

Tries

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Overview I

1 Intro

- Example

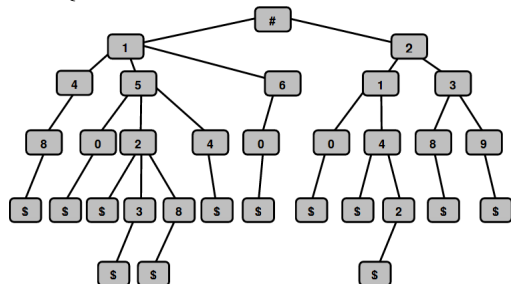
2 Linked list implementation

- A **trie** t for some $S \subset K$ is a tree; either it is empty or it follows these properties:
 - The root contains a special symbol: $\# \notin A$
 - Each leaf node contains a special end of key symbol: $\$ \notin A$
 - Every other node contains an element of A such that:
 $a_1 a_2 \dots a_n \in S$ iff $\# a_1 a_2 \dots a_n \$$ is in path t .

Example

$A = \{0, 1, 2, 3, 4, 5, 6, 7, 8, 9\}$

$S = \{148, 150, 152, 1523, 1528, 154, 160, 210, 214, 2142, 238, 239\}$



- Every path between the root and a leaf node corresponds to a key in S .
- A trie is an appropriate representation when a combined length of all distinct prefixes in a set of keys S is small compared to the total length of all keys in S .
- Maximum number of children of a non-leaf node is $m = |A| + 1$.

Linked list implementation

- First represent the trie as a binary tree:
 - Left child in the binary tree corresponds to leftmost child in the trie.
 - Right child in the binary tree corresponds to leftmost sibling in the trie.
- Keys are represented by character strings:
 - The subset of characters that can be used as symbols in a key is assumed to have been specified, as is the character to be used as the end of key symbol.
- Complexity:
 - Search is $O(nm)$ time where m is the size of the alphabet plus 1 for \$.
 - If a branch is “Straggly” i.e. one branch has a long branch to a single key, they can be compressed and simply go to the one coalesced key.

The End