



CSE 4410
Database Management Systems II
Lab 4

Introduction

In this lab, we explored various PL/SQL queries on a database containing tables for Transaction, Balance, AccountProperty, Account etc. The followings are the tasks and queries that were completed

Pre task

Explanation

We have to create the table using the schema picture provided To accomplish that task, we write the following commands.

Code

```
1  CREATE TABLE Transaction(  
2  TID INT PRIMARY KEY,  
3  AccNo INT,  
4  Amount NUMERIC,  
5  TransactionDate TIMESTAMP,  
6  FOREIGN KEY (AccNo) references Account  
7  );  
8  
9  CREATE TABLE Balance(  
10  AccNo INT,  
11  PrincipalAmount NUMERIC,  
12  ProfitAmount NUMERIC,  
13  FOREIGN KEY (AccNo) references Account  
14  );  
15  
16  CREATE TABLE AccountProperty(  
17  ID INT PRIMARY KEY,  
18  Name VARCHAR2(20),  
19  ProfitRate NUMERIC,  
20  GracePeriod INT  
21  );  
22  
23  CREATE TABLE Account(  
24  ID INT PRIMARY KEY,
```

```
25     Name VARCHAR2(20),
26     AccCode INT UNIQUE,
27     OpeningDate TIMESTAMP,
28     LastDateInterest TIMESTAMP,
29     FOREIGN KEY (AccCode) references AccountProperty
30 );
```

Task 1

Write a function to calculate the current balance from the transactions.

Explanation of Task

We have to create a function that takes account no as input and returns the balance of that account as output.

Code

```
1 CREATE OR REPLACE FUNCTION CALCULATE_BALANCE(ACC_NO INT)
2 RETURN NUMERIC
3 AS
4     CURRENT_BALANCE Balance.PrincipalAmount%TYPE;
5 BEGIN
6
7     SELECT PrincipalAmount INTO CURRENT_BALANCE FROM Balance WHERE AccNo = ACC_NO;
8
9     FOR I IN
10        (SELECT Amount FROM Transaction WHERE AccNo = ACC_NO) loop
11        CURRENT_BALANCE:= CURRENT_BALANCE+I.Amount;
12    end loop;
13 END;
14 /
```

Difficulties

Very straightforward function so no difficulties were faced here.

Task 2

Write another function to calculate the profit based on profitRate, amount and duration. Take account id as input and return profit, balance before profit, and balance after profit.

Explanation of Task

Since a table of profitrate, name, grace period is given, we can calculate how much profit an account receives in total after every grace period is over. However, for that we have to insert some values first.

Code

```
1  INSERT INTO Account VALUES(1, 'Mamun', 2002, TO_TIMESTAMP('12-JAN-2020 11:45:00','DD-MON-
    YYYY HH24:MI:SS'),
2  TO_TIMESTAMP('25-JAN-2023 11:45:00','DD-MON-YYYY HH24:MI:SS'));
3  INSERT INTO Account VALUES(2, 'Tahlil', 3003, TO_TIMESTAMP('11-JUN-2018 13:15:00','DD-MON
    -YYYY HH24:MI:SS'),
4  TO_TIMESTAMP('13-SEP-2022 11:45:00','DD-MON-YYYY HH24:MI:SS'));
5  INSERT INTO Account VALUES(3, 'Ridun', 4004, TO_TIMESTAMP('30-MAR-2016 8:45:00','DD-MON-
    YYYY HH24:MI:SS'),
6  TO_TIMESTAMP('21-AUG-2022 11:45:00','DD-MON-YYYY HH24:MI:SS'));
7  INSERT INTO Account VALUES(4, 'Muaz', 5005, TO_TIMESTAMP('21-JULY-2019 9:20:00','DD-MON-
    YYYY HH24:MI:SS'),
8  TO_TIMESTAMP('30-MAR-2022 11:45:00','DD-MON-YYYY HH24:MI:SS'));
9
10 INSERT INTO AccountProperty VALUES(2002, 'monthly', 2.8, 1);
11 INSERT INTO AccountProperty VALUES(3003, 'quarterly', 4.2, 4);
12 INSERT INTO AccountProperty VALUES(4004, 'biyearly', 6.8, 6);
13 INSERT INTO AccountProperty VALUES(5005, 'yearly', 8, 1);
14
15 CREATE OR REPLACE TYPE BALANCE_TYPE AS OBJECT(
16     PROFIT NUMERIC,
17     BALANCE_BEFORE NUMERIC,
18     BALANCE_AFTER NUMERIC
19 );
20 /
21
22 CREATE OR REPLACE TYPE BALANCE_TABLE AS TABLE OF BALANCE_TYPE;
23 /
24
25 CREATE OR REPLACE FUNCTION CALCULATE_PROFIT(ACCOUNT_ID INT)
26 RETURN BALANCE_TABLE
27 IS
28     BT BALANCE_TABLE;
29     BALANCE_BEFORE NUMERIC;
30     BALANCE_AFTER NUMERIC;
31     PROFIT NUMERIC;
32     MONTHS NUMERIC;
33     GRACE_PERIOD INT;
34 BEGIN
35     SELECT PrincipalAmount INTO BALANCE_BEFORE
36     FROM Balance WHERE AccNo = ACCOUNT_ID;
37
38     SELECT MONTHS_BETWEEN(SYSDATE, LastDateInterest) INTO MONTHS FROM Account
39     WHERE ID = ACCOUNT_ID;
40
41     SELECT GracePeriod INTO GRACE_PERIOD
42     FROM AccountProperty WHERE ID = (
43         SELECT AccCode FROM Account WHERE ID = Account.ID
44     );
45
46     SELECT ProfitRate INTO PROFIT
47     FROM AccountProperty WHERE ID = (
48         SELECT AccCode FROM Account WHERE ID = Account.ID
```

```

49     );
50
51     IF(MOD(MONTHS, GRACE_PERIOD) = 0) THEN
52         PROFIT := BALANCE_BEFORE * (PROFIT/100) * (MONTHS / GRACE_PERIOD);
53     ELSIF(MONTHS > GRACE_PERIOD) THEN
54         PROFIT := BALANCE_BEFORE * (PROFIT/100) * (MOD(MONTHS, GRACE_PERIOD));
55     END IF;
56
57     BALANCE_AFTER := BALANCE_BEFORE + PROFIT;
58
59     SELECT BALANCE_TYPE(PROFIT, BALANCE_BEFORE, BALANCE_AFTER) BULK COLLECT INTO BT FROM
        DUAL;
60
61     RETURN BT;
62 END;
63 /

```

Difficulties

We have to remember that we need to create a table type object and then a table using that object in order to return a copy of that table from a function. We also have to remember that in order to insert values in that table, we have to use something called BULK COLLECT.

Task 3

Write a procedure to calculate all accounts' profit (i.e. profit will be calculated if it satisfies conditions). Use the cursor for loop for this problem. The procedure will insert the appropriate record in its Amounts table.

Explanation of Task

We are to use a cursor to access profit of each account associated with an ID. Then we run a loop to loop through each ID from account table and insert profit for each account as records inside Balance table.

Code

```

1  CREATE OR REPLACE PROCEDURE PROFIT_INSERTION
2  IS
3  CURR_PROFIT NUMERIC;
4
5  CURSOR C1 (GIVEN_ID INT) IS
6  SELECT PROFIT FROM TABLE (CALCULATE_PROFIT(GIVEN_ID));
7
8  BEGIN
9      FOR I IN (SELECT ID FROM ACCOUNT) LOOP
10         OPEN C1(I.ID);
11         FETCH C1 INTO CURR_PROFIT;
12         EXIT WHEN C1%NOTFOUND;
13         INSERT INTO BALANCE (AccNo, ProfitAmount) VALUES (I.ID, CURR_PROFIT);

```

```
14      END LOOP;  
15  END ;  
16 /
```

Difficulties

First of all, FROM TABLE keyword needs to be used in order to fetch a table from CALCULATE_TABLE function. Secondly, we have to remember to open the cursor for each ID then fetch also define an exit condition.