Joins

- Translating a join $R \bowtie_{R.A_i=S.B_j} S$:
  - Map operator:
    - For each tuple in R, produce key-value pair $(A_i, \langle R, A_1, A_2, \ldots, A_n \rangle)$
    - For each tuple in S, produce key-value pair $(B_j, \langle S, B_1, B_2, \ldots, B_m \rangle)$
  - Reduce operator:
    - Each key x either has a value $\langle R, \ldots \rangle$ or $\langle S, \ldots \rangle$
    - Construct Cartesian product of all $\langle R, \ldots \rangle$ values with all $\langle S, \ldots \rangle$ values
    - Output $A_1, A_2, \ldots, A_n, B_1, B_2, \ldots, B_m$ of each element in Cartesian product as a tuple