Web Based Studio Management System for Studios and Color Labs

Weerasekara B.J.D.A[1], Ayuwardhana H.M.KJ.J[2], Rodrigo P.H.M.S[3], Roshani O.V.D.E[4], De Silva D.I[5] and Samarasekara H.M.P.P.K.H[6]

[1]Faculty of Computing, Sri Lanka Institute of Information Technology, New Kandy RD, Malabe, SRI LANKA
[2]Faculty of Computing, Sri Lanka Institute of Information Technology, New Kandy RD, Malabe, SRI LANKA
[3]Faculty of Computing, Sri Lanka Institute of Information Technology, New Kandy RD, Malabe, SRI LANKA
[4]Faculty of Computing, Sri Lanka Institute of Information Technology, New Kandy RD, Malabe, SRI LANKA
[5]Faculty of Computing, Sri Lanka Institute of Information Technology, New Kandy RD, Malabe, SRI LANKA
[6]Faculty of Computing, Sri Lanka Institute of Information Technology, New Kandy RD, Malabe, SRI LANKA

[1]Corresponding Author: kelumjayamini99@gmail.com

ABSTRACT

Simple interfaces are provided by studio management systems for maintaining studio data. It is possible to run a studio effectively with this studio management system. Also, there is the ability to securely store the data of the customers who come to the institution. Also, this data can be updated and deleted at any time. Additionally, it includes the customer's name, phone number, order type, dates, instructions for the required pictures and videos, as well as details on the pertinent occasions and dates. The information about the amounts paid and the relevant dates from the day the customer gave the advance is stored in this system. Orders are separated into pieces and processed gradually in accordance with the orders placed by the respective consumers. Also, this system has been set up in such a way that customers can get a bill with the amount spent after providing the required data. The main aim of introducing a computerized system for studio management is to increase the effectiveness and overcome the drawbacks of a manual system.

Keywords-- Customer, Management, Orders, Studio

I. INTRODUCTION

Although most of the systems are being computerized with the development of new technologies, studio management has been identified as one of the least focused and neglected areas to adopt the latest technologies and automation. In contrast to the past, photography and related designing have acquired a distinct increment of attention mainly because of the invention of high-performance hardware devices.

According to recent research conducted targeting the Balangoda area in Sri Lanka, it was observed that every studio is still using manual management systems. The studio staff is responsible for allocating extra effort to manage different types of customers, orders, and deals with other neighboring or sibling studios. This procedure appears to be cumbersome in certain aspects. Mainly the studio fails in providing satisfactory customer service which will affect the studio's reputation and income. Another noteworthy disadvantage is the lack of accuracy and efficiency which results in complications in managing finances. The suggestion to have an automated studio management system will solve these difficulties encountered while using a manual system. This research paper discusses in depth the suggested web-based studio management system and how this system will aid in increasing the effectiveness of studio processes. Mainly there will be two focus areas in this system. First would be any type of photography coverage including event photography, photo printing, and graphics. The second service would be printed items provided by color labs. Under the before mentioned two areas, major functionalities addressed by this studio management system are Professional Customer Management, Professional Order Management, Event Order Management, and Amateur Order Management. In addition, Finance Management, Search Facility, and Report Generation operations will be associated with each of the major functions. Transparent classification of the orders, customers, and operations is offered for the studio staff which requires less brain power. A computerized system is several times faster than a manual system which saves a considerable amount of time both for the staff and the client. Throughout the paper, there will be a comprehensive discussion on the newly proposed management system for the studio and each of the functions performed by the system along with the prototype web application developed demonstrating the behavior of the system in a studio. This studio management web application is developed using ReactJS, Node, NestJS, and MongoDB which stands at the front of web development technologies at present. The main purpose of this research is to transform the manual studio managing procedure to a completely automated computerized system without losing any of the fundamental features but introducing more functionalities

that will improve the organization, effectiveness, customer satisfaction, and company revenue with less paperwork and human effort by gaining the competitive advantage of the modern technology. The main information sources for this research are real-world studios currently utilizing manual processes, similar management systems, and scholarly articles on the internet. Readers are encouraged to raise appreciatory or critical reviews and to continue further research. The research paper is started with a brief discussion of related work to studio management systems. Then the methodology section includes the technologies used and system design which are followed by the proposed system explanations along with results. The research paper concludes with a comprehensive discussion, future research recommendations, and a conclusion. Finally will be a reference section that was based on constructing this research paper.

II.   RELATED WORK

A research paper written and published by Faizul Mohd Noh on a studio management system has been based for this research paper. In [6] authors have discussed the shortcomings of the existing manual studio management systems which is quite similar to the problem discussed in this research paper. [6] Authors have mentioned about the manual records, slow and inefficient feedbacks, redundancy, difficulties in tracking and monitoring, poor stock management, staff dissatisfaction, and paper waste as major disadvantages of current systems. In addition, the requirement of a computerized system is also included. In this research paper all these issues are considered. In [6] research paper discusses about studio booking system, tape tracking system and staff attendance system. But in this research paper a clear classification of functions in studio orders and customers is done as Amateur Order Management, professional Order Management, Event Order Management and Professional Customer Management. The prototype system is implemented according to the aforementioned functions. [6] research paper has been a great aid to clarify the structure of this research paper and identify problems within manual systems.

The research paper [7] has also discussed regarding a similar approach towards an automated system over a manual studio management system. This is directly related to the research done for writing this research paper because this is based in Sri-Lanka. Author of [7] has also discussed about the drawbacks in manual systems such as paperwork, human effort, time waste and mentioned about the requirement of a computerized system. In addition [7] also specifically indicate about the customer management, order management, transaction management and report generation which is similar to the proposed system and

based information in this research paper. The aim of both the research is the same, to increase the efficiency of the studio management system by introducing automation.

The research paper [8] is also based on research done on studio management systems in Sri-Lanka. The author has mainly discussed about brining an E-commerce platform to studio management. Two major functionalities have been included as photography and equipment in the research paper [8]. This concept was useful for this research paper to conduct a subdivision in each functions as photography and items in the color lab.

III.   METHODOLOGY

1) Technologies Used
React JS

In this prototype web application, React JS used as front-end programming language. React is a free and open-source front-end JavaScript library for building user interfaces based on UI components. It is maintained by Meta (Facebook) and a community of individual developers and companies. [1] Creating interactive user interfaces is easy using React. React is declarative, flexible, efficient, component-based, and it is allowing to make reusable components. There is pre-made react UI libraries that make easy to create UIs.

Nest JS

In this prototype web application, Nest JS used as back-end programming language. Nest (NestJS) is a framework for building efficient, scalable Node.js server-side applications. It uses progressive JavaScript, is built with, and fully supports TypeScript and combines elements of OOP (Object Oriented Programming), FP (Functional Programming), and FRP (Functional Reactive Programming). Nest provides an out-of-the-box application architecture which allows developers and teams to create highly testable, scalable, loosely coupled, and easily maintainable applications.[2]

CSS

CSS Stands for "Cascading Style Sheet". Cascading Style Sheets is a style sheet language used for describing the presentation of a document written in a markup language such as HTML or XML. CSS is a cornerstone technology of the World Wide Web, alongside HTML and JavaScript.[3] For styling this web application CSS is chosen.

Mongo DB

To store data that created from this web application we selected Mongo DB. MongoDB is a source-available cross-platform document-oriented database program. Classified as a NoSQL database program, MongoDB uses JSON-like documents with optional schemas. MongoDB is developed by MongoDB Inc.[4] Mongo DB is scalable, and it is increasing the load

balancing. As a result of that availability and application responsiveness will increases. Mongo DB provide many useful functions such as Aggregation, Capped collections, and Transactions.

2) System Design
Data Flow Diagram

A Data Flow Diagram is a graphical representation of the "flow" of the Studio Management System. This DFD in Figure 3.1 represents how the system interacts with internal and external entities and the way a given input is transformed into the desired output through data flows in the system.
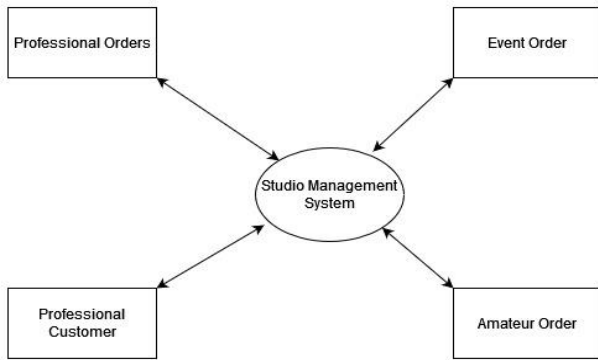
Figure 3.1: Data Flow Diagram

Detailed Flow Graph

The detailed flow graph depicts the flow and distribution of user activities starting from the entrance to the system through login. Figure 3.2 depicts the Detailed Flow Graph for the entire system followed by the Data Flow Diagrams for the major functionalites. The login page would be the main entry point to the system. After a successful login user is granted access to all the major functionalities namely professional customer, professional order, event order, and amateur order functions.
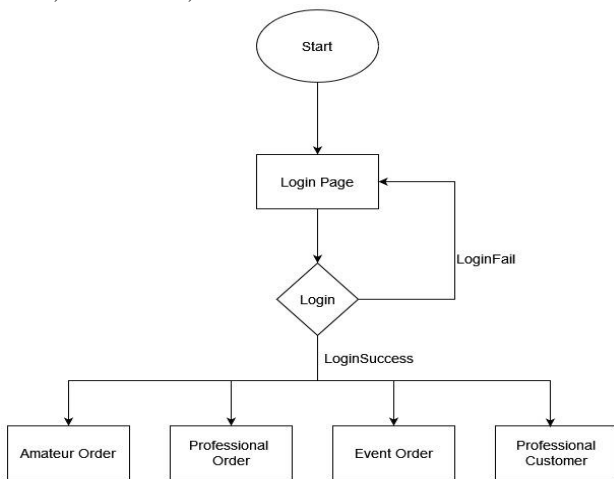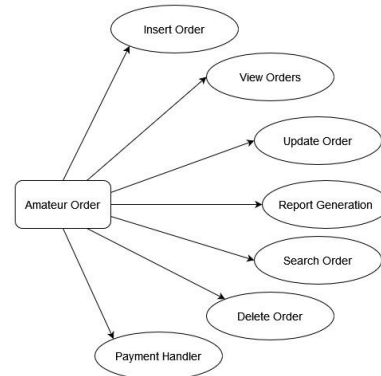

Figure 3.2: Detailed Flow Graph
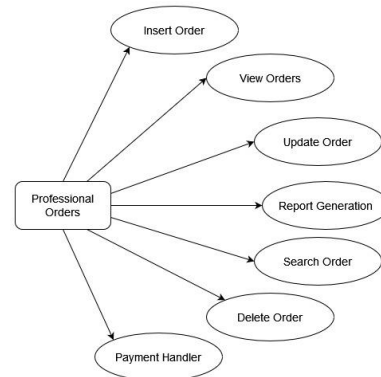

Figure 3.3: Detailed Flow Graph
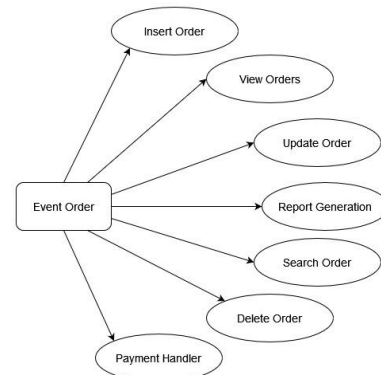

Figure 3.4: Detailed Flow Graph
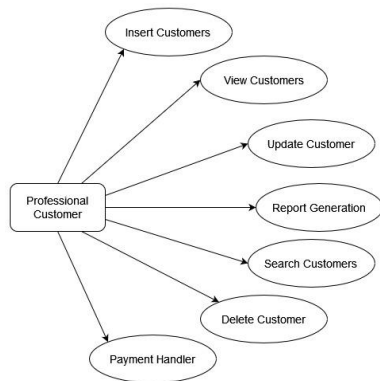

Figure 3.5: Detailed Flow Graph

Figure 3.6: Detailed Flow Graph

IV. PROPOSED SYSTEM

Event Order Management

Event order management function is differed from amateur and professional order management function. Event is a special occasion or function. Weddings, birthday parties, special functions, graduations, or ceremonies and get together are popular events. They are held away from the photography studio. For these events photographer or photography team should move to event location and all the required tools should be taken away. All the record related to an event like tools taken away, crew that covering the event and deliverable are recorded manually in studio logbooks and details about event and payments done by customer are also recorded manually. Therefor it is exceedingly challenging task to manage an event order and to keep track and monitor it. This web-based studio management application helps to minimize the above problems that sort out. All the details about event, order and payments are stored in database and can be retrieve, when necessary, within one click. Because every detail of event order is recorded it is easy to track and monitor tools, crew members and status of order and payments. In event order management section of this web application there is a page named payment handler. It helps to staff to manage the payment and order status of a relevant order. Payment status will be automatically updated by system looking payment history of the order. If customer, make advance payment then payment status will be "Advance". If customer, make full payment then payment status will be "Completed". Staff can manage order status simply by selecting relevant status from the drop down. "None", "In-progress" and "Completed" are the three statuses of an order. Apart from that this web application provide summary of the event order as a receipt. That receipt includes all the details of event order, payment and order status and payment history. Not only that there is featured to download that receipt as PDF or print using printer. In addition to that there is a search

function that gives any order details within a second after search. These features are the most effective way to overcome above problems.

Professional Order Management

This system has a feature called professional order for user convenience. This section is available for customers or organizations who visit daily, monthly, or annually. That is, for example, if there is an event in an organization every year and some studio is used for that, then this professional order feature is available for such organizations. These organizations or individuals should be registered under professional customers. Then, when necessary, such data may be viewed, changed, or erased. It is also possible to view the information of all the customers who have already registered and are transacting at any time. Additionally, the costs of the customer's desired photographs and films are added, and the final total is shown on the bill. Then, this invoice may be printed or downloaded. This system can be used only for the cashier's use. Then it will be convenient for customers to. The traditional methods of studio organization are expensive and take up a lot of valuable time and energy. Because of this, technical support tools and components are included to address the issues. [5] If it is maintained in traditional ways, it will cause many problems for the customer as well as the management of the studio. That means everything has to be in writing. It gets even more complicated when there are a large number of customers. But with this, pre-registered customers can be found very quickly, and transactions can be made with them. It will take very little time. Therefore, using this system can reduce time and other inconveniences for both parties. That is the main purpose of using this.

Amateur Order Management

The most prominent type of order in a studio is amateur order. These will be mainly made by amateur customers. These are daily orders received by a studio. Amateur orders will most probably be printed photos in different standard or customized sizes or printed items from the color lab. All these amateur orders follow a common structure and a pattern. When considering a manual system or the current procedure occurring in the studios, the studio staff will need to open a new order per each client and maintain the written customer and order records until the order is completed. In some situations, this can be a little advanced that the studio staff may enter the data and store them in Excel sheets. There may be customers who will place orders and make the payment in installments from time to time. Another possible case is that the customers may not collect the orders right after placing the order, but they would return after a certain duration. In both these situations it would be hard for the studio staff to search for a particular order and update the records among all the orders that have been gathered. This

process can consume a huge amount of time and create a bad user experience. Also, if any misplaced order records occur it would be a disadvantage for the studio and the client. There can be occasions when the studio organization lost income unknowingly even because of this unorganized structure. Because there is no better separation between amateur and other orders in the manual system. Amateur customer details are not normally stored whether manually or automatically because they are temporary customers and orders which will require storage only for a particular period. But in a manual system, it would be complex to categorize and filter the completed and ongoing orders and analyze them when needed. The solution for all these problems would be the amateur order management functionality in the studio management system.

In the automated studio management web application system, amateur order management is implemented as whole separate functionality to avoid any confusion. The studio staff is provided the facility to view and manage all the amateur orders in a single place. A specific amateur order can be searched within seconds through the search functionality. New amateur orders can be added with ease because all the photo sizes and available items are given in the system. The user is just required to add specific customer details and select the order preferences. As the total price, the client needs to pay is automatically calculated and displayed it saves time, and effort and prevents any possible errors if the prices were calculated manually. In addition, this system is designed with proper validations to prevent the user from entering any erroneous values by mistake. Therefore, the error rate and the probability of making errors are highly reduced in the automated system. Studio staff can comfortably update any required record without much effort. One of the most significant features is the payment handler which is associated with each amateur order record. The staff is able to manage the finances of each order separately through this function. Clients can make the payments in installments and the staff can enter the payment details and update the order status as necessary whether it is in an in-progress or completed state. But the payment status will be automatically updated based on the payments as advanced or completed. Once the summation of all payments matches the total price of the order payment will be completed and the order also can be completed. A payment receipt is also automatically generated for each order, and it can be downloaded for the use of studio staff. Apart from that, there is the capability to print the payment receipt. It is very convenient for the staff members to manage all the orders with several clicks. They can analyze the payment statuses and order statuses conveniently which are completed or still in progress. If any order is no longer needed to be kept in the system

because it was canceled or completed studio user has the facility to delete the order. But to prevent any accidental deletions these delete operations would require proper confirmations. A list report of all the amateur orders available in the system can be downloaded for further analysis.

Professional Customer Management

The function of managing professional clients mostly focuses on the long-term clients having contracts with the studio. The studio management system is more useful because of this professional customer. Therefore, the system should provide this professional customer a prominent position. If a manual system or the current studio practice were to be used, the studio personnel would have to create a fresh item list for each client and keep written records of those information until the customer's purchase was finished. Customers occasionally fail to appropriately gather order information after placing an order, which can lead to difficulties that worsen over time. Staff members occasionally struggle to update or search certain records concerning an order in a manual system. Studios occasionally need to invest more time and effort into updating the details in this manual system. This process can take a long time and lead to a poor user experience. This system's disorganization has this drawback. Professional clients are crucial to the survival of the studio. Often, studios received exclusive proposals from professionals who were clients of other studios. Because they are constant clients and orders that need to be stored for a long time, the system should store them whether manually or automatically. However, managing and analyzing long-term customers and orders would be challenging under a manual system. The professional customer management features of the studio management system would be the answer to all of these issues.

This web-based studio administration tool offers a fix for these issues. According to staff necessities, the system is retrieving all the information about professional customers, orders, and payments that is kept in a database. Every contract detail is documented, making it simple to track and monitor tools. The system is given the capability to view and manage every professional client in one location. There will be a search option that allows you to look up certain professional client information by owner name. Using the add customer form, the admin can add new clients. The administrator must fill out the entire form with accurate information. In this form, validation will be present. Therefore, there will be a decrease in data entry errors. Any essential record can be easily and conveniently updated by studio staff. In addition to providing action buttons for edit, remove, and view customer profile activities on a single page, admin can display all previously added customer details. Using the delete button, the admin can remove the record if there are no longer any

professional clients. To prevent the user from unintentionally deleting a customer column, pop confirm has been utilized for the delete option. The most important feature is the ability to view a customer's professional profile. Whenever an order is finished, the customer profile is automatically updated. In this page admin can manage unpaid orders. Then the user can view each customer's profile and information. When a user clicks the search button and chooses to search order history, the user's order history will be selected and shown. Users can use the "Download" option to download a report about their order history as a PDF. These characteristics are the best ways to deal with the aforementioned issues.

V. RESULT

Add Function

This interface in Figure 5.1 will be used for add professional orders. When a user clicks the 'Professional Orders' button in the main side navigation bar, the user will redirect to Professional order management UI. After that the user will click the 'Add Order' button. After that modal popup adding a new professional order UI in the same page. Then the user can fill the order adding form with relevant details and click the 'Add Order' button to proceed or click 'Cancel' button to discard the order.
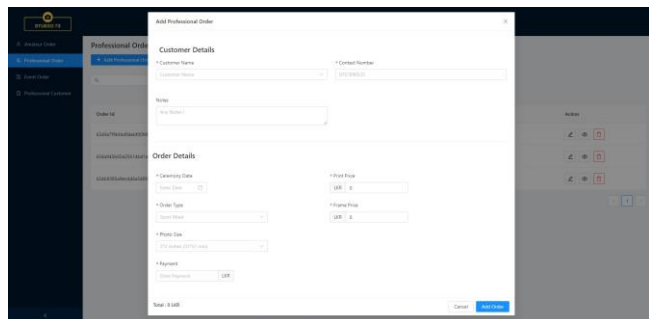

Figure 5.1: Add Professional Order Form

View Function, Search Function and Delete Function

When a user clicks the 'Event Orders' button in the main side navigation bar, the user will redirect to Event order management UI as showed in Figure 5.2. There is a table with relevant details of previously added event orders. It provides action buttons for edit, delete and payment handler actions. Also there is a search component to search relevant event orders.

When a user want delete details, click "delete" icon in the table and its provide Pop confirm has been used for the delete option so that the user may not delete an order accidentally.
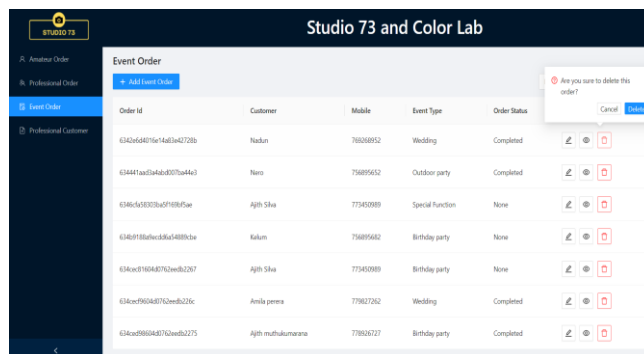

Figure 5.2: View Event Order Interface

Payment Handler, Generate and Print Receipt Function

When a user clicks the 'Event Orders' button in the main side navigation bar, the user will redirect to Event order management UI. After that the user clicks the 'eye' icon button in the action column in the table. Then modal popup with the payment handler and receipt preview UI that is depicted in Figure 5.3. Then users can add payment relevant to order, update order status, preview the receipt and print the receipt.
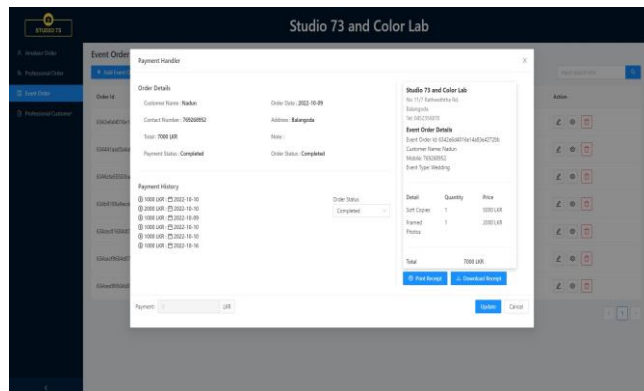

Figure 5.3 Payment Handler Interface

Update Function

This interface will be used to update existing professional orders. After clicking the 'Professional Order' button, the user will redirect to Professional Order management UI. After that user clicks the 'edit' icon button in the action column in the table, modal popup with initial form data relevant to existing professional order as in Figure 5.4. Then the user can edit form value and update it by clicking the 'Update Order' button or discard it by clicking the 'close' button.
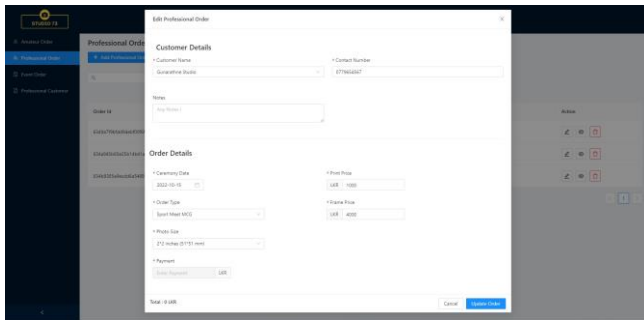
Figure 5.4: Update Professional Order Interface

VI.   DISCUSSION

The major disadvantages discovered in manual studio systems as discussed are inefficiency, paperwork, human effort, lack of storage, lack of management, and loss of revenue. To overcome these struggles best solution is introduced as having a computerized system with all the management functionalities for order and customer management along with report generation and transaction handling. The expected outcome of this solution is a fully functional system capable of increasing efficiency, business revenue, and customer satisfaction and making the work comfortable for studio staff.

Major testing tool that is used for testing the proposed studio management system is Selenium. Tests are automated and each function is thoroughly tested. Figure 6.1, Figure 6.2, and Figure 6.3 depict several examples for testing the Add Amateur Order function, Professional Customer function, and Event Order function respectively using the Selenium tool. A representation of verifying the presence of items on the Event Order page is shown in Figure 6.4. Apart from that Jest is used for writing unit test cases because the proposed system has been developed using the React technology.
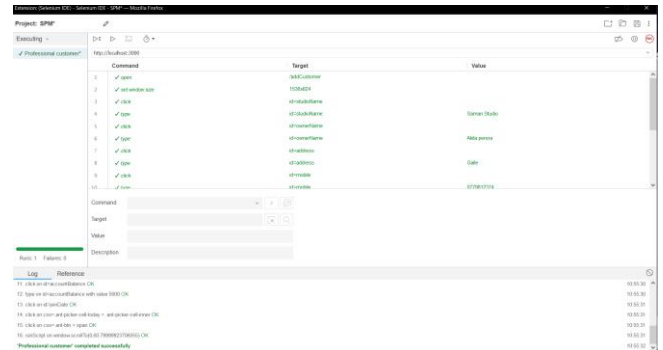
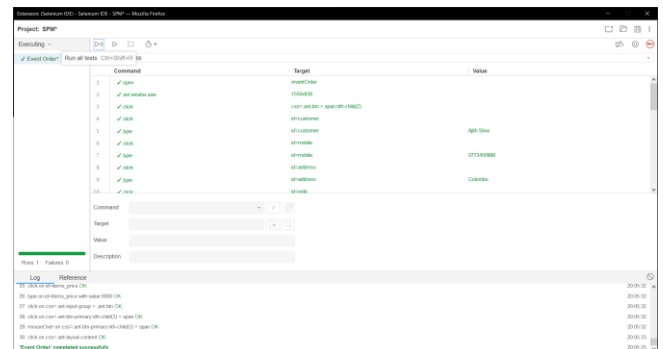

Figure 6.1: Test Add Amateur Order Function

Figure 6.2: Test Professional Customer Function

Figure 6.3: Test Event Order Function
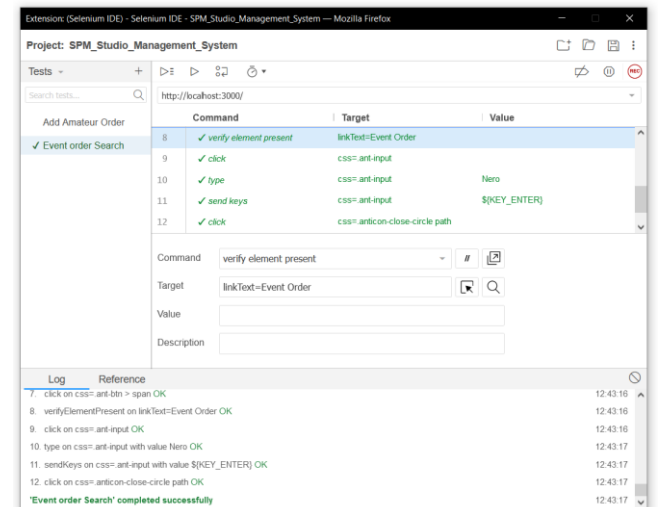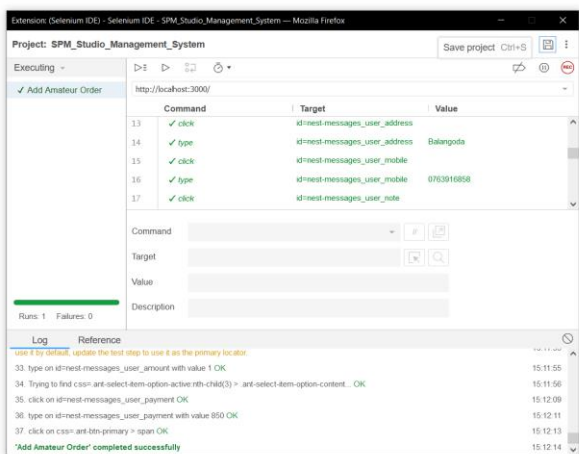

Figure 6.4: Verify Items on Event Order Search

VII.   FUTURE RESEARCH

This section summarizes the future research perspectives in security, data handling and optimization, and extensible features.

1. Security

Web Token) is popular and best example for secure API calls with React JS and Node JS based web applications.

Authorization mean process of verifying access. In this system there are user types such as cashier, photographer, editor, manager, and owner. But these users play distinct roles, and they have different access to the system. By implementing role-based permission system to this web application, it improves the authorization and helps to increase the security of this system. Then it prevents the mistakes that can be made by users and unauthorized access to the system.

2. Data Handling and Optimization

In this system data collection is high because there are daily orders to a photography studio. Daily huge amount of data managed via this system. Then data optimization and handling are another part that should be improved in future. As an example, order views frontend UI loads all orders at once and display only limited order per one page or table. So, using one API request frontend load all the data related at once. It is bad practice and it affect to the speed and responsiveness of the application. To overcome that problem, we can implement function in backend to load limited data to a one API request and manage better pagination system.

3. Extensible Features

We have only focused on main functions of this system but there is large scope that should be covered. Then it improves the effectiveness of this web application. Stock management is another part that should be implemented in future. In stock management all the tools like cameras, stands, lights, lenses, frames, machines, tapes, rolls and papers must track and monitor.

Staff management is another section that can be covered in future. There are different types of staff members in this system and staff can be grow with the time. It is hard to manage staff manually because to get attendance, to make salary at correct time, to make salary increments and to monitor and track workload of staff members are difficult in manually. Implementing staff management section in this system in future overcome the above problem.

VIII. CONCLUSION

The automated studio management web-based system is proposed as a solution to all the discussed drawbacks of a manual management system. Major issues addressed through this system are confusing and complex organizational structure, time wastage in maintaining records, less accuracy, less efficiency, unsatisfactory user experience, complications in finance management, consuming more human effort, loss of data, and less business revenue which are occurred due to manual procedures. The presence of a web application for studio management would be beneficial for a certain higher percentage of studios. Because all the studios are facing the aforementioned issues currently as there are not enough computerized systems implemented for the studio section. The system mentioned in this research paper is a demonstration of the major fundamental features that are supposed to be required by every studio. But what is depicted through this system can be further developed and new inventions can be added. This is implemented according to the currently pioneering technologies, but these can vary with time. Therefore, there is room for further research and further improvements. The main message that is expected to be conveyed through this paper is that still various sections have adopted technology very rarely and attention should be paid to those areas also. There can be more manually driven sectors that could easily reach higher standards if they are properly blended with technology. In a similar way to how technology was used for this studio management procedure, it solved a set of problems and evolved to a whole new angle. This system is to be used by any small-scale or large-scale studio business. Apart from the basic functions, it can be customized based on the requirements. This research paper mainly highlights the benefits of having an automated system for studio management but, arguably, there can be certain disadvantages as well. But overall having an automated system would be more beneficial and comfortable than a manual system where the whole management process can be monitored and accessed simply by navigating through the system increasing the enthusiasm of both studio staff and customers.

REFERENCES

[1] https://en.wikipedia.org/wiki/React_(JavaScript_library).

[2] https://docs.nestjs.com/.

[3] https://en.wikipedia.org/wiki/CSS.

[4] https://en.wikipedia.org/wiki/MongoDB.

[5] S.A.Angayarkanni, D.Harini, K.Mydhili & E.Vishnupriya. (2019,). Online studio management system. *International Research Journal of Engineering and Technology, 06*(03).

[6] www.*core.ac.uk*.

[7] A.A.H.Maduwanthi. (2015). Studio management for han studio. *Bachelor of Information Technology(BIT), Colombo univ., Colombo, Sri-Lanka*.

[8] R.M.K. Rathnayake. (2015). E-commerce & studio management system for studio Silka. *Colombo univ., Colombo, Sri-Lanka*.

[9] S.R.Bharamagoudar, Geeta R.B. & S.G.Totad. (2013, June). Web based student information management system. *International Journal of Advanced Research in Computer and Communication Engineering, 02*(06), 2342.