**Notation:**

R1 ⋈θ R2

R1 and R2 are relations with their attributes (A1, A2, .., An ) and (B1, B2,.. ,Bn) such that no attribute matches that is R1 ∩ R2 = Φ Here θ is condition in form of set of conditions C.

Theta join can use all kinds of comparison operators.

|  |  |  |
| --- | --- | --- |
| **Student** | | |
| **SID** | **Name** | **Std** |
| 101 | Alex | 10 |
| 102 | Maria | 11 |

[*Table: Student Relation*]

|  |  |
| --- | --- |
| **Subjects** | |
| **Class** | **Subject** |
| 10 | Math |
| 10 | English |
| 11 | Music |
| 11 | Sports |

[*Table: Subjects Relation*]

Student\_Detail =

STUDENT ⋈Student.Std = Subject.Class SUBJECT

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Student\_detail** | | | | |
| **SID** | **Name** | **Std** | **Class** | **Subject** |
| 101 | Alex | 10 | 10 | Math |
| 101 | Alex | 10 | 10 | English |
| 102 | Maria | 11 | 11 | Music |
| 102 | Maria | 11 | 11 | Sports |

[*Table: Output of theta join*]

Equi-Join

When Theta join uses only **equality** comparison operator it is said to be Equi-Join. The above example conrresponds to equi-join

Natural Join ( ⋈ )

Natural join does not use any comparison operator. It does not concatenate the way Cartesian product does. Instead, Natural Join can only be performed if the there is at least one common attribute exists between relation. Those attributes must have same name and domain.

Natural join acts on those matching attributes where the values of attributes in both relation is same.

|  |  |  |
| --- | --- | --- |
| **Courses** | | |
| **CID** | **Course** | **Dept** |
| CS01 | Database | CS |
| ME01 | Mechanics | ME |
| EE01 | Electronics | EE |

[*Table: Relation Courses*]

|  |  |
| --- | --- |
| **HoD** | |
| **Dept** | **Head** |
| CS | Alex |
| ME | Maya |
| EE | Mira |

[*Table: Relation HoD*]

|  |  |  |  |
| --- | --- | --- | --- |
| **Courses ⋈ HoD** | | | |
| **Dept** | **CID** | **Course** | **Head** |
| CS | CS01 | Database | Alex |
| ME | ME01 | Mechanics | Maya |
| EE | EE01 | Electronics | Mira |

[*Table: Relation Courses ⋈ HoD*]

Outer Joins

All joins mentioned above, that is Theta Join, Equi Join and Natural Join are called inner-joins. An inner-join process includes only tuples with matching attributes, rest are discarded in resulting relation. There exists methods by which all tuples of any relation are included in the resulting relation.

There are three kinds of outer joins:

Left outer join ( R http://www.tutorialspoint.com/dbms/images/left_outer_join.pngS )

All tuples of Left relation, R, are included in the resulting relation and if there exists tuples in R without any matching tuple in S then the S-attributes of resulting relation are made NULL.

|  |  |
| --- | --- |
| **Left** | |
| **A** | **B** |
| 100 | Database |
| 101 | Mechanics |
| 102 | Electronics |

[*Table: Left Relation*]

|  |  |
| --- | --- |
| **Right** | |
| **A** | **B** |
| 100 | Alex |
| 102 | Maya |
| 104 | Mira |

[*Table: Right Relation*]

|  |  |  |  |
| --- | --- | --- | --- |
| **Courses http://www.tutorialspoint.com/dbms/images/left_outer_join.pngHoD** | | | |
| **A** | **B** | **C** | **D** |
| 100 | Database | 100 | Alex |
| 101 | Mechanics | --- | --- |
| 102 | Electronics | 102 | Maya |

[*Table: Left outer join output*]

Right outer join: ( R http://www.tutorialspoint.com/dbms/images/right_outer_join.pngS )

All tuples of the Right relation, S, are included in the resulting relation and if there exists tuples in S without any matching tuple in R then the R-attributes of resulting relation are made NULL.

|  |  |  |  |
| --- | --- | --- | --- |
| **Courses http://www.tutorialspoint.com/dbms/images/right_outer_join.pngHoD** | | | |
| **A** | **B** | **C** | **D** |
| 100 | Database | 100 | Alex |
| 102 | Electronics | 102 | Maya |
| --- | --- | 104 | Mira |

[*Table: Right outer join output*]

Full outer join: ( R http://www.tutorialspoint.com/dbms/images/full_outer_join.pngS)

All tuples of both participating relations are included in the resulting relation and if there no matching tuples for both relations, their respective unmatched attributes are made NULL.

|  |  |  |  |
| --- | --- | --- | --- |
| **Courses http://www.tutorialspoint.com/dbms/images/full_outer_join.pngHoD** | | | |
| **A** | **B** | **C** | **D** |
| 100 | Database | 100 | Alex |
| 101 | Mechanics | --- | --- |
| 102 | Electronics | 102 | Maya |
| --- | --- | 104 | Mira |