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Ans to the ques No. 1

a. This query is a joining operation. Since, the range partitioning attribute and joining query attribute are same, we don't need to repartition the two relations here. Just local joining of partitions will be enough.

steps

i. $c_i \bowtie_{c.c\text{-}id=s.c\text{-}id} S_i$ where $i \in [1,5]$.

b. This query is a range-selection operation. Since, the range partitioning and selection query attribute are same, once again, we don't need to repartition relation customer here.

Steps

i. Since we need to select customer tuples with $c\text{-}id \leq 300000$, as per the partitioning vector, only N_1, N_2, N_3 will participate in selection query as $N_1 < 111111$, $111111 \leq N_2 < 222222$, $222222 \leq N_3 < 333333$. Tuples from these 3 nodes will be fetched and merged.

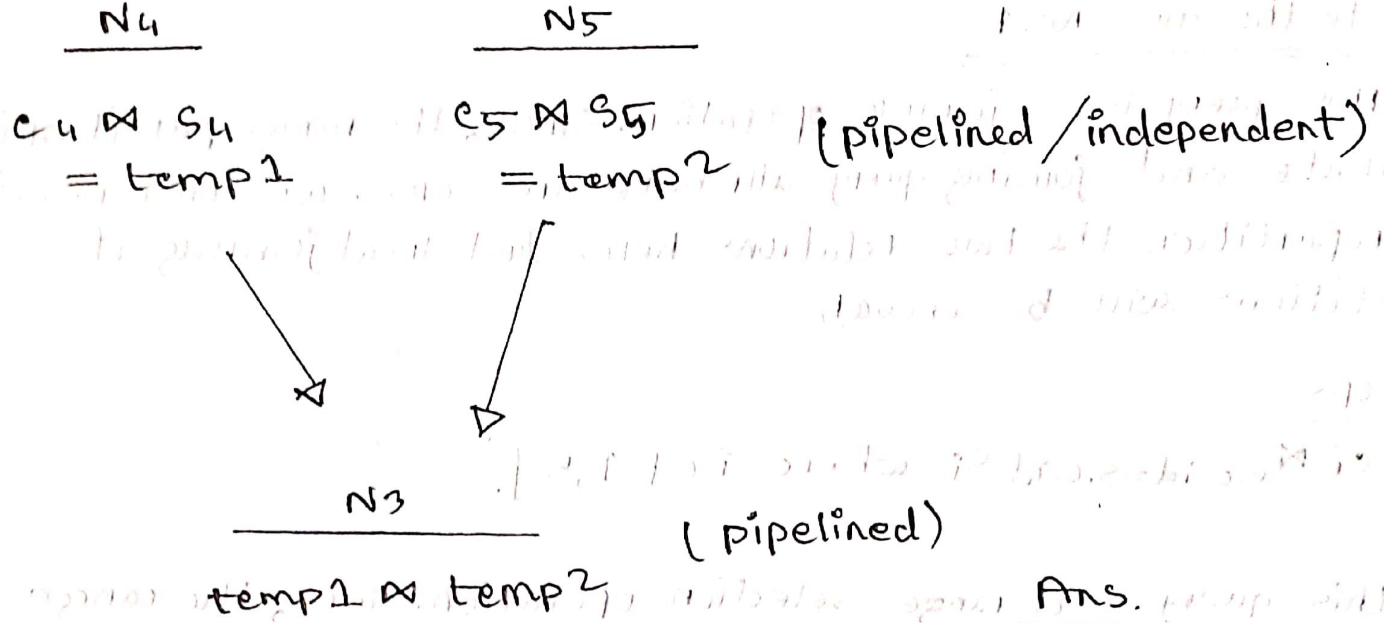
Ans.

Ans to the ques No. 2

Here, the partitioning and the joining attributes are same. So, we don't need to repartition the relations.

Also, N_4 and N_5 will participate in local joining of partititions as $c.c\text{-}id \geq 333333$ is set.

So, N_4 and N_5 can do joining locally in independent parallelism manner and then, their results can be joined at N3 in pipelined parallelism manner to reduced execution/response time.

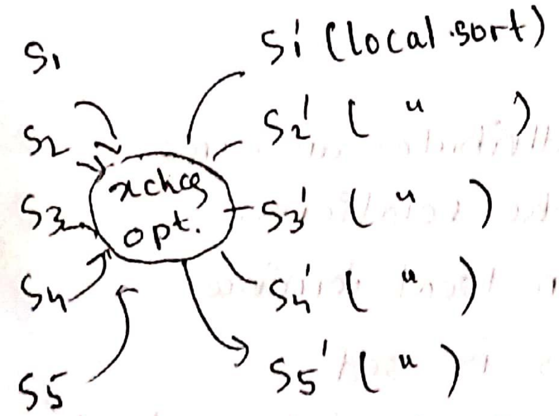


Ans.

Ans to the ques No. 3

The given query is a sorting operation where partitioning and sorting attributes are same. So, no repartitioning is required. Only, local sort at each node will be enough. Otherwise, we can do this by either range partitioning or parallel ext. sort-merge with xchg operator.

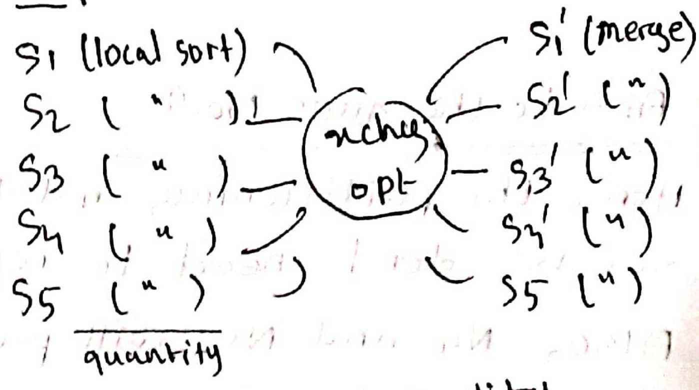
i. range part. sort



i. range p. with xchg opt. (quantity)

ii. local sort

ii. parallel ext. sort_merge



i. local sort by quantity

ii. ordered merge with xchg operator

Ans.