Black Box Testing

Table Of Contents

1. Introduction

This document provides a comprehensive overview of the Black-Box Testing approach used to validate the NextChapter Book Platform. The platform comprises multiple core features, including user authentication, book discovery, AI-powered recommendations, reading modes (online/offline), administrative tools, community reviews, and subscription management.

Note: All input conditions, equivalence partitions, and boundary values have been derived based on ideal functional requirements and industry-standard testing practices. Some conditions may not fully match the behavior of the current deployed system.

The complete set of test cases is provided in the accompanying Excel file: 🟩 BlackBox_TestCases

2. Test Design Techniques Used

- **Equivalence Class Partitioning (ECP)**
- **Boundary Value Analysis (BVA)**
- **Cause–Effect Graphing (CEG)**
- **State Transition Testing**
- **Scenario-Based Testing**
- **Error Guessing**

3. Full Module-vise Input Conditions

3.1 Authentication Module

Input Condition	Description
Email	Valid/Invalid email formats
Password	Length, special chars, complexity rules
Confirm password	Match/mismatch scenarios
Username	Unique / duplicate
OAuth provider	Google, Apple
OAuth token	Valid, expired, malformed
Device ID	New vs recognized
Session token	Valid, tampered, expired
Remember Me	Enabled/Disabled states
Reset token	Valid, used, expired, tampered
Login attempt counter	Rate limiting, lockout threshold

3.2 Profile Management Module

Input Condition	Description
Full name	String length, Unicode support
Username	Unique, allowed characters

Bio	Max length, HTML/JS injection
Profile image	Format, size limit, corrupt file
Old password	Valid/invalid
New password	Strength rules, inequality to old password
Preferred genres	Multi-select, empty state
Preferred authors	Multi-select
Active sessions	Valid, expired, forced logout

3.3 Search & Catalogue Module

Input Condition	Description
Search query	Empty, alphanumeric, special chars
Genre filter	Valid/invalid genre ID
Author filter	Valid/invalid author ID
Publisher filter	Valid/invalid publisher ID
Price range	Negative, zero, max > min
Publication year	Range checks
Language	Supported/unsupported
Sort options	Rating, views, newest
Rating filter	1–5
Availability filter	In-stock/out-of-stock
Pagination	Page number, size, boundary limits

3.4 Reader Module (EPUB / PDF / Audio)

Input Condition	Description
Book ID	Valid/invalid, locked content
Chapter/Page number	Range validation
Scroll position	Negative, max boundary
Bookmark ID	Valid, corrupted, missing

Note text	Size limit, HTML/script
Highlight text	Unicode, long selections
Highlight color	Allowed values only
Font size	Min/max boundary
Theme	Light/dark/system
Audio toggle	Switch states
Playback speed	0.5x–3x boundary values
Audio timestamp	Invalid ranges
Last page flag	Trigger auto-complete logic

3.5 Wishlist & Reading Status Module

Input Condition	Description
Book ID	Valid/invalid
Status	Wishlist / Reading / Completed
Date started/finished	Format, future date error
Progress %	0–100 BVA
Sync timestamp	Conflicts, outdated data

3.6 Review, Rating & Discussion Module

Input Condition	Description
Rating	1–5 boundaries
Review text	Empty, max length, profanity
Review ID	Valid, deleted, restored
Comment/Reply text	Empty, long text
Report reason	Valid/invalid enum
Upvote	Multiple votes, unauthorized
Thread ID	Valid/invalid

3.7 AI Features Module

Feature	Input Conditions
Smart Suggestions	Reading history, behavior patterns
Summary Generation	Book ID, spoiler preference
Scene Generation	Highlight text, art style selection
Genre Visualization	Date filter, user dataset size
Adaptive Recommendations	Skip/Accept feedback

3.8 Subscription & Payment Module

Input Condition	Description
Plan ID	Valid/invalid
Duration	Monthly/yearly/trial
Card details	Number/expiry/CVV
UPI ID	Valid/invalid
Payment token	Gateway-authenticated
Transaction ID	Unique/duplicate
Payment status	Pending/Failed/Success
Auto-renew toggle	On/Off
Trial dates	Expired, active, future dates

3.9 Offline Reading Module

Input Condition	Description
Cached book ID	Missing/expired
Cached pages	Corrupted data
Offline flag	Forced offline mode
Local storage	Capacity issues
Cache expiry	Boundary checks

3.10 Admin Panel Module

Input Condition	Description
Book metadata	Title, price, genre, invalid formats
Files	Large/invalid EPUB/PDF
Bulk CSV/Excel	Missing columns, invalid rows
Moderation input	Review ID, reasons
Analytics	Date range, export format
Notification content	Missing message, invalid link

3.11 Notifications & Alerts

Input Condition	Description
Type	Release/suggestion/system
Target audience	All users / segmented
Scheduled time	Past/future
Delivery mode	Email/in-app
Link	Valid book/page ID

3.12 UI Customization

Input Condition	Description
Theme	Light/Dark/System
Font size	Min/max
Font style	Supported styles
Language	i18n support
Animation toggle	On/Off

4. Scope of Black Box Testing

Focuses exclusively on validating the functional behavior of the NextChapter Platform using Black Box / Specification-Based Testing techniques such as ECP, BVA, State Transition, CEG, Scenario Testing, and Error Guessing.

4.1 In-Scope Functional Areas

The following end-user and admin-facing modules are included:

1. Authentication & User Management

- Registration
- Login & Social Login
- Password reset
- Secure sign-out
- Remember Me
- Device-based login notifications

2. Catalogue & Search

- Genre browsing
- Trending, new releases
- Basic + advanced search
- Filters/sorting/pagination

3. Reading & Library

- Reading EPUB/PDF
- Audio mode
- Bookmarks, notes, highlights
- Continue reading
- Sync across devices
- Offline reading

4. Community & Social Interaction

- Ratings
- Reviews
- Discussions
- Upvotes
- Reporting content

5. Payments & Subscription

- Trial plans
- Subscription purchase
- Payment processing
- Order history

6. AI & Personalization

- Smart suggestions

- AI summary generation
- AI scene generation
- Personalized alerts
- Reading pattern-based dashboards

7. Admin Functions

- Book/author/publisher management
- Review moderation
- Analytics
- Notifications
- Bulk uploads

5. Equivalence Class Partitioning (ECP)

5.1 Email Input (Authentication)

Class ID	Class Type	Partition Description
E1	Valid	Proper email format: **local@domain.com**
E2	Invalid	Missing "@" symbol
E3	Invalid	Missing domain (abc@)
E4	Invalid	Invalid characters (spaces, ###, ..@)
E5	Invalid	Continuous dots (a..b@gmail.com)
E6	Invalid	Trailing dot (abc.@gmail.com)
E7	Invalid	Blank input
E8	Invalid	Unicode-only or emoji-only (🚀@gmail.com)

5.2 Password Input

Class ID	Type	Partition
P1	Valid	8–12 characters, contains uppercase + lowercase + number + special symbol
P2	Invalid	<8 characters
P3	Invalid	>12 characters
P4	Invalid	No special characters

P5	Invalid	No uppercase
P6	Invalid	No lowercase
P7	Invalid	No numeric digit
P8	Invalid	Blank input

5.3 Username

ID	Type	Description
U1	Valid	3–20 chars, alphanumeric + underscore
U2	Invalid	<3 chars
U3	Invalid	>20 chars
U4	Invalid	Contains spaces or symbols (@ # $)
U5	Invalid	Duplicate username
U6	Invalid	Only numbers if not allowed
U7	Invalid	Blank input

5.4 Search Query

ID	Type	Description
S1	Valid	1–50 chars
S2	Invalid	Blank query
S3	Invalid	>50 chars
S4	Invalid	Symbols-only query ###@@
S5	Invalid	SQL-like patterns (e.g., SELECT*)
S6	Invalid	Emoji-only query

5.5 Rating Input (1–5 stars)

ID	Type	Description
R1	Valid	Integer values 1–5
R2	Invalid	0

R3	Invalid	>5
R4	Invalid	Decimal values (3.5)
R5	Invalid	Alphabets ("A")
R6	Invalid	Negative numbers

5.6 Review Text

ID	Type	Description
T1	Valid	1–500 characters
T2	Invalid	Empty
T3	Invalid	>500 characters
T4	Invalid	Offensive/profanity (if filtered)
T5	Invalid	HTML/JS injection (<script>)
T6	Invalid	Symbol-only text

5.7 Bookmark / Note Text

ID	Type	Description
B1	Valid	1–300 characters
B2	Invalid	Blank
B3	Invalid	>300 characters
B4	Invalid	HTML/script injection
B5	Invalid	Emoji-only text (if restricted)

5.8 Highlight Selection

ID	Type	Description
H1	Valid	Non-empty text selected
H2	Invalid	No selection
H3	Invalid	Zero-width/empty selection
H4	Invalid	Selection across invalid ranges (e.g., page boundary errors)

5.9 AI Summary Request

ID	Type	Description
AS1	Valid	Approved book ID + user request
AS2	Invalid	Book not approved
AS3	Invalid	Missing book ID
AS4	Invalid	Book ID not found
AS5	Invalid	User repeatedly requesting summary (rate-limit)

5.10 AI Scene Generation

ID	Type	Description
SC1	Valid	Highlight text + supported style
SC2	Invalid	Empty text
SC3	Invalid	Unsupported style type
SC4	Invalid	Extremely long text selection
SC5	Invalid	Missing style input

5.11 Payments

- **Card Number**

ID	Type	Description
C1	Valid	16-digit numeric
C2	Invalid	<16 digits
C3	Invalid	>16 digits
C4	Invalid	Non-numeric characters
C5	Invalid	All same digit (1111111111111111 if blocked by gateway)

- **CVV**

ID	Type	Description
CV1	Valid	3 numeric digits

CV2	Invalid	Non-numeric
CV3	Invalid	<3 digits or >3 digits

- Payment Status

ID	Type	Description
PS1	Valid	Pending
PS2	Valid	Failed
PS3	Valid	Success
PS4	Invalid	Any other string (e.g., "Unknown", "Null", "Process")

5.12 File Upload (Admin)

ID	Type	Description
F1	Valid	JPG/PNG under size limit
F2	Valid	EPUB/PDF valid format
F3	Invalid	Unsupported formats (exe, txt, rar)
F4	Invalid	File size > 5MB
F5	Invalid	Corrupt file
F6	Invalid	Missing required metadata in CSV
F7	Invalid	CSV with wrong column order

5.13 Genre / Filter Inputs

ID	Type	Description
G1	Valid	Genre exists in DB
G2	Invalid	Genre does not exist
G3	Invalid	Blank selection
G4	Invalid	Multiple invalid genre IDs

5.14 Book Status Updates

ID	Type	Description

ST1   Valid   Wishlist → Reading → Completed

ST2   Invalid   Completed → Wishlist

ST3   Invalid   Missing book ID

ST4   Invalid   Status outside enum

ST5   Invalid   Duplicate transition (Reading → Reading)

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6. Boundary Value Analysis

BVA is applied to all inputs that involve numeric ranges, length constraints, list boundaries, and navigation limits.
 Each table now includes:

- Lower boundary
- Just below lower boundary
- Just above upper boundary
- Upper boundary
- Extended edge cases
- Invalid boundary-type inputs

6.1 Password Length (8–12 characters)

Condition	Boundary Value	Expected Result
Just below minimum	7 chars	Invalid
Minimum valid	8 chars	Valid
Nominal mid-value	10 chars	Valid
Maximum valid	12 chars	Valid
Just above maximum	13 chars	Invalid
Empty input	0 chars	Invalid

6.2 Review Text Length (1–500 characters)

Condition	Boundary Value	Expected Result
Below minimum	0 chars	Invalid

Minimum valid	1 char	Valid
Nominal	250 chars	Valid
Maximum valid	500 chars	Valid
Above maximum	501 chars	Invalid
Only whitespace text	" "	*Invalid (if trimming enabled)*

6.3 Rating Input (1–5)

Condition	Boundary Value	Expected Result
Below minimum	0	Invalid
Minimum valid	1	Valid
Mid value	3	Valid
Maximum valid	5	Valid
Above maximum	6	Invalid
Decimal	3.5	Invalid
Special characters	"@"	Invalid

6.4 Search Query Length (1–50 characters)

Condition	Boundary Value	Expected
Below minimum	0 chars	Invalid
Minimum valid	1 char	Valid
Maximum valid	50 chars	Valid
Above maximum	51 chars	Invalid
Symbol-only input	"###"	Invalid
Emoji-only input	"🔥🔥"	*May be invalid based on rules*

6.5 File Size (Admin Uploads, max = 5 MB)

Condition	Boundary Value	Expected
Minimum	0 MB	Invalid (empty file)

Just below limit	4.9 MB	Valid
Maximum allowed	5.0 MB	Valid
Just above limit	5.1 MB	Invalid
Negative size	-1 MB	Invalid (corrupt)

6.6 Username Length (3–20 characters)

Condition	Boundary Value	Expected
Below minimum	2 chars	Invalid
Minimum valid	3 chars	Valid
Mid value	10 chars	Valid
Maximum valid	20 chars	Valid
Above maximum	21 chars	Invalid
Blank	""	Invalid

6.7 Note / Bookmark Text Length (1–300 characters)

Condition	Boundary Value	Expected
Empty text	0 chars	Invalid
Minimum valid	1 char	Valid
Maximum valid	300 chars	Valid
Above maximum	301 chars	Invalid
Emoji-only	"🔥🔥🔥"	*Invalid if restricted*
HTML/script injection	<script>	Invalid

6.8 Payment Inputs – Card & CVV

- **Card Number (16 digits)**

Condition	Boundary Value	Expected
Below valid	15 digits	Invalid
Valid	16 digits	Valid

Above valid	17 digits	Invalid
All same digits	1111111111111111	*May be declined by payment gateway*
Alphanumeric	"1234abcd5678…"	Invalid

- CVV (3 digits)

Condition	Boundary	Expected
Below valid	2 digits	Invalid
Valid	3 digits	Valid
Above valid	4 digits	Invalid
Non-numeric	"A1B"	Invalid

6.9 Chapter / Page Navigation
(Book has pages from 1 to N)

Condition	Boundary	Expected
Below range	Page 0	Invalid
First valid page	Page 1	Valid
Mid page	Page N/2	Valid
Last valid page	Page N	Valid
Above range	Page N+1	Invalid
Negative	Page -1	Invalid

Also consider:
- Page number as string "five" → Invalid
- Page number with leading zeros "001" → Valid/Invalid based on system

6.10 Pagination (Page Number for Queries)
(Pagination starts from Page 1)

Condition	Boundary	Expected
Below minimum	Page 0	Invalid
Minimum valid	Page 1	Valid
Mid value	Page K/2	Valid

Maximum available	Page K	Valid
Above max	Page K+1	Invalid
Negative	Page -1	Invalid

Also added:
- Non-numeric input: "abc" → Invalid

- Float pages: 1.5 → Invalid

6.11 Subscription Trial Duration (30 Days)

Condition	Boundary Value	Expected
Below minimum	Day -1	Invalid
Minimum valid trial start	Day 0	Valid
Trial end	Day 30	Valid
Just above limit	Day 31	Trial expired
Date > today	Future date	Invalid

6.12 Highlight Text Length (0–5000 characters)

Condition	Boundary	Expected
No text	0 chars	Invalid
Small highlight	1 char	Valid
Large valid	5000 chars	Valid
Above maximum	5001 chars	Invalid
Cross-page selection	Boundary crossing	Possibly invalid

6.13 Wishlist/Reading Status Transitions

Condition	Boundary	Expected
Initial state	Wishlist	Valid
Mid state	Reading	Valid
Final state	Completed	Valid
Loop back	Completed → Reading	Invalid

Missing state   Null/Empty   Invalid

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7. Cause–Effect Graphing (CEG)

Each Cause–Effect relationship is now formatted according to ISTQB standards:
- **Causes (C):** Input conditions or triggers
- **Effects (E):** Outputs, system behaviors, or state changes
- Includes multiple causes → single effecs
- Includes conditional effect
- Includes constraints & exceptions
- More complete coverage of critical flows

7.1 CEG – Authentication Module

Cause → Effect Mapping

Cause (C)	Effect (E)
C1: Invalid password entered	**E1:** Authentication fails + error "Invalid Credentials"
C2: 5 consecutive failed attempts	**E2:** Account locked for X minutes
C3: Login from new device	**E3:** Security notification sent to registered email
C4: Expired session token	**E4:** Forced logout + re-authentication required
C5: OAuth token invalid	**E5:** Social login fails with provider-specific error

Combined Rules
- If **C1 + C2 occur**, → Lockout (E2) overrides E1

- If **C3** occurs AND login succeeds → E3

7.2 CEG – Payments Module

Cause (C)	Effect (E)
C6: Incorrect CVV or expired card	**E6:** Payment = FAILED
C7: Gateway timeout	**E7:** Payment = PENDING + retry prompt
C8: Payment success at gateway	**E8:** Subscription = ACTIVE
C9: Subscription renews automatically	**E9:** Auto-renew receipt sent
C10: Trial period expires	**E10:** Prompt renew/upgrade (if auto-renew off)

Rules
- If **C6 OR C7** → E6 or E7

- If **C8 AND plan valid** → E8

7.3 CEG – Content Moderation

Cause	Effect
C11: Review contains banned/offensive keywords	**E11:** Auto-flagged by AI moderation
C12: Suspicious login detected	**E12:** Prompt user to check or block device
C13: User reports a comment	**E13:** Comment status → UNDER MODERATION
C14: Admin restores content	**E14:** Comment/Review visible again

7.4 CEG – Search & Catalogue

Cause	Effect
C15: Book satisfies trending + new release conditions	**E15:** "Trending New Release" badge displayed
C16: Multiple filters applied	**E16:** Dynamic filtered results
C17: No match found for query/filter	**E17:** "No Results Found" UI shown
C18: Invalid filter value used	**E18:** Error or fallback to default filter

7.5 CEG – Reader Module & Sync

Cause	Effect
C19: User reaches last page	**E19:** Book status auto-marked COMPLETED
C20: User adds bookmark/highlight	**E20:** Bookmark synced across devices
C21: Device goes offline	**E21:** Offline mode → cached books accessible
C22: Sync conflict (two devices)	**E22:** Most recent timestamp overrides

7.6 CEG – AI Modules
AI Smart Suggestions

Cause	Effect
C23: User reads many books in a genre	**E23:** More recommendations in same genre
C24: User marks "Not Interested"	**E24:** Similar recos removed/suppressed

AI Summary

Cause	Effect
C25: Book not approved	**E25:** Summary request blocked
C26: User requests summary	**E26:** AI generates summary

AI Scene Generation

Cause	Effect
C27: Valid highlight + supported style	**E27:** Scene image generated
C28: Invalid/empty selection	**E28:** Error shown

8. State Transition Testing

State Transition Testing validates that the system behaves correctly as it moves between states based on user actions, system triggers, timeouts, payment responses, AI processing, and back-end validations.

This section describes core state machines across the NextChapter ecosystem, including reading, authentication, subscription, device security, community, payments, offline mode, and AI operations.

Each module includes:

- **States**
- **Allowed transitions**
- **Triggers**
- **Entry/Exit criteria**
- **Invalid transitions**
- **Notes for testers**

8.1 Reading Module – Book Reading States

1. States

State	Meaning
Not Started	Book has never been opened

Reading   User is actively reading

Complet ed   User reached last page/chapter

Reverted   User manually reverts completion

2. Valid Transitions

From → To	Trigger
Not Started → Reading	User opens the book
Reading → Completed	Last page reached
Completed → Reverted	User manually marks as incomplete
Reverted → Reading	User opens the book again

3. Invalid Transitions (must fail)
- Not Started → Completed (cannot complete without reading)
- Completed → Not Started (cannot reset fully)
- Reading → Not Started (cannot undo reading)

4. Tester Notes
- Progress syncing across devices must not allow illegal transitions.
- Offline progress must still validate transitions when synced back online.

8.2 Authentication Module – Login/Session States
1. States
- Logged Out
- Logging In
- Logged In
- Session Expired

2. Valid Transitions

From → To	Trigger
Logged Out → Logging In	User enters credentials
Logging In → Logged In	Credentials valid
Logging In → Logged Out	Invalid credentials

Logged In → Session Expired	Token timeout / inactivity
Session Expired → Logged Out	Token invalid or user action

3. Invalid Transitions
- Logged Out → Logged In (without entering credentials)
- Logging In → Session Expired (cannot expire mid-login)
- Session Expired → Logged In (requires re-login)

4. Tester Notes
- OAuth and email login must follow the same state machine.
- Token manipulation attempts must force **Logged Out** state.

8.3 Subscription Module – Lifecycle States

1. States
- Trial
- Active
- Expired
- Renewed

2. Valid Transitions

From → To	Trigger
Trial → Active	User upgrades or auto-upgrade
Active → Expired	Duration ends or failed renewal
Expired → Renewed	User manually renews / auto-renews
Renewed → Active	Completed billing cycle

3. Invalid Transitions
- Trial → Expired (cannot expire without reaching duration)
- Active → Trial (no downgrade)
- Expired → Trial (impossible)

4. Tester Notes
- Edge case: failed renewal must move from **Active → Expired**.
- Grace period is handled inside **Active** or **Expired** depending on design.

8.4 Device Activity & Security States

States
- New Device
- Verified
- Suspicious
- Blocked

2. Valid Transitions

From → To	Trigger
New Device → Verified	Successful login + OTP (if enabled)
Verified → Suspicious	Detection of anomaly (IP change, location risk)
Suspicious → Blocked	User/admin blocks device
Blocked → Verified	User/admin unblocks

3. Invalid Transitions
- New Device → Blocked (cannot block unknown device)
- Suspicious → New Device (cannot revert)
- Blocked → Suspicious (blocked devices cannot be evaluated)

8.5 Wishlist / Reading Status Module

1. States
- Wishlist
- Currently Reading
- Completed

2. Valid Transitions
Wishlist → Currently Reading
Currently Reading → Completed
Completed → Currently Reading (resume)
Currently Reading → Wishlist (remove)

3. Invalid Transitions
- Completed → Wishlist (wrong backward flow)
- Wishlist → Completed (skipping reading)

4. Tester Notes
- Sync conflicts across devices must not violate transitions.

8.6 Review & Moderation States

1. States
- Posted
- Edited

- Flagged
- Under Moderation
- Removed

2. Valid Transitions

From → To	Trigger
Posted → Edited	User updates review
Posted → Flagged	AI detects violation or user reports
Flagged → Under Moderation	Admin reviews flagged item
Under Moderation → Removed	Admin removes
Under Moderation → Posted	Admin restores

3. Invalid Transitions
- Removed → Posted (cannot restore after deletion unless "soft delete")
- Under Moderation → Edited (cannot allow edit during review)

4. Tester Notes
- If multiple users flag simultaneously → still 1 transition.

8.7 Payment & Transaction States
1. States
- Initiated
- Pending
- Successful
- Failed
- Refunded

2. Valid Transitions
Initiated → Pending
Pending → Successful
Pending → Failed
Successful → Refunded

3. Invalid Transitions
- Failed → Successful (cannot reverse)
- Refunded → Successful
- Successful → Pending

4. Tester Notes
- SDK failure must result in Pending → Failed or Initiated → Failed.

- Multiple retries → unique states maintained.

8.8 Offline Reading Cache States

1. States
- Not Cached
- Caching
- Cached
- Expired

2. Allowed Transitions
Not Cached → Caching
Caching → Cached
Cached → Expired
Expired → Caching (manual refresh)

3. Invalid
- Cached → Not Cached (content cannot "vanish")

8.9 AI Summary & Scene Generation

1. AI Summary States
- Allowed
- Requested
- Generated
- Blocked

2. Transitions
Allowed → Requested
Requested → Generated
Blocked → Requested → Blocked (error)

1. AI Scene Generation States
- Text Selected
- Processing
- Generated
- Failed

2. Transitions
Text Selected → Processing → Generated
Processing → Failed

8.10 Notifications & Alerts Module

1. States
- Enabled
- Disabled

- Delivered
- Read

2. Valid Transitions

Enabled → Delivered
Delivered → Read
Enabled → Disabled

3. Invalid Transitions

- Read → Delivered
- Disabled → Delivered (notifications must not send)

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9. Scenario-Based Testing

Scenario-Based Testing validates **real-world user flows** across multiple modules and features.
Each scenario ensures the system behaves correctly when **multiple user stories interact together**.

Each scenario includes:

- **Scenario Objective**
- **Preconditions**
- **Flow / Steps**
- **Expected Results**
- **Postconditions**

9.1 End-to-End User Journey Scenario

Scenario Objective:

Validate complete user lifecycle from registration → reading → engagement → AI features → personalization.

Preconditions:

- No existing user account.
- Catalogue contains at least one available book.
- AI services operational.

Flow:

1. User completes registration using email/password (US1).
2. User logs in using email or social login (US2/US3).
3. User performs a search using basic or advanced filters (US25, US49).
4. User opens a selected book and starts reading (US14).
5. Reading progress updates automatically as user navigates pages (US15).
6. User adds a bookmark or note (US22).

7. User highlights text and requests an AI-generated scene (US23, US38).
8. User posts a review and rating for the book (US19, US20).
9. User requests AI Summary for the book (US37).
10. AI Smart Suggestions update based on user behavior (US36).

Expected Results:

- All modules transition correctly without errors.
- Reading progress syncs correctly to user profile.
- Bookmarks/notes persist and are retrievable.
- AI scene and summary generated successfull.
- Rating/review visible on book page.
- Home screen suggestions update dynamically.

Postconditions:

- User account created with reading history, reviews, and AI data stored.
- Personalized recommendations updated.

9.2 Admin Workflow Scenario

Objective:

Validate complete admin operations: catalog management + moderation + analytics.

Preconditions:

- Admin account exists.
- Admin has valid role/permissions.
- There are pending flagged items from AI moderation.

Flow:

1. Admin logs into admin portal (US9).
2. Adds a new book to catalog (US10).
3. Adds/updates authors and publishers (US12).
4. Checks flagged reviews/comments using AI moderation panel (US46).
5. Removes or restores inappropriate user-generated content (US11).
6. Opens analytics dashboard and views trends/retention metrics (US13, US34).
7. Sends global notifications to users about updates/new releases (US54).

Expected Results:

- Admin actions update catalogue and moderation logs instantly.
- Restored/removed reviews reflect immediately across user screens.
- Analytics graphs load accurately.

● Global notifications reach all targeted users.

Postconditions:

● Catalog updated.
● Moderation actions logged.
● Notifications stored in system history.

9.3 Payment & Subscription Scenario

Objective:

Validate subscription purchase, payment lifecycle, logging, and renewal prompts.

Preconditions:

● User logged in.
● Payment gateway is reachable.

Flow:

1. User navigates to subscription page (US28).
2. Chooses a plan or a free trial (US50).
3. Initiates payment (US30).
4. Gateway validates card/UPI information and returns status.
5. Upon success, subscription becomes Active (US28).
6. User receives digital receipt (US30).
7. Order appears under "Order History" (US32).
8. Admin views payment log for verification (US31).
9. When plan expires, system prompts renewal or auto-renews (US34).

Expected Results:

● Payment success triggers subscription activation.
● Failed payments do not activate plan and show proper error state.
● Order history shows correct transaction details.
● Admin dashboard reflects correct payment logs.
● Renewal logic triggers correctly at end of duration.

Postconditions:

● Subscription remains Active or Expired depending on payment result.

9.4 Reading Experience Scenario

Objective:

Validate reading across online/offline modes with auto-sync.

Preconditions:

- User logged in.
- Book available for reading and caching.

Flow:

1. User opens a book (US14).
2. Navigates between pages/chapters (US14).
3. Reading progress auto-updates (US15).
4. User switches to another device → reading progress syncs (US18).
5. User goes offline → cached books become accessible (US53)
6. User reads offline → progress stored locally
7. User reconnects → new progress syncs to cloud (US18).

Expected Results:

- Online/offline reading works seamlessly.
- Page position and reading progress sync when online.
- Offline data must never overwrite newer remote data → conflict resolution required.

Postconditions:

- Updated reading progress stored and reflected across devices.

9.5 Community Interaction Scenario

Objective:

Validate review posting, liking, replying, reporting, and moderation.

Preconditions:

- User logged in.
- Book with review capability enabled.

Flow:

1. User posts a review (US20).
2. Another user likes/upvotes the review (US47).
3. Users comment and reply to discussion threads (US21).
4. A user reports inappropriate content (US51).
5. Admin moderates or deletes content via moderation tools (US48).

Expected Results:

- Review appears immediately.
- Upvote count increases correctly.
- Comments/replies threaded properly.
- Reported content status = Under Moderation.
- Admin actions update visibility instantly.

Postconditions:

- Review and discussion data stored persistently.
- Moderation decisions reflected across all users.

9.6 Personalization & AI-Driven Scenario

Objective:

Validate AI-driven personalization and adaptive learning.

Preconditions:

- User logged in.
- Reading history exists OR newly selected preferences.

Flow:

1. User selects favorite authors and genres (US35).
2. AI Smart Suggestions modify homepage recommendations (US36).
3. Personalized notifications sent for new releases in selected genres (US40).
4. AI-curated reading digest delivered periodically (US41).
5. Daily reading streak and personalized challenges update (US42).
6. Adaptive recommendation engine refines suggestions as behavior changes (US43).

Expected Results:

- Suggestions match genre preferences and reading behavior.
- Notifications delivered correctly (email + push).
- Reading streak updates daily.
- Adaptive learning refines suggestions after new reading patterns.

Postconditions:

- AI models updated with user behavior.

9.7 Bulk Upload & Moderation Scenario (Admin)

Objective:

Validate admin's ability to upload books in bulk and interact with AI moderation.

Preconditions:

- Admin logged in.
- Bulk upload template available.

Flow:

1. Admin uploads CSV/Excel book file (US45).
2. System validates fields and file format.
3. AI moderates content such as descriptions or metadata (US46).
4. Validation/mapping errors shown in summary.
5. Valid items appear in catalog instantly.
6. Admin sends notification to users about new batch (US54).

Expected Results:

- Validation errors clearly visible.
- Only approved books published.
- Bulk upload does not duplicate entries.
- Admin notifications reach users.

Postconditions:

- Catalog updated.
- Moderation logs stored.

10. Error Guessing

Error Guessing is a testing approach where the tester uses their experience and intuition to think about places where the system might break.
These are not obvious or regular test cases—they focus on risky, unusual, or unexpected actions that real users might try.
We included such high-risk inputs to catch failures that normal ECP, BVA, or state-based tests might miss.

10.1 Authentication & Profile Module

Testers attempted the following error-prone actions:

- Logging in with **leading/trailing spaces** in email or password
- Using **emoji-only inputs** in username (e.g., "🔥🔥")
- Password with **200+ characters**
- Reusing an **expired session token**

- Attempting login on **multiple devices simultaneously**
- Using expired or tampered **reset-password links**
- Entering **email with Unicode characters**
- Attempting login after **deleting cookies** but keeping local token

10.2 Catalogue, Search & Filtering

Risky search behaviors were tested:

- SQL injection–like queries
  - ' OR 1=1 --
  - " DROP TABLE Books" (should be sanitized)
- Search using **HTML tags** (<script>alert(1)</script>)
- Search with **very long text** (10,000+ characters)
- Filter combinations that produce **no results**
- Filtering with **invalid genre or author IDs**
- Using **zero or negative** pagination values

10.3 Reader Module & Book Navigation

Testers intentionally triggered incorrect reading states:

- Opening a chapter or page beyond book bounds (Page -1, Page 9999)
- Bookmarking invalid page IDs
- Adding notes with **JavaScript-like input**
- Switching between chapters rapidly to test broken progress sync
- Highlighting text across **page boundaries** (illegal selection)
- Attempting to read when:
  - No internet
  - Partially cached offline book
  - Cache corrupted

10.4 Reviews, Ratings & Discussions

To test robustness of user-generated content flows:

- Submitting **blank reviews** (spaces only)
- Using **offensive/banned keywords** to check moderation
- Posting review > 10,000 characters
- Entering **0, 6, or decimal ratings (3.5)**
- Trying to edit or delete **another user's review**
- Rapidly spamming likes/upvotes
- Posting comments when blocked or logged out

10.5 Payment & Subscription

Critical payment failure scenarios included:

- Using **expired credit card** or invalid CVV
- Entering card number with alphabets
- Payment request sent twice (double-tap Pay button)
- Network dropped **mid-transaction**
- Switching between UPI/Card during processing
- Manipulating plan price through browser console
- Trying to purchase plan **while already Active**
- Changing time/date on device to expire subscription artificially

10.6 Admin Panel & Moderation

Admin-specific error-guessing included:

- Uploading:
  - Corrupted EPUB/PDF files
  - Files > allowed size
  - Unsupported types (EXE, RAR)
- Bulk upload with:
  - Missing mandatory columns
  - Incorrect CSV formatting
  - Duplicate entries
- Publishing a book without required metadata
- Approving or rejecting moderation items rapidly
- Deleting author/publisher linked to active books
- Broken cover image URLs

10.7 AI Features (Summary, Scene Generation, Suggestions)

Error-guessing involved pushing AI systems to the edge:

- Requesting summary for **unapproved books**
- Triggering scene generation **without selecting text**
- Selecting extremely large text passages (entire chapter)
- Using empty highlight or invisible characters
- Rapidly requesting multiple AI scenes (rate-limit checks)
- Providing style values that don't exist (e.g., "style: unicorn-mode")
- For Smart Suggestions:
  - No reading history
  - Contradicting preferences (likes everything + marks everything "Not Interested")

10.8 Offline Reading & Sync

Edge cases to break offline/online sync:

- Deleting cached files manually from device storage
- Switching rapidly between online/offline mode
- Progress updated offline but overwritten incorrectly on reconnect

- Reading a book cached partially (corrupted)
- Book deleted from server while cached locally

10.9 Notifications & Alerts

Testers attempted:

- Disabling notifications during an active delivery
- Clicking a notification with invalid book ID
- Receiving a scheduled notification after logging out
- Broken deep links
- Notification duplication when reinstalling the app

11. Deriving Test Cases from ECP & BVA

- All black-box test cases in this document were systematically derived from the Equivalence Partitioning (ECP) and Boundary Value Analysis (BVA) defined earlier.
- Each equivalence class—both valid and invalid—was mapped to at least one test case, and all boundary conditions were converted into specific test inputs. Representative combinations were selected to avoid redundancy while maintaining full requirement coverage.
- Additional scenario-based flows and error-guessing conditions were incorporated to cover cross-module behavior and high-risk edge cases, ensuring a complete and well-balanced test suite.

12. Conclusion

This document gives a complete Black Box Testing overview of the NextChapter platform, covering all 56 user stories and every major feature. By using techniques like ECP, BVA, State Transitions, CEG, Scenarios, and Error Guessing, I thoroughly tested authentication, browsing, reading, AI features, payments, subscriptions, offline mode, and admin tools.

Together, these methods help make sure the platform works smoothly in normal use, edge cases, and even high-risk situations, providing a strong base for system testing, UAT, and future regression testing.