Ermal Dedej CS 450

**Q.1** Items (Item#, Desc) that are available from at least two suppliers at the same cost.

### Solution:

 $\pi$  (item#,desc)  $\sigma$  ((Inn= Inn1)  $\land$  (Cost=Cost1))  $\land$  Scode  $\neq$  Scode1)) (Aval x Aval[Inn1, Cost1, Scode])

# Raeval Solution:

project ((((aval rename (Scode as Scode1, Inn as Inn1, Cost as Cost1) times aval) select where (Inn=Inn1 and Cost1=Cost) and Scode1 <>Scode) join items) select where Inn1=Inn) over Inn, Desc

**Q.2** Items (Item#, Desc) that were purchased at least once in a quantity that is larger than at least on of its procured quantities)

### Solution:

 $\pi$  (item#,desc)  $\sigma$  (Inn= Inn1)[ ( $\sigma$  (Inn= Inn1)  $\land$  (Quantity > Pquantity) (Procure[Inn1] x Purchase))join (Items)]

# Raeval Solution:

project ((((procure rename (Inn as Inn1) times purch) select where Inn=Inn1 and Quantity>Pquantity) join items) select where Inn1=Inn) over Inn, Desc

**Q.3** Items (Item#, Desc) with quantity-on-hand greater than 20, that have not been purchased in 2016.

Solution:  $\pi$  (item#,desc)[ ( ( $\pi$  (Inn)  $\sigma$  (QOH>20)(Items) –  $\pi$  (Inn)  $\sigma$ (Date>160000)(Purchase) ) join (Items)]

# Raeval Solution:

project((project (select items where QOH>20) over Inn) difference (project (select purch where Date>160000) over Inn) times( items rename(Inn as Inn1))select where Inn=Inn1) over Inn, Desc

**Q.4** Items (Item#, Desc) with quantity-on-hand less than 20, that have not been procured since 2015.

### Solution:

 $\pi$  (item#,desc)[ ( ( $\pi$  (Inn)  $\sigma$  (QOH>20)(Items)  $\cap \pi$  (Inn)  $\sigma$  (Date>160000)(Purchase) ) join (Items)]

### Raeval Solution:

project((project (select items where QOH<20) over Inn) intersection (project (select procure where Date<160000) over Inn) times( items rename(Inn as Inn1))select where Inn=Inn1) over Inn, Desc

**Q.5** Customers (Cust#, Cname) whose credit cards have all expired.

#### Solution: $\pi$ (Cnn,Cname) $\sigma$ (Cnn1=Cnn) [ $\sigma$ Cexp=Ccnumber [( ( $\pi$ (Cnnumber) $\sigma$ (Exp<1607)(Card)[Cexp] )x (Usage)] x (Cost) [Cnn1]]

# Raeval Solution:

project (((((project (card rename(Ccnumber as Cexp) select where Exp<1607) over Cexp) times usage) select where Cexp=Ccnumber)times (cost rename(Cnn as Cnn1))) select where Cnn1=Cnn) over Cnn, Cname

**Q.6** Customers (Cust#, Cname) who purchased all the items that are available from supplier S01.

# Solution:

π (Cnn,Cname) σ (Cnn1=Cnn) [σ Ainn=Inn [( (π (Cnnumber) σ (Scode<"S01")(Avalible)[Ainn] )x (Purchase)] join (Customer)[Cnn1]]

# Raeval Solution:

project (((((project( aval rename (Inn as Ainn) select where Scode="S01") over Ainn ) join purch) select where Ainn=Inn) join (cust rename (Cnn as Cnn1) ))select where Cnn=Cnn1 )over Cnn, Cname

**<u>Q.7</u>** Customers (Cust#, Cname) that have made at least one purchase in 2015 of an item whose price was over \$100.

# Solution:

**π** (Cnn,Cname) **σ** (Cnn1=Cnn) [ **σ** Inn=Inn1 [((Items)[Inn1]) **σ** (Inn=Inn1)  $\land$  (Date>150000 and Date <160000)join(Purchase)] join (Customer)[Cnn1]]

#### Raeval Solution:

project(((items rename(Inn as Inn1) join (purch rename (Cnn as Cnn1))) select where Inn=Inn1 and Price>100 and (Date>150000 and Date <160000)) join relC select where Cnn1=Cnn )over Cnn,Cname

**Q.8** Employees who work for one department but manage another (Emp#, Ename, Dept#- of-work-department, Dept#-of-managed-department).

#### Solution:

π (Enn,Ename,DeptCode,DeptManCode) (Employee) σ (Manager=Ename) ∧ (DeptCode ≠DeptManCode)join(Admin)[DeptMan]

#### Raeval Solution:

project ((emp join (admin rename (Dcode as D#Mang))) select where Manager= Ename and Dcode<> D#Mang )over Enn, Ename, Dcode, D#Mang

**<u>Q.9</u>** Pairs of employees (Emp#, Ename, Emp#, Ename) in the same department who share at least one skill

#### Solution:

 $\pi$ (Enn,Ename,Enn1,Ename1)(Employee)[Enn1,Ename1,Dcode1,Skills1]  $\sigma$ (Skills1 = Skills)  $\wedge$  (Enn1  $\neq$  Enn )  $\wedge$  (Dcode1=Dcode) join(Employee)

#### Raeval Solution:

project (((emp rename(Enn as Enn1, Ename as Ename1, Dcode as Dcode1, Skills as Skills1)) join emp) select where Skills1 =Skills and Enn1 <>Enn and Dcode1=Dcode) over Enn, Ename, Enn1,Ename1

**Q.10** Pairs of employees (Emp#, Ename, Emp#, Ename) in the same department who have identical skills.

#### Solution:

 $\pi$ (Enn,Ename,Enn1,Ename1)(Employee)[Enn1,Ename1,Dcode1,Skills1]  $\sigma$ (Skills1 = Skills)  $\wedge$  (Enn1  $\neq$  Enn )  $\wedge$  (Dcode1=Dcode) join(Employee)

#### Raeval Solution:

project (((emp rename(Enn as Enn1, Ename as Ename1, Dcode as Dcode1, Skills as Skills1)) join emp) select where Skills1 =Skills and Enn1 <>Enn and Dcode1=Dcode) over Enn, Ename, Enn1,Ename1