Accounting System

Group ID: 5
Student Details:

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Lab: Lab 7

Queries:

1. **Given a date each company can retrieve the financial transactions of that particular date.**

Relational Algebra:

π(TransactionNumber, TransactionDate, Amount, F.Description, AccountName, CompanyName)(σ(CompanyName = 'Myntra' AND TransactionDate = '10-23-2020')((Company $\bowtie$<Company.CompanyID = FinancialTransactions.CompanyId> FinancialTransactions) $\bowtie$<FinancialTransactions.AccountId = Account.AccountId> Account))

SQL Query:

```
Select TransactionNumber, TransactionDate, Amount, F.Description, AccountName, CompanyName
From Company as C JOIN FinancialTransactions as F ON ( C.CompanyID = F.CompanyId ) JOIN Account as A ON ( F.AccountId = A.AccountId )
Where CompanyName = 'Myntra' AND TransactionDate = '10-23-2020';
```

2. **Each company can retrieve all the personal accounts that are associated with it.**

Relational Algebra:

π(PersonalAccount.CompanyName, PersonalAccount.GSTIN)(σ(Company.CompanyName = 'Myntra') (((PersonalAccount $\bowtie$<PersonalAccount.AccountId = Account.AccountId> Account) $\bowtie$<Account.AccountGroupId = AccountGroup.AccountGroupId> AccountGroup) $\bowtie$<Company.CompanyID = AccountGroup.CompanyId> Company))

SQL Query:

```
Select P.CompanyName, P.GSTIN
From PersonalAccount as P JOIN Account as A ON ( P.AccountId = A.AccountId ) JOIN AccountGroup as AG ON (AG.AccountGroupId = A.AccountGroupId) JOIN Company as C ON (C.CompanyID = AG.CompanyId)
Where C.CompanyName = ‘Myntra’;
```

6. Retrieve any receipt by their bill number.

Relational Algebra:

ρ(Si,SalesInvoice)
ρ(A,Account)
ρ(C,Company)
ρ(I,SalesItem)
ρ(It,Item)

ΠT(C.CompanyName,A.AccountName,Si.InvoiceId,Si.Date,It.ItemName,I.Amount,I.Qty)(σ(C.CompanyName = 'Myntra' AND SalesInvoice.InvoiceID=1)((((SalesInvoice ⋈<Si.AccountId = A.AccountId> Account) ⋈<C.CompanyID = Si.CompanyId> Company) ⋈<Si.InvoiceId = I.InvoiceId and Si.CompanyId=I.CompanyId> SalesItem)⋈<I.ItemID = It.ItemID> Item))

SQL Query:

```
Select C.CompanyName,A.AccountName, Si.InvoiceId, Si.Date, It.ItemName, I.Amount,
I.Qty
From SalesInvoice as Si
JOIN Account as A ON ( Si.AccountId = A.AccountId )
JOIN Company as C ON (C.CompanyID = Si.CompanyId)
JOIN SalesItem as I ON (Si.InvoiceId = I.InvoiceId and Si. CompanyId=I. CompanyId)
JOIN Item as It ON ( I.ItemID = It.ItemID )
Where C.CompanyName = 'Myntra'  and Si.InvoiceID=1;
```

7. Retrieve any invoice by their receipt number.

Relational Algebra:

ΠT(Company.CompanyName,Account.AccountName,PurchaseInvoice.ReceiptID,PurchaseInvoice.Date,Item.ItemName,PurchaseItem.Amount,PurchaseItem.Qty)(σ(Company.CompanyName = 'Myntra' AND PurchaseInvoice.ReceiptID=1)((((PurchaseInvoice ⋈<PurchaseInvoice.AccountId = Account.AccountId> Account) ⋈<Company.CompanyID = PurchaseInvoice.CompanyId> Company) ⋈<PurchaseInvoice.ReceiptID = PurchaseItem.ReceiptID and PurchaseInvoice.CompanyId=PurchaseItem.CompanyId> PurchaseItem)⋈<PurchaseItem.ItemID = Item.ItemID> Item))

SQL Query:

```
Select C.CompanyName, A.AccountName, Pi.ReceiptID, Pi.Date, It.ItemName,
I.Amount, I.Qty
From PurchaseInvoice as Pi
JOIN Account as A ON ( Pi.AccountId = A.AccountId )
JOIN Company as C ON (C.CompanyID = Pi.CompanyId)
JOIN PurchaseItem as I ON (Pi.ReceiptID = I.ReceiptID and Pi. CompanyId=I.
CompanyId)
```

JOIN Item as It ON (I.ItemID = It.ItemID)
Where C.CompanyName = ‘Myntra’ AND Pi.ReceiptID=1;

8. Can retrieve details of the purchase made on a particular day.

Relational Algebra:

ρ(Pi,PurchaseInvoice)
ρ(A,Account)
ρ(C,Company)
ρ(I,PurchaseItem)
ρ(It,Item)
$\pi_{(C.CompanyName,A.AccountName,Pi.ReceiptID,Pi.Date,It.ItemName,I.Amount,I.Qty)}(\sigma_{(C.CompanyName = 'Myntra' and Pi.Date= '10-23-2020')}((((PurchaseInvoice \bowtie_{<Pi.AccountId = A.AccountId>} Account) \bowtie_{<C.CompanyID = Pi.CompanyId>} Company) \bowtie_{<Pi.ReceiptID = I.ReceiptID and Pi.CompanyId=I.CompanyId>} PurchaseItem) \bowtie_{<I.ItemID = It.ItemID>} Item))$

SQL Query:

Select C.CompanyName, A.AccountName, Pi.ReceiptID, Pi.Date, It.ItemName, I.Amount, I.Qty
From PurchaseInvoice as Pi
JOIN Account as A ON (Pi.AccountId = A.AccountId)
JOIN Company as C ON (C.CompanyID = Pi.CompanyId)
JOIN PurchaseItem as I ON (Pi.ReceiptID = I.ReceiptID and Pi. CompanyId=I.CompanyId)
JOIN Item as It ON (I.ItemID = It.ItemID)
Where C.CompanyName = 'Myntra' and Pi.Date= '10-23-2020';

9. Can retrieve details of the sales made on a particular day.

Relational Algebra:

ρ(Si,SalesInvoice)
ρ(A,Account)
ρ(C,Company)
ρ(I,SalesItem)
ρ(It,Item)
$\pi_{(C.CompanyName,A.AccountName,Si.InvoiceId,Si.Date,It.ItemName,I.Amount,I.Qty)}(\sigma_{(C.CompanyName = 'Myntra' and Si.Date= '10-23-2020'')}((((SalesInvoice \bowtie_{<Si.AccountId = A.AccountId>} Account) \bowtie_{<C.CompanyID = Si.CompanyId>} Company) \bowtie_{<Si.ReceiptID = I.ReceiptID and Si.CompanyId=I.CompanyId>} SalesItem) \bowtie_{<I.ItemID = It.ItemID>} Item))$

SQL Query:

Select C.CompanyName, A.AccountName, Si.InvoiceId, Si.Date, It.ItemName, I.Amount, I.Qty
From SalesInvoice as Si
JOIN Account as A ON (Si.AccountId = A.AccountId)
JOIN Company as C ON (C.CompanyID = Si.CompanyId)
JOIN SalesItem as I ON (Si.InvoiceId = I.InvoiceId and Si. CompanyId=I. CompanyId)
JOIN Item as It ON (I.ItemID = It.ItemID)

Where C.CompanyName = 'Myntra' and Si.Date= '10-23-2020';

10. Can retrieve details of the purchases whose amount is between a given range.
Relational Algebra:

ρ (Pi,PurchaseInvoice)
ρ (A,Account)
ρ (C,Company)
ρ (I,PurchaseItem)
ρ (It,Item)

π (C.CompanyName,A.AccountName,Pi.ReceiptID,Pi.Date,It.ItemName,I.Amount,I.Qty)
(**σ**(C.CompanyName = 'Myntra' and I.Amount BETWEEN (5000 AND20000))
((((PurchaseInvoice ⋈ <Pi.AccountId = A.AccountId> Account) ⋈ <C.CompanyID = Pi.CompanyId> Company)
⋈ <Pi.ReceiptID = I.ReceiptID AND Pi.CompanyId=I.CompanyId> PurchaseItem) ⋈ <I.ItemID = It.ItemID> Item))

SQL Query:

Select C.CompanyName, A.AccountName, Pi.ReceiptID, Pi.Date, It.ItemName, I.Amount, I.Qty
From PurchaseInvoice as Pi
JOIN Account as A ON (Pi.AccountId = A.AccountId)
JOIN Company as C ON (C.CompanyID = Pi.CompanyId)
JOIN PurchaseItem as I ON (Pi.ReceiptID = I.ReceiptID and Pi. CompanyId=I. CompanyId)
JOIN Item as It ON (I.ItemID = It.ItemID)
Where C.CompanyName = 'Myntra' and I.Amount BETWEEN 1000 and 2000000;

11. Can retrieve details of the sales whose amount is between a given range.
Relational Algebra:

ρ (Si,SalesInvoice)
ρ (A,Account)
ρ (C,Company)
ρ (I,SalesItem)
ρ (It,Item)

π(C.CompanyName,A.AccountName,Si.InvoiceID,Si.Date,It.ItemName,I.Amount,I.Qty)
(**σ** (C.CompanyName = 'Myntra' and I.Amount BETWEEN 5000 and 20000)
((((SalesInvoice ⋈ <Si.AccountId = A.AccountId> Account) ⋈ <C.CompanyID = Si.CompanyId> Company) ⋈
<Si.InvoiceID = I.InvoiceID AND Si.CompanyId=I.CompanyId> SalesItem) ⋈ <I.ItemID = It.ItemID> Item))

SQL Query:

Select C.CompanyName, A.AccountName, Si.InvoiceId, Si.Date, It.ItemName, I.Amount, I.Qty
From SalesInvoice as Si
JOIN Account as A ON (Si.AccountId = A.AccountId)
JOIN Company as C ON (C.CompanyID = Si.CompanyId)
JOIN SalesItem as I ON (Si.InvoiceId = I.InvoiceId and Si. CompanyId=I. CompanyId)

JOIN Item as It ON (I.ItemID = It.ItemID)
Where C.CompanyName = 'Myntra' and I.Amount BETWEEN 5000 and 20000;

12. Can show the position of all the accounts of a given account group of a given company. Like showing the value of all the assets.

Relational Algebra:

$\pi_{AccountName,\ F_{sum(f.account)\ as\ total\_accounts}}(\sigma_{(C.CompanyName = 'Myntra'\ and\ AG.Name= 'Assets')}$

$((((\rho_{f}(FinancialTransactions) \bowtie_{<f.AccountID=A.AccountID>} \rho_{A}(Account))$

$\bowtie_{<A.AccountGroupId=AG.AccountGroupId>} \rho_{AG}(AccountGroup))$

$\bowtie_{<AG.CompanyID=C.CompanyID>} \rho_{C}(Company))$

SQL Query:

Select A.AccountName, SUM(F.Amount)
From FinancialTransactions as F JOIN Account as A ON(F.AccountId=A.AccountId) JOIN AccountGroup as AG ON (AG.AccountGroupId = A.AccountGroupId) JOIN Company as C ON (C.CompanyID = AG.CompanyId)
Where C.CompanyName = 'Myntra' AND AG.Name = 'Short-Term Assets'
GROUP BY A.AccountName;

13. List all the Journal Entries of a given Financial Year.

Relational Algebra:

$\mathcal{F}_{(Ft.TransactionNumber,\ Ft.TransactionDate,ac.accountName,ABS(Ft.Amount->Transaction\ Amount)}\sigma_{(C.CompanyName = 'Myntra'\ AND\ (Ft.TransactionDate>='04-01-2019'\ AND\ Ft.TransactionDate<='03-31-2020'))}(((FinancialTransactions \bowtie_{<c.companyId = ft.companyId>} Company) \bowtie_{<ft.accountId = ac.accountId>} Account) \bowtie_{<acg.AccountGroupId = ac.AccountGroupId>} AccountGroup)$

SQL Query:

Select Ft.TransactionNumber, Ft.TransactionDate,ac.accountName,ABS(Ft.Amount) as "Transaction Amount"
From FinancialTransactions as ft
INNER JOIN Company as c ON (c.companyId = ft.companyId)
INNER JOIN Account as ac ON (ft.accountId = ac.accountId)
INNER JOIN AccountGroup as acg ON (acg.AccountGroupId = ac.AccountGroupId)
Where C.CompanyName = 'Myntra' AND Ft.TransactionDate BETWEEN '04-01-2019' AND '03-31-2020'
Order By Ft.TransactionNumber;

14. Retrieve any given ledger account of a particular company.

Relational Algebra:

$\pi_{AccountName,\ F_{sum(f.account)\ as\ total\_accounts}}(\sigma_{(C.CompanyName = 'Myntra'\ and\ A.AccountName= 'Machinery')}$

$((((\rho_{f}(FinancialTransactions) \bowtie_{<f.AccountID=A.AccountID>} \rho_{A}(Account))$

$\bowtie_{<A.AccountGroupId=AG.AccountGroupId>} \rho_{AG}(AccountGroup))$

$\bowtie_{<AG.CompanyID=C.CompanyID>} \rho_{C}(Company))$

SQL Query:

```
Select A.AccountName, SUM(F.Amount)
From FinancialTransactions as F JOIN Account as A ON(F.AccountId=A.AccountId) JOIN
AccountGroup as AG ON (AG.AccountGroupId = A.AccountGroupId) JOIN Company as C
ON (C.CompanyID = AG.CompanyId)
Where C.CompanyName = 'Myntra' AND A.AccountName = 'Machinery'
GROUP BY A.AccountName;
```

19. Calculate Gross Profit and Loss of a company of a given year.

Relational Algebra:

$r1 <- {}_{A.AccountId}\mathcal{F}_{SUM(F.Amount)->DrTradingSum}(\sigma_{(C.CompanyName = 'Myntra'\ AND\ AG.Name= 'Trading\ Account'\ AND\ AG.Header = True\ AND\ (F.TransactionDate >= '04-01-2019'\ AND\ F.TransactionDate <= '03-31-2020'))}$

$((((\rho_{f}(FinancialTransactions) \bowtie_{<f.AccountID=A.AccountID>} \rho_{A}(Account))$

$\bowtie_{<A.AccountGroupId=AG.AccountGroupId>} \rho_{AG}(AccountGroup))$

$\bowtie_{<AG.CompanyID=C.CompanyID>} \rho_{C}(Company)) \cup \rho_{DrTradingSum}(0)$

$DrTable <- \mathcal{F}_{SUM(r1.DrTradingSum)->DrSide}$

$r2 <- {}_{A.AccountId}\mathcal{F}_{SUM(F.Amount)->CrTradingSum}(\sigma_{(C.CompanyName = 'Myntra'\ AND\ AG.Name= 'Trading\ Account'\ AND\ AG.Header = False\ AND\ (F.TransactionDate >= '04-01-2019'\ AND\ F.TransactionDate <= '03-31-2020'))}$

$((((\rho_{f}(FinancialTransactions) \bowtie_{<f.AccountID=A.AccountID>} \rho_{A}(Account))$

$\bowtie_{<A.AccountGroupId=AG.AccountGroupId>} \rho_{AG}(AccountGroup))$

$\bowtie_{<AG.CompanyID=C.CompanyID>} \rho_{C}(Company)) \cup \rho_{CrTradingSum}(0)$

$CrTable <- \mathcal{F}_{SUM(r2.CrTradingSum)->CrSide}$

$GrossProfit <- \sigma_{(CrSide - DrSide)}(DrTable \times CrTable)$

SQL Query:

```
Select (CrSide - DrSide) as "Gross Profit"
From
        (
                Select SUM(DrTradingSum) as DrSide
```

```
            From(
                Select SUM(F.Amount) as DrTradingSum
                From FinancialTransactions as F JOIN Account as A
ON(F.AccountId=A.AccountId) JOIN
                AccountGroup as AG ON (AG.AccountGroupId = A.AccountGroupId)
JOIN Company as C
                ON (C.CompanyID = AG.CompanyId)
                Where C.CompanyName = 'Myntra' AND AG.ShowIn = 'Trading
Account' AND AG.Header = True
                AND F.TransactionDate BETWEEN '04-01-2019' AND '03-31-2020'
                GROUP BY A.AccountId
                UNION
                Select 0 as DrTradingSum
            ) as r1
        ) as DrTable,
        (
            Select SUM(CrTradingSum) as CrSide
            From(
                Select SUM(F.Amount) as CrTradingSum
                From FinancialTransactions as F JOIN Account as A
ON(F.AccountId=A.AccountId) JOIN
                AccountGroup as AG ON (AG.AccountGroupId = A.AccountGroupId)
JOIN Company as C
                ON (C.CompanyID = AG.CompanyId)
                Where C.CompanyName = 'Myntra' AND AG.ShowIn = 'Trading
Account' AND AG.Header = False
                AND F.TransactionDate BETWEEN '04-01-2019' AND '03-31-2020'
                GROUP BY A.AccountId
                UNION
                Select 0 as CrTradingSum
            ) as r2
        ) as CrTable;
```

20. Calculate the Net profit or loss of a company of a given year.

Relational Algebra:

$r1 \leftarrow -_{A.AccountId} \mathcal{F}_{SUM(F.Amount) \rightarrow DrPNLSum}(\sigma_{(C.CompanyName = 'Myntra' \text{ AND } AG.ShowIn = 'Profit and Loss Account' \text{ AND } AG.Header = True \text{ AND } (F.TransactionDate >= '04-01-2019' \text{ AND } F.TransactionDate <= '03-31-2020'))}$

$((((\rho_{f}(FinancialTransactions) \bowtie_{<f.AccountID=A.AccountID>} \rho_{A}(Account))$

$\bowtie_{<A.AccountGroupId=AG.AccountGroupId>} \rho_{AG}(AccountGroup))$

$\bowtie_{<AG.CompanyID=C.CompanyID>} \rho_{C}(Company)) \cup \rho_{DrPNLSum}(0)$

$DrTable \leftarrow -\mathcal{F}_{SUM(r1.DrPNLSum) \rightarrow DrSide}$

$r2 \leftarrow {}_{A.AccountId}\mathcal{F}_{SUM(F.Amount)\rightarrow CrPNLSum}(\sigma_{(C.CompanyName = 'Myntra' \text{ AND } AG.ShowIn = 'Profit and Loss Account' \text{ AND } AG.Header = True \text{ AND } (F.TransactionDate >= '04\text{-}01\text{-}2019' \text{ AND } F.TransactionDate <= '03\text{-}31\text{-}2020'))}$
$((((\rho_{f}(FinancialTransactions) \bowtie_{<f.AccountID=A.AccountID>} \rho_{A}(Account))$
$\bowtie_{<A.AccountGroupId=AG.AccountGroupId>} \rho_{AG}(AccountGroup))$
$\bowtie_{<AG.CompanyID=C.CompanyID>} \rho_{C}(Company)) \cup \rho_{CrPNLSum}(0)$

$CrTable \leftarrow -\mathcal{F}_{SUM(r1.CrPNLSum)\rightarrow CrSide}$

$r3 \leftarrow {}_{A.AccountId}\mathcal{F}_{SUM(F.Amount)\rightarrow DrTradingSum}(\sigma_{(C.CompanyName = 'Myntra' \text{ AND } AG.Name= 'Trading Account' \text{ AND } AG.Header = True \text{ AND } (F.TransactionDate >= '04\text{-}01\text{-}2019' \text{ AND } F.TransactionDate <= '03\text{-}31\text{-}2020'))}$
$((((\rho_{f}(FinancialTransactions) \bowtie_{<f.AccountID=A.AccountID>} \rho_{A}(Account))$
$\bowtie_{<A.AccountGroupId=AG.AccountGroupId>} \rho_{AG}(AccountGroup))$
$\bowtie_{<AG.CompanyID=C.CompanyID>} \rho_{C}(Company)) \cup \rho_{DrTradingSum}(0)$

$DrTable \leftarrow -\mathcal{F}_{SUM(DrTradingSum)\rightarrow DrSide}$

$r4 \leftarrow {}_{A.AccountId}\mathcal{F}_{SUM(F.Amount)\rightarrow CrTradingSum}(\sigma_{(C.CompanyName = 'Myntra' \text{ AND } AG.Name= 'Trading Account' \text{ AND } AG.Header = False \text{ AND } (F.TransactionDate >= '04\text{-}01\text{-}2019' \text{ AND } F.TransactionDate <= '03\text{-}31\text{-}2020'))}$
$((((\rho_{f}(FinancialTransactions) \bowtie_{<f.AccountID=A.AccountID>} \rho_{A}(Account))$
$\bowtie_{<A.AccountGroupId=AG.AccountGroupId>} \rho_{AG}(AccountGroup))$
$\bowtie_{<AG.CompanyID=C.CompanyID>} \rho_{C}(Company)) \cup \rho_{CrTradingSum}(0)$

$CrTable \leftarrow -\mathcal{F}_{SUM(CrTradingSum)\rightarrow CrSide}$

$GrossProfitTable \leftarrow -\sigma_{(r4.CrSide - r3.DrSide)}(DrTable \times CrTable)$

$Net\ Profit \leftarrow -\sigma_{(CrSide + GrossProfit - DrSide)}(DrTable \times CrTable \times GrossProfitTable)$

SQL Query:

```
Select (CrSide + GrossProfit - DrSide) as "Net Profit"
From
        (
                Select SUM(DrPNLSum) as DrSide
                From(
                        Select SUM(F.Amount) as DrPNLSum
                        From FinancialTransactions as F JOIN Account as A
ON(F.AccountId=A.AccountId) JOIN
```

```
                    AccountGroup as AG ON (AG.AccountGroupId = A.AccountGroupId)
JOIN Company as C
                    ON (C.CompanyID = AG.CompanyId)
                    Where C.CompanyName = 'Myntra' AND AG.ShowIn = 'Profit and
Loss Account' AND AG.Header = True
                    AND F.TransactionDate BETWEEN '04-01-2019' AND '03-31-2020'
                    GROUP BY A.AccountId
                    UNION
                    Select 0 as DrPNLSum
            ) as r1
        ) as DrTable,
        (
            Select SUM(CrPNLSum) as CrSide
            From(
                Select SUM(F.Amount) as CrPNLSum
                From FinancialTransactions as F JOIN Account as A
ON(F.AccountId=A.AccountId) JOIN
                    AccountGroup as AG ON (AG.AccountGroupId = A.AccountGroupId)
JOIN Company as C
                    ON (C.CompanyID = AG.CompanyId)
                    Where C.CompanyName = 'Myntra' AND AG.ShowIn = 'Profit and
Loss Account' AND AG.Header = False
                    AND F.TransactionDate BETWEEN '04-01-2019' AND '03-31-2020'
                    GROUP BY A.AccountId
                    UNION
                    Select 0 as DrPNLSum
            ) as r2
        ) as CrTable,
        (
            Select (CrSide - DrSide) as GrossProfit
            From
            (
                Select SUM(DrTradingSum) as DrSide
                From(
                    Select SUM(F.Amount) as DrTradingSum
                    From FinancialTransactions as F JOIN Account as A
ON(F.AccountId=A.AccountId) JOIN
                    AccountGroup as AG ON (AG.AccountGroupId =
A.AccountGroupId) JOIN Company as C
                    ON (C.CompanyID = AG.CompanyId)
                    Where C.CompanyName = 'Myntra' AND AG.ShowIn =
'Trading Account' AND AG.Header = True
                    AND F.TransactionDate BETWEEN '04-01-2019' AND
'03-31-2020'
                    GROUP BY A.AccountId
```

```
                        UNION
                        Select 0 as DrTradingSum
                ) as r1
        ) as DrTable,
        (
                Select SUM(CrTradingSum) as CrSide
                From(
                        Select SUM(F.Amount) as CrTradingSum
                        From FinancialTransactions as F JOIN Account as A
ON(F.AccountId=A.AccountId) JOIN
                        AccountGroup as AG ON (AG.AccountGroupId =
A.AccountGroupId) JOIN Company as C
                        ON (C.CompanyID = AG.CompanyId)
                        Where C.CompanyName = 'Myntra' AND AG.ShowIn =
'Trading Account' AND AG.Header = False
                        AND F.TransactionDate BETWEEN '04-01-2019' AND
'03-31-2020'
                        GROUP BY A.AccountId
                        UNION
                        Select 0 as DrTradingSum
                ) as r2
        ) as CrTable
) as GrossProfitTable;
```