

Industrial Internship Report on " BankingInformationSystem"

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Executive Summary

This report provides details of the Industrial Internship provided by upskill Campus and The IoT Academy in collaboration with Industrial Partner UniConverge Technologies Pvt Ltd (UCT).

This internship was focused on a project/problem statement provided by UCT. We had to finish the project including the report in 6 weeks' time.

My project :- "I'm working on a project to build short URLs in Python. It will generate short URLs, store mappings between short and long URLs, and let users download from short URLs to their URLs." the corresponding lengths." It will handle the redirect request centrally

This internship gave me a very good opportunity to get exposure to Industrial problems and design/implement solution for that. It was an overall great experience to have this internship.

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8 Future work scope **Error! Bookmark not defined.**

1 Preface

Summary of the whole 4 weeks' work.

Week 1: Introduction to Upskill Development and an overview of Uniconverge Technology

During the first week of the internship, trainees will be introduced to the concept of upskilling, and the importance of continuous learning and technical skill development will be emphasized in a rapidly developing environment. Additionally, interns will receive an overview of Uniconverge Technologies, including its core values, mission, and areas of operation. This introductory phase lays the foundation for training by providing trainees with an understanding of the company's culture and goals.

Week 2: Introductory projects and projects using a strategic plan

During the second week, trainees will explore their specific projects and projects during their training. This includes a detailed introduction to the projects, their objectives, and related technologies. Trainees will receive guidance on project design, including setting up development environments and understanding project requirements. This orientation ensures that trainees have a clear understanding of their responsibilities and are ready to start working effectively in their jobs.

3 weeks of Data Science with AI Training :

During the 3-week internship on data science with AI, participants covered a range of topics including.

Introduction to Data Science: Understanding the role of data in decision-making and the fundamentals of data analysis.

Statistical Analysis: Exploring statistical concepts such as mean, median, mode, standard deviation, and hypothesis testing for making data-driven decisions.

Machine Learning: Introduction to machine learning algorithms such as linear regression, logistic regression, decision trees, and clustering techniques like K-means.

Data Preprocessing: Techniques for cleaning and preprocessing raw data, handling missing values, and feature scaling.

Model Evaluation and Validation: Understanding different metrics for evaluating model performance and techniques for model validation like cross-validation.

Real-world Applications: Exploring case studies and practical applications of data science and AI across various industries such as healthcare, finance, and e-commerce.

Ethical Considerations: Discussions on the ethical implications of data science and AI, including privacy concerns, bias in algorithms, and responsible AI practices.

Week 4: Program work

During the final week of the internship, interns will transition into administrative work, where they will undertake individual projects independently under the guidance of mentors. This hands-on experience allows the intern to apply the skills and knowledge gained throughout the internship to real-world situations. Support and resources are available for trainees to help with problem solving and overcome any challenges they may encounter during the project. Emphasis will be placed on gaining practical experience and understanding the importance of working in the real world to prepare for future career opportunities.

All of the learning and experience I have gained during internships has been invaluable. Through structured, hands-on training and mentoring, I gained a deeper understanding of various technologies and their practical applications. The opportunity to work on real-world projects sharpened my problemsolving skills and gave me valuable business experience.

I am extremely grateful to everyone who has contributed directly and indirectly to my learning journey. Special thanks to the IoT Academy for providing informative videos that expanded my knowledge base and helped me better understand complex concepts. Additionally, I would like to thank UniConverge

Technologies for providing this internship opportunity and providing insight into their organizational culture, values and areas of expertise. Their support and guidance has been invaluable in my professional development.

Overall, this internship has been a transformative experience, and I am grateful for the knowledge, skills and relationships I gained throughout the journey and look forward to applying these lessons in future endeavors and moving on have made progress in my chosen profession. Your message to your juniors and peers.

Message to Junior:- Dear Junior,

Believe in yourself, keep learning, don't hesitate to ask for help, and enjoy the journey.

2 Introduction

2.1 About UniConverge Technologies Pvt Ltd

A company established in 2013 and working in Digital Transformation domain and providing Industrial solutions with prime focus on sustainability and RoI.

For developing its products and solutions it is leveraging various **Cutting Edge Technologies e.g. Internet of Things (IoT), Cyber Security, Cloud computing (AWS, Azure), Machine Learning, Communication Technologies (4G/5G/LoraWAN), Java Full Stack, Python, Front end** etc.



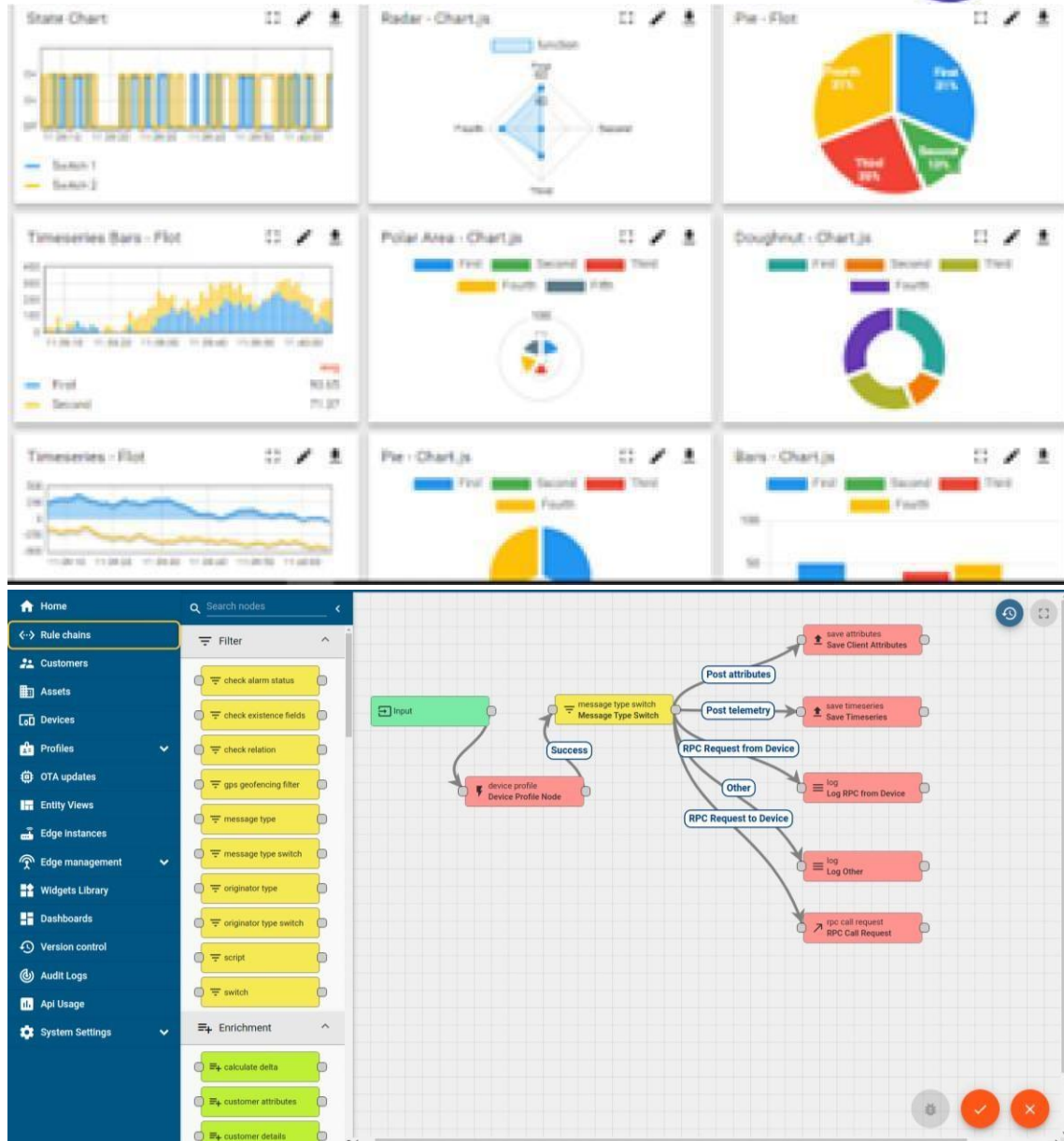
i. UCT IoT Platform { }

UCT Insight is an IOT platform designed for quick deployment of IOT applications on the same time providing valuable “insight” for your process/business. It has been built in Java for backend and ReactJS for Front end. It has support for MySQL and various NoSql Databases.

- It enables device connectivity via industry standard IoT protocols - MQTT, CoAP, HTTP, Modbus TCP, OPC UA
- It supports both cloud and on-premises deployments.

It has features to

- Build Your own dashboard
- Analytics and Reporting
- Alert and Notification
- Integration with third party application(Power BI, SAP, ERP)
- Rule Engine



FACTORY
WATCH

Smart Factory Platform ()

Factory watch is a platform for smart factory needs.

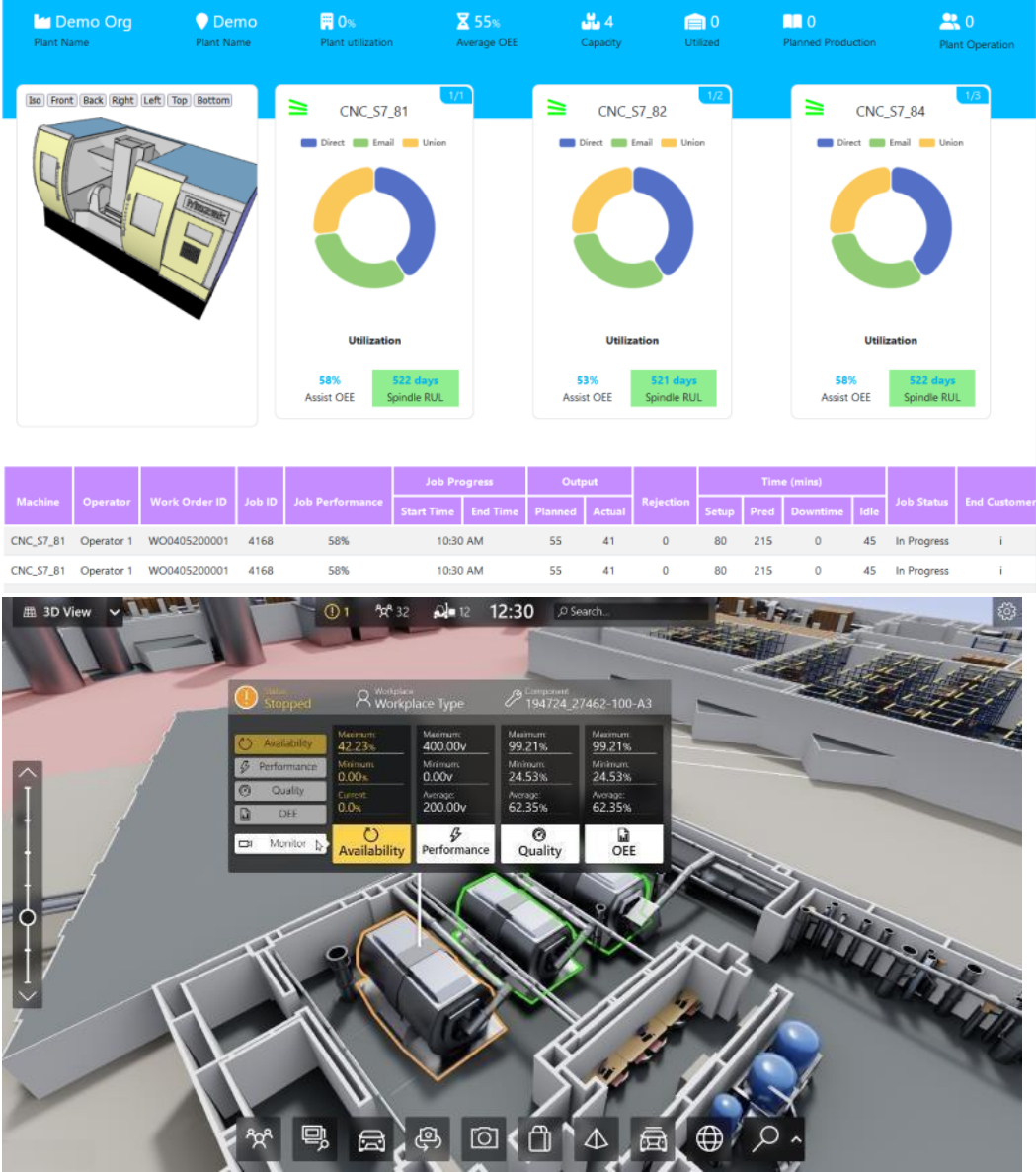
It provides Users/ Factory

- with a scalable solution for their Production and asset monitoring

- OEE and predictive maintenance solution scaling up to digital twin for your assets.

- to unleash the true potential of the data that their machines are generating and helps to identify the KPIs and also improve them.
- A modular architecture that allows users to choose the service that they want to start and then can scale to more complex solutions as per their demands.

Its unique SaaS model helps users to save time, cost and money.



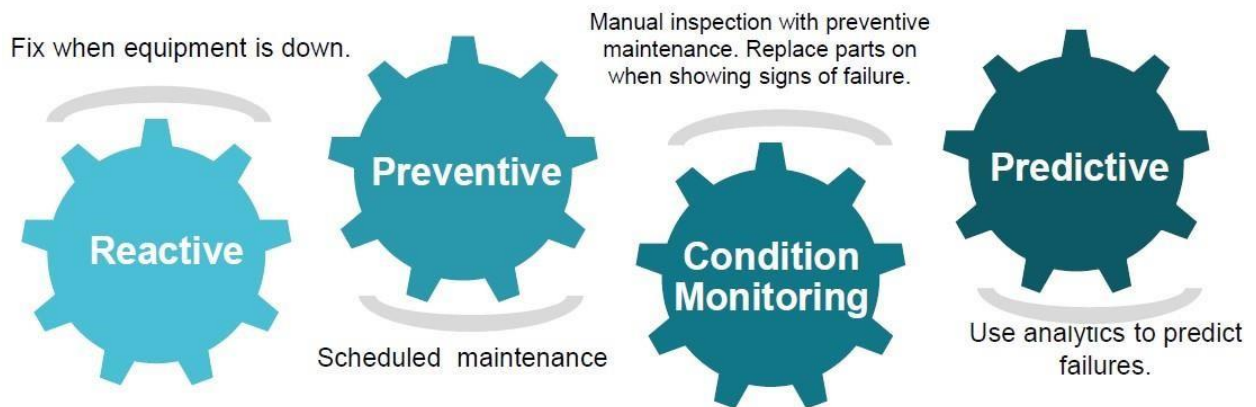


iii. LoRaWAN based Solution

UCT is one of the early adopters of LoRAWAN technology and providing solution in Agritech, Smart cities, Industrial Monitoring, Smart Street Light, Smart Water/ Gas/ Electricity metering solutions etc. **iv.**

Predictive Maintenance

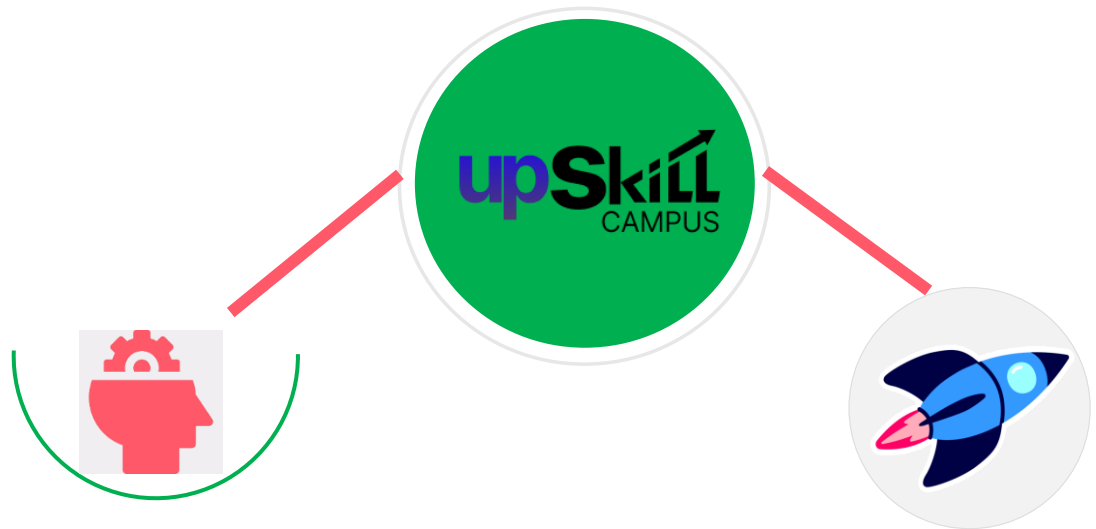
UCT is providing Industrial Machine health monitoring and Predictive maintenance solution leveraging Embedded system, Industrial IoT and Machine Learning Technologies by finding Remaining useful life time of various Machines used in production process.



2.2 About upskill Campus (USC)

upskill Campus along with The IoT Academy and in association with Uniconverge technologies has facilitated the smooth execution of the complete internship process.

USC is a career development platform that delivers **personalized executive coaching** in a more affordable, scalable and measurable w

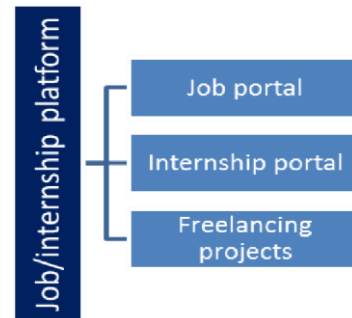


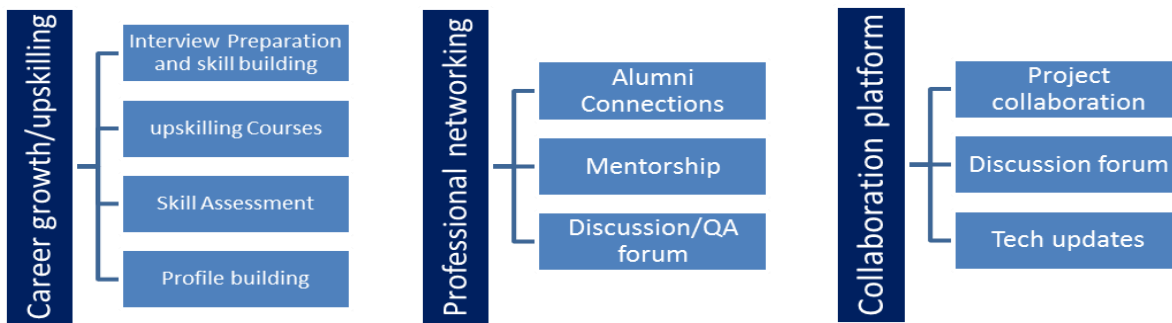
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Seeing need of upskilling in self upSkill Campus aiming paced manner along-with to upskill 1 million additional support services e.g. learners in next 5 year Internship, projects, interaction with Industry experts, Career growth Services

<https://www.upskillcampus.com/>





2.3 The IoT Academy

The IoT academy is EdTech Division of UCT that is running long executive certification programs in collaboration with EICT Academy, IITK, IITR and IITG in multiple domains.

2.4 Objectives of this Internship program

The objective for this internship program was to get practical experience of working in the industry.

- to solve real world problems.
- to have improved job prospects.
- to have Improved understanding of our field and its applications.
- to have Personal growth like better communication and problem solving.

2.5 Reference

- [1] The IoT Academy

[2] Offline Data Science with AI Documentation

[3] Community Forum

2.6 Glossary

Terms	Acronym
URL	Uniform Resource Locator
MVT	Model View Template
HTTPS	Hyper Text Transfer Text Protocol Security

3 Problem Statement

"Design and develop an online banking information system that provides secure and efficient access to banking services for customers while enabling seamless management of financial transactions for the banking institution. The system should address the following key objectives:

User Authentication and Security: Implement robust authentication mechanisms to ensure that only authorized users can access their accounts and perform transactions. This includes secure login procedures, multi-factor authentication options, and encryption techniques to protect sensitive user information.

Account Management: Enable customers to create, view, update, and close their accounts online. Provide features for account holders to manage their personal information, set up account preferences, and view account balances and transaction histories in real-time.

Fund Transfer and Payments: Facilitate secure transfer of funds between accounts within the same bank as well as to external accounts. Support various types of transactions such as bill payments, wire transfers, and peer-to-peer payments, while adhering to banking regulations and security standards.

Transaction Monitoring and Alerts: Implement monitoring functionalities to track and analyze customer transactions for suspicious activities or fraud detection. Set up automated alerts and notifications for users to receive updates on account activities, balance thresholds, and transaction statuses.

Customer Support and Feedback: Offer responsive customer support channels such as live chat, email, and phone assistance to address customer inquiries, troubleshoot issues, and provide assistance with banking services. Incorporate feedback mechanisms to gather user input and continuously improve the system's usability and functionality.

Scalability and Reliability: Design the system architecture to accommodate a large volume of users and transactions, ensuring high availability and reliability. Implement measures for data backup, disaster recovery, and system performance optimization to minimize downtime and maintain service continuity.

Regulatory Compliance: Ensure compliance with regulatory requirements and industry standards governing online banking operations, including data protection laws, anti-money laundering (AML) regulations, and Know Your Customer (KYC) procedures.

User Experience and Accessibility: Prioritize user-friendly interface design and intuitive navigation to enhance the overall user experience. Ensure accessibility features for users with disabilities to ensure inclusivity and compliance with accessibility standards.

The successful implementation of this online banking information system will empower customers with convenient and secure access to banking services while enabling the banking institution to streamline its operations, enhance customer satisfaction, and maintain regulatory compliance in the digital banking landscape”.

4 Existing and Proposed solution

The existing proposed solution for an online banking information system project typically includes the following components:

User Authentication: Secure login system for customers and administrators, utilizing methods like username/password authentication or two-factor authentication for enhanced security.

Account Management: Functionality for users to view account balances, transaction history, transfer funds between accounts, and manage beneficiaries.

Bill Payment: Capability for users to pay bills online, schedule recurring payments, and receive notifications for upcoming payments.

Fund Transfer: Options for users to transfer funds between their own accounts or to other accounts within the same bank or to external accounts.

Mobile Banking Integration: Compatibility with mobile devices, providing a seamless experience for users accessing the system via smartphones or tablets.

Security Measures: Implementation of encryption techniques, firewalls, and security protocols to safeguard sensitive user information and prevent unauthorized access.

Customer Support: Access to customer support services such as live chat, email support, or a helpdesk system for resolving queries and issues.

Transaction Alerts: Automatic alerts via email or SMS for significant account activities, such as large transactions, balance updates, or suspicious login attempts.

Personalization: Customizable features for users to set preferences, personalize their dashboard, and receive tailored recommendations based on their banking behavior.

Compliance and Regulation: Adherence to regulatory requirements such as Know Your Customer (KYC) and AntiMoney Laundering (AML) regulations to ensure legal compliance and mitigate financial risks.

Scalability and Reliability: Architecture designed for scalability to accommodate increasing user loads and ensure system reliability through redundancy and failover mechanisms.

Analytics and Reporting: Tools for generating reports and analytics on user transactions, account activities, and system performance for both customers and administrators.

Integration with Third-party Services: Integration with external services such as credit scoring agencies, payment gateways, or financial management tools to extend the functionality of the banking system.

Continuous Improvement: Processes for gathering user feedback, analyzing usage patterns, and iteratively improving the system based on user needs and technological advancements.

4.1 Code submission (Github link):- <https://github.com/Abhialle/upskillcampus>

4.2 Report submission (Github link) : [upskillcampus/Url-Shortener Shon USC UCT.pdf at main · hackersnake/upskillcampus \(github.com\)](#)

5 Proposed Design/ Model

The proposed model for an online banking information system project could include the following components:

User Authentication: Implementing secure login mechanisms such as username/password authentication, multifactor authentication (MFA), or biometric authentication to ensure the security of user accounts.

Account Management: Allowing users to create, manage, and update their bank accounts, including viewing account balances, transaction history, and making transfers between accounts.

Transaction Processing: Facilitating various types of transactions such as deposits, withdrawals, fund transfers between accounts, bill payments, and setting up recurring payments.

Security Measures: Implementing robust security measures to protect sensitive user information and financial transactions, including encryption techniques, firewalls, and intrusion detection systems.

Notifications: Providing real-time notifications to users for account activities such as deposits, withdrawals, and transactions to enhance security and keep users informed.

Customer Support: Offering customer support features such as live chat, FAQs, and ticketing systems to assist users with inquiries, issues, or account-related tasks.

Data Analytics: Incorporating data analytics capabilities to analyze user behavior, identify patterns, and offer personalized recommendations or insights to users for better financial management.

Mobile Accessibility: Developing a mobile-friendly interface or dedicated mobile application to allow users to access banking services on smartphones or tablets seamlessly.

Compliance and Regulations: Ensuring compliance with relevant banking regulations and standards such as GDPR, PCI DSS, and banking industry regulations to protect user privacy and maintain trust.

Continuous Improvement: Implementing feedback mechanisms to gather user feedback and suggestions for improving the online banking system, as well as regular updates and maintenance to enhance performance and security.

Overall, the proposed model aims to provide a secure, convenient, and user-friendly online banking experience while adhering to industry standards and regulations.

6 Performance Test

This is very important part and defines why this work is meant of Real industries, instead of being just academic project.

For a performance test on an online banking information system project, several key aspects need to be considered:

Load Testing: Simulate expected usage levels to ensure the system can handle the anticipated number of users, transactions, and data volume without performance degradation.

Stress Testing: Assess the system's stability and responsiveness under extreme conditions, such as peak loads or unexpected spikes in user activity.

Scalability Testing: Evaluate the system's ability to handle increased load by adding resources (e.g., servers, databases) and measure its performance as the load increases.

Concurrency Testing: Determine how well the system handles multiple simultaneous users accessing and updating data concurrently without conflicts or performance bottlenecks.

Response Time Testing: Measure the time taken for the system to respond to user requests, such as logging in, transferring funds, or retrieving account information, ensuring it meets acceptable performance benchmarks.

Resource Utilization Testing: Monitor CPU, memory, disk I/O, and network usage during different usage scenarios to identify resource-intensive components or potential bottlenecks.

Endurance Testing: Verify the system's stability and performance over an extended period, ensuring it can handle continuous operation without memory leaks, performance degradation, or system crashes.

Security Testing: Assess the system's ability to handle security threats such as SQL injection, cross-site scripting (XSS), and unauthorized access attempts without compromising performance.

Failover and Disaster Recovery Testing: Evaluate the system's ability to failover to backup servers or data centers in case of hardware failures or disasters, ensuring minimal downtime and maintaining performance levels.

Reporting and Analysis: Analyze test results to identify performance issues, bottlenecks, and areas for optimization, and provide recommendations for improving the system's performance and scalability.

By conducting thorough performance testing across these areas, the online banking information system project can ensure optimal performance, reliability, and scalability to meet the needs of its users while maintaining security and compliance requirements.

6.1 Test Plan/ Test Cases

- The test cases were designed to cover various aspects of the application, including banking system processing, redirection, database processing, input validation, error handling, and performance under load - To divide the test cases into unit tests, integration tests, system tests, and performance tests.

6.2 Test Procedure

For testing procedures on an online banking information system project, the following steps are typically involved:

Requirement Analysis: Understand the functional and non-functional requirements of the online banking system to guide testing efforts.

Test Planning: Develop a test plan outlining the testing approach, objectives, scope, resources, and timelines.

Test Case Design: Create test cases covering various scenarios such as user authentication, funds transfer, bill payments, account management, and security features.

Test Environment Setup: Prepare the testing environment that closely resembles the production environment, including hardware, software, and network configurations.

Unit Testing: Developers perform unit tests to ensure individual components of the system work as expected.

Integration Testing: Verify the integration of different modules within the online banking system to ensure they communicate and function correctly together.

System Testing: Conduct comprehensive testing of the entire system to validate its functionality, usability, security, and performance.

User Acceptance Testing (UAT): Allow actual users or stakeholders to test the system to ensure it meets their requirements and expectations.

Regression Testing: After making changes or updates to the system, retest the existing functionalities to ensure that no new defects were introduced.

Security Testing: Evaluate the system's security measures to identify vulnerabilities and ensure compliance with security standards and regulations.

Performance Testing: Assess the system's performance under various load conditions to ensure it can handle multiple concurrent users without degradation.

Compatibility Testing: Verify the compatibility of the online banking system with different web browsers, operating systems, and devices.

Accessibility Testing: Ensure the online banking system is accessible to users with disabilities according to accessibility standards.

Documentation: Document test results, including any defects found, and provide recommendations for improvement.

User Training: Provide training to users and support staff on how to use the online banking system effectively and securely.

Post-Implementation Review: Conduct a review after deployment to evaluate the effectiveness of the testing process and identify areas for improvement in future projects.

6.3 Performance Outcome

- Performance tests gave good results, indicating that the application can handle a significant number of concurrent users and maintain an acceptable response time.
- Further improve application performance through optimizations such as caching, database indexing, and improved query design.
- Used monitoring tools to monitor key performance metrics and identify areas for further improvement.

7 My learnings

1. Technical Skills Development: Through this internship, I have gained practical experience in Data Science with AI, Machine Learning, intro to AI, and intro to Deep Learning. This greatly improved your technical skills, especially in Data Science with AI.
2. Problem Solving and Design: You learned how to solve complex problems by focusing on scalable solutions to effective problems. This includes considerations of uniqueness, security, performance, and user experience.
3. Project Management: Managing a project within a defined timeline (4 weeks) has taught you project management skills, including work prioritization, resource allocation and deadlines will be used in addition.
4. Collaboration and Communication: Working with industry partners like UniConverge Technologies Pvt Ltd and educational institutions like upskill Campus and The IoT Academy, I learned the importance of effective communication, teamwork and collaboration work to achieve project objectives.
5. Testing and Best Practices: Experienced in conducting test designs, test cases, and performance tests to ensure the functionality, reliability, and performance of a Banking Information System application. Includes testing for memory efficiency, accuracy, stability, power consumption and security.
6. Continuous learning: Participants emphasized the importance of continuing education, staying abreast of industry developments, and making use of resources such as flyers, community forums and online forums to emphasize knowledge.

7. Real-world applications: Applying theoretical knowledge to real-world projects gained practical insights into technical problems, technical solutions and business applications, contributing to your overall business performance.

Together, these courses contribute to your development as a competent and experienced professional in software development and IT solutions.

8 Future Scope

The future scope for an online banking information system project includes:

Enhanced Security Measures: Implementing advanced security protocols such as biometric authentication, blockchain technology, and AI-driven fraud detection to ensure the safety of customer data and transactions.

Personalized Customer Experience: Utilizing data analytics and machine learning algorithms to provide personalized recommendations, targeted marketing offers, and customized financial advice based on customer preferences and behavior.

Integration with Emerging Technologies: Integrating with emerging technologies such as Internet of Things (IoT) for smart banking solutions, voice recognition for customer service interactions, and virtual reality for immersive banking experiences.

Expansion of Services: Offering a wider range of financial services beyond traditional banking, including investment management, insurance services, and peer-to-peer lending platforms.

Mobile and Omni-channel Banking: Enhancing mobile banking capabilities and providing seamless integration across multiple channels such as web, mobile apps, social media, and chatbots to improve accessibility and convenience for customers.

API Banking and Open Banking Initiatives: Embracing open banking initiatives and developing APIs (Application Programming Interfaces) to facilitate collaboration with third-party developers and fintech companies, enabling innovative financial products and services.

Data Analytics for Business Insights: Leveraging big data analytics to gain insights into customer behavior, market trends, and operational efficiency, enabling data-driven decision-making and strategic planning.

Regulatory Compliance: Ensuring compliance with evolving regulatory requirements such as PSD2 (Revised Payment Service Directive), GDPR (General Data Protection Regulation), and other regional regulations to maintain trust and transparency in banking operations.

Continuous Improvement and Innovation: Adopting an agile approach to software development and embracing a culture of continuous improvement and innovation to stay ahead of the competition and meet evolving customer expectations.

Global Expansion and Digital Transformation: Expanding the reach of online banking services to new markets and demographics, embracing digital transformation initiatives to streamline processes, reduce costs, and enhance competitiveness in the digital age.