**FASHION E-COMMERCE PLATFORM**

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**MINI PROJECT**

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**DEPARTMENT OF ARTIFICIAL INTELLIGENCE AND DATA SCIENCE**

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**AUTONOMOUS**

**DEPARTMENT OF ARTIFICIAL INTELLIGENCE AND DATA SCIENCE**

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**BONAFIDE CERTIFICATE**

This is to certify that it is the Bonafide work of **PAVARNA. V (9517202209040), SAMYUKTHA S V (9517202209049), VIDHYA. S (9517202209059)** for the mini project titled **“FASHION E-COMMERCE PLATFORM”** in **19AD652 – FULL STACK DEVELOPMENT LABORATORY** during the sixth semester December 2024 – May 2025 under my supervision.

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**ABSTRACT**

This project delivers a comprehensive Luxury Fashion E-Commerce Platform focused primarily on women's fashion with extensibility for men's and children's categories. Built using modern web development best practices, the platform combines an elegant user interface with robust functionality and secure database integration.

The frontend leverages React.js with TypeScript for type safety and component-based architecture, styled with TailwindCSS for responsive design. State management is handled through Redux Toolkit, while React Router provides seamless navigation between product categories, detail pages, and checkout flows. The user experience is enhanced with React Hot Toast notifications for immediate feedback.

The backend infrastructure transitions from a development JSON Server to a production MongoDB database, secured through bcrypt password hashing, JWT authentication, and additional security measures via Helmet and rate limiting. The platform includes a custom synchronization system to migrate and maintain consistency between the initial JSON data model and the MongoDB collections.

This solution offers merchants a complete ecosystem for luxury fashion retail, combining visual appeal with technical excellence to create an engaging shopping experience that meets the expectations of discerning customers in the high-end fashion market.

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**CHAPTER 1**

**INTRODUCTION**

* 1. **OVERVIEW**

**1.1.1 Project Architecture**

The Fashion eCommerce Platform employs a modern client-server architecture with clear separation of concerns. The front end is built on React.js with TypeScript, providing a component-based structure that enhances maintainability and code reusability. This architecture allows for independent development and testing of UI components while maintaining type safety throughout the application. The platform utilizes JSON Server during development to simulate RESTful API behavior, transitioning to MongoDB for production, with a custom synchronization system ensuring data consistency between these environments.

**1.1.2 Frontend Implementation**

The user interface is designed collaboratively using Figma, focusing on luxury aesthetics that appeal to the high-end fashion market. React.js serves as the foundation, with TypeScript adding static typing to prevent common errors and improve developer experience. TailwindCSS provides utility-first styling capabilities, allowing for rapid UI development and consistent design language across the platform. The component structure follows best practices with reusable elements for product cards, navigation menus, and checkout forms.

The state management implementation leverages Redux Toolkit, offering a predictable state container that simplifies complex data flows and user interactions. React Router handles navigation between various sections of the application, including product listings, detail pages, and shopping cart views. User feedback is enhanced through React Hot Toast, providing elegant notifications for actions such as adding items to cart, completing purchases, or encountering errors.

**1.1.3 Backend Structure**

The backend architecture transitions from development to production environments by moving from JSON Server to a robust MongoDB implementation. Express.js provides the server framework, handling HTTP requests and routing API endpoints efficiently. Mongoose serves as the MongoDB object modeling tool, offering schema validation and relationship management between data entities like products, users, and orders.

Security is implemented through multiple layers: bcrypt handles password hashing for user credentials, JSON Web Tokens (JWT) manage authentication and session maintenance, while Helmet and express-rate-limit protect against common web vulnerabilities and brute force attacks. The API design follows RESTful principles with endpoints for product management, user operations, cart manipulation, and order processing.

**1.1.4 Data Management**

The data model is initially defined in JSON format, encompassing entities such as products (with attributes for name, description, price, inventory, and images), users (with authentication and profile information), shopping carts, and order history. The custom synchronization system facilitates migration from the JSON-based development environment to MongoDB collections, maintaining referential integrity and data consistency.

MongoDB provides document-oriented storage with flexibility for handling varied product attributes and categories. The database schema supports dynamic filtering options for product discovery based on characteristics relevant to luxury fashion items, such as designer, material, season, and collection. Indexing strategies optimize query performance for product searches and category browsing.

**1.1.5 User Experience Design**

The platform offers an intuitive shopping experience tailored for luxury fashion consumers. The interface balances aesthetic appeal with functionality, featuring high-quality product imagery, detailed descriptions, and size/fit information. The shopping journey is streamlined with features such as persistent shopping carts, wishlist functionality, and simple checkout processes.

Category navigation is designed for the primary focus on women's fashion while maintaining extensibility for men's and children's categories. Product discovery is enhanced through filtering systems customized for fashion attributes, allowing users to browse by designer, collection, garment type, or seasonal relevance. The responsive design ensures optimal viewing experiences across devices, from desktop to mobile.

**1.1.6 Admin Capabilities**

The administrative interface provides comprehensive tools for inventory and order management. Merchants can add, edit, and remove products with detailed attribute specifications relevant to fashion items. The admin dashboard offers insights into sales performance, inventory levels, and customer activity, supporting informed business decisions.

Product management features include batch operations for seasonal updates or promotional campaigns, image management for multiple product views, and variant handling for size and color options. Order management capabilities encompass status tracking, fulfillment workflow, and customer communication tools for personalized service appropriate to luxury retail.

**1.1.7 Implementation Details**

The development environment utilizes Concurrently to run multiple scripts simultaneously, streamlining the workflow between frontend React applications and backend services. The build process optimizes assets for production deployment, with consideration for performance in image-heavy fashion catalogs.

API integration is handled through Axios, providing a promise-based HTTP client that simplifies data fetching and error handling. The API design includes endpoints for product filtering, user authentication, shopping cart operations, and order processing, all secured through appropriate authorization checks.

Error handling is implemented comprehensively throughout the application, with appropriate user feedback for common scenarios such as out-of-stock items, authentication failures, or network issues. Logging mechanisms capture system activities for troubleshooting and performance optimization.

**1.1.8 Testing Approach**

The testing strategy encompasses multiple levels of verification. Component testing validates individual UI elements and their interactions, while integration testing ensures proper communication between frontend and backend systems. End-to-end testing simulates user journeys from browsing to checkout, confirming the complete shopping experience functions as expected.

Data integrity tests verify that the synchronization between JSON data and MongoDB maintains consistency and accuracy. Performance testing evaluates response times for product browsing and search operations, ensuring the platform remains responsive even with extensive product catalogs and concurrent users.

**1.1.9 Scalability Considerations**

The architecture is designed with scalability in mind, allowing for growth in product catalog size and user base. The component-based frontend structure facilitates the addition of new features without significant refactoring. The MongoDB database provides horizontal scaling capabilities to accommodate increasing data volumes.

State management through Redux Toolkit supports complex application states that may emerge as the platform evolves to include features such as personalized recommendations, loyalty programs, or integrated marketing campaigns. The API design anticipates future expansion with versioned endpoints and modular controller structure.

* 1. **OBJECTIVES**

**1.2.1 Core Technical Objectives**

* Developing a Modern Web Architecture
  + Implement a React.js frontend with TypeScript for type safety and code maintainability
  + Create a component-based structure that enables reusable UI elements and consistent styling
  + Establish a clear separation between presentation and business logic layers
* Build a Robust Data Management System
  + Design a flexible data model that accommodates fashion-specific attributes and relationships
  + Develop a seamless synchronization mechanism between JSON-based development data and MongoDB
  + Implement efficient data retrieval patterns optimized for fashion product browsing and filtering
* Ensure Security and Performance
  + Integrate authentication using JWT with secure password handling via bcrypt
  + Implement protective measures including rate limiting and Helmet security headers
  + Optimize asset loading and state management for responsive performance across device

**1.2.2 Functional Objectives**

* Creating an Intuitive Shopping Experience
  + Design an elegant user interface that reflects luxury fashion aesthetics
  + Implement intuitive navigation pathways organized by fashion categories and collections
  + Develop a streamlined checkout process appropriate for high-value purchases
* Provide Comprehensive Administrative Tools
  + Build a dashboard for inventory management with fashion-specific attributes
  + Develop order management capabilities with status tracking and fulfillment workflows
* Enable Extensible Category Management
  + Focus primarily on women's luxury fashion with a versatile product structure
  + Design an extensible taxonomy that can accommodate men's and children's categories
  + Implement flexible attribute management for diverse product types

**1.2.3 Technical Implementation Objectives**

* Establish a Scalable Frontend Foundation
  + Utilize Redux Toolkit for predictable state management across complex user journeys
  + Implement React Router for seamless navigation between product collections and details
  + Integrate React Hot Toast for elegant user notifications and feedback
* Creating a Flexible Backend Infrastructure
  + Develop RESTful API endpoints using Express.js for all eCommerce operations
  + Implement Mongoose schemas that capture fashion product complexity and relationships
  + Create authentication and authorization flows appropriate for customer and admin access
* Ensure System Quality and Reliability
  + Develop a comprehensive testing strategy covering components, integration, and user journeys
  + Implement error handling with appropriate user feedback for common scenarios
  + Establish logging mechanisms for system monitoring and troubleshooting

**1.2.4 Business-Aligned Objectives**

1. Support Luxury Retail Operations
   * Enable high-quality product presentation with multiple image views and detailed descriptions
   * Implement inventory controls appropriate for limited-availability luxury items
   * Create customer accounts with order history and preferences
2. Facilitate Growth and Adaptation
   * Design for future implementation of personalization and recommendation features
   * Ensure mobile optimization for increasingly mobile-centric shopping behaviors
   * Prepare for integration with marketing automation and CRM systems
   1. **SCOPE OF THE PROJECT**

**1.3.1 System Components**

* **Frontend Application**
* React.js with TypeScript component architecture for all user interfaces
* TailwindCSS implementation for responsive, luxury-oriented design
* Redux Toolkit state manage for product browsing, cart, and checkout flows
* React Router implementation for navigation between platform sections
* React Hot Toast integration for user feedback and notification system
* Responsive layouts optimized for desktop, tablet, and mobile experiences
* **Backend Services**
* Express.js RESTful API development with standardized endpoint structure
* MongoDB integration with Mongoose for data modeling and validation
* JSON Server implementation for development environment
* Custom synchronization system between JSON and MongoDB data sources
* JWT authentication and authorization framework
* Security implementation including bcrypt password hashing, Helmet protection, and rate limiting

**1.3.2 Core Features**

* **User-Facing Functionality**
* Product browsing with specific filtering (designer, collection, season, etc.)
* Product detail present with multiple image views and detailed specifications
* Shopping cart management with persistent storage
* User account creation and management
* Secure checkout process with order confirmation
* **Administrative Capabilities**
* Product management dashboard for inventory control
* Product creation and editing with fashion-specific attributes
* Order management system with status updates and fulfillment tracking
* Basic sales and inventory reporting
* User account administration

**1.3.3 Data Management**

* **Product Catalog**
* Comprehensive product data model capturing fashion-specific attributes
* Support for product variants (sizes, colors)
* Multiple product images with zoom capability
* Inventory tracking at the variant level
* Categorization system aligned with fashion taxonomy
* **User Data**
* Secure customer profile management
* Address book for shipping and billing information
* Order history and status
* Basic customer segmentation capabilities
* **Transaction Data**
* Order creation and management
* Payment status tracking (payment processing integration excluded)
* Order fulfillment status updates

**1.3.4 Technical Scope**

* **Development Environment**
* Concurrently implementation for frontend & backend development
* Figma integration for UI/UX design collaboration
* Version control system implementation
* Development, staging, and production environment configurations
* **Performance Optimization**
* Image optimization for fashion product presentation
* Frontend bundle optimization
* Database query optimization for product browsing
* Response caching strategies for improved performance
* **Testing Coverage**
* Component testing for UI elements
* Integration testing for API endpoints
* End-to-end testing for critical user journeys
* Data integrity validation

**1.3.5 Exclusions**

The following items are specifically excluded from the project scope:

* Actual payment processing integration (placeholder for future integration)
* Advanced analytics and reporting dashboards
* Marketing automation features
* Personalized recommendation engine
* Customer review and rating system
* Internationalization and multi-currency support
* Advanced CMS capabilities for content pages
* Loyalty program features
* Integration with external ERP or inventory management systems
* Social media login integration
* Email marketing functionality

**Implementation Timeline:** Development planned across 12 weeks with phased delivery of core components followed by refinement and optimization.

* 1. **MODULES USED**

**1.4.1 Frontend Modules**

* **Core UI Framework**
* React.js: Component-based UI library for building the interactive interface
* TypeScript: Adds static type checking to JavaScript for more robust code
* TailwindCSS: Utility-first CSS framework for creating the luxury aesthetic
* React Router: Handles navigation between different sections of the application
* **State Management**
* Redux Toolkit: Manages global state for products, cart, and user sessions
* React Context API: Handles local state for component trees where appropriate
* Local Storage Integration: Persists cart and user preferences across sessions
* **User Interface Components**
* Product Gallery Module: Displays fashion items with filtering and sorting
* Product Detail Module: Shows comprehensive product information with images
* Shopping Cart Module: Manages item selection and purchase preparation
* Checkout Module: Handles the order completion process
* User Account Module: Provides profile management and order history
* Navigation Module: Implements category browsing and search functionality
* React Hot Toast: Delivers user notifications and system feedback

**1.4.2 Backend Modules**

* **API Framework**
* Express.js: Provides the RESTful API structure and request handling
* Middleware Stack: Processes requests for authentication, logging, and error handling
* Route Controllers: Manage specific API endpoint functionality
* **Database Integration**
* MongoDB Connection: Manages database connectivity and operations
* Mongoose: Provides schema validation and object modeling
* JSON Server: Simulates API responses during development
* Data Synchronization Module: Facilitates JSON to MongoDB data migration
* **Authentication & Security**
* JWT Implementation: Handles token-based authentication
* bcrypt Module: Secures user passwords with hashing
* Helmet: Protects against common web vulnerabilities
* Rate Limiting: Prevents abuse through request throttling

**1.4.3 Data Modules**

**Product Management**

* Product Catalog Module: Maintains fashion item data and relationships
* Inventory Tracking Module: Monitors stock levels across product variants
* Category Management Module: Organizes products in fashion-specific taxonomy
* Image Asset Module: Handles product imagery and presentation

**User Management**

* Customer Profile Module: Manages user information and preferences
* Address Book Module: Stores shipping and billing information
* Authentication Module: Controls user access and permissions

**Order Processing**

* Shopping Cart Module: Tracks selected items and quantities
* Order Creation Module: Converts carts to confirmed orders
* Order Status Module: Monitors fulfillment progress
* Order History Module: Maintains customer purchase records

**1.4.4 Administrative Modules**

**Inventory Control**

* Product Editor Module: Facilitates creating and updating fashion items
* Stock Management Module: Controls inventory levels and availability
* Bulk Operations Module: Enables batch updates for seasonal changes

Order Management

* Order Dashboard Module: Provides overview of all customer orders
* Fulfillment Module: Tracks order processing and shipping
* Customer Communication Module: Manages order-related notifications

Reporting

* Sales Analytics Module: Basic reporting on product performance
* Inventory Reports Module: Stock level monitoring and alerts
* User Activity Module: Tracks customer engagement metrics

**1.4.5 Development & Testing Modules**

**Development Environment**

* Concurrently: Runs multiple development servers simultaneously
* Figma Integration: Supports collaborative UI/UX design
* Environment Configuration: Manages settings across development stages

**Testing Framework**

* Component Testing Module: Validates UI element functionality
* API Testing Module: Verifies endpoint behavior and data integrity
* User Journey Testing Module: Confirms end-to-end functionality
* Performance Testing Module: Evaluates system responsiveness

**1.4.6 Integration Modules**

**Data Connectivity**

* Axios HTTP Client: Handles API communication
* Response Parsing Module: Processes API data for frontend consumption
* Error Handling Module: Manages API failures and retry logic

**Future Integration Points**

* Payment Gateway Connector: Prepared for payment processor integration
* Analytics Integration Module: Ready for future reporting expansion
* Marketing Automation Hook: Structured for CRM system connection

**1.5 PACKAGE USED**

**1.5.1 Frontend Packages**

* react: Core library for building component-based user interfaces
* react-dom: React package for DOM rendering and manipulation
* typescript: JavaScript superset providing static typing
* tailwindcss: Utility-first CSS framework for custom styling
* react-router-dom: Declarative routing for React applications
* axios: Promise-based HTTP client for API requests

**1.5.2 Backend Packages**

* express: Fast, unopinionated web framework for Node.js
* mongoose: MongoDB object modeling for Node.js
* jsonwebtoken: Implementation of JSON Web Tokens
* bcrypt: Library for password hashing and security
* cors: Express middleware for Cross-Origin Resource Sharing
* dotenv: Loads environment variables from .env file

**1.5.3 Development Tools**

* json-server: Creates mock API from JSON file for development
* concurrently: Runs multiple commands simultaneously
* nodemon: Monitors for changes and restarts server
* typescript-eslint: TypeScript specific linting rules
* jest: JavaScript testing framework
* react-testing-library: Testing utilities for React components

**1.5.4 Data Management & Utilities**

* mongodb: Official MongoDB driver for Node.js
* redux-persist: Persist and rehydrate Redux stores
* axios-cache-adapter: Caching adapter for Axios requests
* formik: Form management library for React
  1. **WORKING**

**1.6.1 User Experience Flow**

When a customer visits the platform, the React application initializes and loads the core UI components. Redux Toolkit establishes global state management, while React Router determines the appropriate view based on the URL path. For first-time visitors, featured luxury fashion items are displayed in a visually appealing grid layout.

As users browse the women's fashion catalog, the system sends API requests through Axios to the backend services. These requests are handled by the Express.js server, which queries the MongoDB database (or JSON Server during development) for product data. The fetched data is transformed into appropriate formats and returned to the frontend, where React components render the products with their images, descriptions, and pricing information.

When a user selects specific filtering criteria (such as designer, collection, or season), these parameters are encoded in API requests, triggering filtered database queries. The filtered results update seamlessly in the UI without full page reloads, thanks to React's virtual DOM and efficient state management.

**1.6.2 Key System Interactions**

Product detail views load comprehensive information including multiple high-resolution images, detailed descriptions, material information, sizing guides, and inventory availability. When a user adds an item to their cart, the Redux store is updated immediately, while React Hot Toast provides visual confirmation of the action. The cart data is synchronized with local storage to persist across browser sessions.

The checkout process begins when a user navigates to their cart and proceeds to check out. The system validates inventory availability in real-time before proceeding. During checkout, user information is collected through forms built with Formik and validated with Yup schemas. For registered users, stored address information can be retrieved from their profile data in MongoDB through authenticated API calls secured by JWT.

Order creation occurs when the user confirms their purchase. The frontend sends a comprehensive order request to the backend, which processes the transaction, updates inventory levels, and creates order records in MongoDB. Order confirmation details are then returned to the user with React Hot Toast providing successful transaction feedback. At this point, the cart is cleared, and order history is updated for registered users.

**1.6.3 Administrative Operations**

Behind the scenes, store administrators access a protected dashboard requiring JWT authentication. This dashboard provides interfaces for managing products, monitoring orders, and viewing basic sales reports. When adding new fashion items, administrators use forms to input comprehensive product details including multiple image uploads, variant information for sizes and colors, and inventory quantities.

The product management workflow includes the ability to create, update, and temporarily deactivate products without permanent deletion to maintain order history integrity. Bulk operations facilitate seasonal updates or promotional activities. Order management enables status updates as items move through fulfillment stages, with each state change triggering database updates and optionally notifying customers.

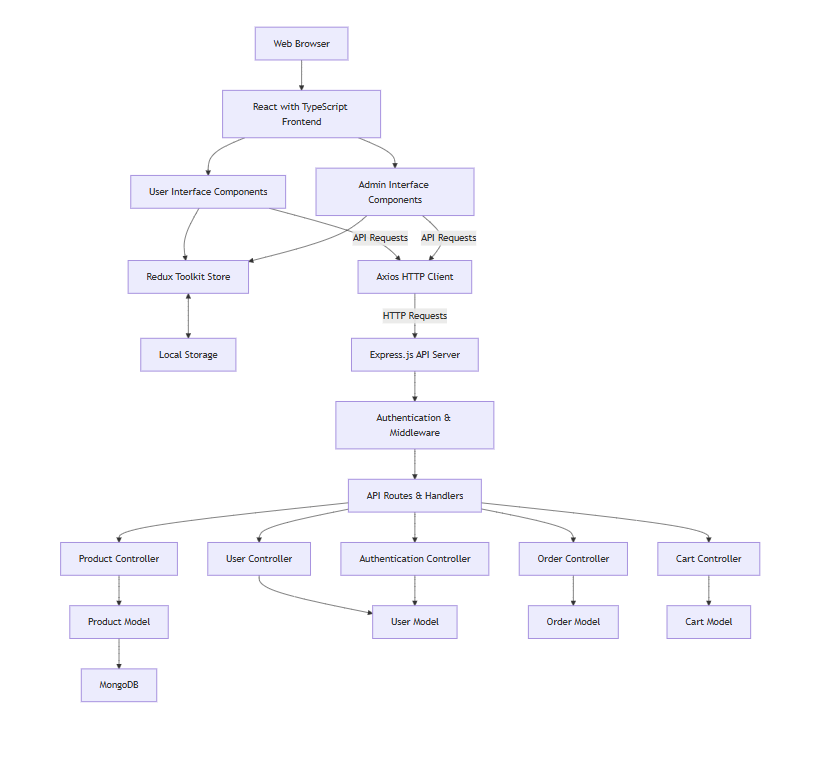
**1.6.4 Technical Operations**

The custom synchronization module provides tooling to migrate data between the JSON development environment and MongoDB production database, ensuring consistent data models and relationships. This approach allows for accelerated development cycles while maintaining production readiness.

Performance optimization includes frontend bundle optimization through React's built-in capabilities, tailored TailwindCSS configuration to minimize CSS payload, strategic data fetching patterns to reduce unnecessary API calls, and MongoDB query optimization for efficient catalog browsing. The responsive design implementation ensures appropriate layouts and interactions across devices, with TailwindCSS handling breakpoint management for mobile, tablet, and desktop experiences.

**CHAPTER 2**

**2.1 SYSTEM DESIGN**

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**Figure 2.1.1 System Design**

The system uses a modern client-server architecture. The React/TypeScript frontend handles user and admin interfaces, with Redux managing application state. API requests travel through Axios to an Express.js server, which processes them through authentication middleware and specialized controllers. Data is stored in MongoDB through corresponding data models.

**CHAPTER 3**

**SYSTEM REQUIREMENTS**

**3.1 Software Requirements**

**3.1.1 Functional Requirements**

* **User Authentication & Management** 
  + User registration, login, and profile management
  + Role-based access control (customer, admin)
  + Password recovery functionality
* **Product Management** 
  + Product categorization for luxury fashion items
  + Advanced filtering by size, color, price, and brand
  + Product inventory and stock management
  + Image handling for multiple product views
* **Shopping Experience** 
  + Shopping cart functionality with persistent storage
  + Wishlist capability for saved items
  + Product search with autocomplete suggestions
  + Order processing and status tracking
* **Administrative Features** 
  + Dashboard for sales analytics
  + Inventory management interface
  + Order processing workflow
  + User account management

**3.1.2 Non-Functional Requirements**

* **Performance** 
  + Page load time under 2 seconds
  + Support for concurrent users (minimum 100)
  + Responsive design across devices (mobile, tablet, desktop)
* **Security** 
  + Encrypted data transmission (HTTPS)
  + Secure payment processing
  + Protection against common web vulnerabilities
  + User data protection compliant with privacy regulations
* **Technical Requirements** 
  + React.js with TypeScript frontend
  + Express.js backend API
  + MongoDB database integration
  + Redux for state management
  + Responsive design using modern CSS techniques
* **Quality Assurance** 
  + Cross-browser compatibility (Chrome, Firefox, Safari, Edge)
  + Automated testing for core functionality
  + Error logging and monitoring

**3.2 Hardware Requirements**

**3.2.1 Development Environment**

* **Developer Workstations**
  + Processor: Intel Core i5/AMD Ryzen 5 or higher
  + RAM: Minimum 16GB
  + Storage: 256GB SSD
  + Operating System: Windows 10/11, macOS, or Linux
  + Display: Full HD resolution (1920×1080) or higher
* **Development Tools**
  + Code Editor: Visual Studio Code or equivalent
  + Node.js runtime environment (v14.x or higher)
  + Git version control system
  + NPM or Yarn package manager

**3.2.2 Production Environment**

* **Web Server**
  + Virtual Private Server (VPS) or Cloud Instance
  + CPU: 4 cores minimum
  + RAM: 8GB minimum
  + Storage: 100GB SSD minimum
  + Network: 1Gbps connection
  + Operating System: Ubuntu Server 20.04 LTS or equivalent
* **Database Server**
  + Dedicated MongoDB instance
  + RAM: 8GB minimum
  + Storage: 100GB SSD with backup capability
  + Backup: Daily automated backups

**CHAPTER 4**

**IMPLEMENTATION**

**4.1 SOURCE CODE**

|  |
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|  |
| **Figure 4.1.1 Directories Structure** |
| **App.tsx:**  import { RouterProvider, createBrowserRouter } from "react-router-dom";  import {    Cart,    Checkout,    HomeLayout,    Landing,    Login,    OrderConfirmation,    OrderHistory,    Register,    Search,    Shop,    SingleOrderHistory,    SingleProduct,    UserProfile,  } from "./pages";  import { checkoutAction, searchAction } from "./actions/index";  import { shopCategoryLoader } from "./pages/Shop";  import { loader as orderHistoryLoader } from "./pages/OrderHistory";  import { loader as singleOrderLoader } from "./pages/SingleOrderHistory";  const router = createBrowserRouter([{      path: "/",      element: <HomeLayout />,      children: [        {          index: true,          element: <Landing />,        },        {          path: "shop",          element: <Shop />,        },        {          path: "shop/:category",          element: <Shop />,          loader: shopCategoryLoader,        },        {          path: "product/:id",          element: <SingleProduct />,        },        {          path: "cart",          element: <Cart />,        },        {          path: "checkout",          element: <Checkout />,          action: checkoutAction,        },        {          path: "search",          action: searchAction,          element: <Search />,        },        {          path: "login",          element: <Login />,        },        {          path: "register",          element: <Register />,        },        {          path: "order-confirmation",          element: <OrderConfirmation />,        },        {          path: "user-profile",          element: <UserProfile />,        },        {          path: "order-history",          element: <OrderHistory />,          loader: orderHistoryLoader,        },        {          path: "order-history/:id",          element: <SingleOrderHistory />,          loader: singleOrderLoader        },      ],    },  ]);  function App() {    return <RouterProvider router={router} />;  }  export default App; |
| **Main.tsx**  import React from "react";  import ReactDOM from "react-dom/client";  import App from "./App.tsx";  import "./index.css";  import { store } from "./store.ts";  import { Provider } from "react-redux";  import { Toaster } from "react-hot-toast";  ReactDOM.createRoot(document.getElementById("root")!).render(    <React.StrictMode>      <Provider store={store}>        <Toaster />        <App />      </Provider>    </React.StrictMode>  ); |

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| **Store.tsx**  import { configureStore } from "@reduxjs/toolkit";  import cartReducer from "./features/cart/cartSlice";  import shopReducer from "./features/shop/shopSlice";  import authReducer from "./features/auth/authSlice";  export const store = configureStore({    reducer: {      cart: cartReducer,      shop: shopReducer,      auth: authReducer    },  });  export type RootState = ReturnType<typeof store.getState>;  export type AppDispatch = typeof store.dispatch; |

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| **Typings.d.ts**  interface Product {    id: string;    title: string;    image: string;    category: string;    price: number;    popularity: number;    stock: number;  }  interface ProductInCart extends Product {    id: string;    quantity: number;    size: string;    color: string;    stock: number;  }  interface User {    id: string;    name: string;    lastname: string;    email: string;    role: string;    password: string;  }  interface Order {    id: number;    orderStatus: string;    orderDate: string;    data: {      email: string;    };    products: ProductInCart[];    subtotal: number;    user: {      email: string;      id: number;    };  } |

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| **Index.html**  <!DOCTYPE html>  <html lang="en">    <head>      <meta charset="UTF-8" />      <link rel="icon" type="image/svg+xml" href="/vite.svg" />      <meta name="viewport" content="width=device-width, initial-scale=1.0" />      <title>Vite + React + TS</title>      <link rel="preconnect" href="https://fonts.googleapis.com" />      <link rel="preconnect" href="https://fonts.gstatic.com" crossorigin />      <link        href="https://fonts.googleapis.com/css2?family=Merriweather:ital,wght@0,300;0,400;0,700;0,900;1,300;1,400;1,700;1,900&display=swap"        rel="stylesheet"      />    </head>    <body>      <div id="root"></div>      <script type="module" src="/src/main.tsx"></script>    </body>  </html> |

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| **Index.ts**  export { default as HomeLayout } from "./HomeLayout";  export { default as Landing } from "./Landing";  export { default as Shop } from "./Shop";  export { default as SingleProduct } from "./SingleProduct";  export { default as Cart } from "./Cart";  export { default as Checkout } from "./Checkout";  export { default as Search } from "./Search";  export { default as Login } from "./Login";  export { default as Register } from "./Register";  export { default as OrderConfirmation } from "./OrderConfirmation";  export { default as UserProfile } from "./UserProfile";  export { default as OrderHistory } from "./OrderHistory";  export { default as SingleOrderHistory } from "./SingleOrderHistory"; |

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| **AuthSlice.tsx**  import { createSlice, PayloadAction } from "@reduxjs/toolkit";  type AuthState = {    loginStatus: boolean;  };  const initialState: AuthState = {    loginStatus: JSON.parse(localStorage.getItem("user") || "{}").id      ? true      : false,  };  export const authSlice = createSlice({    name: "auth",    // `createSlice` will infer the state type from the `initialState` argument    initialState,    reducers: {      setLoginStatus: (state, action: PayloadAction<boolean>) => {        state.loginStatus = action.payload;        },    },  });  export const { setLoginStatus } = authSlice.actions;  export default authSlice.reducer; |

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| **CartSlice.tsx**  import { createSlice, PayloadAction } from "@reduxjs/toolkit";  type CartState = {    productsInCart: ProductInCart[];    subtotal: number;  };  const initialState: CartState = {    productsInCart: [],    subtotal: 0,  };  export const cartSlice = createSlice({    name: "cart",    // `createSlice` will infer the state type from the `initialState` argument    initialState,    reducers: {      addProductToTheCart: (state, action: PayloadAction<ProductInCart>) => {        const product = state.productsInCart.find(          (product) => product.id === action.payload.id        );        if (product) {          state.productsInCart = state.productsInCart.map((product) => {            if (product.id === action.payload.id) {              return {                ...product,                quantity: product.quantity + action.payload.quantity,              };            }            return product;          });        } else {          state.productsInCart.push(action.payload);        }        cartSlice.caseReducers.calculateTotalPrice(state);      },      removeProductFromTheCart: (        state,        action: PayloadAction<{ id: string }>      ) => {        state.productsInCart = state.productsInCart.filter(          (product) => product.id !== action.payload.id        );        cartSlice.caseReducers.calculateTotalPrice(state);      },      updateProductQuantity: (        state,        action: PayloadAction<{ id: string; quantity: number }>      ) => {        state.productsInCart = state.productsInCart.map((product) => {          if (product.id === action.payload.id) {            return {              ...product,              quantity: action.payload.quantity,            };          }          return product;        });        cartSlice.caseReducers.calculateTotalPrice(state);      },      calculateTotalPrice: (state) => {        state.subtotal = state.productsInCart.reduce(          (acc, product) => acc + product.price \* product.quantity,          0        );      },    },  });  export const {    addProductToTheCart,    removeProductFromTheCart,    updateProductQuantity,    calculateTotalPrice,  } = cartSlice.actions;  export default cartSlice.reducer; |

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| **ShopSlice.tsx**  import { createSlice, PayloadAction } from "@reduxjs/toolkit";  type ShopState = {    totalProducts: number;    showingProducts: number;  };  const initialState: ShopState = {    totalProducts: 0,    showingProducts: 0,  };  export const shopSlice = createSlice({    name: "shop",    // `createSlice` will infer the state type from the `initialState` argument    initialState,    reducers: {      setTotalProducts: (state, action: PayloadAction<number>) => {        state.totalProducts = action.payload;      },      setShowingProducts: (state, action: PayloadAction<number>) => {        state.showingProducts = action.payload;      },    },  });  export const { setTotalProducts, setShowingProducts } = shopSlice.actions;  export default shopSlice.reducer; |

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| **Index.ts** export { default as Footer } from "./Footer";  export { default as Header } from "./Header";  export { default as Banner } from "./Banner";  export { default as Button } from "./Button";  export { default as HomeCollectionFilter } from "./HomeCollectionFilter";  export { default as ProductItem } from "./ProductItem";  export { default as ProductGrid } from "./ProductGrid";  export { default as HomeCollectionSection } from "./HomeCollectionSection";  export { default as SocialMediaFooter } from "./SocialMediaFooter";  export { default as ShopBanner } from "./ShopBanner";  export { default as ShopFilterAndSort } from "./ShopFilterAndSort";  export { default as ShowingPagination } from "./ShowingPagination";  export { default as StandardSelectInput } from "./StandardSelectInput";  export { default as QuantityInput } from "./QuantityInput";  export { default as ProductGridWrapper } from "./ProductGridWrapper";  export { default as ShopPageContent } from "./ShopPageContent";  export { default as CategoryItem } from "./CategoryItem";  export { default as CategoriesSection } from "./CategoriesSection";  export { default as SidebarMenu } from "./SidebarMenu";  export { default as Dropdown } from "./Dropdown";  export { default as ScrollToTop } from "./ScrollToTop";  export { default as ShowingSearchPagination } from "./ShowingSearchPagination"; |

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| **Action.index.ts**  import { redirect } from "react-router-dom";  import customFetch from "../axios/custom";  interface SearchActionRequest {    request: {      formData: () => Promise<FormData>;    };  }  interface CheckoutFormAction {    request: {      formData: () => Promise<FormData>;    };  }  export const searchAction = async ({ request }: SearchActionRequest) => {    // getting form data    const formData = await request.formData();    // converting form data to object for easy access    const data = Object.fromEntries(formData);    return redirect(`/search?query=${data?.searchInput || ""}`);  };  export const checkoutAction = async ({request} : CheckoutFormAction) => {    const formData = await request.formData();    const data = Object.fromEntries(formData);    const response = await customFetch.post("/orders", data);    return redirect('/');  } |

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| **Header.tsx** import { HiBars3 } from "react-icons/hi2";  import { HiOutlineUser } from "react-icons/hi2";  import { HiOutlineMagnifyingGlass } from "react-icons/hi2";  import { HiOutlineShoppingBag } from "react-icons/hi2";  import { Link } from "react-router-dom";  import SidebarMenu from "./SidebarMenu";  import { useState } from "react";  const Header = () => {    const [ isSidebarOpen, setIsSidebarOpen ] = useState(false);    return (      <>      <header className="max-w-screen-2xl flex text-center justify-between items-center py-4 px-5 text-black mx-auto max-sm:px-5 max-[400px]:px-3">        <HiBars3 className="text-2xl max-sm:text-xl mr-20 max-lg:mr-0 cursor-pointer" onClick={() => setIsSidebarOpen(true)} />        <Link          to="/"          className="text-4xl font-light tracking-[1.08px] max-sm:text-3xl max-[400px]:text-2xl"        >          FASHION        </Link>        <div className="flex gap-4 items-center max-sm:gap-2">          <Link to="/search">            <HiOutlineMagnifyingGlass className="text-2xl max-sm:text-xl" />          </Link>          <Link to="/login">            <HiOutlineUser className="text-2xl max-sm:text-xl" />          </Link>          <Link to="/cart">            <HiOutlineShoppingBag className="text-2xl max-sm:text-xl" />          </Link>        </div>      </header>      <SidebarMenu isSidebarOpen={isSidebarOpen} setIsSidebarOpen={setIsSidebarOpen} />      </>    );  };  export default Header; |

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| **ProductGridWrapper.tsx** import React, { ReactElement, useCallback, useEffect, useState } from "react";  import customFetch from "../axios/custom";  import { useAppDispatch, useAppSelector } from "../hooks";  import {    setShowingProducts,    setTotalProducts,  } from "../features/shop/shopSlice";  const ProductGridWrapper = ({    searchQuery,    sortCriteria,    category,    page,    limit,    children,  }: {    searchQuery?: string;    sortCriteria?: string;    category?: string;    page?: number;    limit?: number;    children:      | ReactElement<{ products: Product[] }>      | ReactElement<{ products: Product[] }>[];  }) => {    const [products, setProducts] = useState<Product[]>([]);    const { totalProducts } = useAppSelector((state) => state.shop);    const dispatch = useAppDispatch();    // Memoize the function to prevent unnecessary re-renders    // getSearchedProducts will be called only when searchQuery or sortCriteria changes    const getSearchedProducts = useCallback(      async (query: string, sort: string, page: number) => {        if (!query || query.length === 0) {          query = "";        }        const response = await customFetch("/products");        const allProducts = await response.data;        let searchedProducts = allProducts.filter((product: Product) =>          product.title.toLowerCase().includes(query.toLowerCase())        );        if (category) {          searchedProducts = searchedProducts.filter((product: Product) => {            return product.category === category;          });        }        if (totalProducts !== searchedProducts.length) {          dispatch(setTotalProducts(searchedProducts.length));        }        // Sort the products based on the sortCriteria        if (sort === "price-asc") {          searchedProducts = searchedProducts.sort(            (a: Product, b: Product) => a.price - b.price          );        } else if (sort === "price-desc") {          searchedProducts = searchedProducts.sort(            (a: Product, b: Product) => b.price - a.price          );        } else if (sort === "popularity") {          searchedProducts = searchedProducts.sort(            (a: Product, b: Product) => b.popularity - a.popularity          );        }        // Limit the number of products to be displayed        if (limit) {          setProducts(searchedProducts.slice(0, limit));          // Set the number of products being displayed          // This will be displayed in the ShowingPagination component          dispatch(setShowingProducts(searchedProducts.slice(0, limit).length));          // If page is provided, slice the products based on the page number          // this will be used for pagination        } else if (page) {          setProducts(searchedProducts.slice(0, page \* 9));          // Set the number of products being displayed          // This will be displayed in the ShowingPagination component          dispatch(            setShowingProducts(searchedProducts.slice(0, page \* 9).length)          );          // If no limit or page is provided, display all the products        } else {          setProducts(searchedProducts);          // Set the number of products being displayed          dispatch(setShowingProducts(searchedProducts.length));        }      },      []    );    useEffect(() => {      getSearchedProducts(searchQuery || "", sortCriteria || "", page || 1);    }, [searchQuery, sortCriteria, page]);    // Clone the children and pass the products as props to the children    // This will cause the children to re-render with the new products    // Also it will cause many re-renders if the children are not memoized    // So I memoized the ProductGrid component    const childrenWithProps = React.Children.map(children, (child) => {      // Checking isValidElement is the safe way and avoids a      // typescript error too.      if (React.isValidElement(child) && products.length > 0) {        return React.cloneElement(child, { products: products });      }      return null;    });    return childrenWithProps;  };  export default ProductGridWrapper; |

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| **SidebarMenu.tsx**  import { useEffect, useState } from "react";  import toast from "react-hot-toast";  import { HiXMark } from "react-icons/hi2";  import { Link, useNavigate } from "react-router-dom";  import { useAppSelector } from "../hooks";  import { setLoginStatus } from "../features/auth/authSlice";  import { store } from "../store";  const SidebarMenu = ({    isSidebarOpen,    setIsSidebarOpen,  }: {    isSidebarOpen: boolean;    setIsSidebarOpen: (prev: boolean) => void;  }) => {    const [isAnimating, setIsAnimating] = useState(false);    const { loginStatus } = useAppSelector((state) => state.auth);    const navigate = useNavigate();    const logout = () => {      toast.error("Logged out successfully");      localStorage.removeItem("user");      store.dispatch(setLoginStatus(false));      navigate("/login");    };    useEffect(() => {      if (isSidebarOpen) {        setIsAnimating(true);      } else {        const timer = setTimeout(() => setIsAnimating(false), 300); // Match the transition duration        return () => clearTimeout(timer);      }    }, [isSidebarOpen]);    return (      <>        {(isSidebarOpen || isAnimating) && (          <div            className={              isSidebarOpen                ? "fixed top-0 left-0 w-64 z-50 h-full transition-transform duration-300 ease-in-out bg-white shadow-lg transform border-r border-black translate-x-0"                : "fixed top-0 left-0 w-64 z-50 h-full transition-transform duration-300 ease-in-out bg-white shadow-lg transform border-r border-black -translate-x-full"            }          >            <div className="flex justify-end mr-1 mt-1">              <HiXMark                className="text-3xl cursor-pointer"                onClick={() => setIsSidebarOpen(false)}              />            </div>            <div className="flex justify-center mt-2">              <Link                to="/"                className="text-4xl font-light tracking-[1.08px] max-sm:text-3xl max-[400px]:text-2xl"              >                FASHION              </Link>            </div>            <div className="flex flex-col items-center gap-1 mt-7">              <Link                to="/"                className="py-2 border-y border-secondaryBrown w-full block flex justify-center"              >                Home              </Link>              <Link                to="/shop"                className="py-2 border-y border-secondaryBrown w-full block flex justify-center"              >                Shop              </Link>              <Link                to="/search"                className="py-2 border-y border-secondaryBrown w-full block flex justify-center"              >                Search              </Link>              {loginStatus ? (                <>                  <button                    onClick={logout}                    className="py-2 border-y border-secondaryBrown w-full block flex justify-center"                  >                    Logout                  </button>                </>              ) : (                <>                  <Link                    to="/login"                    className="py-2 border-y border-secondaryBrown w-full block flex justify-center"                  >                    Sign in                  </Link>                  <Link                    to="/register"                    className="py-2 border-y border-secondaryBrown w-full block flex justify-center"                  >                    Sign up                  </Link>                </>              )}              <Link                to="/cart"                className="py-2 border-y border-secondaryBrown w-full block flex justify-center"              >                Cart              </Link>            </div>          </div>        )}      </>    );  };  export default SidebarMenu; |

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| **Dropdown.tsx**  import { useState } from "react";  import { HiChevronDown, HiChevronUp } from "react-icons/hi2";  const Dropdown = ({    dropdownTitle,    children,}: {    dropdownTitle: string;    children: React.ReactNode;}) => {    const [isOpen, setIsOpen] = useState(false);    return (      <div>        <div          className="flex justify-between items-center border-b border-black/30 h-14 cursor-pointer"          onClick={() => setIsOpen((prev) => !prev)} >          <p className="text-black/95 text-base">{dropdownTitle}</p>          {isOpen ? (            <HiChevronUp className="text-base" /> ) : (            <HiChevronDown className="text-base" />)}        </div>        {isOpen && (          <div className="mt-4">            <p className="text-sm">{children}</p>          </div> )}      </div> );  };  export default Dropdown; |

**4.2 RESULTS**

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| **Figure 4.2.1 Main Page** |
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| **Figure 4.2.2 Collection Page** |
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| **Figure 4.2.3 Categories Page** |
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| **Figure 4.2.4 Login Page** |
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| **Figure 4.2.5 Register Page** |
|  |
| **Figure 4.2.6 User Profile Page** |
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| **Figure 4.2.7 User Product Selection & Add to Cart** |
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| **Figure 4.2.8 Shopping Cart** |
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| **Figure 4.2.9 Address & Payment** |
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| **Figure 4.2.10 Order Confirmation** |

**CHAPTER 5**

**CONCLUSION**

The Fashion E-Commerce Platform represents a comprehensive solution for luxury fashion retail in the digital space. By leveraging modern web technologies including React with TypeScript for the frontend and Express.js with MongoDB for the backend, the platform delivers robust and scalable architecture capable of supporting sophisticated eCommerce operations.

The system's modular design enables clear separation of concerns between presentation, business logic, and data layers, facilitating both maintainability and future expansion. The implementation of Redux state management provides consistent user experiences across the application, while the RESTful API structure ensures efficient data exchange between client and server components.

Security considerations have been addressed through authentication middleware, encrypted data transmission, and secure payment processing integration. The responsive design approach ensures accessibility across various devices, catering to the modern shopper's multi-device journey.

This project demonstrates successful application of software engineering principles to create a specialized eCommerce solution that addresses the unique requirements of luxury fashion retail, with particular attention to product presentation, user experience, and administrative capabilities. The platform's architecture provides a solid foundation for future enhancements and scaling to accommodate business growth.

**CHAPTER 6**

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