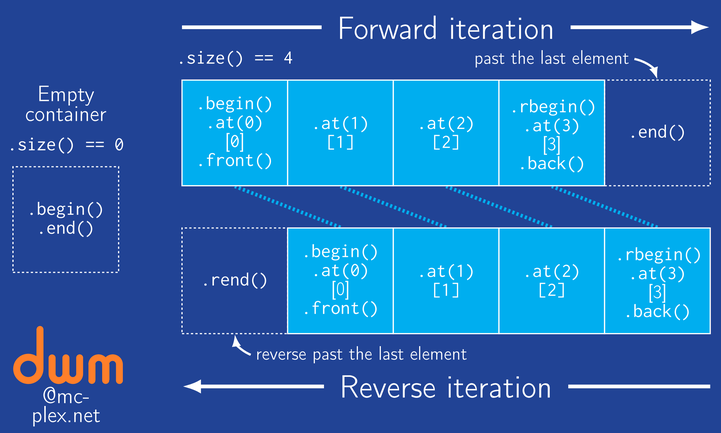
# C++ STL container members and iterators

| | | Sequence containers | | | | | Associative containers | | | | Unordered associative containers | | | | Container adaptors | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Header ⟶ | | <array> | <vector> | <deque> | <forward_list> | <list> | <set> | | <map> | | <unordered_set> | | <unordered_map> | | <stack> | <queue> | |
| Container ⟶ | | array | vector | deque | forward_list | list | set | multiset | map | multimap | unordered_set | unordered_multiset | unordered_map | unordered_multimap | stack | queue | priority_queue |
| Construct, destruct, assign | (constructor) | (implicit) | vector | deque | forward_list | list | set | multiset | map | multimap | unordered_set | unordered_multiset | unordered_map | unordered_multimap | stack | queue | priority_queue |
| | (destructor) | (implicit) | ~vector | ~deque | ~forward_list | ~list | ~set | ~multiset | ~map | ~multimap | ~unordered_set | ~unordered_multiset | ~unordered_map | ~unordered_multimap | ~stack | ~queue | ~priority_queue |
| | operator= | (implicit) | operator= | operator= | operator= | operator= | operator= | operator= | operator= | operator= | operator= | operator= | operator= | operator= | operator= | operator= | operator= |
| | assign | | assign | assign | assign | assign | | | | | | | | | | | |
| Iterators | begin | begin | begin | begin | begin | begin | begin | begin | begin | begin | begin | begin | begin | begin | | | |
| | cbegin | cbegin | cbegin | cbegin | cbegin | cbegin | cbegin | cbegin | cbegin | cbegin | cbegin | cbegin | cbegin | cbegin | | | |
| | end | end | end | end | end | end | end | end | end | end | end | end | end | end | | | |
| | cend | cend | cend | cend | cend | cend | cend | cend | cend | cend | cend | cend | cend | cend | | | |
| | rbegin | rbegin | rbegin | rbegin | | rbegin | rbegin | rbegin | rbegin | rbegin | | | | | | | |
| | crbegin | crbegin | crbegin | crbegin | | crbegin | crbegin | crbegin | crbegin | crbegin | | | | | | | |
| | rend | rend | rend | rend | | rend | rend | rend | rend | rend | | | | | | | |
| | crend | crend | crend | crend | | crend | crend | crend | crend | crend | | | | | | | |
| Element access | at | at | at | at | | | | | at | | | at | | | | | |
| | operator[] | operator[] | operator[] | operator[] | | | | | operator[] | | | | operator[] | | | | |
| | data | data | data | | | | | | | | | | | | | | |
| | front | front | front | front | front | front | | | | | | | | | | front | top |
| | back | back | back | back | | back | | | | | | | | | top | back | |
| Capacity | empty | empty | empty | empty | empty | empty | empty | empty | empty | empty | empty | empty | empty | empty | empty | empty | empty |
| | size | size | size | size | | size | size | size | size | size | size | size | size | size | size | size | size |
| | max_size | max_size | max_size | max_size | max_size | max_size | max_size | max_size | max_size | max_size | max_size | max_size | max_size | max_size | | | |
| | resize | | resize | resize | resize | resize | | | | | | | | | | | |
| | capacity | | capacity | | | | | | | | bucket_count | bucket_count | bucket_count | bucket_count | | | |
| | reserve | | reserve | | | | | | | | reserve | reserve | reserve | reserve | | | |
| | shrink_to_fit | | shrink_to_fit | shrink_to_fit | | | | | | | | | | | | | |
| Modifiers | clear | | clear | clear | clear | clear | clear | clear | clear | clear | clear | clear | clear | clear | | | |
| | insert | | insert | insert | insert_after | insert | insert | insert | insert | insert | insert | insert | insert | insert | | | |
| | insert_or_assign | | | | | | | | insert_or_assign | | | | insert_or_assign | | | | |
| | emplace | | emplace | emplace_after | | emplace | emplace | emplace | emplace | emplace | emplace | emplace | emplace | emplace | | | |
| | emplace_hint | | | | | | emplace_hint | emplace_hint | emplace_hint | emplace_hint | emplace_hint | emplace_hint | emplace_hint | emplace_hint | | | |
| | try_emplace | | | | | | | | try_emplace | | | | try_emplace | | | | |
| | erase | | erase | erase | erase_after | erase | erase | erase | erase | erase | erase | erase | erase | erase | | | |
| | push_front | | push_front | push_front | push_front | | | | | | | | | | | | |
| | emplace_front | | emplace_front | emplace_front | emplace_front | | | | | | | | | | | | |
| | pop_front | | pop_front | pop_front | pop_front | | | | | | | | | | | pop | pop |
| | push_back | | push_back | push_back | | push_back | | | | | | | | | push | push | push |
| | emplace_back | | emplace_back | emplace_back | | emplace_back | | | | | | | | | emplace | emplace | emplace |
| | pop_back | | pop_back | pop_back | | pop_back | | | | | | | | | pop | | |
| | swap | swap | swap | swap | swap | swap | swap | swap | swap | swap | swap | swap | swap | swap | swap | swap | swap |
| | merge | | | | merge | merge | merge | merge | merge | merge | merge | merge | merge | merge | | | |
| | extract | | | | | | extract | extract | extract | extract | extract | extract | extract | extract | | | |
| List operations | splice | | | splice_after | splice | | | | | | | | | | | | |
| | remove | | | remove | remove | | | | | | | | | | | | |
| | remove_if | | | remove_if | remove_if | | | | | | | | | | | | |
| | reverse | | | reverse | reverse | | | | | | | | | | | | |
| | unique | | | unique | unique | | | | | | | | | | | | |
| | sort | | | sort | sort | | | | | | | | | | | | |
| Lookup | count | | | | | | count | count | count | count | count | count | count | count | | | |
| | find | | | | | | find | find | find | find | find | find | find | find | | | |
| | lower_bound | | | | | | lower_bound | lower_bound | lower_bound | lower_bound | | | | | | | |
| | upper_bound | | | | | | upper_bound | upper_bound | upper_bound | upper_bound | | | | | | | |
| | equal_range | | | | | | equal_range | equal_range | equal_range | equal_range | equal_range | equal_range | equal_range | equal_range | | | |
| Observers | key_comp | | | | | | key_comp | key_comp | key_comp | key_comp | | | | | | | |
| | value_comp | | | | | | value_comp | value_comp | value_comp | value_comp | | | | | | | |
| | hash_function | | | | | | | | | | hash_function | hash_function | hash_function | hash_function | | | |
| | key_eq | | | | | | | | | | key_eq | key_eq | key_eq | key_eq | | | |
| Allocator | get_allocator | | get_allocator | get_allocator | get_allocator_after | get_allocator | get_allocator | get_allocator | get_allocator | get_allocator | get_allocator | get_allocator | get_allocator | get_allocator | | | |

C++03
C++11
C++17

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*"The trouble with quick and dirty is that dirty remains long after quick has been forgotten."*

– Steve McConnell

*"Simple, not easy. There's a difference."*

– Ron Jeffries

*"Successful software always gets changed."*

– Fred Brooks

## Iterator invalidation

| Category | Container | After insertion, are... iterators valid? | After insertion, are... references valid? | After erasure, are... iterators valid? | After erasure, are... references valid? | Conditionally |
|---|---|---|---|---|---|---|
| Sequence containers | array | N/A | | N/A | | |
| | vector | no | | N/A | | • Insertion changed capacity |
| | | yes | | yes | | • Before modified element(s) |
| | | no | | no | | • At or after modified element(s) |
| | deque | no | yes | Yes, except erased element(s) | | • Modified first or last element |
| | | | no | no | | • Modified middle only |
| | list | yes | | Yes, except erased element(s) | | |
| | forward_list | | | | | |
| Associative containers | set | yes | | Yes, except erased element(s) | | |
| | multiset | | | | | |
| | map | | | | | |
| | multimap | | | | | |
| Unsorted associative containers | unordered_set | no | yes | yes, except erased element(s) | | • Insertion caused rehash |
| | unordered_multiset | | | | | |
| | unordered_map | yes | | | | • No rehash |
| | unordered_multimap | | | | | |