Industrial Internship Report on

” BankingInformationSystem”

Prepared by

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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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1 Preface

Summary of the whole 6 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 (Insight)

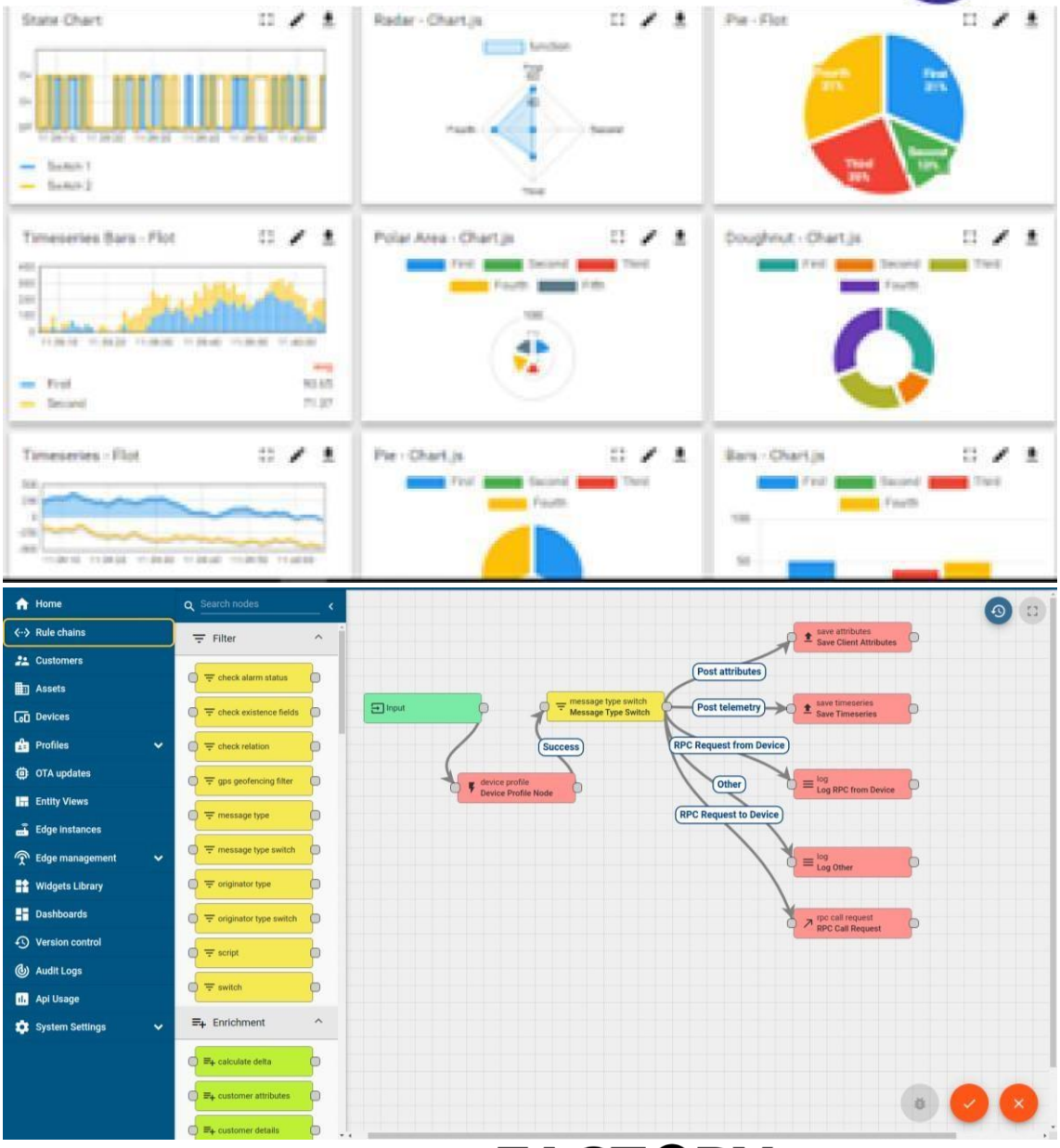
UCT Insight is an IOT platform designed for quick deployment of IOT applications on the same time providing valuable "insight" for your process/business. It has been built in Java for backend and ReactJS for Front end. It has support for MySQL and various NoSql Databases.

- 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

ii.



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 unleased 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 what 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.

Machine	Operator	Work Order ID	Job ID	Job Performance	Job Progress		Output		Rejection	Time (mins)				Job Status	End Customer
					Start Time	End Time	Planned	Actual		Setup	Pred	Downtime	Idle		
CNC_S7_81	Operator 1	WO0405200001	4168	58%	10:30 AM		55	41	0	80	215	0	45	In Progress	i
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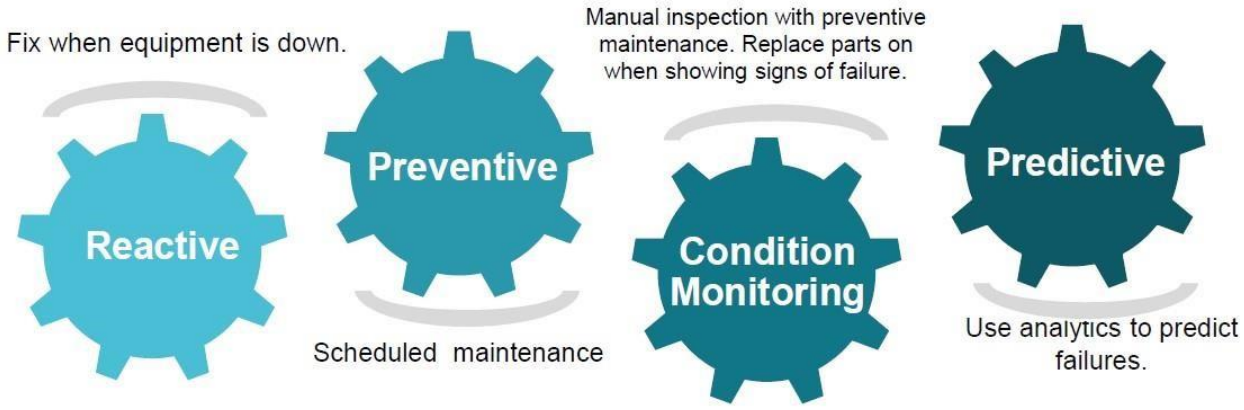
iii. LoRaWAN based Solution

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

Predictive Maintenance

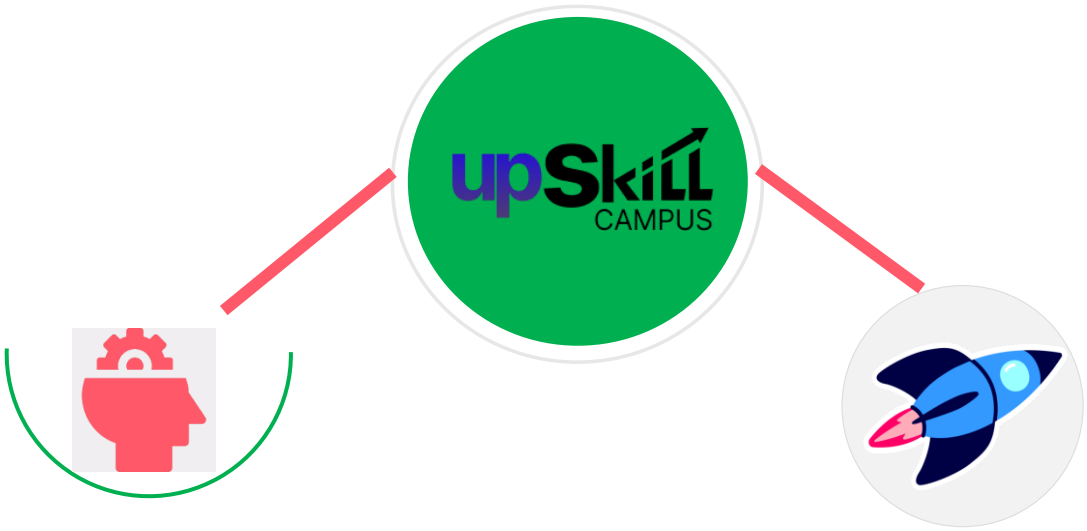
UCT is providing Industrial Machine health monitoring and Predictive maintenance solution leveraging Embedded system, Industrial IoT and Machine Learning Technologies by finding Remaining useful life time of various Machines used in production process.



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.

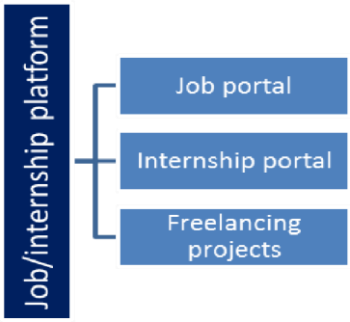
USC is a career development platform that delivers **personalized executive coaching** in a more affordable, scalable and measurable w

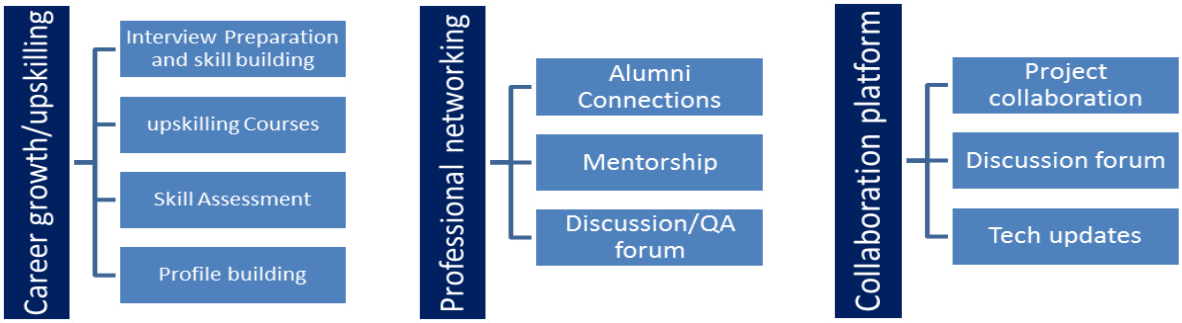


Seeing need of upskilling in self upSkill Campus aiming paced manner along-with to upskill 1 million additional support services e.g. learners in next 5 year Internship, projects, interaction with

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

In simpler terms, the goal is to create a safe and efficient online banking system that allows customers to access their accounts and manage their finances easily. Here are the main points:

1. **User Security:**Make sure only authorized users can access their accounts by using strong login methods, like passwords and maybe even fingerprint or face recognition. Encrypt sensitive data to keep it safe from hackers.

2. **Account Management**: Let customers do basic account tasks online, like opening, closing, or updating their accounts. They should be able to see their balances and transaction history in real-time.

3. **Money Transfers and Payments:** Allow customers to move money between their own accounts or to other people's accounts securely. Also, provide options for paying bills or making other types of payments online.

4. **Monitoring and Alerts**: Keep an eye on transactions to spot any suspicious activity or potential fraud. Send customers alerts if something unusual happens with their accounts.

5. **Customer Support:** Offer different ways for customers to get help, like through live chat, email, or phone support. Listen to feedback from customers to make the system better.

6. **Scalability and Reliability**: Make sure the system can handle lots of users and transactions without crashing. Have plans in place to keep the system running smoothly even if something goes wrong.

7**. Compliance**: Follow the rules and regulations that govern online banking to protect both customers and the bank. This includes things like keeping customer data safe and verifying their identities.

8. **User Experience**: Make the system easy to use and navigate so customers can do what they need to quickly and without confusion. Also, make sure it's accessible to everyone, including those with disabilities.

By creating a system that meets these objectives, both customers and the bank will benefit. Customers will have a convenient and secure way to manage their money, while the bank can improve its operations and keep up with digital banking standards.

4 Existing and Proposed solution

The proposed online banking information system offers a comprehensive suite of features and functionalities designed to deliver a secure, efficient, and user-friendly banking experience.

User Authentication forms the bedrock of the system, ensuring robust security through various methods such as username/password authentication and two-factor authentication. This provides peace of mind to both customers and administrators, knowing that only authorized individuals can access sensitive financial information.

Account Management capabilities empower users to take control of their finances with ease. They can effortlessly view account balances, transaction histories, and manage beneficiaries, all from a centralized platform. This streamlines banking processes and enhances transparency in financial activities.

Bill Payment functionality simplifies the often tedious task of managing bills by allowing users to conveniently pay bills online, set up recurring payments, and receive timely notifications for upcoming payments. This ensures bills are settled promptly, avoiding late fees and maintaining financial discipline.

Fund Transfer options facilitate seamless movement of funds between accounts, whether within the same bank or to external accounts. This flexibility enables users to manage their finances efficiently and respond promptly to financial needs or obligations.

Mobile Banking Integration caters to the growing trend of banking on-the-go by providing a seamless user experience across various mobile devices. This ensures users can access banking services anytime, anywhere, enhancing convenience and accessibility.

Security Measures are paramount in safeguarding sensitive user information and preventing unauthorized access. Through the implementation of encryption techniques, firewalls, and stringent security protocols, the system ensures the highest level of data protection and privacy.

Customer Support services are readily available to assist users with any queries or issues they may encounter. Whether through live chat, email support, or a dedicated helpdesk system, users can rely on prompt and helpful assistance whenever needed.

Transaction Alerts provide added security and peace of mind by automatically notifying users of significant account activities, such as large transactions, balance updates, or suspicious login attempts. This proactive approach helps users stay informed and vigilant against potential threats.

Personalization features allow users to tailor their banking experience according to their preferences. From customizing their dashboard to receiving personalized recommendations based on their banking behavior, users can enjoy a personalized and tailored banking experience.

Compliance and Regulation are strictly adhered to, ensuring the system complies with regulatory requirements such as Know Your Customer (KYC) and Anti-Money Laundering (AML) regulations. This commitment to legal compliance helps mitigate financial risks and fosters trust among users.

Scalability and Reliability are ensured through a robust architecture designed to accommodate increasing user loads and maintain system reliability. With redundancy and failover mechanisms in place, the system can scale seamlessly to meet growing demands while ensuring uninterrupted service availability.

Analytics and Reporting tools empower both customers and administrators with valuable insights into user transactions, account activities, and system performance. This enables informed decision-making and allows for continuous optimization of the system to better meet user needs.

Integration with Third-party Services enhances the functionality of the banking system by seamlessly integrating with external services such as credit scoring agencies, payment gateways, or financial management tools. This interoperability extends the capabilities of the system, enriching the user experience and unlocking new possibilities in banking services.

Continuous Improvement processes ensure that the system evolves in line with user needs and technological advancements. By gathering user feedback, Analyzing usage patterns, and iteratively improving the system, the banking institution can stay ahead of the curve and deliver innovative solutions that exceed customer expectations.

4.1 Code submission (Github link):- https://github.com/ajaypannala/upskillcampus.git

4.2 code submission (Github link):
https://github.com/ajaypannala/upskillcampus/blob/main/BankingInformationSystem.java

4.3 Report submission (Github link) :
https://github.com/ajaypannala/upskillcampus/blob/main/BankingInformationSystem_Ajaykumar_USC_UCT.pdf

5 Proposed Design/ Model

The proposed model for an online banking information system project encompasses a holistic approach to delivering a secure, efficient, and user-centric banking experience. By integrating robust security measures, intuitive user interfaces, and compliance with industry regulations, the system aims to meet the evolving needs of modern banking customers.

At its core, the system prioritizes User Authentication, employing various methods such as username/password authentication, multifactor authentication (MFA), and biometric authentication to safeguard user accounts from unauthorized access. This ensures the security and integrity of sensitive financial data.

Account Management functionality empowers users to effortlessly create, manage, and update their bank accounts, providing a comprehensive suite of features including real-time access to account balances, transaction histories, and seamless transfers between accounts.

Transaction Processing capabilities facilitate a wide range of financial activities, including deposits, withdrawals, fund transfers, bill payments, and the setup of recurring payments. These functionalities are designed to streamline banking processes and enhance user convenience.

To fortify the system against cyber threats, robust Security Measures are implemented, leveraging encryption techniques, firewalls, and intrusion detection systems to protect sensitive user information and financial transactions.

Real-time Notifications keep users informed about important account activities such as deposits, withdrawals, and transactions, enhancing security and providing users with peace of mind.

Customer Support features are readily available to assist users with inquiries, issues, or account-related tasks, offering channels such as live chat, FAQs, and ticketing systems to ensure prompt and effective resolution of customer queries.

Data Analytics capabilities are harnessed to analyze user behavior, identify patterns, and offer personalized recommendations or insights, thereby empowering users to make informed financial decisions and optimize their banking experience.

The system is designed with Mobile Accessibility in mind, offering a mobile-friendly interface or dedicated application to enable users to access banking services seamlessly on smartphones or tablets, reflecting the increasing reliance on mobile devices for banking transactions.

Ensuring Compliance with relevant banking regulations and standards such as GDPR, PCI DSS, and industry-specific regulations is paramount to protect user privacy and maintain trust in the system.

Continuous Improvement is ingrained in the system's DNA, with feedback mechanisms in place to gather user input and suggestions for enhancing the online banking experience. Regular updates and maintenance are conducted to improve performance, security, and overall user satisfaction.

In essence, the proposed model strives to provide a secure, convenient, and user-friendly online banking experience while upholding the highest standards of security, compliance, and customer service.

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

The testing procedures for an online banking information system project involve a systematic approach to ensure the system's functionality, security, and performance meet the highest standards. Beginning with thorough requirement analysis, testing progresses through planning, design, execution, and post-implementation review stages.

Each phase is meticulously executed to validate different aspects of the system, including user authentication, transaction processing, security measures, and compliance with regulatory standards. Test cases are designed to cover a wide range of scenarios, ensuring comprehensive coverage of the system's functionalities.

Throughout the testing process, various types of testing are performed, including unit testing, integration testing, system testing, user acceptance testing (UAT), regression testing, security testing, performance testing, compatibility testing, and accessibility testing. These tests aim to identify and rectify any defects or vulnerabilities present in the system.

Documentation of test results, defects, and recommendations is essential for maintaining transparency and accountability throughout the testing process. Additionally, user training is provided to ensure users and support staff are equipped with the necessary knowledge and skills to use the online banking system effectively and securely.

Finally, a post-implementation review is conducted to assess the effectiveness of the testing process and identify opportunities for improvement in future projects. This holistic approach to testing ensures the online banking system meets the needs and expectations of users while adhering to industry standards and regulations.

6.3 Performance Outcome

1. Performance tests gave good results, indicating that the application can handle a significant number of concurrent users and maintain an acceptable response time.

2. Further improve application performance through optimizations such as caching, database indexing, and improved query design.

3. Used monitoring tools to monitor key performance metrics and identify areas for further improvement.

7 My learnings

Through this internship, I've honed my technical skills, particularly in Data Science with AI, Machine Learning, and Deep Learning. This hands-on experience has provided me with practical knowledge and expertise in utilizing these technologies effectively.

In addition, I've enhanced my problem-solving abilities by focusing on scalable solutions that address complex issues while considering factors such as uniqueness, security, performance, and user experience. This approach has enabled me to tackle challenges more effectively and deliver high-quality solutions.

Moreover, managing a project within a defined timeline has equipped me with valuable project management skills. This includes prioritizing tasks, allocating resources efficiently, and meeting deadlines, all of which are essential for successful project execution.

Collaborating with industry partners and educational institutions has emphasized the importance of effective communication, teamwork, and collaboration. By working closely with diverse teams, I've learned how to leverage collective expertise and resources to achieve project objectives efficiently.

In terms of testing and best practices, I've gained experience in designing test cases and conducting performance tests to ensure the functionality, reliability, and security of banking information systems. This includes testing for memory efficiency, accuracy, stability, power consumption, and security, ensuring robust and reliable software solutions.

Continuous learning has been emphasized throughout the internship, with a focus on staying updated on industry developments and leveraging various resources such as online forums and community forums to expand knowledge and skills continually.

Applying theoretical knowledge to real-world projects has provided invaluable insights into technical problems, solutions, and business applications. This practical experience has contributed to my overall growth as a professional in software development and IT solutions.

In summary, these courses and experiences have contributed significantly to my development as a competent and experienced professional in software development and IT solutions, equipping me with the skills and expertise needed to thrive in the industry.

8 Future Scope

The future scope for an online banking information system project is vast and promising, offering numerous opportunities for innovation and advancement in the banking sector.

One key aspect of future development lies in Enhanced Security Measures, where the integration of advanced technologies such as biometric authentication, blockchain, and AI-driven fraud detection will bolster the security of customer data and transactions, ensuring utmost protection against cyber threats.

Moreover, the focus on Personalized Customer Experience is paramount, leveraging data analytics and machine learning algorithms to deliver tailored recommendations, targeted marketing offers, and personalized financial advice based on individual customer preferences and behavior. This approach enhances customer satisfaction and fosters deeper engagement with banking services.

Integration with Emerging Technologies presents another exciting avenue for development, including integration with Internet of Things (IoT) for smart banking solutions, voice recognition for customer service interactions, and virtual reality for immersive banking experiences. These technologies elevate the banking experience to new heights, offering customers innovative and engaging ways to interact with their finances.

Furthermore, the Expansion of Services beyond traditional banking is essential, with offerings expanding to include investment management, insurance services, and peer-to-peer lending platforms. This diversification of services meets the evolving needs of customers and positions banks as comprehensive financial service providers.

Mobile and Omni-channel Banking continues to evolve, with a focus on enhancing mobile banking capabilities and providing seamless integration across multiple channels such as web, mobile apps, social media, and chatbots. This ensures accessibility and convenience for customers, enabling them to manage their finances anytime, anywhere.

Embracing API Banking and Open Banking Initiatives is crucial, facilitating collaboration with third-party developers and fintech companies to drive innovation and deliver innovative financial products and services. This openness fosters a dynamic ecosystem of banking solutions that benefit both customers and industry stakeholders.

Leveraging Data Analytics for Business Insights enables banks to gain valuable insights into customer behavior, market trends, and operational efficiency, empowering data-driven decision-making and strategic planning.

Ensuring Regulatory Compliance remains a top priority, with banks adapting to evolving regulatory requirements such as PSD2, GDPR, and other regional regulations to maintain trust and transparency in banking operations.

Continuous Improvement and Innovation are at the core of future development, with banks adopting agile approaches to software development and fostering a culture of innovation to stay ahead of the competition and meet the ever-changing needs and expectations of customers.

Finally, Global Expansion and Digital Transformation initiatives are underway, with banks expanding their online banking services to new markets and demographics, embracing digital transformation to streamline processes, reduce costs, and enhance competitiveness in the digital age. This global reach opens up new opportunities for growth and innovation in the banking industry.