E-COMM VELOCITY

A Project Report Submitted in the partial fulfillment of the requirements for the award of the degree of

BACHELOR OF TECHNOLOGY

In

DEPARTMENT OF COMPUTER SCIENCE ENGINNERING

&

DEPARTMENT OF COMPUTER SCIENCE AND INFORMATION TECHNOLOGY

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K L (Deemed to be) University
DEPARTMENT OF COMPUTER SCIENCE ENGINEERING

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Declaration

The Project Report entitled "**E-COMM VELOCITY**" is a record of Bonafide work of **BALGURY ASHRITH RAO – 2320030442, KALISITI JAYAKRISHNA – 2320030191** submitted in partial fulfillment for the award of B. Tech in Computer Science and Engineering (or) Computer Science and Information Technology to the K L University. The results embodied in this report have not been copied from any other departments/University/Institute.

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DEPARTMENT OF COMPUTER SCIENCE AND INFORMATION TECHNOLOGY

CERTIFICATE

This is certify that the mini project based report entitled "**E-COMM VELOCITY"** is a Bonafide work done and submitted by **BALGURY ASHRITH RAO – 2320030442, KALISITI JAYAKRISHNA – 2320030191** in partial fulfillment of the requirements for the award of the degree of **BACHELOR OF TECHNOLOGY** in Department of Computer Science Engineering, K L (Deemed to be University), during the academic year **2024-2025.**

Signature of the Guide

Signature of the Course Coordinator **Signature of the HOD**

ACKNOWLEDGEMENT

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ABSTRACT

E-Comm Velocity is a modern, full-stack e-commerce platform designed to provide a seamless online shopping experience while offering comprehensive vendor management capabilities. This project addresses the growing need for flexible, user-centric digital marketplaces by implementing a dual-interface system that caters to both customers and vendors.The platform is built using cutting-edge technologies including React, TypeScript, and Redux, with a focus on scalability, performance, and user experience. It features a responsive design system with dark/light theme support, ensuring accessibility across various devices and user preferences. The authentication system implements role-based access control, allowing for distinct customer and vendor experiences while maintaining security standards.

Key innovations include:

- A streamlined vendor dashboard for efficient product management
- An intuitive shopping experience with real-time cart updates
- A comprehensive order management system
- Responsive design with theme customization
- Role-based access control with secure authentication

The implementation emphasizes modern development practices, utilizing Tailwind CSS for styling, Formik with Yup for form validation, and Redux for state management. The component-based architecture ensures maintainability and scalability, while the TypeScript integration provides enhanced type safety and developer experience. This project demonstrates the successful integration of modern web technologies to create a robust e-commerce solution that meets the demands of both sellers and buyers in today's digital marketplace. The platform's architecture allows for future expansions, including payment gateway integration, real-time order tracking, and advanced analytics capabilities.

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14	Appendices	- Screenshots of the app - Sample code snippets - Installation/setup instructions - User manual or guide -certifications	

CHAPTER 1

INTRODUCTION

1.1 Background of the Project

E-commerce has become an integral part of modern business, with increasing demand for flexible and user-friendly online shopping platforms. Traditional e-commerce solutions often lack comprehensive vendor management capabilities or offer complex interfaces that deter small businesses. E-Comm Velocity addresses these challenges by providing a dual-interface system that caters to both customers and vendors, offering a seamless shopping experience while simplifying product management.This platform is designed to bridge the gap between vendors and customers, offering intuitive interfaces for both user types. It supports the complete e-commerce lifecycle: from product listing and inventory management to shopping cart functionality and order processing.

1.2 Problem Statement

Many existing e-commerce platforms present challenges such as:

• Complex vendor onboarding and product management processes

• Lack of integrated theme customization for user preference

• Limited role-based access control

• Inadequate user experience on mobile devices

• Complex checkout processes that lead to cart abandonment

There is a need for an e-commerce platform that offers:

• Streamlined vendor management interface

• Intuitive shopping experience

• Responsive design with theme customization

• Secure authentication and authorization

• Efficient order processing system

1.3 Scope of the Project

This project encompasses the development of a full-stack e-commerce application with:

• React-based frontend with TypeScript for enhanced type safety

• Redux state management for seamless data flow

• Role-based authentication system

• Product management dashboard for vendors

• Shopping cart and checkout functionality

- Order tracking and history
- Responsive design with dark/light theme support

1.4 Objectives

- Create an intuitive interface for both customers and vendors
- Implement secure user authentication with role-based access
- Develop comprehensive product management capabilities
- Enable efficient shopping cart and checkout processes
- Provide order tracking and history functionality
- Ensure responsive design across all devices
- Implement theme customization for enhanced user experience

1.5 Importance of the Application

E-Comm Velocity revolutionizes online retail by providing a unified platform that serves both vendors and customers effectively. It simplifies the process of setting up an online store while ensuring a smooth shopping experience. The platform's responsive design and theme customization ensure accessibility across different devices and user preferences, while its robust architecture provides scalability for growing businesses.

1.6 Target Users/Audience

Vendors:

- Small and medium-sized businesses
- Individual sellers
- Artisans and craftspeople
- Digital product creators

Customers:

- Online shoppers
- Tech-savvy consumers
- Mobile-first users

Administrators:

- Platform managers
- Content moderators
- Support staff

CHAPTER 2

SYSTEM REQUIREMENT

2.1 Hardware Requirements

Minimum 8 GB RAM (Recommended: 16 GB for development)

• Intel Core i5 or equivalent processor (2.4 GHz or higher)

• 1 GB disk space for application and dependencies

• Stable internet connection for API interactions and real-time updates

• Display resolution: 1920 x 1080 (recommended for development)

2.2 Software Requirements

Operating System: Windows 10/11, macOS, or Linux

• Node.js (v16.0 or higher)

• npm (v8.0 or higher) or Yarn (v1.22 or higher)

• Git (v2.30 or higher)

• Visual Studio Code (Latest version)

2.3 Development Tools and Frameworks

Browser Support

• Google Chrome (v90+)

• Mozilla Firefox (v88+)

• Microsoft Edge (v90+)

• Safari (v14+)

• Chrome DevTools or Firefox Developer Tools

• Redux DevTools Extension

• React Developer Tools

• Postman for API testing

CHAPTER 3

TECHNOLOGY STACK

3.1 Frontend Technologies

Core Framework

• **React.js (v18+)**

- Functional components with hooks
- Context API for local state management
- Custom hooks for reusable logic
- Virtual DOM for efficient rendering

State Management

• **Redux Toolkit**

- Centralized state management
- Redux Thunk for async operations
- Redux Persist for state persistence
- Redux DevTools for debugging

Styling and UI

• **Tailwind CSS**

- Utility-first CSS framework
- Custom theme configuration
- Responsive design utilities
- Dark/Light mode support

Type System

• **TypeScript**

- Static type checking
- Interface definitions
- Type safety
- Enhanced IDE support

3.2 Routing and Navigation

React Router DOM (v6+)

- Dynamic routing
- Protected routes
- Navigation guards
- Route parameters
- Nested routing

3.3 UI Components and Libraries

• **Lucide React**

- Icon components
- Customizable styling
- Optimized rendering

• **Component Libraries**

- Custom reusable components
- Responsive layouts
- Accessibility features

3.4 Form Validation

Yup

- Schema validation
- Custom validation rules
- Error messages
- Type coercion

3.5 Development Tools

IDE and Extensions

• **Visual Studio Code**

- ESLint integration
- Prettier formatting
- Git integration
- TypeScript support

- Tailwind CSS IntelliSense

Version Control

• **Git**

- Branch management
- Commit history
- Merge strategies
- Code review workflow

Development Utilities

• **npm/Yarn**

- Package management
- Dependency resolution
- Script running
- Build processes

Testing Tools

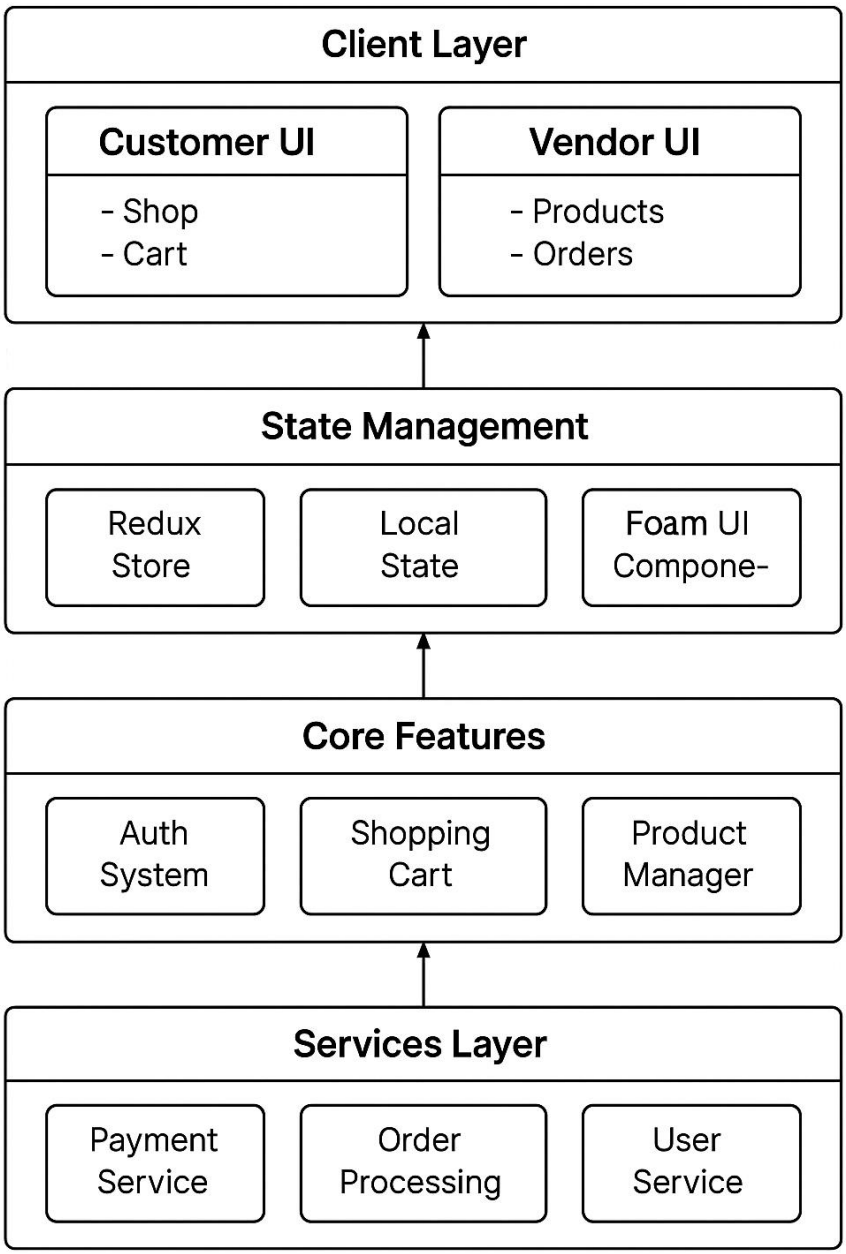
• **React Testing Library**

- Component testing
- User interaction simulation
- Accessibility testing

CHAPTER 4

SYSTEM ARCHITECTURE

4.1 High-Level Architecture Diagram



4.2 Layer-wise Breakdown

- **Frontend Layer (React + TypeScript)**
- **• Component Architecture**
- Functional components with hooks
- Reusable UI components
- Responsive layouts using Tailwind CSS
- Protected route wrappers
- **• State Management**
- Redux store for global state
- Local state using useState
- Form state using Formik
- Theme state for appearance
- **• Navigation**
- React Router for routing
- Dynamic route guards
- Role-based access control
- Navigation history management
- Discussions

State Management Layer (Redux)

• Slice Management

- Authentication state
- Shopping cart operations
- Theme preferences
- Product management

- Order tracking

Component Layer

• **Core Components**

- Product cards
- Shopping cart
- Order summaries
- User profile
- Vendor dashboard

• **Form Components**

- Login/Register forms
- Product management forms
- Checkout forms
- Profile update forms

Service Layer

• **Authentication Services**

- User registration
- Login/logout handling
- Session management
- Role verification

• **Product Services**

- Product CRUD operations
- Inventory management
- Category organization
- Image handling

• **Order Services**

- Cart management
- Checkout processing
- Order tracking
- Payment handling

4.3 Deployment Overview

Development Environment

• **Local Setup**
- React development server
- TypeScript compiler
- Redux DevTools
- Hot module replacement

• **Development Tools**
- VS Code with extensions
- Chrome DevTools
- Redux DevTools
- React Developer Tools

Scalability Considerations

• **Performance**
- Code splitting
- Lazy loading
- Caching strategies
- Asset optimization

• **Maintenance**
- Modular architecture
- Clean code practices
- Documentation
- Version control

CHAPTER 5

DESIGN

5.1 Wireframes / Mockups

Main Pages

Home Page

• **Purpose:** Main landing and product showcase
• **Elements:**
- Featured products slider
- Category navigation
- New arrivals section
- Theme toggle

Cart & Checkout

• **Purpose:** Shopping cart management
• **Elements:**
- Cart items list
- Price summary
- Payment options
- Address form

Vendor Dashboard

• **Purpose:** Product management for vendors
• **Elements:**
- Product list
- Add/Edit forms
- Order management
- Inventory tracking

User Profile

• **Purpose:** Account management
• **Elements:**
- Personal info
- Order history
- Saved addresses
- Settings

CHAPTER 6

IMPLEMENTATION

6.1 Module-Wise Implementation

The project is divided into five core modules:

1. **Authentication Module**
- Manages user registration and login
- Handles role-based access (Customer/Vendor)
- Implements protected routes and session management
- Uses Redux for state management

2. **Product Management Module**
- Controls product listing and details
- Handles vendor product operations (CRUD)
- Manages categories and inventory
- Implements search and filter functionality

3. **Shopping Module**
- Controls cart operations
- Manages checkout process
- Handles order processing
- Tracks order status

4. **User Profile Module**
- Manages personal information
- Tracks order history
- Handles address management
- Controls user preferences

5. **Vendor Dashboard Module**
- Provides product management interface
- Controls inventory tracking
- Manages order fulfillment
- Displays sales analytics

6.2 Frontend Logic

- Implements Redux for global state management
- Uses React Router for navigation
- Handles form validation with Formik and Yup
- Manages responsive layouts with Tailwind CSS

6.3 Core Features

- Authentication and authorization
- Shopping cart functionality

- Product management system
- Order processing
- Theme customization

6.4 Data Management

- Redux store implementation
- Local storage integration
- API data handling
- Form state management

6.5 Security Features

- Protected route implementation
- Role-based access control
- Input validation
- Error handling

6.6 Authentication & Authorization

- User authentication flow
- Role management (Customer/Vendor)
- Session handling
- Access control implementation

CHAPTER 7

FEATURES

7.1 Key Features of E-Comm Velocity

1. User Authentication System
2. Dual Interface (Customer/Vendor)
3. Product Management
4. Shopping Cart System
5. Order Processing
6. Theme Customization
7. Responsive Design
8. Profile Management
9. Vendor Dashboard
10. Order Tracking

7.2 Feature Descriptions

1. User Authentication System

• **User View:**
- Simple registration and login
- Role selection (Customer/Vendor)
- Protected access to features

• **Technical:**
- Redux-based auth state
- Protected route implementation
- Role-based access control

2. Dual Interface

• **User View:**
- Customer shopping interface
- Vendor management dashboard
- Role-specific features

• **Technical:**
- Conditional rendering
- Role-based routing
- Separate component trees

3. Product Management

• **User View:**
- Product listing and details
- Category filtering
- Search functionality

- **Technical:**
    - Redux product state
    - Filter implementation
    - Search optimization

4. Shopping Cart System

- **User View:**
    - Add/remove items
    - Quantity adjustment
    - Price calculation
- **Technical:**
    - Cart state management
    - Local storage sync
    - Real-time updates

5. Order Processing

- **User View:**
    - Checkout flow
    - Address selection
    - Payment integration
- **Technical:**
    - Form validation
    - Order state management
    - Payment gateway integration

6. Theme Customization

- **User View:**
    - Dark/Light mode toggle
    - Consistent styling
    - Smooth transitions

CHAPTER 8

TESTING

8.1 Testing Objectives

- Verify functionality of all features
- Ensure responsive design across devices
- Validate user flows and interactions
- Test state management and data flow
- Confirm security implementations

8.2 Testing Types Performed

A. Component Testing

- Individual React components
- Redux state management
- Form validations
- Theme switching
- Navigation flows

B. Integration Testing

- User authentication flow
- Shopping cart operations
- Checkout process
- Vendor product management
- Order processing

C. UI/UX Testing

- Responsive design
- Theme consistency
- User interactions
- Error handling
- Loading states

8.3 Tools Used

Tool	Purpose
React Testing Library	Component testing
Jest	Unit testing
Redux DevTools	State management testing
Chrome DevTools	UI debugging
React Developer Tools	Component inspection

CHAPTER 9

DEPLOYMENT

9.1 Deployment Objectives

- Launch production-ready application
- Ensure secure user data handling
- Implement responsive design across devices
- Enable efficient state management
- Maintain code quality and performance

9.2 Deployment Process

Frontend Deployment

Configuration:

- Environment variables
- Theme settings
- Route configurations
- State persistence

Development Tools

| Tool | Purpose ||------|---------|| VS Code | Development IDE || Git | Version control || npm | Package management || Chrome DevTools | Debugging |

Production Setup

- Code optimization
- Asset compression
- Error handling
- Performance monitoring

9.3 Deployment Architecture

Component Structure

```
Production Build

├── Static Assets

│   ├── Optimized images

│   ├── Minified CSS

│   └── Bundled JS

├── Index HTML
```

```
└── Configuration Files
```

Security Measures

- Protected routes
- Data encryption
- Input validation
- Error handling

9.4 Deployment Tools

Core Services

- Version Control: GitHub
- Development: Local environment
- Production: Hosting platform
- Monitoring: Performance tools

Environment Setup

```
  NODE_ENV: 'production',

  API_URL: process.env.API_URL,

  THEME_MODE: 'system'

}
```

9.5 Maintenance

Regular Tasks

- Code updates
- Security patches
- Performance optimization
- Bug fixes

Monitoring

- User experience
- Error tracking
- Performance metrics
- Usage analytics

CHAPTER 10

CHALLENGES & LIMITATIONS

10.1 Challenges Faced During Development

A. State Management

- Complex cart state synchronization
- Theme persistence across sessions
- User authentication state handling
- Order status management

B. User Interface

- Responsive design implementation
- Dark/Light theme switching
- Form validation complexity
- Mobile navigation optimization

C. Authentication Flow

- Role-based access control
- Protected route management
- Session persistence
- Security implementation

D. Performance Issues

- Image optimization
- State updates efficiency
- Component rendering
- Data fetching strategies

E. Technical Integration

- TypeScript implementation
- Redux setup complexity
- Form state management
- API integration

10.2 Solutions Implemented

State Management

```
- Centralized store

- Persistent storage

- Action creators

- State selectors
```

Authentication

```
- Protected routes

- Role verification

- Session management

- Error handling
```

Performance

- Code splitting
- Lazy loading
- Image optimization
- Caching strategies

10.3 Current Limitations

Technical Limitations

- Limited payment options
- Basic search functionality
- Simple analytics
- Basic inventory management

Feature Limitations

- No real-time updates
- Limited vendor analytics
- Basic order tracking
- Simple user profiles

CHAPTER 11

FUTURE ENHANCEMENTS

11.1 Planned Features

A. Payment Integration

- Multiple payment gateways
- International payment support
- Subscription models
- Secure transactions
  - `Stripe/PayPal integration`
  - `Crypto payments`
  - `Wallet system`
  - `Refund handling`

B. Advanced Vendor Features

- Analytics dashboard
- Inventory forecasting
- Bulk product management
- Sales reports

C. Enhanced User Experience

- Real-time order tracking
- Wishlist functionality
- Product recommendations
- Social sharing

D. Mobile Application

- React Native app
- Push notifications
- Offline support
- Mobile payments

E. Social Features

- Product reviews
- User ratings
- Community discussions
- Share purchases

11.2 Long-Term Vision

Performance

- Advanced caching
- Image optimization
- Lazy loading
- Server-side rendering

Analytics

- User behavior tracking

- Sales analytics

- Performance metrics

- Conversion tracking

Security

- Enhanced authentication
- Fraud detection
- Data encryption
- GDPR compliance

CHAPTER 12

CONCLUSION

12.1 Summary

E-Comm Velocity represents a modern e-commerce solution designed to provide a seamless shopping experience while offering robust vendor management capabilities. The platform successfully implements:

- Dual interface system (Customer/Vendor)
- Secure authentication and authorization
- Comprehensive product management
- Efficient shopping cart system
- Responsive design with theme customization

The project demonstrates the practical application of modern web technologies including React, TypeScript, Redux, and Tailwind CSS, creating a scalable and maintainable e-commerce platform.

12.2 Achievements

Technical Achievements

- Built responsive React-based frontend
- Implemented Redux state management
- Created role-based access control
- Developed theme customization

- Established efficient data flow

Feature Achievements

- User authentication system
- Product management dashboard
- Shopping cart functionality
- Order processing system
- Profile management

12.3 Learnings

Technical Skills

- React and TypeScript expertise
- State management patterns
- Component architecture
- Form handling strategies
- Security implementation

Development Practices

- Clean code principles
- Version control workflow
- Testing methodologies
- Performance optimization
- Responsive design

Project Management

- Module organization
- Feature prioritization
- Problem-solving approaches
- Documentation practices
- Code maintenance

CHAPTER 13

REFERENCES

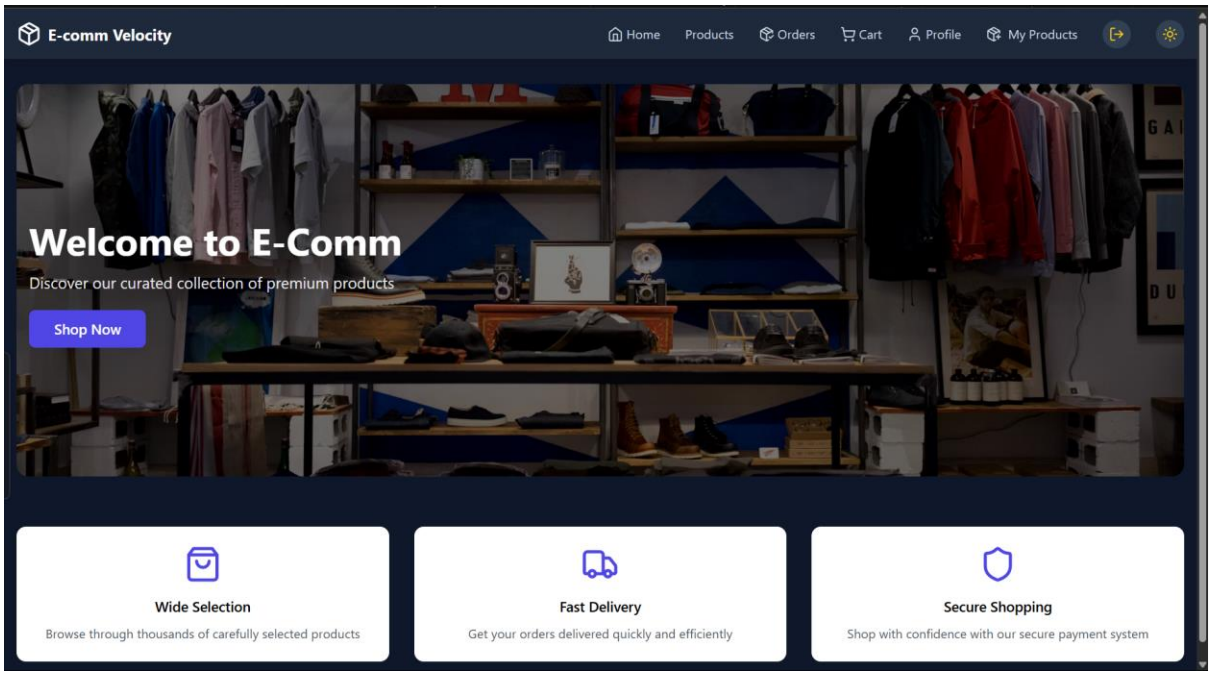
1. **React.js Documentation**
   - https://react.dev/
   - Official documentation for React framework
2. **TypeScript Documentation**
   - https://www.typescriptlang.org/docs/
   - TypeScript language and tooling guide
3. **Redux Documentation**
   - https://redux.js.org/
   - State management library documentation
4. **Tailwind CSS Documentation**
   - https://tailwindcss.com/docs
   - Utility-first CSS framework guide
5. **Formik Documentation**
   - https://formik.org/docs/
   - Form management library documentation
6. **React Router Documentation**
   - https://reactrouter.com/
   - Routing library for React applications
7. **Yup Documentation**
   - https://github.com/jquense/yup
   - Schema validation library guide
8. **Lucide React Icons**
   - https://lucide.dev/
   - Icon library documentation
9. **React Testing Library**
   - https://testing-library.com/docs/
   - Testing utilities documentation
10. **Jest Documentation**
    - https://jestjs.org/docs/
    - Testing framework documentation
11. **GitHub Documentation**
    - https://docs.github.com/
    - Version control and collaboration guide
12. **VS Code Documentation**
    - https://code.visualstudio.com/docs
    - IDE documentation and extensions
13. **npm Documentation**
    - https://docs.npmjs.com/
    - Package manager documentation

CHAPTER 14

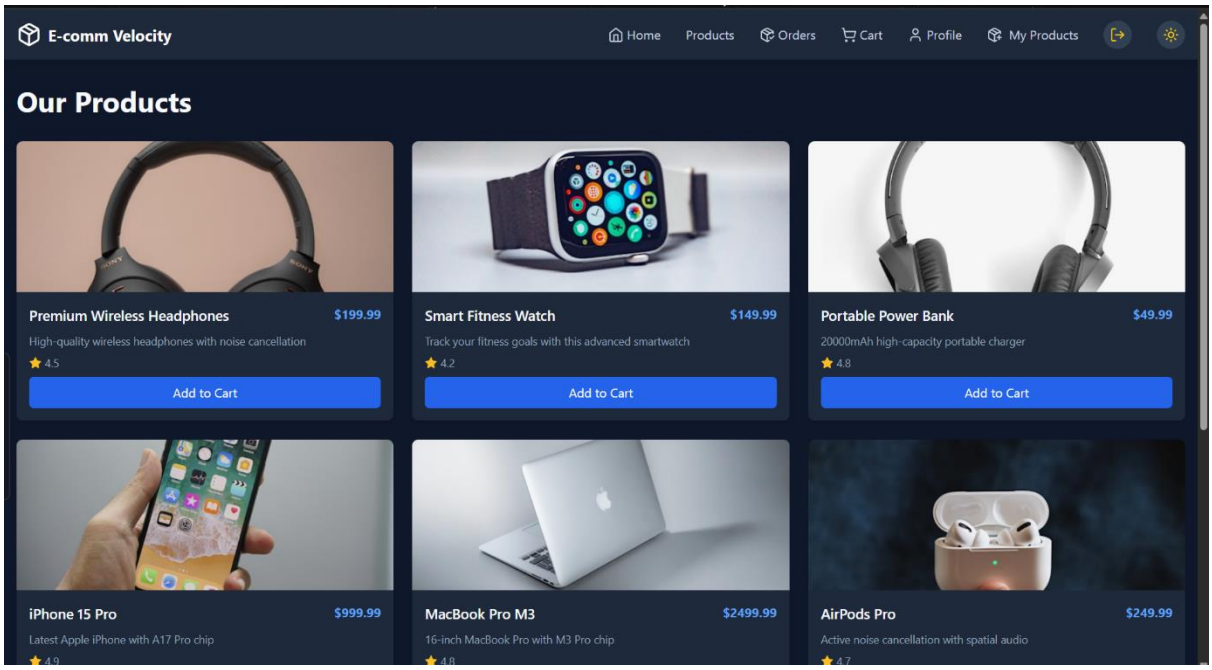
APPENDICES

Appendix A: Screenshots

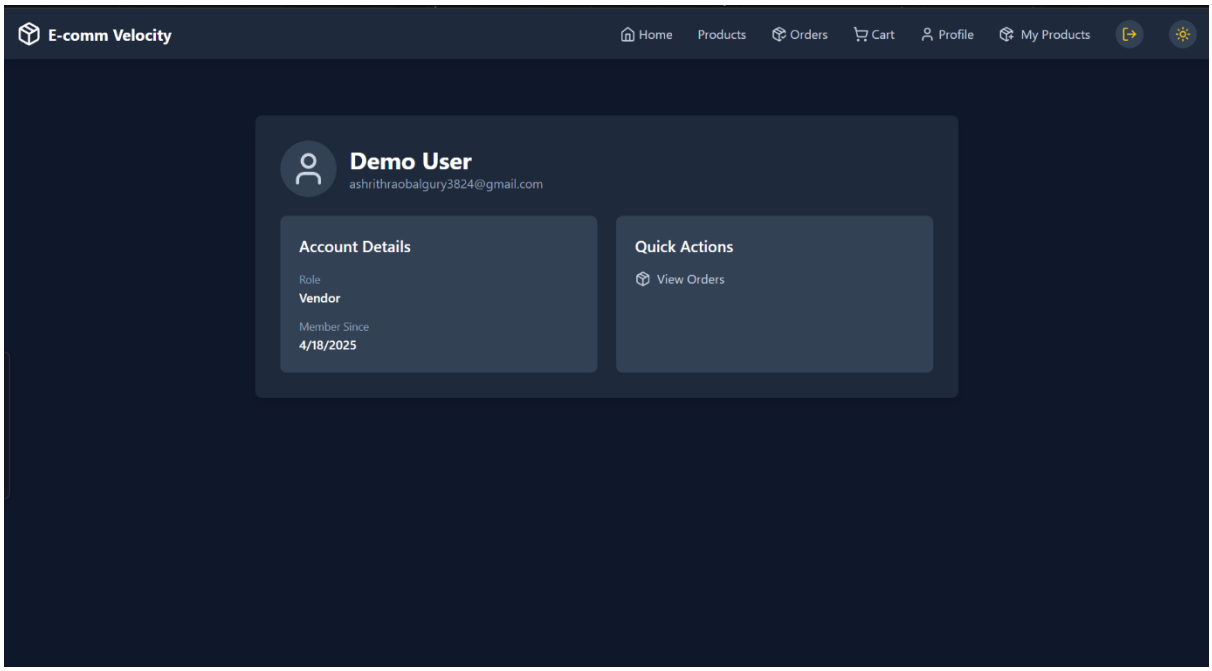
1. Home Page



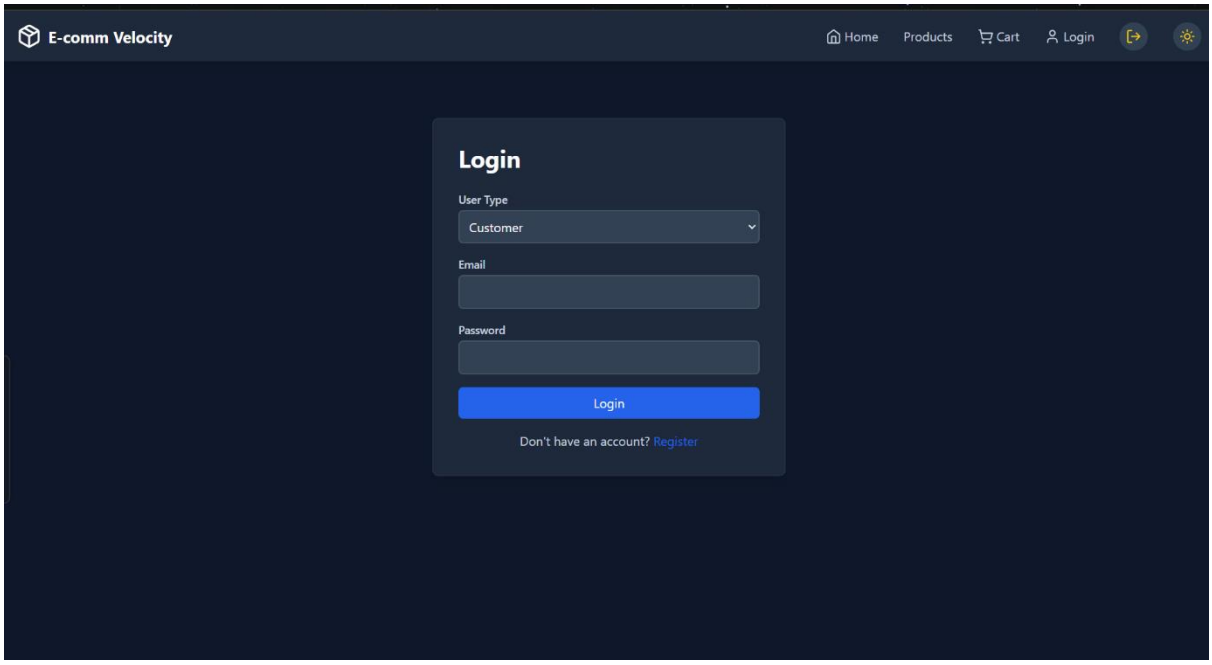
2. Product Page

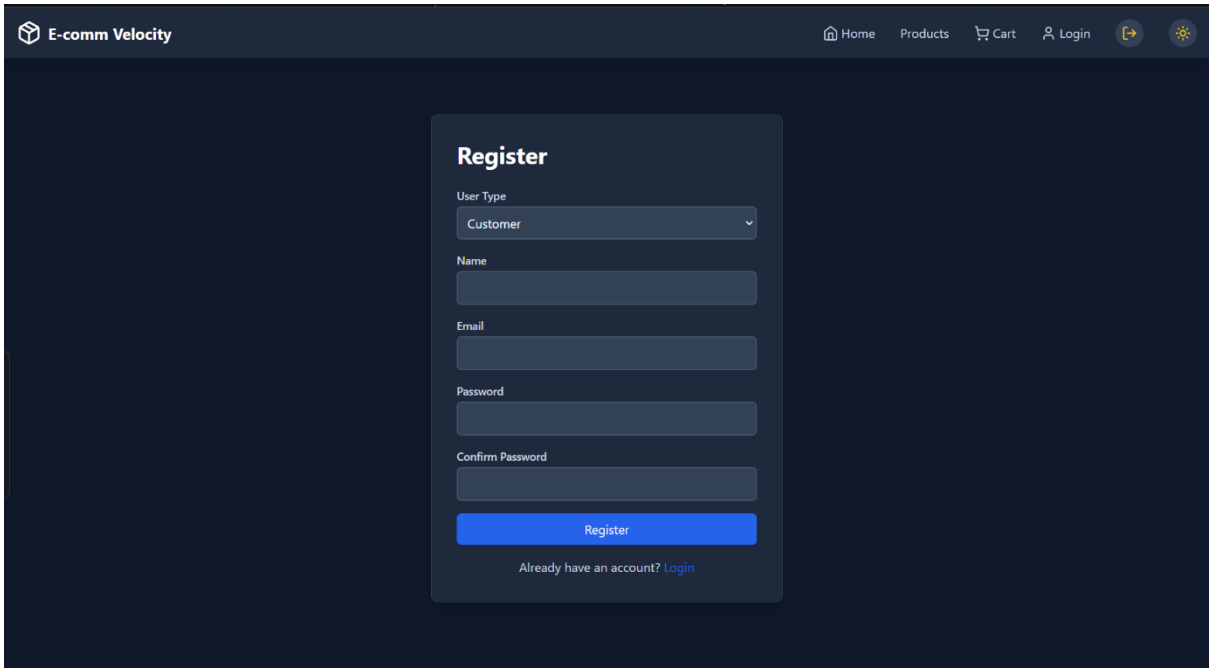


3. Profile Page

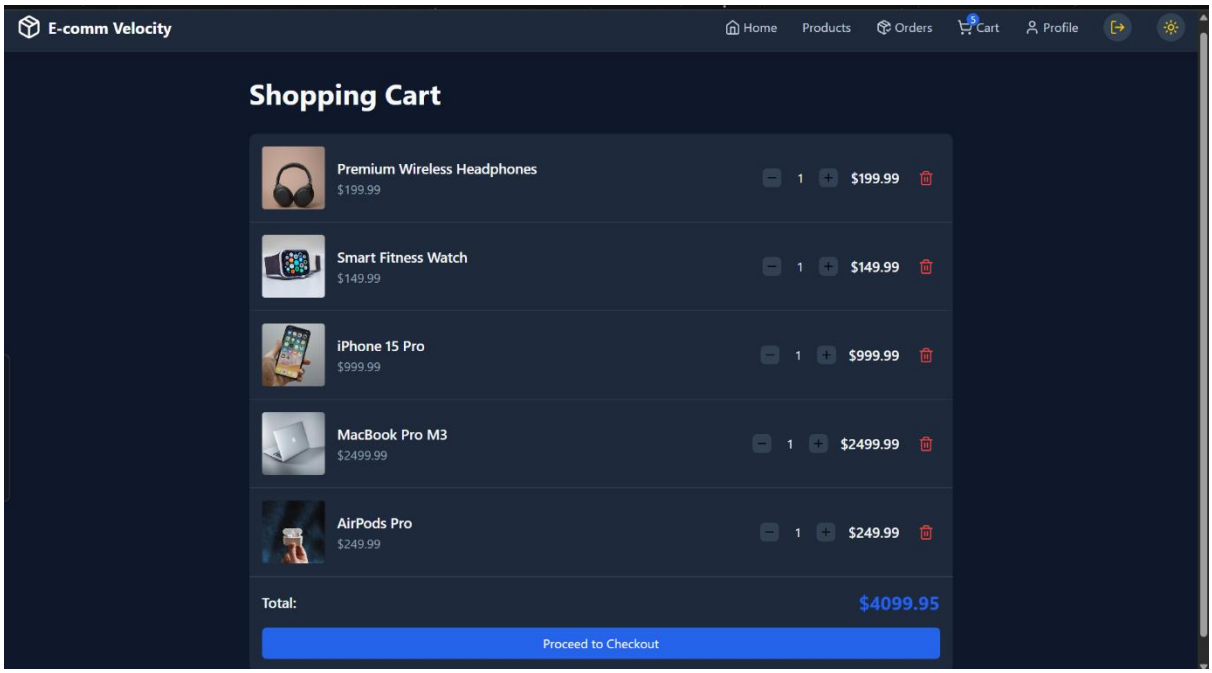


5. Login/Register Page




E-comm Velocity
Home
Products
Cart
Login
Register
User Type
Customer
Name
Email
Password
Confirm Password
Register
Already have an account? Login

6. **Cart Page**


E-comm Velocity
Home
Products
Orders
Cart
Profile
Shopping Cart
Premium Wireless Headphones
$199.99
1
$199.99
Smart Fitness Watch
$149.99
1
$149.99
iPhone 15 Pro
$999.99
1
$999.99
MacBook Pro M3
$2499.99
1
$2499.99
AirPods Pro
$249.99
1
$249.99
Total:
$4099.95
Proceed to Checkout

7. **Check Out Page**