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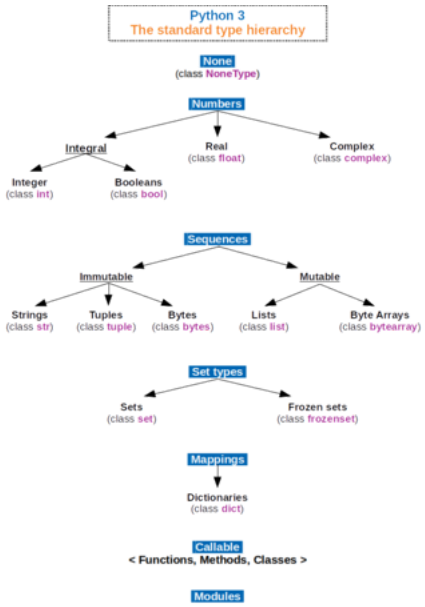
List of data structures

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



Contents

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
- Date Time, value referring to Date and Time

Composite types or non-primitive type

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

Abstract data types

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

Some properties of abstract data types:

Structure	Order	Unique
List	yes	no
Associative array	no	keys (indexes) only
Set	no	yes
Stack	yes	no
Multimap	no	no
Multiset (bag)	no	no
Queue	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
- C tree

Multi-way trees

- Ternary tree
- K-ary tree
- And–or tree
- (a,b)-tree
- Link/cut tree
- SPQR-tree
- Spaghetti stack
- Disjoint-set data structure (Union-find 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
- Blockchain, a hash-based chained data structure that can persist state history over time

External links

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

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