Accessible Webtechnology - Lesson 2

JavaScript and Vue.js, Accessibility, NVDA

FH University of Applied Sciences TECHNIKUM WIEN

Lesson 2 Overview

- JavaScript and Vue.js
- Accessibility
- NVDA

JavaScript and Vue.js

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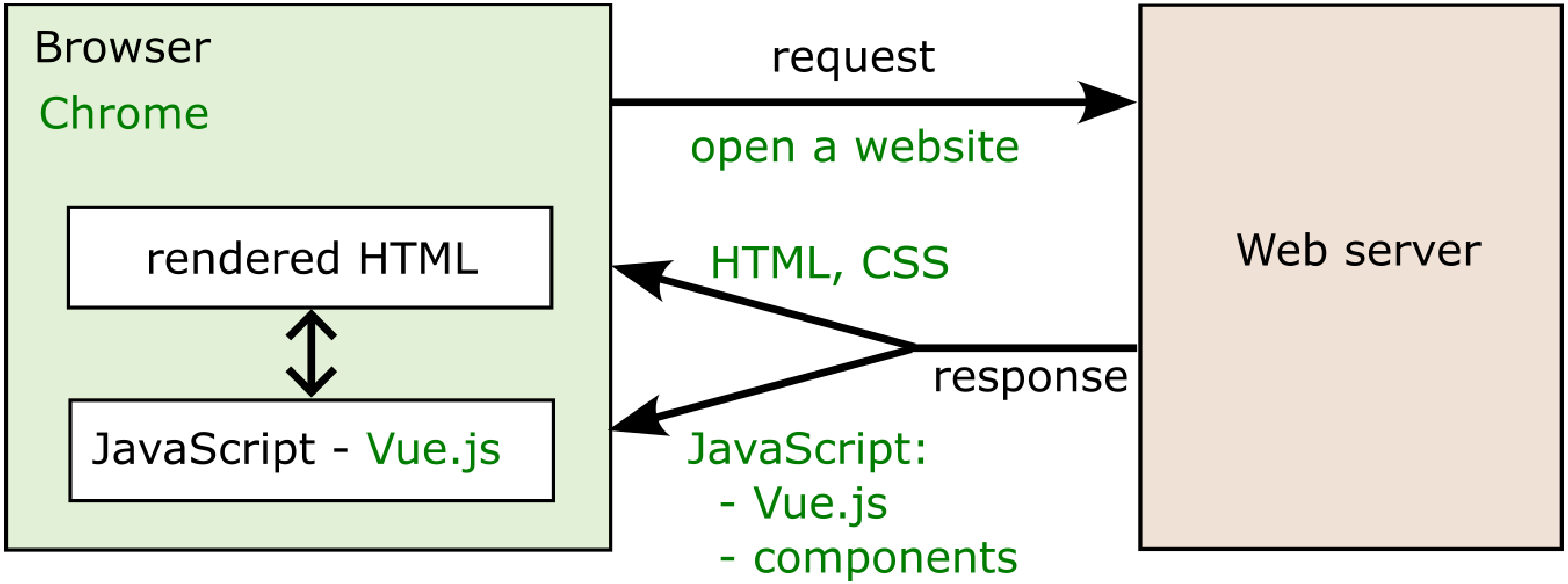
What is Vue.js?

- framework for building web applications
- can be used for **quickly building prototypes**
- is also used by **big websites and projects** (e.g. orf.at, GitLab)

- web applications are developed **component-based**
- Vue.js is basically a **JavaScript programm** running in the browser
- **dynamically renders HTML** based on defined components and user interaction

Single-Page Application (SPA) concept



Use of Vue.js for components

```
import Message from "./Message.js";

const htmlTemplate = /*html*/`
<ol>
   <li>
      <Message/>
   </li>
   <li>
      <Message/>
   </li>
</ol>
`


export default {
  template: htmlTemplate,
  components: { Message }
};
```

Vue.js actually replaces our `<Message/>` element with the HTML defined in the `Message.js` component.

Adding interactivity

Vue.js components (like our `Message`, `MessateList`, etc.) can made more interactive easily:

```
import Message from "./Message.js";

const htmlTemplate = /*html*/`
<ol>
   <li v-for="message of messages">
      <Message/>
   </li>
   <button @click="addMessage()">Add</button
</ol>
`

export default {
  template: htmlTemplate,
  components: { Message },
  data() {
   return {
      messages: ["Text 1", "Text 2", "Text 3"]
   }
  },
  methods: {
   addMessage() {
      this.messages.push("New Text");
   }
  }
};
```

HTML

↕ interacts with

JavaScript

Vue.js: data binding

Data binding: connects variables from JavaScript with HTML

Vue.js definition of some data for a component:

```
data() {
   return {
      messages: ["Text 1", "Text 2", "Text 3"]
   }
}
```

Usage of `messages` data within HTML template:

```
<div>First message:</div>
<div>{{ messages[0] }}</div>

<div>All messages:</div>
<div v-for="message of messages">{{ message }}</div>
<div v-if="messages.length === 0">No messages</div>
```

- data binding makes it **easy to render data to HTML**
- **curly braces** are used to access data, e.g. `{{ data }}`
- no curly braces needed for special functions (*directives*):
  - `v-for` : loop through arrays, e.g. `v-for="msg of messages"` , duplicates the HTML element for each array element
  - `v-if` : conditionally show something based on data

Vue.js: component methods

Component methods: provide logic to the component using JavaScript

Vue.js definition of a method in JavaScript:

```
methods: {
   addMessage() {
      this.messages.push("New Text");
   }
}
```

Usage of method `addMessage()` in HTML:

```
<ol>
   <li v-for="message of messages">
      <Message/>
   </li>
   <button @click="addMessage()">Add</button
</ol>
```

- `@click="addMessage()"` means that the method is called if the button is clicked
- the method accesses `this.messages` which is the `messages` array defined in the component
- the same `messages` array is also used in `<li v-for="message of messages">` to create list elements (`<li>`) for each message
- adding an element with `this.messages.push("New Text")` automatically adds it as new `<li>`
- **Result**: clicking the button adds a new message to the list

Vue.js basics: try for yourself

- open `lecture2/example_solution_basic` in VS Code
- start "Live Server" plugin
- examine `Demo 1: MessageList (basic)` and related code:
  - `MessageBasic.js`
  - `MessageListBasic.js`
- try to find solutions for the `TODO` comments in `MessageListBasic.js`

Vue.js: component properties

- we have this hierarchy of components: `Conversation -> MessageList -> Message`
- **properties** (or *props*) can be used to **pass data to other components**

Definition of props to receive in component:

```
// MessageList.js
export default {
  template: htmlTemplate,
  props: ["messages"] // MessageList receives prop "messages"
}
```

Usage of the component + prop in HTML:

```
<!-- e.g. in Conversation.js -->
<MessageList :messages="messagesData"/>
```

- `:messages="..."` is the syntax to pass a prop to a component
- `:messages="messagesData"` passes the local variable `messageData` from component `Conversation` to component `MessageList`

Vue.js props: try for yourself

- open `lecture2/example_solution_basic` in VS Code
- start "Live Server" plugin
- examine `Demo 2: Conversation (pass props)` and related code:
    - `Conversation.js`
    - `MessageList.js`
- try to find a solution for the `TODO` comment in `Conversation.js`

Saving data in JavaScript: localStorage

- full applications mostly need databases for saving user data (outside the scope of this lecture)
- we use a **browser-internal** storage called **localStorage**
  - data persists even if the browser is closed
  - no (easy) way to transfer data to another device (e.g. log in with the same user)
  - data is stored in **key / value pairs**

Example `lecture2/example_solution_basic` contains a file `dataService.js` :

```
import dataService from "../service/dataService.js";

// some constant to use as key for saving / retrieving data
const DATA_KEY = "DATA_KEY";

// save some data
dataService.save(DATA_KEY, "Hello");

// retrieve the data again
let data = dataService.get(DATA_KEY); // data now contains "Hello"
```

localStorage: try for yourself

- open `lecture2/example_solution_basic` in VS Code
- start "Live Server" plugin
- examine `Demo 3: Conversation (with save)` and related code:
    - `ConversationWithSave.js`
    - `views/SettingsView.js`
- try to find solution for the `TODO` comments in these files

> ℹ️ see `lecture2/example_solution_complete` for a more advanced example of the chat app, which can save chats for different contacts.

Accessibility

WCAG and the POUR principles

The **Web Content Accessibilty Guidelines (WCAG)** define these basic principles:

- **Perceivable** – users must be able to perceive information with their senses
    - e.g. alternative text of images, captions of videos, good document structure
- **Operable** – the website must be operable for all users
    - e.g. everything must be accessible via keyboard, without mouse
- **Understandable** – everybody should be able to understand the website
    - e.g. labels for inputs, language of the webpage, understandable error-handling
- **Robust** – it should be possible to use the webpage by all browsers and screen-readers
    - e.g. write valid HTML code complying with the current standards

Example for good accessibility

```html
<nav>
   <ul>
      <li><a href="news.html">News</a></li>
      <li><a href="register.html">Register</a></li>
      <li><a href="legal.html">Legal information</a></li>
   </ul>
</nav>

<main>
   <h1>Register</h1>

   <label for="name">Name</label>
   <input id="name" type="text">

   <label for="email">E-Mail</label>
   <input id="email" type="email">

   <h2>About registration</h2>
   <p> ... some text </p>
</main>
```

Example for good accessibility explained

- semantic tags for page regions help blind people to orientate, e.g. `<nav>` and `<main>`
- using tags like `<h1>`, `<ul>`, `<li>` help to categorize and understand the content
- using correct `for` and `id` attributes on connects `<label>` with `<input>` elements
    - adds meta information which label belongs to which input field

For accessibility it's very important to:

- provide data about the **structure of a document** and it's content
- information should **never** be available **only in a visual way** (e.g. font-size and color)

Screen Reader: NVDA

- Free screen reader for Windows
- Download: nvaccess.org
- also see *Self-Study - preparations* in Moodle for info about other screen readers on other platforms

NVDA: Basic Shortcuts

Action	Key
Read next element	`Arrow down [↓]`
Read previous element	`Arrow up [↑]`
Stop reading	`Ctrl`
Next heading	`H`
Next link	`K`
Next landmark (region)	`D`
Previous [heading / link / landmark]	`Shift + [H / K / D]`
Change to input mode	`NVDA + Space`
Change speak mode (turn on/off)	`NVDA + S` (2x)