**EXERCISE 7: Packages**

***Scenario 1: Group all customer-related procedures and functions into a package.***

**QUESTION: Create a package CustomerManagement with procedures for adding a new customer, updating customer details, and a function to get customer balance.**

CREATE OR REPLACE PACKAGE CustomerManagement AS

PROCEDURE AddCustomer(p\_CustomerID NUMBER, p\_Name VARCHAR2, p\_DOB DATE, p\_Balance NUMBER);

PROCEDURE UpdateCustomer(p\_CustomerID NUMBER, p\_Name VARCHAR2, p\_DOB DATE, p\_Balance NUMBER);

FUNCTION GetCustomerBalance(p\_CustomerID NUMBER) RETURN NUMBER;

END CustomerManagement;

CREATE OR REPLACE PACKAGE BODY CustomerManagement AS

PROCEDURE AddCustomer(p\_CustomerID NUMBER, p\_Name VARCHAR2, p\_DOB DATE, p\_Balance NUMBER) IS

BEGIN

INSERT INTO Customers (CustomerID, Name, DOB, Balance, LastModified)

VALUES (p\_CustomerID, p\_Name, p\_DOB, p\_Balance, SYSDATE);

EXCEPTION

WHEN DUP\_VAL\_ON\_INDEX THEN

DBMS\_OUTPUT.PUT\_LINE('Customer with ID ' || p\_CustomerID || ' already exists.');

WHEN OTHERS THEN

DBMS\_OUTPUT.PUT\_LINE('Error occurred while adding customer: ' || SQLERRM);

END AddCustomer;

PROCEDURE UpdateCustomer(p\_CustomerID NUMBER, p\_Name VARCHAR2, p\_DOB DATE, p\_Balance NUMBER) IS

BEGIN

UPDATE Customers

SET Name = p\_Name, DOB = p\_DOB, Balance = p\_Balance, LastModified = SYSDATE

WHERE CustomerID = p\_CustomerID;

IF SQL%ROWCOUNT = 0 THEN

DBMS\_OUTPUT.PUT\_LINE('Customer with ID ' || p\_CustomerID || ' not found.');

END IF;

EXCEPTION

WHEN OTHERS THEN

DBMS\_OUTPUT.PUT\_LINE('Error occurred while updating customer: ' || SQLERRM);

END UpdateCustomer;

FUNCTION GetCustomerBalance(p\_CustomerID NUMBER) RETURN NUMBER IS

v\_balance NUMBER;

BEGIN

SELECT Balance INTO v\_balance

FROM Customers

WHERE CustomerID = p\_CustomerID;

RETURN v\_balance;

EXCEPTION

WHEN NO\_DATA\_FOUND THEN

RETURN NULL;

WHEN OTHERS THEN

DBMS\_OUTPUT.PUT\_LINE('Error occurred while retrieving customer balance: ' || SQLERRM);

RETURN NULL;

END GetCustomerBalance;

END CustomerManagement;

***Scenario 2: Create a package to manage employee data.***

**QUESTION: Write a package EmployeeManagement with procedures to hire new employees, update employee details, and a function to calculate annual salary.**

CREATE OR REPLACE PACKAGE EmployeeManagement AS

PROCEDURE HireEmployee(p\_EmployeeID NUMBER, p\_Name VARCHAR2, p\_Position VARCHAR2, p\_Salary NUMBER, p\_Department VARCHAR2, p\_HireDate DATE);

PROCEDURE UpdateEmployee(p\_EmployeeID NUMBER, p\_Name VARCHAR2, p\_Position VARCHAR2, p\_Salary NUMBER, p\_Department VARCHAR2);

FUNCTION CalculateAnnualSalary(p\_EmployeeID NUMBER) RETURN NUMBER;

END EmployeeManagement;

CREATE OR REPLACE PACKAGE BODY EmployeeManagement AS

PROCEDURE HireEmployee(p\_EmployeeID NUMBER, p\_Name VARCHAR2, p\_Position VARCHAR2, p\_Salary NUMBER, p\_Department VARCHAR2, p\_HireDate DATE) IS

BEGIN

INSERT INTO Employees (EmployeeID, Name, Position, Salary, Department, HireDate)

VALUES (p\_EmployeeID, p\_Name, p\_Position, p\_Salary, p\_Department, p\_HireDate);

EXCEPTION

WHEN DUP\_VAL\_ON\_INDEX THEN

DBMS\_OUTPUT.PUT\_LINE('Error: Employee with ID ' || p\_EmployeeID || ' already exists.');

WHEN OTHERS THEN

DBMS\_OUTPUT.PUT\_LINE('Error occurred while hiring employee: ' || SQLERRM);

END HireEmployee;

PROCEDURE UpdateEmployee(p\_EmployeeID NUMBER, p\_Name VARCHAR2, p\_Position VARCHAR2, p\_Salary NUMBER, p\_Department VARCHAR2) IS

BEGIN

UPDATE Employees

SET Name = p\_Name, Position = p\_Position, Salary = p\_Salary, Department = p\_Department

WHERE EmployeeID = p\_EmployeeID;

IF SQL%ROWCOUNT = 0 THEN

DBMS\_OUTPUT.PUT\_LINE('Error: Employee with ID ' || p\_EmployeeID || ' not found.');

END IF;

EXCEPTION

WHEN OTHERS THEN

DBMS\_OUTPUT.PUT\_LINE('Error occurred while updating employee: ' || SQLERRM);

END UpdateEmployee;

FUNCTION CalculateAnnualSalary(p\_EmployeeID NUMBER) RETURN NUMBER IS

v\_salary NUMBER;

BEGIN

SELECT Salary INTO v\_salary

FROM Employees

WHERE EmployeeID = p\_EmployeeID;

RETURN v\_salary \* 12;

EXCEPTION

WHEN NO\_DATA\_FOUND THEN

RETURN NULL;

WHEN OTHERS THEN

DBMS\_OUTPUT.PUT\_LINE('Error occurred while calculating annual salary for Employee ID ' || p\_EmployeeID || ': ' || SQLERRM);

RETURN NULL;

END CalculateAnnualSalary;

END EmployeeManagement;

***Scenario 3: Group all account-related operations into a package.***

**QUESTION: Create a package AccountOperations with procedures for opening a new account, closing an account, and a function to get the total balance of a customer across all accounts.**

CREATE OR REPLACE PACKAGE AccountOperations AS

PROCEDURE OpenAccount(p\_AccountID NUMBER, p\_CustomerID NUMBER, p\_AccountType VARCHAR2, p\_Balance NUMBER);

PROCEDURE CloseAccount(p\_AccountID NUMBER);

FUNCTION GetTotalBalance(p\_CustomerID NUMBER) RETURN NUMBER;

END AccountOperations;

CREATE OR REPLACE PACKAGE BODY AccountOperations AS

PROCEDURE OpenAccount(p\_AccountID NUMBER, p\_CustomerID NUMBER, p\_AccountType VARCHAR2, p\_Balance NUMBER) IS

BEGIN

INSERT INTO Accounts (AccountID, CustomerID, AccountType, Balance, LastModified)

VALUES (p\_AccountID, p\_CustomerID, p\_AccountType, p\_Balance, SYSDATE);

EXCEPTION

WHEN DUP\_VAL\_ON\_INDEX THEN

DBMS\_OUTPUT.PUT\_LINE('Error: Account with ID ' || p\_AccountID || ' already exists.');

WHEN OTHERS THEN

DBMS\_OUTPUT.PUT\_LINE('Error occurred while opening account: ' || SQLERRM);

END OpenAccount;

PROCEDURE CloseAccount(p\_AccountID NUMBER) IS

BEGIN

DELETE FROM Accounts

WHERE AccountID = p\_AccountID;

IF SQL%ROWCOUNT = 0 THEN

DBMS\_OUTPUT.PUT\_LINE('Error: Account with ID ' || p\_AccountID || ' not found.');

END IF;

EXCEPTION

WHEN OTHERS THEN

DBMS\_OUTPUT.PUT\_LINE('Error occurred while closing account: ' || SQLERRM);

END CloseAccount;

FUNCTION GetTotalBalance(p\_CustomerID NUMBER) RETURN NUMBER IS

v\_totalBalance NUMBER;

BEGIN

SELECT NVL(SUM(Balance), 0) INTO v\_totalBalance

FROM Accounts

WHERE CustomerID = p\_CustomerID;

RETURN v\_totalBalance;

EXCEPTION

WHEN OTHERS THEN

DBMS\_OUTPUT.PUT\_LINE('Error occurred while calculating total balance for Customer ID ' || p\_CustomerID || ': ' || SQLERRM);

RETURN 0;

END GetTotalBalance;

END AccountOperations;