

STUDENT OBJECTIVES

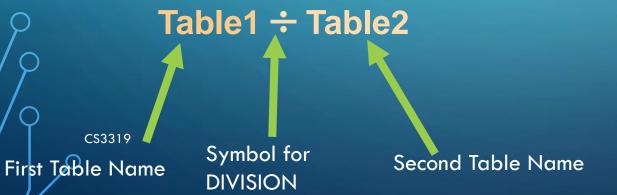
- Upon completion of this video, you should be able to:
 - Identify the symbol for DIVISION
 - Given 2 tables and a DIVISION relational algebra expression, show the new table that would be returned once the expression is performed.
 - Write a relational algebra expression that uses DIVISION given two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

Table AA: Table BB:

Γ.	LI	١ .	D	D.
		le .	D	B :

A	В
a1	b1
a2	b1
a3	b1
a4	b1
a1	b2
a3	b2
a2	b3
a3	b3
a4	b3
a1	b4
a2	b4

a3

b4

A	
a1	
a2	
a3	

Table CC: B b1 **b**4

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

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

SSN_PNOS

Essn	Pno
123456789	1
123456789	2
666884444	3
453453453	1
453453453	2
333445555	2
333445555	3
333445555	10
333445555	20
999887777	30
999887777	10
987987987	10
987987987	30
987654321	30
987654321	20
888665555	20

SMITH_PNOS

Pno
1
2

SSNS

Ssn
123456789
453453453

- 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_{EmpID} (\sigma_{LastName = "Leno"} (Employee))
```

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

Result
$$\leftarrow \pi_{FirstName, LastName}$$
 (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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	⊕ A6	Acct6	Toronto	S7G				2 A1	56
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	± 12	Inventory2	London	S7G				3 A6	45
	⊕ P1	Payroll	Springfield	G8H				3 I1	43
	⊕ P2	Payroll2	London	G8H				3 P1	9
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+	2 Smithe	ers Waylan	S7G		М	1/1/1960	4	\$2,000.00	
+	3 Beauvi		Y5J		F	3/3/1959	E		
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