Micro-frontends Architecture with Nx and Angular

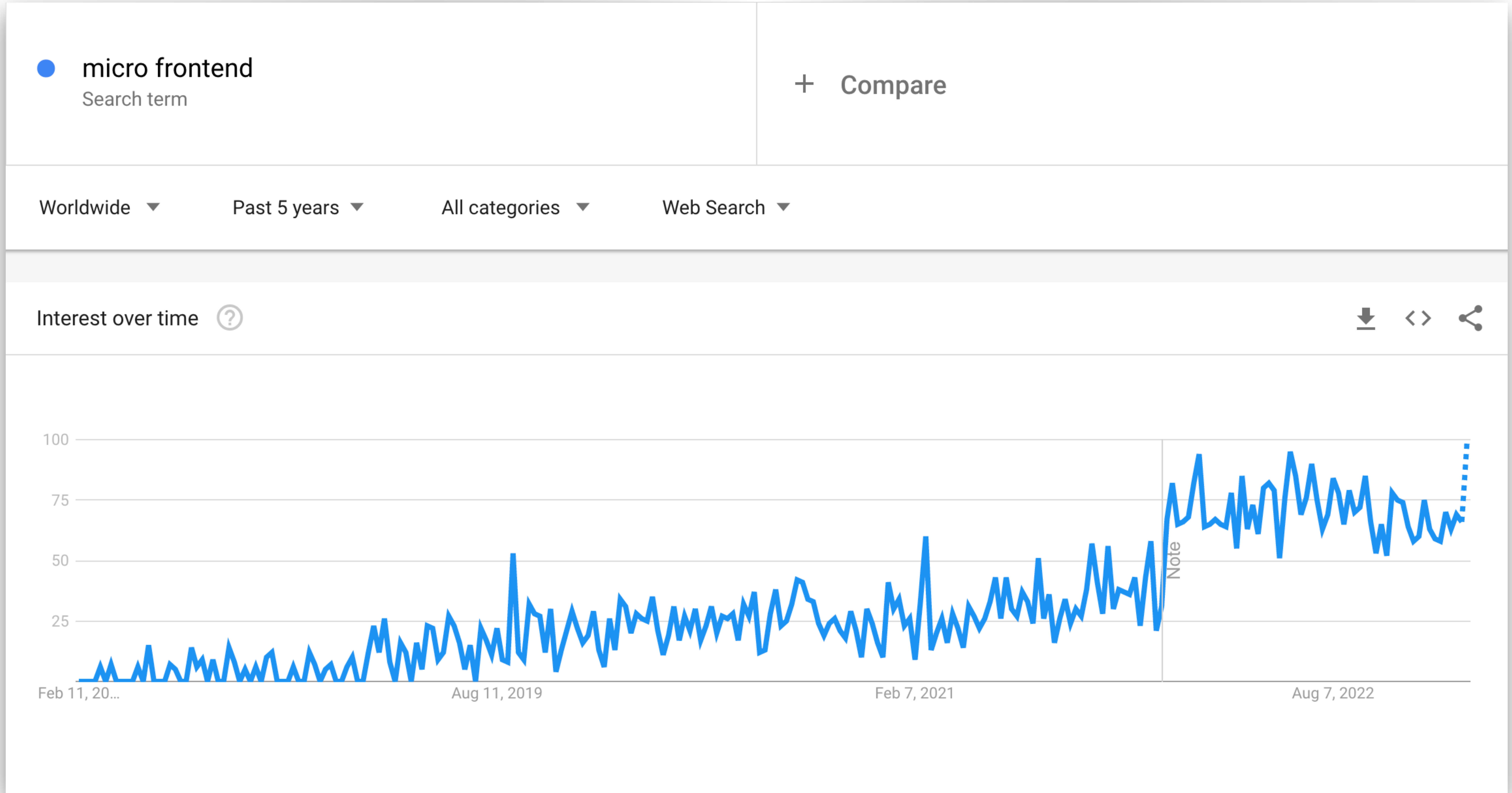
Filip Voska
JavaScript Team Lead

Filip Voska

TEAM LEAD
JAVASCRIPT

01

The journey and the buzz-word

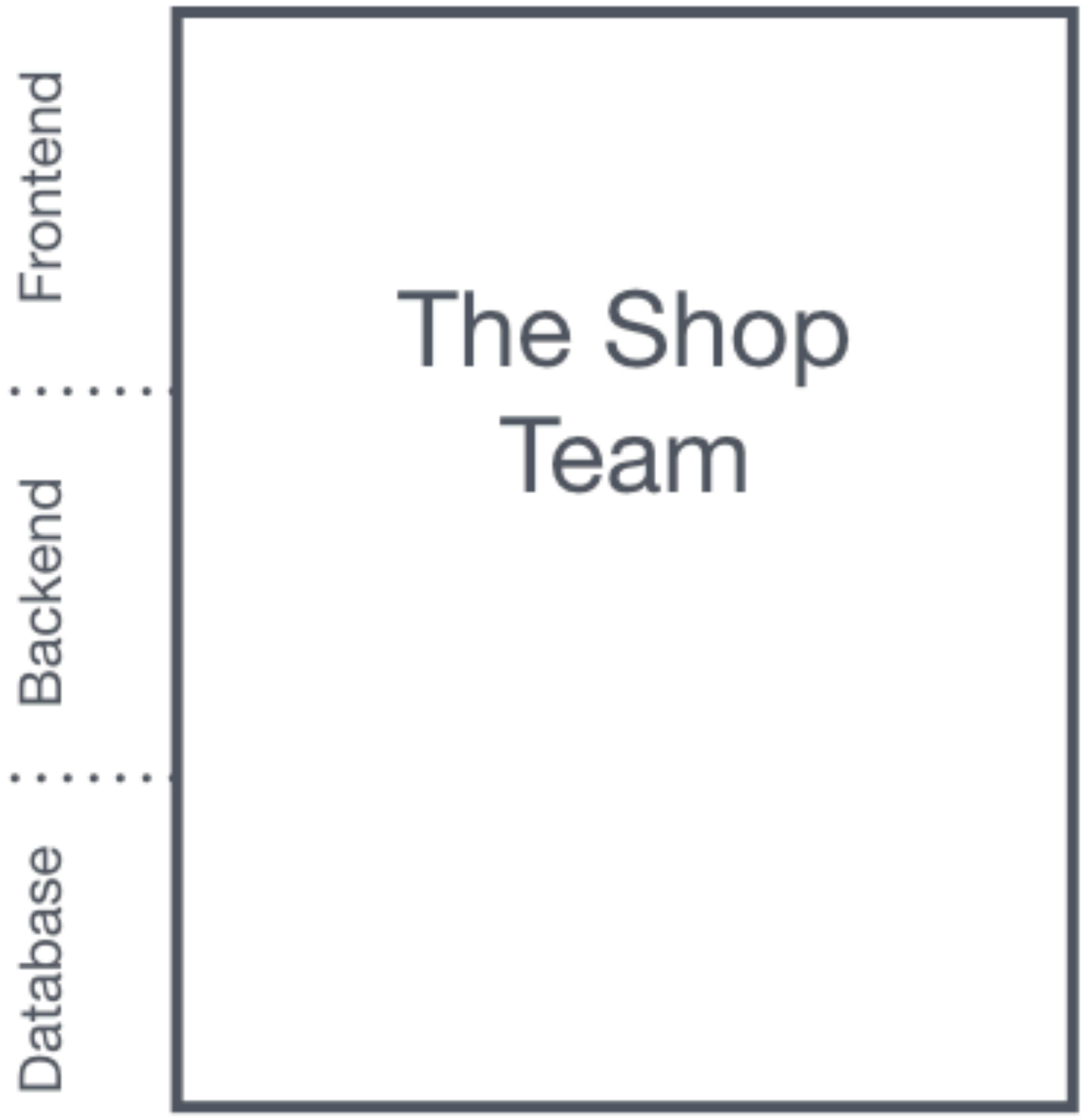


● micro frontend
Search term

Worldwide ▾ Past 5 years ▾ All categories ▾ Web Search ▾

Interest over time

The Monolith



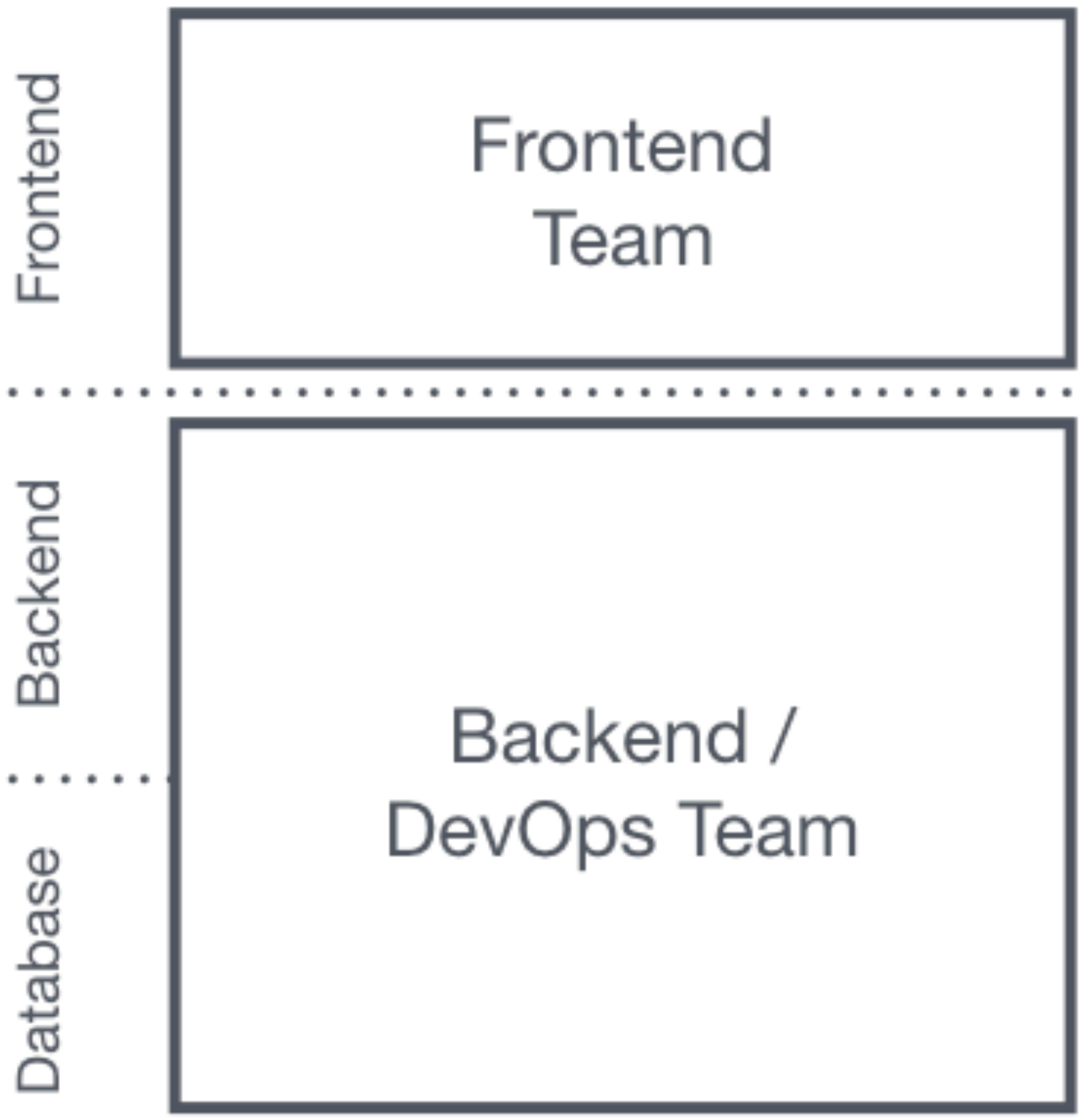
Frontend

Backend

Database

The Shop Team

Front & Back



Frontend

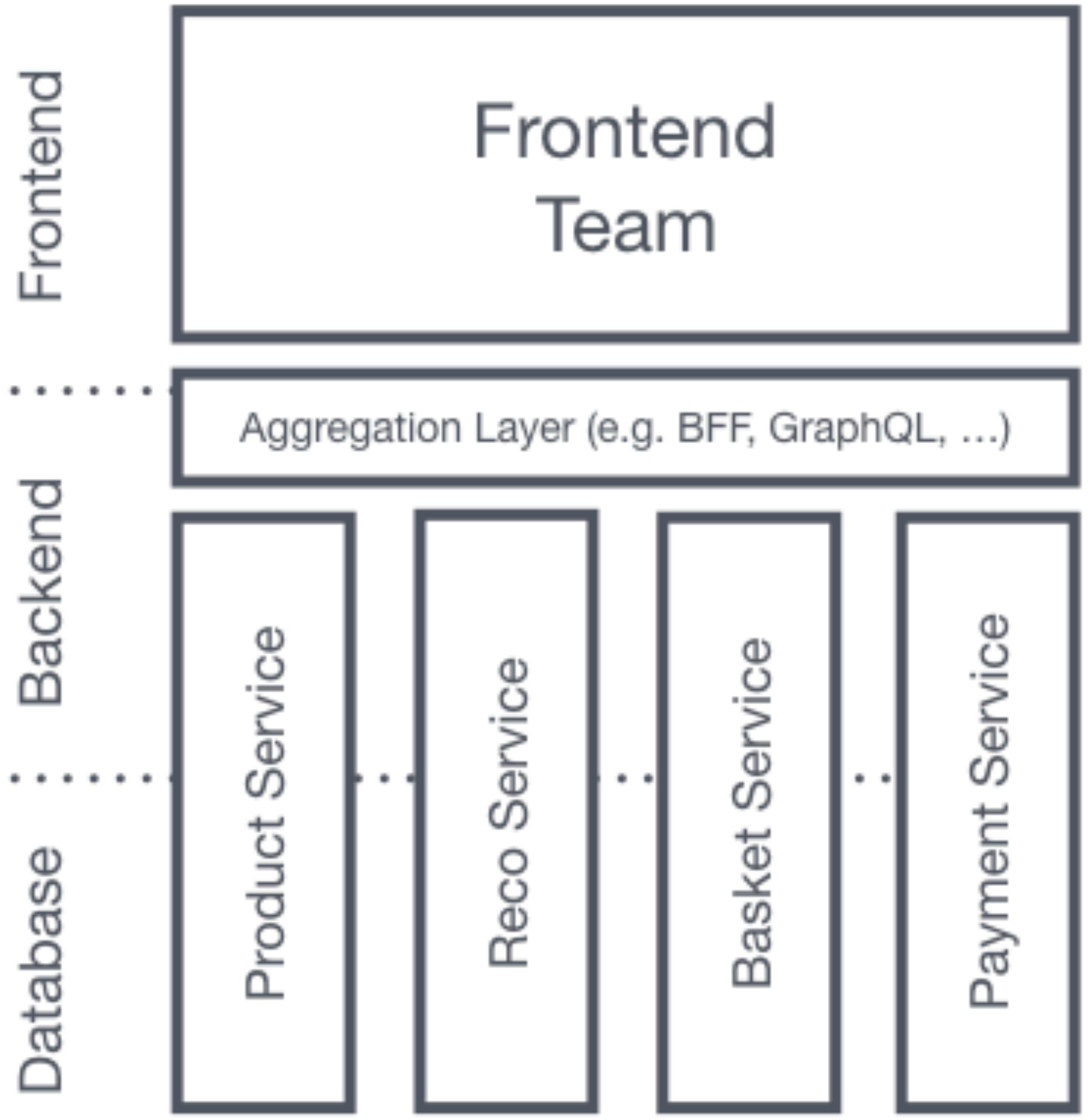
Backend

Database

Frontend Team

Backend / DevOps Team

Microservices



Frontend

Backend

Database

Frontend Team

Aggregation Layer (e.g. BFF, GraphQL, ...)

Product Service

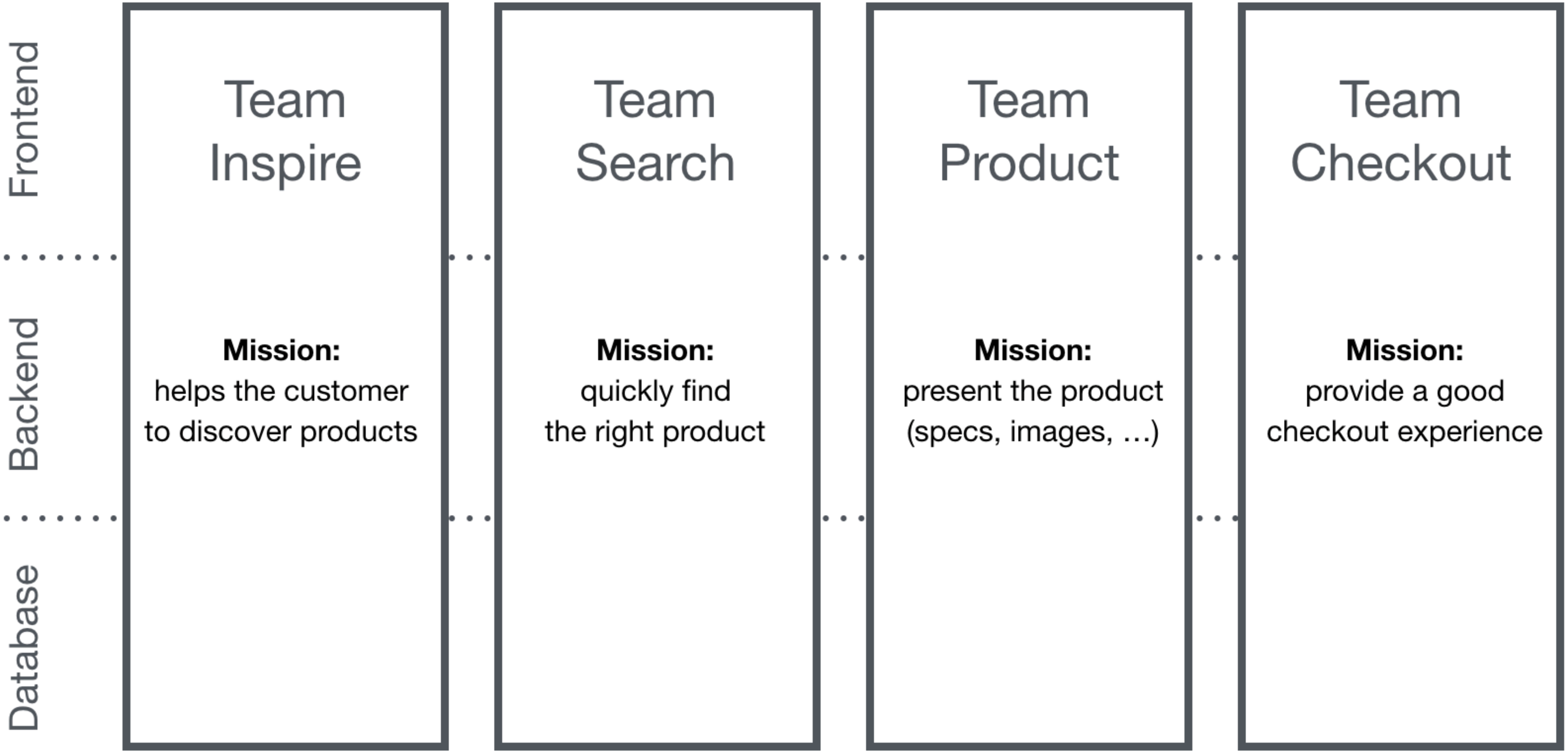
Reco Service

Basket Service

Payment Service

Source: https://micro-frontends.org/

End-to-End Teams with Micro Frontends



Team Inspire

Mission: helps the customer to discover products

Team Search

Mission: quickly find the right product

Team Product

Mission: present the product (specs, images, …)

Team Checkout

Mission: provide a good checkout experience

Source: https://micro-frontends.org/

02 Goals

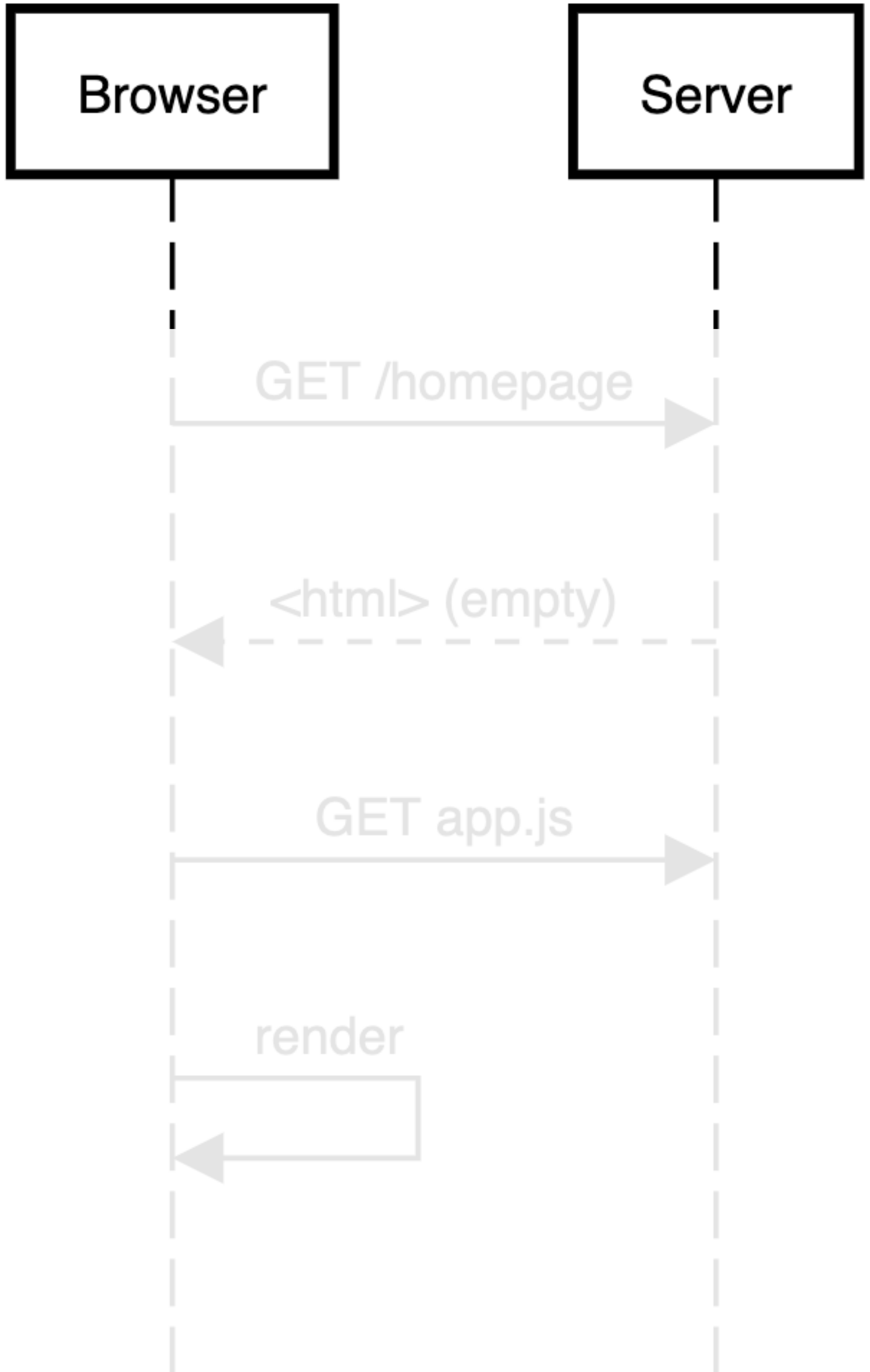
Goals

- Be framework-agnostic
- Independent teams
- Share code and state
- Share coding standards
- Be more resilient
- Follow DDD
- Set clear boundaries
- Faster build times
- Independent deployments

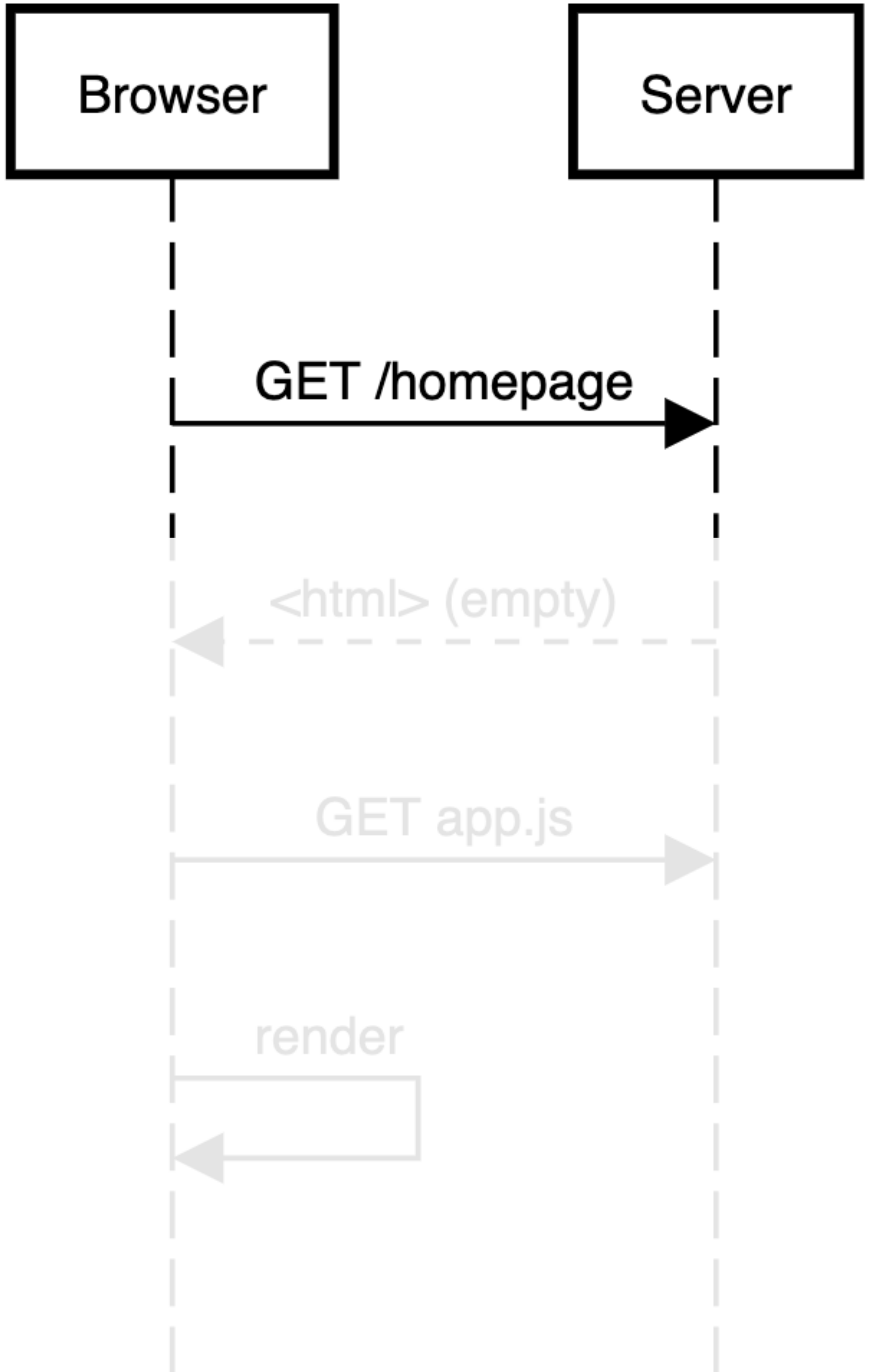
03

How we serve apps

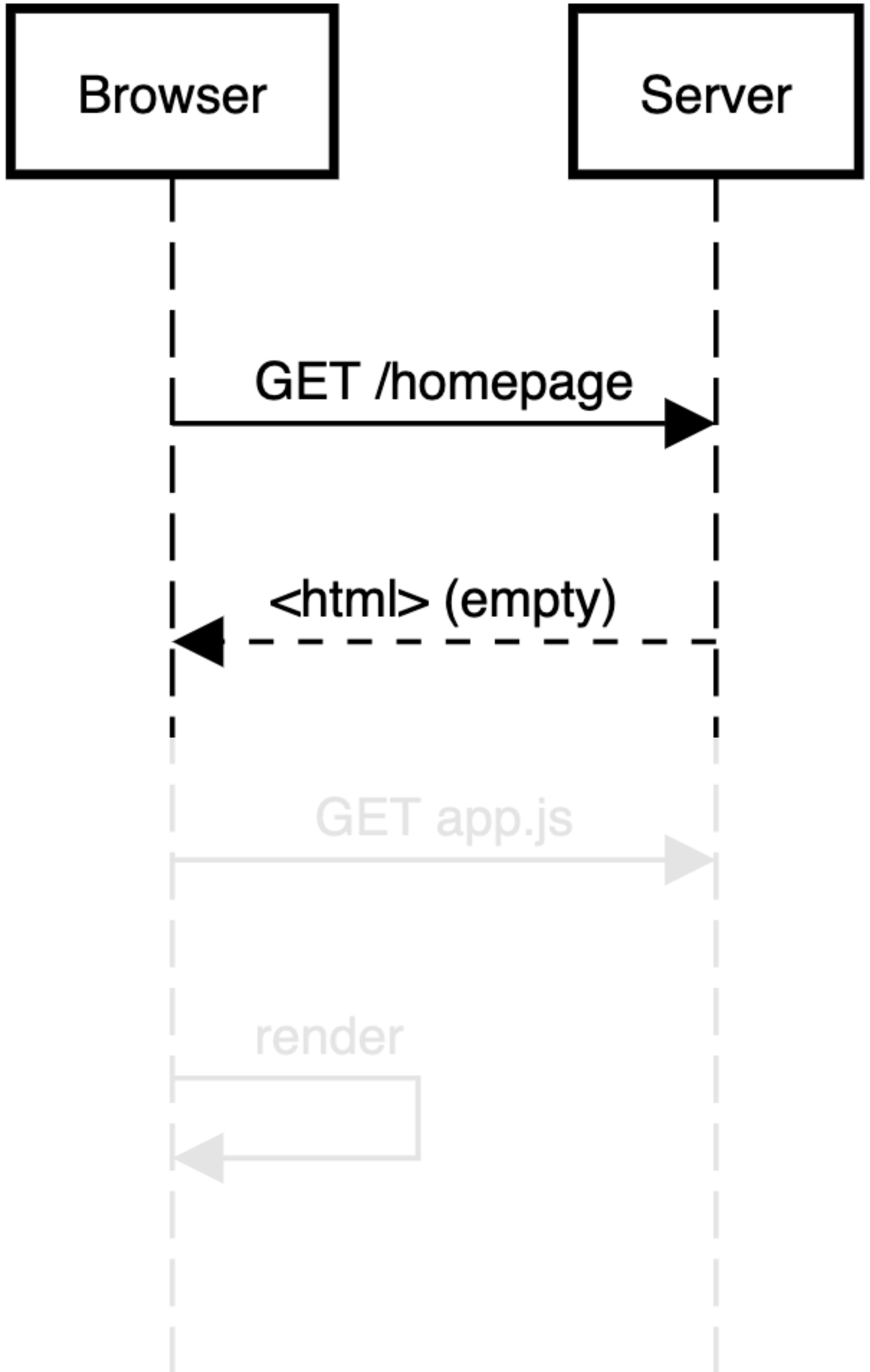
Classic SPA App



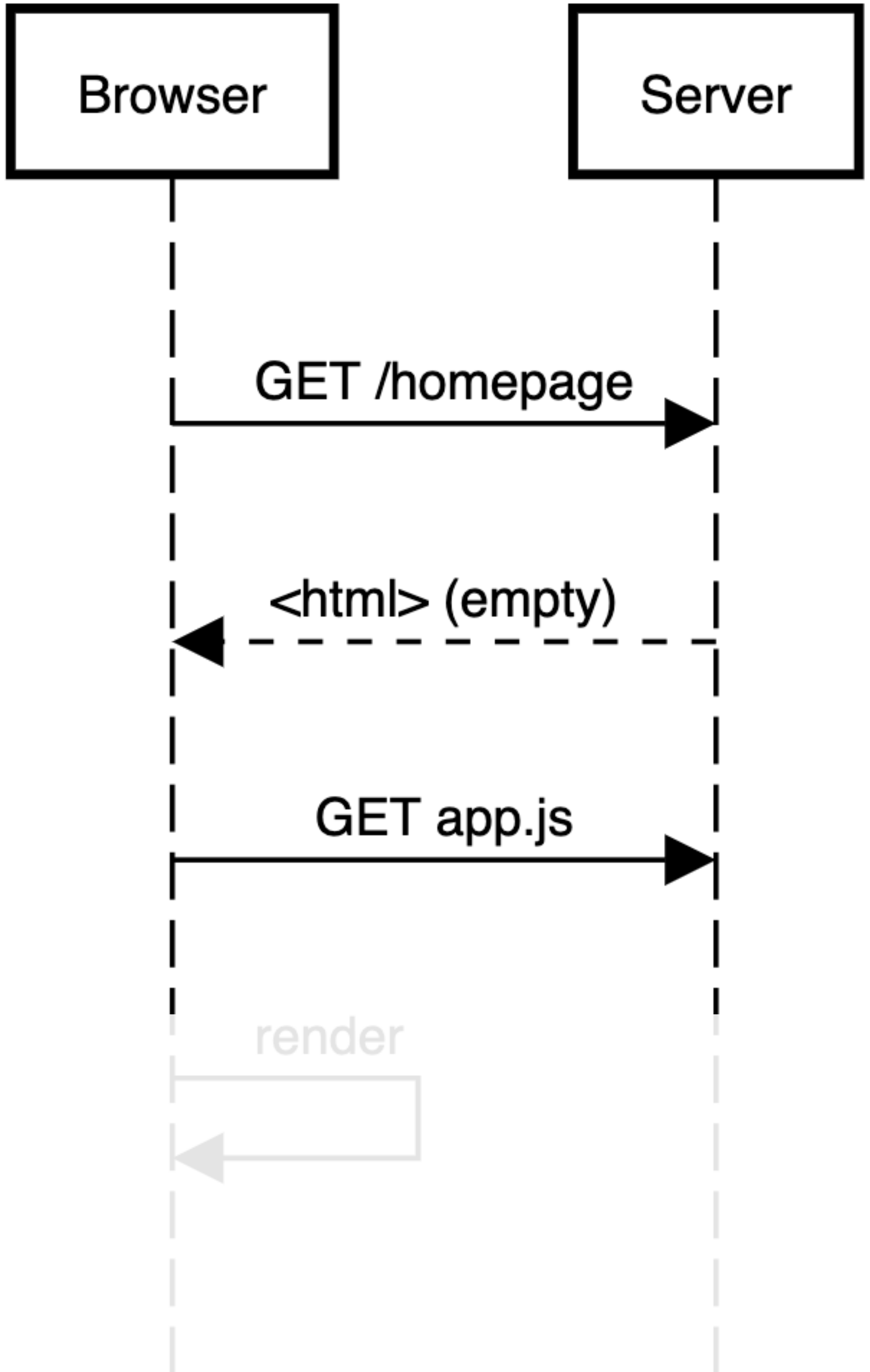
Classic SPA App



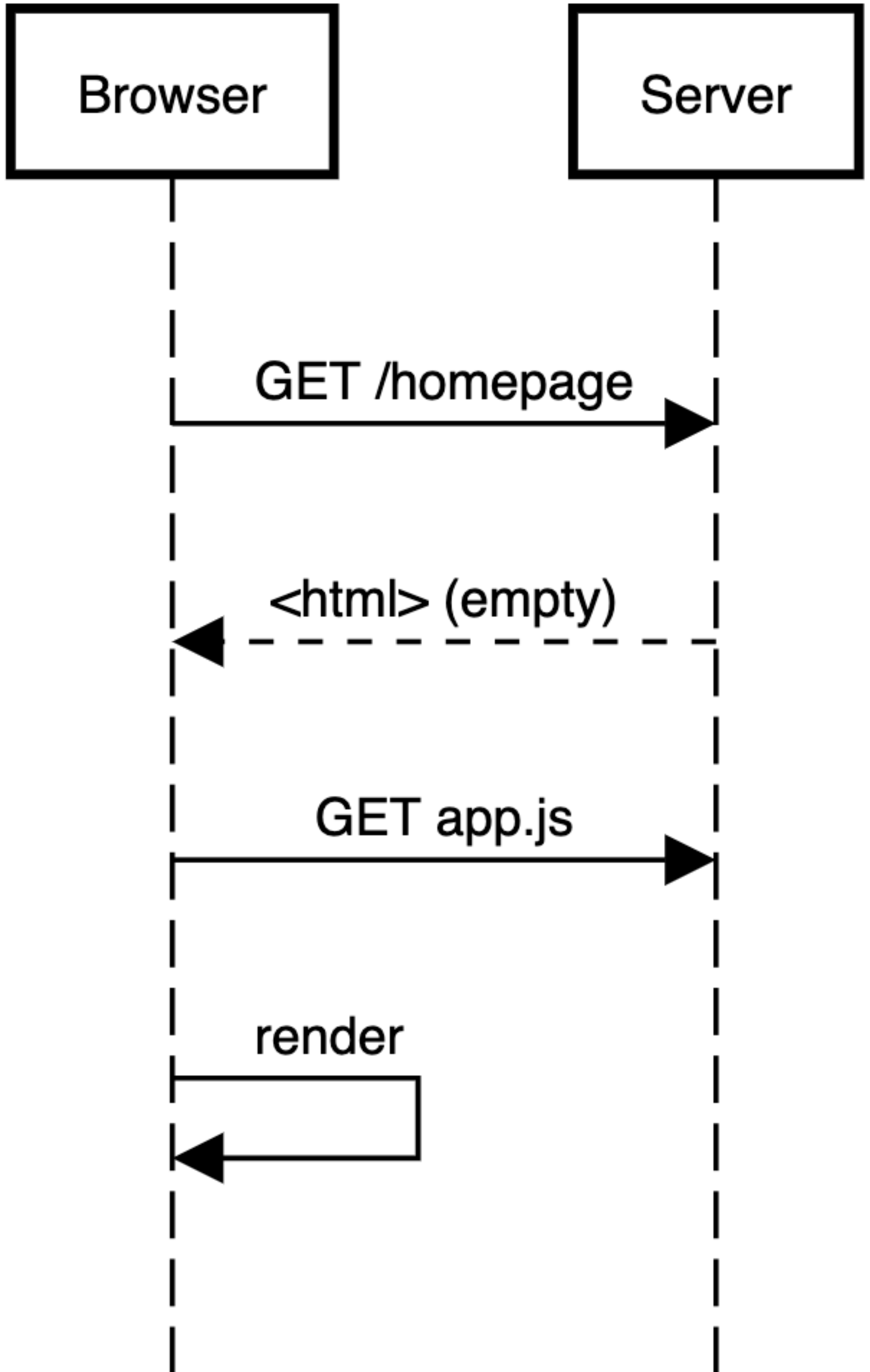
Classic SPA App



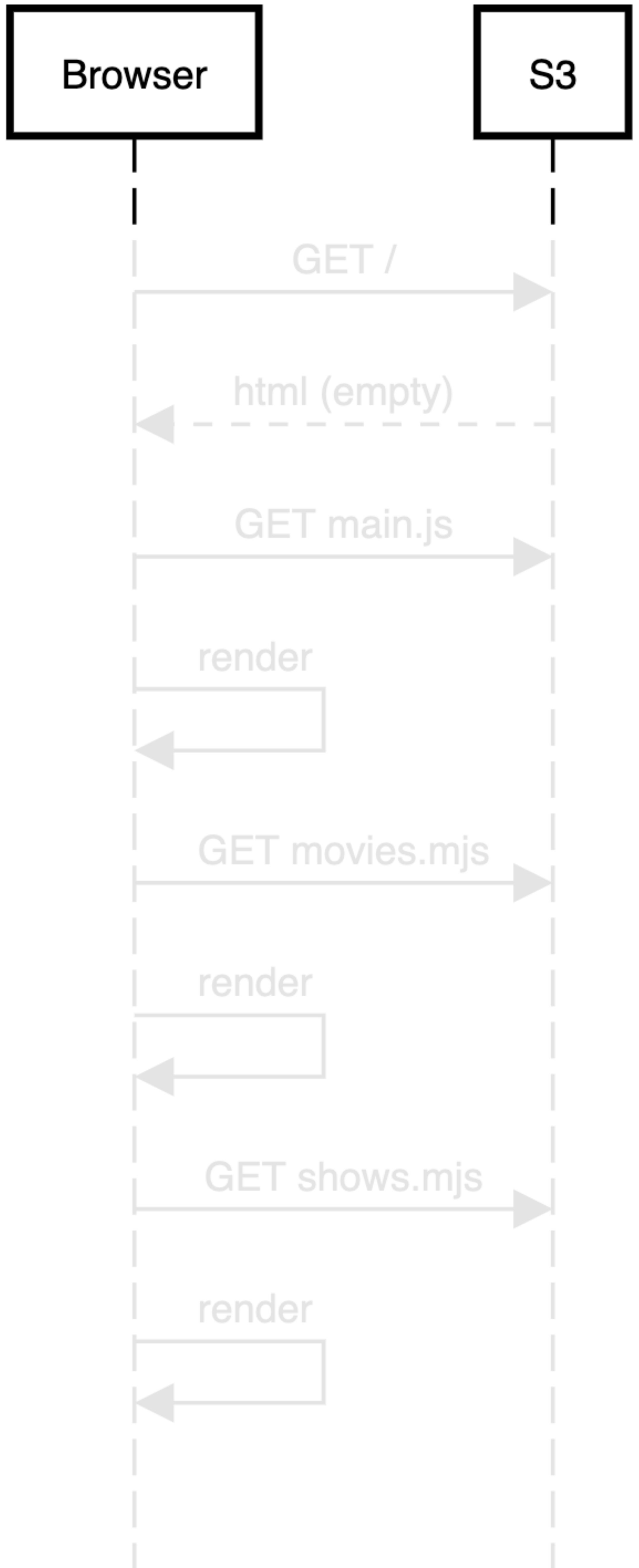
Classic SPA App



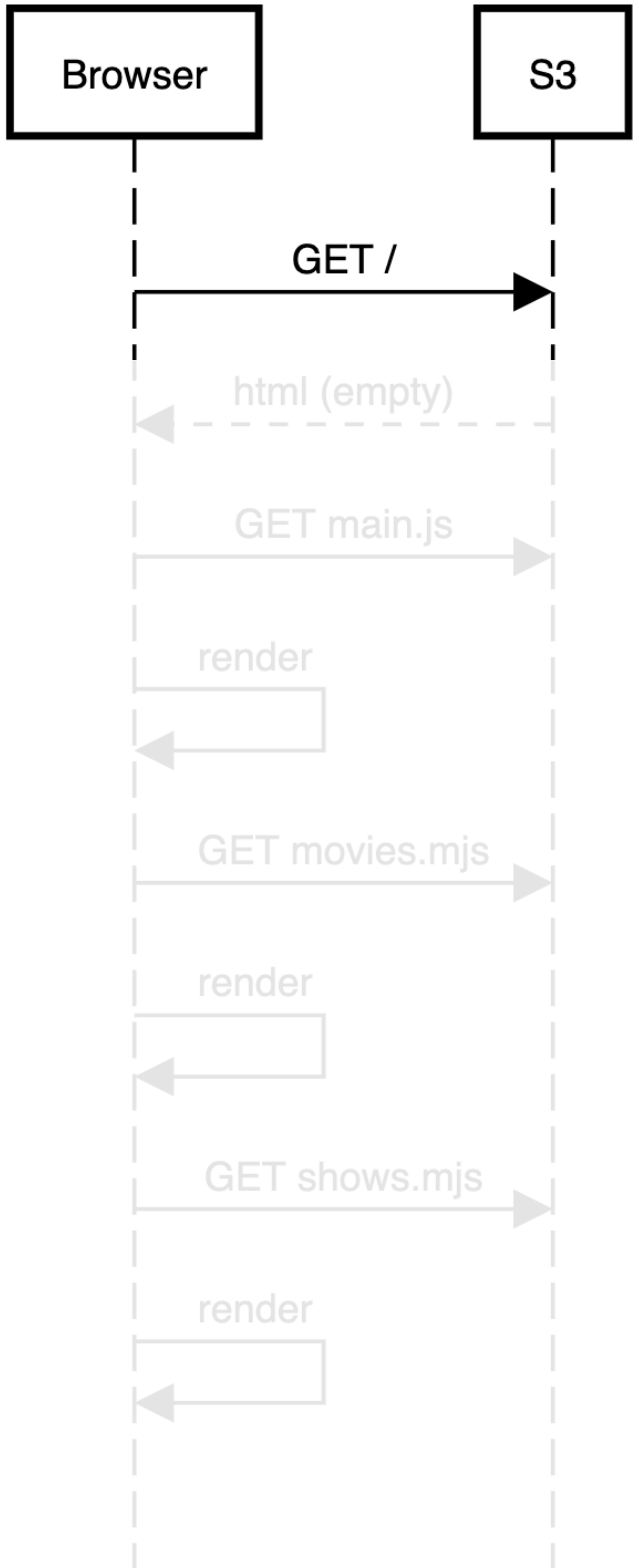
Classic SPA App



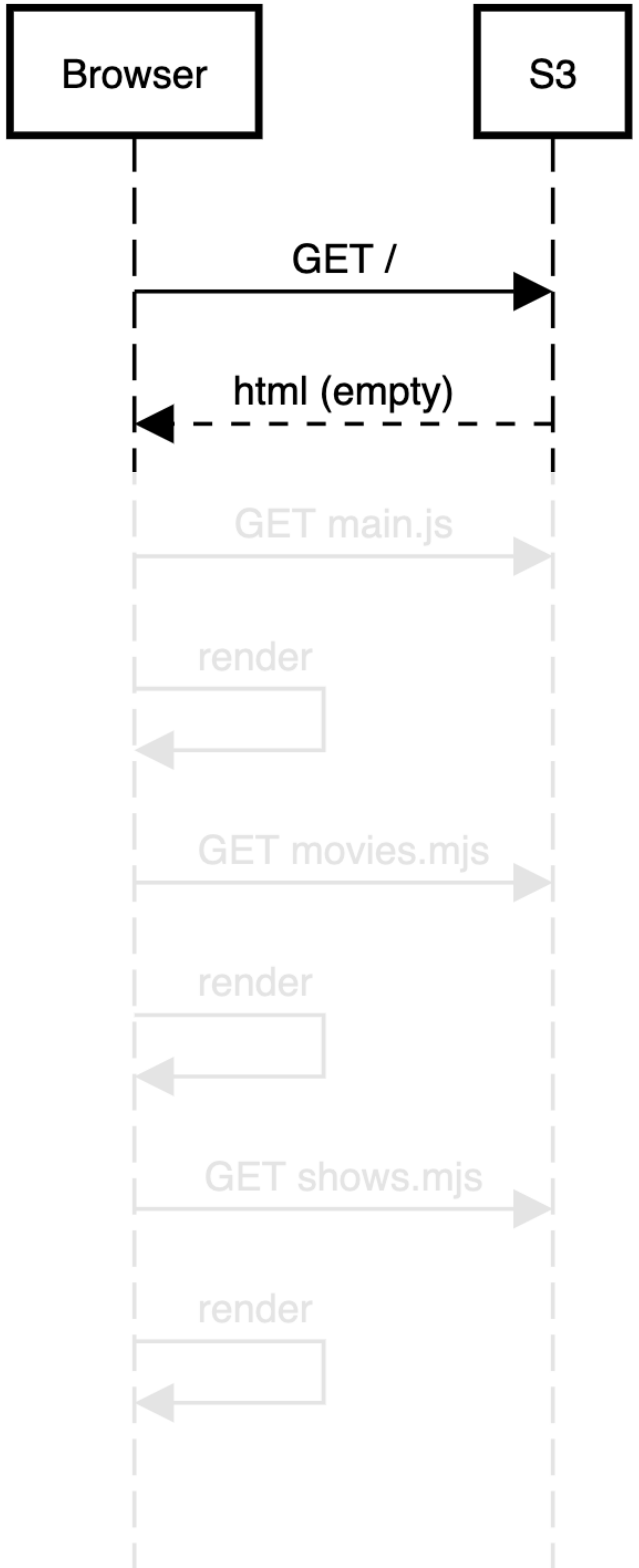
SPA Monoliths



SPA Monoliths



SPA Monoliths



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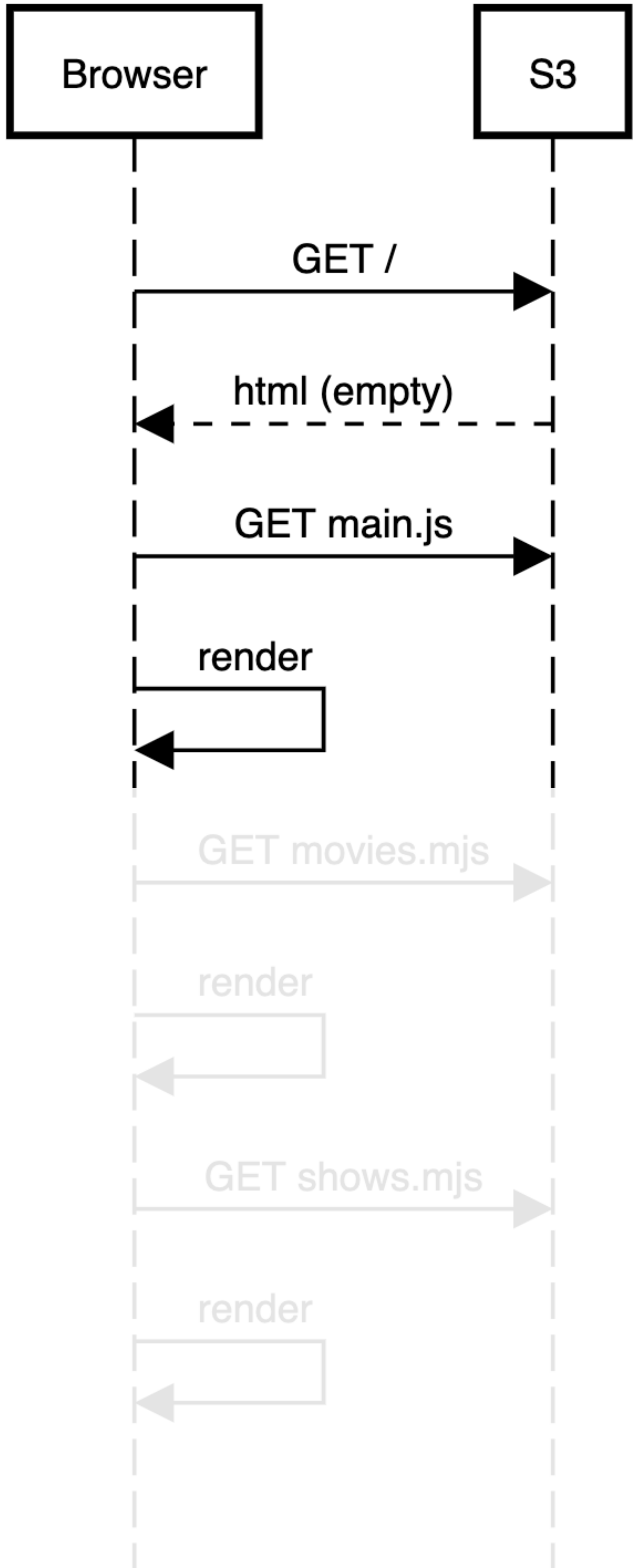

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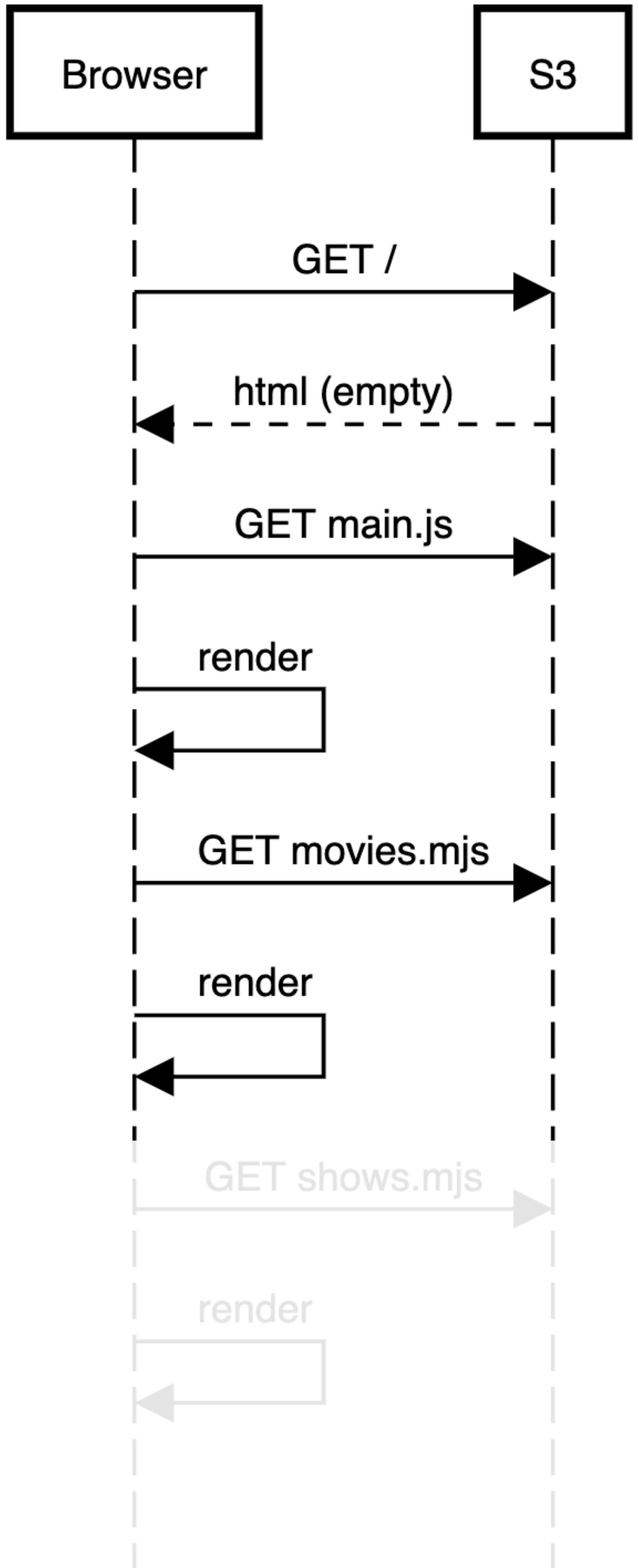

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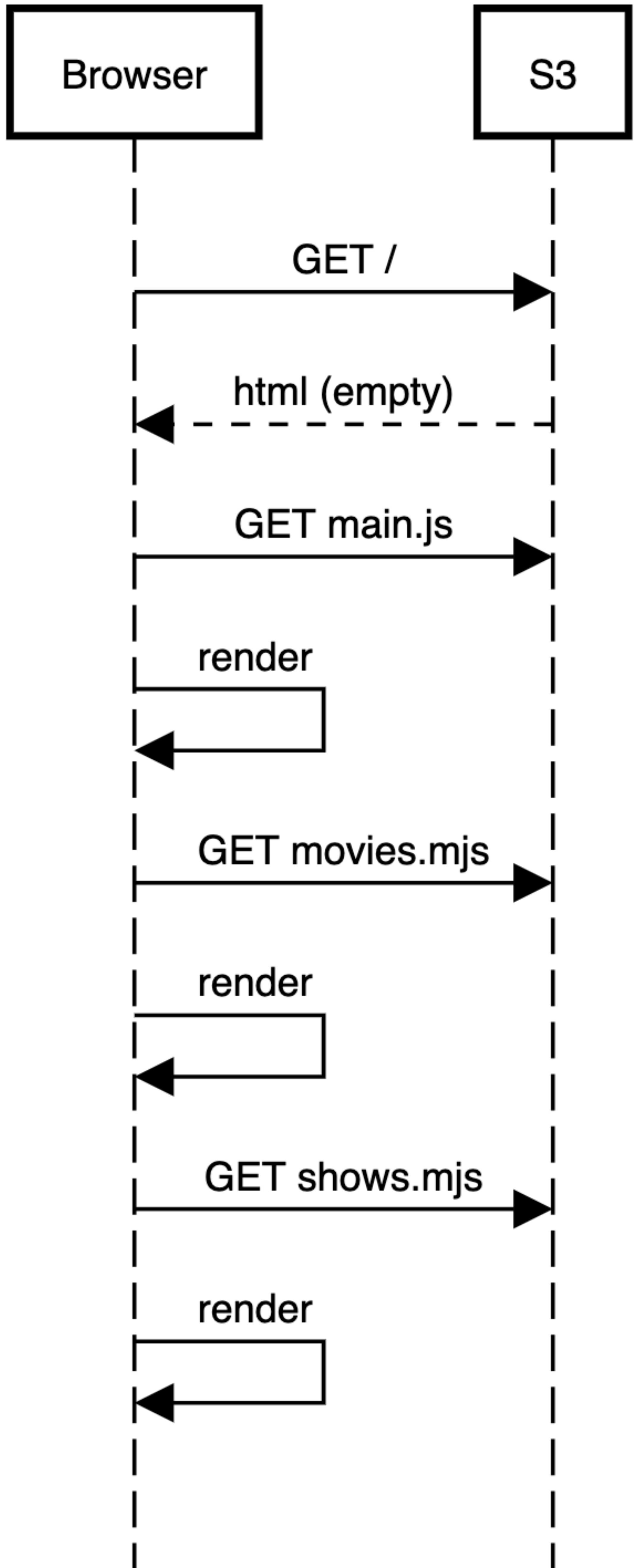
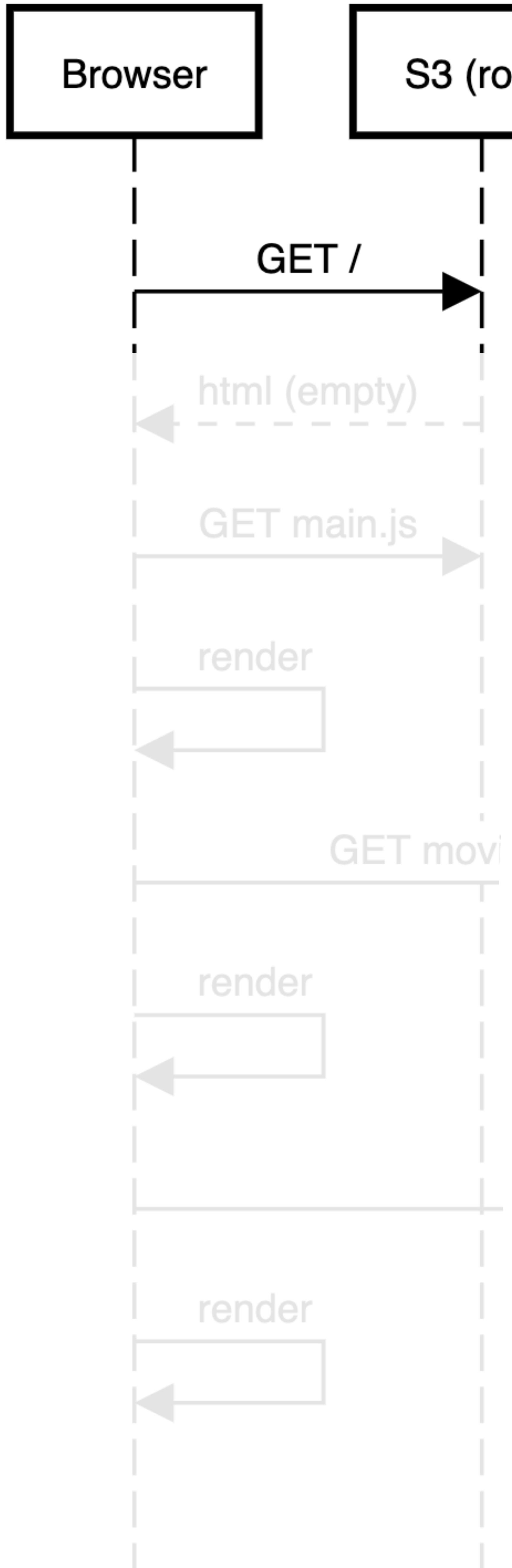
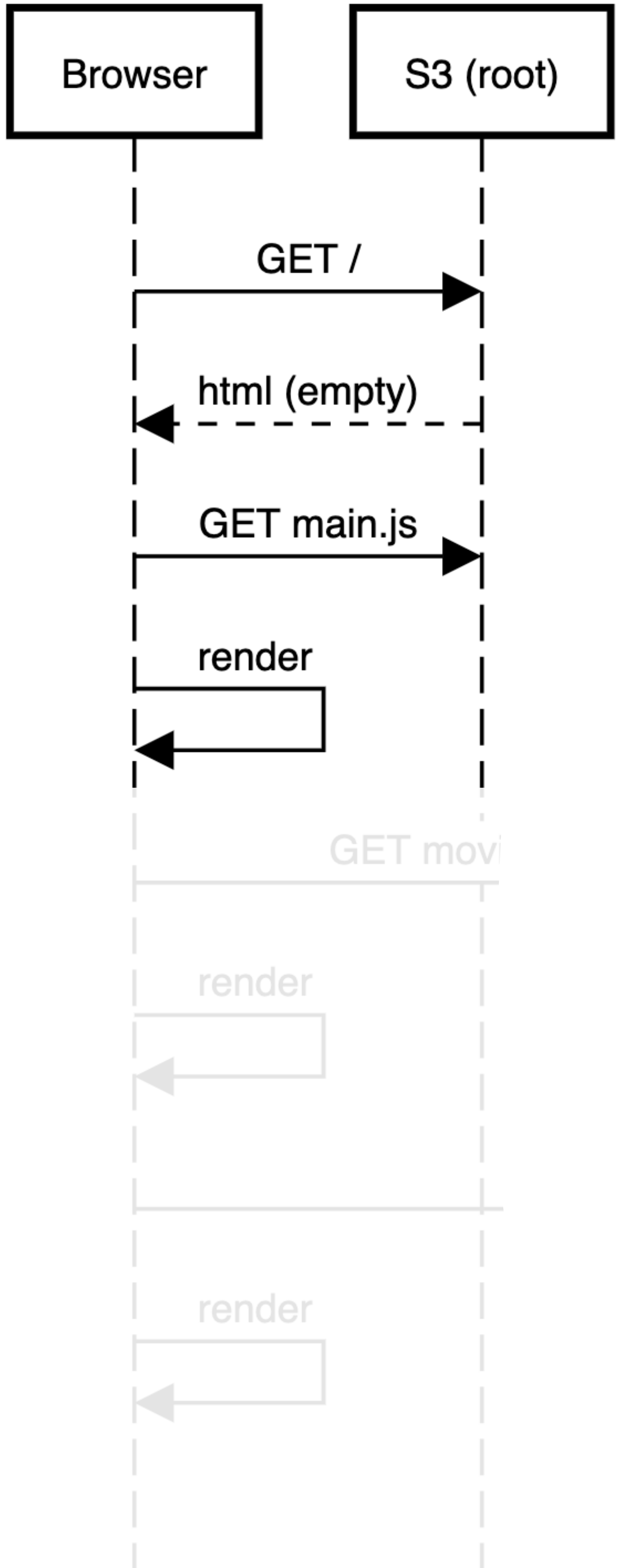


MFE Apps


Browser
S3 (root)
GET /
html (empty)
GET main.js
render
GET movi
render
render

MFE Apps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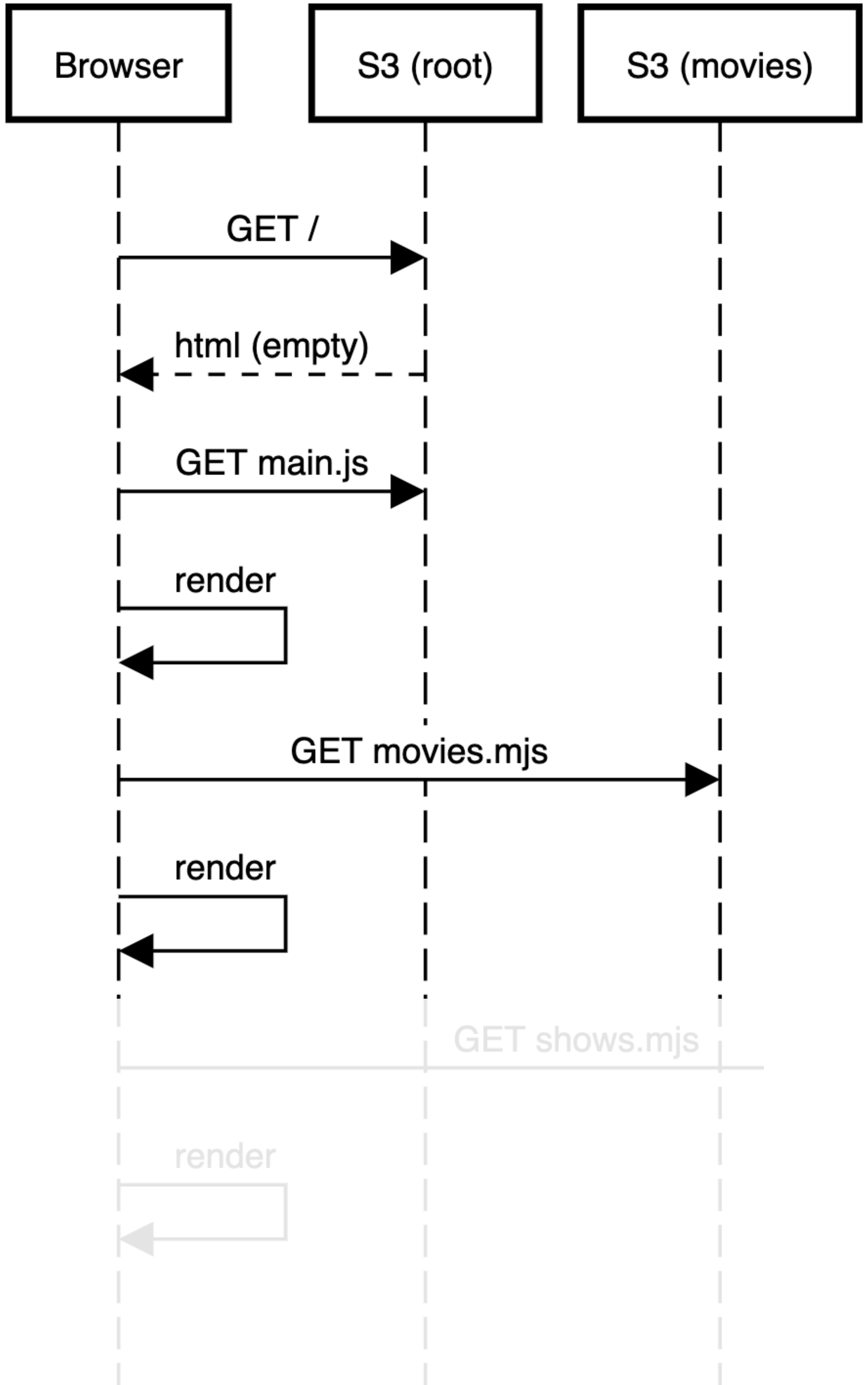
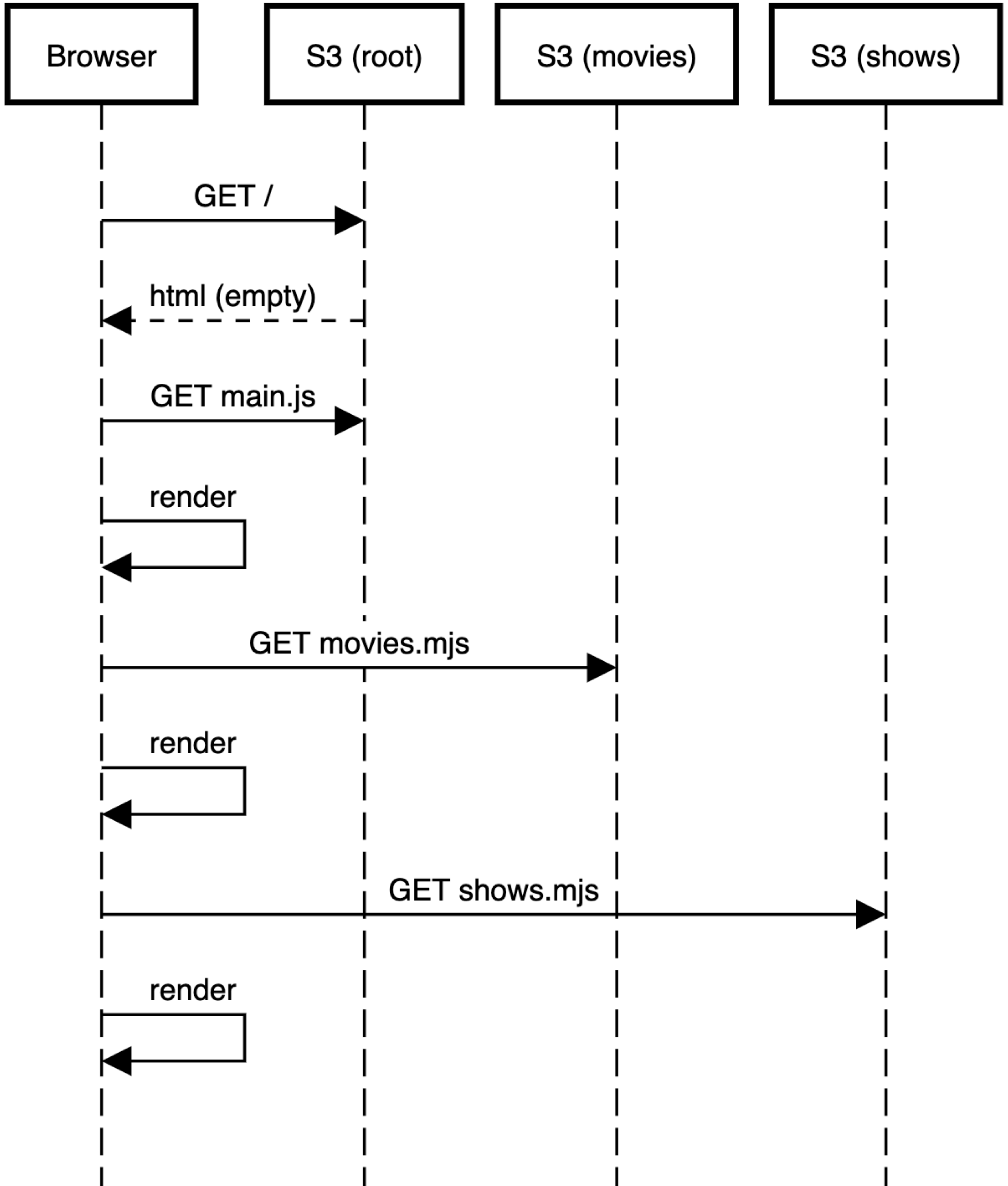

Browser
S3 (root)
S3 (movies)
GET /
html (empty)
GET main.js
render
GET movies.mjs
render
GET shows.mjs
render

MFE Apps



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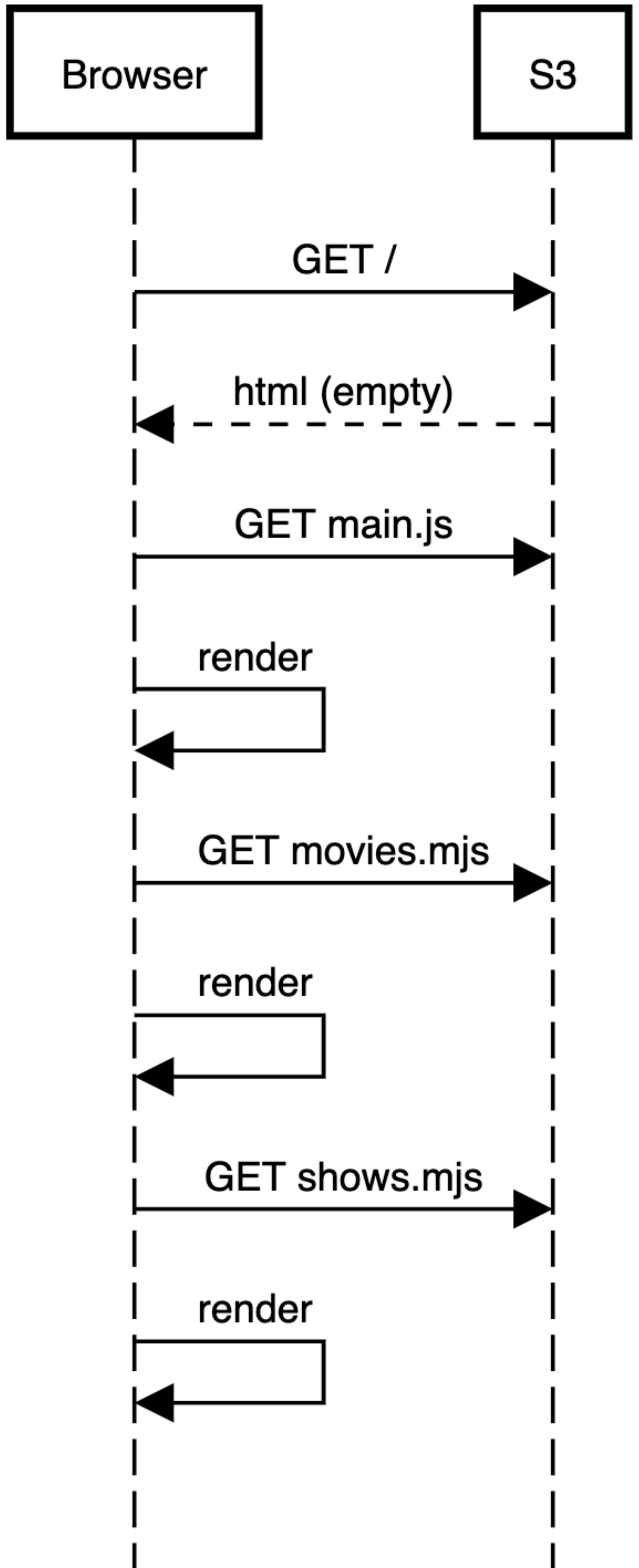

Browser

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GET movies.mjs

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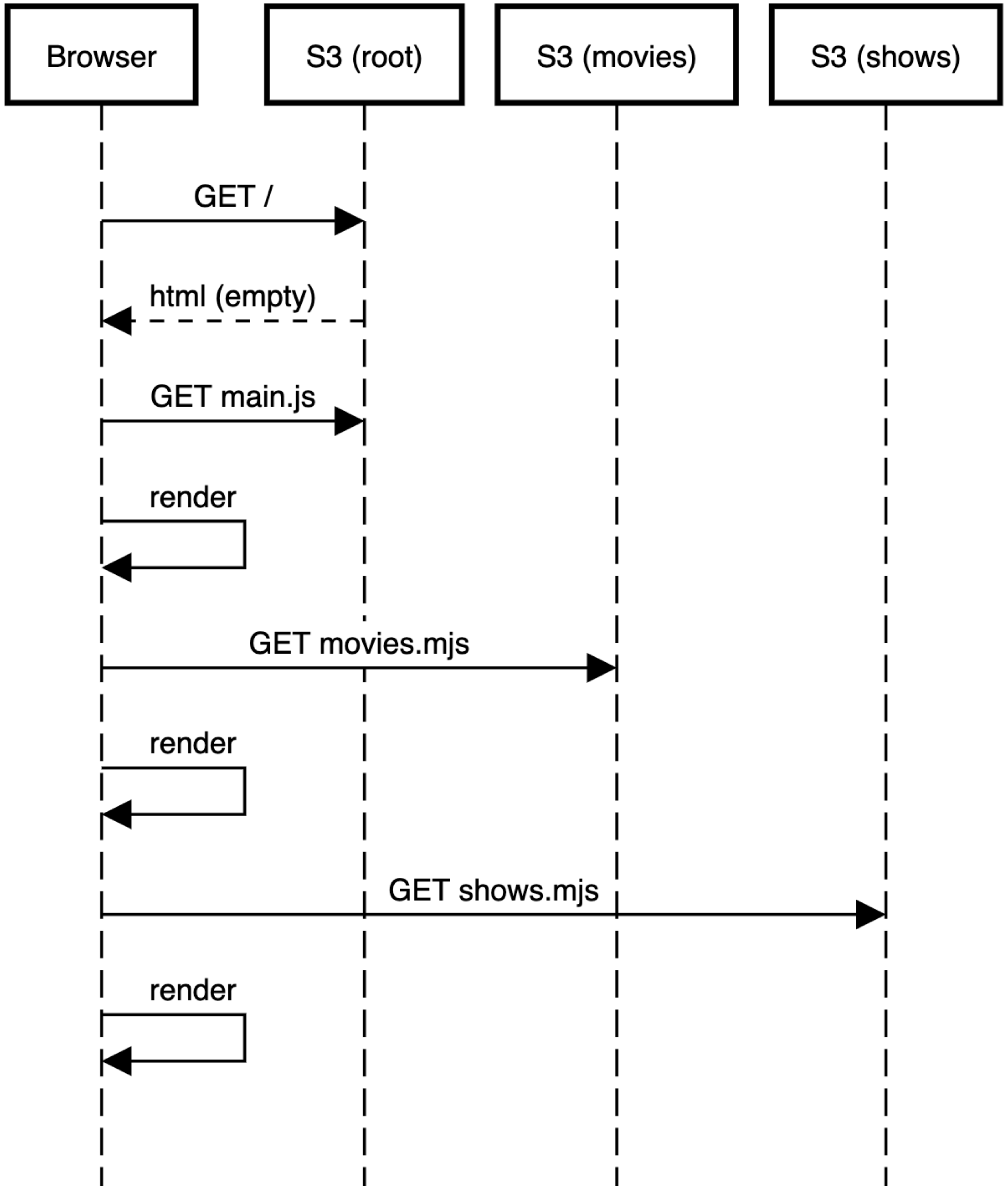
MFE Apps



Browser

S3 (root)

S3 (movies)

S3 (shows)

GET /

html (empty)

GET main.js

render

GET movies.mjs

render

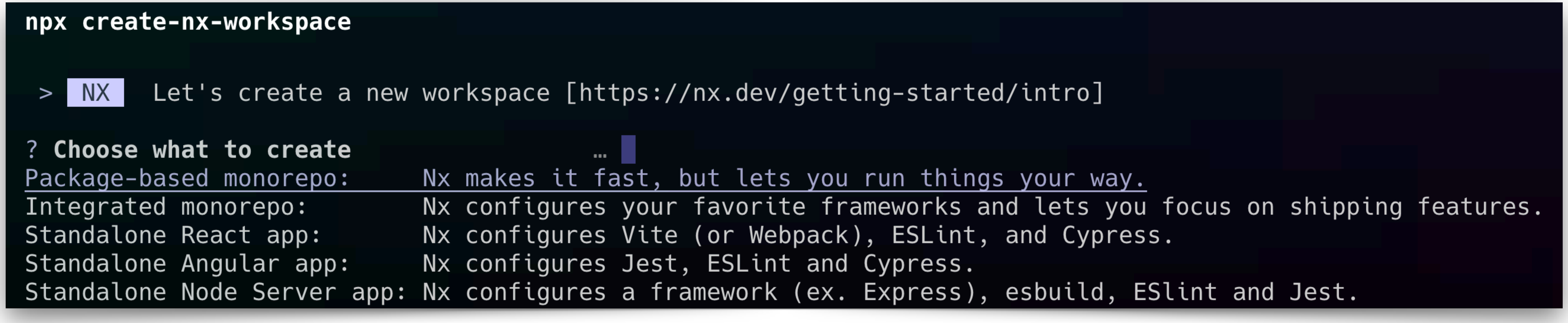
GET shows.mjs

render

04

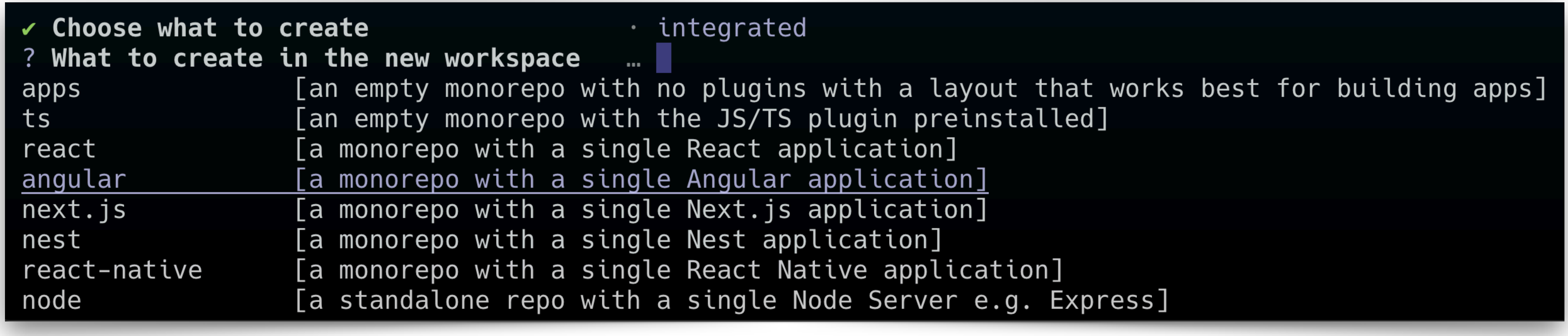
What can we do with Nx?

1. Pick your monorepo style



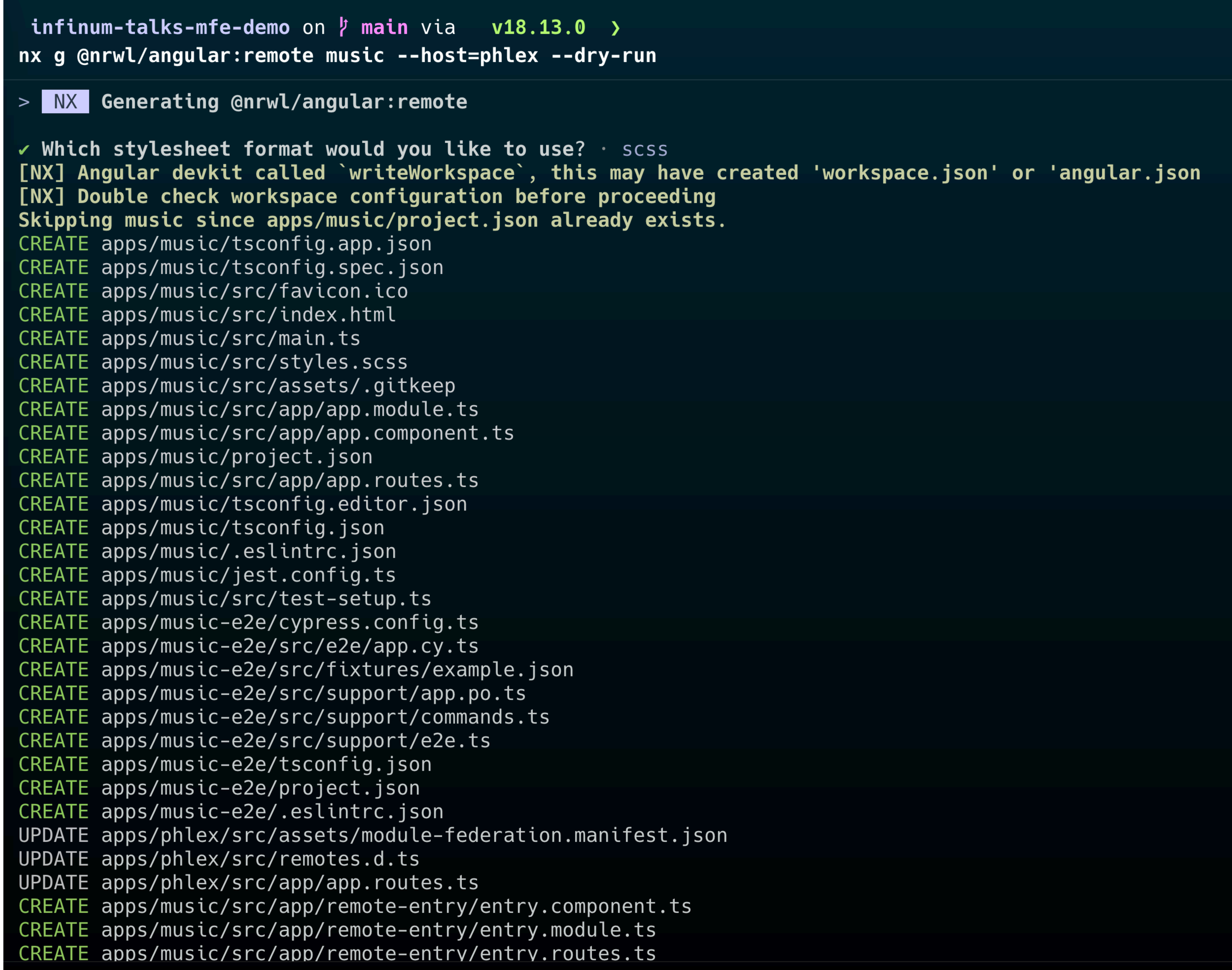
```
npx create-nx-workspace

 >  NX   Let's create a new workspace [https://nx.dev/getting-started/intro]

? Choose what to create                   …
Package-based monorepo:     Nx makes it fast, but lets you run things your way.
Integrated monorepo:        Nx configures your favorite frameworks and lets you focus on shipping features.
Standalone React app:       Nx configures Vite (or Webpack), ESLint, and Cypress.
Standalone Angular app:     Nx configures Jest, ESLint and Cypress.
Standalone Node Server app: Nx configures a framework (ex. Express), esbuild, ESlint and Jest.
```

2. Pick your framework



```
✔ Choose what to create                 · integrated
? What to create in the new workspace   …
apps                  [an empty monorepo with no plugins with a layout that works best for building apps]
ts                    [an empty monorepo with the JS/TS plugin preinstalled]
react                 [a monorepo with a single React application]
angular               [a monorepo with a single Angular application]
next.js               [a monorepo with a single Next.js application]
nest                  [a monorepo with a single Nest application]
react-native          [a monorepo with a single React Native application]
node                  [a standalone repo with a single Node Server e.g. Express]
```

3. Use generators



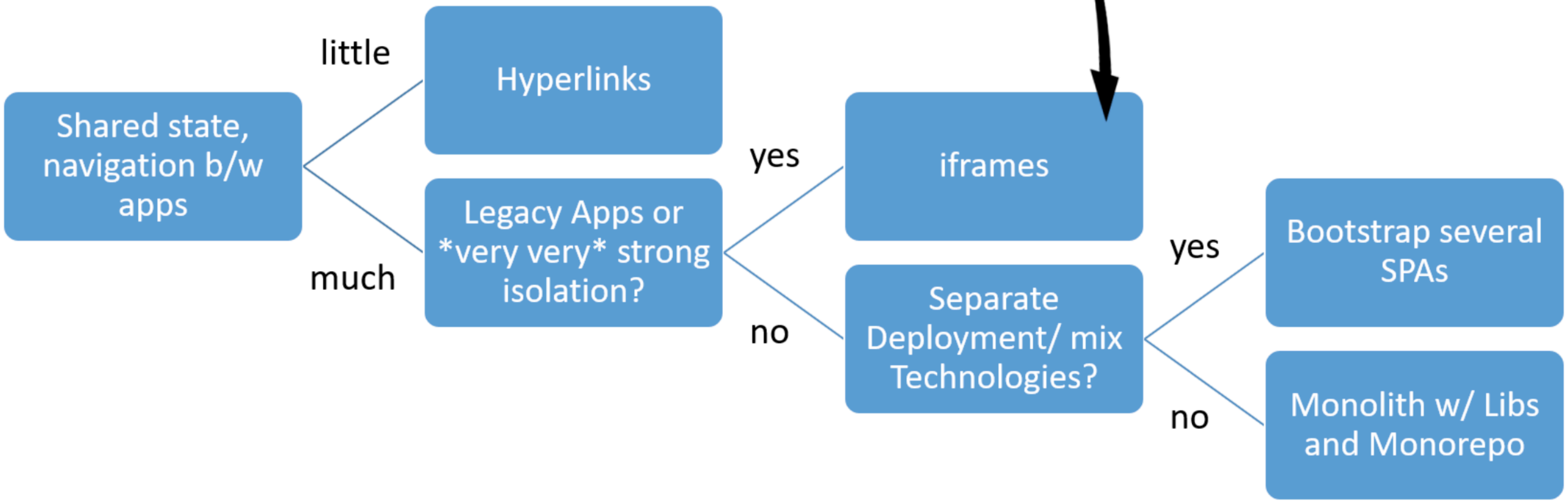
```
 infinum-talks-mfe-demo on  main via   v18.13.0 ❯
nx g @nrwl/angular:remote music --host=phlex --dry-run

>  NX   Generating @nrwl/angular:remote

✔ Which stylesheet format would you like to use? · scss
[NX] Angular devkit called `writeWorkspace`, this may have created 'workspace.json' or 'angular.json
[NX] Double check workspace configuration before proceeding
Skipping music since apps/music/project.json already exists.
CREATE apps/music/tsconfig.app.json
CREATE apps/music/tsconfig.spec.json
CREATE apps/music/src/favicon.ico
CREATE apps/music/src/index.html
CREATE apps/music/src/main.ts
CREATE apps/music/src/styles.scss
CREATE apps/music/src/assets/.gitkeep
CREATE apps/music/src/app/app.module.ts
CREATE apps/music/src/app/app.component.ts
CREATE apps/music/project.json
CREATE apps/music/src/app/app.routes.ts
CREATE apps/music/tsconfig.editor.json
CREATE apps/music/tsconfig.json
CREATE apps/music/.eslintrc.json
CREATE apps/music/jest.config.ts
CREATE apps/music/src/test-setup.ts
CREATE apps/music-e2e/cypress.config.ts
CREATE apps/music-e2e/src/e2e/app.cy.ts
CREATE apps/music-e2e/src/fixtures/example.json
CREATE apps/music-e2e/src/support/app.po.ts
CREATE apps/music-e2e/src/support/commands.ts
CREATE apps/music-e2e/src/support/e2e.ts
CREATE apps/music-e2e/tsconfig.json
CREATE apps/music-e2e/project.json
CREATE apps/music-e2e/.eslintrc.json
UPDATE apps/phlex/src/assets/module-federation.manifest.json
UPDATE apps/phlex/src/remotes.d.ts
UPDATE apps/phlex/src/app/app.routes.ts
CREATE apps/music/src/app/remote-entry/entry.component.ts
CREATE apps/music/src/app/remote-entry/entry.module.ts
CREATE apps/music/src/app/remote-entry/entry.routes.ts
```

05 Demo time!

06

When to use MFEs

Not a good fit for public web sites


Shared state, navigation b/w apps
little
much
Hyperlinks
Legacy Apps or *very very* strong isolation?
yes
no
iframes
Separate Deployment/ mix Technologies?
yes
no
Bootstrap several SPAs
Monolith w/ Libs and Monorepo

Source: Manfred Steyer - Enterprise Angular - Micro Frontends and Moduliths with Angular

“Don’t do it if you don’t have to”

~~“Don’t do it if you don’t have to”~~

“Don’t do it if you can’t reap the benefits”

07

Things to look out for

The devil is in the details

- **Individual MFE app initialisation logic**
  - Solution: “MODULE_INITIALIZER”
- **Serving and fetching of assets**
  - Solution: Provide APP_URL to each MFE
- **Environment-specific configuration at runtime**
  - Solution: Fetch env.json for each MFE
- **Global styles and providers**
  - Solution: Do them all in root MFE
- **Deployment synchronisation**
  - Solution: Nx affected
- **Framework Pick n Mix**
  - Solution: Don’t do it if you don’t have to (you lose some of the benefits)

The devil is in the details

- **Dependency updates & management**
  - Solution: Do it regularly, on a schedule
- **Inter-team dependencies**
  - Solution: Plan & communicate
- **Branching process**
  - Solution: Less branches / Trunk-based development / Good tagging
- **Making people stick to coding standards**
  - Solution: Enforce as much as possible with tooling
- **Apps that stop being maintained**
  - Solution: Fork and do classic stand-alone non-MFE SPA build
- **Noise in the monorepo**
  - Solution: Proper CODEOWNERS setup & clear definition of responsibilities

08

Alternate approaches

Alternate approaches

- **Custom Elements (a.k.a. Web Components)**
  - https://web.dev/custom-elements-v1/

```
<head>
  <script src=“https://components.mycompany.com/my-widget.js”>
</head>
<body>
  <my-widget></my-widget>
</body>
```

- **Server-side includes**
  - https://en.wikipedia.org/wiki/Server_Side_Includes

```
<!--#include virtual="menu.cgi" -->
<!--#include file="footer.html" -->
```

- **Edge-side includes**
  - https://en.wikipedia.org/wiki/Edge_Side_Includes

```
<esi:include
  src="http://example.com/1.html"
  alt="http://bak.example.com/2.html"
  onerror="continue"
/>
```

Thank you!

Clutch
Facebook
Instagram
Twitter
Linkedin
Dribbble

Resources

- https://micro-frontends.org
- https://www.youtube.com/watch?v=tslZjUAtF1U
- https://www.angulararchitects.io/en/book
- https://webpack.js.org/concepts/module-federation
- https://nx.dev/more-concepts/micro-frontend-architecture
- https://nx.dev/recipes/module-federation/dynamic-module-federation-with-angular
- https://auth0.com/blog/micro-frontends-with-angular-module-federation-and-auth0
- https://nx.dev/more-concepts/library-types
- https://nx.dev/concepts/mental-model
- https://nx.dev/concepts/integrated-vs-package-based

Questions?

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Dribbble