Web Programming

Vue.js I.

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Web frameworks

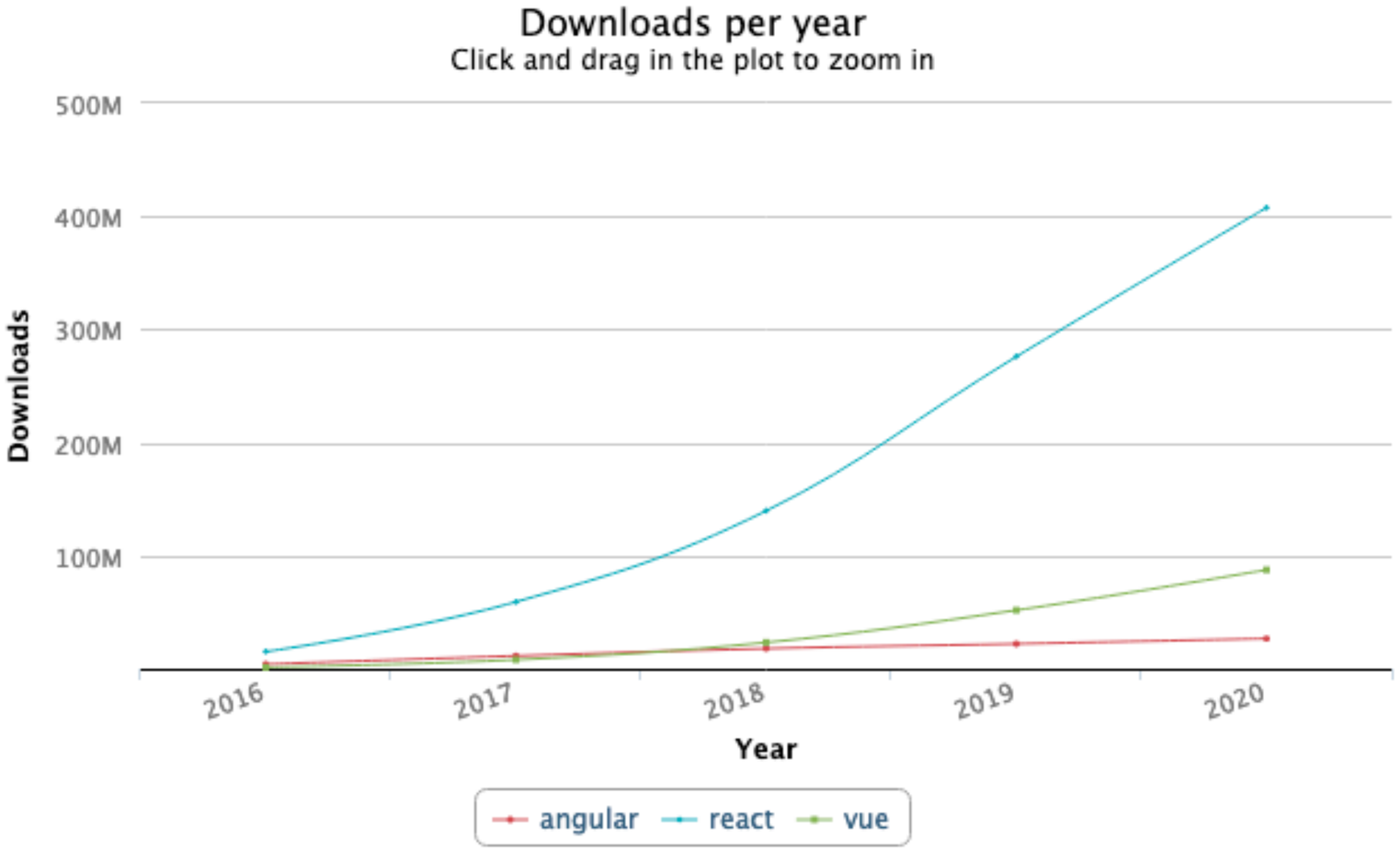
- Simplify development
- Code reuse
- Frameworks exist for all components, including
  - JavaScript
  - CSS
  - PHP
  - See: http://www.bestwebframeworks.com/

Simple JavaScript frameworks

- Aims
  - Consistent browser support
  - Simplified, easy-to-use functions
- Number of available options
  - jQuery
  - Prototype
  - Yahoo! UI Library
  - Dojo

The three big ones

- Angular
- React
- Vue



npm-stat.com

Pure JS
(what is the problem?)

- Source of truth (JS vs. HTML)
- Verbose DOM manipulation
- Difficult to separate application logic from display

Source of truth

- Can be in the DOM or in JS

```
// This function uses the DOM (html) as source of truth
function add(){
    counter = document.getElementById("count");
    count = parseInt(counter.innerText) + 1;
    counter.innerText = count;
}

// a global variable
let count = 0;
// increment uses the global count
function increment(){
    count += 1;
    document.getElementById("count_2").innerText = count;
}
```

Example #1

examples/js/vue/no_vue/counter_local_state

```
function createCounter(){
    let theCount = 0;
    let counter = document.createElement('div');
    counter.classList.add("counter");
    document.querySelector(".counter_container").appendChild(counter);

    let count = document.createElement('span');
    count.classList.add("count");
    count.innerText="0";
    counter.appendChild(count);

    let button = document.createElement('button');
    button.onclick = function(){
        theCount += 1;
        this.parentElement.querySelector(".count")
            .innerText = theCount;
    };
    button.innerText = "Add";
    counter.appendChild(button);

}
```

Vue.js
installation

- https://v3.vuejs.org/guide
- Simply include the vue library.

```
<!-- Import Vue ->
<!-- development version, includes helpful console warnings -->
<script src="https://unpkg.com/vue@3.0.5/dist/vue.global.js"></script>
```

Vue.js
My first app

- Create element to contain vue app:

```
<div id="app"></div>
```

- Create vue app in JS:

```
    <script>
        var app = Vue.createApp({
            // specify a template
            template: "<strong>{{ message }}</strong>",
            // the data used in this app
        });
        // mount the app on the element #app
        app.mount("#app");
    </script>
```

Vue.js
My first app

- Create element to contain vue app:

```
<div id="app"></div>
```

The template/application is placed inside this element.

- Create vue app in JS:

```
<script>
    var app = Vue.createApp({
        // specify a template
        template: "<strong>{{ message }}</strong>",
        // the data used in this app
    });
    // mount the app on the element #app
    app.mount("#app");
</script>
```

This tells Vue where the application lives.

Vue.js
My first app with data

- Create element to contain vue app:

```
<div id="app"></div>
```

- Create vue app in JS:

```
<script>
    var app = Vue.createApp({
        // specify a template
        template: "<strong>{{ message }}</strong>",
        // the data used in this app
        data(){return {
            message: "Hello Vue!"
        }}
    });
    // mount the app on the element #app
    app.mount("#app");
</script>
```

A function that returns an object, that is the data.

Vue.js
My first app with data

- Data is a function that returns an object

```
data: ()=> {
    return {
        message: "Hello Vue!"
     }
}
```

or

```
data: function(){
    return {
        message: "Hello Vue!"
    }
}
```

or

```
data(){
    return {
        message: "Hello Vue!"
    }
}
```

- Results in application data:

```
{
    message: "Hello Vue!"
}
```

Vue.js
Templates

- Content between **{{ }}** is replaced with element from data

```
{{ message }}
```

```
data: function(){
    return {
        message: "Hello Vue!"
    }
}
```

Vue.js
Specifying templates

- Plain JS string:

```
template: "<strong>{{ message }}</strong>"
```

- Template literal (multiline string)

```
template: `
   <strong>
     {{ message }}
   </strong>
 `
```

- In the HTML (not good if component is reused)

```
<div id=“app”>
  <strong>
    {{ message }}
  </strong>
</div>
```

Vue.js
Specifying templates

- Plain JS string:

```
template: "<strong>{{ message }}</strong>"
```

- Template literal (multiline string)

```
template: /* html */ `
    <strong>
        {{ message }}
     </strong>`
```

VSCode Extension: **`es6-string-html`** allows html syntax highlighting

- In the HTML template with id

```
<template id="my-component">
  <strong>
    {{ message }}
  </strong>
</template>
```

```
template: "#my-component"
```

Vue.js
Reactive

- Vue is **reactive**. If the data in JS changes, the DOM changes

```
<script>
    var app = Vue.createApp({
        // specify a template
        template: "<strong>{{ message }}</strong>",
        // the data used in this app
        data(){
            return {
                message: "Hello Vue!"
            }
        }
    });
    // mount the app on the element #app
    let vm = app.mount("#app");
</script>
```

- In the JS Console, we can change **`message`**

```
>>> vm.message = "Hello World!”
```

v-bind attributes

- **`{{ value }}`** only works for text content!
- To assign a data element to an html attribute use **`v-bind:`**

```
// template including bound attributes
template: /*html*/`
    <img width="100"
         v-bind:src='image'
         v-bind:alt='desc'
    >`,
data: function() {
  return {
    image: "images/logo.png",
    desc: "Vue logo”
  }
}
```

To bind **`attr`** use **`v-bind:attr`**.
No need for **`{{ }}`**.

v-on and methods

- Specify methods of our app (component):

```
data(){
    return { message: "Hello Vue!" }
},
methods: {
    toggleMessage: function(){
        if (this.message == "Hello Vue!")
            this.message = "Can I help you?";
        else this.message = "Hello Vue!";
    }
}
```

Access **message** in **data** as **this.message**

Can pass arguments here, e.g. **method(argument)**

- Add event handler to template **v-on:event="method"**

```
template: /*html*/`
    <div
      v-on:mouseover="toggleMessage"
      v-on:mouseout="toggleMessage"
    >{{ message }}</div>`,
```

or

```
template: /*html*/`
    <div
      v-on:mouseover="toggleMessage()"
      v-on:mouseout="toggleMessage()"
    >{{ message }}</div>`,
```

Exercise #1, #1b

github.com/dat310-2024/info/tree/master/
exercises/js/vue

Expressions and computed properties

- You can specify expressions within {{ }}

```
<div id=“app”>
   {{ has_error ? “Oups”: “OK” }}
</div>
```

  - or

```
<div id=“app”>
   {{ count + 2}}
</div>
```

- For complex expression use a computed property

```
template: "<p>{{ isEven ? 'even': 'odd' }}</p>",
computed: {
    isEven: function(){
        return (this.count%2 == 0);
    }
}
```

Methods vs computed properties

- Methods are used with **`v-on:event="method"`**
  - executed on events
- Computed properties:
  - Specified as function that return value:

```
computed: {
    isEven: function(){
        return (this.count%2 == 0);
    }
}
```

  - Use in template like element in data: **`{{ isEven }}`**
  - Function is executed and value is updated reactively, i.e. when data changes

Conditionals v-if, v-else

- Use **`v-if="condition"`** in the template
  - render only if **`condition`** is **`true`**
  - Can add element with **`v-else`**

```
template: /*html*/`
    <div v-if="easy" class="success">Have fun!</div>
    <div v-else class="error">Oh no!</div>`,
// the data used in this app
data(){
    return {
        easy: true
    }
}
```

Render lists: v-for

- Use **`v-for="item in array"`** in the template
  - Displays one element for each item in array

```
template: /*html*/`
    <ul>
        <li v-for="fruit in fruits">{{ fruit }}</li>
    </ul>`,
data(){
    return { fruits: ["apple", "pear", "banana", "orange"] }
}
```

  - Use **`v-for="item, index in array"`** to get both item and index

```
template: `
    <ul>
        <li v-for="(fruit, index) in fruits">#{{ index }} {{ fruit }}</li>
    </ul>`,
```

Render lists: v-for

- Use computed property to filter array

```
template: `
    <ul>
        <li v-for="fruit in shortFruits">{{ fruit }}</li>
    </ul>`,
data(){
    return { fruits: ["apple", "pear", "banana", "orange"] }
},
computed: {
    shortFruits: function(){
        return this.fruits
          .filter(function(value){return (value.length <= 4)})
    }
}
```

Exercise #2

github.com/dat310-2024/info/tree/master/
exercises/js/vue

Forms

- **`v-bind`** only creates a one way binding
  - i.e. changes in input below are not reflected in JS

```
<input id="name" v-bind:value="john.name"/>
```

- use **`v-model`** to create two way binding

```
<input type="text" id="nickname" v-model="john.nickname"/>
```

Checkbox

- the model belonging to a checkbox will be true or false

```
<input id="checkbox" v-model="john.happy"/>
```

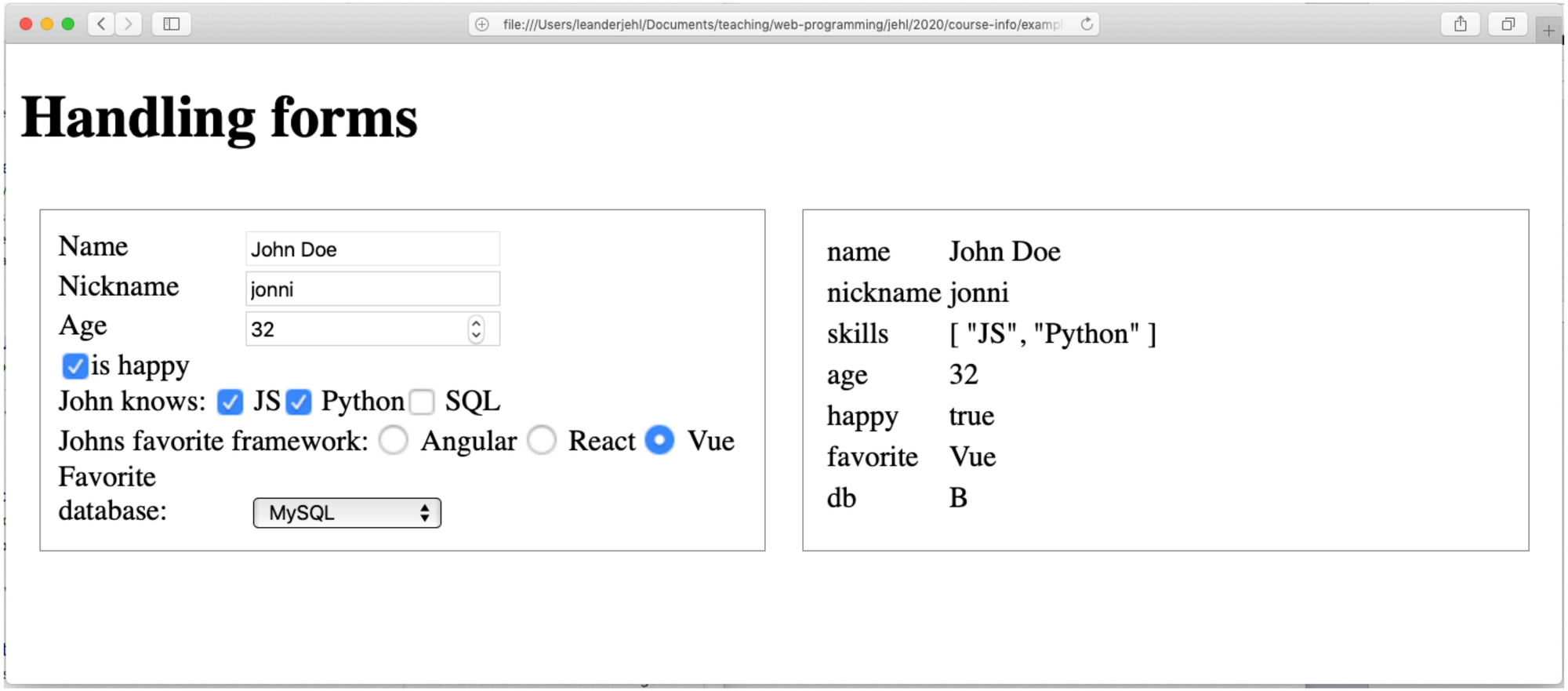
- multiple checkboxes with the same model result in an array

```
<input type="checkbox" value="CSS" v-model="skills"/>
<input type="checkbox" value="JS" v-model="skills"/>
<input type="checkbox" value="Python" v-model="skills"/>
```

```
data(){
    return { skills: [] }
}
```

Example #2

examples/js/vue/vue6_model/index.html



Other

- **`v-html`** allows to update **`innerHTML`**

```
template: "<span v-html='msg'></span>",
data: {
    msg: "<em>Hello Vue!</em>"
}
```

- **`v-show`** can be used like **`v-if`**, but toggles **`display: none;`**

```
template: `
    <div v-show="easy" class="success">Have fun!</div>
    <div v-show="!easy" class="error">Oh no!</div>`,
```

Exercise #3, #4

github.com/dat310-2024/info/tree/master/
exercises/js/vue