(Remaining) Agenda

- **Data Fetching and Caching**
  - **The react-query library**
- **Assignment 1 specification**

Data Fetching & Caching.

SPA State (Data)

- **Client state (aka App State).**
  - **e.g. Menu selection, UI theme, Text input, logged-in user id.**
  - **Characteristics:**
    - **Client-owned; Not shared; Not persisted (across sessions); Always up-to-date.**
    - **Accessed synchronously.**
    - useState**() hook**
    - **Management - Private to a component or Global state (Context).**

SPA State (Data)

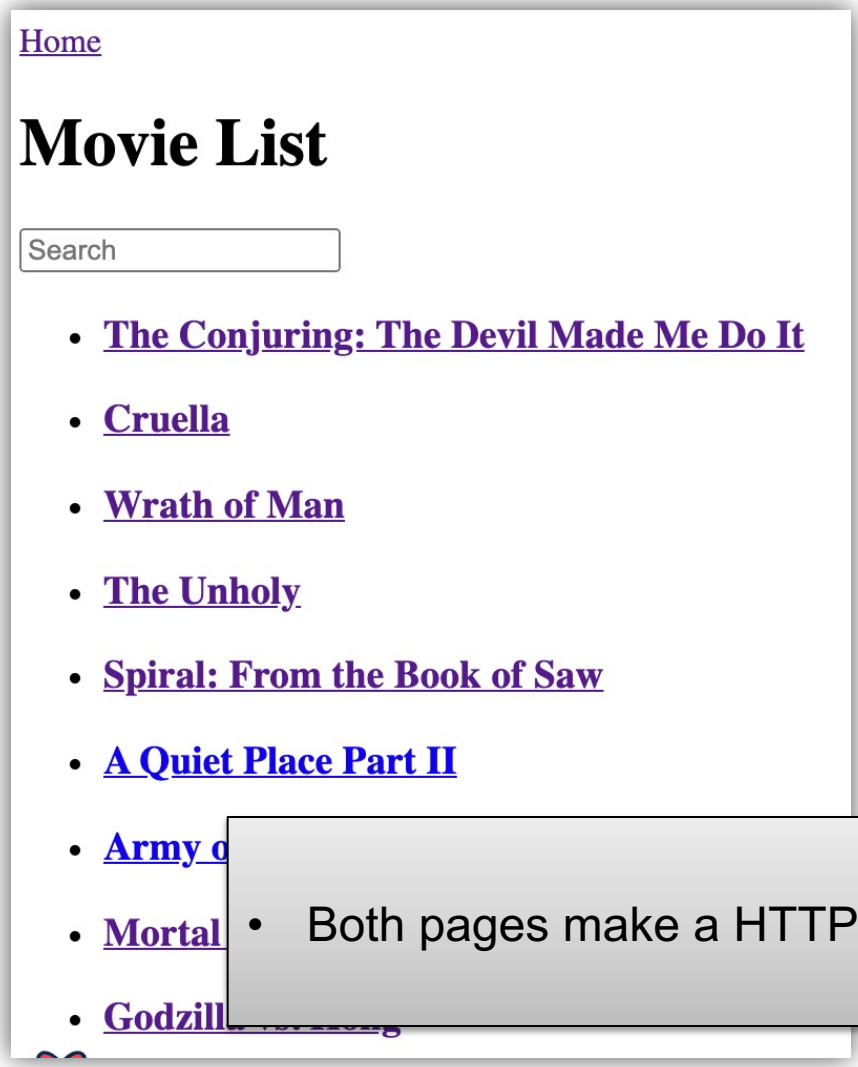
- **Server state (The M in MVC).**
  - **e.g. list of ‘discover’ movies, movie details, friends.**

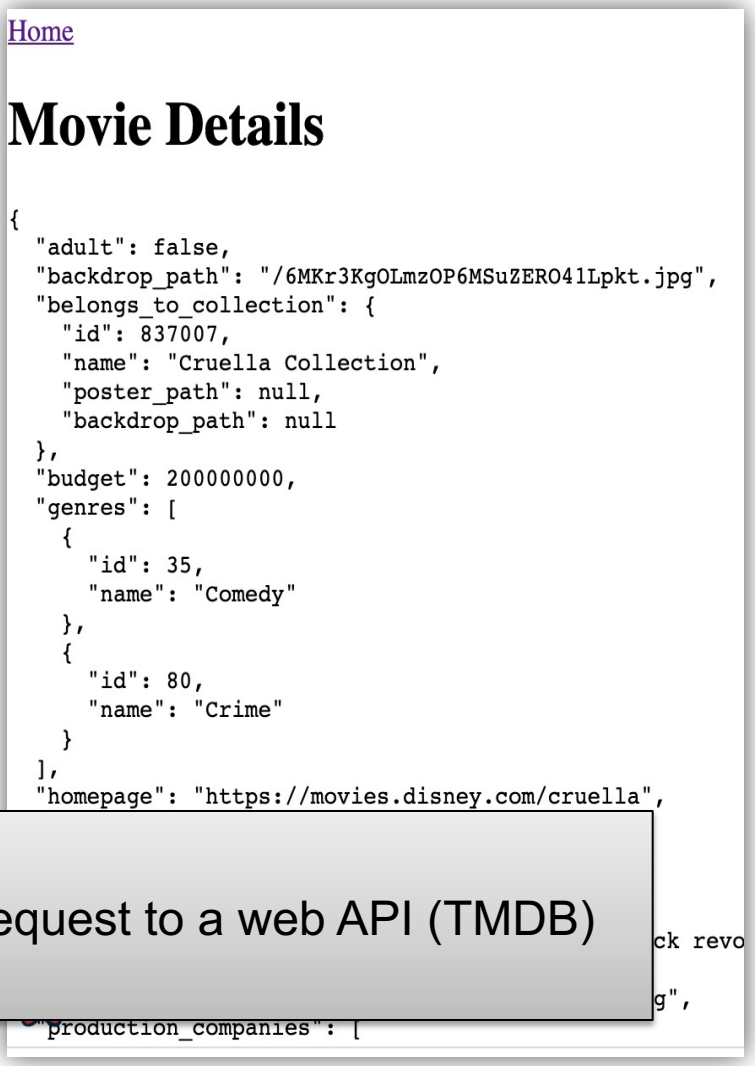
  - **Characteristics:**
    - **Persisted remotely. Shared ownership.**
    - **Accessed asynchronously → Impacts user experience.**
    - **Can change without client’s knowledge → Client can be ‘out of date’.**
    - useState **+** useEffect **hooks.**

SPA Server State.

- **Server state characteristics (contd.).**
  - **Management options:**
    1. **Spread across many component.**
       - **Good separation of concerns. (+)**
       - **Unnecessary re-fetching. (-)**
    2. **Global state (Context).**
       - **No unnecessary re-fetching. (+)**
       - **Fetching data before its required. (-)**
       - **Poor separation of concerns. (-)_**
    3. **3rd party library – e.g. Redux**
       - **Same as 2 above.**
- **We want the best of 1 and 2, if possible.**

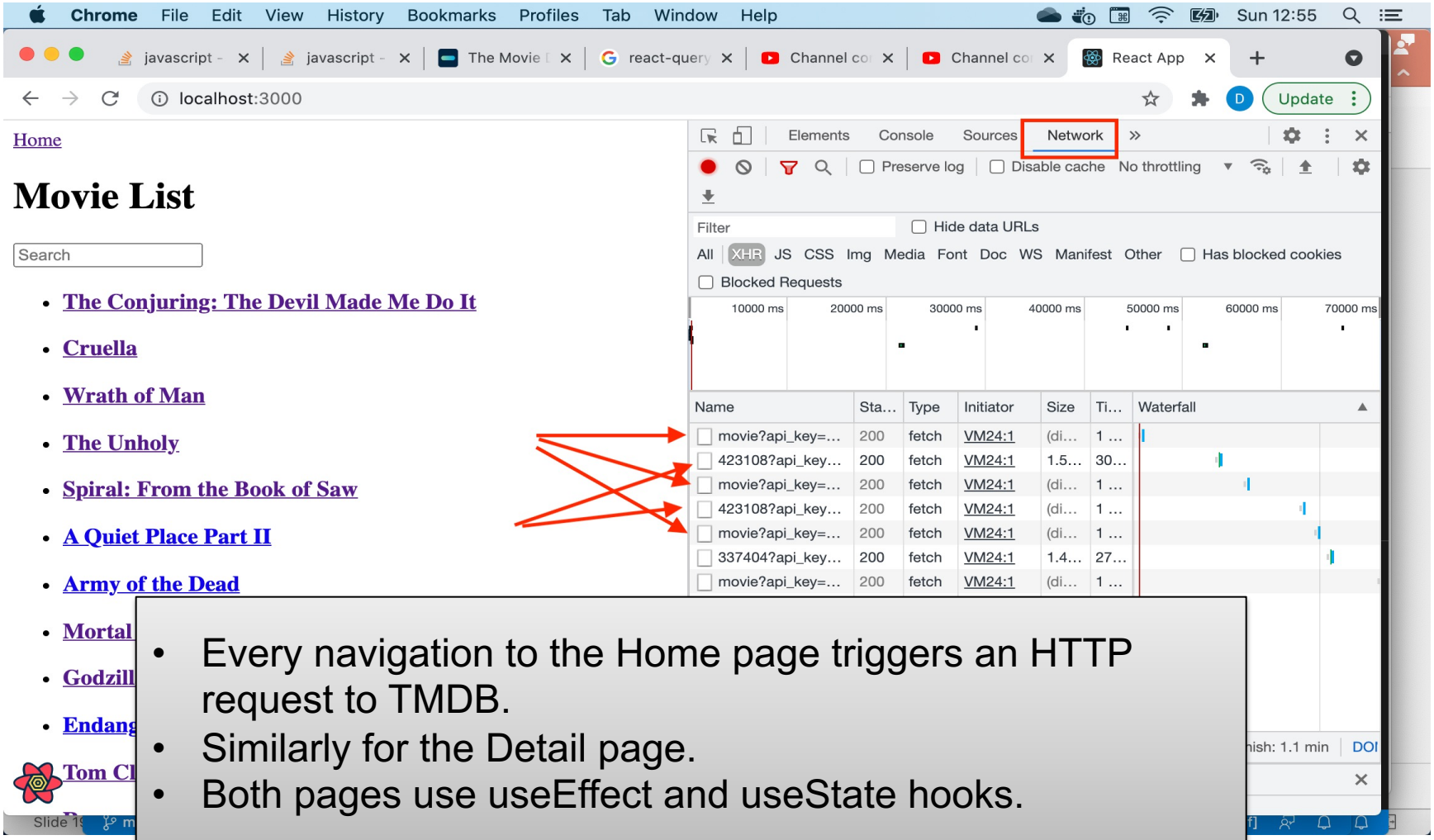
Sample App.





- Both pages make a HTTP Request to a web API (TMDB)

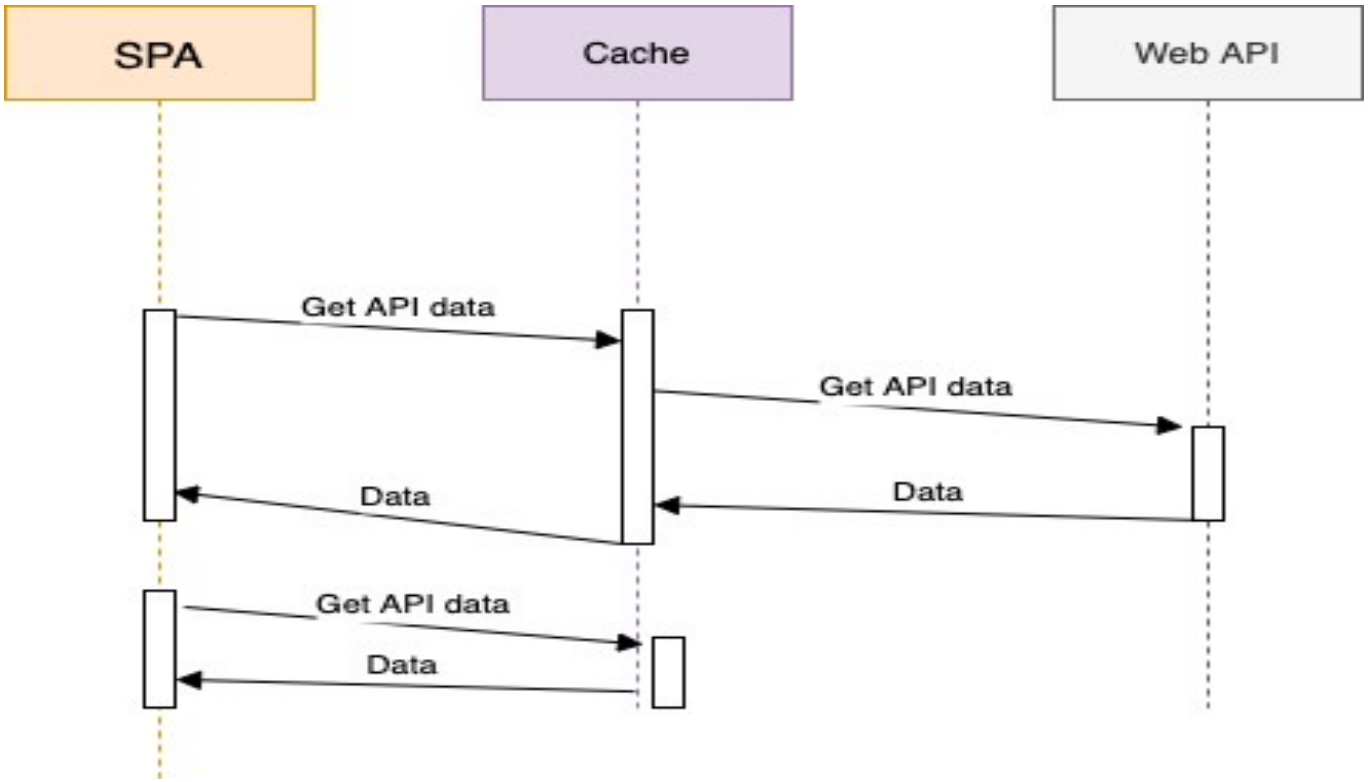
Sample App – The Problem.



- Every navigation to the Home page triggers an HTTP request to TMDB.
- Similarly for the Detail page.
- Both pages use useEffect and useState hooks.

Sample App – The Solution. .

- *Cache* **(store temporarily) the API data locally in the browser.**
- **Reduces the workload on the backend for read intensive apps.**
- **Speeds up the rendering time for revisited pages.**



Caching (General).

- **Caches are** in-memory datastores **with high** performance and **low** latency**.**
- **Simple** key-valu**e datastores structure.**
  - **Keys must be unique.**
  - **Value can be any serializable data type – Object, Array, Primitive.**
- **Cache hit – The requested data is in the cache.**
- **Cache miss - The requested data is not in the cache.**
- **Caches have a simple interface:**

  serializedValue = cache.get(key)

  cache.delete(key)

  cache.purge()
- **Cache entries have a** time-to-live **(TTL).**

The react-query library

- **3rd party JavaScript (React) caching library.**
  - **Provides a set of hooks.**

  e.g. const { data, error, isLoading, isError } =
  useQuery(key, queryFunction);
  - data **– from the cache (hit) or returned by the API (miss).**
  - error – **error response from API.**
  - isLoading(boolean) – **true while waiting for API response**.
  - isError (boolean) – **true when API response is an error status**.

- **Causes a component to re-render on query completion.**
- **Replaces your** useState **and** useEffect **hooks.**

The query key.

- *"Query keys can be as simple as a string, or as complex as an array of many strings and nested objects. As long as the query key is serializable, and **unique to the query's data** ….."*

e.g. const { ……, } =

useQuery**(["movie", { id: 1234 }],** getMovie);

// The query function.

export const getMovie = (**args**) => {

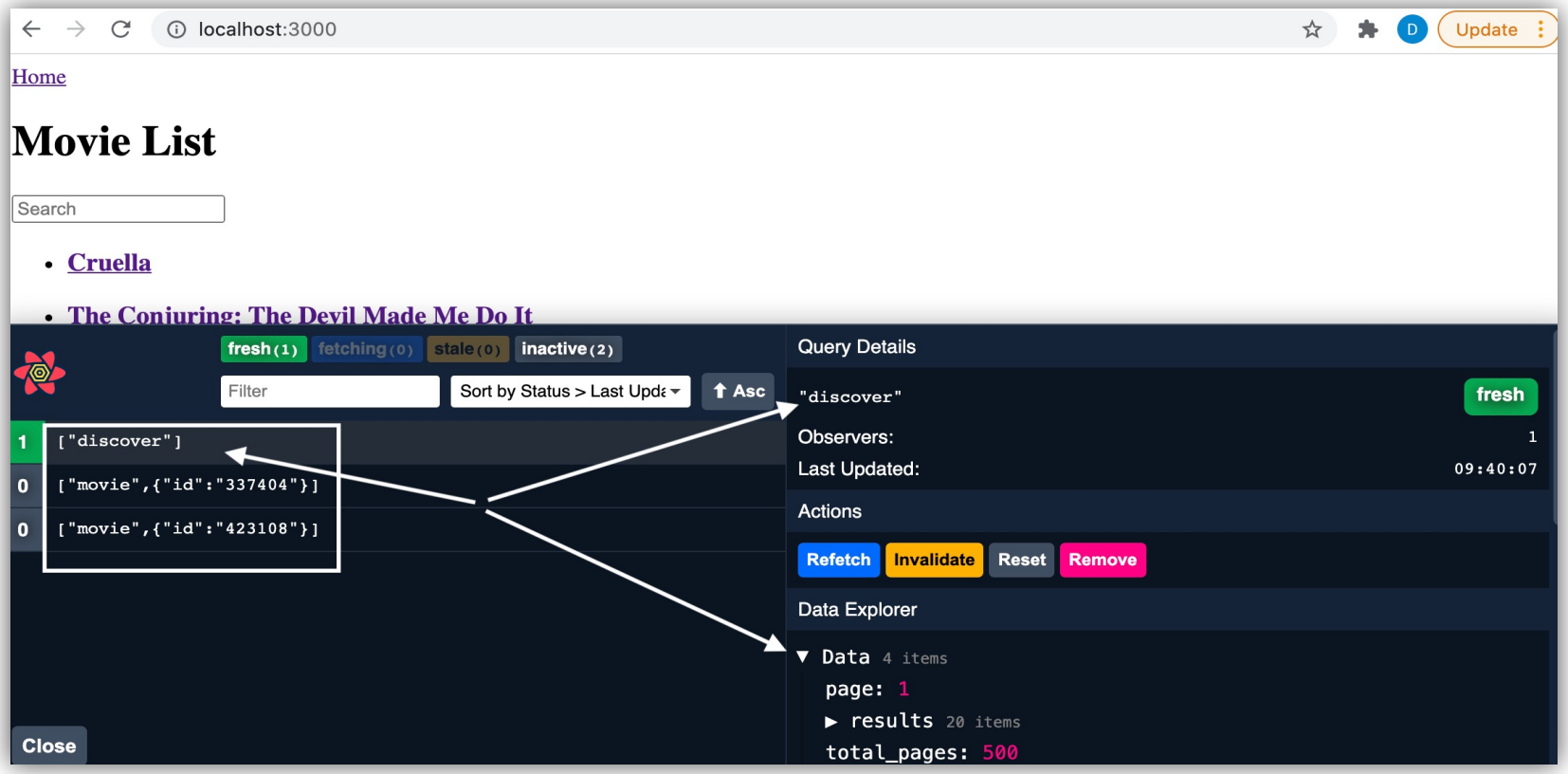
const [, idPart] = args.queryKey;

const {id} = idPart

…. Do HTTP GET using a movie id of 1234

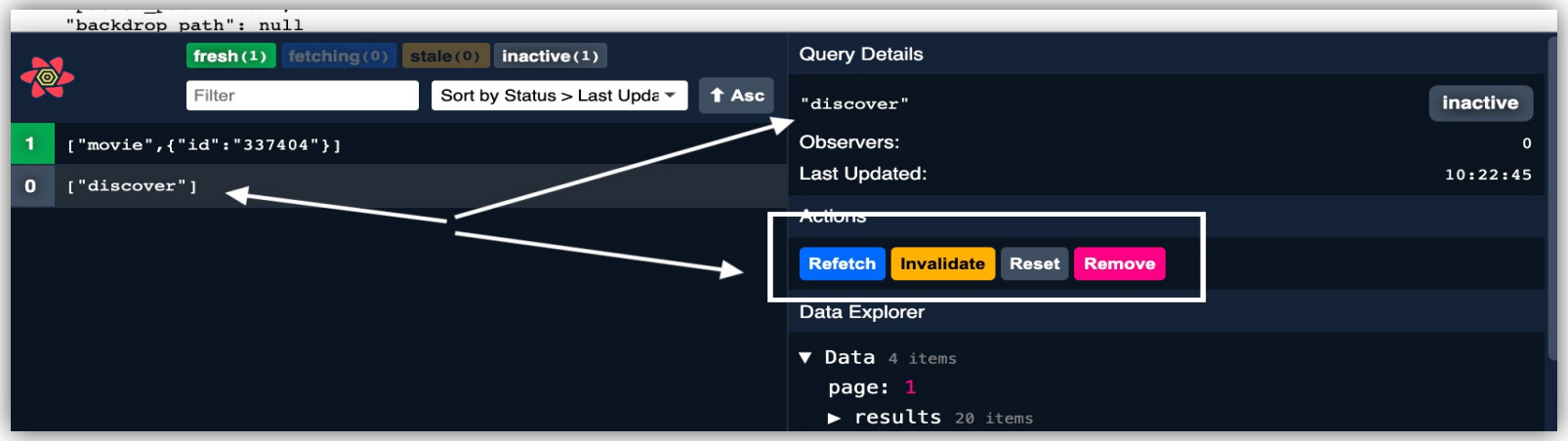
react-query DevTools.

- **Allows us to observe the current state of the cache datastore – great for debugging.**



react-query DevTools.

- **Allows us to <u>manipulate</u> cache entries.**



  - Refresh **– force an immediate re-request of data from theAPI.**
  - Invalidate **– set entry as 'stale'. Cache will request update from web API when next required by the SPA.**
  - Reset **– only applies when app can mutate the API's data.**
  - Remove **– remove entry from cache immediately.**

Summary

- **State Management - The M in MVC**

- **State:**
  1. **Client/App state.**
  2. **Server state.**

- **Cache server state locally in the browser.**
  - **Avoid unnecessary HTTP traffic → Reduce page load time**
  - **Be aware of cache entry** staleness **→ Use TTL to minimize staleness.**

- **The react-query library**
  - **A set of hooks for cache interaction.**