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Section 1B

Homework 5

1. 750,000 R tuples/ 500 tuples per block = 1,500 blocks of R
   5 tuples in S for every in R * 750,000 R tuples = 3,750,000

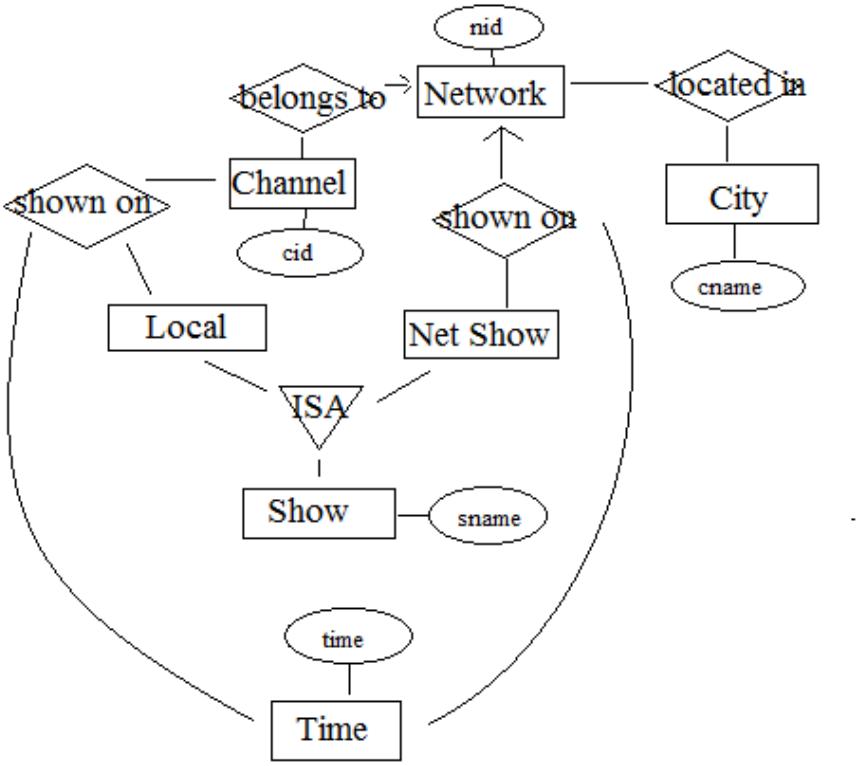
   3,751,500 disk I/Os are needed for the first query plan.

   The first query plan reads 1,500 blocks of R and uses random I/Os to read 3,750,000 blocks of S.

   The second query plan reads 1,500 blocks of R and uses sequential I/Os to read 37,500,000 blocks of S.

   The first plan is superior since it is 10 times faster than the second. The second plan would only be better if the random I/Os took 10 times longer.

2.



3. Parts (number), Assembly(number, cost), ComposedOf(part, assembly, quantity)

4. Since (A,B,C,F) ∩ (A,D,E) = A
   And since A is the key of both
   The decomp is lossless

5. C -> A
   A -> B

6. a. sid -> dept cnum
      dept cnum -> sid

   b. sid -> dept cnum

7. E+ = {A,B,C,D,E} so E is a key
   BC+ = {A,B,C,D,E} so BC is a key

8. R -> R1(C,E) R2(A,B,C,D,F)
   R2 -> R3(B,D) R4(A,B,C,F)
   R4 -> R5(A,B,C) R6(A,F)

   BCNF: R1(C,E), R3(B,D), R5(A,B,C), R6(A,F)