



# REVIEW ON DIFFERENT WEB TECHNOLOGY STACK

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**Abstract**— Most of the services and products are online now. There are various web technology stacks available for web development. This paper reviews different web development stacks and their comparative study, their industrial influence, architecture pros and cons of using the particular stack, and their feasibility. There are many new technologies in the market. Competitive studies between them provide a clear view of choosing a stack for a particular purpose. The paper focuses on the main four technical stacks which are LAMP (Linux-Apache-MySQL-PHP), MERN (MongoDB-Express-React-Node), Django stack (JavaScript - Python - Django - MySQL), Ruby on Rails (JavaScript - Ruby - SQLite - Rails)

**Keywords**— web development, stacks

## I. INTRODUCTION

Nowadays web technology develops rapidly. Traditional way of web operation is that client-side sends requests and server side renders the entire page needed. Nowadays, with the improvement of Ajax technology, single page application (SPA) is used more and more frequently and widely, this technology enables the current web page to load partially, which separates server-side and client-side. [1]

A technology stack is defined as the set of technologies an developer uses to build a web or mobile application. It is a combination of programming languages, frameworks, libraries, patterns, servers, UI/UX solutions, software, and tools used by the developers. Despite the different technologies, the main architecture of the web stack is the client and server site, all the stacks discussed here have different technologies both for the front end and also for the back end. There are several stacks available in the market but for these study we are focusing on the LAMP, MERN, Django, Ruby on Rails.

There are various technologies used in the web development field. There is vast scope in the development field. The big MNCs are hiring web developers to develop web applications. Choosing the resources and technical stack is also important as the different needs of the project and they need to be fulfilled which is not possible by using single technology.

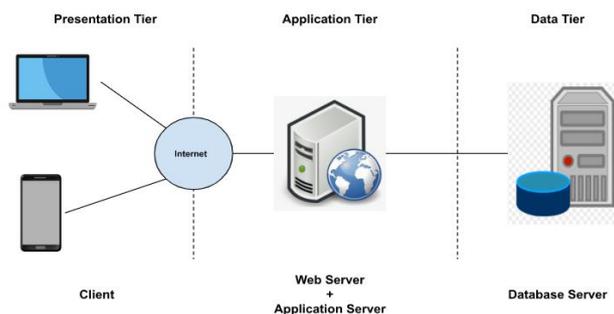


Fig. General architecture of web application.

## II. OVERVIEW

### A. LAMP

The LAMP stack has been around for many years and is the established way to develop Web applications. Originally it stood for “Linux, Apache, MySQL, and PHP,” but its meaning is now broader.

- Linux - Operating system.
- Apache-HTTP server
- MySQL-Database Management System
- PHP-Programming language

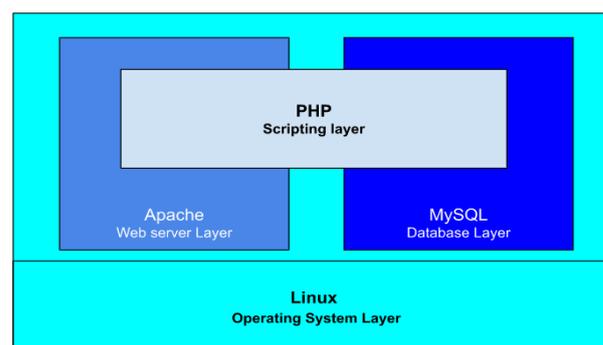


Fig. LAMP Stack

1. **LINUX:** Linux is the operating system layer and the pillar of the LAMP stack. The flexible and customizable nature of Linux and also it is open-source, make it a popular OS solution for running the rest of the LAMP components.[2]
2. **APACHE:** It is a Popular web server software, Apache HTTP Server, is part of the LAMP stack and runs on top of the Linux operating system. The web server's responsibility is to handle requests and send data across the internet using HTTP.
3. **MySQL:** MySQL is an open-source, multithreaded SQL database management system, SQL is a structured query language. MySQL is a central component of the LAMP open-source web application software stack. Database plays very important role in the data management. Proper management of the data leads to the efficient insertion, retrieval and updating of the data. MySQL is the relational database system.

**B. MERN**

MERN stands for MongoDB, Express, React, Node. The web application was developed using the MERN stack using Mongoose and MongoDB database. Chrome developer tools were utilized while testing using redux tools for simulation. The following section discusses MERN stack components and their implementation. [3].

- MongoDB – Document Database
- Express– Node.js web framework
- React– A client-side JavaScript framework
- Node– JavaScript web server(Node.js)

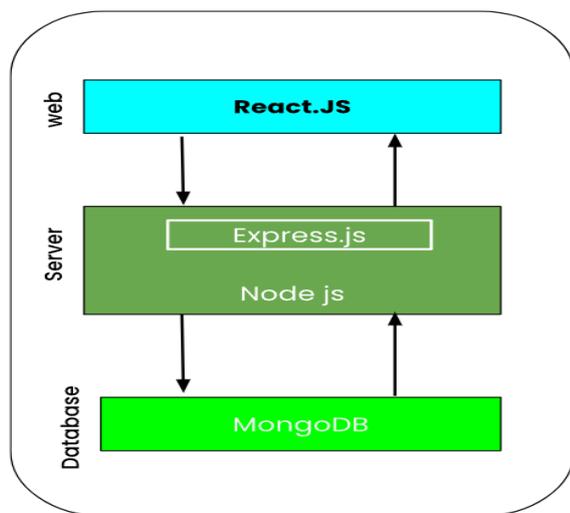


Fig: MERN Stack

1. **MongoDB:** MongoDB is a NoSQL database. Each record in a document is consisting of key-value pairs that are similar to JSON (JavaScript Object Notation) objects. Due to MongoDB's flexibility, users can build schemas, databases, tables, etc. Identifiable by a primary key, a document is the fundamental building unit of MongoDB. Users can utilise MySQL and the Mongo shell after installing MongoDB.
2. **Express:** Node.js Web Framework - Express is a Node.js framework. Relative to utilizing Node.js and creating several Node modules, Express makes it simpler and easier to construct the back-end code. Express is used to build excellent web apps and APIs. Express supports many middleware's, which makes the code shorter and easier to write. It contain the many predefined functions and method, which are very useful.
3. **React:** Front-End Library - React is a JavaScript library that is used for development and building of front-end

and user interfaces. React is used for the development of single-page web applications and mobile applications because of its ability to handle rapidly changing data. React allows users to code in JavaScript and create UI components. These components are reusable and make the code efficiently. Mainly consist of classful components and classless functional components, which returns the html in return method. React uses JSX as a syntax extension to JavaScript. Use for making the UI components.

4. **Node.js:** JS Runtime Environment - Node.js provides a development environment for JavaScript which allows the user to run their code on the server (outside the browser). Node pack manager i.e. npm is used for managing JS packages. NPM is very useful package management packages contains dependencies which are needed to use the functions and methods in react. It is used for writing the backend of and for creating the server itself. The user has better control on the server and provides flexibility to the user on the server.

**C. DJANGO**

The rapid development of secure and reliable websites is made possible by the high-level Python web framework known as Django. By handling a lot of the complexity involved with web development, Django, which was developed by seasoned programmers, frees you up to focus on creating your app instead of having to reinvent the wheel.

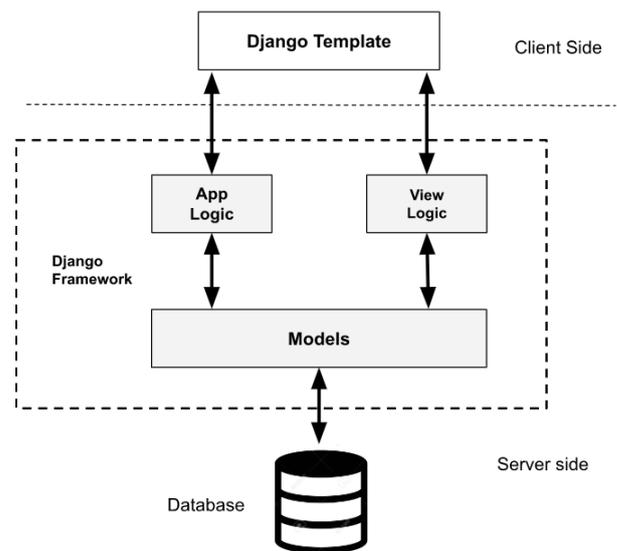


Fig. Django Stack

1. **Model:** The user-friendly interface that shows when you create a webpage on your website is called the View. It is described in jinja files, HTML, CSS, and JavaScript files.
2. **View:** The View is the user-friendly interface that appears when you create a webpage on your website. In addition to HTML, CSS, and JavaScript files, it is described in jinja files.
3. **Template:** The static elements of the desired HTML output must be included in a template, as well as a special syntax that indicates where variable information would be included.

**D. RUBY ON RAILS**

Ruby on Rails is a creative Web 2.0 framework that tries to combine the simplicity of PHP with the architecture, purity, and quality of Java. It certainly one of the most promising frameworks that have emerged for agile Web 2.0 application development.

1. Model: The Model layer contains the application's business logic as well as the rules for manipulating data. Models in Ruby on Rails are used to manage interactions with their respective database items. The Models reflect the data in the database and perform the necessary validations.
2. View: The view is the application's front-end, representing the user interface. Views in Ruby on Rails are HTML files with embedded Ruby code. The Ruby code inserted in the HTMLs is fairly basic (loops and conditionals). Its primary purpose is to present data to the user in the form of views. Views are used to deliver data to browsers that have requested the web pages. Views can deliver material in a variety of forms, including HTML, PDF, XML, RSS, and others.
3. Controller: Controllers interact with models and views. Incoming browser requests are processed by controllers, which process data from models and transfer it to views for presentation.

### III. FRONT END

A web application has two primary sides. One is available to the client and is accountable for the UI, while the other is liable for the client's experience. The side which is open to the client and exploited by him/her to communicate with the application establishes the front end.[4]

1. There is no Frontend Framework for the LAMP stack. This is due to the fact that the LAMP stack design architecture is more server-based than client-based.
2. MERN has ReactJS for Frontend/Client Side. React js is used for making the single page applications which can directly renders the content without being refreshed.
3. Django is a popular Python web application framework that follows the "batteries-included" philosophy. The principle behind batteries-included is that the common functionality for building web applications should come with the framework instead of as separate libraries [5].
4. Similarly, to LAMP there's no Frontend Framework for the ROR stack. This is because RoR(Ruby on Rails) is generally used for backend and we can use any Frontend Technology as we want.

### IV. SERVER

It is also called the backend as it is the core part which is responsible for actual operations .It stores all the file information and everything. It servers the content to the client whenever requested there are many services which are provide by the server. Most commonly in web stack it listens to the HTTP request coming from client.

- The LAMP Stack uses Apache server for handling http requests. The Apache web server is among the most popular web servers in the world. It is a wonderful default option for hosting a website because it is well documented and has been widely used for a significant portion of the history of the web.
- In MERN Stack the by using the Express JS and node js we are creating the server. In the core server is made by using the JavaScript node.Node.js is a non-blocking (non-blocking), event-driven (event-based) I/O platform built on Google Chrome's v8 engine, with event-driven as its core.Node.js uses the "Single Threaded Event Loop" architecture to handle multiple concurrent clients. Node.js Processing Model is based on the JavaScript event-based model along with the JavaScript callback mechanism. Node.js is a fantastic solution for

performing highly concurrent, low-CPU processing applications. If you need to serve a million chat requests at once or provide real-time metrics to a dashboard, node is perfect. Node fails when you have highly CPU-intensive processing required. Once you start eating CPU time, you've completely lost the benefit of it's event-driven non-blocking IO.[6]

- Being a web framework, Django requires a web server to function. And because Python isn't a native language of most web servers, we need an interface to enable communication. WSGI and ASGI are the two interfaces that Django presently supports.
- A default web server called WEBrick is included with the Ruby standard library. The majority of frameworks, including Rails and Rack, use WEBrick as their default development web server even though it is not a compilation because it is installed on every machine running Ruby.
- Rails is great for CRUD applications and highly CPU-driven applications. It's also great for leveraging relational databases, which are essential for specific applications. While you can use a relational database in a Node.js application, it is nowhere as mature and powerful as Active Record.

### V. DATABASE

A database is a well-organized group of data that has been structured and is often stored electronically in a system. A database management system (DBMS) primarily controls a database . The term "database system," which is frequently abbreviated to "simply a database," refers to the combination of data, the DBMS, and the applications that are connected to them.

- MySQL is a very well-liked enterprise-level relational database that is used by LAMP stack. In order to interface with MySQL and to use it with other programmers for applications that require relational database functionality, MySQL uses standalone clients. Because of its reputation for reliability, MySQL is used as the default DBMS in well-known CMS alternatives like Drupal, Joomla, phpBB, and WordPress. It is also a component of the well-known LAMP stack (Linux, Apache, MySQL, Python/Perl/PHP).
- MERN makes use of MongoDB, a well-liked NoSQL database that employs JavaScript Object Notation (JSON-like) syntax. MongoDB, a scalable, adaptable NoSQL document database technology, was designed to address both the limitations of existing NoSQL alternatives and the relational databases method. Application developers now have access to a level of flexibility and scalability never before achievable, thanks to MongoDB's well-known horizontal scaling and load balancing capabilities.
- Django uses the PostgreSQL for database which provides number of data types, django has the django. Contrib, postgres to operate PostgreSQL. If we are building an application with maps or storing geographical data then there is need to use PostgreSQL, as GeoDjango is only fully compatible with PostgreSQL.
- Ruby On Rails uses MYSQL, POSTGRESQL for Relational Databases and for NOSQL we use MongoDB.

### VI. MODELS

- LAMP follows the DOM model. The Document Object Model (DOM) is a programming interface for web documents. It represents the page so that programmers can change the structure, style, and content of the

document. The document is represented by the DOM as nodes and objects, allowing programming languages to interact with the page.

- A web page is a document that can be seen in the browser window or as HTML source code. It is the same document in both circumstances, but the Document Object Model (DOM) representation allows it to be changed. It can be updated with a scripting language such as JavaScript because it is an object-oriented representation of the web page.
- MERN stack follows the virtual DOM model. Virtual DOM in React is a “virtual” representation of the actual DOM. It is basically an object designed to mimic the real DOM. Because it does not write to the screen, the virtual DOM is more efficient to generate than the actual DOM. It is only offered as a method to avoid having unnecessary page components rebuilt when rendering is executed again.
- Django is based on MVT (Model-View-Template) architecture. MVT is a software design pattern used in the creation of a web application. The model will serve as the data's interface. It maintains the data. It is represented by a database and serves as the logical data structure for the entire application.
- Ruby on Rails uses MVC (Model, View, Controller) architecture to define flow of data on the Web Application. The data flow and business logic is defined in the model part, UI is defined by View part, Controller forms an interface between Model and View.

#### VII. APPLICATIONS

- LAMP- Best for handling heavy traffic, dynamic data, and client-side web apps. The best choice for developing a client-side web app. It is popular for making the management website like E-commerce, collage and student management. It is easily customizable. Users can swap out any component for another open-source solution to meet the requirements of the specific application.
- MERN- Handling heavy databases, dynamic data, and client-side web apps. It has high speed, faster updates and client site rendering. MERN Stack's React.js is best for UI layer abstraction. It executes code development quickly due to its collection of dynamic user interfaces readily available within the library. It is also used for making cross-site web applications.
- Django- For developing a Web application or API Backend For Rapid Development of some web application Deploying the application Fast and Scaling it according to your needs. Perfect for working with databases instead of database queries to develop a secure single-page application for either retrieving data or posting data. It is ideal for making the API and data related problem solutions.
- Ruby on Rails- E-commerce, i.e., online stores with sophisticated options like Informational portals. Stock exchange platforms, Dating websites and web platforms. Social networks, On-standard complex projects, SaaS-solutions.

#### VIII. MARKET INFLUENCE

- LAMP is open source solutions for making web applications and it is quite popular among the developers and has wide community support which helps to find solutions easily. It is used in the industries for various applications like WordPress, Facebook, Wikipedia, Tumblr.

- As per increasing demand of the dynamic web applications is continuously increasing the MERN stack provides the best options for the development of the dynamical and real-time applications therefore MERN has high demand. As there is only single language for the both frontend and backend it is very popular with vast amount of the developer's support. MNC like facebook uses React for the there front end. Market influencing products like LinkedIn, NASA, Netflix, PayPal, Instagram.
- Ruby on rails is widely popular in the market. Many famous web applications like Shopify, GitHub, Basecamp, Urban Dictionary, are using ruby on rails for the development and has large market influence.
- Many websites like Mozilla, Pinterest, Bitbucket, Prezi. are using Django for web development and provide reliable and consistent. Capturing wide area in the market.

#### IX. CONCLUSION

By comparing the different web stacks we have understood the architecture of different stacks and processing, uses, market influence, and various factors. We have better ideas on specific uses of a particular stack and know their abilities. The application-based comparison provides a clear view of development trends. The popularity of Node.js is increasing every day. Based on the application they are different and have different use which can be more beneficial.

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