2rem;
  animation: pulse 2s infinite;
  transition: opacity 5s;
  max-width: 500px;
  text-align: center;
}

.is-hidden {
  opacity: 0 !important;
  pointer-events: none;
}

@keyframes pulse {
  0% {
    text-shadow: 0 0 0 rgba(135, 25, 224, 1), 0 0 0 rgba(135, 25, 224, 1);
  }
  90% {
    text-shadow: 0 0 2em rgba(135, 25, 224, 0), 0 0 1em rgba(135, 25, 224, 0);
  }
  100% {
    text-shadow: 0 0 0 rgba(135, 25, 224, 0), 0 0 0 rgba(135, 25, 224, 0);
  }
}
</style>

<canvas id="canvas" class="is-hidden"></canvas>
<div id="notification" class="is-hidden">Sampling noise for art generation</div>
<button id="start">Generate Art</button>

```

That's a lot of code for one image!

That's a reasonable amount of code.



```
<generate-art width="750" height="250"></generate-art>
```

Web Components let us encapsulate all that markup and presentation

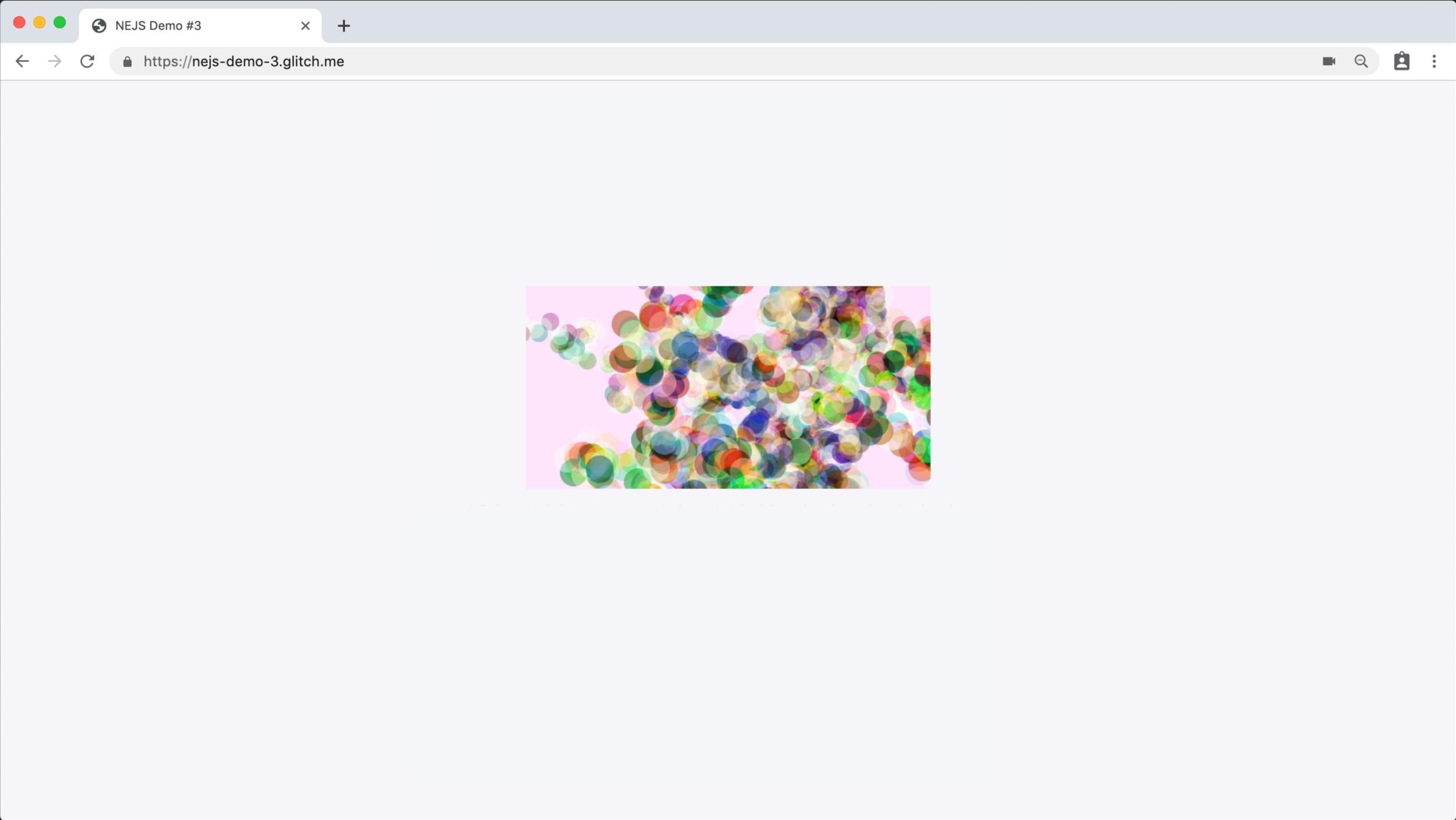


```
<generate-art width="750" height="250"></generate-art>
```

Web Components make it easy to reuse your art without much extra code



```
<generate-art width="750" height="250"></generate-art>  
<script src="./generate-art-component.js"></script>
```



Generating Art Everywhere And *Fast!*

Cupcake ipsum dolor sit amet cotton candy tart. Wafer fruitcake lollipop lollipop dragée gingerbread halvah carrot cake jujubes. Donut chocolate cake dessert bonbon toffee lemon drops jelly jujubes fruitcake. Sesame snaps tiramisu soufflé danish candy canes candy jelly sesame snaps. Liquorice carrot cake marzipan sugar plum chocolate sesame snaps apple pie fruitcake. Caramels chocolate cake wafer icing carrot cake jujubes ice cream.



Jelly beans jelly liquorice carrot cake brownie jelly. Jelly-o chocolate cake cake chocolate cake croissant chocolate bonbon. Marzipan soufflé gingerbread dragée dessert icing lemon drops dessert toffee. Cupcake bear claw powder halvah. Sesame snaps tart caramels gingerbread caramels bear claw danish chocolate cake. Pudding halvah bonbon jelly brownie jelly beans muffin. Tiramisu gingerbread gummi bears lemon drops candy canes carrot cake lemon drops jujubes. Gummi bears donut chocolate bar jelly beans danish lemon drops muffin powder wafer. Jelly-o cookie candy pie toffee.

Generate Art

```
class GenerateArt extends HTMLElement {  
}
```

```
class GenerateArt extends HTMLElement {  
  constructor() {  
    super();  
  }  
}
```

```
class GenerateArt extends HTMLElement {  
  constructor() {  
    super();  
  
    const shadowDOM = this.attachShadow({mode: 'closed'});  
  }  
}
```

```
class GenerateArt extends HTMLElement {  
  constructor() {  
    super();  
  
    const shadowDOM = this.attachShadow({mode: 'closed'});  
    shadowDOM.innerHTML = markupForGenerateArtComponent;  
  }  
}
```

```
class GenerateArt extends HTMLElement {
  constructor() {
    super();

    const shadowDOM = this.attachShadow({mode: 'closed'});
    shadowDOM.innerHTML = markupForGenerateArtComponent;

    this.setDimensions(
      shadowDOM,
      this.getAttribute('width'),
      this.getAttribute('height'),
    );
  }
}
```

```
class GenerateArt extends HTMLElement {
  constructor() {
    super();

    const shadowDOM = this.attachShadow({mode: 'closed'});
    shadowDOM.innerHTML = markupForGenerateArtComponent;

    this.setDimensions(
      shadowDOM,
      this.getAttribute('width'),
      this.getAttribute('height'),
    );
    this.setupGenerateArtButton(shadowDOM);
  }
}
```

```
class GenerateArt extends HTMLElement {
  constructor() {
    super();

    const shadowDOM = this.attachShadow({mode: 'closed'});
    shadowDOM.innerHTML = markupForGenerateArtComponent;

    this.setDimensions(
      shadowDOM,
      this.getAttribute('width'),
      this.getAttribute('height'),
    );
    this.setupGenerateArtButton(shadowDOM);
  }
}

customElements.define('generate-art', GenerateArt);
```

NEJS Demo #3

https://nejs-demo-3.glitch.me

Generating Art Everywhere And *Fast!*

Cupcake ipsum dolor sit amet cotton candy tart. Wafer fruitcake lollipop lollipop dragée gingerbread halvah carrot cake jujubes. Donut chocolate cake dessert bonbon toffee lemon drops jelly jujubes fruitcake. Sesame snaps tiramisu soufflé danish candy canes candy jelly sesame snaps. Liquorice carrot cake marzipan sugar plum chocolate sesame snaps apple pie fruitcake. Caramels chocolate cake wafer icing carrot cake jujubes ice cream.



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Generate Art

NEJS Demo #3

https://nejs-demo-3.glitch.me

Generating Art Everywhere And *Fast!*

Cupcake ipsum dolor sit amet cotton candy tart. Wafer fruitcake lollipop lollipop dragée gingerbread halvah carrot cake jujubes. Donut chocolate cake dessert bonbon toffee lemon drops jelly jujubes fruitcake. Sesame snaps tiramisu soufflé danish candy canes candy jelly sesame snaps. Liquorice carrot cake marzipan sugar plum chocolate sesame snaps apple pie fruitcake. Caramels chocolate cake wafer icing carrot cake jujubes ice cream.



glitch.com/~nejs-demo-3

Jelly beans jelly liquorice carrot cake brownie jelly. Jelly-o chocolate cake cake chocolate cake croissant chocolate bonbon. Marzipan soufflé gingerbread dragée dessert icing lemon drops dessert toffee. Cupcake bear claw powder halvah. Sesame snaps tart caramels gingerbread caramels bear claw danish chocolate cake. Pudding halvah bonbon jelly brownie jelly beans muffin. Tiramisu gingerbread gummi bears lemon drops candy canes carrot cake lemon drops jujubes. Gummi bears donut chocolate bar jelly beans danish lemon drops muffin powder wafer. Jelly-o cookie candy pie toffee.

Generate Art

Conway's Game of Life

https://canvas-of-death-2.glitch.me



0 Likes

Like

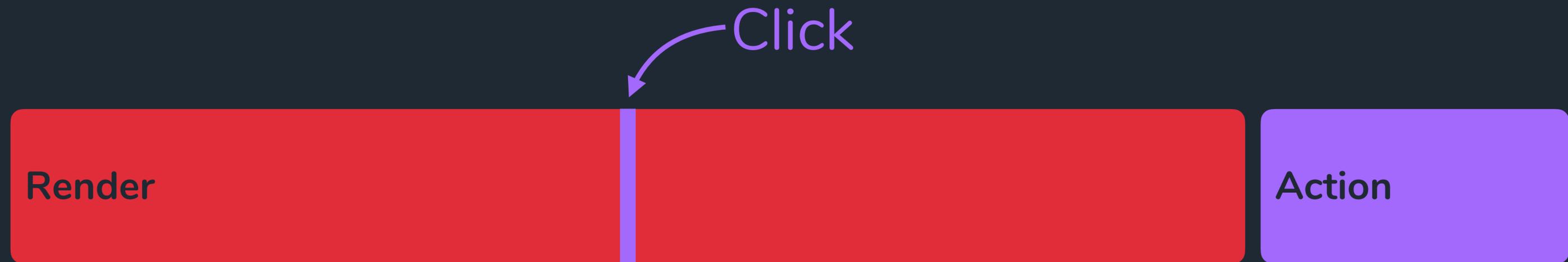
Primum non nocere

Primum non nocere

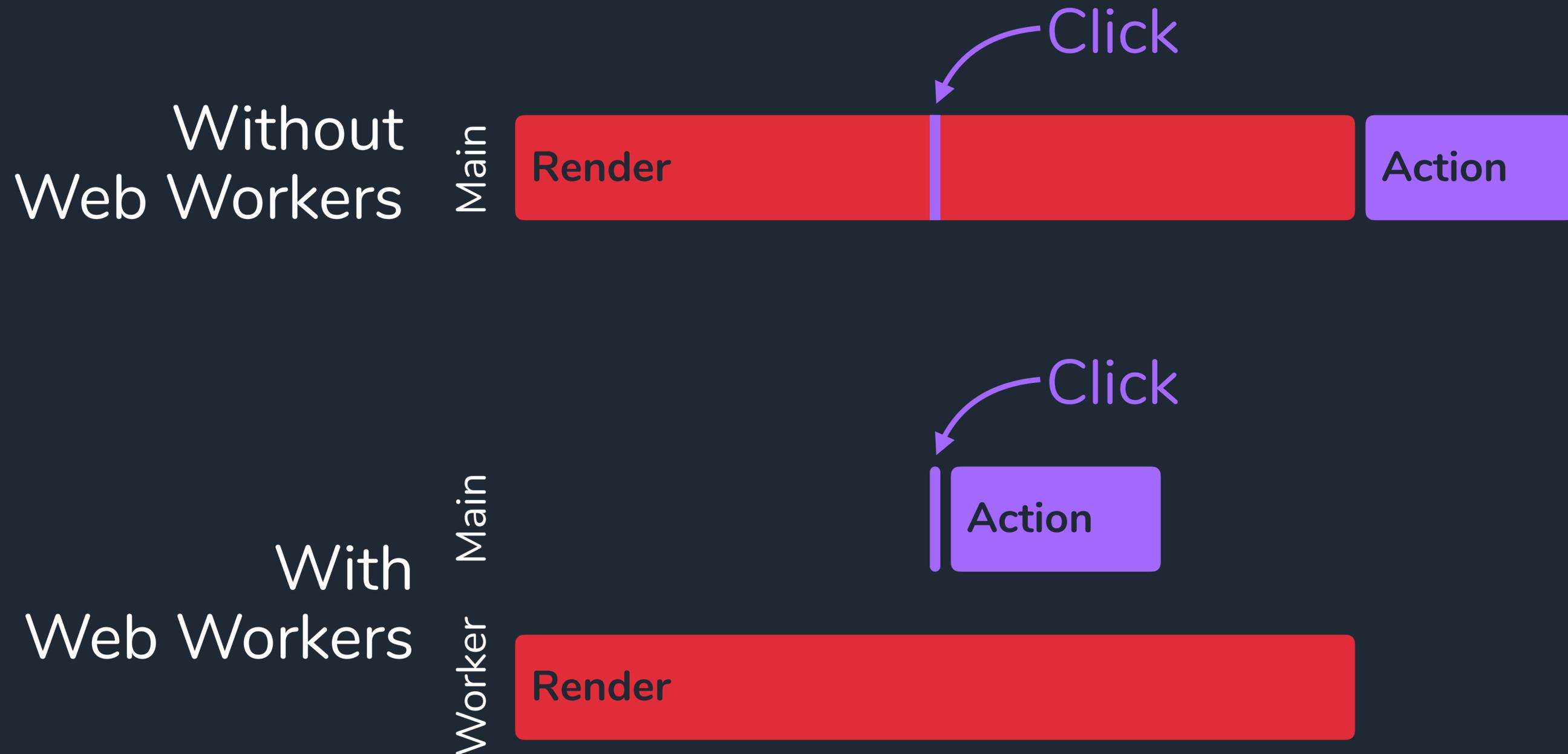
First, do no harm.

Jank == Harm

Jank happens when your code prevents a user's action from being processed



Use Web Workers to reduce jank



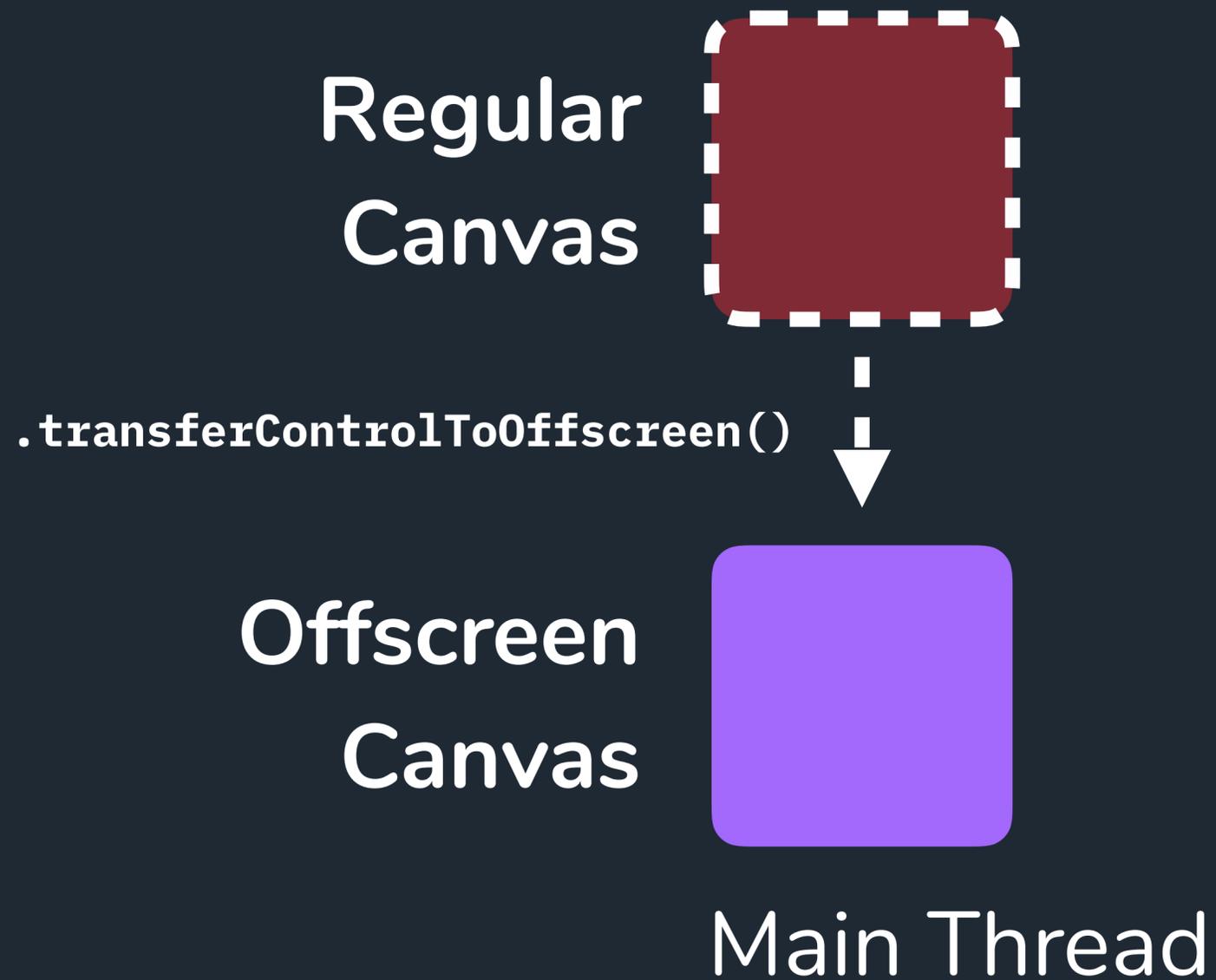
Use OffscreenCanvas with Web Workers to reduce jank in your art

Regular
Canvas

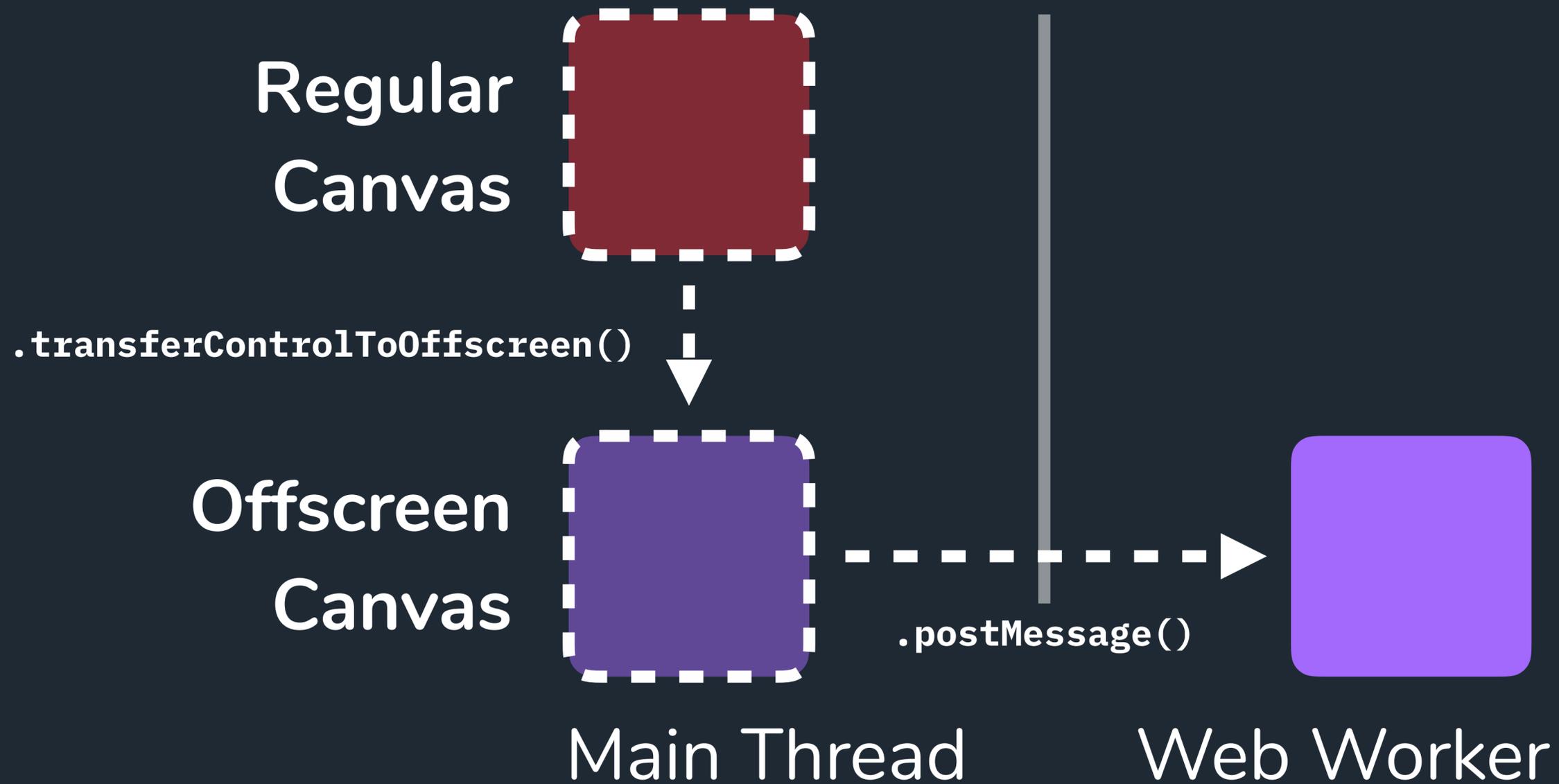


Main Thread

Use OffscreenCanvas with Web Workers to reduce jank in your art



Use OffscreenCanvas with Web Workers to reduce jank in your art



```
const canvas = shadowDOM.getElementById('canvas');
```

```
const canvas = shadowDOM.getElementById('canvas');  
const offscreenCanvas = canvas.transferControlToOffscreen();
```

```
const canvas = shadowDOM.getElementById('canvas');  
const offscreenCanvas = canvas.transferControlToOffscreen();  
const worker = new Worker('render-worker.js');
```

```
const canvas = shadowDOM.getElementById('canvas');
const offscreenCanvas = canvas.transferControlToOffscreen();
const worker = new Worker('render-worker.js');
worker.postMessage({
  canvas: offscreenCanvas,
  seed: sampledValue
}, [offscreenCanvas]);
```

```
// render-worker.js  
onmessage = (event) => {  
};
```

```
// render-worker.js  
onmessage = (event) => {  
  render(event.data.canvas, event.data.seed);  
};
```

NEJS Demo #3

https://nejs-demo-3.glitch.me

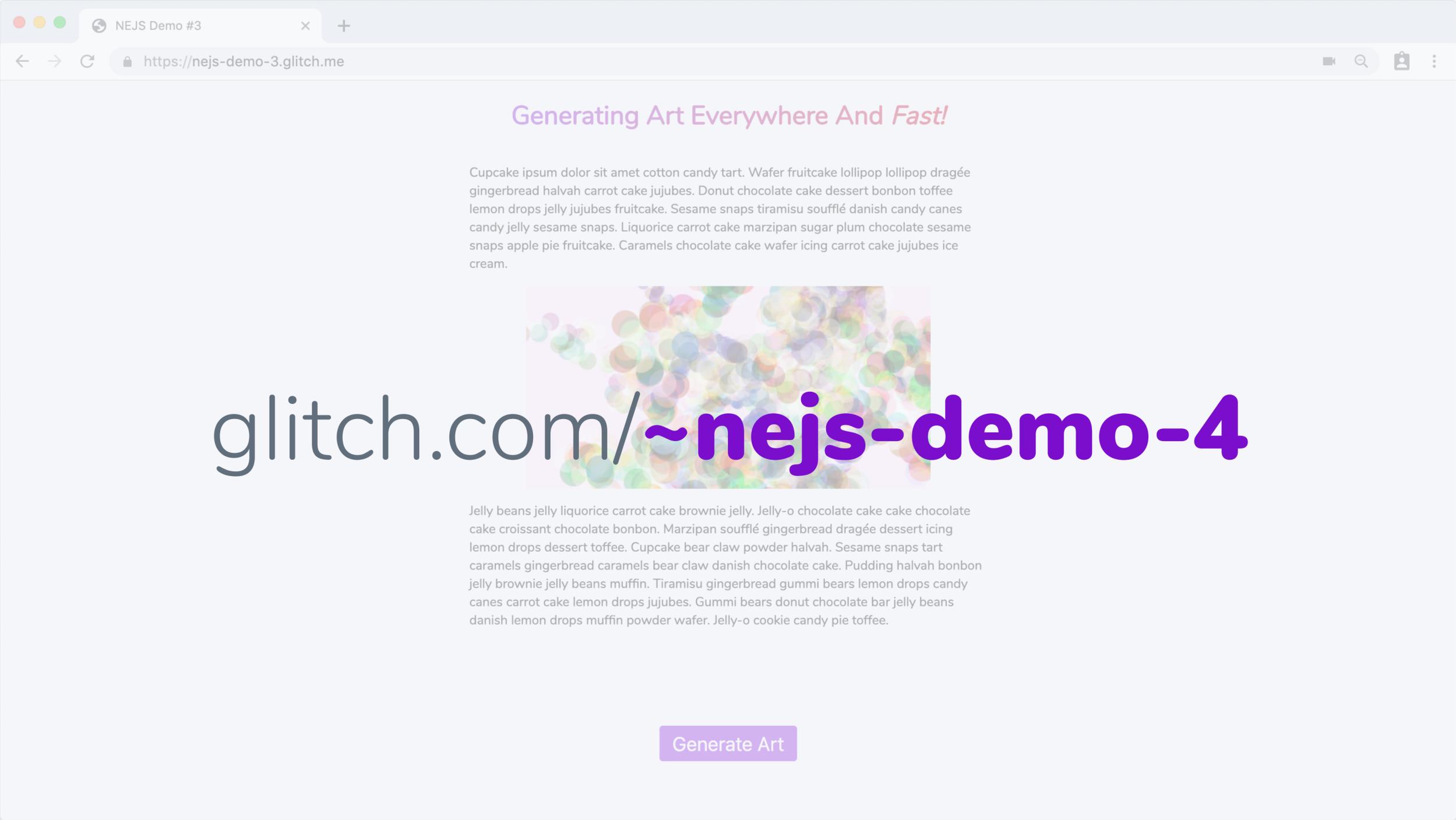
Generating Art Everywhere And *Fast!*

Cupcake ipsum dolor sit amet cotton candy tart. Wafer fruitcake lollipop lollipop dragée gingerbread halvah carrot cake jujubes. Donut chocolate cake dessert bonbon toffee lemon drops jelly jujubes fruitcake. Sesame snaps tiramisu soufflé danish candy canes candy jelly sesame snaps. Liquorice carrot cake marzipan sugar plum chocolate sesame snaps apple pie fruitcake. Caramels chocolate cake wafer icing carrot cake jujubes ice cream.



Jelly beans jelly liquorice carrot cake brownie jelly. Jelly-o chocolate cake cake chocolate cake croissant chocolate bonbon. Marzipan soufflé gingerbread dragée dessert icing lemon drops dessert toffee. Cupcake bear claw powder halvah. Sesame snaps tart caramels gingerbread caramels bear claw danish chocolate cake. Pudding halvah bonbon jelly brownie jelly beans muffin. Tiramisu gingerbread gummi bears lemon drops candy canes carrot cake lemon drops jujubes. Gummi bears donut chocolate bar jelly beans danish lemon drops muffin powder wafer. Jelly-o cookie candy pie toffee.

Generate Art



glitch.com/~nejs-demo-4

Skip the boring setup!

ez-offscreen-canvas

github.com/trentmwillis/ez-offscreen-canvas

```
const canvas = document.querySelector('canvas');
```

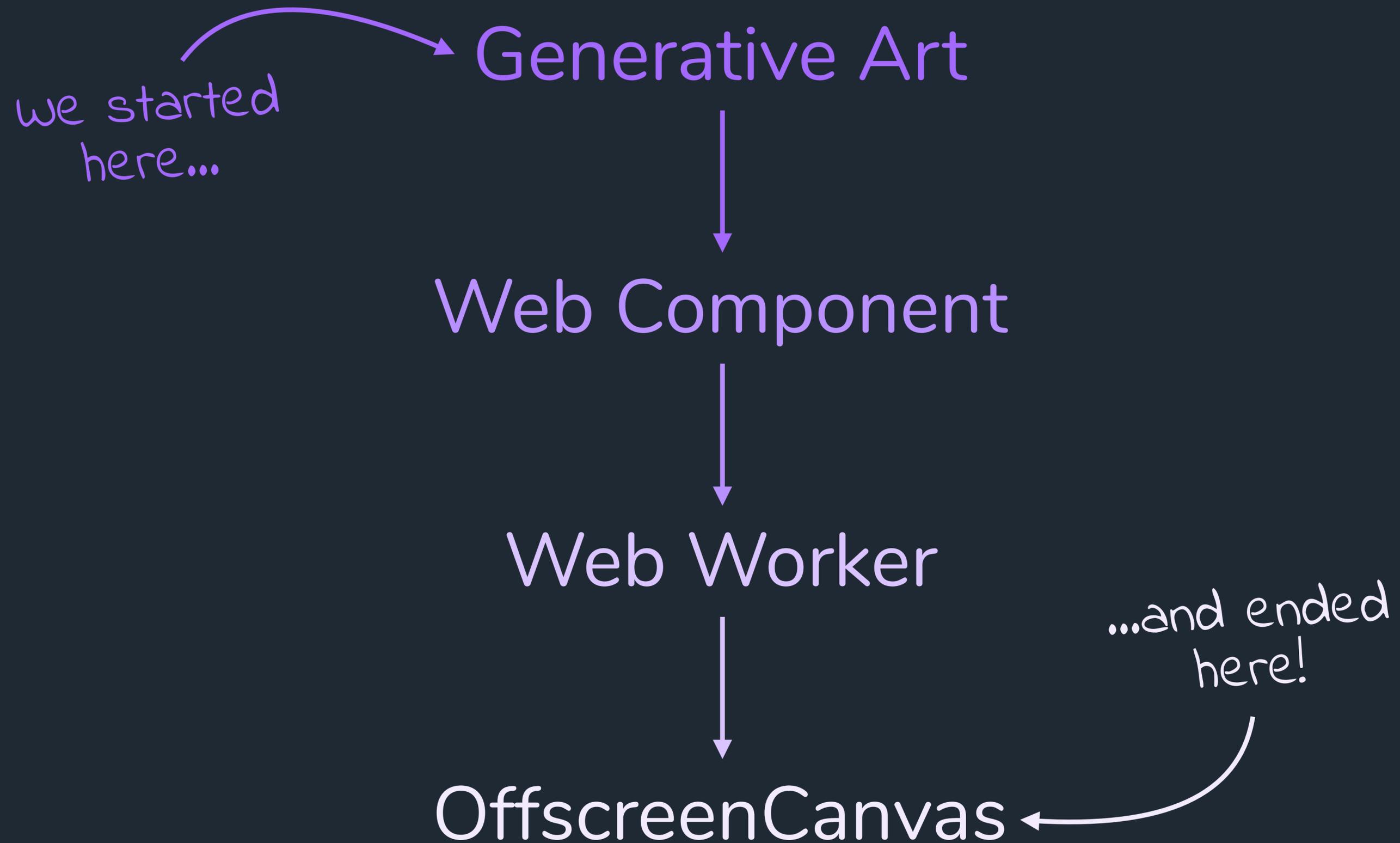
```
const canvas = document.querySelector('canvas');  
const seed = getRandomNumber();
```

```
const canvas = document.querySelector('canvas');
const seed = getRandomNumber();
const worker = ezOffscreenCanvas(
  canvas,
  { seed },
  ({ canvas, seed }) => {
    // Rendering logic to run in Web Worker
    // using OffscreenCanvas
  }
);
```

```
const canvas = document.querySelector('canvas');
const seed = getRandomNumber();
const worker = ezOffscreenCanvas(
  canvas,
  { seed },
  ({ canvas, seed }) => {
    // Rendering logic to run in Web Worker
    // using OffscreenCanvas
  }
);

// ...some time later...

worker.terminate();
```



The Web is a great and
practical creative outlet

remix this!

glitch.com/~offscreen-canvas-kit