Invoice Manager

A PROJECT REPORT

Submitted by

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CERTIFICATE

This is to certify that the Internship report submitted along with the project entitled **Invoice Manager** has been carried out by **MANSURI MUKHTAR AHMED J.** under my guidance in partial fulfillment for the Bachelor of Technology in Information Technology, 7th Semester of Silver Oak University, Ahmedabad during the academic year 2024- 25.

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DECLARATION

We here by declare that the Internship report submitted along with the project entitled **Invoice Manager** submitted in partial fulfillment for the Bachelor of Engineering in Information Technology to Silver Oak University, Ahmedabad, is a Bonafide record of original project work carried out by me / us at Silver Oak College of Engineering And Technology under the supervision of **Dr. Deepa R** and that no part of this report has been directly copied from any students' reports or taken from any other source, without providing due reference.

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ABSTRACT

An Invoice Manager is a comprehensive software solution designed to automate and streamline the invoicing process, reducing the burden of manual tasks and minimizing the risk of errors in billing. This tool allows businesses to create, send, and track invoices with ease, enabling a more efficient management of accounts receivable. Through features like customizable templates, automated payment reminders, and integration with payment gateways, an Invoice Manager ensures that businesses can maintain a consistent and professional approach to billing. Real-time tracking and reporting provide valuable insights into financial performance, allowing for better cash flow management and improved decision-making. Furthermore, integration with accounting systems and multi-currency support make it suitable for businesses of all sizes and industries. By enhancing transparency, accuracy, and efficiency in financial transactions, an Invoice Manager is an indispensable tool that contributes to smoother operations and stronger customer relationships.

List of Figures

List of Tables

Table of Contents

CHAPTER - 1: INTRODUCTION OF PROJECT

1. Project Summary:

The Invoice Manager project aims to develop a robust, user-friendly software tool to automate and optimize the invoicing process for businesses. Designed to reduce manual entry, minimize errors, and streamline billing operations, this software offers a comprehensive solution for managing the lifecycle of an invoice, from creation to payment collection and reporting.

2. Purpose:

The purpose of the Invoice Manager project is to create a reliable, automated solution for handling invoicing processes in businesses of all sizes. By replacing manual, time-consuming tasks with an efficient digital system, this tool aims to enhance accuracy, reduce administrative workload, and improve cash flow management.

1.3 Objective:

The primary objective of the Invoice Manager project is to develop a comprehensive software solution that automates and optimizes the invoicing process for businesses. This tool aims to increase efficiency, accuracy, and control over billing and payment collection, supporting businesses in achieving better financial management. collaboration platforms, the system promotes efficient communication among team members.

By achieving these objectives, the Invoice Manager will become a valuable tool for businesses, helping them streamline their billing operations, strengthen financial control, and support growth.

4. Scope:

The scope of the Invoice Manager project includes the development, implementation, and support of a robust invoicing solution tailored to meet the needs of businesses in various sectors. The project encompasses core invoicing functions, integrations with financial and payment systems, and features aimed at improving the overall efficiency and accuracy of billing operations.

5. Technology and Literature Review:

1.5.1 Technology:

The Table 3.1 lists out the complete bundle of technologies used.

Category	Technology
Programming Language(s)	React.Js
FrontEnd	HTML,CSS,Bootstrap 5
BackEnd	Nest.Js
Database used	MySQL

Table 3.1 bundle of technologies used

1.5.2 Literature Review:

A literature review on invoice management systems reveals the growing need for automated invoicing solutions in the digital economy. Traditional manual invoicing processes, which often involve spreadsheet-based systems or physical documents, are prone to errors, delays, and inefficiencies. Automated invoice management solutions offer a modern alternative, providing streamlined, accurate, and efficient invoicing to support business scalability and improved financial management.

Early invoice management systems were primarily paper-based, requiring significant manual effort in data entry, calculations, and record-keeping (Narayanan, 2020). As technology evolved, businesses began adopting basic software applications like spreadsheets to streamline some of these tasks. However, these solutions lacked integration capabilities and were prone to data entry errors (Ferguson & Elliot, 2019). With advancements in computing and the internet, modern invoicing systems evolved to support digital billing, automated calculations, and data integration, drastically reducing manual workload and minimizing errors..

Recent literature highlights the core functions of modern invoicing systems, which include customizable invoice templates, automated tax and discount calculations, multi-format support (e.g., PDF), and error prevention through validation checks (Kumar & Lim, 2022). These features enable organizations to produce accurate invoices efficiently. Automation is also emphasized as a key feature, with systems now performing calculations automatically, which reduces processing time and ensures consistent accuracy (Ritchie, 2021).

Integration capabilities are essential to today's invoice management systems, as they allow for seamless synchronization with other business applications like enterprise resource planning (ERP) and customer relationship management (CRM) systems (Jain et al., 2021). Payment gateway integrations, in particular, facilitate real-time tracking of payments, which improves cash flow visibility and enhances financial planning. Studies show that companies using integrated invoicing solutions experience faster payment processing times and improved financial accuracy (Patel, 2022).

The literature on invoice management systems underscores their importance in modern financial operations, emphasizing core features like automation, integration, and data security. Invoicing solutions not only streamline billing processes but also offer strategic value by providing insights into financial health.

6. Project Planning

- **Project Overview**

To develop an *Invoice Manager* to enhance bug detection and management. and aim to improve collaboration and decision-making through analytics.

- **Project Commitment and Duration**

The successful execution of the *Invoice Manager* requires a firm commitment from all stakeholders involved, including project team members, management, and users. This commitment is essential to ensure that resources are allocated appropriately, project timelines are adhered to, and collaborative efforts are maximized.

- **Roles and Duties**

The success of the *Invoice Manager* project relies on the clear definition of roles and responsibilities among team members. Each role contributes uniquely to the project's objectives and overall success

7. Project Scheduling (Gantt Chart)

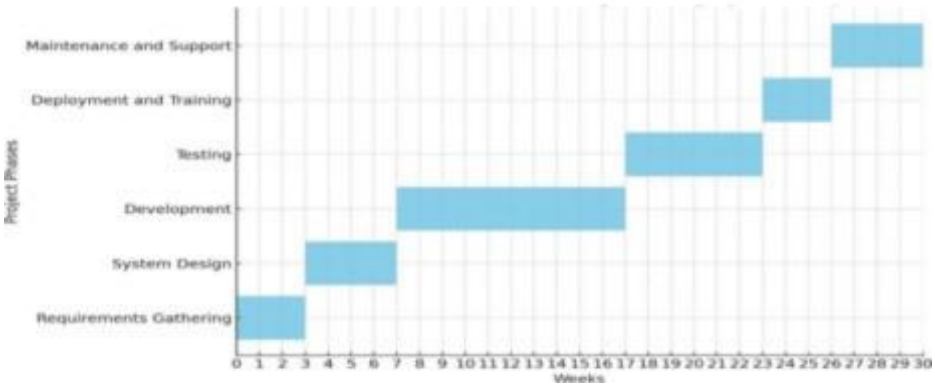

figure 1.1 Project scheduling Gantt chart

CHAPTER - 2: SYSTEM ANALYSIS

1. Study of Current System:

The **study of the current invoicing system** involves analyzing the existing processes, tools, challenges, and inefficiencies in managing invoices within an organization. This assessment serves as a foundation for identifying areas where an Invoice Manager system can improve operations, reduce errors, and streamline financial workflows. Below is a detailed study of the current system:

Challenges of Manual Video Tagging:

Manual data tagging within an invoicing system, like the Invoice Manager, involves assigning keywords, labels, or categorizing information such as payment types, client data, product descriptions, and other invoice details by human input. This process helps make data more searchable, supports reporting functions, and aids in analytics and auditing. However, manual data tagging presents various challenges, especially as the volume and complexity of invoicing data grow. Below is an exploration of the primary challenges:

2. System Feasibility

●**Technical Feasibility:** The technical feasibility of an Invoice Manager centers around assessing whether the project can be developed with the available technology, resources, and skills. With advancements in programming frameworks like React.Js and database systems such as MySQL.

●**Economic Feasibility:** Economic feasibility refers to the cost-effectiveness of implementing the Invoice Manager project in terms of development, operational costs, and the potential return on investment (ROI). The objective is to evaluate whether the benefits of the project outweigh the financial costs, ensuring that the project will be financially sustainable and provide value to its users.

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2.3 Proposed System:

● User Registration and Authentication: The system will support user sign-up, login, and password recovery, ensuring secure access to the invoicing platform.

● Invoice Creation: Users can fill out a simple form to input invoice details, including customer information, items or services, prices, and taxes..

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● PDF Generation: After the invoice details are entered, the system will automatically generate a downloadable PDF version of the invoice that can be emailed to clients or printed for record-keeping.

● Invoice History and Tracking: Users will be able to view a history of their invoices, track payments, and update invoice statuses (e.g., paid, pending, overdue).

2.4 Features of New System:

- Sign-up and Login: Users can securely sign up, log in, and recover their password to access the system..
- Role-based Access: Depending on the user role (e.g., Admin, User), the system provides varying levels of access to functionalities and data.
- Secure Authentication: Integration with secure authentication protocols, such as JWT (JSON Web Tokens), ensures that only authorized users can access their invoices..
- Simple Invoice Form: Users can easily create invoices by filling out a form with necessary details such as client name, products or services, quantity, price, taxes, etc.
- Customizable Invoice Templates: The system offers customizable templates, enabling users to tailor invoices according to their business requirements, including adding logos, payment terms, and notes.

5. List Of Main Modules

• **Sign Up/Login**: Handles user registration, authentication, and password recovery.

• **Role-based Access Control**: Manages different user roles (e.g., Admin, User) with appropriate permissions.

● **Invoice Form**: Allows users to create invoices by inputting customer information, products/services, pricing, taxes, and additional notes.

● **Invoice Template** Customization: Users can select or customize templates with their logo, business details, and formatting preferences.

● **Dynamic Fields**: Provides customizable fields like discounts, payment terms, and additional notes.

● **Download/Print**: Users can download or print the PDF invoice for their records or to send to clients.

● **Invoice Versioning**: Supports multiple versions of the same invoice (e.g., revised invoices) if needed.

6. Selection of Hardware and Software

1. Requirements of Hardware

- At the core of the system, the **server hardware** needs to be powerful enough to handle multiple user requests, manage databases, generate invoices, and provide seamless access to the application. A multi-core processor, such as an Intel Core i5 or AMD Ryzen 5 with a clock speed of at least 2.0 GHz, is the minimum requirement for smaller operations. However, for a more robust and scalable system, an Intel Xeon or AMD Ryzen 7 with 8 cores and a higher clock speed of 3.0 GHz is recommended.

- Sufficient memory (RAM) is essential for smooth performance; a minimum of 8 GB is required, while 16 GB or more is recommended for larger businesses with higher traffic and more active users. As the system processes data and stores generated invoices in PDF format, fast and reliable storage is necessary. A solid-state drive (SSD) of at least 100 GB is the minimum, but 500 GB or more is recommended to accommodate growing data.

2. Requirements of Software

- The software requirements for the **Invoice Manager** system are essential for providing the right infrastructure, tools, and technologies to ensure the smooth operation of the platform. The software stack includes components for both the backend and frontend development, database management, security, and more.

- A Linux-based operating system, such as **Windows 11** or higher, is recommended due to its stability, security, and wide support in the development community. Alternatively, **CentOS** or **Debian** could also be used.Windows, macOS, or Linux for end-users to access the system.

- **React.js:** is a powerful JavaScript library developed by Facebook for building user interfaces, particularly for single-page applications (SPAs). It focuses on creating reusable UI components that can be dynamically updated, making it ideal for applications that require frequent updates to the user interface based on user interactions.

- **Nest.js:** is a powerful backend framework built on top of **Node.js** and **Express.js** that is designed to help developers create scalable, maintainable, and modular server-side applications. It is written in TypeScript, providing strong typing and better maintainability, and it is particularly useful for building enterprise-level applications.

- **MySQL** is one of the most popular relational database management systems (RDBMS) used for storing structured data. It is highly reliable, widely supported, and provides powerful features for managing complex data relationships.

- **Bootstrap 5:** The **Invoice Manager** system will bring a more modern and streamlined approach to frontend development. **Bootstrap 5** introduces several enhancements over previous versions, such as a simplified grid system, improved utility classes, and better support for custom themes without relying on jQuery.
- **Invoice Manager** system, ensuring compatibility with major browsers such as **Google Chrome**, **Microsoft Edge**, and **Safari** is essential for providing a seamless user experience. These browsers are widely used, and it's important to ensure that your application works consistently across them. Below is an overview of how to ensure cross-browser compatibility and handle specific considerations for each:

CHAPTER - 3: SYSTEM DESIGN

1. System Design & Methodology:

1. Time-line Chart:

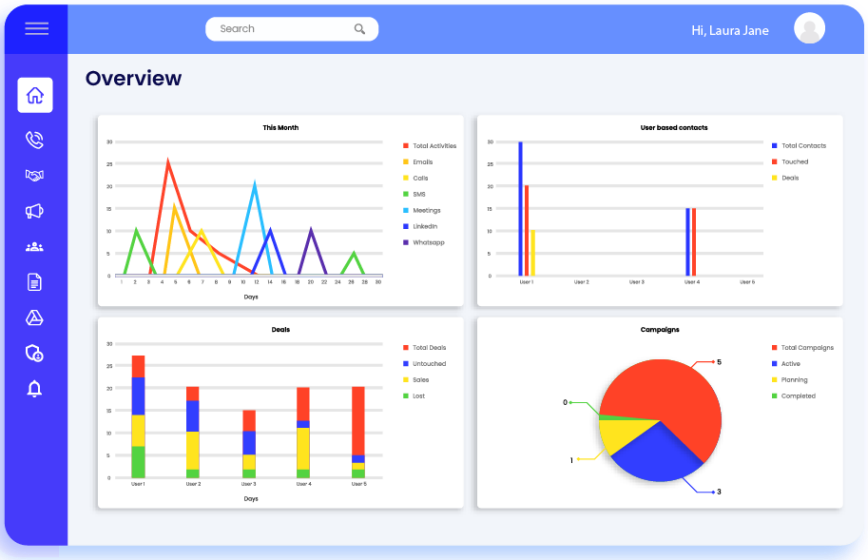


figure 3.1 time-line chart

3.1.2 Sequence Diagram:

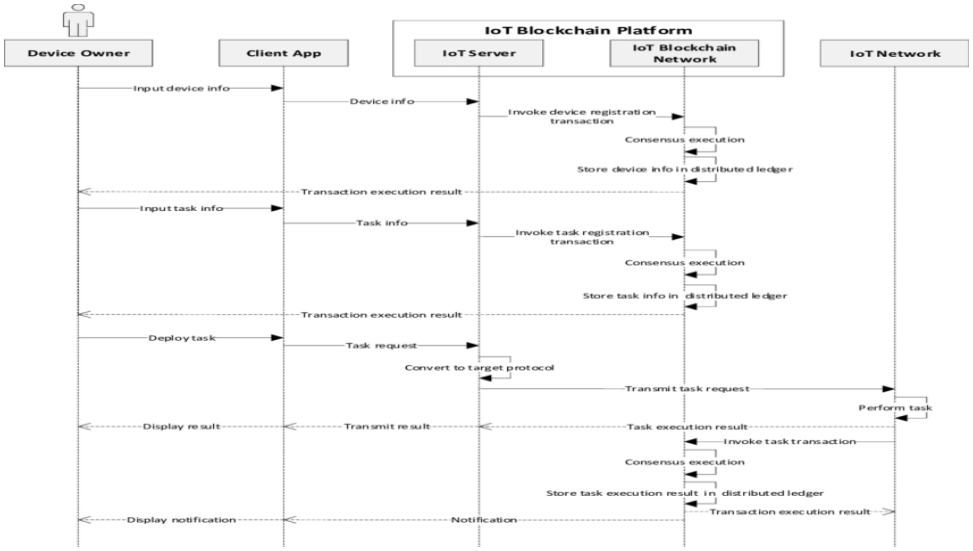


figure 3.2 sequence diagram

3.1.2 Activity Diagram:

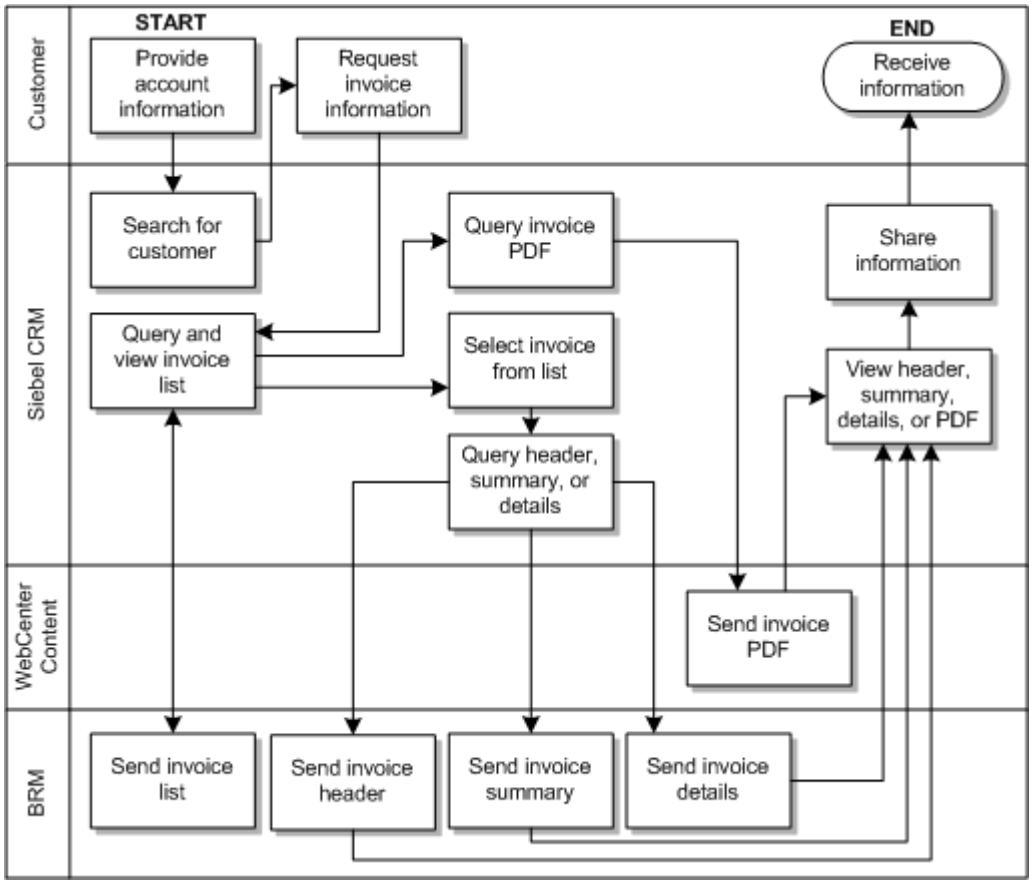


figure 3.3 Activity diagram

3.1.2 Use Case Diagram:

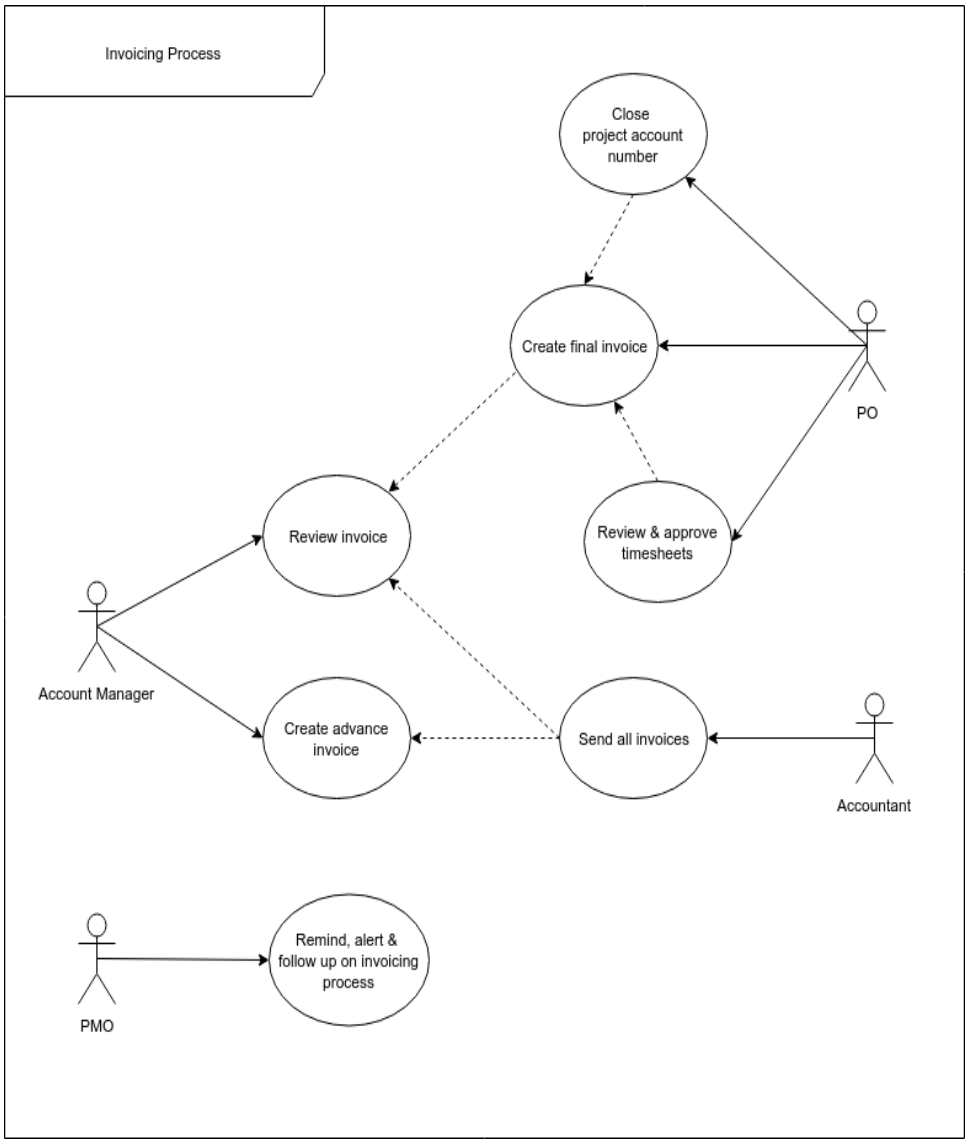


figure 3.4 use case diagram

CHAPTER - 4: IMPLEMENTATION

4.1 Homepage:

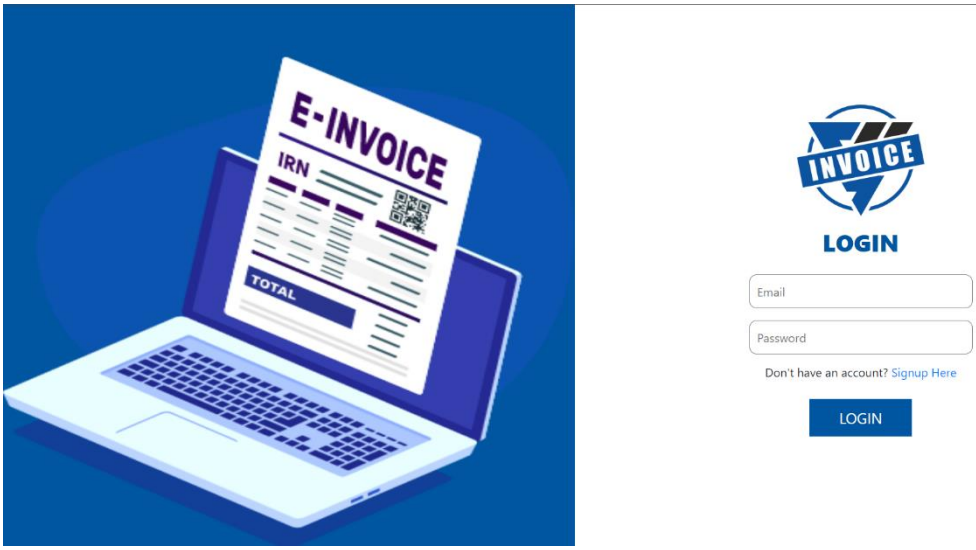
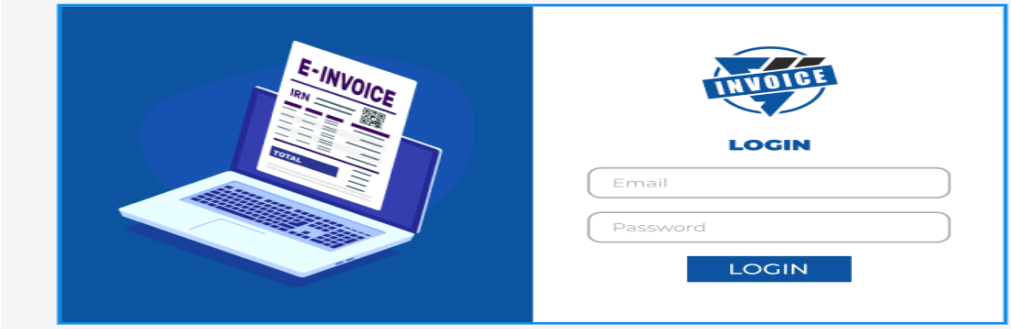


figure 4.1 home page

4.2 Upload Video:



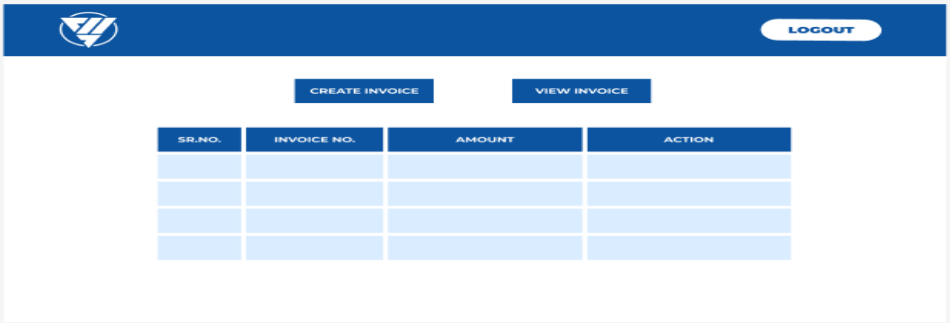


figure 4.2 upload video page

4.3 Reports assign image:

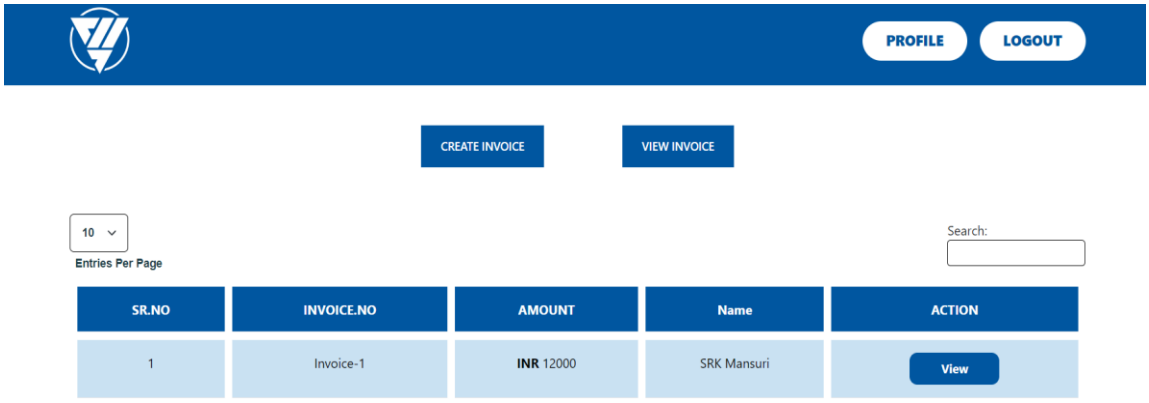


figure 6.3 fetched category page

4.4 Update Category:

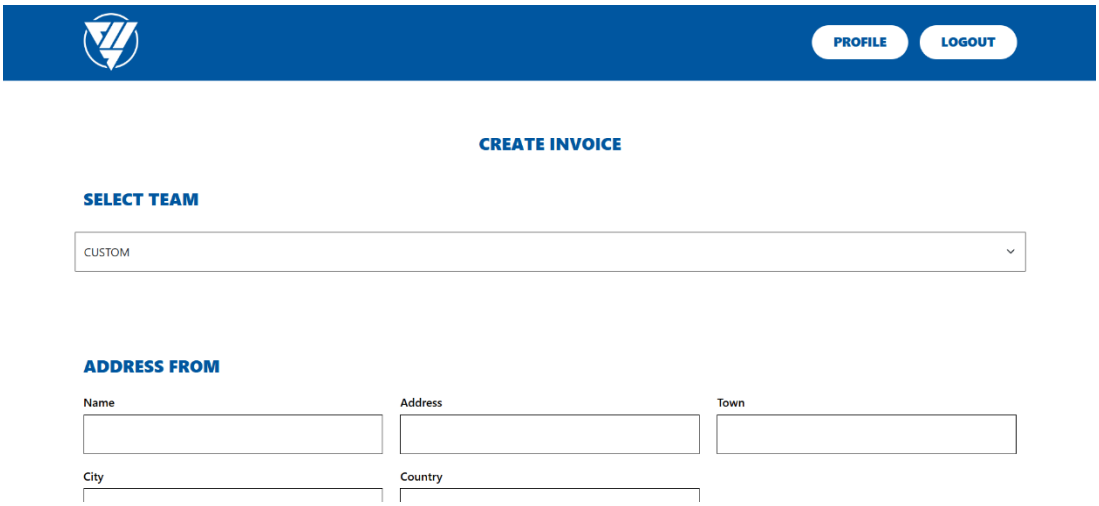


figure 4.4 update category page

4.5 Updated video:

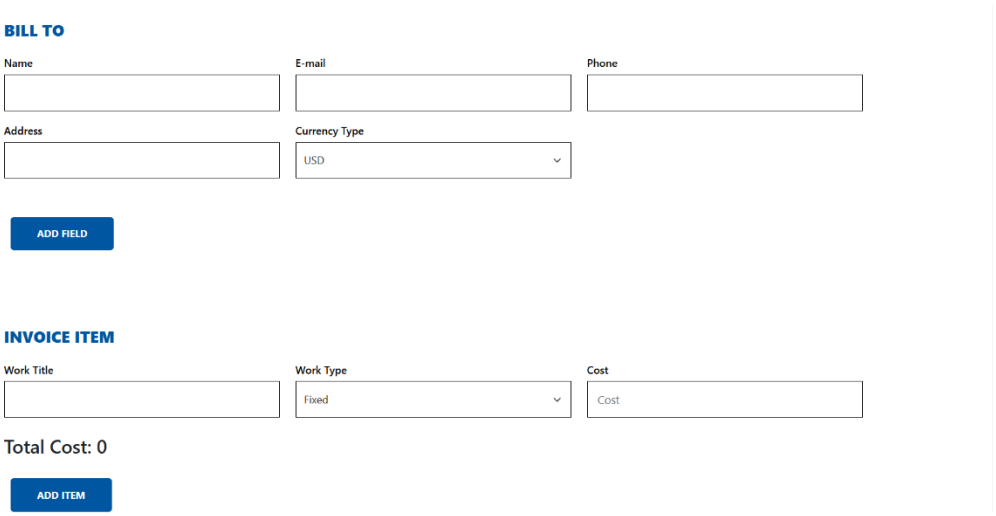


figure 4.5 updated added category page

CHAPTER - 5: TESTING

1. Testing Plan:

- **Unit Testing:** Test individual modules and functions to verify they work correctly.
- **Integration Testing**: Ensure seamless data flow between modules, such as between video processing and bug tracking modules.
- **Functional Testing:** Validate the system's core functionalities: video processing, automatic tagging, bug identification, and report generation.
- **System Testing:** Conduct end-to-end tests to evaluate the entire system in a production-like environment.
- **Performance Testing:** Conduct load testing to see how the system handles multiple concurrent videos and tagging processes.
- **Accuracy Testing:** Measure the model's bug detection accuracy by comparing outputs against a labeled dataset.
- **Usability Testing:** Have users test the interface for ease of tagging review, error reporting, and overall user flow.

1. Testing Strategy:

- **Define Clear Testing Objectives:** Establish key testing objectives to focus on the system's primary goals: bug detection accuracy, efficiency, and usability.
- **Prioritize Testing Phases Based on System Requirements:** Create a detailed test plan that outlines test cases, objectives, success criteria, and dependencies.
- **Use a Modular Testing Approach:** Test individual components (e.g., video tagging, bug detection algorithms) in isolation before integrating.
- **Leverage Automated Testing Tools:** Use automated testing tools to streamline regression, performance, and accuracy testing for repeated tasks.

5.3 Test Cases:

Test Case	Description	Expected Result
TC#1	Functional Testing	Invoice should be generated with the correct customer details.
TC#2	Usability Testing	The system should generate the invoice and display a download link
TC#3	Performance Testing	Invoice generation time should be within 2 seconds.
TC#4	Category Retrieval	Admins can access and view the list of Invoce.
TC#5	Category Association	Videos are tagged with categories available in the database.
TC#6	Security Testing	The system should sanitize inputs and not allow SQL injection.
TC#7	User Acceptance Testing	Invoice should meet all business requirements.
TC#8	End-to-End Testing	The user should be able to generate and download an invoice successfully.

Table 5.1 Test Case

CHAPTER - 6: CONCLUSION AND DISCUSSION

1. Overall Analysis of Project:

- **Core Functionality**: Automates invoice generation with customer details and dynamic fields.
- **Performance**: Efficient invoice generation and PDF downloads; handles multiple concurrent users.
- **Security**: Strong data protection, input validation, encryption, and session-based authentication.
- **Testing**: Extensive testing across functional, security, performance, and compatibility aspects.
- **Future Improvements**: Add template customization, multi-currency support, and automated reminders.

6.3 Problem Encountered and Possible Solutions:

One major issue was **browser compatibility**, where the application exhibited inconsistencies in rendering across different browsers like Google Chrome, Microsoft Edge, and Safari. To resolve this, cross-browser testing tools like **BrowserStack** were used, and CSS prefixes were applied to ensure compatibility. Another challenge arose with **slow PDF generation**, especially for invoices with extensive dynamic fields. This was mitigated by optimizing the PDF generation process with more efficient libraries like **jsPDF** and considering server-side PDF creation for larger invoices.

Possible Solutions:

1.Browser Compatibility: Use cross-browser testing tools like **BrowserStack** to ensure consistent functionality across different browsers. Implement CSS prefixes and fallbacks for broader support.

2.Slow PDF Generation: Optimize PDF generation using **jsPDF** or server-side tools like **Puppeteer**. Use compression techniques for faster processing of large invoices.

3.Security Vulnerabilities: Prevent **SQL injection** with parameterized queries and protect against **XSS** using input sanitization. Use **SSL encryption** for secure data transmission.

4.User Authentication: Implement **JWT** for stateless, secure user authentication and enhance session management. Add **session expiration** and automatic logout for added security.

5.UI Responsiveness: Ensure UI responsiveness with **Bootstrap 5's grid system** and **media queries**. Conduct thorough testing on various screen sizes and devices.

6.4 Limitation and Future Enhancement:

8.5.1 Limitations:

● The **Invoice Manager** project, while functional, has a few limitations that can affect its flexibility and scalability. One significant limitation is the **limited invoice customization**, where users can only make basic adjustments to the template, which restricts personalization options. Additionally, the system currently supports **single currency** operations, making it unsuitable for international clients who require invoicing in various currencies.

● Looking ahead, several **enhancements** could address these limitations and expand the system's capabilities. A major improvement would be the addition of **advanced invoice customization** options, including a **drag-and-drop interface** and more dynamic templates, enabling users to fully personalize their invoices.

● Additionally, the system could be enhanced with **automated financial reporting**, providing users with detailed insights into their invoices, payments, and taxes. Lastly, incorporating **automated reminders and notifications** for overdue invoices and status updates would significantly improve user experience and financial management.

8.5.2 Future Enhancements:

● The **Invoice Manager** project has significant potential for growth and improvement. One of the most valuable enhancements would be the addition of **advanced invoice customization** options, such as a **drag-and-drop interface** for users to easily personalize invoices with logos, custom colors, and layouts, offering greater flexibility. Another key enhancement is the integration of **multi-currency support**, which would allow users to generate invoices in different currencies, making the system more globally accessible. This could be achieved by integrating a **currency conversion API** for real-time updates. Additionally, implementing **automated tax calculations** based on the user's location or product category would streamline the invoicing process, eliminating the need for manual input and reducing the chances of errors.

● Introducing **role-based access control (RBAC)** would allow businesses to assign different permissions and access levels to multiple users, enhancing collaboration, security, and workflow management. Moreover, **automated financial reporting** would provide users with detailed, insightful reports on their invoices, payments, and taxes, enabling better decision-making and financial oversight.

● Lastly, the system could benefit from **automated reminders and notifications** for overdue invoices, payment statuses, and upcoming due dates, helping users stay on top of their financial tasks and improving client relationships. These enhancements would make the **Invoice Manager** a more robust, user-friendly, and scalable solution for businesses of all sizes.

6.6 Conclusion:

The **Invoice Manager** project has successfully addressed the core needs of businesses by automating the invoice generation process, offering users a streamlined way to manage their financial transactions. With its secure backend powered by **Nest.js**, dynamic frontend using **React.js**, and efficient database management with **MySQL**, the system provides a solid foundation for creating and managing invoices. Despite its current limitations, such as basic invoice customization and single-currency support, the project demonstrates a clear path to scalability and user-centered improvements.

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