Join

- Can be defined as cross-product followed by selection and projection.
- We have several variants of join.
  - Condition joins
  - Equijoin
  - Natural join

Condition Join

$$R \bowtie_c S = \sigma_c (R \times S)$$

Example: $S1 \bowtie_{S1.sid < R1.sid} R1$

(sid)	sname	rating	age	(sid)	bid	day
22	dustin	7	45.0	22	101	10/10/96
22	dustin	7	45.0	58	103	11/12/96
31	lubber	8	55.5	22	101	10/10/96
31	lubber	8	55.5	58	103	11/12/96
58	rusty	10	35.0	22	101	10/10/96
58	rusty	10	35.0	58	103	11/12/96

(sid)	sname	rating	age	(sid)	bid	day
22	dustin	7	45.0	58	103	11/12/96
31	lubber	8	55.5	58	103	11/12/96

Equijoin

$$\boxed{R \bowtie_{C} S}$$

- Condition consists only of equalities connected by ∧
- Redundancy in retaining both attributes in result
- So, an additional projection is applied to remove the second attribute.

Equijoin

Example:

$$S1 \bowtie_{R.sid=S.id} R1$$

(sid)	sname	rating	age	(sid)	bid	day
22	dustin	7	45.0	22	101	10/10/96
22	dustin	7	45.0	58	103	11/12/96
31	lubber	8	55.5	22	101	10/10/96
31	lubber	8	55.5	58	103	11/12/96
58	rusty	10	35.0	22	101	10/10/96
58	rusty	10	35.0	58	103	11/12/96

sid	sname	rating	age	bid	day
22	dustin	7	45.0	101	10/10/96
58	rusty	10	35.0	103	11/12/96

Natural Join

- It is an equijoin in which equalities are specified on all fields having the same name in R and S
- We can then omit the join condition.
- Result is guaranteed not to have two fields with the same name.
- If no fields in common, then natural join is simply cross product.

The equijoin expression $S1 \bowtie_{R.sid=S.sid} R1$ is actually a natural join and can simply be denoted as $S1 \bowtie R1$, since the only common field is *sid*. If the two relations have no attributes in common, $S1 \bowtie R1$ is simply the cross-product.