CLASSROOM LOG -3

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DIVISION OPERATOR

- Binary Operator
- Takes as input two relations R and S
- Denoted by R ÷ S
- Used to express queries with “ALL”
- The operator returns the elements in set R associated with “all” the elements in set S
- Example: Which students are registered for **all** the courses registered by X?

DIVISION OPERATION EXAMPLE

Student ID	Course ID
IMT2014001	CC101
IMT2014001	CC102
IMT2014001	CC103
IMT2014002	CC102
IMT2014003	CC101
IMT2014003	CC102
IMT2014003	CC104
IMT2014004	CC105

÷

Course ID
CC101
CC102

=

Student ID
IMT2014001
IMT2014003

RENAME OPERATOR

- Unary operator
- Takes as input the relation and the new names to be assigned
- Denoted by $\rho_{\text{New Relation Name<List of new attribute names>}}(\text{Relation})$
- Renames the attributes or the relation or both relation and attributes
- The operator returns the same relation with the new names assigned either to the relation or the attributes or both.
- The Rename operator is useful to change the name of a field in a table before performing a natural join.

OUTER JOIN

- Binary Operator
- Takes as input two relations and a condition
- Denoted by  (Left Outer Join),  (Right Outer Join) or  (Full Outer Join)
- The outer join operator returns a relation in which all the tuples from the input relations are included.
- The left outer join includes all tuples from the left input relation, the right outer join includes all tuples from the right input relation and the full outer join includes all tuples from both the input relations.

OUTER JOIN EXAMPLE

INPUT RELATIONS

Employee

Employee ID	Name	Department
E1	A	D1
E2	B	D2
E3	C	D1

Department

Dept ID	Dept Name	Manager
D1	X	E3
D2	Y	E2
D3	Z	null

OUTER JOIN EXAMPLE

OUTPUT RELATION

Employee ⋈ (Employee.Employee ID ==Department.Manager) Department

Employee. EmployeeID	Employee. Name	Employee. Department	Department. Dept ID	Department. Name	Department. Manager
E3	C	D1	D1	X	E3
E2	B	D2	D2	Y	E2
null	null	null	D3	Z	null

COMPLETE SET OF OPERATORS

- The set $\{\sigma, \pi, \times, \cup, -\}$ forms a complete set of operators.
- Composition of operators from this set produce results equivalent to any of the other operators.
- Examples:
  - $R1 \bowtie_{(condition)} R2 = \sigma_{(condition)}(R1 \times R2)$
  - $R \cap S = R - (R - S)$

THANK YOU