Analyzing development using the MEAN Stack

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Abstract—MEAN Stack is the new and upcoming technology stack being used by various startups and companies alike to build and deploy scalable web applications. This paper discusses the various components of the MEAN stack i.e. MongoDb, Express.js, Angular.js, Node.js and how they come together to make a full web application. This paper analyzes how development using MEAN stack is different from using LAMP which has been the preferred technology stack for development for years. We will also be looking into the advantages and disadvantages of using the MEAN stack and its appropriateness in the making of full scale web applications. This paper also discusses an approach to using the MEAN stack in designing a web applications.

Index Terms—**MongoDb, Web Development, Express.js, Angular.js, Node.js, Software Engineering, MEAN**

INTRODUCTION

MEAN Stack comprises of the four technologies of MongoDb, Express.js, Angular.js, Node.js which can be used together to build deployment ready web applications. Knowledge of MEAN stack is quickly becoming the skill set of modern FULL-STACK developers i.e. those who can develop both the front-end application and the backend application. At the core of all the technologies used in the MEAN stack are JavaScript and JavaScript Object Notation which are quickly becoming the basis of all RESTful web-service APIs. The advantages of using MEAN is that is fast, stable, efficient and highly scalable. The biggest disadvantage of using MEAN is its one-size fits all development strategy which may not be the best for many use cases where relational databses or backends written in other languages may perform better and more stably.

MEAN STACK

MEAN is the abbreviated name given to the initial letters of the four technologies that it comprises. MongoDb, Express.js, Angular.js and Node.js. All these technologies are based on JavaScript and JavaScript Object Notation. Initally JavaScript was used to develop Client-side web applications and has since moved to backend development quite successfully.

1. MongoDB

MongoDb is a NoSql database which means it provides a mechanism for storage and retrieval of data that is modeled in JSON like format which is different than the tabular relations used in relational databases[1]. MongoDb has been built around the JSON format which makes it high-performance[2]. MongoDb is very well documented and one of the most popular databses in use today[3]. It can perform all the CRUD (Create, Read, Update, Delete) operations very quickly and easily. The fact that all the requests made to MongoDB are returned in JSON format makes it really easy for the developers to parse that data to and from the database.

2. Express.js

Express.js is a framework built for the server side in the Node.js environment. It acts as the framework which handles all the HTTP and routing operations. It removes the need for distinct implementing of different RESTful calls in a simple and elegant way. It is built on top of Node and is considered to be fast and reliable[4]. The job of Express is to configure middlewares which are the functions responsible for requests and responses or calling other middlewares.

3. Angular.js

Angualr is a frontend web application framework developed and maintained by Google which provides client-side framework for Model-View-Controller single page web applications[5]. Angular is open source, well documented and keeps getting updated making it faster and more stable. Angular divides the workflow into different shorter and easier tasks therefore making the whole process esier to understand and the code easily readable and understandable. Angular handles a lot of data binding by itself which practically removes the use of extra variables and functions that needed to be implemented earlier in other development frameworks thus making it faster.

4. Node.js

Node is the most important part of the MEAN stack despite being the last on the naming list. Node is an asynchronous, high performance event-driven server built on Googles's V8 engine and written in C++ for high speed and performance[6]. Node is used to build lightweight high performace server environment[7]. Node works on a single thread but can handle various distinct clients at the same time. Node does not let functions handle I/O operations which are handled by higher level functions[8].

DEVELOPMENT

Possibly the biggest factor of developing using MEAN stack is the fact that the developer effectively needs to know how to develop using only 1 language which is JavaScript[9]. Other development technology stacks such as LAMP(x) require the developer to learn or know 2 or more languages or framewroks. While MEAN uses MongoDb which is a non-relational database built on models using JSON for data delivery, LAMP uses relational databses such as PostGres and MySql for data delivery to server-side web application. NoSql databses such as MongoDB have been known to perform better than relational databases in general and the performance is known to increase exponentially as the data size increases. Relational databses are still considered to be far superior due to the years of development done on them and the fact that they can handle infor-

mation at the databse level itself[10].

Having JavaScript at the backend has been studied to be more unsafe as compared to the LAMP counterpart of PHP. Studies have shown that it is a better practice to go with Apache than Javascript as the server-side web application due to Apache being more robust and secure than JavaScript[11]. So, the role of Express in MEAN as compared to that of Apache in LAMP can be questioned in terms of stability and security with Apache being the more secure and stable of the two. But when it comes to speed Node servers have been researched and found to be more than 2.5 times faster than Apache servers which is a big point while deciding which server side implementation to go with[4,12].

It can be argued that the choice to go with MEAN over LAMP can strictly be an issue of what the system requires and how well it can be implemented by using MEAN. If the use case does not require the system to be very secure, then having MEAN stack to develop the web application makes sense. In cases where handling of user data is involved LAMP seems to be a better fit as it is more secure than MEAN.

DISCUSSION

This paper shows that even though MEAN stack, being fairly able to create scalable and deployable full stack web applications, it still needs to improve on certain big factors such as security and robustness. LAMP, which has been the preferred technology stack of developers for years has more stability and robustness majorly due to years of development and support and knowing the best practices.

MEAN lacks the discovery of best practices and due to it being fairly new, a lot of developers using it are still discovering them. MEAN might be able to achieve the level of LAMP in coming years, but it requires a lot of development cases. MEAN can also be viewed as the one size fits all solution. Even though MEAN might be able to do that in a lot of scenarios, it is recommended that the developers understand their use case decide to either LAMP or MEAN. LAMP can be a better technology stack for web applications such as Bank's web portal, as it is known to more secure and, in this case, relational databses make more sense than non-relational databases which MEAN employs.

Not to take away the fact that development using MEAN is faster and easier than LAMP. The fact that MEAN requires the knowledge of only 1 language gives it a big plus point over LAMP. MEAN is also easier to implement than LAMP and can be easily debugged and put back into production, faster than its counterpart LAMP. Node plays the most vital role in the MEAN stack with it being a part of all the components of the MEAN stack except the MongoDb database.

CONCLUSION

MEAN stack is a very powerful, easy and scalable way of developing full stack web applications. The ease of implementation makes it a good choice for startups and quick projects. MEAN has also been seen as the right choice for projects based on Internet of Things[13]. Nodejs has been the backend development development choice of various big corporations such as Walmart[14].

Even though the benefits of using MEAN stack outweigh most of its negatives, the issue of security of data remains its biggest challenge. While robustness can be achieved by writing good code, improving the security of the system should be the main priority moving forward. LAMP still proves to be the best technology stack for security first projects, but the use of non-relational databases and the time taken to develop full stack applications do not make it suitable for projects that have a shorter deadline or require large database expansions.

More research needs to be done on using MEAN stack for making bigger full stack web applications and there is a great need of guidelines to best practices of developing web applications using the MEAN stack.

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