MACQUARIE University

FACULTY OF SCIENCE AND ENGINEERING

SCHOOL OF COMPUTING

COMP2350/COMP6350:

Database Systems

Session 2, 2023

Assignment Three: Procedural Programming

Unit Code	COMP6350	Assignment#	3
Student ID Number	47814403	Student Name	Gino Sunny
Tutor's Name	I Wayan Budi Sentana	Workshop Date/Time	Monday(11am-1 pm)

Part B: Report Writing

- **Schema of the tables created**

  The following is the schema of the tables created as part of this project.

  - BOOK (BookID [PK], BookTitle, PublisherID [FK], PublishedYear, Price)
  - MEMBER (MemberID [PK], MemberName, MemberAddress, MemberSuburb, MemberState, MemberExpDate, MemberPhone, MemberStatus, Fine_Fees)
  - HOLDING (BranchID [PK, FK], BookID [PK, FK], InStock, OnLoan)
  - BORROWEDBY (BookIssueID [PK], BranchID [FK], BookID [FK], MemberID [FK], DateBorrowed, DateReturned, ReturnDueDate)
  - AUTHOREDBY (BookID [PK, FK], AuthorID [PK, FK])
  - BRANCH (BranchID [PK], BranchSuburb, BranchState)
  - AUTHOR (AuthorID [PK], AuthorName, AuthorAddress)
  - PUBLISHER (PublisherID [PK], PublisherName, PublisherAddress)
  - STATUSCHANGEHISTORY (StatusChangeID[PK], MemberID[FK], StatusChanged, StatusChangeDate)

Report of the solutions of Tasks 1, 2, 3 and 4

- **Task 1: Logging of fees on Member table**

  Total fees accumulated by a member are stored in the new column, **FINE_FEES** inside the Member table. If the value of the **FINE_FEES** column = 0, then the Member has no outstanding fees. Outstanding fees can include fees for lost, damaged or overdue items, and late membership fees.

  #**Member** table initial state. See below.

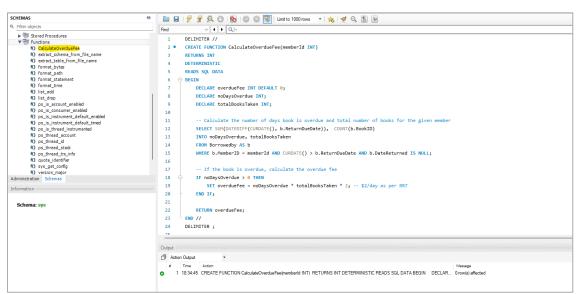| MemberID	MemberStatus	MemberName	MemberAddress	MemberSuburb	MemberState	MemberExpDate	MemberPhone
1	REGULAR	Joe	4 Nowhere St	Here	NSW	2021-09-30	0434567811
2	REGULAR	Pablo	10 Somewhere St	There	ACT	2022-09-30	0412345678
3	REGULAR	Chen	23/9 Faraway Cl	Far	QLD	2020-11-30	0412346578
4	REGULAR	Zhang	Dunno St	North	NSW	2020-12-31	
5	REGULAR	Saleem	44 Magnolia St	South	SA	2020-09-30	1234567811
6	SUSPENDED	Homer	Middle of Nowhere	North Ryde	NSW	2020-09-30	1234555811
NULL	NULL	NULL	NULL	NULL	NULL	NULL	NULL

FINE_FEES column added to the Member table. ALTER table query was used for implementing this. See below.

MemberID	MemberStatus	MemberName	MemberAddress	MemberSuburb	MemberState	MemberExpDate	MemberPhone	FINE_FEES
1	REGULAR	Joe	4 Nowhere St	Here	NSW	2021-09-30	0434567811	0
2	REGULAR	Pablo	10 Somewhere St	There	ACT	2022-09-30	0412345678	0
3	REGULAR	Chen	23/9 Faraway Cl	Far	QLD	2020-11-30	0412346578	0
4	REGULAR	Zhang	Dunno St	North	NSW	2020-12-31		0
5	REGULAR	Saleem	44 Magnolia St	South	SA	2020-09-30	1234567811	0
6	SUSPENDED	Homer	Middle of Nowhere	North Ryde	NSW	2020-09-30	1234555811	0
NULL	NULL	NULL	NULL	NULL	NULL	NULL	NULL	NULL

Verification of the operation is done by calculating the total overdue fees for each member and updating it in the **Member** table against the **FINE_FEES column.**

For this, an UPDATE query was created to update the total fees for members with overdue items. The overdue fees are calculated based on the BR7 business rule. Inside the update query, a stored function was created to calculate the overdue fees for a member. This function called, **CalculateOverdueFee** will be called by the update query to get the total overdue fee for a member. The stored function is created so that any changes to the BR7 business rule won't affect the UPDATE query and the changes can be incorporated without modifying the query. This facilitates better code management and usability.

Stored function CalculateOverdueFee created. See below.

Borrowedby table values. **MemberID=1**, and **MemberID=2** has overdue items and the fines will be calculated only for those two members. See below.

BookIssueID	BranchID	BookID	MemberID	DateBorrowed	DateReturned	ReturnDueDate
4	2	4	1	2023-10-29	NULL	2023-11-19
6	1	1	1	2020-08-30	NULL	2020-09-30
1	1	1	2	2023-10-29	NULL	2023-11-19
7	1	2	2	2020-08-30	NULL	2020-09-30
8	3	4	2	2020-08-30	NULL	2020-09-30
5	3	5	3	2023-10-29	NULL	2023-11-19
2	2	4	4	2023-10-29	NULL	2023-11-19
3	2	1	4	2023-10-29	NULL	2023-11-19
NULL	NULL	NULL	NULL	NULL	NULL	NULL

#**UPDATE** query is executed and overdue fees for **MemberID=1** and **MemberID=2** are updated in the member table. See below.

MemberID	MemberStatus	MemberName	MemberAddress	MemberSuburb	MemberState	MemberExpDate	MemberPhone	FINE_FEES
1	REGULAR	Joe	4 Nowhere St	Here	NSW	2021-09-30	0434567811	2248
2	REGULAR	Pablo	10 Somewhere St	There	ACT	2022-09-30	0412345678	8992
3	REGULAR	Chen	23/9 Faraway Cl	Far	QLD	2020-11-30	0412346578	0
4	REGULAR	Zhang	Dunno St	North	NSW	2020-12-31		0
5	REGULAR	Saleem	44 Magnolia St	South	SA	2020-09-30	1234567811	0
6	SUSPENDED	Homer	Middle of Nowhere	North Ryde	NSW	2020-09-30	1234555811	0
NULL	NULL	NULL	NULL	NULL	NULL	NULL	NULL	NULL

Assumptions

- Total fees are the outstanding fees for a member *(As per the business rules, outstanding fees can include fees for lost, damaged or overdue items, and late membership fees).*

- BR6 is not considered here and it is assumed that, the change in MemberStatus to 'SUSPENDED' when the fees > 30$ is taken care of by another query or function. The current scenario is out of the scope of the BR6 business rule and only focuses on updating the overdue fees.

- **Task 2 – Trigger for BR8 business rule.**

  In order to solve this problem, a trigger needed to be fired after a fine is updated in the fine_fees column of the Member table. For implementing this trigger, the **fine_fees** column in the **Member** table is used as the triggering column. When this fine is updated to **0**, the trigger should be fired and it should check if the member is in '**SUSPENDED**' status. If the fine=0 and status='SUSPENDED', then, a check should be done to identify if the member has any overdue books. If don't, then the status should be updated as "**REGULAR**". The trigger **br8_trigger** has been created and placed in the SQL file.

#Trigger created

```
 1    DELIMITER //
 2  • CREATE TRIGGER br8_trigger
 3    BEFORE UPDATE ON Member
 4    FOR EACH ROW
 5  ⊖ BEGIN
 6        DECLARE overdueClearedCount INT DEFAULT 0; -- Setting default value to handle situations where no row or multiple rows are fetched.
 7
 8        -- Logic to check if the total fine in the column fine_fees is cleared and member status is SUSPENDED
 9  ⊖     IF NEW.fine_fees = 0 AND NEW.MemberStatus = 'SUSPENDED' THEN
10            -- Steps to check the number of overdue items
11            SELECT COUNT(*)
12            INTO overdueClearedCount
13            FROM borrowedby as bb
14            WHERE bb.MemberID = NEW.MemberID AND CURDATE() > bb.ReturnDueDate AND bb.DateReturned IS NOT NULL;
15
16            -- If there are no overdue count, set status to REGULAR
17  ⊖         IF overdueClearedCount IS NOT NULL AND overdueClearedCount != 0 THEN  -- IS NOT NULL check to handle exceptions due to NULL values.
18                SET NEW.MemberStatus = 'REGULAR';
19            END IF;
20        END IF;
21    END //
22    DELIMITER ;
23
```

SHOW TRIGGERS statement to validate the successful creation of the trigger.

#The state of the **Member** table before executing the trigger.

MemberID	MemberStatus	MemberName	MemberAddress	MemberSuburb	MemberState	MemberExpDate	MemberPhone	FINE_FEES
1	REGULAR	Joe	4 Nowhere St	Here	NSW	2021-09-30	0434567811	2248
2	REGULAR	Pablo	10 Somewhere St	There	ACT	2022-09-30	0412345678	8992
3	REGULAR	Chen	23/9 Faraway Cl	Far	QLD	2020-11-30	0412346578	0
4	REGULAR	Zhang	Dunno St	North	NSW	2020-12-31		0
5	REGULAR	Saleem	44 Magnolia St	South	SA	2020-09-30	1234567811	0
6	SUSPENDED	Homer	Middle of Nowhere	North Ryde	NSW	2020-09-30	1234555811	0
7	SUSPENDED	sam	smith	MQ	NSW	2021-09-30	NULL	10
NULL	NULL	NULL	NULL	NULL	NULL	NULL	NULL	NULL

The state of the **Borrowedby** table

BookIssueID	BranchID	BookID	MemberID	DateBorrowed	DateReturned	ReturnDueDate
1	1	1	2	2023-10-29	NULL	2023-11-19
2	2	4	4	2023-10-29	NULL	2023-11-19
3	2	1	4	2023-10-29	NULL	2023-11-19
4	2	4	1	2023-10-29	NULL	2023-11-19
5	3	5	3	2023-10-29	NULL	2023-11-19
6	1	1	1	2020-08-30	NULL	2020-09-30
7	1	2	2	2020-08-30	NULL	2020-09-30
8	3	4	2	2020-08-30	NULL	2020-09-30
9	3	4	7	2020-08-30	2022-01-02	2022-01-01
NULL	NULL	NULL	NULL	NULL	NULL	NULL

A new member with **MemberID**=7 is created in the **Member** table, with **MemberStatus**='SUSPENDED' and **FINE_FEES**=10. Also, a record is created for MemberID=7 in the Borrowedby table to show the trigger is working.

#Trigger is executed to update the status of **MemberID =7**. Upon trigger execution successfully, the **MemberStatus** would be changed to '**REGULAR**'.

Trigger start is when the **fine_fees** value of **MemberID**=7 is updated to 0.

Apply SQL Script to Database

Review SQL Script

Apply SQL Script

Review the SQL Script to be Applied on the Database

```
1    UPDATE `sys`.`MEMBER` SET `FINE_FEES` = '0' WHERE (`MemberID` = '7');
2
```

Back   Apply   Cancel

#Trigger executed successfully and the status of the **MemberID**=7 changed to 'REGULAR'

MemberID	MemberStatus	MemberName	MemberAddress	MemberSuburb	MemberState	MemberExpDate	MemberPhone	FINE_FEES
1	REGULAR	Joe	4 Nowhere St	Here	NSW	2021-09-30	0434567811	2248
2	REGULAR	Pablo	10 Somewhere St	There	ACT	2022-09-30	0412345678	8992
3	REGULAR	Chen	23/9 Faraway Cl	Far	QLD	2020-11-30	0412346578	0
4	REGULAR	Zhang	Dunno St	North	NSW	2020-12-31		0
5	REGULAR	Saleem	44 Magnolia St	South	SA	2020-09-30	1234567811	0
6	SUSPENDED	Homer	Middle of Nowhere	North Ryde	NSW	2020-09-30	1234555811	0
7	REGULAR	sam	smith	MQ	NSW	2021-09-30	NULL	0
NULL	NULL	NULL	NULL	NULL	NULL	NULL	NULL	NULL

- **Task 3 – Stored Procedure**

  To achieve the task, a stored procedure was required. Below are the different steps to create it.

  - Identify members with overdue items:

    A member has an overdue item if the current date is greater than the ReturnDueDate in the Borrowedby table and the DateReturned is NULL. In order to identify the members and iterate the results, a **CURSOR** was used and implemented in the SQL code.

  - Identify members whose membership has been suspended twice in the past three years:

    In order to accomplish this, a table called **statusChangeHistory** is created to store the historic status changes of each member. This is created under the assumption that any membership status changes need to be recorded in the database and it can be facilitated only by having a new table that holds the data of status changes across time. Additionally, this requirement was decided during the Task 3 solution execution, where the past 3 years' data of suspended membership that a member had was needed. This table would log every time a member's status is changed.

    The results in the **CURSOR** were iterated and for each member, the check was done to see if the member had suspended membership in the last 3 years and if so, the status of the membership was changed to '**TERMINATE**'.

    Also, an error handler for the **CURSOR** was created to handle potential error cases such, as no existing member has an overdue item.

  - End the membership for these members :

    By setting their **MemberStatus** to "**TERMINATE**". As the size of MemberStatus was limited to 9 characters, the status '**TERMINATED**' was shortened to '**TERMINATE**'.

    With the above logic, the procedure was created and stored in the schema.

  - Error handling is also done in this case

Created **statusChangeHistory** table and data was inserted. See below.

StatusChangeId	MemberID	StatusChanged	StatusChangeDate
100	6	SUSPENDED	2021-09-30
101	2	SUSPENDED	2021-03-30
102	2	REGULAR	2021-05-15
103	6	REGULAR	2021-12-30
104	1	SUSPENDED	2021-07-30
105	1	REGULAR	2021-10-15
106	1	SUSPENDED	2021-12-10
107	1	REGULAR	2022-04-18
108	1	SUSPENDED	2022-07-30
NULL	NULL	NULL	NULL

#Member table values before calling the procedure. The procedure will work for the applicable **MemberID** =1.

MemberID	MemberStatus	MemberName	MemberAddress	MemberSuburb	MemberState	MemberExpDate	MemberPhone	FINE_FEES
1	REGULAR	Joe	4 Nowhere St	Here	NSW	2021-09-30	0434567811	2248
2	REGULAR	Pablo	10 Somewhere St	There	ACT	2022-09-30	0412345678	8992
3	REGULAR	Chen	23/9 Faraway Cl	Far	QLD	2020-11-30	0412346578	0
4	REGULAR	Zhang	Dunno St	North	NSW	2020-12-31		0
5	REGULAR	Saleem	44 Magnolia St	South	SA	2020-09-30	1234567811	0
6	SUSPENDED	Homer	Middle of Nowhere	North Ryde	NSW	2020-09-30	1234555811	0
NULL	NULL	NULL	NULL	NULL	NULL	NULL	NULL	NULL

#Procedure created

```
1    DELIMITER //
2    CREATE PROCEDURE TerminateMemberStatus()
3    BEGIN
4        -- Declare variables
5        DECLARE v_MemberID INT;
6        DECLARE v_Suspensions INT;
7
8        -- Declare a cursor to get members with overdue items
9        DECLARE borrowedby_cursor CURSOR FOR
10           SELECT DISTINCT b.MemberID
11           FROM Borrowedby b
12           WHERE CURDATE() > b.ReturnDueDate AND b.DateReturned IS NULL;
13       -- Handlers
14       DECLARE CONTINUE HANDLER FOR NOT FOUND SET v_MemberID = NULL;
15
16       -- Open the cursor
17       OPEN borrowedby_cursor;
18       FETCH NEXT FROM borrowedby_cursor INTO v_MemberID;
19       -- Loop through the members with overdue items
20       WHILE v_MemberID IS NOT NULL DO
21
22           SELECT COUNT(*)
23           INTO v_Suspensions
24           FROM statuschangehistory
25           WHERE MemberID = v_MemberID AND StatusChanged = 'SUSPENDED'
26               AND StatusChangeDate > DATE_SUB(CURDATE(), INTERVAL 3 YEAR);
27           -- If member was suspended twice, terminate their membership
28           IF v_Suspensions >= 2 THEN
29               UPDATE Member
30               SET MemberStatus = 'TERMINATE'
31               WHERE MemberID = v_MemberID;
32           END IF;
33           -- Fetch the next row
34           FETCH NEXT FROM borrowedby_cursor INTO v_MemberID;
35       END WHILE;
36   END //
37   DELIMITER ;
```

CALL TerminateMemberStatus procedure successfully executed.

#after procedure execution the status of MemberID = 1 changed to 'TERMINATE'

MemberID	MemberStatus	MemberName	MemberAddress	MemberSuburb	MemberState	MemberExpDate	MemberPhone	FINE_FEES
1	TERMINATE	Joe	4 Nowhere St	Here	QLD	2021-09-30	0434567811	0
2	REGULAR	Pablo	10 Somewhere St	There	ACT	2022-09-30	0412345678	NULL
3	REGULAR	Chen	23/9 Faraway Cl	Far	QLD	2020-11-30	0412346578	NULL
4	REGULAR	Zhang	Dunno St	North	NSW	2020-12-31		NULL
5	REGULAR	Saleem	44 Magnolia St	South	SA	2020-09-30	1234567811	NULL
6	SUSPENDED	Homer	Middle of Nowhere	North Ryde	NSW	2020-09-30	1234555811	100
NULL	NULL	NULL	NULL	NULL	NULL	NULL	NULL	NULL

- ## Task 4 – Test plan for Task 2 & Task 3

- ## Task 2 test plan - Trigger

   To validate the working of the TRIGGER, **br8_trigger**, an end-to-end test plan was required. Below are the different test scenarios of the test plan that was considered:

   1. Test Scenario: Suspended Member with Cleared Fine but with Overdue Items
   - **Objective**: To verify that a member's status does not change to "REGULAR" if they have overdue items even after clearing the fine.
   - **Test Data**:
      - MemberStatus: SUSPENDED
      - fine_fees: 10 –> to be updated as 0 to test the trigger
      - Borrowed items with **ReturnDueDate** past and **DateReturned** still NULL
   - **Expected Result**: MemberStatus should remain "SUSPENDED".

   Tables Before Insert:

   Member table

MemberID	MemberStatus	MemberName	MemberAddress	MemberSuburb	MemberState	MemberExpDate	MemberPhone	FINE_FEES
1	REGULAR	Joe	4 Nowhere St	Here	NSW	2021-09-30	0434567811	2248
2	REGULAR	Pablo	10 Somewhere St	There	ACT	2022-09-30	0412345678	8992
3	REGULAR	Chen	23/9 Faraway Cl	Far	QLD	2020-11-30	0412346578	0
4	REGULAR	Zhang	Dunno St	North	NSW	2020-12-31		0
5	REGULAR	Saleem	44 Magnolia St	South	SA	2020-09-30	1234567811	0
6	SUSPENDED	Homer	Middle of Nowhere	North Ryde	NSW	2020-09-30	1234555811	0
7	REGULAR	sam	smith	MQ	NSW	2021-09-30	NULL	0
NULL	NULL	NULL	NULL	NULL	NULL	NULL	NULL	NULL

Borrowedby table

BookIssueID	BranchID	BookID	MemberID	DateBorrowed	DateReturned	ReturnDueDate
1	1	1	2	2023-10-29	NULL	2023-11-19
2	2	4	4	2023-10-29	NULL	2023-11-19
3	2	1	4	2023-10-29	NULL	2023-11-19
4	2	4	1	2023-10-29	NULL	2023-11-19
5	3	5	3	2023-10-29	NULL	2023-11-19
6	1	1	1	2020-08-30	NULL	2020-09-30
7	1	2	2	2020-08-30	NULL	2020-09-30
8	3	4	2	2020-08-30	NULL	2020-09-30
9	3	4	7	2020-08-30	2022-01-02	2022-01-01
NULL	NULL	NULL	NULL	NULL	NULL	NULL

Tables After Insert:

Member table

MemberID	MemberStatus	MemberName	MemberAddress	MemberSuburb	MemberState	MemberExpDate	MemberPhone	FINE_FEES
1	REGULAR	Joe	4 Nowhere St	Here	NSW	2021-09-30	0434567811	2248
2	REGULAR	Pablo	10 Somewhere St	There	ACT	2022-09-30	0412345678	8992
3	REGULAR	Chen	23/9 Faraway Cl	Far	QLD	2020-11-30	0412346578	0
4	REGULAR	Zhang	Dunno St	North	NSW	2020-12-31		0
5	REGULAR	Saleem	44 Magnolia St	South	SA	2020-09-30	1234567811	0
6	SUSPENDED	Homer	Middle of Nowhere	North Ryde	NSW	2020-09-30	1234555811	0
7	REGULAR	sam	smith	MQ	NSW	2021-09-30	NULL	0
8	SUSPENDED	RAM	smith	MQ	NSW	2021-09-30	NULL	10
NULL	NULL	NULL	NULL	NULL	NULL	NULL	NULL	NULL

Borrowedby table

BookIssueID	BranchID	BookID	MemberID	DateBorrowed	DateReturned	ReturnDueDate
1	1	1	2	2023-10-29	NULL	2023-11-19
2	2	4	4	2023-10-29	NULL	2023-11-19
3	2	1	4	2023-10-29	NULL	2023-11-19
4	2	4	1	2023-10-29	NULL	2023-11-19
5	3	5	3	2023-10-29	NULL	2023-11-19
6	1	1	1	2020-08-30	NULL	2020-09-30
7	1	2	2	2020-08-30	NULL	2020-09-30
8	3	4	2	2020-08-30	NULL	2020-09-30
9	3	4	7	2020-08-30	2022-01-02	2022-01-01
10	3	4	8	2020-08-30	NULL	2022-05-01
NULL	NULL	NULL	NULL	NULL	NULL	NULL

Tables After Trigger: Member table after the fees updated to 0

MemberID	MemberStatus	MemberName	MemberAddress	MemberSuburb	MemberState	MemberExpDate	MemberPhone	FINE_FEES
1	REGULAR	Joe	4 Nowhere St	Here	NSW	2021-09-30	0434567811	2248
2	REGULAR	Pablo	10 Somewhere St	There	ACT	2022-09-30	0412345678	8992
3	REGULAR	Chen	23/9 Faraway Cl	Far	QLD	2020-11-30	0412346578	0
4	REGULAR	Zhang	Dunno St	North	NSW	2020-12-31		0
5	REGULAR	Saleem	44 Magnolia St	South	SA	2020-09-30	1234567811	0
6	SUSPENDED	Homer	Middle of Nowhere	North Ryde	NSW	2020-09-30	1234555811	0
7	REGULAR	sam	smith	MQ	NSW	2021-09-30	NULL	0
8	SUSPENDED	RAM	smith	MQ	NSW	2021-09-30	NULL	0
NULL	NULL	NULL	NULL	NULL	NULL	NULL	NULL	NULL

For MemberID =8, MemberStatus remains 'SUSPENDED' after the fees are updated to 0. Trigger executed successfully.

2. <u>Test Scenario: Suspended Member with Cleared Fine and No Overdue Items</u>

- **Objective:** To ensure that a member's status changes to "REGULAR" after clearing the fine and no pending overdue items.

- **Test Data:**

    - MemberStatus: SUSPENDED

    - fine_fees: 10 –> to be updated as 0 to test the trigger

    - All borrowed items are either returned or not overdue.

- **Expected Result:** MemberStatus should change to "REGULAR".

Tables Before Insert:

Member table

MemberID	MemberStatus	MemberName	MemberAddress	MemberSuburb	MemberState	MemberExpDate	MemberPhone	FINE_FEES
1	REGULAR	Joe	4 Nowhere St	Here	NSW	2021-09-30	0434567811	2248
2	REGULAR	Pablo	10 Somewhere St	There	ACT	2022-09-30	0412345678	8992
3	REGULAR	Chen	23/9 Faraway Cl	Far	QLD	2020-11-30	0412346578	0
4	REGULAR	Zhang	Dunno St	North	NSW	2020-12-31		0
5	REGULAR	Saleem	44 Magnolia St	South	SA	2020-09-30	1234567811	0
6	SUSPENDED	Homer	Middle of Nowhere	North Ryde	NSW	2020-09-30	1234555811	0
7	REGULAR	sam	smith	MQ	NSW	2021-09-30	NULL	0
8	SUSPENDED	RAM	smith	MQ	NSW	2021-09-30	NULL	0
NULL	NULL	NULL	NULL	NULL	NULL	NULL	NULL	NULL

Borrowedby table

BookIssueID	BranchID	BookID	MemberID	DateBorrowed	DateReturned	ReturnDueDate
1	1	1	2	2023-10-29	NULL	2023-11-19
2	2	4	4	2023-10-29	NULL	2023-11-19
3	2	1	4	2023-10-29	NULL	2023-11-19
4	2	4	1	2023-10-29	NULL	2023-11-19
5	3	5	3	2023-10-29	NULL	2023-11-19
6	1	1	1	2020-08-30	NULL	2020-09-30
7	1	2	2	2020-08-30	NULL	2020-09-30
8	3	4	2	2020-08-30	NULL	2020-09-30
9	3	4	7	2020-08-30	2022-01-02	2022-01-01
10	3	4	8	2020-08-30	NULL	2022-05-01
NULL	NULL	NULL	NULL	NULL	NULL	NULL

Tables After Insert:

Member table

MemberID	MemberStatus	MemberName	MemberAddress	MemberSuburb	MemberState	MemberExpDate	MemberPhone	FINE_FEES
1	REGULAR	Joe	4 Nowhere St	Here	NSW	2021-09-30	0434567811	2248
2	REGULAR	Pablo	10 Somewhere St	There	ACT	2022-09-30	0412345678	8992
3	REGULAR	Chen	23/9 Faraway Cl	Far	QLD	2020-11-30	0412346578	0
4	REGULAR	Zhang	Dunno St	North	NSW	2020-12-31		0
5	REGULAR	Saleem	44 Magnolia St	South	SA	2020-09-30	1234567811	0
6	SUSPENDED	Homer	Middle of Nowhere	North Ryde	NSW	2020-09-30	1234555811	0
7	REGULAR	sam	smith	MQ	NSW	2021-09-30	NULL	0
8	SUSPENDED	RAM	smith	MQ	NSW	2021-09-30	NULL	0
9	SUSPENDED	kevin	smith	MQ	NSW	2021-09-30	NULL	10
NULL	NULL	NULL	NULL	NULL	NULL	NULL	NULL	NULL

Borrowedby table

BookIssueID	BranchID	BookID	MemberID	DateBorrowed	DateReturned	ReturnDueDate
1	1	1	2	2023-10-29	NULL	2023-11-19
2	2	4	4	2023-10-29	NULL	2023-11-19
3	2	1	4	2023-10-29	NULL	2023-11-19
4	2	4	1	2023-10-29	NULL	2023-11-19
5	3	5	3	2023-10-29	NULL	2023-11-19
6	1	1	1	2020-08-30	NULL	2020-09-30
7	1	2	2	2020-08-30	NULL	2020-09-30
8	3	4	2	2020-08-30	NULL	2020-09-30
9	3	4	7	2020-08-30	2022-01-02	2022-01-01
10	3	4	8	2020-08-30	NULL	2022-05-01
11	3	4	9	2020-08-30	2022-01-02	2022-01-01
NULL	NULL	NULL	NULL	NULL	NULL	NULL

Tables After Trigger: Member table after the fees updated to 0

MemberID	MemberStatus	MemberName	MemberAddress	MemberSuburb	MemberState	MemberExpDate	MemberPhone	FINE_FEES
1	REGULAR	Joe	4 Nowhere St	Here	NSW	2021-09-30	0434567811	2248
2	REGULAR	Pablo	10 Somewhere St	There	ACT	2022-09-30	0412345678	8992
3	REGULAR	Chen	23/9 Faraway Cl	Far	QLD	2020-11-30	0412346578	0
4	REGULAR	Zhang	Dunno St	North	NSW	2020-12-31		0
5	REGULAR	Saleem	44 Magnolia St	South	SA	2020-09-30	1234567811	0
6	SUSPENDED	Homer	Middle of Nowhere	North Ryde	NSW	2020-09-30	1234555811	0
7	REGULAR	sam	smith	MQ	NSW	2021-09-30	NULL	0
8	SUSPENDED	RAM	smith	MQ	NSW	2021-09-30	NULL	0
9	REGULAR	kevin	smith	MQ	NSW	2021-09-30	NULL	0
NULL	NULL	NULL	NULL	NULL	NULL	NULL	NULL	NULL

For MemberID =9, MemberStatus changed to 'REGULAR' after the fees are updated to 0. Trigger executed successfully.

3. Test Scenario: **Regular Member with Cleared Fine and No Overdue Items**

- **Objective:** To check if the trigger affects regular members unnecessarily.
- **Test Data:**
  - MemberStatus: REGULAR
  - fine_fees: 10 –> to be updated as 0 to test the trigger

- **Expected Result**: MemberStatus should remain "REGULAR" and there should be no change.

Tables Before Insert:

Member table

MemberID	MemberStatus	MemberName	MemberAddress	MemberSuburb	MemberState	MemberExpDate	MemberPhone	FINE_FEES
1	REGULAR	Joe	4 Nowhere St	Here	NSW	2021-09-30	0434567811	2248
2	REGULAR	Pablo	10 Somewhere St	There	ACT	2022-09-30	0412345678	8992
3	REGULAR	Chen	23/9 Faraway Cl	Far	QLD	2020-11-30	0412346578	0
4	REGULAR	Zhang	Dunno St	North	NSW	2020-12-31		0
5	REGULAR	Saleem	44 Magnolia St	South	SA	2020-09-30	1234567811	0
6	SUSPENDED	Homer	Middle of Nowhere	North Ryde	NSW	2020-09-30	1234555811	0
7	REGULAR	sam	smith	MQ	NSW	2021-09-30	NULL	0
8	SUSPENDED	RAM	smith	MQ	NSW	2021-09-30	NULL	0
NULL	NULL	NULL	NULL	NULL	NULL	NULL	NULL	NULL

Borrowedby table

BookIssueID	BranchID	BookID	MemberID	DateBorrowed	DateReturned	ReturnDueDate
1	1	1	2	2023-10-29	NULL	2023-11-19
2	2	4	4	2023-10-29	NULL	2023-11-19
3	2	1	4	2023-10-29	NULL	2023-11-19
4	2	4	1	2023-10-29	NULL	2023-11-19
5	3	5	3	2023-10-29	NULL	2023-11-19
6	1	1	1	2020-08-30	NULL	2020-09-30
7	1	2	2	2020-08-30	NULL	2020-09-30
8	3	4	2	2020-08-30	NULL	2020-09-30
9	3	4	7	2020-08-30	2022-01-02	2022-01-01
10	3	4	8	2020-08-30	NULL	2022-05-01
NULL	NULL	NULL	NULL	NULL	NULL	NULL

Tables After Insert:

Member table

MemberID	MemberStatus	MemberName	MemberAddress	MemberSuburb	MemberState	MemberExpDate	MemberPhone	FINE_FEES
1	REGULAR	Joe	4 Nowhere St	Here	NSW	2021-09-30	0434567811	2248
2	REGULAR	Pablo	10 Somewhere St	There	ACT	2022-09-30	0412345678	8992
3	REGULAR	Chen	23/9 Faraway Cl	Far	QLD	2020-11-30	0412346578	0
4	REGULAR	Zhang	Dunno St	North	NSW	2020-12-31		0
5	REGULAR	Saleem	44 Magnolia St	South	SA	2020-09-30	1234567811	0
6	SUSPENDED	Homer	Middle of Nowhere	North Ryde	NSW	2020-09-30	1234555811	0
7	REGULAR	sam	smith	MQ	NSW	2021-09-30	NULL	0
8	SUSPENDED	RAM	smith	MQ	NSW	2021-09-30	NULL	0
9	REGULAR	kevin	smith	MQ	NSW	2021-09-30	NULL	0
10	REGULAR	Mathew	smith	MQ	NSW	2021-09-30	NULL	10
NULL	NULL	NULL	NULL	NULL	NULL	NULL	NULL	NULL

Borrowedby table

BookIssueID	BranchID	BookID	MemberID	DateBorrowed	DateReturned	ReturnDueDate
1	1	1	2	2023-10-29	NULL	2023-11-19
2	2	4	4	2023-10-29	NULL	2023-11-19
3	2	1	4	2023-10-29	NULL	2023-11-19
4	2	4	1	2023-10-29	NULL	2023-11-19
5	3	5	3	2023-10-29	NULL	2023-11-19
6	1	1	1	2020-08-30	NULL	2020-09-30
7	1	2	2	2020-08-30	NULL	2020-09-30
8	3	4	2	2020-08-30	NULL	2020-09-30
9	3	4	7	2020-08-30	2022-01-02	2022-01-01
10	3	4	8	2020-08-30	NULL	2022-05-01
11	3	4	9	2020-08-30	2022-01-02	2022-01-01
12	3	4	10	2020-08-30	2022-01-02	2022-01-01
NULL	NULL	NULL	NULL	NULL	NULL	NULL

Tables After Trigger: Member table after the fees updated to 0

MemberID	MemberStatus	MemberName	MemberAddress	MemberSuburb	MemberState	MemberExpDate	MemberPhone	FINE_FEES
1	REGULAR	Joe	4 Nowhere St	Here	NSW	2021-09-30	0434567811	2248
2	REGULAR	Pablo	10 Somewhere St	There	ACT	2022-09-30	0412345678	8992
3	REGULAR	Chen	23/9 Faraway Cl	Far	QLD	2020-11-30	0412346578	0
4	REGULAR	Zhang	Dunno St	North	NSW	2020-12-31		0
5	REGULAR	Saleem	44 Magnolia St	South	SA	2020-09-30	1234567811	0
6	SUSPENDED	Homer	Middle of Nowhere	North Ryde	NSW	2020-09-30	1234555811	0
7	REGULAR	sam	smith	MQ	NSW	2021-09-30	NULL	0
8	SUSPENDED	RAM	smith	MQ	NSW	2021-09-30	NULL	0
9	REGULAR	kevin	smith	MQ	NSW	2021-09-30	NULL	0
10	REGULAR	Mathew	smith	MQ	NSW	2021-09-30	NULL	0
NULL	NULL	NULL	NULL	NULL	NULL	NULL	NULL	NULL

For MemberID =10, MemberStatus remains 'REGULAR' after the fees are updated to 0. Trigger executed successfully.

4. Test Scenario: Suspended Member with Pending Fine and No Overdue Items

- **Objective:** To ensure that members with a pending fine do not get their status updated even if they don't have overdue items.
- **Test Data:**
  - MemberStatus: SUSPENDED
  - fine_fees: 30 –> to be updated as 10 to test the trigger
  - All borrowed items are either returned or not overdue.
- **Expected Result:** MemberStatus should remain "SUSPENDED".

Tables Before Insert:

Member table

MemberID	MemberStatus	MemberName	MemberAddress	MemberSuburb	MemberState	MemberExpDate	MemberPhone	FINE_FEES
1	REGULAR	Joe	4 Nowhere St	Here	NSW	2021-09-30	0434567811	2248
2	REGULAR	Pablo	10 Somewhere St	There	ACT	2022-09-30	0412345678	8992
3	REGULAR	Chen	23/9 Faraway Cl	Far	QLD	2020-11-30	0412346578	0
4	REGULAR	Zhang	Dunno St	North	NSW	2020-12-31		0
5	REGULAR	Saleem	44 Magnolia St	South	SA	2020-09-30	1234567811	0
6	SUSPENDED	Homer	Middle of Nowhere	North Ryde	NSW	2020-09-30	1234555811	0
7	REGULAR	sam	smith	MQ	NSW	2021-09-30	NULL	0
8	SUSPENDED	RAM	smith	MQ	NSW	2021-09-30	NULL	0
NULL	NULL	NULL	NULL	NULL	NULL	NULL	NULL	NULL

Borrowedby table

BookIssueID	BranchID	BookID	MemberID	DateBorrowed	DateReturned	ReturnDueDate
1	1	1	2	2023-10-29	NULL	2023-11-19
2	2	4	4	2023-10-29	NULL	2023-11-19
3	2	1	4	2023-10-29	NULL	2023-11-19
4	2	4	1	2023-10-29	NULL	2023-11-19
5	3	5	3	2023-10-29	NULL	2023-11-19
6	1	1	1	2020-08-30	NULL	2020-09-30
7	1	2	2	2020-08-30	NULL	2020-09-30
8	3	4	2	2020-08-30	NULL	2020-09-30
9	3	4	7	2020-08-30	2022-01-02	2022-01-01
10	3	4	8	2020-08-30	NULL	2022-05-01
NULL	NULL	NULL	NULL	NULL	NULL	NULL

Tables After Insert:

Member table

MemberID	MemberStatus	MemberName	MemberAddress	MemberSuburb	MemberState	MemberExpDate	MemberPhone	FINE_FEES
1	REGULAR	Joe	4 Nowhere St	Here	NSW	2021-09-30	0434567811	2248
2	REGULAR	Pablo	10 Somewhere St	There	ACT	2022-09-30	0412345678	8992
3	REGULAR	Chen	23/9 Faraway Cl	Far	QLD	2020-11-30	0412346578	0
4	REGULAR	Zhang	Dunno St	North	NSW	2020-12-31		0
5	REGULAR	Saleem	44 Magnolia St	South	SA	2020-09-30	1234567811	0
6	SUSPENDED	Homer	Middle of Nowhere	North Ryde	NSW	2020-09-30	1234555811	0
7	REGULAR	sam	smith	MQ	NSW	2021-09-30	NULL	0
8	SUSPENDED	RAM	smith	MQ	NSW	2021-09-30	NULL	0
9	REGULAR	kevin	smith	MQ	NSW	2021-09-30	NULL	0
10	REGULAR	Mathew	smith	MQ	NSW	2021-09-30	NULL	0
11	SUSPENDED	Joice	smith	MQ	NSW	2021-09-19	NULL	30
NULL	NULL	NULL	NULL	NULL	NULL	NULL	NULL	NULL

Borrowedby table

BookIssueID	BranchID	BookID	MemberID	DateBorrowed	DateReturned	ReturnDueDate
1	1	1	2	2023-10-29	NULL	2023-11-19
2	2	4	4	2023-10-29	NULL	2023-11-19
3	2	1	4	2023-10-29	NULL	2023-11-19
4	2	4	1	2023-10-29	NULL	2023-11-19
5	3	5	3	2023-10-29	NULL	2023-11-19
6	1	1	1	2020-08-30	NULL	2020-09-30
7	1	2	2	2020-08-30	NULL	2020-09-30
8	3	4	2	2020-08-30	NULL	2020-09-30
9	3	4	7	2020-08-30	2022-01-02	2022-01-01
10	3	4	8	2020-08-30	NULL	2022-05-01
11	3	4	9	2020-08-30	2022-01-02	2022-01-01
12	3	4	10	2020-08-30	2022-01-02	2022-01-01
13	3	4	11	2020-08-29	2022-01-02	2022-01-01
NULL	NULL	NULL	NULL	NULL	NULL	NULL

Tables After Trigger: Member table after the fees updated to 10

MemberID	MemberStatus	MemberName	MemberAddress	MemberSuburb	MemberState	MemberExpDate	MemberPhone	FINE_FEES
1	REGULAR	Joe	4 Nowhere St	Here	NSW	2021-09-30	0434567811	2248
2	REGULAR	Pablo	10 Somewhere St	There	ACT	2022-09-30	0412345678	8992
3	REGULAR	Chen	23/9 Faraway Cl	Far	QLD	2020-11-30	0412346578	0
4	REGULAR	Zhang	Dunno St	North	NSW	2020-12-31		0
5	REGULAR	Saleem	44 Magnolia St	South	SA	2020-09-30	1234567811	0
6	SUSPENDED	Homer	Middle of Nowhere	North Ryde	NSW	2020-09-30	1234555811	0
7	REGULAR	sam	smith	MQ	NSW	2021-09-30	NULL	0
8	SUSPENDED	RAM	smith	MQ	NSW	2021-09-30	NULL	0
9	REGULAR	kevin	smith	MQ	NSW	2021-09-30	NULL	0
10	REGULAR	Mathew	smith	MQ	NSW	2021-09-30	NULL	0
11	SUSPENDED	Joice	smith	MQ	NSW	2021-09-19	NULL	10
NULL	NULL	NULL	NULL	NULL	NULL	NULL	NULL	NULL

For MemberID =11, MemberStatus remains 'SUSPENDED' after the fees are updated to 10. Trigger executed successfully.

5. <u>Test Scenario:</u> **Update of Member Fields other than 'fine_fees' or 'MemberStatus'**

- **Objective:** To ensure the trigger doesn't execute unnecessarily when other fields are updated.
- **Test Data:** Update any other column (e.g., MemberPhone or MemberAddress) for a member with fine_fees and MemberStatus untouched.
- **Expected Result:** There should be no change in the MemberStatus.
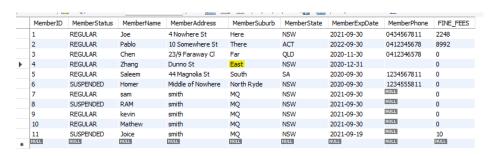
Tables Before Update:

Member table

MemberID	MemberStatus	MemberName	MemberAddress	MemberSuburb	MemberState	MemberExpDate	MemberPhone	FINE_FEES
1	REGULAR	Joe	4 Nowhere St	Here	NSW	2021-09-30	0434567811	2248
2	REGULAR	Pablo	10 Somewhere St	There	ACT	2022-09-30	0412345678	8992
3	REGULAR	Chen	23/9 Faraway Cl	Far	QLD	2020-11-30	0412346578	0
4	REGULAR	Zhang	Dunno St	North	NSW	2020-12-31		0
5	REGULAR	Saleem	44 Magnolia St	South	SA	2020-09-30	1234567811	0
6	SUSPENDED	Homer	Middle of Nowhere	North Ryde	NSW	2020-09-30	1234555811	0
7	REGULAR	sam	smith	MQ	NSW	2021-09-30	NULL	0
8	SUSPENDED	RAM	smith	MQ	NSW	2021-09-30	NULL	0
NULL	NULL	NULL	NULL	NULL	NULL	NULL	NULL	NULL

Borrowedby table

BookIssueID	BranchID	BookID	MemberID	DateBorrowed	DateReturned	ReturnDueDate
1	1	1	2	2023-10-29	NULL	2023-11-19
2	2	4	4	2023-10-29	NULL	2023-11-19
3	2	1	4	2023-10-29	NULL	2023-11-19
4	2	4	1	2023-10-29	NULL	2023-11-19
5	3	5	3	2023-10-29	NULL	2023-11-19
6	1	1	1	2020-08-30	NULL	2020-09-30
7	1	2	2	2020-08-30	NULL	2020-09-30
8	3	4	2	2020-08-30	NULL	2020-09-30
9	3	4	7	2020-08-30	2022-01-02	2022-01-01
10	3	4	8	2020-08-30	NULL	2022-05-01
NULL	NULL	NULL	NULL	NULL	NULL	NULL

Tables After Update:

Member table

MemberID	MemberStatus	MemberName	MemberAddress	MemberSuburb	MemberState	MemberExpDate	MemberPhone	FINE_FEES
1	REGULAR	Joe	4 Nowhere St	Here	NSW	2021-09-30	0434567811	2248
2	REGULAR	Pablo	10 Somewhere St	There	ACT	2022-09-30	0412345678	8992
3	REGULAR	Chen	23/9 Faraway Cl	Far	QLD	2020-11-30	0412346578	0
4	REGULAR	Zhang	Dunno St	East	NSW	2020-12-31		0
5	REGULAR	Saleem	44 Magnolia St	South	SA	2020-09-30	1234567811	0
6	SUSPENDED	Homer	Middle of Nowhere	North Ryde	NSW	2020-09-30	1234555811	0
7	REGULAR	sam	smith	MQ	NSW	2021-09-30	NULL	0
8	SUSPENDED	RAM	smith	MQ	NSW	2021-09-30	NULL	0
9	REGULAR	kevin	smith	MQ	NSW	2021-09-30	NULL	0
10	REGULAR	Mathew	smith	MQ	NSW	2021-09-30	NULL	0
11	SUSPENDED	Joice	smith	MQ	NSW	2021-09-19	NULL	10
NULL	NULL	NULL	NULL	NULL	NULL	NULL	NULL	NULL

Borrowedby table

BookIssueID	BranchID	BookID	MemberID	DateBorrowed	DateReturned	ReturnDueDate
1	1	1	2	2023-10-29	NULL	2023-11-19
2	2	4	4	2023-10-29	NULL	2023-11-19
3	2	1	4	2023-10-29	NULL	2023-11-19
4	2	4	1	2023-10-29	NULL	2023-11-19
5	3	5	3	2023-10-29	NULL	2023-11-19
6	1	1	1	2020-08-30	NULL	2020-09-30
7	1	2	2	2020-08-30	NULL	2020-09-30
8	3	4	2	2020-08-30	NULL	2020-09-30
9	3	4	7	2020-08-30	2022-01-02	2022-01-01
10	3	4	8	2020-08-30	NULL	2022-05-01
NULL	NULL	NULL	NULL	NULL	NULL	NULL

For MemberID =4, when the member suburb is updated no change is observed in the MemberStatus. Trigger executed successfully.

- **Task 3 test plan - Procedure**

To validate the working of the STORE PROCEDURE, **TerminateMemberStatus**, an end-to-end test plan was required. Below are the different test scenarios of the test plan that was considered:

1. Test Scenario: Member with Overdue Items and Suspended Twice in the Last Three Years

- **Objective**: To verify that members who have overdue items and have been suspended at least twice in the past three years have their membership terminated.
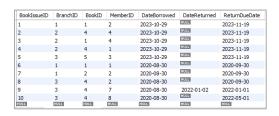
- **Test Data**:

    - A member in **Borrowedby** table with overdue items.

    - Two or more entries for the member in **statuschangehistory** table with 'SUSPENDED' status within the last three years.

- **Expected Result**: The member's **MemberStatus** in the **Member** table should be updated to 'TERMINATE'
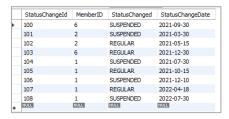
Tables Before Insert:

Member table

MemberID	MemberStatus	MemberName	MemberAddress	MemberSuburb	MemberState	MemberExpDate	MemberPhone	FINE_FEES
1	REGULAR	Joe	4 Nowhere St	Here	NSW	2021-09-30	0434567811	2248
2	REGULAR	Pablo	10 Somewhere St	There	ACT	2022-09-30	0412345678	8992
3	REGULAR	Chen	23/9 Faraway Cl	Far	QLD	2020-11-30	0412346578	0
4	REGULAR	Zhang	Dunno St	North	NSW	2020-12-31		0
5	REGULAR	Saleem	44 Magnolia St	South	SA	2020-09-30	1234567811	0
6	SUSPENDED	Homer	Middle of Nowhere	North Ryde	NSW	2020-09-30	1234555811	0
7	REGULAR	sam	smith	MQ	NSW	2021-09-30	NULL	0
8	SUSPENDED	RAM	smith	MQ	NSW	2021-09-30	NULL	0
NULL	NULL	NULL	NULL	NULL	NULL	NULL	NULL	NULL

Borrowedby table

BookIssueID	BranchID	BookID	MemberID	DateBorrowed	DateReturned	ReturnDueDate
1	1	1	2	2023-10-29	NULL	2023-11-19
2	2	4	4	2023-10-29	NULL	2023-11-19
3	2	1	4	2023-10-29	NULL	2023-11-19
4	2	4	1	2023-10-29	NULL	2023-11-19
5	3	5	3	2023-10-29	NULL	2023-11-19
6	1	1	1	2020-08-30	NULL	2020-09-30
7	1	2	2	2020-08-30	NULL	2020-09-30
8	3	4	2	2020-08-30	NULL	2020-09-30
9	3	4	7	2020-08-30	2022-01-02	2022-01-01
10	3	4	8	2020-08-30	NULL	2022-05-01
NULL	NULL	NULL	NULL	NULL	NULL	NULL

Statuschangehistory table

StatusChangeId	MemberID	StatusChanged	StatusChangeDate
100	6	SUSPENDED	2021-09-30
101	2	SUSPENDED	2021-03-30
102	2	REGULAR	2021-05-15
103	6	REGULAR	2021-12-30
104	1	SUSPENDED	2021-07-30
105	1	REGULAR	2021-10-15
106	1	SUSPENDED	2021-12-10
107	1	REGULAR	2022-04-18
108	1	SUSPENDED	2022-07-30
NULL	NULL	NULL	NULL

Tables After Insert:

Member table

MemberID	MemberStatus	MemberName	MemberAddress	MemberSuburb	MemberState	MemberExpDate	MemberPhone	FINE_FEES
1	SUSPENDED	Joe	4 Nowhere St	Here	NSW	2021-09-30	0434567811	2248
2	REGULAR	Pablo	10 Somewhere St	There	ACT	2022-09-30	0412345678	8992
3	REGULAR	Chen	23/9 Faraway Cl	Far	QLD	2020-11-30	0412346578	0
4	REGULAR	Zhang	Dunno St	East	NSW	2020-12-31		0
5	REGULAR	Saleem	44 Magnolia St	South	SA	2020-09-30	1234567811	0
6	SUSPENDED	Homer	Middle of Nowhere	North Ryde	NSW	2020-09-30	1234555811	0
7	REGULAR	sam	smith	MQ	NSW	2021-09-30	NULL	0
8	SUSPENDED	RAM	smith	MQ	NSW	2021-09-30	NULL	0
9	REGULAR	kevin	smith	MQ	NSW	2021-09-30	NULL	0
10	REGULAR	Mathew	smith	MQ	NSW	2021-09-30	NULL	0
11	SUSPENDED	Joice	smith	MQ	NSW	2021-09-19	NULL	10
13	SUSPENDED	Cleon	smith	MQ	NSW	2021-09-30	NULL	0
NULL	NULL	NULL	NULL	NULL	NULL	NULL	NULL	NULL

Borrowedby table

BookIssueID	BranchID	BookID	MemberID	DateBorrowed	DateReturned	ReturnDueDate
1	1	1	2	2023-10-29	NULL	2023-11-19
2	2	4	4	2023-10-29	NULL	2023-11-19
3	2	1	4	2023-10-29	NULL	2023-11-19
4	2	4	1	2023-10-29	NULL	2023-11-19
5	3	5	3	2023-10-29	NULL	2023-11-19
6	1	1	1	2020-08-30	NULL	2020-09-30
7	1	2	2	2020-08-30	NULL	2020-09-30
8	3	4	2	2020-08-30	NULL	2020-09-30
9	3	4	7	2020-08-30	2022-01-02	2022-01-01
10	3	4	8	2020-08-30	NULL	2022-05-01
11	3	4	9	2020-08-30	2022-01-02	2022-01-01
12	3	4	10	2020-08-30	2022-01-02	2022-01-01
13	3	4	11	2020-08-29	2022-01-02	2022-01-01
15	3	4	13	2020-08-30	NULL	2023-01-01
NULL	NULL	NULL	NULL	NULL	NULL	NULL

Statuschangehistory table

StatusChangeId	MemberID	StatusChanged	StatusChangeDate
100	6	SUSPENDED	2021-09-30
101	2	SUSPENDED	2021-03-30
102	2	REGULAR	2021-05-15
103	6	REGULAR	2021-12-30
104	1	SUSPENDED	2021-07-30
105	1	REGULAR	2021-10-15
106	1	SUSPENDED	2021-12-10
107	1	REGULAR	2022-04-18
111	13	SUSPENDED	2022-06-01
112	13	SUSPENDED	2021-05-01
NULL	NULL	NULL	NULL

Member table after Procedure execution:

MemberID	MemberStatus	MemberName	MemberAddress	MemberSuburb	MemberState	MemberExpDate	MemberPhone	FINE_FEES
1	TERMINATE	Joe	4 Nowhere St	Here	NSW	2021-09-30	0434567811	2248
2	REGULAR	Pablo	10 Somewhere St	There	ACT	2022-09-30	0412345678	8992
3	REGULAR	Chen	23/9 Faraway Cl	Far	QLD	2020-11-30	0412346578	0
4	REGULAR	Zhang	Dunno St	East	NSW	2020-12-31		0
5	REGULAR	Saleem	44 Magnolia St	South	SA	2020-09-30	1234567811	0
6	SUSPENDED	Homer	Middle of Nowhere	North Ryde	NSW	2020-09-30	1234555811	0
7	REGULAR	sam	smith	MQ	NSW	2021-09-30	NULL	0
8	SUSPENDED	RAM	smith	MQ	NSW	2021-09-30	NULL	0
9	REGULAR	kevin	smith	MQ	NSW	2021-09-30	NULL	0
10	REGULAR	Mathew	smith	MQ	NSW	2021-09-30	NULL	0
11	SUSPENDED	Joice	smith	MQ	NSW	2021-09-19	NULL	10
13	TERMINATE	Cleon	smith	MQ	NSW	2021-09-30	NULL	0
NULL	NULL	NULL	NULL	NULL	NULL	NULL	NULL	NULL

The **MemberID**=13, **MemberStatus** is updated to 'TERMINATE' on procedure execution.

2. Test Scenario: Member with Overdue Items but Not Suspended Twice in the Last Three Years

- **Objective**: To check that the member's status is not terminated if they don't meet the suspension count criteria.

- **Test Data**:

    - A member in **Borrowedby** table with overdue items.

- Less than two entries for the member in **statuschangehistory** table with 'SUSPENDED' status within the last three years.

- **Expected Result**: The member's **MemberStatus** should not change.

Tables Before Insert:

Member table

MemberID	MemberStatus	MemberName	MemberAddress	MemberSuburb	MemberState	MemberExpDate	MemberPhone	FINE_FEES
1	TERMINATE	Joe	4 Nowhere St	Here	NSW	2021-09-30	0434567811	2248
2	REGULAR	Pablo	10 Somewhere St	There	ACT	2022-09-30	0412345678	8992
3	REGULAR	Chen	23/9 Faraway Cl	Far	QLD	2020-11-30	0412346578	0
4	REGULAR	Zhang	Dunno St	East	NSW	2020-12-31		0
5	REGULAR	Saleem	44 Magnolia St	South	SA	2020-09-30	1234567811	0
6	SUSPENDED	Homer	Middle of Nowhere	North Ryde	NSW	2020-09-30	1234555811	0
7	REGULAR	sam	smith	MQ	NSW	2021-09-30	NULL	0
8	SUSPENDED	RAM	smith	MQ	NSW	2021-09-30	NULL	0
9	REGULAR	kevin	smith	MQ	NSW	2021-09-30	NULL	0
10	REGULAR	Mathew	smith	MQ	NSW	2021-09-30	NULL	0
11	SUSPENDED	Joice	smith	MQ	NSW	2021-09-19	NULL	10
13	TERMINATE	Cleon	smith	MQ	NSW	2021-09-30	NULL	0
NULL	NULL	NULL	NULL	NULL	NULL	NULL	NULL	NULL

Borrowedby table

BookIssueID	BranchID	BookID	MemberID	DateBorrowed	DateReturned	ReturnDueDate
1	1	1	2	2023-10-29	NULL	2023-11-19
2	2	4	4	2023-10-29	NULL	2023-11-19
3	2	1	4	2023-10-29	NULL	2023-11-19
4	2	4	1	2023-10-29	NULL	2023-11-19
5	3	5	3	2023-10-29	NULL	2023-11-19
6	1	1	1	2020-08-30	NULL	2020-09-30
7	1	2	2	2020-08-30	NULL	2020-09-30
8	3	4	2	2020-08-30	NULL	2020-09-30
9	3	4	7	2020-08-30	2022-01-02	2022-01-01
10	3	4	8	2020-08-30	NULL	2022-05-01
11	3	4	9	2020-08-30	2022-01-02	2022-01-01
12	3	4	10	2020-08-30	2022-01-02	2022-01-01
13	3	4	11	2020-08-29	2022-01-02	2022-01-01
15	3	4	13	2020-08-30	NULL	2023-01-01
NULL	NULL	NULL	NULL	NULL	NULL	NULL

Statuschangehistory table

StatusChangeId	MemberID	StatusChanged	StatusChangeDate
100	6	SUSPENDED	2021-09-30
101	2	SUSPENDED	2021-03-30
102	2	REGULAR	2021-05-15
103	6	REGULAR	2021-12-30
104	1	SUSPENDED	2021-07-30
105	1	REGULAR	2021-10-15
106	1	SUSPENDED	2021-12-10
107	1	REGULAR	2022-04-18
111	13	SUSPENDED	2022-06-01
112	13	SUSPENDED	2021-05-01
NULL	NULL	NULL	NULL

Tables After Insert:

Member table

MemberID	MemberStatus	MemberName	MemberAddress	MemberSuburb	MemberState	MemberExpDate	MemberPhone	FINE_FEES
1	TERMINATE	Joe	4 Nowhere St	Here	NSW	2021-09-30	0434567811	2248
2	REGULAR	Pablo	10 Somewhere St	There	ACT	2022-09-30	0412345678	8992
3	REGULAR	Chen	23/9 Faraway Cl	Far	QLD	2020-11-30	0412346578	0
4	REGULAR	Zhang	Dunno St	East	NSW	2020-12-31		0
5	REGULAR	Saleem	44 Magnolia St	South	SA	2020-09-30	1234567811	0
6	SUSPENDED	Homer	Middle of Nowhere	North Ryde	NSW	2020-09-30	1234555811	0
7	REGULAR	sam	smith	MQ	NSW	2021-09-30	NULL	0
8	SUSPENDED	RAM	smith	MQ	NSW	2021-09-30	NULL	0
9	REGULAR	kevin	smith	MQ	NSW	2021-09-30	NULL	0
10	REGULAR	Mathew	smith	MQ	NSW	2021-09-30	NULL	0
11	SUSPENDED	Joice	smith	MQ	NSW	2021-09-19	NULL	10
13	TERMINATE	Cleon	smith	MQ	NSW	2021-09-30	NULL	0
14	SUSPENDED	Cleon	smith	MQ	NSW	2021-09-30	NULL	0
NULL	NULL	NULL	NULL	NULL	NULL	NULL	NULL	NULL

Borrowedby table

BookIssueID	BranchID	BookID	MemberID	DateBorrowed	DateReturned	ReturnDueDate
1	1	1	2	2023-10-29	NULL	2023-11-19
2	2	4	4	2023-10-29	NULL	2023-11-19
3	2	1	4	2023-10-29	NULL	2023-11-19
4	2	4	1	2023-10-29	NULL	2023-11-19
5	3	5	3	2023-10-29	NULL	2023-11-19
6	1	1	1	2020-08-30	NULL	2020-09-30
7	1	2	2	2020-08-30	NULL	2020-09-30
8	3	4	2	2020-08-30	NULL	2020-09-30
9	3	4	7	2020-08-30	2022-01-02	2022-01-01
10	3	4	8	2020-08-30	NULL	2022-05-01
11	3	4	9	2020-08-30	2022-01-02	2022-01-01
12	3	4	10	2020-08-30	2022-01-02	2022-01-01
13	3	4	11	2020-08-29	2022-01-02	2022-01-01
15	3	4	13	2020-08-30	NULL	2023-01-01
16	3	4	14	2020-08-30	NULL	2023-01-01
NULL	NULL	NULL	NULL	NULL	NULL	NULL

Statuschangehistory table

StatusChangeId	MemberID	StatusChanged	StatusChangeDate
100	6	SUSPENDED	2021-09-30
101	2	SUSPENDED	2021-03-30
102	2	REGULAR	2021-05-15
103	6	REGULAR	2021-12-30
104	1	SUSPENDED	2021-07-30
105	1	REGULAR	2021-10-15
106	1	SUSPENDED	2021-12-10
107	1	REGULAR	2022-04-18
111	13	SUSPENDED	2022-06-01
112	13	SUSPENDED	2021-05-01
113	14	SUSPENDED	2022-06-01
NULL	NULL	NULL	NULL

Member table after Procedure execution:

MemberID	MemberStatus	MemberName	MemberAddress	MemberSuburb	MemberState	MemberExpDate	MemberPhone	FINE_FEES
1	TERMINATE	Joe	4 Nowhere St	Here	NSW	2021-09-30	0434567811	2248
2	REGULAR	Pablo	10 Somewhere St	There	ACT	2022-09-30	0412345678	8992
3	REGULAR	Chen	23/9 Faraway Cl	Far	QLD	2020-11-30	0412346578	0
4	REGULAR	Zhang	Dunno St	East	NSW	2020-12-31		0
5	REGULAR	Saleem	44 Magnolia St	South	SA	2020-09-30	1234567811	0
6	SUSPENDED	Homer	Middle of Nowhere	North Ryde	NSW	2020-09-30	1234555811	0
7	REGULAR	sam	smith	MQ	NSW	2021-09-30	NULL	0
8	SUSPENDED	RAM	smith	MQ	NSW	2021-09-30	NULL	0
9	REGULAR	kevin	smith	MQ	NSW	2021-09-30	NULL	0
10	REGULAR	Mathew	smith	MQ	NSW	2021-09-30	NULL	0
11	SUSPENDED	Joice	smith	MQ	NSW	2021-09-19	NULL	10
13	TERMINATE	Cleon	smith	MQ	NSW	2021-09-30	NULL	0
14	SUSPENDED	Cleon	smith	MQ	NSW	2021-09-30	NULL	0
NULL	NULL	NULL	NULL	NULL	NULL	NULL	NULL	NULL

The **MemberID**=14, **MemberStatus** remained same after procedure execution.