

**A**  
**Seminar Report On**

**CodeSphere: A Scalable Online IDE for Integrated Frontend and Backend  
under the company Lowe's India**

**Submitted in partial fulfilment of the requirement for the award of**

**BACHELOR OF TECHNOLOGY**  
**in**  
**COMPUTER SCIENCE AND ENGINEERING**

**SUBMITTED BY:**

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**DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING**



**SCHOOL OF STUDIES IN ENGINEERING & TECHNOLOGY**

**GURU GHASIDAS VISHWAVIDYALAYA**

**(CENTRAL UNIVERSITY)**

**BILASPUR, CHHATTISGARH, INDIA**

**August, 2024**

# INTERNSHIP COMPLETION CERTIFICATE



Lowe's India  
Building Willow - L2  
Manyata Embassy Business Park SEZ  
Outer Ring Rd. Nagawara  
Bengaluru, Karnataka 560045

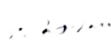
Date: 19/07/2024

## TO WHOMSOEVER IT MAY CONCERN

This is to certify that **Nayasha** from Guru Ghasidas Vishwavidyalaya, Bilaspur has successfully completed her internship at Lowe's Services India Pvt. Ltd. The duration of the project was from **15/05/2024** to **30/06/2024**. The internship and the projects assigned thereunder have been completed under the guidance of Shikhar Sundriyal (Sr Manager, Data Engineering).

We wish him all the best for his future endeavors.

Sincerely,

  
**Swati Agrawal**  
Director- Human Resources  
Lowe's Services India Private Limited

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## ABSTRACT

The " **CodeSphere** " project aims to develop a comprehensive online Integrated Development Environment (IDE) designed to support both frontend and backend development, akin to the functionality provided by platforms like Replit. The project focuses on leveraging DevOps principles and cloud-native technologies to create a scalable, secure, and efficient development environment.

At its core, CodeSphere integrates **Node.js** with **Docker** to facilitate containerization, ensuring isolated and secure execution environments for user code. The system is built on **Kubernetes**, enabling dynamic autoscaling and efficient resource management, which are crucial for handling multiple concurrent sessions without compromising performance. Through a robust WebSocket server, CodeSphere manages real-time communication between the frontend interface and backend services, allowing seamless code execution, session handling, and terminal management.

Key challenges, including Remote Code Execution (RCE) security, resource optimization, and autoscaling, were addressed by implementing best practices in container orchestration and infrastructure configuration. The result is a highly resilient IDE that not only meets the demands of modern development workflows but also ensures a smooth user experience by automatically scaling resources based on real-time demand.

The project's outcomes underscore the potential for future enhancements, including expanded language support and improved user interface design, making CodeSphere a versatile tool for developers in diverse domains.