IDS 521 – Fall 2019

Assignment #2

To do this assignment, you may form a group of up to two students

Assigned date: September 10, 2019 **Due date: post your answer file on Blackboard by 11:59pm on September 21, 2019**

To answer these questions, you need to consult the relational schema on the last page of this document as well as the new Pine Value Furniture (NewPVF) database that contains some sample data.

1. (10%) State what the following query computes:
   $\pi_{Vendor\ Name}(\pi_{Vendor\ ID}(\sigma_{Material\ Description='Walnut'} Raw\_Materials\_t \bowtie \sigma_{Unit\ price<14}\ Supplies\_t) \bowtie Vendor\_t)$
   Answer: Show vendor names who sell the Raw materials with the material description = "Walnut" at a price less than $14.

2. (15%) Compose a relational algebra expression that would show each product id and product name that uses *all* of raw materials with material description = cherry *[hint: use a Division operator].*
   Answer: using the concept of Division (there could be other ways to get the same result)
   $\rho\ (B, \pi_{Material\_ID}\ (\sigma_{Material\_description\ =\ 'Cherry'}\ Raw\_Materials\_t\ ))$
   $\rho\ (A, \pi_{Product\_ID,\ Material\_ID}\ (Uses\_t\ ))$
   $\pi_{Product\_ID,\ Product\_Name}\ (A/B \bowtie Product\_t)$

3. (20%) Compose a SQL statement that is equivalent to Question 1 above. Note, you might want to try and execute this SQL statement against the NewPVF database in SQL Server to see if it works as intended.
   Answer:

```
SELECT Distinct V.Vendor_name
FROM Vendor_t V INNER JOIN
 (SELECT S.Vendor_ID
  FROM Raw_Materials_t R INNER JOIN Supplies_t S ON R.Material_ID = S.Material_ID
  WHERE R.Material_description='Walnut' and S.Unit_price < 14) as A
 ON A.Vendor_ID = V.Vendor_ID;
```

   Note: there could be other solutions to accomplish the same results. As long as the end results are the same as the above answers, we can accept other solutions.

4. (20%) Compose a SQL statement that is equivalent to Question 2 above. Note, you might want to try and execute this SQL statement against the NewPVF database in SQL Server to see if it works as intended *[hint: use a correlated subquery].*

Answer:

```
Select product_id, product_name
From product_t as p
Where not exists
 (
   Select r.material_id
   From raw_materials_t as r
   Where material_description = 'Cherry'
 Except
   Select u.material_id
   From uses_t as u
   Where u.product_id = p.product_id
  )
```

5. (20%) Compose an SQL statement to generate a list of two least expensive vendors (suppliers) for each raw material. In the result table, show the following columns: material ID, material description, vendor ID, vendor name, and the supplier's unit price. Sort the result table by material ID and supplier's unit price in ascending order. *Note: If a raw material has only one vendor (supplier), that supplier and its unit price for the raw material should also be in the result (output) table [hint: use a correlated subquery].*

Answer:

```
Select R.Material_ID, Material_description, V.Vendor_ID, Vendor_name, S.Unit_price
From ((Raw_Materials_t as R inner join Supplies_t as S on R.Material_ID = S.Material_ID)
     inner join Vendor_t as V on V.Vendor_ID = S.Vendor_ID)
Where S.Unit_price in
  (Select TOP 2 S1.Unit_price
   From Supplies_t as S1
   Where S1.Material_ID = R.Material_ID
   Order by S1.Unit_price ASC)
Order By R.Material_ID, S.Unit_price;
```

Alternative Answer:

```
With temp AS
(
  Select r.Material_ID, r.Material_Description, v.Vendor_ID, v.Vendor_Name, s.Unit_price,
         Rank () Over (Partition by r.Material_ID Order by s.Unit_price) as PriceRank
  FROM Vendor_t v join Supplies_t s on v.Vendor_ID=s.Vendor_ID
       join Raw_Materials_t r on r.Material_ID=s.Material_ID
)
Select temp.Material_ID, temp.Material_description, temp.Vendor_ID,
       temp.Vendor_name, temp.Unit_price
FROM temp
Where PriceRank <= 2
```

Another Alternative Answer:

```
Select c.Material_description, a.Material_ID, a.Vendor_ID, b.Vendor_name, a.Unit_price as Price
From (Select s.*,
      ROW_NUMBER() over (partition by s.material_id order by s.Material_ID) as rownum
      From supplies_t s) a, Vendor_t b, Raw_Materials_t c
Where a.Vendor_ID = b.Vendor_ID and a.Material_ID = c.Material_ID and rownum <= 2
Order By a.material_id, a.Unit_price
```

Note: there could be other solutions to accomplish the same results. As long as the end results are the same as either one of the above answers, we can accept other solutions.

6. (15%) Compose a query that would find customer(s) with exactly one order in October 2011. In the result table, display Customer_ID, Customer_Name, Order_ID, and Order_Date.

Answer

```
Select c.Customer_ID, Customer_Name, Order_ID, Order_Date
From Customer_t as c inner join Order_t as o on c.Customer_ID = o.Customer_ID
Where o.Order_Date between '10/1/2011' and '10/31/2011' and o.Customer_ID IN
 (
  Select o2.Customer_ID
  From Order_t as o2
  Where o2.Order_Date between '10/1/2011' and '10/31/2011'
  Group By o2.Customer_ID
  Having Count(*) = 1
 )
```

Relationships for PVFCh7-Ch9-Queries