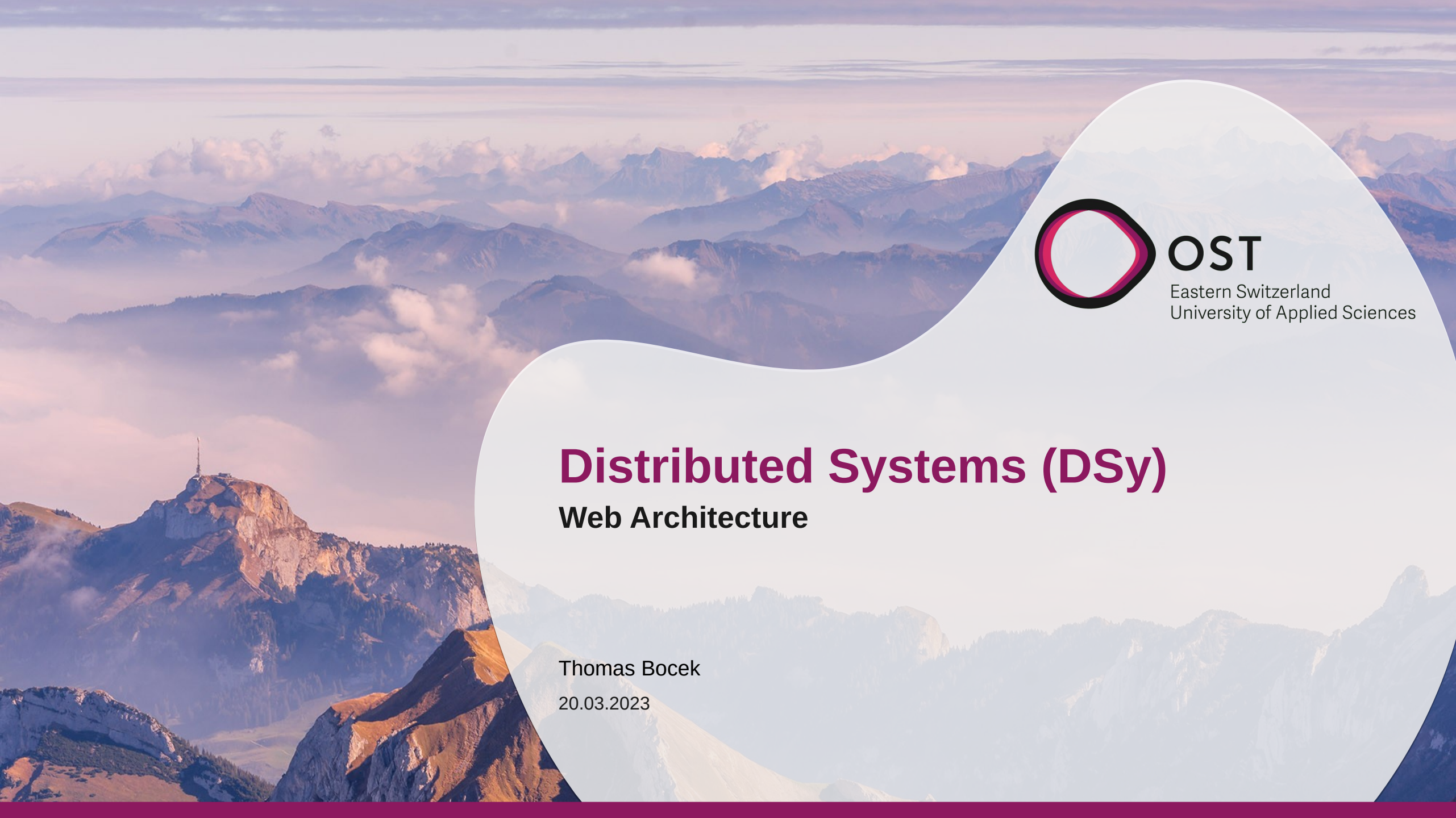


OST
Eastern Switzerland
University of Applied Sciences

Distributed Systems (DSy)

Web Architecture

Thomas Bocek

20.03.2023

Learning Goals

- Lecture 5
  - What are the options to build my challenge task?
  - What is currently “state-of-the-art”?

Server-Side Rendering

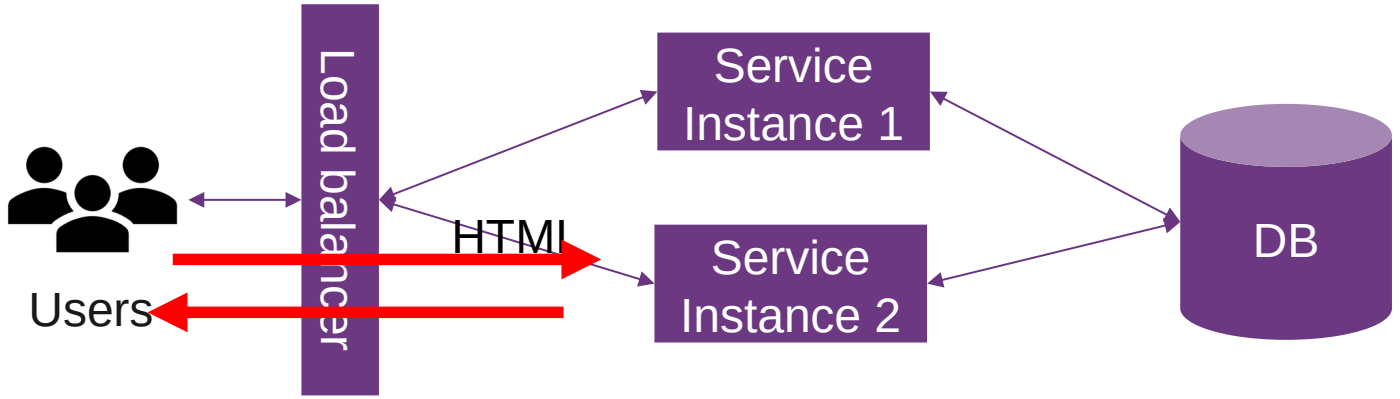
- “Classic” approach - “SSR”
- Not to be confused with static site rendering and (SSR)
- Server generates HTML/JS/CSS dynamically, sends the assets in real-time to the browser
  - User request: browser sends a request to the web server (server-side routing)
  - Server processing: server processes request by running server-side code (e.g., C#, Java, …),
    - Fetch required data from a database or other sources
    - Server-side code can use template engines to render the HTML - reusability
  - Response: Generate the appropriate HTML, CSS, and JavaScript for the requested page.
  - Browser rendering: browser receives response and renders page
- Big advantage: SEO, but needs rendering for every request (caching!)
- Static site rendering: pre-render HTML/CSS/JS since its the same for every user. Done only once, resp, if the content changes.
  - dsl.i.ost.ch → markdown to HTML
  - Can also include DB access

Single Page Application SPA / CSR

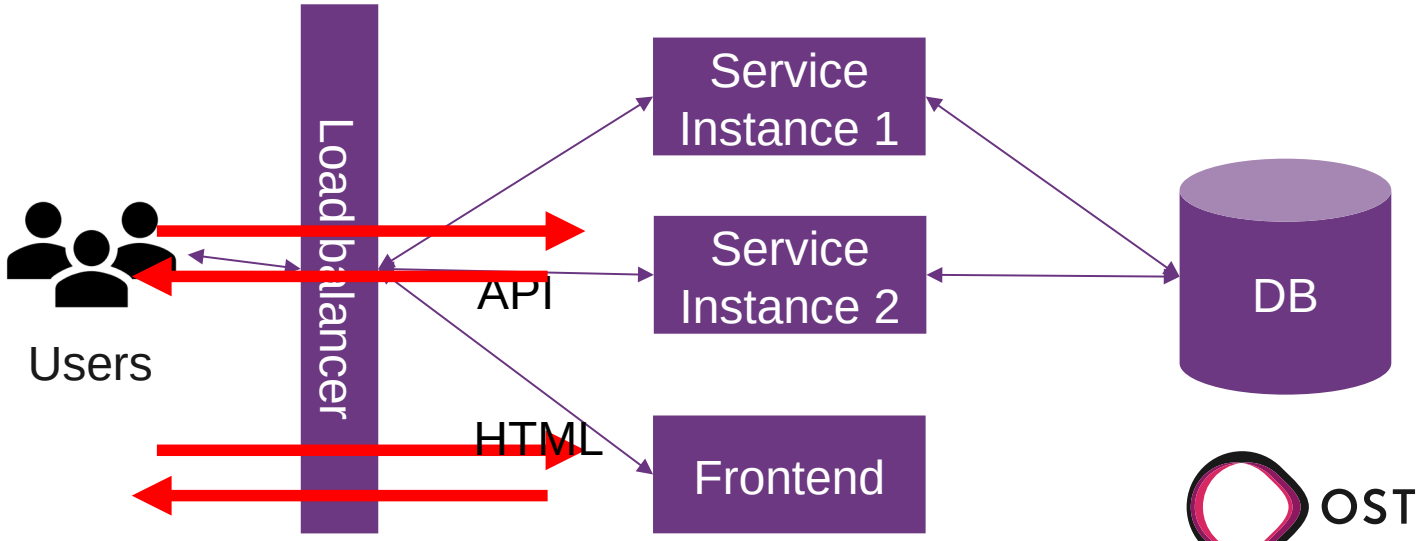
- Interactions occur within a single web page
- Client page dynamically updates as the user interacts with it, providing a smooth, app-like experience
- Relies on JavaScript to update UI
  - Initial request: browser sends a request to web server, hosting the HTML/JS
  - Initial response: server returns a single HTML file with CSS/JavaScript. JavaScript files contain the application's logic
  - Browser rendering: shows HTML file, typically a spinner, then executes JavaScript
  - User interactions: JavaScript manages the UI updates. Application does not require full page reloads.
  - API communication: When the SPA needs to fetch or send data, communicates through APIs
  - Client-side routing: SPAs for navigation
- Use a framework: React, Angular, Vue
- Feels more app like
- The backend serves API requests only
- SEO only works if JavaScript is executed at the SE.

Architecture

- Server side rendering (SSR)



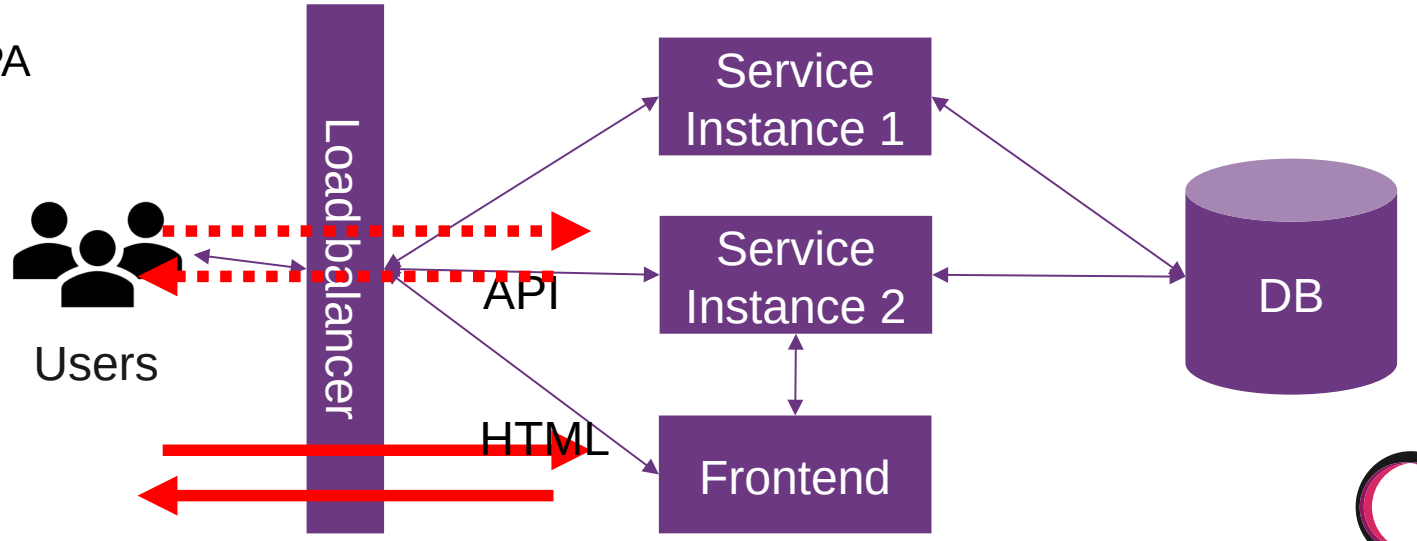
- Single page application (SPA), client side rending (CSR)



OST

Web Architectures

- SPA: CORS - Cross-Origin Resource Sharing
  - HTTP-header based mechanism to indicate other origins (domain, scheme, or port) from which a browser can load assets.
- “State-of-the-art”: hydration
  - Initial HTML not with a “spinner”, but already the first content in HTML, like SSR (e.g., next.js server renders it for you - JavaScript)
  - Further access, with API, like SPA
  - Combine SSR/SPA
  - Flatfeestack: pre-SSR/SPA
    - Every user sees the same page, SSR can be pre-hydrated
- 17.03.2023: New React docs pretend SPAs don't exist anymore [link]
  - “The strongly recommended way to start a new React project is to use a framework such as Next.js, while the traditional route of using bundlers like Vite or CRA is fairly strongly discouraged.”



Examples

- Static site rendering: dsl.i.ost.ch
  - Componets: nginx
  - Java daemon who reacts on file changes in a director. If markdown file changes → create HTML, copy it to nginx directory
- Server side rendering (e.g., handlebarsjs)
  - Simple example: ssr.go (no template)
  - Components: go-based server
- SPA
  - Components: node server, go server
- Hydration
  - Best of both worlds, but adds complexity, needs JavaScript in the backend
  - E.g., react: hydrate() instead of render() method – choices... source