**VISVESVARAYA TECHNOLOGICAL UNIVERSITY JNANA SANGAMA, BELAGAVI - 590018**



*An Internship Report on*

**Full Stack Development (E-Commerce Platform)**

*Submitted in**partial fulfilment of requirements for award of the degree of*

**Bachelor of Engineering**

**in**

**Electronics and Communication Engineering**

for **Academic Year: 2024-25**

*Submitted by*

**Kushal K V (1NT21EC072)**

Under the Guidance of

**Dr. Karunakara Rai B**

Associate Professor

Department of Electronics and Communication Engineering

**Preetha Krishnamurthy**

Intern   
Cognizant Technology Solutions, Chennai



**DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING**

**YELAHANKA, BENGALURU- 560064**

**VISVESVARAYA TECHNOLOGICAL UNIVERSITY JNANA SANGAMA, BELAGAVI - 590018**



*An Internship Report on*

**Full Stack Development (E-Commerece Platform)**

*Submitted in**partial fulfilment of requirements for award of the degree of*

**Bachelor of Engineering**

**in**

**Electronics and Communication Engineering**

for the **Academic Year: 2024-25**

*Submitted by*

**Kushal K V (1NT21EC072)**

Under the Guidance of

**Dr. Karunakara Rai B**

Professor

Department of Electronics and Communication Engineering

**Preetha Krishnamurthy**

Intern @ Cognizant Technology Solutions, Chennai



**DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING**

**YELAHANKA, BENGALURU- 560064**

Text

Description automatically generated with medium confidence

**DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING**

**BENGALURU- 560 064**

***Certificate***

Icon

Description automatically generatedCertified that the internship work titled “**Full Stack Development”** is carried out by **Kushal K V** **(1NT21EC072)**, bonafide student of Nitte Meenakshi Institute of Technology submitted in partial fulfilment for the award of Bachelor of Engineering in Electronics and Communication Engineering of Visvesvaraya Technological University, Belagavi during the academic year 2024-2025. The internship report has been approved as it satisfies the academic requirement in respect of internship work prescribed as per the autonomous scheme of Nitte Meenakshi Institute of Technology, Bangalore for the said degree.

|  |  |  |
| --- | --- | --- |
| **Signature of the Guide** | **Signature of the HoD** | **Signature of the Principal** |
| **Dr.Karunakara Rai B**  Professor  Dept of ECE, NMIT | **Dr. Parameshachari B D** HoD  Dept of ECE, NMIT | **Dr. H C Nagaraj**  Principal  NMIT |

**External Internship Viva-Voce**

**Name of Examiners Signature with Date**

**1.**

**2.**

**Project Completion Certificate/Industrial Certificate**

I, **Kushal K V (1NT21EC072)**, hereby declare that the material presented in the Project Report titled "**Full Stack Development**" represents original work carried out by me in the Cognizant Technology Solutions, Chennai during the tenure 27 March, 2025 – 18 June, 2025.

With My signature, I certify that:

* I have not manipulated any of the data or results.
* I have not committed any plagiarism of intellectual property and have clearly indicated and referenced the contributions of others.
* I have explicitly acknowledged all collaborative research and discussions.
* I understand that any false claim will result in severe disciplinary action.
* I understand that the work may be screened for any form of academic misconduct.

Date: 22/05/2025 Student Signature:

In my capacity as the supervisor of the above-mentioned work, I certify that the work presented in this report was carried out under my supervision and is worthy of consideration for the requirements of the B.E. Internship Work.

External Guide Name: Preetha K Guide Name: Dr. Karunakara Rai B

External Guide Signature Guide Signature

##### Acknowledgement

The successful execution of our internship gives us an opportunity to convey our gratitude to each one who have been instrumental in paving path to our continuation of this internship work. Whatever we have done is due to such guidance and help and we would not forget to thank them all.

We would like to thank and seek the blessings from **Dr. N R. Shetty,** Advisor, **Nitte Meenakshi Institute of Technology**, for his thrust on project-based learning and constructivist principles in our institution.

We would like to express our gratitude to the **Nitte Meenakshi Institute of Technology** and our beloved Principal **Dr. H C. Nagaraj** forproviding us the support, facilities and motivation to carry out our project.

We express our deep sense of gratitude to **Dr. Parameshachari B D**, HoD, Department of Electronics and Communication Engineering, for his kind co-operation, valuable guidance and creating the best learning environment for us.

We wholeheartedly thank our guide **Dr. Karunakara Rai B,** Professor, Department of Electronics and Communication Engineering, for his/her support and guidance anytime we require.

We also thank and share this moment of happiness with our parents who rendered us enormous support during the whole tenure of our studies at Nitte Meenakshi Institute of Technology, Bengaluru.

Finally, we would like to thank all other unnamed who helped us in various ways to gain knowledge and have a good training.

Kushal K V (1NT21EC072)

Place: Chennai

Date:22/05/2025

##### Abstract

During my internship at Amadeus Software Labs, I had the opportunity to work as a Software Development Intern in the Hospitality Solutions (HOS) department, focusing on system observability and API performance monitoring. The primary objective of my internship project was to design and implement a monitoring and visualization tool for the aCRS UI application. This included analyzing HTTP Archive (HAR) files for real-time error detection, integrating OpenTelemetry (OTEL) for request tracing, and using Prometheus and Grafana to build dashboards for system performance visualization. The initiative aimed to improve traceability, reduce troubleshooting time, and enhance the reliability of enterprise applications.

Over the course of the internship, I was actively involved in end-to-end development tasks—from setting up the development environment and working on full-stack modules using Java, Spring Boot, and Angular, to integrating log correlation with Splunk and deploying the solution in test environments using virtual machines on Ubuntu. This experience not only strengthened my technical proficiency in backend and monitoring tools but also improved my understanding of real-world software development practices and system reliability in a production-grade environment.

Through continuous collaboration with the development team and iterative feedback, I was able to contribute to a meaningful solution that aligns with the company's goals of improving user experience and system stability. This internship has laid a strong foundation for my future aspirations in software engineering, particularly in the areas of observability, distributed tracing, and performance optimization.

**Contents**

Chapter 1 Introduction

1.1 Purpose of the Internship ……..6

1.2 Internship Objectives ……..6

1.3 Company Overview ……..7

Chapter 2 Internship Activities and Responsibilities

2.1 Job Description and Tasks …….11

2.2 Hardware and Software Requirements …….12

2.3 Learning Experiences …….13

2.4 Challenges and Solutions …….14

Chapter 3 Learning Outcomes and Skills Acquired

3.1 Technical Skills ……15

3.2 Personal and Professional Skills ……16

3.3 Knowledge Gained ……17

Chapter 4 Reflection on the Internship Experience

4.1 Alignment with Expectations ……19

4.2 Most Valuable Aspects …….20

4.3 Areas for Improvement ……21

4.4 Career Clarity and Goals ……21

4.5 Final Reflections ……21

Chapter 5 Conclusion

Appendix Tables, Figures, Screenshots, Code Snippets (if any)

References Books, Tools, Articles, Documentation

##### List of Figures

[Fig 3.1 Metrics Flow through ACRS 8](#_Toc72277113)

[Fig 3.2 Request Tracing in ACRS UI 9](#_Toc72277114)

##### List of Tables

[Table 5.1 Work Plan and Timeline Table 12](#_Toc72279137)

# Chapter 1 Introduction

**1.1 Background and Context**

In today’s fast-paced digital ecosystem, real-time system observability has become a cornerstone of modern software engineering practices. As enterprise applications grow in complexity and scale, ensuring their reliability, availability, and performance is critical for delivering seamless user experiences. System observability—the ability to understand the internal state of a system based on the data it produces, such as logs, metrics, and traces—plays a pivotal role in achieving this reliability.

Modern architectures such as microservices, containerization, and cloud computing bring both scalability and challenges. Distributed systems, while powerful, are inherently difficult to monitor due to their decentralized and asynchronous nature. In such environments, issues like API latency, service failures, and connectivity breakdowns must be detected and resolved swiftly to minimize customer impact. Consequently, organizations are increasingly adopting advanced observability tools like OpenTelemetry (OTEL), Prometheus, Grafana, and Splunk to gain visibility into their systems and enable proactive troubleshooting.

Industry leaders such as Google, Netflix, and Amazon have pioneered the integration of observability into their DevOps pipelines, emphasizing its importance in ensuring system health, reducing mean time to recovery (MTTR), and enhancing user satisfaction. As a result, gaining hands-on experience with these tools is becoming indispensable for aspiring software engineers and system architects.

My internship at Amadeus Software Labs provided me with an opportunity to work on a real-world monitoring project that aligned with these trends. The project focused on building a portal to monitor API performance in the aCRS UI application using modern observability techniques. This experience not only reinforced the theoretical foundations of my engineering curriculum but also offered insights into solving complex problems in production environments using contemporary industry practices.

**1.2 Purpose of the Internship**

The primary motivation behind choosing this internship was to bridge the gap between academic knowledge and real-world applications. As a student pursuing a Bachelor of Engineering in Electronics and Communication, I have cultivated a strong interest in software systems, particularly backend development, distributed systems, and observability frameworks. While my academic curriculum laid the groundwork in programming, data structures, and systems design, I was keen to apply these concepts in a practical, enterprise-level setting.

Amadeus Labs offered a unique opportunity to work on a project involving full-stack development and system monitoring—two domains I am deeply passionate about. The role aligned perfectly with my aspiration to build a career as a backend or platform engineer, working on systems that require high reliability and operational excellence. Moreover, the emphasis on modern tools like OpenTelemetry and Grafana resonated with my goal of mastering observability platforms, which are vital in today’s cloud-native development landscape.

Another important reason for selecting this internship was Amadeus’s reputation as a global technology leader in the travel industry. Their culture of innovation, coupled with a structured approach to mentoring and training interns, provided a conducive environment for learning and professional growth. I believed that this internship would equip me not only with technical skills but also with soft skills such as teamwork, communication, and problem-solving—critical attributes for success in any tech career.

**1.3 Internship Objectives**

At the outset of my internship, I defined a set of personal and professional objectives to guide my learning journey. These objectives were designed to help me maximize the value of the internship and build a solid foundation for future roles in software engineering.

Technical Objectives:

* Gain hands-on experience in Java and Spring Boot for backend development.
* Learn frontend development using Angular to build interactive and intuitive user interfaces.
* Understand and implement observability concepts using OpenTelemetry, Prometheus, Grafana, and Splunk.
* Develop the ability to work with HTTP Archive (HAR) files and analyze network traffic for performance diagnostics.
* Build and deploy a monitoring tool that integrates with existing microservices architecture and provides real-time API performance visualization.

Professional Objectives:

* Improve collaboration and communication skills by working closely with a cross-functional team.
* Participate in sprint planning, code reviews, and daily stand-ups to understand Agile development practices.
* Learn how to deploy and test software in controlled environments using virtual machines on Ubuntu.
* Document project progress, challenges, and learnings for knowledge transfer and future reference.
* Develop problem-solving skills by debugging real-time issues and optimizing system performance based on monitoring feedback.

These objectives formed the backbone of my internship journey, ensuring that every activity and milestone contributed meaningfully to my academic learning and career development.

A computer screen shot of a diagram

AI-generated content may be incorrect.

Figure 1 Metrics flow through ACRS

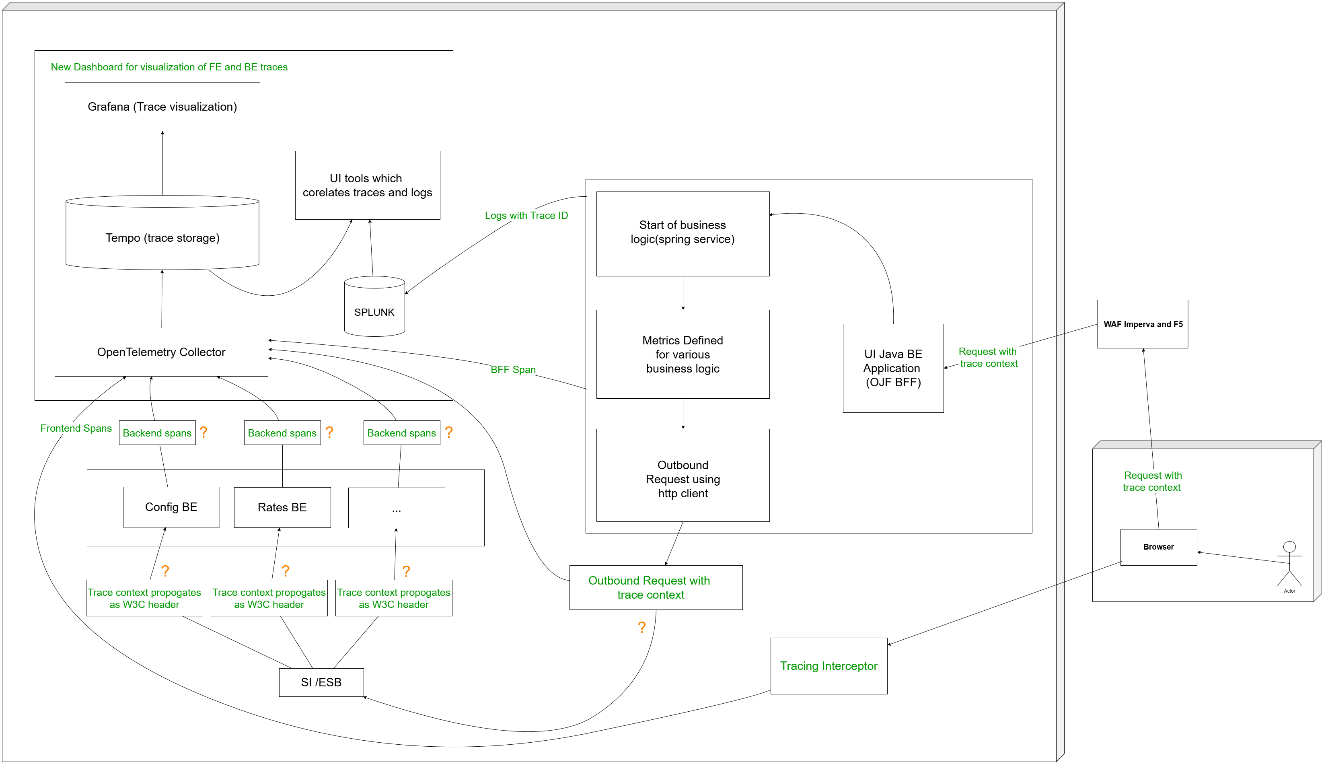


Figure 2 Request Tracing in ACRS UI

**1.4 Company Overview**

Amadeus Software Labs India Pvt. Ltd. is the Indian R&D hub of Amadeus IT Group, a global leader in travel technology solutions. Headquartered in Nice, France, Amadeus was founded in 1987 and has since become a cornerstone of digital transformation in the travel and tourism industry. The company delivers innovative, reliable, and scalable technology solutions that empower travel service providers—including airlines, travel agencies, hotels, airports, and rail operators—to enhance operational efficiency and improve customer experience.Amadeus’s comprehensive product portfolio includes airline reservation and ticketing systems, global distribution systems (GDS), airport operations management platforms, hotel property management systems, and travel agency software. These solutions are designed to handle massive volumes of real-time transactions and data exchanges across a highly interconnected travel ecosystem. The company has positioned itself at the intersection of travel and technology, using artificial intelligence, big data analytics, distributed systems, and cloud-native architectures to shape the future of the travel experience.The Indian subsidiary, Amadeus Software Labs, is located in Bengaluru, one of India’s foremost technology hubs. This center of excellence serves as a research and development nucleus, playing a vital role in building, testing, and maintaining critical components of Amadeus’s global product suite. With a strong emphasis on software engineering best practices, agile methodologies, system reliability, and continuous integration/deployment, the India lab fosters a culture of innovation and technical rigor. It is also a key contributor to Amadeus’s global vision by developing end-to-end solutions that are both robust and future-ready.Amadeus operates in over 190 countries and employs more than 17,000 professionals worldwide, fostering a diverse and inclusive work environment. The organization emphasizes employee growth, skill development, knowledge sharing, and the pursuit of technical excellence through regular internal workshops, mentoring programs, and opportunities to work on high-impact projects. This commitment to innovation and continuous learning makes Amadeus a highly sought-after workplace for aspiring technologists.

My internship with the Hospitality Solutions (HOS) division of Amadeus Software Labs allowed me to engage with real-world engineering challenges related to system observability, monitoring, and performance optimization. Working in this environment exposed me to the complexities of developing enterprise-scale solutions while reinforcing my skills in full-stack development, distributed tracing, and log analytics. More importantly, it gave me a front-row seat to witness how technology can revolutionize global travel by ensuring seamless, responsive, and reliable service delivery.

Amadeus’s forward-looking approach, combined with its global impact and commitment to engineering excellence, made it an ideal organization for me to gain professional exposure, grow as a software engineer, and align my learning with industry best practices**.**

# Chapter 2 Internship Activities and Responsibilities

**2.1 Job Description and Tasks**

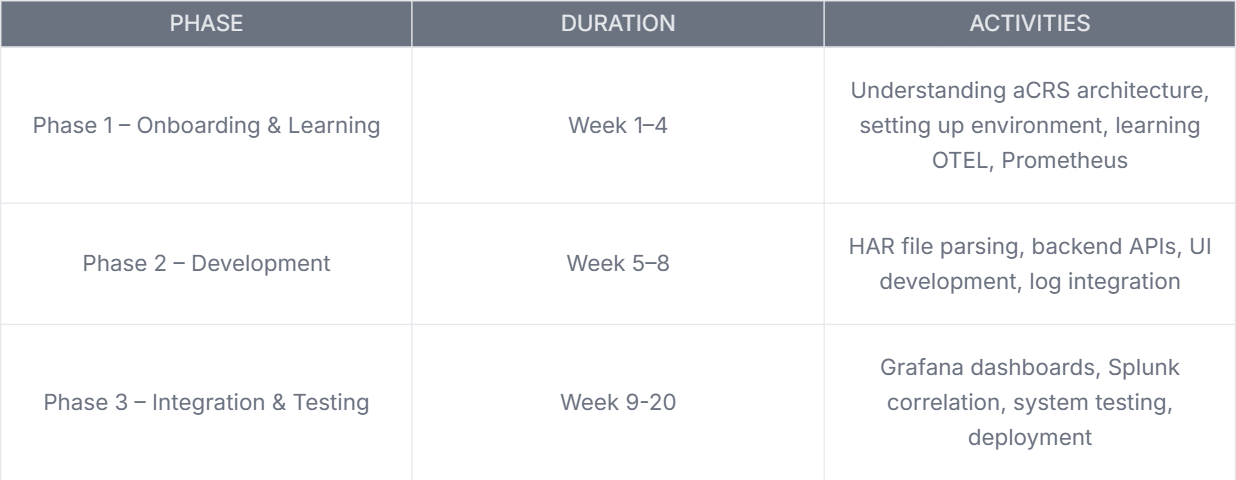
During my internship at Amadeus Software Labs, I was designated as a Software Development Intern under the Hospitality Solutions (HOS) department. I worked primarily on the aCRS UI Monitoring Project, which aimed to improve observability across distributed systems by building a performance monitoring and visualization tool for internal API systems.

My responsibilities covered the entire software development lifecycle—ranging from requirement gathering to development, testing, and deployment. Specifically, I contributed to:

* Analyzing HAR (HTTP Archive) Files to extract and visualize network-level request data and errors.
* Developing backend services using Java and Spring Boot for handling file uploads, parsing HAR files, and integrating APIs.
* Building a frontend using Angular for user interaction, enabling users to upload HAR files, view logs, and analyze request-response patterns.
* Implementing OpenTelemetry (OTEL) tracing for distributed systems monitoring and enhancing traceability of API calls.
* Creating dashboards in Grafana, integrated with Prometheus, to visualize key performance indicators such as API response times, failure rates, and connectivity issues.
* Correlating logs using Splunk to support real-time error tracking and root cause analysis through Transaction IDs and Correlation IDs.

I collaborated closely with my mentor and a small development team through daily stand-up meetings and sprint planning sessions. Regular code reviews and demo sessions helped me stay aligned with project objectives and maintain code quality standards.

Table 1 Work Plan and Timeline Table



**2.2 Hardware and Software Requirements**

Throughout the internship, I used and enhanced my proficiency in various tools, programming languages, and development platforms. Below is a breakdown of key technical and soft skills:

**Technical Skills and Tools Used**

* **Programming Languages:** Java (Spring Boot), TypeScript (Angular)
* **Frontend Framework:** Angular CLI with component-based architecture
* **Backend Framework:** Spring Boot with RESTful API design
* **Monitoring Tools:**
  + **OpenTelemetry (OTEL)** – for request tracing
  + **Prometheus** – for storing time-series metrics
  + **Grafana** – for dashboard creation and metric visualization
* **Log Analysis Tool:** Splunk – to analyze log data and correlate with user sessions
* **Version Control:** Git and GitHub – for collaborative coding and version management
* **Operating System:** Ubuntu Linux – development and deployment environment
* **Virtual Machines:** HPE VMs for sandbox testing of the developed tool

**Soft Skills Developed**

* Agile development principles (scrum, sprint planning)
* Communication skills during code review discussions
* Documentation practices for maintainable code
* Collaboration through pair programming and team meetings
* Time management to meet iterative deadlines

This diverse toolset and environment allowed me to experience a full-stack development workflow, understand the structure of enterprise-level applications, and strengthen my ability to contribute effectively to large-scale software systems.

**2.3 Learning Experiences**

The internship served as a bridge between academic learning and practical application. My most significant technical learnings included:

* **Understanding Microservices and Distributed Systems:** I gained insight into how microservices interact, and how tracing tools like OTEL help visualize these interactions.
* **End-to-End Monitoring Architecture:** Learning how different monitoring tools interconnect—such as Prometheus for metric collection and Grafana for visualization—gave me a holistic view of observability systems.
* **Data-Driven Debugging:** By using HAR files and log correlation, I learned to perform deep-dive analyses of API failures and latency issues.
* **Frontend and Backend Synergy:** Working on both sides of the stack enhanced my understanding of how data flows between the user interface and backend services.

On the professional side, I experienced tremendous growth in:

* **Team Collaboration:** I learned how to work efficiently in a team, take ownership of components, and communicate clearly with peers and mentors.
* **Problem-Solving:** Whether debugging a misbehaving service or optimizing a query, the ability to methodically approach problems improved significantly.
* **Adaptability:** Working with new tools like Splunk and OTEL, which I hadn’t used before, taught me to learn technologies quickly and integrate them effectively.

This experience has helped me build a strong foundation for a future role in backend or platform engineering, especially in teams that prioritize system reliability and observability.

**2.4 Challenges and Solutions**

No software project is free from challenges, and my internship experience at Amadeus Software Labs was no exception. However, each obstacle presented a valuable opportunity for learning, problem-solving, and skill enhancement. Overcoming these technical and functional challenges not only tested my resilience and adaptability but also helped me understand the importance of structured debugging, collaboration, and critical thinking in a real-world development environment. Below, I detail some of the most significant challenges I faced and how I tackled them.

**Challenge 1: Parsing Large HAR Files**

**Problem:**  
The HTTP Archive (HAR) files used in the aCRS UI Monitoring tool often contained thousands of HTTP requests and responses. During initial testing, parsing these large files on the backend led to high memory usage, which resulted in performance slowdowns and occasionally even service crashes. This was a serious concern, as the system needed to process user-submitted HAR files in near real-time to provide immediate feedback.

**Solution:**  
To address this, I redesigned the HAR file parser using **stream processing techniques**, which allowed data to be read and processed incrementally, rather than loading the entire file into memory at once. This approach drastically reduced the memory footprint and improved response times. I also implemented **early validation checks** to identify malformed or unsupported files before parsing, which reduced unnecessary processing and improved system reliability. These improvements made the backend service significantly more efficient and scalable.

**Challenge 2: Data Inconsistency Between Observability Tools**

**Problem:**  
In the early stages of integration, there were inconsistencies between the data reported by different observability tools. For instance, **metrics in Prometheus** sometimes did not align with **tracing information from OpenTelemetry**, or the **logs retrieved from Splunk** lacked reference points for correlation. This inconsistency made it difficult to trace the flow of a request across services or identify the root cause of a system failure.

**Solution:**  
After a detailed investigation, I discovered that the root of the problem was the absence of a **common identifier** linking data across these tools. To solve this, I introduced a mechanism to generate and propagate a **unique Transaction ID** and **Correlation ID** across all requests at the middleware level. These IDs were passed through HTTP headers and logged consistently across all observability tools. This strategy ensured a single transaction could be tracked from start to finish, allowing for **end-to-end correlation** of metrics, traces, and logs. As a result, debugging became significantly more effective, and system transparency improved.

**Challenge 3: Grafana Dashboard Optimization**

**Problem:**  
The initial versions of the **Grafana dashboards** were functional but lacked clarity and ease of use. Panels were cluttered, important metrics were buried among less relevant ones, and color schemes did not effectively convey system status at a glance. For developers and support teams relying on these dashboards to identify issues quickly, this was a major usability bottleneck.

**Solution:**  
I undertook a **dashboard refactoring initiative** to improve readability and relevance. I reorganized metrics into logical groupings (e.g., latency, error rates, throughput), added **color-coded thresholds** to indicate healthy or critical values, and simplified panel layouts to highlight the most important metrics. Additionally, I used **templating features and dynamic variables** in Grafana to allow users to filter views based on service type, time range, or error type. These enhancements drastically improved the dashboard's usability, reduced cognitive load for users, and enabled faster identification of anomalies.

**Challenge 4: Integrating Tracing with Legacy APIs**

**Problem:**  
A significant portion of the aCRS system comprised **legacy APIs** that were not originally built with observability in mind. These APIs did not support **OpenTelemetry headers** required for end-to-end traceability, which created blind spots in the trace data. This posed a challenge to building a comprehensive monitoring solution.

**Solution:**  
Working alongside the backend team, I identified a strategic location within the **middleware layer** of the API gateway where trace headers could be injected. This allowed us to instrument trace context propagation without needing to rewrite legacy services themselves. By updating the gateway to automatically inject OTEL-compatible trace and span IDs, we enabled these older APIs to participate in distributed tracing **without disrupting existing logic or contracts**. This lightweight solution maintained system stability while extending observability coverage across the entire stack.

# Chapter 3 Learning Outcomes and Skills Acquired

The internship at Amadeus Software Labs proved to be a transformative experience, both technically and professionally. Working on a real-world software system within a corporate environment provided a unique opportunity to apply academic knowledge, develop hands-on skills, and build a professional mindset essential for succeeding in the tech industry. This chapter highlights the technical competencies, soft skills, and industry knowledge I gained throughout the internship.

**3.1 Technical Skills**

The core focus of my internship project was the development of a **monitoring and visualization tool** for API performance tracking. This allowed me to work across the entire software development stack and become proficient in several industry-relevant technologies. Below are some key technical skills that I significantly improved or acquired:

**Full-Stack Development (Java & Angular)**

My role required building both the backend and frontend for the project. On the backend, I used **Java with Spring Boot** to develop RESTful APIs that handled HAR file processing, log integration, and data transformation. This helped me strengthen my understanding of:

* Object-Oriented Programming (OOP) principles
* API design and response modeling
* Data parsing and transformation logic
* Service integration patterns

On the frontend, I used **Angular**, which allowed me to develop dynamic user interfaces. I became comfortable with component-based architecture, TypeScript, form handling, routing, and HTTP client services.

**Observability Tools**

One of the most valuable aspects of my internship was the exposure to **observability tools**, which are crucial in modern software development:

* **OpenTelemetry (OTEL):** I learned to instrument services for distributed tracing. It helped me understand how to track the journey of API requests across microservices and identify performance bottlenecks.
* **Prometheus:** I used Prometheus to collect, query, and manage performance metrics. This involved writing custom metrics exporters and integrating time-series data into dashboards.
* **Grafana:** With Grafana, I created real-time dashboards that visualized system health. I worked with various panels, data sources, and query customization to present critical system indicators.
* **Splunk:** I utilized Splunk to fetch and analyze system logs, performing root cause analysis using Correlation IDs and timestamps.

**DevOps and Environment Management**

I also gained experience with **Ubuntu Linux** environments and **HPE virtual machines**, which were used to test and deploy our monitoring tool. This included:

* Configuring system environments
* Testing services under simulated API failure conditions
* Performing command-line operations for log analysis and service monitoring

**Version Control & Agile Methodology**

All development was managed using **Git** and **GitHub**. I contributed to code repositories, used feature branches, and managed pull requests. Agile development practices were followed through **daily stand-ups, sprint planning**, and **retrospective meetings**, which helped me understand iterative and collaborative development models.

**3.2 Personal and Professional Skills**

Beyond the technical skills, the internship contributed significantly to my personal growth and professional development. Working in a corporate environment with real-world expectations taught me a great deal about teamwork, accountability, and effective communication.

**Communication Skills**

One of the most important soft skills I honed during this internship was **clear and effective communication**. Whether it was presenting weekly updates, participating in stand-up meetings, or discussing feedback during code reviews, I learned to articulate my ideas precisely and confidently. My mentor emphasized documenting technical challenges and decisions, which helped me improve my written communication as well.

**Team Collaboration**

The project involved collaboration with cross-functional teams including backend engineers, DevOps professionals, and product stakeholders. This experience helped me:

* Learn to give and receive constructive feedback
* Understand group dynamics in an Agile environment
* Coordinate tasks efficiently to meet sprint goals
* Respect different perspectives and roles within a development cycle

**Time Management and Prioritization**

Interning in a fast-paced environment required me to balance learning with deliverables. I learned to **prioritize tasks**, estimate time for feature completion, and adjust my approach when faced with unforeseen blockers. Tools like **Jira** (used internally) helped me understand how tasks are tracked and how to manage deadlines effectively.

**Problem-Solving and Adaptability**

The development of a monitoring tool often involved unforeseen technical challenges—from parsing malformed files to dealing with data inconsistencies between systems. Each of these problems required a structured approach to identify root causes, explore alternatives, and implement practical solutions. Over time, I developed a problem-solving mindset that relied on:

* Breaking complex issues into smaller tasks
* Researching documentation and community forums
* Reaching out to team members when needed
* Testing and iterating based on feedback

This ability to adapt and respond effectively to real-world issues has been one of the most valuable lessons of my internship.

**3.3 Knowledge Gained**

This internship has significantly expanded my understanding of software engineering as a discipline and introduced me to the practical application of many concepts learned during my undergraduate program. It also deepened my appreciation of the travel and hospitality tech domain.

**System Observability and Monitoring**

Prior to the internship, I had a theoretical understanding of how systems generate logs and metrics. However, this experience allowed me to **apply those concepts practically**, particularly in designing monitoring architectures that involve log correlation, trace analysis, and metric visualization. I now understand the importance of:

* Instrumenting APIs for distributed tracing
* Visualizing system health through dashboards
* Reducing MTTR by proactively identifying and resolving system failures

**Microservices Architecture**

By working with distributed systems, I gained an appreciation for the challenges and benefits of **microservices**. I learned how observability tools provide visibility across services, how service failures propagate, and how centralized logging and tracing help maintain system reliability.

**End-to-End Development Lifecycle**

The internship also helped me understand the **complete software development lifecycle (SDLC)**—from requirement gathering and development to testing, deployment, and maintenance. It was fascinating to see how even small modules go through rigorous testing, logging, and performance monitoring before they are deployed.

**Theory Applied in Practice**

Several theoretical concepts from my coursework were applied directly:

* **Data Structures and Algorithms:** Efficient parsing of HAR files, stream processing, and managing data formats required a strong grasp of data structures.
* **Computer Networks:** Understanding HTTP requests, latency, and connection issues directly tied back to networking fundamentals.
* **Software Engineering Principles:** Concepts like modular design, reusability, version control, and Agile development were put into practice throughout the internship.

In summary, the internship at Amadeus Software Labs has been a major milestone in my academic and professional journey. It provided a platform to translate theory into practice, learn from industry experts, and contribute meaningfully to a real-world system. The skills and knowledge I gained have strengthened my confidence and prepared me for the next phase of my career in software development.

### 

# Chapter 4 Reflection on the Internship Experience

An internship is often considered a bridge between the academic environment and the professional world. For me, the internship at **Amadeus Software Labs** was not only a platform to apply my academic knowledge but also an eye-opening journey that deepened my understanding of the software industry, exposed me to cutting-edge technologies, and helped shape my career ambitions. This chapter offers a holistic reflection on the experience—examining the alignment with expectations, key takeaways, areas of improvement, and its impact on my future goals.

**4.1 Alignment with Expectations**

Before beginning the internship, my primary expectations were centered around **gaining practical experience in software development**, **working in a professional corporate environment**, and **getting exposure to modern tools and workflows** used in system monitoring and performance engineering. I anticipated a learning curve but hoped that the role would challenge me in meaningful ways.

The internship experience **surpassed these expectations** in multiple dimensions:

* I was not confined to a narrow scope of tasks but was actively involved in full-stack development.
* I was given **ownership** over certain modules and encouraged to explore and implement new ideas independently.
* I had the opportunity to **collaborate with experienced engineers**, participate in **Agile ceremonies**, and attend knowledge-sharing sessions that exposed me to areas beyond my immediate project.

One of the best aspects of the internship was that it struck a balance between being **structured and flexible**. While there were clear project goals and milestones, I was also given the freedom to research, propose improvements, and contribute to architectural decisions. This autonomy significantly enhanced the learning experience and made the internship feel aligned with a real-world job.

**4.2 Most Valuable Aspects of the Internship**

Among the many learnings, a few experiences stood out as particularly impactful:

**Exposure to Real-World Technologies**

Hands-on experience with tools such as **OpenTelemetry**, **Prometheus**, **Grafana**, and **Splunk** was extremely valuable. These tools are widely used in industry for observability and performance monitoring, and understanding their role in real-world systems gave me a head start in this niche domain. I now have a solid grasp of distributed tracing and system observability—skills that are highly sought-after in today’s job market.

**End-to-End System Understanding**

Unlike many internships where students are assigned limited tasks, I was involved in the **entire lifecycle of a project**—from initial architecture and UI planning to backend development, testing, and deployment. This helped me develop a holistic understanding of how software systems are built and maintained in enterprise environments.

**Mentorship and Team Collaboration**

My mentor played a critical role in ensuring a productive internship experience. Constructive feedback, timely guidance, and weekly one-on-one sessions contributed to my growth. Additionally, collaborating with team members taught me how to communicate effectively, respect deadlines, and manage feedback without ego.

**Learning Through Problem Solving**

Some of the most memorable learnings came from facing and overcoming challenges—whether it was optimizing HAR file parsing or debugging mismatches between logs and performance metrics. These scenarios taught me how to approach problems methodically, test hypotheses, and document my solutions for future use.

**4.3 Areas for Improvement**

While the internship was largely successful and fulfilling, there were areas where both the program and my own performance could be improved.

**In the Internship Program**

* **Onboarding Documentation:** Initially, setting up the environment and understanding the existing system architecture was time-consuming due to limited internal documentation. A structured onboarding guide or a knowledge base would have helped accelerate the ramp-up process.
* **Cross-Project Exposure:** Although I was deeply involved in my assigned project, it would have been valuable to get a brief exposure to other projects running within the department to understand the broader technical landscape at Amadeus.

**In My Own Performance**

* **Better Time Tracking:** Early in the internship, I found it difficult to estimate how long certain tasks would take, which affected my time management. As the internship progressed, I learned to break tasks into smaller units and assign realistic timelines. However, more proactive planning at the start would have enhanced my productivity.
* **Deeper Research Before Implementation:** At times, I began implementation after a brief understanding of the tools or libraries involved. While this worked in some cases, it occasionally led to inefficiencies or rework. I realized the value of thorough initial research and am committed to applying this learning in future projects.

Despite these minor areas for improvement, I believe the iterative nature of the internship allowed me to grow and adapt quickly.

**4.4 Career Clarity and Future Goals**

One of the most lasting impacts of this internship has been the **clarity it brought to my career path**. While I entered the internship with an interest in backend development, I now realize how drawn I am to roles that combine **backend systems, distributed architectures, and observability tools**. I find satisfaction in building systems that are not just functional, but reliable, maintainable, and easy to debug in real-time environments.

Through this experience, I have gained confidence in pursuing roles such as:

* **Backend Developer**
* **Platform or Observability Engineering**

Additionally, I now understand the importance of **continuously learning new tools and contributing to system-wide improvements**, rather than focusing solely on feature development. This realization has encouraged me to seek out further learning opportunities—through certifications, open-source contributions, or academic projects—in areas like monitoring, logging, cloud-native architectures, and DevOps practices.

The internship has also helped me reflect on **what kind of work culture and team structure I thrive in**. I enjoy collaborative teams that support experimentation, offer mentorship, and value technical curiosity.

## 

# Chapter 5 Conclusion

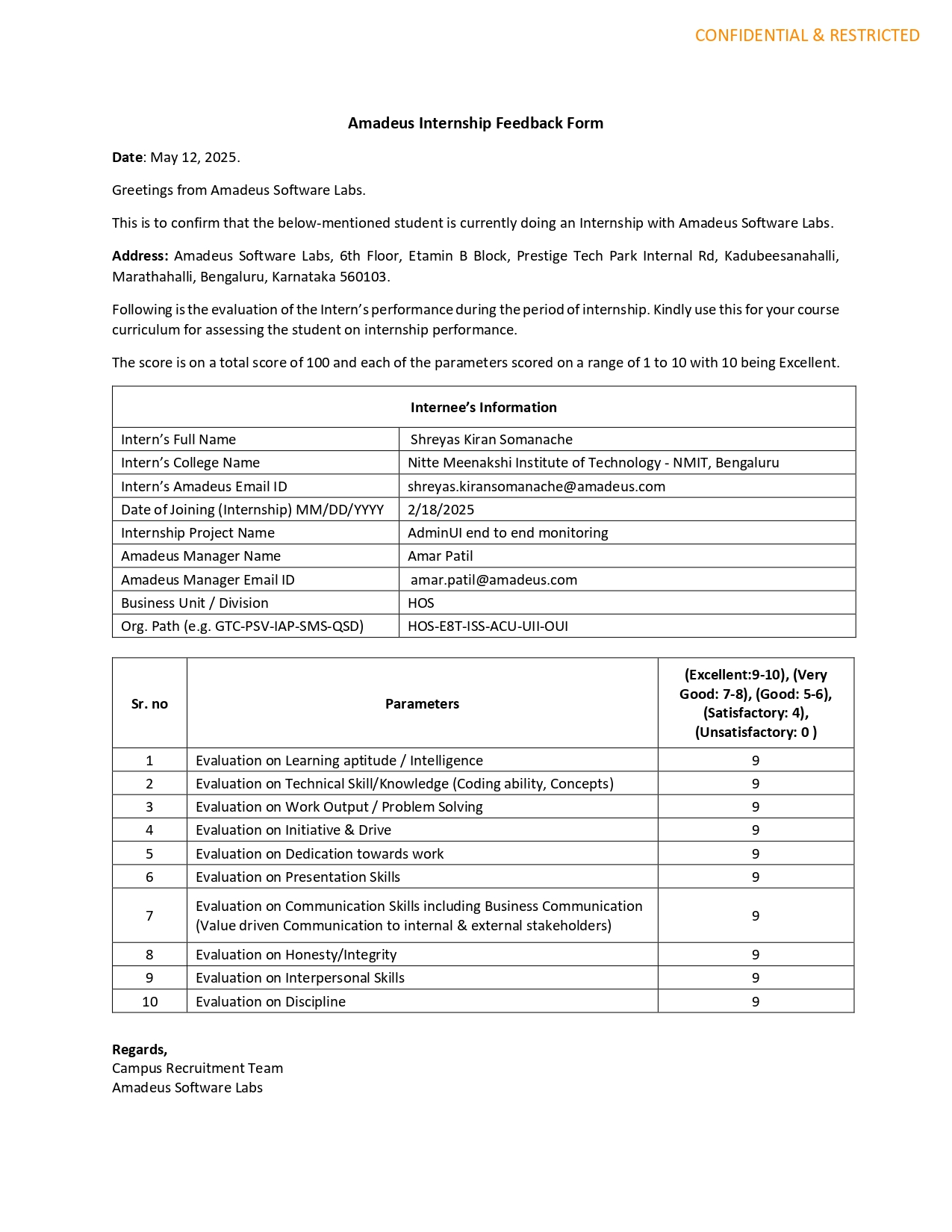
The internship at Amadeus Software Labs was a highly enriching experience that allowed me to bridge the gap between academic learning and real-world software development. Key takeaways include gaining hands-on experience with full-stack development using Java and Angular, mastering observability tools like OpenTelemetry, Prometheus, Grafana, and Splunk, and understanding the importance of system monitoring in ensuring reliability and performance in enterprise applications. Beyond technical skills, I also developed essential professional competencies such as teamwork, effective communication, and structured problem-solving within an Agile environment.

This experience has significantly influenced my career trajectory by reinforcing my interest in backend development, system architecture, and observability engineering. Moving forward, I aim to pursue roles that focus on platform reliability, performance optimization, and scalable system design. I also plan to enhance my expertise through further learning—be it advanced certifications, contributing to open-source projects, or undertaking academic research in system monitoring and distributed systems. This internship has laid a strong foundation for my future in software engineering and given me the confidence to take on more complex challenges in the tech industry.

**References**

* Amadeus Internal Confluence pages related to work process and guides.
* Jira Tickets Related to the project.

**Internship Completion Certificate from the Company**



##### 