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Spring 24-25

Section: C

Software Quality and Testing

AutoCart: Intelligent E-Commerce with Predictive Auto-Refill & Smart Bundling

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Software Test Plan

for

AutoCart: Intelligent E-Commerce with Predictive Auto-Refill & Smart Bundling

Version 1.0 approved

Prepared By

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Date : 26-06-2025

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Revision History

Revision	Date	Updated by	Update Comments
0.1	01.06.2025	Towsif	First Draft
0.2	04.06.2025	Opi	Second Draft
0.3	05.06.2025	Shohan	Third Draft
0.4	08.06.2025	Rafiul	Fourth Draft
0.5	10.06.2025	Towsif	Fifth Draft
0.6	13.06.2025	Opi	Sixth Draft
0.7	17.06.2025	Shohan	Seventh Draft
0.8	23.06.2025	Rafiul	Eighth Draft
0.9	24.06.2025	Towsif	Final Draft

1. TEST PLAN IDENTIFIER: TP-AutoCart-2025-001

- **TP** → Test Plan
- **AutoCart** → Name of the project (Intelligent E-Commerce with Predictive Auto-Refill & Smart Bundling)
- **2025** → Year of execution and testing
- **001** → First official version of this test plan

This test plan covers the Software Quality Assurance and Testing strategy for **AutoCart**, an intelligent e-commerce platform designed to automatically predict product refill needs and offer smart bundle suggestions to users. The identifier serves as a unique reference for Version control of the test documentation, Traceability across all QA reports and deliverables, Coordination among team members, especially during updates or revisions

All future updates to the test plan will follow a consistent versioning format (e.g., TP-AutoCart-2025-002 for version 2, and so on).

2. REFERENCES

- **Academic Course Materials** – Lecture slides, class notes, and examples from the Software Quality Assurance and Testing (SQAT) course provided foundational knowledge for test design, planning, and execution.
- **Figma**– Used for designing the User Interface (UI), creating wireframes, and prototyping the AutoCart platform to ensure a seamless and user-friendly experience.
- **Software Requirements Specification (SRS)** – A detailed documentation of system requirements (both functional and non-functional) was prepared to define the testing scope and to validate expected outcomes.
- **GitHub Repository** – The central codebase of AutoCart, version-controlled using GitHub, served as a reference for feature implementation and tracking tested modules.
- **Third-Party Libraries and APIs Documentation** – Referred to documentation for tools like Firebase, Stripe (for mock payments), and Framer Motion used in frontend development, to ensure correct test coverage and behavior.
- **Industry Standards and Best Practices** – Testing approach was guided by international standards such as:
 1. ISO/IEC 25010 – For defining quality characteristics (like usability, reliability, etc.)
 2. IEEE 829 – Standard for Software Test Documentation
 3. General QA practices for e-commerce platform
- **Online Research & Articles** – Consulted blogs, research articles, and case studies related to subscription-based e-commerce, predictive ordering, and smart bundling to guide the testing design and ensure relevance to real-world practices.

3. INTRODUCTION

AutoCart: Intelligent E-Commerce with Predictive Auto-Refill & Smart Bundling is a next-generation subscription-based e-commerce platform built to automate the replenishment of essential household products. It aims to reduce user effort, minimize waste, and enhance shopping efficiency through intelligent refill prediction and smart bundling features.

With AutoCart, users can subscribe to items like toiletries, groceries, or supplements and receive refill reminders or automatic deliveries based on usage patterns. By integrating predictive logic, personalized recommendations, and eco-conscious design, AutoCart elevates the standard e-commerce model into a smart, user-friendly solution.

Background to the Problem

In today's fast-paced world, many individuals face recurring problems related to managing household essentials:

- **Forgetting to Reorder Essentials** – Busy schedules cause users to run out of daily-use items like toothpaste, detergent, or protein powder.
- **Manual and Repetitive Shopping** – Users waste time reordering the same items manually every month.
- **Poor Personalization in Subscription Models** – Traditional subscription systems are rigid and don't adapt to actual consumption behavior.
- **Missed Savings Opportunities** – Customers often miss discounts or fail to optimize shipping by combining refills.
- **Limited Focus on Sustainability** – Current platforms rarely help users minimize packaging waste or carbon impact.

The **root cause** of this problem is the lack of dynamic, usage-aware logic in current subscription models, which operate on fixed intervals instead of actual consumer behavior. Despite the rise of subscription e-commerce, most systems are static—offering fixed intervals instead of intelligent, usage-based predictions. This results in unnecessary orders or product shortages, lowering user satisfaction and contributing to environmental waste.

Solution to the Problem

AutoCart is designed to address these challenges through an AI-assisted refill automation and bundling system. Key solutions include:

- **Smart Refill Prediction Engine** – Tracks previous order frequency and consumption data to intelligently recommend optimal refill times.
- **Personalized Subscription Management** – Users can pause, resume, or adjust refills with one click based on actual usage.
- **Smart Bundling System** – AutoCart identifies multiple products likely needing refills together and offers bundle discounts with optimized shipping.

- **Sustainability Dashboard** – Shows users the environmental impact of bundled shipments and refill frequency, promoting eco-friendly behavior. Sustainability Dashboard – Shows users the environmental impact of bundled shipments and refill frequency, promoting eco-friendly behavior.
- **User-Centric Dashboard** – Centralized interface for managing all subscriptions, refill statuses, preferences, and offers.

By merging personalization, automation, and sustainability, AutoCart transforms e-commerce into a proactive experience—saving time, minimizing waste, and ensuring customers never run out of what they need.

4. REQUIREMENT SPECIFICATION

4.1 System Features

1. Sign Up / Registration

Functional Requirements:

- 1.1 The system shall allow users to register using a valid email address, phone number, and secure password.
- 1.2 The system shall validate input fields such as email format and password strength during sign-up.
- 1.3 The system shall prevent duplicate registrations using the same email or phone.

Priority Level: High

Precondition: User must have a valid email address or phone number.

2. User Authentication

Functional Requirements:

- 2.1 The system shall allow users to log in using their registered email or phone and password.
- 2.2 The system shall provide a “Forgot Password” option to reset credentials via OTP or email link.
- 2.3 The system shall lock the account for 30 minutes after 5 consecutive failed login attempts (optional).

Priority Level: High

Precondition: User account must be registered and verified.

3. Subscription Management

Functional Requirements:

- 2.1 The system shall allow users to subscribe to one or more products from the catalog.
- 2.2 The system shall allow users to pause, resume, or cancel their product subscriptions.
- 2.3 The system shall show current subscription status (active, paused, canceled) in the dashboard.

Priority Level: High

Precondition: User must be logged in with a verified account.

4. Smart Refill Prediction Engine

Functional Requirements:

- 3.1 The system shall track product usage frequency based on previous orders.
- 3.2 The system shall predict the next refill date based on average consumption intervals.
- 3.3 The system shall notify users with refill suggestions before stock runs out.

Priority Level: High

Precondition: User must have at least one product subscribed and previous order history.

5. Smart Bundling System

Functional Requirements:

- 4.1 The system shall analyze multiple products with overlapping refill windows.
- 4.2 The system shall suggest bundled orders to minimize shipping and maximize savings.
- 4.3 The system shall apply bundle discounts automatically during checkout.

Priority Level: High

Precondition: User must have more than one active product subscription.

6. Product Catalog & Recommendations

Functional Requirements:

- 5.1 The system shall allow users to browse and search for products.
- 5.2 The system shall recommend products based on past purchases and category interest.

5.3 The system shall display detailed product info (price, description, reviews).

Priority Level: Medium

Precondition: User must be logged in to view personalized recommendations.

7. Checkout & Payment System

Functional Requirements:

6.1 The system shall allow users to review order summary before checkout.

6.2 The system shall support payments through debit/credit cards and mobile banking.

6.3 The system shall confirm successful payments and generate order receipts.

Priority Level: High

Precondition: User must be logged in and have valid payment credentials.

8. Notification System

Functional Requirements:

7.1 The system shall send timely refill reminders via email or in-app alerts.

7.2 The system shall notify users of bundle opportunities and ongoing offers.

7.3 The system shall allow users to customize notification preferences.

Priority Level: Medium

Precondition: User must be logged in and have active subscriptions.

9. Sustainability Dashboard

Functional Requirements:

8.1 The system shall track and display statistics on reduced packaging and shipment frequency.

8.2 The system shall compare single vs. bundled orders in terms of carbon footprint.

8.3 The system shall encourage users with eco-friendly suggestions.

Priority Level: Low

Precondition: User must have completed at least one bundled order.

10. Order Tracking System

Functional Requirements:

9.1 The system shall show real-time order status (processing, shipped, delivered).

9.2 The system shall provide estimated delivery date and shipment tracking info.

Priority Level: Medium

Precondition: User must have placed an order.

4.2 System Quality Attributes

1. Performance

- **Requirements:**
 - The system shall respond to user actions (e.g., adding to cart, modifying subscriptions) within **2 seconds**.
 - The system shall process checkout and bundling logic in under **3 seconds**.
 - The platform shall support up to **5,000 concurrent users** during promotional sales without performance degradation.
- **Priority:** High
- **Measure:** Response time, system load under concurrent users
- **Description:** AutoCart should perform efficiently to maintain a seamless user experience even during peak shopping times.

2. Scalability

- **Requirements:**
 - The system architecture shall support **horizontal scaling** using cloud services.
 - The system shall scale to support **up to 100,000 registered users** and growing inventory without re-architecture.
- **Priority:** High
- **Measure:** Number of concurrent users, system resource usage, load distribution
- **Description:** AutoCart should be designed to accommodate increasing users and product data as the platform grows.

3. Usability

- **Requirements:**
 - The system shall feature a **user-friendly dashboard** for managing subscriptions, bundles, and delivery preferences.
 - The platform shall provide **onboarding guidance, tooltips**, and a searchable **help section**.
 - Users should be able to perform key actions (like pausing a subscription) in **3 clicks or fewer**.
- **Priority:** Medium
- **Measure:** Task completion time, user feedback, support request volume
- **Description:** AutoCart should be intuitive for both tech-savvy and non-technical users to encourage adoption and reduce support burden.

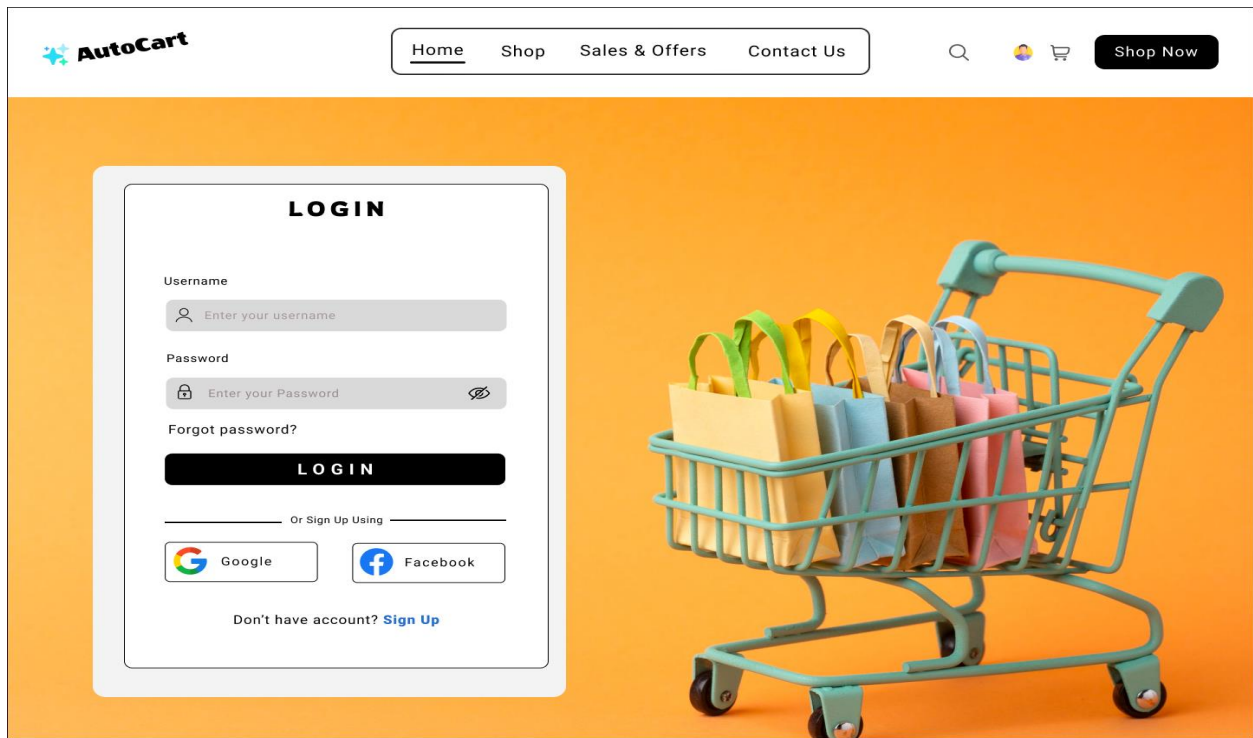
4. Reliability

- **Requirements:**
 - The system shall maintain an **uptime of at least 99.9%**, especially during refill reminder periods and sales.
 - In case of server failure, the system shall **auto-recover within 3 minutes** using fallback containers or replicas.
- **Priority:** High
- **Measure:** Uptime logs, failover testing reports, MTTR (Mean Time to Recovery)
- **Description:** The system should be dependable and available to prevent missed refills or failed transactions.

5. Security

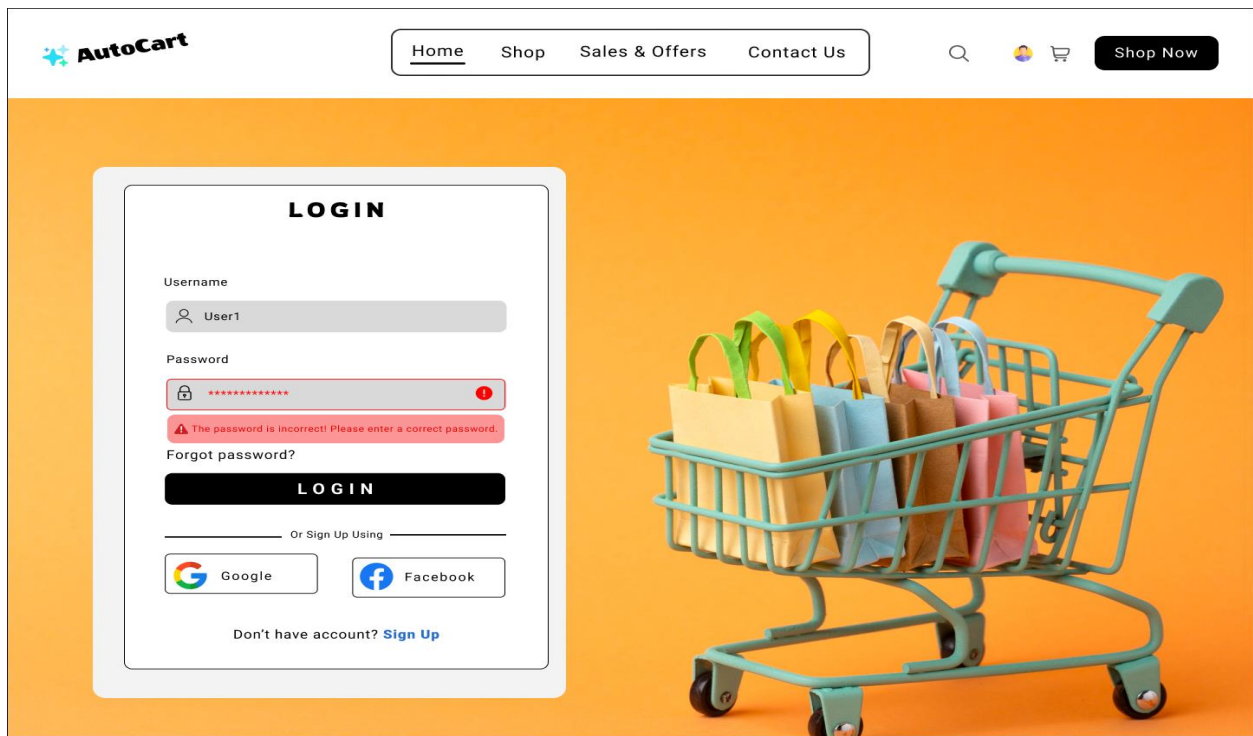
- **Requirements:**
 - All user credentials and payment data shall be stored using **end-to-end encryption**.
 - The system shall use **token-based authentication** with optional **multi-factor authentication** for sensitive actions.
 - The system shall log and monitor all critical actions for **auditability and fraud detection**.
- **Priority:** High
- **Measure:** Number of vulnerabilities, security breach logs, audit trail completeness
- **Description:** User data must be fully protected to ensure trust, privacy, and compliance with security best practices.

4.3 System Interface




The screenshot shows the AutoCart website's login interface. The header includes the AutoCart logo, navigation links (Home, Shop, Sales & Offers, Contact Us), a search icon, a user profile icon, a shopping cart icon, and a 'Shop Now' button. The main content area features a white login form on the left and a shopping cart filled with colorful bags on the right. The login form has fields for 'Username' (containing 'Enter your username') and 'Password' (containing 'Enter your Password'). Below these fields is a 'Forgot password?' link, a 'LOGIN' button, and social media login options for Google and Facebook. A 'Sign Up' link is at the bottom of the form.

Verify login with valid username and password






This screenshot shows the same AutoCart login page, but with a failed login attempt. The 'Username' field now contains 'User1'. The 'Password' field is filled with red dots and has a red error message below it: 'The password is incorrect! Please enter a correct password.' The 'LOGIN' button remains visible, and the rest of the page layout is identical to the previous screenshot.

Verify login fails with invalid credentials



[Home](#) [Shop](#) [Sales & Offers](#) [Contact Us](#)

   [Shop Now](#)

SIGN UP

Username


Email


Password

Confirm Password


SIGN UP

Or Sign Up Using


 Google

 Facebook




Already have an account? [Log In](#)



Verify user registration with valid input data



[Home](#) [Shop](#) [Sales & Offers](#) [Contact Us](#)

   [Shop Now](#)

PASSWORD RESET

Email*


Provide the Email address associated with your account to recover your password

RESET PASSWORD

ENTER OTP

Enter the OTP that has been sent to your email just now

VERIFY



Verify password reset via email OTP

[Home](#)
[Shop](#)
[Sales & Offers](#)
[Contact Us](#)[Shop Now](#)

Dashboard > Bundle Recommendations

FREQUENTLY BROUGHT TOGETHER

Clear Man Shampoo
Cool Sport Menthol
★★★★★
BDT. 350

Soap Bar
Good quality soap Bar
★★★★★
BDT. 150

Bundle & Save 10%

REFRESH SUGGESTIONS

Product total	BDT 500
Discount	BDT 50
Total	BDT 450

Bundle recommendation is based on your previous purchases

The products you see here are suggested for you based on your individual preferences and past interactions, aiming to offer you the most relevant choices.

PLACE ORDER

Verify smart bundle recommendation based on purchase history

[Home](#)
[Shop](#)
[Sales & Offers](#)
[Contact Us](#)[Shop Now](#)

[←](#)
[cart](#)
[Shipping](#)
[Payment](#)

Shopping Cart

Order Items (2)

Denim Jacket
Color: Cold Black
Size: Medium
Qty: 1
BDT. 2200

Denim Pant
Color: Matte Blue
Size: 34
Qty: 2
BDT. 2000

PROCEED TO CHECKOUT

Frequently Brought Together

Deodorant
Good Quality Deodorant
BDT 300

Body Spray
Angled Mechanical
BDT 450

Checkout

Shipping Address: [Change](#)

✓ Raful Hassan
123 Main Street, Apt 16
Dhaka 1212, Bangladesh
+88018XXXXXXX

Payment Method:

☒ SSLCommerz [VISA](#)

☐ Credit/Debit Card

☐ Cash on Delivery

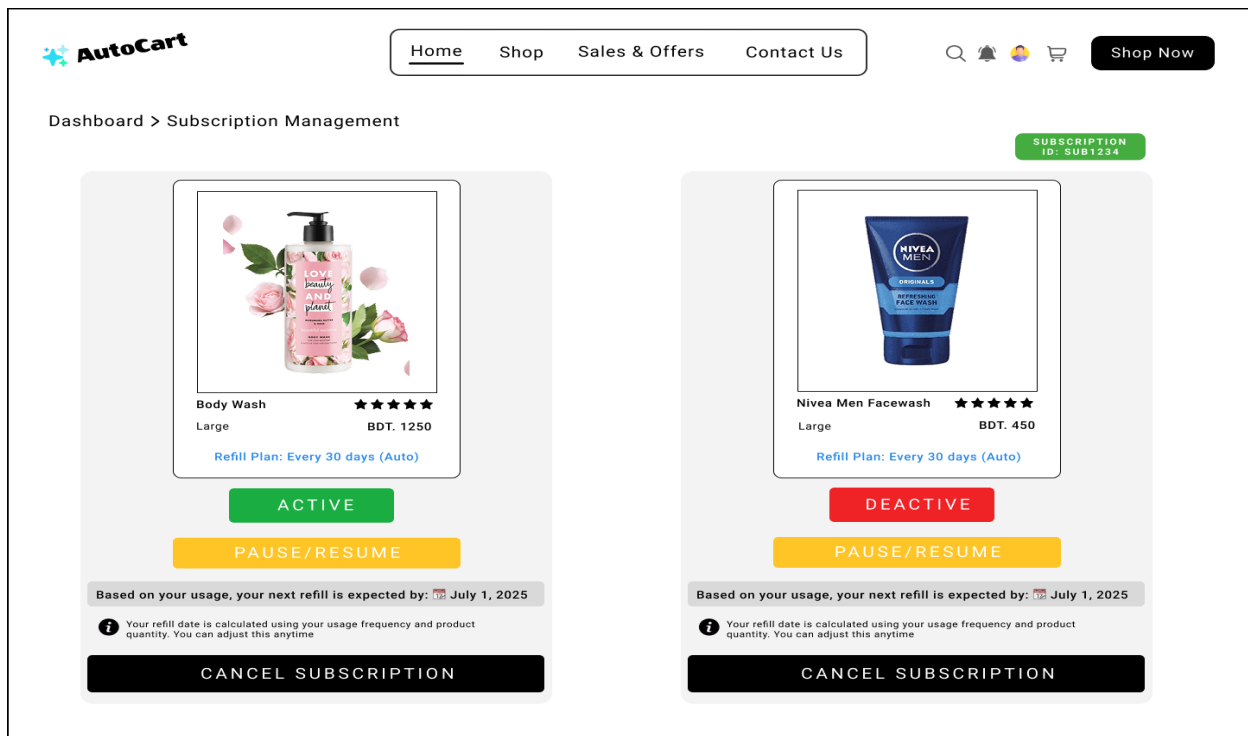
Secured by SSLCommerz, Your payment details are encrypted.

Order Summary

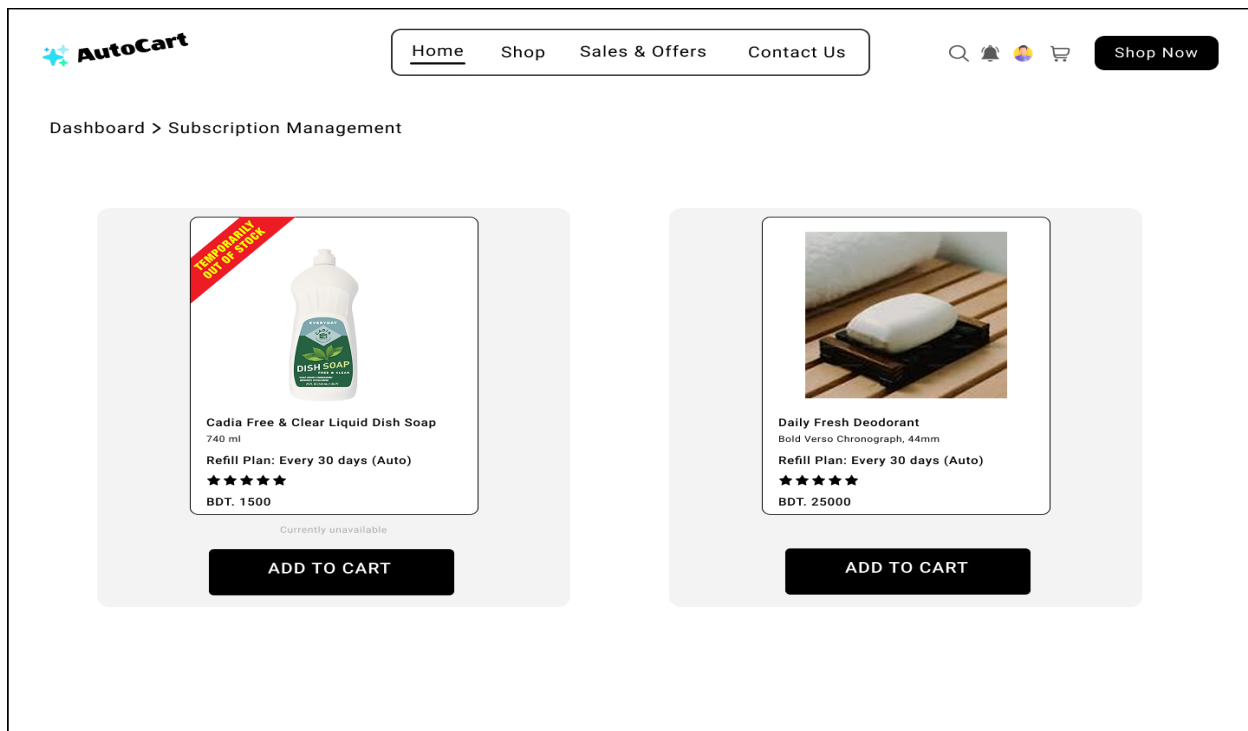
Product	BDT 6,200
Discount	BDT 0
Delivery fee	BDT 120
Total	BDT 6,320

ORDER

Verify adding product to cart and proceeding to checkout



Verify subscription pause and resume functionality



Verify real-time stock alert when product is unavailable

[Home](#)
[Shop](#)
[Sales & Offers](#)
[Contact Us](#)

[Shop Now](#)

[←](#)

cart
 Shipping
 Payment

Order summary

Dove Shampoo

Good Quality

BDT 650.00

Dish Soap

Good Quality

BDT 180.00

Product total	BDT 850
Discount	BDT 0
Delivery fee	BDT 100
Total	BDT 950

Payment Info

Credit Card

Check Your Email

Payment successful

Verify successful order placement with valid payment details

[Home](#)
[Shop](#)
[Sales & Offers](#)
[Contact Us](#)

[Shop Now](#)

[←](#)

cart
 Shipping
 Payment

Payment method

Use saved card: Mastercard

Name on card: User

Card number: 1234-5678-9012-3456

Expiry date: 01 / 25 CCV: 369

Order summary

Face Cream

Good Quality

BDT 750.00

Product total	BDT 750
Discount	BDT 0
Delivery fee	BDT 100
Total	BDT 850

ORDER

✗ Payment failed: Your card has expired. Please use a valid card to proceed.

Verify successful order placement with valid payment details

[Home](#)
[Shop](#)
[Sales & Offers](#)
[Contact Us](#)

[Shop Now](#)

cart
 Shipping
 Payment

Payment method

Use saved card:

Mastercard

Name on card:

Enter your Name

Card number:

123-456-789-

Expiry date:

MM / YY

CCV

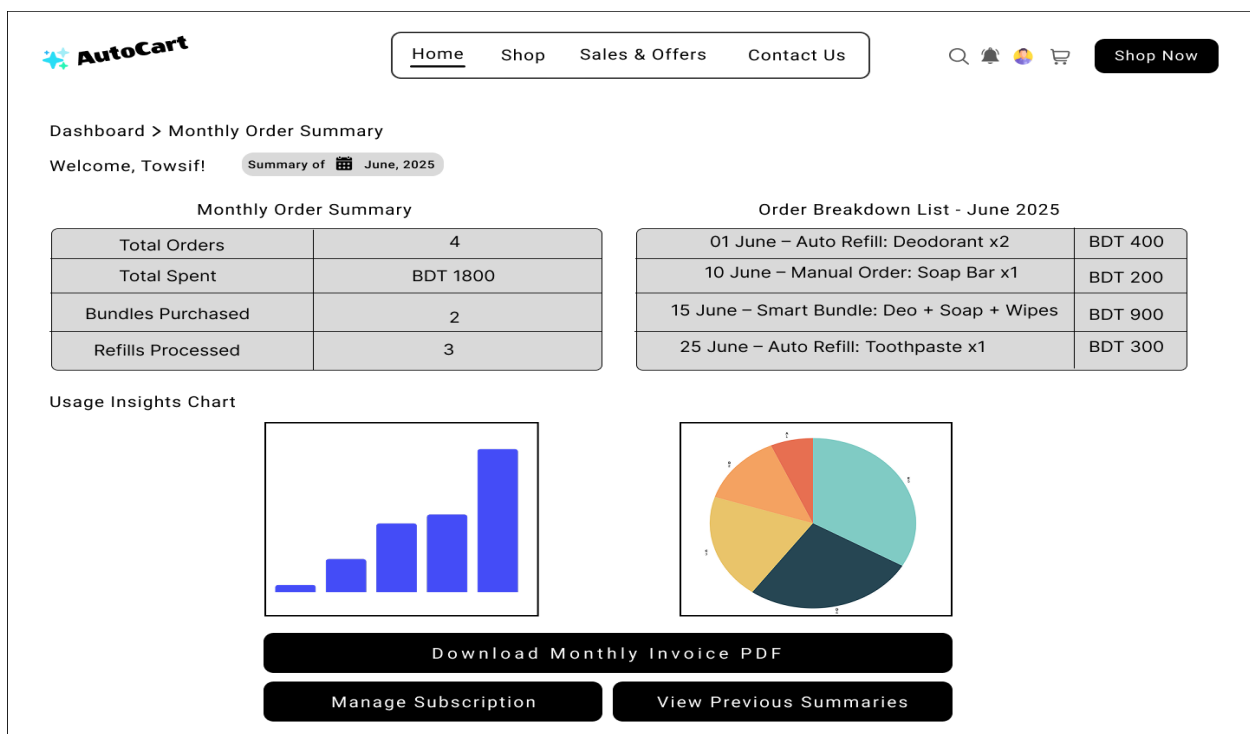
...

Order summary

	Deodorant Good Quality Deodorant		
BDT 300			
	Soap Bar A1 Quality Soap Bar		
BDT 150.00			
	Body Spray Angled Mechanical		
Product total		BDT 1000	
Discount		BDT 0	
Delivery fee		BDT 100	
Total		BDT 1100	

ORDER

Verify secure checkout process with encrypted payment data



Verify accurate monthly order summary generation for user dashboard

4.4 Project Requirements

4.4.1 Budget Constraints

The overall project budget is estimated at 4,25,000 BDT, which includes costs for development, infrastructure, security, marketing, and post-launch support

Category	Estimated Cost (BDT)
AI Refill Prediction Engine Development	1,00,000
Software Development (Frontend & Backend)	90,000
Cloud Infrastructure (Hosting, DB, Storage)	60,000
Third-Party API Integration (Payments, Auth)	40,000
Subscription & Bundling Logic Implementation	30,000
Testing & Quality Assurance (QA)	30,000
Post-Launch Maintenance & Updates	30,000
Marketing & User Onboarding Materials	20,000
Security & Compliance (SSL, MFA, etc.)	25,000
Total Budget	4,25,000 BDT

4.4.2 Time Constraints

The projected development timeline for AutoCart is approximately 5 months, segmented into key phases such as planning, design, development, integration, and final deployment.

Phase	Estimated Duration
Requirement Analysis & Planning	2 weeks
UI/UX Design & Wireframing	3 weeks
AI Engine Development (Prediction)	1 month
Backend Development (APIs & DB)	1 month
Frontend Development (UI Logic)	1 month
Subscription & Cart Logic Setup	2 weeks

Integration, Testing & Deployment	1 month
Total Estimated Time	6 months

4.4.3 Resource Constraints

The successful execution of the AutoCart project depends on the availability of specific human and technological resources to ensure timely and efficient development.

Human Resources

- **Project Manager (1)** – Oversees project timelines, team coordination, and milestone tracking.
- **AI/ML Engineers (2)** – Develop and train the predictive refill engine and smart bundling algorithms.
- **Backend Developers (2)** – Implement server-side logic, subscription management, and database operations.
- **Frontend Developers (2)** – Build responsive and interactive user interfaces for web and mobile platforms.
- **QA Engineers (2)** – Conduct functionality, usability, and performance testing.
- **UI/UX Designer (1)** – Designs intuitive user flows and enhances customer experience.
- **Marketing Strategist (1)** – Plans go-to-market campaigns and handles pre-launch promotions.

Technology Resources

- **Frontend Development:** Next.js (React-based), Tailwind CSS
- **Backend Development:** Node.js with Express.js or Next.js API routes
- **AI/ML Libraries:** Python (scikit-learn, TensorFlow), Time-series analysis tools
- **Database:** PostgreSQL (relational data), Redis (caching), MongoDB
- **Cloud Services:** Vercel (frontend hosting), AWS/GCP (backend, storage, database)
- **Security Tools:** SSL, OAuth 2.0, Two-Factor Authentication (2FA), Data Encryption at Rest and

4.4.4 Environmental Constraints

- The AutoCart platform must be web-based and hosted on cloud infrastructure to ensure high availability and scalability.

- It must be fully responsive and compatible across modern web browsers and devices (mobile, tablet, desktop).
- The system should integrate smoothly with AI modules for refill prediction, requiring minimal delay in real-time recommendations.
- Consistent internet connectivity is required for key features like smart refill, notifications, and real-time bundling logic — which may limit usage in areas with poor network coverage.
- The backend should operate efficiently under various environments (Windows, Linux servers) with minimal configuration.
- All services must adhere to regional data privacy regulations depending on hosting (e.g., GDPR-compliant if deployed in the EU).

5. FEATURES NOT TO BE TESTED

Third-Party Application Integration & Data Usage

While AutoCart enables users to export their subscription and purchase history for personal use or integration with third-party budgeting or tracking tools, the accuracy, compatibility, and performance of such data within external applications are outside the scope of this project.

AutoCart will ensure proper data export formatting, but testing and maintenance of features within external tools remain the responsibility of those respective application developers or maintainers.

6. TESTING APPROACH

6.1 Testing Levels

- **Unit Testing**
 - Developers will perform unit testing for individual features such as smart refill prediction, product bundling, subscription management, and payment processing.
 - Each unit must include documented test cases, sample data, expected output, and defect reports before moving to the next testing phase.
 - Unit testing will be reviewed and approved by the development team lead to ensure all modules function independently.
- **System/Integration Testing**
 - A dedicated QA team will perform integration testing with assistance from developers.
 - Tests will validate interactions between modules (e.g., auto-refill triggers shipping, bundled checkout updates delivery schedule).
 - Integration with third-party services like payment gateways and delivery APIs will also be tested.

- All major defects must be resolved, and critical functionality must pass validation before advancing to user acceptance.
- **User Acceptance Testing (UAT)**
 - Real users (test shoppers) will evaluate the full AutoCart workflow, including product selection, refill recommendations, checkout, and order tracking.
 - UAT will run in parallel with existing manual subscription methods (e.g., regular reminder emails) for a fixed period.
 - Feedback from UAT will be collected to identify usability gaps and minor bugs before official launch.

6.2 Test Tools

Testing for the AutoCart platform will utilize a combination of automated testing tools, performance testing frameworks, and bug tracking systems to ensure a robust and efficient QA process.

A. Automated Testing Tools

Eclipse IDE

- **Purpose:** Development and manual testing environment for Java-based backend modules, including features like user authentication, subscription handling, and refill logic.
- **Usage:** Used to write, run, and debug backend logic manually. Eclipse provides tools for checking code correctness, simulating workflows, and verifying outputs during development.

Selenium WebDriver

- **Purpose:** Automated end-to-end testing of the web application, focusing on user interactions such as browsing products, managing subscriptions, and triggering refill alerts.
- **Usage:** Simulates real user behavior in a browser to test UI functionality, form submissions, navigation flows, and error handling across different frontend scenarios.

B. Performance Testing Tools

Apache JMeter

- **Purpose:** Simulate user traffic and assess system performance under load.
- **Usage:** Test scenarios like peak-time cart checkouts, large bundle creation, and batch refill notifications.

C. Bug Tracking & Reporting Tool

Trello or Jira

- **Purpose:** Track bugs, log defects, and organize the QA workflow.
- **Usage:** Assign issues to developers, prioritize critical bugs, and maintain visibility of testing progress across the team.

6.3 Meetings

- The QA team will conduct **weekly meetings** to assess testing progress, review identified defects, and ensure alignment with testing goals.
- **Bi-weekly coordination meetings** will be held between the QA lead, development team, and project manager to ensure smooth integration and timely resolution of cross-functional issues.
- **Ad-hoc/emergency meetings** may be scheduled when critical bugs or high-priority issues arise that require immediate attention and collaborative resolution.

7. TEST CASES/TEST ITEMS

Project Name: Project Name: AutoCart: Intelligent E-Commerce with Predictive Auto-Refill & Smart Bundling			Test Designed by: FARJANA YESMIN OPI	
Test Case ID: AutoCart-FR-001			Test Designed date: 01/06/2025	
Test Priority (Low, Medium, High): Medium			Test Executed by: MD. ABU TOWSIF	
Module Name: Login Session			Test Execution date: 01/06/2025	
Test Title: Verify login with valid username and password				
Description: Test the website login page with correct credentials				
Precondition: User must have valid username and password				
Dependencies: User account must be registered in the database				
Test Steps	Test Data	Expected Results	Actual Results	Status (Pass/Fail)
1. Go to the website 2. Enter username 3. Enter password 4. Click submit	Username: User1 Password: 321	User should login into the application	As expected	Pass
Post Condition: User is validated with database and successfully login to account. The account session details are logged in the database.				

Project Name: Project Name: AutoCart: Intelligent E-Commerce with Predictive Auto-Refill & Smart Bundling			Test Designed by: FARJANA YESMIN OPI		
Test Case ID: AutoCart-FR-002			Test Designed date: 01/06/2025		
Test Priority (Low, Medium, High): High			Test Executed by: SHOHAN		
Module Name: Login Session			Test Execution date:02/06/2025		
Test Title: Verify login fails with invalid credentials					
Description: Ensure the system does not allow login when incorrect username or password is entered					
Precondition: Login page is accessible					
Dependencies: Login system must be active					
Test Steps		Test Data	Expected Results	Actual Results	Status (Pass/Fail)
1. Go to the website 2. Enter username 3. Enter invalid password 4. Click submit		Username: User1 Password: 123	System should show error and deny login	As expected	Pass
Post Condition: User is not logged in. No session is created, and an appropriate error message is displayed.					

Project Name: Project Name: AutoCart: Intelligent E-Commerce with Predictive Auto-Refill & Smart Bundling			Test Designed by: FARJANA YESMIN OPI	
Test Case ID: AutoCart-FR-003			Test Designed date: 17/06/2025	
Test Priority (Low, Medium, High): High			Test Executed by: RAFIUL HASSAN	
Module Name: User Registration			Test Execution date: 03/06/2025	
Test Title: Verify user registration with valid input data				
Description: Check if new users can register with correct data				
Precondition: Registration page is accessible				
Dependencies: Registration module must be active				
Test Steps	Test Data	Expected Results	Actual Results	Status (Pass/Fail)
1. Go to registration page 2. Fill in valid data 3. Submit the form	Username: Test_user Email: testuser@gmail.com Password: pass	User account should be created and success message should be shown	As expected	Pass
Post Condition: User account is created and saved in the database				

Project Name: Project Name: AutoCart: Intelligent E-Commerce with Predictive Auto-Refill & Smart Bundling			Test Designed by: FARJANA YESMIN OPI	
Test Case ID: AutoCart-FR-004			Test Designed date: 03/06/2025	
Test Priority (Low, Medium, High): High			Test Executed by: SHOHAN	
Module Name: Password Recovery			Test Execution date: 03/06/2025	
Test Title: Verify password reset via email OTP				
Description: Test the ability to reset password using a valid OTP sent to the user’s registered email				
Precondition: User must have a registered email				
Dependencies: OTP email service must be active				
Test Steps	Test Data	Expected Results	Actual Results	Status (Pass/Fail)
1. Click “Forgot Password” link 2. Enter received OTP 3. Enter new password & confirm	Username: Test_user OTP: 123456 New Password: pass123	OTP is received, verified, and password reset is successful	As expected	Pass
Post Condition: Password is updated and login is possible with the new password				

Project Name: Project Name: AutoCart: Intelligent E-Commerce with Predictive Auto-Refill & Smart Bundling			Test Designed by: FARJANA YESMIN OPI	
Test Case ID: AutoCart-FR-005			Test Designed date: 13/06/2025	
Test Priority (Low, Medium, High): High			Test Executed by: MD. ABU TOWSIF	
Module Name: Predictive Auto-Refill			Test Execution date: 14/06/2025	
Test Title: Verify AI-based refill suggestion appears after product depletion				
Description: Check if AI suggests refill when a product runs low or is used up				
Precondition: User has purchased a product with refill tracking enabled				
Dependencies: AI prediction model and product usage tracking must be active				
Test Steps	Test Data	Expected Results	Actual Results	Status (Pass/Fail)
1. Log in to user account 2. Simulate product usage until depletion 3. Check homepage/dashboard for refill alert	Username: Test_user Product: Camera	Refill suggestion appears for depleted item	As expected	Pass
Post Condition: System recommends refill and shows it on dashboard or cart				

Project Name: Project Name: AutoCart: Intelligent E-Commerce with Predictive Auto-Refill & Smart Bundling		Test Designed by: A. F. M. RAFIUL HASSAN		
Test Case ID: AutoCart-FR-006		Test Designed date: 05/06/2025		
Test Priority (Low, Medium, High): Medium		Test Executed by: RAFIUL HASSAN		
Module Name: Smart Bundle Recommendation		Test Execution date: 05/06/2025		
Test Title: Verify smart bundle recommendation based on purchase history				
Description: Ensure the system suggests bundles of products frequently bought together based on past purchase history				
Precondition: User must be logged in and that user have at least two purchased item in the database				
Dependencies: The recommendation system must be running against test database				
Test Steps	Test Data	Expected Results	Actual Results	Status (Pass/Fail)
1. Log into the AutoCart account 2. Go to Bundle Recommendations 3. Refresh or load suggestions. 4. Verify bundle with item-1 and item-2 appears, also with “Frequently bought together” and correct discount/pricing 5. Click on “Place Order”	Username: tuser1 Password: 1234 Purchase history: Products: Item-1 and item-2	The recommendation bundle shown with item-1 + item-2 appears with option "Frequently brought together" and correct discount, update the total prices. No changes are made to order.	As expected	Pass
Post Condition: No changes made to order, as user checks the bundle recommendations.				

Project Name: Project Name: AutoCart: Intelligent E-Commerce with Predictive Auto-Refill & Smart Bundling		Test Designed by: A. F. M. RAFIUL HASSAN		
Test Case ID: AutoCart-FR-007		Test Designed date: 06/06/2025		
Test Priority (Low, Medium, High): High		Test Executed by: FARJANA YESMIN OPI		
Module Name: Shopping Cart & Checkout		Test Execution date: 07/06/2025		
Test Title: Verify adding product to cart and proceeding to checkout.				
Description: Ensure a user can add an in-stock product to cart and complete checkout successfully				
Precondition: User must be logged in and has items in the cart, and a valid address has been provided.				
Dependencies: Payment gateway must be reachable.				
Test Steps	Test Data	Expected Results	Actual Results	Status (Pass/Fail)
1. Log into the AutoCart account 2. Go to Shopping Cart 3. Click “Add to cart or Remove” 4. Proceed to the checkout. 5. Select or change shipping address. 6. Select payment method. 7. Click on “Order”	Username: tuser2 Password: 1234 Product: Denim Jacket Price: 2200 BDT Payment Method: SSLCommerz Product: Denim Pant Price: 2000 BDT	The payment should be made and the order should be successfully ordered also stored in the database with order and payment information.	As expected	Pass
Post Condition: Item added to the checkout, Order successfully placed.				

Project Name: Project Name: AutoCart: Intelligent E-Commerce with Predictive Auto-Refill & Smart Bundling		Test Designed by: A. F. M. RAFIUL HASSAN		
Test Case ID: AutoCart-FR-008		Test Designed date: 05/06/2025		
Test Priority (Low, Medium, High): Medium		Test Executed by: FARJANA YESMIN OPI		
Module Name: Subscription Management		Test Execution date: 06/06/2025		
Test Title: Verify subscription pause and resume functionality				
Description: Validate that pausing an active subscription halts refill/billing and resuming recalculates next refill correctly				
Precondition: User must be logged in and Active subscription exists for a product and next refill date in future				
Dependencies: Subscription service and scheduler must be active.				
Test Steps	Test Data	Expected Results	Actual Results	Status (Pass/Fail)
1. Log into the AutoCart account 2. Go to My Subscriptions. 3. Verify status “Active” and next refill date. 4. Click “Pause” or “Resume” and confirm. 5. Successful changes with subscription status and next refill calculation.	Username: tuser3 Password: 1234 Subscription ID: SUB1234 for “AutoRefillProduct” and the next refill is on July 1, 2025.	The user should successfully “Pause” or “Resume” the subscription with updated refill date.	Not as expected	Fail
Post Condition: Subscription remains active with next refill scheduled.				

Project Name: Project Name: AutoCart: Intelligent E-Commerce with Predictive Auto-Refill & Smart Bundling			Test Designed by: MD. SHOHANUR RAHMAN SHOHAN		
Test Case ID: AutoCart-FR-009			Test Designed date: 06/06/2025		
Test Priority (Low, Medium, High): High			Test Executed by: MD. ABU TOWSIF		
Module Name: Inventory Management / Stock Alert			Test Execution date: 08/06/2025		
Test Title: Verify real-time stock alert when product is unavailable					
Description: Ensure the system displays a clear “Out of Stock” alert when a user attempts to view or add an unavailable product					
Precondition: User is logged in; product exists in catalog but is marked as out of stock					
Dependencies: Inventory status must be correctly synced in the backend database					
Test Steps		Test Data	Expected Results	Actual Results	Status (Pass/Fail)
1. Log into the AutoCart account 2. Navigate to product catalog or use search 3. Select an out-of-stock product 4. Try to add product to cart		Username: user1 Password: 321 Product: Dish Soap Stock = 0 in database Click “Add to Cart”	Product card should display "Out of Stock" badge, and System should prevent action and show warning.	As expected	Pass
Post Condition: Product remains unavailable until re-stocked. UI prevents ordering and reflects accurate inventory.					

Project Name: Project Name: AutoCart: Intelligent E-Commerce with Predictive Auto-Refill & Smart Bundling			Test Designed by: MD. SHOHANUR RAHMAN SHOHAN	
Test Case ID: AutoCart-FR-010			Test Designed date: 09/06/2025	
Test Priority (Low, Medium, High): High			Test Executed by: MD. ABU TOWSIF	
Module Name: Checkout & Payment			Test Execution date: 11/06/2025	
Test Title: Verify successful order placement with valid payment details				
Description: Ensure the checkout system processes the order correctly when valid payment details are provided				
Precondition: User is logged in and has items in the cart				
Dependencies: Payment gateway must be active and reachable				
Test Steps	Test Data	Expected Results	Actual Results	Status (Pass/Fail)
1. Log into the AutoCart account 2. Add items to cart 3. Go to Checkout page 4. Enter valid payment details 5. Click "Place Order" 6. Return to Order Successful page with all details and check email.	Username: user1 Password: 321 Product: Shampoo (₹650), Dish Soap (₹180) Cart Items Total: ₹830 Cart Items Total: ₹830 Method: Credit Card (SSLCommerz), Card No: 1234-XXXX-XXXX-5678 Email: user1@gmail.com	Order summary is displayed from payment form accepts data and confirmation message appears, order saved, and order receipt received.	As expected	Pass
Post Condition: Order is added to the user’s order history. Confirmation receipt is generated. Payment is marked as successful in system logs				

Project Name: Project Name: AutoCart: Intelligent E-Commerce with Predictive Auto-Refill & Smart Bundling			Test Designed by: MD. SHOHANUR RAHMAN SHOHAN	
Test Case ID: AutoCart-FR-011			Test Designed date: 09/06/2025	
Test Priority (Low, Medium, High): High			Test Executed by: RAFIUL HASSAN	
Module Name: Checkout & Payment			Test Execution date: 10/06/2025	
Test Title: Verify system behavior with expired payment method				
Description: Ensure the system detects and blocks transactions made using an expired card or outdated payment credentials				
Precondition: User must be logged in and have at least one item in the cart				
Dependencies: Payment gateway must be active and capable of detecting expiry				
Test Steps	Test Data	Expected Results	Actual Results	Status (Pass/Fail)
1. Log into the AutoCart account 2. Add items to cart 3. Go to Checkout page 4. Enter valid payment details 5. Click "Place Order" 6. User cannot complete order	Username: user1 Password: 321 Product: Face Cream (BDT 750) Delivery Fee BDT 100 Cart Items Total: BDT 850 Method: Credit Card (SSLCommerz), Card No: 1234-5678-9012-3456 Name: User Expiry: 01/23 CCV: 369	Cart summary shown and system should detect expiry. System should reject payment and show error message. Order is not placed, card must be updated	Not as expected	Fail
Post Condition: Order is not processed. User is prompted to update payment method. Error message is displayed and logged in system.				

Project Name: Project Name: AutoCart: Intelligent E-Commerce with Predictive Auto-Refill & Smart Bundling			Test Designed by: MD. ABU TOWSIF		
Test Case ID: AutoCart-FR-012			Test Designed date: 09/06/2025		
Test Priority (Low, Medium, High): High			Test Executed by: SHOHAN		
Module Name: Refill Prediction Engine			Test Execution date: 11/06/2025		
Test Title: Verify refill schedule adjustment based on user consumption input					
Description: Validate that the system correctly updates the next refill prediction based on updated user usage input					
Precondition: User must be logged in and have at least one active subscription item					
Dependencies: User account must be registered in the database					
Test Steps		Test Data	Expected Results	Actual Results	Status (Pass/Fail)
1. Navigate to the “My Subscriptions” dashboard 2. Select a subscribed item (e.g., Shampoo) 3. Enter new consumption frequency (e.g., 1 bottle every 10 days) 4. Submit updated usage data 5. Navigate to next predicted refill date		Username: User1 Password: 321 Product: Shampoo Usage input: 1 per 10 days	System should accept new usage input and adjust the predicted refill date accordingly.	As expected	Pass
Post Condition: System updates the refill logic for that item. Dashboard now reflects updated refill prediction. New schedule is stored in the backend and triggers new notification timing.					

Post Condition: System updates the refill logic for that item. Dashboard now reflects updated refill prediction. New schedule is stored in the backend and triggers new notification timing.				
Project Name: Project Name: AutoCart: Intelligent E-Commerce with Predictive Auto-Refill & Smart Bundling			Test Designed by: MD. ABU TOWSIF	
Test Case ID: AutoCart-FR-013			Test Designed date: 10/06/2025	
Test Priority (Low, Medium, High): High			Test Executed by: FARJANA YESMIN OPI	
Module Name: Smart Notification System			Test Execution date: 12/06/2025	
Test Title: Verify accurate refill reminder notification based on predicted usage cycle				
Description: Test whether users receive correct refill notifications based on their usage history and prediction logic				
Precondition: User is logged in and has an active subscription with at least 1 refill cycle completed				
Dependencies: User account must be registered in the database				
Test Steps	Test Data	Expected Results	Actual Results	Status (Pass/Fail)
1. Log into the AutoCart account 2. Navigate to the “Notifications” or “Smart Refill Alerts” section 3. Simulate consumption data (e.g., product lasts for 10 days) 4. Wait until predicted threshold (e.g., Day 8–9) 5. Check if refill reminder notification appears	Product: Face Wash Usage Frequency: 1 unit every 10 days Product: Toothpaste Usage Frequency: 1 unit every 20 days	User should receive a smart notification with an estimated refill date, tagged as "Predicted by AutoCart AI".	As expected	Pass
Post Condition: A refill reminder notification is logged in the user’s notification history and available in the dashboard until dismissed or acted upon.				

Project Name: Project Name: AutoCart: Intelligent E-Commerce with Predictive Auto-Refill & Smart Bundling			Test Designed by: MD. ABU TOWSIF		
Test Case ID: AutoCart-FR-014			Test Designed date: 12/06/2025		
Test Priority (Low, Medium, High): High			Test Executed by: RAFIUL HASSAN		
Module Name: Checkout & Payment Security Module			Test Execution date: 13/06/20255		
Test Title: Verify secure checkout process with encrypted payment data					
Description: Ensure the checkout system uses encrypted communication and processes payment securely.					
Precondition: User is logged in, has items in the cart, and a valid payment method is configured.					
Dependencies: User account must be registered in the database					
Test Steps		Test Data	Expected Results	Actual Results	Status (Pass/Fail)
1. Log into the AutoCart account 2. Add one or more items to the cart 3. Proceed to the checkout page 4. Enter valid payment information (e.g., card/mobile banking) 5. Complete the payment process 6. Monitor network activity and inspect security headers (optional for developer validation)		Product: Protein Powder Price: 1,200 BDT Payment Method: SSLCommerz (Credit Card) Product: Shampoo Price: 650 BDT Payment Method: Mobile Banking (bKash/Nagad)	Payment should be completed successfully using HTTPS, and payment data should be transmitted securely using encryption.	As expected	Pass
Post Condition: Transaction is recorded in the user’s order history, and a confirmation receipt is generated and sent via email/SMS.					

Project Name: Project Name: AutoCart: Intelligent E-Commerce with Predictive Auto-Refill & Smart Bundling			Test Designed by: MD. ABU TOWSIF	
Test Case ID: AutoCart-FR-015			Test Designed date: 12/06/2025	
Test Priority (Low, Medium, High): High			Test Executed by: FARJANA YESMIN OPI	
Module Name: Order Summary Dashboard			Test Execution date: 14/06/2025	
Test Title: Verify accurate monthly order summary generation for user dashboard				
Description: Test if the dashboard correctly summarizes all user orders made within a specific month.				
Precondition: User is logged in, has items in the cart, and a valid payment method is configured.				
Dependencies: User has completed at least one successful order within the current month.				
Test Steps	Test Data	Expected Results	Actual Results	Status (Pass/Fail)
<div>1. Log into the AutoCart account</div> <div>2. Navigate to the “Dashboard” or “My Orders” section</div> <div>3. Filter orders by the current month (e.g., June 2025)</div> <div>4. View the monthly summary (including product names, prices, total amount, and delivery status)</div> <div>5. Compare with actual order history data</div>	<div>Order 1: Toothpaste, Qty: 2, Price: 200 BDT</div> <div>Order 2: Body Lotion, Qty: 1, Price: 400 BDT</div>	The dashboard should accurately display all orders placed in the selected month, with correct total amount, item list, and delivery statuses..	Not as expected	Fail
Post Condition: Monthly order data remains visible in the dashboard for user reference, and can be exported or used for analytics.				

8. ITEM PASS/FAIL CRITERIA

The testing process for the AutoCart system will be considered complete when the following criteria are satisfied:

1. **Core Functionality Verification:** All essential features — including smart refill prediction, personalized bundle creation, subscription management, and order checkout — must function correctly according to defined requirements. Any module failing its expected outcome will be marked as **Fail**.
2. **Data Accuracy & Integrity:** User-related data (e.g., cart contents, refill schedules, account preferences) must be stored and retrieved without errors. Any mismatched or lost data during operations will result in a **Fail**.
3. **System Stability & Error Handling:** The system must operate without crashes or critical errors during normal use. Smooth navigation and proper error feedback are mandatory. Unhandled exceptions or user-facing bugs will be treated as **Fail** conditions.
4. **Performance Benchmarks:** The application should handle high-traffic situations such as flash sales or peak hours without slowing down. If page load times or order processing exceeds the acceptable threshold (e.g., 2 seconds), it will be marked as **Fail**.
5. **User Acceptance & Expectations:** All features must align with user requirements, including a seamless shopping experience, timely refill suggestions, and accurate product bundling. Any deviation from user expectations as defined in acceptance criteria will lead to a **Fail**.
6. **Accessibility & Usability:** The interface must be intuitive for a wide range of users. If any user struggles with navigation, text readability, or overall experience due to poor UI/UX or lack of accessibility features, it will result in a **Fail**.

Out of the 15 test cases executed for the AutoCart project, 12 test cases have passed, while 3 encountered issues. This results in a pass rate of approximately 80% and a fail rate of 20%. Despite a few failed cases, the high success rate indicates a stable and well-performing system. Fixing the failed items will further enhance the robustness and user satisfaction of AutoCart.

9. TEST DELIVERABLES

A. Test Plan

A comprehensive document outlining the overall testing strategy, objectives, scope, testing environment, and schedule. It includes test coverage for AutoCart features like AI-powered refill prediction, smart bundling, and subscription management.

B. Test Cases

A collection of detailed test cases that define test inputs, execution conditions, expected outcomes, and pass/fail criteria. These include scenarios like automated refill triggers, personalized bundle generation, and payment gateway validation.

C. Test Execution Logs

Logs recording the results of executed test cases, including timestamps, outcomes (pass/fail), issues encountered, and relevant screenshots or logs. These help in auditing and issue traceability.

D. Defect Reports

Structured documentation of all bugs and issues identified during testing. Each report includes the defect ID, description, severity, steps to reproduce, and resolution status to assist developers in fixing the issues efficiently.

E. Test Summary Report

A final report summarizing testing outcomes, highlighting the number of test cases executed, success rates, unresolved bugs, and overall system readiness for deployment.

F. Screen Prototypes & UI Mockups

Visual layouts and interaction models of major screens such as the cart interface, refill suggestions, subscription control, and checkout flow, which were used as references during testing.

G. Turnover Documentation

A formal document handed over at the end of the testing phase, detailing test completion status, critical issues (if any), and transition notes for deployment and maintenance teams.

10. STAFFING AND TRAINING NEEDS

Staffing Requirements

- **1 Full-Time Tester:** Dedicated to system, integration, and acceptance testing phases. Initially involved part-time during early development and assigned full-time approximately halfway through the project. If a dedicated tester is unavailable, the project manager or test lead will take on testing responsibilities.
- **2 AI/ML Engineers:** Support testing related to AI-powered features such as refill prediction and smart bundling.
- **2 Backend Developers:** Assist with unit testing, bug fixing, and integration testing.
- **2 Frontend Developers:** Support UI testing and usability verification.
- **Project Manager/Test Lead:** Oversees testing activities, defect management, and ensures testing quality and schedule adherence.

Training Requirements

- **Testers and Developers:** Training on AutoCart's key features, including AI refill prediction models, subscription management workflows, smart bundling logic, and payment integration.
- **Operations Staff:** Training on monitoring AI model outputs, managing subscription adjustments, and handling customer service workflows.

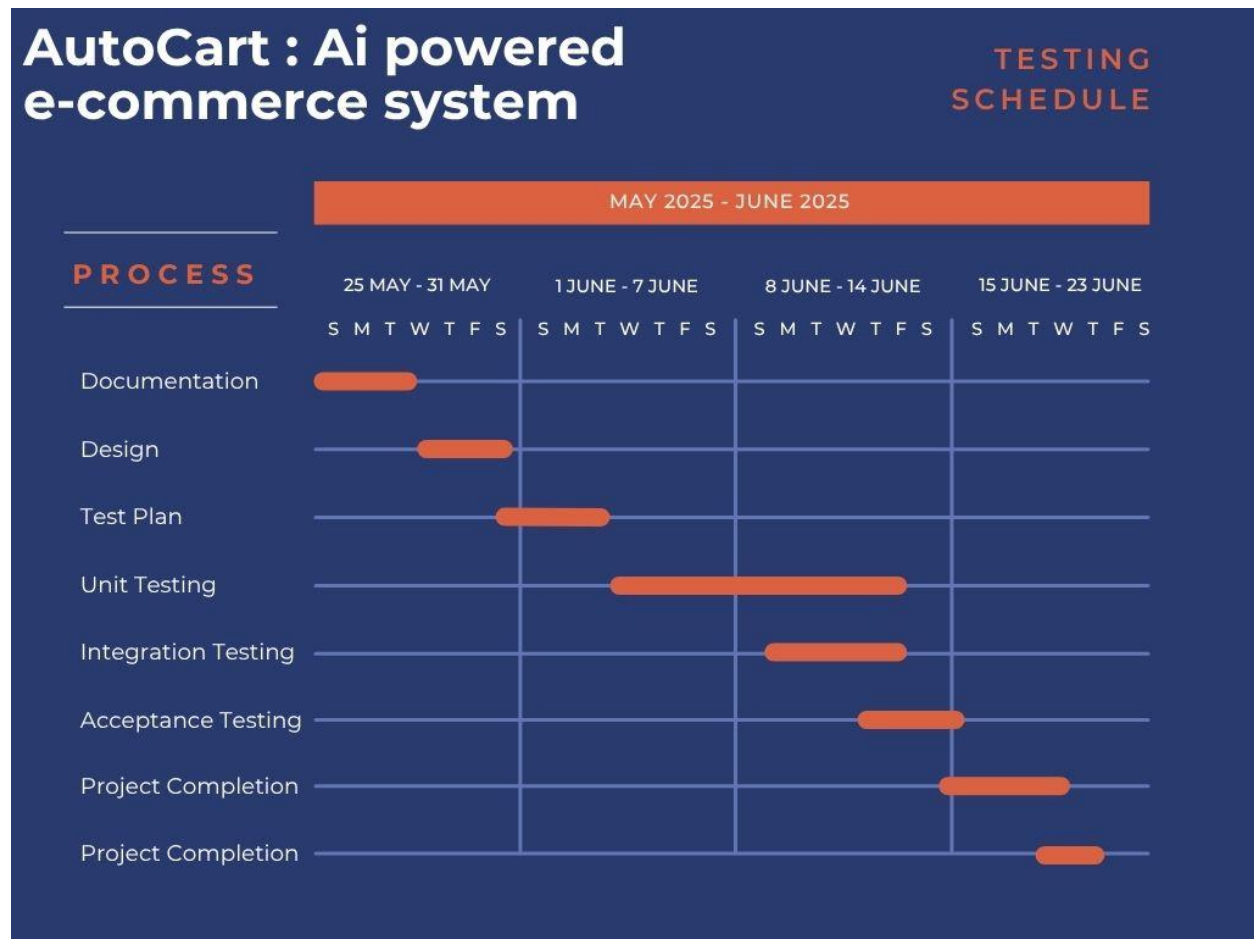
- **Support and Sales Teams:** Training to assist users with subscription management, auto-refill settings, and troubleshooting common issues.
- **Security Team:** Training on implementing and monitoring multi-factor authentication, data privacy regulations, and secure transaction processing.

11. RESPONSIBILITIES

Task	Project Manager	Dev Team	Test Team	AI Specialist	Client
Acceptance Test Documentation & Execution	X	X	X		X
System Integration Documentation & Execution	X	X	X		
Unit Test Documentation & Execution		X	X		
System Design Reviews	X	X	X	X	
Detailed Design Reviews	X	X	X	X	
Test Procedures and Rules	X		X		
AI Refill Prediction Model Evaluation & Validation	X			X	
Smart Bundling & Personalization Logic Review		X		X	
API & Payment Gateway Integration Testing	X	X	X		
Change Control & Regression Testing	X	X	X	X	

12. TESTING SCHEDULE

Time has been allocated within the project plan for the following testing activities. The specific dates and times for each activity are defined in the project plan timeline. The persons required for each process are detailed in the project timeline and plan as well. Coordination of the personnel required for each task, test team, development team, management and customer will be handled by the project manager in conjunction with the development and test team leaders. Schedule must be done using any project management tool. Don't make the schedule using MS word/ excel.



13. PLANNING RISKS AND CONTINGENCIES

- **Limited Availability of Domain Experts:** Experts in e-commerce, subscription management, or AI may have restricted availability, potentially delaying validation of predictive models and feature usability. To mitigate this, flexible scheduling and backup consultants will be arranged.
- **Data Privacy and Security Risks:** Handling customer purchase data and subscription details involves privacy concerns. To address this, strong data encryption, anonymization techniques, and frequent security audits will be implemented.

- **Third-Party API Integration Delays:** Integration with external payment gateways, delivery services, or AI service providers may face delays. Early API testing, proactive communication with vendors, and use of mock APIs will help minimize impact.
- **Limited Testing Resources:** Constraints in QA personnel or tools could affect testing timelines. Cross-training team members and prioritizing critical test cases will help optimize resource utilization.
- **User Acceptance Testing (UAT) Delays:** Delays in customer or stakeholder feedback during UAT could impact project deadlines. A well-defined UAT schedule with regular follow-ups and clear communication channels will be maintained.
- **Regulatory and Compliance Challenges:** Failure to meet e-commerce and data protection regulations may delay launch. Regular compliance checks and consultations with legal experts will be conducted throughout the project.

14. APPROVALS

Role	Name
Project Sponsor	Shwapno
Project Manager	Farjana Yesmin Opi
Development Team Lead	Md. Abu Towsif
Test Manager	Md Shohanur Rahman Shohan
UI/UX Designer	A. F. M. Rafiul Hassan