VISVESVARAYA TECHNOLOGICAL UNIVERSITY

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An On Job Training (Research/Industry Internship) Report on

"CLOUD-BASED INVENTORY MANAGEMENT SYSTEM"

Submitted in partial fulfillment of the requirements for the Eighth Semester in Research/Industry Internship

Submitted by:

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Certificate

This is to certify that the On Job Training (OJT) internship work entitled "Cloud-Based Inventory Management System" is Bonafide work carried out by **KAVITA CHAVAN (2KA21CS021),** in partial fulfillment of the requirements for the completion of eight semester in Research/Industry Internship, during the year 2024-2025. It is certified that all the corrections/suggestions indicated for internal assessment have been incorporated in the report. The OJT internship report has been approved as it satisfies the academic requirements in respect of internship work prescribed for the Bachelor of Engineering degree.

Signature of the Guide	Signature of HOD	Principal
Dr. Arunkumar Joshi	Dr. Arun Kumbi	Dr. Parashuram Baraki

Examiners: 1. ***2.***

DECLARATION

I, **KAVITA CHAVAN** bearing the USN **2KA21CS021** studying in the eighth semester of Bachelor of Engineering in Computer Science and Engineering at Smt. Kamala & Sri. Venkappa M. Agadi College of Engineering & Technology, Lakshmeshwar, hereby declare that this internship work entitled **"Cloud-Based Inventory Management System"** which is being submitted by me, in completion of eight semester Research/Industry Internship, is an authentic record of me carried out during the academic year 2024-2025, under the guidance of **Dr. Arunkumar Joshi**, Associate. Prof, Department of Computer Science & Engineering, Smt. Kamala & Sri. Venkappa M. Agadi College of Engineering & Technology, Lakshmeshwar.

I further undertake that the matter embodied in the dissertation has not been submitted previously for the award of any degree by me to any other university or institution.

Place: **Student Name**

Date: KAVITA CHAVAN

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Place: Name of the Student

KAVITA CHAVAN

ABSTRACT

Cloud Computing is revolutionizing the way organizations manage their IT infrastructure and application deployment. It offers on-demand access to computing resources, cost efficiency, scalability, and flexibility. With the rising adoption of cloud services across various sectors, it has become crucial for upcoming engineers to develop skills in cloud technologies. The On-Job-Training (OJT) provided by SS SOFTWARE SOLUTIONS was an excellent opportunity to explore the field practically. As part of my OJT, I developed a project titled "Student Management System" hosted on AWS (Amazon Web Services) Cloud. The application facilitates the storage, retrieval, update, and deletion of student records via a web interface. The backend database was created on AWS RDS (Relational Database Service) using MySQL, while the frontend was developed using Python Flask Framework. Additionally, AWS S3 was used for storing student profile images securely. The entire system was hosted on an AWS EC2 instance. This report documents the learning experience, project details, design methodologies, implementation steps, challenges encountered, results obtained, and insights gained during the course of the OJT program. It illustrates the importance of cloud platforms in real-world application development and my readiness for cloud-centric industry roles.

TABLE OF CONTENTS

Chapter 1

Company Profile

Name of the Company: SSE Protech

Headquarters: Hubballi, Karnataka, India

Website: www.sseprotech.com

Type of Organization: Private Educational and Technical Training Institute

Field of Operation: Skill Development, Engineering Education, Technical Project Development, Industrial Internships, and Mentoring

1. Overview

SSE Protech is a leading educational and technical training institution dedicated to empowering students with real-time industrial skills and practical exposure. Based in Hubballi, Karnataka, SSE Protech was founded with the core mission of bridging the widening gap between theoretical knowledge taught in academic institutions and the practical skills demanded by modern industries. The company operates as a platform that connects academic learning with industry-ready practices by offering internships, hands-on training, workshops, webinars, and project guidance for students across various educational levels.

SSE Protech has made a significant impact in engineering education by designing programs that cater to a wide range of specializations including Mechanical Engineering, Electrical and Electronics Engineering (EEE), Electronics and Communication Engineering (ECE), Civil Engineering, and Computer Science Engineering. The organization ensures that students not only learn the foundational concepts but also gain the ability to apply them in real-world scenarios through direct engagement in projects and prototype development.

1.1 Core Services Offered:

Internships and Industrial Training: Customized internship programs for engineering students that focus on live project experience, practical exposure to tools and software, and industrial processes.

IEEE and Mini Project Development: Support for students in designing, building, and documenting IEEE-standard projects and academic mini-projects.

Workshops and Webinars: Expert-led technical workshops and webinars covering emerging trends in technology, tools, and industrial practices.

Technical Mentorship: Continuous guidance from experienced professionals and industry experts to help students develop innovative solutions and boost confidence.

School-Level Programs: Introduction of technology and innovation-based learning modules for school students to spark early interest in STEM fields.

Key Objectives:

- To create a learning environment where students can develop technical, analytical, and problem-solving skills.
- To provide affordable and accessible skill development programs tailored to modern industry demands.
- To support academic institutions in enhancing student employability through practical exposure.

Chapter 2

About Company

SSE Protech is a forward-thinking educational and technical training organization headquartered in Hubballi, Karnataka. The company was established with the vision of bridging the gap between theoretical academic learning and practical industry requirements. Recognizing the need for experiential education in today's competitive world, SSE Protech offers a wide range of programs designed to enhance the technical skills and professional competencies of students, particularly those pursuing engineering and technology-related fields.

SSE Protech specializes in providing hands-on internships, industry-relevant workshops, guided mentorship programs, and skill-based webinars. These programs are carefully crafted to cater to students from diverse engineering branches including Mechanical Engineering, Electrical and Electronics Engineering (EEE), Electronics and Communication Engineering (ECE), Civil Engineering, and Computer Science. The primary objective is to give students exposure to real-world problems, tools, and technologies through practical learning experiences.

One of the company's key strengths is its focus on project-based learning. Students are encouraged to work on mini-projects, IEEE-based projects, and prototype development activities which mimic actual industry scenarios. This approach not only strengthens their technical understanding but also fosters problem-solving abilities, teamwork, and creativity.

In addition to engineering-level training, SSE Protech also engages with school students through technical programs, helping to build a strong foundation for future learning. The company collaborates with subject matter experts, academic institutions, and industry professionals to ensure that its training modules remain current, innovative, and impactful.

By providing structured guidance, industry insights, and hands-on practice, SSE Protech plays a vital role in preparing students for successful careers. Its commitment to quality education, skill development, and innovation has made it a trusted name among students seeking practical knowledge and professional growth.

Chapter 3

Tasks Performed

3.1 OJT Project

Project Title: Cloud based inventory management system

In the modern digital era, businesses are increasingly moving towards cloud-based solutions to optimize their operations, reduce costs, and improve efficiency. One such vital aspect is inventory management. A Cloud-Based Inventory Management System offers a centralized, scalable, and real-time solution for managing inventory across multiple locations and platforms. This project aims to develop a robust and user-friendly cloud inventory management system that enables businesses, especially small to medium enterprises (SMEs), to track, manage, and optimize their stock levels effectively through an internet-connected platform.

3.1.1 Introduction

Traditional inventory management systems are often manual or rely on locally installed software, which poses challenges like limited accessibility, data inconsistency, high maintenance costs, and lack of real-time updates. These limitations can lead to overstocking, stockouts, and inefficient warehouse management. In contrast, a cloud-based system provides real-time access to inventory data from any location, ensures automatic backups, integrates seamlessly with other business functions (like sales and procurement), and offers data analytics to support informed decision-making.

With the growing trend of e-commerce, omnichannel retail, and globalization, businesses require an intelligent inventory management solution that ensures transparency, speed, and accuracy across their supply chain. This system becomes even more critical in industries such as retail, manufacturing, logistics, and pharmaceuticals where timely inventory control directly impacts business outcomes.

Project Objectives

The objective of this project is to design and implement a cloud-based inventory management system that provides businesses with a seamless, real-time inventory solution. By utilizing modern cloud platforms such as Amazon Web Services (AWS), Google Firebase, or Microsoft Azure, this system enables real-time data synchronization, automated notifications, and secure access control, ensuring that inventory data is accurate, secure, and easily accessible.

The primary objectives of this Cloud-Based Inventory Management System project are:

1. Real-Time Tracking: Enable real-time tracking of stock items including purchases, sales, and returns.

2. Multi-User Accessibility: Provide access to multiple users with different roles such as admin, warehouse staff, and sales representatives.

3. Data Synchronization: Maintain synchronized inventory data across all branches and departments.

4. Alerts and Notifications: Generate alerts for low stock, overstocking, and expiry of products.

5. Reporting and Analytics: Offer dashboards and reporting tools for sales trends, stock levels, and demand forecasting.

6. User-Friendly Interface: Design a simple yet powerful interface that is easy to use for users with basic technical knowledge.

7. Security and Reliability: Ensure that data is securely stored and easily recoverable in case of system failure.

3.1.2 Literature survey

1. **Adoption of Cloud Technology in Inventory Systems:**

   Kumar et al. (2019) highlighted the growing adoption of cloud technology for inventory management systems. Their study focused on the benefits of moving from traditional on-premise solutions to cloud-based platforms, which offer better scalability, flexibility, and cost efficiency.

2. **Centralized Inventory Control:**

   A study by Patel and Desai (2018) developed a cloud-based inventory system using Google Cloud for centralized inventory control across multiple branches. This system allowed real-time synchronization of stock data, enabling better coordination and faster decision-making.

3. **Real-Time Stock Monitoring:**

   In their work, Sharma et al. (2021) demonstrated the integration of real-time tracking in cloud-based inventory systems, ensuring up-to-the-minute visibility of inventory across various locations. The study showed how this helped businesses reduce stockouts and excess stock.

   Singh and Singh (2020) implemented a real-time stock monitoring system using Amazon Web Services (AWS) to ensure continuous updates and prevent human error in inventory tracking.

4. **Use of Cloud Platforms like Firebase, AWS, and Azure:**
   Wang et al. (2019) utilized AWS S3 and RDS for data storage in their inventory management project. Their approach highlighted the advantages of cloud platforms for real-time synchronization and data security.

   Jain et al. (2020) developed a similar system using Google Firebase for its real-time database feature, providing real-time updates and data integrity in their cloud-based inventory

3.1.3 Methodology

The development of a Cloud-Based Inventory Management System follows a systematic approach involving several key stages from planning to deployment and maintenance. The methodology ensures the solution is reliable, scalable, and meets user requirements effectively. This section outlines the processes, tools, and techniques adopted during the lifecycle of the project.

1. Requirement Analysis

The first step involves identifying the needs of the stakeholders, including inventory managers, sales personnel, and administrators. This phase focuses on understanding:

- Current challenges in existing inventory systems.
- Key functionalities required such as stock tracking, reporting, alerts, and multi-user access.
- User roles and permissions.
- Scalability and integration with other systems.

2. System Design

The design phase converts the requirements into a blueprint for development. It includes both high-level system architecture and low-level component design.

- Architecture Design
- A three-tier architecture is adopted:
- Presentation Layer: Web-based user interface for interaction.
- Application Layer: Backend logic handling requests, validation, and business processes.
- Database Layer: Cloud-hosted database for storing inventory and user data.

Tools used:

- UML diagrams (Class, Sequence, Activity diagrams)
- ER diagrams for database schema

3. Technology Stack Selection

The project uses a modern and scalable technology stack:

- Frontend: HTML, CSS, JavaScript (React.js or Angular)
- Backend: Node.js / Express or Django / Flask
- Database: Firebase / MongoDB / MySQL (cloud-hosted)
- Hosting Platform: AWS / Google Cloud / Microsoft Azure
- Authentication: JWT / OAuth for secure login
- Version Control: Git and GitHu

4. Development Process

The Agile development methodology is followed, focusing on iterative and incremental development. The process is divided into sprints, each delivering a functional module.
Steps:

- Sprint planning and task allocation
- Backend API development
- Frontend integration
- Database connectivity
- Module-wise testing

5. Testing and Quality Assurance

To ensure system reliability and performance, both manual and automated testing approaches are adopted.
Testing Types:

- Unit Testing: Individual components and functions.
- Integration Testing: Interaction between modules.
- System Testing: End-to-end testing of the full system.
- Usability Testing: User experience and interface navigation.
- Security Testing: User access control and data protection.

6. Deployment and Maintenance

Once the system is tested and validated, it is deployed to a cloud hosting environment. Deployment Activities:

- Setting up CI/CD pipelines for automatic deployment
- Configuring cloud servers, domains, and databases
- Enabling SSL for secure connections

Post-deployment, the system is monitored for uptime and performance. Regular maintenance includes:

- Fixing bugs
- Updating features
- Enhancing security patches

7. Documentation and User Training

Proper documentation is provided for users and administrators. It includes:

- User Manuals
- Admin Guides
- APIDocumentation

3.1.4 Implementation

The implementation phase of the Cloud-Based Inventory Management System involves turning design specifications into a fully functional software application. This stage includes the development of various modules, integration with cloud services, deployment, and testing. The implementation process was guided by modular programming principles and best practices in cloud computing to ensure the system is scalable, secure, and user-friendly.

System Architecture:

The system follows a three-tier architecture:

1. Frontend (Client Layer):

Built using modern web technologies like HTML5, CSS3, JavaScript, and frameworks like React.js or Angular, this layer provides a responsive and interactive user interface.

2. Backend (Server Layer):

Implemented using Node.js with Express or Python Django/Flask, the backend handles business logic, processes API requests, and communicates with the database.

3. Database (Data Layer):

A cloud-hosted database such as MongoDB Atlas, Firebase Realtime Database, or MySQL on AWS RDS stores inventory data, user profiles, and transaction records.

Module-Wise Implementation

1. User Authentication and Role Management

Function: Allows user registration, login, and role-based access .

Tools Used: JWT (JSON Web Token) for session management and role verification.

Features:

- Password encryption
- Role assignment and permission control
- Session timeout and token refresh

2. Inventory Management Module

Function: Core module for adding, updating, deleting, and tracking inventory.

Features:

- Product categorization and tagging
- Quantity and unit management
- Barcode/RFID code integration for faster tracking

- Bulk import/export via CSV files

3. Order and Transaction Management

Function: Records incoming and outgoing inventory with real-time updates.

Features:

- Sales order creation
- Purchase tracking
- Returns and adjustments
- Auto stock level updates post-transaction

4. Alert and Notification System

Function: Notifies users of important inventory events.

- Implementation:
- Threshold-based low stock alerts
- Email or in-app notifications using Firebase Cloud Messaging or NodeMailer

5. Reports and Analytics Module

Function: Provides insights into stock movements, product demand, and operational efficiency.Tools Used: Chart.js or Google Charts for visualization.

Features:

- Stock movement reports
- Daily/weekly sales summary
- Demand forecasting based on historical data

6. Cloud Integration and Deployment

Cloud Platform: AWS (EC2, RDS, S3), Google Cloud Platform (App Engine, Firestore), or Heroku.

Steps Involved:

- Backend and frontend hosted on cloud servers.
- Database deployed on cloud-based DBaaS.
- SSL certificates and domain configuration for secure access.
- CI/CD pipeline setup using GitHub Actions or Jenkins.

3.1.5 Results and Discussions

The implementation of the Cloud-Based Inventory Management System yielded effective results in enhancing inventory tracking, data accessibility, and operational efficiency. Upon testing, the system demonstrated real-time synchronization of inventory data across different devices and user roles. This ensured that stock levels, product additions, and transaction records were instantly updated and reflected throughout the system, reducing delays and minimizing human errors.

One of the most significant outcomes was the successful deployment of role-based user access control, which provided differentiated privileges for administrators and staff members. Administrators could manage products, monitor inventory levels, and generate reports, while staff could update stock and process transactions. This separation of duties contributed to better accountability and system security.

The system's notification feature also proved effective. Automated alerts for low- stock items ensured timely restocking, helping to prevent stockouts and overstocking. These notifications played a critical role in maintaining optimal inventory levels without constant manual oversight. Additionally, the use of a secure cloud platform enhanced data reliability and availability, allowing users to access inventory information remotely with proper authentication.

Reports generated by the system offered valuable insights into inventory trends, product movement, and sales patterns. These analytics supported informed decision- making for procurement and warehouse management. The user interface was tested for usability and showed a smooth and intuitive experience, even for users with minimal technical knowledge.

However, during the testing phase, some limitations were observed. The system relies on a stable internet connection, and offline support was not integrated. Furthermore, scalability for larger enterprises with complex inventory needs would require optimization of cloud resources and additional modules.

3.1.6 Conclusion

The successful completion of the Cloud-Based Inventory Management System marks a significant step toward addressing the inefficiencies and limitations present in traditional inventory management practices. The project has demonstrated the potential of cloud computing as a powerful tool for transforming inventory control into a more dynamic, accessible, and intelligent process.

By utilizing cloud platforms, the system enables real-time inventory updates, allowing users to track and manage stock levels with immediate accuracy. This is particularly beneficial in multi-location businesses where centralization and instant communication are essential. The ability to remotely access the system through any internet-connected device also adds flexibility, making inventory management more responsive and mobile.

A notable strength of the system is its role-based access feature, which helps maintain data integrity by limiting permissions according to user roles. Administrators have full control, including report generation and system settings, while general staff can only interact with assigned modules, such as stock entry or sales processing. This structure not only improves security but also ensures that operational responsibilities are clearly defined.

The system's alert mechanism for low stock levels enhances inventory planning by prompting timely replenishment actions. Moreover, the integration of analytics and reporting tools provides valuable insights into inventory behavior—such as fast-moving products, seasonal demand patterns, and reorder frequency—thus enabling more informed decision-making.

Despite its strengths, the system has certain limitations that must be acknowledged. It currently requires a consistent internet connection for full functionality, which could pose challenges in environments with limited connectivity. In addition, while the system is ideal for small to medium-scale businesses, scaling it for enterprise-level operations would demand further development, including more complex database handling, third-party integrations, and advanced automation features.This project lays a solid foundation for future advancements, such as offline support, mobile app integration, barcode scanning, predictive analytics, and integration with larger ERP systems.

Chapter 4

Reflection

The development of the Cloud-Based Inventory Management System served as a valuable learning experience, offering deep insight into how cloud technology can be used to solve real-world inventory challenges. The project not only strengthened technical knowledge in cloud computing, database integration, and inventory workflows, but also emphasized the importance of designing systems that are accessible, scalable, and reliable.

Throughout the project, there was a growing awareness of the critical role that cloud infrastructure plays in modern software development. Working with features such as real-time data synchronization, user authentication, and automated alerts provided hands-on experience in building responsive and efficient applications that reflect current industry standards.

The process also highlighted the importance of structured planning, clean coding practices, and user-centered design. Testing each feature and refining it based on feedback reinforced the value of iteration and continuous improvement. Moreover, the project provided an opportunity to understand how systems are deployed, secured, and maintained over cloud platforms.

Beyond the technical aspects, this project fostered better problem-solving and time management skills. It revealed how attention to detail, logical thinking, and adaptability contribute to building successful software solutions.

Overall, the project was an essential step in connecting academic knowledge with practical application. It reinforced the significance of cloud-based systems in today's digital landscape and laid a strong foundation for future development work in similar domains.

Chapter 5

Conclusion

The on-job training experience provided an invaluable opportunity to bridge the gap between academic learning and practical application in a professional setting. Over the course of this training, I gained hands-on experience in cloud-based technologies, inventory management systems, and the software development lifecycle. This real-world exposure enhanced my understanding of how theoretical knowledge is applied in a fast-paced, problem-solving environment.

The training not only improved my technical skills but also strengthened my soft skills, such as communication, teamwork, and time management. Working closely with professionals in the field allowed me to observe best practices in action, learn effective project management techniques, and understand the importance of attention to detail in every phase of system development.

Moreover, the experience deepened my understanding of industry-standard tools and platforms, such as cloud services (e.g., AWS, Firebase), version control systems, and real- time database management, which are essential for modern software development. The process of collaboration, troubleshooting, and problem-solving helped me gain confidence in my technical abilities while also emphasizing the significance of continuous learning and adaptability in the tech industry.

The on-job training experience was a vital learning phase that not only equipped me with practical skills but also gave me a comprehensive understanding of the professional environment. It has prepared me for future career opportunities and provided a strong foundation for pursuing further technical advancements in software and cloud technologies.

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