

#### STUDENT OBJECTIVES

- Upon completion of this video, you should be able to:
  - Write a relational algebra expression that uses SELECTION given a table and a query.
  - Given a table and a SELECTION relational algebra expression, show the new table that would be returned once the expression is performed on the table.
  - Write a relational algebra expression that uses PROJECTION given a table and a query.
  - Given a table and a PROJECTION relational algebra expression, show the new table that would be returned once the expression is performed on the table.
  - Write an expression that renames an attribute
  - Break an expression down so that it creates temporary tables that are used as input to the next expression

CS3319

## EXAMPLES OF PROJECTION & SELECTION

• Using the following data:

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3	Beuvieau	Р	Patty			Toronto		\$4,000	0.00		6	Y5J			
	1 Burns	Р	Montg	omer	7/7/20	Toronto	М	\$5,000	0.00			S7G			
6	Simpson	J	Lisa		6/6/90	London	F	\$1,00	0.00		2	S7G			
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### **SELECTION**

- Create a new table from a given table and in that new table return
  - only the **rows** that satisfy a given condition
- Symbol  $\rightarrow$   $\mathbf{\sigma}$
- Example Expression:



Symbol for Selection

CS3319

Condition that each row must satisfy to be returned in the answer

Table Name

#### **EMPLOYEE**

ID	FirstName	LastName	Age
12	Homer	Smith	24
24	Gene	Simpson	13
45	Walter	Reid	45
47	William	Reid	87
78	Ben	Cooker	14

#### **ANSWER**

ID	FirstName	LastName	Age
45	Walter	Reid	45
47	William	Reid	87

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# • QUESTION: What would be returned with the expression: $\sigma_{Salary > 3000} \text{ (Employee)}$

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			2	Smithe	rs .	J		Waylan		1/1/60	Springfie	M	\$2,00	0.00		4	S7G			
			3	Beuviea	au	Р		Patty		3/3/59	Toronto	F	\$4,00			6	Y5J			
				Burns		Р		Montgon	mer		Toronto	М	\$5,00				S7G			
CSC	3319			Simpso		J		Lisa			London	F	\$1,00				S7G			
			12	Simpso	n .	J		Homer		8/8/61	Toronto	М	\$2,00	0.00		2	G8H	<u> </u>		
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• QUESTION: What would be returned with the expression:  $\sigma_{Salary > 3000}$  (Employee)

#### **ANSWER**

SSN	<b>LastNa</b> me	MiddleInitial	FirstName	Bdate	Address	Sex	Salary	SuperSSN	DeptNum
3	Beuvieau	P	Patty	3/3/59	Toronto	F	4000	6	Y5J
4	Burns	P	Montgomery	7/7/20	Toronto	М	5000		S7G

The above rewritten as an English question would be:
 Find all the employee information about employees
 who make a salary greater than 3000.
 This is called a QUERY

10/2/2023

### **PROJECTION**

• Create a new table from a given table and in that new table return only the

**COLUMNS** that satisfy a given condition

- Symbol → **TT**
- Example Expression:

π<sub>Age,LastName</sub> (EMPLOYEE)

Symbol for The Columns (Attributes)
Projection that should be returned

Table Name

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ID	FirstName	LastName	Age
12	Homer	Smith	24
24	Gene	Simpson	13
45	Walter	Reid	45
47	William	Reid	87
78	Ben	Cooker	14

#### **ANSWER**

Age	LastName
24	Smith
13	Simpson
45	Reid
87	Reid
14	Cooker

7



#### **QUESTION:** What would be returned with the expression:

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			π	LastNam	e, First	:Name	(Er	nploye	ee)			ANSW	ER			
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		Beuvieau		Patty		Toronto		\$4,000.00			Y5J					
	4	Burns	Р	Montgomer		Toronto		\$5,000.00			S7G					
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#### QUESTION: What would be returned with the expression:

π LastName, FirstName (Employee)

#### **ANSWER**

LastName	FirstName
Simpson	Bart
Smithers	Waylan
Beuieau	Patty
Burns	Montgomery
Simpson	Lisa
Simpson	Homer

QUESTION: Rewrite the question above as a query (English Question):

ANSWER: Give me just the first name and last name of all the employees.

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9

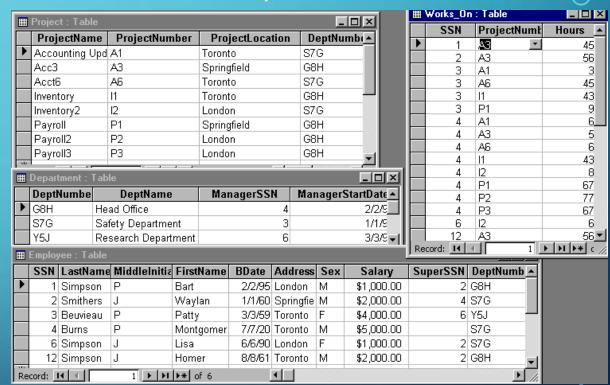
## **QUESTION:** Write the expression to find all project information about projects located in Toronto or London:

σ (ProjectLocation = 'Toronto' or ProjectLocation = 'London') (Project)

QUESTION: Write the expression to find all department names:

π <sub>DeptName</sub> (Department)

QUESTION: Write the expression to find the address and first name of male employees:



π<sub>Address,FirstName</sub>(σ<sub>(Sex='M')</sub> (Employee))

## SEQUENCE OF OPE

- Building Temporary Tables
  - Can break a series of opera relations

		Employ	Record: N 1								
		SSN	LastName	MiddleInitia	FirstName	BDate	Address	Sex	Salary	SuperSSN	DeptNumb_
	•	1	Simpson	Р	Bart	2/2/95	London	М	\$1,000.00	2	G8H
		2	Smithers	J	Waylan	1/1/60	Springfie	М	\$2,000.00	4	S7G
		3	Beuvieau	Р	Patty	3/3/59	Toronto	F	\$4,000.00	6	Y5J
		4	Burns	Р	Montgomer	7/7/20	Toronto	М	\$5,000.00		S7G
		6	Simpson	J	Lisa	6/6/90	London	F	\$1,000.00	2	S7G
		12	Simpson	J	Homer	8/8/61	Toronto	М	\$2,000.00	2	G8H .
-	Record: 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1										

**Example:** The following expression:

 $\pi$ <sub>LastName, Sex</sub> ( $\sigma$ <sub>BDate > 1/1/70</sub> (Employee))

Can be broken down into:

Temp1  $\leftarrow \sigma_{BDate > 1/1/70}$  (Employee) Temp2  $\leftarrow \pi_{LastName, Sex}$  (Temp1)

Tem	<b>p</b> 2

LastName	Sex
Simpson	M
Simpson	F

Temp1

	SSN	LastName	MiddleInitial	FirstName	Bdate	Address	Sex	Salary	SuperSSN	DeptNum
T	1	Simpson	P	Bart	2/2/95	London	М	1000	2	G8H
CS	6	Simpson	J	Lisa	6/6/90	London	F	1000	2	S7G

- Renaming Attributes:
  - You may need to rename attributes to make the names easier to understand and occasionally you MUST rename attributes when performing union and joins.

# Example: TempTabA $_{(LName, MorF)} \leftarrow \pi$ $_{LastName, Sex}$ (Temp2)

Temp2

LastName	Sex		
Simpson	М		
Simpson	F		

**TempTabA** 

Lname	MorF
Simpson	М
Simpson	F

#### **QUESTION:** Are these the same? YES or NO?

TableA  $\rightarrow \pi_{\text{LastName, Sex}}$  ( $\sigma_{\text{Bdate} > 1/1/70}$  (Employee))



## NEVER SHOW DUPLICATE ROWS IN RELATIONAL ALGEBRA

QUESTION: What would be returned with the expression:  $\pi_{MiddleInitial}$  (Employee)

