CSC343 - Assignment 2: Relational Algebra

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1)
$\gamma_{\text{COUNT}(*)\rightarrow\text{totalSeniors}}(\sigma_{\text{ DateOfBirth<=DATE(”1954–11–14”)}}(\text{Person}))$

2) A:= Person $\bowtie$ Take $\bowtie$ Ship
$\gamma_{\text{COUNT}(*)\rightarrow\text{taken}}(\sigma_{\text{ Occupation=”student”}\wedge\text{Date=DATE(”2019–09–04”)}\wedge\text{RouteID=4}}(\text{A}))$

3a)
$\pi_{\text{ShipID,Age,Manufactureur}}(\sigma_{\text{ AdvertisingRevenue>10000}}(\text{Ship}))$

3b) A:= Person $\bowtie$ Pilot $\bowtie$ Operate $\bowtie$ Ship
$\gamma_{\text{MAX(AdvertisingRevenue),FirstName,LastName,YearsOfService,ShipID}}(\text{A})$

3c) A:= $\gamma_{\text{SUM(AdvertisingRevenue}\rightarrow\text{totalRevenue}}(\text{Ship})$
$\gamma_{\text{RouteID,–totalRevenue}}(\text{A})$

4a)
$\gamma_{\text{Type,SUM(Fee)}\rightarrow\text{revenue}}(\text{Passenger} \bowtie \text{Take} \bowtie \text{Fare})$

4b)A :=$\gamma_{\text{Type,SUM(Fee)}\rightarrow\text{revenue}}(\text{Passenger} \bowtie \text{Take} \bowtie \text{Fare})$
$\pi_{\text{Type,revenue}}(\sigma_{\text{revenue}>500}(\text{A}))$

4c) A:= Passenger $\bowtie$ Take $\bowtie$ Fare
B :=$\gamma_{\text{Type,SUM(Fee)}\rightarrow\text{revenue}}(\sigma_{\text{Date=DATE(”2019–09–01”)}}(\text{A}))$
$\gamma_{\text{MAX(revenue),Type}}(\text{B})$

5a) A:= $\gamma_{\text{SIN,COUNT(SIN)}\rightarrow\text{Count}}(\text{Infraction})$
B :=$\pi_{\text{SIN}}(\sigma_{\text{Count}<3}(\text{A}))$
$\pi_{\text{SIN,FirstName,LastName,Age}}(\text{B} \bowtie \text{Person})$

5b)A := Pilot $\bowtie$ Infraction
B :=$\gamma_{\text{SIN,SUM(Demerit)}\rightarrow\text{totalDemeritPoints,SUM(Fine)}\rightarrow\text{totalFine}}(\text{A})$

$\gamma_{\text{–totalDemeritPoints,–totalFine}}(\sigma_{\text{totalDemeritPoints}>=2}(\text{B}))$

6a) $\text{A}:=\gamma_{\text{COUNT(Manufacturer)}\rightarrow\text{count}}(\pi_{\text{Manufacturer}}(\text{Ship}))$
$\gamma_{\text{Manufacturer,ShipID}}(\sigma_{\text{count}=1}(\text{Ship} \bowtie \text{A}))$

6b) $\text{A}:=\sigma_{\text{Date}=\text{DATE(”2019–09–07”)}}(\text{Take} \bowtie \text{Ship})$
$\gamma_{\text{RouteID,MAX(COUNT(RouteID)}\rightarrow\text{numberOfTimes)}}(\text{A})$

6c)
$\gamma_{\text{Date,MAX(COUNT(Date)}\rightarrow\text{tripsTaken)}}(\text{Take})$

7a) $\text{A}:=$ Sites $\bowtie$ Go $\bowtie$ Ship $\bowtie$ Take $\bowtie$ Person
$\text{B} :=\sigma_{\text{Category}=\text{”Library”}\wedge(\text{Date}=\text{DATE(”2019–09–05”)}\vee\text{Date}=\text{DATE(”2019–09–06”)})}(\text{A})$
$\gamma_{\text{Occupation,COUNT(Occupation)}\rightarrow\text{occurences}}(\text{B})$

7b) $\text{A} :=$ Sites $\bowtie$ Go $\bowtie$ Ship $\bowtie$ Take $\bowtie$ Person
$\text{B} :=\sigma_{\text{Category}=\text{”Library”}\wedge(\text{Date}=\text{DATE(”2019–09–05”)}\vee\text{Date}=\text{DATE(”2019–09–06”)})}(\text{A})$
$\gamma_{\text{Occupation,Date,–(COUNT(Occupation)}\rightarrow\text{occurences)}}(\text{B})$

8) $\text{A}:=\text{Pilot} \bowtie \text{Infraction} \bowtie \text{Person}$
$\text{B} :=\sigma_{\text{YearsOfService}>5\wedge\text{Salary}>75000}(\text{A})$
$\text{C}:=\gamma_{\text{SIN,SUM(Demerit)}\rightarrow\text{totalDemeritPoints,FirstName,LastName}}(\text{B})$
$\pi_{\text{FirstName,LastName,SIN}}(\sigma_{\text{totalDemeritPoints}<9}(\text{C}))$

9) $\text{A}:=$ Person $\bowtie$ Phone $\bowtie$ Take $\bowtie$ Ship $\bowtie$ Event
$\text{B} :=\sigma_{\text{EName}=\text{”JediKnightBasketball”}\wedge\text{RouteID}=4\wedge\text{Occupation}=\text{”student”}}(\text{A})$
$\pi_{\text{FirstName,LastName,SIN,Sex}}(\text{B})$

10) $\text{A}:=$ Schedule $\bowtie$ Stop $\bowtie$ Event
$\text{B} :=\sigma_{\text{EName}=\text{”YG hunnidConcert”}\wedge\text{ArrivalTime}<=\text{TIME(”17:00:00”)}\wedge\text{ArrivalTime}>=\text{TIME(”16}$
$\pi_{\text{RouteID,SName,ArrivalTime}}(\text{B})$