Software Requirements Specification (SRS)

E-Commerce Order Management System

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Project: AutoCart - Online E-Commerce Platform
Prepared by: Development Team

1. Introduction

1.1 Purpose

This Software Requirements Specification (SRS) document describes the functional and non-functional requirements for the AutoCart E-Commerce Order Management System. The system will enable customers to browse products, place orders, make payments, and track deliveries while providing administrators with comprehensive order management capabilities.

1.2 Scope

The AutoCart system encompasses:

- Customer registration and authentication
- Product catalog management
- Shopping cart functionality
- Order processing and payment integration
- Inventory management
- Order tracking and delivery management
- Administrative dashboard
- Customer support features

1.3 Definitions and Abbreviations

- **SRS:** Software Requirements Specification
- **API:** Application Programming Interface
- **SSL:** Secure Sockets Layer
- **PCI DSS:** Payment Card Industry Data Security Standard
- **SKU:** Stock Keeping Unit
- **OTP:** One-Time Password

2. Overall Description

2.1 Product Perspective

AutoCart is a web-based e-commerce platform that integrates with third-party payment gateways, shipping providers, and inventory management systems. The system supports multiple user roles and provides real-time order processing capabilities.

2.2 User Classes

1. **Customers:** End users who browse and purchase products
2. **Vendors:** Third-party sellers who list and manage their products
3. **Administrators:** System managers with full access rights
4. **Customer Support Representatives:** Staff handling customer inquiries
5. **Warehouse Staff:** Personnel managing inventory and fulfillment

2.3 Operating Environment

- **Web Browsers:** Chrome 90+, Firefox 88+, Safari 14+, Edge 90+
- **Mobile Platforms:** iOS 14+, Android 10+
- **Server Environment:** Linux/Windows Server with HTTPS support
- **Database:** MySQL 8.0+ or PostgreSQL 12+

3. Functional Requirements

3.1 User Registration and Authentication

FR-1.1 Customer Registration

- The system shall allow new customers to register using email address, phone number, or social media accounts (Google, Facebook, Apple)
- Registration shall require email verification via OTP within 10 minutes
- Users shall provide: full name, email, phone number, and password
- Password must meet complexity requirements: minimum 8 characters, uppercase, lowercase, number, and special character

FR-1.2 User Authentication

- The system shall authenticate users using email/phone and password
- The system shall support two-factor authentication (2FA) via SMS or authenticator app
- Failed login attempts shall be limited to 5 tries within 15 minutes before account temporary lockout

- Account lockout duration shall be 30 minutes for first offense, increasing exponentially for repeat offenses

FR-1.3 Password Management

- Users shall be able to reset passwords using registered email or phone number
- Password reset links shall expire after 1 hour
- The system shall maintain password history and prevent reuse of last 5 passwords

3.2 Product Catalog Management

FR-2.1 Product Display

- The system shall display products with: name, description, price, images, ratings, reviews, and availability status
- Products shall be categorized and support multi-level category navigation
- The system shall provide search functionality with filters: price range, brand, ratings, availability
- Search results shall be sortable by: relevance, price (low to high/high to low), ratings, newest first

FR-2.2 Product Information

- Each product shall have detailed specifications, multiple high-resolution images, and 360-degree view (if available)
- The system shall display related products and customer recommendations
- Product availability shall be updated in real-time based on inventory levels

3.3 Shopping Cart and Wishlist

FR-3.1 Cart Management

- Users shall be able to add, remove, and modify quantities of products in their cart
- The system shall preserve cart contents for registered users across sessions for up to 30 days
- Cart shall display: product details, individual prices, quantities, subtotal, taxes, shipping charges, and total amount
- The system shall validate product availability and pricing before checkout

FR-3.2 Wishlist Functionality

- Users shall be able to save products to wishlist for future purchase
- Wishlist items shall be organized in categories created by users
- The system shall notify users when wishlist items go on sale or become available

3.4 Order Processing

FR-4.1 Checkout Process

- The system shall support guest checkout and registered user checkout
- Checkout shall require: delivery address, billing address, payment method selection
- The system shall calculate taxes based on delivery location and applicable tax rates
- Users shall be able to apply discount coupons and promo codes during checkout

FR-4.2 Order Confirmation

- The system shall generate unique order numbers for each transaction
- Order confirmation shall be sent via email and SMS within 2 minutes of successful payment
- The system shall provide estimated delivery date and tracking information

3.5 Payment Processing

FR-5.1 Payment Methods

- The system shall support multiple payment options: credit/debit cards, digital wallets (PayPal, Apple Pay, Google Pay), bank transfers, and cash on delivery
- Payment processing shall comply with PCI DSS standards
- The system shall support installment payments for orders above $500

FR-5.2 Payment Security

- All payment transactions shall be processed through secure, encrypted connections
- The system shall not store complete credit card information locally
- Failed payment attempts shall be logged and monitored for fraud detection

3.6 Order Management and Tracking

FR-6.1 Order Status Updates

- The system shall provide real-time order status updates: Order Placed, Payment Confirmed, Processing, Shipped, Out for Delivery, Delivered, Cancelled
- Customers shall receive automated notifications for each status change via email and SMS
- The system shall integrate with shipping partner APIs for real-time tracking updates

FR-6.2 Order Modification and Cancellation

- Customers shall be able to cancel orders within 1 hour of placement if not yet processed
- The system shall allow order modifications (address changes, item additions/removals) within 30 minutes of placement
- Cancellation refunds shall be processed within 5-7 business days

3.7 Inventory Management

FR-7.1 Stock Management

- The system shall maintain real-time inventory levels for all products
- Low stock alerts (below 10 units) shall be sent to administrators and vendors
- Out-of-stock products shall be automatically removed from active listings
- The system shall support inventory reservations during checkout process for 15 minutes

FR-7.2 Vendor Inventory

- Vendors shall be able to update their product inventory through a dedicated portal
- The system shall support bulk inventory updates via CSV file uploads
- Inventory changes shall be logged with timestamps and user information

3.8 Returns and Refunds

FR-8.1 Return Process

- Customers shall be able to initiate returns within 30 days of delivery for eligible products
- The system shall generate return labels and pickup scheduling
- Return requests shall require reason selection and optional photo uploads

FR-8.2 Refund Processing

- Approved returns shall trigger automatic refund processing
- Refunds shall be credited to the original payment method within 5-7 business days
- The system shall handle partial refunds for damaged or incomplete returns

4. Non-Functional Requirements

4.1 Performance Requirements

- **Response Time:** Web pages shall load within 3 seconds under normal load conditions
- **Throughput:** System shall handle 10,000 concurrent users during peak hours
- **Search Performance:** Product search results shall be displayed within 2 seconds
- **Payment Processing:** Payment transactions shall complete within 30 seconds

4.2 Security Requirements

- All data transmission shall be encrypted using SSL/TLS 1.3 or higher
- User passwords shall be hashed using bcrypt with minimum salt rounds of 12
- The system shall implement rate limiting to prevent API abuse
- Personal data shall be encrypted at rest using AES-256 encryption

- The system shall comply with GDPR and CCPA privacy regulations

4.3 Reliability and Availability

- System uptime shall be 99.9% excluding scheduled maintenance
- Scheduled maintenance windows shall not exceed 4 hours monthly
- The system shall implement automatic failover mechanisms for critical components
- Data backups shall be performed daily with 30-day retention

4.4 Scalability Requirements

- The system architecture shall support horizontal scaling to handle traffic spikes
- Database queries shall be optimized to handle tables with millions of records
- The system shall support CDN integration for static content delivery
- API endpoints shall be designed to handle 1000 requests per second per endpoint

4.5 Usability Requirements

- The user interface shall be responsive and mobile-friendly
- Key user actions (add to cart, checkout) shall require no more than 3 clicks
- The system shall provide comprehensive help documentation and tutorials
- Error messages shall be user-friendly and provide clear guidance for resolution

4.6 Compatibility Requirements

- The system shall be compatible with all major web browsers (Chrome, Firefox, Safari, Edge)
- Mobile applications shall support iOS 14+ and Android 10+
- The system shall integrate with popular third-party services (Google Analytics, social media platforms)
- API endpoints shall follow REST conventions and support JSON data format

5. External Interface Requirements

5.1 User Interfaces

- Web-based responsive interface optimized for desktop and mobile devices
- Administrative dashboard with role-based access controls
- Vendor portal for inventory and order management
- Customer support interface for handling inquiries and issues

5.2 Hardware Interfaces

- Integration with barcode scanners for warehouse operations
- Support for receipt printers in warehouse and customer service areas
- Mobile device camera integration for product photo uploads and barcode scanning

5.3 Software Interfaces

- **Payment Gateway Integration:** PayPal, Stripe, Razorpay, Square APIs
- **Shipping Integration:** FedEx, UPS, DHL, USPS tracking and label generation APIs
- **Email Service:** SendGrid or AWS SES for transactional emails
- **SMS Gateway:** Twilio for SMS notifications
- **Social Media:** Facebook, Google, Apple authentication APIs

5.4 Communication Interfaces

- RESTful API endpoints for mobile application integration
- Webhook support for real-time notifications to external systems
- Email protocols (SMTP/IMAP) for customer communication
- SMS gateway integration for order notifications

6. Data Requirements

6.1 Data Storage

- Customer personal information (encrypted)
- Product catalog with images and specifications
- Order history and transaction records
- Inventory levels and movement tracking
- User activity logs and analytics data

6.2 Data Backup and Recovery

- Daily automated backups with offsite storage
- Point-in-time recovery capability for critical data
- Backup testing and validation procedures
- Disaster recovery plan with RTO of 4 hours and RPO of 1 hour

7. Quality Attributes

7.1 Maintainability

- Code shall follow established coding standards and best practices
- System documentation shall be comprehensive and up-to-date
- Modular architecture to facilitate updates and feature additions

7.2 Testability

- Unit test coverage shall exceed 80% for critical business logic
- Integration tests shall cover all API endpoints
- Automated testing pipeline for continuous integration

7.3 Portability

- System shall be deployable across different cloud providers (AWS, Azure, GCP)
- Database-agnostic design to support multiple database systems
- Containerized deployment using Docker and Kubernetes

8. Constraints and Assumptions

8.1 Technical Constraints

- System must comply with PCI DSS Level 1 requirements
- Maximum file upload size limited to 10MB per file
- API rate limits: 1000 requests per hour per user for standard accounts

8.2 Business Constraints

- Project budget allocated for third-party service integrations
- Launch timeline requires core functionality completion within 6 months
- Compliance with local tax regulations for supported regions

8.3 Assumptions

- Reliable internet connectivity for end users
- Third-party service availability (payment gateways, shipping APIs)
- Adequate server infrastructure for expected user load

9. Acceptance Criteria

9.1 Functional Acceptance

- All specified functional requirements successfully implemented and tested
- Integration with external services functioning as specified
- User acceptance testing completed with 95% satisfaction rate

9.2 Performance Acceptance

- Load testing demonstrates system can handle specified concurrent users
- Response time requirements met under various load conditions
- Security vulnerability assessment passed with no critical issues

9.3 Compliance Acceptance

- Security audit completed with compliance certification
- Accessibility standards (WCAG 2.1 Level AA) compliance verified
- Data privacy requirements implementation validated

Document Approval:

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