

# Relational Algebra

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## Part II of Assignment 2

Q1)

$R1 := \Pi_{Hname, City}(\sigma_{AnnualBudget > 3000000} Hospital)$   
 $\tau_{-AnnualBudget}(R1)$

Q2)

$R1 := \sigma_{(DateOfBirth \geq '1979-11-17' \wedge DateOfBirth < '2019-11-17') \wedge City = 'Toronto'} Person$   
 $R2 := \Pi_{ID, FirstName, LastName, Gender, DateOfBirth}(R1)$   
 $R3 := \Pi_{PatientID}(\sigma_{Disease = \%Cancer\%} Diagnose)$   
 $R4 := \Pi_{FirstName, LastName, Gender, DateOfBirth}(R2 \bowtie_{R2.ID = R3.PatientID} R3)$   
 $\delta(R4)$

Q3.

- a)  $\Pi_{Specialty, Salary}(\gamma_{Specialty, AVG(Salary) \rightarrow Salary} Physician)$
- b)  $R1 := (Physician \bowtie_{Physician.HName = Hospital.HName} Hospital)$   
 $R2 := \sigma_{City = 'Toronto' \cup City = 'Hamilton'}(R1)$   
 $\Pi_{Specialty, Salary}(\sigma_{Count(PhysicianID) > 5}(\gamma_{Specialty, Count(PhysicianID), AVG(Salary) \rightarrow Salary} R1))$
- c)  $R1 := \Pi_{YearsOfPractice, Salary}(\gamma_{YearsOfPractice, AVG(SALARY) \rightarrow Salary} Nurse)$   
 $\tau_{-YearsOfPractice}(R1)$

Q4)

$R1 := \sigma_{Date \geq '2017-08-05' \wedge Date < '2017-08-10'} Admission$   
 $\Pi_{Hname, NumOfPatients}(\gamma_{Hname, Count(PatientID) \rightarrow NumOfPatients} R1)$

Q10.

- a)  $R1 := \sigma_{HName = 'University of Toronto Medical Centre' \wedge DName = 'Intensive Care Unit'}(Physician)$   
 $R2 := R1 \bowtie_{Physician.PhysicianID = Diagnose.PhysicianID} Diagnose$   
 $R3 := \Pi_{Disease, Prognosis}(R2)$   
 $\delta(R3)$

- b)  $R1 := \sigma_{HName="University of Toronto Medical Centre" \wedge DName="Intensive Care Unit"}(Physician)$   
 $R2 := R1 \bowtie_{Physician.PhysicianID=Diagnose.PhysicianID} (Diagnose)$   
 $R3 := \Pi_{Disease,Prognosis,PatientID}(R2)$   
 $R4 := R3 \bowtie_{R3.PatientID=Take.PatientID} (Take)$   
 $R5 := R4 \bowtie_{R4.TestID=MedicalTest.TestID} (MedicalTest)$   
 $R6 := \Pi_{PatientID,TotalCost}(\gamma_{PatientID, Sum(Fee) \rightarrow TotalCost}(R5))$   
 $\tau_{TotalCost}(R6)$
- c)  $R1 := \sigma_{HName="University of Toronto Medical Centre" \wedge DName="Intensive Care Unit"}(Physician)$   
 $R2 := R1 \bowtie_{Physician.PhysicianID=Diagnose.PhysicianID} (Diagnose)$   
 $R3 := \Pi_{Disease,Prognosis,PatientID}(R2)$   
 $R4 := \sigma_{R3.PatientID=Prescription.PatientID \wedge Prescription.DrugCode=Drug.DrugCode}(R3 \times Prescription \times Drug)$   
 $R5 := \Pi_{PatientID,TotalCost}(\gamma_{PatientID, Sum(UnitCost) \rightarrow TotalCost}(R4))$   
 $\tau_{TotalCost}(R5)$

**Q11)**

- $R1 := \sigma_{(Patient.PatientID=Person.ID=Admission.PatientID) \wedge (Admission.Category="urgent" \cup Admission.Category="standard")}$   
 $(Patient \times Person \times Admission)$   
 $\Pi_{Person.ID,FirstName,LastName}(\sigma_{Count(HName)=2}(\gamma_{Person.ID, Count(HName)}(R1)))$