Technical Specification Document (TSD): Online Apparels Shopping Website

1. Architectural Overview

The system will employ a **Three-Tier Architecture** (Presentation, Application/Business Logic, and Data) to ensure scalability (to accommodate up to 100 concurrent users [1]) and separation of concerns.

The platform will consist of two primary interfaces:

1. **Frontend (Buyer Website):** The public-facing e-commerce storefront.
2. **Backend (Admin Panel):** A secure, web-based interface for the business owner/admin user.

2. Technology Stack

2.1 Programming Languages and Frameworks

Layer	Component	Technology/Tool	Rationale
Frontend/Presentation	Buyer Website UI	HTML5, CSS3, JavaScript (with a modern framework like React or Vue.js)	Ensures speed (page load <3 seconds [2]) and a responsive user experience.
Backend/Application	Business Logic/API	(Example: Python/Django, Node.js/Express, or PHP/Laravel)	Provides a robust, scalable, and secure environment for processing orders, payments, and product data.
Database/Data	Data Storage	PostgreSQL or MySQL	Reliable, scalable relational databases

Layer	Component	Technology/Tool	Rationale
			suitable for e-commerce catalog and transactional data.

2.2 Payment Gateway

Component	Technology/Tool	BRD Reference
Online Payment	**Stripe**	Stripe payment gateway will be used for online payment integration. [33333]

2.3 Deployment and Hosting

Component	Requirement	Standard
Hosting Environment	Scalable Cloud Service (e.g., AWS, Google Cloud, Azure)	Ensures high availability and scalability for up to 100 concurrent users. [4]
Domain/Security	SSL Security and Encryption	Mandatory for online payments and securing all data transfer. [5]

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3. Data Model (High-Level Entities)

The system requires several core entities to support product, order, and user management.

Entity	Key Attributes (Minimum)	Relationship	BRD Requirements Supported
Product	Product Code (SKU) [6], Name, Description, Price [777], Images [8], Keywords [9]	One-to-Many with **Category**	FR-005, FR-019 (Manage products/catalog)
Category	Name, Status (Active/Inactive) [10]	One-to-Many with **Sub-Category**	FR-018 (Manage categories/sub-categories)
User (Buyer)	Email (unique), Password (hashed), First Name, Last Name, Contact Number [11], Status (Active/Inactive) [1212]	One-to-Many with **Order**	FR-002, FR-016 (Registration, Buyer Management)
Address	Type (Billing/Shipping), Street, City, State, PIN Code [1313131313]	One-to-Many with **User**	FR-008, FR-010 (Checkout, Manage address book)
Order	Order ID, Total Amount, Status (Open, Confirmed, Shipped, etc.) [1414], Payment Status [15]	Many-to-One with **User**	FR-012, FR-017 (Order History, Order Management)
Shipment	Shipping Carrier, Tracking ID, Current Status, Delivery	One-to-One with **Order**	FR-017 (Manage shipment details)

Entity	Key Attributes (Minimum)	Relationship	BRD Requirements Supported
	Address, Shipping Cost [16]		
Rating/Review	Product ID, User ID, Rating Score, Review Text, Status (Approved/Rejected) [17]	Many-to-One with **Product**	FR-011, FR-020 (Post/Manage Ratings & Reviews)

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4. Frontend Specifications (Buyer Website)

4.1 Search and Product Display (FR-003, FR-004, FR-005)

- **Search Functionality:** Implement a server-side full-text search engine (e.g., Elasticsearch or database indexing) to handle keyword and category search efficiently[181818].
- **Product Variations:** The Product Details Page must dynamically handle **color and size variations** [191919] and update the display based on availability.
- **Shipping Check:** An API call must be made to a shipping service or internal table based on the entered **PIN code** to check availability[20].

4.2 Security and Access

- **Login/Registration:** Implement OAuth 2.0 or OpenID Connect flows for third-party logins (Facebook, Google)[21]. Passwords must be **hashed and salted** (e.g., using bcrypt).
- **Mandatory Verification:** Implement an asynchronous job or service to send the **email verification link** upon registration[22].
- **Secure Transactions:** All checkout and payment pages must enforce **HTTPS** and interact with the Stripe API securely using tokens, without storing sensitive card details on the internal server[23].

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5. Backend Specifications (Admin Panel)

5.1 System Security and Permissions (FR-022, FR-023)

- **Role-Based Access Control (RBAC):** Implement a granular RBAC system allowing the main Admin to create sub-users and assign them specific roles/permissions (e.g., "Order Manager," "Content Editor," "Product Manager")[24].
- **Authentication:** The Admin panel must be behind a separate, secure login form (FR-014) with measures against brute-force attacks.

5.2 Product and Order Management

- **Catalog Management (FR-019):** Utilize a Content Management System (CMS) interface within the Admin Panel to manage product attributes, including multiple images, descriptions, and dynamic input fields for variations (color, size)[25].
- **Inventory Integration:** The system will assume that physical inventory storage is **already established** [26]and will use the **Product Code (SKU)** [27] as the key for integrating with any future inventory management tools.
- **Order Status Workflow (FR-017):** Implement a state machine for order status transitions (Open $\rightarrow$ Confirmed $\rightarrow$ In process $\rightarrow$ Shipped $\rightarrow$ Delivered) with automated **email notifications** to the buyer upon each change[28282828].

5.3 Reporting and Statistics (FR-021)

- **Data Aggregation:** Implement a data layer optimized for reporting (potentially a separate data warehouse or materialized views) to quickly generate reports for Products Uploaded and Revenue/Total Sale[29].
- **Export Functionality:** Use a library (e.g., Pandas for Python or similar) to generate and export reports into standard **PDF and Excel** formats[30].

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6. Constraints and Risks (Recap from BRD)

Category	Detail	Technical Mitigation Strategy
Schedule	October 31st delivery date[31].	Use agile methodology with defined sprints to manage scope. Prioritize

Category	Detail	Technical Mitigation Strategy
		Critical (1) and **High (2)** requirements (e.g., Login, Checkout, Product Management)[323232323232323232].
Scope	Additional features/changes may require changes in time/costing[33].	Maintain strict change control process; use modular coding practices for easy extension.
Geographic	Website will accept orders from **US country only**[34].	Implement geographic IP filtering and only allow US addresses during checkout/registration.
Risk	Timeline for enterprise platform updates will impact testing and delivery[35].	Utilize a dedicated Staging/UAT environment that mirrors the Production environment.