Test Plan

Nelson Villatoro

CMSC115

Chapter 5, Project 6

November 19, 2024

**Program Goals & Objectives**

The primary objective of this program is to read a 12-digit string input from the user, representing the first 12 digits of an ISBN-13 number, validate the input, compute the 13th checksum digit according to the ISBN-13 standard, and display the complete 13-digit ISBN-13 number. If the input is invalid (not exactly 12 digits or contains non-digit characters), the program will display an appropriate error message.

**Program Functional Requirements**

**1. User Input:**

* The program should prompt the user to enter the first 12 digits of an ISBN number as a string.
* The user input must be exactly 12 characters long to constitute a valid ISBN number.
* The input must consist solely of numeric digits (0-9).

**2. Input Validation:**

* Check if the input length is exactly 12 characters.
  + If not, display "[input] is an invalid input".
* Check if the input contains only digits.
  + If not, display "[input] is an invalid input".

**3. Checksum Calculation:**

* Assign each digit in the input string to variables d1 through d12.
* Calculate the checksum digit (d13) using the following steps:
  + Initialize a sum variable to 0.
  + For each digit in positions 1 to 12 (using 0-based indexing):
    - If the position is odd (1-based indexing), multiply the digit by 3 and add it to the sum.
    - If the position is even (1-based indexing), add the digit to the sum.
  + Calculate the checksum as checksum = 10 - (sum % 10).
  + If the checksum equals 10, set it to 0.

**4. Output:**

* If the input is valid:
  + Display "The ISBN-13 number is [input][checksum]".
* If the input is invalid:
  + Display "[input] is an invalid input".

**Program Pseudocode**

START

Ask user to enter first 12 digits of ISBN number

Get user's input

IF input is not exactly 12 digits long OR contains non-numbers THEN

Show error message with invalid input

Stop program

END IF

Set running total to 0

Set position counter to 0

WHILE position counter is less than 12 DO

Get digit at current position

IF digit is in even position THEN

Add (digit times 3) to running total

ELSE

Add digit to running total

END IF

Move to next position

END WHILE

Calculate checksum by subtracting remainder of (running total divided by 10) from 10

IF checksum equals 10 THEN

Set checksum to 0

END IF

Show complete ISBN-13 by combining input with checksum

END

**Program Flowchart**

**A screenshot of a diagram

Description automatically generated**

**Table 1 – Traceability Matrix**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Test Case | Input/Output | Expected Result | Actual Result | Outcome  (Pass/Fail) |
| 1a | Enter the first 12 digits of an ISBN number as a string: 763585768143 | The ISBN-13 number is 7635857681435 | The ISBN-13 number is 7635857681435 | Pass |
| 2a | Enter the first 12 digits of an ISBN number as a string: 12a2h48 | 12a2h48 is an invalid input | 12a2h48 is an invalid input | Pass |
| 3a | Enter the first 12 digits of an ISBN number as a string: | is an invalid input | is an invalid input | Pass (empty string) |