

# Tech Stacks in Web Applications; Overview and Analysis

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**Abstract:** A technology stack is important for creating and building easy to maintain scalable web applications. This research paper tells us about tech stacks and its various models that are used in the development of web applications. It will guide us through the combinations of frameworks, programming languages, database ecosystems, frontend and backend technologies. It will describe how and why new tech stacks have emerged with time indicating their use. By comparing different tech stacks it will help us plan, analyze, evaluate, develop and maintain the product specifications using platforms and technology. So, this will help differentiate and analyze the technology stack which will be suitable for the web application creation process.

**Keywords:** Application, Web, Technology, Development

## 1. Introduction

A stack considered to be a pile of objects which are arranged one over the other. A tech stack or a technology stack is a set of technologies that are used together to build an application. The type of technology stack that one chooses determines the type of applications one can build and the level of customizations the application can perform. It is important to know the resources needed to develop an application as choosing the right tech stack will result in developing apps faster and more efficiently. Since technology is rapidly increasing, new combinations of these frameworks are emerging. But to the core every tech stack has the same order. A standard tech stack model contains the browser, where the client interacts with the application. It can be through a mobile, computer or any other platform. Different programming languages and frameworks can be used to build the application's frontend with the backend. Then there is a database which stores all the information of the user's data. The web server software manages all the web server site files and responds to all requests made by web browsers [1]. And in the bottom is the operating system which manages the application program and the computer. However, a modern tech stack includes more components than usual as users have significantly increased. It might include tools for containerization, performance monitoring, business intelligence, event processing, data lakes, cloud services, microservices, and analytics [2].

## 2. Web Application Architecture

First is the UI (User interface) which is the interaction between human and device. It is the whole visual medium that is visible to the user. The process of UI includes wireframing, creating mockups and a final prototype. A special designing software is used to create the UI which is often mixed with UX (User experience). Every web application has the fundamental HTML and CSS as its backbone. Second are programming languages which contains all the logic that a web application uses. Be it the user experience, controlling the frontend and backend or simply interacting with the database. Programming languages plays a crucial role in building and developing an

application and one might need to select which one works best according to the requirements of the application. Third is the frontend which contains all the software that is part of the user interface. JavaScript is used in frontend website development. But, making a web application can be possible by using one of its frameworks. Fourth is backend which is basically the layer below the frontend. It allows us to interact with the computer program, frontend and database. It cannot be accessed by any user interacting with the application. Any programming language and its frameworks can be used for the backend web application. Fifth is a database. It is used for storing, maintaining and accessing any sort of data. They collect information on people, places or things. That information is gathered in one place so that it can be observed and analyzed. Databases can be thought of as an organized collection of information [3]. Sixth are servers. A web server requests http from a client through a browser and transfers it to the database of the application for the requested information. It is also responsible for the response. There are various robust web servers available. Finally, there are many other components which form up the whole web application like APIs, analytic tools, business intelligence tools, microservices, cloud apps etc. This can increase the productivity and efficiency of an application.

## 3. Advantages of Using a Tech Stack

Whenever a full-fledged application is developed, a lot of people are involved in the agile process. Choosing the right frameworks, databases and technologies which scale properly during the initial phase will save a lot of time. One can easily hire a full stack developer who is proficient in both frontend and backend of the application which speeds up the development process. Even hiring someone who is familiar with a particular technology and assigning a technology to a team can be very useful. It also becomes easier for developers to communicate and build the application. A tech stack can also save huge costs as the size of the web application can be controlled by the complexity of the stack and avoiding technologies which are not required. This removes all the bulk resources.

#### 4. Choosing the Right Tech Stack

When choosing a tech stack, the web application should always provide fast and good experience to the users who are interacting with it. The web application should fetch and organize the information efficiently. If the demand of application grows which means more users, then it should scale properly as well. So, in a nutshell, the right set of technologies have to be cost effective, scaled properly, seamless in its frontend user interaction and fast during application development. If a web application is single paged, then selecting a lightweight technology would be ideal. But a web app with a lot of functionalities might require tools, frameworks, different workflows and integration between systems. In the modern day, hybrid apps are also suitable as it will be accessible to mobile users also. A good user experience and interaction is the key to attract more traffic on the web app. Choosing tools and design software that will be most effective should be an ideal choice for the design team. If a content-based web app has to be developed then selecting a technology which can support server-side rendering results to be beneficial. Choosing a popular technology that has well developed community can help during an issue in the development process. A technology which is about to become obsolete or is not well known can be bad for the application as there will be not many developers to hire and since its communities will be small. This means testing and debugging might become hard. Scalability can be both horizontal and vertical. Horizontal scalability outlines the app's versatility for use on different devices and with an increasing number of uses. [4]. Usage of cloud services reduces costs of deployment and maintenance as using advanced deployment tools might require developers with a lot of experience and high salary. Security should also be one of the major concerns before the development process begins. Even the type of business and product matters when selecting the technologies.

#### 5. Modern Technologies

The frontend consists of HTML, CSS and JavaScript. Popular frontend design frameworks are Tailwind and Bootstrap. Frontend technologies that are used to convert the website into a web app are Angular, React and Vue. These all are created from JavaScript itself. Popular programming languages that are used includes JavaScript, Python and Java. Someone proficient in one of these languages can chose its framework for the backend. Node and Express for JavaScript. Django and Flask for Python. Spring Boot for Java. Some other backend technologies such as Ruby on Rails and PHP. Databases are important. Popular Relational Database Management Systems includes MySQL and PostgreSQL. Popular NoSQL is MongoDB. For large web apps infrastructure comes handy. This includes Microsoft Azure, Google Cloud and AWS. For DevOps virtualization, automation and version control is crucial. Kubernetes, Docker, Chef, Jenkins and Git are some modern DevOps tools used. The combinations of these technologies can make a tech stack such as MEVN, MERN and MEAN which are the most popular JavaScript web applications currently. Similarly, some other combinations LAMP (Linux, Apache Server, MySQL and PHP), Python Full Stack, Java Full Stack and custom selection of tools are also used.

#### 6. Comparing JavaScript Frontend Technologies

The JavaScript full stack is developed using MERN, MEVN or MEAN. Here MongoDB, Express and Node are in common. Only the frontend technologies are changing which are React, Vue and Angular. Hence, it is important to differentiate them. First, we have React. It was founded by Facebook. It uses JavaScript XML and virtual document object model. It is the most popular currently. It provides a great user experience and better capabilities for testing. It is used by companies like Instagram, Netflix, Udemy and WhatsApp. Second, we have Vue. It was founded by Evan You. It uses JavaScript and virtual document object model. It is User-friendly, easy to learn, highly scalable, versatile and well-documented. It is used by GitHub, Alibaba and 9gag. Finally, we have Angular. It was founded by Google. It uses TypeScript and real virtual document object model. It provides easy error handling and high performance. It is good with error handling and provides a higher performance. It is used by companies like Forbes, Nike and Telegram.

#### 7. Comparing Popular Backend Technologies

First is Ruby on Rails. It has very fast backend development and easy for test automation. Second is Express and Node. It is good for creating application programming interfaces, is simple and flexible as the whole web application will be created using JavaScript only. Third is Laravel. It has a very popular community and used on various websites around the world. Fourth is Python. Django and Flask are well documented and secure. Fifth is Spring Boot. Large product-based companies use Java in their backend and Spring Boot is flexible and an ideal choice for developing an application. It's the easiest alternative to collaborate with various other programs [5].

#### 8. Employment

The tech industry has a lot of demand for developers skilled in web applications. Their growth rate is very high and it is a very lucrative career option. The developers who are able to create and maintain a system from start to finish using these tech stacks are highly valued. Right now, it's safe to say full-stack developers are sitting pretty in the job market [6]. The contribution of tech stacks has made it easier for startups, service and product-based companies to prosper. Earlier it was difficult to develop such things without involving high costs and experienced engineers. A person without any college degree but skilled can get a job and earn very high from a startup to a large company. This has led to the contribution to economy and being in the tech industry, one can easily jump up the ladder from a software engineer to top level positions.

#### 9. Future

Websites and webapps are the most common way to reach out to consumers. All the companies require this and there is a huge demand for this. Even after the presence of CMS platforms, tech stacks will always be in demand. As time goes by, new tech stacks will emerge as technology is

getting better day by day and needs improvement in efficiency. With web-based activities, things are getting decentralized as user data should not be violated. Blockchain is rapidly growing and giving rise to web3. Further artificial intelligence will mix with these tech stacks and the development process will become easier. Tech stacks will never go obsolete rather get more advanced and better.

## 10. Conclusion

A web application is an important resource in today's world. They are formed by different technologies and are developed using tech stacks. It must be clear which tech stack is suitable for whom. Deciding a tech stack is the most crucial part of the web application development lifecycle and important for software agile development. Different tech stacks are available and each varies by its performance, use and properties. Big companies use these tech stacks in a certain way through which each technology stack has a relevance. The future of web applications and tech stacks also seems to be promising. Hence, tech stacks play a very important role and its use should be done with proper analysis.

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