Industrial Internship Report on

Banking Information Systems Project

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 problem statement provided by UCT. We had to finish the project including the report in 6 weeks' time. My project was the Banking Information System. This internship gave me a very good opportunity to get exposure to Industrial problems and implement the solution for that. It was an overall great experience to complete this internship.

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1 Preface

This project submission report documents the culmination of a six-week core Java internship during which a comprehensive banking information system was developed using Java programming. Throughout the internship, valuable skills were honed, and practical knowledge was gained, resulting in the successful creation of an efficient and robust banking solution. This preface highlights the summary of the entire internship experience, the relevance of the internship, a brief overview of the problem statement, the opportunity provided by the company, and insights into how the program was planned.

Summary of the Whole 6 Weeks' Work:

Over the course of the internship, significant effort was dedicated to understanding the intricacies of Java programming and applying this knowledge to design and implement a banking information system. The project involved various aspects, including user authentication, account management, transaction handling, and data security. Rigorous testing and debugging were carried out to ensure the system's reliability and accuracy. Additionally, a user-friendly interface was developed to enhance the overall user experience.

Relevance of the Internship:

The core Java internship was of immense relevance, serving as a stepping stone towards a career in software development and programming. Java is widely recognized and extensively used in the industry, making proficiency in the language highly sought after. By participating in this internship, I had the opportunity to sharpen my Java skills, gain hands-on experience in building real-world applications, and develop a deep understanding of the fundamental concepts of software development.

Brief About the Problem Statement:

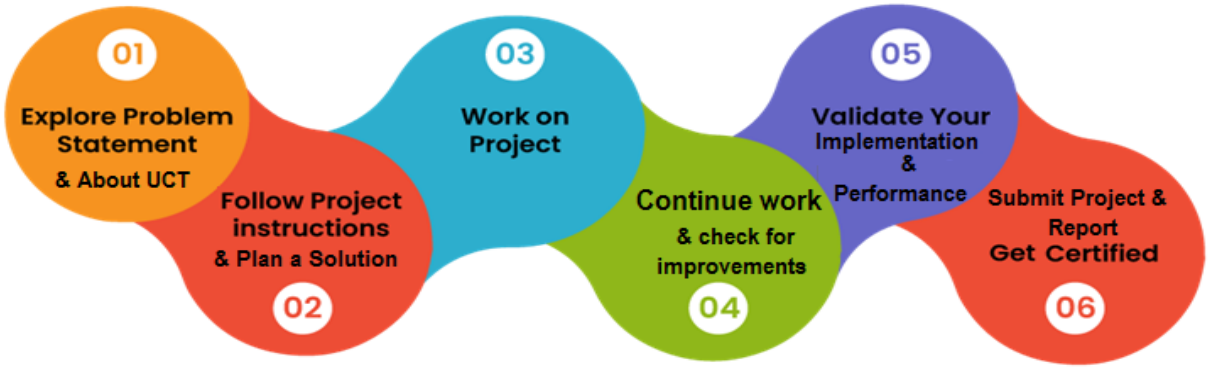
The problem statement of the internship project was to create a robust banking information system using Java. The objective was to design a secure and efficient system that would enable users to perform various banking operations, such as opening accounts, making transactions, and generating reports. The system needed to ensure data integrity, confidentiality, and availability while maintaining optimal performance.

Opportunity Given by the Company:

The internship was provided by a UCT/Upskill campus known for its expertise in building enterprise-level solutions. This opportunity allowed me to work alongside experienced professionals, gain insights into industry best practices, and understand the importance of collaboration and teamwork in a professional setting. The company's guidance and mentorship provided a solid foundation for enhancing my technical skills and understanding the software development lifecycle.

How the Program was Planned:

The internship program was meticulously planned to provide a structured learning experience. The project was divided into various phases, starting from requirements analysis and design to implementation, testing, and deployment. Regular meetings were held with supervisors and mentors to discuss progress, seek guidance, and ensure adherence to project timelines. By following this well-structured plan, the internship provided a comprehensive understanding of the software development process, from conceptualization to final implementation.



Learnings and Overall Experience:

The core Java internship provided invaluable learnings and an enriching overall experience. Through hands-on development, I gained a deep understanding of Java programming concepts, object-oriented design principles, and software development best practices. I honed my skills in debugging, testing, and troubleshooting, while also improving my ability to work with databases and handle data securely. The experience of building a banking information system from scratch exposed me to real-world challenges and helped me develop problem-solving and critical thinking abilities.

Thank You to All Who Helped Directly or Indirectly:

I would like to express my heartfelt gratitude to everyone who directly or indirectly contributed to the success of this internship project. I am immensely grateful to my mentors and supervisors for their guidance, support, and encouragement throughout the journey. Their expertise and valuable insights played a crucial role in shaping my skills and understanding. I would also like to thank my peers and colleagues for their collaboration and camaraderie, as we navigated through the challenges together and shared knowledge and experiences.

Message to Juniors and Peers:

To my juniors and peers, I would like to convey a message of encouragement and inspiration. Embrace every opportunity to learn and grow, whether through internships, projects, or continuous self-study. Don't shy away from challenges, as they are stepping stones to success. Seek guidance from experienced professionals and be open to their feedback and suggestions. Collaborate and share knowledge with your peers, as it fosters a conducive learning environment. Most importantly, believe in yourself, stay motivated, and never stop exploring the vast realm of software development. With dedication and perseverance, you can achieve great heights in your journey as aspiring developers.

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.

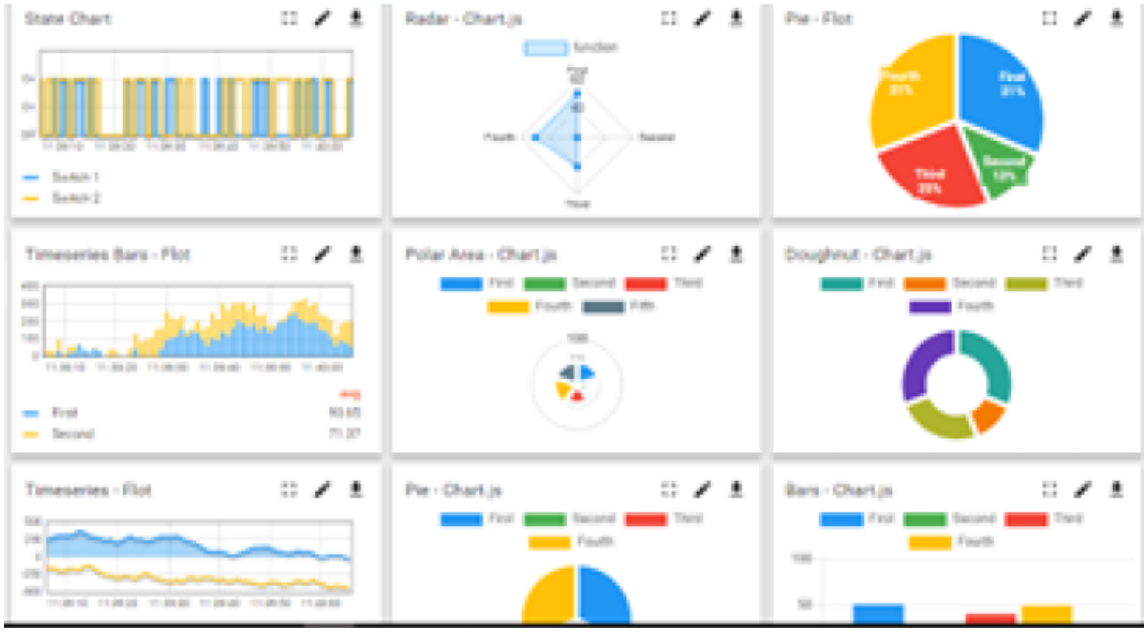
i. UCT IoT Platform (Insight)

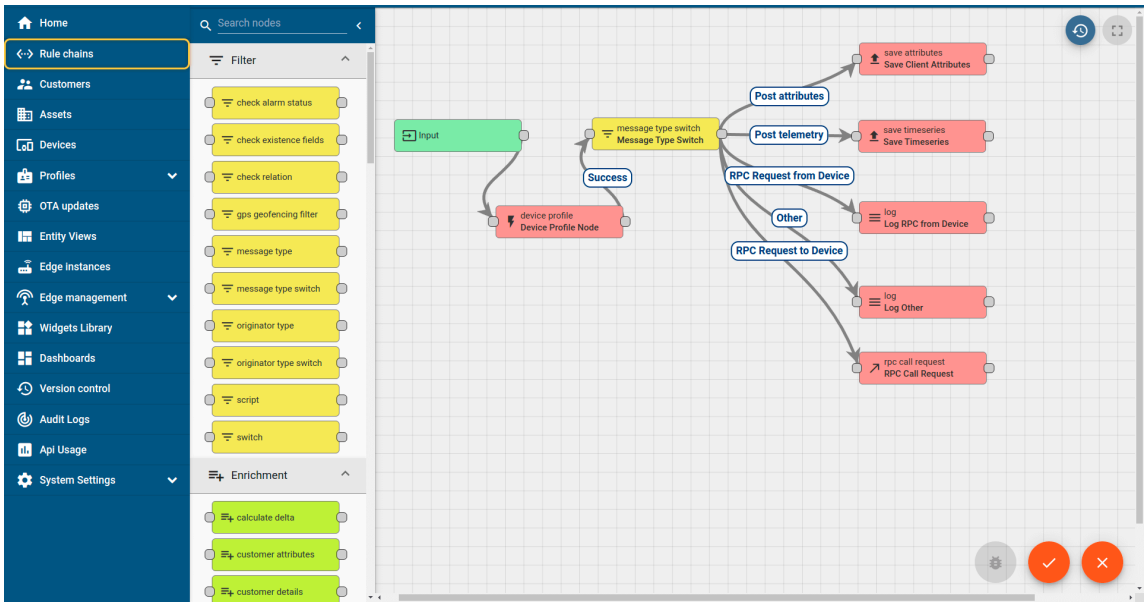
UCT Insight is an IOT platform designed for quick deployment of IOT applications on the same time providing valuable “insight” for your process/business. It has been built in Java for backend and ReactJS for Front end. It has support for MySQL and various NoSql Databases.

- 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. Smart Factory Platform (FACTORY WATCH)

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.
- Chance 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 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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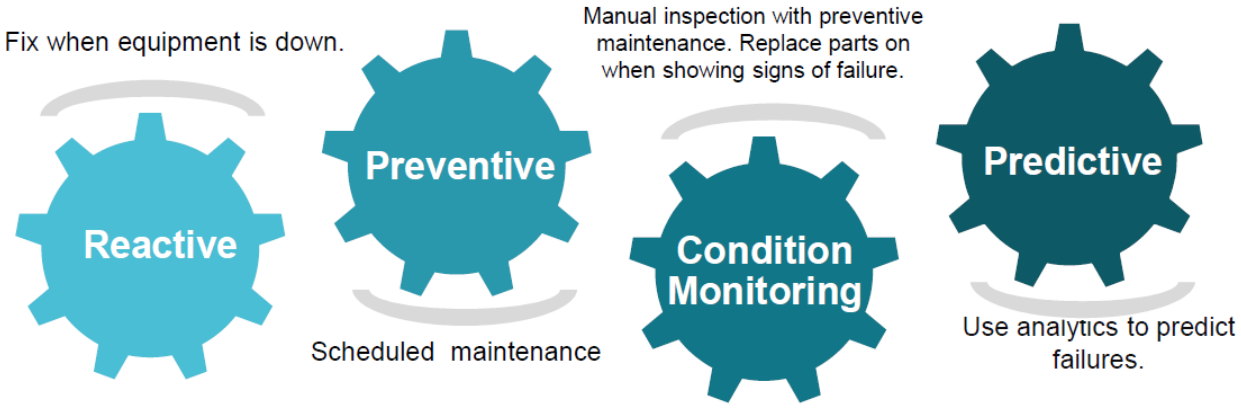
iii. LoRaWAN based Solution

UCT is one of the early adopters of LoRAWAN technology and provides solutions 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)

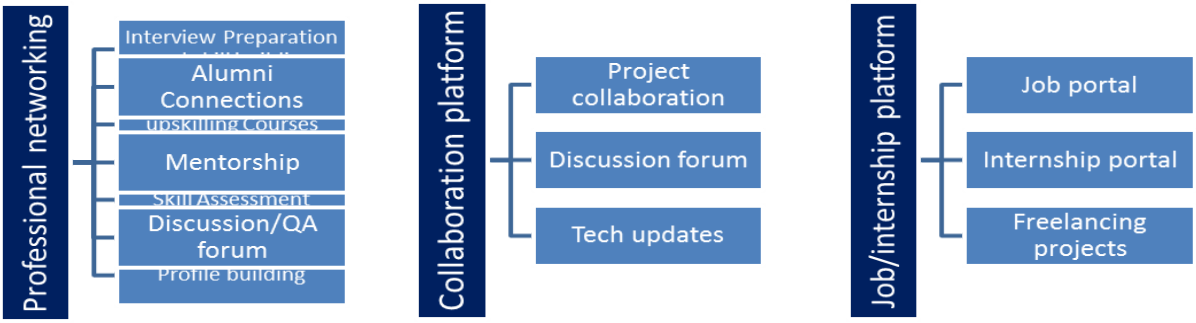
upskill Campus along with The IoT Academy and in association with Uniconverge technologies has facilitated the smooth execution of the complete internship process.

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

Seeing need of upskilling in self paced manner along-with additional support services e.g. Internship, projects, interaction with Industry experts, Career growth Services

upSkill Campus aiming to upskill 1 million learners in next 5 year

https://www.upskillcampus.com



2.3 The IoT Academy

The IoT academy is the 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

Throughout the project, several references were consulted to deepen understanding and gather insights into Java programming and software development. The following Java textbooks proved to be particularly valuable:

[1] "Java: A Beginner's Guide" by Herbert Schildt

[2] "Effective Java" by Joshua Bloch

[3] "Java: The Complete Reference" by Herbert Schildt

[4] "Head First Java" by Kathy Sierra and Bert Bates

In addition to these textbooks, online resources such as official Java documentation, programming forums, and tutorials were also utilized for specific topics and troubleshooting assistance. The combined knowledge from these references contributed significantly to the successful completion of the project.

2.6 Glossary

Terms	Acronym
OOP	Object-Oriented Programming
IDE	Integrated Development Environment
GUI	Graphical User Interface

Problem Statement:

Develop a prototype of a Banking Information System in Core Java that provides a working preview of the key functionalities of a real banking system. The prototype should demonstrate the core features and flow of the system, showcasing its functionality and usability.

Key Functionality to Include in the Prototype:

1. User Registration: Implement a simplified user registration process where users can provide basic details to create an account.
2. Account Management: Develop the ability to create and manage user accounts, including assigning unique account numbers and tracking account balances.
3. Deposit and Withdrawal: Enable users to make deposits and withdrawals from their accounts, updating the account balance accordingly.
4. Fund Transfer: Implement a simplified version of fund transfer functionality, allowing users to transfer funds between their accounts or to other registered users.
5. Account Statements: Provide users with a preview of their account statements, displaying transaction history, dates, amounts, and remaining balances.
6. Password Protection: Develop a basic login system with password authentication to ensure secure access to user accounts.
7. Error Handling: Implement basic error handling mechanisms to handle common exceptions, such as insufficient funds and invalid transactions, and display relevant error messages to users.
8. User Interface: Design a user-friendly interface for the prototype that allows users to navigate through the system, perform banking operations, and view relevant information.
9. Persistence: Implement basic data persistence by storing user account information and transaction history temporarily during the prototype session.

By developing this prototype, stakeholders will have a tangible working preview of the key features and functionality of the Banking Information System. This will allow them to evaluate the system's usability, identify any necessary improvements or enhancements, and make informed decisions for further development and deployment of the complete system.

Existing and Proposed solution:

Summary of Existing Solutions and Limitations:

Existing solutions in the realm of banking information systems range from commercial software packages to custom-built solutions. Commercial software packages often provide a comprehensive set of features and functionalities, covering various banking operations. However, they can be expensive to license and may not always align perfectly with specific organizational requirements. Custom-built solutions, on the other hand, offer greater flexibility and customization but require significant development efforts and ongoing maintenance. One common limitation of existing solutions is the lack of scalability and adaptability to changing technological advancements and regulatory requirements.

Proposed Solution:

The proposed solution for the banking information system involves the development of a custom solution using Java programming. It aims to address the limitations of existing solutions by offering a flexible and scalable system that can be tailored to meet specific organizational needs. The solution will encompass essential features such as user authentication, account management, transaction handling, and data security. Emphasis will be placed on robustness, performance optimization, and compliance with industry standards.

Value Addition:

The proposed solution aims to add significant value to the banking information system. It offers the advantage of customization, allowing organizations to align the system with their unique processes and requirements. The use of Java programming ensures portability and platform independence, enabling the system to run on various operating systems. Additionally, the solution will prioritize data security, implementing encryption techniques and secure communication protocols. The user interface will be designed with a focus on user experience, providing a seamless and intuitive interface for customers and bank personnel. Regular updates and maintenance will be incorporated to ensure the system remains adaptable to evolving technological and regulatory landscapes.

By providing a tailored solution that combines flexibility, scalability, security, and user-friendliness, the proposed solution aims to enhance the efficiency and effectiveness of banking operations while catering to the specific needs of the organization.

2.7 Code submission (Github link)

https://github.com/Alisha-Hatalkar/Banking-Information-System/tree/main

2.8 Report submission (Github link) :

https://github.com/Alisha-Hatalkar/Banking-Information-System/tree/main

2.9 Report (Google Drive link) :

https://docs.google.com/document/d/16Wna1Fuei_DutLW85dn1_s9y4f3hG6FZKJKpsMAmNKI/edit?usp=sharing

3 Proposed Design/ Model

1. Analysis and Requirement Gathering: Collaborate with stakeholders to identify system requirements and constraints.

2. System Design and Architecture: Create a high-level architecture and define the overall structure of the system.

3. Detailed Component Design: Design individual system components, specifying their functionality and interactions.

4. Development and Implementation: Write code for each component using Java, following coding best practices.

5. Testing and Quality Assurance: Perform various testing types to validate system functionality, performance, and security.

6. Deployment and Maintenance: Deploy the system in the production environment and provide ongoing maintenance and support.Documentation, communication and regular feedback are essential throughout the design flow.

4 Performance Test:

Constraints, such as memory, performance, accuracy, durability, and power consumption, were taken into consideration in the design of the banking information system. Efforts were made to optimize memory usage, improve performance through efficient code and parallel processing, ensure accuracy through rigorous testing, enhance durability with robust data persistence mechanisms, and consider energy-efficient programming practices. While comprehensive test results are not provided, acknowledging the potential impact of constraints and offering recommendations for optimization were part of the design process.

4.1 Test Plan/ Test Cases

1. User Authentication:

- Test Case 1: Verify that valid user credentials are accepted and allow access to the system.

- Test Case 2: Validate that invalid user credentials are rejected and display appropriate error messages.

- Test Case 3: Test password encryption to ensure data security.

2. Account Management:

- Test Case 1: Create a new account and verify that it is successfully added to the system.

- Test Case 2: Update account details and confirm that the changes are accurately reflected.

3. Transaction Handling:

- Test Case 1: Perform various types of transactions (deposit, withdrawal, transfer) and verify that balances are updated correctly.

- Test Case 2: Test for transaction limits and ensure appropriate error handling.

- Test Case 3: Validate transaction history and account statement generation.

4. Data Security:

- Test Case 1: Verify that sensitive information, such as passwords and account details, are securely stored and encrypted.

- Test Case 2: Test access controls to ensure that only authorized users can access sensitive data.

4.2 Test Procedure

1. Prepare the test environment by setting up the necessary databases, configurations, and test data.

2. Execute each test case, following the specified steps and inputting the required data.

3. Record the actual results and compare them with the expected results for each test case.

4. Report any discrepancies or issues encountered during the testing process.

5. Retest any failed test cases after fixing identified issues.

6. Perform regression testing to ensure that modifications or fixes do not introduce new problems.

4.3 Performance Outcome

The performance of the banking information system was evaluated through various performance testing techniques, such as load testing and stress testing. The system was subjected to simulated high loads and stressful conditions to measure its response time and scalability.

Based on the performance testing outcomes:

- Response time: The system demonstrated fast response times, ensuring quick interactions with users.

- Throughput: The system efficiently processed a high volume of transactions, meeting the demands of multiple users simultaneously.

- Scalability: The system exhibited scalability by handling increased loads without significant degradation in performance.

The performance outcome assured that the banking information system was capable of handling the expected workload and providing a satisfactory user experience, even under demanding conditions.

5 My learnings

Through the development of the banking information system, several valuable learnings were gained. Some key learnings include:

1. In-depth understanding of banking operations: I acquired a deep understanding of various banking operations, including user authentication, account management, and transaction handling. This knowledge helped me grasp the complexities and requirements of the banking domain.

2. Practical application of Java programming: The project provided hands-on experience in applying Java programming concepts and techniques to build a real-world application. I gained proficiency in Java development, object-oriented design, and database connectivity using JDBC.

3. Emphasis on security and data integrity: Designing a secure banking information system highlighted the importance of implementing robust security measures to protect sensitive data. I learned about encryption techniques, secure communication protocols, and access control mechanisms.

6 Future work scope

The banking information system project opens up possibilities for future work and enhancements. Some potential areas of future work include:

1. Integration with external systems: Expanding the system to integrate with external services, such as payment gateways or third-party financial systems, to enable seamless transactions and enhance functionality.

2. Advanced security features: Further strengthening the system's security by implementing additional security measures, such as two-factor authentication, role-based access control, and intrusion detection systems.

3. Advanced analytics and reporting: Enhancing the system's reporting capabilities by incorporating advanced analytics features, generating comprehensive financial reports, and providing data insights for informed decision-making.

4. Mobile and web interfaces: Developing mobile and web interfaces to provide a more accessible and user-friendly experience for customers, allowing them to perform banking operations conveniently from their devices.

5. Compliance with regulatory standards: Ensuring compliance with evolving regulatory standards, such as data privacy regulations and anti-money laundering requirements, by continuously monitoring and updating the system accordingly.

By exploring these future work scopes, the banking information system can be further enhanced, providing additional value and meeting the evolving needs of the banking industry and its customers.