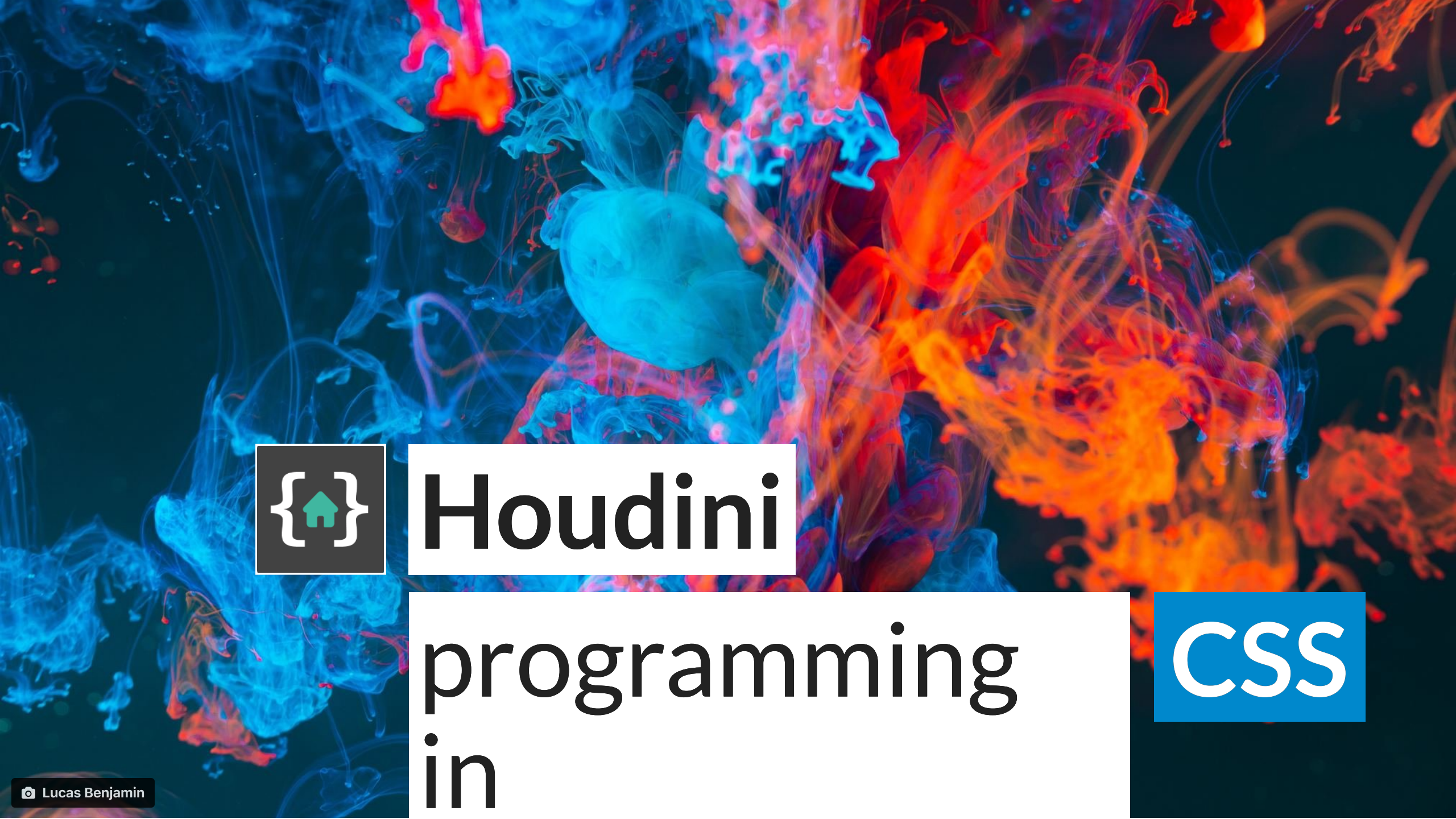


Houdini

programming in

CSS

Lucas Benjamin

Joan León

joanleon.dev

youtube.com/c/JoanLeon

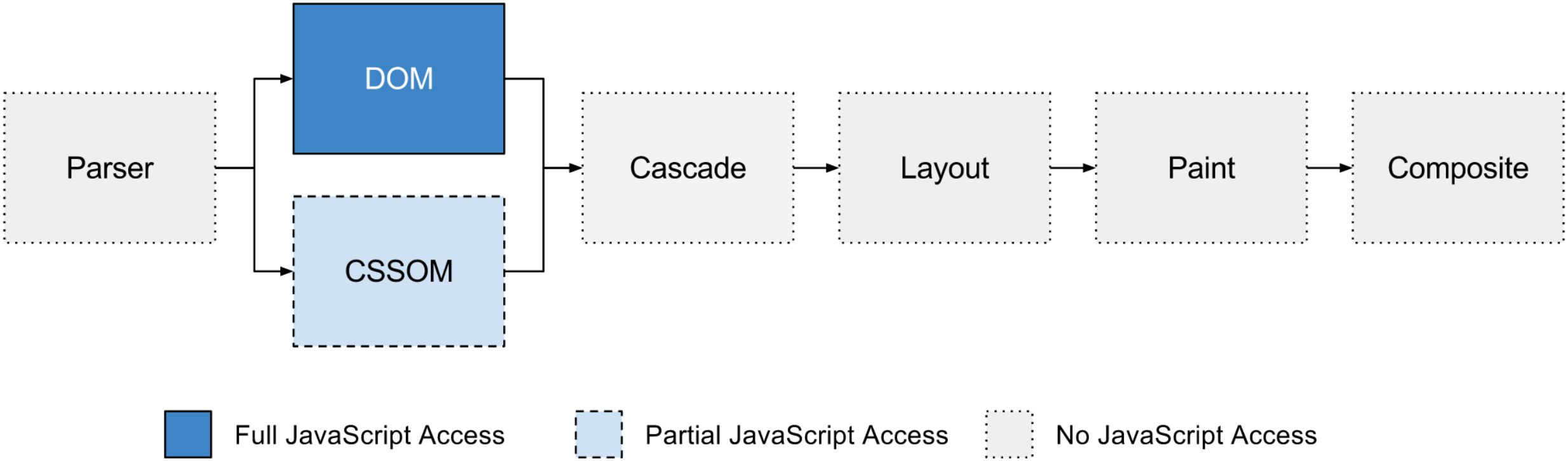
@nucliweb

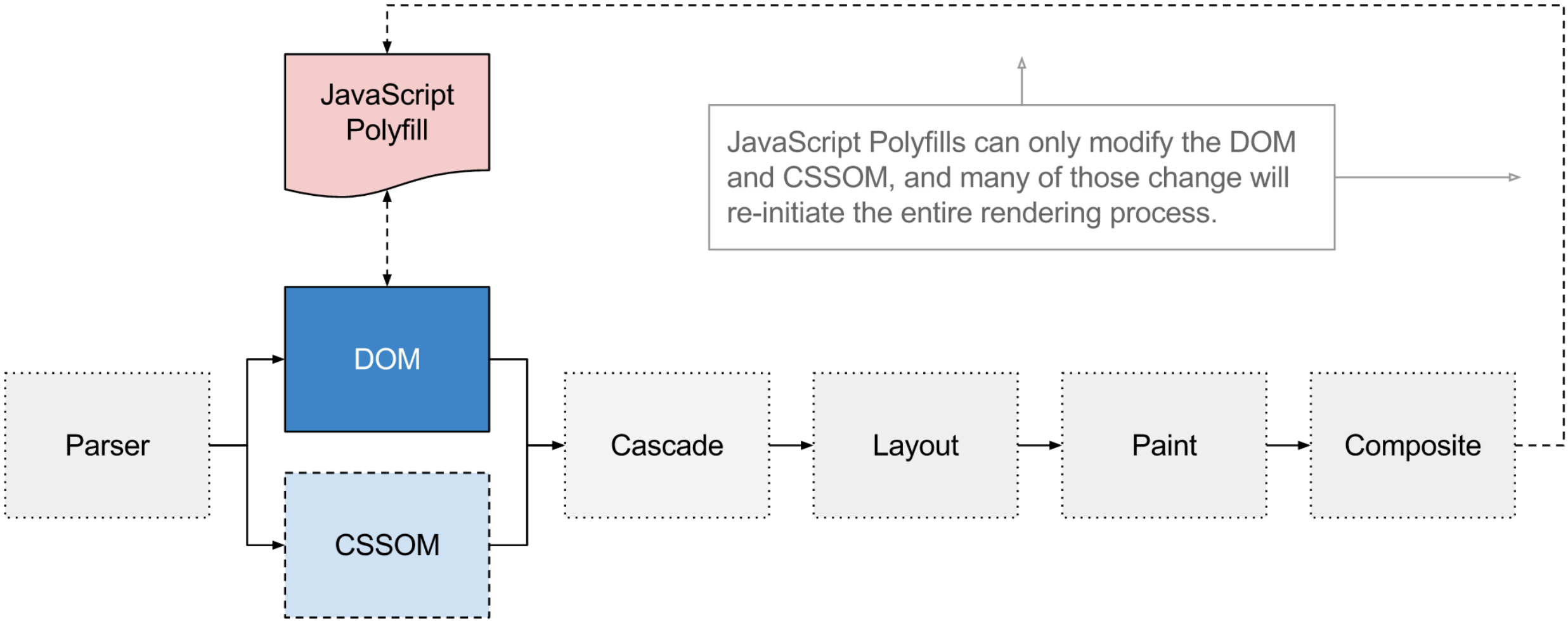
nucliresources

Google Developers Experts 2019
Web Technologies GDE

Cloudinary

CSS
Ruvim Noga

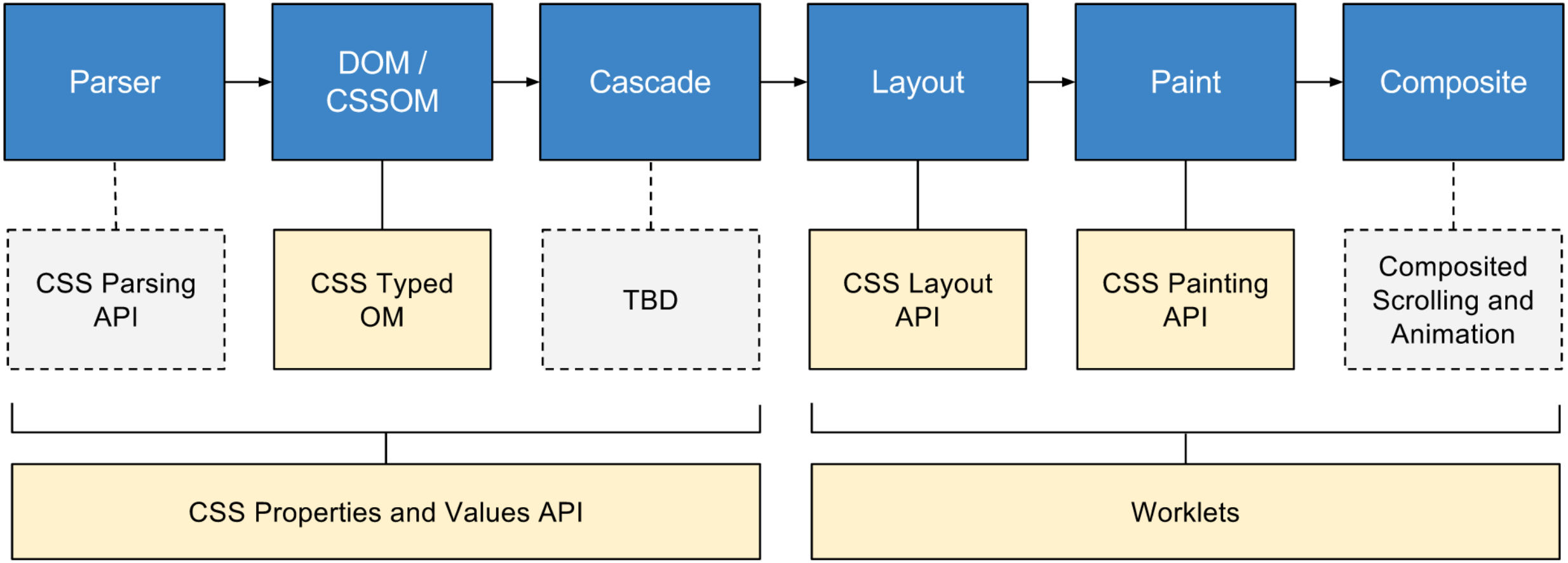

DOM
Parser
CSSOM
Cascade
Layout
Paint
Composite
Full JavaScript Access
Partial JavaScript Access
No JavaScript Access


JavaScript Polyfill
JavaScript Polyfills can only modify the DOM and CSSOM, and many of those change will re-initiate the entire rendering process.
DOM
Parser
CSSOM
Cascade
Layout
Paint
Composite

CSS Houdini

Lucas Benjamin

The objective of the CSS-TAG Houdini Task Force (CSS Houdini) is to jointly develop features that explain the “magic” of Styling and Layout on the web. - CSS Houdini


Parser
DOM / CSSOM
Cascade
Layout
Paint
Composite
CSS Parsing API
CSS Typed OM
TBD
CSS Layout API
CSS Painting API
Composited Scrolling and Animation
CSS Properties and Values API
Worklets

- Box Tree API
- Parser API
- Layout API
- Paint API
- Properties & Values API
- Worklets
- Typed OM API
- Animation Worklet
- Font Metrics API

Extends CSS

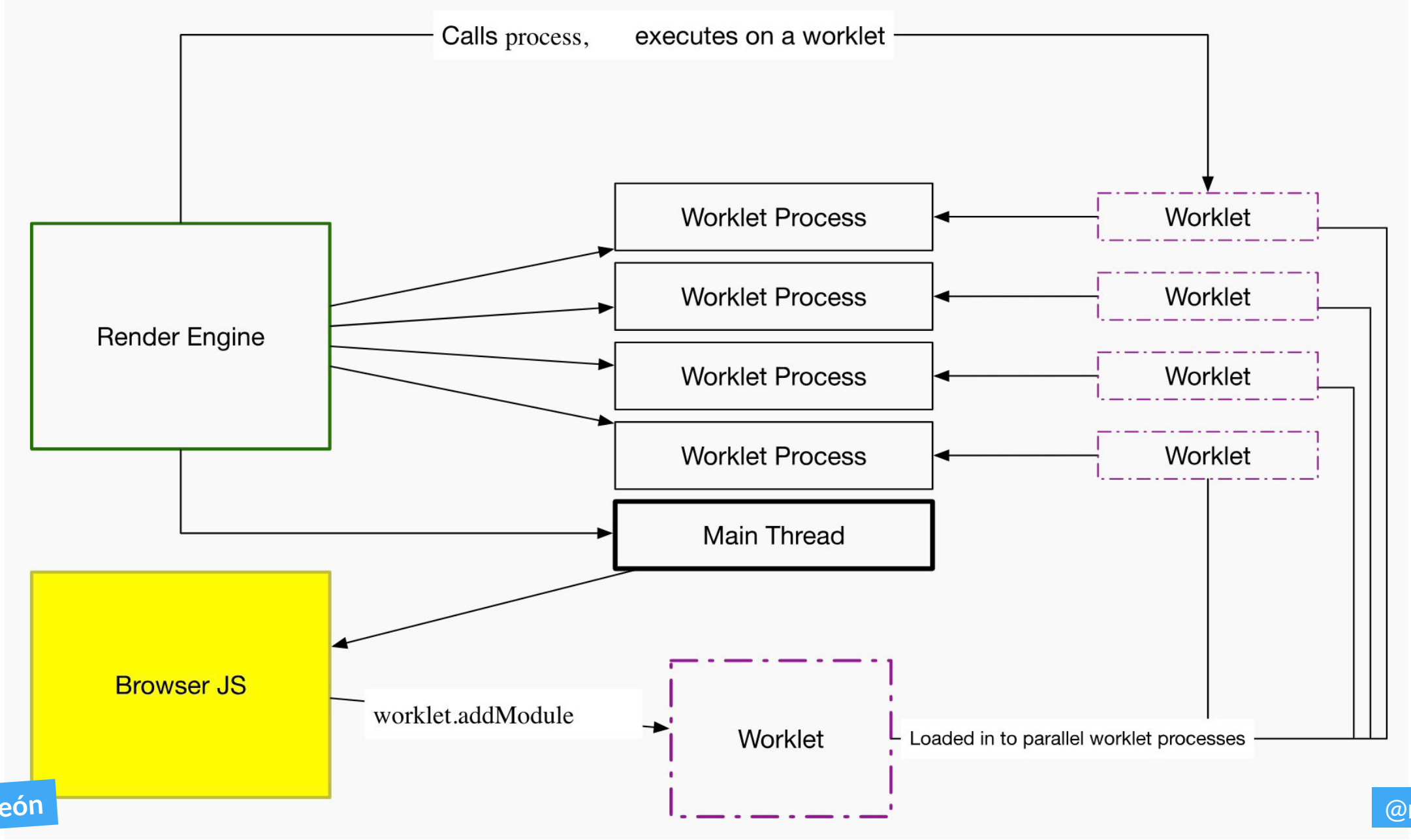
Worklets

Worklet connects to the browser engine

Is a Javascript Module

Without control over execution

It has no impact on performance


Calls process,
executes on a worklet
Render Engine
Worklet Process
Worklet Process
Worklet Process
Worklet Process
Main Thread
Worklet
Worklet
Worklet
Worklet
Browser JS
worklet.addModule
Worklet
Loaded in to parallel worklet processes

js

```
if ('paintWorklet' in CSS) {
    CSS.paintWorklet.addModule('PlaceholderBoxPainter.js');
}
```

worklet

```
class PlaceholderBoxPainter {
    paint(ctx, size) {
        // Magic 🎩
    }
}

registerPaint('placeholder-box', PlaceholderBoxPainter);
```

Paint API

js

```
if ('paintWorklet' in CSS) {
    CSS.paintWorklet.addModule('PlaceholderBoxPainter.js');
}
```

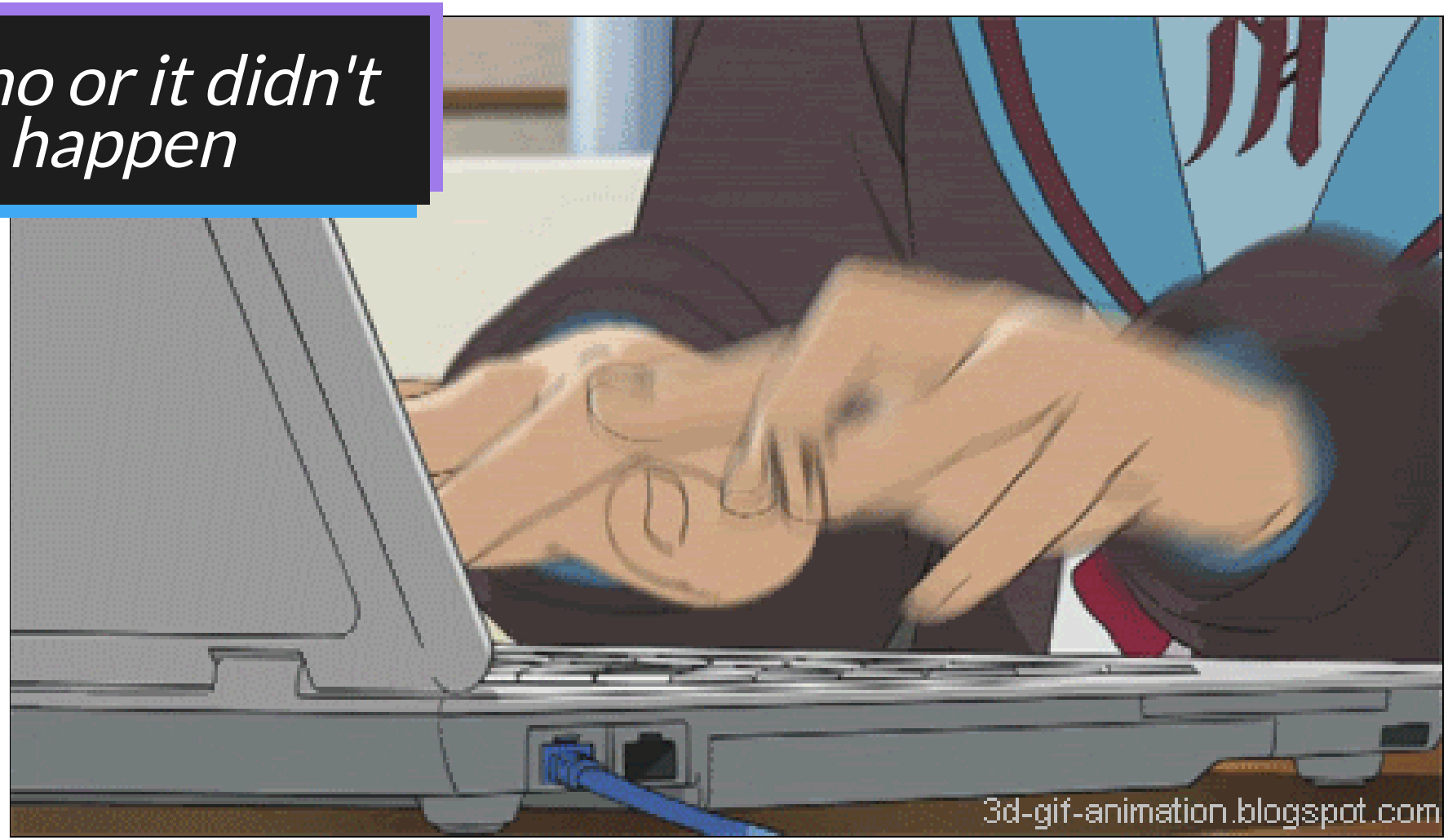
CSS

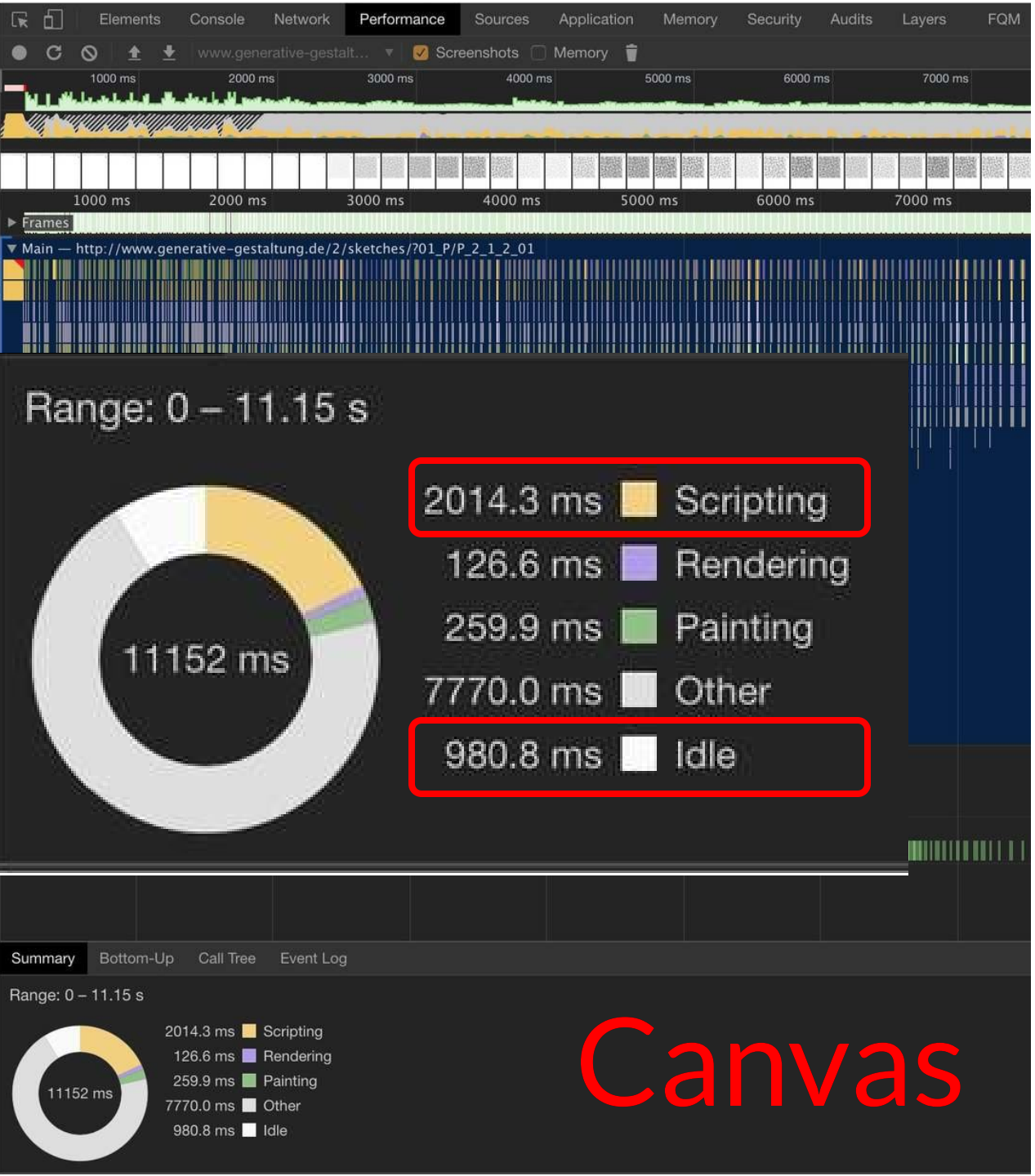
```
@supports (background: paint(slanted-bg)) {
  .el span {
    background: paint(slanted-bg);
  }
}
```

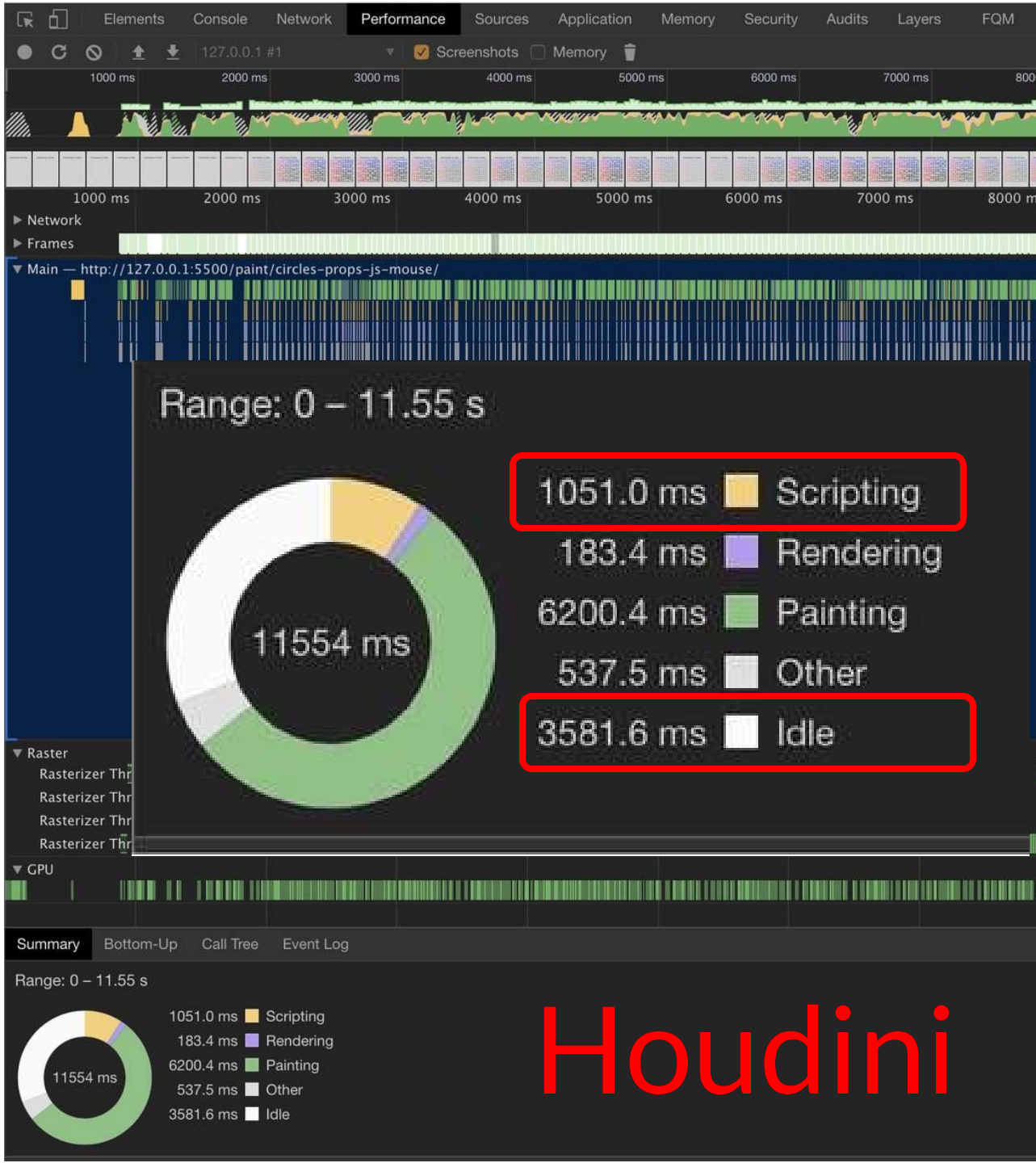
worklet

```
class SlantedBg {
  constructor () {
    this.hue = 110;
  }
  paint (ctx, geom, props, args) {
    // draw random colors
    ctx.fillStyle = 'hsl(' + this.hue + ', 100%, 50%)';
    this.hue += 10;

    ...
  }
}

registerPaint('slanted-bg', SlantedBg)
```

Demo or it didn't happen




Elements
Console
Network
Performance
Sources
Application
Memory
Security
Audits
Layers
FQM
Screenshots
Memory
Frames
Main — http://www.generative-gestaltung.de/2/sketches/?01_P/P_2_1_2_01
Range: 0 – 11.15 s
11152 ms
2014.3 ms Scripting
126.6 ms Rendering
259.9 ms Painting
7770.0 ms Other
980.8 ms Idle
Summary
Bottom-Up
Call Tree
Event Log
Range: 0 – 11.15 s
11152 ms
2014.3 ms Scripting
126.6 ms Rendering
259.9 ms Painting
7770.0 ms Other
980.8 ms Idle
Canvas


Elements
Console
Network
Performance
Sources
Application
Memory
Security
Audits
Layers
FQM
Screenshots
Memory
Network
Frames
Main — http://127.0.0.1:5500/paint/circles-props-js-mouse/
Raster
GPU
Range: 0 – 11.55 s
11554 ms
1051.0 ms Scripting
183.4 ms Rendering
6200.4 ms Painting
537.5 ms Other
3581.6 ms Idle
Summary
Bottom-Up
Call Tree
Event Log
Range: 0 – 11.55 s
11554 ms
1051.0 ms Scripting
183.4 ms Rendering
6200.4 ms Painting
537.5 ms Other
3581.6 ms Idle
Houdini

Properties & Values API

.Extends-CSS .Properties-Values-API { }

js

```
CSS.registerProperty({
  name: '--color-stop',
  syntax: '<color>',
  inherits: false,
  initialValue: 'transparent'
})
```

CSS

```
@property --color-stop {
  syntax: '<color>';
  inherits: false;
  initial-value: transparent;
}
```

CSS

```
.element {
  --color-stop: deeppink;
  background: linear-gradient(white, var(--color-stop))
  transition: --color-stop 1s;
}

.element:hover {
  --color-stop: deepskyblue;
}
```

input

```
@property --theme {
  syntax: '<color>+';
  initial-value: #fff;
  inherits: true;
}
```

output

```
if ("registerProperty" in CSS) {
  CSS.registerProperty({
    name: "--theme",
    syntax: "<color>+",
    initialValue: "#fff",
    inherits: true
  });
}
```

postcss-register-custom-props (Vitalii Bobrov)

Typed OM API

CSSOM

```
el.style.opacity = 0.5;
window.getComputedStyle(el).opacity === "0.5" // Strings!
```

Typed OM

```
el.attributeStyleMap.set('opacity', 0.5);

el.computedStyleMap().get('opacity')// CSSUnitValue {value: 0.5, unit: "number"}
el.computedStyleMap().get('opacity').value // 0.5
```

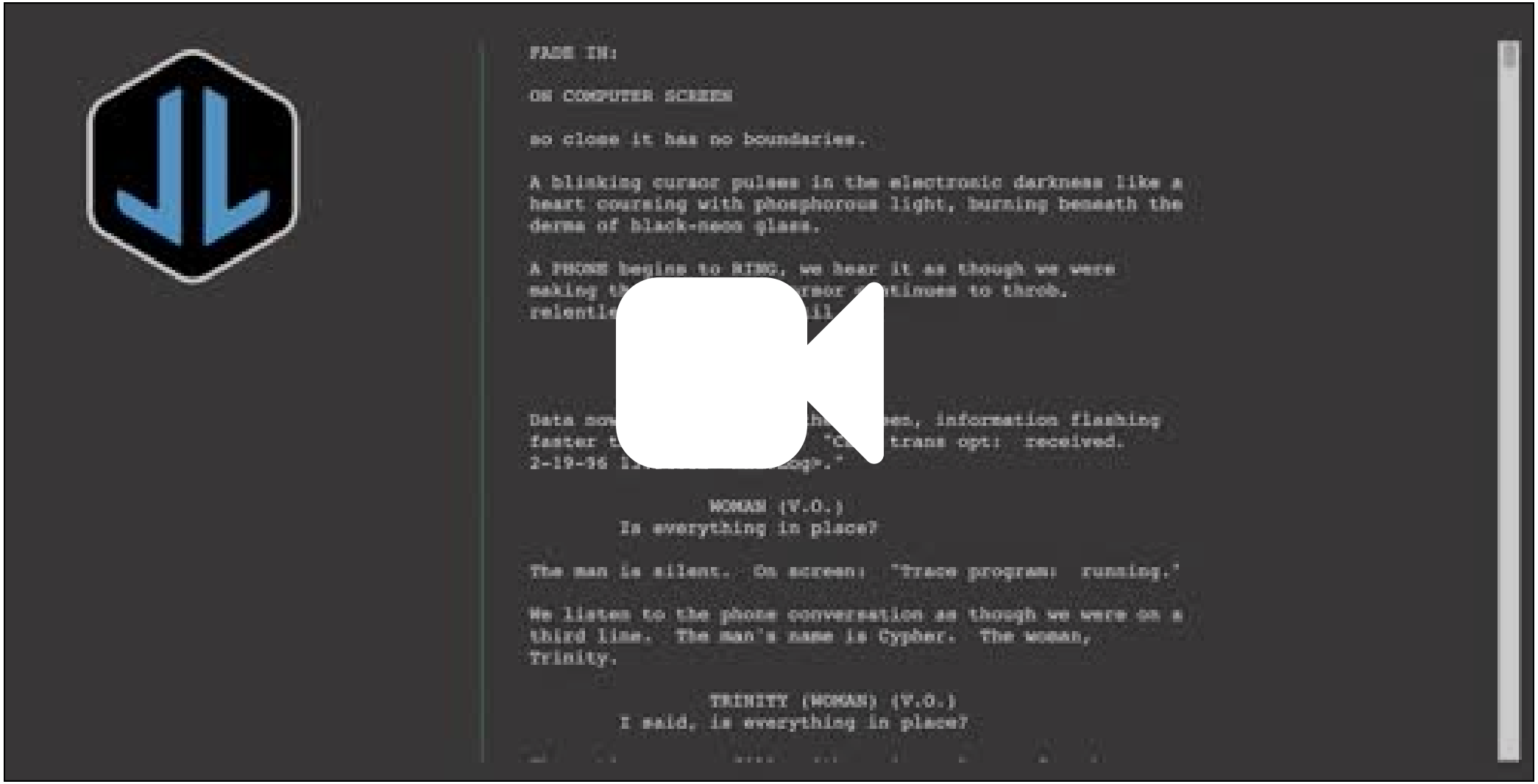
Nested expressions

```
calc(1px - 2 * 3em)
```

```
new CSSMathSum(
  CSS.px(1),
  new CSSMathNegate(
    new CSSMathProduct(2, CSS.em(3))
  )
);
```

Animation Worklet

.Extends-CSS Animation-Worlet { }



Logo Scroll Animation

Joan León

Layout API

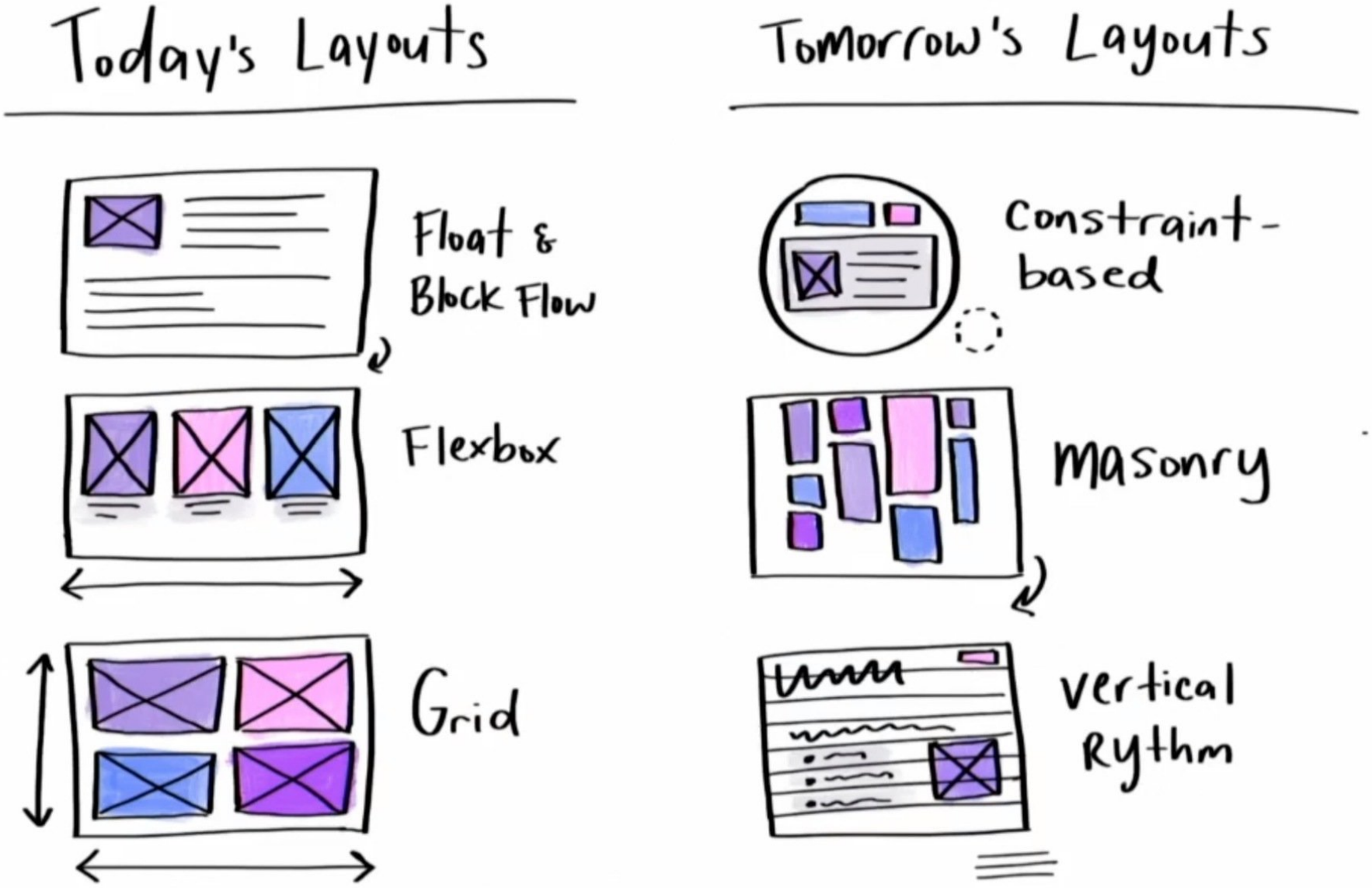
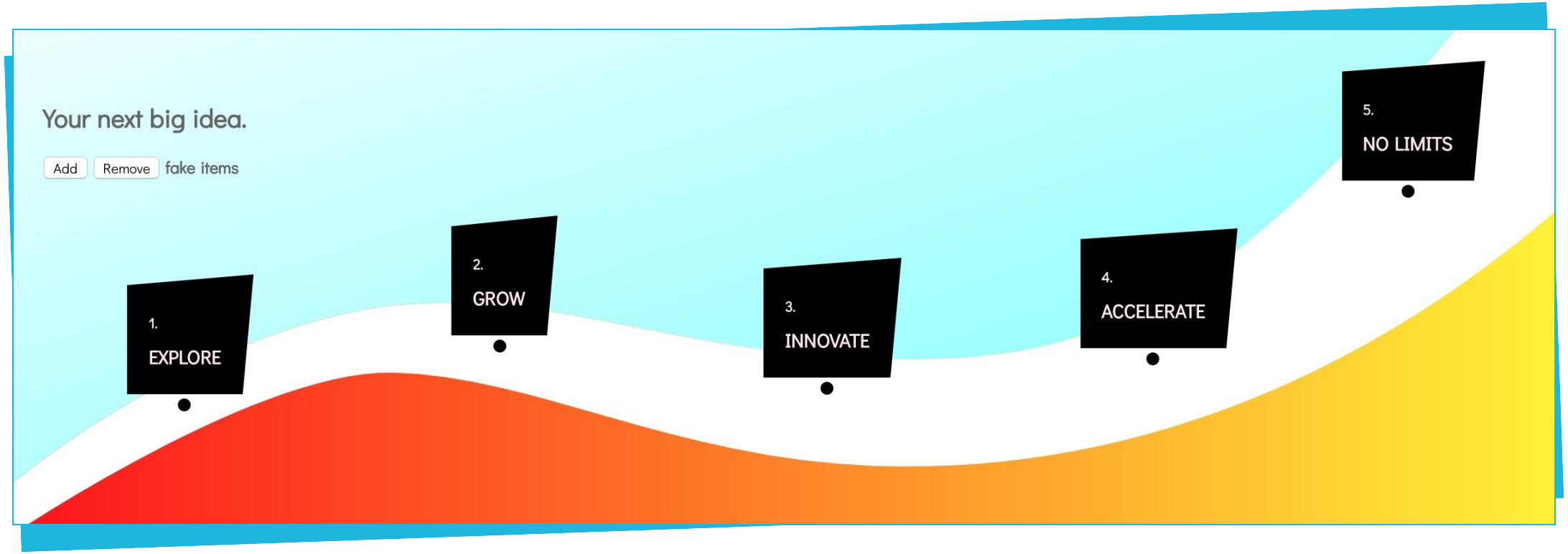

Today's Layouts
Tomorrow's Layouts
Float & Block Flow
Flexbox
Grid
Constraint-based
masonry
vertical Rythm

Image by **@Una**

.Extends-CSS Layout API { }



Joan León

@nucliweb

Support
Christoph Keil

	Google Chrome	Microsoft Edge	Opera	Samsung Internet	Mozilla Firefox	Apple Safari	Spec
Engine	Blink				Gecko	WebKit	-
Layout API (Explainer Demos)	Partial support (Canary) Details	Partial support (Canary) Details	Partial support (Developer) Details	No signal	Intent to implement Details	No signal	First Public Working Draft Spec
Paint API (Explainer Demos Article)	Shipped (Chrome 65) Details	Shipped (Edge 79) Details	Shipped (Opera 52) Details	Shipped (Internet 9.2) Details	Intent to implement (Servo) Details	In Development Details	Candidate Recommendation Spec
Parser API (Explainer)	No signal	No signal	No signal	No signal	No signal	No signal	No spec
Properties & Values API (Demos Article)	Shipped (Chrome 78) Details	Shipped (Edge 79) Details	Shipped (Opera 65) Details	No signal	In Development Details	Partial support (Safari TP 67) Details	Working Draft Spec
AnimationWorklet (Explainer Demos Article)	Partial support (Chrome 71) Details	Partial support (Edge 79)	Partial support (Opera 58)	Partial support (Internet 10.2 Beta)	No signal	No signal	First Public Working Draft Spec
Typed OM (Explainer Article)	Shipped (Chrome 66) Details	Shipped (Edge 79) Details	Shipped (Opera 53) Details	Shipped (Internet 9.2) Details	Intent to implement Details	In Development Details	Working Draft Spec
Font Metrics API (Explainer)	No signal	No signal	No signal	No signal	No signal	No signal	No spec

Conclusions

.Conclusions { }

Polyfills

This is not for me

EXTRA.CSS

Free will

Houdini is NOT like a Babel for CSS

Resources

Ricardo Gomez Angel

How Browsers Work: Behind the scenes of modern web browsers

.Awesome-CSS-Houdini { }

⭐ are welcome 😊

Houdini samples

@csshoudini

¿?

/github.com/nucliweb/ama/

Joan León

Thank you!

joanleon.dev

youtube.com/c/JoanLeon

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Web Technologies GDE

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