BillWise Pro

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IN

COMPUTER SCIENCE

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May 2025

DECLARATION

We hereby declare that this submission is our own work and that, to the best of our knowledge and belief, it contains no material previously published or written by another person nor material which to a substantial extent has been accepted for the award of any other degree or diploma of the university or other institute of higher learning, except where due acknowledgment has been made in the text.

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CERTIFICATE

This is to certify that Project Report entitled "**BillWise Pro**" which is submitted by **Dev Varshney, Shreshthi Tayal, Vanshika Jain,** and **Viyapi Tyagi** in partial fulfillment of the requirement for the award of degree B. Tech. in Department of Computer Science of Dr. A.P.J. Abdul Kalam Technical University, Lucknow is a record of the candidates own work carried out by them under my supervision. The matter embodied in this report is original and has not been submitted for the award of any other degree.

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Last but not least, we thank our friends for their input to the completion of the project.

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ABSTRACT

Small and medium-sized enterprises (SMEs) typically waste time on inefficient billing, inventory, and accounting processes that are non-productive and prone to errors. BillWise Pro is a robust, web-based application that streamlines such processes by integrating billing, real-time inventory management, sales tracking, customer relationships, and financial reporting in a single program. The software offers an affordable, easy-to-install solution to costly enterprise resource planning (ERP) software.

The project makes use of already existing technologies like React.js as front-end, Node.js and Express.js as back-end, and PostgreSQL for database handling. Modular architecture facilitates scalability, and security provisions like OTP-based authentication and real-time notifications enable usability. Impact on the system was measured quantitatively in an experiment run among SMEs based on reduction of errors, increase in productivity, and user satisfaction.

Findings confirm that BillWise Pro eliminates human error, optimizes operating efficiency, and is simplicity itself to operate. Findings confirm the effectiveness of the system in addressing SMEs' operating issues. Against other disparate or expensive alternatives, BillWise Pro provides a low-cost, integrated platform optimally suited to SMEs. Its future expansion will be by the addition of additional functions and support for other business software with a view to further improving its use.

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LIST OF ABBREVIATIONS

BIMS	Billing & Inventory Management System
SMEs	Small & Medium Enterprises

SDG MAPPING

SDG 8: Decent Work and Economic Growth

BillWise Pro enables SDG 8 through the enhanced productivity and financial health of small and medium-sized enterprises (SMEs). The majority of SMEs are plagued by manual, inefficient billing, inventory, and accounting processes, which lead to money loss and business growth. With an automated and integrated platform, BillWise Pro helps companies eradicate errors, save administrative time, and focus on business growth. Further, through the provision of an affordable alternative to expensive enterprise resource planning (ERP) software, it provides even small businesses with access to sophisticated financial capabilities, thus ensuring financial inclusion. The enhanced efficiency and accessibility allow SMEs to grow, sustain businesses, and generate more jobs, thus ensuring economic growth and job creation.

SDG 9: Industry, Innovation, and Infrastructure

BillWise Pro aligns with SDG 9 by encouraging digitalization and technological innovation in business processes. Such traditional, paper-based processes are still the norm for most SMEs, which slows down their efficiency and scalability. Leveraging new web technologies such as React.js, Node.js, Express.js, and PostgreSQL, BillWise Pro provides a secure, scalable, and cloud-based platform for businesses to run their financial and business processes. With digitalization, SMEs can compete in a fast-paced tech-oriented economy.

Additionally, by integrating billing, inventory, and accounting into a single platform, BillWise Pro reduces reliance on dispersed tools, making business processes more streamlined and industrial efficiency improved. Through the capability of SMEs to leverage cost-effective and scalable solutions, the project supports the development of a stronger digital economy and robust business infrastructure, and industrial development becomes sustainable.

CHAPTER 1
INTRODUCTION

1.1 Introduction

Financial management of businesses in all industries depends heavily on efficient billing and invoicing operations. A proper billing process is very crucial to maintaining accurate records, timely payments, and the best possible financial performance. The conventional billing process, however, is beset with errors through manual intervention, delayed payments, and non-real-time tracking. The issues listed above tend to lead to finance discrepancies, which negatively impact cash flow and business performance. The lack of a standard and automated billing process has a tendency to lead to missing invoices, calculation errors, and payment processing issues from customers. It is an issue of greatest importance to small and medium enterprises (SMEs), which are unable to maintain billing details up-to-date while complying with tax regulations and financial reporting laws. In resolving the above-stated issues, BillWise Pro provides a cutting-edge billing management system that automates payment processing, invoice generation, and financial reporting. The cutting-edge system features secure payment gateways, real-time tracking of expenditures, and customizable invoice templates to ensure accuracy and efficiency. The in-built analytics provide businesses vital information on revenue streams, which allows for well-educated decision-making and financial planning. With the use of BillWise Pro, businesses can steer clear of manual errors in billing, enhance cash flow management, and enhance customer satisfaction through transparent and timely invoicing. The system

not only provides increased operating effectiveness but also provides maximum financial security, making it an important feature for contemporary businesses.

1.2 Project Category

This project is part of the Billing & Inventory Management Software category of money management, invoicing, and payment settlement automation software for small, medium, and large enterprises.

Key Features of This Category:

1. Invoice Generation and Management

Billing Management Software allows companies to create, modify, and send professional bills. The users can create bills that include detailed billing information, taxes, discounts, and payment terms. The software provides accuracy and financial regulation compliance.

2. Payment Processing and Monitoring

The application is coupled with secure payment gateways to enable businesses to accept online payments through various payment methods, e.g., credit/debit card, UPI, and bank transfer. Auto-payment tracking enables businesses to track pending and settled payments efficiently.

3. Monitoring of Client and Vendor

BillWise Pro enables organizations to maintain a well-structured customer and supplier database, monitor their payment history, outstanding balances, and conversation history. The feature provides transparency of finances and relationship management.

4. Cost Monitoring and Financial Analysis

The app offers expense tracking, financial categorization, and reporting capabilities. The companies are able to analyze cash flow, revenue trends, and numbers in order to make sound financial decisions.

5. Security and Compliance

Billing Management Software gives high emphasis to data security by implementing encryption, access control, and financial regulation compliance like GST, VAT, and other taxation laws. This ensures the financial data are processed in an environment that is free from fraudulent activities and unauthorized access.

6. User-Friendly Interface and Personalization

An intuitively designed platform ensures that it is simple for any-sized business to utilize the system. Having the option of having customizable templates, dashboards, and reporting capabilities ensures that the users can customize the software as per their individual needs.

BillWise Pro is a robust Billing & Inventory Management Software to enable organizations to streamline finance operations, reduce human errors, and automate cash handling all in a structured and regulatory compliant manner.

1.3 Objectives

Enhanced Billing Accuracy:

Through automatic payment monitoring and billing, BillWise Pro offers error-free billing free of calculation mistakes inherent when the calculations are carried out manually.

Increased Financial Transparency:

The system provides real-time transparency into payments due balances, payments, and invoices, and consequently enables businesses to track current financial data more effectively and make more effective decisions.

Improved Cash Flow Management:

With in-built late payment reminders and integration with secure payment gateways, BillWise Pro allows companies to achieve reliable cash flow and avoid revenue drain.

Increased Client Satisfaction:

By providing timely and business-like bills and multiple payment modes, the system promotes easier access to improved billing service to customers and hence propels business relationships forward.

Efficient Resource Allocation:

BillWise Pro allows companies to track financial expenditures and establish a spending pattern so that they can allocate resources properly to enable growth and long-term sustainability.

Enhanced Operational Efficiency:

Automation of the simple billing process reduces the workload, allowing businesses to concentrate on core operations and boost productivity.

Improved Compliance and Security:

The system guarantees tax authority compliance (e.g., GST, VAT, etc.) and fiscal rules by implementing strict security controls to protect confidential transaction data.

Comprehensive Performance Analysis:

Through providing comprehensive financial reports and analysis, companies can scrutinize their revenue trends, identify areas of improvement, and make informed expansion plans.

1.4 Structure of the Report

The structure of the report for the BillWise Pro: Billing & Inventory Management Software project is as follows:

1. Title Page:

- Title of the Report: BillWise Pro: Billing & Inventory Management Software
- Project Name
- Date
- Team Members' Name

2. Table of Contents:

- List of all the sections and subsections with page numbers for easy navigation.

3. Executive Summary:

- Short description of the project.
- Summary of key objectives, findings, and recommendations.
- Highlights of the project's achievements and challenges.

4. Introduction:

- Background of the project.
- Purpose and objectives of billing management software.
- Scope and limitations of the project.
- Overview of the report structure.

5. Project Overview:

- Description of the billing management software.
- Key features and functionalities.
- Target users (company owners, agents, administrators).
- Technology stack used in development.

6. Requirements Analysis:

- Functional requirements: Detailed description of features and functionalities.
- Non-functional requirements: Performance, security, usability, and other requirements.
- Stakeholder requirements: Needs and expectations of company owners, agents, and administrators.

7. Design and Architecture:

- Overview of the software architecture.
- Design principles and methodologies used.
- Description of major components/modules.
- Database schema and data model.

8. Implementation:

- Description of the development process.
- Technologies and tools used.
- Challenges faced during implementation and solutions adopted.
- Code organization and structure.

9. Testing and Quality Assurance:

- Overview of testing methodologies used (e.g., unit testing, integration testing, user acceptance testing).
- Test cases and scenarios.
- Test results and findings.
- Measures taken to ensure software quality.

10. Deployment:

- Overview of the deployment process.
- Infrastructure setup and configuration.
- Deployment environment and server specifications.
- Steps taken to ensure a smooth deployment process.

11. Maintenance and Support:

- Description of ongoing maintenance activities.
- Bug tracking and resolution process.
- User support mechanisms in place.

12. Future Enhancements:

- Potential future features and functionalities.
- Areas for improvement based on user feedback.
- Long-term vision for the software.

13. Conclusion:

- Summary of key findings and achievements.
- Reflections on the project journey.
- Lessons learned and recommendations for future projects.

14. References:

- List of all sources cited in the report (e.g., research papers, articles, documentation).

15. Appendices:

- Additional information, such as detailed technical documentation, diagrams, charts, or project artifacts.

CHAPTER 2
LITERATURE REVIEW

2.1 Literature Review

The growing need for financial automation has made the use of Billing & Inventory Management Systems (BIMS) common in various industries. Companies are moving from manual billing procedures to digital mediums to enhance precision, automate payments, and provide greater financial transparency.

Development of Billing & Inventory Systems:

Traditional billing processes were through paper billing and manual bookkeeping, which was prone to error, late payment, and bureaucratic inefficiencies. With the revolution of digitalization, businesses have embraced automated invoice software to reduce human intervention, thus ensuring precision and tax compliance. Automated bill systems have immensely enhanced financial operations by reducing processing time and eliminating transaction errors.

Technological Innovations in Billing & Inventory Management:

Technological advancements in billing and inventory management, including automated billing, and real-time inventory tracking, have increased the level of efficiency for SMEs by a great extent. Software such as BillWise Pro combines these features to minimize human error, automate processes, and maximize productivity. Real-time inventory tracking prevents stockouts and optimizes supply chain management. These technologies combined improve business performance, enabling SMEs to concentrate on growth and customer satisfaction.

Challenges in Conventional Billing & Inventory Processes:

The majority of businesses are plagued by issues like delayed payment, invoice forgery, and compliance. Manual billing businesses risk losing 30% of their revenues on account of invoice faults and delayed payment. A well-crafted billing management system eliminates all such issues with low stocks, and due payment tracking.

Impact of Billing Management Systems on Business Growth:

Efficient billing management systems improve cash flow by 40%, lower administrative expenses, and improve customer satisfaction. Organizations with automated billing systems have 40% greater operational efficiency and quicker payment cycles. Organized billing processes allow for improved financial control and scalability for organizations.

Conclusion:

Literature review discovers the increasing significance of automated Billing Management Systems in modern business. As various industries increasingly use online financial solutions, solutions such as BillWise Pro are instrumental in improving financial precision, streamlining cash flow, and aiding regulatory compliance. There is also a possibility of future developments in artificial intelligence and blockchain technology to revolutionize the billing system entirely and render it smart, secure, and easy to manage.

2.2 Research Gaps

1. User Experience (UX) and Customization in Billing Software

While the majority of billing systems concentrate on automation and efficiency, user-centric design principles resulting in usability across various business needs have seen limited research. Future research can explore the role of customized invoice templates, towards overall user satisfaction.

2. Scalability of Billing Management Systems for Small and Medium Enterprises

While the majority of systems are designed for small and medium-sized enterprises (SMEs), few studies have been conducted on scalable models that can accommodate large organizations with intricate financial processes. Future studies can focus on cloud-based distributed billing systems that can effectively process large volumes of transactions.

3. Impact of Automated Billing on Business Performance

While electronic billing systems are purported to enhance efficiency, few empirical studies of research quantify their true effects on business profitability, customer retention, and financial compliance. Performance measures and case studies can be used in subsequent research to corroborate these assertions.

4. Ethical Considerations in Financial Data Processing

Automation of financial transactions also creates transparency, fairness, and ethical information usage concerns. An enormous amount of research remains unaddressed in how companies can ensure ethical billing when implementing AI and automation. Future research can explore equitable models of invoicing, data stewardship, and ethical information usage of AI within financial systems.

5. Effectiveness of Automated Payment Reminders and Collections

While reminders are ubiquitous in billing systems, their effectiveness in curbing late payments and enhancing cash flow has not been well documented. It may be feasible to examine payment behavior trends and the scope for improving reminder strategy by customer segments.

6. Adoption Barriers for SMEs and Startups

Although automated billing systems have benefits, most small businesses continue to use manual billing. Studies can identify the barriers to adoption, including cost considerations, absence of technical capabilities, and resistance to computerization, and recommend improvements to make it more accessible.

7. Future Trends in Billing Automation

With the advent of technologies such as blockchain-based smart contracts, cryptocurrency payments, and embedded finance, there is little research that has been conducted on the future of billing management systems. Future research can be done on how future-generation technologies can be leveraged by businesses to develop more secure, automated, and transparent billing systems.

2.3 Problem Formulation

Proper billing and accounting are as of the business world of today an essential requirement to enable efficient operation and profitability. However, the majority of businesses still grapple with manual invoicing, tracking of payments, and book-keeping in the books of accounts, leading to inaccuracies, delayed payments, and financial discrepancies.

Even with the presence of electronic billing systems, there are certain complexities:

- **Lack of Automation:** Most small and medium enterprises (SMEs) employ manual billing, and as such, they are prone to the risk of inefficiency and operational errors**.**

- **Delayed Payments and Cash Flow Problems**: Companies have been delaying payments and receivables because there is no automatic monitoring and reminder system.
- **Limited Financial Transparency:** Without real-time reporting and analysis, businesses cannot make the best financial decisions, and resources are misallocated
- **Security and Compliance Issues:** As tax laws are evolving (e.g., GST and VAT), companies are finding it difficult to stay compliant while keeping financial data secure from fraud and cyber-attacks.
- **Scalability Issues:** The majority of the billing solutions available are not scalable enough to support growing company demands and thus lead to inefficiency in processing bulk and multiple currencies in transactions.

A poorly integrated, automatic Billing & Inventory Management System leads to financial inefficiencies, slow payments, security threats, and regulatory compliance issues. Organizations require a secure, scalable, and user-friendly billing solution to optimize billing, improve cash flow, increase financial visibility, and meet regulatory compliance requirements.

CHAPTER 3
PROPOSED SYSTEM

3.1 Proposed System

BillWise Pro is a sophisticated billing & inventory management software to automate and streamline fiscal transactions for any business enterprise. The solution best solves core issues associated with manual invoice processing, payment tracking, and conformity verification with a secure, user-friendly, and customizable platform for better billing management.

Key Features & Technologies:

1. Automated Invoice Creation

- BillWise Pro enables businesses to pre-print and send bills directly through email using pre-formatted templates.
- It also calculates taxes (GST, VAT, etc.), discount, and late fees correctly and if necessary.

2. Real-Time Financial Tracking

- It contains a financial analytics dashboard and provides companies with real-time visibility of income, outstanding payments, and spending.

3. Two-Factor Authentication (2FA) Strengthening of Security

- For ensuring no unauthorized access, the system implements OTP-based two-factor authentication at login and while editing invoices.

BillWise Pro is a safe, smart, and robust billing solution that can help organizations automate billing, improve financial transparency, achieve regulatory compliance, and improve payment security.

3.2 Unique Features of the System

BillWise Pro is a robust stock management and billing system that utilizes the strength of security, automation, and real-time reporting to transform the finance function of the company.

Following are the special features that distinguish it from conventional billing systems:

1. Invoice and Payment Monitoring

- The system creates invoices with proper tax amounts (GST, VAT, etc.) and sends to the customers.
- It has a live bill payment tracking dashboard where companies can easily look paid, pending, and outstanding accounts.

2. Real-Time Financial Analytics and Business Insights

- BillWise Pro provides business owners with financial reports so that they can track revenue, payment due, and customer payment history.
- Customizable dashboards allow you to view profit/loss accounting, tax summaries, and cost analysis at a glance.

3. Support for Taxes

- Most appropriate for foreign businesses, the page will also translate the invoice into the desired currency of the customer automatically.

- Dynamic tax calculation enables tax compliance to different tax legislations in different geographies.

4. User Management

- The multi-user access control feature enables organizations to define roles such as Administrator, Accountant, and Sales Representative with different levels of access.
- This feature keeps confidential financial information away from unauthorized people with the aim of ensuring effective communication among members.

As opposed to conventional billing software, BillWise Pro not only bills but is a full finance management system with a strong emphasis on security, automation and real-time functionality analysis, which allows business to maximize operational efficiency, minimize human error, and maximize cash flow.

CHAPTER 4
REQUIREMENT ANALYSIS AND SYSTEM SPECIFICATION

4.1 Feasibility Study (Technical, Economical, Operational)

4.1.1. Technical Feasibility:

- **Technology Stack:** Leverages React.js, Node.js, and PostgreSQL, and is easy to implement.
- **Scalability:** Built with the capacity for expansion, covering more business accounts without decreasing performance.

BillWise Pro has been shown to be technologically feasible with scalability, security, and smooth integration, thus being a potential billing management solution.

4.1.2. Economic Feasibility:

- **Cost Estimate:** Development process includes frontend and backend features, database setup, and security features needed. Support and maintenance contribute to ongoing costs.
- **Revenue Opportunities:** Revenue is earned using subscription models, transaction fees, and premium features, which may include other reporting features and multi-user access.

- **Return on Investment (ROI):** Computerized billing systems reduce manual effort, reduce errors, and speed up transaction processing, thus increasing operating efficiency and allowing for cost savings over the long term.

BillWise Pro offers a cost-efficient solution, striking the perfect balance of cost-efficient development and high revenue potential and favorable ROI.

4.1.3. Operational Feasibility:

User Acceptance: Built with an easy-to-use interface and experience for business owners as well as finance teams. User feedback from pilot users confirms that the product meets their requirements.
Training Requirements: Requires very little or no training due to ease of use. Provides support documentation and customer support to simplify onboarding.

BillWise Pro demonstrates operational feasibility, characterized by ease of adoption and minimal or no training requirements.

4.2 Software Requirement Specification

4.2.1 Data Requirement

1. Invoice Information:

- Invoice Number
- Client Name
- Date of Invoice
- Payment Due Date

- Detailed Billing Information (product/service, quantity, price)
- Total Amount and Applicable Taxes (GST, etc.)
- Payment Status (paid, pending, overdue)

2. Client Information:

- Client Name
- Contact Details (email, phone)
- Billing and Shipping Addresses
- Payment Options

3. Transaction Information:

- Transaction Identifier
- Payment Method (Cash, Online)
- Date and Time of Transaction
- Amount Paid
- Payment Status

5. Business Information:

- Company Name
- Business Registration Information
- Tax Details (GSTIN)

6. Security and Compliance Measures:

- Data Encryption for sensitive information
- Backup and Recovery Procedures

BillWise Pro guarantees effective data management, security, and compliance to facilitate smooth billing processes.

4.2.2 Functional Requirements:

1. Invoice Administration:

- Create, modify, and remove invoices.
- Implement taxes (GST, etc.) and apply discounts.

2. Client Management:

- Add, modify, and remove client information.
- Maintain records of purchase and contact details.

3. Payment Monitoring:

- Log payments and update the status of invoices (paid, pending, overdue).

4. Reporting & Analytics:

- Create reports on sales, outstanding payments, and revenue patterns.
- Export reports in PDF/CSV formats.

5. User Authentication:

- Secure login through OTP/email verification.

6. Data Protection & Backup:

- Encrypt sensitive information.
- Automatic backup for invoices and reports.

BillWise Pro provides effective invoicing, payment monitoring, and secure financial management for enterprises.

4.2.3 Performance Requirements:

1. Response Time:

- Invoice generation and retrieval must be completed in less than 2 seconds**.**

2. Scalability:

- Database queries must be optimized for rapid searching and retrieval of invoices and customer information.

3. Reliability & Uptime:

- Achieve a minimum of 99.9% uptime through cloud-based redundancy solutions.
- Establish automatic failover systems to manage unforeseen server failures.

4. Data Processing Efficiency:

- Bulk uploads of invoices should be capable of processing a minimum of 100 invoices per minute.
- Report generation must occur within 5 seconds for datasets containing fewer than 10,000 records.

BillWise Pro guarantees efficient, scalable, and dependable invoicing processes for enterprises.

4.2.4 Maintainability Requirements:

1. Code Maintainability:

- Employ modular and organized code accompanied by clear naming conventions.
- Follow best practices like SOLID principles and MVC architecture for better readability.

2. Version Control:

- Use **Git** to track code changes with a branch-based approach.
- Make use of feature branches, pull requests, and code reviews for an easy development process.

3. Documentation:

- Provide access to API documentation, developer manuals, and user guides.
- Keep architecture diagrams and design rationale up-to-date to make it easier to troubleshoot.

BillWise Pro ensures smooth maintenance, easy debugging, and simple future additions.

4.2.5. Security Requirements:

1. Data Protection:

- Use AES encryption for storing data and implement SSL/TLS protocols for secure transmission of data.

2. Privacy Safeguards:

- Adhere to GDPR and relevant local data protection regulations.
- Secure user consent prior to the collection and storage of personal information.

BillWise Pro focuses on data integrity, confidentiality, and regulatory requirements to provide a safe setting.

4.3 SDLC Model Used

BillWise Pro has been developed based on the Agile Model to provide flexibility, ongoing improvement, and effective collaboration during development.

Agile Model Overview: Iterative and adaptive, the Agile Model is an incremental improvement-based software development model with continuous collaboration to adapt as needs change Agile values flexibility, customer feedback, and quick releases over the Waterfall Model.

Because of the multiple iterations (sprints) of BillWise Pro, we could always be adding features based on feedback.

To ensure that the product was aligned with business requirements, the development involved regular interaction with stakeholders.

Adaptive Planning: Agile enabled us to modify the development plan as priorities and requirements changed.

Regular Testing and Releases: For detecting and fixing bugs at the initial stage, frequent testing was performed, and hence a stable and reliable program was developed.

BillWise Pro was successfully built on Agile with user input at each step to provide a flexible, scalable, and user-focused solution for companies.

4.4 System Design

4.4.1 Data Flow Diagram

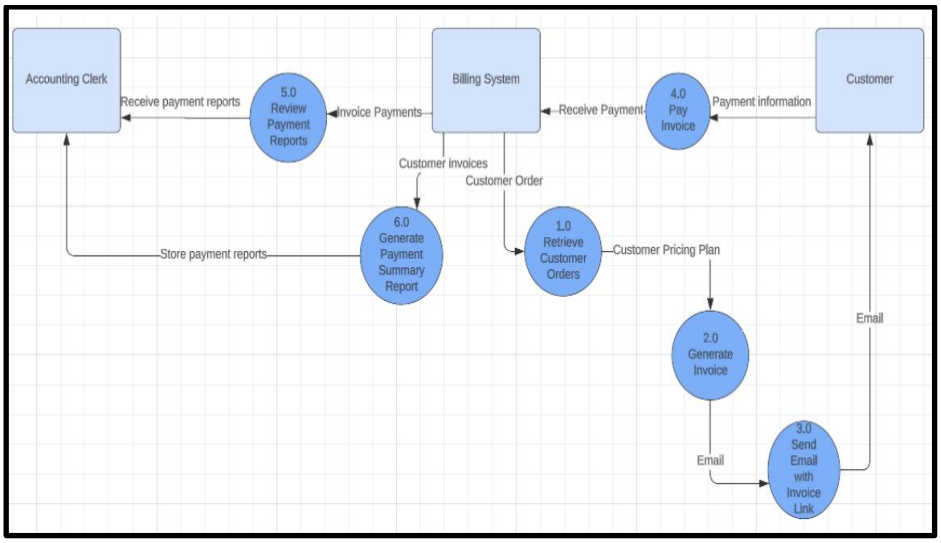

Figure. 4.1. Data Flow Diagram of BillWise Pro

4.4.2 Use Case Diagram

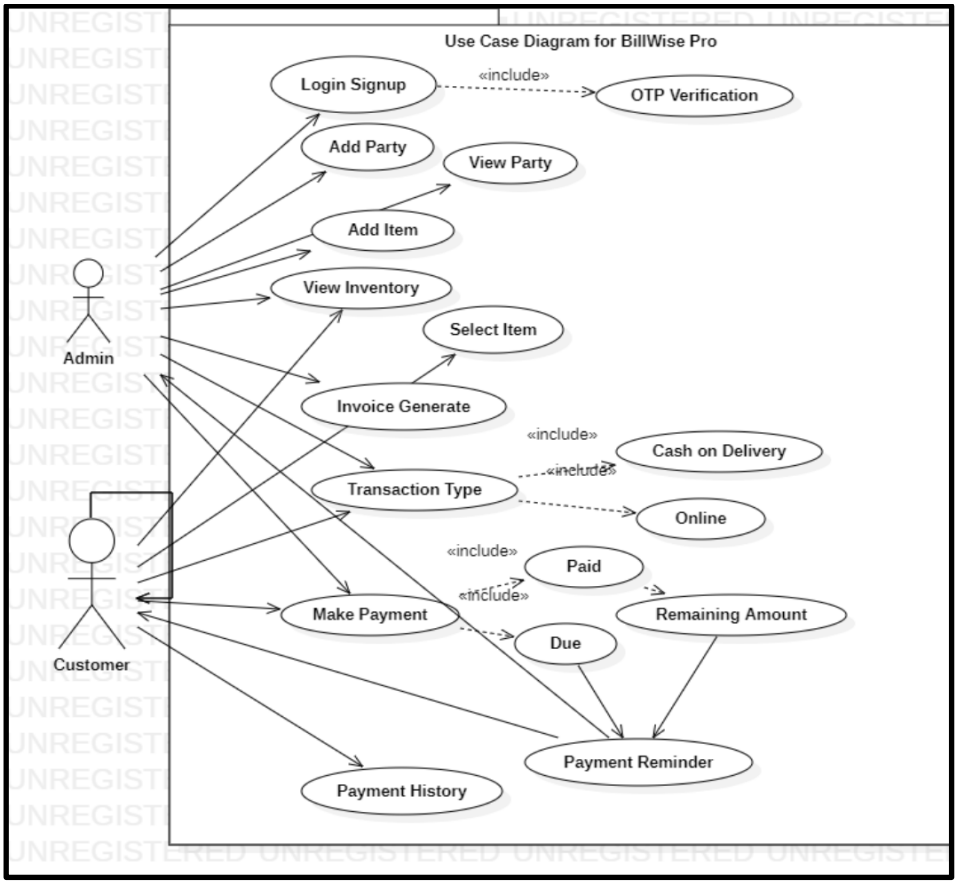

Figure. 4.2. Use Case Diagram of BillWise Pro

4.5 Database Design

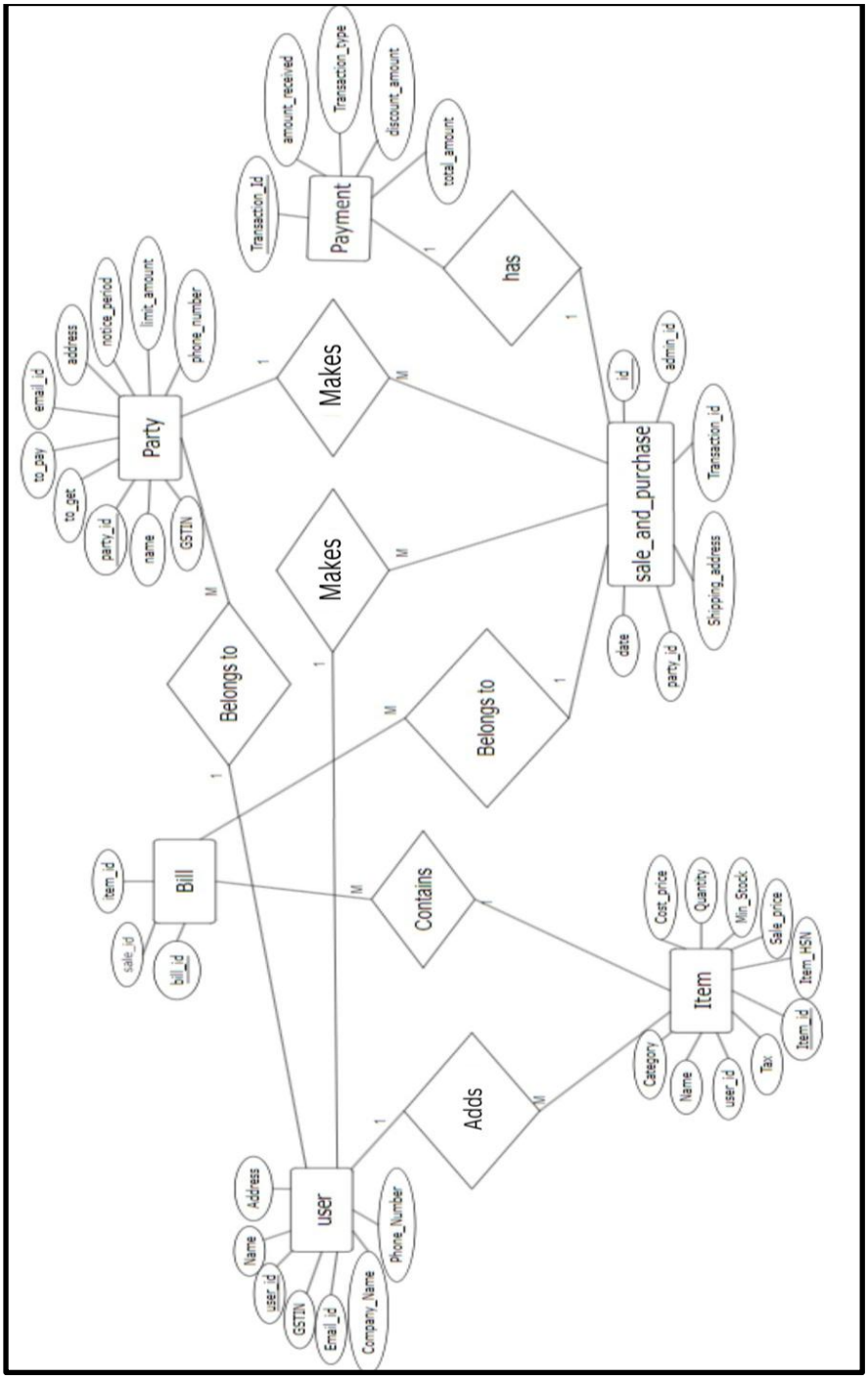

Figure. 4.3. ER Diagram of BillWise Pro

CHAPTER - 5
IMPLEMENTATION

5.1 Introduction Tools and Technologies used

BillWise Pro's build consists of a heterogeneous set of modern instruments and technologies designed to optimize efficiency, scalability, and security.

1. Frontend Development:

- **React.js:** Employed for creating a dynamic and interactive user interface.
- **Tailwind CSS:** Employed for styling and UI/UX enhancement.

2. Backend Development:

- **Node.js & Express.js:** Used for processing API requests and server-side operations.
- **PostgreSQL:** An open-source relational database with robust ACID support and powerful querying, PostgreSQL is used for storing invoices, payments, and user data.

3. Development & Deployment:

- **Git & GitHub:** Used for version control to track code changes.
- **Render / Neon PostgreSQL / Vercel Hosting:** For hosting and maintaining consistent uptime.

All of these technologies are combined to provide scalable, and high-performance billing and invoicing software.

CHAPTER 6
TESTING AND MAINTENANCE

6.1 Testing Techniques and Test Cases Used

1. Requirements Analysis:

- Make sure all functionalities required such as generating invoices, processing payments, calculating tax, and handling customers are documented and tested thoroughly.

2. Requirement Traceability Matrix (RTM):

- Assign each requirement to individual test cases for obtaining full test coverage.

3. Functional Testing:

- **Positive Testing:** Test successful generation of invoices, proper taxation, and proper payment processing.
- **Negative Testing:** Test the response of the system to invalid input, calculation faults, and attempts to access unauthorized**.**

4. Security Testing:

- **Data Encryption:** Make sure that all the sensitive information is encrypted.
- **Authentication & Authorization:** Assess user session security.

5. Usability Testing:

- **UI Testing:** That the user interface of the invoice management is intuitive and simple to navigate.
- **Workflow Testing:** Ensure the workflow of creating, editing, and processing payments for bills is seamless.

6. Performance Testing:

- **Load Testing:** Check system response under multiple users and transactions, with no performance degradation.
- **Scalability Testing:** Test how the system responds when data volume is growing.

7. Regression Testing:

- Automate your critical test cases such that any modification will not impact the existing functionalities.

8. Data Integrity Testing:

- Validate invoice data accuracy, tax calculation accuracy, and stored transaction records accuracy.

9. Compatibility Testing:

- Ensure that the system works on different browsers, devices, and screens.

10. User Acceptance Testing (UAT):

- Obtain comments from accountants and businesses to test the usability and workability of the system in place.

6.1.1 Test Cases

6.1.1.1 Test Case Name: User Signup

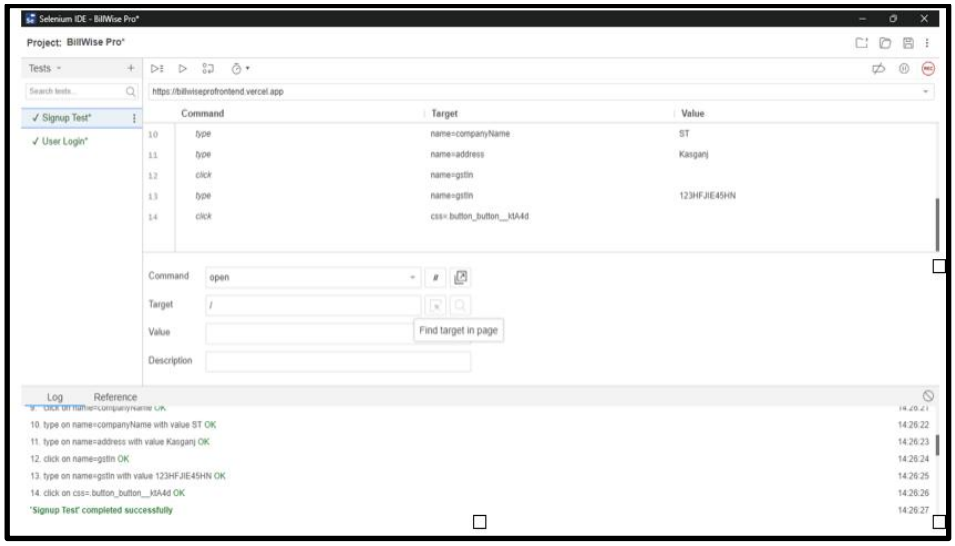

Figure. 6.1. Test Case 1: User Signup

6.1.1.2 Test Case Name: User Login

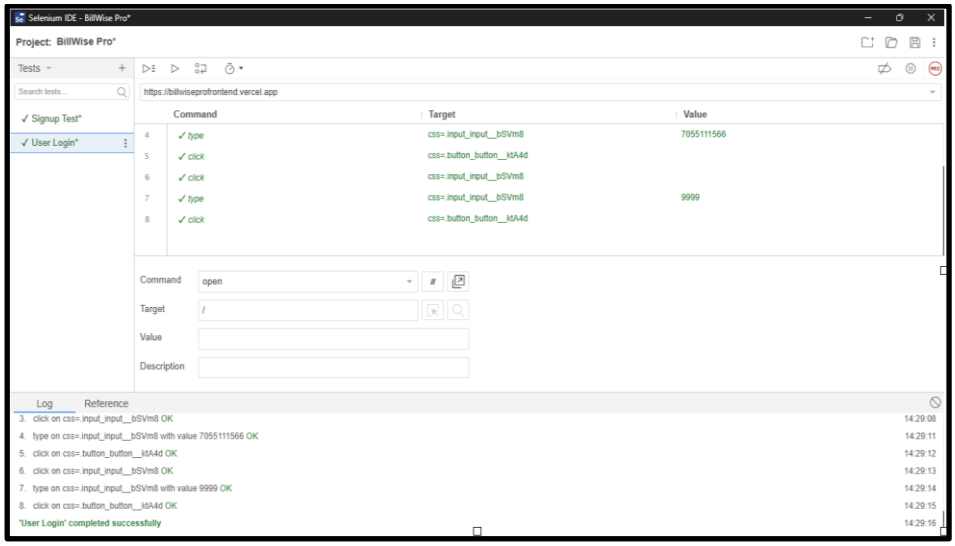

Figure. 6.2. Test Case 2: User Login

6.1.1.3 Test Case Name: Adding Clients

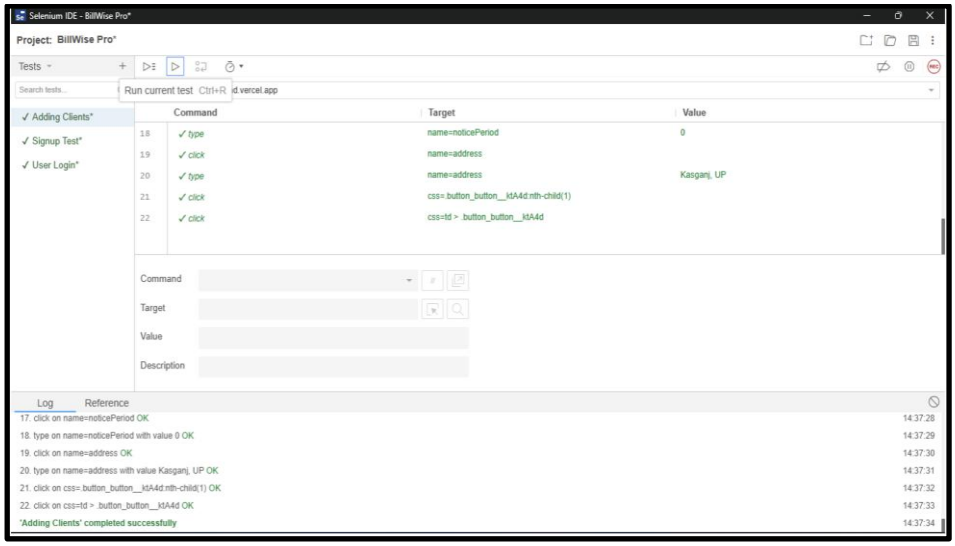

Figure. 6.3. Test Case 3: Adding Clients

6.1.1.4 Test Case Name: Adding item

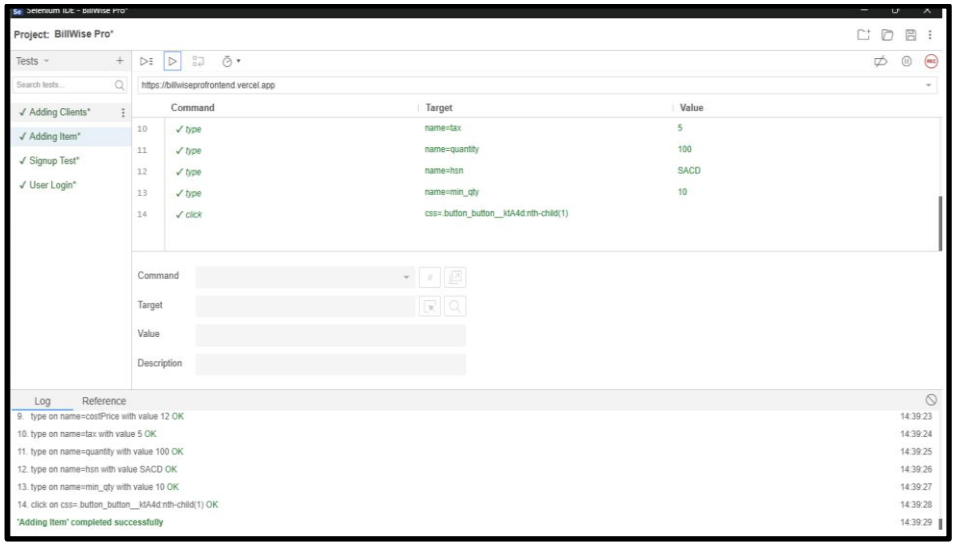

Figure. 6.4. Test Case 4: Adding Items

6.1.1.5 Test Case Name: Sales Invoice

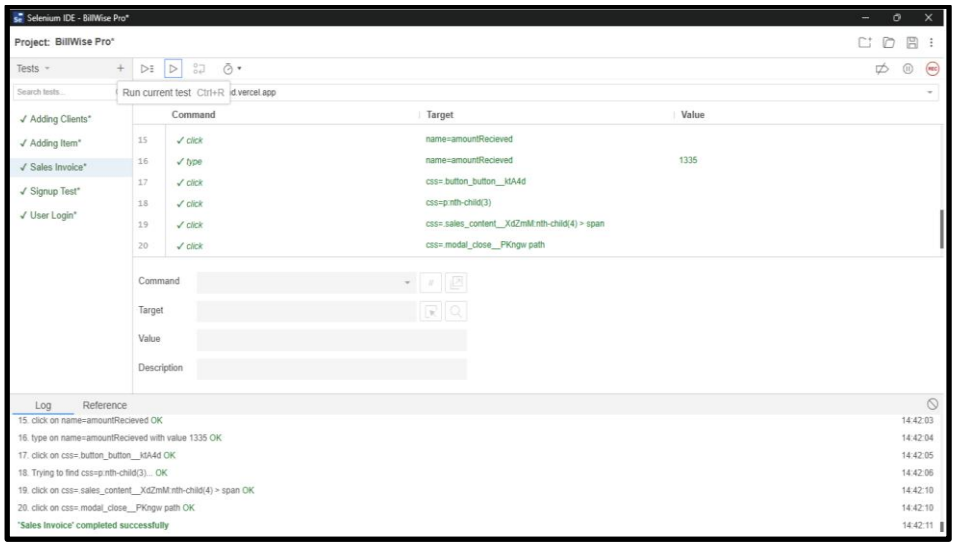

Figure. 6.5. Test Case 5: Sales Invoice

6.1.1.6 Test Case Name: Making Purchase

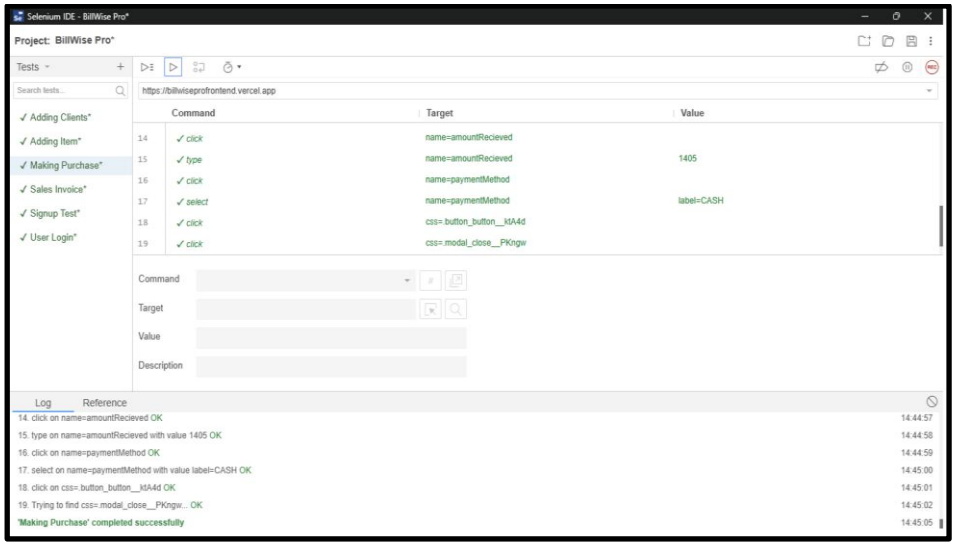

Figure. 6.6. Test Case 6: Making Purchase

6.1.1.7 Test Case Name: Profile Update

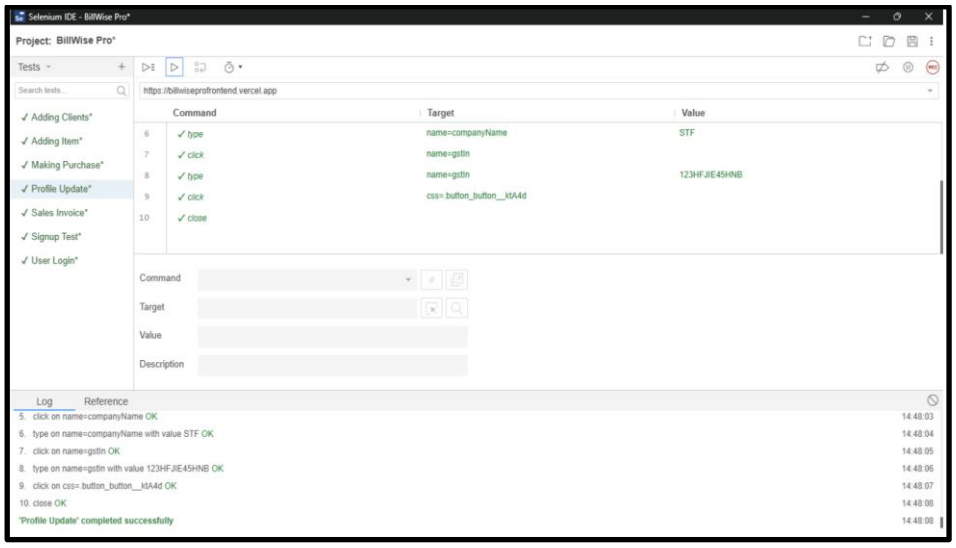

Figure. 6.7. Test Case 7: Profile Update

6.1.2 Test Cases

Test Case ID	**Test Scenario**	**Steps to Execute**	**Expected Result**
TC01	Validate User Sign-up functionality	1. Navigate to the Sign-up page. 2. Enter valid phone number, name, email id, etc. 3. Click "Sign Up."	User account is created successfully.
TC02	Validate User Login with valid credentials	1. Navigate to the Login page. 2. Enter valid phone number and OTP. 3. Click "Log In."	User is logged in and redirected to the dashboard.

TC03	Validate User Login with invalid credentials	1. Navigate to the Login page. 2. Enter valid phone number but invalid OTP. 3. Click "Log In."	Error message displayed: "Invalid OTP."
TC04	Verify adding a new item in inventory	1. Navigate to "Inventory" page. 2. Enter valid item details (name, price, quantity). 3. Click "Add."	Item is added successfully and visible in the "Inventory" list.
TC05	Verify adding a new customer	1. Navigate to "Clients" page. 2. Enter valid client details (name, email, phone). 3. Click "Add."	Customer is added successfully and listed in "Clients."
TC06	Validate duplicate customer cannot be added	1. Add a customer with existing details. 2. Attempt to save.	Error message: "Customer already exists."
TC07	Validate sales and invoice generation functionality	1. Navigate to "Sales" page. 2. Select items and quantities. 3. Click "Save"	Invoice is generated successfully, and inventory is updated.
TC08	Validate inventory updates after sales	1. Check item quantity before sales. 2. Make a sale. 3. Check item quantity after sales.	Inventory count decreases appropriately.
TC09	Verify purchase updates inventory	1. Navigate to "Add Purchase" page. 2. Select items and quantities. 3. Click "Add Purchase."	Inventory count increases appropriately.
TC10	Validate dashboard displays accurate metrics	1. Navigate to Dashboard. 2. Check total sales, amount due, and inventory metrics.	Dashboard displays correct and real-time data.

Table. 6.1. Test Cases

CHAPTER - 7
RESULTS AND DISCUSSIONS

7.1 Description of User Module

User Module: The User Module offers easy management of financial transactions to accountants and business enterprises. It provides the functionality of invoicing, handling payments, and client relationship management.

Key Features:

- **Dashboard:** Displays key figures such as bills outstanding, finance summary, and low inventory warnings**.**
- **Invoice Management:** They are able to create, and edit invoices with tax calculation, and rebates.
- **Tracking of bill payment:** Enables people to pay and track bills and automatically sends reminders overdue bills.
- **Client Management:** Stores large customer database with their billing addresses, payment terms, and contact information.

7.2 Key Findings of the Project

Positive Findings:

1. Improved Financial Management: Invoicing, payment, and customers have all been streamlined by automation, leaving less room for mistakes and streamlining the process.

2. User-Friendly Interface: The users have also mentioned that the interface is easy to use, and it is simple to create invoices, monitor payments, and manage financial information.

3. Automated Payment Notifications: System-automated reminders have proven effective in minimizing delayed payments and enhancing cash flow for businesses.

4. Insightful Data Analytics: The reporting and analytics features offered valuable insights into tax calculations, past-due payments, and revenue trends, which helped improve financial decision-making.

Areas for Improvement:

1. Performance Optimization: Some users have complained that response times are slow during high traffic, and hence, further database query and API interaction optimization would be helpful.

2. Enhancements in Security: Although basic security features such as encryption and authentication are in place, the inclusion of role-based access control and periodic security audits would also enhance data security.

3. Customization Features: Users have requested additional invoice template and tax settings customization options to support varied business requirements.

5. Mobile Usability: While the platform can be accessed on mobile devices, the development of a dedicated mobile app would further boost performance and usability when accessing the platform on the go.

In summary, **BillWise Pro** has been able to effectively make financial management more convenient for businesses; however, further improvements in performance, security, and customizability would make it more effective as a standalone entity.

7.3 Brief Description of Database

Concise Overview of the Database – Bill Wise Pro

Database Title:

- **BillWiseDB**

Database Management System (DBMS):

- PostgreSQL

Summary:

- The database is a core system for processing invoices, clients, payments, and financial records in an effective way.
- It employs a relational schema with well-defined tables to provide data consistency, integrity, and efficient retrieval.
- Relationships are defined by the use of foreign keys, primary keys, and indexing to enable easy operations.

Essential Tables and Attributes:

1. Users Table:

- Attributes: id, name, gstin, phone_number (UNIQUE), email (UNIQUE), company_name, address, deleted

2. Clients Table:

- Attributes: id, name, gstin, phone_number, email, address, user_id (FK), to_get, to_pay, notice_period, deleted

3. Products Table:

- Attributes: id, hsn, name, sale_price, cost_price, tax, quantity, user_id (FK), deleted, min_qty

4. SalesAndPurchaseRecords Table:

- Attributes: id, date, client_id (FK), shipping_address, type (SALE/PURCHASE), deleted, user_id (FK)

5. TransactionItems Table:

- Attributes: id, sale_and_purchase_id (FK), product_id (FK), quantity, sale_price

6. Transactions Table:

- Attributes: id, total_amount, discount_amount, amount_received, payment_method_id (FK), sale_and_purchase_id (FK)

7. Invoices Table:

- Attributes: id, sale_and_purchase_id (FK), invoice_number, date_issued, due_date, total_amount, status (PAID/UNPAID/OVERDUE)

8. PaymentMethods Table:

- Attributes: id, name

7. ErrorLogs Table:

- Attributes: id, error_message, error_time

This organized database enhances efficient processes for invoicing, payment tracking, tax calculation, financial reporting, etc. in BillWise Pro.

7.4 Snapshots of BillWise Pro

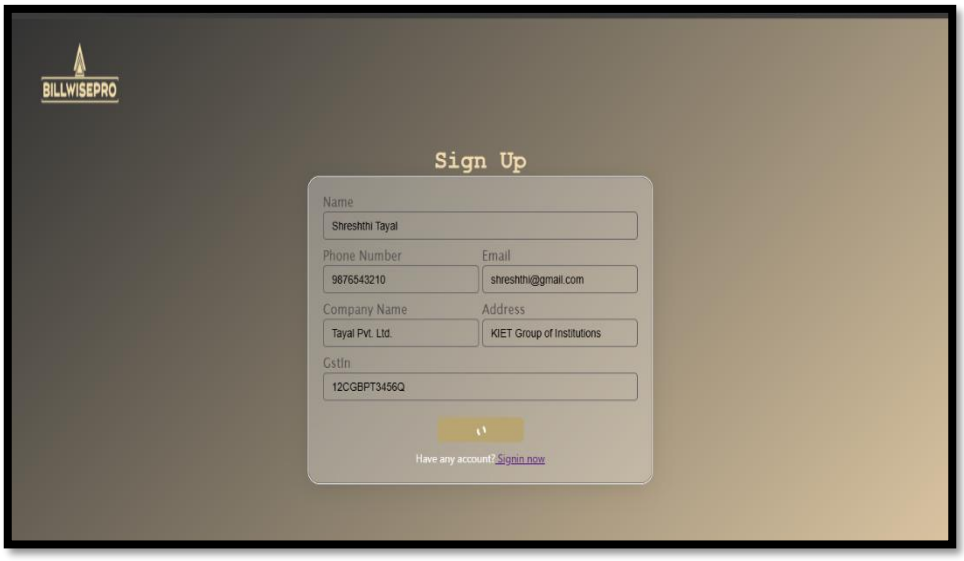

Figure. 7.1. Sign Up Page

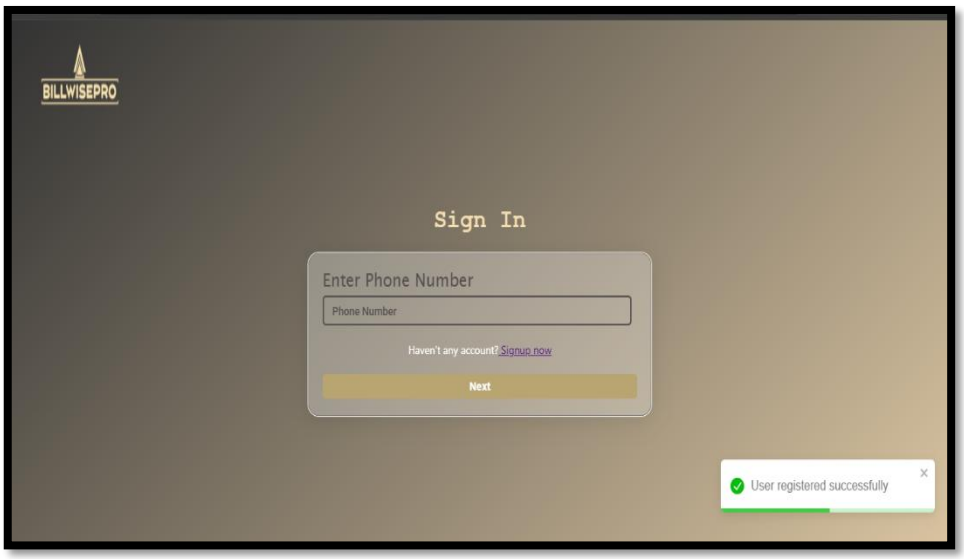

Figure. 7.2. Sign Up Successful

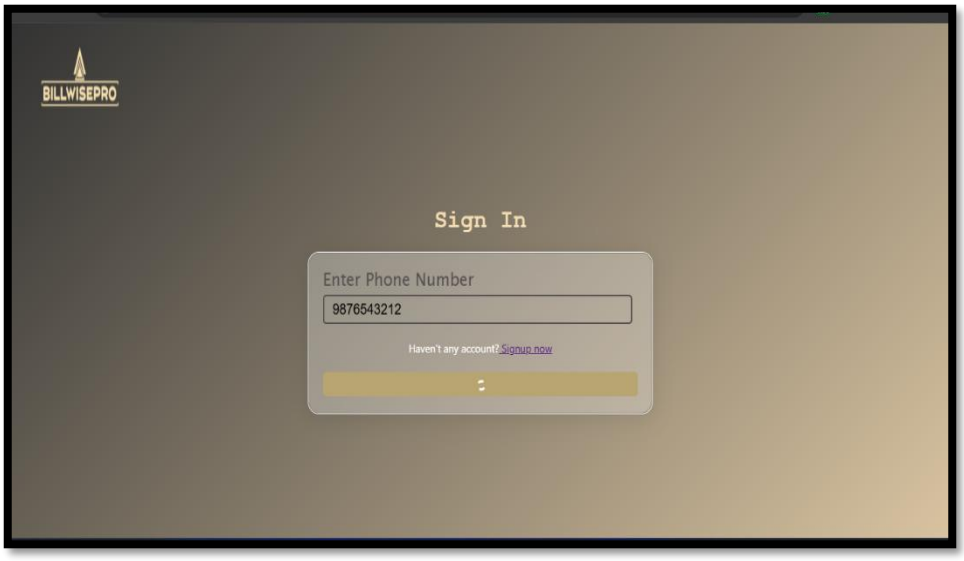

Figure. 7.3. Sign In Page

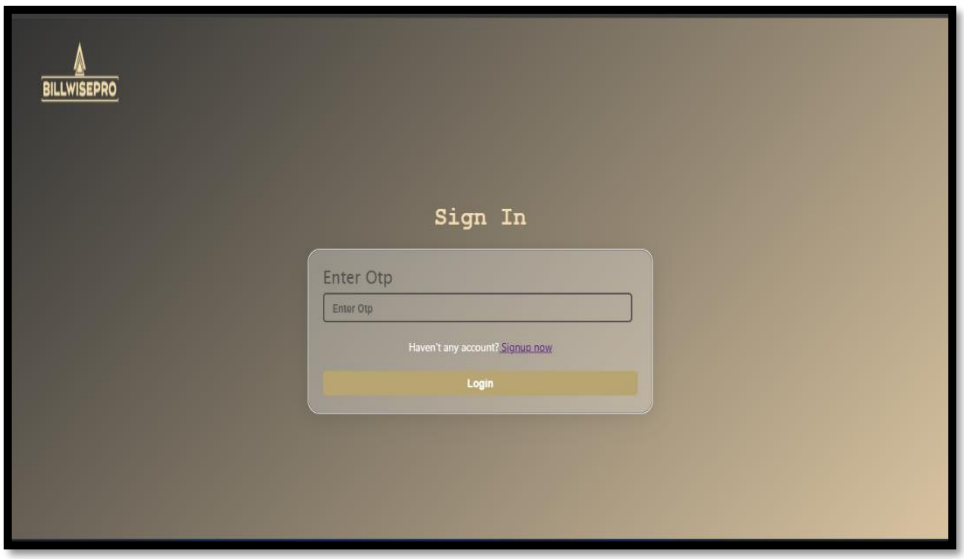

Figure. 7.4. Login through OTP

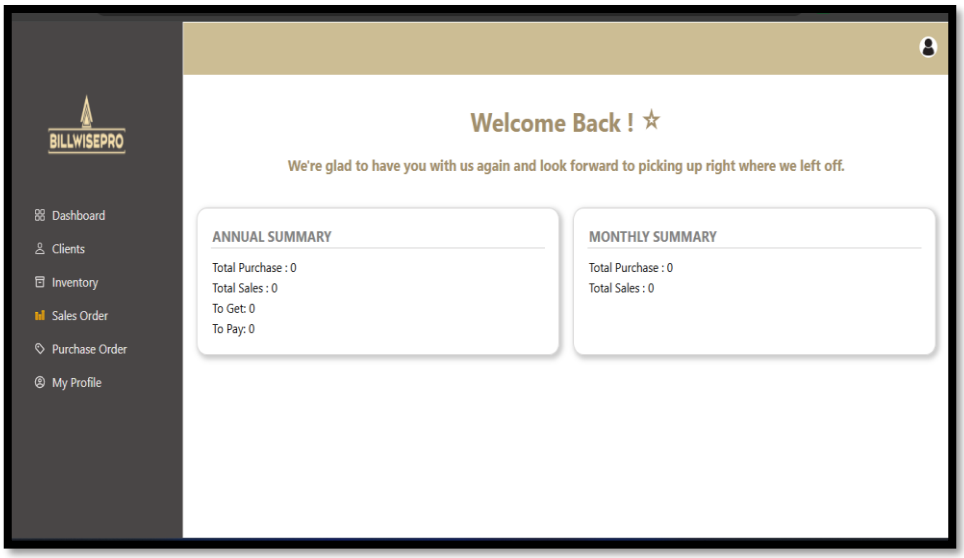

Figure. 7.5. Dashboard

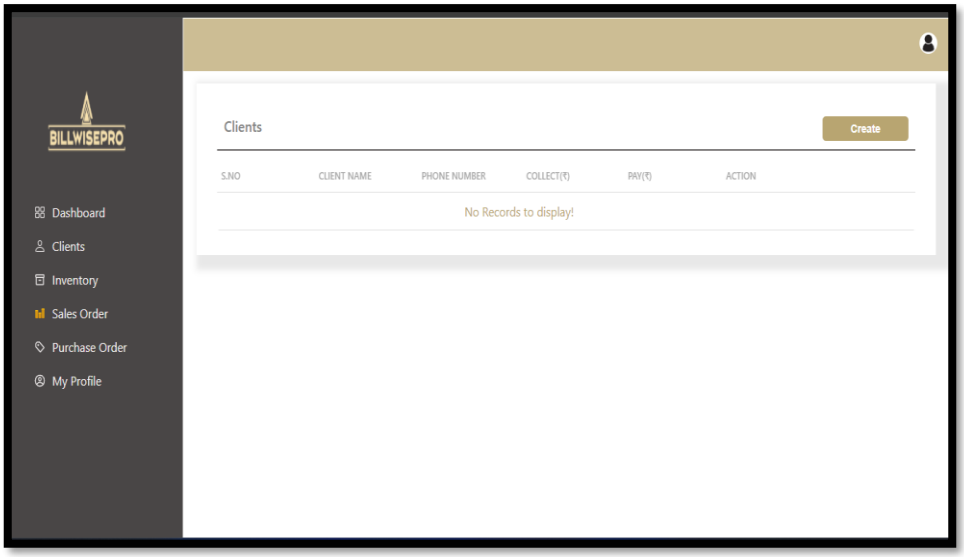

Figure. 7.6. Clients Module

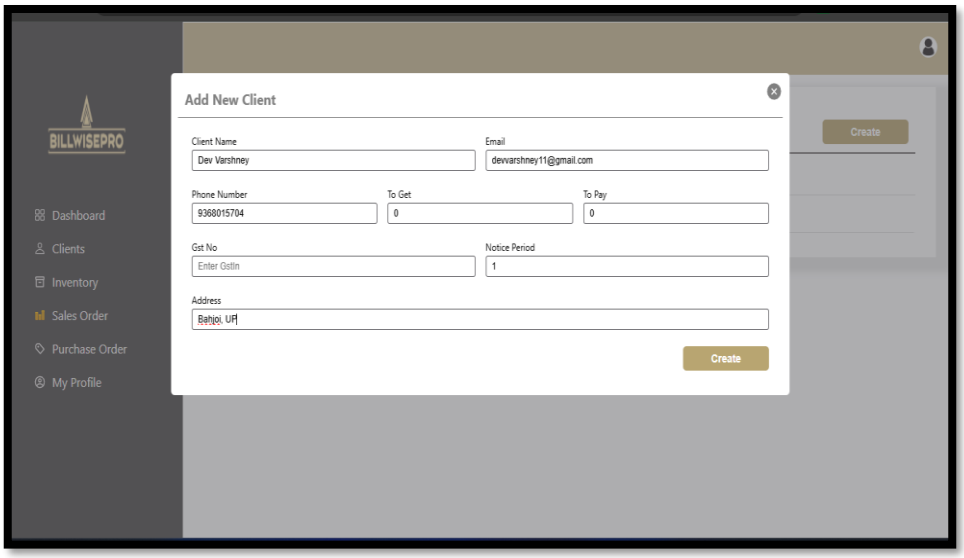

Figure. 7.7. Add New Clients

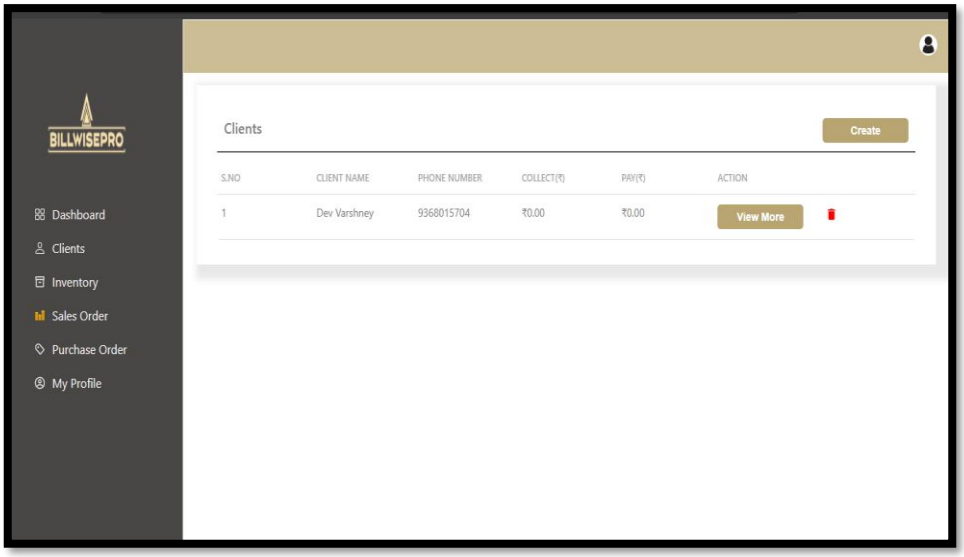

Figure. 7.8. Client Added Successfully

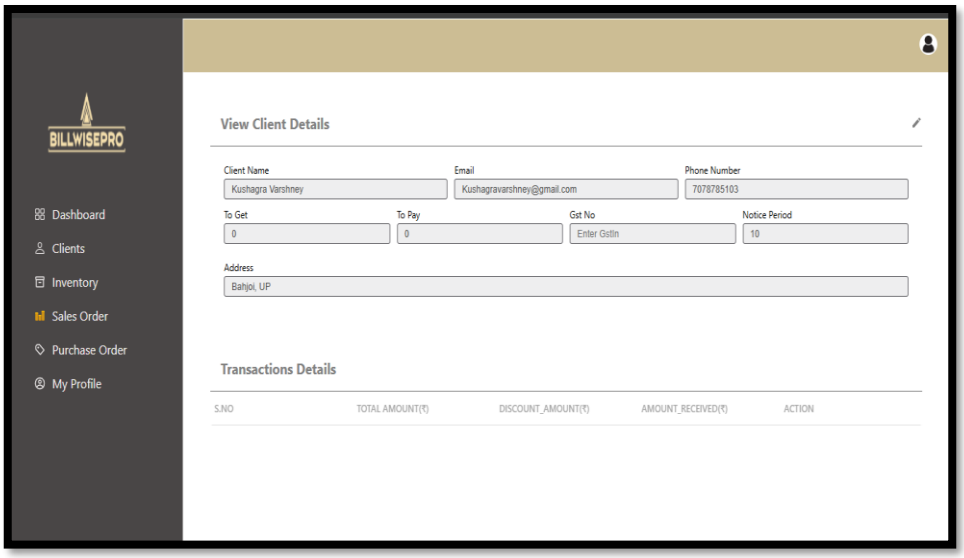

Figure. 7.9. Client Details

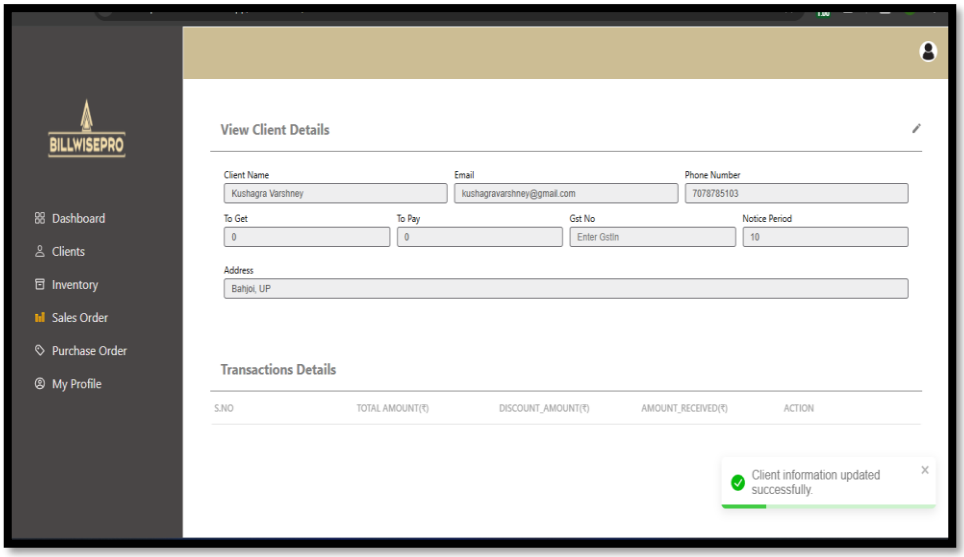

Figure. 7.10. Client Details Updated Successfully

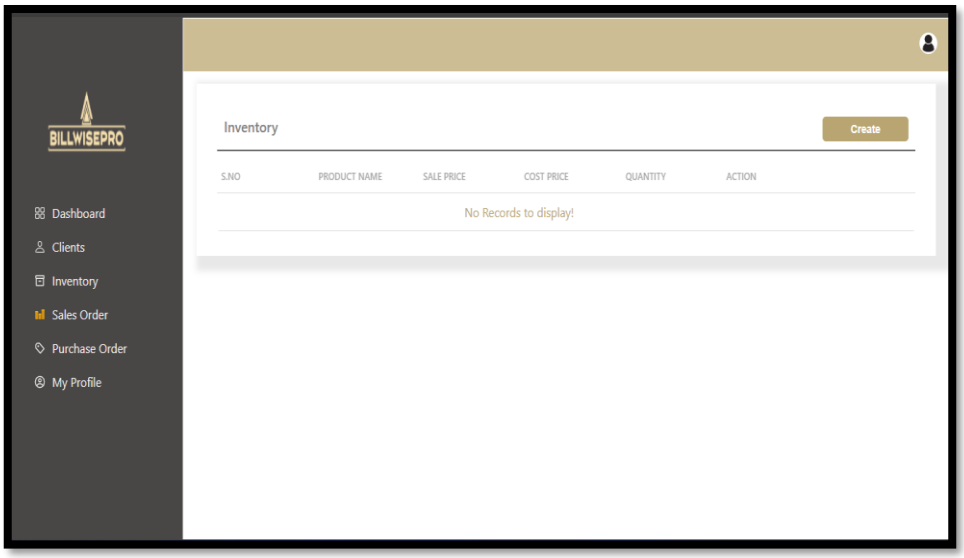

Figure. 7.11. Inventory Module

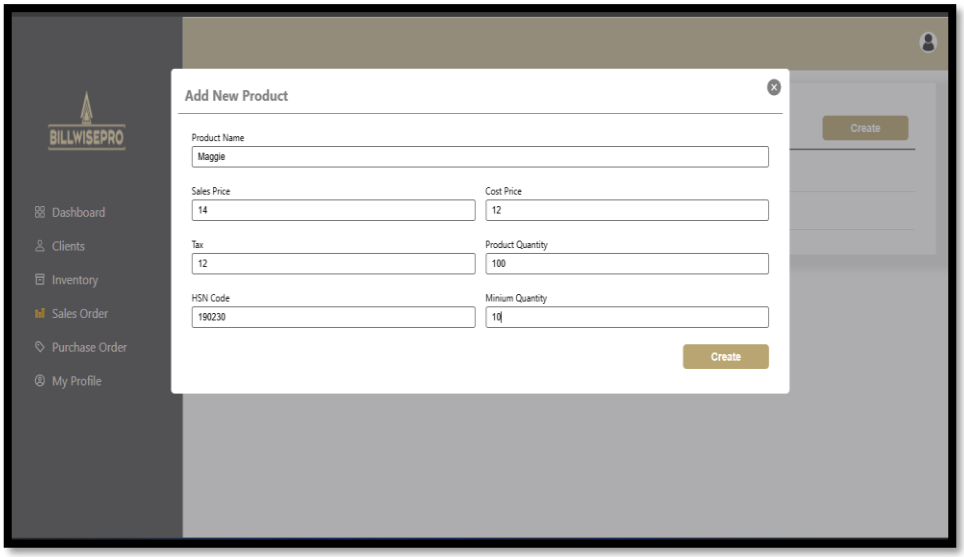

Figure. 7.12. Add New Product

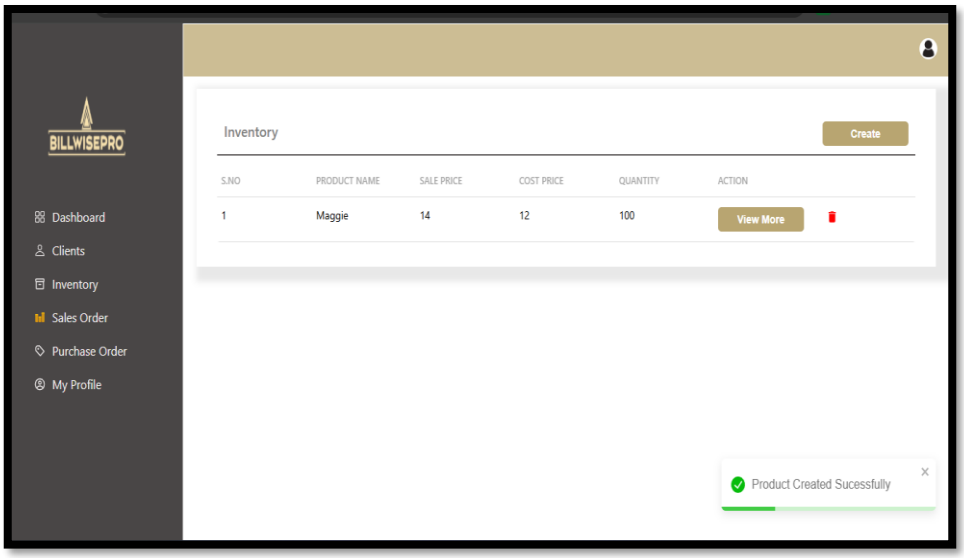

Figure. 7.13. Product Added Successfully

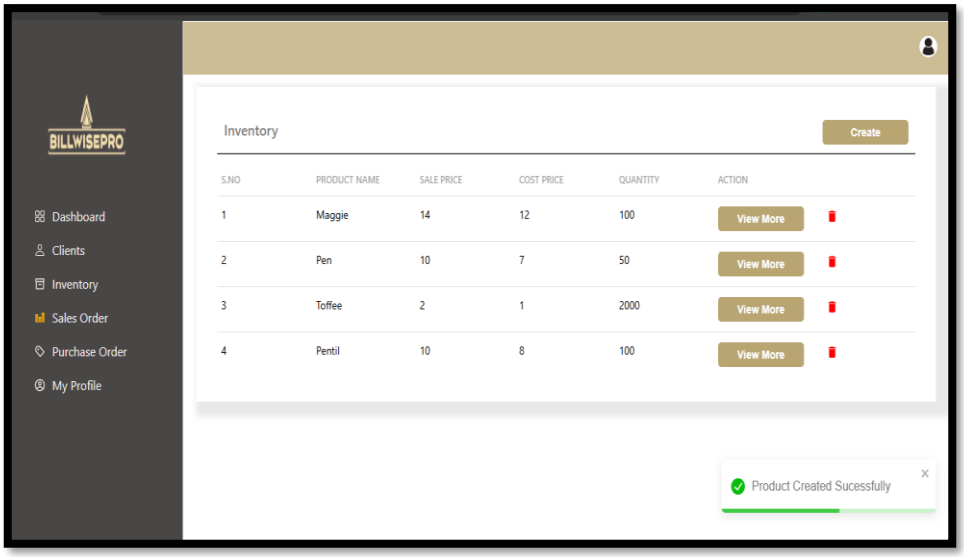

Figure. 7.14. Products Added in the Inventory

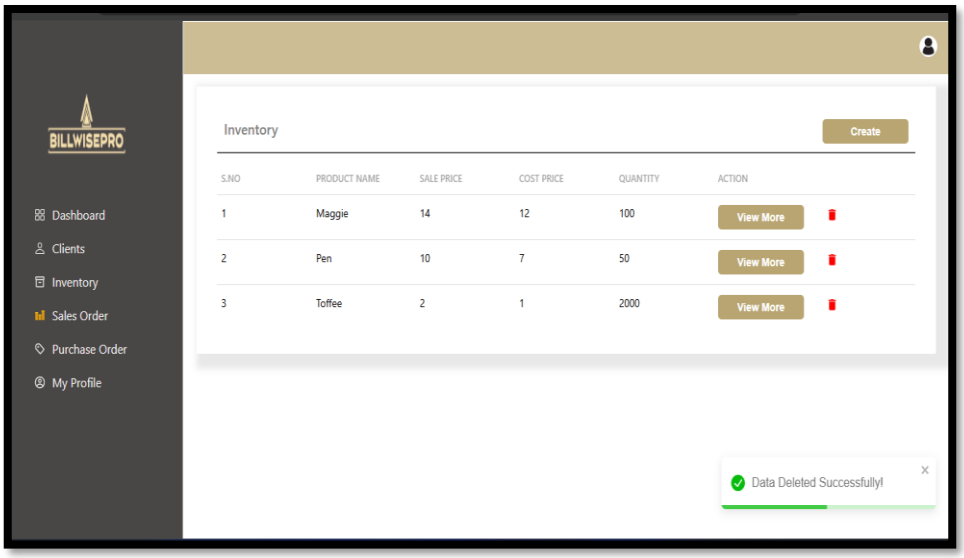

Figure. 7.15. Product Deleted Successfully

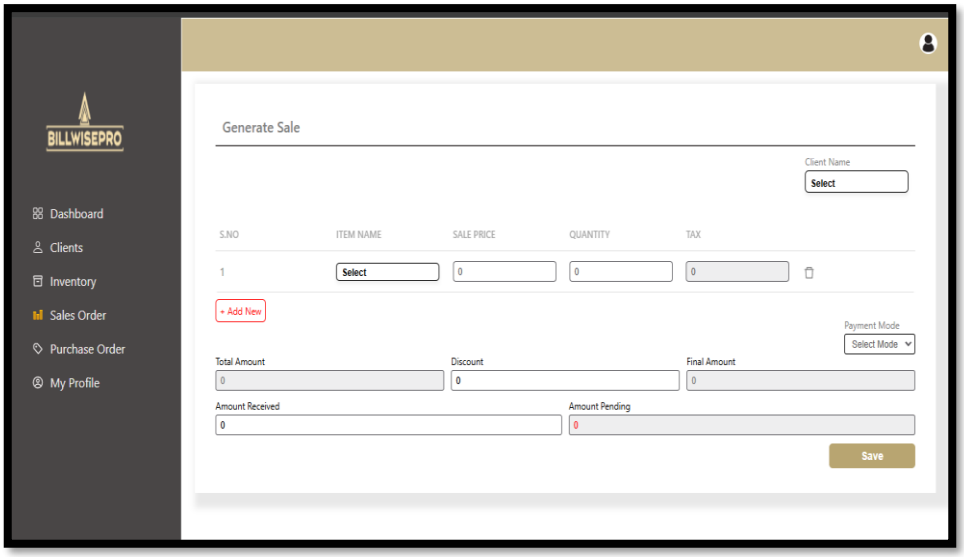

Figure. 7.16. Generate Sales Module

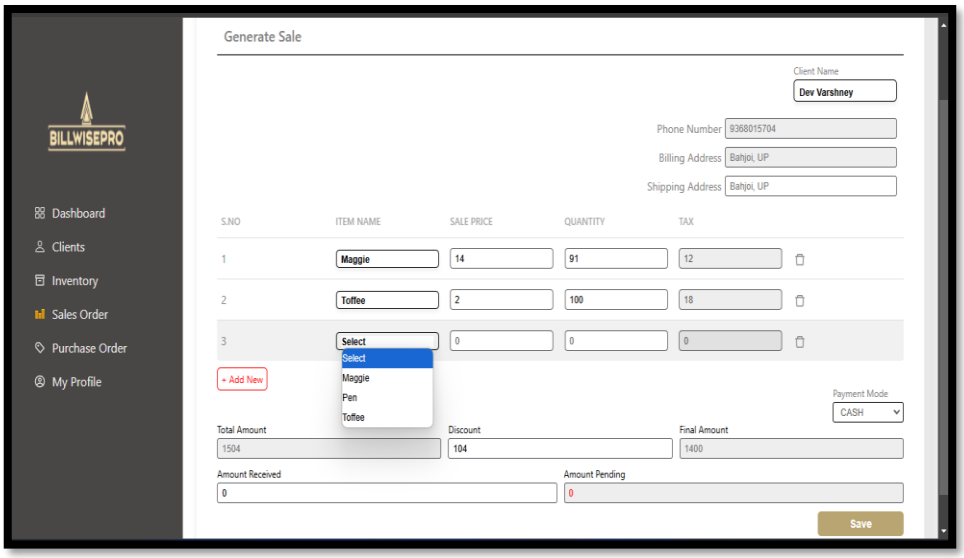

Figure. 7.17. Add Products

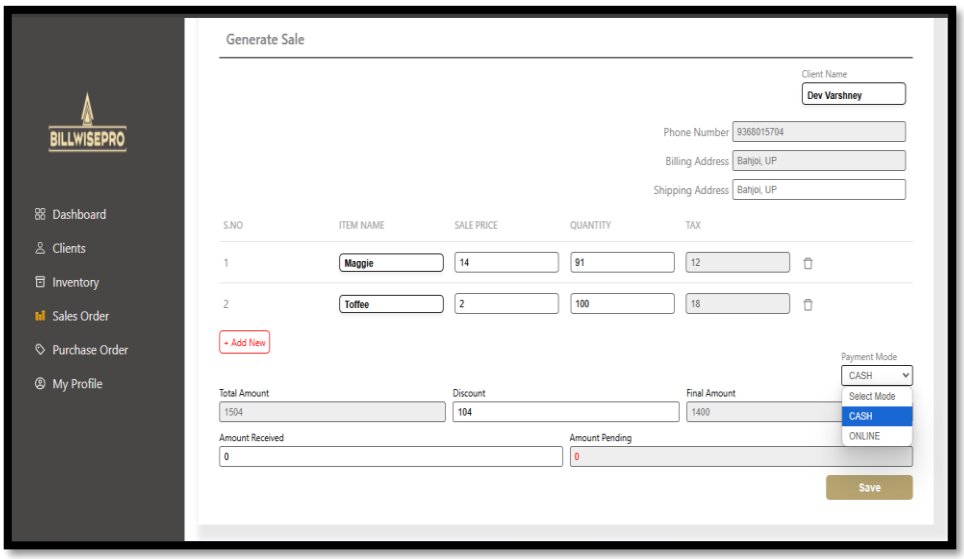

Figure. 7.18. Select Payment Mode

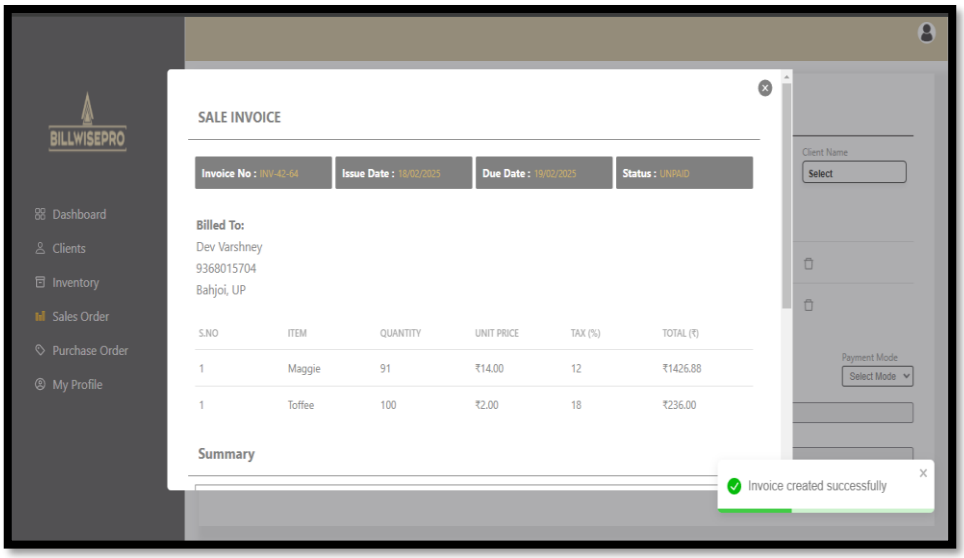

Figure. 7.19. Invoice Created Successfully

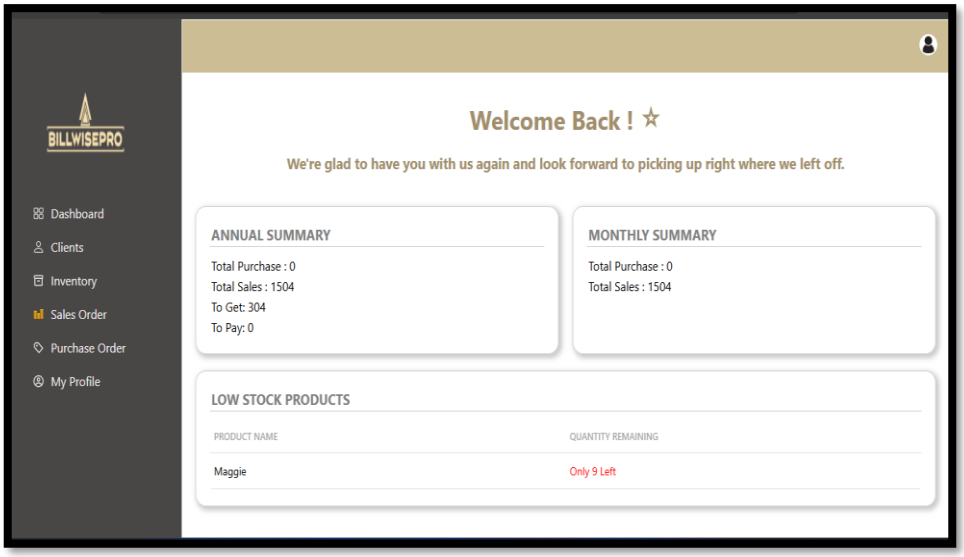

Figure. 7.20. Low Stock Alert

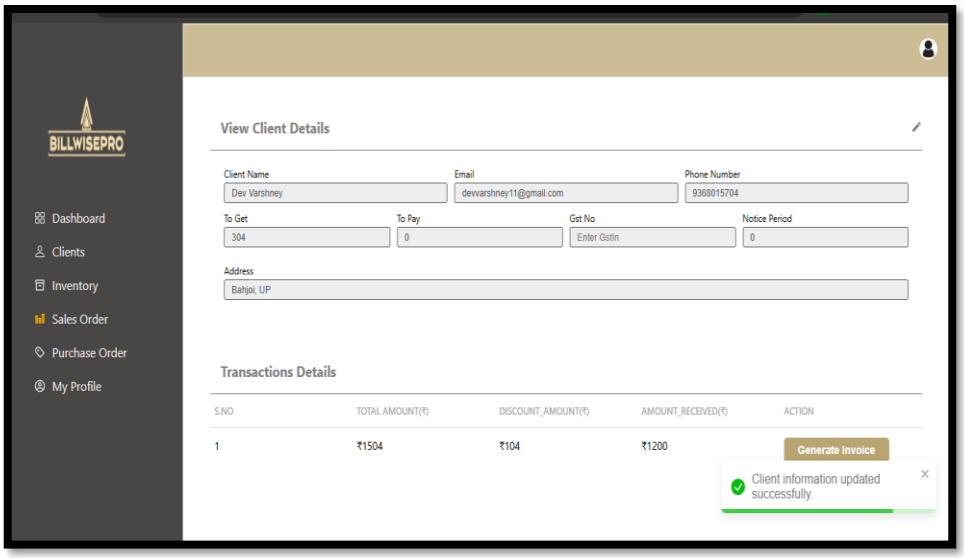

Figure. 7.21. Client Information Updated (Notice Period)

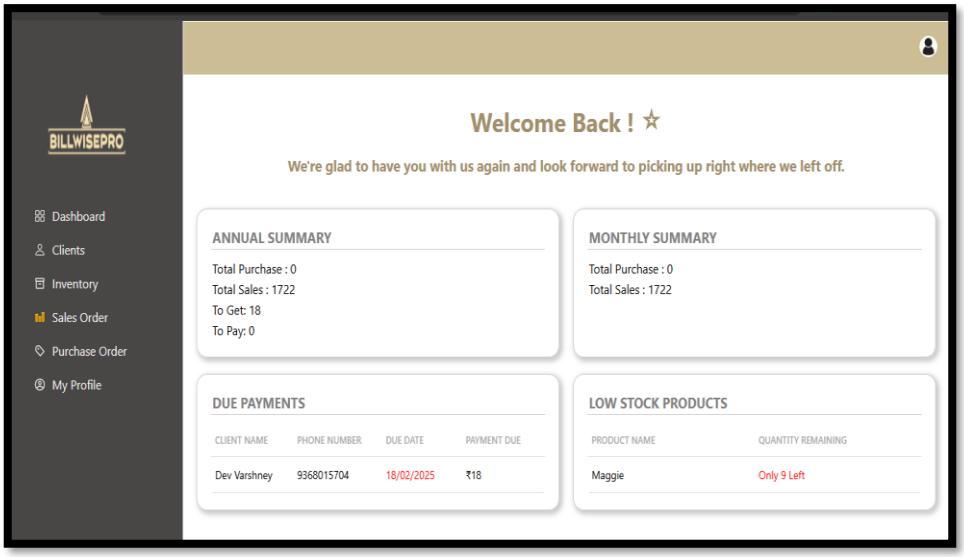

Figure. 7.22. Due Payments Alert

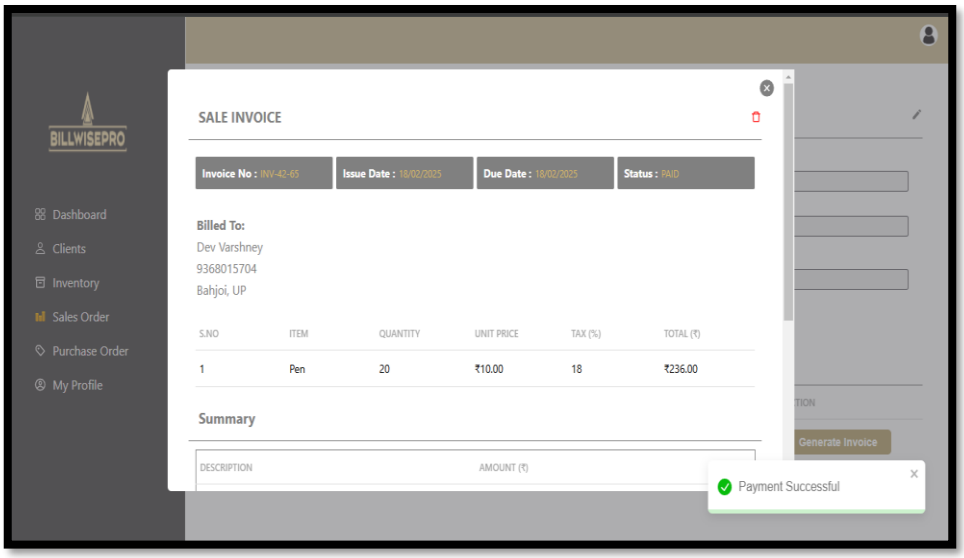

Figure. 7.23. Due Payment Successful

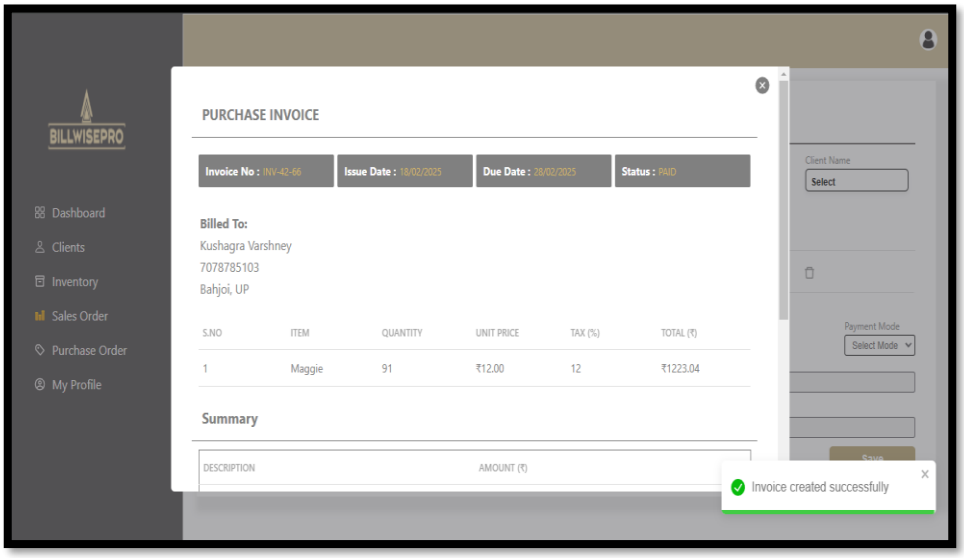

Figure. 7.24. Purchase Invoice Created Successfully

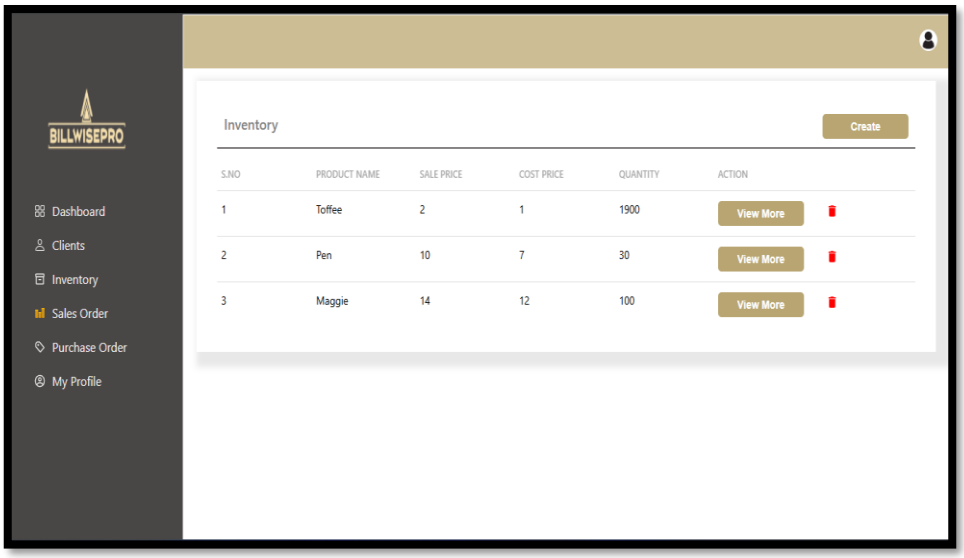

Figure. 7.25. Product Quantity Updated

Figure. 7.26. Dashboard Updated

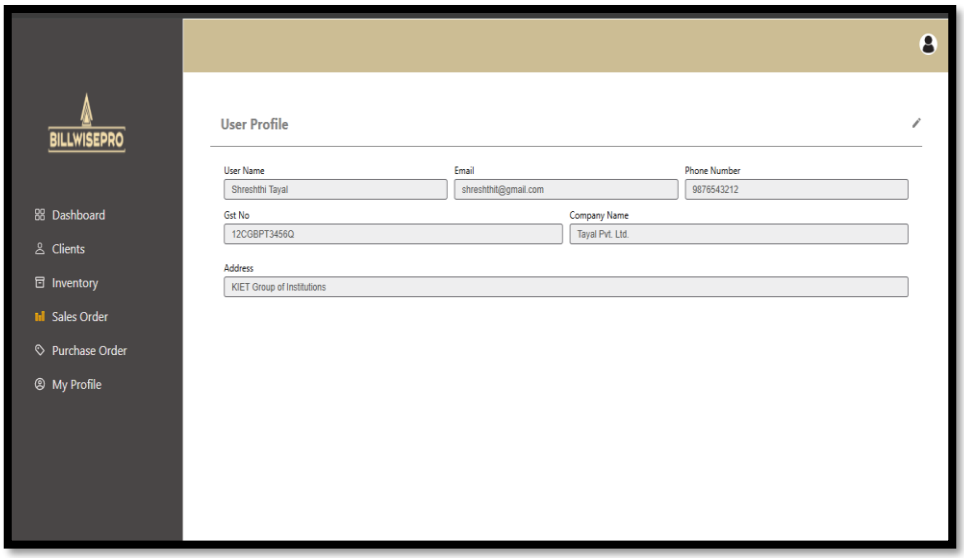

Figure. 7.27. My Profile Module

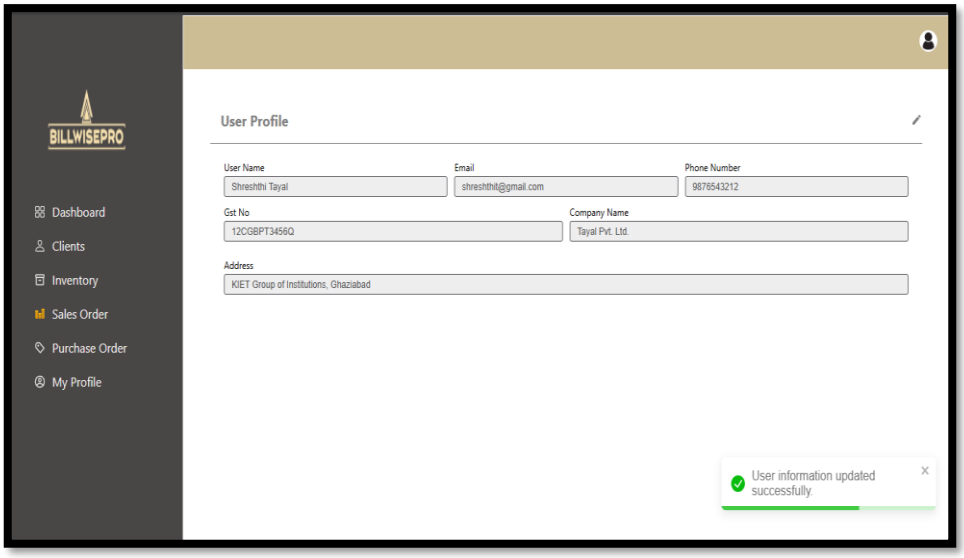

Figure. 7.28. User Information Updated Successfully

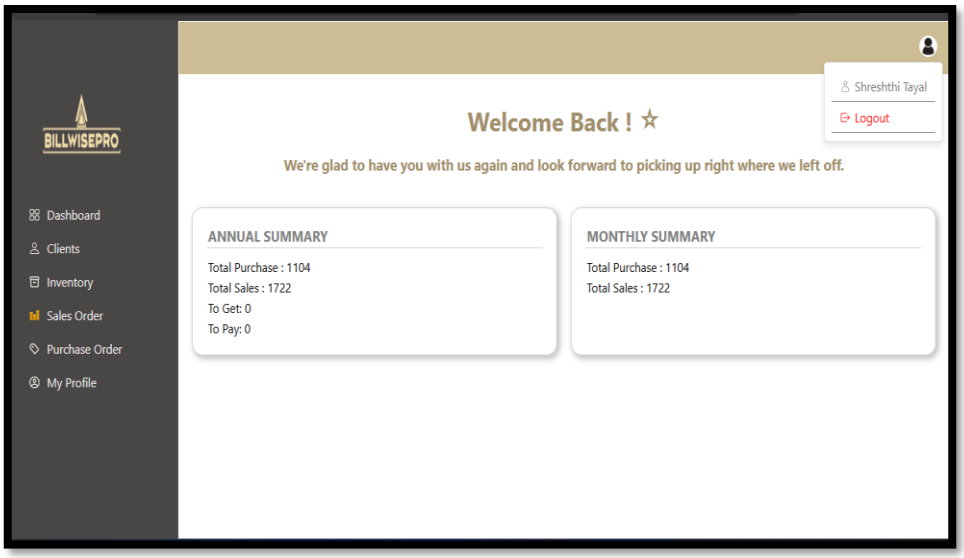

Figure. 7.29. Logout Button

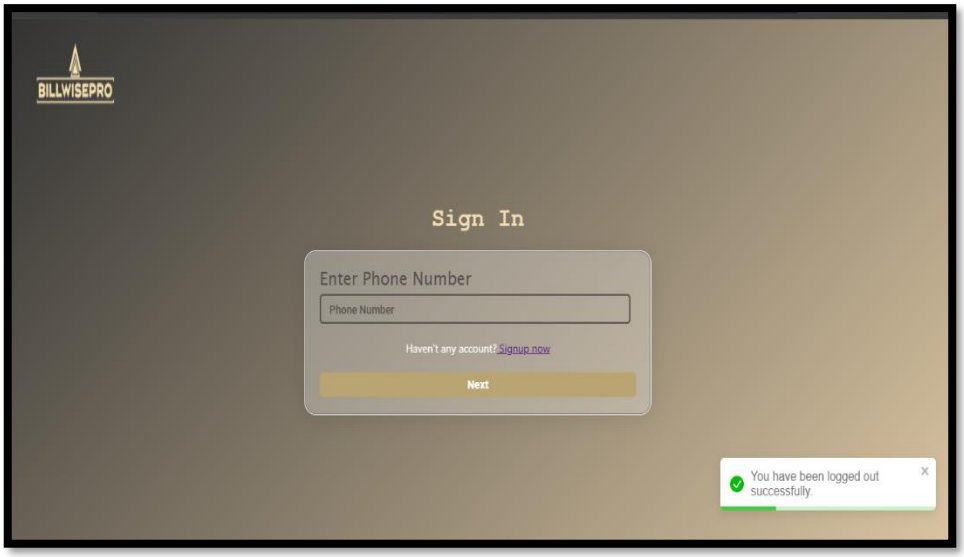

Figure. 7.30. Logout Successful

CHAPTER -8
CONCLUSION AND FUTURE SCOPE

BillWise Pro has successfully automated payment tracking, client billing, and invoice management, with accuracy and efficiency in financial transactions. The system provides a user-friendly interface, real-time financial data, and automated notifications that greatly reduce manual errors and enhance productivity. With the inclusion of secure payment gateways, tax calculations, and multi-currency support, BillWise Pro is a comprehensive solution for businesses seeking easy financial operations.

In comprehensive reports and analytics, organizations can get informative data on their cash flow, outstanding payments, and overall financial position.

Future Scope:

Although BillWise Pro has been progressing steadily in electronic bill processing, there are some areas that need more growth and development. One of the largest opportunities is in expense forecasting using artificial intelligence, where machine learning algorithms can be employed to monitor expenses and predict future cash inflows, allowing improved financial planning. Another growth area is integrating blockchain technology to provide additional security for transactions, block spam, and promote transparency in financial transactions. Additional integration with other well-known accounting packages like QuickBooks, Tally, and Zoho Books will also assist with more streamlined bookkeeping and automation. Creating a native mobile application is also essential, where users can create bills, make payments, and monitor finances on the move.

Last but not least, to prepare the ground for international expansion, BillWise Pro must integrate multi-currency and multi-language support, facilitating cross-border transactions and supporting international users. With integration of cutting-edge technologies and customer feedback, BillWise Pro is well on its way to revolutionizing bill management and emerging as a best-of-breed solution in financial automation and electronic billing.

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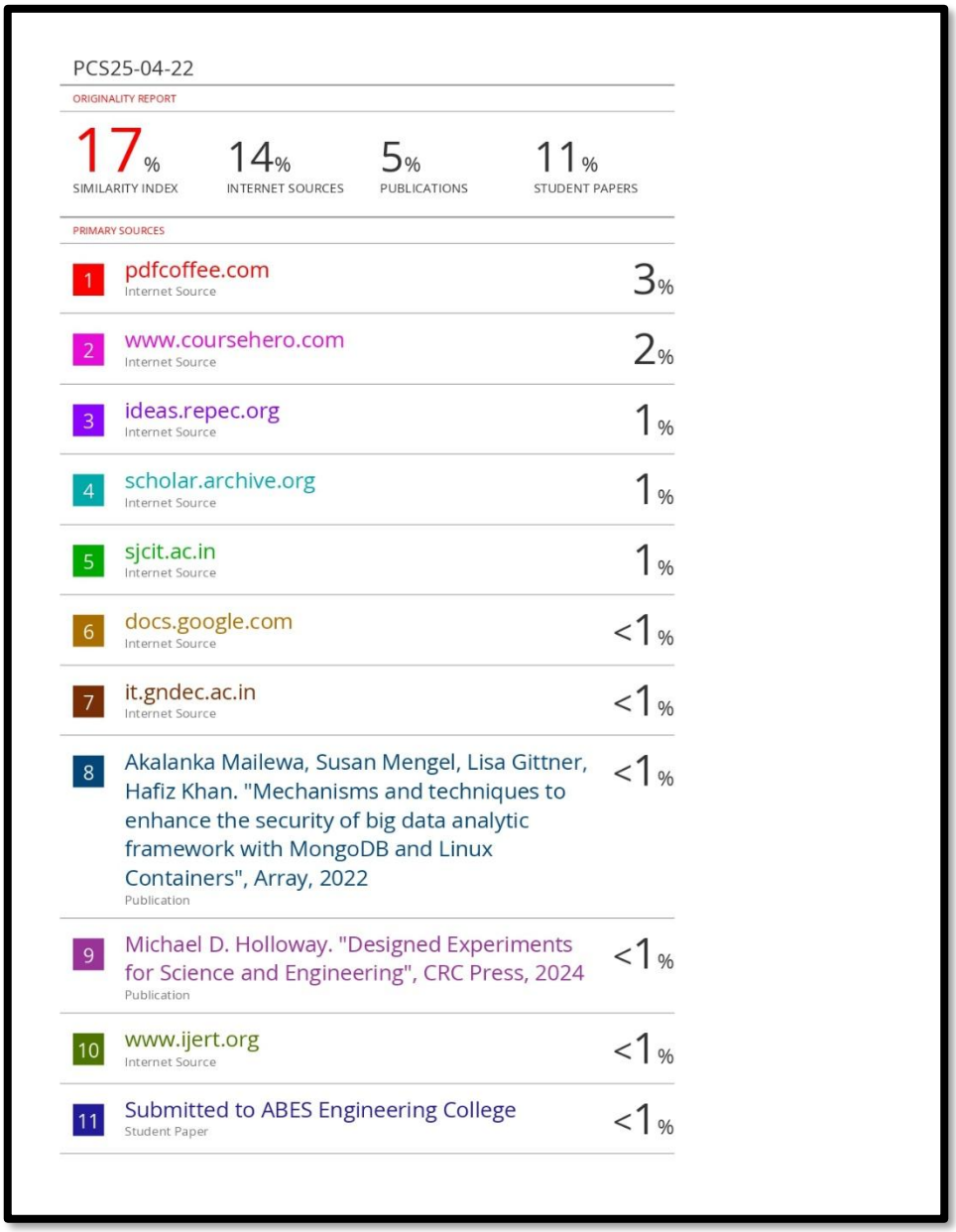

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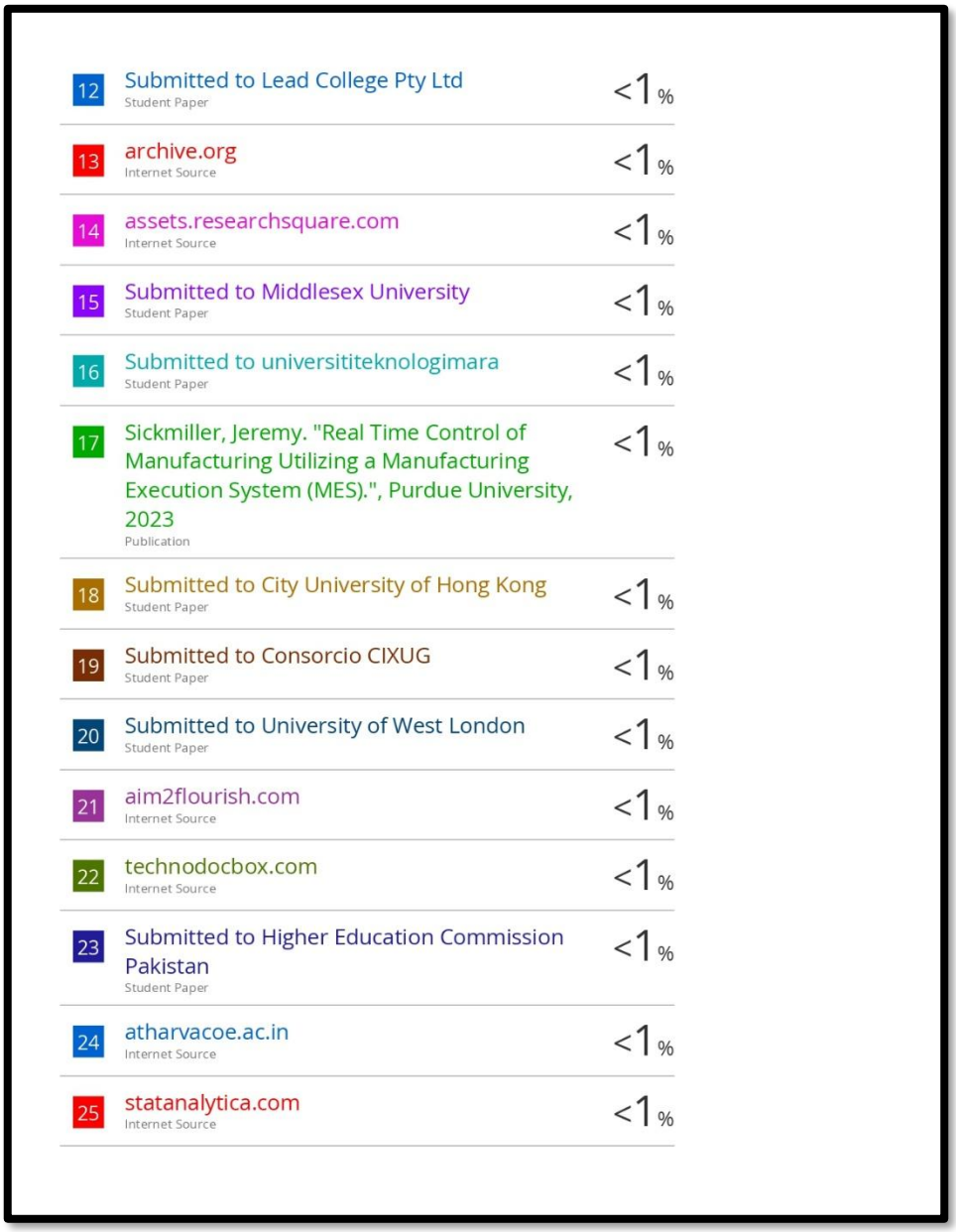

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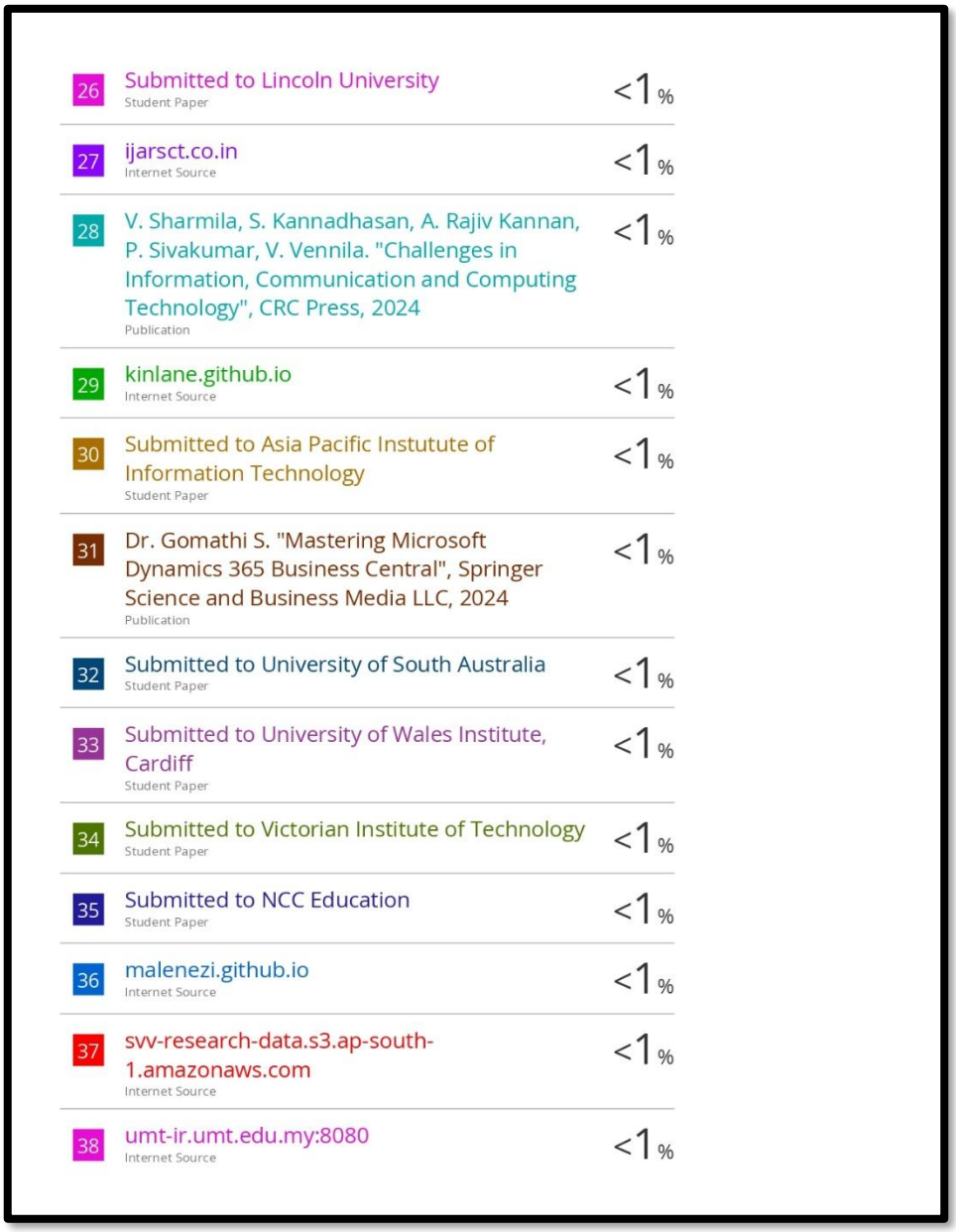
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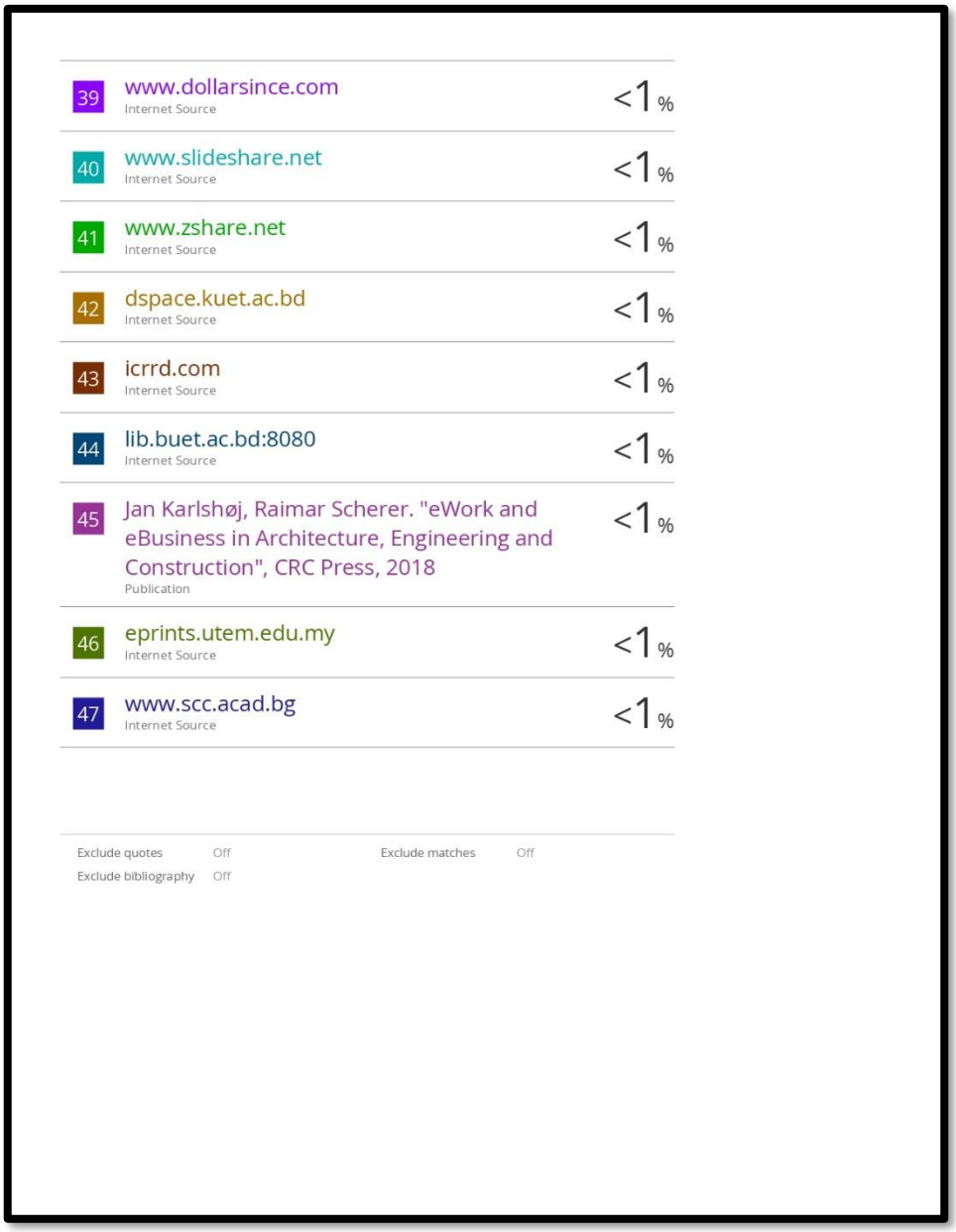

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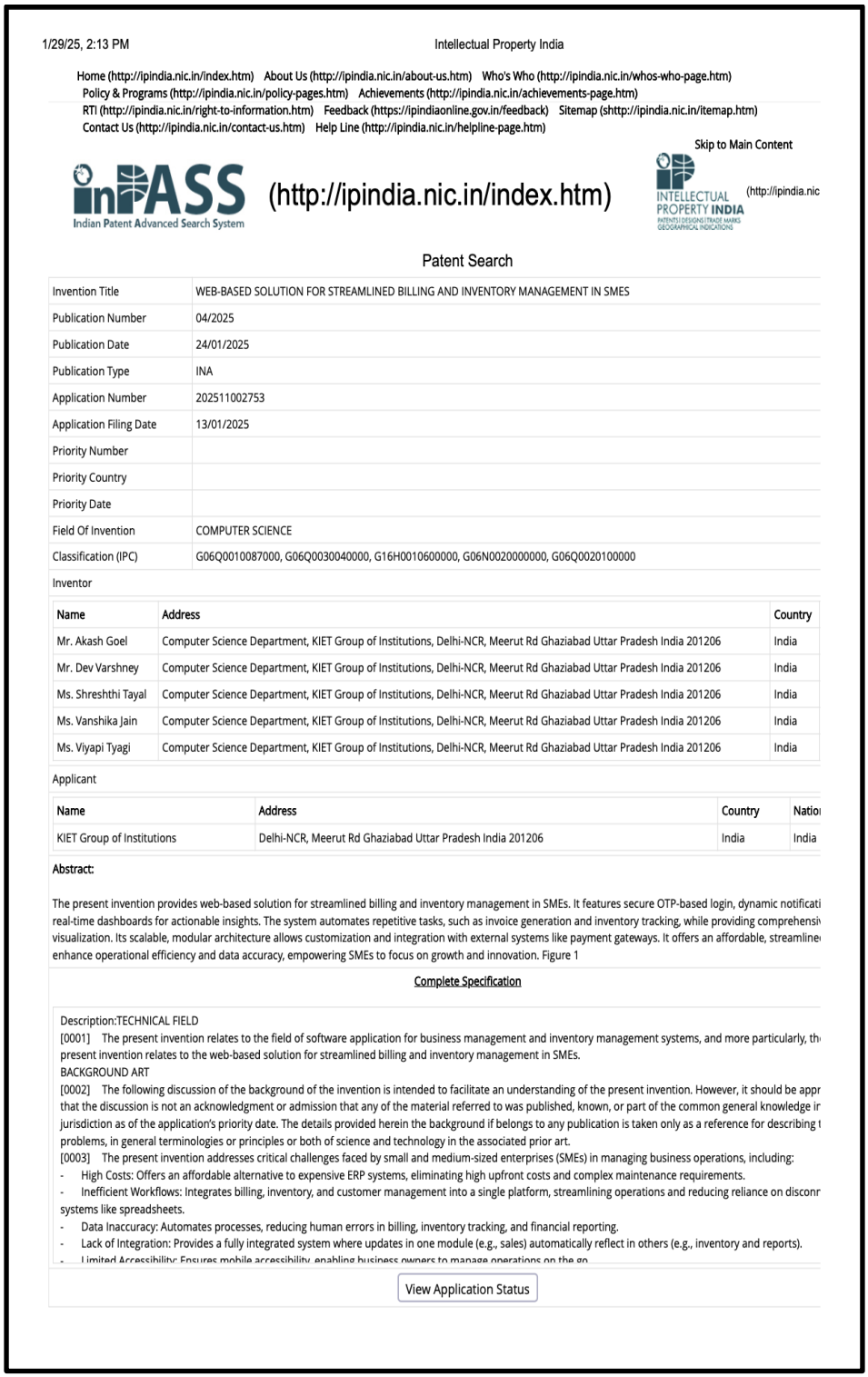

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Abstract:

The present invention provides web-based solution for streamlined billing and inventory management in SMEs. It features secure OTP-based login, dynamic notificati real-time dashboards for actionable insights. The system automates repetitive tasks, such as invoice generation and inventory tracking, while providing comprehensi visualization. Its scalable, modular architecture allows customization and integration with external systems like payment gateways. It offers an affordable, streamline enhance operational efficiency and data accuracy, empowering SMEs to focus on growth and innovation. Figure 1

Complete Specification

Description:TECHNICAL FIELD
[0001] The present invention relates to the field of software application for business management and inventory management systems, and more particularly, th present invention relates to the web-based solution for streamlined billing and inventory management in SMEs.
BACKGROUND ART
[0002] The following discussion of the background of the invention is intended to facilitate an understanding of the present invention. However, it should be appr that the discussion is not an acknowledgment or admission that any of the material referred to was published, known, or part of the common general knowledge ir jurisdiction as of the application's priority date. The details provided herein the background if belongs to any publication is taken only as a reference for describing t problems, in general terminologies or principles or both of science and technology in the associated prior art.
[0003] The present invention addresses critical challenges faced by small and medium-sized enterprises (SMEs) in managing business operations, including:
- High Costs: Offers an affordable alternative to expensive ERP systems, eliminating high upfront costs and complex maintenance requirements.
- Inefficient Workflows: Integrates billing, inventory, and customer management into a single platform, streamlining operations and reducing reliance on disconr systems like spreadsheets.
- Data Inaccuracy: Automates processes, reducing human errors in billing, inventory tracking, and financial reporting.
- Lack of Integration: Provides a fully integrated system where updates in one module (e.g., sales) automatically reflect in others (e.g., inventory and reports).
- Limited Accessibility: Ensures mobile accessibility, enabling business owners to manage operations on the go.

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