WEEK 4

THE RELATIONAL ALGEBRA BINARY OPERATION OF INTERSECTION

STUDENT OBJECTIVES

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

INTERSECTION

- Creates a new table from the given 2 tables that includes only the identical rows from both tables (no repeats).
- The 2 Tables MUST be union compatible
- Intersection can be expressed as:

$$(R \cup S) - ((R - S) \cup (S - R))$$

- Symbol → $\cap$
- Example Expression:

Table1 ∩ Table2

First Table Name

Symbol for INTERSECTION

Second Table Name

Table1

ID	FirstName	LastName	Age
12	Homer	Smith	24
24	Gene	Simpson	13
45	Marg	Reid	45

Table2

ID	FirstName	LastName	Age
33	Marg	Jones	28
24	Gene	Simpson	13
31	Milhouse	Lee	22

Ans ← π ANSWER(Table1) ∩ (π FirstName (Table2))

Ans

FirstName
Gene
Marg

stName	LastName	Age
ene	Simpson	13

Example of Intersection:

Table AA:

B
b1
b2
b7
b8
b11
b16

Table BB:

B
b2
b7
b13

QUESTION: What will CC ←AA ∩ BB return?

Table CC:

B
b2
b7

- useful in situation with the word ***both*** or ***and***, such as list the people who work on BOTH project X and project Y

$$ProjectX \leftarrow \pi_{ProjectNumber}(\sigma_{ProjectName = \text{“X”}}(Project))$$

$$ProjectY \leftarrow \pi_{ProjectNumber}(\sigma_{ProjectName = \text{“Y”}}(Project))$$

$$WorksOnX \leftarrow \pi_{SSN}(ProjectX \bowtie Works\_On)$$

$$WorksOnY \leftarrow \pi_{SSN}(ProjectY \bowtie Works\_On)$$

$$Answer \leftarrow \pi_{LastName}((WorksOnX \cap WorksOnY) \bowtie Employee)$$

QUESTION: Write the relational algebra to find the project name of all projects that BOTH Simpson AND Smithers work on:

$$TempSimp \leftarrow \pi_{EmpID}(\sigma_{LastName= \text{“Simpson”}}(Employee))$$

$$TempSmit \leftarrow \pi_{EmpID}(\sigma_{LastName= \text{“Smithers”}}(Employee))$$

$$WorksOnSimp \leftarrow \pi_{ProjectNumber}(TempSimp \bowtie Works\_On)$$

$$WorksOnSmit \leftarrow \pi_{ProjectNumber}(TempSmit \bowtie Works\_On)$$

$$Answer \leftarrow \pi_{ProjectName}((WorksOnSimp \cap Wor$$

Project)

Project

ProjectNu	ProjectName	ProjLocati	Managing
A1	Accounting Update	Toronto	S7G
A3	Acc3	Springfield	G8H
A6	Acct6	Toronto	S7G
I1	Inventory	Toronto	G8H
I2	Inventory2	London	S7G
P1	Payroll	Springfield	G8H
P2	Payroll2	London	G8H
P3	Payroll3	London	G8H

Record: 8 of 8

Department

DeptNun	DeptName	ManagerEmpID	ManagerStartdate
G8H	Head Office	4	12/12/1999
S7G	Safety Department	3	11/11/1998
Y5J	Research Department	6	12/24/1998

Record: 1 of 3

WorksOn

EmpSSNu	ProjectNu	Hours
1	A3	45
2	A1	56
3	A3	3
3	A6	45
3	I1	43
3	P1	9
4	A1	6
4	A3	5
4	A6	6
4	I1	43
4	I2	8
4	P1	67
4	P2	77
4	P3	67
6	I2	6
12	A3	56

Record: 1 of 16

Employee

EmpID	LastName	FirstName	DeptNumber	Sex	BDate	SuperSSN	Salary
1	Simpson	Bart	G8H	M	2/2/1995	2	$1,000.00
2	Smithers	Waylan	S7G	M	1/1/1960	4	$2,000.00
3	Beauvieau	Patty	Y5J	F	3/3/1959	6	$4,000.00
4	Burns	Monty	S7G	M	7/7/2020		$5,000.00
6	Simpson	Lisa	S7G	F	6/6/1990	2	$1,000.00
12	Simpson	Homer	G8H	M	8/8/1961	2	$2,000.00