|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | **Trie Special Tree | Prefix Tree** | | | **Radix Tree** |
| **Who** | Axel Thue | Rene de la Briandais | Edward Fredkin | Donald R. Morisson |
| **When** | 1912 | 1959 | 1960 | 1968 |
| **What** | Are typically used to store associative arrays where the keys are usually strings. It is totally dependent on the contents of the tree. Can be used in searching & intellisense, dictionary & data compression | | | Variant of a Trie that is a space-optimized variant of a trie in which nodes with only one child get merged with its parents. Same use as tries but space optimized. |
| **Properties** | * Each node has max 26 pointers * Each represent a character of the English alphabet * Trie is also called **Digital Tree** * Strings only | Characters only | | | * Each node has at least 2 children with N-1 pointers * Also called a compressed trie * 1 node can store at max 3 letters if possible |

**TIME AND SPACE COMPLEXITY**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Time Complexity** | | | | | |
|  | **Trie Tree** | | **Radix Tree** | |  |
|  | Average | Worst | Average | Worst |  |
| **Access** | O(k) | O(k) | O(k)  k = length | O(k)  k = length | k = key length  m = alphabet size |
| **Search** | O(k) |
| **Insertion** | O(k) |
| **Deletion** | O(k) |

|  |  |  |  |
| --- | --- | --- | --- |
| **Space Complexity** | | | |
|  | **Trie Tree** | **Radix Tree** |  |
|  | Average | Better guro compared sa trie kay space-optimized | k = key length  m = alphabet size |
| **Access** | O (1) |
| **Search** | O (1) |
| **Insertion** | O (k \* m) |
| **Deletion** | O (1) |