## WEEK 6

DOING A JOIN IN TUPLE RELATIONAL CALCULUS

CS3319

Ī

## STUDENT OBJECTIVES

- Upon completion of this video, you should be able to:
  - List a set of tables and a query, write the tuple relational calculus statement that will answer the query
  - Determine when and when not to use the existential quantifier symbol  $\exists$
  - Given a set of tables and a relation calculus expression, list the tuples that would be returned.

We will be using the following tables for our discussion and examples:

**Employee** 

FName Minit Lname SSN BDate Address Sex Salary SuperSSN\* DNO\*

**Department** 

DName DNumber MGRSSN\* MgrStartDate

Works On

**DepartmentLocation** 

ESSN\* PNO\* Hours

**Dnumber\* Dlocation** 

Project

PName PNumber Plocation Dnum\*

**Dependent** 

ESSN\* DependentName Sex BDate Relationship

CS33 9

10/15/2023

- Also we need two more symbols called quantifiers: they are the universal quantifier  $\rightarrow \forall$ and the existential qualifier  $\rightarrow 3$
- With the existential quantifier, a formula:

(31)(F) there exist at least one you to that formula F true. is TRUE if the formula F evaluates to TRUE for some (at least one) tuple.

- If you are NOT displaying a tuples attribute in your answer, but you need that tuple from another table to do the join, then you MUST use  $(\exists t)(F)$
- With the universal quantifier, a formula:

(M)(F) for every single van in the emple over the all energe dhe is TRUE only if the formula F evaluates to TRUE for every tuple.

## TUPLE CALCULUS EXAMPLES (JOINING TABLES):

• Retrieve the name and address of all employees who work for the 'Research' Department

```
{t.Fname, t.Lname, t.Address | EMPLOYEE(t) and ((Ad) Considered) (DEPARTMENT(d) and d.Dname = 'Research' and d.Dnumber = t.DNO))} there exist department of the lept is employer's dept no.
```

- For every project located in 'London', list the project number, the controlling department number, and the department manager's last name.
- {p.PNumber, p.Dnum, e.Lname | PROJECT(p) and EMPLOYEE(e) and
  p.PLocation = 'London' and ((∃ d)(DEPARTMENT(d) and d.Dnumber
  = p.Dnum and d.Mgrssn = e.ssn))}

10/15/2023 5



Retrieve t 'Research'

{t.Fname, t (DEPART t.DNO))}



controlling name.

{p.PNumbe p.PLocati = p.Dnur

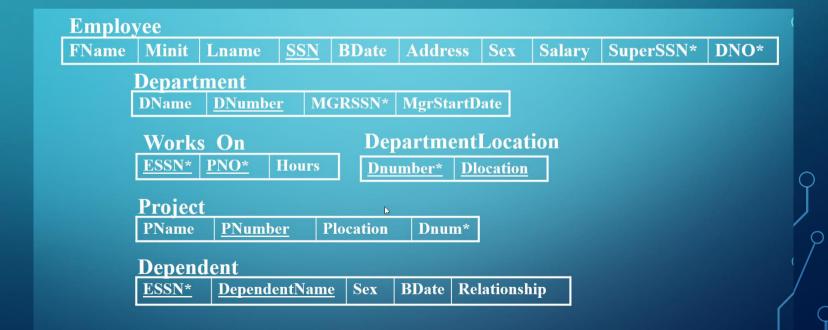
• For every project located in "London". list the project number, the **Employee** ger's last FName Minit Lname SSN BDate Address Sex Salary SuperSSN\* DNO\* Department MGRSSN\* | MgrStartDate DName DNumber YEE(e) and **DepartmentLocation** Works On d.Dnumber ESSN\* PNO\* Hours Dnumber\* Dlocation **Project** PNumber Plocation **PName** Dnum\* **/2023** Dependent **DependentName** Sex BDate Relationship ESSN\*

Find the name of employees who have no dependents:

{e.Fname, e.Iname | EMPLOYEE(e) and (NOT (∃d) (DEPENDENT(d) and e.SSN = d.ESSN))}

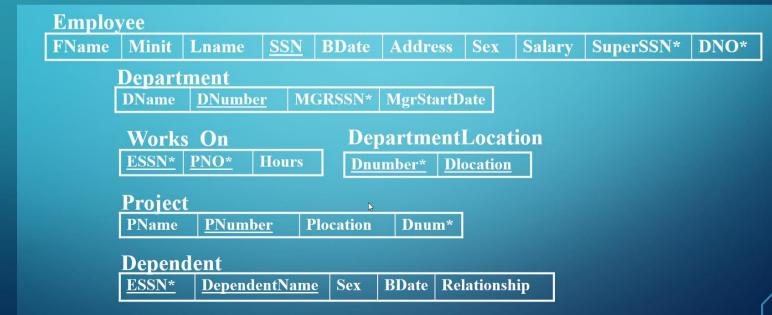
OR

{e.Fname, e.Iname | EMPLOYEE(e) and  $((\forall d) \text{ (NOT DEPENDENT(d))}$  or NOT(e.SSN = d.ESSN))



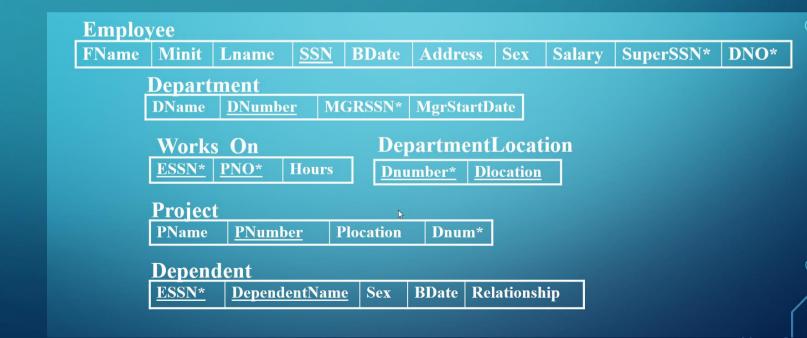
QUESTION: Write the tuple relation calculus to find any employee last name who work on projects. Also list the number of hours they worked on the project and the project name:

{e.Lname, w.Hours, p.Pname | EMPLOYEE(e) and WORKSON(w) and PROJECT(p) and p.PNumber=w.PNO and w.ESSN=e.SSN}



QUESTION: Write the tuple relation calculus to find any employee lastname and project name of employees who work on projects:

{e.Lname, p.Pname | EMPLOYEE(e) and PROJECT(p) and ((∃w) (WORKSON(w) and p.PNumber=w.PNO and w.ESSN=e.SSN))}



AA				
A	В	С		
Pig	22	Pink		
Cat	22	Green		
Cat	55	Blue		

БВ			
A	В	С	D
Pig	22	Blue	14
Cat	22	Green	33
Cat	22	Blue	22

Cat 22 Green
Cat 55 Blue

(w) A	A(W) alla W.A — Co	
{w.C	BB(w) and $w.B > = v$	w.D }

 $\{t.C, w.D \mid AA(t) \text{ and } BB(w) \text{ and } w.C = t.C \}$ 

 $\{t.A, t.C \mid AA(t) \text{ and } ((\exists w) BB(w) \text{ and } w.C= t.C \text{ and } w.D \ge 20 \}$ 

С
Blue

w.D
33
14
22

A	С
Cat	Green
Cat	Blue