***INTERSHIP REPORT***

***Title of the report***

*Submitted in partial fulfillment of the requirements*

*for the award of the degree of*

**Bachelor of Technology**

**Computer Science and Engineering**



**Submitted By: Submitted To:**

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**DECLARATION**

I hereby declare that the work presented in this internship report is my own and that all sources of information have been acknowledged. I have not submitted this report or any part thereof in support of any other application. The learning outcomes and contributions mentioned in this report reflect my personal experience during my internship at Unthinkable Solutions LLP.

Signature:

Aditya Kumar Maurya

5 March 2025

**ACKNOWLEDGMENT**

I would like to express my sincere gratitude to everyone who made my internship experience both educational and rewarding. I extend my heartfelt thanks to:

**My Delivery Owner and Mentors at Unthinkable Solutions LLP:** For their unwavering support, guidance, and for providing a challenging environment that fostered both personal and professional growth.

**The Web Development Team:** For their assistance in navigating complex technical challenges and introducing me to new technologies.

**To Ms. Anita yadav :** For continuously encouraging practical learning and supporting my internship journey.

**Family and Friends:** For their constant encouragement and moral support throughout my internship period.

Your support has been instrumental in shaping my skills and career aspirations.

**Place:** Gurugram

**Date: 5 March**

**CERTIFICATE**

This is to certify that this Internship report submitted in partial fulfillment of the degree of B.Tech. (CSE) as a part of the curriculum bearing Course Code ES-458 submitted to the Department of Computer Science & Engineering, at Dr. Akhilesh Das Gupta Institute of professional Studies, Delhi, affiliated to Guru Gobind Singh Indraprastha University, New Delhi-110078 to me by

S. No. Student Name Enrollment Number Student Signature

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is an authentic work carried out by them under my guidance. The matter embodied in this project work has not been submitted earlier for award of any degree to the best of my knowledge and belief

. **Signature of the Supervisor**

**(Ms. Anita Yadav)**

Countersigned by:

Director/Principal/HoD/Project In charge

Place:

Date:

**Abstract**

### **Abstract**

This report presents a comprehensive account of my internship at Unthinkable Solutions LLP, a leading service-based company engaged in delivering cutting-edge technology solutions across multiple domains globally. As a dynamic organization, Unthinkable collaborates with clients worldwide, working on diverse projects that span various industries, including healthcare, fintech, e-commerce, and enterprise solutions.

During my tenure, I had the opportunity to be part of a high-impact project, gaining hands-on experience in software development and problem-solving. My responsibilities included understanding complex codebases, contributing to project development, and learning best practices in modern software engineering. Throughout this journey, I enhance my technical skills, adapted to real-world workflows, and gained insights into the global tech industry.

This report outlines my key responsibilities, challenges faced and their resolutions, skills acquired, and my contributions to the organization. Additionally, it reflects on the professional and personal growth achieved during this enriching experience.

**Chapter 1 : Introduction to Internship & Organization**

**1.1 About Unthinkable Solutions LLP**

The internship program at Unthinkable Solutions LLP provided me with an invaluable opportunity to develop both my technical and professional skills in the field of software development. As an intern, I was entrusted with real-world projects, working as a Backend Developer for one of their high-profile clients, Zophop (Chalo). This hands-on experience not only allowed me to apply the theoretical knowledge acquired during my academic studies but also introduced me to the practical challenges faced in the industry.

During the internship, I was primarily focused on backend development using Node.js. The tasks assigned to me involved building and maintaining APIs, optimizing database queries, and ensuring the seamless integration of various services within the platform. The program allowed me to gain exposure to different stages of the software development lifecycle, including coding, testing, debugging, and deployment, while working in a collaborative environment with a team of skilled professionals. Additionally, the internship provided insight into agile methodologies, enabling me to work in sprints and prioritize tasks efficiently.

Overall, this internship was an excellent learning experience that equipped me with the tools and knowledge necessary to grow as a backend developer and to further pursue a career in the software development field.

**1.2 Organization profile**

Unthinkable Solutions LLP is a service-based technology company that specializes in providing innovative and scalable software solutions to clients across various industries. The company prides itself on its client-centric approach, offering customized services to address the unique needs of each client. With a broad portfolio of clients, including Zophop, Nykaa Fashion, Dr. Chambers, Umang, TopFans, and Ullu, Unthinkable Solutions LLP has gained a reputation for delivering high-quality solutions in areas such as mobile applications, web development, cloud computing, and backend services.

The company operates in a fast-paced and dynamic environment, consistently staying ahead of industry trends to deliver cutting-edge solutions to its clients. The diverse range of projects undertaken by the company has provided its employees with the opportunity to work on a variety of technologies, enhancing their skill sets and broadening their professional experience.

Unthinkable Solutions LLP has established itself as a leader in providing comprehensive software solutions, and its commitment to innovation and excellence is reflected in the successful partnerships it has developed with prominent clients.

**1.3 Work culture and environment**

The work culture at Unthinkable Solutions LLP fosters collaboration, innovation, and continuous learning. The organization believes in creating a positive and inclusive environment where employees can thrive both professionally and personally. As an intern, I was made to feel like a valuable member of the team, with ample opportunities to contribute to projects and share ideas.

The company places a strong emphasis on work-life balance, with flexible working hours and an open-door policy that encourages transparent communication. Employees are encouraged to work closely with colleagues across different departments, facilitating knowledge sharing and the exchange of ideas. The company’s leadership team is approachable and supportive, providing guidance and mentorship to ensure the professional growth of their team members.

Unthinkable Solutions LLP also adopts agile practices in its work processes, promoting collaboration, adaptability, and efficiency. The company’s focus on maintaining a positive and motivating environment made it easy for me to learn, grow, and adapt to the fast-paced nature of the industry.

In summary, the work culture at Unthinkable Solutions LLP is one of empowerment, where employees are encouraged to take ownership of their work and contribute to the success of the organization. This supportive and engaging environment made my internship experience both enjoyable and enriching.

**Chapter 2: Project Overview**

**2.1 Introduction to the project**

The Chalo project aims to revolutionize bus travel in India by providing real-time tracking of buses, mobile ticketing, and digital passes to reduce waiting time and improve commuter convenience. As part of the backend development team, my work focused on developing secure and efficient RESTful APIs, designing database schemas, and integrating different modules like ticket management, live tracking, and fare collection systems. Using **Node.js**, **Express.js**, and **MongoDB**, I contributed to building the server-side architecture that communicates with mobile applications and operator systems. Working in a dynamic and fast-paced environment, I collaborated with frontend teams, testers, and senior developers to ensure that all services were seamlessly integrated, highly available, and scalable for real-world usage. The project required strict adherence to data security and high performance to maintain smooth real-time operations across multiple cities.

**2.2 Objectives of the Project**

The objective of the Chalo project was to build a robust and scalable backend infrastructure that could handle real-time bus tracking, user ticketing, payment processing, and commuter information services across different cities. Another goal was to ensure that backend systems could process large volumes of data generated by active buses, transactions, and users without delays or downtime. An important part of the project was to secure data transmission and protect sensitive user and payment information. The backend services also needed to be modular and maintainable, allowing for easy integration of new features like subscription passes, fare adjustments, dynamic bus routing, and expansion into new cities. Overall, the project focused on delivering a reliable transportation technology platform capable of supporting Chalo’s mission to improve daily commuting.

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**2.2 Problem statement**

Chalo, operating across multiple cities with thousands of buses, needed a strong and scalable backend system capable of handling real-time data from buses, ticketing systems, and users. The major problem was ensuring that real-time bus tracking and ticketing operations remained fast and consistent even under high traffic loads. Any delay or inaccuracy in data could lead to poor commuter experiences, operational inefficiencies, and revenue loss. Additionally, with an increasing number of users relying on Chalo's digital services, the backend needed to be optimized for quick API responses, secure user authentication, and robust payment processing. Hence, the key challenge was to build backend systems that were highly performant, secure, scalable, and capable of processing real-time operations efficiently to support Chalo's growing network.

**Chapter 3: System analysis**

**3.1 Requirements and Specifications**

The Chalo project required a robust, scalable, and real-time backend system to manage the growing needs of urban transportation solutions. The main requirement was to create a secure server-side system capable of handling high volumes of real-time GPS data from thousands of buses operating across multiple cities. Additionally, the backend needed to provide seamless API services for the mobile app and web portal, enabling users to track buses live, purchase tickets, renew travel passes, and make digital payments without friction. Critical specifications also included secure user authentication, role-based access for administrators and drivers, support for promotional schemes, generation of usage analytics, and detailed reporting systems for operational monitoring. The system had to ensure minimal downtime, maintain data integrity, protect user data privacy, and be capable of future enhancements such as route optimization algorithms, AI-driven traffic predictions, and broader integration with metro or taxi services. Overall, the backend had to serve as a strong foundation for Chalo’s mission to redefine daily commuting through technology.

### **3.2 Feasibility Study**

**3.2.1 Technical Feasibility**

From a technical perspective, the Chalo project was highly feasible. Technologies like Node.js provided non-blocking, event-driven architecture perfect for handling multiple concurrent API requests without performance degradation. Express.js allowed quick API development with modular structure and middleware support. MongoDB, being a NoSQL database, efficiently handled large volumes of unstructured and semi-structured data generated from buses and user interactions. Cloud platforms like AWS ensured scalability and high availability through services like EC2, S3, and load balancers. Moreover, using tools like Postman, Swagger, and GitHub streamlined the development and documentation processes. Given the team’s proficiency and the maturity of these tools, it was completely feasible to meet both current and future technical demands.

**3.2.1 Economic Feasibility**

The project also proved economically viable. While there were initial costs associated with cloud infrastructure, development resources, and licensing where applicable, the long-term benefits clearly outweighed the investment. With the deployment of a stable backend system, Chalo significantly reduced operational inefficiencies, manual ticketing costs, and dependency on third-party vendors. Digital payments and pass systems increased revenue channels, and real-time tracking improved commuter satisfaction, indirectly boosting user base and loyalty. Also, the system’s modular architecture minimized the cost of future updates or new feature integrations. Thus, from an economic standpoint, the project was a financially sound investment.

**3.2.3 Operational Feasibility**

### Operational feasibility was a key strength of the Chalo project. The backend systems integrated smoothly with existing GPS devices on buses and mobile apps without requiring significant changes to current operations. Operators, drivers, and users were able to adapt easily to the new system after basic training. Real-time bus tracking reduced commuter complaints, while digital passes simplified the purchase and renewal process. Furthermore, operational teams benefited from the administrative dashboards and real-time reporting tools developed through the backend services. The clear operational advantages validated the project’s success in meeting practical, day-to-day needs.

**Chapter 4: System Design**

**4.1 Design Methodlogy**

The Chalo project adopted an agile and modular design methodology. Instead of building a monolithic backend, the system was divided into logical modules such as user management, bus tracking, ticketing, and payment processing. Each module was independently designed, developed, tested, and integrated, allowing the team to work simultaneously on different features and maintain flexibility for future updates. Agile sprints allowed for regular releases, user feedback incorporation, and continuous improvement. RESTful API design principles were strictly followed, ensuring predictable communication between frontend and backend services. Data normalization, proper indexing, and caching strategies were also embedded early in the design phase to enhance performance.

### **4.2 User Interface Design**

Although my primary responsibility was backend development, understanding the user interface design was crucial to align API responses with frontend needs. The mobile application for commuters demanded a fast and intuitive experience, which translated to developing APIs that responded within milliseconds and delivered accurate, real-time data. Error messages were standardized for clarity, and APIs were designed to be resilient, ensuring the frontend could gracefully handle edge cases such as service outages or network failures. Close collaboration between backend developers and frontend teams helped ensure that the user interface remained clean, responsive, and reliable even during peak traffic.

### **4.3 Architecture Diagram & DFDs**

The overall system architecture was based on a client-server model using a microservices approach. The architecture featured a load balancer distributing API requests across multiple Node.js servers to ensure high availability. MongoDB served as the primary database, with cloud storage services supporting media uploads and backups. Services were containerized for better deployment flexibility. The Data Flow Diagrams (DFDs) illustrated the flow of user requests — from login, live bus tracking, ticket purchase, to payment confirmation — across different backend services, databases, and third-party integrations like payment gateways. Layered security, including authentication tokens and encryption, was integrated at various stages.

**Chapter 5: Implementation & Testing**

### **5.1 Code Implementation Summary**

The backend was implemented using **Node.js** and the **Express.js** framework following a clean and modular structure. Each major functionality — such as authentication, bus tracking, ticketing, or payments — was developed within separate services with clearly defined routes, controllers, and models. MongoDB was used for efficient data handling, with schemas designed for minimal latency. JWT (JSON Web Tokens) were employed for secure user authentication, and API rate limiting was enforced to prevent abuse. Code review practices and pull requests were strictly followed, ensuring a collaborative and error-free development process. Deployment to cloud servers followed continuous integration and continuous deployment (CI/CD) pipelines.

### **5.2 Testing Methods & Results**

Testing was an integral part of the project lifecycle. Unit testing was performed using testing libraries such as Mocha and Chai to validate individual components and business logic. API endpoints were rigorously tested through Postman, where functional, boundary, and negative test cases were covered. Integration testing ensured that communication between different services like ticketing and payment modules remained smooth and accurate. Load testing simulated high traffic situations to verify system resilience. Security testing also ensured that user authentication and sensitive payment data were properly encrypted. Overall, testing results showed that the backend could reliably handle thousands of concurrent users with minimal latency.

# **Chapter 6 : Learning Outcomes & Skill Development**

### **6.1 Technical Skills Gained**

This internship significantly strengthened my backend development skills. I deepened my understanding of server-side JavaScript through hands-on experience with Node.js and Express.js. I learned how to design scalable APIs, optimize database queries, manage real-time data flows, and implement advanced authentication mechanisms. I became proficient in tools like Postman, MongoDB Compass, and GitHub, and gained initial exposure to cloud deployment and containerization technologies like Docker. Understanding how backend services are structured in a production environment gave me insight into building fault-tolerant, scalable systems that can grow with user demand.

### **6.2 Soft Skills & Professional Ethics**

Beyond technical knowledge, I developed key professional skills essential for the workplace. Regular team meetings and code reviews improved my communication skills and taught me the importance of articulating technical ideas clearly. I learned the value of time management, proactive problem solving, and collaborative work in a fast-paced project environment. Furthermore, professional ethics were deeply ingrained throughout the project, emphasizing the protection of user data, the need for clear documentation, and respect for deadlines. Understanding how to maintain integrity and responsibility as a software professional was one of the most valuable outcomes of this internship.

# **Chapter 7 : Challenges, Solutions & Recommendations**

Throughout the project, several challenges emerged. One major challenge was ensuring API scalability under sudden surges in user traffic, especially during peak commuting hours. To address this, the team implemented horizontal scaling and optimized API queries by adding indexing to the MongoDB collections. Another challenge was managing integration with multiple third-party services for payments and notifications, each having different requirements and response formats. Proper abstraction layers and error handling modules were developed to handle these complexities effectively. Based on my experience, I recommend starting projects with a scalable architecture mindset, adopting strict coding standards from the beginning, and investing time in thorough testing to avoid production issues.

# **Chapter 8 : Summary, Conclusion and Future Scope**

The internship at Unthinkable Solutions LLP has been an incredibly enriching experience, offering exposure to a diverse range of global projects, advanced backend technologies, and real-world software development challenges. Over the course of my internship, I worked on multiple projects that enhanced both my technical expertise and professional skills in a dynamic, fast-paced environment.

Through developing and optimizing Node.js backend services, integrating RabbitMQ for asynchronous processing, improving API performance, and collaborating with DevOps teams for efficient deployment, I was able to make meaningful contributions to the organization. The challenges I faced—such as navigating a complex codebase, optimizing backend workflows, and managing microservices—were tackled through continuous learning, problem-solving, and effective teamwork.

The skills I acquired, including proficiency in Node.js, Express.js, RabbitMQ, Docker, Git, API documentation with Swagger, and load testing with Artillery, have provided me with a solid foundation for a career in backend development. Additionally, working on cloud-based solutions and containerized deployments has broadened my understanding of scalable and efficient software architectures.

In summary, this internship has been a period of significant technical and professional growth. The hands-on experience, coupled with industry best practices, has strengthened my ability to build robust, scalable, and high-performance backend systems. I look forward to leveraging these experiences in my future endeavors and making impactful contributions to the tech industry.