**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 to add a new customer

PROCEDURE AddCustomer(

p\_CustomerID IN NUMBER,

p\_Name IN VARCHAR2,

p\_DOB IN DATE,

p\_Balance IN NUMBER

);

-- Procedure to update customer details

PROCEDURE UpdateCustomer(

p\_CustomerID IN NUMBER,

p\_Name IN VARCHAR2,

p\_Balance IN NUMBER

);

-- Function to get the balance of a customer

FUNCTION GetCustomerBalance(p\_CustomerID IN NUMBER) RETURN NUMBER;

END CustomerManagement;

/

CREATE OR REPLACE PACKAGE BODY CustomerManagement AS

-- Procedure to add a new customer

PROCEDURE AddCustomer(

p\_CustomerID IN NUMBER,

p\_Name IN VARCHAR2,

p\_DOB IN DATE,

p\_Balance IN 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('Error: Customer with ID ' || p\_CustomerID || ' already exists.');

WHEN OTHERS THEN

DBMS\_OUTPUT.PUT\_LINE('Error: ' || SQLERRM);

END AddCustomer;

-- Procedure to update customer details

PROCEDURE UpdateCustomer(

p\_CustomerID IN NUMBER,

p\_Name IN VARCHAR2,

p\_Balance IN NUMBER

) IS

BEGIN

UPDATE Customers

SET Name = p\_Name,

Balance = p\_Balance,

LastModified = SYSDATE

WHERE CustomerID = p\_CustomerID;

IF SQL%ROWCOUNT = 0 THEN

DBMS\_OUTPUT.PUT\_LINE('Error: Customer with ID ' || p\_CustomerID || ' does not exist.');

END IF;

EXCEPTION

WHEN OTHERS THEN

DBMS\_OUTPUT.PUT\_LINE('Error: ' || SQLERRM);

END UpdateCustomer;

-- Function to get the balance of a customer

FUNCTION GetCustomerBalance(p\_CustomerID IN 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

DBMS\_OUTPUT.PUT\_LINE('Error: Customer with ID ' || p\_CustomerID || ' does not exist.');

RETURN NULL;

WHEN OTHERS THEN

DBMS\_OUTPUT.PUT\_LINE('Error: ' || SQLERRM);

RETURN NULL;

END GetCustomerBalance;

END CustomerManagement;

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**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 to hire a new employee

PROCEDURE HireEmployee(

p\_EmployeeID IN NUMBER,

p\_Name IN VARCHAR2,

p\_Position IN VARCHAR2,

p\_Salary IN NUMBER,

p\_Department IN VARCHAR2,

p\_HireDate IN DATE

);

-- Procedure to update employee details

PROCEDURE UpdateEmployee(

p\_EmployeeID IN NUMBER,

p\_Name IN VARCHAR2,

p\_Position IN VARCHAR2,

p\_Salary IN NUMBER,

p\_Department IN VARCHAR2

);

-- Function to calculate annual salary of an employee

FUNCTION CalculateAnnualSalary(p\_EmployeeID IN NUMBER) RETURN NUMBER;

END EmployeeManagement;

/

CREATE OR REPLACE PACKAGE BODY EmployeeManagement AS

-- Procedure to hire a new employee

PROCEDURE HireEmployee(

p\_EmployeeID IN NUMBER,

p\_Name IN VARCHAR2,

p\_Position IN VARCHAR2,

p\_Salary IN NUMBER,

p\_Department IN VARCHAR2,

p\_HireDate IN 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: ' || SQLERRM);

END HireEmployee;

-- Procedure to update employee details

PROCEDURE UpdateEmployee(

p\_EmployeeID IN NUMBER,

p\_Name IN VARCHAR2,

p\_Position IN VARCHAR2,

p\_Salary IN NUMBER,

p\_Department IN 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 || ' does not exist.');

END IF;

EXCEPTION

WHEN OTHERS THEN

DBMS\_OUTPUT.PUT\_LINE('Error: ' || SQLERRM);

END UpdateEmployee;

-- Function to calculate annual salary of an employee

FUNCTION CalculateAnnualSalary(p\_EmployeeID IN 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

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

RETURN NULL;

WHEN OTHERS THEN

DBMS\_OUTPUT.PUT\_LINE('Error: ' || SQLERRM);

RETURN NULL;

END CalculateAnnualSalary;

END EmployeeManagement;

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**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 to open a new account

PROCEDURE OpenAccount(

p\_AccountID IN NUMBER,

p\_CustomerID IN NUMBER,

p\_AccountType IN VARCHAR2,

p\_Balance IN NUMBER

);

-- Procedure to close an account

PROCEDURE CloseAccount(

p\_AccountID IN NUMBER

);

-- Function to get the total balance of a customer across all accounts

FUNCTION GetTotalBalance(p\_CustomerID IN NUMBER) RETURN NUMBER;

END AccountOperations;

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CREATE OR REPLACE PACKAGE BODY AccountOperations AS

-- Procedure to open a new account

PROCEDURE OpenAccount(

p\_AccountID IN NUMBER,

p\_CustomerID IN NUMBER,

p\_AccountType IN VARCHAR2,

p\_Balance IN 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: ' || SQLERRM);

END OpenAccount;

-- Procedure to close an account

PROCEDURE CloseAccount(

p\_AccountID IN 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 || ' does not exist.');

END IF;

EXCEPTION

WHEN OTHERS THEN

DBMS\_OUTPUT.PUT\_LINE('Error: ' || SQLERRM);

END CloseAccount;

-- Function to get the total balance of a customer across all accounts

FUNCTION GetTotalBalance(p\_CustomerID IN NUMBER) RETURN NUMBER IS

v\_total\_balance NUMBER;

BEGIN

SELECT SUM(Balance)

INTO v\_total\_balance

FROM Accounts

WHERE CustomerID = p\_CustomerID;

RETURN NVL(v\_total\_balance, 0); -- Return 0 if no accounts found

EXCEPTION

WHEN NO\_DATA\_FOUND THEN

DBMS\_OUTPUT.PUT\_LINE('Error: No accounts found for Customer ID ' || p\_CustomerID);

RETURN 0;

WHEN OTHERS THEN

DBMS\_OUTPUT.PUT\_LINE('Error: ' || SQLERRM);

RETURN 0;

END GetTotalBalance;

END AccountOperations;

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