SNS COLLEGE OF ENGINEERING

Kurumbapalayam(Po), Coimbatore – 641 107

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DEPARTMENT OF COMPUTER SCIENCE AND TECHNOLOGY

Course Code and Name : 19TS601 FULL STACK DEVELOPMENT

Unit 2 : REACT

Topic : React Introduction

ReactJS

- ReactJS is a **component-based** JavaScript library used to build dynamic and interactive user interfaces. It simplifies the creation of single-page applications (SPAs) with a focus on performance and maintainability.
- It is developed and maintained by Facebook.
- Uses a virtual DOM for faster updates.
- Supports a declarative approach to designing UI components.
- Ensures better application control with one-way data binding.

How does React work?

- React operates by creating an in-memory virtual DOM rather than directly manipulating the browser's DOM.
- It performs necessary manipulations within this virtual representation before applying changes to the actual browser DOM

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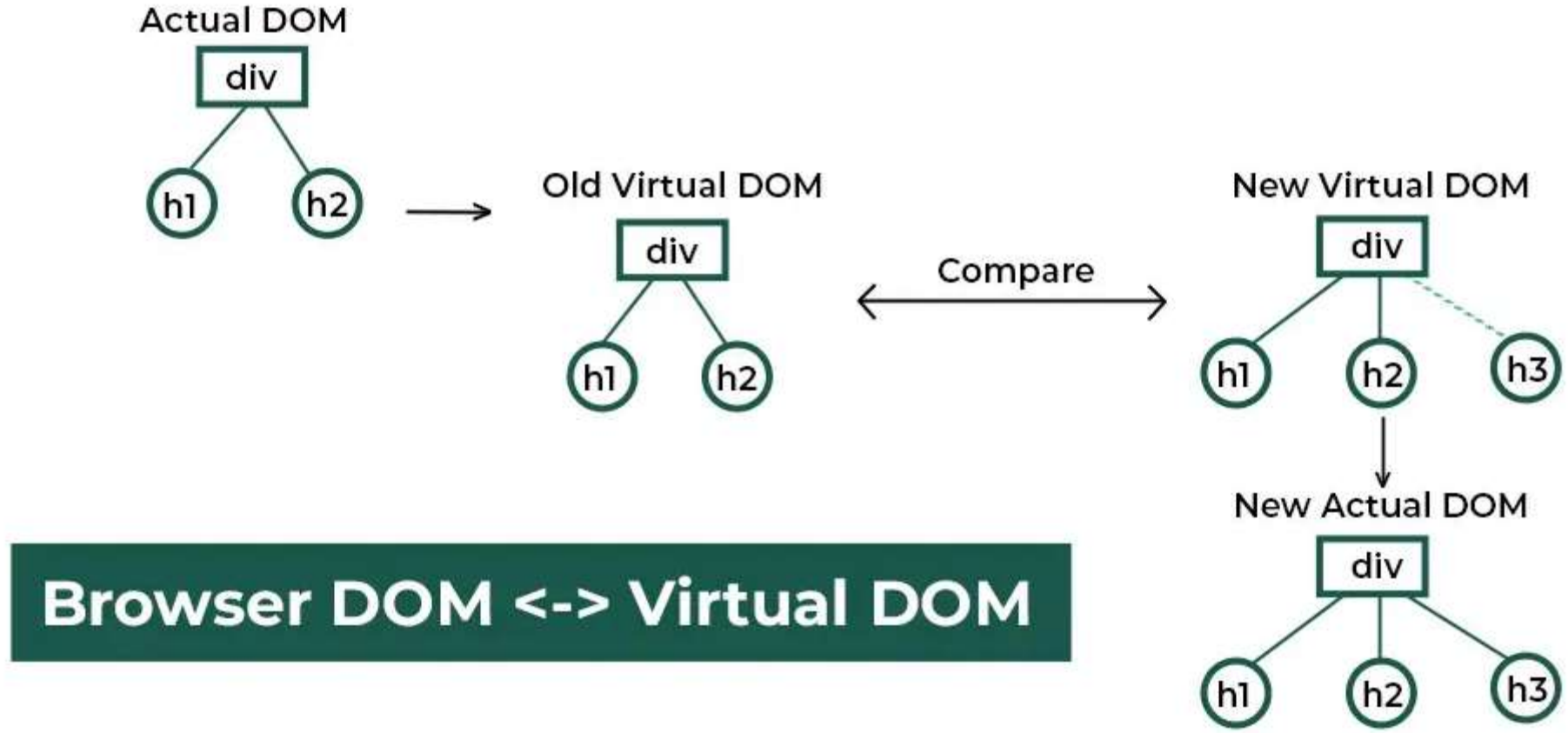

Actual DOM
div
h1
h2
Old Virtual DOM
div
h1
h2
Compare
New Virtual DOM
div
h1
h2
h3
New Actual DOM
div
h1
h2
h3
Browser DOM <-> Virtual DOM

Actual DOM and Virtual DOM

- Initially, there is an Actual DOM(Real DOM) containing a div with two child elements: h1 and h2.
- React maintains a previous Virtual DOM to track the UI state before any updates.

Detecting Changes

- When a change occurs (e.g., adding a new h3 element), React generates a New Virtual DOM.
- React compares the previous Virtual DOM with the New Virtual DOM using a process called reconciliation.

Efficient DOM Update

- React identifies the differences (in this case, the new h3 element).
- Instead of updating the entire DOM, React updates only the changed part in the New Actual DOM, making the update process more efficient.

History of React

- React was developed by Facebook in 2011 to improve the performance of their applications and was officially released as ar open-source library in 2013.
- It was designed to create dynamic, fast, and responsive user interfaces for web applications by focusing on the view layer.
- React introduced concepts like components (reusable UI pieces) and the virtual DOM (a lightweight copy of the real DOM) for optimizing UI updates
- React is now a widely used framework for building modern web a mobile apps, supported by a strong community and major companies

Features of React

- Virtual DOM
- Component-Based Architecture
- JSX (JavaScript XML)
- One-Way Data Binding
- State Management
- React Hooks
- React Router

Features of React

- **Virtual DOM**
- React uses a **Virtual DOM** to optimize UI rendering. Instead of updating the entire real DOM directly, React:
- Creates a lightweight copy of the DOM (Virtual DOM).
- Compares it with the previous version to detect changes (diffing).
- Updates only the changed parts in the actual DOM (reconciliation), improving performance.

Component-Based Architecture

- React follows a **component-based approach**, where the UI is broker down into reusable components. These components:
- Can be functional or class-based.
- Allow code reusability, maintainability, and scalability.

JSX (JavaScript XML)

- React uses **JSX**, a syntax extension that allows developers to write HTML inside JavaScript. JSX makes the code:
- More readable and expressive.
- Easier to understand and debug.
- **One-Way Data Binding**
- React uses one-way data binding, meaning data flows in a single direction from parent components to child components via props. This provides better control over data and helps maintain predictable behavior.

State Management

- React manages component state efficiently using the useState hook (for functional components) or this.state (for class components).
- State allows dynamic updates without reloading the page.

React Hooks

- Hooks allow functional components to use state and lifecycle features without needing class components. Common hooks include:
- **useState:** for managing local state.
- **useEffect:** for handling side effects like API calls.
- **useContext:** for global state management.

React Router

- React provides React Router for managing navigation in single-page applications (SPAs).
- It enables dynamic routing without requiring full-page reloads.

- React leverages ES6 (ECMAScript 2015) features to enhance the development experience, making it more efficient and structured.
- The key ES6 concepts that are particularly beneficial when working with React.

What is ES6?

- ES6, or ECMAScript 2015, is a significant update to the JavaScript language that introduced new syntax and features aimed at improving code readability and maintainability.
- It includes enhancements like classes, modules, arrow functions, and destructuring, which are extensively utilized in React applications

Key ES6 Features in React

- Classes
- Arrow Functions
- let and const
- Destructuring
- Modules
- Spread Operator
- Ternary Operator

- Classes
- A class is a type of function, the keyword class, and the properties are assigned inside a constructor() method.
- The class name. We have begun the name, "Car", with an uppercase character. This is a standard naming convention for classes.
- The constructor function is called automatically when the object is initialized.
- The method by referring to the object's method name followed by parentheses (parameters would go inside the parentheses).

```
<html>
<body>
<script>
class Car {
  constructor(name) {
    this.brand = name;
  }
  present() {
    return 'I have a ' + this.brand;
  }
}
const mycar = new Car("Ford");
document.write(mycar.present());
</script>
</body>
</html>
```

Output:
I have a Ford

```
<html>
<body>
<h1>Regular Function</h1>
<p>The <strong>this</strong> keyword represents different objects depending on how the function was called.</p>
<button id="btn">Click Me!</button>
<p><strong>this</strong> represents:</p>
<p id="demo"></p>
<p>See the difference before and after the button is clicked.</p>
<script>
```

```
class Header {
  constructor() {
    this.color = "Red";
  }
  changeColor = function() {
    document.getElementById("demo").innerHTML += this;
  }
}
const myheader = new Header();
window.addEventListener("load", myheader.changeColor);
document.getElementById("btn").addEventListener("click", myheader.changeColor);
</script>
</body>
</html>
```

- Arrow Functions: If the function has only one statement, and the statement returns a value.
- The handling of this is also different in arrow functions compared to regular functions.
- In short, with arrow functions there is no binding of this.
- In regular functions the this keyword represented the object that called the function, which could be the window, the document, a button or whatever.
- With arrow functions, the this keyword *always* represents the object that defined the arrow function.

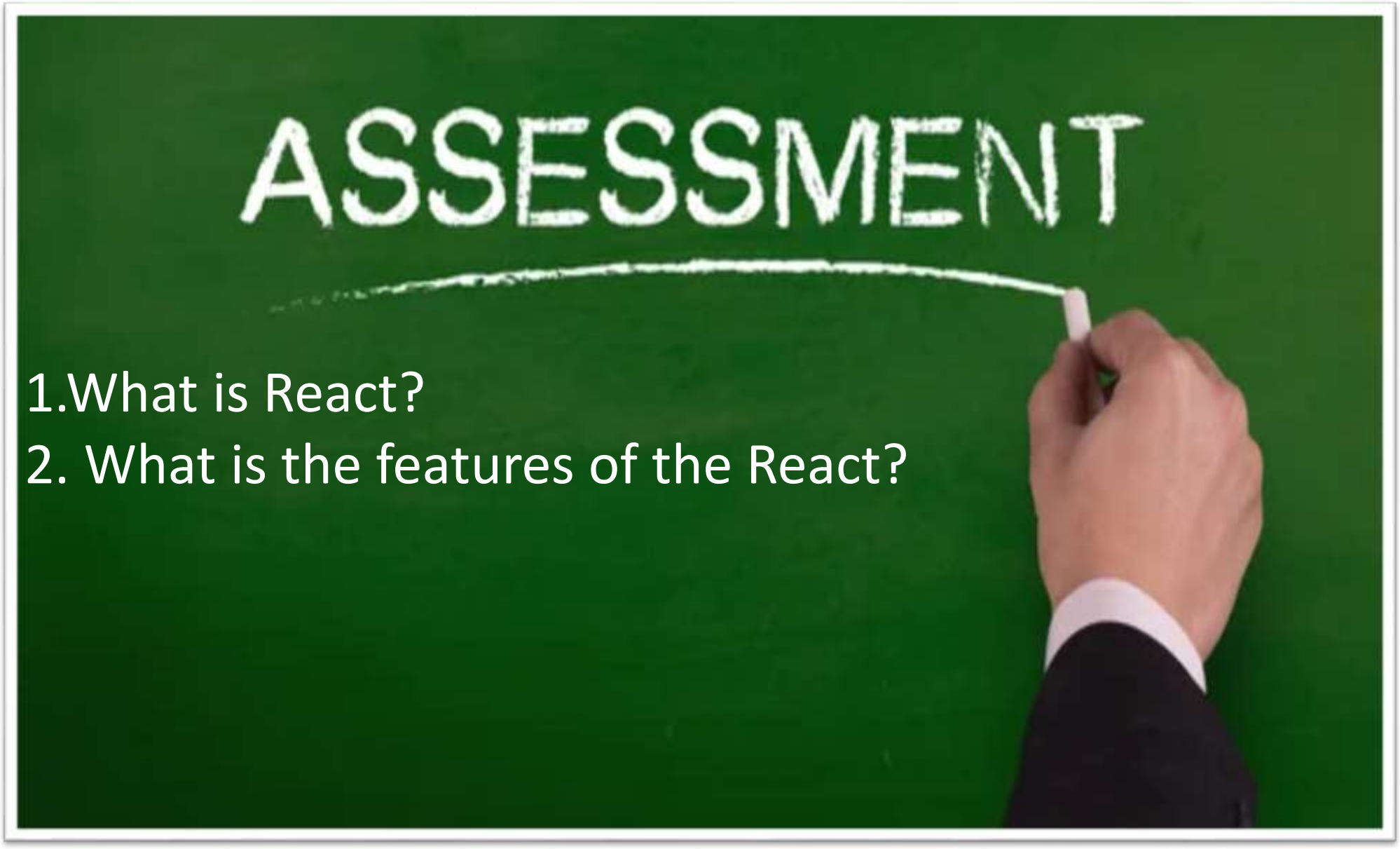
•let and const: These keywords allow for block-scoped variable declarations. const is used for constants that should not change, while let is used for variables that may be reassigned.

•Destructuring: This feature simplifies the extraction of values from objects and arrays. In React, destructuring is commonly used to extract props and state values, enhancing code clarity

•Modules: ES6 modules enable developers to organize code into separate files, making it easier to manage complex applications. Components can be exported and imported between files seamlessly.

•Spread Operator: The spread operator (...) allows for easy copying and merging of objects and arrays. It is useful in React for passing props or updating state without mutating the original data.

•Ternary Operator: This operator provides a shorthand for conditional rendering in JSX, making it easier to display different components based on conditions



1.What is React?

2. What is the features of the React?

Text Book:

1.Pro MERN Stack, Full Stack Web App Development with Mongo, Express, React, and Node, Vasan Subramanian, A Press Publisher, 2019.

Reference:

David Flanagan, “Java Script: The Definitive Guide”, O’Reilly Media, Inc, 7 th Edition, 2020

2. Matt Frisbie, “Professional JavaScript for Web Developers” Wiley Publishing, Inc, 4th Edition, ISBN: 978-1-119-36656-0, 2019


Thank
You!