DWA_12 Knowledge Check

To complete this Knowledge Check, ensure you have worked through all the lessons in **Module 12: Declarative Abstractions.**

To prepare for your session with your coach, please answer the following questions. Then download this document as a PDF and include it in the repository with your code.

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1. What are the benefits of direct DOM mutations over replacing HTML? Performance boost:

Direct DOM mutations can offer several performance benefits over replacing HTML:

- **Efficiency:** Direct DOM manipulation is generally more efficient than replacing HTML. This is because updating the DOM directly only changes the specific elements that need to be updated, rather than replacing the entire HTML content.
- **Batching Updates:** Some frameworks, like React, use a Virtual DOM to batch multiple updates together, reducing the number of actual DOM operations and improving performance.
- **Avoiding Full Page Loads:** When you manipulate the DOM directly, you can implement smooth transitions without a full-page load.
- **Order of Operations:** By using promises with DOM mutations, you can ensure that the changes to the DOM are made in the correct order and only after the asynchronous operations have completed successfully. This can help to avoid errors and ensure that your code is more performant and maintainable.
- **Lightweight:** Direct DOM manipulation libraries can be super-fast and lightweight.

However, it’s important to note that while direct DOM manipulation can offer performance benefits, it can also make the code more complex and harder to manage compared to declarative approaches.

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2. What low-level noise do JavaScript frameworks abstract away? Imperative updating of the DOM, keeping track of what elements need to change:

JavaScript frameworks abstract away a lot of the low-level noise that developers would otherwise have to deal with. Here are some of the key aspects:

- **DOM Manipulation:** JavaScript frameworks provide higher-level APIs for interacting with the Document Object Model (DOM), abstracting away the complexities of direct DOM manipulation.
- **Cross-Browser Compatibility:** JavaScript frameworks handle the differences between various browsers and browser versions, providing a consistent API that works across all browsers.
- **Event Handling:** Frameworks provide an abstraction for event handling, allowing developers to attach event listeners in a consistent and efficient manner.
- **Asynchronous Programming:** JavaScript frameworks often include utilities for dealing with asynchronous operations, such as Promises and async/await, which abstract away the complexities of callbacks.
- **State Management:** Many JavaScript frameworks provide a structured way to manage application state, abstracting away the complexities of tracking changes to variables and elements over time.
- **Component-Based Architecture:** Frameworks like React and Vue.js allow developers to build applications as a collection of reusable components, abstracting away the complexities of managing and updating individual DOM elements.

Even though these abstractions can make development easier and more efficient, they also add an additional layer of complexity to the application so It’s important to understand what a framework is doing “under the hood” so it can be used effectively and debug issues when they arise.

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3. What essence do JavaScript frameworks elevate?

JavaScript frameworks elevate the essence of web development in several ways:

- **Interactivity:** JavaScript frameworks help to turn static HTML and CSS into interactive web pages. They allow developers to add distinctive features to web pages, applications, servers, and even games.
- **Efficiency:** JavaScript frameworks provide the basic foundation necessary for building JavaScript applications. This saves developers the effort of starting from scratch by utilizing a functional base to get things rolling.
- **Structure:** JavaScript frameworks define the structure of the entire application. They provide a template for development, which can make the process more efficient and manageable.

- **Abstraction:** JavaScript frameworks abstract away a lot of the low-level noise that developers would otherwise have to deal with, such as DOM manipulation, event handling, and asynchronous programming.
- **Reusability:** Frameworks like React and Vue.js allow developers to build applications as a collection of reusable components.
- **Cross-Browser Compatibility:** JavaScript frameworks handle the differences between various browsers and browser versions, providing a consistent API that works across all browsers.

In essence, JavaScript frameworks elevate the process of web development by providing a structured, efficient, and manageable way to build interactive web applications.

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4. Very broadly speaking, how do most JS frameworks achieve abstraction?
They hide away the imperative DOM mutations

JavaScript frameworks achieve abstraction primarily through the following mechanisms:

- Virtual DOM: Many JavaScript frameworks, such as React, use a concept known as the Virtual DOM.
    - This is an abstraction of the actual DOM, and changes are first made to the Virtual DOM. The framework then calculates the difference between the current Virtual DOM and the new one (a process known as “diffing”) and updates the real DOM efficiently.
- Component-Based Architecture: Frameworks provide a way to encapsulate functionality into reusable components. Each component manages its own state and lifecycle methods, and can be composed to build complex user interfaces.
- Declarative Syntax: JavaScript frameworks often use declarative syntax, which allows developers to describe what the UI should look like for a given state, and the framework takes care of updating the DOM to match that state.
- Event Handling: Frameworks provide an abstraction for event handling, allowing developers to attach event listeners in a consistent and efficient manner.
- Data Binding: Some frameworks, like Angular, provide two-way data binding. This means that changes in the model (e.g., user input) automatically update the view, and changes in the view (e.g., a user action) automatically update the model.

By abstracting away direct DOM manipulation and providing these higher-level concepts, JavaScript frameworks allow developers to focus on the logic of their applications rather than the details of manipulating the DOM.

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5. What is the most important part of learning a JS framework?

The most important part of learning a JavaScript framework is understanding the core concepts that the framework abstracts. Here are some key aspects to focus on:

- **Understanding the Framework's Philosophy:** Each framework has its own way of doing things. Understanding the philosophy behind a framework can help you use it more effectively.
- **Mastering the Basics:** Before diving into advanced topics, it's crucial to have a solid understanding of the basics, such as the framework's syntax, structure, and main features.
- Component-Based Architecture: Understanding how to build applications as a collection of reusable components is a key aspect of many modern JavaScript frameworks.
- **State Management:** Learning how to manage application state is crucial. This includes understanding concepts like props, state, and lifecycle methods in React, or directives and modules in Angular.
- **Routing:** Most single-page applications (SPAs) handle routing on the client side, so understanding how routing works in your chosen framework is important.
- **Asynchronous Programming:** As JavaScript is asynchronous, understanding how to handle asynchronous operations in the context of your chosen framework is vital.
- **Tooling:** Familiarize yourself with the build tools and development environment associated with the framework. This includes package managers like npm or yarn, task runners like Gulp or Grunt, and transpilers like Babel.
- **Testing:** Learning how to test your application is crucial for ensuring code quality and catching bugs before they reach production.

The goal is not just to learn how to use the framework, but also to understand how the framework does what it does. This will make me a more effective developer and enable me to debug issues when they arise.