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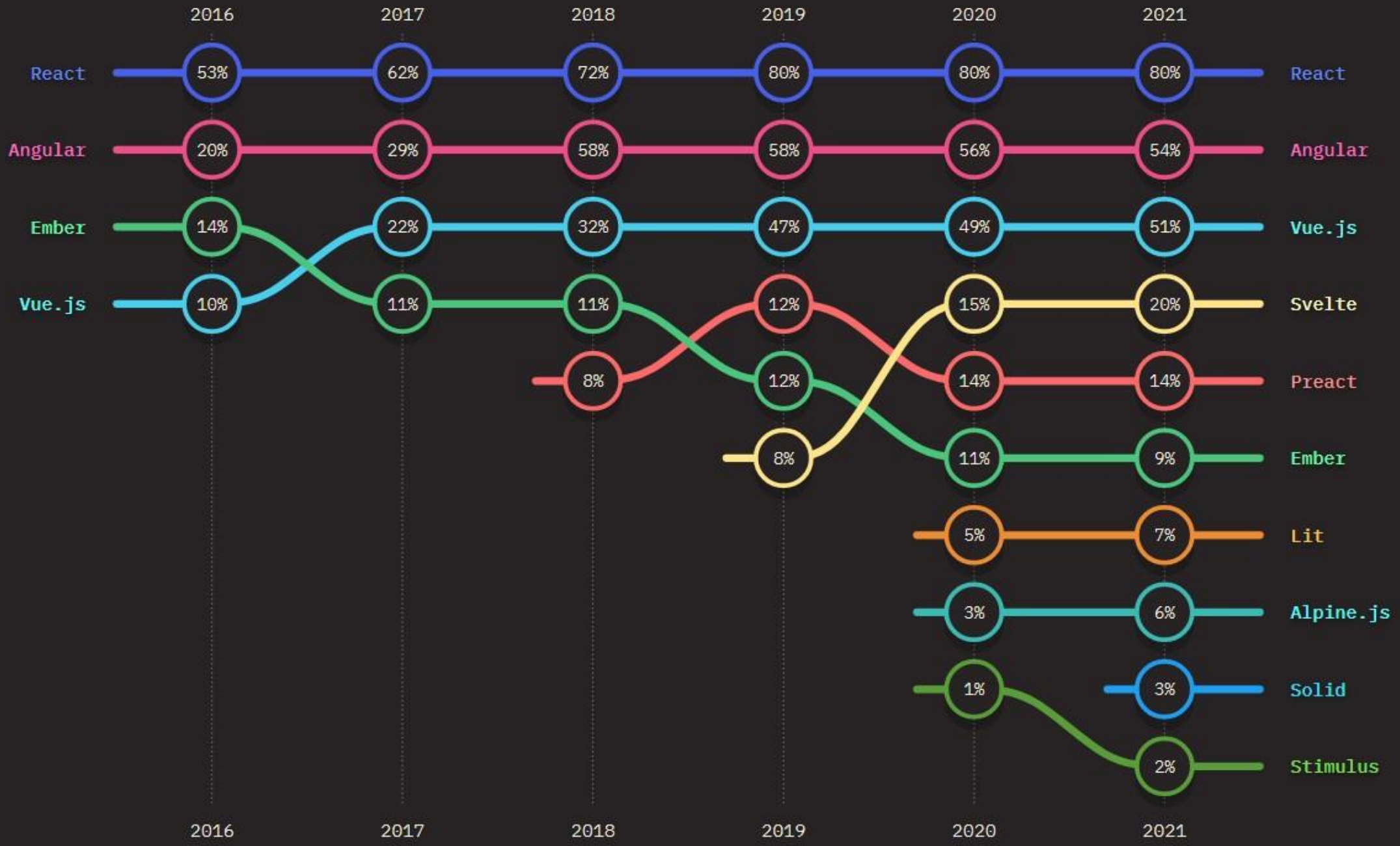
Develop standard web components

Under a design system


2016
2017
2018
2019
2020
2021
React
Angular
Ember
Vue.js
53%
62%
72%
80%
80%
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20%
29%
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5%
7%
3%
6%
1%
3%
2%
Svelte
Preact
Lit
Alpine.js
Solid
Stimulus

Gustavo Petruzzi

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Frontend developer

Work with Angular and React.

Love to ride my motorcycle and learn about different technologies.

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Agenda

Design system

Web components

Web components in Angular

Web components in React

Final Thoughts

Q & A

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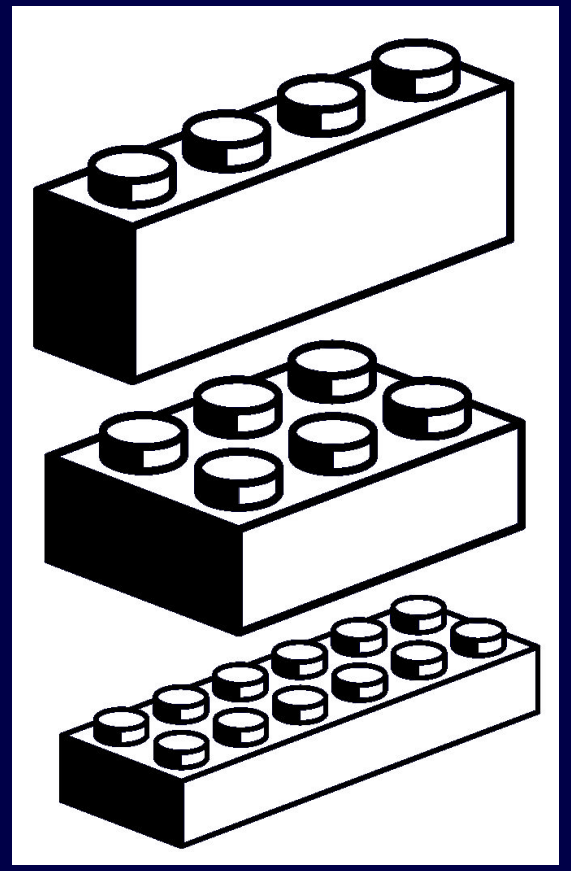
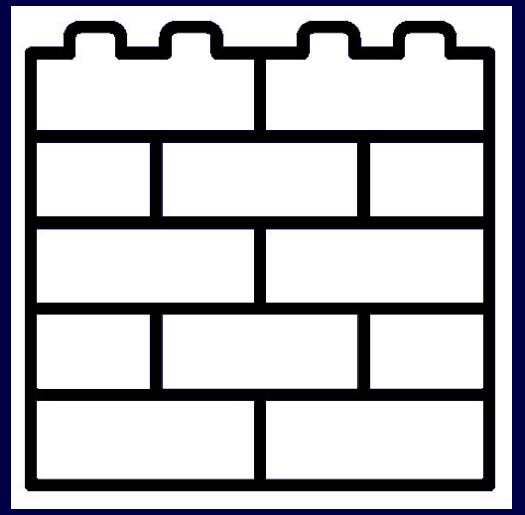
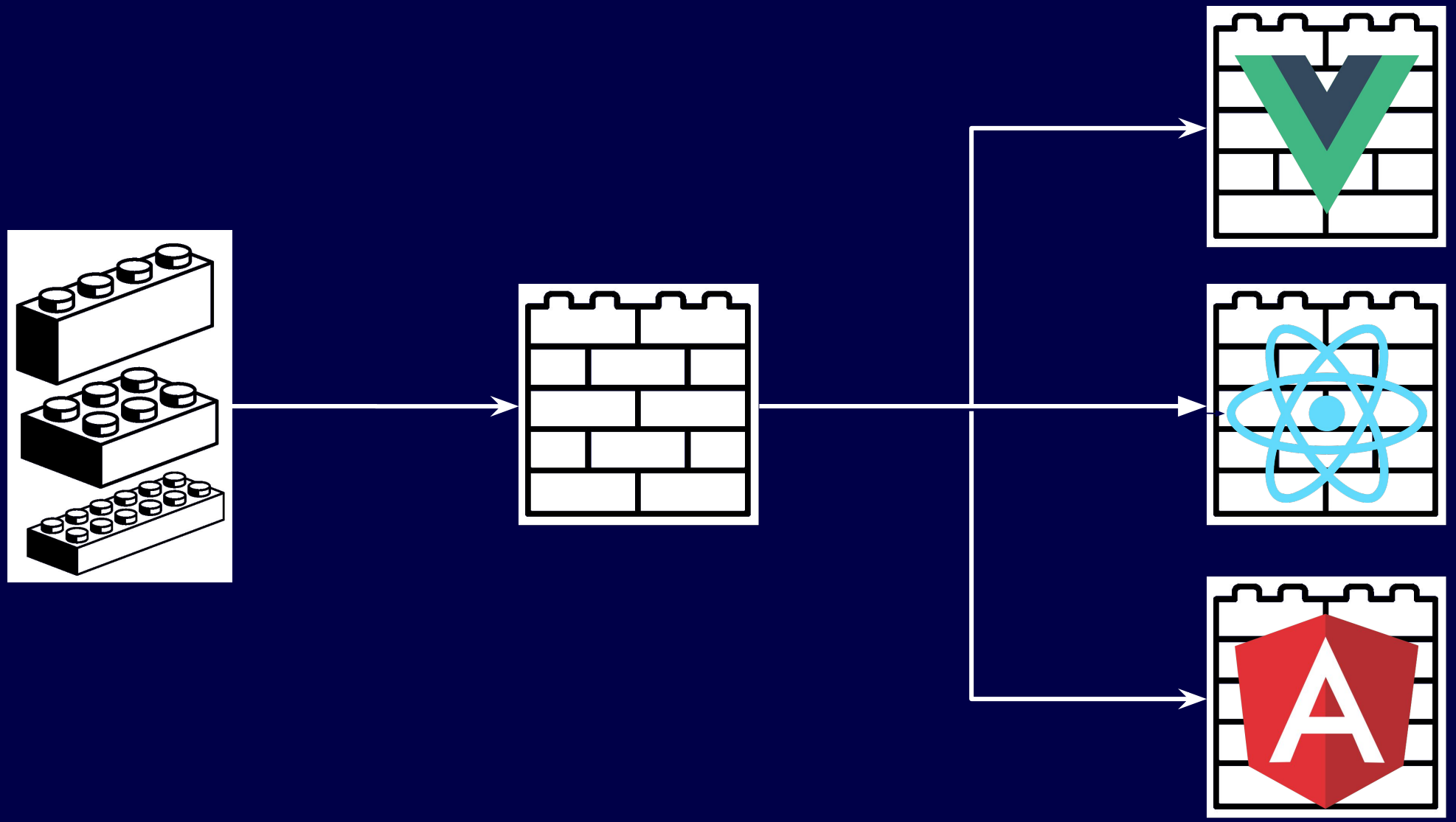
What is a design system?

Design system





The problem with design system and frameworks.



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Working Sample
React & Angular

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Web components

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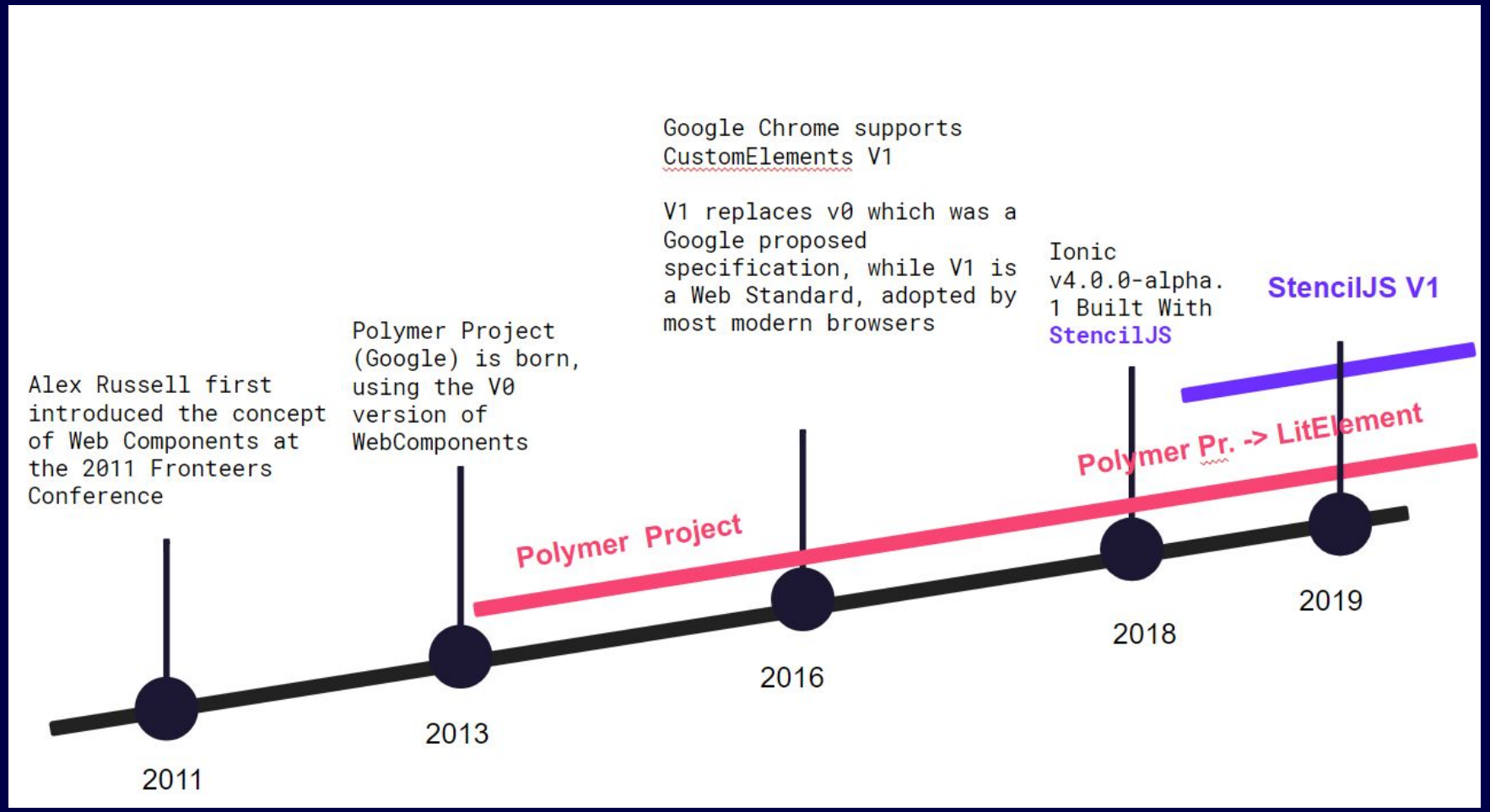
What are web components?

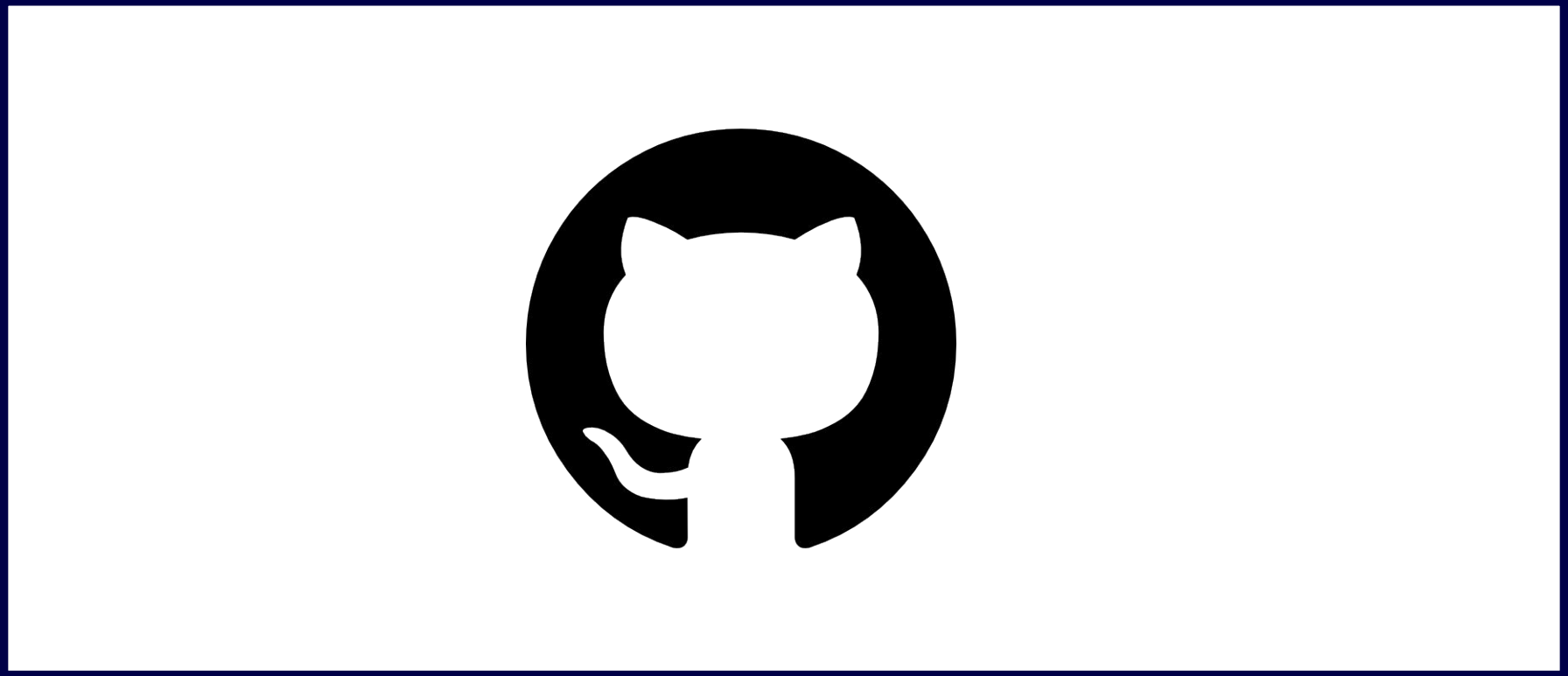
Web components is a suite of different technologies that allows you create reusable and encapsulated components.

To create web components, you only need Javascript, HTML and CSS.

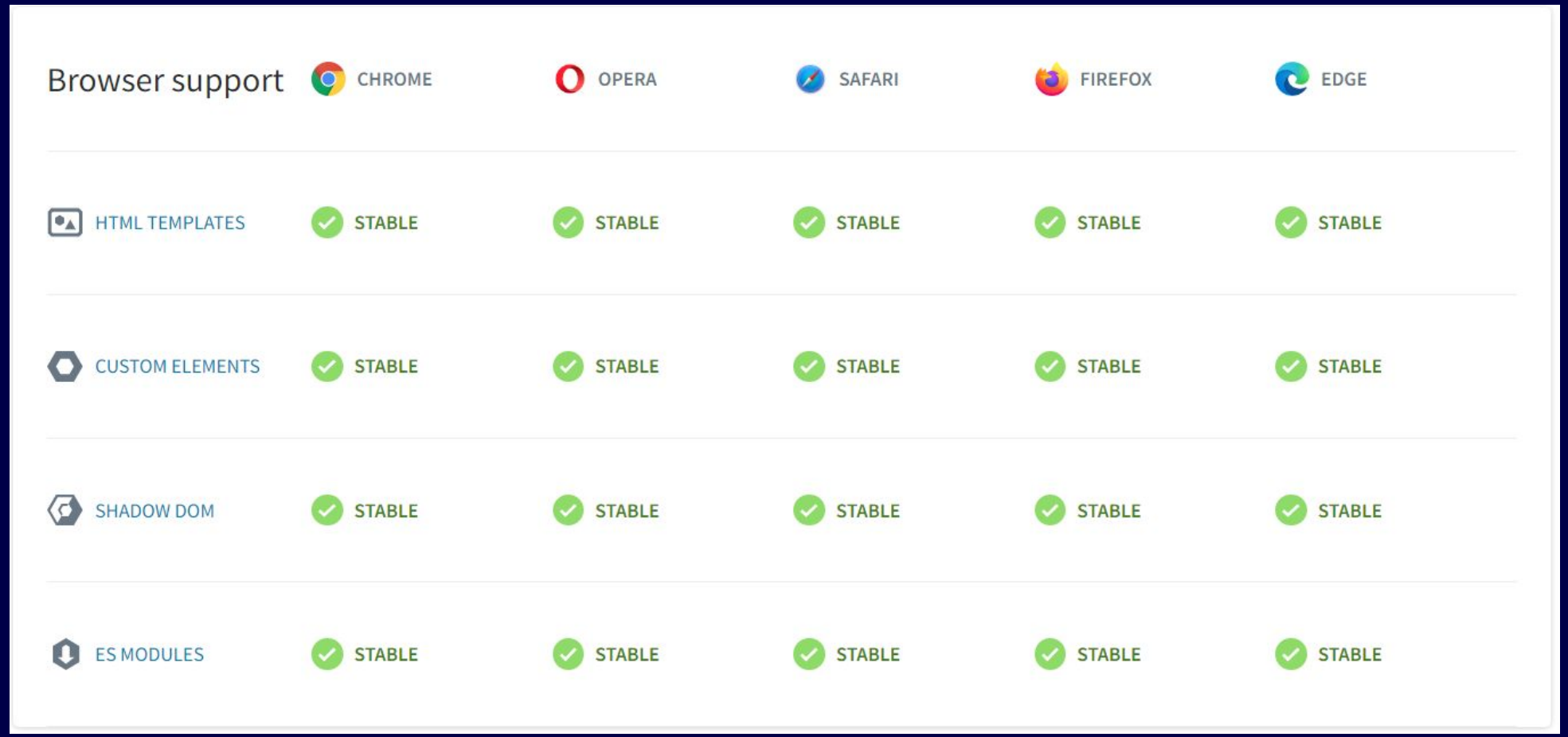
Web components first appearance



Web components adoption



Browser support



Browser support	CHROME	OPERA	SAFARI	FIREFOX	EDGE
HTML TEMPLATES	STABLE	STABLE	STABLE	STABLE	STABLE
CUSTOM ELEMENTS	STABLE	STABLE	STABLE	STABLE	STABLE
SHADOW DOM	STABLE	STABLE	STABLE	STABLE	STABLE
ES MODULES	STABLE	STABLE	STABLE	STABLE	STABLE

Web component specifications.

Custom Elements

Shadow DOM

Templates

Modules

CSS Scopes

What are custom elements?

Autonomous custom elements

Customized built-in elements

Custom Elements

Autonomous custom elements


```
customElements.define('prw-title', PrwTitle);
```

```
class PrwTitle extends HTMLElement {
  // ...
}
```

```
<prw-title> Hello world </prw-title>
```

Customized built-in elements


```
customElements.define('prw-title', PrwTitle, { extend: 'h1'});
```

```
class PrwTitle extends HTMLHeadingElement {
  // ...
}
```

```
<h1 is="prw-title"> Hello world! </h1>
```

Make sure you do not forget to **define** your web component.

The **class definition is not enough** to create your component.

Browsy's tips

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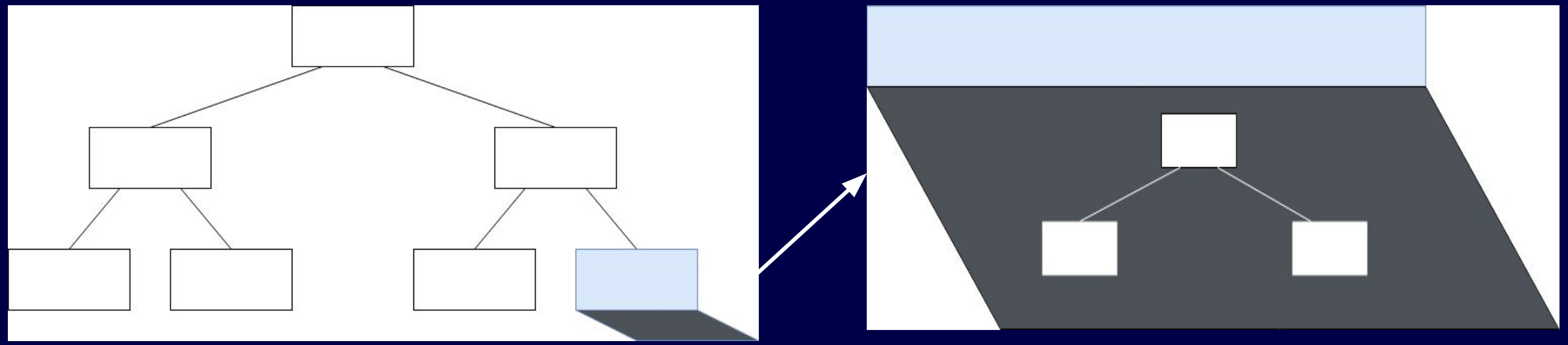
What is the shadow DOM?

Shadow DOM



Mode option

```
class PrwTitle extends HTMLElement {
  constructor() {
    super();
    this.attachShadow({ mode: 'open' });
    this.shadowRoot.innerHTML = `
      <h1>
        Hello world!
      </h1>
    `
  }
}
```

```
class PrwTitle extends HTMLElement {
  constructor() {
    super();
    this.attachShadow({ mode: 'closed' });
    this.shadowRoot.innerHTML = `
      <h1>
        Hello world!
      </h1>
    `
  }
}
```

```
const customElement = document.querySelector('prw-title');
const shadowRoot = customElement.shadowRoot;
// You can access all the properties and methods
// in your Shadow DOM
```

```
const customElement = document.querySelector('prw-title');
const shadowRoot = customElement.shadowRoot;
// ShadowRoot is going to be null
```

Keep in mind that the shadow DOM is not a security measure. The user can anyway affect the shadow DOM of your component, even just by using the attachShadow() method of your shadow host element

Browsy's tips

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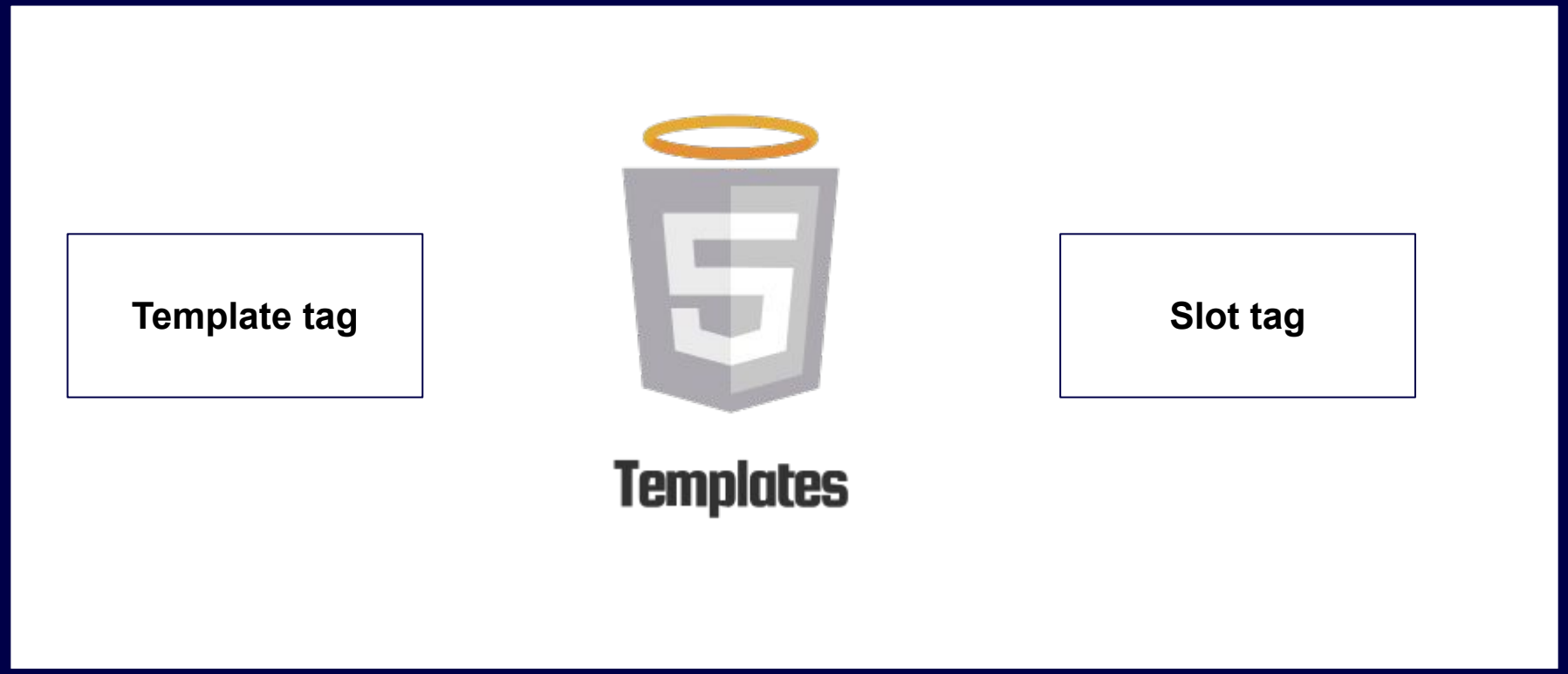
What are templates?



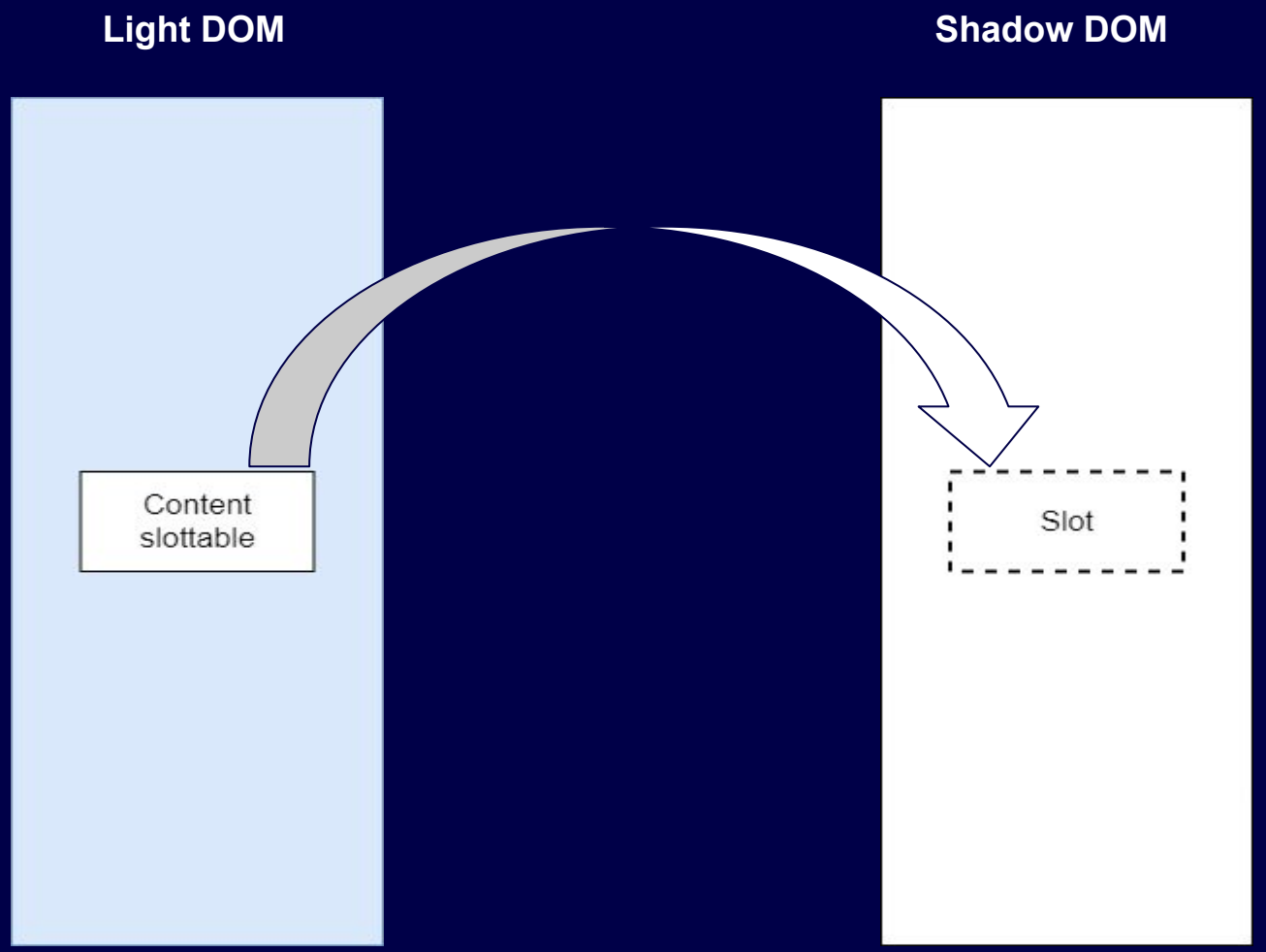
Template tag.


```
<template id="my-title">
    <h1> My title </h1>
</template>
```

```
class PrwTitle extends HTMLElement {
  constructor() {
    super();
    let template = document.getElementById('my-title');
    let templateContent = template.content;
    this.attachShadow({ mode: 'open' });
    this.shadowRoot.appendChild(templateContent.cloneNode(true));
  }
}
```

```
<prw-title> <h1> Hello world </h1> </prw-title>
```

Slot tag.



Slot tag.


```
<template id="my-title">
  <slot>
    <h1> My title </h1>
  </slot>
</template>
```

```
class PrwTitle extends HTMLElement {
  constructor() {
    super();
    let template = document.getElementById('my-title');
    let templateContent = template.content;
    this.attachShadow({ mode: 'open' });
    this.shadowRoot.appendChild(templateContent.cloneNode(true));
  }
}
```

```
<prw-title> <h1> Hello world </h1> </prw-title>
```

Multiples slots

```
<template id="my-section">
  <slot name="title">
    <h1> My title </h1>
  </slot>
  <slot name="content">
    <h1> My content </h1>
  </slot>
</template>
```

```
class PrwTitle extends HTMLElement {
  constructor() {
    super();
    let template = document.getElementById('my-title');
    let templateContent = template.content;
    this.attachShadow({ mode: 'open' });
    this.shadowRoot.appendChild(templateContent.cloneNode(true));
  }
}
```

```
<prw-title>
  <h1 slot="title"> Hello World! </h1>
  <p slot="content">
    Awesome content about web components.
  </p>
</prw-title>
```

Slotchange event


```
class PrwTitle extends HTMLElement {
  constructor() {
    super();
    const template = document.getElementById('my-title');
    const template = template.content;
    this.attachShadow({ mode: 'open' });
    this.shadowRoot.appendChild(templateContent.cloneNode(true));
    this.slot = this.shadowRoot.querySelector('slot');
    this.slot.addEventListener('slotchange', (event) => {
      console.log('Slot changed!')
    })
  }
}
```

Remember! You need a shadow DOM if you want to use slots. Slots are only placeholders inside a shadow DOM.

Browsy's tips

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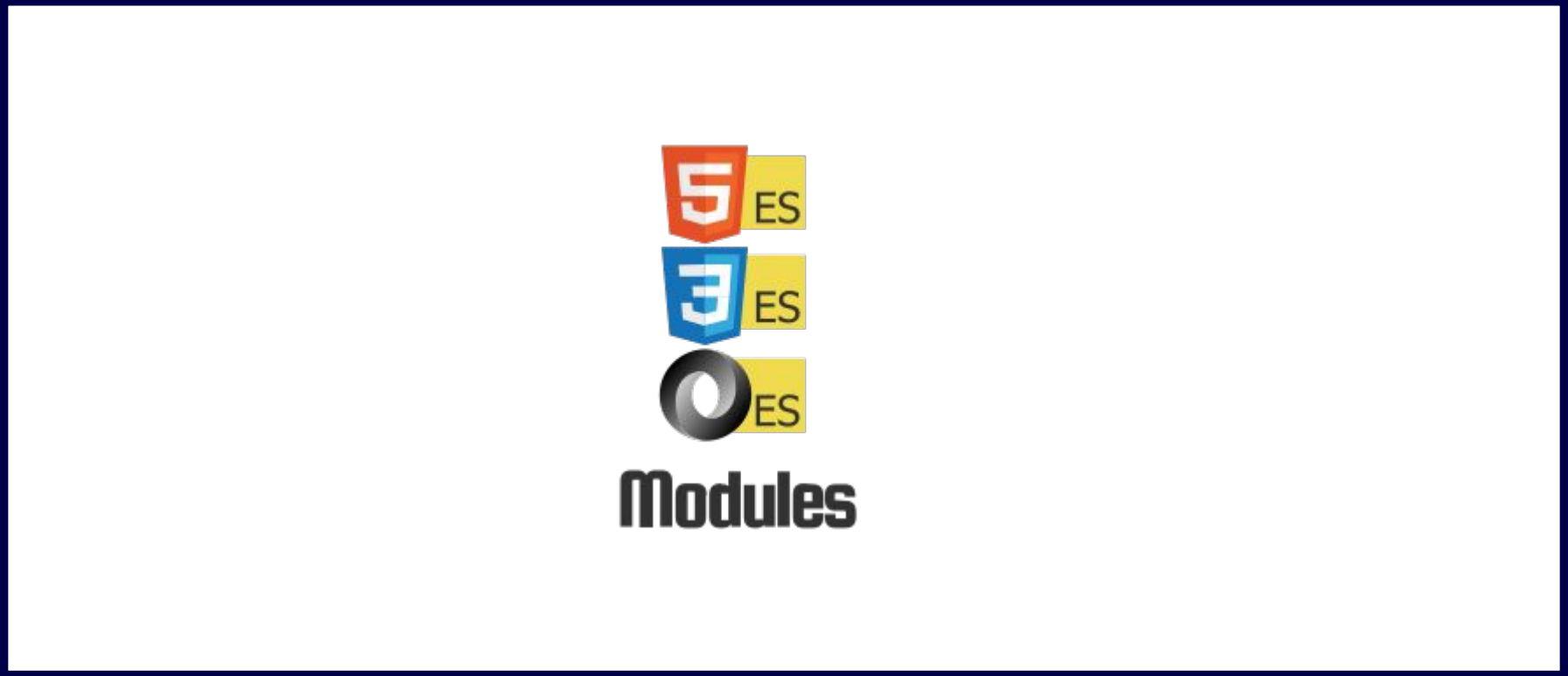
ES modules



ES modules


```
<script type="module">
  import PrwTitle from './title.js'
</script>
...

<prw-title>
  <h1 slot="title"> Hello World! </h1>
</prw-title>
```

CSS Scopes

Web component tag


```
<template id="my-title">
  <slot> My title </slot>
</template>
```

```
prw-title {
  display: flex;
  flex-direction: column;
  width: 500px;
}

prw-title h1 {
  width: 250px;
}
```

```
<prw-title> <h1> Hello world </h1> </prw-title>
```

CSS variables

```
<template id="my-title">
  <style>
    h1 {
      color: var(--primary, black)
    }
  </style>
  <h1> My title </h1>
</template>
```

```
:root {
  --primary: red;
}
```

```
<prw-title></prw-title>
```

::part pseudo element

```
<template>
  <div part="wrapper">
    <slot name="title">
      My title
    </slot>
    <h2 part="subtitle">
      Powered by web components
    </h2>
  </div>
</template>
```

```
prw-title::part(wrapper) {
  width: 500px;
  color: red;
}

prw-title::part(subtitle) {
  color: blue;
}
```

```
<prw-title></prw-title>
```

Inline style


```
<template id="my-title">
  <style>
    .wrapper {
      width: 350px;
      color: red;
    }
  </style>
  <div class="wrapper">
    <slot name="title"> My title</slot>
    <h2> Powered by web components </h2>
  </div>
</template>
```

:host pseudo class


```
<template id="my-title">
  <style>
    :host {
      display: flex;
      flex-direction: column
    }
  </style>
  <slot name="title"> My title </slot>
  <h2> Powered by web components </h2>
</template>
```

::host() function


```
<template id="my-title">
  <style>
    :host(.error) {
      color: red;
    }
  </style>
  <div class="wrapper">
    <slot name="title"> My title </slot>
    <h2> Powered by web components </h2>
  </div>
</template>
```

```
<prw-title class="error">
  Hello world
</prw-title>
```

Anatomy of a web component

Constructor


```
class PrwTitle extends HTMLElement {

  constructor() {
    super();
    const template = document.getElementById('my-title');
    const templateContent = template.content;
    this.attachShadow({ mode: 'open' });
    this.shadowRoot.appendChild(templateContent.cloneNode(true));
  }
}
```

ConnectedCallback method


```
class PrwTitle extends HTMLElement {
  //More code here
  handleOffline() { ... }

  connectedCallback() {
    window.addEventListener('offline', handleOffline);
  }
}
```

DisconnectedCallback method


```
class PrwTitle extends HTMLElement {
  // More code here
  handleOffline() { ... }

  disconnectedCallback() {
    window.removeEventListener('offline', handleOffline);
  }
}
```

AttributeChangedCallback method


```
<prw-title type="warning">
  <h1> Hello World! </h1>
</prw-title>
```

```
class PrwTitle extends HTMLElement {
  // More code here

  static get observedAttributes() {
    return ['type'];
  }

  attributeChangedCallback(name, oldValue, newValue) {
    // Code to handle attributes changes.
  }
}
```

AdoptedCallback method


```
class PrwTitle extends HTMLElement {
  // More code here
  adoptedCallback() {
    // Handle on adoptedCallback
  }
}
```

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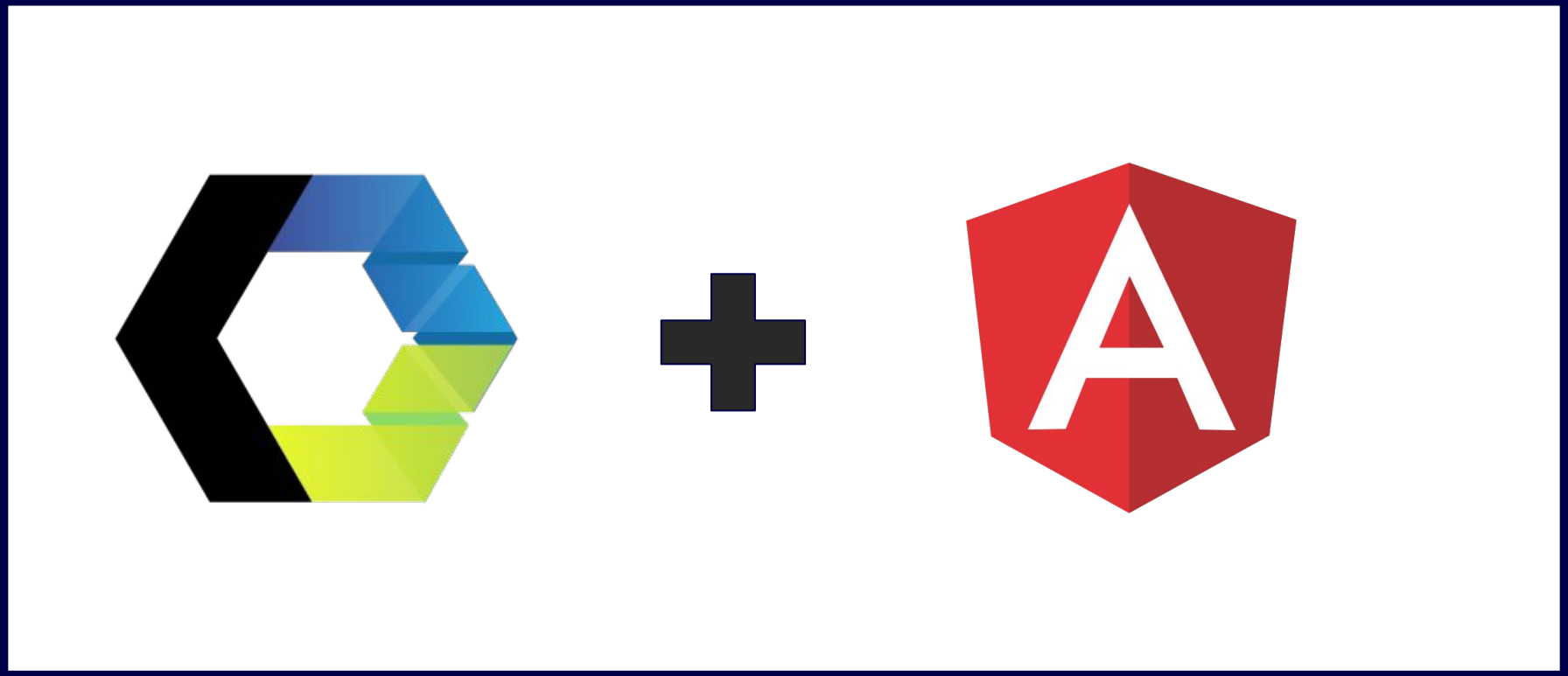
Working sample of a web component

Web components in Angular



Web components in Angular


```
(element) prw-modal: HTMLElement

'prw-modal' is not a known element:
1. If 'prw-modal' is an Angular component, then verify that it is part of this module.
2. If 'prw-modal' is a Web Component then add 'CUSTOM_ELEMENTS_SCHEMA' to the '@NgModule.schemas'
of this component to suppress this message. ngtsc(-998001)

app.component.ts(7, 13): Error occurs in the template of component AppComponent.

View Problem    No quick fixes available
```

Web components in Angular


```
1  import { CUSTOM_ELEMENTS_SCHEMA, NgModule } from '@angular/core';
2  import { BrowserModule } from '@angular/platform-browser';
3
4  import { AppComponent } from './app.component';
5
6  @NgModule({
7    declarations: [
8      AppComponent
9    ],
10   imports: [
11     BrowserModule
12   ],
13   schemas: [
14     CUSTOM_ELEMENTS_SCHEMA
15   ],
16   providers: [],
17   bootstrap: [AppComponent]
18 })
19 export class AppModule { }
20
```

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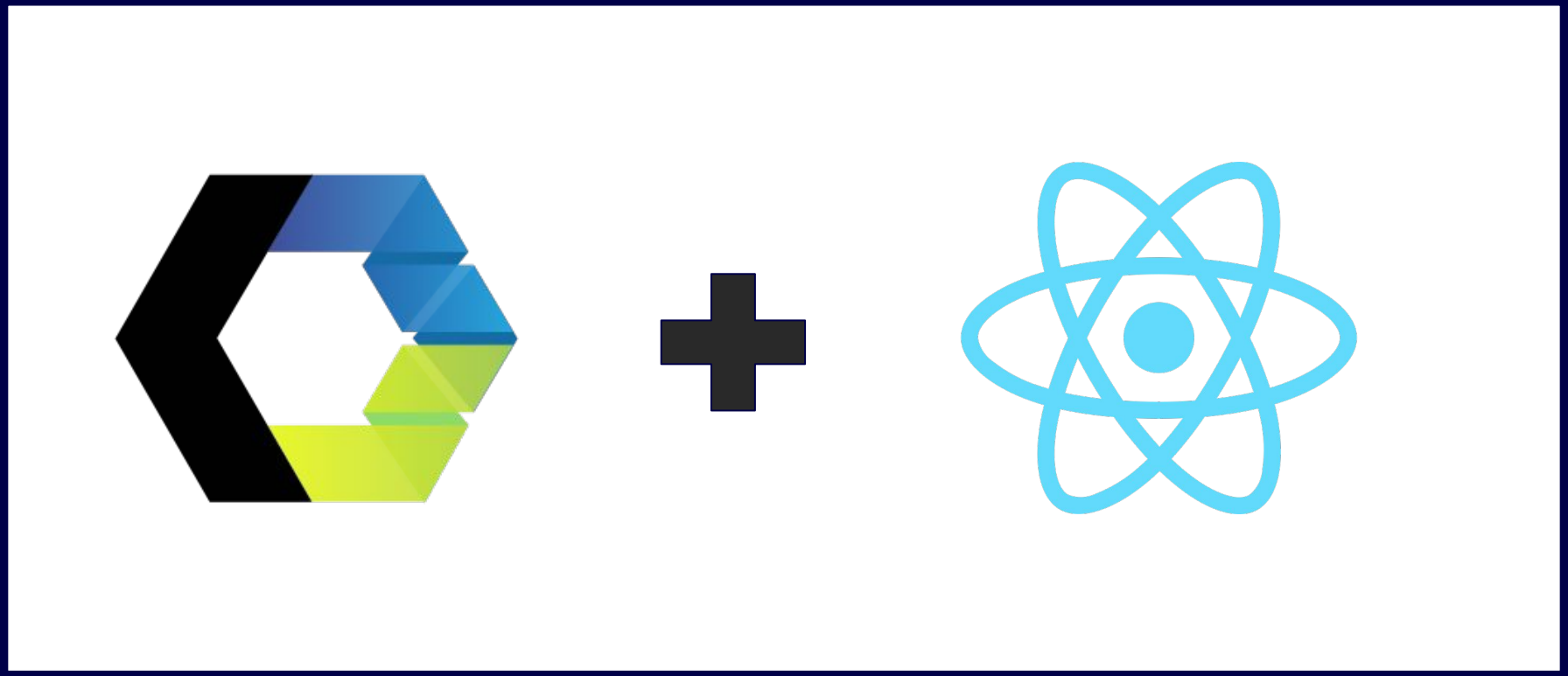
Working sample of a web component in Angular

Web components in React



Web components in React


```
    <>
      <h1> Modal web component </h1>
      <prw-modal title="Awesome Modal" onClose={closeModal}>
        <p> Powered by web components.</p>
        <button className="btn" onClick={closeModal}> Close modal </button>
      </prw-modal>
      <button className="btn" onClick={openModal}> Open modal</button>
    </>
  )
```

Web components in React


```
const modalRef = useRef(null);

useEffect(() => {
  const modalRefCurrent = modalRef.current;
  if (modalRefCurrent) {
    modalRefCurrent.addEventListener('onClose', modalRefCurrent.hideModal);
  }

  return () => {
    modalRefCurrent.removeEventListener('onClose', modalRefCurrent.hideModal);
  }
}, []);
```

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Working sample of a web component in React

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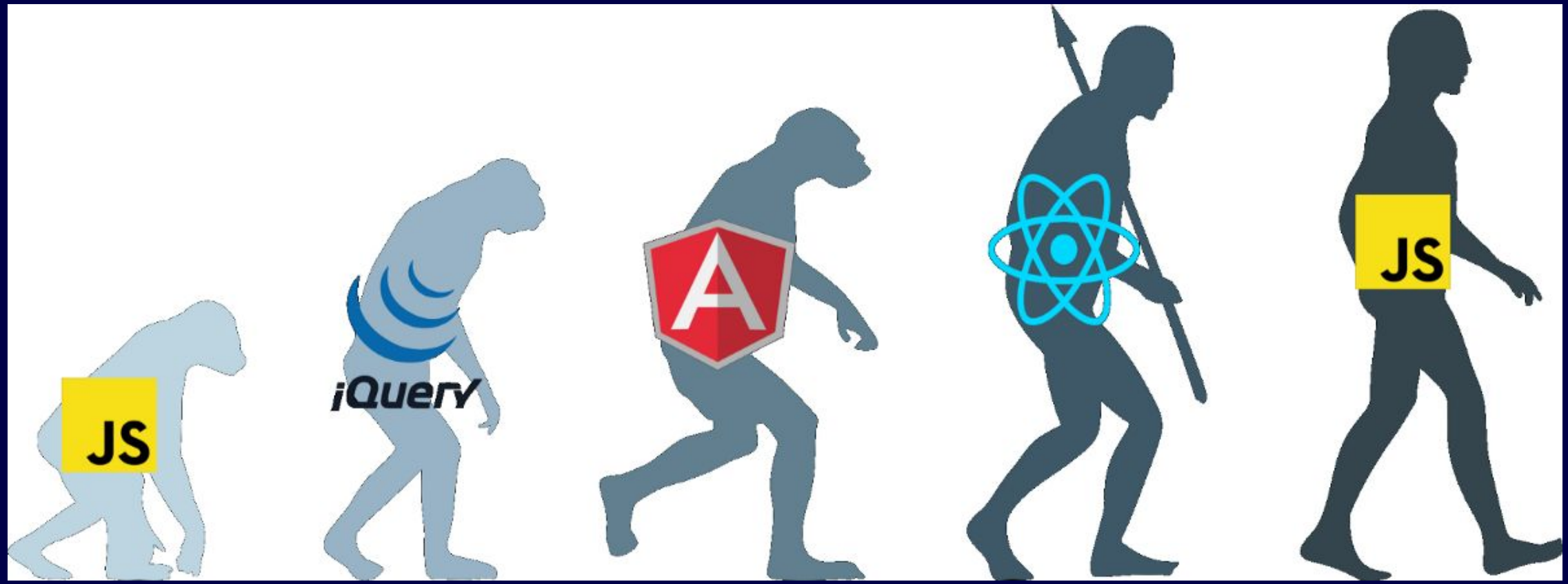
Final thoughts

Final thoughts



“We have to find solutions for a problem and no problems for a solution.”

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References

Documentation

- Custom elements, v1, mdn
- Template
- Shadow DOM, w3c
- ShadowRoot
- Webcomponents.org, mdn

Guides, articles and more

- The state of web components in 2022
- Building components
- Custom Element Best Practices
- Book: Web Components in Action
- webcomponents.dev
- Awesome list, another list, and another

Web components repository

https://github.com/cognizant-softvision/pw2022-web-components