
Computer Science CS3743

Homework #3 Sample Solution

1.
 - (a) The gross capacity = 652,800,000 bytes; the effective capacity is 614,400,000 bytes.
 - (b) The block transfer time is 0.104 ms without gap and 0.111 ms with gap. The average rotational delay = 5.5556 ms.
 - (c) The access time for random access is 669.576 ms and for sequential access is 18.2156 ms.
2.
 - (a) The unspanned storage requires 66667 blocks.
 - (b) For access using EID, if the file is unsorted, the max cost is 66667 blocks and the average cost is 33334 blocks. If the file is already sorted on EID, the average cost using a binary search is 17. If a name is given and the file is unsorted, we must sequentially search the entire file, the cost is therefore 66667 blocks. If the file is sorted on name, we can perform a binary search, so the cost is 17 + result size.
 - (c) The estimated cost of search by City is 20 blocks.
 - (d) The total number of blocks in the B+ tree is 982 or 968 blocks in 3 levels. The total cost of finding an employee with a given EID is 4 blocks.
3.
 - (a)
 - i. Sequential search: cost = 4412 blocks
 - ii. Binary search on R.A: cost = 4427 blocks
 - iii. Index on R.A: cost = 4415 blocks
 - iv. Index on R.B: cost = 253 blocks
 - v. Index on R.D: cost = 336 blocks
 - (b)
 - i. The result has 111,112 blocks.
 - ii. With S as the outer relation, the cost is 4,426,800 blocks;
With R as the outer relation, the cost is 4,483,824 blocks;
With R as the outer relation and using index S.C, the cost is 4,058,824 blocks;
The best nested-loop join is NL join with R as outer relation and using index S.C.

