Available online at http://www.advancedscientificjournal.com
http://www.krishmapublication.com
IJMASRI, Vol. 2, issue 12, pp.752- 759, Dec. -2022
https://doi.org/10.53633/ijmasri

INTERNATIONAL JOURNAL OF MULTIDISCIPLINARY ADVANCED SCIENTIFIC RESEARCH AND INNOVATION (IJMASRI)

ISSN: 2582-9130 **IBI IMPACT FACTOR 1.5** **DOI: 10.53633/IJMASRI**

RESEARCH ARTICLE

APPLICATION USING MERN STACK, SOCKET.IO AND WEBRTC

Lakhan Pundhir

Department of Information Technology, Maharaja Agrasen Institute of Technology affiliated to Guru Gobind Singh Indraprastha University, Rohini, Delhi
Mail: lakhanpundhir544@gmail.com

Abstract

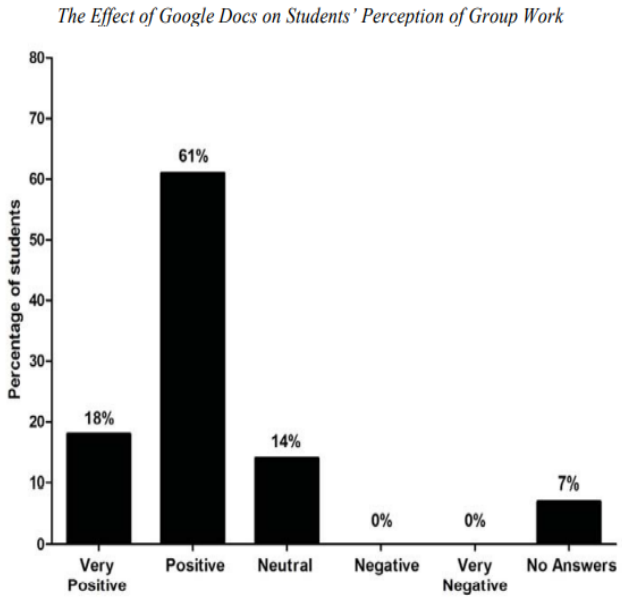
Currently, we use different apps for document editing and creation. I use the Google Docs to track edit and create documents at my work, but it doesn't provide chatting feature and calling feature which eventually leads to miscommunication between my peers. Full adoption of calling feature will support ongoing collaboration and allow you to track the current status about each project in one place. This is especially useful for large projects with members from different teams, such as regulatory, commercial, contractual, and tax, located all over the world. The aim of this project is to create and design an RealTime Docs platform using new technology called MERN Stack technology such as: MongoDB, Express JS framework, ReactJS library, and NodeJS platform incorporated with Socket.io. The basic document creating platform consists of several tools and methodology to provide user to edit document with several features like styling converting to HTML . Sign up/Login methods are used to differentiate one user from other managing authorization of the documents using MERN Stack. Administrative tools such as user information, managing document authorization, chatting, video conferencing and sending invite using push notifications. Since then this is the matter of research to create online web application assessable across globe and available to everyone, they can quickly real time documents and share it with their peers . This application is potentially useful to anyone who needs to share or collaborate with another writer, team member, teacher, or researcher. The user or blog editor can conveniently view and edit files at any time. The research evidences shows the importance of the sharing and collaborating in developing countries for business application growth in a country.

Keywords: Real Time Docs using MERN stack Socket.io, Sharing and collaborating for business growth, Real Time Docs platform.

Introduction

Since writing for publication or preparing a presentation is a common group effort, it is helpful to have some type of mechanism in place to facilitate the collaboration. Almost every major software program allows files to be shared, but the actual process of sharing can be difficult. This is especially true when multiple versions of a single manuscript or presentation are created. Members of the collaborative group can easily lose track of who has the most current version and how to effectively merge changes. These are just a few of the problems that interfere with the efficiency of any research process. However, innovations in web 2.0 technologies are successfully addressing such problems— with Google Docs being one of the most common solutions. This is a system that allows users to share, edit, and update manuscripts, presentations, data files, and drawings with relative ease. It shares the reputation of all Google's products for seamless integration, security, reliability. This is a research on creating Hashed In Real Time docs which uses the concept of Google docs incorporated with new features such as real time chatting and video conferencing with peers with the help of WEBRTC.

Proposed System



The work proposed in this paper is a work on share and collaborating platform for potentially anyone who needs to share or collaborate with another writer, team member, teacher, or researcher. The user or blog editor can conveniently view and edit files at any time that uses technology stack called MERN stack, socket.io and WEBRTC. M for mongoDB , E for express , R for reactJS , N for nodeJS.The project include readily available documents for editing, video conferencing and chatting. Managing access of the documents and collaborating via invite links.

1. Schema of the Database

3.1 Document Schema

```
const docSchema = new mongoose.Schema({
    name: {
        type: String,
        required: true
    },
    owner: {
        type: mongoose.Schema.ObjectId,
        ref: 'UserModel'
    },
    collaborators: {
        type: [{
            type: mongoose.Schema.ObjectId,
            ref: 'UserModel'
        }],
        default: []
    },
    content: {
        type: Array,
        default: [
            {
                type: 'paragraph',
                children: [
                        { text: 'This is a simple rich text
editor! Much better than a ' },
    { text: '<textarea>', code: true },
    { text: '!' }
    ]
    }
    ],
    required: true
    }

    })
```

3.2 Notifications Schema

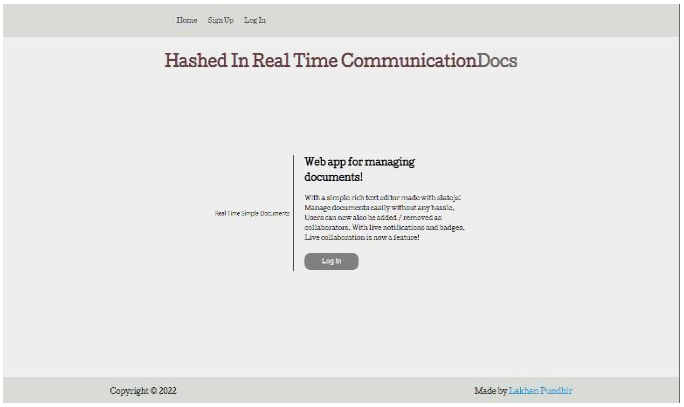
```
const notificationSchema = new mongoose.Schema({
    type: String,
    reciever: {
      type: mongoose.Schema.ObjectId,
      ref: "UserModel"
    },
    sender: {
      type: mongoose.Schema.ObjectId,
      ref: "UserModel"
    },
    doc: {
      type: mongoose.Schema.ObjectId,
      ref: "DocModel"
    },
    notification: {
      type: String,
      required: true
    }
  })
```

3.3 Users Schema

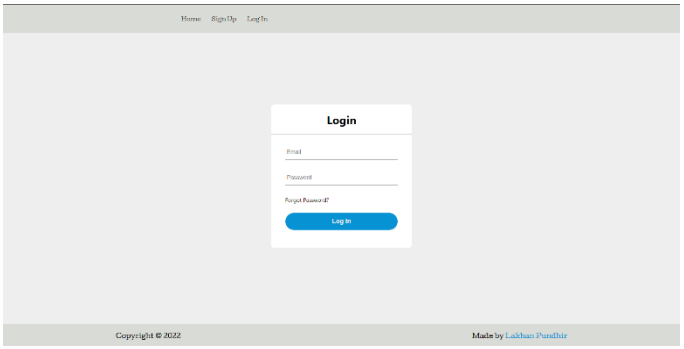
```
const userSchema = new mongoose.Schema({
  username: {
    type: String,
      required: [true, "username is a required field!"],
    unique: [true, "username already exists!"],
  },
  email: {
    type: String,
    required: [true, "email is a required field!"],
    unique: [true, "email already exists!"],
  },
  password: {
    type: String,
     minlength: [8, "password too short, must be atleast 8 characters long!"],
      required: [true, "password is a required field!"],
    select: false,
    },
    passwordConfirm: {
      type: String,
        required: [true, "passwordConfirm is a required field"],
    validate: {
      validator: function (currElement) {
        return currElement === this.password;
      },
      message: "Fields do not match!",
    },
  },
});
```

4. Snaps of Project

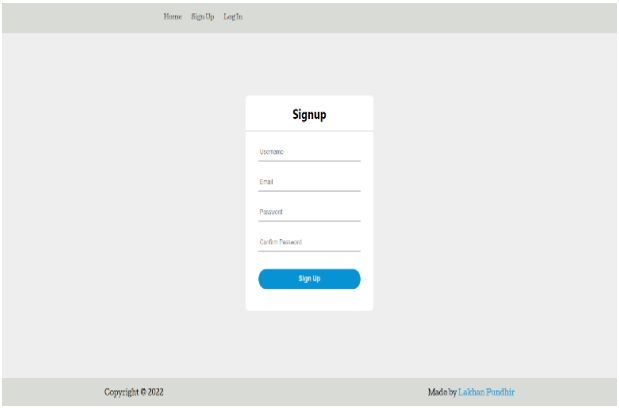
4.1 Home Page



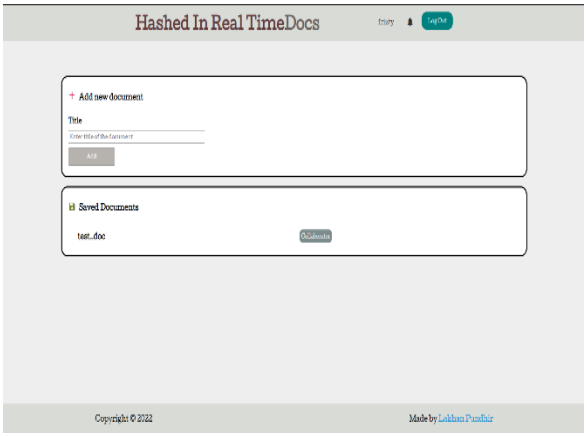
4.2 Login Page



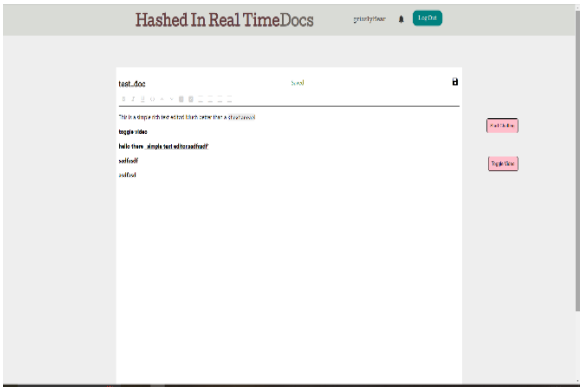
4.3 Signup Page



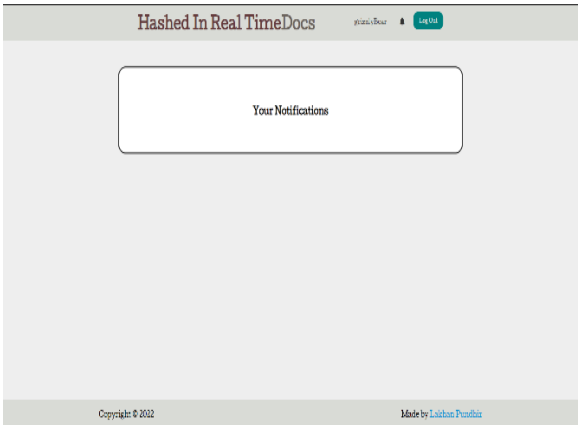
4.3 User Dashboard Page



4.4 Editors Page



4.5 Notifications Page



5. Literature survey

5.1 a survey of mern stack technology

The research aim is about studying the basic components of MERN Stack[14,16] technology such as: MongoDB, ExpressJS , ReactJS , and NodeJS platform. Using the basic functions of an web application such as sign up, sign in, showing dashboards, displaying store categories and products Using MERN Stack technology in to build a web application to shop for product stores and payment gateway. Deploy admin functions for the website such as user management, store management, statistics, and reports. Since then, this topic is declared to research and create an online product search website so thatsmall grocery stores and groceries can post and manage their products right on the website. website system and branding. At the same time, the store can link to its own website (if any). For customers, they can quickly search for urgent products from their nearby stores. Based on the search results, customers can directly contact the store owner to discuss more about the products they are looking for.

A. Node Js

Node.js is an open source, a system application and an environment for servers. NodeJS is an independent development platform developed on Chrome's JavaScript that we can build network applications quickly and easily. Google JavaScript engine to execute the code. Moreover, a huge part of required modules are written in JavaScript 6 Node.js accommodate a built-in library which allows applications to serve as a Webserver like Apache HTTP Server.

B. Express Js

Express.js Express.js is a framework built above NodeJS. It provides various advanced features for web and mobile development. Express.js supports HTTP, making the API extremely powerful, reliable and easy to use. Express implements extra features for developers which help them get a better programming environment, without scaling down the speed of NodeJS.

C. Mongo Db

MongoDBis an open source database; it is also the leading NoSQL[20] database nowdays adopted by thousands of people. It is written in one of the most popular programming languages today. In addition, MongoDB is cross-platform data that operates on the concepts of Collections and Documents, providing high performance with high availability and ease of expansion of NoSQL is a source database format that does not use Transact-SQL to access information, this database was developed on JavaScript Framework on JSON data type. With its introduction, it has overcome the disadvantages of RDBMS relational database management system model to improve operating speed and functionality. Furthermore, MongoDB is a cross-platform database, performing on Collection and Document approach, it produces sharp production, huge availability, and effortless scalability.

D. Javascript

JavaScript is a scripting, object-oriented and cross-platform programming language. Objects of host environment can be connected to JavaScript and arranged in such a way so that it can be operted. Standard libraries such as Array, Date, Math, and the essence component of programming languages for instance managers, control framework and statements objects are contained by JavaScript.

E. Components

ComponentReact is built around components. A component can be created by creating Class function of the React object, the starting point of accessing this library. ReactJS creates HTML tags unlike we normally write but uses Component to wrap HTML tags into objects to render. Among React Components, render function is the most important It is a function that handles the generation of HTML tags as well as a demonstration of the ability to process via Virtual-DOM.

F. Socket.Io

Socket.IO is an event-driven library for real-time web applications. It enables real-time, bi-directional communication between web clients and servers. It consists of two parts: a client-side library that runs in the browser, and a server-side library for Node.js. Both components have a nearly identical API.

G. Webrtc

WebRTCC(Web Real-Time Communication) is a technology that enables Web applications and sites to capture and optionally stream audio and/or video media, as well as to exchange arbitrary data between browsers without requiring intermediary.

5.2 A survey of WebSocket Development Techniques and Technologies

WebSocket protocol has become a sound technology in software industry for real-time web application development, since it provides bidirectional, fullduplex communication between client and server over a single connection. There are several concepts, techniques, and technologies such as frameworks and libraries for WebSocket based development. However, the knowledge existing regarding these concepts, techniques, and technologies is scattered, thus it is not easy to obtain the information required for a specific development environment. In this paper we analyse the literature, then discuss about the existing concepts, techniques, and technologies, available for WebSocket based development. The facts delivered in this paper can be utilized to reduce knowledge search time for engineering of WebSocket based applications, and it can help developers to easily find the needful for the implementation of WebSocket. The knowledge of this paper will be utilized in our ongoing research, towards design and development of a WebSocket server-tool, which will help in rapid development.

5.3 Review and study of Real time Video Collaboration Framework WEBRTC

The standards like IETF as well as W3C are used to define the framework, protocols, and application programming interfaces. These interfaces provide further real-time interactive voice, video, and data in web browsers as well as other applications. This is explaining how media as well as data transfer in a

peer-to-peer style directly between two web browsers. It's showing the protocols handled to transport & its secure the encrypted media, traverse NATs & firewalls, negotiate media capabilities, and provide identity for the media. Web Real-Time Communication (Web RTC) is an upcoming standard that aims to enable real-time communication among Web browsers in a peer-to-peer fashion. In this paper we are aiming to present the detailed review over WebRTC framework. We are presenting the standard and technology used of WebRTC, different methods used in WebRTC, bandwidth allocation scheme discussed which is used for video collaboration under real time environment.

5.4 Design And Architecture of a WebRTC application

The aim of this thesis is to investigate existing design patterns for WebRTC applications in order to achieve a scalable, performant and efficient WebRTC application that keeps streams unique. Further, this thesis shows how these can be implemented using JavaScript technologies. Through a literature study, we conclude that the design patterns full mesh using a signaling server and star topology with a media server that relays streams, called Selective Forwarding Unit (SFU). Both these design patterns have quality attributes that are desirable. We propose an approach of combining these patterns in the same application in order to achieve a scalable application that can fit a broad spectrum of use cases while being efficient. As full mesh is performant and cost-effective in comparison to an SFU but does not scale well with increasing number of participants, we investigate ways to optimize a full mesh session to use it as long as possible before converting a session to using an SFU.

5.5 Literature review of online peer-to-peer(P2P) lending: current status, developments and future directions

Online peer-to-peer lending has been promoted as a potential solution for individuals lacking a bank account to be eligible for a loan. The number of peer-to-peer (P2P) lending platforms has been increasing yet, in most cases, regulators have issued licenses without strict guidelines as to the type of online financial institution that can be registered under P2P lending regulations. At present, no literature review paper which specifically explores online P2P lending that published in peer-reviewed journals has existed. This research use bibliometrics analysis, content analysis, word frequency and trend of keyword analysis to divide 141 publications in P2P lending into seven themes and 25 subthemes and to find the future research agenda; they are default predictions, auction process, regulation, and regulation.

Critical Objectives

Expanding sharing, lowering time taken to edit and sharing document via email, and managing access to the documents incorporated with chatting and video conferencing. Influencing learning experiences for students. Make a useful collaborative tool that allows sharing and editing in a more simple and flexible way as compared to traditional communication methods. Making a chat box to provide additional ways to communicate and collaborate in real time. Also saving the changes of all the user instances editing the document using Cloud.

Conclusion

Effective sharing and collaboration of writers, students, team members, teachers or researcher helps in effective learning and cuts-off the tear and toil generated through documents edited via non-collaborative editors. Not only it is popular but also the requirement of today's era when people are digitally connected everywhere and everything is just a click away. This project is build on a technology stack called MERN stack which works as the backend and frontend of the projects, socket.io for real time editing of the documents and WebRTC which facilitates the chatting and video conferencing interface , saving of the documents using cloud and managing access of the documents.

Acknowledgment

I am highly grateful to the head of department Information technology at Maharaja Agrasen Institute of Technology for giving me proper guidance, advice and facility for the successful completion of my

Project Work. It gives me a great pleasure to express my deep sense of gratitude and indebtedness to my guide Dr. Ml. Sharma, HOD, Department of Information Technology, for his valuable support and encouraging mentality throughout the project. I am highly obliged to him for providing me this opportunity to carry out the ideas and work during my project period and helping me to gain the successful completion of my Project. I am also highly obliged to Project Coordinator Mrs. Narinder Kaur, Assistant Professor, Department of Information Technology, for providing me all the facilities in all activities and for their support and valuable encouragement throughout my project.

References

1. Apple, K. J., Reis-Bergan, M. Adams, A. H. and Saunders, G. (2011). Online tools to promote student collaboration. In D. S. Dunn, J. H. Wilson, J. Freeman, & J. R. Stowell (Eds.), Getting connected: Best practices for technology enhanced teaching and learning in high education (pp. 239- 252). New York, NY: Oxford University Press.
2. Blair, R. M. (2006). Beyond crossroads: Implementing mathematics standards in the first two years of college. Memphis, TN: American Mathematical Association of Two-Year Colleges.
3. Blau, I and Caspi, A. (2008). Don't edit, discuss! The influence of Wiki editing on learning experience and achievement. In D. Ben-Zvi (Ed.), Innovative e-learning in higher education (pp. 19-23). Haifa, Israel: University of Haifa.
4. Bottge, B., Rueda, E. Kwon, J. Grant, T. and LaRoque, P. (2009). Assessing and tracking students' problem solving performances in anchored learning environments. Educational Technology Research and Development, 57(4), 529-552. doi:10.1007/s11423-007-9069-y.
5. Bower, M and Richards, D. (2006). Collaborative learning: Some possibilities and limitations for students and teachers. Paper presented at the 23rd Annual Ascilite Conference: Who's Learning? Whose Technology?, Sydney, Australia.
6. Brodahl, C., Hadjerrouit, S and Hansen, N. K. (2011). Collaborative writing with web 2.0 technologies: Education students' perceptions. Journal of Information Technology Education: Innovations in Practice, 10, 73-103.
7. Cardoso, L and Coutinho, C. P. (2011). Web 2.0 learning environments in vocational education: A study on the use of collaborative online tools in the Statistics module. In M. Koehler & P. Mishra (Eds.), Proceedings of the Society for Information Technology & Teacher Education International Conference 2011 (pp. 3155-3164). Chesapeake, VA: AACE.
8. Chou, P. N and Chen, H. H. (2008). Engagement in online collaborative learning: A case study using a web 2.0 tool. Journal of Online Learning and Teaching, 4(4), 574-582.
9. Chang, E and Simpson, D. (1997). The circle of learning: Individual and group processes. Education Policy Analysis Archives, 5(7). Retrieved from http://epaa.asu.edu/ojs/article/view/608.
10. Chu, S., Kennedy, D and Mak, M. (2009, December). MediaWiki and Google Docs as online collaborative tools for group project coconstruction [CDROM]. Proceedings of the 2009 International Conference on Knowledge Management, Hong Kong, China.
11. Conner, N. (2008). Google Apps: The missing manual. Sebastopol, CA: O'Relly Media.
12. Educause Learning Initiative. (2008). 7 things you should know about Google Apps (ID No. ELI7035). Retrieved from http://net.educause.edu /ir/library/pdf/ELI7035.pdf.
13. Gehringer, E. (2010). Teaching interactively with Google Docs. Proceedings of the 2010 American Society for Engineering Education Annual Conference & Exposition, Louisville, KY, 117. Retrieved from https://www.asee.org/conferencesand-events/conferences/annual-conference/pastconferences/2010.
14. Gralla, P. (2010, April 23). Google Docs better; Ready to take on Office. Computerworld. Retrieved from http://www.cio.com.au/article/344145/google_docs _better_ready_take_office_/

15. Green, T. (2010). TechSpotting: Observations of technology integration and application. Tech Trends, 54, 24-26.
16. Guerra, A and Bota, J. (2011). Collaborative writing using Google Docs: Insights from writing projects in intermediate French classes. Proceedings of the 3rd International Conference on Education and New Learning Technologies, Barcelona, Spain, 6147-6154.
17. Holliman, R and Scanlon, E. (2006). Investigating cooperation and collaboration in near synchronous computer mediated conferences. Computers & Education, 46(3), 322-335. doi:10.1016/j.compedu.2005.11.002.
18. Jones, R. W. (2007). Learning and teaching in small groups: Characteristics, benefits, problems and approaches. Anaesthesia and Intensive Care, 35(4), 587-592.
19. Kieser, A. L., & Golden, F. O. (2009). Using online office applications. Distance Learning, 6(1), 41-46.
20. Koch, M. (2010). Utilizing emergent web-based software tools as an effective method for increasing collaboration and knowledge sharing in collocated student design teams (Unpublished master's thesis). University of Oregon, Eugene, OR. [21] Lamb, B. (2004). Wide open spaces: Wikis, ready or not. EDUCAUSE Review, 39(5), 36-48. Retrieved from http://www.educause.edu/EDUCAUSE+Review/E DUCAUSEReviewMagazineVolume39/WideOpen SpacesWikisReadyorNot/157925

*****