Library Management System – PL/SQL

The various functionality associated with it is depicted as below:

Consider the following:

1. The library has 3 kinds of members

a. Monthly – this member can borrow 4 books

b. Yearly – this member can borrow 2 books

c. Lifetime – This member can be borrow 6 books

2. The same kind of a book cannot be borrowed by a member at one instance.

3. The fine amount should be calculated basing on the issuedate ,returndate and duedate.

4. The fine amount can be 5/- per day.

5. When a book is issued automatically it should reflect in the book table.

Table name

Member

Column name	Data Type	Description
Mem_no	Varchar2(20)	Primary Key
Mem_name	Varchar2(20)	Not Null
Mem_type	Varchar2(20)	(M,Y,L)
No_of_books	Number(4)	
Total_fine	Number(4)	

Book

Column name	Data Type	Description
Book_no	Varchar2(20)	Primary Key
Book_name	Varchar2(20)	Not Null
Author	Varchar2(20)	
Price	Varchar2(20)	
No_of_books	Number(4)	

Trans

Column name	Data Type	Description
Book_no	Varchar2(20)	Foreign key of books
Mem_no	Varchar2(20)	Foreign key of member
Issue_date	Date	Sysdate

Due_date	Date	Sysdate+7
Return_date	date	

-- table member

create table member(mem_no varchar2(20) primary key, mem_name varchar2

(20) not null, mem_type varchar2(20), no_of_books number(4), total_fine number(4));

-- table book

create table book(book_no varchar2(20) primary key, book_name varchar2(20) not null , author varchar2(20), price varchar2(20), no_of_books number(4));

-- table trans

create table trans(book_no varchar2(20), mem_no varchar2(20),issue_date date,due_date date ,return_date date, constraint bid_fkey FOREIGN KEY (book_no) REFERENCES book(book_no),constraint mid_fkey FOREIGN KEY (mem_no) REFERENCES member(mem_no));

--table transaction history

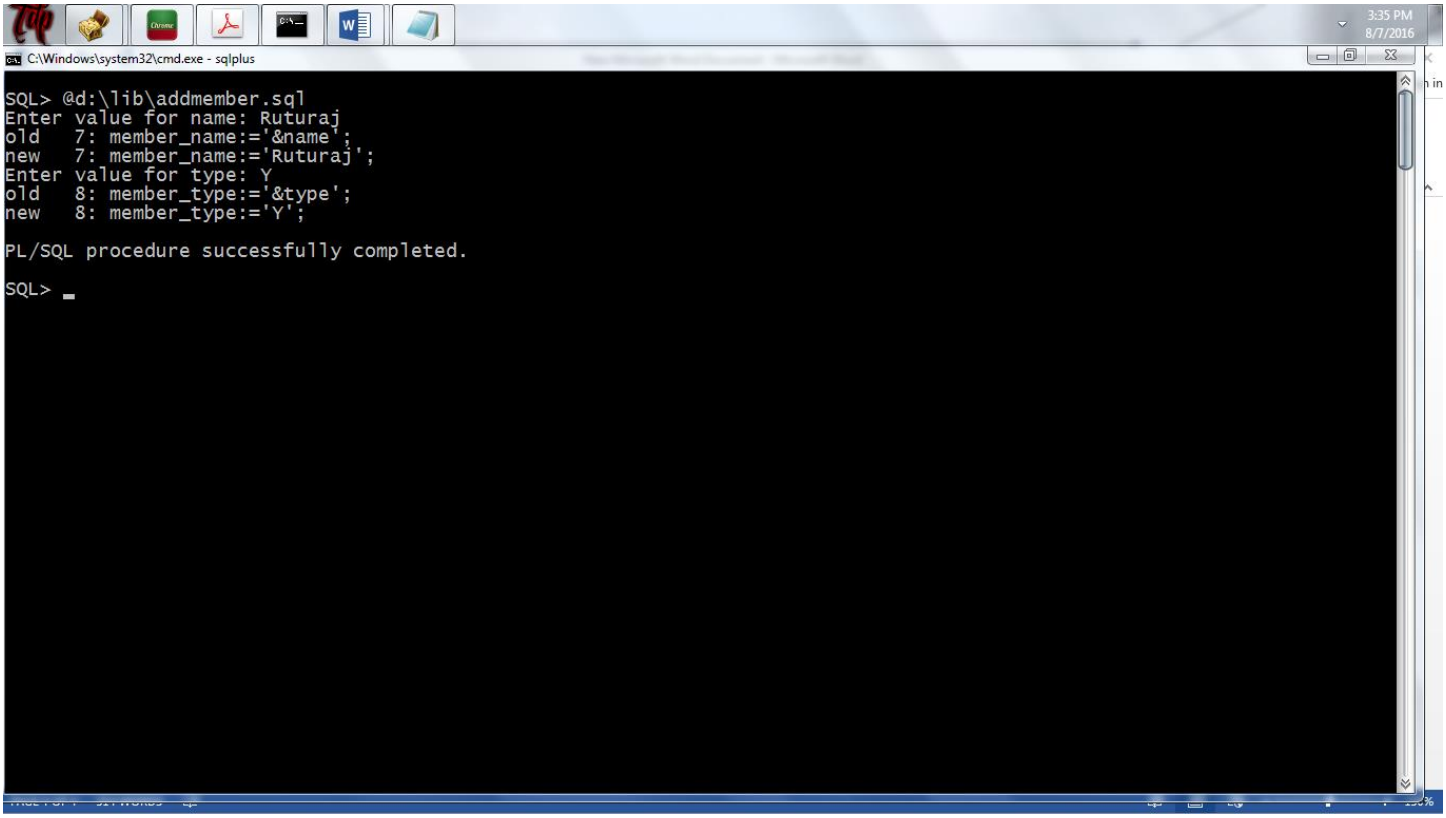
create table transaction_history(book_no varchar2(20), mem_no varchar2(20),issue_date date,due_date date ,return_date date, constraint bid_fkey1 FOREIGN KEY (book_no) REFERENCES book(book_no),constraint mid_fkey1 FOREIGN KEY (mem_no) REFERENCES member(mem_no))

/

```
C:\Windows\system32\cmd.exe - sqlplus

SQL> desc member
 Name                                      Null?    Type
 ----------------------------------------- -------- ----------------------------
 MEM_NO                                    NOT NULL VARCHAR2(20)
 MEM_NAME                                  NOT NULL VARCHAR2(20)
 MEM_TYPE                                           VARCHAR2(20)
 NO_OF_BOOKS                                        NUMBER(4)
 TOTAL_FINE                                         NUMBER(4)

SQL> desc book
 Name                                      Null?    Type
 ----------------------------------------- -------- ----------------------------
 BOOK_NO                                   NOT NULL VARCHAR2(20)
 BOOK_NAME                                 NOT NULL VARCHAR2(20)
 AUTHOR                                             VARCHAR2(20)
 PRICE                                              VARCHAR2(20)
 NO_OF_BOOKS                                        NUMBER(4)

SQL> desc trans
 Name                                      Null?    Type
 ----------------------------------------- -------- ----------------------------
 BOOK_NO                                            VARCHAR2(20)
 MEM_NO                                             VARCHAR2(20)
 ISSUE_DATE                                         DATE
 DUE_DATE                                           DATE
 RETURN_DATE                                        DATE

SQL> select constraint_name,column_name from user_cons_columns where table_name='TRANS';

CONSTRAINT_NAME
--------------------------------------------------------------------------------
COLUMN_NAME
--------------------------------------------------------------------------------
MEM_NO_FKEY
MEM_NO

BOOK_NO_FKEY
BOOK_NO
```

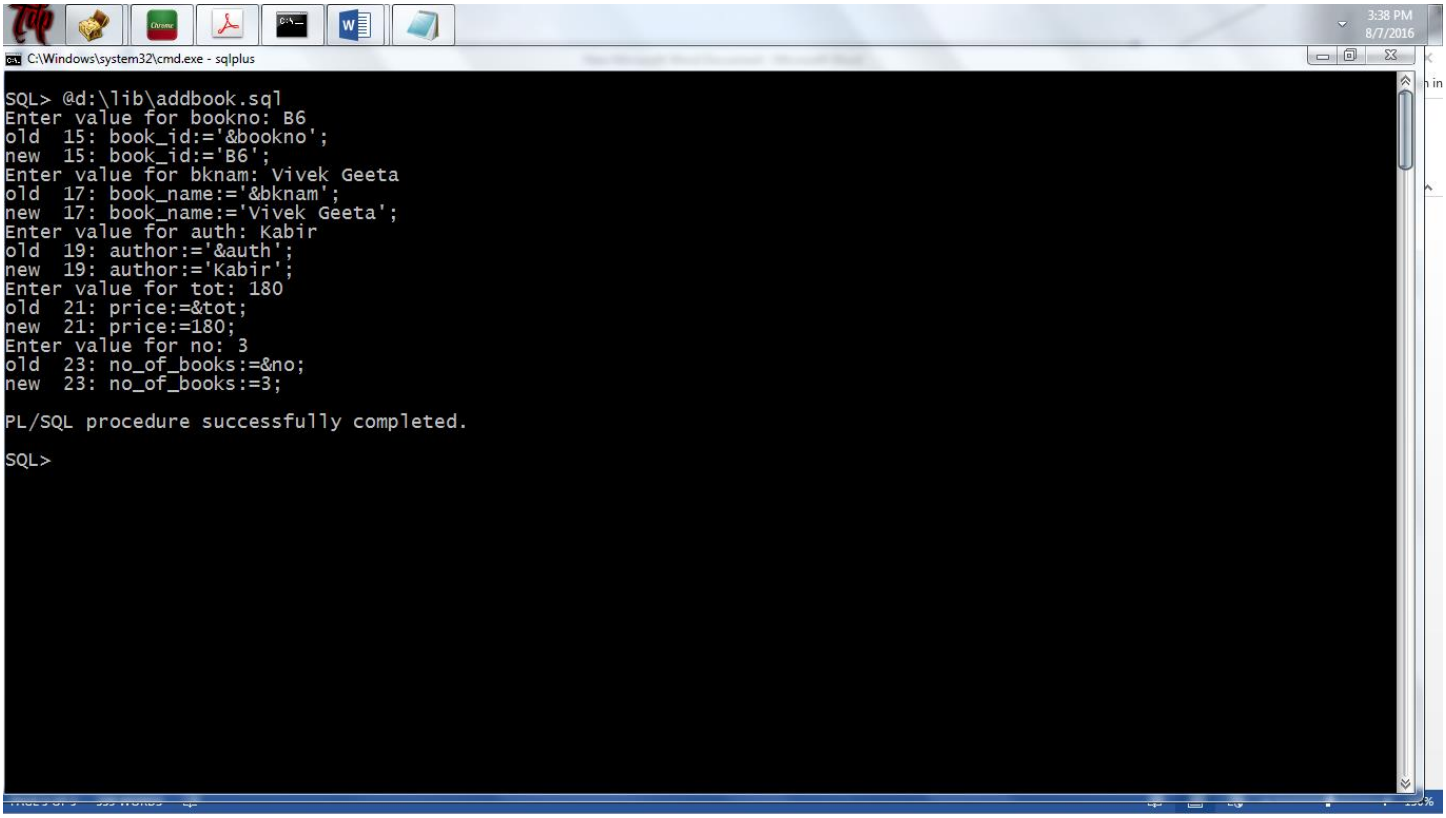
```
--For adding member
declare
member_name varchar2(15);
member_type varchar2(20);
no varchar2(20);
id varchar2(20);
begin
member_name:='&name';
member_type:='&type';
select MAX(mem_no) into no from member;
if no is not null then
id:=no+1;
else
```

```
id:=1;
end if;
insert into member values(id,member_name,member_type,0,0);
dbms_output.put_line('Mr/Mrs/Miss. '||member_name||', your membership id is '||id);
end;
/
```




```
-- for adding book
declare
book_name varchar2(50);
author varchar2(20);
price varchar2(20);
no_of_books number(5);
book_id varchar2(20);
begin
book_id:='&bookno';
book_name:='&bknam';
```

```
author:='&auth';
price:=&tot;
no_of_books:=&no;
insert into book values(book_id,book_name,author,price,no_of_books);
end;
/
```



1. Write a procedure to issue the book to the member.

Proc Name : Issue

Parameters : book_no,mem_no

```
create or replace procedure insert1(book_id varchar2,mem_id number)
is
a boolean default false;
b boolean default false;
c boolean default false;
d boolean default false;
mep number(4);
```

```
tep number(4);
sep number(4);
bep number(4);
mb number(4);
dat varchar2(10);
typ varchar2(10);
expiry_date date;
ddate date;
begin
```

Consideration for issue of book

a. **Book No. must be a valid book no. from the book table or handle exception.**
```
select count(*) into tep from book where book_no = book_id;
if tep = 1
then
dbms_output.put_line('The book '||book_id||' exsist in the library');
else
dbms_output.put_line('The book '||book_id||' does not exsist in the library');
end if;
```
b. **Mem no. Must be a valid Mem no. From member table.**
```
select count(*) into mep from member where mem_no = mem_id;
if mep = 1
then
dbms_output.put_line('The user '||mem_id||' is a member of club');
else
dbms_output.put_line('The user '||mem_id||'  is not a member of club');
end if;
```
c. **The same memno. Cannot borrow the same book without returning the book.**
```
select count(*) into sep from trans where book_no = book_id and
mem_no = mem_id and return_date is null;
if sep = 1
then
dbms_output.put_line('The user already have this book');
end if;
```
d. **If the due date is crossing the expiry date of the member, doesn't issue the book.**
```
select mem_type into typ from member where mem_no=mem_id;
expiry_date := add_months(ROUND(SYSDATE,'MONTH'),1);
```

```
ddate := ROUND(SYSDATE,'YEAR');
if typ='M'
then
        if expiry_date < SYSDATE+7
        then
        a:=true;
        dbms_output.put_line('Your membership expiry date '||

expiry_date||' is before due date '||SYSDATE+7);
        end if;
elsif typ='Y'
then
        if ddate < SYSDATE+7
        then
        a:=true;
        dbms_output.put_line('Your membership expiry date '||

expiry_date||' is before due date '||SYSDATE+7);
        end if;
elsif typ='L'
then
        dbms_output.put_line('You have lifetime membership');
end if;
```

e. If the number of book is already borrowed by the member without returning the book exceeds the membership limit then handle error.

```
select no_of_books into mb from member where mem_no=mem_id;
if typ='M'
then
        if mb >= 4
        then
        b:=true;
        dbms_output.put_line('Your have reached monthly borrow limit of 4 books');
        end if;
elsif typ='Y'
then
        if mb >= 2
        then
        b:=true;
        dbms_output.put_line('Your have reached yearly borrow limit of 2 books');
        end if;
elsif typ='L'
```

```
then
        if mb >= 6
        then
        b:=true;
        dbms_output.put_line('Your have reached lifetime borrow limit of 6 books');
        end if;
end if;
```

f. If the stock of the book is not available then trap the error.

```
select no_of_books into bep from book where book_no=book_id;
if bep >= 1
then
d:= true;
dbms_output.put_line(' The book is available in the library ');
end if;
```

g. If all validations are fulfilled, then enter into transaction table bookno. Memno. Issue will by sysdate and due_date is sysdate+7,return date is null and fine is null.

```
if (tep is not null and mep is not null and b is not null and a is not null and  d is not null and
c is not null)
then
insert into trans values(book_id,mem_id,SYSDATE,SYSDATE+7,NULL);
dbms_output.put_line('its working');
end if;
```

h. On Saturday or Sunday no issue of the books.

```
select to_char(SYSDATE,'DY') into dat from dual;
if dat = 'SUN'
then
dbms_output.put_line('It is '||to_char(SYSDATE,'DAY')||' so cannot issue book.');
elsif dat = 'SAT'
then
dbms_output.put_line('It is '||to_char(SYSDATE,'DAY')||' so cannot issue book.');
else
c:=true;
dbms_output.put_line('It is '||to_char(SYSDATE,'DAY')||' so can issue book.');
end if;
```

Output:

-- simple running for new user

```
C:\Windows\system32\cmd.exe - sqlplus

SQL> @d:\lib\issuedate.sql

Procedure created.

SQL> select * from trans;

BOOK_NO              MEM_NO               ISSUE_DAT DUE_DATE  RETURN_DA
-------------------- -------------------- --------- --------- ---------
B4                   7                    05-AUG-16 12-AUG-16 30-AUG-16
B3                   5                    05-AUG-16 12-AUG-16
B3                   2                    07-AUG-16 14-AUG-16
B6                   3                    07-AUG-16 14-AUG-16
B1                   1                    07-AUG-16 14-AUG-16

SQL> execute insert1('B2',6);
The book B2 exsist in the library
The user 6 is a member of club
The book is available in the library
Issuing book to member 6

PL/SQL procedure successfully completed.

SQL> select * from trans;

BOOK_NO              MEM_NO               ISSUE_DAT DUE_DATE  RETURN_DA
-------------------- -------------------- --------- --------- ---------
B4                   7                    05-AUG-16 12-AUG-16 30-AUG-16
B3                   5                    05-AUG-16 12-AUG-16
B3                   2                    07-AUG-16 14-AUG-16
B6                   3                    07-AUG-16 14-AUG-16
B1                   1                    07-AUG-16 14-AUG-16
B2                   6                    07-AUG-16 14-AUG-16

6 rows selected.

SQL> _
```

-- if user already has issued the book

```
C:\Windows\system32\cmd.exe - sqlplus

SQL> @d:\lib\issuedate.sql

Procedure created.

SQL> select * from trans;

BOOK_NO              MEM_NO               ISSUE_DAT DUE_DATE  RETURN_DA
-------------------- -------------------- --------- --------- ---------
B4                   7                    05-AUG-16 12-AUG-16 30-AUG-16
B3                   5                    05-AUG-16 12-AUG-16
B3                   2                    07-AUG-16 14-AUG-16
B6                   3                    07-AUG-16 14-AUG-16
B1                   1                    07-AUG-16 14-AUG-16
B2                   6                    07-AUG-16 14-AUG-16

6 rows selected.

SQL> execute insert1('B2',6);
The book B2 exsist in the library
The user 6 is a member of club
The user already have this book

PL/SQL procedure successfully completed.

SQL>
```

-- if user can borrow more book or not

```
C:\Windows\system32\cmd.exe - sqlplus

SQL> execute insert1('B2',4);
The book B2 exsist in the library
The user 4 is a member of club
Your have reached monthly borrow limit of 4 books

PL/SQL procedure successfully completed.

SQL>
```

-- if Sunday or Saturday no return of book

```
C:\Windows\system32\cmd.exe - sqlplus

SQL> execute insert1('B4',5);
The book B4 exsist in the library
The user 5 is a member of club
You have lifetime membership
It is SUNDAY    so cannot issue book.

PL/SQL procedure successfully completed.

SQL>
```

2. Write a procedure to return the book.

Proc name : Return

Parameter : book_no,mem_no

```
create OR REPLACE procedure retrn(book_id varchar2, mem_id number)
is
fine number(20);
memid number(20);
retrn_date date not null := '30-AUG-16';
dat varchar2(5);
dd date;
begin
```

Consideration for return book

a. Return of the book is possible only if the member has borrowed the book, check for existence of record in the transaction table.

```
select mem_no into memid from trans where mem_no = mem_id and book_no=book_id;
```

b. Update return_date with the current date and calculate the fine amount by finding the difference between due_date and return_date.

```
update trans set return_date='30-AUG-16' where book_no=book_id and mem_no=memid;
select due_date into dd from trans where book_no=book_id and mem_no=memid;
fine := (retrn_date - dd)*5;
dbms_output.put_line('Fine is '||fine);
```

c. Update the total_fine of that member by add this fine amount with the existing total_fine in the member table.

```
update member set total_fine = fine where mem_no=memid;
```

d. On Saturday or Sunday no return of book.

```
select to_char(SYSDATE,'DY') into dat from dual;
if dat = 'SUN'
then
dbms_output.put_line('It is '||to_char(SYSDATE,'DAY')||' so you cannot return book.');
```

```
end if;
if dat = 'SAT'
then
dbms_output.put_line('It is '||to_char(SYSDATE,'DAY')||' so you cannot return book.');
end if;
```

e. Upon returning the book delete the information from the transaction table and move the data to transaction_history.

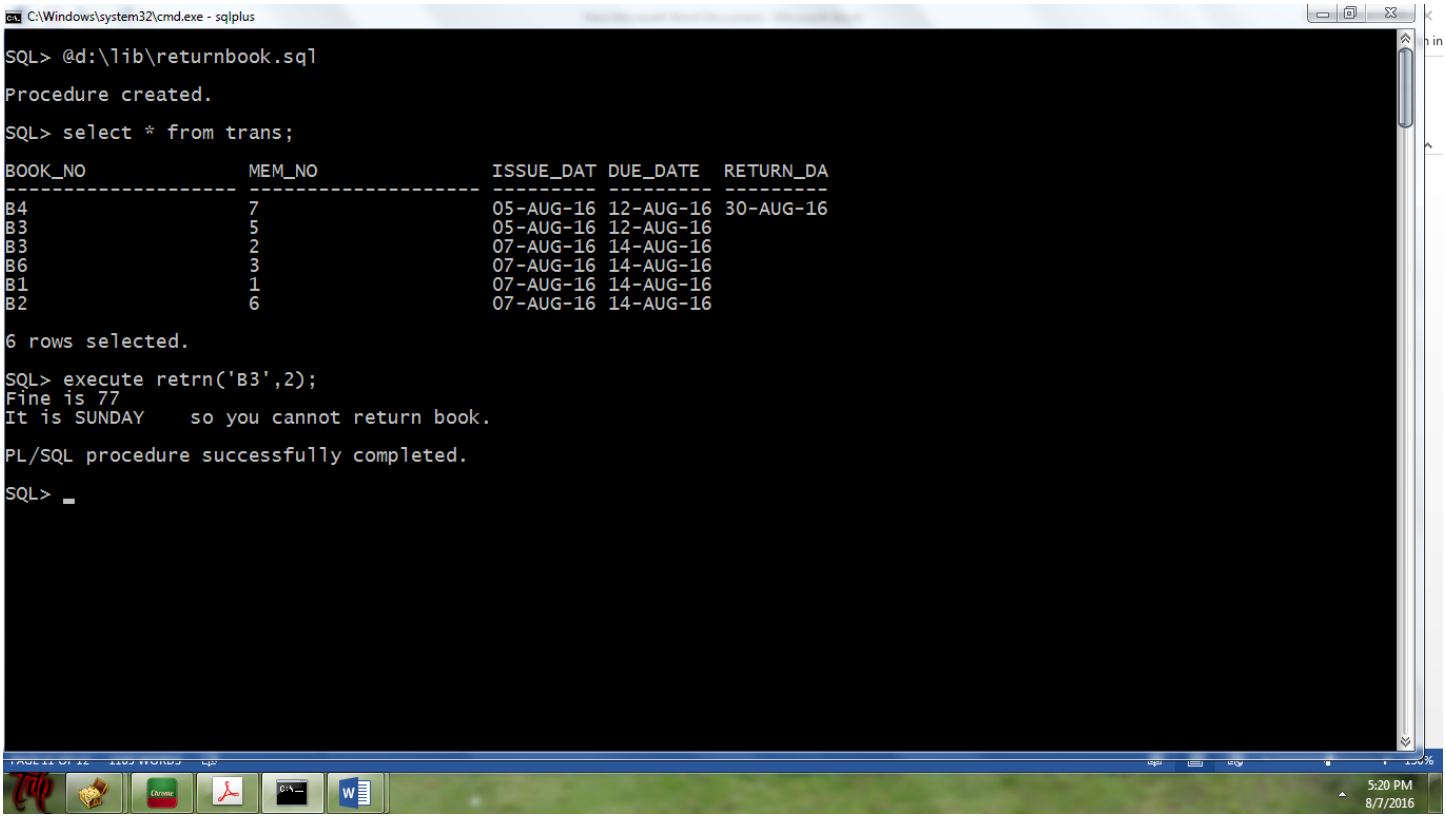
-- used using trigger

f. Create transaction_history as that of transaction table to record old data.

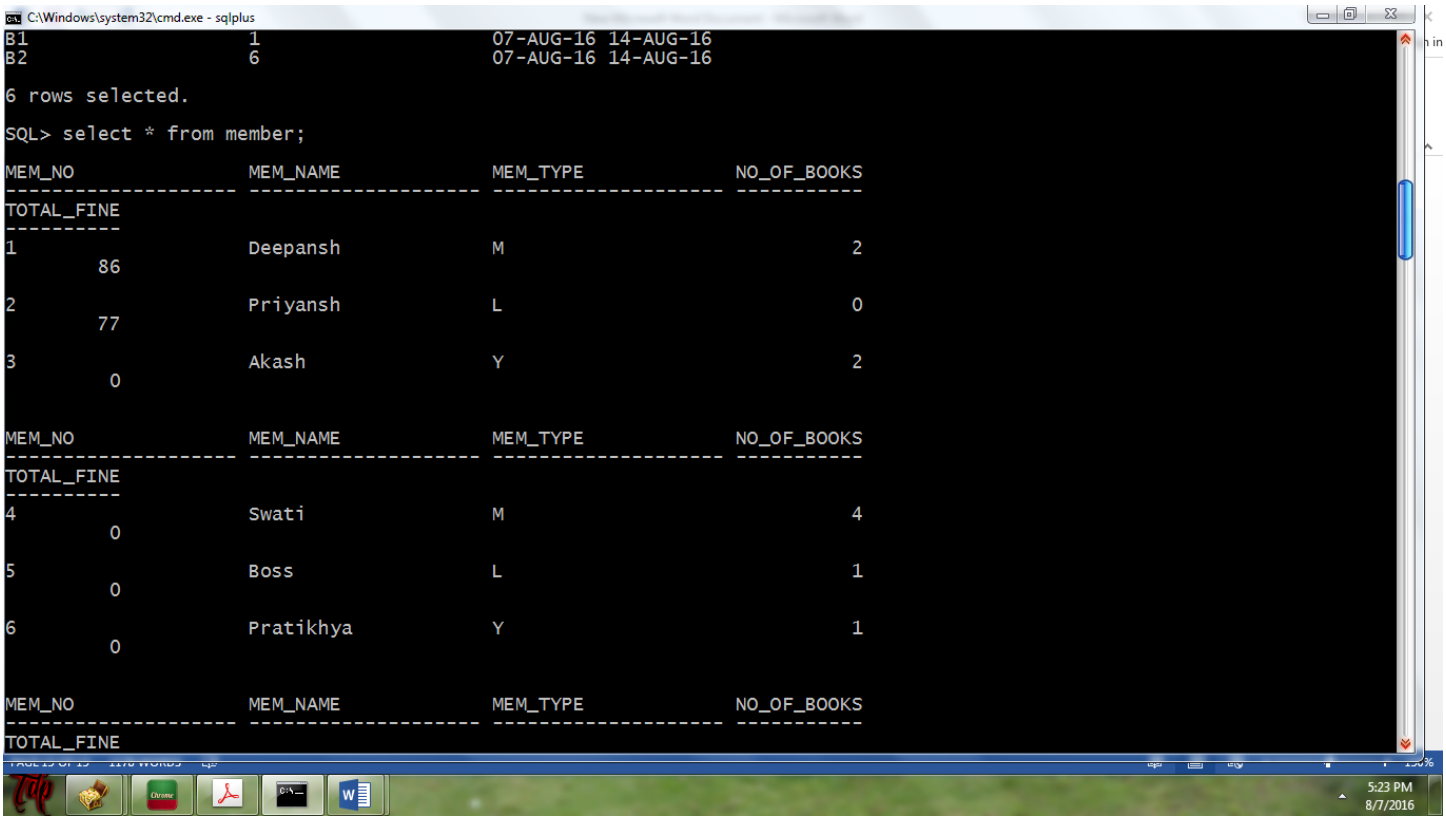
-- table created transaction history

```
EXCEPTION
WHEN NO_DATA_FOUND THEN
dbms_output.put_line('There is no book issued to this member.');
end;
/
```

-- return date is set as 30 august for now to calculate fine



-- the fine is calculated and updated in the member table for mem_id=2

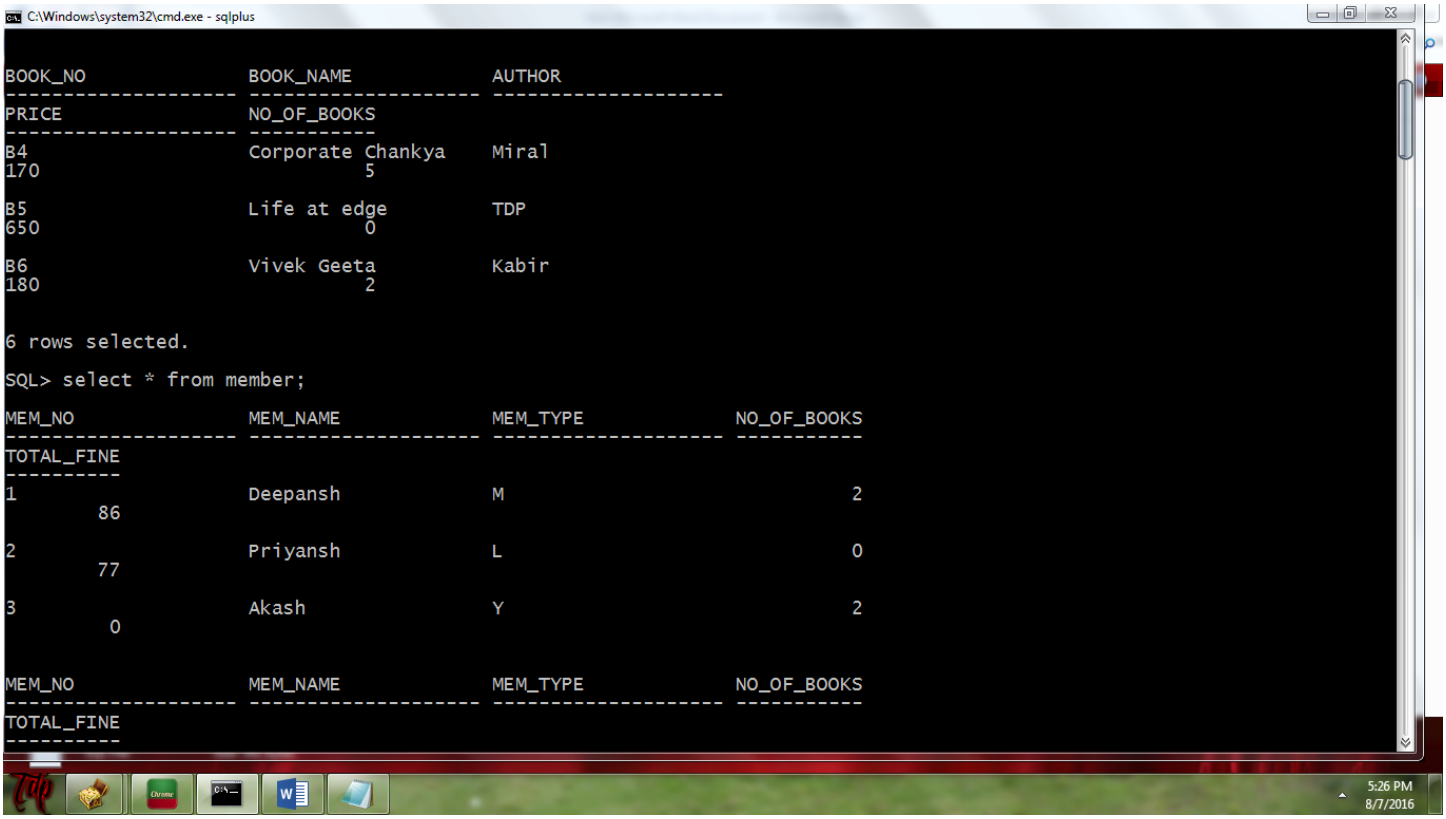


```
C:\Windows\system32\cmd.exe - sqlplus
B1                  1                   07-AUG-16 14-AUG-16
B2                  6                   07-AUG-16 14-AUG-16

6 rows selected.

SQL> select * from member;

MEM_NO               MEM_NAME             MEM_TYPE             NO_OF_BOOKS
-------------------- -------------------- -------------------- -----------
TOTAL_FINE
----------
1                    Deepansh             M                              2
        86

2                    Priyansh             L                              0
        77

3                    Akash                Y                              2
         0


MEM_NO               MEM_NAME             MEM_TYPE             NO_OF_BOOKS
-------------------- -------------------- -------------------- -----------
TOTAL_FINE
----------
4                    Swati                M                              4
         0

5                    Boss                 L                              1
         0

6                    Pratikhya            Y                              1
         0


MEM_NO               MEM_NAME             MEM_TYPE             NO_OF_BOOKS
-------------------- -------------------- -------------------- -----------
TOTAL_FINE
```

3. Write a trigger to automatically increment and decrement the no_of books from the and member table upon issue and return.

```
CREATE OR REPLACE TRIGGER incr_trigger
AFTER INSERT OR UPDATE ON trans
FOR EACH ROW
BEGIN
  IF INSERTING THEN
        UPDATE book
        SET no_of_books = no_of_books-1
        WHERE book_no = :NEW.book_no;
        UPDATE MEMBER
        SET no_of_books = no_of_books+1
        WHERE mem_no = :NEW.mem_no;
  ELSIF UPDATING THEN
        UPDATE book
```

```
        SET no_of_books = no_of_books+1
        WHERE book_no = :old.book_no;
        UPDATE MEMBER
        SET no_of_books = no_of_books-1
        WHERE mem_no = :NEW.mem_no;
        END IF;
END;
/
-- on issue of book
-- before issue of book
```



-- B4 has 5 no of book and priyansh has 0 no_of_books

-- after issuing a book B4 to priyansh member_id 2

```
C:\Windows\system32\cmd.exe - sqlplus
B3                  Monk sold ferrari    arnab goswami
150                           5

BOOK_NO             BOOK_NAME            AUTHOR
------------------- -------------------- --------------------
PRICE               NO_OF_BOOKS
------------------- -----------
B4                  Corporate Chankya    Miral
170                           4

B5                  Life at edge         TDP
650                           0

B6                  Vivek Geeta          Kabir
180                           2

6 rows selected.

SQL> select * from member;

MEM_NO              MEM_NAME             MEM_TYPE             NO_OF_BOOKS
------------------- -------------------- -------------------- -----------
TOTAL_FINE
----------
1                   Deepansh             M                            2
        86

2                   Priyansh             L                            1
        77

3                   Akash                Y                            2
         0

MEM_NO              MEM_NAME             MEM_TYPE             NO_OF_BOOKS
------------------- -------------------- -------------------- -----------
```

-- same happens for return for B6 for member_id of akash i.e. 3

```
C:\Windows\system32\cmd.exe - sqlplus
200                           1

B3                  Monk sold ferrari    arnab goswami
150                           5

BOOK_NO             BOOK_NAME            AUTHOR
------------------- -------------------- --------------------
PRICE               NO_OF_BOOKS
------------------- -----------
B4                  Corporate Chankya    Miral
170                           4

B5                  Life at edge         TDP
650                           0

B6                  Vivek Geeta          Kabir
180                           3

6 rows selected.

SQL> select * from member;

MEM_NO              MEM_NAME             MEM_TYPE             NO_OF_BOOKS
------------------- -------------------- -------------------- -----------
TOTAL_FINE
----------
1                   Deepansh             M                            2
        86

2                   Priyansh             L                            1
        77

3                   Akash                Y                            1
        77
```

4. Write a trigger to move the data from the transaction to transaction_history table upon deletion.

create or replace trigger move_trigger

before delete on trans

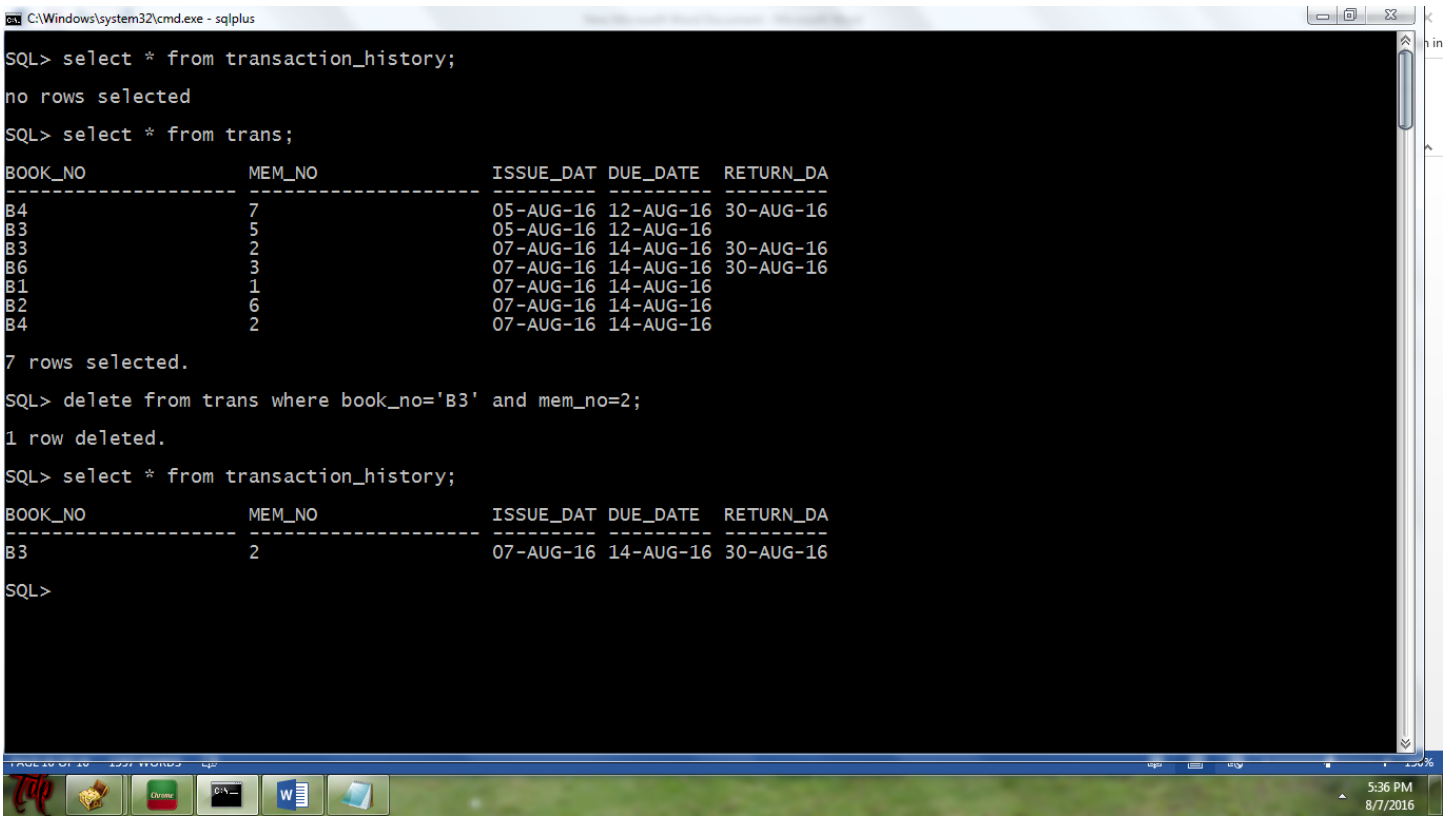
for each row

begin

insert into transaction_history values(:old.book_no,:old.mem_no,:old.issue_date,:old.due_date,:old.return_date);

end;

/



-- hence the built library management system meets all the requirements specified.