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IMPROVING ACADEMIC OUTCOMES: AN IN-DEPTH ANALYSIS OF DOCUMENT MANAGEMENT SYSTEMS IN EDUCATIONAL SETTINGS

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Abstract: — In today's educational environment, boosting educational outcomes requires effective document management. This study report takes a close look at how School Document Management Systems (SDMS) can improve student accomplishment. Educators and administrators can enhance the distribution, organization, and storage of instructional resources with the use of SDMS, which facilitates collaboration, optimizes processes, and ultimately improves teaching and learning experiences. This study examines the different characteristics, strategies for implementation, and outcomes related to the adoption of SDMS in educational settings by reviewing current literature, empirical data, and case studies The purpose of this study is to examine the use of both paper-based and electronic DMSs in a sample of small contracting businesses. Given how important hardcopy documents are to the majority of an organization's operations—especially in government agencies—managing them in a safe and secure manner has become imperative. In order to address the shortcomings of the current document management practices used by government agencies, we consequently put up a new framework. Large amounts of paper must be handled efficiently in the current educational environment in order to support administrative, instructional, and learning activities. The study described in this abstract examines School Document Management Systems (SDMS) and how important they are to contemporary educational settings. By providing a single platform for the archiving, retrieval, and organization of educational resources, SDMS promotes cooperation between administrators, teachers, and students. This essay explores the features, advantages, and difficulties of implementing SDMS in educational institutions. It investigates how SDMS improve overall educational efficacy, facilitate processes, and improve information accessibility through a review of case studies and academic literature.

Index Terms - Acceptance by Users of Technology for Education, Streamlining Workflow, Collaboration Improvement, Student Performance, Compliance with Data Security Regulations

I. INTRODUCTION

The abundance of digital resources and administrative duties in today's educational environment require effective document management in schools. The emergence of School Document Management Systems (SDMS) has provided educational institutions with a consolidated platform to optimize document-related workflows and improve operational efficiency, thereby mitigating these difficulties. This introduction lays the groundwork for a thorough investigation of SDMS and their revolutionary influence on the efficacy of education.

Lesson plans, assignments, administrative paperwork, and student records are just a few of the many documents that educators, administrators, and students must deal with on a daily basis. Conventional paper-based document management techniques have difficulties with accessibility, organization, and security in addition to consuming important time and resources. Schools are increasingly using SDMS to transform the creation, storage, access, and sharing of documents within the educational ecosystem as a result of realizing these limits.

This study paper's main goal is to present a thorough analysis of SDMS and their contribution to bettering educational outcomes. We will examine the features, advantages, and difficulties related to SDMS deployment in educational contexts using a multifaceted lens. Through the comprehensive analysis of extant literature, case studies, and empirical data, our goal is to clarify the ways in which SDMS facilitate instructional effectiveness, teamwork, and, eventually, student success.

In addition, this study will look at important factors that are necessary for the adoption and effective usage of SDMS in schools, such as user acceptability, data security, and regulatory compliance. By talking about these aspects, we hope to help administrators and teachers navigate the tricky world of digital document management by offering helpful advice and insights.

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II. RELATED WORK

A popular web-based tool that works with Microsoft Office, Microsoft SharePoint provides document features for workflow automation, version control, and administration that are appropriate for cooperation inside groups. Cloud-based document management is made possible by Google Workspace (previously G Suite) through Google Drive provides users and teams with storage, versioning, and collaboration tools to work on documents instantly. Alfresco is an open-source platform that facilitates collaboration and document management.

Characteristics that are tailored to enterprises, like workflow management, records management, and version control looking for scalable and adaptable solutions. DocuWare provides feature-rich document management systems. Such as process automation, document capture, indexing, and interaction with several business apps, appropriate for enterprises needing effective document management.

M-Files is a metadata-driven document management system with an emphasis on providing features such as real-time collaboration, workflow automation, and version control. Arranging information according to its context rather than its location. For companies requiring sophisticated PDF management capabilities, Adobe Document Cloud provides tools for generating, editing, and managing PDF documents with features like electronic signatures, document tracking, and real-time collaboration. Small and medium-sized enterprises can utilize Zoho

Docs, a cloud-based platform for document management and collaboration, which offers capabilities like version control, sharing, editing, and real-time collaboration. With capabilities like file synchronization, sharing, and version history, Dropbox Business provides cloud-based file storage and collaboration for organizations in need of straightforward and easy-to-use document management solutions.

Large enterprises needing scalable and configurable content management solutions can use IBM FileNet, an enterprise content management system with features for document management, workflow automation, and records management.

M. Ismael, L. Okumus, “Design and implementation of an electronic document management system. Mehmet” Akif Ersoy Universities Uygulamalı Bilimler Dergisi. 2017, vol...1, no.1, pp.:9-17. https://doi.org/10.31200/makuubd.321093 addressed the challenge of using the paper concept of document and record management to design and implement an Electronic Document Management System. The authors analyzed the current system and specified the requirement for developing the desktop application of EDMS based on the resources available. Furthermore, the requirement gathering and data analysis phase was carried out through the process of interview method and analysis of existing documents in the organization. The system architecture was designed and developed having three modules namely document management, document storage, document retrieval and sharing as well as other features such as the digital signature verification feature. However, the implemented desktop-based EDMS was tested and used by 30 users. [4] Investigated the current electronic EDMS in enterprises, particularly construction firms, companies. The case study employed, attempted to evaluate "Aconex EDMS" with requirements, difficulties, and advantages, elicited from the contemporary Sri Lankan construction sector. A semi-structured interview and a questionnaire survey were used to perform the study. The paper also discussed the effective way of evaluating the EDMS using the technology acceptance model of the Information system theory. The findings of the study established the fact that the use of the document management system is beneficial and reduces complexity. [43] Argued that managing information-containing electronic records and document management systems is important for educational institutions. To analyze and assess the current records and archive system at the University, the author conducted a study. A model was suggested for use by all Turkish universities to implement the records and archive processes following the principles and practices of records and archives management. However, when creating the application for the polytechnic institution, the Özdemirci’s model was taken into account, and new features were included.

Airlangga University began working on its own Electronic Document Management (EDM) as E-office at the end of 2013. This is because the application known as SIKD was deemed too wide and did not meet its needs. Moreover, the initial E-office system was developed and evaluated by students using Technology Acceptance Model (TAM). The result yields a 3.41 average mean value which saw an overall acceptance rate of the EDMS by the university community. However, the system requires modifications and improvements. Furthermore, an additional investigation on Electronic Document Management (EDM) was conducted in 2015 [7]. The author used a quantitative technique in the study using a questionnaire tool with 36 responses. After successful implementation, the data was analyzed using DeLeon and McLean's information system theory model. The outcome of the implementation demonstrates a statistically significant correlation between system quality and intention to use, information quality and user satisfaction, system quality and intention to use, and intention to use with net profit of 75% success rate. [8] Addressed the issue of ineffective and inefficient storage as well as the time and cost during the process of document retrieval and storage. The author used descriptive methodologies and a qualitative approach in the study. Similar to this, information was gathered through a combination of field observations, interviews, and document analysis.

“Electronic document management system for Kırıkkale University” investigated the issues of producing, sharing, copying and archiving manually or semi-automated in an ineffective manner. The N-tier architecture of the proposed system was designed using JavaScript, ASP.net and C# program language. The author developed a web-based EDMS application for Kırıkkale University that

is readily available. The developed system is ubiquitous and can be accessed from any location within and outside the university using any internet-enabled mobile device. However, the developed system lacks adequate security for document control, access and retrieval. The limitation posed by this system spurred the design and implementation of EDMS with enhanced security features being implemented by Mahmoud and Okumus. [5] Examined the issues facing organizations in Nigeria when it comes to maintaining proper and secure document management the goal of the work was aimed at creating and implementing an improved document management system for a government organization. The author employed an object-oriented Analysis and development methodology (OOADM) approach using a waterfall method and designed the system. Using unified modelling language. Moreover, the author developed a three-tier system architecture using HTML, CSS, and JavaScript with PHP programming language and MySQL for the programming and designing of its database. The result from the study shows that the developed document system helps in the efficient and secure organization of the organization's documents and records.

A machine learning method for predicting the analysis of strokes is provided by G. Fang et al. [12], utilizing a dataset that protected patient records from 467 hospitals. The usage of Random forest (RF) classifiers, they have been able to detect reperfusion of vascular infarction (RVISINF) with the fine accuracy.

Despite these consistent problems associated with poor document management within an organization, the administrators, students, workers and the public irrespective of their domain application still implements most document management and organization using a manual system or pattern that uses a book register to track the application procedure for documents that are not yet implemented. Here, documents applications such as letters, memos, drafts and classified information documents are received, recorded and approved by some people at the centre. All document application types must wait until they return before being accepted, documented, and authorized; otherwise, unforeseen delays in document approval will occur. The system's primary flaw, however, is that it was all primarily centered on the dispersal and circulation of information. No current works have examined the use of the internet as a tool for omnipresent data production, access, update, or deletion, especially in our public workspace, government, and higher education institutions.

III. PROPOSED WORK

The proposed research paper aims to present a comprehensive analysis of a School Document Management System (SDMS) developed using advanced functionalities of React.js for the frontend, TypeScript in Node.js for the backend, and Mongo DB for the database. The system incorporates a sophisticated routing mechanism leveraging the React Router DOM library, facilitating seamless navigation and user interaction. A key feature of the SDMS is its capability to accommodate multiple classification lists, enabling clients to efficiently organize their documents based on predefined categories or custom classifications generated through a user-friendly interface. Moreover, the system includes a robust authentication system, allowing clients to securely log in and log out of the website, ensuring data privacy and confidentiality. By employing cutting-edge technologies and innovative design principles, the proposed SDMS aims to revolutionize document management practices in educational institutions, offering a user-centric approach to document organization, retrieval, and collaboration. Through a detailed examination of the system's architecture, key functionalities, implementation process, and evaluation metrics, this research paper seeks to provide valuable insights into the development and deployment of SDMS solutions in educational settings, contributing to the advancement of document management technology and educational efficiency.

The proposed system is based on the engagement of users and others on a web-based platform towards documents easy access, sharing, retrieval, enhanced security, increased productivity and development with colleagues and clients over the network. A model is developed with the main focus to facilitate the storage and extraction of documents from a database that relates to the process of an administrator receiving, approving and issuing documents for the employees and other clients to use. The data flow diagram of the proposed system is depicted in Fig.1. Admin, departmental staff and secretary are the external entities of the system that interact together. The progress report and feedback are the data flows that serve as the collection of several pieces of information.

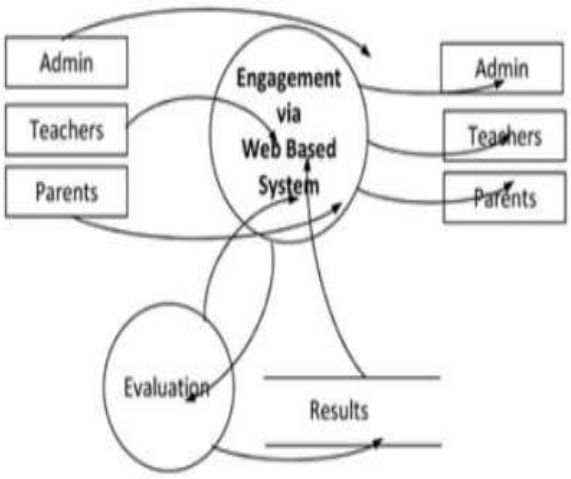

Fig.1. Data Flow Diagram of the Proposed System.

The proposed solution seeks to address recurring issues brought on by inadequate document management in an organization. This system introduces systematic document management and takes into account some elements related to the correct management and arrangement of documents to support work being done and advancement. Additionally, it promotes the use of electronic methods for tracking document workflow and simple document retrieval. It also takes into account how often papers are processed electronically, promoting the development and exchange of content inside a company. Some of the functionality provided by this system are full-text search, multi-user access, content creation, storage, and structured filing, full document retrieval, document workflow, and document version control.

System Design

As illustrated in Fig. 2, the main goals of the design of the suggested School Document Management System (SDMS) are usability, scalability, and flexibility in order to satisfy the various demands of educational establishments. The presentation layer, application layer, and data layer make up the three primary layers of the system's structure.

***Layer of Presentation*:**

React.js, a well-liked JavaScript package renowned for its declarative syntax and component-based architecture, is used in the construction of the SDMS's front end. Client-side routing is managed by React Router DOM, allowing for smooth transitions between website sections. With its adaptable layouts, dynamic components, and easy-to-use navigation menus, the user interface (UI) design adheres to contemporary design concepts and is compatible with a wide range of devices and screen sizes. React's advanced features, like context API and hooks, are used to improve state management, minimize component dependencies, and maximize performance.

Layer of Application*:*

The backend logic is developed using Node.js and TypeScript in the application layer. TypeScript adds object-oriented capabilities and static typing for improved code maintainability and reliability, while Node.js provides a lightweight and effective runtime environment for developing scalable server-side applications.

To handle HTTP requests, build routes, and implement middleware for request processing and error handling, Express.js, a lightweight web framework for Node.js, is used. JSON Web Tokens (JWT) are used in authentication and authorization systems to secure endpoints and limit access to authorized users. Secure cookies or local storage are used to manage user sessions and preserve the user's authentication state between sessions.

Layer of Data:

The database management system (DBMS) used to store and manage data connected to documents is called MongoDB. MongoDB can handle different document structures and volumes because of its scalability and flexible document-based data paradigm.

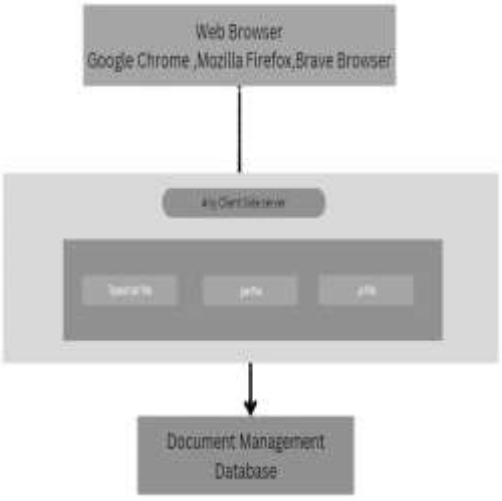

Fig .2. System architecture diagram.

The use case shown in Table 1 was used to specify the system’s requirements.

USE CASE NAME	DESCRIPTION	ACTORS
Login	The user enters the username and password into the system to gain access	Secretary, Departmental Staff
Document capture and image scanning	All documents entering the department are captured and scanned by the system, and the physical copies are filed away in the cabinets	Secretary
Insert new entry	The essential details, including date, document type, source, and destination, are recorded together with the identified documents.	Secretary
Internal document workflow	This section demonstrates the document transfer process within the department's workforce.	Secretary, Departmental Staff
Create new document	This feature allows users to produce content (such as letters, memos, and reports) using designed document templates similar to Microsoft Word and then share those contents with other departmental staff members.	Departmental Staff
View existing documents	The created and saved documents in the file repositories are opened in this manner.	Departmental Staff
Document versioning.	Only one person is allowed to work on a document at once under this section A lock is created when a user checks in, and it is then released when the user checks out.	Departmental Staff
Document sharing	A user can authorize other employees to see, comment on, and share the document by using this attribute	Departmental Staff
Basic search and advanced search.	The user can get or recover documents using the required search criteria	Departmental Staff
Audit trails of entries	This displays comprehensive data on each incoming document that has been received by the system	Secretary
Admin panel	performs system maintenance and performance monitoring.	System Administrator

III. IMPLEMENTATION

Implementation Overview:

The proposed system is developed using Visual Studio Code (VS Code) as the primary integrated development environment (IDE), harnessing its robust features for efficient coding and project management. The system architecture revolves around React.js for the frontend and Node.js for the backend, providing a scalable and versatile solution for web-based document management. The graphical user interface (GUI) is meticulously crafted using HTML, CSS, and JavaScript within the React.js framework, ensuring an intuitive and responsive user experience. React Router is seamlessly integrated to facilitate client-side routing, enabling smooth navigation between different components and pages of the application.

On the backend, Node.js powers the server logic, leveraging Express.js for streamlined route handling, middleware implementation, and API integration. MongoDB serves as the database management system (DBMS) of choice, offering a flexible and scalable solution for storing and managing document-related data. The system is designed to run efficiently on hardware with 8GB RAM, an Intel Core i5 processor, and a 512GB SSD, ensuring optimal performance and responsiveness. Deployment options include local hosting or cloud deployment, providing accessibility across different platforms and devices.

By leveraging modern development tools and technologies, the proposed system delivers a comprehensive and platform-independent solution for web-based document management, catering to the diverse needs of organizations and educational institutions. Patterns from the pics.

The WBDMS system is a web-based electronic program that can be accessible by a local host web server or remotely hosted in the cloud, as shown in Fig. 3.

4.1. Login page for Document System

The primary login page, depicted in Figure 3, is the page that is only visible to authorized users, such as administrative officials, department personnel, and secretaries can get to. Only the username and password that the administrator has provided to the authenticated user will allow them to access the system. With the use of the password and username, they can

entry to the dashboard. Upon entering accurate login credentials, users' dashboards are redirected by the system based on their allocated role, which was identified at the time of their system addition.

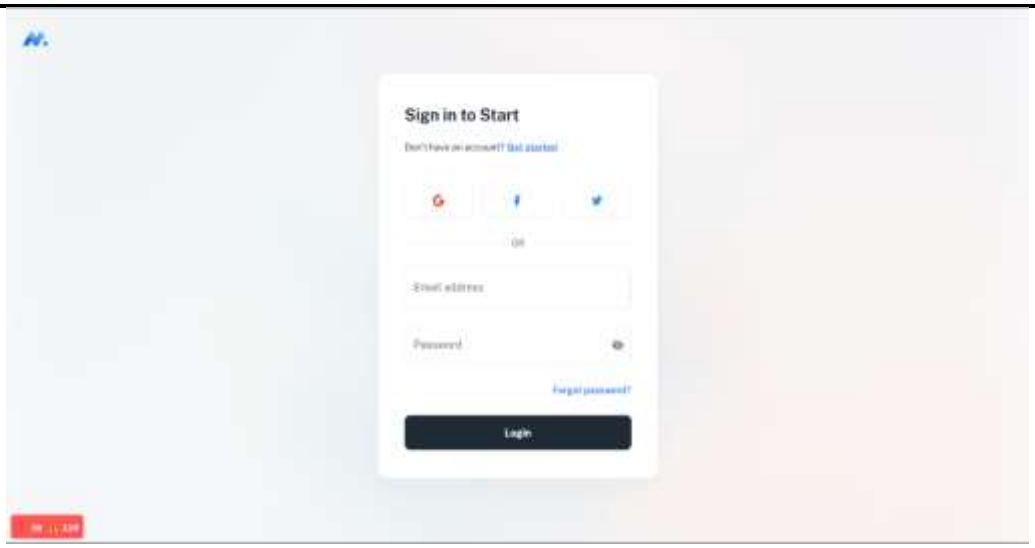

Fig .3.Screenshot showing the login page of the Web-based Document Management System

4.2. *Home Page*

The home page as shown in Fig. 4 is the first page that a user sees after logging in to the system. It serves as the main page that directs users to other pages in the system.The homepage of the suggested system acts as a central location for effective document management. It has an intuitive user interface that makes it easy to navigate and access key features. Users are presented with an orderly list of file folders on the homepage, which highlights recently opened files and folders for easy access. The interface prominently displays user-friendly choices for uploading files and creating new folders, enabling users to manage and organize their papers with ease. Whether classifying HR records, legal files, or other pertinent materials, users can customize the system to meet their unique organizational needs by creating custom classification lists using the visible 'Create' button.

The centerpiece of the homepage is a dynamic search bar with extensive search capabilities that lets users find particular files or folders on the system fast. By giving users immediate access to pertinent documents and reducing the amount of time they must spend manually searching through directories, this search feature increases productivity. Furthermore, a carefully curated list of shared files is prominently shown on the site to promote easy collaboration and document sharing among individuals inside the company.

The 'Starred Files' section on the site is another noteworthy feature that lets users flag particular documents as favorites for quick access. By prioritizing vital files and streamlining workflow efficiency, this functionality makes sure that crucial papers are always available when needed.

Overall, the suggested system's homepage is well-thought-out to emphasize user productivity and convenience, providing an extensive feature set and a full range of tools to facilitate efficient document management in businesses.

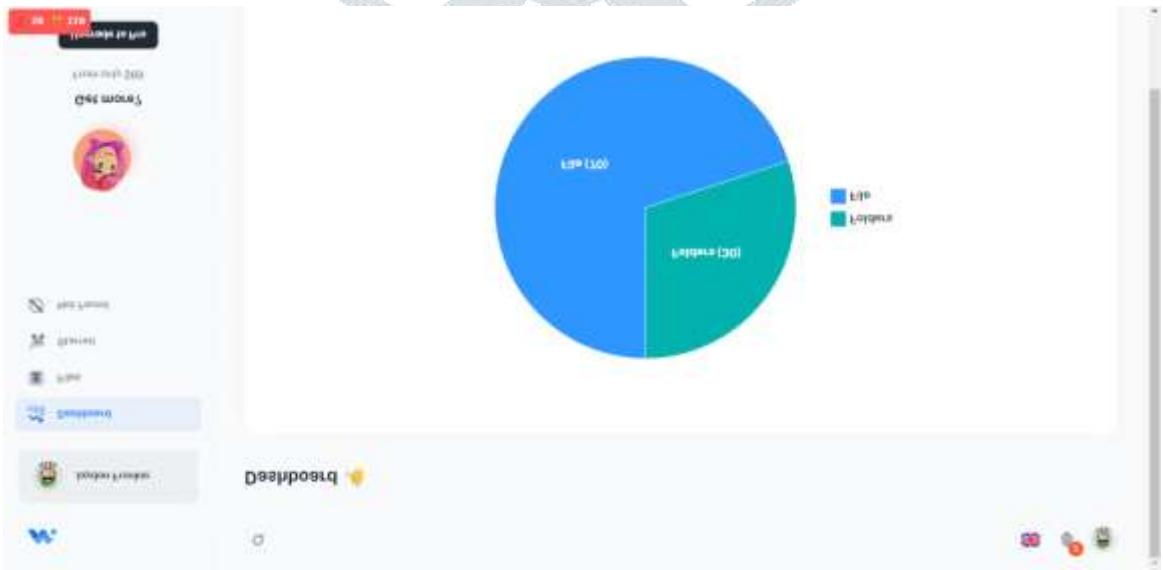

Fig .4. Screenshot showing Homepage of the Document system

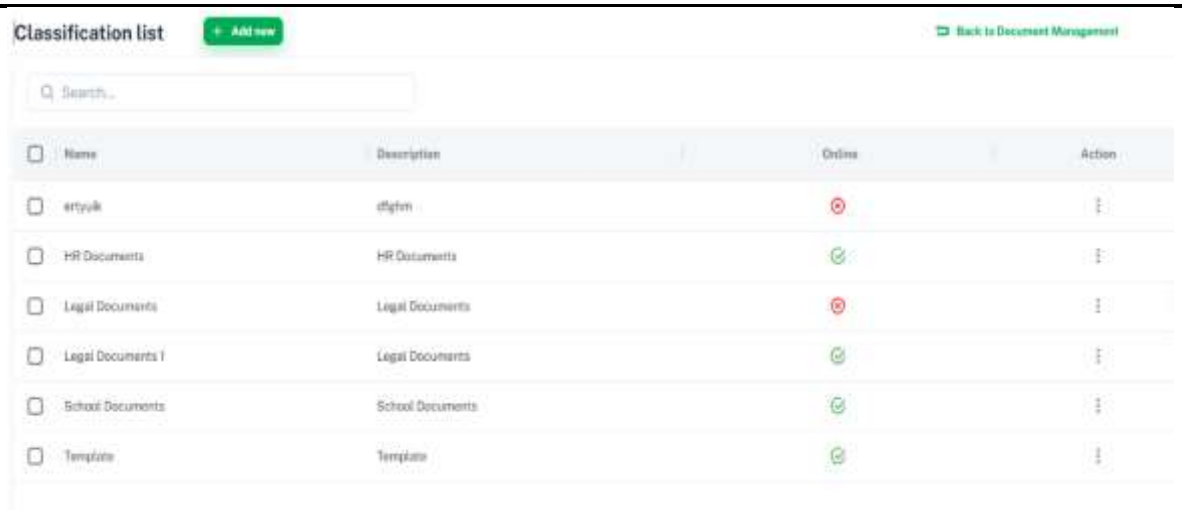

Fig .5. Screenshot of All Classification List of DMS

Fig.6. Screenshot of Shared Document Page

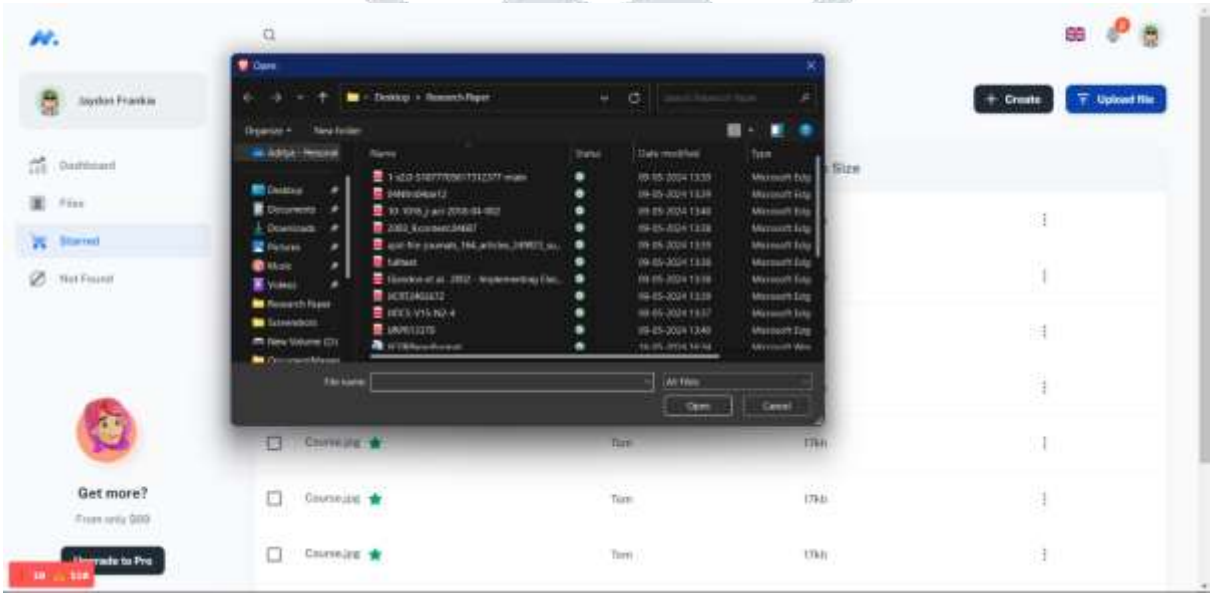

Fig .7. Screenshot showing upload pop-up for files

VII. CONCLUSION

The suggested electronic document management system, which makes use of cutting-edge technology like React, TypeScript, Node.js, and MongoDB, offers a substantial leap in office administration. The system delivers improved functionality, scalability, and security to satisfy the changing needs of enterprises in managing digital documents by implementing a current development stack.

The system was carefully built to guarantee compatibility, adaptability, and usability using the Unified Modelling Language (UML) and the Object-Oriented Hypermedia Design Methodology (OOHDM). The system's architecture and user interface were designed with the integrated development environment (IDE) made possible by tools like as VS Code for React and NetBeans for backend development. These technologies allowed for easy navigation and effective processing of documents.

Node.js and TypeScript power the backend functionality, which makes user requests robust and responsive. MongoDB is a dependable and scalable database option for document-related data storage. The system's middleware, which was constructed with XAMPP, adds crucial features like load balancing, scalability, and transaction processing to improve efficiency and dependability even more.

As a result of extensive testing and evaluation using updated information system theory models, the system exhibits remarkable metrics for correctness, usability, and reliability. These results highlight the system's potential to improve office administration jobs' data efficiency, increase user productivity, and streamline document management procedures.

In order to further maximize workflow efficiency and user experience, future improvements to the electronic document management system may include the integration of intelligent features, platform-centric content strategies, and cloud awareness. Through the adoption of cutting-edge document management solutions, businesses may leverage digital innovation to boost efficiency and competitiveness in the ever-changing business environment.

VIII. FUTURE SCOPE

There are plenty of opportunities for the electronic document management system to grow and improve in the future. Creating a specific mobile application is one way to increase the system's accessibility and reach for users of tablets and smartphones. With the ability to handle documents while on the road, this mobile app will allow users to be productive and efficient outside of traditional desktop environments. Users can easily switch between devices and keep their document management workflows consistent by syncing with the web-based platform.

Performance optimization and scalability are also greatly enhanced by incorporating cloud services into the system architecture. Cloud storage technologies such as Microsoft Azure and Amazon Web Services (AWS) can be leveraged by the system to support increasing volumes of documents while improving data redundancy and disaster recovery capabilities. Moreover, the system's scalability and responsiveness can be enhanced by offloading computational activities to cloud-based document processing and analysis.

REFERENCES

[1]. Abbasova, V. S. 2020. Main Concepts of the Document Management System Required for Its Implementation in Enterprises. ScienceRise, 28(1): 32-37. https://doi.org/10.21303/2313-8416.2020.001149.

[2]. Abdulkadhim, H. A., Bahari, M., Bakri, A., and Ismail, W. A. 2015. Research framework of electronic document management systems (EDMS) implementation process in government. Journal of Theoretical and Applied Information Technology. https://oarep.usim.edu.my/jspui/handle/123456789/2128.

[3]. Adamu, H. 2019. Management of Electronic Records in Federal Universities in North Western States of Nigeria: Being a Thesis based on imbalanced medical dataset. Artificial Intelligence in Medicine, 101: 101723.

[4]. Aldhmour, F., and Sarayrah, I. 2016. An Investigation of Factors Influencing Consumers' intention To Use Online Shopping: An Empirical Study In South Of Jordan. The Journal of Internet Banking and Commerce, 21(2). https://www.icommercecentral.com/open-access.

[5]. Aliero, S. M. 2019. Strategic approaches to address the challenges faced in using electronic document management system: a case of staff of Kebbi State University of Science and Technology Aliero, Nigeria. Doctoral dissertation, Kampala International University. http://hdl.handle.net/20.500.12306/2196.

[6]. Anderson, C. 2012. Is document control really that important. Bizmanualz OnPolic. Retrieved September 23, 2012, From http://www.onpolicy.com/2010-12/is-document-control-really-that-important.html.

[7]. Asogwa, B. E. 2012. The challenge of managing electronic records in developing countries: Implications for records managers in sub-Saharan Africa. Records Management Journal, 22(3): 198-211. https://doi.org/10.1108/09565691211283156.

[8]. Callinan, T. 2018. How AI, Machine Learning & Automation Will Impact Business In 2018 and Beyond. April 2018. https://magazine.startus.cc/ai-machine-learning-automation-will-impact-business-2018-beyond/.

[9]. Davis, F. 1989. Perceived Usefulness, Perceived Ease of Use, and User Acceptance of Information Technology. MIS Quarterly, 13(3): 319-339.

[10]. Fernando, H., Hewavitharana, T., and Perera, A. 2019. Evaluation of Electronic Document Management (EDM) systems for construction organizations. In 2019 Moratuwa Engineering Research Conference (MERCon) IEEE, pp. 273-278. https://doi.org/10.1109/MERCon.2019.8818768.

[11]. Hajiha, A., Shahriari, M., and Vakilian, N. 2014. The role of perceived value on customer E-shopping intention using technology acceptance model, (TAM). In 2014 IEEE international conference on industrial engineering and engineering

management (pp. 1136-1140).

[12]. Ismael, M., and Okumus, L. 2017. Design and implementation of an electronic document management system. Mehmet Akif Ersoy Üniversitesi Uygulamalı Bilimler Dergisi, 1(1): 9-17. https://doi.org/10.31200/makuubd.321093.

[13]. Manyika, J., et al. 2017. A Future That Works: Automation, Employment, and Productivity. McKinsey Global Institute, January 2017. https://www.mckinsey.com/~/media/mckinsey/featured%20insights/digital%20disruption/harnessing%20automation%20for%20a%20future%20that%20works/a-future-that-works-executive-summary-mgi-january-2017.ashx.

[14]. Morley, D., and Parker, C. S. 2014. Understanding computers: Today and tomorrow, comprehensive. Cengage Learning.

[15]. Noyes, M. J., and Garland, J. K. 2008. Computer- vs. Paper-Based Tasks: Are They Equivalent? Ergonomics, 51: 1352–1375. https://doi.org/10.1080/00140130802170387.

[16]. Ostroukh, M., Krasnyanskiy, S., Karpushkin, S., and Obukhov, A. 2014. Development of automated control system for university research projects. Middle-East Journal of Scientific Research, 20(12): 1780-1784. DOI: 10.5829/idosi.mejsr.2014.20.12.21091.

[17]. Spade Technology. 2019. The Age of Automation and how it impacts Business and Workflow. https://www.spadetechnology.com/the-age-of-automation-and-how-it-impacts-business-and-workflow.

[18]. Mighty Guides. 2019. The Impact of Automation on Modern Business. Mighty Guides, Inc. New York: Great Neck. https://www.ca.com/content/dam/ca/us/files/ebook/the-impact-of-automation-on-modern-business.

[19].Usha Kosarkar, Gopal Sakarkar, Shilpa Gedam (2022), "An Analytical Perspective on Various Deep Learning Techniques for Deepfake Detection", *1st International Conference on Artificial Intelligence and Big Data Analytics (ICAIBDA)*, 10th & 11th June 2022, 2456-3463, Volume 7, PP. 25-30, https://doi.org/10.46335/IJIES.2022.7.8.5

[20] Usha Kosarkar, Gopal Sakarkar, Shilpa Gedam (2022), "Revealing and Classification of Deepfakes Videos Images using a Customize Convolution Neural Network Model", *International Conference on Machine Learning and Data Engineering (ICMLDE)*, 7th & 8th September 2022, 2636-2652, Volume 218, PP. 2636-2652, https://doi.org/10.1016/j.procs.2023.01.237

[21] Usha Kosarkar, Gopal Sakarkar (2023), "Unmasking Deep Fakes: Advancements, Challenges, and Ethical Considerations", *4th International Conference on Electrical and Electronics Engineering (ICEEE)*,19th & 20th August 2023, 978-981-99-8661-3, Volume 1115, PP. 249-262, https://doi.org/10.1007/978-981-99-8661-3_19

[22] Usha Kosarkar, Gopal Sakarkar, Shilpa Gedam (2021), "Deepfakes, a threat to society", *International Journal of Scientific Research in Science and Technology (IJSRST)*, 13th October 2021, 2395-602X, Volume 9, Issue 6, PP. 1132-1140, https://ijsrst.com/IJSRST219682

[23] Usha Kosarkar, Gopal Sakarkar (2024), "Design an efficient VARMA LSTM GRU model for identification of deep-fake images via dynamic window-based spatio-temporal analysis", *International Journal of Multimedia Tools and Applications, 8th May 2024, https://doi.org/10.1007/s11042-024-19220-w*