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# N-Dimensional Structure: A Data Structure with Fast Access and Sorting of Integers

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## Abstract

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Various Data Structures have been introduced till date that aim at either to improve them in terms of time or space complexity or they are particularly designed for some special applications. This work aims at developing a new data structure that takes the idea of plotting each digit to another dimension and thereby reducing the access time for keys stored in it. In order to make it practical to implement, a tree-based approach has been used to store it in the

memory. The asymptotic time complexity is  $O(nu)$  for extracting the keys in sorted order where  $u$  is the size of universe. In practical testing, the procedure took much less time to complete as compared to Merge Sort which is the best Comparison based Sorting Technique in terms of worst-case time complexity. This work discusses the concept, implementation and algorithms associated with the data structure. Then it evaluates it against various test scenarios with other sorting techniques.

### Keywords

- Data structure**
- Algorithm**
- Sorting**
- Efficiency**
- Fast access**
- Time complexity**
- Optimization**

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