Engineering Team Internship Zomato

Submitted In Partial Fulfillment of Requirements
For the Degree Of

Bachelor of Technology
In
Computer Engineering

By
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2021-25

Somaiya Vidyavihar University

K. J. Somaiya School of Engineering

Certificate

This is to certify that the Internship report entitled **Engineering Team Internship** completed at **Zomato** during **6th January to 4th July** submitted by **Pargat Singh Dhanjal** at the end of semester VIII of LY B. Tech is a bona fide record for partial fulfillment of requirements for the degree of Bachelors in Technology in Computer Engineering of Somaiya Vidyavihar University.

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Internship Internal Mentor

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Internship External Mentor

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Head of the Department

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Principal

Date: 13-05-2025

Place: Mumbai-77

Somaiya Vidyavihar University

K. J. Somaiya School of Engineering

Certificate of Approval of Examiners

We certify that this Internship report entitled **Engineering team Internship** is bona fide record of internship work done by **Pargat Singh Dhanjal** during semester VIII. This internship work is submitted at the end of semester VIII in partial fulfillment of requirements for the degree of Bachelors in Technology in Computer Engineering of Somaiya Vidyavihar University.

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Internal Mentor

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External/Internal Examiners

Date: 13-05-2025

Place: Mumbai-77

DECLARATION

I declare that this written internship report submission represents the work done based on our and / or others' ideas with adequately cited and referenced the original source. I also declare that I have adhered to all principles of intellectual property, academic honesty and integrity as we have not misinterpreted or fabricated or falsified any idea/data/fact/source/original work/ matter in my submission.

I understand that any violation of the above will be cause for disciplinary action by the college and may evoke the penal action from the sources which have not been properly cited or from whom proper permission is not sought.

Signature of the Student

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Roll No.

Date: 13-05-2025

Place: Mumbai-77

Internship Completion Certificate

(Certificate received by Organization can be attached here)

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TO WHOM IT MAY CONCERN

This is to certify that **Pargatsingh Jaspalsingh Dhanjal (ZI3623)** was working at Eternal Limited from **06-Jan-2025** to **06-Jun-2025**. The last designation held by them was **Intern** in the **Engineering** team.

We thank them for their contribution and wish them the very best in all their future endeavors.

For and on behalf of Eternal Limited,

Daminee!!

Daminee Sawhney
Vice President - Operations

ETERNAL LIMITED *(Formerly known as Zomato Limited)*
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Abstract

This report documents an internship experience at Zomato, with a focus on contributions made across the Security and Web Platform teams. The internship was structured into two distinct phases, each offering hands-on exposure to real-world challenges in cybersecurity and backend development.

During the first phase, work was undertaken as part of the Security Team, focusing on the maintenance and enhancement of internal security tools developed in Ruby. Responsibilities included deep analysis of legacy codebases, identification and resolution of potential security gaps, and implementation of updates to ensure continued efficiency and protection within Zomato's infrastructure.

In the second phase, efforts shifted to the Web Platform Team, with involvement in building backend services for a new vertical at Zomato. Tasks included the design and development of scalable, secure, and high-performance services using Golang. Additionally, work was done on the frontend development of internal dashboards for Hyperpure's inventory management system. These dashboards visualized key operations such as inwarding, packaging assembly lines, order metrics, and system-wide inventory tracking.

Key outcomes of the internship include enhanced security tools, efficient backend service components, and impactful internal tools that support operational transparency and efficiency. The experience reinforced strong software engineering principles, collaborative development practices, and a solid understanding of secure, scalable backend architecture and user-focused frontend development.

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Chapter 1

Introduction and Motivation

1.1 Background

The internship at Zomato provided a valuable opportunity to gain industry-level experience in cybersecurity, backend engineering, and frontend development. The internship was divided into two distinct phases. In the first phase, I worked with the Security Team, focusing on enhancing internal security tools written in Ruby. This involved understanding the legacy codebase, identifying vulnerabilities, and implementing improvements to ensure the tools remained efficient and aligned with evolving security standards.

In the second phase, I transitioned to the Web Platform Team, where I contributed to building backend services for a new vertical at Zomato. My responsibilities included designing scalable services in Go, implementing secure authentication systems, and optimizing data flow between systems. Additionally, I contributed to frontend development by building internal dashboards for Hyperpure's inventory management system, enhancing operational visibility and efficiency.

1.2 Motivation

With the increasing complexity of web applications and the ever-growing cyber threats, it has become crucial for organizations to implement robust security frameworks and efficient backend architectures. This internship presented an opportunity to gain practical exposure to these domains. My goal was to enhance my understanding of security tools, learn the principles behind robust authentication systems, and gain hands-on experience building efficient backend and frontend systems. The challenges involved—ranging from revamping a legacy Ruby-based security tool to designing performant services in Go and developing user-centric dashboards—were crucial in shaping my understanding of full-stack engineering practices. The experience not only allowed me to contribute to improving security measures at Zomato but also helped me develop a solid understanding of backend architecture, data synchronization techniques, and system design.

1.3 Scope of Work

The internship covered a wide range of tasks, broadly categorized into three areas:

- **Security Tooling:** Focused on enhancing existing security tools in Ruby, incorporating new functionalities, and integrating dashboards to streamline internal security workflows. This involved working with legacy codebases, analyzing existing implementations, and improving security tools to align with current best practices.

- **Web Platform Team Work:** Played a crucial role in the development of a new product vertical at Zomato by designing the system architecture, implementing data synchronization services, developing authentication mechanisms, and building scalable backend workflows using Go. The work required deep collaboration with multiple teams to ensure seamless integration and high-performance execution of backend services.

- **Frontend Dashboards**: Development of operational dashboards for Hyperpure's inventory system, visualizing metrics like inwarding, packaging workflows, and inventory status, which helped drive informed decision-making.
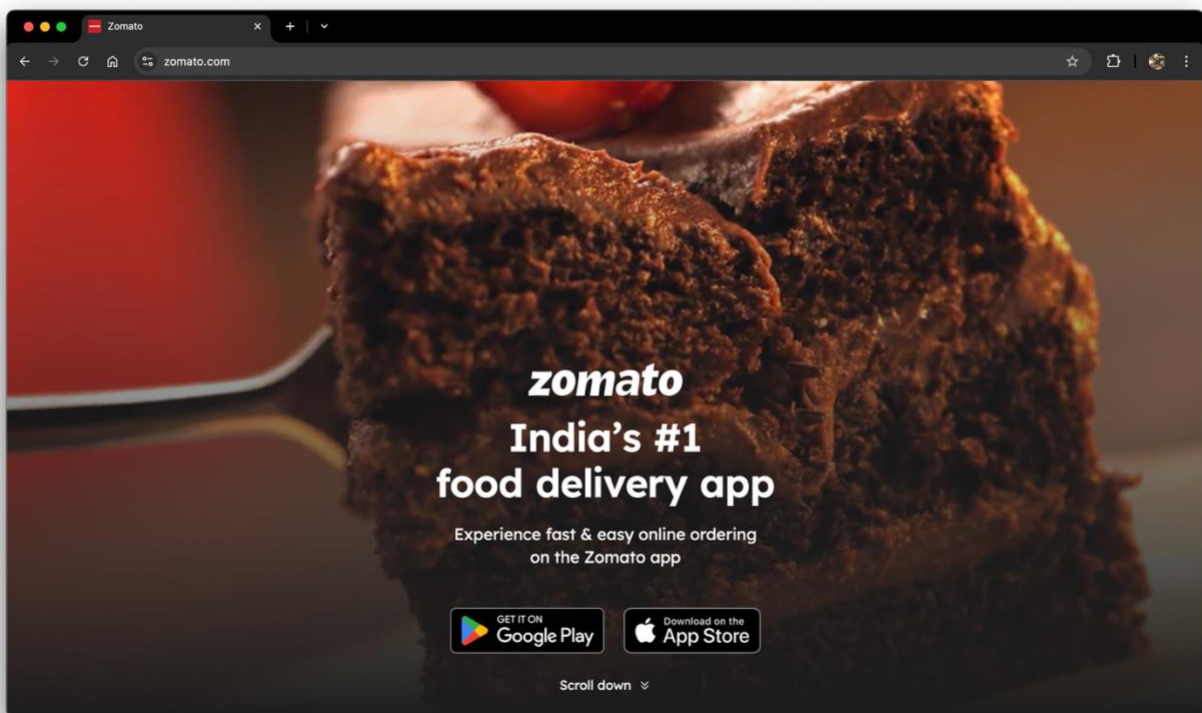
Chapter 2

Concept of the Internship

2.1 Literature Survey

To establish a strong foundational understanding of the security tools and backend services currently in use, extensive reference was made to internal documentation covering various critical topics. This process was instrumental in comprehending the existing system architecture, including authentication mechanisms, data synchronization workflows, and established security best practices. By carefully analyzing this documentation, a clearer picture of the infrastructure emerged, allowing for an informed approach to the internship tasks. This review was foundational for ensuring that enhancements and contributions aligned with the company's architecture and standards.

2.2 Understanding the Systems

System comprehension involved examining the interplay between various backend services, including how they handled security, authentication, and data flow. It also required understanding the architecture supporting internal tools such as dashboards used by the operations team.

One of the key aspects of the internship was gaining an in-depth understanding of the security and backend systems that were already in place. This required a thorough analysis of how authentication processes were managed, the implementation of security workflows, and the intricate ways in which different backend services communicated and interacted with one another. Understanding these components was essential for effectively contributing to system improvements and security enhancements.

2.3 Objectives

The internship was structured around the following key objectives:

- To gain a comprehensive understanding of the security tools and backend infrastructure currently deployed within the organization.
- To actively contribute to the enhancement, optimization, and development of security and backend systems.
- To identify and implement improvements aimed at increasing the efficiency, scalability, and overall security of the tools and services in use.
- Build user-friendly, real-time dashboards for internal use by operational teams.
- Gain practical exposure to large-scale distributed system design.
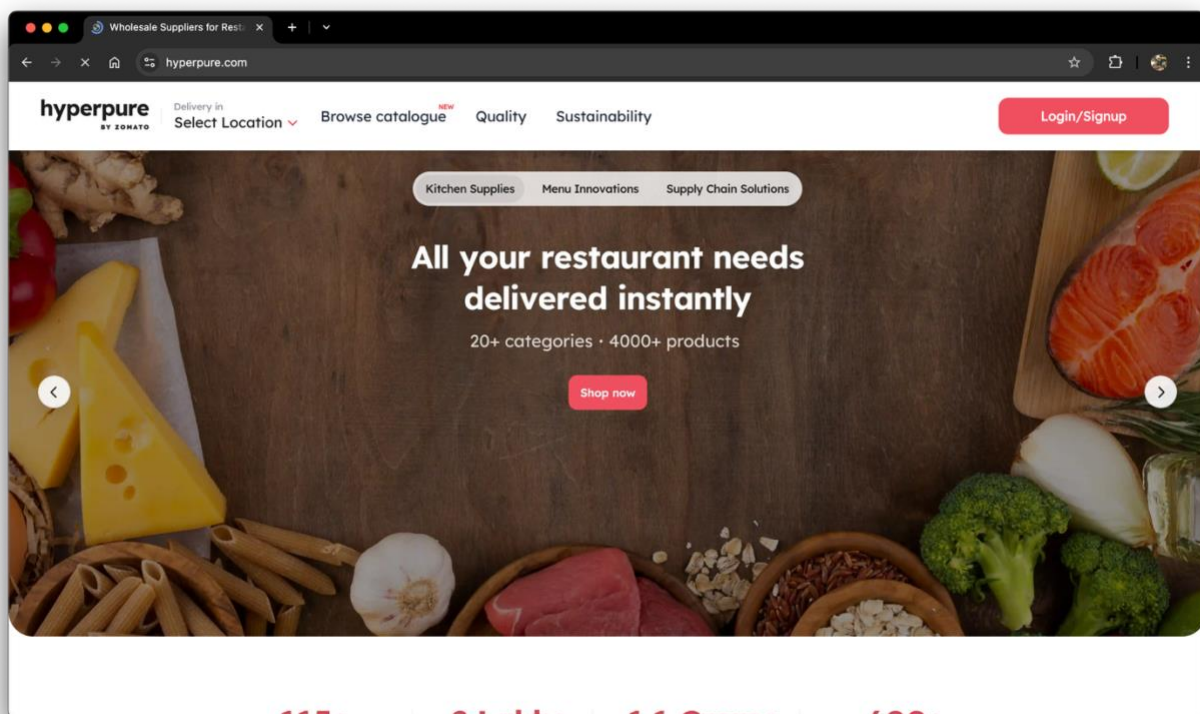
2.4 Methodology

A structured and methodical approach was adopted during the internship to ensure meaningful contributions. The key steps included:

- Conducting in-depth research on authentication mechanisms, backend system architectures, and security frameworks to build a solid knowledge base.
- Actively working on code enhancements, optimizations, and feature implementations to improve the security tools and backend services.
- Developing new backend workflows and service interactions for the web platform team using Go, with a focus on improving performance and maintainability.
- Designing and implementing data synchronization mechanisms alongside role-based access control (RBAC) strategies to strengthen system security and enhance operational efficiency.
- Collaborated with designers and stakeholders for the frontend work to ensure dashboards were intuitive and met operational needs.

This systematic approach enabled a deeper engagement with security and backend technologies, fostering both learning and practical contributions to the organization's infrastructure.

Chapter 3

Flow diagram / Methodology

3.1 Security Tool Enhancement Methodology

The process of enhancing legacy security tools involved multiple stages, from analyzing existing functionalities to integrating new features that improved usability and performance. The methodology followed is outlined below:

3.1.1 Understanding Existing Security Tools

- Conducted a thorough analysis of legacy security tools built using Ruby.
- Identified limitations, performance bottlenecks, and potential areas of improvement.
- Studied security vulnerabilities that the tools were designed to detect.

3.1.2 Feature Enhancement and Dashboard Integration

- Designed and implemented new functionalities to improve security threat detection.
- Integrated interactive dashboards to provide better visibility of security events.
- Ensured backward compatibility with existing security infrastructure.

3.1.3 Testing and Optimization

- Performed rigorous testing to validate the correctness of new features.
- Optimized code for performance improvements and reduced execution time.
- Deployed updates in a staged manner to avoid disruptions.

3.2 Web Platform Development Methodology

Developing backend services for a new vertical at Zomato involved designing scalable and efficient systems. The methodology adopted is as follows:

3.2.1 Backend Architecture and Technology Selection

Chose Go for backend development due to its concurrency model and efficiency in handling large-scale applications.

Defined system architecture with microservices-based principles.

Designed an authentication flow with OAuth 2.0 and JWT-based session management.

3.2.2 Implementation of Authentication and Data Synchronization

Developed APIs to handle user authentication, role-based access control (RBAC), and session management.

Implemented real-time data synchronization mechanisms for seamless data consistency.

Ensured security best practices, including encryption of sensitive information.

3.2.3 Performance Optimization and Scalability Considerations

Conducted load testing to assess backend service efficiency under high traffic.

Optimized database queries to reduce response times.

Implemented caching mechanisms for faster data retrieval.
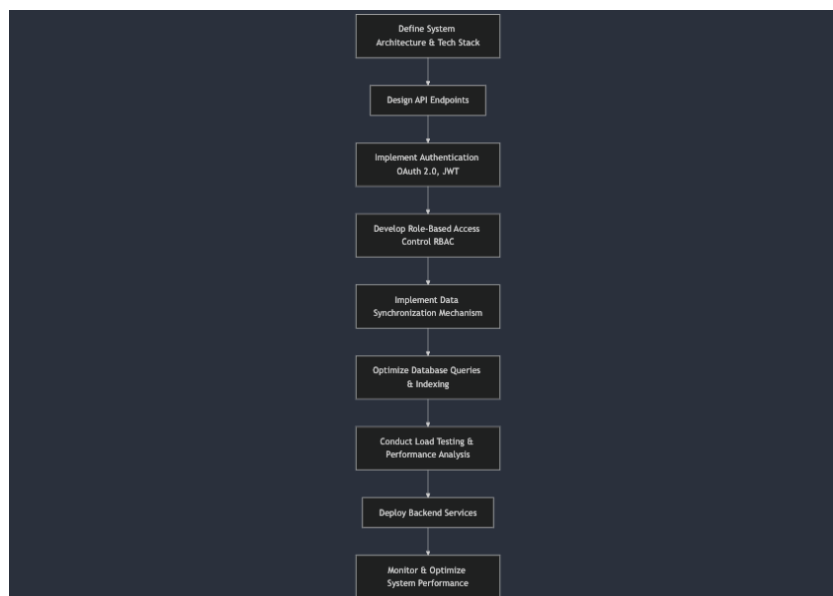
3.3 Hyperpure Dashboard Development Methodology

Built operational dashboards for Hyperpure by collaborating with stakeholders to gather requirements. Developed responsive UIs using React, integrating real-time updates and backend services.

3.3.1 Requirement Analysis and Stakeholder Collaboration

Engaged with operations and supply chain stakeholders to gather detailed requirements related to processes such as inwarding, packaging, dispatching, and inventory tracking.
Mapped workflows to identify key data points and user interactions critical for operational efficiency.

3.3.2 Frontend Development and UI Design

Developed interactive dashboards using React, prioritizing responsiveness and usability across devices.
Focused on intuitive design with clear data visualization and actionable components to assist on-ground teams in real-time decision-making.
Incorporated live updates using WebSocket connections and polling mechanisms where necessary.

3.3.3 Backend Integration and Iterative Refinement

Integrated frontend components with backend services to fetch and update operational data securely and efficiently.
Conducted UAT (User Acceptance Testing) with the operations team, gathering feedback to iteratively refine UX and resolve usability bottlenecks.
Ensured modular, maintainable code for long-term scalability and feature extension.
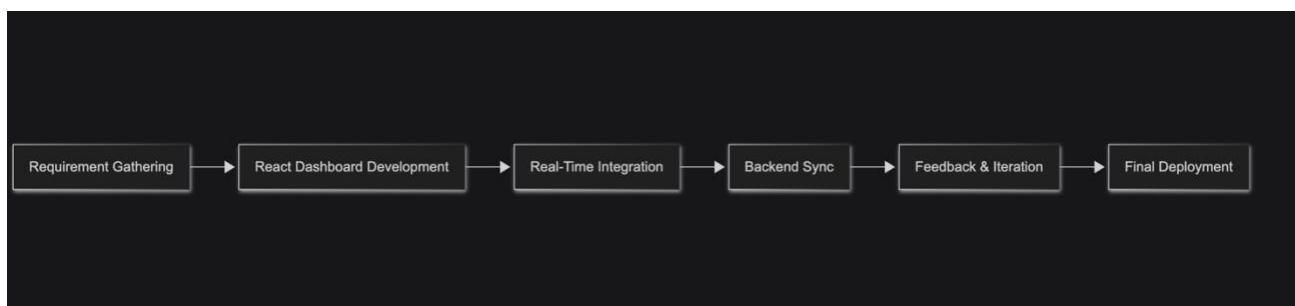
This structured methodology ensured that security tool enhancements, backend and frontend were robust, scalable, and aligned with industry standards.

Chapter 4

Implementation and experimentation

4.1 Security Tool Enhancements

During the internship, one of the primary tasks undertaken was improving and enhancing legacy security tools written in Ruby. These tools had been in use for a considerable period and required upgrades to meet evolving security requirements and improve their efficiency. The work involved adding new features that extended the tools' capabilities, making them more robust and adaptable to modern security challenges.

A key focus was on improving user experience by integrating dashboards, which allowed for better data visualization and enhanced usability. These dashboards provided real-time insights, making it easier for security teams to analyze data and take necessary actions proactively. By refining existing functionalities and introducing new capabilities, the efficiency of security processes was significantly improved. The enhancements helped in reducing manual effort, minimizing security risks, and streamlining various security-related operations within the organization.

4.2 Web Platform Development

Another significant aspect of the internship involved contributing to a new vertical at Zomato, specifically focusing on backend development. The work encompassed designing and implementing scalable backend services using Go, a programming language known for its efficiency and performance in building distributed systems.

A major responsibility involved implementing authentication mechanisms to ensure secure access control. This included integrating OAuth-based authentication flows and enhancing security through token-based authentication and multi-factor authentication (MFA). Role-Based Access Control (RBAC) was also implemented to define user permissions and restrict unauthorized access.

Additionally, optimizing data synchronization mechanisms was a crucial part of the work. This ensured seamless and efficient data exchange between different services, minimizing latency and improving overall performance. Efforts were directed towards designing efficient database queries and reducing redundancy in data storage. By implementing optimized caching strategies, performance bottlenecks were mitigated, leading to faster response times and improved system reliability.

4.3 Hyperpure Dashboard Frontend Development

The development of operational dashboards for Zomato's Hyperpure unit aimed at streamlining critical processes and providing real-time visibility into the supply chain.

The frontend was built using **React**, leveraging its component-based architecture to ensure modular, reusable components. The design focused on **clarity**, emphasizing a clean and intuitive interface that minimized cognitive load for the ground teams, enabling them to focus on decision-making.

The dashboard's responsive design ensured usability across devices, from desktops to tablets, allowing warehouse and operations managers to access critical data on-the-go. **User feedback** was gathered from the operations team throughout the development process to ensure that the UI/UX met their needs and facilitated smooth interaction with complex data sets.

By reducing the need for manual oversight and improving access to actionable data, these dashboards helped streamline operational processes, increase efficiency, and improve decision-making at all stages of the supply chain.

Chapter 5

Key learnings from the Internship

5.1 Technical Learnings

Through the course of the internship, a profound understanding of security tooling and backend development was developed. The hands-on experience of working with Ruby for security tool enhancement provided insights into the language's scripting capabilities and its role in security automation.

The opportunity to work with Go for backend services development helped in grasping its concurrency model, memory management, and performance optimization techniques. A deep dive into authentication mechanisms, including OAuth, JWT, and RBAC, further strengthened the understanding of secure access control implementations.

Moreover, working on data synchronization involved exploring best practices for handling large-scale data flow efficiently. This included utilizing message queues, caching strategies, and database optimization techniques to ensure smooth and reliable data processing.

Developed real-time, interactive dashboards using modern frontend frameworks, particularly React, with an emphasis on building responsive UIs. Worked closely with backend teams to integrate APIs and ensure smooth data flow, providing a seamless user experience for operational teams.

Exposure to these technical concepts significantly contributed to improving problem-solving skills and the ability to design scalable systems.

5.2 Soft Skills

Beyond technical advancements, the internship provided a valuable opportunity to refine several soft skills. Problem-solving and debugging capabilities were greatly improved through hands-on troubleshooting of security tools and backend services.

Collaboration within cross-functional teams played a crucial role in the success of the projects. The experience of working alongside security experts, backend engineers, and product managers helped in understanding team dynamics, effective communication strategies, and the importance of collective brainstorming for problem resolution.

Time management skills were enhanced as multiple projects had to be managed simultaneously. Prioritizing tasks based on urgency and impact became an essential aspect of work, leading to better productivity and efficient workload handling. The ability to work under deadlines while maintaining quality was an invaluable takeaway from this experience.

Communication skills regularly presented progress updates and discussed technical trade-offs with mentors and peers, refining the ability to communicate complex technical concepts clearly and concisely. These interactions helped develop a strong understanding of stakeholder needs and expectations.

Chapter 6

Results and Conclusions

6.1 Results

The following results were achieved:

- Successfully enhanced legacy security tools by adding new features and improving usability through dashboard integration.

- Developed backend services for a new vertical at Zomato using Go, ensuring efficient and scalable system architecture.

- Implemented authentication mechanisms, including OAuth, JWT-based authentication, and multi-factor authentication, enhancing security.

- Optimized data synchronization mechanisms to ensure smooth, real-time data flow between services.

- Improved system performance through caching strategies and optimized database queries.

- Built real-time operational dashboards for Hyperpure, which provided essential data on inventory levels, order status, and operational progress. These dashboards empowered the operations team with immediate insights, enabling faster decision-making.

6.2 Conclusions

The internship experience was instrumental in providing hands-on exposure to security tool enhancement and backend development. The opportunity to work on real-world projects allowed for the practical application of theoretical concepts, bridging the gap between academia and industry practices. By improving security tooling, the efficiency of security operations was enhanced, ensuring better threat detection and response. Similarly, backend development work contributed to the seamless integration and performance optimization of a new service vertical, reinforcing the importance of well-architected systems in large-scale applications. This experience laid a strong foundation in secure, scalable system design and implementation, which will be valuable for future career growth in software engineering.

6.3 Bibliography

I.   Go Documentation. *The Go Programming Language*.

Available at: https://golang.org/doc/

II.   Ruby Documentation. *Official Ruby Language Documentation*.

Available at: https://www.ruby-lang.org/en/

III.   OAuth 2.0 Framework. *OAuth 2.0 Authorization Framework*.

Available at: https://oauth.net/2/

IV.   React Documentation. *Official React Documentation*.

Available at: https://react.dev/

V.   React Flow Documentation. *React Flow: A Library for Building Node-Based UIs*.

Available at: https://reactflow.dev/

VI.   Internal Documentation and Resources. *Zomato Engineering Team*. Various internal resources and documentation for engineering practices and guidelines.