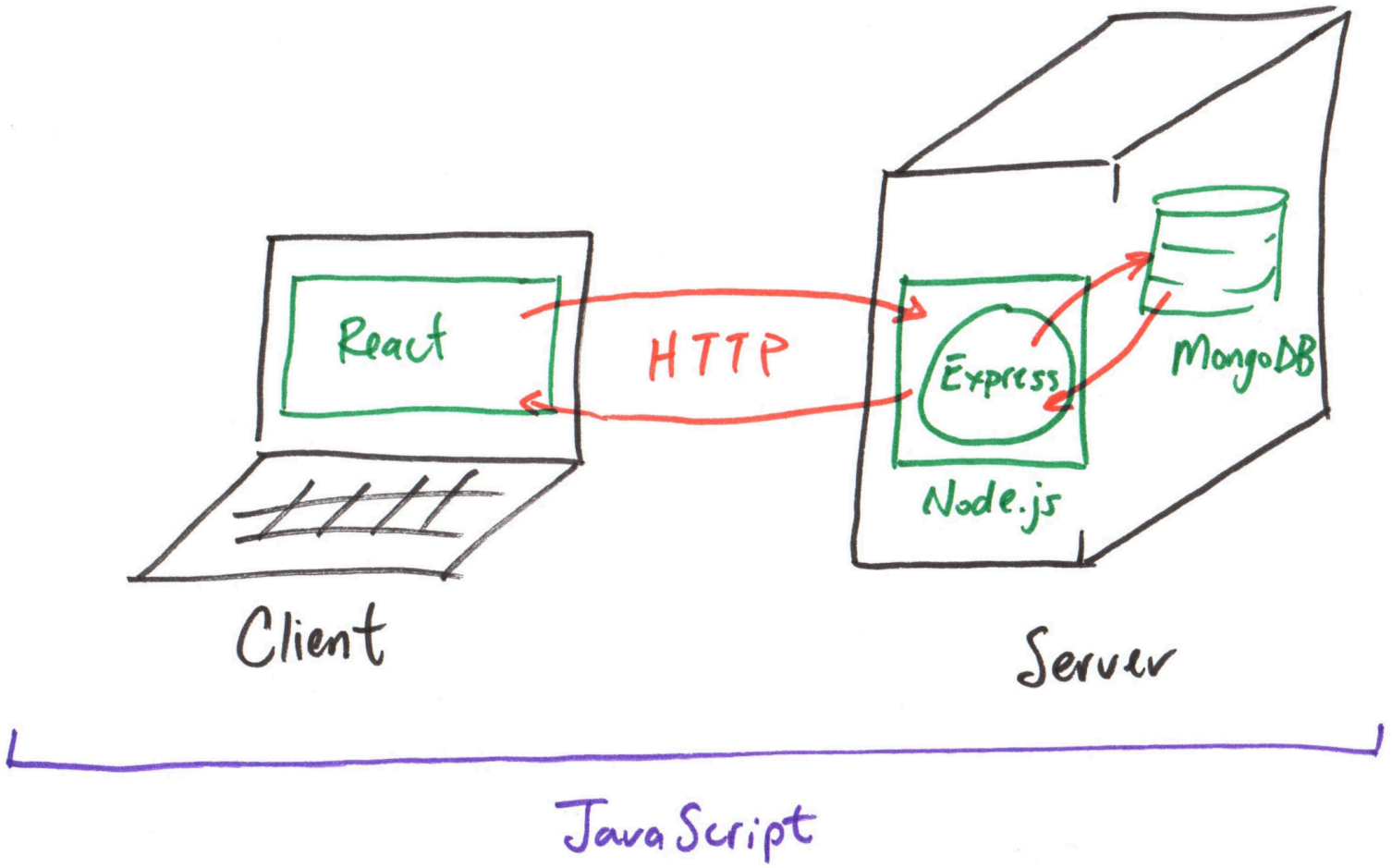
Class 24: Asynchronous Request UX & Debouncing

- Review: Client-Side HTTP Requests
- Asynchronous Request UX Design
- Side Effect Dependencies
- Debouncing

Review

Review: MERN Stack



Review: Asynchronous Client-Side HTTP Requests

Axios is a promise-based HTTP client for the browser and Node.js.

When using making HTTP requests at the top level of a React component, use the **promise fulfillment callback** to receive the response.

```
axios.get("/api/produce", {
  params: {
    category: "fruit"
  }
})
  .then((response) => {
  })
  .catch((error) => {
  })
  .finally(() => {
  })
```

Review: Side Effect Hook

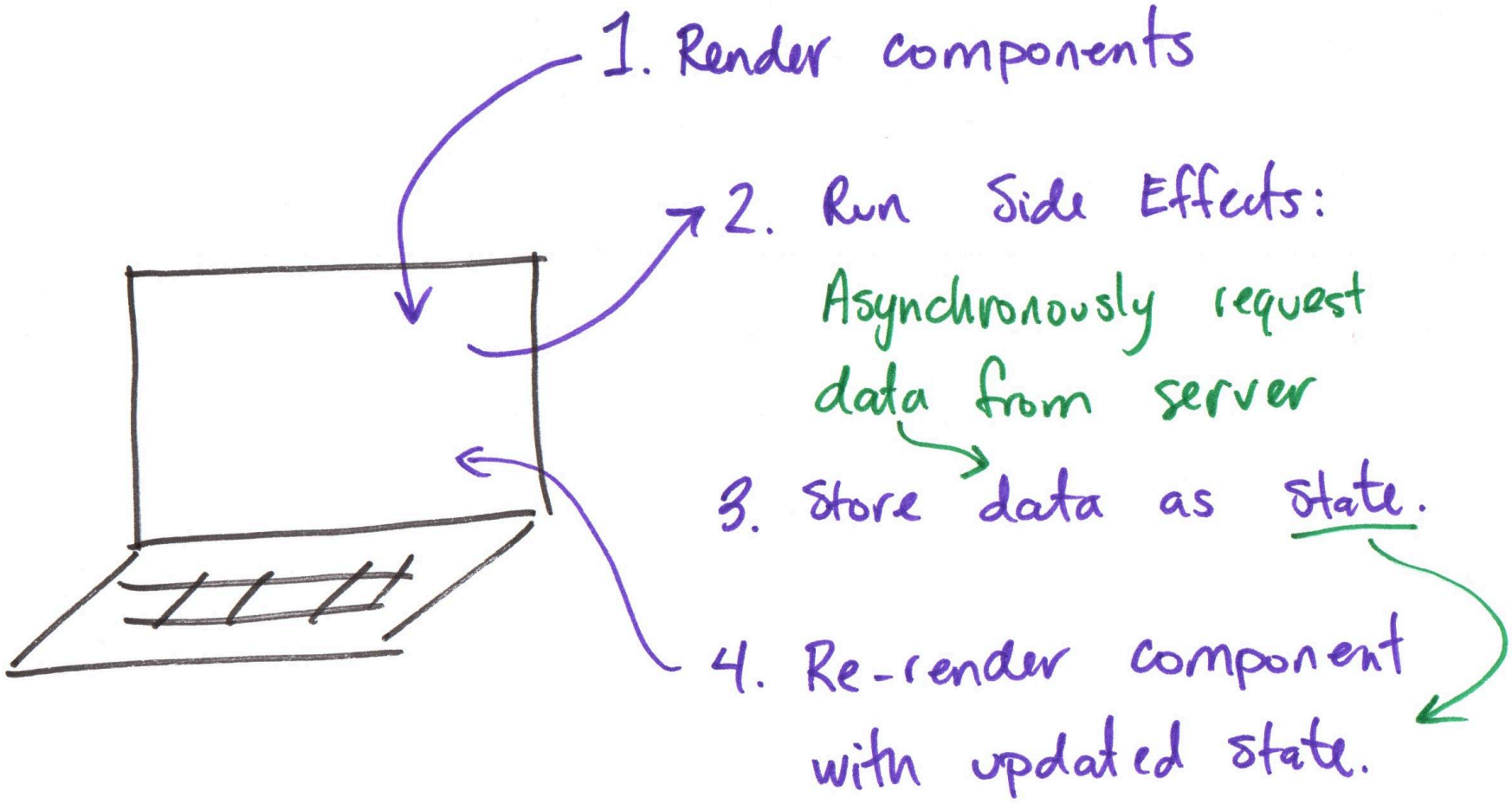
A **side effect** is any operation that interacts with the outside world (e.g., making an HTTP request, manipulating the DOM, setting up a timer).

```
import { useEffect } from "react"

export default function App() {
  useEffect(() => {
    // Side effect code (e.g., HTTP request) goes here
  }, [])

  ...
}
```

Big Picture: Rendering Asynchronous Data



Review: Asynchronous Design Patterns

1. When data is **pending**, show a loading indicator.
    - indeterminate loading indicator
    - skeleton
2. When data is **rejected**, show an error message with a retry option.
3. When data is **fulfilled**, show the data in the UI.

Asynchronous Request UX Design

Activity: Asynchronous UX Design

Working with your peers (2-4), go to the **board** and sketch a design that supports loading the **produce** data (an unordered list) in an SPA with the following states:

1. When data is **pending**, show a loading indicator.
2. When data is **rejected**, show an error message with a retry option.
3. When data is **fulfilled**, show the data in the UI.

Activity: Plan States for Asynchronous UX

Working with your peers (2-4), plan the **states** needed to support the **pending**, **rejected**, and **fulfilled** states for the asynchronous UX on your **handout** (Question **1**).

Then, plan the code to correctly set each state. (Question **2**)

Lastly, your Codespace has an existing design for pending, rejected, and fulfilled states. (We don't have time to implement your design during class.) **Implement your planned code from the handout in the Codespace.** (Only implement the states, not the design.)

Review: Event Handlers Don't Use Side Effects

Event handlers (e.g., `onClick`) run outside of React's rendering process.

```
<button onClick={() => {
  axios.get("/api/produce")
    .then((response) => {
      console.log(response.data);
    });
}}>
  Fetch Produce
</button>
```

Do **not** use a side effect hook (e.g., `useEffect`) in an event handler.

Activity: Plan Retry

Working with your peers (2-4), plan the code to implement a **retry** button that re-attempts to load the produce data when requested by the user on your **handout** (Question **3**).

Side Effect Dependencies

How to Run a Side Effect

A side effect runs **outside** of React's rendering process.

A side effect will run **every time** the component is rendered.

```
useEffect(() => {
  console.log("This runs when the component is rendered.");
})
```

Re-run a Side Effect

A side effect can be re-run if its **dependencies** change.

Side Effect Dependencies are React values (i.e. props, state, etc.) that are **used** by the side effect.

When a dependency's value changes, the side effect will run again.

Side Effect Dependencies

Specify side effect dependencies (i.e. props, state, etc.) in the second argument of `useEffect` as an array.

```
export default function App({ prefix }) {
  const [count, setCount] = useState(0);

  useEffect(() => {
    console.log(prefix + "This runs when the component is rendered and when prefix or count changes.");
  }, [prefix, count])
}
```

`[prefix, count]` is the dependency array for the side effect.

Side Effect Dependencies

Run side effect **every render**:

```
useEffect(() => {})
```

Run side effect only on **initial render**:

```
useEffect(() => {}, [])
```

Run side effect when **prop or state changes** (and on initial render):

```
useEffect(() => {}, [prop1, prop2, state1, state2, ...])
```

Discussion: Event Filtering & Search

For your final milestone (project 2), you will implement **live** search and tag filtering.

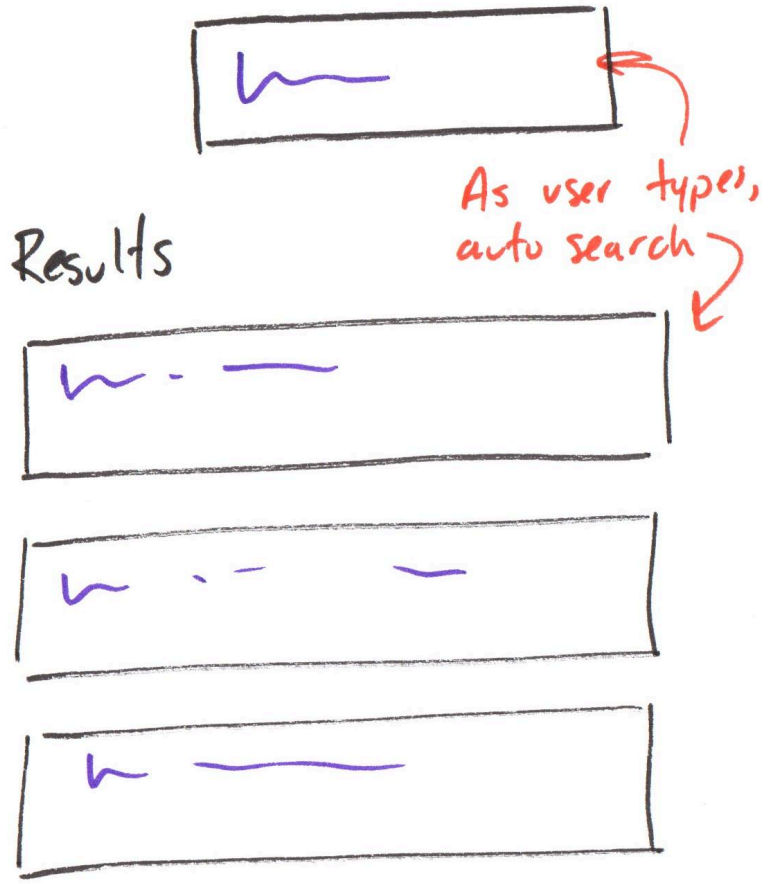
How might you request filtered event data when a user clicks a tag chip?

How might you render the search results when the user types a query into the search bar?

Debouncing

Live Search

A common interactive design pattern employed in SPAs: as the user types a query into a search bar, the search results are updated in real time.



Activity: Live Search HTTP Requests

Working with your peers (2-4), answer **question 4** on your **handout**.

Try the search bar in your Codespace to help you answer the question.

Debouncing

A technique to limit how often a function gets executed.

Debouncing prevents extra activation sor slow functions from triggering too often.

Example:

In a live search, limit sending an HTTP request to the server by only sending the request after the user has stopped typing 500 milliseconds.

Debouncing in React

```
import { useDebounce } from "use-debounce"

...

const [ DEBOUNCED_VALUE ] = useDebounce(VALUE_TO_DEBOUNCE, 500);
```

`DEBOUNCED_VALUE` will only update to the latest value of `VALUE_TO_DEBOUNCE` after `VALUE_TO_DEBOUNCE` has not changed for 500 milliseconds.

Activity: Plan Search Debouncing

Working with your peers (2-4), plan the code to debounce the search query in the search bar on your **handout** (Question **5**).

Then implement the code in your Codespace and lastly answer questions ***6*** and **7** on your handout.

Debouncing Best Practices

- Debounce to minimize expensive operations (e.g., HTTP requests, complex calculations, etc.) that are triggered by user input.
- A delay of 500 milliseconds is a common choice for debouncing user input.
- Use the debounced value (not the original value) to trigger side effects (e.g., HTTP requests).

Summary

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- Provide good UX for asynchronous requests by handling pending, rejected, and fulfilled states.
- Use side effect dependencies to control when a side effect runs.
- Use debouncing to limit how often a function gets executed in response to user input.

Discussion: Class Next Week

How would you like to use class next week?

What's Next

Wednesday: Project 2, Final Milestone released

Friday: *Last* practice problem workshop!