Accessible Webtechnology - Lesson 1

Web development basics, HTML, Component-based development, Screen reader

FH University of Applied Sciences TECHNIKUM WIEN

Lesson 1 Overview

- Basics of Web Development
- HTML
- Component-Based Web Development
- Development with VS Code and Vue.js template

Basics of Web Development

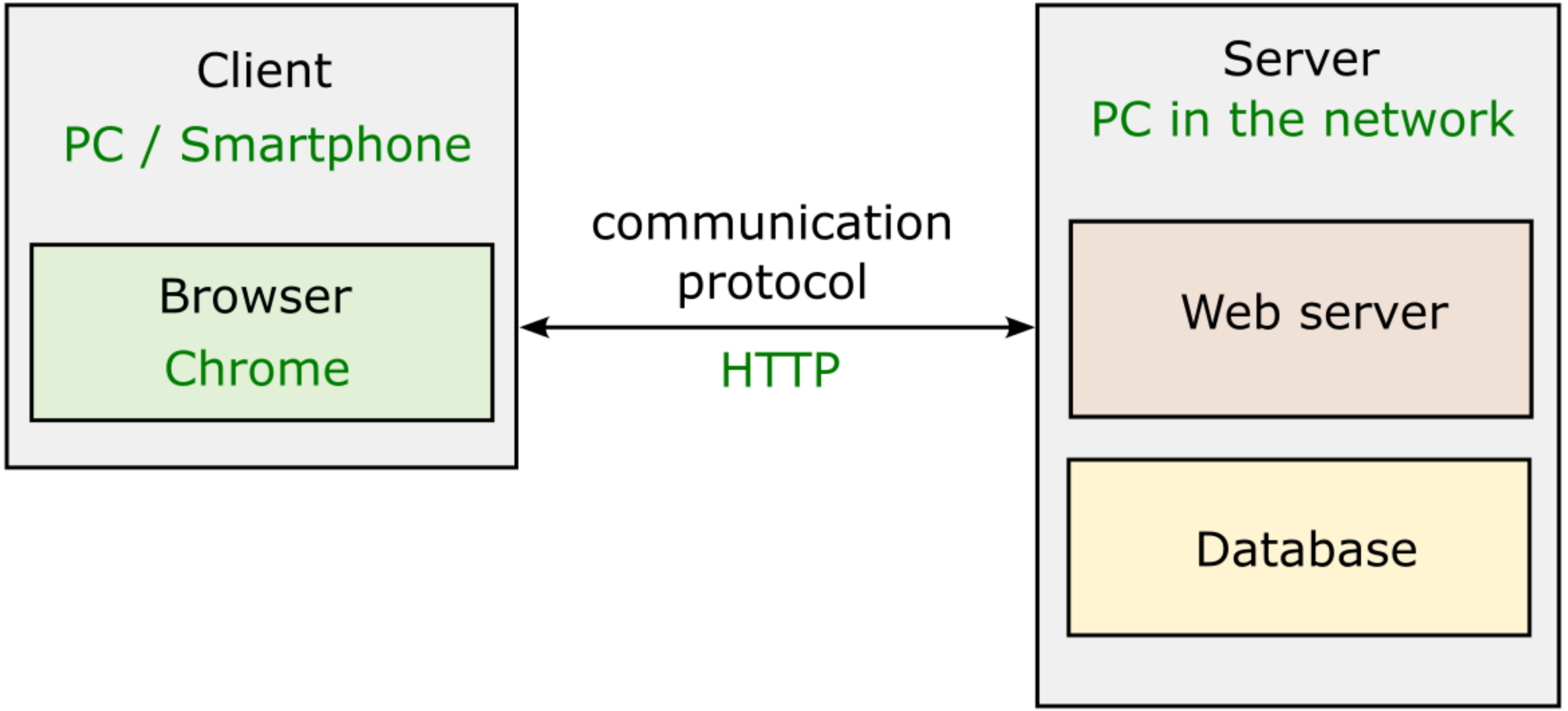
What is the World Wide Web?

- a worldwide **network of computers**
- **Clients**: Browsers or devices requesting content
- **Servers**: Host content and respond to requests
- **HTTP**: used communication protocol
- **HTML**: a markup language for structuring content

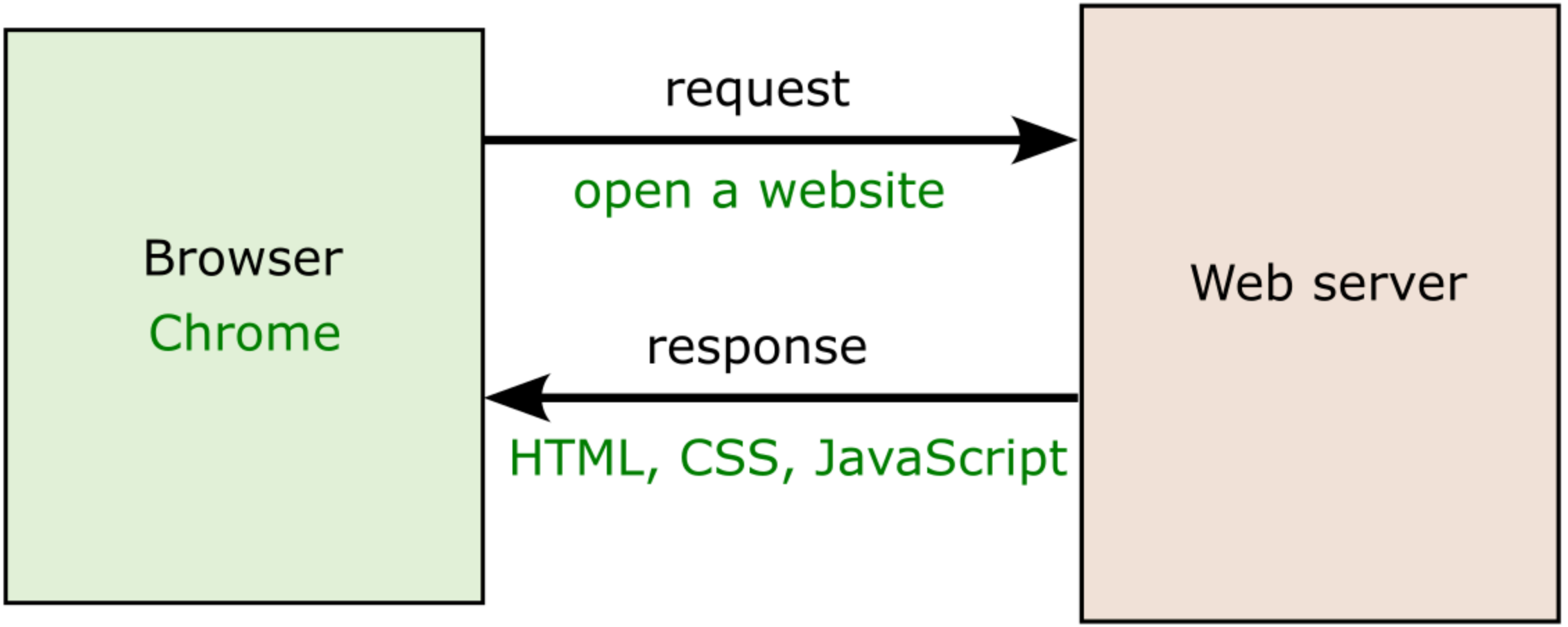
Request / Response Flow

```
Client → Server → Client
```

Interaction of client and server

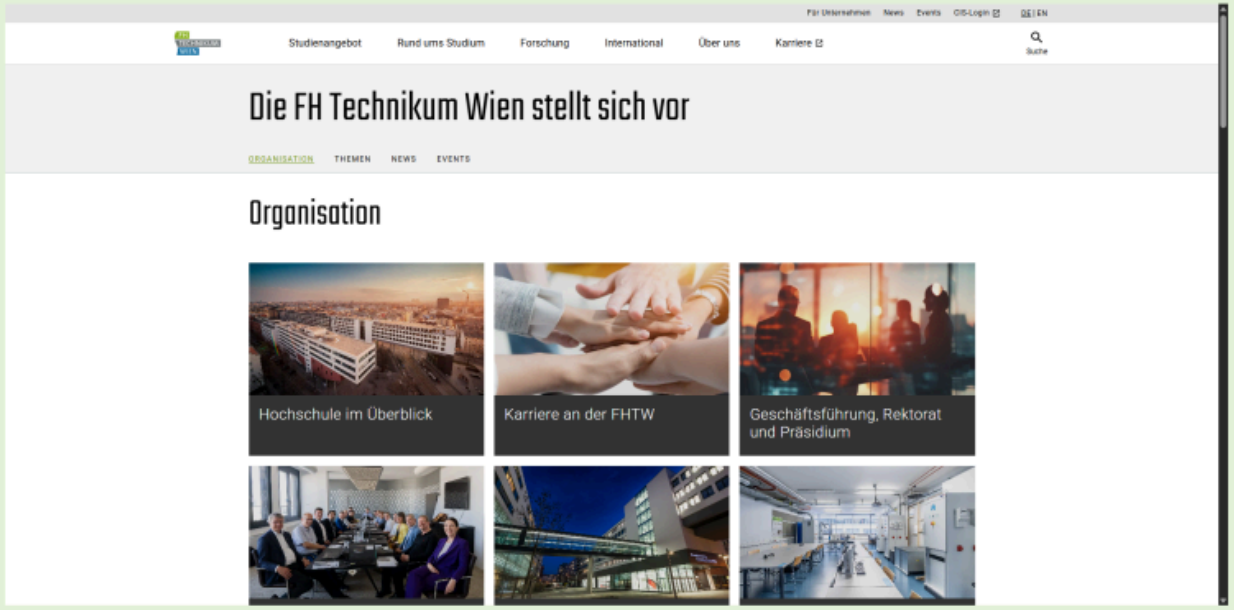


Request and response retrieving a webpage



Browser as rendering tool for webpage

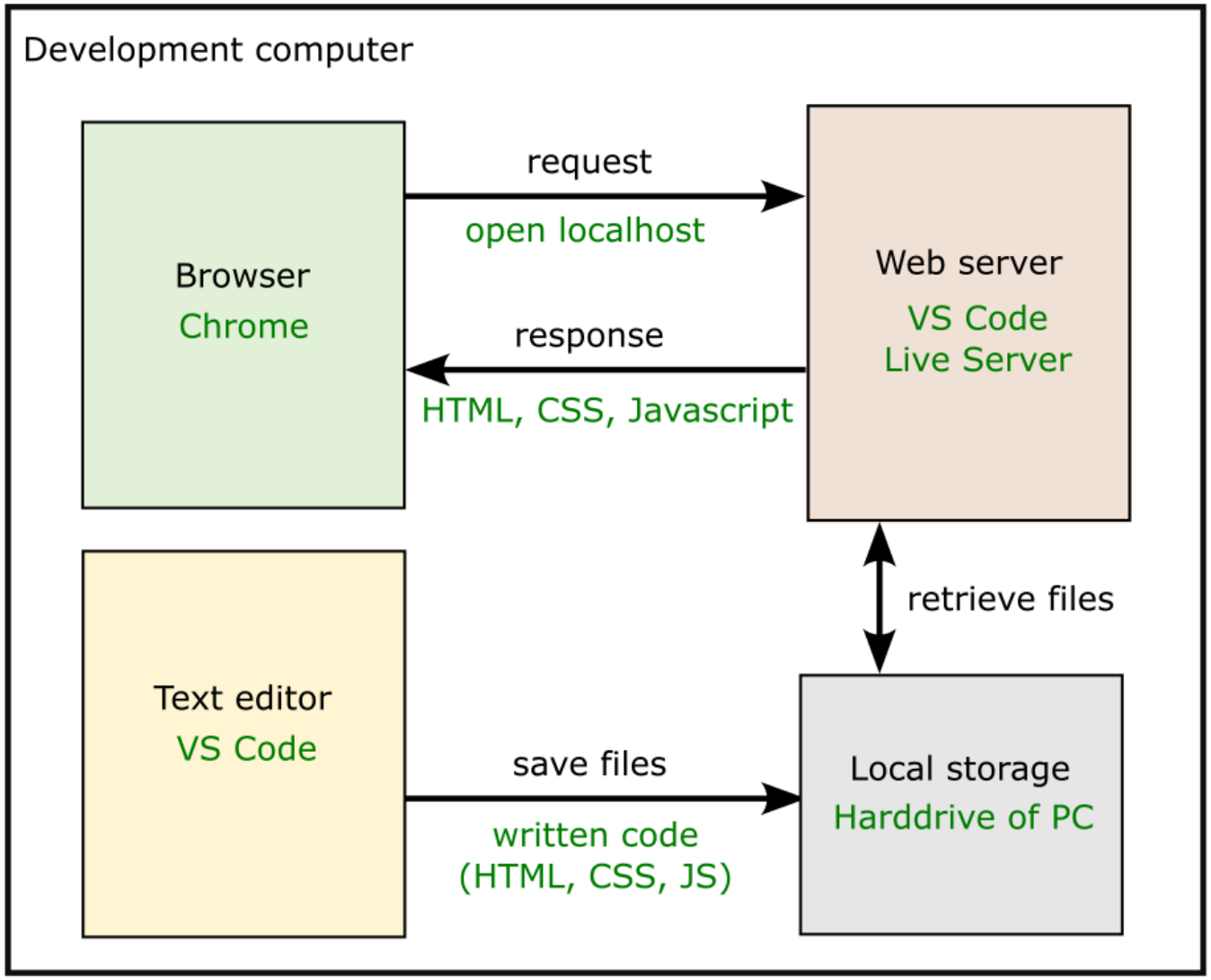
Browser renders webpage



request and receive text files

HTML, CSS, JavaScript

Local development of a web application



HTML basics

HTML is a **markup language** - a well defined system for structuring text and information.

- **Tags**: reserved keywords for defined elements
  - `<h1></h1>` are tags for a heading level 1
  - tags are like brackets, `<h1>` is an opening tag, `</h1>` a closing tag
- **Content**:
  - many tags can have an **element content**
  - in `<h1>Heading</h1>` the text `Heading` is the content
- **Attributes**: tags can have additional information
  - `<img src="image.png" alt="Image description">`
  - `src` is the attribute sof defining the image source
  - `alt` is a text describing the image

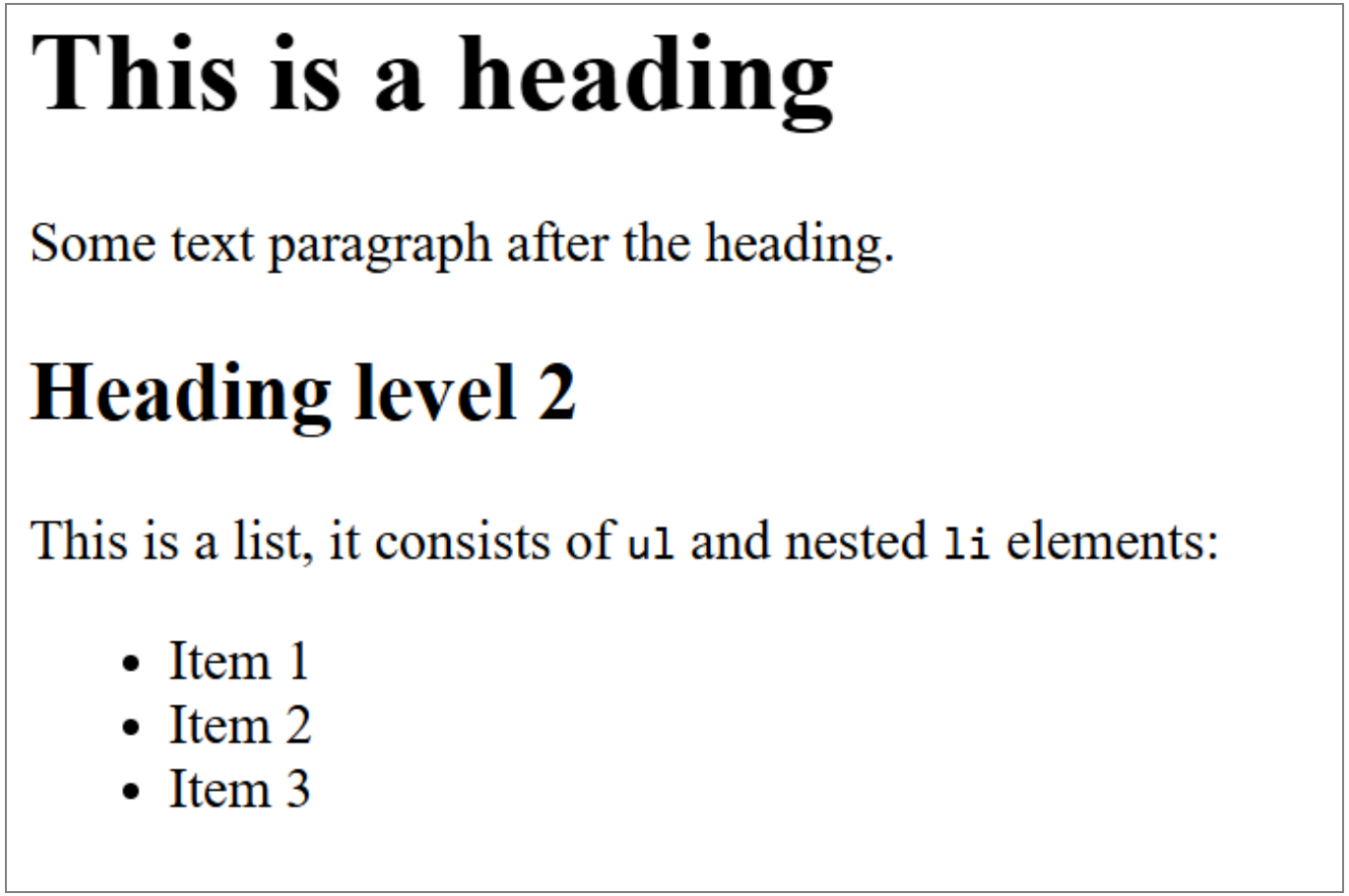
HTML example

Simple example of some HTML markup:

```
<h1>This is a heading</h1>
<p>Some text paragraph after the heading.</p>

<h2>Heading level 2</h2>
This is a list, it consists of <code>ul</code> and nested <code>li</code> elements:
<ul>
  <li>Item 1</li>
  <li>Item 2</li>
  <li>Item 3</li>
</ul>
```

HTML example - rendered in browser



HTML – Content Elements

There are many elements for actual content of a website:

- `<h1>`, `<h2>`, `<h3>` etc. – Headings
- `<p>` – Text paragraph
- `<a>` – Link ("**a**nchor")
- `<img>` – Image
- `<ul>`, `<ol>` - Lists (**u**nordered, **o**rdered)
- `<strong>`, `<em>` – Emphasis
- … and many more

HTML – Semantic Regions

HTML elements should be used to define important areas of a page:

- `<header>` – Top section
- `<nav>` – Navigation menu
- `<main>` – Main content
- `<footer>` – Bottom info
- `<article>`, `<section>` – Structured content

> ℹ️ Semantic regions are **important for accessibility**! It gives non-visual users orientation on the webpage.

HTML – generic containers

- `<div>` – Block-level container
- `<span>` – Inline container

> ⚠️ **Attention**: Use with care – prefer semantic tags when possible

Try HTML for yourself

Use the online editor of **stackblitz.com** in order to try basic HTML for yourself:

t1p.de/aw-01a

> ℹ️ **Info**: You can also open `lecture_1/lecture_examples/1_html/index.html` in VS Code and use the "Live Server" plugin for showing it in the browser (see *Self-study - preparations*).

CSS basics

Cascading Style Sheets (CSS) are used for **visual styling** of HTML documents.

Example of a **CSS rule**:

```
h1 {
  background-color: yellow;
}
```

- `h1` is a **selector**, it selects to which elements the style should apply (all h1 tags)
- `background-color: yellow` is a **declaration** which defines how the selected elements should look like.
- more details in **Lecture 3**

JavaScript basics

JavaScript is a **programming language** which can be used to **add interactivity** to a webpage.

Example of a code snippet in JavaScript:

```
let fruits = ['Apple', 'Banana', 'Lemon'];
for (let fruit of fruits) {
  document.body.innerHTML += `<div>${fruit}</div>`;
}
```

This Javascript code appends a new `<div>` element for each element of an array at the end of the webpage.

More details in **Lecture 2**.

Overview of HTML, CSS, JavaScript

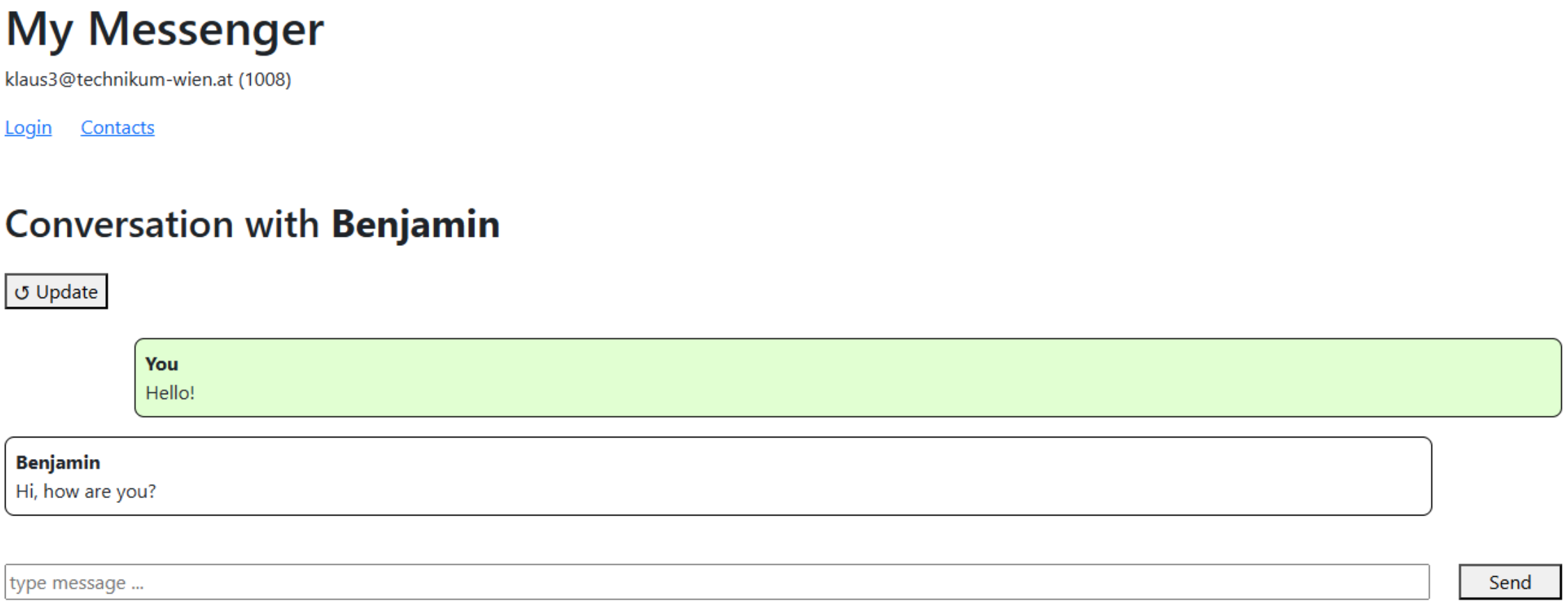
Technology	Purpose
HTML	Structure and page content
CSS	Visual appearance
JavaScript	Interactivity

Component-Based Web Development

What is component-based web development?

- Split user interface (UI) into reusable **components**
- Improves:
  - Maintainability
  - Readability
  - Scalability
- Used in frameworks
  - **framework**: standard foundation for building software
  - examples for common web frameworks: **React, Vue.js, Angular**

Example messenger app



Components of example messenger app

Properties of components

Components ...

- can **contain other components**
  - e.g. `MessageList` contains `Message` components
- can be **reused at several multiple places** within an app
  - e.g. `MessageList` component used in real conversation view and in settings for defining the style of a conversation.
- can **contain HTML, CSS and JavaScript**
  - each component has its own content, style and logic
- are normally defined in separate files, e.g. `MessageList` is defined in `MessageList.js`

Define your components

Let's explore **components in practice**:

- **choose a view** (page) of your UI mockup (from course *UX Aspects*)
- **choose a part** where you think it could be implemented as a component
  - your part should have at least **one sub-component**
  - e.g. `MessageList` with sub-components of type `Message`
- give your components **clear, descriptive names**
- sketch a **simple mockup of your components on paper**

Translate your components to HTML

Now let's think of the **HTML structure** in your components:

- take the **leaf component** (lowest level component), e.g. `Message`
- think about **fitting HTML elements** for this component, e.g. `<div>`, `<strong>`, `<p>`
- create a **HTML block representing your component**, e.g.:

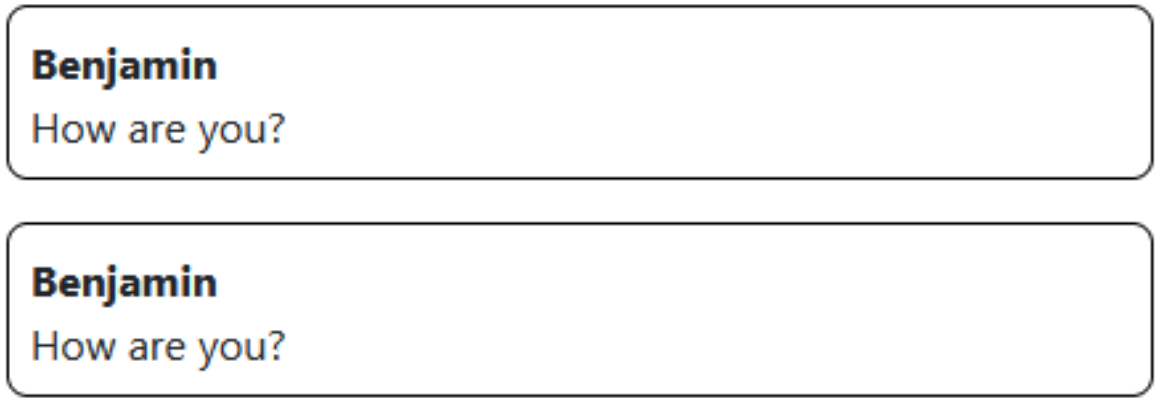

```html
<!-- component "Message" -->
<div>
   <strong>Benjamin</strong>
   <p>Hi, how are you?</p>
</div>
```

For now:

- use **pen and paper** or **any text editor**
- only **focus on content** (no styling via CSS)

Translate your components to HTML (2)

- **go up the hierarchy** to the next component, e.g. `MessageList`
- **translate the component to HTML** and use **new HTML tags for your existing components**:




```
<!-- component "MessageList" -->
<ol>
   <li>
      <Message/>
   </li>
   <li>
      <Message/>
   </li>
</ol>
```

Translate your components to HTML (3)

- **go up the hierarchy** to the next component, e.g. `Conversation`
- **translate the component to HTML** and use **new HTML tags for your existing components**:


```html
<!-- component "Conversation" -->
<h2>Conversation with Benjamin</h2>
<button>↺ Update</button>
<MessageList/>
<input type="text" placeholder="type message...">
<button>Send</button>
```

Critical AI usage

Better **think for yourself** instead of trusting some AI tool:

- you'll learn more
- AI tools often fail to solve tasks which are not "standard tasks"
- our quite simple approach of defining HTML-components (without relation to a specific framework) seems to confuse AI

See this conversation with ChatGPT as an example how AI fails to solve the task we've done within the last slides.

> ⚠️ **Warning**: relying on AI to solve your tasks may seem efficient at first, but often ends up being more tedious than doing everything yourself.

How to use AI

Tips for good use of AI:

- **ask for specific explanations** instead of general solutions
  - e.g. `When should I use a HTML div element and when a span?`
- let it **solve small portions of your task**
  - e.g.
    ```
    Give me some HTML which could represent a simple message bubble including a sender name and the message content
    ```
- **question AI's answers** and let it explain further
  - e.g. `Why did you use only divs and not other more specific HTML elements?`
- **ask for alternatives**
  - e.g. `Could I replace the divs with other HTML elements?`

Development with VS Code and Vue.js template

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What is Visual Studio Code (VS Code)?

- open source code editor from Microsoft
- helps with writing source code (e.g. HTML, CSS, JavaScript)

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 application template

> ℹ️ See steps in Moodle how to get and run the template (*Self-study - preparations*).

Contents of the template (`lecture_1/example_solution`):

- `components` : folder for components (e.g. Message, MessageList, ...)
- `views` : folder for views of the app (see next slide)
- `App.js` : component representing your whole app - outer wrapper of all views and components
- `router.js` : file defining which view should be shown for which URL
  - e.g. *http://127.0.0.1:5500/my-chat-app/#**/users*** shows `UsersView` component
- `index.html` : actual HTML file which is rendered by your browser
  - Vue.js framework does some magic to render your components 🪄
  - details not important for now

Views in web applications

A **view** of a web application is a component that **represents a whole page**.

Our messenger app example could have the following views:

- **Login**: login screen
- **Contacts**: a page showing all contacts
- **Conversation**: a page showing a single conversation
- **Settings**: a page for settings

Views are:

- normally **listed in the page navigation**
- sometimes **not listed in navigation** - e.g. "Conversation" view is only opened if a contact in "Contacts" is selected

Implement your components in the template

- look at your **components** and **HTML snippets** from before (slides *Define your components* ff.)
- again start with the **leaf component** (lowest level component), e.g. `Message`
- duplicate an existing component from folder `components` and name it like your component, e.g. `Message.js`
- put your HTML in a file named like your component to folder `components` , e.g. `Message.js`
- insert your HTML to the variable `htmlTemplate` like this:

```
const htmlTemplate = /*html*/`
<div>
   <strong>Benjamin</strong>
   <p>Hi, how are you?</p>
</div>`
```

> ℹ️ In fact we're adding the HTML to a JavaScript variable, which is then used by Vue.js, but we don't have do understand the details for now.

Implement your components in the template (2)

- **go up the hierarchy** to the next component, e.g. `MessageList`
- create a new component in folder `components` and name it like your component, e.g. `MessageList.js`
- in `MessageList.js` again insert your HTML to the variable `htmlTemplate`

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

> ℹ️ **Note**: we're using the `<Message/>` component, although it's not a real HTML element. We need to import it to our file,

Implement your components in the template (3)

For using your own components within other components (e.g. `<Message>` within `MessageList.js`), we have to import it:

1. **import the component file** at the (top of the file):

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

2. **tell Vue.js to use this component** in the template (bottom of the file):

```
export default {
  template: htmlTemplate,
  components: { Message } // <- this line makes it possible to use <Message/> in the template
};
```

Routing

- `App.js` contains the **basic overall structure** of your app
  - a `<header>` area with a navigation (`<nav>`) including links to your different views (pages)
  - a `<main>` area including the special element `<router-view>`
- the element `<router-view>` is a **placeholder for your views**
  - it depends on the **current navigation** which view is rendered there
  - the **navigation is linked to the current URL** (see browser's address bar)
    - e.g. part `/users` in *http://127.0.0.1:5500/my-chat-app/#**/users***

Routing (2)

The file `router.js` defines a mapping between URLs and views like this:

```
import UsersView from './views/UsersView.js';

const routes = [
  { path: '/users', component: UsersView }
];
```

ℹ️ this mapping means that for URL path `/users` the component `UsersView` will be shown in `<router-view>`

You can **create a link** somewhere in the app which navigates to a view:

```
<router-link to="/users">Users</router-link>
```

Views and components as shown in the browser