

## Set APIs (from Algorithms, 4th ed.)

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- much like the symbol table APIs but only need the keys as values
- only need:
  - add
  - delete
  - contains
  - empty
  - size
- can add set operations such as
  - union
    - for elem in both lhs and rhs add to tmp set and return tmp
  - intersection
    - create tmp
    - if size of lhs < size of rhs -> for elem in lhs if also in rhs, add to tmp
    - else for elem in rhs, if also in lhs, add to tmp
    - return tmp
  - complement
    - need set containing all elements possible
    - create tmp set
    - for elem in all elements, if not in arg add to tmp
    - return tmp
- can implement using linked list, trees (red-black) (ordered), or hash tables (unordered)
- can have set or multiset
- commonly used for filter clients i.e. whitelist or blacklist, or deduplication

## Mathematical notation

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- $\emptyset$  - empty set
- $\mathbb{Z}$  - set of integers  $\{ \dots -1, 0, 1, \dots \}$
- $\mathbb{R}$  - set of real numbers
- $\mathbb{N}$  - set of natural numbers  $\{0, 1, 2, \dots\}$  or  $\{1, 2, 3, \dots\}$
- specifies information about subsets and proper subsets
- defines set intersection, union, and difference
- empty set law
- idempotency laws
- commutative laws
- associative laws
- distributive laws

- absorption laws
- DeMorgan's laws
- set complement
- disjoint
- partition
- finite
- infinite
- n- set
- singleton
- k-subset
- power set
- ordered pair
- Cartesian product
- n-tuples