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); 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.**

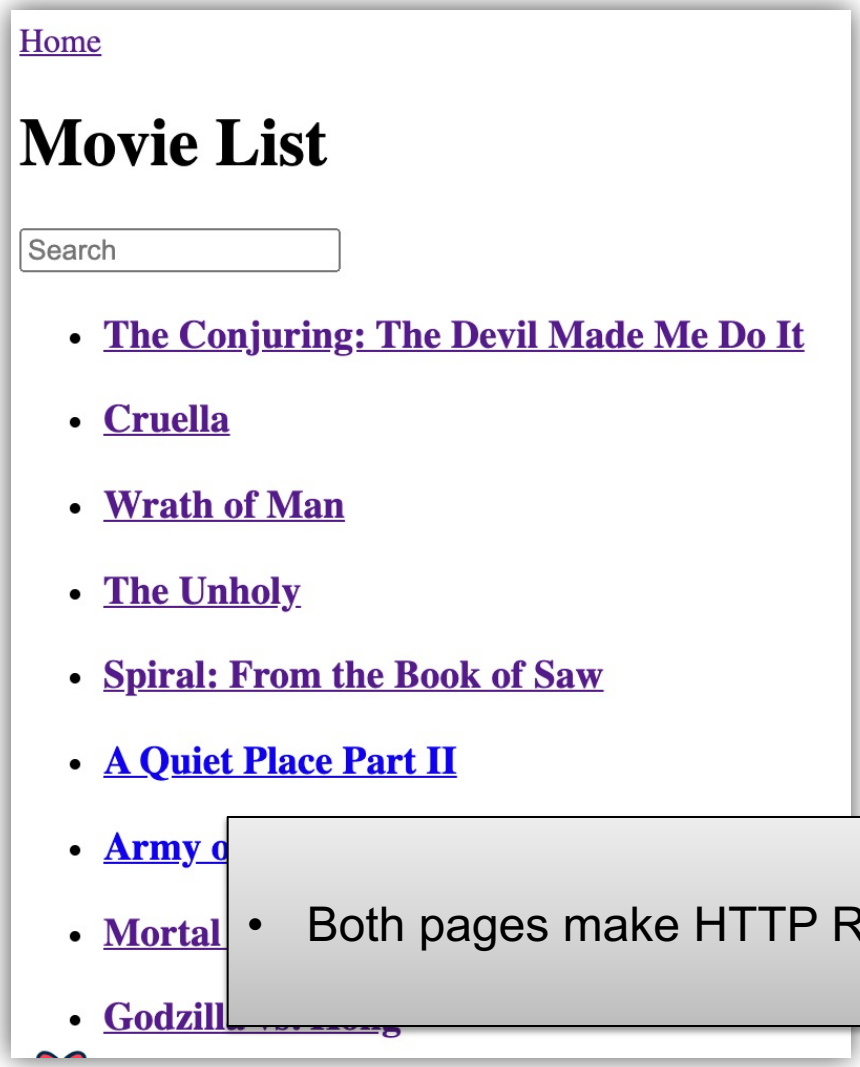
  - **Characteristics:**
    - **Persisted remotely. Shared ownership.**
    - **Accessed asynchronously → Impacts User experience.**
    - **Can change without client's knowledge → Client can be 'out of date'.**
    - useState **+** useEffect **hooks.**

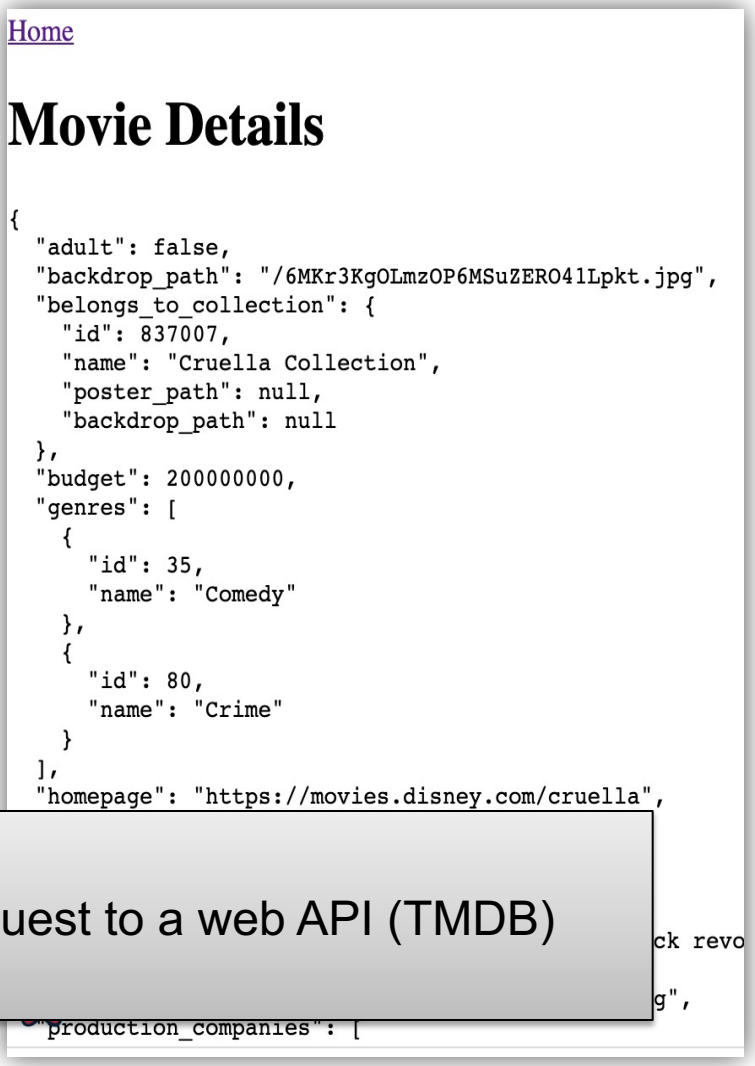
SPA Server State.

- **Server state characteristics (contd.).**
  - **Management options:**
    1. **Private to a 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.**

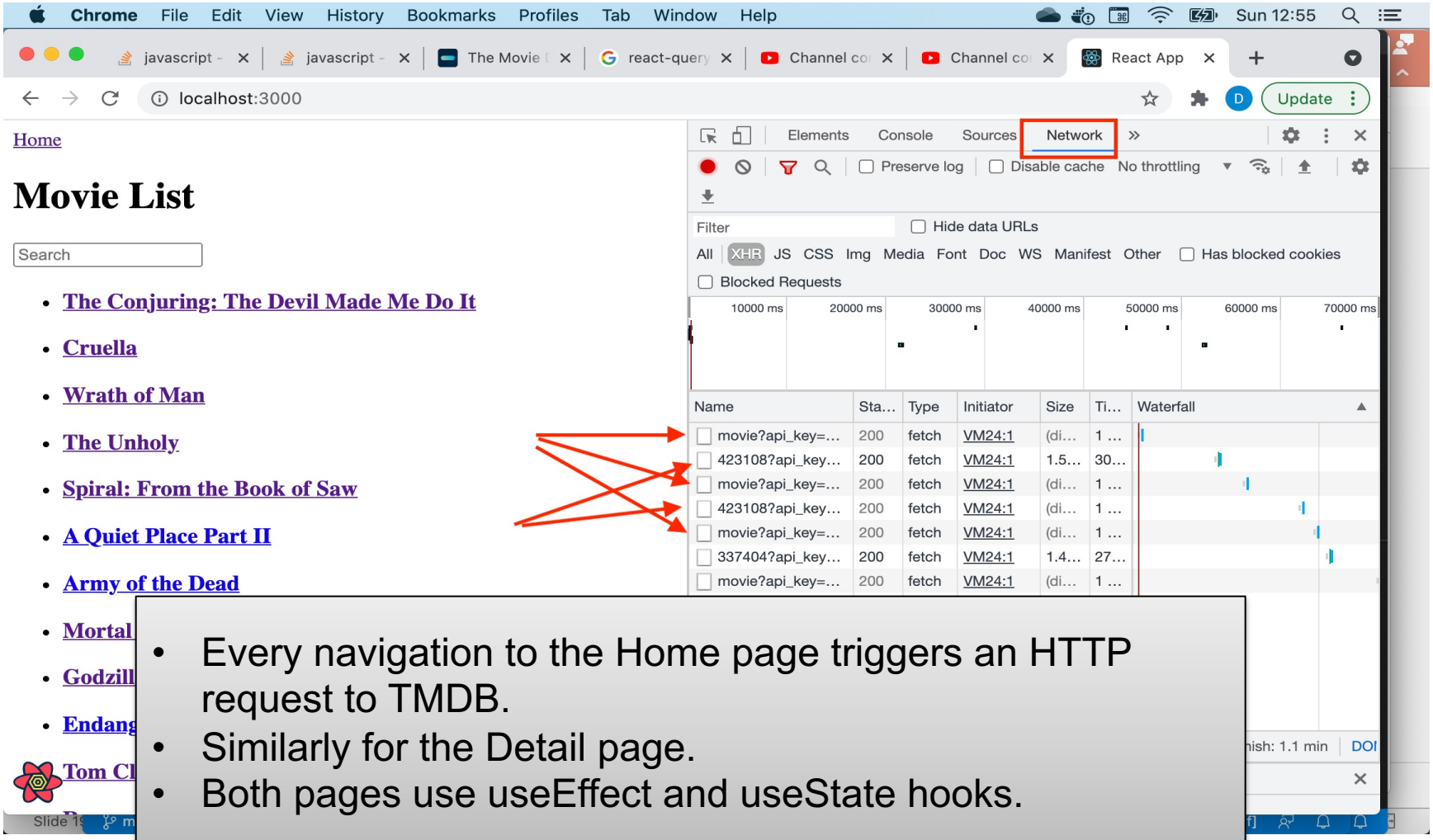
Sample App.





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

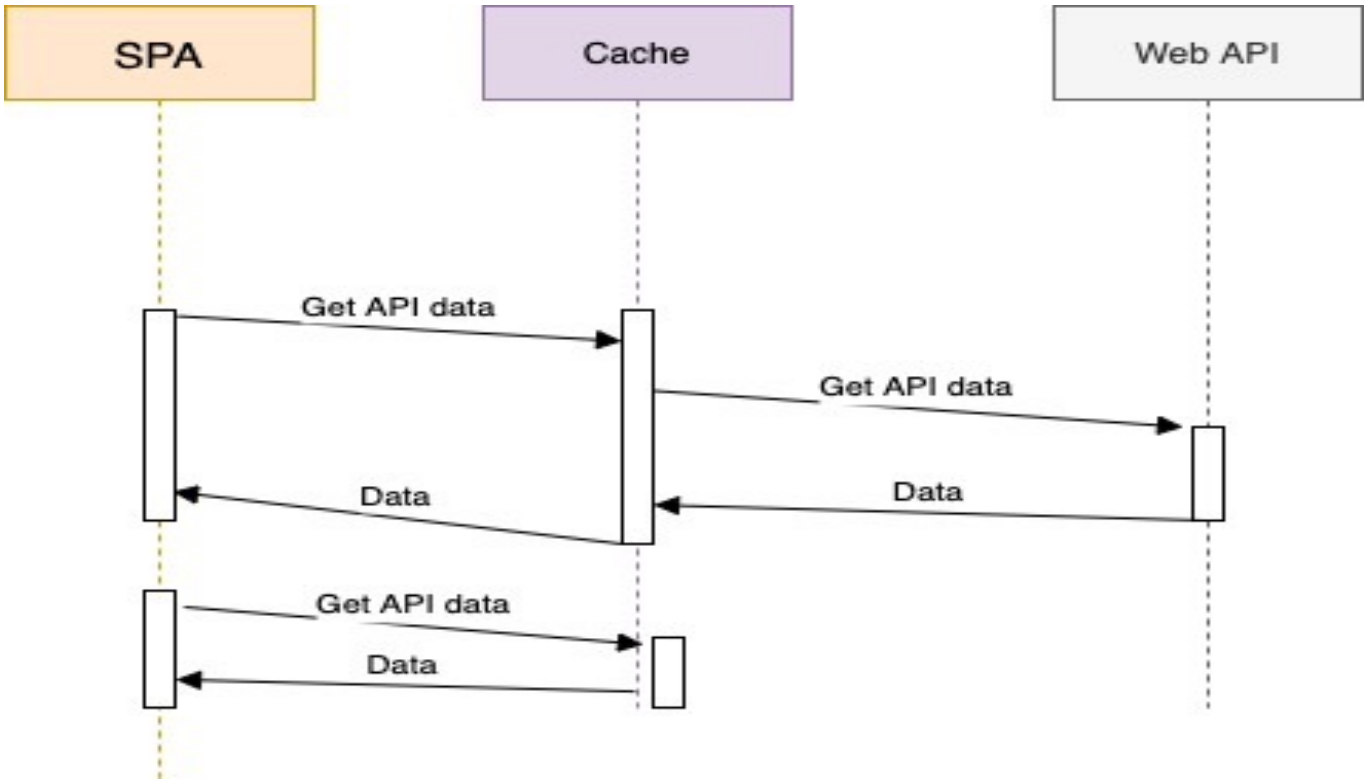
Sample App – The Problem.



- 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 the API data locally in the browser.**
- **Caches are in-memory datastores with high performance, low latency.**
- **Helps reduce the workload on the backend for read intensive workloads.**



Caching (General).

- **Caches are** key-value **datastores.**

  key1: value, key2: value, …….

  - **Keys must be unique.**
  - **Value can be any serializable data type – JS Object, JS 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 should 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 or returned by the API.
  - error – error response from API.
  - isLoading(boolean) – true while waiting for API response.
  - isError (boolean) – true when API response is an error status.

- **It causes a component to re-render on query completion.**
- **It 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: 123456 }],** getMovie);

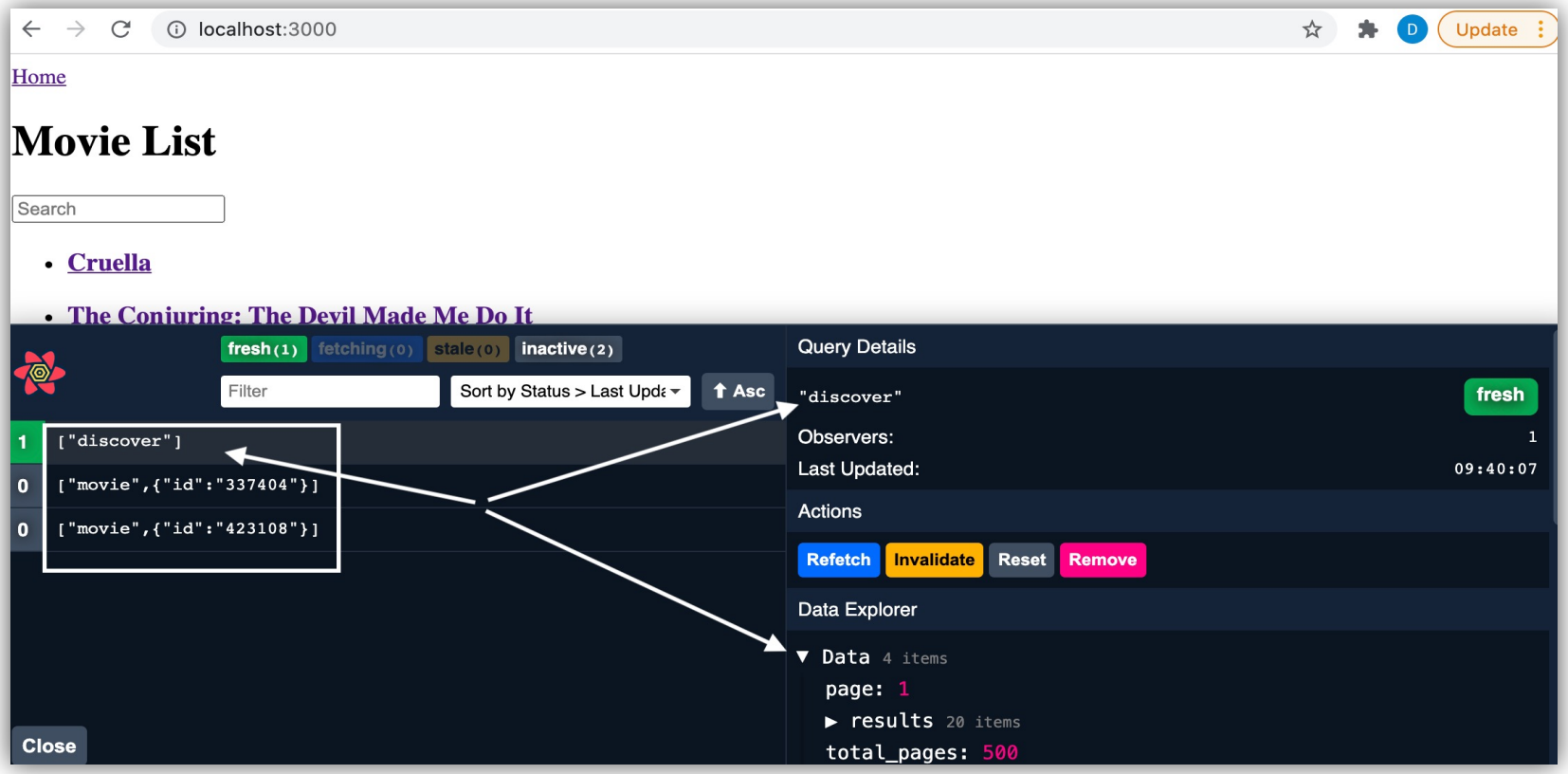
export const getMovie = (**args**) => {

const [prefix, { id: id }] = **args.queryKey**;

…. Do HTTP GET using movie id of 123456

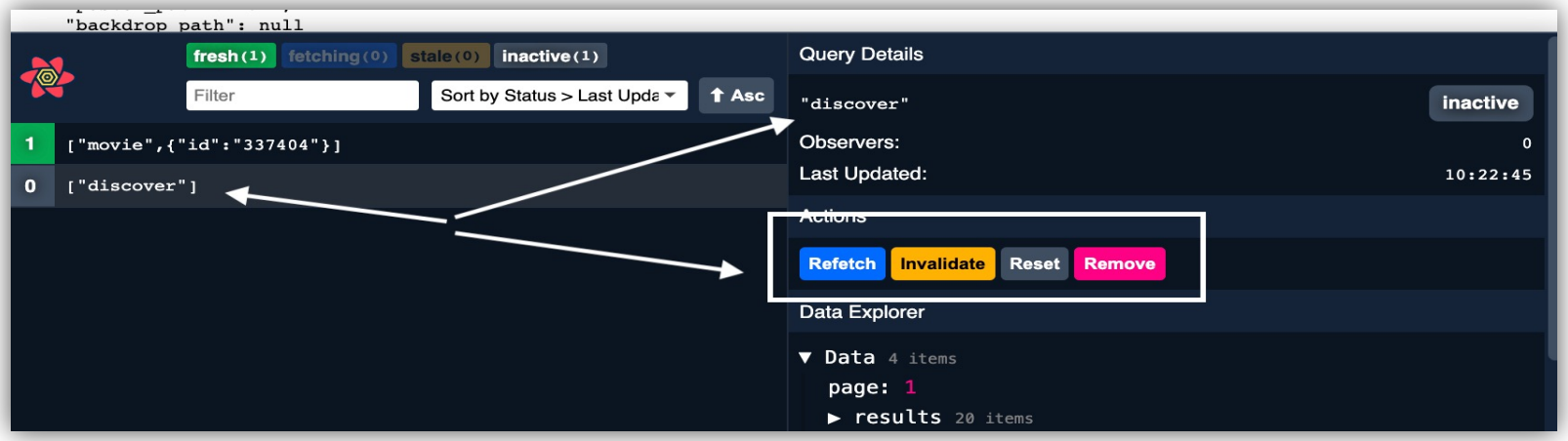
react-query DevTools.

- **Allows us observe the current state of the cache data store – great when debugging.**



react-query DevTools.

- **Allows us manipulate cache entries.**



  - **Refresh – force cache to re-request (update) data from web API immediately.**
  - **Invalidate – Set entry as ‘stale’. Cache will request update from web API when required by the SPA.**
  - **Reset – only applies when app can update 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.**
  - **Reduces unnecessary HTTP traffic → Reduce page loadtime**
  - **Be aware of cache entry staleness → Use TTL.**

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

The End