



Documentation of the results for the 3rd assignment on Data Structures.
George Valavanis

Average number of disk accesses per import	Average number of disk accesses per random search	Average number of disk accesses per deletion	Average number of disk accesses for value range K (K=10)	Average number of disk accesses for value range K (K=1000)
15	2	6	4	5

First, the rank of the tree was calculated from the expression $20 + 4*n + 4*(n+1) = 256 \Rightarrow 8n = 232 \Rightarrow n=29$. So the rank of the tree is 29.

For the height of the tree in the case of 100000 keys, the following applies:

$$H = \log_{29}(\text{base}=100000) = 3.41 = 4.$$

Therefore the tree after inserting 100000 keys has a height of 4.

This explains why we have an average number of accesses close to 4 for random searches, deletions and range searches. The large range shows the advantages of B+ trees as it took just one more disk access than the small range.

For the insertion of an additional 20 nodes, the average number of accesses is well above 4 due to the possible splits that occur during insertion.