Industrial Internship Report on

”HEALTHCARE DATA MANAGEMENT”

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 was (Health Care Data Management it’s about managing data in through virtually in the platforms like AWS, MS AZURE etc. storing the data and retrieving through online using internet from anywhere in the world.) 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

I must say that Upskill campus, Brindavan College of Engineering College and UCT given me an excellent opportunity not only to me but to al the students who are want their career to be in position of peek level in future, to get jobs in dream company, skills required to get that job and almost all the requirements that are needed in job environment.

The complete 6 weeks of the cloud computing internship is well structured and delivered the training session through virtually by providing recorded sessions, discuss forums, whats app group for clearing doubts and for giving instructions to achieve what we want.

This type of internship is need for students to work on projects, to gain experience of work, and also helps to get the job in future.

Present days most of the hospitals using physical files for storing the data of patients like, their, name, dob, age, gender, disease, symptoms, prescriptions/ treatment to the disease. It is not permanent storing and also cannot be retrieval the data when ever want from anywhere. My project solves these problems by storing the data in cloud virtually.

Thanks to the UniConverge Technologies for giving me this opportunity, it helped me a lot to learns on demand technologies and also work experience.

How Program was planned is,

I also interested in creating and maintain websites, this platform gave me an both features. That is I created a website of Healthcare data management with some functions and operations and hosted I AWS for storage and retrieval purposes.

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.

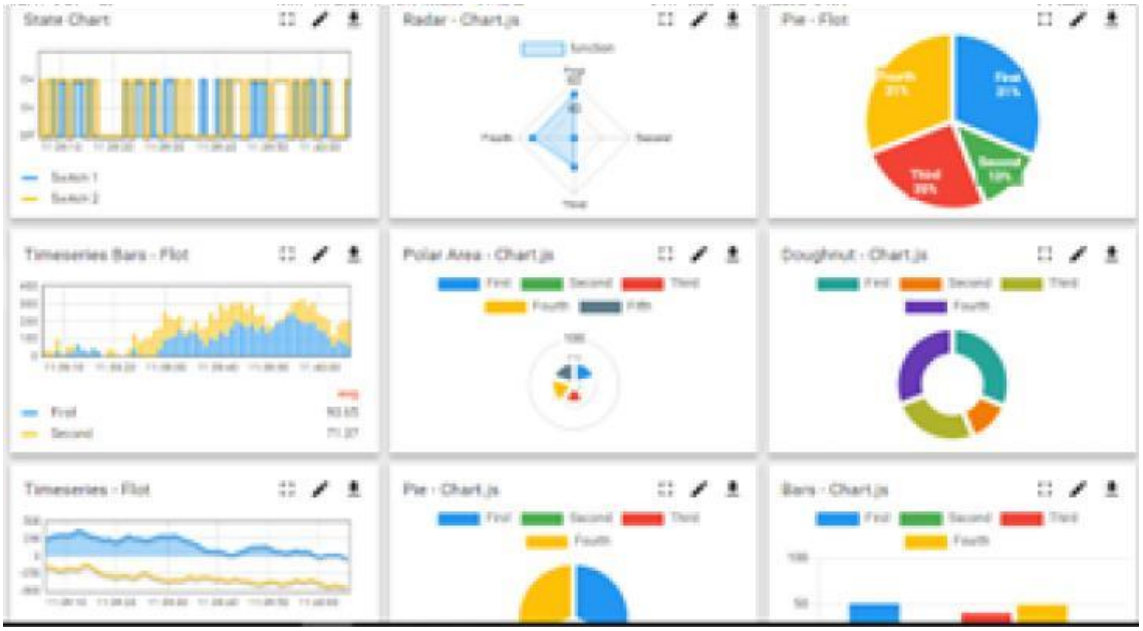
i. UCT IoT Platform (UCT Insight)

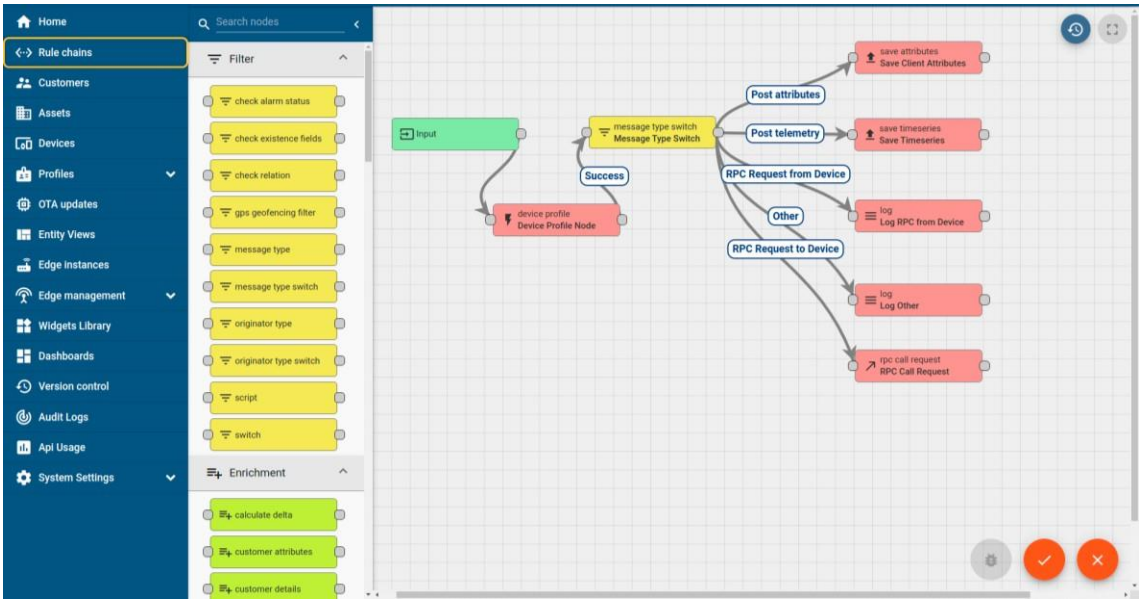
UCT Insight is an IOT platform designed for quick deployment of IOT applications on the same time providing valuable "insight" for your process/business. It has been built in Java for backend and ReactJS for Front end. It has support for MySQL and various NoSql Databases.

- 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.
- 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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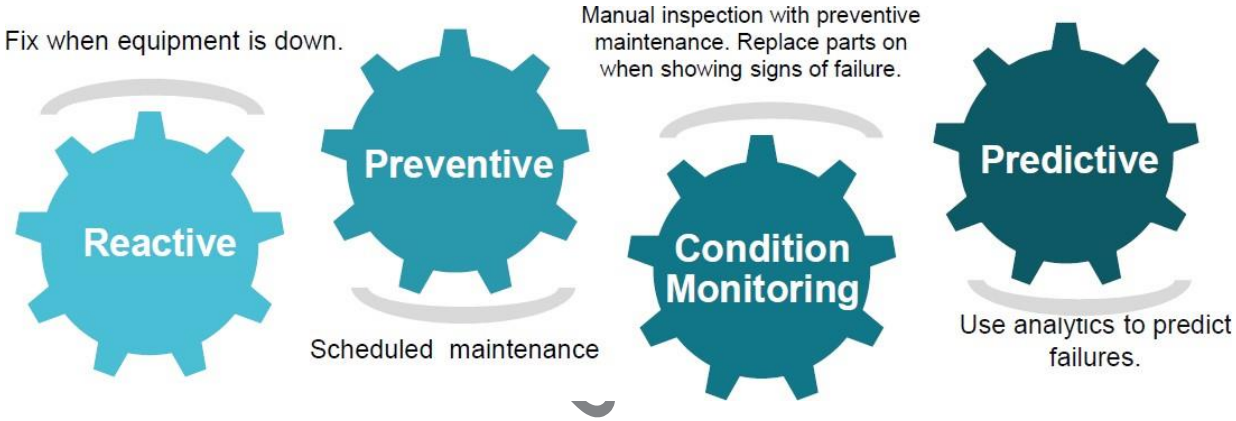
iii. LoRaWAN based Solution

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

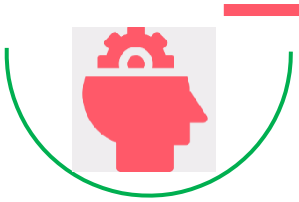
UCT is providing Industrial Machine health monitoring and Predictive maintenance solution leveraging Embedded system, Industrial IoT and Machine Learning Technologies by finding Remaining useful life time of various Machines used in production process.



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.

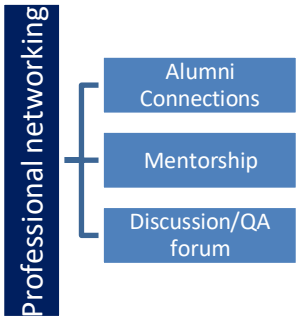
USC is a career development platform that delivers **personalized executive coaching** in a more affordable, scalable and measurable way.

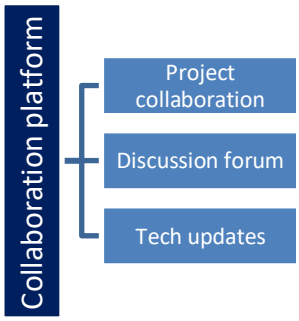


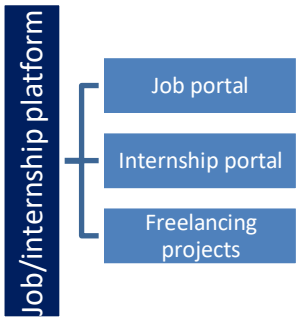
Seeing need of upskilling in self paced manner along-with additional support services e.g. Internship, projects, interaction with Industry experts, Career growth Services

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 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] https://aws.amazon.com/what-is-cloud-computing/

[2] https://www.geeksforgeeks.org/cloud-computing/

[3] https://www.theiotacademy.co/online-certification-in-iot-cloud-computing-and-edge-ai-by-eict-academy-iit-guwahati

2.6 Glossary

Terms	Acronym
S**AAS**	S**oftware As A Service**
P**AAS**	Platform **As A Service**
IAAS	Infrastructure **As A Service**
DAAS	Desktop **As A Service**
M**AAS**	Monitoring **As A Service**

3 Problem Statement

Storing data or information in virtual cloud rather than physical devices.

Normally we use the memory card, internal storage space, hard disks etc., We know that theses devices are not for permanent. Rather than using this we ca use modern technologies because these devices can be used for personal use but when it comes to the IT world, industrial companies require a huge amount of number of devices. So, if we use the technology in a better way can save the amount cost, time and indirectly nature from pollution. This project helps to avoid these problems.

4 Existing and Proposed solution

PROBLEM - Present days most of the hospitals using physical files for storing the data of patients like, their, name, dob, age, gender, disease, symptoms, prescriptions/ treatment to the disease. It is not permanent storing and also cannot be retrieval the data when ever want from anywhere.

SOLUTION - My project solves these problems by storing the data in cloud virtually.

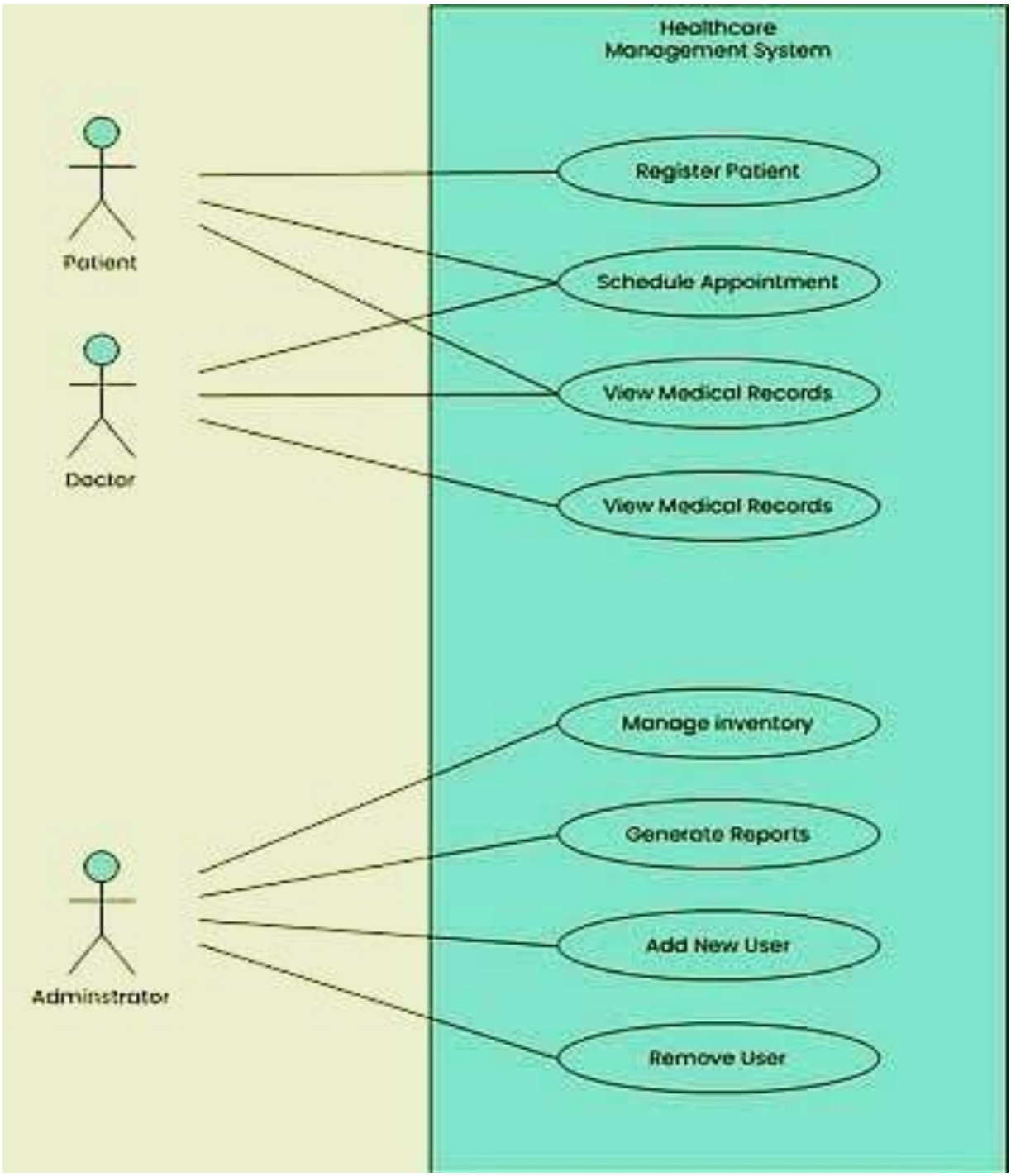
4.1 Code submission (Github link):

https://github.com/NiranjanaaYD/CLOUD.git

4.2 Report submission (Github link):

https://github.com/NiranjanaaYD/CLOUD/blob/main/HealthCareDataManagement_NIRANJANA%20Y%20D%20upSkill%20UCT.%20pdf.pdf

5 Proposed Design/ Model


Healthcare
Management System
Patient
Doctor
Administrator
Register Patient
Schedule Appointment
View Medical Records
View Medical Records
Manage inventory
Generate Reports
Add New User
Remove User

6 Performance Test

Performance testing is a crucial phase in the evaluation of our healthcare data management. This type of testing assesses the system's ability to handle a specific workload and maintain acceptable response times, ensuring that it meets the performance requirements of our application. In the context of our project, performance testing is essential to guarantee the system's reliability and scalability when dealing with healthcare data, which is often critical and time-sensitive.

Key Components of Performance Testing in our Healthcare Data Management:

Load Testing: Load testing involves simulating a realistic load on the system to determine how it behaves under typical usage conditions. It helps us understand how the application performs when multiple users access it concurrently or when processing a high volume of healthcare data transactions.

Stress Testing: Stress testing goes beyond the normal operational capacity of the system. It assesses the application's ability to handle extreme conditions, such as spikes in user activity, network issues, or data processing loads. By identifying the system's breaking point, we can take proactive measures to enhance its robustness.

Scalability Testing: Scalability testing is essential for healthcare data management, as the volume of data can increase significantly over time. This type of testing evaluates how well our system scales with growing data volumes and user loads. It helps us plan for future resource requirements and infrastructure adjustments.

Response Time Analysis: Monitoring and analyzing response times are critical in healthcare data management. We measure the time it takes for the system to respond to user requests, ensuring that it meets the acceptable latency thresholds. This aspect is vital to providing timely healthcare information and services.

Resource Utilization: We assess the utilization of system resources such as CPU, memory, and network bandwidth during different test scenarios. Understanding how efficiently resources are allocated and used helps us optimize the system's performance and cost-effectiveness.

Reliability and Availability: Performance testing also includes evaluating the system's reliability and availability. We test for system crashes, data loss, and downtime scenarios to ensure that our healthcare data management system is highly available and resilient.

Benchmarking: Benchmarking involves comparing our system's performance metrics against industry standards or competitors' solutions. This helps us gauge how well our healthcare data management stands in the broader context of healthcare IT.

In summary, performance testing in our healthcare data management is essential for ensuring that our system can effectively handle healthcare data, maintain acceptable response times, and scale to meet future demands. The insights gained from these tests will guide us in optimizing the system's performance and delivering a reliable and efficient healthcare data management solution.

6.1 Test Plan/ Test Cases

A test plan is a comprehensive document that outlines the strategy and approach for testing our healthcare data management. It serves as a roadmap for our testing efforts, ensuring that we systematically evaluate the functionality, performance, and reliability of our application. The primary goal of this test plan is to validate that our healthcare data management system meets the specified requirements and performs as expected.

Key Components of the Test Plan:

Objectives: The test plan should start by defining the testing objectives, which include validating the functionality, performance, security, and reliability of the healthcare data management system.

Scope: Clearly define the scope of the testing efforts, including what aspects of the application will be tested and what will not be tested. For example, specify if certain modules or features are out of scope for this testing phase.

Test Environment: Describe the test environment, including hardware, software, and network configurations. Ensure that it closely mimics the production environment to obtain accurate test results.

Testing Types: Identify the various types of testing that will be performed. This may include functional testing, performance testing, security testing, and user acceptance testing (UAT).

Test Schedule: Create a timeline for the testing activities, outlining when each type of testing will take place and the estimated duration for each phase.

Test Deliverables: Specify the documents and artifacts that will be produced during the testing process, such as test cases, test data, and test reports.

Test Risks: Identify potential risks and challenges that may impact the testing process. These could include resource constraints, data privacy issues, or external dependencies.

Test Procedures: Describe in detail the procedures for each type of testing, including how test cases will be executed, what criteria will be used to determine pass/fail, and any special considerations or prerequisites.

6.2 Test Procedure

Functional Testing: This section should outline the procedures for testing the core functionality of the healthcare data management system. It includes creating test cases based on functional requirements, executing them, and documenting the results.

Performance Testing: Explain the process for performance testing, including load testing and stress testing. Describe the scenarios, tools, and metrics used to evaluate the system's performance, scalability, and response times.

Security Testing: Detail the procedures for conducting security testing to identify vulnerabilities and ensure the confidentiality and integrity of healthcare data. This may involve penetration testing and code review.

User Acceptance Testing (UAT): Outline the UAT procedures, including how end-users will validate the system against their requirements and expectations.

Test Data Management: Describe how test data will be generated, sanitized, and managed to ensure the privacy and compliance of healthcare data.

Defect Management: Explain how defects or issues identified during testing will be reported, tracked, and resolved. Include a process for retesting and verification of fixes.

Test Reporting: Describe the format and content of test reports, including test execution summaries, defect logs, and recommendations for improvements.

Test Sign-off: Define the criteria for test completion and the process for obtaining sign-off from stakeholders, indicating that testing has been successfully completed.

6.3 Performance Outcome

In the realm of healthcare data management, achieving optimal performance outcomes is paramount to the success of any software project. The design of data management patterns plays a critical role in shaping these outcomes. Performance outcomes are essentially the results or measurements that indicate how well the chosen design patterns and architectural decisions perform in terms of data handling, processing, and system efficiency.

Key Performance Outcomes in Healthcare Data Management Pattern Design:

[1] **Data Access Speed:** One of the primary performance outcomes is the speed at which healthcare data canbe accessed. Design patterns should be evaluated based on how efficiently they enable the retrieval of patient records, medical histories, and other critical data. Faster data access translates to quicker decision-making and improved patient care.

[2] **Scalability:** Healthcare systems must be scalable to accommodate growing data volumes and user loads.Performance outcomes should assess how well the chosen design patterns allow the system to scale horizontally or vertically. Scalability ensures that the system remains responsive and efficient as data demands increase.

[3] **Data Integrity:** The integrity of healthcare data is non-negotiable. Performance outcomes should includemeasures to ensure data consistency, accuracy, and reliability. Design patterns should minimize the risk of data corruption, loss, or unauthorized access.

[4] **Throughput:** Throughput measures the rate at which data can be processed and transmitted within thesystem. The chosen design patterns should facilitate high throughput to handle the constant flow of healthcare data, including real-time monitoring, diagnostics, and communications.

[5] **Latency:** Low latency is crucial for healthcare applications, especially those involving remote consultations or telemedicine. Performance outcomes should assess the delay in data transmission andprocessing. Lower latency ensures timely healthcare interventions and patient interactions.

[6] **Resource Utilization:** Efficient utilization of system resources such as CPU, memory, and storage is essential for cost-effective healthcare data management. Design patterns should optimize resource usageto minimize operational expenses.

[7] **Fault Tolerance and Reliability:** Healthcare systems cannot afford downtime or data loss. Design patternsshould be evaluated based on their ability to ensure fault tolerance, redundancy, and high availability.

[8] Performance outcomes should reflect the system's reliability in maintaining data accessibility.

[9] **Security:** Data security is paramount in healthcare. Performance outcomes should include assessments ofhow well the design patterns protect sensitive patient information from unauthorized access, breaches, and data leaks.

[10] **Compliance:** Healthcare data management often involves adhering to strict regulatory requirements, such as HIPAA in the United States. Performance outcomes should demonstrate the system's compliancewith these regulations, ensuring that patient data is handled in a legally and ethically sound manner.

7 My learnings

- ✓ Data Challenges: We learned about the paramount importance of data privacy, security, and standardization in healthcare data management.
- ✓ Django Framework: Gained a strong grasp of the Django web framework and its utility in building secure and scalable healthcare applications.
- ✓ Testing and Quality Assurance: Prioritized comprehensive testing, enhancing application reliability and robustness.
- ✓ Version Control: Mastered Git and version control practices for effective collaboration and change tracking.
- ✓ Agile Methodology: Adopted agile principles, fostering adaptability and communication within our project.
- ✓ Team Collaboration: Effective teamwork, leveraging diverse skills, proved vital to project success.
- ✓ Data Integration Challenges: Tackled complex data integration issues with harmonization scripts and middleware.
- ✓ Performance Optimization: Conducted performance testing and profiling to optimize database queries and resource allocation.
- ✓ Conclusion: Project experience deepened our technical skills and underscored the critical role of software in enhancing healthcare data management and patient care.

8 Future work scope

- ❖ Advanced Data Integration and Analytics: By 2024, the project is expected to have integrated diverse healthcare data sources, implemented machine learning and AI for predictive analytics, and enhanced data-driven decision-making. This will result in early disease detection, personalized treatments, and improved patient outcomes.

- Enhanced User Experience and Scalability: The project will have prioritized user experience improvements, resulting in an intuitive interface. It will also demonstrate scalability to accommodate growing data volumes and user loads, ensuring accessibility and reliability.
- Compliance, Interoperability, and Positive Impact: The project will maintain strict regulatory compliance, promoting data interoperability standards for seamless data exchange. Overall, it will have a positive impact on healthcare by delivering cost-effective, secure, and data-driven solutions that improve patient care and support healthcare providers.

*** THANK YOU***