WEEK 4

THE RELATIONAL ALGEBRA BINARY OPERATION OF DIVISION

CS3319

STUDENT OBJECTIVES

- Upon completion of this video, you should be able to:
 - Identify the symbol for DIVISION
 - Given 2 tables and a DIVISION relational algebra expression, show the new table that would be returned once the expression is performed.
 - Write a relational algebra expression that uses DIVISION given two tables and a query.

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DIVISION

- R ÷ S returns a new table that contains:
 - For Columns: only the columns (i.e. attributes) that were in R that were NOT in S
 - For Rows: only the rows (i.e. tuples) from the remaining columns in R that match EVERY SINGLE row in S
- The columns in S MUST be a subset of the columns in R.
- R MUST have more columns than S
- Division can be expressed as:

- Symbol → ÷
- Example Expression:



Example of Division: QUESTION: What will CC \leftarrow AA \div BB return? Table AA: Table BB: **Table CC: /**b1 a1 a 1 B **b**1 **a**2 **a**2 **b**1 a3 b1 a3 **b**4 **b**1 **a4** b2 a1 b2 a3 **a**2 **b**3 a3 b3 **a4** 64 a l **a**2 **b**4 CS319

a3

b4

ANOTHER EXAMPLE

QUESTION: What will CC AA BB return?

Table AA:

A	В	С	D
dog	2	77	pink
dog	3	77	yellow
cat	2	88	pink
pig	1	77	yellow
pig	5	99	red
cat	1	88	yellow
owl	1	66	yellow
owl	2	77	pink
owl	2	66	pink

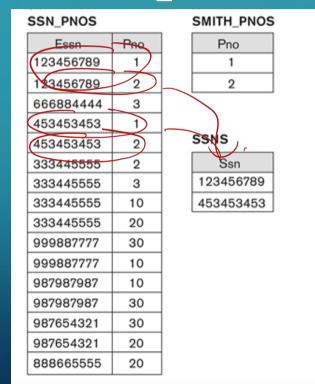
Table BB:

В	D
1	yellow
2	pink

Table CC:

A	С
cat	88
owl	66

- Type of query might be: Find SSN's of people who work on **Q** of Smith's projects
- Result of: SSN_PNOS ÷ SMITH_PNO



- Useful for situations where the term "ALL" is used, for example:
 - Find the first and last names of employees who work on **all** the projects that Dave Leno works on.

the answer would be like this:

Leno $\leftarrow \pi_{EmplD}$ ($\sigma_{LastName = "Leno"}$ (Employee))

Leno_Proj $\leftarrow \pi_{ProjectNumber}$ (Works_On $\bowtie_{Emp|DSSNum = Emp|D}$ Leno)

All_Proj $\leftarrow \pi_{\text{EmplDSSNum, ProjectNumber}}$ (Works_On)

LenoPROJ ← All_Proj ÷ Leno_Proj

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Result $\leftarrow \pi_{\text{FirstName,LastName}}$ (LenoPROJ \bowtie Employee)

QUESTION: Write the relational algebra to find the project names of any projects that also have all the employees working on them that work on the project named "Acct6".

 $Acct6 \leftarrow \pi_{ProjectNumber}(\sigma_{ProjectName="Acct6"}(Project))$

Acct6_Emp $\leftarrow \pi_{EmpSSNum}(Works_On \bowtie Acct6)$

 $ProjNums \leftarrow \pi_{EmpSSNum,ProjectNumber}(Works_On)$

AllAcct6 ← ProjNums ÷ Acct6_Emp

Result $\leftarrow \pi_{ProjectName}$ (AllAcct6 \bowtie Project)

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