

List of data structures

This is a list of data structures. For a wider list of terms, see list of terms relating to algorithms and data structures. For a comparison of running time a subset of this list see comparison of data structures.

Contents

Data types

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Data types

Primitive types

- Boolean, true or false.
- Character
- Floating-point numbers, limited precision approximations of real number values.
 - Including Single precision and Double precision IEEE 754 Floats, among others
- Fixed-point numbers
- Integer, integral or fixed-precision values.
- Reference (also called a pointer or handle), a small value referring to another object's address in memory, possibly a much larger one.
- Enumerated type, a small set of uniquely named values.

Composite types or non-primitive type

- Array (as an example String which is an array of characters)
- Record (also called tuple or structure)
- Union (Tagged union is a subset, also called variant, variant record, discriminated union, or disjoint union)

Abstract data types

- Container
- List
- Tuple
- Multimap (example Associative array)
- Set
- Multiset (bag)
- Stack
- Queue (example Priority queue)
- Double-ended queue
- Graph (example Tree, Heap)

Some properties of abstract data types:

Structure	Order	Unique
<u>List</u>	yes	no
<u>Associative array</u>	no	yes
<u>Set</u>	no	yes
<u>Stack</u>	yes	no
<u>Multimap</u>	no	no
<u>Multiset (bag)</u>	no	no
<u>Queue</u>	yes	no

Order means the insertion sequence counts. Unique means that duplicate elements are not allowed, based on some inbuilt or, alternatively, user-defined rule for comparing elements.

Linear data structures

A data structure is said to be linear if its elements form a sequence.

Arrays

- Array
- Bit array
- Bit field
- Bitboard
- Bitmap
- Circular buffer
- Control table
- Image
- Dope vector
- Dynamic array
- Gap buffer
- Hashed array tree
- Lookup table
- Matrix

- [Parallel array](#)
- [Sorted array](#)
- [Sparse matrix](#)
- [Iliffe vector](#)
- [Variable-length array](#)

Lists

- [Doubly linked list](#)
- [Array list](#)
- [Linked list](#)
- [Association list](#)
- [Self-organizing list](#)
- [Skip list](#)
- [Unrolled linked list](#)
- [VList](#)
- [Conc-tree list](#)
- [Xor linked list](#)
- [Zipper](#)
- [Doubly connected edge list](#) also known as half-edge
- [Difference list](#)
- [Free list](#)

Trees

Binary trees

- [AA tree](#)
- [AVL tree](#)
- [Binary search tree](#)
- [Binary tree](#)
- [Cartesian tree](#)
- [Conc-tree list](#)

- [Left-child right-sibling binary tree](#)
- [Order statistic tree](#)
- [Pagoda](#)
- [Randomized binary search tree](#)
- [Red–black tree](#)
- [Rope](#)
- [Scapegoat tree](#)
- [Self-balancing binary search tree](#)
- [Splay tree](#)
- [T-tree](#)
- [Tango tree](#)
- [Threaded binary tree](#)
- [Top tree](#)
- [Treap](#)
- [WAVL tree](#)
- [Weight-balanced tree](#)

B-trees

- [B-tree](#)
- [B+ tree](#)
- [B*-tree](#)
- [B sharp tree](#)
- [Dancing tree](#)
- [2-3 tree](#)
- [2-3-4 tree](#)
- [Queap](#)
- [Fusion tree](#)
- [Bx-tree](#)
- [AList](#)

Heaps

- Heap
- Binary heap
- B-heap
- Weak heap
- Binomial heap
- Fibonacci heap
- AF-heap
- Leonardo Heap
- 2-3 heap
- Soft heap
- Pairing heap
- Leftist heap
- Treap
- Beap
- Skew heap
- Ternary heap
- D-ary heap
- Brodal queue

Trees

In these data structures each tree node compares a bit slice of key values.

- Tree (data structure)
- Radix tree
- Suffix tree
- Suffix array
- Compressed suffix array
- FM-index
- Generalised suffix tree
- B-tree
- Judy array
- X-fast trie

- [Y-fast trie](#)
- [Merkle tree](#)
- [Ctree](#)

Multiway trees

- [Ternary tree](#)
- [K-ary tree](#)
- [And–or tree](#)
- [\(a,b\)-tree](#)
- [Link/cut tree](#)
- [SPQR-tree](#)
- [Spaghetti stack](#)
- [Disjoint-set data structure](#)
- [Fusion tree](#)
- [Enfilade](#)
- [Exponential tree](#)
- [Fenwick tree](#)
- [Van Emde Boas tree](#)
- [Rose tree](#)

Space-partitioning trees

These are data structures used for [space partitioning](#) or [binary space partitioning](#).

- [Segment tree](#)
- [Interval tree](#)
- [Range tree](#)
- [Bin](#)
- [K-d tree](#)
- [Implicit k-d tree](#)
- [Min/max k-d tree](#)
- [Relaxed k-d tree](#)

- [Adaptive k-d tree](#)
- [Quadtree](#)
- [Octree](#)
- [Linear octree](#)
- [Z-order](#)
- [UB-tree](#)
- [R-tree](#)
- [R+ tree](#)
- [R* tree](#)
- [Hilbert R-tree](#)
- [X-tree](#)
- [Metric tree](#)
- [Cover tree](#)
- [M-tree](#)
- [VP-tree](#)
- [BK-tree](#)
- [Bounding interval hierarchy](#)
- [Bounding volume hierarchy](#)
- [BSP tree](#)
- [Rapidly exploring random tree](#)

Application-specific trees

- [Abstract syntax tree](#)
- [Parse tree](#)
- [Decision tree](#)
- [Alternating decision tree](#)
- [Minimax tree](#)
- [Expectiminimax tree](#)
- [Finger tree](#)
- [Expression tree](#)
- [Log-structured merge-tree](#)
- [Lexicographic Search Tree](#)

Hash-based structures

- [Bloom filter](#)
- [Count-Min sketch](#)
- [Distributed hash table](#)
- [Double hashing](#)
- [Dynamic perfect hash table](#)
- [Hash array mapped trie](#)
- [Hash list](#)
- [Hash table](#)
- [Hash tree](#)
- [Hash trie](#)
- [Koorde](#)
- [Prefix hash tree](#)
- [Rolling hash](#)
- [MinHash](#)
- [Quotient filter](#)
- [Ctrie](#)

Graphs

Many [graph](#)-based data structures are used in computer science and related fields:

- [Graph](#)
- [Adjacency list](#)
- [Adjacency matrix](#)
- [Graph-structured stack](#)
- [Scene graph](#)
- [Decision tree](#)
 - [Binary decision diagram](#)
- [Zero-suppressed decision diagram](#)
- [And-inverter graph](#)
- [Directed graph](#)

- [Directed acyclic graph](#)
- [Propositional directed acyclic graph](#)
- [Multigraph](#)
- [Hypergraph](#)

Other

- [Lightmap](#)
- [Winged edge](#)
- [Quad-edge](#)
- [Routing table](#)
- [Symbol table](#)

See also

- [Purely functional data structure](#)

External links

- [Tommy Benchmarks \(http://tommyds.sourceforge.net/doc/benchmark.html\)](http://tommyds.sourceforge.net/doc/benchmark.html) Comparison of several data structures.
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