**Software Requirements Specification (SRS) for an E-commerce Application**

**1. Introduction**

**1.1 Purpose**

The purpose of this Software Requirements Specification (SRS) document is to detail the functional and non-functional requirements for the development of a modern e-commerce application. This document aims to serve as a comprehensive guide for the development team, testers, and stakeholders, ensuring a clear understanding of the system's capabilities, constraints, and quality attributes. It will facilitate the design, development, and testing phases of the project.

**1.2 Document Conventions**

* Requirements Naming: Functional requirements will be identified with a prefix "FR-" followed by a unique number (e.g., FR-001). Non-functional requirements will use "NFR-" (e.g., NFR-001).
* Terminology: All technical terms and abbreviations used in this document are defined in the Glossary section (Section 6).
* Formatting: Headings, bullet points, and bold text are used for readability and emphasis.

**1.3 Intended Audience and Reading Suggestions**

**This SRS is intended for:**

* Project Managers: To understand the scope and plan project timelines and resources.
* Development Team: To design, implement, and build the application.
* Quality Assurance (QA) Team: To develop test plans and validate the system against specified requirements.
* Stakeholders/Clients: To review and approve the system's proposed functionalities.

Readers are encouraged to start with Section 1 for an overview, then proceed to Section 2 for a high-level understanding of the product. Sections 3, 4, and 5 provide detailed requirements for specific audiences.

**1.4 Product Scope**

The e-commerce application will provide an online platform for customers to browse, search, and purchase products. It will include features for user registration, product catalog management, shopping cart functionality, secure checkout, order management, and administrative tools for managing products, orders, and users. The application aims to provide a seamless and intuitive shopping experience for customers and efficient management for administrators.

**1.5 References**

* IEEE Std 830-1998: IEEE Recommended Practice for Software Requirements Specifications.
* Stakeholder interviews and business requirements documents.

**2. Overall Description**

**2.1 Product Perspective**

The e-commerce application will be a standalone web-based system accessible via standard web browsers. It will interact with various external systems for payment processing and potentially for shipping/logistics.

**2.1.1 System Interfaces**

* Payment Gateway API: Integration with third-party payment processors (e.g., Stripe, PayPal) for secure online transactions.
* Email Service API: For sending order confirmations, shipping notifications, password reset emails, and marketing communications.
* SMS Gateway API (Optional): For sending order updates via SMS.
* Shipping Carrier API (Optional): For real-time shipping rate calculation and tracking.

**2.1.2 User Interfaces**

* Responsive Web Design: The application's user interface will be fully responsive, adapting to various screen sizes (desktop, tablet, mobile).
* Intuitive Navigation: Clear and consistent navigation menus, search bars, and breadcrumbs.
* Product Display: High-quality product images, detailed descriptions, pricing, and availability.
* Shopping Cart: Clear display of selected items, quantities, and total cost.
* Checkout Flow: Multi-step, guided checkout process with clear progress indicators.
* Admin Dashboard: A separate, secure interface for administrators with tools for product, order, and user management.

**2.1.3 Hardware Interfaces**

The application will be deployed on cloud servers (e.g., AWS, Google Cloud, Azure) and will not have direct hardware interfaces beyond standard server infrastructure.

**2.1.4 Software Interfaces**

* Operating System: Linux-based distributions (e.g., Ubuntu, CentOS).
* Web Server: Nginx or Apache.
* Database Management System: PostgreSQL or MySQL.
* Programming Language/Framework: (e.g., Python/Django, Node.js/Express, PHP/Laravel, React/Angular/Vue for frontend).
* Caching Mechanism: Redis or Memcached (optional, for performance).

**2.1.5 Communications Interfaces**

* HTTPS: All communication between the client and server will be secured using HTTPS.
* RESTful APIs: Internal and external service communication will primarily use RESTful APIs with JSON data format.

**2.1.6 Memory Constraints**

The system should be designed to operate efficiently within typical cloud server memory allocations, optimizing database queries and caching strategies to minimize memory footprint.

**2.1.7 Operations**

The system will be available 24/7, with scheduled maintenance windows. Monitoring tools will be in place to detect and alert on operational issues.

**2.1.8 Site Adaptation Requirements**

The application should support easy configuration for different locales, including currency, language, and tax regulations.

**2.2 Product Functions**

The e-commerce application will provide the following high-level functions:

* User Management: Allow users to register, log in, manage profiles, and reset passwords.
* Product Catalog: Display a wide range of products with detailed information, categories, search, and filtering options.
* Shopping Cart: Enable users to add, remove, and update products in a virtual shopping cart.
* Checkout Process: Facilitate a secure and streamlined process for placing orders, including shipping and payment.
* Order Management (Customer): Allow customers to view their order history and track order status.
* Order Management (Admin): Enable administrators to view, process, and update order statuses.
* Product Management (Admin): Allow administrators to add, edit, and delete products and categories.
* User Management (Admin): Allow administrators to view and manage user accounts.
* Reporting & Analytics (Admin): Provide basic reports on sales, products, and users.

**2.3 User Characteristics**

* Customers:
  + Technical Skill: Varying, from novice to experienced internet users.
  + Goal: Easily find products, make purchases, and track orders.
  + Expectations: Intuitive interface, fast loading times, secure transactions, clear product information.
* Administrators:
  + Technical Skill: Moderate to high, comfortable with web-based dashboards.
  + Goal: Efficiently manage products, orders, and customer data.
  + Expectations: Robust tools, clear reporting, secure access.

**2.4 Constraints**

* Technology Stack: To be decided based on team expertise and project requirements (e.g., specific database, framework).
* Security Standards: Adherence to industry best practices for data security (e.g., PCI DSS compliance for payment data, GDPR for user data).
* Performance: Must handle a specified number of concurrent users and transactions without significant degradation.
* Budget: Development must stay within the allocated budget.
* Timeline: Project completion within a specified timeframe.

**2.5 Assumptions and Dependencies**

* Internet Connectivity: Users are assumed to have stable internet access.
* Third-Party Services: Availability and reliability of external payment gateways, email services, and shipping APIs.
* Product Data: Accurate and complete product data (images, descriptions, pricing) will be provided.
* Legal Compliance: The business will ensure compliance with all relevant e-commerce laws and regulations.

**4. System Features (Functional Requirements)**

**4.1 User Management**

* FR-001: User Registration:
  + Users shall be able to register for a new account by providing a unique email address, password, and basic personal details (name, phone number).
  + The system shall validate the email format and password strength.
  + The system shall send a confirmation email for account activation (optional, but recommended).
* FR-002: User Login:
  + Users shall be able to log in using their registered email and password.
  + The system shall provide a "Remember Me" option.
  + The system shall provide appropriate error messages for invalid credentials.
* FR-003: User Profile Management:
  + Logged-in users shall be able to view and update their personal information (name, email, phone).
  + Users shall be able to manage multiple shipping addresses.
  + Users shall be able to change their password.
* FR-004: Password Reset:
  + Users shall be able to request a password reset via their registered email address.
  + The system shall send a secure link or OTP to the user's email for password reset.

**4.2 Product Catalog Management**

* FR-005: Browse Products:
  + Users shall be able to browse products by categories and subcategories.
  + The system shall display product listings with images, names, prices, and a brief description.
* FR-006: Search Products:
  + Users shall be able to search for products using keywords (e.g., product name, description, brand).
  + The search functionality shall support auto-suggestions and fuzzy matching.
* FR-007: View Product Details:
  + Users shall be able to click on a product to view its detailed page, including:
    - Multiple high-resolution images.
    - Comprehensive description and specifications.
    - Price and availability (in-stock/out-of-stock).
    - Customer reviews and ratings.
    - Related products or recommendations.
    - Options for variations (e.g., size, color).
* FR-008: Product Filtering and Sorting:
  + Users shall be able to filter products by price range, brand, category, and other attributes.
  + Users shall be able to sort products by relevance, price (low to high/high to low), and new arrivals.

**4.3 Shopping Cart Management**

* FR-009: Add to Cart:
  + Users shall be able to add products to their shopping cart from product listing or detail pages.
  + The system shall provide visual feedback (e.g., a mini-cart update) when an item is added.
* FR-010: View Cart:
  + Users shall be able to view all items currently in their shopping cart.
  + The cart shall display product name, image, quantity, unit price, and subtotal for each item.
  + The cart shall display the total price of all items.
* FR-011: Update Cart Quantity:
  + Users shall be able to increase or decrease the quantity of items in their cart.
  + The system shall update the subtotal and total price dynamically.
* FR-012: Remove from Cart:
  + Users shall be able to remove individual items from their shopping cart.
* FR-013: Empty Cart:
  + Users shall be able to clear all items from their shopping cart.

**4.4 Checkout Process**

* FR-014: Initiate Checkout:
  + Users shall be able to proceed to checkout from the shopping cart page.
  + Unregistered users shall be prompted to register or checkout as a guest.
* FR-015: Shipping Information:
  + Users shall be able to select from saved shipping addresses or enter a new one.
  + The system shall validate shipping address details.
  + The system shall present available shipping methods and their costs.
* FR-016: Payment Information:
  + Users shall be able to select a payment method (e.g., credit/debit card, net banking, digital wallets).
  + The system shall securely collect payment details via integration with a payment gateway.
  + The system shall not store sensitive payment information on its servers.
* FR-017: Order Review:
  + Users shall be able to review their complete order details (products, quantities, prices, shipping, payment method, total cost) before final confirmation.
* FR-018: Order Confirmation:
  + Upon successful payment, the system shall display an order confirmation page with an order ID.
  + The system shall send an order confirmation email to the user.

**4.5 Order Management (Customer)**

* FR-019: View Order History:
  + Logged-in users shall be able to view a list of all their past orders.
  + Each order in the history shall show basic details like order ID, date, total amount, and status.
* FR-020: View Order Details:
  + Users shall be able to click on an order from their history to view detailed information, including:
    - List of purchased products.
    - Shipping address.
    - Payment method.
    - Current order status (e.g., Pending, Processing, Shipped, Delivered, Cancelled).
    - Tracking information (if available).

**4.6 Admin Features**

* FR-021: Admin Login:
  + Administrators shall have a separate, secure login interface.
  + The system shall support role-based access control (e.g., Super Admin, Product Manager, Order Processor).
* FR-022: Product Management:
  + Admins shall be able to add new products with details (name, description, price, stock, images, categories, variations).
  + Admins shall be able to edit existing product details.
  + Admins shall be able to delete products.
  + Admins shall be able to manage product categories and subcategories.
* FR-023: Order Fulfillment:
  + Admins shall be able to view all incoming orders.
  + Admins shall be able to update the status of an order (e.g., from "Pending" to "Processing" to "Shipped" to "Delivered").
  + Admins shall be able to view detailed order information, including customer details.
* FR-024: User Management:
  + Admins shall be able to view a list of all registered users.
  + Admins shall be able to view user details.
  + Admins shall be able to deactivate or activate user accounts.
* FR-025: Reporting and Analytics:
  + Admins shall be able to view basic sales reports (e.g., sales by date, top-selling products).
  + Admins shall be able to view customer registration trends.

**7. Frontend Details**

This section outlines the specific pages and modules that constitute the user-facing part of the e-commerce application.

**7.1 Customer-Facing Pages**

* Homepage:
  + Purpose: Entry point for the application, showcasing featured products, promotions, and easy navigation.
  + Key Elements: Hero banner, category navigation, featured product sections, new arrivals, promotional banners, search bar, mini-cart icon, login/signup links.
* Product Listing Page (Category/Search Results):
  + Purpose: Display a collection of products based on category selection or search queries.
  + Key Elements: Product grid/list view, pagination, filtering options (price, brand, attributes), sorting options (relevance, price, newest), "Add to Cart" buttons, quick view option (optional).
* Product Detail Page:
  + Purpose: Provide comprehensive information about a single product.
  + Key Elements: Multiple high-resolution product images (with zoom), detailed product description, specifications, price, stock availability, product variations (size, color, etc.), "Add to Cart" button, customer reviews and ratings, related products, social sharing buttons.
* Shopping Cart Page:
  + Purpose: Allow users to review and manage items selected for purchase.
  + Key Elements: List of selected products with image, name, quantity, unit price, and line item total; options to update quantity or remove items; subtotal, estimated shipping, and total cost; coupon/discount code input field; "Proceed to Checkout" button.
* Checkout Pages (Multi-step):
  + Purpose: Guide the user through the secure purchasing process.
  + Key Elements (across steps): Progress indicator (e.g., Shipping > Payment > Review > Confirmation), shipping address input/selection, shipping method selection, payment method selection (credit card, net banking, etc.), order summary, privacy policy and terms agreement checkboxes.
* Order Confirmation Page:
  + Purpose: Confirm successful placement of an order.
  + Key Elements: Order ID, summary of order details, estimated delivery date, option to print/download invoice, links to order history.
* User Account Dashboard:
  + Purpose: Central hub for registered users to manage their account.
  + Key Elements: Overview of recent orders, quick links to order history, profile settings, address book, and wishlist.
* Order History Page:
  + Purpose: Display a list of all past orders for a logged-in user.
  + Key Elements: Table/list of orders with date, ID, total, and status; links to view detailed order information.
* Order Details Page:
  + Purpose: Show in-depth information for a specific order.
  + Key Elements: Order ID, date, status, list of purchased products (with quantity and price), shipping address, billing address, payment method, tracking information (if available).
* Profile Settings Page:
  + Purpose: Allow users to update their personal information.
  + Key Elements: Editable fields for name, email, phone number; password change form.
* Address Book Page:
  + Purpose: Enable users to manage multiple shipping and billing addresses.
  + Key Elements: List of saved addresses, options to add new address, edit existing, or set as default.
* Login / Registration Pages:
  + Purpose: Provide access for existing users and registration for new ones.
  + Key Elements: Email/username and password input fields, "Forgot Password" link, "Register" button, social login options (e.g., Google, Facebook - optional).
* Static Pages:
  + Purpose: Provide essential information about the business, policies, etc.

Key Elements: "About Us," "Contact Us" (with form and contact details), "Privacy Policy," "Terms & Conditions," "FAQ."

**10. Project Team Details**

This section outlines the key personnel and their roles within the development team for the e-commerce application.

* Project Manager:
  + Name: Saravana Balaji A J
  + Responsibilities: Overall project planning, execution, monitoring, control, stakeholder communication, risk management, ensuring project stays within scope, budget, and timeline.
* Frontend Team Leader:
  + Name: Bhuvaneshwaran S
  + Responsibilities: Leading frontend development, architectural decisions for the UI, code reviews, mentoring frontend team members, ensuring UI/UX requirements are met, integration with backend APIs.
  + Team Members (3):
    - Amuthan S
    - Lokithapoorna J
    - Thiyagaraajan L L
* Backend Team Leader:
  + Name: Kishore N
  + Responsibilities: Leading backend development, database design, API development, ensuring security and performance of backend services, mentoring backend team members, integration with external services (payment gateways, email).
  + Team Members (4):
    - Dhejenthira G
    - Gowtham S
    - Manoj A
    - Majela Isabella L