

## MERN Stack Web Application

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**Abstract:** Teams Application is a responsive web application that can also be used in mobile phones is developed using React JS as the front end and MongoDB[4] as database. The main objective of the application is to form small teams and assign some duties to the members for which the members are notified through email and they can notify the team members about the completion status with comments via email. This application is developed using MERN Stack i.e., Mongoose, Express, ReactJs and NodeJs. We propose a three-tier architecture which has client-tier, business-logic tier and database-tier[5]. The client-tier will have the user experience and interface elements. It consists of ReactJs (jsx elements), html and the browser[11]. Our web application is a single page web application which means that only one html page is rendered. Using ReactJs, different components are rendered in that single html element. The business-logic tier consists of the functionality elements which will be done using NodeJs and express server. NodeJs is the platform and ReactJs is the framework used for User Interface. ExpressJs is a library that acts as a server for the application. The last will be the database-tier which consists of the MongoDB database[7]. The data from the database is fetched using Mongoose ODM. The important goal of the application is to provide better communication among the members of a team which helps the team to perform better and come up with better ideas that may lead to increase in productivity. The user's data is also kept safe in the application and managed properly. We have achieved this connectivity among the members using email notifications. Every move of the user is kept track and the members are notified about it. The members are given proper information about the status of the task that is live. This application can also have a lot of add-on features which can be done in the future enhancements.

*Keywords; Mongoose, ExpressJs, ReactJs and NodeJs*

### 1. INTRODUCTION

This is a responsive web application that can be accessed in both desktops as well as mobile phone browsers[10]. This application is developed using the MERN Stack i.e. Mongoose, ExpressJs, ReactJs and NodeJs. It is basically a single page web application which means there is only one html page that is rendered. The front-end is developed using ReactJs which is a NodeJs library. The different views of the application are built as different components and are rendered in the html element. Every component has its own set of jsx elements which are html tags that can be rendered in that component. The functionality of every component is taken care by the NodeJs. It has methods and libraries which can do the functionalities for every component. The backend server is built using ExpressJs which is library that acts as a server for the application. A MongoDB database is used to store the user data. Whenever the user requests some data from the database, the client sends a http request to the server and it fetches the data from the database

and sends it back to the user. The client server communication is facilitated by a library called axios and the server fetch the data from the database using Mongoose which is an ODM for MongoDB.

The users can create an account in the application by giving their credentials such as name, email address and phone number along with their password for the account. The password is validated against a regular expression and the other fields are also validated. Once the validation is completed, the password is hashed and all our data should be stored in the database. The account is created and the user is notified that they have signed up for the application. After creating the account the user can login to the application. The user can provide their email and password for login. The username and password is validated against the values from database and the user is authorized to login successfully. After logging in the user can form teams and start performing tasks. One person from the team has to create the task and assign the task to other members. While creating the task the user can provide a deadline along with the description of the task. The members are communicated that a new task has been created and they are made responsible for it to be completed. The members have to complete the task before the deadline. The tasks will be shown in the form of a table which has the basic details of the task with few options that the particular user have access to. The members can view the task details by clicking the view option. It will show all the details of the task along with the status of every member. The members can edit the task and add their own comments and completion status of the task. The creator of the task can edit the details such as deadline, description and completion status of the task. Also the creator has the privilege to delete the task once he feels that the task is no longer necessary. The members do not have the access to delete the task or edit its deadline. The application also allows the user to change their password for the account whenever the user feels that their password is compromised.

### 1.1 SCOPE

MERN Stack Web Application software is designed to make the process of task creation and management easy. The key benefit of the proposed application is that the end user can build a list of tasks and assign them to their colleagues. The task can be expressed with a description along with a deadline to denote when the system should be completed. The members assigned to the task have the ability to edit their completion status and can add their comments.

### 1.2 OBJECTIVE

The objective of this application is to improve the working and definite achievement of goals within a certified time. Here we can decentralize and distribute the tasks to the members of the team in order to complete the system at the earliest possible within the deadline. Whenever a task is created or edited in this proposed application it will be automatically communicated to the creator and members of the team assigned through e-mail. The team members also have the advantage to edit and update the task description and their completion status. The creator of the task only has the authority to delete the task. MERN Stack Application is created by using ReactJs for the front end and MongoDB for the back end.

### 1.3 SYSTEM DESIGN INTRODUCTION

System design is known as the process of defining all the requirements of a system such as the architecture, design, interface and modules. System design is an important process for the entire software development starting from requirements gathering to product development. It is a

dynamic process where we can change it many times to meet the present requirement.

A systematic approach is required to manage the system requirements and style methodology. System design are often classified as logical design and physical design. Logical design represents the abstract dataflow while physical design represents the input and output processes within the system.. The system architecture should be able to provide the needed data and information for implementation. Design definition is the technique of developing, expressing, documenting, and speaking the belief of the architecture of the machine via a whole set of layout traits defined in a shape appropriate for implementation.

## 1.4 EXISTING SYSTEM

- All over the world people uses to-do application which can be accessed via portable device.
- To-do application is used for maintaining schedules in an organized manner.
- The user can list out their schedules in the application and once the work has been completed it can be marked as completed by selecting the check box near that work.
- If the work has been cancelled it can be removed from the application by striking or deleting it.
- Time for completing a certain event can also be mentioned in the application.

## 2 PROPOSED SYSTEM

- Every user has a specific id and password for accessing the system.
- Group activities can be scheduled and maintained in an organized manner.
- Teams can be formed with one organizer and the organizer can provide separate or common work to the team members.
- Teams can communicate between themselves by posting comments.
- The information in the application can be accessed in any device by the user.

### 2.1 ADVANTAGES

- Data security: User data is stored in secure cloud storage and users are also authenticated to view data in the application.
- More organized way of maintaining the schedules of multiple users.
- Enhanced communication: Users are notified whenever there is an update in the task or when a new task is created.

## 3. SYSTEM ARCHITECTURE

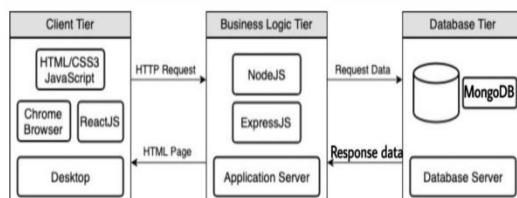


Fig 1 – Architecture for proposed model

#### 4. IMPLEMENTATION AND ANALYSIS

Our system titled “MERN Stack Web Application” may be a responsive web application which will even be utilized in mobile phones. The proposed gadget is advanced the usage of ReactJs due to the fact the front and MongoDB due to the fact the rear. this technique are often implemented the usage of easy PHP or HTML , in view that React JS makes use of a full-featured programming language (JavaScript)[1] to assemble repetitive or conditional DOM elements which accurately states that developers don’t need to experience approximately managing the consequences of changes inside the view’s state (the item which determines how components behave) or changes inside the given data. Now its maintained with the aid of using Facebook, also with the aid of using a network of improvement agencies and character developers.

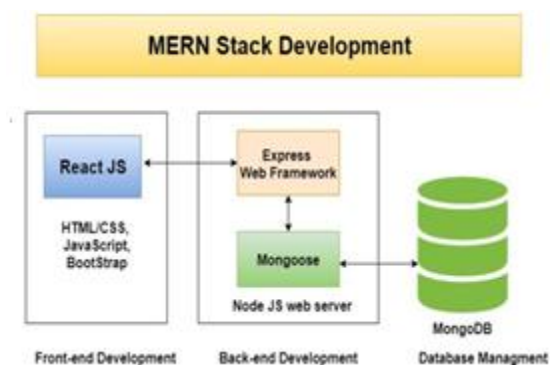


FIG 2: MERN Stack Architecture

On the opposite hand MongoDB may also be a NoSQL (non-relational) document-orientated database[6]. While traditional relational databases have a normal schema design supported columns and tables, MongoDB is schema-less. Data is saved in bendy files with a JSON (JavaScript Object Notation)-based command language[2] . The content, size, and quantity of fields inside the files can range from one to subsequent. This suggests that the info structure are often changed over time. The functions of the machine are mentioned briefly inside the further sections.

##### 4.1 JUSTIFICATION OF THE PROGRAMMING LANGUAGE

This device changed into evolved the use of MERN stack i.e. MongoDB, Express, ReactJs and NodeJs the first benefit for builders the use of the MERN stack is that each line of code is written in JavaScript, a famous one that is often a programming language which used everywhere, each for server-facet code and client-facet code[3]. With one language throughout tiers, there may be no want for switching context. Answer anchors the MERN stack during a few senses, that's typically the shaping issue of the MERN stack. React is an open-supply JavaScript library that's sustained with the help of exploitation[12] Facebook which can be used for growing views rendered in hypertext mark-up language. Unlike AngularJS, React isn’t a framework and its a library. Thus, it doesn’t , with the help of exploitation itself, dictate a framework sample like MVC sample. You use React to provide a read (the V in MVC), however the way to tie the rest of the appliance along fully depends upon you. Node.js ships with a gaggle of middle modules that compiles into the binary. These modules supply get right of entry to to the OS parts like filing device , networking, input/output, etc. They additionally offer a few software capabilities which might be generally required with the aid of using maximum of the

programs. aside from your personal files and consequently the middle modules, you'll additionally find an excellent quantity of third birthday celebration open-supply libraries available for straight forward installation. The Express framework lets you outline routes, specs of what to try and to when a HTTP request matching a particular sample arrives. The similar measurement is regular-regex) primarily based totally is extremely flexible, like maximum different internet software frameworks. The what-to-do division is simply a characteristic that is given the parsed HTTP request. Compared to relational databases wherein records is saved within the type of relations, or tables, NoSQL may be a document-orientated database[9]. The piece of storage (related to a row) can be a document, or an object, and multiple files be saved in collections (similar to a table). Every document during a collection capabilities a unique identifier the use of which it are often accessed. The identifier is listed automatically. MongoDB has the subsequent capabilities which makes it extra suitable for the device Document-Oriented

- Schema-Less
- JavaScript Based

## 5. IMPLEMENTATION

The implementation of the system involves basic logic and features of programming. It involves the following modules explained in detail. This is the first module of the system where the user can create an account and login using their credentials to use the application. While registering, the user has to provide name, email, password and phone number. The important features of this operation are,

- Password are validated against a regular expression which demand the password to have minimum 8 letters with atleast 1 lowercase alphabet, 1 uppercase alphabet, 1 number and 1 special symbol.
- Password has to be typed twice which are again validated for equality.
- Phone number is validated against a regular expression which has to have 10 digits exactly.
- Email id is validated against a regular expression and also against data from the database so that there are no duplicate accounts created with same email address.
- The passwords are stored in the database after hashing along with the data.  
After creating an account the user can login using their email id and password. The following will be the features of the login process,
- The email address is validated against the data from the database to check the user already has an account.
- The password user entering is hashed and then checked against the password from the database.
- If the credentials are matched, then the user is allowed to use the application. If not they are prompted to enter the right credentials.
- Once the user is successfully authenticated, a cookie is created in the browser with the email address as the cookie value.

### 5.1 TASK LIST

After the successful authentication, the user enters the home page of the application where they will see the list of tasks that they are involved with. They have the hamburger menu which will have the change password and logout options in the header. The header also contains

the create task button which allows to create a new task. The main features of this page will be,

- The task created by the user is displayed in the grid by querying the database with email address as identification parameter.
- The task to which the user is assigned responsible is displayed in the grid by querying the database with email address as identification parameter.
- The task has basic details displayed in the form of a grid with options such as delete, view and edit enabled.
- The view and edit options are enabled to all the tasks but delete is enabled only for the tasks that are created by the particular user.

## 5.2 CREATE TASK

The create task option displays a form with certain parameters to be given as input and submit button. It includes the following features,

- The user has to give a proper description for the task.
- The user has to select the list of users who has to be responsible for the task from an auto complete dropdown box which has the list of users registered for the application.
- The user also has to provide a valid deadline for the task which can only be a date that is greater than today.
- Once the submit button is clicked, the task is completed and the details are sent as email to all the users who are assigned the task and also to the one created the task.

## 5.3 EDIT TASK

The edit option enables the user to edit the task in certain ways with respect to the role of the user in the task. If the user is the creator of the task ,

- The user can edit the description of the task.
- The user can change the deadline of the task.
- The user can change the status of the task which can be done by checking the check box to change it to task completed.
- If the task status is changed to completed, the task will be striked in the grid to differentiate. If the user is one of the people who is assigned the responsibility of the task, then it includes the features like,
- The user can edit his/her own comments for the task or for his part on the task.
- The user can also add his/her own completion status on the task.

## 5.4 VIEW TASK

The view option in the grid enables the user to view the details of the task. The following are the features of the view task module,

- The user can view the description, deadline and completion status of the task.
- The view option also includes a grid like display where every user responsible for the task is listed along with their completion status and comments.
- All the details are displayed in a form-like structure that is in read-only mode.

## 5.5 DELETE TASK

This option enables the user to delete the task completely from the database. This option shows the details of the task in read-only mode and asks for confirmation from the user for the deletion of the task. Once the delete button is clicked, the task is completely deleted from the database and the user is alerted that the task is deleted permanently. Only the user who created the task can delete the task as it is checked using the email address as comparing parameter.

## 5.6 CHANGE PASSWORD

This option in the hamburger menu enables the user to change the password whenever they feel that their password is compromised. It includes the following features,

- The user has to enter the current password which is hashed and compared with the password from the database.
- The user has to enter the new password that has to be entered twice and matched with each other.
- The new password also is validated against a regular expression which demands the password to have minimum 8 letters with at least 1 lowercase alphabet, 1 uppercase alphabet, 1 number and 1 special symbol.
- The new password is also validated such that it is not the same as the current password.

## 5.7 LOGOUT

This option in the hamburger menu allows the user to logout from the application. When the option is used by the user, the cookie in the browser will get cleared and the user will be redirected to the login page. The enter layout acts because the link between the user information and the system. It accommodates the growing specification and procedures for facts instruction and people steps are vital to place transaction facts in to a usable shape for processing can be achieved via way of means of analyzing the pc to read facts from a written or revealed file or it can arise via way of means of having people keying the facts without delay into the system. The layout of enter especially focuses on controlling the amount of enter that's required, controlling the occurrence of errors, warding off delay, stopping greater steps and preserving the technique very simple. The enter is designed in a manner in which it gives security and simplicity of use with preserving the privacy.

## 6 . CONCLUSION

The development of “MERN Stack Web Application” for Task creation and Management using React JS and MongoDB accords a lot of benefits to the end users. React JS provides one-way Data Binding, which improves code maintainability and serve the purpose of streamlining the UI development. React also has a flexible architecture which consists of plethora of Third-Party libraries that one can easily access. The React developers have created components expanding the functionality of these libraries. This is one of the driving forces behind the momentum gained by the React in the developer’s community. On the alternative hand, MongoDB is a Schema-Less database, wherein the code defines our schema. The capacity to derive a document-based totally statistics version is actually taken into consideration one among the most appealing functions of MongoDB. Because, the manner it shops the statistics in the shape of BSON (Binary JSON)[8], ruby hashes etc, facilitates to save the statistics in a very wealthy manner on the identical time as being capin a position to keeping arrays and different documents. Thus the process of creating, editing, updating and management of tasks are easier

when we implement the website using React and MongoDB.

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