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17.18

g.

Suppose that the file is not ordered by the key field Ssn and we want to construct a B+-tree access structure (index) on Ssn. Calculate (i) the orders p and p leaf of the B+-tree; (ii) the number of leaf-level blocks needed if blocks are approximately 69% full (rounded up for convenience); (iii) the number of levels needed if internal nodes are also 69% full (rounded up for convenience); (iv) the total number of blocks required by the B+-tree; and (v) the number of block accesses needed to search for and retrieve arecord from the file—given its Ssn value—using the B+-tree.

* For order of non-leaf nodes:
  + p(P) + (p-1)(Vssn) <= 512
  + p (6) + (p-1)(9) <= 512
  + 6p + 9p – 9 <= 512
  + 15p <= 521
  + P <= 34.73
  + Therefore, order (p) = 34
* For order of leaf node:
  + p(Vssn + PR) + P <= 512
  + p(9 + 7) + 6 <= 512
  + 16p + 6 <= 512
  + 16p <= 506
  + p <= 31.62
  + Therefore, order (pleaf) = 31
* 0.69 \* pleaf = 0.69 \* 31 = 22. There will be 22 search keys per leaf node. The file is not ordered on that field so there will have to be a search record for each record in the file, i.e 30,000.
* Number of leaf blocks = ceiling(30,000/ 22)

= 1364 blocks

* 0.69 \* p = 0.69 \* 34 = 24. There will be 24 block pointers per internal node
* There are 1364 blocks in the first level of the tree, so there must be 1364 block pointers in the second level.
  + 1364/24 = 57 blocks in the second level.
* Similarly, in the third level,
  + 57/24 = 3 blocks
* Finally, in the fourth level
  + 3/24 = 1 block
* Therefore, the number of levels needed is 4.

1. 1st level = 1364

2nd level = 57

3rd level = 3

4th level = 1

Therefore, the total blocks = 1364+57+3+1 = 1425 blocks.

1. 4 accesses are needed to traverse the levels. We also need 1 more access to get the primary record from the file. Therefore, 5 total block accesses

17.19

A PARTS file with Part# as the key field includes records with the following Part# values: 23, 65, 37, 60, 46, 92, 48, 71, 56, 59, 18, 21, 10, 74, 78, 15, 16, 20, 24, 28, 39, 43, 47, 50, 69, 75, 8, 49, 33, 38. Suppose that the search field values are inserted in the given order in a B+-tree of order p = 4 and pleaf = 3; show how the tree will expand and what the final tree will look like.

🡪Please look below:







