**Assignment 2**

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Part 4

**Part IV. Object-Relational Database and SQL3**

1. **Defining Types:** Create object types below using CREATE TYPE statement

1.

Solution:

CREATE TYPE Address\_objtyp AS OBJECT (

Street VARCHAR2(200),

City VARCHAR2(200),

State CHAR(2),

Zip VARCHAR2(20)

);

Result:



2.

Query: CREATE TYPE PhoneList\_vartyp AS VARRAY(10) OF VARCHAR2(20);



3.

Query: CREATE TYPE Address\_objtyp AS OBJECT (

Street VARCHAR2(200),

City VARCHAR2(200),

State CHAR(2),

Zip VARCHAR2(20)

);



4.

Query: CREATE TYPE StockItem\_objtyp AS OBJECT (

StockNo NUMBER,

Price NUMBER,

TaxRate NUMBER

);



5.

Query: CREATE TYPE LineItem\_objtyp AS OBJECT (

LineItemNo NUMBER,

Stock\_ref REF StockItem\_objtyp,

Quantity NUMBER,

Discount NUMBER

);



6.

Query: CREATE TYPE LineItemList\_ntabtyp AS TABLE OF LineItem\_objtyp;



7.

Query: CREATE TYPE PurchaseOrder\_objtyp AUTHID CURRENT\_USER AS OBJECT (

PONo NUMBER,

Cust\_ref REF Customer\_objtyp,

OrderDate DATE,

ShipDate DATE,

LineItemList\_ntab LineItemList\_ntabtyp,

ShipToAddr\_obj Address\_objtyp,

MAP MEMBER FUNCTION getPONo RETURN NUMBER,

MEMBER FUNCTION sumLineItems RETURN NUMBER

);



**2**. **Method Definitions:** Create the twomember functions getPONo and sumLineItems of type

PurchaseOrder\_objtyp.

Query: CREATE OR REPLACE TYPE BODY PurchaseOrder\_objtyp AS

MAP MEMBER FUNCTION getPONo RETURN NUMBER

IS

BEGIN

RETURN self.PONo;

END;

MEMBER FUNCTION sumLineItems RETURN NUMBER

IS

i INTEGER;

StockVal StockItem\_objtyp;

Total NUMBER := 0;

BEGIN

FOR i IN 1 .. self.LineItemList\_ntab.COUNT LOOP

UTL\_REF.SELECT\_OBJECT(self.LineItemList\_ntab(i).Stock\_ref, StockVal);

Total := Total + self.LineItemList\_ntab(i).Quantity \* StockVal.Price;

END LOOP;

RETURN Total;

END;

END;

/

1. **Creating Object Tables**: Creating an object type and creating a table are distinct steps. Defining a type merely establishes a logical structure without allocating storage. Proceed to create the tables below, each based on its corresponding object type.
2. Customer\_objtab table

Query:

CREATE TABLE Customer\_objtab OF Customer\_objtyp (

CustNo PRIMARY KEY

)

OBJECT IDENTIFIER IS PRIMARY KEY;

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**(2)** Stock\_objtab table

Query:

CREATE TABLE Stock\_objtab OF StockItem\_objtyp (

StockNo PRIMARY KEY

)

OBJECT IDENTIFIER IS PRIMARY KEY;

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**(3)** PurchaseOrder\_objtab table

Query:

CREATE TABLE PurchaseOrder\_objtab OF PurchaseOrder\_objtyp (

PRIMARY KEY (PONo),

FOREIGN KEY (Cust\_ref) REFERENCES Customer\_objtab

)

OBJECT IDENTIFIER IS PRIMARY KEY

NESTED TABLE LineItemList\_ntab STORE AS PoLine\_ntab (

PRIMARY KEY (NESTED\_TABLE\_ID, LineItemNo)

ORGANIZATION INDEX COMPRESS

)

RETURN AS LOCATOR;

ALTER TABLE PoLine\_ntab

ADD (SCOPE FOR (Stock\_ref) IS Stock\_objtab);

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**4. Inserting Values**.

**(1)** Inserting values in Stock\_objtab

**Query:**

INSERT INTO Stock\_objtab VALUES (1004, 150.00, 0.05);

INSERT INTO Stock\_objtab VALUES (1011, 200.00, 0.07);

INSERT INTO Stock\_objtab VALUES (1534, 100.00, 0.05);

INSERT INTO Stock\_objtab VALUES (1535, 300.00, 0.04);

**(2) Inserting values in Customer\_objtab**

**Query:**

-- Inserting the first record

INSERT INTO Customer\_objtab VALUES (

1, 'Kaye Pitcher',

Address\_objtyp('2101 E. Coliseum Blvd', 'Fort Wayne', 'IN', '46805'),

PhoneList\_vartyp('260-481-6803')

);

-- Inserting the second record

INSERT INTO Customer\_objtab VALUES (

2, 'Jane Smith',

Address\_objtyp('456 Maple Ave', 'Lincoln', 'NE', '68502'),

PhoneList\_vartyp('609-555-9012')

);

-- Inserting the third record

INSERT INTO Customer\_objtab VALUES (

3, 'John Nike',

Address\_objtyp('323 College Drive', 'Edison', 'NJ', '08820'),

PhoneList\_vartyp('609-555-1212', '201-555-1212')

);

**(3)** Inserting the order values of customer number “1” with PONo “5001” in

PurchaseOrder\_objtab

Query:

-- Inserting order values into PurchaseOrder\_objtab

INSERT INTO PurchaseOrder\_objtab

SELECT 5001, REF(C), DATE '2024-01-01', DATE '2024-01-08', LineItemList\_ntabtyp(), NULL

FROM Customer\_objtab C

WHERE C.CustNo = 1;

-- Inserting order items into nested table LineItemList\_ntab

INSERT INTO TABLE (

SELECT P.LineItemList\_ntab

FROM PurchaseOrder\_objtab P

WHERE P.PONo = 5001

)

SELECT 01, REF(S), 12, 10

FROM Stock\_objtab S

WHERE S.StockNo = 1534;

-- Inserting the second order item

INSERT INTO TABLE (

SELECT P.LineItemList\_ntab

FROM PurchaseOrder\_objtab P

WHERE P.PONo = 5001

)

SELECT 02, REF(S), 1, 0

FROM Stock\_objtab S

WHERE S.StockNo = 1004;

**(4)** Similarly, inserting the order values of customer number “2” with PONo “5002” in

PurchaseOrder\_objtab

Query:

-- Inserting order values into PurchaseOrder\_objtab

INSERT INTO PurchaseOrder\_objtab

SELECT 5002, REF(C), DATE '2024-02-02', DATE '2024-02-09', LineItemList\_ntabtyp(), NULL

FROM Customer\_objtab C

WHERE C.CustNo = 2;

-- Inserting order item into nested table LineItemList\_ntab

INSERT INTO TABLE (

SELECT P.LineItemList\_ntab

FROM PurchaseOrder\_objtab P

WHERE P.PONo = 5002

)

SELECT 01, REF(S), 3, 5

FROM Stock\_objtab S

WHERE S.StockNo = 1535;

**5. Querying**

(1) Query all purchase order numbers.

Query:

SELECT P.PONo

FROM PurchaseOrder\_objtab P;

**(2)** Query customer and line item data for purchase order 5001.

**Query:**

SELECT DEREF(P.Cust\_ref), P.ShipToAddr\_obj, P.PONo, P.OrderDate, P.LineItemList\_ntab

FROM PurchaseOrder\_objtab P

WHERE P.PONo = 5001;

**(3)** Query total value of each purchase order using a member function, sumLineItems().

**Query:**

SELECT p.PONo, p.sumLineItems()

FROM PurchaseOrder\_objtab p;

**(4) Query the stock items with the highest tax rate.**

**Query:**

SELECT \*

FROM Stock\_objtab

WHERE TaxRate = (SELECT MAX(TaxRate) FROM Stock\_objtab);

**(5)** Query all customers who have made a purchase order after Feburary 01, 2024 .

Query:

SELECT c.\*

FROM Customer\_objtab c

JOIN PurchaseOrder\_objtab p ON c.CustNo = p.Cust\_ref.CustNo

WHERE p.OrderDate > DATE '2024-02-01';