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INF551 Homework 4

* 1. Start at the root of 10. Since 7 is less than 10 we go to the left. Then we look at each one and find all values greater than 7. The first value that satisfies this is 8. Then we follow the pointer to the next list all the way until we see 18. 18 is the last value because 32 is greater than 20. I/O blocks: 4
  2. 

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* 1. Nested-loop join with R as the outer relation
     1. Input: Read M-2 (100-2 = 98) blocks of R into the main memory buffers. A search structure, with search key equal to b of R and S, is created for the tuples of R that are in main memory. Then go through all the blocks of S, reading each one in turn into the last block of memory. Then we compare all the tuples of S’s block with all the tuples in all the blocks of R that are currently in main memory.
     2. Output: The tuples from S and R that join.
     3. Size: Outer loop runs B(R) / M-2 times which is 500 / 98. Each of those times you need to read S.
     4. Total number of block I/O’s: B(R) + ( B(R) \* B(S) )/ M-2 =
  2. Nested-loop join with S as the outer relation
     1. Input: Same as part A but we switch R and S with each other.
     2. Output: The tuples from S and R that join.
     3. Size: Outer loop runs B(S) / M-2 times which is 500 / 98. Each of those times you need to read R.
     4. Total number of block I/O’s: B(S) + ( B(S) \* B(R) )/ M-2 =
  3. Sort-merge join
     1. Input: Repeatedly fill the M buffers with new tuples from R and sort them in main memory. Write out each sorted sublist to a secondary storage. Do the same for S. Then merge them together by comparing them.
     2. Output: Sorted join of R and S.
     3. Size:
     4. Total number of block I/O’s: 3B(S) + 3B(R)
  4. Simple sort-based join
     1. Input: Completely sort R and S on the join attribute. Then merge them
     2. Output:
     3. Size:
     4. Total number of block I/O’s: 5 B(R) + 5B(S)
  5. Partitioned-hash join
     1. Input: Hash S into M buckets. Send all the buckets to disk. Do the same for R. Then join every pair of corresponding buckets.
     2. Output:
     3. Size:
     4. Total number of block I/O’s: 3B(S) + 3B(R)
  6. Index join
     1. Input:
     2. Output:
     3. Size:
     4. Total number of block I/O’s: