

Symbol Tables

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- Important on many levels of CS
- Search by keys
 - Dictionary
 - Phone book
 - Search engine
 - Database

- Aka *map*, *dictionary*, *associative array*
- A set of (key, value) pairs
- Operations
 - Add a new pair
 - Return an item with a given key
- Alternatively: An array (or vector) that can be indexed by anything

Implementations

- Array indexed by key
- Vector of pairs
- List of pairs
- Sorted vector of pairs
- Binary Search Tree

Implementations of symbol table

Method	Get	Add	Remove
Key-indexed array	$O(1)$	$O(1)$	$O(1)$
Unordered vector	$O(n)$	$O(1)$	$O(n)$
Unordered list	$O(n)$	$O(1)$	$O(n)$
Ordered list	$O(n)$	$O(n)$	$O(n)$
Binary search	$O(\log(n))$	$O(n)$	$O(n)$
BST (Average)	$O(\log(n))$	$O(\log(n))$	$O(\log(n))$
BST (WC)	$O(n)$	$O(n)$	$O(n)$

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Definition

Hash-function A function that maps data of variable length to data of fixed length.

We want to turn a (long) sequence of bits into a fixed length sequence of bits