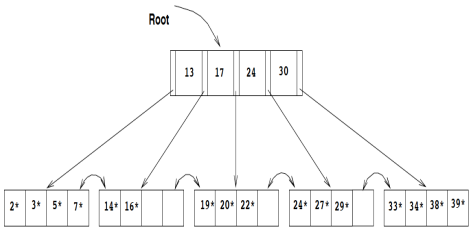
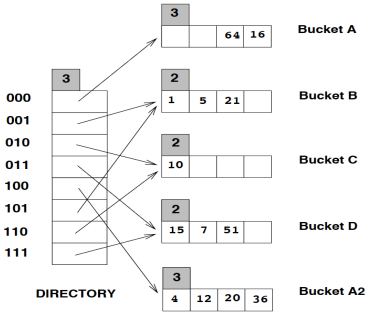
EECS 484



Exercise 10.7 Suppose that you have a sorted file and want to construct a dense primary B+ tree index on this file.

1. One way to accomplish this task is to scan the file, record by record, inserting each one using the B+ tree insertion procedure. What performance and storage utilization problems are there with this approach?
2. Explain how the bulk-loading algorithm described in the text improves upon this scheme.

Answer 10.7 1. This approach is likely to be quite expensive, since each entry requires us to start from the root and go down to the appropriate leaf page. Even though the index level pages are likely to stay in the buffer pool between successive requests, the overhead is still considerable. Also, according to the insertion algorithm, each time a node splits, the data entries are redistributed evenly to both nodes. This leads to a fixed page utilization of 50%



2. The last insertion could not have caused a split because the total number of data entries in the buckets A and A_2 is 6. If the last entry caused a split the total would have been 5.

3. The last insertion which caused a split cannot be in bucket C. Buckets B and C or C and D could have made a possible bucket-split image combination but the total number of data entries in these combinations is 4 and the absence of deletions demands a sum of at least 5 data entries for such combinations. Buckets B and D can form a possible bucket-split image combination because they have a total of 6 data entries between themselves. So do A and A_2. But for the B and D to be split images the starting global depth should have been 1. If the starting global depth is 2, then the last insertion causing a split would be in A or A_2.