Black Box Testing : NewsXpress

This document outlines the Black Box testing approach for the aNewsXpress system, a form of system testing. The plan focuses on two key techniques: Equivalence Class Partitioning and Boundary Value Analysis.

1. Project and System Details

Field	Detail
Project Name	NewsXpress
Testing Type	System Testing (Black Box)
Document Version	1.0
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2. Testing Objective

The primary objective of this testing phase is to identify defects and validate the system's compliance with requirements by examining the system's functionality from an external perspective, without knowledge of the internal code structure.

3. Equivalence Class Partitioning (ECP)

Equivalence Class Partitioning is a software testing technique that divides the input domain of a program into classes of data, from which test cases can be derived. This reduces the total number of test cases required while maintaining thorough coverage.

4. Boundary Value Analysis (BVA)

Boundary Value Analysis is a testing technique that checks the boundaries of the input domain. Since errors often occur at the boundaries of the input, this method is highly effective in finding defects. Test cases should be created for inputs just on, just below, and just above the boundaries for both Valid and Non-Valid equivalence classes.

6. Definitions

- **Valid Class:** An equivalence class containing inputs that are expected to be accepted by the system and result in correct behavior.
- **Non-Valid Class:** An equivalence class containing inputs that are expected to be rejected by the system or result in an error message.
- **TC:** Test Case - The specific input data or set of actions used for testing.
- **Output:** The result generated by the system after executing the Test Case.
- **System Testing:** Testing conducted on a complete, integrated system to evaluate the system's compliance with its specified requirements.

This plan serves as the template for creating and documenting the Black Box Test Cases for aNewsXpress. All executed tests should be documented accurately in the tables provided.

Please refer to the detailed requirements document, for specific input constraints and expected behaviors. The schedule for the testing activities can be found in the project calendar.

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1. Test Scope & Strategy

The goal is to validate the system against the Functional Requirements and User Stories without looking at the internal code. We will focus on:

- **Input Validation:** Using BVA and EP on fields like Username and Password.
- **Functional Flow:** Verifying the "Happy Path" and "Error Paths" for features like Login, News Feed, and Summarization.

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2. Test Suite: User Authentication (US1 & US2)

Reference User Story: US1 (Account Registration) & US2 (Login)

Constraints Identified:

- **Username:** Min 5 chars, Max 30 chars. Allowed: Letters, numbers, _, .. No spaces. Cannot start with .. No consecutive ..
- **Password:** Min 8 chars. Must contain Uppercase, Lowercase, Digit, Special Character.

2.1 Username Validation (Equivalence Partitioning & BVA)
- **Valid Class:** 5-30 characters, alphanumeric + _ .
- **Invalid Class:** <5 chars, >30 chars, special symbols (except _ .), starts with ., consecutive ..

Test ID	Description	Test Data (Input)	Technique	Expected Result
TC-AUTH-01	**Boundary Value (Min-1)**	user (4 chars)	BVA	**Fail:** Error "Username must be at least 5 characters"
TC-AUTH-02	**Boundary Value (Min)**	user1 (5 chars)	BVA	**Pass:** Account Created
TC-AUTH-03	**Boundary Value (Max)**	30 chars string	BVA	**Pass:** Account Created
TC-AUTH-04	**Boundary Value (Max+1)**	31 chars string	BVA	**Fail:** Error "Username cannot exceed 30 characters"
TC-AUTH-05	**Invalid Format (EP)**	user name (Space)	EP	**Fail:** Error "No spaces allowed"
TC-AUTH-06	**Invalid Start Char (EP)**	.username	EP	**Fail:** Error "Cannot start with a period"
TC-AUTH-07	**Consecutive Dots (EP)**	user..name	EP	**Fail:** Error "No consecutive periods allowed"
TC-AUTH-08	**Valid Complex (EP)**	user_name.01	EP	**Pass:** Account Created

2.2 Password Validation (EP & BVA)
- **Valid Class:** Length $\ge$ 8, Contains [A-Z], [a-z], [0-9], Special.

Test ID	Description	Test Data (Input)	Technique	Expected Result
TC-AUTH-09	**Boundary Value (Len < 8)**	Pass1! (6 chars)	BVA	**Fail:** Error "Password too short"
TC-AUTH-10	**Valid Boundary (Len = 8)**	Pass123!	BVA	**Pass:** Account Created
TC-AUTH-11	**Missing Uppercase (EP)**	pass123!	EP	**Fail:** Error "Must contain uppercase letter"
TC-AUTH-12	**Missing Special Char (EP)**	Password123	EP	**Fail:** Error "Must contain special character"
TC-AUTH-13	**Missing Digit (EP)**	Password!	EP	**Fail:** Error "Must contain a number"

3. Test Suite: Content Ingestion & Summaries (US7 & US9)

Reference User Story: US9 (AI Summarization)

Constraints Identified:

- Summary length: ≤ 60 words.
- System must store "Failed" status if generation fails.

3.1 Summary Generation (BVA on Output)

Test ID	Description	Condition / Input	Technique	Expected Result

Test ID	Description	Pre-Condition	Action	Expected Result
TC-NEWS-01	**Valid Summary Generation**	Article text > 300 words	EP	**Pass:** Summary displayed is ≤ 60 words.
TC-NEWS-02	**Short Source Text**	Article text < 50 words	EP	**Pass:** System returns original text or specific "Too short to summarize" message.
TC-NEWS-03	**API Failure Handling**	Simulate Groq API timeout	Robustness	**Pass:** UI displays "Summary unavailable" or placeholder; does not crash.
TC-NEWS-04	**Broken Source Link**	Ingest article with 404 URL	EP	**Pass:** System flags as 'No Reference' or hides from feed.

4. Test Suite: Personalization & Interactions (US14 & US15)

Reference User Story: US14 (Bookmark) & US15 (Personalized Feed)

4.1 User Preferences (State Transition Testing)

Test ID	Description	Pre-Condition	Action	Expected Result
TC-PERS-01	**Select Interests**	New User (No preferences)	Select "Technology" & "Sports" in Settings	**Pass:** Feed updates to show only Tech and Sports articles.
TC-PERS-02	**Deselect All**	User has preferences	Uncheck all categories	**Pass:** System prompts to select at least one OR defaults to "General/All" feed.

TC-PERS-03	Bookmark Article	User Logged In	Click "Bookmark" icon on Article A	**Pass:** Icon changes state (filled); Article A appears in "Saved Articles".
TC-PERS-04	Remove Bookmark	Article A is Bookmarked	Click "Bookmark" icon on Article A again	**Pass:** Icon reverts to empty; Article A removed from "Saved Articles".
TC-PERS-05	Bookmark w/o Login	User Logged Out	Click "Bookmark" icon	**Pass:** Redirect to Login Page or show "Please Login" toast.

5. Test Suite: Accessibility & Utilities (US13 & US17)

Reference User Story: US17 (Translation) & US13 (Text-to-Speech)

Test ID	Description	Input / Action	Expected Result
TC-UTIL-01	Translation Selection	Select "Hindi" from dropdown	**Pass:** Summary text changes to Hindi characters.
TC-UTIL-02	Revert Translation	Click "Show Original"	**Pass:** Text reverts to original English.
TC-UTIL-03	TTS Playback	Click "Play Audio" icon	**Pass:** Audio begins playing; Icon changes to "Pause".
TC-UTIL-04	TTS Stop/Pause	Click "Pause" icon	**Pass:** Audio stops immediately.

6. Defect Reporting Template

If any of the above tests fail, use this format (based on your testing/bug-log.md structure):

- **Bug ID:** BUG-001
- **Test Case ID:** TC-AUTH-04
- **Description:** Username field accepts 35 characters without error.
- **Severity:** Low (Functional deviation, but not critical)
- **Priority:** Medium
- **Environment:** Chrome v120, Windows 11
- **Steps to Reproduce:**
    1. Go to Sign Up page.
    2. Enter a string of 35 'a's in the Username field.
    3. Click Register.
- **Expected:** Error message "Username cannot exceed 30 characters".
- **Actual:** Account created successfully.