MERN-TECHNOLOGY

INTRODUCTION

WHAT IS FULL STACK DEVELOPMENT?

Full stack development refers to the end-to-end application software development, including the front end and back end. The front end consists of the user interface, and the back end takes care of the business logic and application workflows.

WHAT IS A FULL STACK DEVELOPER AND WHAT DO THEY DO?

Full stack developers must have knowledge of an entire technology stack, i.e., the set of technologies that are used to build an end-to-end application quickly and efficiently. For example, if they want to build an application using the MERN stack, they should know how to work with MongoDB, Express, React and Node.

Full stack developers should be able to judge whether the selected technologies are the right choice for their project during the early phases. Some responsibilities of a full stack developer are to:

- Help in choosing the right technologies for the project development and testing both on the front end and the back end.
- Write clean code across the stack by following the best practices of the tools used.
- Be up to date with the latest technologies and tools to make the best technology usage decisions.

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MERN STACK

MERN Stack is a collection of powerful technologies and robust, used to develop scalable master web applications comprising **backend, front-end,** and **database components**. It is JavaScript that is used for the faster and easier development of full-stack web applications. MERN Stack is a technology that is a user-friendly full-stack JavaScript framework for building applications and dynamic websites.

MERN Stack consists of four main components or can say four main technologies:

1. **M** stands for **MongoDB (Database),** mainly used for preparing document database and is a NoSQL (Non-Structured Query Language) Database System
2. **E** stands for **Express,** mainly used for developing Node.js web framework
3. **R** stands for **React,** mainly used for developing a client-side JavaScript framework
4. **N** stands for **Nodejs,** mainly used for developing the premier JavaScript web server

Each of these four technologies plays an important role in providing an end-to-end framework for the developers. Even these four technologies play an important role in the development process of web applications.

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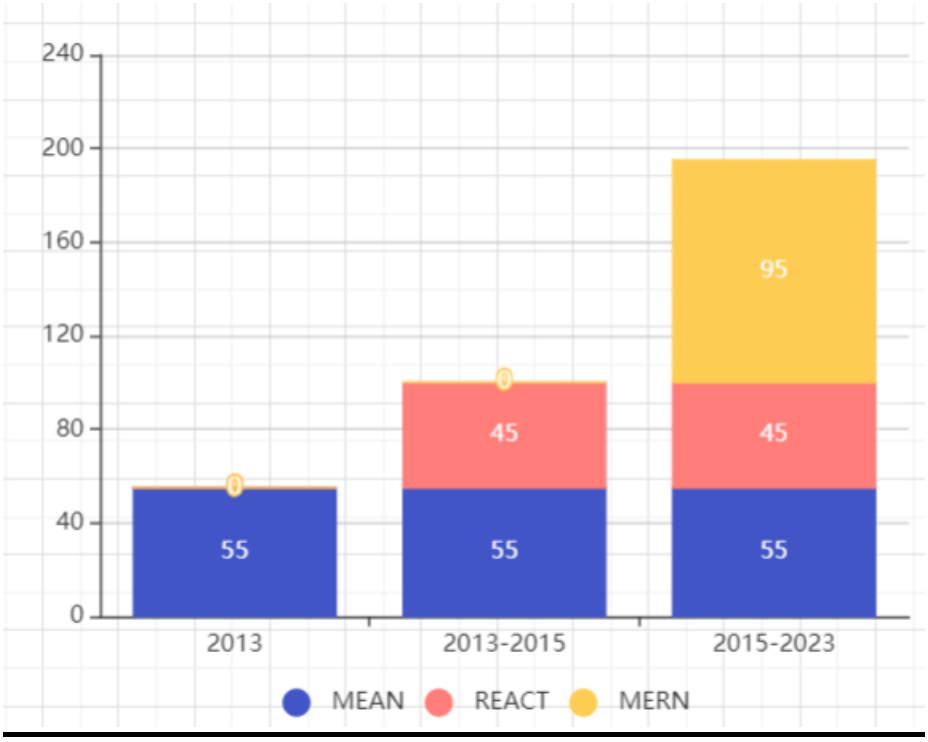
A HISTROY OF MERN STACK

The individual elements of the MERN stack were each developed separately to address different development tasks commonly associated with JavaScript. Node.js was developed in 2009 to serve as a scalable run-time framework for running JavaScript code outside a web browser. Express.js was developed over a year later to serve as a de-facto server framework for Node.js applications. MongoDB was developed in 2009 to create a JavaScript native database documentation framework. React was introduced in 2013 as a framework for building and repurposing component UI elements.

MERN is a modification of the previously popular MEAN stack, which utilizes Angular.js rather than React



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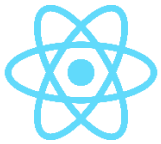
COMPONENTS OF MERN STACK

1. **MongoDB:** MongoDB is a NoSQL database that stores data in a flexible, JSON-like format called BSON (Binary JSON). It is designed to be scalable and can handle large amounts of data. MongoDB is often chosen for its flexibility, ease of use, and ability to handle unstructured data.

2. **Express.js:** Express.js is a web application framework for Node.js, designed to simplify the process of building robust, scalable web applications and APIs. It provides a set of features for building web and mobile applications quickly with Node.js.

3. **React:** React is a JavaScript library developed by Facebook for building user interfaces. It allows developers to create reusable UI components and manage the state of an application efficiently. React uses a virtual DOM (Document Object Model) to optimize rendering and update only the necessary parts of a page, which improves performance.



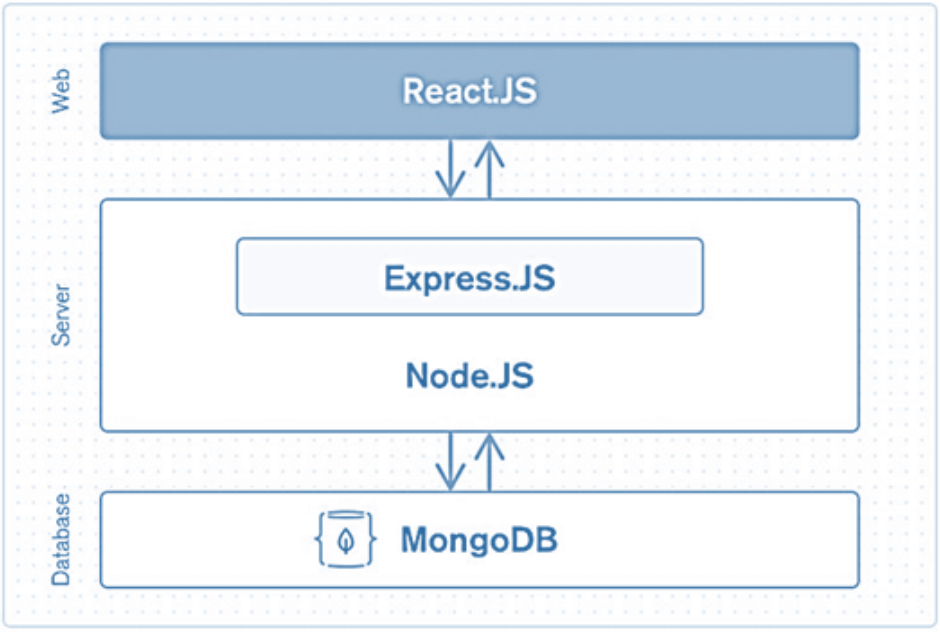
4. **Node.js:** Node.js is a server-side JavaScript runtime built on the V8 JavaScript engine. It allows developers to use JavaScript for server-side scripting, enabling the development of scalable and high-performance web applications. Node.js is event-driven and non-blocking, making it suitable for handling concurrent requests.

ARCHITECTURE OF MERN STACK

MERN has a 3-tier Architecture system mainly consisting of 3 layers -

These layers are as follows:

1. Web as front-end tier
2. Server as the middle tier
3. Database as backend tier



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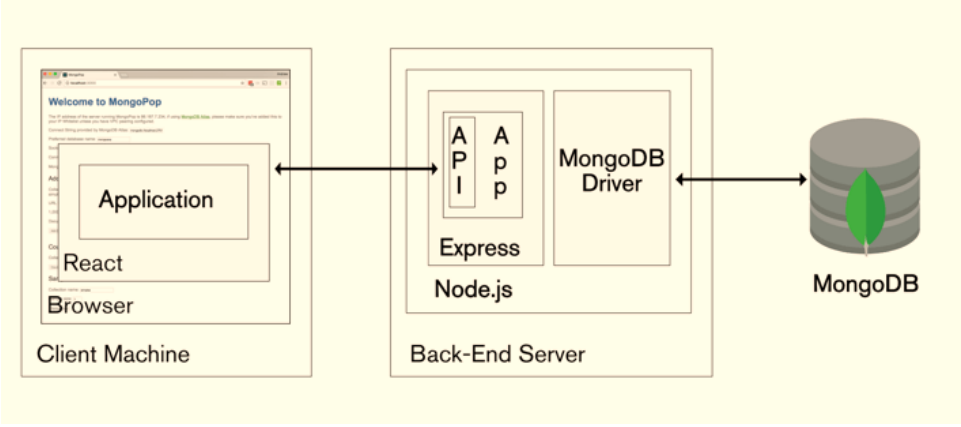
i. **Web or front-end tier -** The top tier of the MERN stack is mainly handled by React.js. It is one of the most prominent used open-source front-end JavaScript libraries used for building Web applications. It is famous for creating **dynamic client-side applications**. React will help you construct complex interfaces by using single components. It also connects those complex interfaces to data available on the backend server. React is used to create mobile applications (React Native) and web applications. React allows the reusability of code and can easily support it, which has many benefits and is much time saver. It permits users to create large web applications that can easily change the data of the page even without reloading the page.

ii. **Server or middle-tier -** It is just next level from the top layer and is mainly handled by two components of the MERN stack, i.e., **Express.js** and **Node.js.** These two's components handle it simultaneously because Express.js maintained the Server-side framework, running inside the Node.js server. Express.js is one of the widely used backend development JavaScript Frameworks. It allows developers to spin up robust APIs (Application Programming Interface) and web servers much easier and simpler. It also adds helpful functionalities to Node.js HTTP (**HyperText Transfer Protocol**) objects. Whereas on the other hand, Node.js plays a very important role in itself. It is an open-source server environment, and it is a cross-platform runtime environment for executing JavaScript code outside a browser. Node.js continuously uses JavaScript; thus, it's ultimately helpful for a computer user to quickly create any net service or any net or mobile application.



iii. **Database as backend tier -** It is one of the most important levels of the MERN Stack and is mainly handled by MongoDB; the main role of a database is to store all the data related to your application, for example - **content, statistics, information, user profiles, comments** and so on. It mainly stores all the data for **safety purposes**. It maintains a proper record, which usually returns the data to the user whenever required. It mainly stores the data in the database. It generates two or more replica files of the data so that whenever the system fails, it can retrieve the exact information or data that the user wanted earlier. It implies that MongoDB is not based on the table-like relational database structure. On the other hand, it provides an altogether different mechanism for the retrieval and storage of data. **Mongo DB** is the most popular NoSQL (NoSQL or Non Structured Query Language) database, an open-source document-oriented database. The term 'NoSQL' typically means a non-relational database that does not require a fixed schema or proper relational tables to store the necessary data in it. MongoDB stores the data in a different format other than the relational tables, consisting of rows and columns.

ADVANTAGES & DISADVANTAGES IN MERN

Advantages

1. Performance and UI Rendering

When it comes to UI layer abstraction, React development is the best. Because React is just a library, you have complete control over building your app and organizing your code. As a result, it outperforms Angular in terms of UI rendering and performance.

2. Budget-Friendly

Because the MERN Stack only uses one language, JavaScript, it will be more cost-effective to hire JavaScript experts rather than different specialists for different technologies. This decision will save both time and money.

3. Free and open-source software

All of the technologies used in MERN are open-source. This feature allows a developer to use open portals to answer questions during development. As a result, a developer will benefit from it.

4. Switching between client & server is simple

MERN is simple and quick because everything is written in the same language. It’s also simple to switch between client and server modes.

Disadvantages

1. Efficiency

Because React is merely a library, it makes extensive use of third-party libraries, lowering developer productivity. In addition, the React code will require more effort due to this upgrade.

2. Applications at a Large Scale

Doing a large project with many developers becomes difficult with MERN. The MERN stack best serves Single-page applications.

3. Large Bundle Sizes

React applications tend to generate large JavaScript bundles, resulting in longer load times for users, especially on slower connections. This can adversely affect the user experience, and developers need to employ optimization techniques like code splitting to mitigate this problem.

4.Security Concerns

Like any technology stack, the MERN Stack is not immune to security vulnerabilities. Developers need to be vigilant about implementing security best practices, especially when dealing with user authentication, data validation, and API security.

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