



American International University-Bangladesh (AIUB)

Department of Computer Science
Faculty of Science & Technology (FST)

Spring 24-25

Section: C Software Quality and Testing

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

Report Submitted By

SN	Student Name	Student ID
1	MD. SHOHANUR RAHMAN SHOHAN	22-46013-1
2	FARJANA YESMIN OPI	22-47018-1
3	MD. ABU TOWSIF	22-47019-1
4	A. F. M. RAFIUL HASSAN	22-47048-1

Checked By Industry Personnel (Optional)

Name:

Designation:

Company:

Sign:

Date:

Software Test Plan

for

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

Version 1.0 approved

1. Shohanur Rahman Shohan

2. Farjana Yesmin Opi

3. Md. Abu Towsif

4. A. F. M. Rafiul Hassan

<organization>

<date created>

Table of Contents

Revision History	3
1. TEST PLAN IDENTIFIER: TP-AutoCart-2025-001	4
2. REFERENCES	4
3. INTRODUCTION	5
Background to the Problem.....	5
Solution to the Problem.....	5
4. REQUIREMENT SPECIFICATION	6
4.1 System Features	6
4.2 System Quality Attributes.....	9
4.3 System Interface.....	11
4.4 Project Requirements.....	18
5. FEATURES NOT TO BE TESTED.....	20
6. TESTING APPROACH.....	20
6.1 Testing Levels.....	20
6.2 Testing Tools.....	21
6.3 Meetings.....	21
7. TEST CASES/TEST ITEMS.....	22
8. ITEM PASS/FAIL CRITERIA.....	37
9. TEST DELIVERABLES.....	37
10. STAFFING AND TRAINNING NEEDS.....	38
11. RESPONSIBILITIES.....	39
12. TESTING SCHEDULE.....	40
13. PLANNING RISKS AND CONTINGENCIES.....	40
14. APPROVALS.....	41

Revision History

Revision	Date	Updated by	Update Comments
0.1	2007.06.04	Scot Robinson	First Draft
0.2	2007.06.19	Amit Nimse	

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.
- **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.

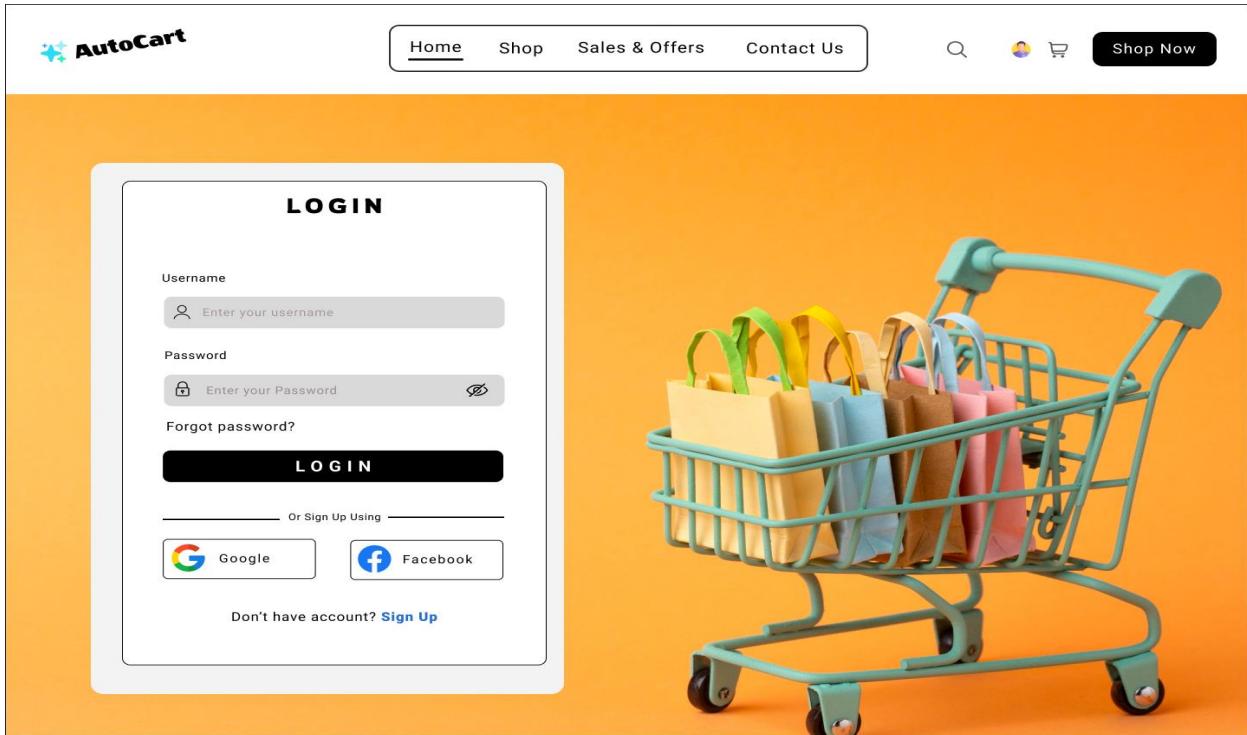
4. Reliability

- **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.

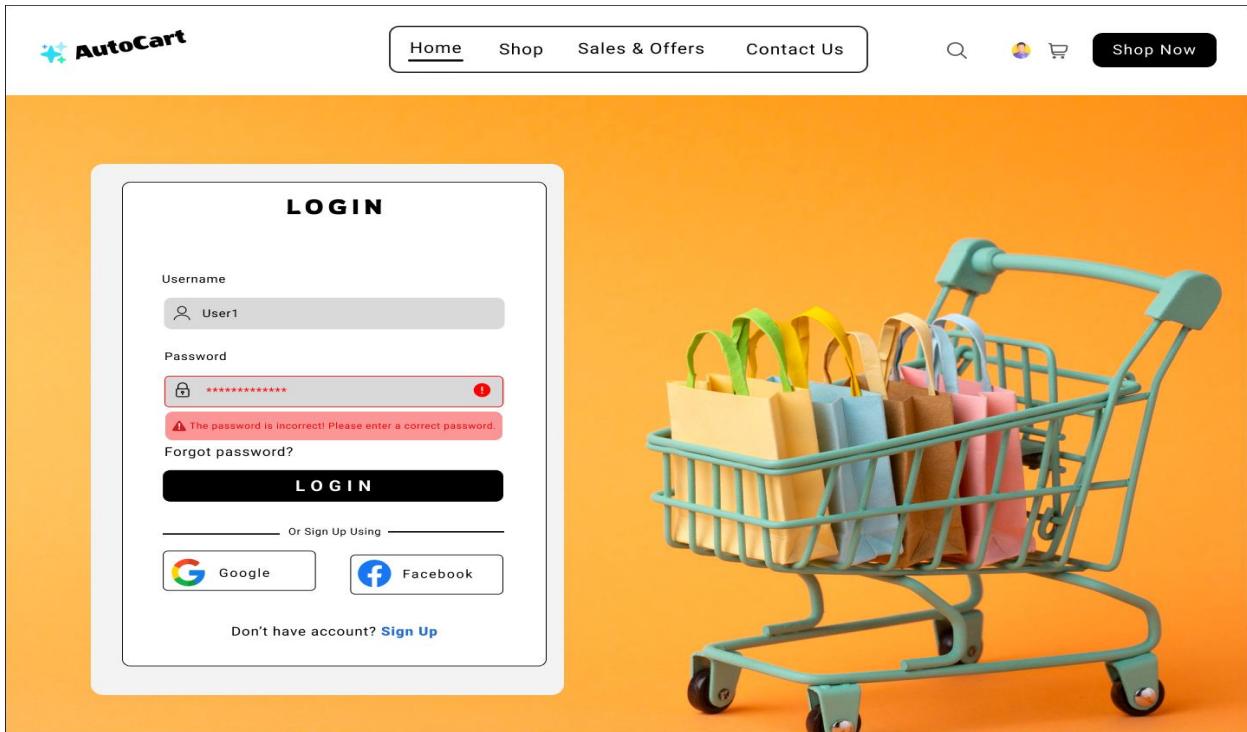
5. Security

- **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.

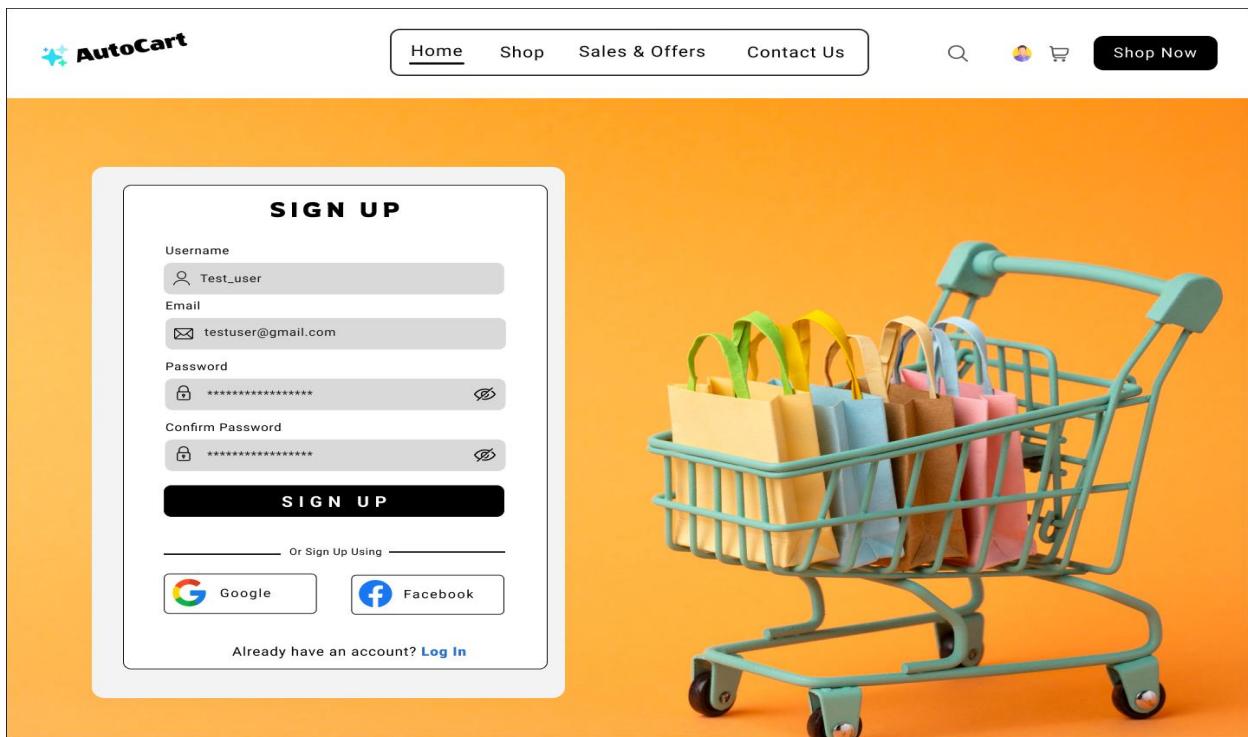
4.3 System Interface



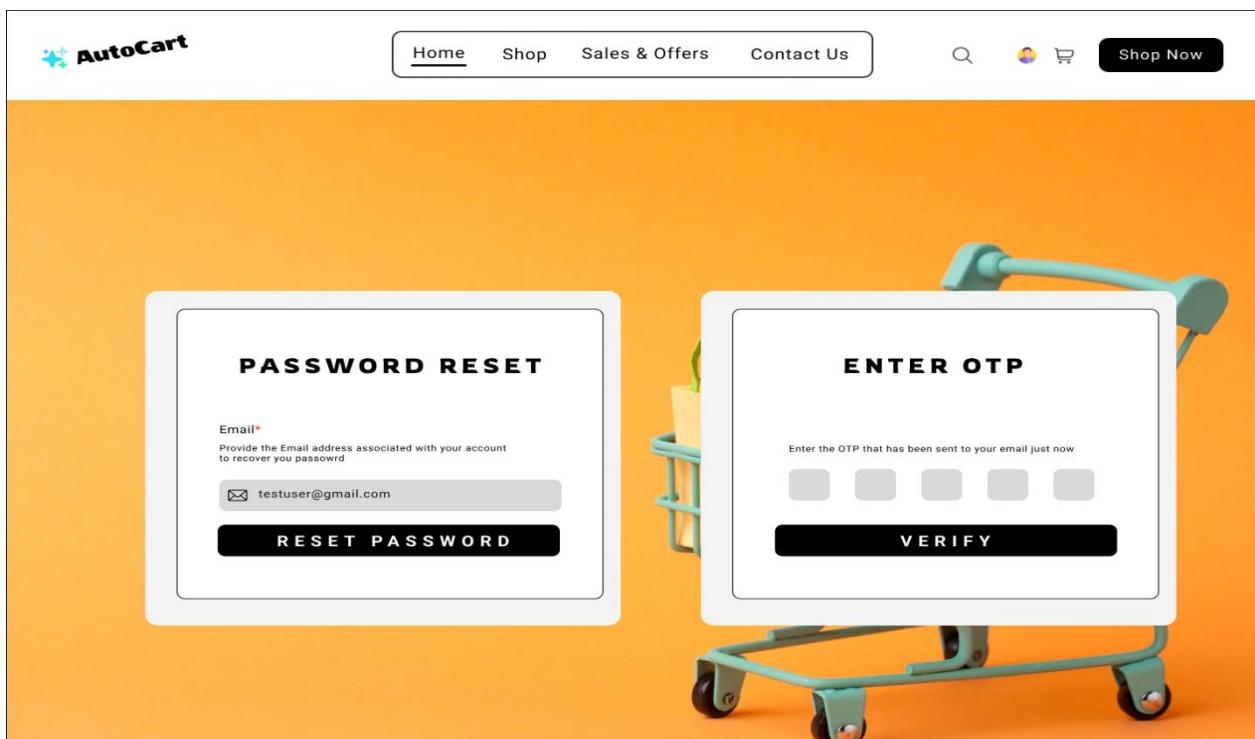
Verify login with valid username and password



Verify login fails with invalid credentials



Verify user registration with valid input data



Verify password reset via email OTP

The screenshot shows the AutoCart dashboard with a navigation bar at the top. The main content area displays a summary of a purchase, including a breakdown of product total, discount, and total amount.

Product total	BDT 500
Discount	BDT 50
Total	BDT 450

A note below states: "Bundle recommendation is based on your previous purchases". A small icon indicates that products are suggested based on individual preferences and past interactions.

REFRESH SUGGESTIONS

PLACE ORDER

Verify smart bundle recommendation based on purchase history

The screenshot shows the AutoCart shopping cart page. The cart contains two items: a Denim Jacket and Denim Pants. The right side of the screen displays the checkout process, including shipping address, payment method, and order summary.

Order Items (2)

	Denim Jacket Qty: 1 Color: Cold Black Size: Medium		Denim Pant Qty: 2 Color: Matte Blue Size: 34
--	---	--	---

Proceed To Checkout

Checkout

Shipping Address:
Rafiq 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
Total	BDT 0
Delivery fee	BDT 120
Total	BDT 6,320

ORDER

Verify adding product to cart and proceeding to checkout

AutoCart

Home Shop Sales & Offers Contact Us

Shop Now

Dashboard > Subscription Management

SUBSCRIPTION ID: SUB1234

Body Wash
Large
BDT. 1250

Refill Plan: Every 30 days (Auto)

ACTIVE

PAUSE/RESUME

Based on your usage, your next refill is expected by: July 1, 2025

Your refill date is calculated using your usage frequency and product quantity. You can adjust this anytime

CANCEL SUBSCRIPTION

Nivea Men Facewash
Large
BDT. 450

Refill Plan: Every 30 days (Auto)

DEACTIVE

PAUSE/RESUME

Based on your usage, your next refill is expected by: July 1, 2025

Your refill date is calculated using your usage frequency and product quantity. You can adjust this anytime

CANCEL SUBSCRIPTION

Verify subscription pause and resume functionality

AutoCart

Home Shop Sales & Offers Contact Us

Shop Now

Dashboard > Subscription Management

Cadia Free & Clear Liquid Dish Soap
740 ml
Refill Plan: Every 30 days (Auto)
★★★★★
BDT. 1500

Currently unavailable

ADD TO CART

Daily Fresh Deodorant
Bold Verso Chronograph, 44mm
Refill Plan: Every 30 days (Auto)
★★★★★
BDT. 25000

ADD TO CART

Verify real-time stock alert when product is unavailable

The screenshot shows a successful payment confirmation on the AutoCart website. The top navigation bar includes links for Home, Shop, Sales & Offers, Contact Us, a search icon, a notification bell with 7 notifications, a user profile, and a shopping cart. Below the navigation is a breadcrumb trail: Order summary → cart → Shipping → Payment.

Order summary:

- Dove Shampoo (Good Quality) BDT 650.00
- Dish Soap (Good Quality) BDT 180.00

Payment Info:

Credit Card

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

Payment successful: A large green circle with a white checkmark, followed by the text "Payment successful".

Verify successful order placement with valid payment details

The screenshot shows a failed payment attempt on the AutoCart website. The top navigation bar and breadcrumb trail are identical to the previous screenshot.

Payment method:

A saved card from N Bank is displayed, showing the card number 1234 5678 9876 5432, name AL HOLDER, and expiration date 01/25. The card is a Mastercard.

Order summary:

- Face Cream (Good Quality) BDT 750.00

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

ORDER

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

Verify successful order placement with valid payment details

AutoCart

Home Shop Sales & Offers Contact Us

Shop Now

Dashboard > Subscription Management



Daily Fresh Deodorant
Bold Verso Chronograph, 44mm

Refill Plan: Every 30 days (Auto)

★★★★★

BDT. 200

How often do you use this product?
 Every day
 Every 3 days
 Weekly

Quantity used per use:

Based on your usage, your next refill is expected by: July 14, 2025

ⓘ Your refill date is calculated using your usage frequency and product quantity. You can adjust this anytime

UPDATE REFILL PLAN



Soap Bar
Good quality soap Bar

Refill Plan: Every 30 days (Auto)

★★★★★

BDT. 150

How often do you use this product?
 Every day
 Every 3 days
 Weekly

Quantity used per use:

Based on your usage, your next refill is expected by: July 14, 2025

ⓘ Your refill date is calculated using your usage frequency and product quantity. You can adjust this anytime

UPDATE REFILL PLAN

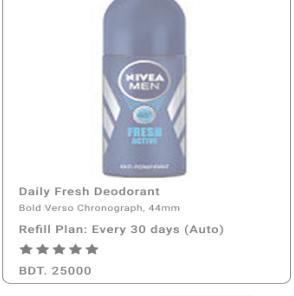
Verify refill schedule adjustment based on user consumption input

AutoCart

Home Shop Sales & Offers Contact Us

Shop Now

Dashboard > Subscription Management



Daily Fresh Deodorant
Bold Verso Chronograph, 44mm

Refill Plan: Every 30 days (Auto)

★★★★★

BDT. 25000

How often do you use this product?
 Every day
 Every 3 days
 Weekly

Quantity used per use:

Based on your usage, your next refill is expected by: July 14, 2025

ⓘ Your refill date is calculated using your usage frequency and product quantity. You can adjust this anytime

UPDATE REFILL PLAN

Notificatoinos Mark all as read

All 7 Archived

Refill Alert
Predicted by AutoCart AI
 You may run out of "Daily Fresh Deodorant" by July 15, 2025.

View Usage Timeline **Refill Now** **Pause Subscription**

Remind me latter

Bundle Suggestion
 Based on your refill cycle, consider bundling with Mint Shampoo
Bundle & Save 10%

Refill Alert
Predicted by AutoCart AI
 You may run out of "Daily Fresh Deodorant" by July 15, 2025.

View Usage Timeline **Refill Now** **Pause Subscription**

Remind me latter

Bundle Suggestion
 Based on your refill cycle, consider bundling

Verify accurate refill reminder notification based on predicted usage cycle

Payment method

Use saved card: **N Bank**

Name on card: Enter your Name

Card number: 123-456-789-

Expiry date: MM / YY CCV

VISA

Order summary

	Deodorant Good Quality Deodorant	x 2 +
	Soap Bar A1 Quality Soap Bar	x 1 +
	Body Spray Angled Mechanical	x 1 +

Product total BDT 1000
Discount BDT 0
Delivery fee BDT 100
Total **BDT 1100**

O R D E R

Verify secure checkout process with encrypted payment data

Dashboard > Monthly Order Summary

Welcome, Towsif! **Summary of June, 2025**

Monthly Order Summary

Total Orders	4
Total Spent	BDT 1800
Bundles Purchased	2
Refills Processed	3

Order Breakdown List - June 2025

01 June – Auto Refill: Deodorant x2	BDT 400
10 June – Manual Order: Soap Bar x1	BDT 200
15 June – Smart Bundle: Deo + Soap + Wipes	BDT 900
25 June – Auto Refill: Toothpaste x1	BDT 300

Usage Insights Chart

Download Monthly Invoice PDF

Manage Subscription

View Previous Summaries

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	2 weeks
Total Estimated Time	5 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.

5. 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 (optional for dynamic content)
- **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

6. 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.

7. TESTING APPROACH

7.1 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.

7.2 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

Visual Studio Code with Jest & React Testing Library

- **Purpose:** Unit and component testing for frontend features such as product cards, subscription flows, and dynamic refill alerts.
- **Usage:** Validate UI logic, interaction states, and conditional rendering in the Next.js-based frontend.
-
- **Postman**
 - **Purpose:** API testing for endpoints including smart refill triggers, cart operations, and user subscription management.
 - **Usage:** Validate request/response payloads, authentication flows, and error handling for backend APIs.

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.

7.3 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.

8. TEST CASES/TEST ITEMS

Project Name: AutoCart: Intelligent E-Commerce with Predictive Auto-Refill & Smart Bundling	Test Designed by: FARJANA YESMIN OPI							
Test Case ID: TP-AutoCart-2025-001	Test Designed date: 17/06/2025							
Test Priority (Low, Medium, High): Medium	Test Executed by:							
Module Name: Login Session	Test Execution date:							
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: AutoCart: Intelligent E-Commerce with Predictive Auto-Refill & Smart Bundling		Test Designed by: FARJANA YESMIN OPI					
Test Case ID: TP-AutoCart-2025-002		Test Designed date: 17/06/2025					
Test Priority (Low, Medium, High): High		Test Executed by:					
Module Name: Login Session		Test Execution date:					
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: AutoCart: Intelligent E-Commerce with Predictive Auto-Refill & Smart Bundling		Test Designed by: FARJANA YESMIN OPI					
Test Case ID: TP-AutoCart-2025-003		Test Designed date: 17/06/2025					
Test Priority (Low, Medium, High): High		Test Executed by:					
Module Name: User Registration		Test Execution date:					
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: AutoCart: Intelligent E-Commerce with Predictive Auto-Refill & Smart Bundling	Test Designed by: FARJANA YESMIN OPI			
Test Case ID: TP-AutoCart-2025-004	Test Designed date: 17/06/2025			
Test Priority (Low, Medium, High): High	Test Executed by:			
Module Name: Password Recovery	Test Execution date:			
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: AutoCart: Intelligent E-Commerce with Predictive Auto-Refill & Smart Bundling		Test Designed by: FARJANA YESMIN OPI					
Test Case ID: TP-AutoCart-2025-005		Test Designed date: 17/06/2025					
Test Priority (Low, Medium, High): High		Test Executed by:					
Module Name: Predictive Auto-Refill		Test Execution date:					
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: AutoCart: Intelligent E-Commerce with Predictive Auto-Refill & Smart Bundling		Test Designed by: A. F. M. RAFIUL HASSAN					
Test Case ID: TP-AutoCart-2025-006		Test Designed date: 17/06/2025					
Test Priority (Low, Medium, High): Medium		Test Executed by:					
Module Name: Smart Bundle Recommendation		Test Execution date:					
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)			
<ol style="list-style-type: none"> 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: AutoCart: Intelligent E-Commerce with Predictive Auto-Refill & Smart Bundling		Test Designed by: A. F. M. RAFIUL HASSAN					
Test Case ID: TP-AutoCart-2025-07		Test Designed date: 17/06/2025					
Test Priority (Low, Medium, High): High		Test Executed by:					
Module Name: Shopping Cart & Checkout		Test Execution date:					
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)			
<ol style="list-style-type: none"> 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: AutoCart: Intelligent E-Commerce with Predictive Auto-Refill & Smart Bundling		Test Designed by: A. F. M. RAFIUL HASSAN					
Test Case ID: TP-AutoCart-2025-008		Test Designed date: 17/06/2025					
Test Priority (Low, Medium, High): Medium		Test Executed by:					
Module Name: Subscription Management		Test Execution date:					
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)			
<ol style="list-style-type: none"> 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.	As expected	Pass			
Post Condition: Subscription remains active with next refill scheduled.							

Project Name: AutoCart: Intelligent E-Commerce with Predictive Auto-Refill & Smart Bundling		Test Designed by: MD. SHOHANUR RAHMAN SHOHAN					
Test Case ID: TP-AutoCart-2025-009		Test Designed date: 17/06/2025					
Test Priority (Low, Medium, High): High		Test Executed by:					
Module Name: Inventory Management / Stock Alert		Test Execution date:					
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)			
<ol style="list-style-type: none"> 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: TP-AutoCart-2025-010		Test Designed date: 17/06/2025		
Test Priority (Low, Medium, High): High		Test Executed by:		
Module Name: Checkout & Payment		Test Execution date:		
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)
<ol style="list-style-type: none"> 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. 	<p>Username: user1 Password: 321</p> <p>Product: Shampoo (₹650), Dish Soap (₹180)</p> <p>Cart Items Total: ₹830</p> <p>Cart Items Total: ₹830</p> <p>Method: Credit Card (SSLCommerz), Card No: 1234-XXXX-XXXX-5678</p> <p>Email: user1@gmail.com</p>	<p>Order summary is displayed from payment form accepts data and confirmation message appears, order saved, and order receipt received.</p>	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: AutoCart: Intelligent E-Commerce with Predictive Auto-Refill & Smart Bundling		Test Designed by: MD. SHOHANUR RAHMAN SHOHAN					
Test Case ID: TP-AutoCart-2025-011		Test Designed date: 17/06/2025					
Test Priority (Low, Medium, High): High		Test Executed by:					
Module Name: Checkout & Payment		Test Execution date:					
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)			
<ol style="list-style-type: none"> 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	As expected	Pass			
Post Condition: Order is not processed. User is prompted to update payment method. Error message is displayed and logged in system.							

Project Name: AutoCart: Intelligent E-Commerce with Predictive Auto-Refill & Smart Bundling	Test Designed by: MD. ABU TOWSIF			
Test Case ID: TP-AutoCart-2025-012	Test Designed date: 12/06/2025			
Test Priority (Low, Medium, High): High	Test Executed by:			
Module Name: Refill Prediction Engine	Test Execution date:			
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: TP-AutoCart-2025-013			Test Designed date: 12/06/2025			
Test Priority (Low, Medium, High): High			Test Executed by:			
Module Name: Smart Notification System			Test Execution date:			
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: AutoCart: Intelligent E-Commerce with Predictive Auto-Refill & Smart Bundling		Test Designed by: MD. ABU TOWSIF					
Test Case ID: TP-AutoCart-2025-014		Test Designed date: 12/06/2025					
Test Priority (Low, Medium, High): High		Test Executed by:					
Module Name: Checkout & Payment Security Module		Test Execution date:					
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)			
<ol style="list-style-type: none"> Log into the AutoCart account Add one or more items to the cart Proceed to the checkout page Enter valid payment information (e.g., card/mobile banking) Complete the payment process Monitor network activity and inspect security headers (optional for developer validation) 	<p>Product: Protein Powder Price: 1,200 BDT Payment Method: SSLCommerz (Credit Card)</p> <p>Product: Shampoo Price: 650 BDT Payment Method: Mobile Banking (bKash/Nagad)</p>	<p>Payment should be completed successfully using HTTPS, and payment data should be transmitted securely using encryption.</p>	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: AutoCart: Intelligent E-Commerce with Predictive Auto-Refill & Smart Bundling		Test Designed by: MD. ABU TOWSIF					
Test Case ID: TP-AutoCart-2025-015		Test Designed date: 12/06/2025					
Test Priority (Low, Medium, High): High		Test Executed by:					
Module Name: Order Summary Dashboard		Test Execution date:					
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)			
<ol style="list-style-type: none"> 1. Log into the AutoCart account 2. Navigate to the “Dashboard” or “My Orders” section 3. Filter orders by the current month (e.g., June 2025) 4. View the monthly summary (including product names, prices, total amount, and delivery status) 5. Compare with actual order history data 	Order 1: Toothpaste, Qty: 2, Price: 200 BDT Order 2: Body Lotion, Qty: 1, Price: 400 BDT	The dashboard should accurately display all orders placed in the selected month, with correct total amount, item list, and delivery statuses..	As expected	Pass			
Post Condition: Monthly order data remains visible in the dashboard for user reference, and can be exported or used for analytics.							

9. 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 **XX** test cases executed for the AutoCart project, **YY** test cases have passed, while **ZZ** encountered issues. This results in a pass rate of approximately **AA%** and a fail rate of **BB%**. 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.

10. 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.

11. 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.

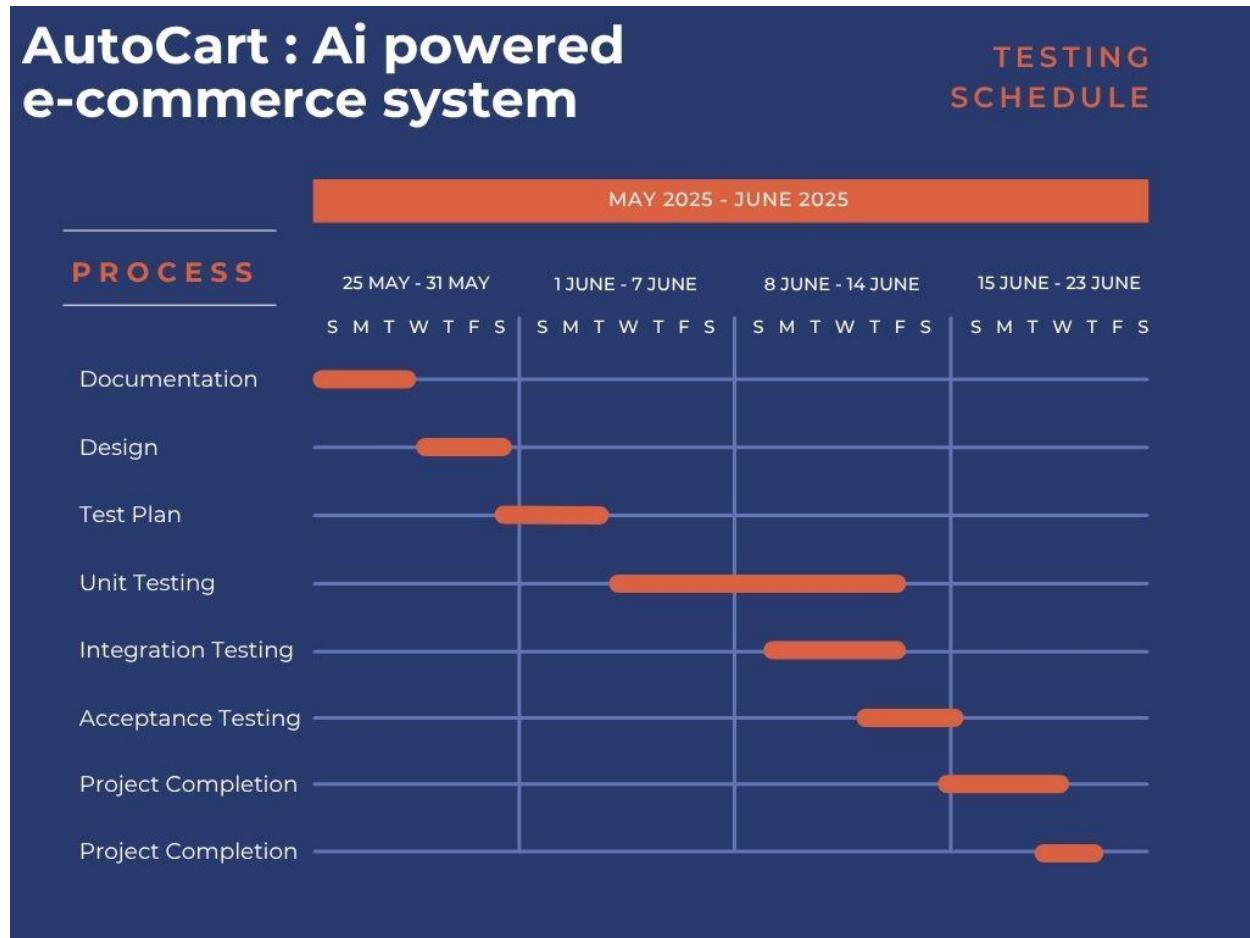
- **Operations Staff:** Training on monitoring AI model outputs, managing subscription adjustments, and handling customer service workflows.
- **Support and Sales Teams:** Training to assist users with subscription management, auto-refill settings, and troubleshooting common issues.
- **Security Team:** Training on implementing and monitoring multi-factor authentication, data privacy regulations, and secure transaction processing.

12. 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	

13. 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.



(To be Updated)

14. 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.

Project Sponsor - Steve Sponsor	
Development Management - Ron Manager	
EDI Project Manager - Peggy Project	
RS Test Manager - Dale Tester	
RS Development Team Manager - Dale Tester	
Reassigned Sales - Cathy Sales	
Order Entry EDI Team Manager - Julie Order	

15. APPROVALS

(To be updated)