**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**

**Computer Science and Engineering**

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

*Submitted by*

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**DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING**

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**Department of Computer Science and Engineering**

***Certificate***

This is to certify that the internship work entitled **“Full Stack Development (E-Commerce Platform)”** has been successfully carried out by **Sudeep H M (1NT21CS178)**, a bonafide student of **Nitte Meenakshi Institute of Technology**, in partial fulfillment of the requirements for the award of the degree of **Bachelor of Engineering in Computer Science and Engineering** under **Visvesvaraya Technological University (VTU), Belagavi**, during the academic year **2024–2025**.

The internship report has been examined and approved as it meets the academic requirements prescribed under the **autonomous scheme of Nitte Meenakshi Institute of Technology, Bengaluru**, for the said degree.

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| --- | --- | --- |
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***Name of Examiners Signature with Date***

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2. **…………………………….. …………………………..**

##### Acknowledgement

The successful completion of our internship marks a significant milestone in our academic journey. We take this opportunity to express our heartfelt gratitude to all those who supported and guided us throughout this enriching experience. Whatever we have achieved is the result of their encouragement, support, and timely guidance, for which we remain deeply thankful.

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##### Abstract

During my internship, I developed a comprehensive e-commerce web application using ASP.NET Core MVC, focusing on modular architecture, responsive design, and seamless user experience. The project was structured into five core modules: Product Management, Shopping Cart, Order Management, User Authentication, and Admin Dashboard — each designed to simulate real-world e-commerce functionality.

The Product Management Module enabled administrators to create, update, categorize, and display products with detailed attributes such as name, description, price, and image. The Shopping Cart Module allowed users to add or remove items, view cart contents, and dynamically calculate totals. For order processing, the Order Management Module handled order placement, shipping details, payment status, and order tracking.

User access and personalization were managed through the User Authentication and Profile Management Module, which supported secure registration, login, and profile updates. Administrative operations were centralized in the Admin Dashboard Module, offering tools for product and order management, customer insights, and sales analytics.

The application was built using Entity Framework Core for database integration, with data seeding to simulate a live environment. Razor views and Bootstrap were used to create a responsive, mobile-friendly frontend, while static assets were organized under the wwwroot directory. Development was carried out in Visual Studio, leveraging its scaffolding and debugging features to streamline the workflow.This project provided hands-on experience in full-stack development, combining traditional MVC patterns with modern UI/UX practices. It significantly enhanced my skills in building scalable, maintainable, and production-ready web applications.

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# Chapter 1 Introduction

## In the digital era, the demand for robust, scalable, and user-friendly web applications has grown rapidly across industries. E-commerce, in particular, has transformed the way businesses operate and how consumers interact with products and services. With the rise of online shopping, companies are investing heavily in building platforms that are not only functional but also intuitive, secure, and responsive across devices.My internship at Cognizant Technology Solutions provided an invaluable opportunity to work on a real-world e-commerce web application project. This experience allowed me to apply my academic knowledge in a professional setting, gain exposure to enterprise-level development practices, and contribute meaningfully to a production-grade software system.

## The project was developed using ASP.NET Core MVC, a powerful framework for building dynamic, data-driven web applications. It incorporated Entity Framework Core for seamless database integration, Razor views for server-side rendering, and Bootstrap for responsive and mobile-first design. The application was modular in nature, with clearly defined components for product management, shopping cart functionality, order processing, user authentication, and administrative control.

## Purpose of the Internship

## The primary purpose of this internship was to bridge the gap between classroom learning and real-world application. As a student with a strong foundation in software development, I was eager to gain hands-on experience in building scalable web applications, understanding enterprise workflows, and working within a collaborative development environment.

## The internship aimed to:

## Provide exposure to full-stack development using modern frameworks and tools.

## Enhance my understanding of MVC architecture and modular design.

## Improve my ability to write clean, maintainable, and testable code.

## Develop problem-solving skills in a real-world context.

## Internship Objectives

**Technical Objectives**

* Design and implement a modular e-commerce web application using ASP.NET Core MVC.
* Develop and integrate the following modules:
  + Product Management: CRUD operations, product categorization, and image handling.
  + Shopping Cart: Add/remove items, quantity updates, and total price calculation.
  + Order Management: Order placement, shipping details, and payment status tracking.
  + User Authentication: Secure login, registration, and profile management.
  + Admin Dashboard: Product and order management, customer insights, and analytics.
* Use Entity Framework Core for ORM-based database operations and data seeding.
* Build responsive Razor views using Bootstrap and manage static assets via wwwroot.
* Ensure cross-browser compatibility and mobile responsiveness.

**Professional Objectives**

* Gain experience using Visual Studio for development, debugging, and scaffolding.
* Collaborate with team members using Git and participate in code reviews.
* Follow best practices in software design, including separation of concerns and DRY principles.
* Understand the software development lifecycle in a corporate environment.
* Participate in sprint planning, daily stand-ups, and project retrospectives.
  1. **Company Overview**
* About Cognizant Technology Solutions

**Cognizant** is a global IT services and consulting company that helps businesses modernize technology, reimagine processes, and transform customer experiences. Founded in 1994 and headquartered in Teaneck, New Jersey, Cognizant operates in over 40 countries and employs more than 350,000 professionals worldwide.

The company offers a wide range of services, including:

* Application development and maintenance
* Cloud infrastructure and migration
* Artificial intelligence and machine learning
* Enterprise software solutions
* Digital engineering and automation

Cognizant is known for its client-centric approach, innovation-driven culture, and commitment to delivering high-quality solutions across industries such as healthcare, finance, retail, and manufacturing.

**Objectives of the Company**

* Deliver scalable and secure IT solutions tailored to client needs.
* Drive innovation through emerging technologies like AI, cloud, and data analytics.
* Foster a culture of continuous learning and professional development.
* Promote sustainability and digital inclusion through technology.
* Ensure customer satisfaction through agile, collaborative development practices.

# Chapter 2 Internship Activities and Responsibilities

## 2.1 Job Description and Task

As a Full-Stack Developer Intern, my primary responsibilities included:

* Designing and implementing core modules of the e-commerce application.
* Developing backend logic using ASP.NET Core MVC and Entity Framework Core.
* Creating dynamic and responsive frontend interfaces using Razor views and Bootstrap.
* Writing and maintaining clean, modular, and reusable code.
* Integrating database operations such as product listing, cart management, and order processing.
* Participating in code reviews, debugging sessions, and sprint planning meetings.
* Collaborating with team members using Git and version control best practices.

**2.2 Key Modules Developed:**

* Product Management: CRUD operations, product categorization, and image handling.
* Shopping Cart: Add/remove items, quantity updates, and total price calculation.
* Order Management: Order placement, shipping details, and payment status tracking.
* User Authentication: Secure login, registration, and profile management.
* Admin Dashboard: Product and order management, customer insights, and analytics.

## 2.2 Hardware and Software Requirements

**Hardware:**

* Laptop with Intel i5/i7 processor
* Minimum 8 GB RAM
* Stable internet connection for remote collaboration

**Software & Tools:**

* Visual Studio 2022 – IDE for ASP.NET Core development
* .NET SDK – For building and running the application
* SQL Server / SQLite – For database management
* Entity Framework Core – ORM for database operations
* Bootstrap 5 – For responsive UI design
* Git & GitHub – Version control and collaboration
* Postman – API testing and debugging
* Microsoft Teams – Communication and meetings

## 2.3 Learning Experiences

This internship provided a rich learning environment where I was able to:

* Understand the Model-View-Controller (MVC) architecture in depth.
* Gain hands-on experience with Entity Framework Core for database integration.
* Learn how to build responsive and accessible UIs using Bootstrap and Razor.
* Improve my problem-solving and debugging skills in a real-world setting.
* Understand the importance of code modularity, reusability, and scalability.
* Collaborate effectively in a team environment using agile methodologies.
* Participate in code reviews and learn from feedback to improve code quality.
* Explore deployment practices and how enterprise applications are maintained.

## 2.4 Challenges and Solutions

During the internship, I encountered several technical and architectural challenges that tested my understanding of full-stack development and real-world application design. Each challenge provided a valuable learning opportunity and helped me grow in terms of technical maturity, debugging skills, and design thinking.

**Complex Entity Relationships in EF Core**

**Challenge**:  
Designing and managing relationships between entities such as Product, CartItem, Order, and User was initially difficult. Improper configuration led to issues like circular references, lazy loading errors, and unexpected null values during data retrieval.

**Solution**:  
I studied the official Entity Framework Core documentation and experimented with both data annotations and Fluent API configurations. I created a simplified ER diagram to visualize relationships and used navigation properties with explicit foreign keys. This helped me implement one-to-many and many-to-many relationships correctly, improving data integrity and query performance.

**Razor View Rendering and Model Binding Errors**

**Challenge**:  
While building dynamic pages like the Product Details and Cart views, I faced issues with Razor syntax, model binding mismatches, and null reference exceptions during runtime.

**Solution**:  
I used Visual Studio’s debugger and browser developer tools to inspect model data and trace errors. I added null checks and used @model directives consistently to ensure type safety. I also modularized views using partials to improve maintainability and reduce duplication.

**Responsive UI and Cross-Browser Compatibility**

**Challenge**:  
Ensuring that the application looked and functioned well across different screen sizes and browsers was a recurring challenge, especially for the cart and admin dashboard pages.

**Solution**:  
I adopted a mobile-first design approach using Bootstrap’s grid system and utility classes. I tested the application on multiple devices and browsers, using Chrome DevTools to simulate screen sizes and fix layout issues. I also used media queries for fine-tuned responsiveness.

**Session Management for Shopping Cart**

**Challenge**:  
Maintaining cart state across user sessions and ensuring data consistency between guest and logged-in users was complex, especially when switching between pages or refreshing the browser.

**Solution**:  
I implemented session-based cart storage using ASP.NET Core’s session middleware for guest users and persisted cart data in the database for authenticated users. I also added logic to merge session and database carts upon login, ensuring a seamless user experience.

**Role-Based Access Control for Admin Features**

**Challenge**:  
Restricting access to admin-only features like product management and order tracking required a secure and scalable role-based access control system.

**Solution**:  
I used ASP.NET Core Identity to implement role-based authorization. I created separate areas for admin and user views, applied [Authorize (Roles = "Admin")] attributes to controllers, and customized the layout to reflect user roles dynamically.

**Form Validation and User Feedback**

**Challenge**:  
Users were not receiving clear feedback when submitting forms with missing or invalid data, leading to confusion and poor user experience.

**Solution**:  
I implemented both client-side and server-side validation using Data Annotations and jQuery Unobtrusive Validation. I also added Bootstrap alert components to display success and error messages clearly, improving usability and accessibility.

**Managing Static Assets and Performance Optimization**

**Challenge**:  
As the project grew, managing CSS, JavaScript, and image files in the wwwroot folder became difficult, and page load times increased.

**Solution**:  
I organized static files into logical subfolders (/css, /js, /images) and used bundling and minification to reduce file sizes. I also optimized images and used lazy loading where appropriate to improve performance.

# Chapter 3 Learning Outcomes and Skills Acquired

## 3.1 Technical Skills

* **Full-Stack Web Development**

I developed a strong understanding of the Model-View-Controller (MVC) architecture by building a modular e-commerce platform. I implemented core features such as product listing, product details, shopping cart functionality, order placement, and user authentication.

* **Backend Development**

I used ASP.NET Core MVC to build the backend logic for the application. I designed models, controllers, and services to handle business logic and data flow. I also used Entity Framework Core to manage database operations, including data seeding, CRUD operations, and relationship mapping between entities like Product, CartItem, Order, and User.

* **Frontend Development**

On the frontend, I worked with Razor views, HTML, CSS, and Bootstrap to create responsive and user-friendly interfaces. I designed pages such as the Home page, Product Details, Cart, and Admin Dashboard, ensuring they were mobile-friendly and visually consistent.

* **Database Integration**

I integrated the application with a SQL Server database using Entity Framework Core. I created and managed database schemas, wrote LINQ queries for data retrieval, and ensured data consistency across modules.

* **Authentication and Authorization**

I implemented secure user authentication using ASP.NET Core Identity. This included user registration, login, role-based access control, and profile management. I also created a separate admin area with restricted access for managing products and orders.

* **Version Control and Collaboration**

I used Git and GitHub for version control, managing branches, and collaborating with team members. This helped me understand the importance of clean commit history, pull requests, and code reviews.

## 3.2 Hardware and Software Requirements

* **Technical Skills Used and Developed**

Frontend: Razor Views, HTML, CSS, Bootstrap, JavaScript

Backend: ASP.NET Core MVC, Entity Framework Core, LINQ

Database: SQL Server / SQLite

Authentication: ASP.NET Core Identity

Tools: Visual Studio, Git, GitHub, Postman

* **Soft Skills Improved**

Collaboration: I worked closely with mentors and peers, learning how to communicate effectively in a team environment.

Problem-Solving: I tackled real-world challenges such as managing cart state, handling entity relationships, and debugging Razor view errors.

Time Management: I balanced multiple tasks and deadlines, prioritizing features based on project goals.

Documentation: I maintained clear documentation for each module, including API behavior, database schema, and UI flow.

* **Tools and Environments Used**

Visual Studio – Primary IDE for development and debugging

SQL Server Management Studio (SSMS) – For database management

Git & GitHub – For version control and collaboration

Postman – For testing APIs

Bootstrap – For responsive UI design

wwwroot – For managing static files (CSS, JS, images)

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# Chapter 4 Reflection on the Internship Experience

The internship at Cognizant Technology Solutions was a highly enriching experience that provided me with a practical understanding of full-stack web development in a real-world enterprise environment. Working on a modular e-commerce web application allowed me to apply theoretical concepts to a live project and gain hands-on experience with modern development tools, frameworks, and best practices.

**4.1 Technical Skills Enhancement**

One of the most significant outcomes of this internship was the enhancement of my technical skills across both backend and frontend development.

* Backend Development: I became proficient in using ASP.NET Core MVC to build scalable APIs and manage business logic. I also worked extensively with Entity Framework Core for database operations, including data modeling, migrations, and relationship mapping.
* Frontend Development: I improved my ability to design responsive and user-friendly interfaces using Razor views, Bootstrap, and JavaScript. I implemented key pages such as the Home page, Product Details, Cart, and Admin Dashboard.
* Database Integration: I gained practical experience in working with SQL Server, writing LINQ queries, and optimizing data access for performance and scalability.
* Authentication & Authorization: I implemented secure user authentication using ASP.NET Core Identity, including role-based access control for admin and customer users.

**4.2 Real-World Application of Theoretical Knowledge**

While I had a solid academic foundation in full-stack development, this internship gave me the opportunity to apply that knowledge in a structured and collaborative environment.

* I designed and implemented complete workflows, from user interaction on the frontend to data processing in the backend.
* I developed and consumed RESTful APIs, handled form validation, and ensured smooth data flow between the client and server.
* I learned the importance of modular architecture, code reusability, and clean separation of concerns, which are essential for building scalable and maintainable applications.

**4.3 Exposure to Enterprise Practices**

Working in a professional setting exposed me to real-world development workflows and tools:

* I used Visual Studio for development and debugging, and Git for version control and collaboration.
* I participated in code reviews, followed naming conventions, and adhered to best practices in software design.
* I learned how to manage static assets in the wwwroot folder and optimize frontend performance using bundling and minification.

**4.4 Project Management & Agile Collaboration**

Throughout the internship, I gained exposure to Agile methodologies and collaborative development practices:

* I participated in sprint planning, daily stand-ups, and retrospectives.
* I worked with mentors and peers to review code, resolve bugs, and plan features.
* I used GitHub for managing branches, pull requests, and issue tracking, which helped me understand the importance of version control in team environments.

**4.5 Personal Growth and Soft Skills**

Beyond technical development, the internship also contributed to my personal and professional growth:

* I improved my problem-solving skills by debugging complex issues related to Razor views, database relationships, and session management.
* My communication skills improved through regular interactions with team members, where I learned to explain technical concepts clearly and concisely.
* I became more confident in presenting my work, documenting project components, and contributing to team discussions.
* I developed a structured approach to technical documentation, including API behavior, module descriptions, and integration notes, which proved valuable for project continuity.

# Chapter 5 Conclusion

My internship at Cognizant Technology Solutions was a highly rewarding and transformative experience that allowed me to bridge the gap between academic learning and real-world software development. Working on a full-stack e-commerce web application provided me with the opportunity to apply theoretical concepts in a practical environment, gain exposure to enterprise-grade tools and frameworks, and understand the intricacies of building scalable, maintainable, and user-friendly applications.

Throughout the internship, I enhanced my technical skills in ASP.NET Core MVC, Entity Framework Core, Razor views, and Bootstrap, while also gaining hands-on experience with database design, user authentication, and responsive UI development. I learned how to structure a project using modular architecture, follow best practices in coding and documentation, and collaborate effectively within a team using version control and Agile methodologies.

Beyond technical growth, the internship also contributed significantly to my personal development. I improved my communication skills, learned how to manage time and tasks efficiently, and became more confident in presenting my work and contributing to team discussions. The challenges I faced—whether debugging Razor views, managing cart state, or implementing secure authentication—taught me how to approach problems analytically and persistently.

This experience has not only strengthened my foundation in full-stack development but also prepared me for future roles in the software industry. I now feel more equipped to take on complex development tasks, work in collaborative environments, and contribute meaningfully to real-world projects. I am grateful to Cognizant for providing a supportive and enriching learning environment, and I look forward to applying these skills and insights in my future endeavors.

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