

Industrial Internship Report on Online Education Platform

Prepared by

Kanan Patel

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.

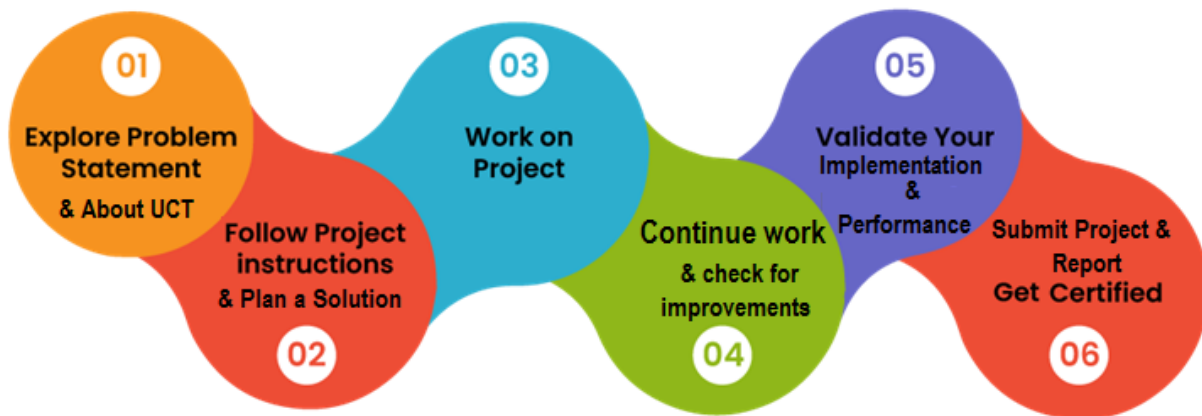
My project was an online education platform that is one of the trending cloud computing projects that can provide students with access to high-quality education from anywhere in the world. This project can be built using platforms like AWS or Google Cloud and can include features like virtual classrooms, video through conferencing, and collaboration tools.

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



Working at Uniconverge Technologies provided me with an excellent learning and growing environment. This unique model visualizes the idea that interns want to gain knowledge and put the knowledge to practice, it just comes to show that diversity of thinking experience can really enter the picture - and it can work as we see here. I got a chance to work on live projects which not only polished my technical skills but also provided a great idea about the industry standards and practices.

During my internship, I worked on different stages of cloud-based project development, from initial planning and design to deployment and maintenance. This allowed me to understand the full lifecycle of cloud solutions and appreciate the complexities and challenges involved in delivering robust and scalable cloud services.

I am grateful for the mentorship and support provided by the team at Uniconverge Technologies. Their guidance was instrumental in helping me navigate the complexities of cloud computing and in honing my problem-solving skills. The collaborative work environment and the opportunity to engage with experienced professionals have significantly contributed to my professional growth.

This report details the projects I worked on, the skills I developed, and the knowledge I gained during my time at Uniconverge Technologies. I hope it serves as a testament to the valuable experience I have acquired and my readiness to contribute to the field of cloud computing. I extend my sincere thanks to Uniconverge Technologies for this invaluable internship opportunity, and I look forward to applying the skills and knowledge gained in my future endeavors.

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.

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.



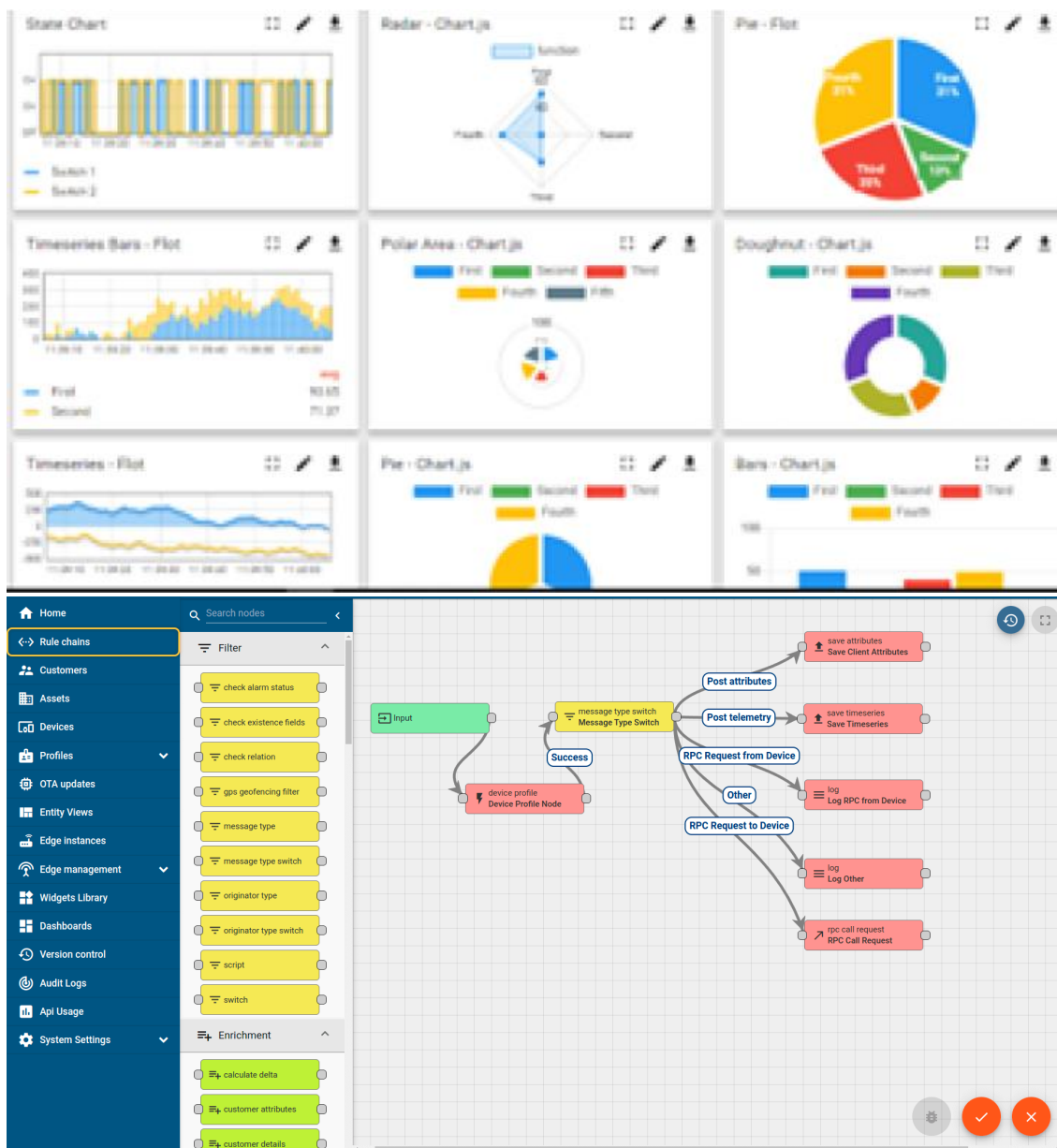
i. UCT IoT Platform ()

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

ii. 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.



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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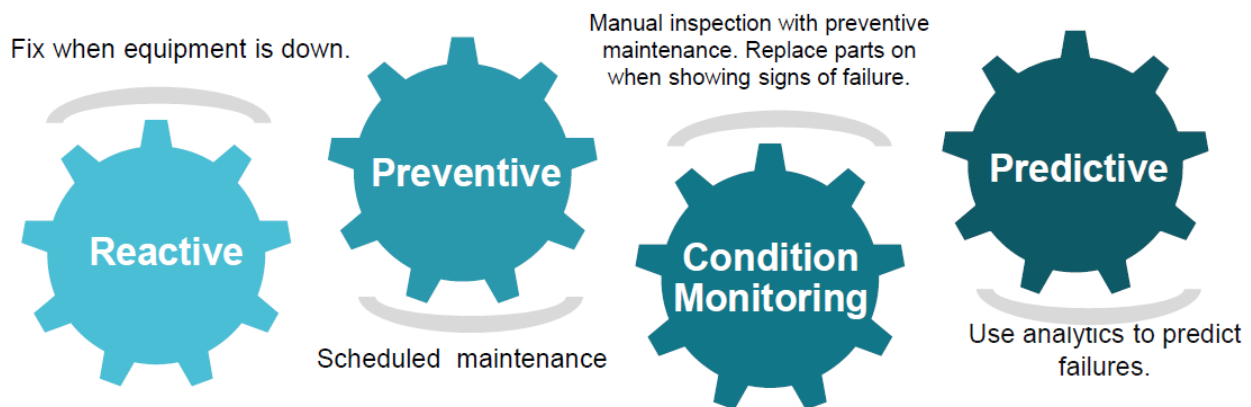


iii. LoRaWAN based Solution

UCT is one of the early adopters of LoRAWAN technology and provides solutions in Aggrotech, Smart cities, Industrial Monitoring, Smart Street Light, Smart Water/ Gas/ Electricity metering solutions etc.

iv. Predictive Maintenance

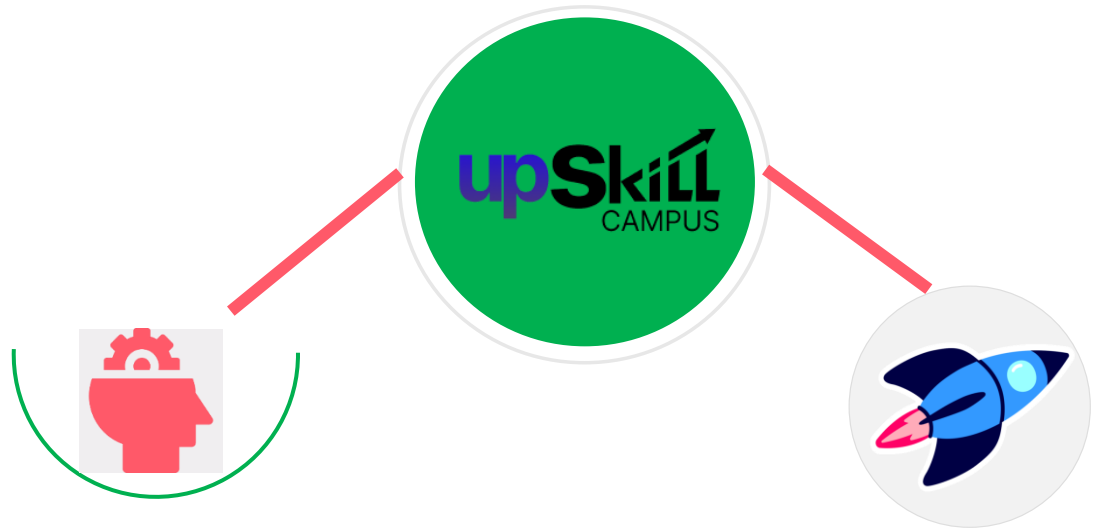
UCT is providing Industrial Machine health monitoring and Predictive maintenance solution leveraging Embedded system, Industrial IoT and Machine Learning Technologies by finding Remaining useful lifetime of various Machines used in production process.



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.

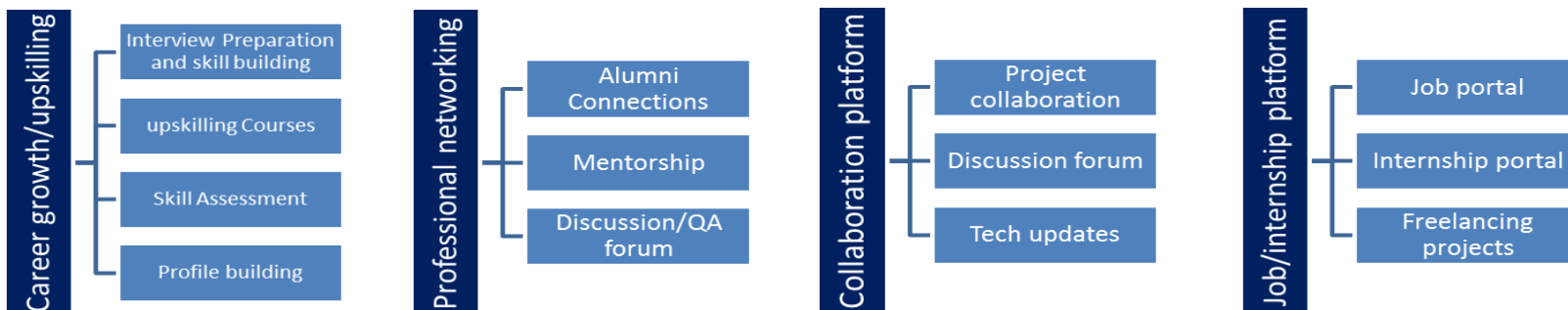
USC is a career development platform that delivers **personalized executive coaching** in a more affordable, scalable and measurable way.



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.

3 Problem Statement

The eLearning industry has seen significant growth with numerous platforms offering a wide array of courses, specializations, and learning tracks. Major platforms like Coursera, Udemy, edX, and others provide extensive educational content across various domains such as Artificial Intelligence, Computer Science, Data Science, and Software Engineering. Despite the abundance of educational resources, learners often face challenges in navigating through the vast amount of available content to find the courses best suited to their needs. Similarly, educational institutions and content providers struggle to analyze user preferences and trends effectively to enhance their offerings.

Scope:

The project will involve the following key activities:

- Extracting data from multiple directories related to eLearning platforms.
- Organizing and storing data using cloud infrastructure.
- Analyzing the data using statistical and machine learning techniques.
- Developing visual reports and dashboards to present the analysis results.
- Implementing a recommendation engine for personalized course suggestions.

4 Existing and Proposed solution

Project Overview

The project involved working with data from multiple eLearning platforms, such as Coursera, Udemy, edX, and more. The goal was to organize, analyze, and derive insights from this data to improve the company's educational offerings.

Key Responsibilities

1. Data Extraction and Organization:

- Extracted data from various directories such as Coursera-specializations, Udemy-courses, edx-programs, etc.
- Organized the data into a structured format suitable for analysis.

2. Cloud Infrastructure Management:

- Set up and manage cloud storage solutions for data hosting.
- Implemented security protocols to ensure data integrity and confidentiality.

3. Data Analysis and Reporting:

- Analyzed the data to identify trends, popular courses, and user preferences.
- Created visualizations and reports to present findings to the project team.

4. Documentation:

- Documented the processes and methodologies used during the project.
- Maintained clear and detailed records in the docs directory for future reference.

Tools and Technologies Used

- Cloud Platforms: AWS, Google Cloud, Microsoft Azure
- Data Analysis Tools: Python, Pandas, Jupyter Notebook
- Visualization Tools: Matplotlib, Seaborn
- Version Control: GitHub

Challenges Faced

- Data Volume: Managing and processing large volumes of data from multiple platforms required efficient data handling techniques.
- Data Integration: Integrating data from various sources with different structures and formats posed significant challenges.
- Cloud Security: Ensuring the security and privacy of sensitive data in the cloud environment was crucial.

Achievements

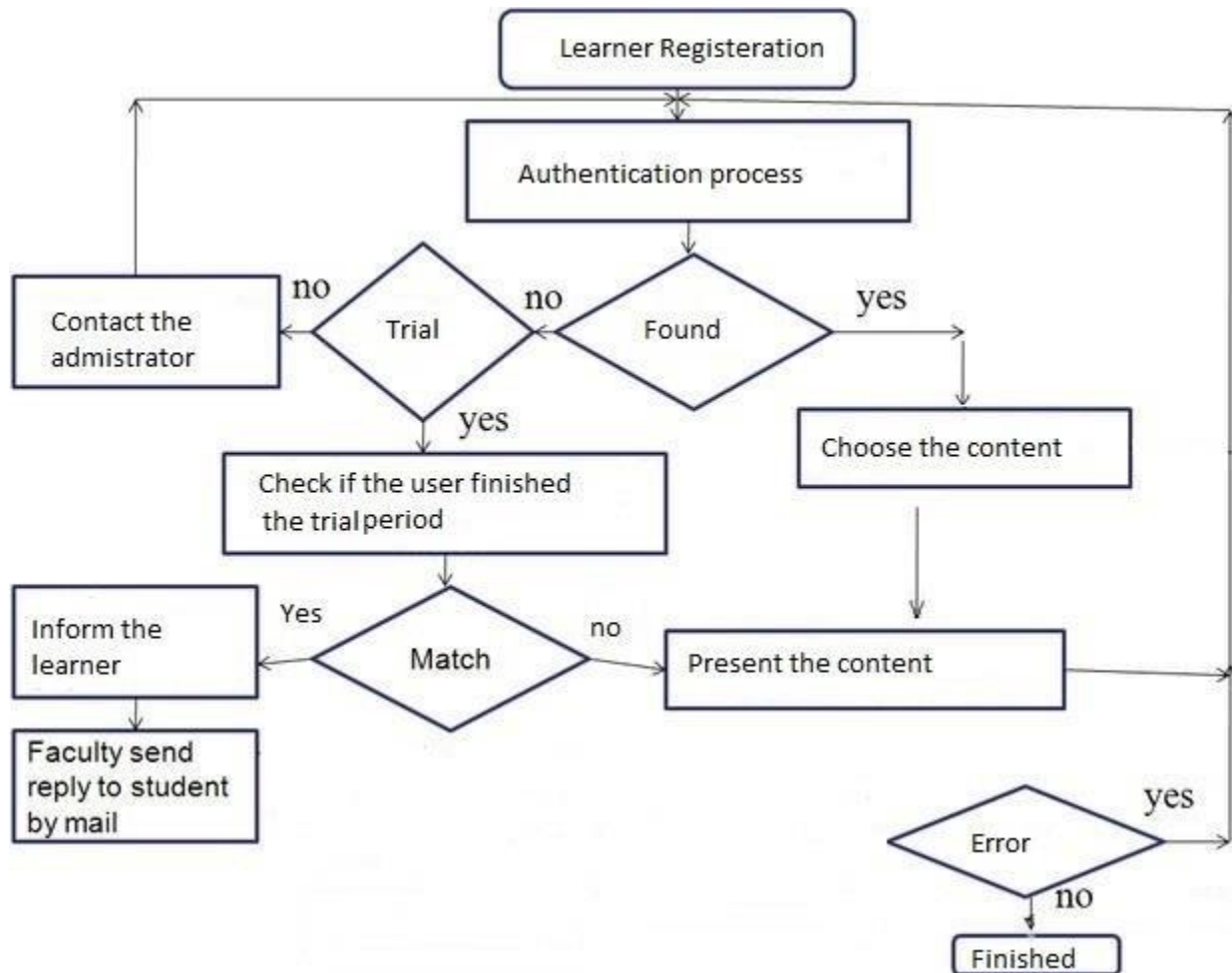
- Successfully organized and analyzed data from over ten eLearning platforms.
- Developed a comprehensive set of reports and visualizations that provided valuable insights into user behavior and course popularity.
- Improved my understanding and practical skills in cloud computing and data analysis.

4.1 Code submission (Github link)

<https://github.com/TechInnovatorKP/upskillCampus.git>

4.2 Report submission (Github link) : first make placeholder, copy the link.

5 Proposed Design/ Model



6 Performance Test

Importance of Performance Testing

Performance testing is crucial for a project that consolidates and analyzes data from multiple eLearning platforms because it ensures the system operates efficiently and reliably. The following reasons highlight the importance of performance testing in this context:

1. **Data Volume Handling:** The project involves large datasets from platforms like Coursera, Udemy, edX, and others. Performance testing ensures the system can handle high volumes of data without degradation.
2. **User Experience:** Learners and educators need quick and accurate access to course information and recommendations. Performance testing ensures the system provides a fast and seamless user experience.
3. **System Reliability:** The system must remain reliable under various loads, ensuring continuous operation and accurate data processing.
4. **Resource Management:** Efficient resource usage is critical for cost-effective cloud operations. Performance testing helps optimize the use of computational and storage resources.

Performance Testing Strategy

The performance testing strategy for the eLearning platforms data project includes several key components:

1. **Load Testing:** Simulate varying levels of data load to evaluate system performance. This involves testing current data volumes and projecting future growth.
2. **Stress Testing:** Push the system beyond its typical operational capacity to identify breaking points and ensure it can handle unexpected spikes in usage.
3. **Endurance Testing:** Run the system for extended periods to verify it can handle prolonged use without performance degradation.
4. **Scalability Testing:** Assess the system's ability to scale horizontally and vertically to accommodate increased data and user loads.

Implementation of Performance Testing

- Data Simulation: Create synthetic datasets that mimic the characteristics of real-world data from eLearning platforms. This helps test the system's ability to manage large volumes and diverse data structures.
- Automated Testing Tools: Use tools like Apache JMeter, LoadRunner, and custom scripts to automate load and stress testing. These tools simulate multiple users and data loads.
- Monitoring and Metrics: Implement monitoring tools such as AWS CloudWatch, Google Cloud Monitoring, or Prometheus to track performance metrics (e.g., response time, throughput, resource utilization) during tests.
- Analysis and Optimization: Analyze test results to identify bottlenecks and areas for improvement. Optimize system architecture, database queries, and data processing algorithms based on findings.

Real-World Industry Application

This project has significant real-world industry implications, making it much more than an academic exercise. Here's why:

1. Integrated Data Management: eLearning platforms generate extensive data. Efficiently consolidating and managing this data is essential for providing accurate and comprehensive information to users.
2. Enhanced User Experience: Fast, reliable access to course information and recommendations is crucial for a positive user experience. Performance testing ensures the system meets user expectations.
3. Scalability and Growth: As the eLearning industry grows, the system must scale to accommodate new platforms, courses, and users. Performance testing ensures the system can handle this growth effectively.
4. Cost Efficiency: Optimized resource utilization leads to cost savings, crucial for the commercial viability of the project. Performance testing helps achieve this by identifying and mitigating inefficiencies.
5. Competitive Advantage: A high-performing, reliable system attracts and retains users, providing a competitive edge and enhancing the organization's reputation.

7 My learnings

During my six-week cloud computing internship, I gained valuable insights and skills through hands-on experience with a project that involved consolidating and analyzing data from various eLearning platforms. This section outlines the key learnings and skills I developed throughout this period.

Technical Skills

1. Cloud Computing Platforms:

- AWS: Learned to set up and manage cloud infrastructure, including data storage solutions like S3 and EC2 instances for computation.
- Google Cloud: Gained experience with Google Cloud Storage and Big Query for handling large datasets.
- Microsoft Azure: Worked with Azure Blob Storage and Azure Functions for data processing.

4. Performance Testing:

- Load Testing: Learned to simulate different levels of data loads and measure system performance.
- Stress Testing: Gained experience in pushing the system beyond its normal capacity to identify breaking points.
- Monitoring: Used monitoring tools to track system performance and resource utilization.

Project Management and Documentation

1. Project Planning:

- Task Management: Developed skills in breaking down project tasks into manageable components and planning their execution.
- Time Management: Learned to prioritize tasks and manage my time effectively to meet project deadlines.

2. Documentation:

- Process Documentation: Improved my ability to document processes and methodologies clearly and comprehensively.
- Reporting: Learned to create detailed reports and presentations to communicate findings and progress to stakeholders.

Conclusion:

My internship experience has been highly enriching, equipping me with technical, analytical, and project management skills that are crucial for a career in cloud computing and data analysis. The hands-on experience with real-world data and the opportunity to work on a project with significant industry implications have been invaluable. I am confident that the skills and knowledge I have gained will serve as a strong foundation for my future endeavors in the field.

8 Future work scope

Future Scope of the Online Education Platforms Data Project

1. Enhanced Recommendation Systems:

- Personalization: Develop more sophisticated recommendation algorithms using machine learning to provide personalized course suggestions based on user behavior, preferences, and learning history.
- Adaptive Learning: Implement adaptive learning techniques that adjust the content and difficulty based on the learner's progress and performance.

2. Integration with More Platforms:

- New eLearning Platforms: Expand the data integration to include additional eLearning platforms, thus increasing the variety and richness of the dataset.
- LMS Integration: Integrate with Learning Management Systems (LMS) used by educational institutions to provide a more comprehensive view of learners' activities and progress.

3. Advanced Analytics and Insights:

- Predictive Analytics: Utilize predictive analytics to forecast trends in eLearning, such as emerging popular subjects or courses, and provide actionable insights for educators and content providers.
- Skill Gap Analysis: Analyze the data to identify skill gaps in the market and suggest new courses or learning paths that address these gaps.

4. Interactive Dashboards and Reporting:

- Real-Time Analytics: Develop interactive, real-time dashboards that provide dynamic insights and allow users to explore data and trends as they emerge.
- Custom Reports: Enable users to generate custom reports tailored to specific needs, such as institutional performance reviews or individual learner progress.

5. Scalability and Performance Enhancements:

- Distributed Computing: Implement distributed computing frameworks (e.g., Apache Spark) to handle larger datasets and more complex analysis efficiently.
- Enhanced Cloud Infrastructure: Leverage advanced cloud technologies and services to improve the scalability, reliability, and cost-effectiveness of the system. This includes utilizing serverless architectures and auto-scaling features.