CPTS 415 – ASSIGNMENT 2

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1. Relation Algebra

Q1:

Q2:

Q3:

Q4:

1. Relation

Relation

*Assumption:* neither is indexed.

*Constraint:* 52 blocks of memory.

* 1. Nested-Join: using two nested for loops (technically 4 but more on that later).
     1. For each block in S, : (1)
        1. For each block in R, : (2)
           1. For each tuple in S, : (3)

For each tuple in R, : (4)

Test if share condition

End for

* + - * 1. End for
      1. End for
    1. End for

The cost of the two innermost loops is tuples per per each call on the second for-loop. Since memory can hold at most 52 blocks, we can abstract this cost away and consider only the two outermost loops on and .

The cost, then, is:

* Worst case: for transfers, for seeks.
* Best case: for transfers, for seeks.
  1. Sort-Merge: using divide and conquer.

Create sorted chunks that can fit in memory (52 blocks).

* Recursively call the following till the end of the relation:
  + - * 1. Read M blocks of relation into memory
        2. Sort the in-memory blocks as sorted chunk
        3. Write sorted chunk to disk
* Given that the input is much larger than the memory, we need several merge passes. Therefore, we read blocks per chunk so that we can merge a group of   
   chunks per pass.
* A pass reduces the number of chunks by a factor of , and   
  creates chunks longer by the same factor.
* Repeated passes are performed till all runs have been merged into one.
* Total number of merge passes required: .
* determines the trade-off between number of passes, and disk I/O   
  operation time per pass.
* The cost is then:
  + Number of transfers:
  + Number of seeks:
  1. Hash-Join: applicable for equijoins and natural joins.
* Perfect hashing breaks down into 40 partitions and
* Total cost, where :
  + Block transfers:
  + Seeks:

1. See separate XML files.

* For DTD, keys are declared as attributes. Primary key is defined as . Foreign key is defined as .
* For XML Schema, primary keys are identified by the attribute. The attributes can serve as foreign keys.

1. See separate JSON files.