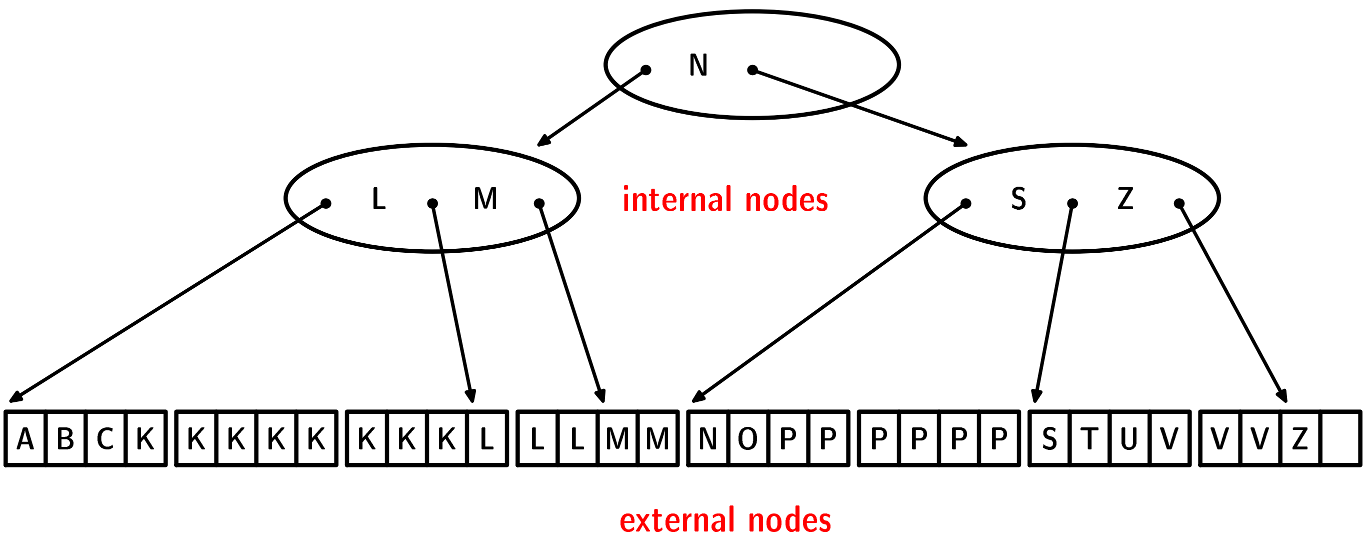
B+Tree (Bottom Up) Construction IV

Data file contains 31 summary records, accessed as 8 nodes each containing space for 4 summary records; internal nodes have order three.



Read first external node; create the first internal (order m) root node. The address of the data node is the root node's left-most link value.

Set lastPrevRec to the last summary value in the node.

```
for ( ; ; ) {

        read the next external node and set firstRec to
        the first summary value in the node and set
        lastRec to the last summary value in the node.

        if ( firstRec > lastPrevRec ) {

               install a link and router to the
               first summary record i.e. firstRec.

        } else if ( firstRec < lastRec ) {

               install a link and router to the
               leftmost summary record in the node
               differing from firstRec.
    }

        lastPrevRec = lastRec ;
}
```

Clean Up. Some of the rightmost internal nodes may not be order m modes. Start at the top of the tree and work down ensuring each node (except the root) has ceil(m/2) children.

As a side comment, the installation of a router always takes place in the non-full node closest to the external nodes; in the event a node becomes filled, it is written to disk. The external node links all reside within nodes at the lowest level within the index. When the router is installed in a node above the lowest level, new empty nodes are installed with each parent pointing at its child; the external node link is placed within the lowest level. If nodes at all levels within the tree were just written (were all full) then a new root is created at the next level to hold the router value. The root has empty nodes as new children at all levels between the external nodes and itself with each parent pointing at its child; the external node link is placed within the lowest level.

This algorithm ensures that each external node has at most one link from the internal nodes. Also, long stretches of records with identical values will not necessarily have any links.