Complete Set of Relational algebra operations

Complete Set

- The set of relational algebra operations $\{\sigma, \pi, \cup, \rho, -, \times\}$ is a complete set;
- any of the other original relational algebra operations can be expressed as a sequence of operations from this set.
- For example, the INTERSECTION operation can be expressed by using UNION and MINUS as follows: $R \cap S \equiv (R \cup S) - ((R - S) \cup (S - R))$
- As another example, a JOIN operation can be specified as a CARTESIAN PRODUCT followed by a SELECT operation,
- $R \bowtie S \equiv \sigma(R \times S)$
- Similarly, a NATURAL JOIN can be specified as a CARTESIAN PRODUCT preceded by RENAME and followed by SELECT and PROJECT operations.
- Hence, the various JOIN operations are also not strictly necessary for the expressive power of the relational algebra