

A decorative graphic on the left side of the slide, consisting of a network of white lines and circles on a blue gradient background, resembling a circuit board or a neural network.

WEEK 6

DOING A JOIN IN TUPLE RELATIONAL CALCULUS

CS3319

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	<u>SSN</u>	BDate	Address	Sex	Salary	SuperSSN*	DNO*
-------	-------	-------	------------	-------	---------	-----	--------	-----------	------

Department

DName	<u>DNumber</u>	MGRSSN*	MgrStartDate
-------	----------------	---------	--------------

Works_On

<u>ESSN*</u>	<u>PNO*</u>	Hours
--------------	-------------	-------

DepartmentLocation

<u>Dnumber*</u>	<u>Dlocation</u>
-----------------	------------------

Project

PName	<u>PNumber</u>	Plocation	Dnum*
-------	----------------	-----------	-------

Dependent

<u>ESSN*</u>	<u>DependentName</u>	Sex	BDate	Relationship
--------------	----------------------	-----	-------	--------------

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 ((\exists d) (DEPARTMENT(d) and d.Dname = 'Research' and d.Dnumber = t.DNO)))}

- 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 ((\exists d)(DEPARTMENT(d) and d.Dnumber = p.Dnum and d.Mgrssn = e.ssn)))}

TUPLE CALC

- Retrieve the employees who work in 'Research'

$\{t.Fname, t.Minit, t.Lname, t.SSN, t.BDate, t.Address, t.Sex, t.Salary, t.SuperSSN, t.DNO\}$
 $(DEPARTMENT(DName = 'Research', DNumber = t.DNO))\}$

Employee									
FName	Minit	Lname	<u>SSN</u>	BDate	Address	Sex	Salary	SuperSSN*	DNO*

Department			
DName	<u>DNumber</u>	MGRSSN*	MgrStartDate

Works On			DepartmentLocation	
<u>ESSN*</u>	<u>PNO*</u>	Hours	<u>Dnumber*</u>	<u>Dlocation</u>

Project			
PName	<u>PNumber</u>	Plocation	Dnum*

Dependent				
<u>ESSN*</u>	<u>DependentName</u>	Sex	BDate	Relationship

$\{t.Fname, t.Minit, t.Lname, t.SSN, t.BDate, t.Address, t.Sex, t.Salary, t.SuperSSN, t.DNO\}$

for the

number =

- For every project located in 'London', list the project number, the controlling employee's last name.

$\{p.PNumber, p.PLocation, p.DNumber\}$
 $p.PLocation = p.DNumber$

Employee									
FName	Minit	Lname	<u>SSN</u>	BDate	Address	Sex	Salary	SuperSSN*	DNO*

Department			
DName	<u>DNumber</u>	MGRSSN*	MgrStartDate

Works On			DepartmentLocation	
<u>ESSN*</u>	<u>PNO*</u>	Hours	<u>Dnumber*</u>	<u>Dlocation</u>

Project			
PName	<u>PNumber</u>	Plocation	Dnum*

Dependent				
<u>ESSN*</u>	<u>DependentName</u>	Sex	BDate	Relationship

er's last

YEE(e) and
d.Dnumber

Find the name of employees who have no dependents:

$\{e.Fname, e.lname \mid \text{EMPLOYEE}(e) \text{ and } (\text{NOT } (\exists d) (\text{DEPENDENT}(d) \text{ and } e.SSN = d.ESSN))\}$

OR

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

Employee

FName	Minit	Lname	<u>SSN</u>	BDate	Address	Sex	Salary	SuperSSN*	DNO*
-------	-------	-------	------------	-------	---------	-----	--------	-----------	------

Department

DName	<u>DNumber</u>	MGRSSN*	MgrStartDate
-------	----------------	---------	--------------

Works On

<u>ESSN*</u>	<u>PNO*</u>	Hours
--------------	-------------	-------

DepartmentLocation

<u>Dnumber*</u>	<u>Dlocation</u>
-----------------	------------------

Project

PName	<u>PNumber</u>	Plocation	Dnum*
-------	----------------	-----------	-------

Dependent

<u>ESSN*</u>	<u>DependentName</u>	Sex	BDate	Relationship
--------------	----------------------	-----	-------	--------------

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}

Employee

FName	Minit	Lname	<u>SSN</u>	BDate	Address	Sex	Salary	SuperSSN*	DNO*
-------	-------	-------	------------	-------	---------	-----	--------	-----------	------

Department

DName	<u>DNumber</u>	MGRSSN*	MgrStartDate
-------	----------------	---------	--------------

Works On

<u>ESSN*</u>	<u>PNO*</u>	Hours
--------------	-------------	-------

DepartmentLocation

<u>Dnumber*</u>	<u>Dlocation</u>
-----------------	------------------

Project

PName	<u>PNumber</u>	Plocation	Dnum*
-------	----------------	-----------	-------

Dependent

<u>ESSN*</u>	<u>DependentName</u>	Sex	BDate	Relationship
--------------	----------------------	-----	-------	--------------

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

$\{e.Lname, p.Pname \mid EMPLOYEE(e) \text{ and } PROJECT(p) \text{ and } ((\exists w) (WORKSON(w) \text{ and } p.PNumber=w.PNO \text{ and } w.ESSN=e.SSN))\}$

Employee

FName	Minit	Lname	<u>SSN</u>	BDate	Address	Sex	Salary	SuperSSN*	DNO*
-------	-------	-------	------------	-------	---------	-----	--------	-----------	------

Department

DName	<u>DNumber</u>	MGRSSN*	MgrStartDate
-------	----------------	---------	--------------

Works On

<u>ESSN*</u>	<u>PNO*</u>	Hours
--------------	-------------	-------

DepartmentLocation

<u>Dnumber*</u>	<u>Dlocation</u>
-----------------	------------------

Project

PName	<u>PNumber</u>	Plocation	Dnum*
-------	----------------	-----------	-------

Dependent

<u>ESSN*</u>	<u>DependentName</u>	Sex	BDate	Relationship
--------------	----------------------	-----	-------	--------------

AA

A	B	C
Pig	22	Pink
Cat	22	Green
Cat	55	Blue

BB

A	B	C	D
Pig	22	Blue	14
Cat	22	Green	33
Cat	22	Blue	22

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

A	B	C
Cat	22	Green
Cat	55	Blue

C
Blue

t.C	w.D
Green	33
Blue	14
Blue	22

A	C
Cat	Green
Cat	Blue