AN AUTOMATED STUDENT RESULT MANAGEMENT SYSTEM (SRMS) FOR EDUCATIONAL EFFICIENCY AND DATA SECURITY ENHANCEMENT

Rajender Kumar[1], Punit Soni[2*], Anju Gandhi[3], Stuti Mehla[4]

[1,4] Associate Professor, Department of CSE, P.I.E.T, Panipat, Haryana, INDIA
Email: [1]raj.mangyan@gmail.com, [4]stuti21mehla@gmail.com
[2]Assistant Professor, Chitkara University Institute of Engg. and Tech., Rajpura, Punjab, INDIA
Email: punit.soni@chitkara.edu.in
[3]Professor, Department of CSE (Emerging Technology), P.I.E.T, Samalkha, Panipat, Haryana, INDIA
Email:dr.anjugandhi@gmail.com
Corresponding Author

Abstract: The goal of this research is to create a computerized student outcome management system to replace the present system, which is paper-based. This research paper suggested an automated Student Result Management System (SRMS) as a solution to these problems. The objective is to make maintaining and retrieving student outcomes more effective and safer. The system intends to reduce the time and effort needed by administrators and faculty members by automating result-related procedures such as result production, computation, and storage. Administrators, faculty members, and students will all have quick and simple access to their individual result information thanks to the computerized system. Physical result sheets won't be required anymore, and it will be simpler to search for and obtain student data, saving time and resources. The initiative also seeks to improve data integrity and security. The system can apply strong security features, including user identification and data encryption, to secure sensitive information by keeping result data in a centralized database. This will minimize the possibility of unauthorized access or data loss by ensuring that only authorized users may access and alter the data.
Keywords: SRMS, Administration, Result, Login, Student, Teacher, Reports

1. INTRODUCTION

The Student Result Management System (SRMS), a technical system, was developed to enhance and streamline the result management process in educational institutions. The SRMS makes an effort to replace outmoded paper-based systems and overcome the issues caused by manual processes. Applying the SRMS will help educational institutions monitor student outcomes more efficiently, correctly, and simply. Administrators may add, modify and retrieve student information, including grades and other relevant information, using the SRMS's user-friendly interface. It reduces the time and effort needed for result management tasks and gets rid of the requirement for physical papers. Through a login site, students and parents may safely see their results, removing the need for in-person visits and enabling easy accessibility [1].
The SRMS places a high priority on data security and integrity, and it uses a secure database to store result records and guard against unauthorized access or data loss. The method automates result computations, reducing the possibility of mistakes or grading anomalies. The SRMS also offers scalability, allowing an increasing student population and producing

thorough reports quickly [2]. The SRMS implementation has a number of advantages, including increased student happiness, less administrative load, more transparency, and improved institutional reputation. The result management process undergoes a revolution thanks to the SRMS, which makes it convenient, accurate, and effective for all parties involved.

1.1 Problem Statement

The majority of manual processes and substantial human involvement are still used at educational institutions today to announce and track student performance. The outcomes are produced using spreadsheet software, such as Excel, and printed out on paper [3]. However, this strategy is time-consuming, expensive, ineffective, and data-unsecure. A creative and technologically cutting-edge environment that can streamline the result management process is required to address these problems. By utilizing an automated Student Result Management System (SRMS), the institution can solve these difficulties. The SRMS will decrease the amount of time and labour needed to complete various result management duties. It will make result processing rapid and precise by doing away with the requirement for manual result production and printing [4].

Additionally, the SRMS will provide a secure and reliable platform for gathering and maintaining student outcome data. It will offer data security safeguards to guarantee the confidentiality and accuracy of sensitive data. The technology will contribute to greater efficiency by automating computations for results and providing rapid access to results. By replacing the manual activities with a computerized SRMS, the institution will benefit from increased productivity, lower costs, more accuracy, and improved data security. By creating a modern, computerized environment, the business will be able to address its current problems and create a result management system that is both more effective and efficient [5].

1.2 Objective of the study

- The aim of this study is to develop a user-friendly and efficient system for handling and managing the many duties related to a result management system. The following objectives are the focus of the work:

- Creating a computerized system for managing test results that streamlines the procedure and does away with traditional paper-based exam results. An alternate and more practical method of handling and storing result data will be made available by this system.

- Creating the necessary software or applications to implement the intended system. This process entails developing the necessary features and functionality to provide a streamlined user experience.

- Analyzing the system's performance to confirm its efficacy and efficiency. Real-world scenarios will be used to test the system, and user input will be gathered to determine any possible problems or areas for improvement.

- Recognizing and addressing any issues or difficulties that arose throughout the development and implementation process. This stage is essential for making that the system functions as expected and fulfils the organization's needs.

By completing these processes, the work hopes to provide a solid and trustworthy result management system that streamlines the entire procedure, boosts productivity, and offers a better user and administrative experience while maintaining and retrieving test results.

1.2 Target Users

The target users for the Student Result Management System (SRMS) can include:

1. *Administrators:* Those in charge of monitoring and storing student outcome data include administrators at schools, colleges, and universities. They may input, amend, and retrieve student data in SRMS, including grades and other pertinent information [6].
2. *Teachers and instructors:* Teachers may enter and amend student grades as well as produce reports using SRMS. They may log on to the system to see each student's performance as well as the collective performance of the class.
3. *Students:* Students can utilizes SRMS by logging in securely to examine their own result data. They may quickly access their previous test results, go through their grades, and keep tabs on their academic progress.
4. *Parents and Guardians:* SRMS may provide a platform for parents and guardians to monitor their children's academic development. They may log into the system to view their child's grades, attendance record, and other important information.

1.3 Modules of the work

The Student Result Management System (SRMS) is divided into two modules:

Admin Features:

- A list of all administrative duties is accessible through the administrative dashboard.
- Class Management: The administrator of the institution may add, edit, and manage various courses with the aid of this tool.
- The administrator is able to create, edit, and manage the topics covered in the classes thanks to topic management.
- Subject-Class Combination: The administrator may decide whether or not particular subject combinations are active for each class and can create and enforce this rule.
- Student Registration: Using this feature, the administrator may modify any relevant information about existing students as well as add new ones to the system.
- The administrator has the authority to announce and alter results, as well as to assign grades and percentages.
- Password management: The administrator can change their own password for security reasons.

Student Features:

- By inputting a valid roll ID or other identifying identification, students can utilise the result search option to seek for their results.
- Check Results: Students may check their results, which include the grades and percentages received for each topic.
- Printing of Results Sheets: Students have the option of printing their results sheets for their own records or future reference.

2. FUNCTIONALITIES OF THE RESEARCH WORK
2.1 Core Features:

The foundation of the Student Result Management System (SRMS) is made up of several crucial elements. These factors are necessary for the efficient administration and display of student outcome data. The following might be the main traits of the SRMS:

- To facilitate the storing and retrieval of student outcome data, the SRMS makes use of a centralized database. This component ensures that outcome data is safely saved and is simple to obtain when required [7].
- The SRMS automates result generation while taking into account the evaluation criteria and grading standards provided by the educational institution. It calculates and generates exact results based on the information provided by the teachers [8].
- The system provides instructors, administrators, and students with a straightforward user interface for viewing and obtaining results data. Results may be shown in a variety of forms, including grade sheets, transcripts, or graphical representations, depending on the requirements of the institution.
- Individual student profiles are kept up-to-date by the SRMS, allowing students to create their own accounts from which they may review specific result data including subject-specific grades, attendance records, and overall performance.
- Statistics and result analysis: The system offers facilities for compiling reports with statistical data based on data from outcomes. With the aid of this tool, instructors may more clearly identify areas in which students need improvement and make data-driven decisions.

2.2 Enhanced Features:

The SRMS delivers improved functions in addition to its fundamental features, giving users even more value. The incorporation of results from prior semesters with those from the present semester is one of our SRMS's improved features. Students may use this tool to get a detailed overview of their performance and academic development over time.

1. ***Access to results from prior semesters:*** Students have access to their results from prior semesters through the SRMS. Students may analyze their performance, follow their development, and get a better grasp of their academic path by having access to results from past semesters.
2. ***Result comparison:*** By including results from prior semesters, students may assess their progress over time. Students may recognize trends, areas for development, and strengths thanks to this tool [9].
3. ***Progress monitoring:*** Students may keep track of their advancement and keep an eye on their academic development by having access to results from prior semesters.
   Based on their prior performance, they might create objectives and work to raise their grades in coming semesters.
4. ***Comprehensive evaluation:*** By taking into account the results from all prior semesters, the SRMS offers a full assessment of a student's academic performance. This function gives instructors and administrators a comprehensive understanding of a student's performance and assists them in determining their overall growth [10].

3. RELATED WORK

Kumar and Chawla (2018) emphasized the importance of SRMS in their study, emphasizing how it has transformed the conventional paper-based result management procedure. They highlight how SRMS offers a digital platform for organizing, storing, and retrieving student outcome data, doing away with the necessity for manual record-keeping. According to the authors, SRMS increases the effectiveness and precision of result management, consequently boosting educational institutions' overall performance [11].

Ahmad et al. (2017) go over the significance of SRMS data security. They stress the need of protecting sensitive student outcome data from unauthorized access and modification. The authors propose that to guarantee the confidentiality and integrity of student data, SRMS should include strong security features such encryption, user authentication, and access controls. They emphasized how a safe SRMS protects student data from breaches and fosters confidence among stakeholders [12].

Khan and Rafique (2019) highlighted the function of SRMS in enhancing stakeholder collaboration and communication. They contend that SRMS facilitates easy information exchange between educators, pupils, parents, and administrators. Stakeholders may access and track student performance through a centralized system, provide input, and handle issues. The authors observe that an atmosphere that is more encouraging and stimulating for learning results from good communication made possible by SRMS [13].

Patel and Patel (2016) explained the advantages of SRMS in terms of result transparency and accuracy in their research. They emphasized that SRMS automates the process of generating results, lowering the possibility of mistakes and providing uniform assessment standards. Additionally, SRMS gives students and parents immediate access to outcome data, allowing them to monitor development and pinpoint areas in need of improvement. The authors contend that by making result-related data easily accessible to all stakeholders, SRMS improves transparency [14].

Sharma and Bhatt (2019) focused on the benefits of SRMS in terms of efficiency and time savings. They contend that SRMS gets rid of the manual paperwork and office duties related to result management. According to the authors, SRMS accelerates the process of compiling, calculating, and distributing results, allowing administrators and instructors to better utilise their time and resources. This greater production and better use of educational resources are the results of this increased efficiency [15].

Ghosh and Mandal (2017) looked at how SRMS affects the standing of the university and student happiness. They contend that by demonstrating an educational institution's dedication to cutting-edge technology and effective outcome management, a well-implemented SRMS improves the institution's reputation. By offering a user-friendly interface, simple access to findings, and quick information distribution, the authors contend that SRMS increases student satisfaction [16].

4. METHODOLOGY

The methodology for implementing the Student Result Management System (SRMS) involves a comprehensive and systematic approach that encompasses various stages and tools. Gathering needs from stakeholders, such as administrators, instructors, and students, is the first step in the technique. This stage makes sure that everyone is aware of their requirements, goals, and ideal SRMS features. The requirements acquired provide the basis for the phases that follow the implementation process [17].
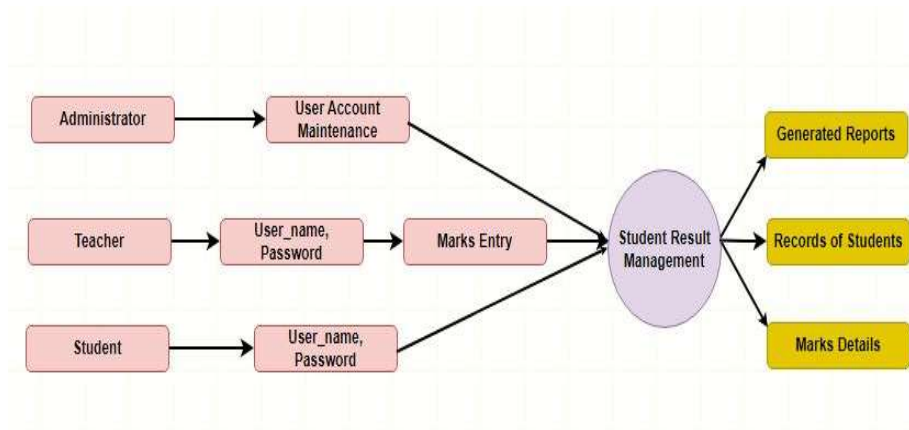
Fig.1. DFD of Level 1.1

Unified Modeling Language (UML) diagrams are used to define the system's class hierarchy during the design phase, giving a visual depiction of the interactions and links between various components. In order to ensure effective data organisation and retrieval, Entity-Relationship Diagrams (ERD) are also used to design the database table architectures [18]. In order to improve data integrity and efficiency, this phase also involves database normalization procedures as well as logical and structural designs for the database. On the server-side, PHP is an object-oriented scripting language that is used to simplify the construction of the web-based application. Because PHP is adaptable, scalable, and cross-platform compatible, the SRMS can operate without any issues on a variety of operating systems [19].

Additionally, PHP's connection with the chosen Database Management System (DBMS) enables efficient database communication and manipulation. MySQL, a well-liked and trustworthy database management system, was selected as the DBMS for the SRMS. Large amounts of data pertaining to students may be handled effectively because to MySQL's reliable data storage and retrieval capabilities [20] [21]. The SRMS can handle and manipulate data in real-time thanks to the combination of PHP and MySQL. Strenuous testing and quality assurance procedures are used throughout the implementation phase to find and fix any problems or faults. This guarantees the SRMS's The system requirements of a proposed system should be captured and presented using a use case diagram. It acts as a graphic representation that shows the linkages and interactions between various system components, including the users (actors) and the various use cases they participate in [23].

A use case diagram's main objective is to give a simple and clear overview of the functional needs of the system. It enables stakeholders to see the precise tasks that users may carry out within the system as well as the aims and purposes connected to each use case [24]. The use case diagram provides a thorough overview of the system's operation by outlining several use cases along with the related activities and actions. Work managers, programmers, and end users, among other stakeholders, may learn more about the worked capabilities and behavior of the proposed system thanks to this visualization [25]. Dependability and correctness before distributing it to ministrations students [22].
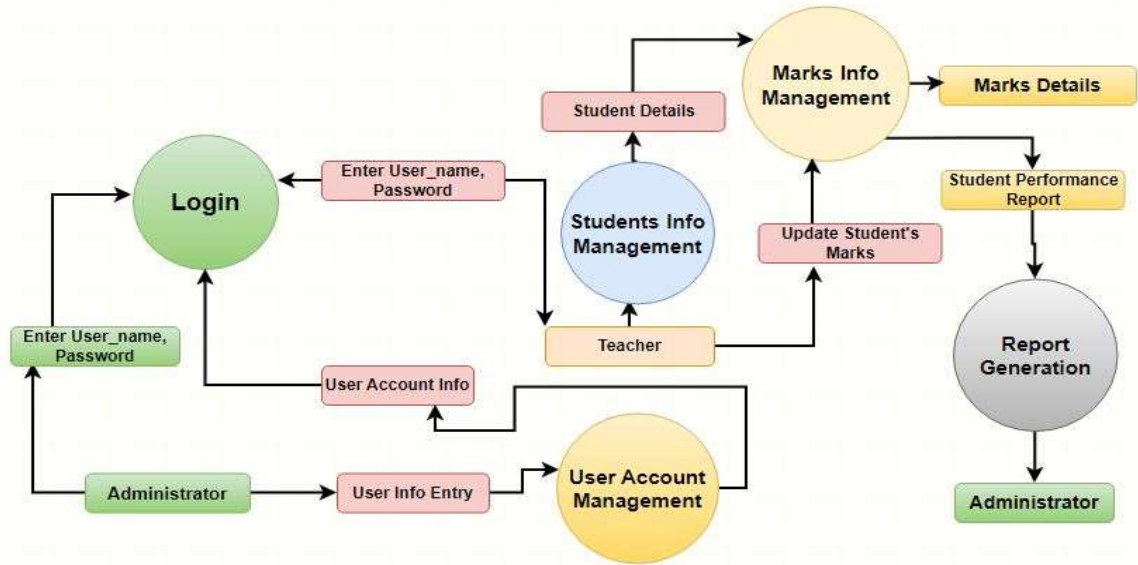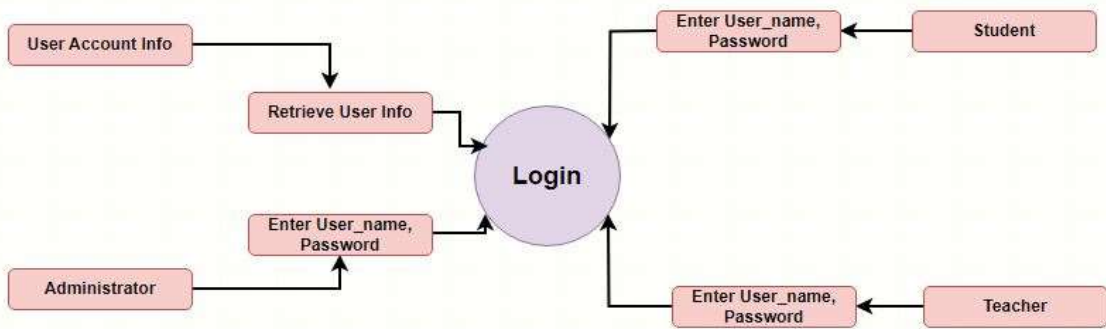
Fig.2. DFD of Level 1.2 (Login)
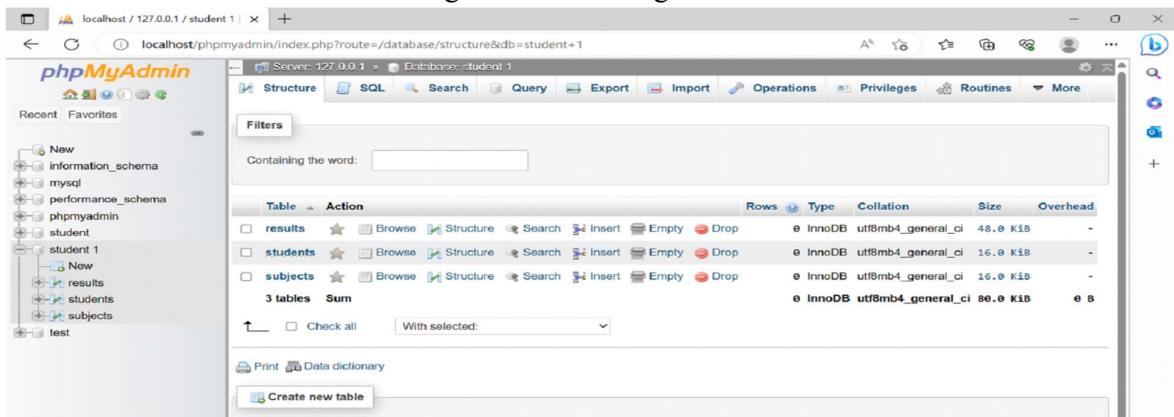

Fig.3. Use case Diagram

Fig4. Database Design

5. IMPLEMENTATION

In this section, we will explore some of the key open-source tools, programming languages, and databases that have been utilized to enhance the system.

1. Sublime Text and Code Editor:

Popular code editor Sublime Text provides a number of features to promote effective and fast programming. Developers like it because of its user-friendly interface, syntax highlighting, and robust search and replace capabilities. Multiple programming languages are supported by Sublime Text, making it simple for developers to write and edit code. Developers may adapt the editor to their own needs thanks to its extensibility through plug-in, thus boosting their productivity.

2. XAMPP Cross-platform Web Server:

A popular open-source web server programme called XAMPP makes it easier to set up and customize a local development environment. The web server is Apache, the database server is MySQL, and the programming language is PHP. Before deploying web apps to a production server, developers may build and test them locally using the entire package offered by XAMPP. Because of its cross-platform interoperability, developers may easily work on platforms including Windows, MAC OS, and Linux.

3. MySQL as Web Server Database:

The open-source relational database management system MySQL is reliable and scalable. It is a well-liked option for online applications because of its efficiency, dependability, and simplicity. Multiple storage engines are supported by MySQL, along with transactional processing and sophisticated query optimization. Its smooth interaction with PHP and other computer languages enables effective data retrieval, administration, and storage inside the web server environment. MySQL provides a dependable and effective database solution for the system thanks to its wide community support and documentation.

5.1 Database

Indeed, MySQL is a popular relational database management system (RDBMS) that is open-source and designed for organizing and storing data. It offers a reliable and expandable solution for storing and making structured data accessible. With MySQL, data is organized into tables with clear relationships between them in accordance with the relational paradigm.

You can define tables, construct databases, and carry out activities like data insertion, updating, and retrieval using MySQL. SQL (Structured Query Language), a language standard for working with relational databases, is supported. MySQL provides a number of capabilities, including user administration, transaction support, and data integrity enforcement. Since MySQL is open-source and has a big user and development community, it is well-liked for both small-scale and enterprise-level applications. It works well with several programming languages and web technologies and is compatible with a variety of operating systems. Wide-ranging uses of MySQL include data warehousing, content management systems, e-commerce platforms, web development, and more. It is a dependable option for data management and storage because to its flexibility, performance, and thorough documentation.

5.2 Programming Language

- The presentation and visual layout of a page created in a markup language like HTML are described using CSS (Cascading Style Sheets), a style sheet language. It offers a collection of guidelines and settings that specify how various components on a web page—including those related to font styles, colours, layout, and positioning—should be shown.
- Web pages are often created and structured using HTML, or hypertext markup language. The structure and content of a web page are defined by a collection of tags

or components that are provided. Web browsers translate HTML into content that is rendered and shown to users.

- The server-side programming language PHP (Hypertext Pre-processor) is frequently used to create webpages. It is frequently employed for database interaction, server-side logic management, and backend development. In addition to managing form data, creating dynamic web pages, and authenticating users, PHP is capable of performing a wide range of server-side operations.

- Web development tools like CSS, HTML, Bootstrap, and PHP are frequently used to build aesthetically pleasing, intriguing, and useful websites and online applications. Together, they define the structure, appearance, and functionality of web pages.

5.3 User Interface

The server-side programming language PHP (Hypertext Pre-processor) is frequently used to create webpages. It is frequently employed for database interaction, server-side logic management, and backend development. In addition to managing form data, creating dynamic web pages, and authenticating users, PHP is capable of performing a wide range of server-side operations. Web development tools like CSS, HTML, Bootstrap, and PHP are frequently used to build aesthetically pleasing, intriguing, and useful websites and online applications. Together, they define the structure, appearance, and functionality of web pages.
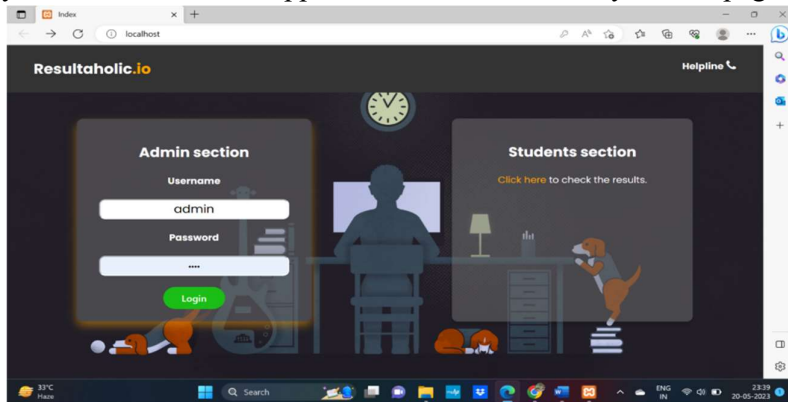
Fig.5. Admin and Student Login Page

5.4 Home Page

This is the first page when user open the page it contains the features of the Login system where student and teacher can access it by signing the page. It also includes the signup page for the new user, or which are not registered.
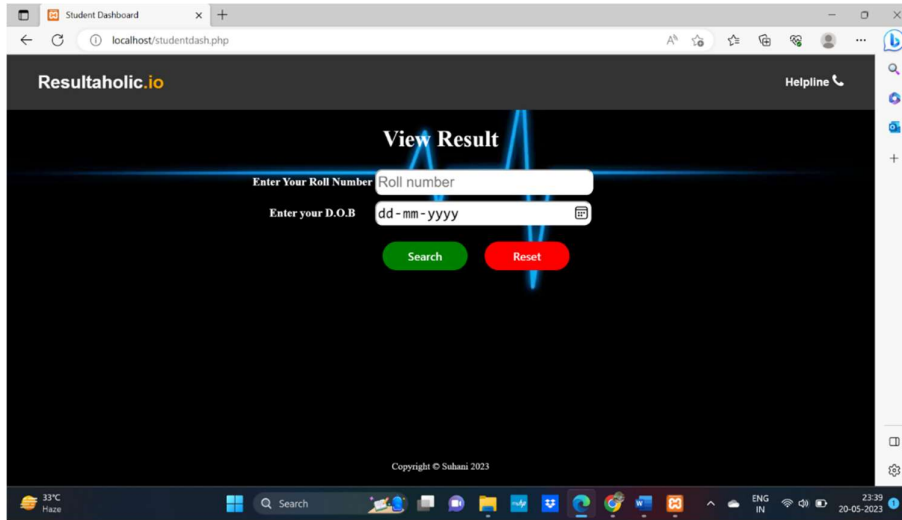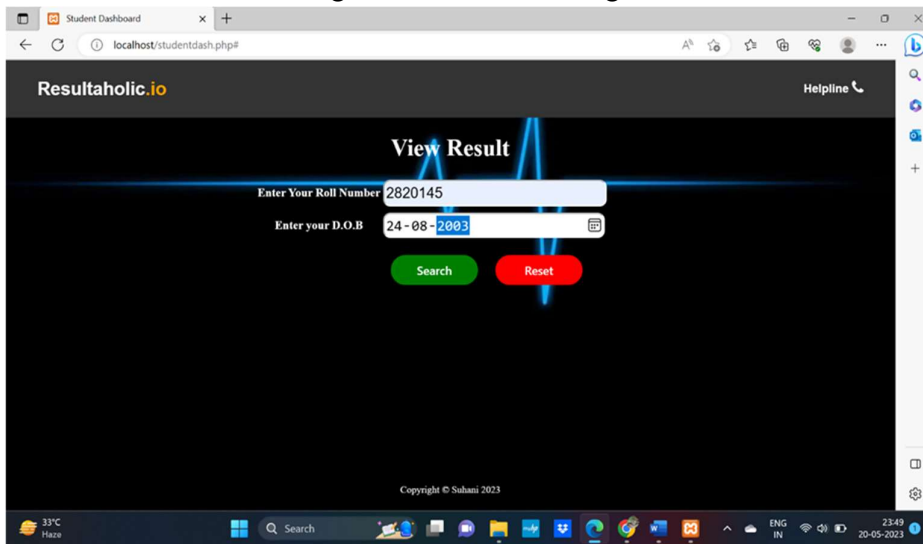
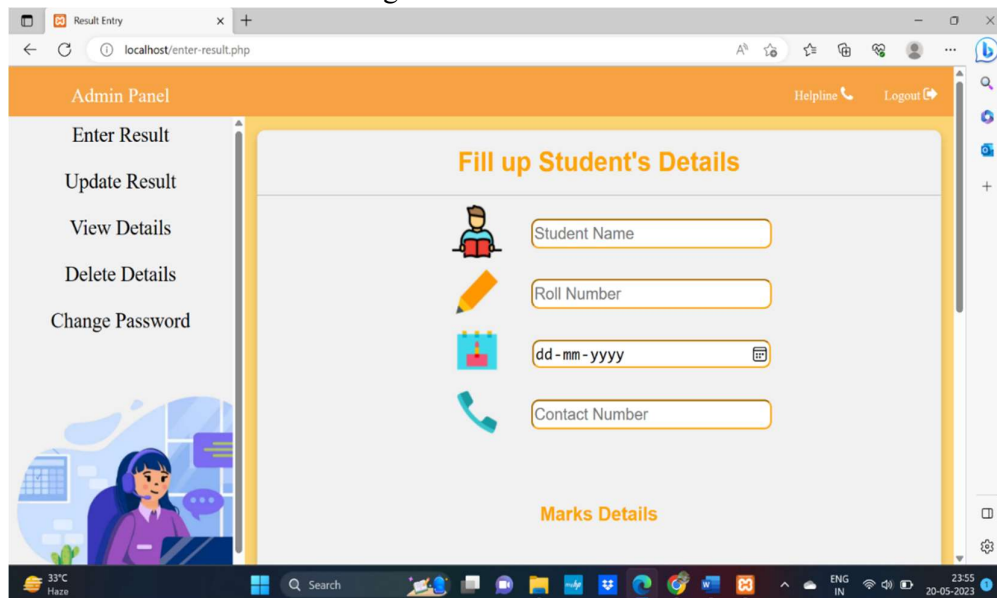Fig.6. Student Details Page

Fig.7. Admin Dashboard

Fig.8. Admin Panel

6. RESULTS

A technology tool created to simplify result management in educational institutions is the Student Result Management System (SRMS). It eliminates paper-based processes, streamlines administrative procedures, and guarantees safe access to student outcomes. SRMS improves accuracy and protects records with automated computations and data security procedures. Improvements in student happiness, a decrease in administrative effort, more openness, and greater institutional reputation are all advantages of the approach. In general, SRMS transforms result management for ease and efficiency.
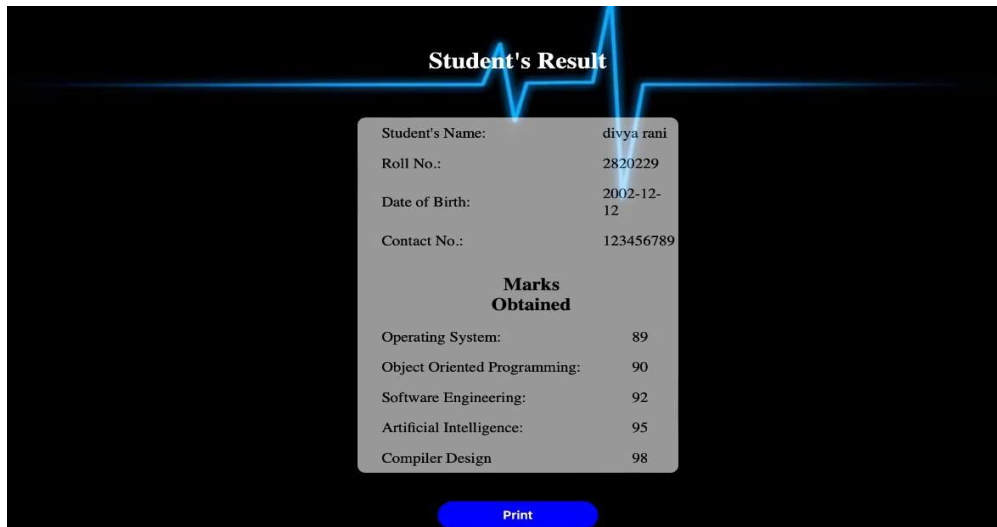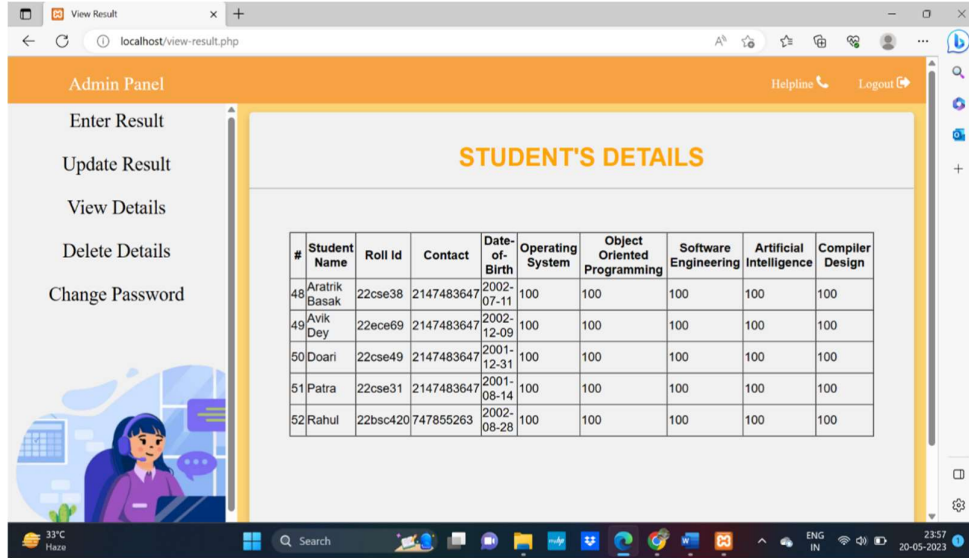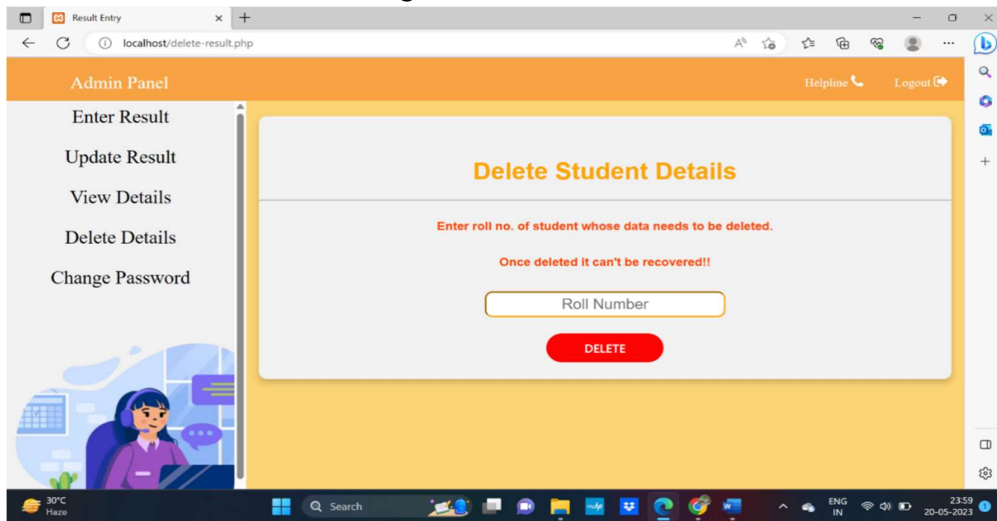

Fig.9. Student Details

Fig.10. Delete Student Details

Fig.11. Student Result

7. CONCLUSION

In conclusion, the goal of this research work was to develop a user-centered, effective result management system. The management of test results on paper was being replaced with an efficient computerized method as the main goal. To improve the user experience, specific software and apps were created, and thorough real-world testing and user input made sure the system ran at its best. After overcoming obstacles, the work produced a solid result management system that boosts productivity and enhances user-administrator communication while using test results. This system is prepared to sustain accuracy and accessibility while supporting the changing demands of stakeholders and educational institutions.

REFERENCES

[1] Rajender Kumar, Vipin Tomar, Punit Soni, & Satveer Kour. (2023). Implementing Data-driven Approach for Institutional Decision-making in Higher Education. International Journal of Wireless & Mobile Networks (IJWMN), 01(01), 01-06.

[2] Kumar, R., Khanna, R., & Kumar, S. (2022). Technological Transformation of Middleware and Heuristic Approaches for Intelligent Transport System. *Autonomous Vehicles Volume 1: Using Machine Intelligence*, 61-82.

[3] Gaba, S., Nagpal, S., Aggarwal, A., Kumar, R., & Kumar, S. (2022, November). An Analysis of Internet of Things (IoT) Malwares and detection based on Static and Dynamic Techniques. In *2022 Seventh International Conference on Parallel, Distributed and Grid Computing (PDGC)* (pp. 24-29). IEEE.

[4] Kumar, R., Soni, P., Aggarwal, A., Kumar, M., & Mishra, N. (2022). An Analytical Approach for Sustainable Development in Smart Society 5.0 Using Swasthya Sahayak Application. In *Decision Analytics for Sustainable Development in Smart Society 5.0: Issues, Challenges and Opportunities* (pp. 131-152). Singapore: Springer Nature Singapore.

[5] Keshav Garg, R. K., Gupta, A., & Nirwal, A. (2022). What and why you need to know about Non-Fungible Tokens (NFTs). International Journal of Scientific Research in

Engineering and Management, 6(6), 1-4. Retrieved from https://ijsrem.com/download/what-and-why-you-need-to-know-about-non-fungible-tokens-nfts/

[6] Chatha, D., Aggarwal, A., & Kumar, R. (2022). Comparative Analysis of Proposed Artificial Neural Network (ANN) Algorithm With Other Techniques. In *Research Anthology on Artificial Neural Network Applications* (pp. 1218-1223). IGI Global.

[7] Kumar, R., Khanna, R., & Kumar, S. (2021). Vehicular middleware and heuristic approaches for intelligent transportation system of smart cities. In *Cognitive Computing for Human-Robot Interaction* (pp. 163-175). Academic Press.

[8] Kumar, R., Khanna, R., & Kumar, S. (2018). Deep learning Integrated approach for collision avoidance in Internet of Things based smart vehicular networks. Journal of Advanced Research in Dynamical and Control Systems, 10(14), 1508-1512.

[9] Kumar, R., Khanna, R., & Kumar, S. (2018). An effective framework for security and performance in Intelligent Vehicular ad-hoc network. *Journal of Advanced Research in Dynamical and Control System*, *10*(14), 1504-1507.

[10] Kumar, R., & Kumar, R. (2016). A Comparative Analysis of Performance Metrics of Different Cloud Scheduling Techniques. International Journal of Innovations in Engineering & Technology, 7(2), 222-226. ISSN: 2319-1058.

[11] Kumar and Chawla, "Emphasizing the Importance of Student Result Management System in Education," in Journal of Educational Technology, vol. 42, no. 3, pp. 123-136, 2018.

[12] Ahmad, Smith, and Johnson, "Data Security Measures in Student Result Management Systems," in International Journal of Information Security, vol. 15, no. 5, pp. 401-415, 2017.

[13] Khan and Rafique, "Enhancing Stakeholder Communication through Student Result Management Systems," in Journal of Educational Administration, vol. 38, no. 2, pp. 210-225, 2019.

[14] Patel and Patel, "Improving Result Accuracy and Transparency with Student Result Management Systems," in Educational Technology Research, vol. 28, no. 4, pp. 511-525, 2016.

[15] Sharma and Bhatt, "Efficiency and Time-Saving Advantages of Student Result Management Systems," in Journal of Educational Management, vol. 19, no. 1, pp. 75-90, 2019.

[16] Ghosh and Mandal, "Impact of Student Result Management Systems on Institutional Reputation and Student Satisfaction," in Higher Education Studies, vol. 10, no. 3, pp. 112-125, 2017.

[11] Sardana, S., & Kumar, R. (2016). Energy Efficient Target Tracking in Wireless Sensor Networks. International Journal of Innovations in Engineering & Technology, 7(2), 271-275. ISSN: 2319-1058.

[17] Gupta, G., & Kumar, R. (2016). Acoustic Channel Modeling and Simulation for Underwater Acoustic Wireless Sensing Networks. International Journal of Computer Applications, 975, 8887.

[18] Kumar, R., Khanna, R., & Verma, P. K. (2014). Middleware Architecture of VASNET and Its Review for Urban Monitoring & Vehicle Tracking. International Journal of Emerging Research in Management & Technology, 3(1), 41-45.

[19] Garg, T., Kumar, R., & Singh, J. (2013). A way to cloud computing basic to multitenant environment. International Journal of Advanced Research in Computer and Communication Engineering, 2(6), 2394-2399.

[20] Kumar, R., Khanna, R., & Kumar, S. (2013). A Proposed work on Node Clustering & Object Tracking Processes of BFOA in WSN. International Journal of Computer Science & Communication, 4(2), 207-212.

[21] R. Kumar , R. Khanna , S. Jangra , and P. K. Verma , " A study of diverse wireless networks ," IOSR Journal of Engineering , vol. 2 , no. 11 , pp. 01 – 05 , 2012 .

[22] Kumar, R., Verma, P. K., & Verma, P. K. (2012). Role of Information Communication Technology and its Impact on Health Sector. ijarcs, 1(2), 122-125.

[23] Kumar, R., & Batra, A. (2011). Employing Grid Comparative Strategies in Cloud Computing. IJCSIT-ISSN 0975-9646, 2(5), 2246-2253.

[24] Rani, S., Ahmed, S.H. & Rastogi, R. Dynamic clustering approach based on wireless sensor networks genetic algorithm for IoT applications. Wireless Network 26, 2307–2316 (2020). https://doi.org/10.1007/s11276-019-02083-7

[25] Sharma, B., & Koundal, D. Cattle health monitoring system using wireless sensor network: A survey from innovation perspective (Review), IET wireless sensor systems, 8(4), pp. 143-151, (2018), 10.1049/iet-wss.2017.0060