std::list

Defined in header `<list>`

```
template<
    class T,
    class Allocator = std::allocator<T>
> class list;
```

`std::list` is a container that supports constant time insertion and removal of elements from anywhere in the container. Fast random access is not supported. It is usually implemented as a doubly-linked list. Compared to `std::forward_list` this container provides bidirectional iteration capability while being less space efficient.

Addition, removal and moving the elements within the list or across several lists does not invalidate the iterators or references. An iterator is invalidated only when the corresponding element is deleted.

`std::list` meets the requirements of `Container`, `AllocatorAwareContainer`, `SequenceContainer` and `ReversibleContainer`.

Template parameters

T - The type of the elements.

`T` must meet the requirements of `CopyAssignable` and `CopyConstructible`.	(until C++11)
The requirements that are imposed on the elements depend on the actual operations performed on the container. Generally, it is required that element type is a complete type and meets the requirements of `Erasable`, but many member functions impose stricter requirements.	(since C++11) (until C++17)
The requirements that are imposed on the elements depend on the actual operations performed on the container. Generally, it is required that element type meets the requirements of `Erasable`, but many member functions impose stricter requirements. This container (but not its members) can be instantiated with an incomplete element type if the allocator satisfies the allocator completeness requirements.	(since C++17)

Allocator - An allocator that is used to acquire memory to store the elements. The type must meet the requirements of `Allocator`.

Member types

Member type	Definition
`value_type`	`T`
`allocator_type`	`Allocator`
`size_type`	Unsigned integral type (usually `std::size_t`)
`difference_type`	Signed integer type (usually `std::ptrdiff_t`)
`reference`	`Allocator::reference` (until C++11) `value_type&` (since C++11)
`const_reference`	`Allocator::const_reference` (until C++11) `const value_type&` (since C++11)
`pointer`	`Allocator::pointer` (until C++11) `std::allocator_traits<Allocator>::pointer` (since C++11)
`const_pointer`	`Allocator::const_pointer` (until C++11) `std::allocator_traits<Allocator>::const_pointer` (since C++11)
`iterator`	`BidirectionalIterator`
`const_iterator`	Constant bidirectional iterator
`reverse_iterator`	`std::reverse_iterator<iterator>`
`const_reverse_iterator`	`std::reverse_iterator<const_iterator>`

Member functions

(constructor)	constructs the `list` (public member function)
(destructor)	destructs the `list` (public member function)
`operator=`	assigns values to the container (public member function)
`assign`	assigns values to the container (public member function)
`get_allocator`	returns the associated allocator (public member function)

Element access

`front`	access the first element (public member function)
`back`	access the last element (public member function)

Iterators

`begin` **`cbegin`**	returns an iterator to the beginning (public member function)
`end` **`cend`**	returns an iterator to the end (public member function)
`rbegin` **`crbegin`**	returns a reverse iterator to the beginning (public member function)
`rend` **`crend`**	returns a reverse iterator to the end (public member function)

Capacity

`empty`	checks whether the container is empty (public member function)
`size`	returns the number of elements (public member function)
`max_size`	returns the maximum possible number of elements (public member function)

Modifiers

`clear`	clears the contents (public member function)
`insert`	inserts elements (public member function)
`emplace` (C++11)	constructs element in-place (public member function)
`erase`	erases elements (public member function)
`push_back`	adds elements to the end (public member function)
`emplace_back` (C++11)	constructs elements in-place at the end (public member function)
`pop_back`	removes the last element (public member function)
`push_front`	inserts elements to the beginning (public member function)
`emplace_front` (C++11)	constructs elements in-place at the beginning (public member function)
`pop_front`	removes the first element (public member function)
`resize`	changes the number of elements stored (public member function)
`swap`	swaps the contents (public member function)

Operations

merge	merges two sorted lists (public member function)
splice	moves elements from another `list` (public member function)
remove **remove_if**	removes elements satisfying specific criteria (public member function)
reverse	reverses the order of the elements (public member function)
unique	removes consecutive duplicate elements (public member function)
sort	sorts the elements (public member function)

Non-member functions

operator== **operator!=** **operator<** **operator<=** **operator>** **operator>=**	lexicographically compares the values in the list (function template)
std::swap(std::list)	specializes the `std::swap` algorithm (function template)

Retrieved from "http://en.cppreference.com/mwiki/index.php?title=cpp/container/list&oldid=78630"

std::list::list

```
explicit list( const Allocator& alloc = Allocator() );
```
(1) (until C++14)

```
list() : list( Allocator() ) {}
explicit list( const Allocator& alloc );
```
(1) (since C++14)

```
explicit list( size_type count,
               const T& value = T(),
               const Allocator& alloc = Allocator());
```
(2) (until C++11)

```
         list( size_type count,
               const T& value,
               const Allocator& alloc = Allocator());
```
(2) (since C++11)

```
explicit list( size_type count );
```
(3) (since C++11) (until C++14)

```
explicit list( size_type count, const Allocator& alloc = Allocator() );
```
(3) (since C++14)

```
template< class InputIt >
list( InputIt first, InputIt last,
      const Allocator& alloc = Allocator() );
```
(4)

```
list( const list& other );
```
(5)

```
list( const list& other, const Allocator& alloc );
```
(5) (since C++11)

```
list( list&& other )
```
(6) (since C++11)

```
list( list&& other, const Allocator& alloc );
```
(6) (since C++11)

```
list( std::initializer_list<T> init,
      const Allocator& alloc = Allocator() );
```
(7) (since C++11)

Constructs a new container from a variety of data sources, optionally using a user supplied allocator `alloc`.

1) Default constructor. Constructs an empty container.

2) Constructs the container with `count` copies of elements with value `value`.

3) Constructs the container with `count` default-inserted instances of `T`. No copies are made.

4) Constructs the container with the contents of the range `[first, last)`.

This constructor has the same effect as overload (2) if `InputIt` is an integral type.	(until C++11)
This overload only participates in overload resolution if `InputIt` satisfies `InputIterator` , to avoid ambiguity with the overload (2).	(since C++11)

5) Copy constructor. Constructs the container with the copy of the contents of `other`. If `alloc` is not provided, allocator is obtained by calling `std::allocator_traits<allocator_type>::select_on_container_copy_construction(other.get_allocator())` .

6) Move constructor. Constructs the container with the contents of `other` using move semantics. If `alloc` is not provided, allocator is obtained by move-construction from the allocator belonging to `other`.

7) Constructs the container with the contents of the initializer list `init`.

Parameters

alloc	-	allocator to use for all memory allocations of this container
count	-	the size of the container
value	-	the value to initialize elements of the container with
first, last	-	the range to copy the elements from
other	-	another container to be used as source to initialize the elements of the container with
init	-	initializer list to initialize the elements of the container with

Complexity

1) Constant

2-3) Linear in `count`

4) Linear in distance between `first` and `last`

5) Linear in size of `other`

6) Constant. If `alloc` is given and `alloc != other.get_allocator()`, then linear.

7) Linear in size of `init`

Example

Run this code

```
#include <list>
#include <string>
#include <iostream>

template<typename T>
std::ostream& operator<<(std::ostream& s, const std::list<T>& v) {
    s.put('[');
    char comma[3] = {'\0', ' ', '\0'};
    for (const auto& e : v) {
        s << comma << e;
        comma[0] = ',';
    }
    return s << ']';
}

int main()
{
    // c++11 initializer list syntax:
    std::list<std::string> words1 {"the", "frogurt", "is", "also", "cursed"};
    std::cout << "words1: " << words1 << '\n';

    // words2 == words1
    std::list<std::string> words2(words1.begin(), words1.end());
    std::cout << "words2: " << words2 << '\n';

    // words3 == words1
    std::list<std::string> words3(words1);
    std::cout << "words3: " << words3 << '\n';

    // words4 is {"Mo", "Mo", "Mo", "Mo", "Mo"}
    std::list<std::string> words4(5, "Mo");
    std::cout << "words4: " << words4 << '\n';
}
```

Output:

```
words1: [the, frogurt, is, also, cursed]
words2: [the, frogurt, is, also, cursed]
words3: [the, frogurt, is, also, cursed]
words4: [Mo, Mo, Mo, Mo, Mo]
```

See also

assign	assigns values to the container (public member function)
operator=	assigns values to the container (public member function)

Retrieved from "http://en.cppreference.com/mwiki/index.php?title=cpp/container/list/list&oldid=50529"

std::list::~list

```
~list();
```

Destructs the container. The destructors of the elements are called and the used storage is deallocated. Note, that if the elements are pointers, the pointed-to objects are not destroyed.

Complexity

Linear in the size of the container.

Retrieved from "http://en.cppreference.com/mwiki/index.php?title=cpp/container/list/%7Elist&oldid=50548"

std::list::operator=

`list& operator=( const list& other );`	(1)	
`list& operator=( list&& other );`	(2)	(since C++11)
`list& operator=( std::initializer_list<T> ilist );`	(3)	(since C++11)

Replaces the contents of the container.

1) Copy assignment operator. Replaces the contents with a copy of the contents of `other`. If `std::allocator_traits<allocator_type>::propagate_on_container_copy_assignment()` is `true` , the target allocator is replaced by a copy of the source allocator. If the target and the source allocators do not compare equal, the target (`*this`) allocator is used to deallocate the memory, then `other`'s allocator is used to allocate it before copying the elements. (since C++11)

2) Move assignment operator. Replaces the contents with those of `other` using move semantics (i.e. the data in `other` is moved from `other` into this container). `other` is in a valid but unspecified state afterwards. If `std::allocator_traits<allocator_type>::propagate_on_container_move_assignment()` is `true` , the target allocator is replaced by a copy of the source allocator. If it is `false` and the source and the target allocators do not compare equal, the target cannot take ownership of the source memory and must move-assign each element individually, allocating additional memory using its own allocator as needed.

3) Replaces the contents with those identified by initializer list `ilist`.

Parameters

other	-	another container to use as data source
ilist	-	initializer list to use as data source

Return value

`*this`

Complexity

1) Linear in the size of the `other`.

2) Constant unless `std::allocator_traits<allocator_type>::propagate_on_container_move_assignment()` is false and the allocators do not compare equal (in which case linear).

3) Linear in the size of `ilist`.

Exceptions

(since C++17)

2) `noexcept` specification:

```
noexcept(std::allocator_traits<Allocator>::is_always_equal::value)
```

Example

The following code uses to assign one `std::list` to another:

Run this code

```
#include <list>
#include <iostream>

void display_sizes(const std::list<int>& nums1,
                   const std::list<int>& nums2,
                   const std::list<int>& nums3)
{
    std::cout << "nums1: " << nums1.size()
              << " nums2: " << nums2.size()
              << " nums3: " << nums3.size() << '\n';
}

int main()
{
    std::list<int> nums1 {3, 1, 4, 6, 5, 9};
    std::list<int> nums2;
    std::list<int> nums3;

    std::cout << "Initially:\n";
    display_sizes(nums1, nums2, nums3);

    // copy assignment copies data from nums1 to nums2
    nums2 = nums1;

    std::cout << "After assigment:\n";
    display_sizes(nums1, nums2, nums3);

    // move assignment moves data from nums1 to nums3,
    // modifying both nums1 and nums3
    nums3 = std::move(nums1);

    std::cout << "After move assigment:\n";
    display_sizes(nums1, nums2, nums3);
}
```

Output:

```
Initially:
nums1: 6 nums2: 0 nums3: 0
After assigment:
nums1: 6 nums2: 6 nums3: 0
After move assigment:
nums1: 0 nums2: 6 nums3: 6
```

See also

(constructor)	constructs the `list` (public member function)
`assign`	assigns values to the container (public member function)

Retrieved from "http://en.cppreference.com/mwiki/index.php?title=cpp/container/list/operator%3D&oldid=43660"

std::list::assign

`void assign( size_type count, const T& value );`	(1)	

`template< class InputIt >`
`void assign( InputIt first, InputIt last );`
	(2)	

`void assign( std::initializer_list<T> ilist );`	(3)	(since C++11)

Replaces the contents of the container.

1) Replaces the contents with `count` copies of value `value`

2) Replaces the contents with copies of those in the range `[first, last)`.

This overload has the same effect as overload (1) if `InputIt` is an integral type.	(until C++11)
This overload only participates in overload resolution if `InputIt` satisfies `InputIterator`.	(since C++11)

3) Replaces the contents with the elements from the initializer list `ilist`.

Parameters

`count`	-	the new size of the container
`value`	-	the value to initialize elements of the container with
`first, last`	-	the range to copy the elements from
`ilist`	-	initializer list to copy the values from

Complexity

1) Linear in `count`

2) Linear in distance between `first` and `last`

3) Linear in `ilist.size()`

Example

The following code uses `assign` to add several characters to a `std::list<char>`:

Run this code

```
#include <list>
#include <iostream>

int main()
{
    std::list<char> characters;

    characters.assign(5, 'a');

    for (char c : characters) {
        std::cout << c << '\n';
    }

    return 0;
}
```

Output:

```
a
a
a
a
a
```

See also

(constructor)	constructs the `list` (public member function)

Retrieved from "http://en.cppreference.com/mwiki/index.php?title=cpp/container/list/assign&oldid=50516"

std::list::get_allocator

```
allocator_type get_allocator() const;
```

Returns the allocator associated with the container.

Parameters

(none)

Return value

The associated allocator.

Complexity

Constant.

Retrieved from "http://en.cppreference.com/mwiki/index.php?title=cpp/container/list/get_allocator&oldid=50527"

std::list::front

```
reference front();
const_reference front() const;
```

Returns a reference to the first element in the container.

Calling `front` on an empty container is undefined.

Parameters

(none)

Return value

reference to the first element

Complexity

Constant

Notes

For a container `c`, the expression `c.front()` is equivalent to `*c.begin()`.

Example

The following code uses `front` to display the first element of a `std::list<char>`:

Run this code

```
#include <list>
#include <iostream>

int main()
{
    std::list<char> letters {'o', 'm', 'g', 'w', 't', 'f'};

    if (!letters.empty()) {
        std::cout << "The first character is: " << letters.front() << '\n';
    }
}
```

Output:

```
The first character is o
```

See also

back	access the last element (public member function)

Retrieved from "http://en.cppreference.com/mwiki/index.php?title=cpp/container/list/front&oldid=50526"

std::list::back

```
reference back();
```

```
const_reference back() const;
```

Returns reference to the last element in the container.

Calling `back` on an empty container is undefined.

Parameters

(none)

Return value

Reference to the last element.

Complexity

Constant.

Notes

For a container `c`, the expression `return c.back();` is equivalent to `{ auto tmp = c.end(); --tmp; return *tmp; }`

Example

The following code uses `back` to display the last element of a `std::list<char>`:

Run this code

```
#include <list>
#include <iostream>

int main()
{
    std::list<char> letters {'o', 'm', 'g', 'w', 't', 'f'};
    if (!letters.empty()) {
        std::cout << "The last character is: " << letters.back() << '\n';
    }
}
```

Output:

```
The last character is f
```

See also

front	access the first element (public member function)

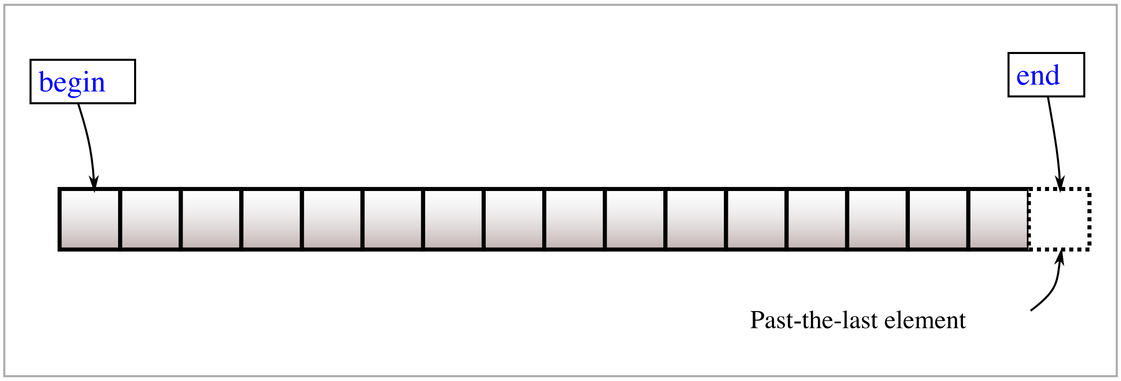
Retrieved from "http://en.cppreference.com/mwiki/index.php?title=cpp/container/list/back&oldid=50517"

std::list::begin, std::list::cbegin

`iterator begin();`	
`const_iterator begin() const;`	
`const_iterator cbegin() const;`	(since C++11)

Returns an iterator to the first element of the container.

If the container is empty, the returned iterator will be equal to `end()`.



Parameters

(none)

Return value

Iterator to the first element

Exceptions

(none)		(until C++11)
`noexcept` specification:	`noexcept`	(since C++11)

Complexity

Constant

Example

This section is incomplete
Reason: no example

See also

end **cend**	returns an iterator to the end (public member function)

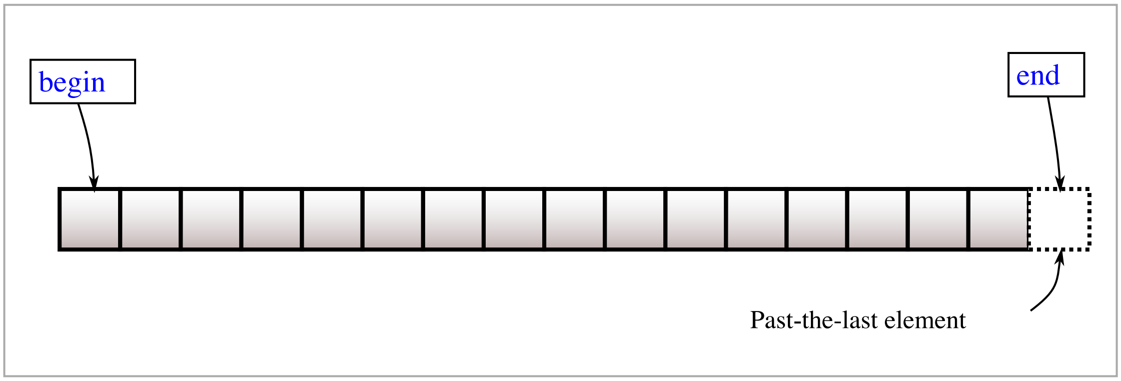
Retrieved from "http://en.cppreference.com/mwiki/index.php?title=cpp/container/list/begin&oldid=50518"

std::list::end, std::list::cend

`iterator end();`	
`const_iterator end() const;`	
`const_iterator cend() const;`	(since C++11)

Returns an iterator to the element following the last element of the container.

This element acts as a placeholder; attempting to access it results in undefined behavior.



Parameters

(none)

Return value

Iterator to the element following the last element.

Exceptions

(none)		(until C++11)
`noexcept` specification:	`noexcept`	(since C++11)

Complexity

Constant.

See also

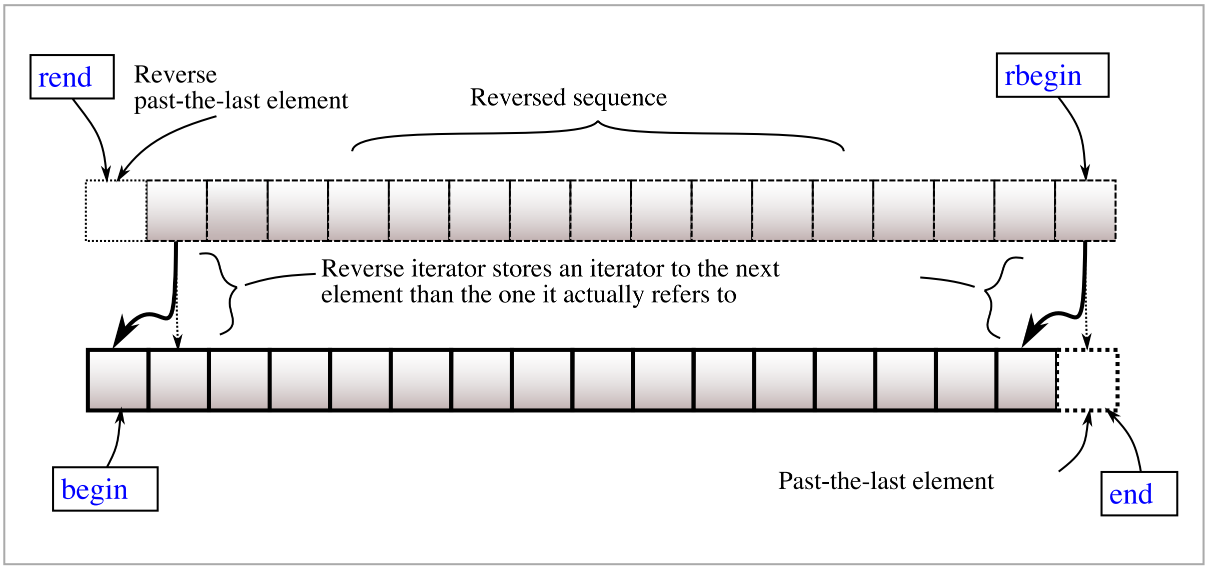
`begin` **`cbegin`**	returns an iterator to the beginning (public member function)

Retrieved from "http://en.cppreference.com/mwiki/index.php?title=cpp/container/list/end&oldid=50524"

std::list::rbegin, std::list::crbegin

`reverse_iterator rbegin();`	
`const_reverse_iterator rbegin() const;`	
`const_reverse_iterator crbegin() const;`	(since C++11)

Returns a reverse iterator to the first element of the reversed container. It corresponds to the last element of the non-reversed container.


rend
Reverse
past-the-last element
Reversed sequence
rbegin
Reverse iterator stores an iterator to the next
element than the one it actually refers to
begin
Past-the-last element
end

Parameters

(none)

Return value

Reverse iterator to the first element.

Exceptions

(none)		(until C++11)
`noexcept` specification:	`noexcept`	(since C++11)

Complexity

Constant.

See also

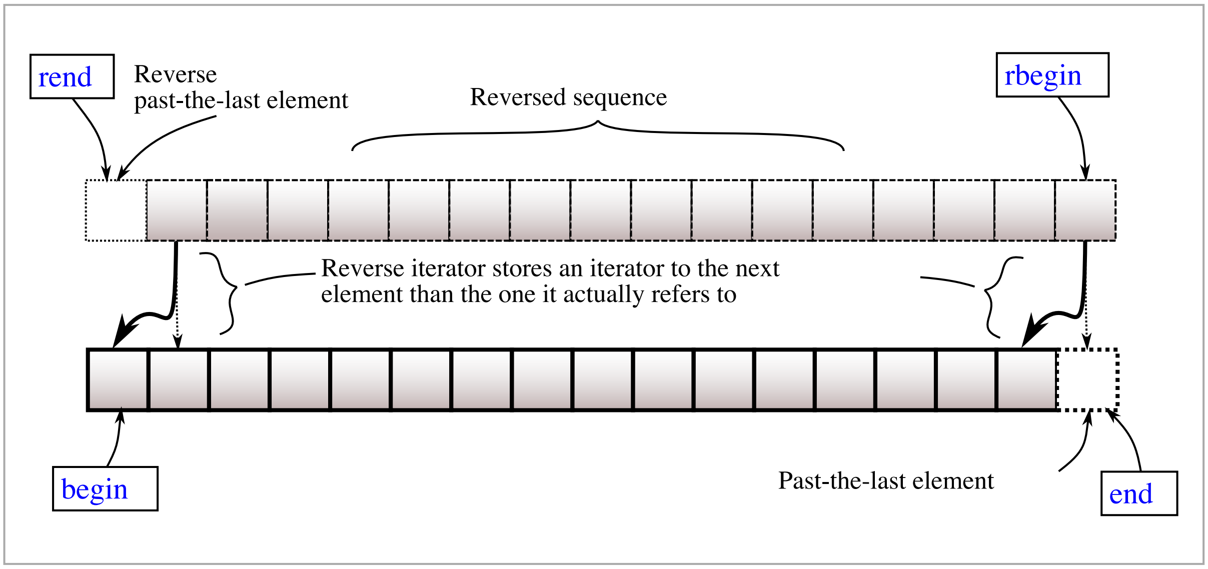
rend **crend**	returns a reverse iterator to the end (public member function)

Retrieved from "http://en.cppreference.com/mwiki/index.php?title=cpp/container/list/rbegin&oldid=50537"

std::list::rend, std::list::crend

```
reverse_iterator rend();
const_reverse_iterator rend() const;
const_reverse_iterator crend() const;      (since C++11)
```

Returns a reverse iterator to the element following the last element of the reversed container. It corresponds to the element preceding the first element of the non-reversed container. This element acts as a placeholder, attempting to access it results in undefined behavior.


rend
Reverse
past-the-last element
Reversed sequence
rbegin
Reverse iterator stores an iterator to the next
element than the one it actually refers to
begin
Past-the-last element
end

Parameters

(none)

Return value

Reverse iterator to the element following the last element.

Exceptions

(none)		(until C++11)
`noexcept` specification:	`noexcept`	(since C++11)

Complexity

Constant.

See also

rbegin **crbegin**	returns a reverse iterator to the beginning (public member function)

Retrieved from "http://en.cppreference.com/mwiki/index.php?title=cpp/container/list/rend&oldid=50539"

std::list::empty

```
bool empty() const;
```

Checks if the container has no elements, i.e. whether `begin() == end()`.

Parameters

(none)

Return value

`true` if the container is empty, `false` otherwise

Exceptions

(none)		(until C++11)
`noexcept` specification:	`noexcept`	(since C++11)

Complexity

Constant.

Example

The following code uses `empty` to check if a `std::list<int>` contains any elements:

Run this code

```
#include <list>
#include <iostream>

int main()
{
    std::list<int> numbers;
    std::cout << "Initially, numbers.empty(): " << numbers.empty() << '\n';

    numbers.push_back(42);
    numbers.push_back(13317);
    std::cout << "After adding elements, numbers.empty(): " << numbers.empty() << '\n';
}
```

Output:

```
Initially, numbers.empty(): 1
After adding elements, numbers.empty(): 0
```

See also

`size`	returns the number of elements (public member function)

Retrieved from "http://en.cppreference.com/mwiki/index.php?title=cpp/container/list/empty&oldid=50523"

std::list::size

```
size_type size() const;
```

Returns the number of elements in the container, i.e. `std::distance(begin(), end())`.

Parameters

(none)

Return value

The number of elements in the container.

Exceptions

(none)		(until C++11)
`noexcept` specification:	`noexcept`	(since C++11)

Complexity

Constant or linear.	(until C++11)
Constant.	(since C++11)

Example

The following code uses `size` to display the number of elements in a `std::list`:

Run this code

```
#include <list>
#include <iostream>

int main()
{
    std::list<int> nums {1, 3, 5, 7};

    std::cout << "nums contains " << nums.size() << " elements.\n";
}
```

Output:

```
nums contains 4 elements.
```

See also

`empty`	checks whether the container is empty (public member function)
`max_size`	returns the maximum possible number of elements (public member function)
`resize`	changes the number of elements stored (public member function)

Retrieved from "http://en.cppreference.com/mwiki/index.php?title=cpp/container/list/size&oldid=64980"

std::list::max_size

```
size_type max_size() const;
```

Returns the maximum number of elements the container is able to hold due to system or library implementation limitations, i.e. `std::distance(begin(), end())` for the largest container.

Parameters

(none)

Return value

Maximum number of elements.

Exceptions

(none)		(until C++11)
`noexcept` specification:	`noexcept`	(since C++11)

Complexity

Constant.

Notes

This value is typically equal to `std::numeric_limits<size_type>::max()`, and reflects the theoretical limit on the size of the container. At runtime, the size of the container may be limited to a value smaller than `max_size()` by the amount of RAM available.

Example

Run this code

```
#include <iostream>
#include <list>

int main()
{
    std::list<char> s;
    std::cout << "Maximum size of a 'list' is " << s.max_size() << "\n";
}
```

Possible output:

```
Maximum size of a 'list' is 18446744073709551615
```

See also

`size`	returns the number of elements (public member function)

Retrieved from "http://en.cppreference.com/mwiki/index.php?title=cpp/container/list/max_size&oldid=50530"

std::list::clear

```
void clear();
```

Removes all elements from the container.

Invalidates any references, pointers, or iterators referring to contained elements. May invalidate any past-the-end iterators.

Parameters

(none)

Return value

(none)

Exceptions

(none)		(until C++11)
`noexcept` specification:	`noexcept`	(since C++11)

Complexity

Linear in the size of the container.

`clear` is defined in terms of `erase`, which has linear complexity.	(until C++11)
complexity of `clear` is omitted	(since C++11) (until C++14)
`clear` has linear complexity for sequence containers.	(since C++14)

See also

`erase`	erases elements (public member function)

Retrieved from "http://en.cppreference.com/mwiki/index.php?title=cpp/container/list/clear&oldid=50519"

std::list::insert

`iterator insert( iterator pos, const T& value );`	(1)	(until C++11)
`iterator insert( const_iterator pos, const T& value );`		(since C++11)
`iterator insert( const_iterator pos, T&& value );`	(2)	(since C++11)
`void insert( iterator pos, size_type count, const T& value );`	(3)	(until C++11)
`iterator insert( const_iterator pos, size_type count, const T& value );`		(since C++11)

`template< class InputIt >`
`void insert( iterator pos, InputIt first, InputIt last);`
	(4)	(until C++11)

`template< class InputIt >`
`iterator insert( const_iterator pos, InputIt first, InputIt last );`
		(since C++11)

`iterator insert( const_iterator pos, std::initializer_list<T> ilist );`	(5)	(since C++11)

Inserts elements at the specified location in the container.

1-2) inserts `value` before `pos`

3) inserts `count` copies of the `value` before `pos`

4) inserts elements from range `[first, last)` before `pos`.

This overload has the same effect as overload (3) if `InputIt` is an integral type.	(until C++11)
This overload only participates in overload resolution if `InputIt` qualifies as `InputIterator`, to avoid ambiguity with the overload (3).	(since C++11)

The behavior is undefined if `first` and `last` are iterators into `*this`.

5) inserts elements from initializer list `ilist` before `pos`.

No iterators or references are invalidated.

Parameters

pos	-	iterator before which the content will be inserted. `pos` may be the `end()` iterator
value	-	element value to insert
first, last	-	the range of elements to insert, can't be iterators into container for which insert is called
ilist	-	initializer list to insert the values from

Type requirements

- `T` must meet the requirements of `CopyInsertable` in order to use overload (1).
- `T` must meet the requirements of `MoveInsertable` in order to use overload (2).
- `T` must meet the requirements of `CopyAssignable` and `CopyInsertable` in order to use overload (3).
- `T` must meet the requirements of `EmplaceConstructible` in order to use overload (4,5).

Return value

1-2) Iterator pointing to the inserted `value`

3) Iterator pointing to the first element inserted, or `pos` if `count==0`.

4) Iterator pointing to the first element inserted, or `pos` if `first==last`.

5) Iterator pointing to the first element inserted, or `pos` if `ilist` is empty.

Complexity

1-2) Constant.

3) Linear in `count`

4) Linear in `std::distance(first, last)`

5) Linear in `ilist.size()`

Exceptions

If an exception is thrown, there are no effects (strong exception guarantee).

See also

`emplace` (C++11)	constructs element in-place (public member function)
`push_front`	inserts elements to the beginning (public member function)
`push_back`	adds elements to the end (public member function)

Retrieved from "http://en.cppreference.com/mwiki/index.php?title=cpp/container/list/insert&oldid=50528"

std::list::emplace

```
template< class... Args >
iterator emplace( const_iterator pos, Args&&... args );
```
(since C++11)

Inserts a new element into the container directly before `pos`. The element is constructed through `std::allocator_traits::construct`, which typically uses placement-new to construct the element in-place at a location provided by the container. The arguments `args...` are forwarded to the constructor as `std::forward<Args>(args)...` .

No iterators or references are invalidated.

Parameters

pos	-	iterator before which the new element will be constructed
args	-	arguments to forward to the constructor of the element

Type requirements

- `T (the container's element type)` must meet the requirements of `EmplaceConstructible`.

Return value

Iterator pointing to the emplaced element.

Complexity

Constant.

Exceptions

If an exception is thrown (e.g. by the constructor), the container is left unmodified, as if this function was never called (strong exception guarantee).

See also

insert	inserts elements (public member function)

Retrieved from "http://en.cppreference.com/mwiki/index.php?title=cpp/container/list/emplace&oldid=50520"

std::list::erase

`iterator erase( iterator pos );`	(1)	(until C++11)
`iterator erase( const_iterator pos );`		(since C++11)
`iterator erase( iterator first, iterator last );`	(2)	(until C++11)
`iterator erase( const_iterator first, const_iterator last );`		(since C++11)

Removes specified elements from the container.

1) Removes the element at `pos`.

2) Removes the elements in the range `[first; last)`.

References and iterators to the erased elements are invalidated. Other references and iterators are not affected.

The iterator `pos` must be valid and dereferenceable. Thus the `end()` iterator (which is valid, but is not dereferencable) cannot be used as a value for `pos`.

The iterator `first` does not need to be dereferenceable if `first==last`: erasing an empty range is a no-op.

Parameters

pos	-	iterator to the element to remove
first, last	-	range of elements to remove

Return value

Iterator following the last removed element. If the iterator `pos` refers to the last element, the `end()` iterator is returned.

Exceptions

(none)

Complexity

1) Constant.

2) Linear in the distance between `first` and `last`.

Example

Run this code

```
#include <list>
#include <iostream>
#include <iterator>

int main( )
{
    std::list<int> c{0, 1, 2, 3, 4, 5, 6, 7, 8, 9};
    for (auto &i : c) {
        std::cout << i << " ";
    }
    std::cout << '\n';

    c.erase(c.begin());

    for (auto &i : c) {
        std::cout << i << " ";
    }
    std::cout << '\n';
    std::list<int>::iterator range_begin = c.begin();
    std::list<int>::iterator range_end = c.begin();
    std::advance(range_begin,2);
    std::advance(range_end,5);

    c.erase(range_begin, range_end);

    for (auto &i : c) {
        std::cout << i << " ";
    }
    std::cout << '\n';
}
```

Output:

```
0 1 2 3 4 5 6 7 8 9
1 2 3 4 5 6 7 8 9
1 2 6 7 8 9
```

See also

clear	clears the contents (public member function)

Retrieved from "http://en.cppreference.com/mwiki/index.php?title=cpp/container/list/erase&oldid=50525"

std::list::push_front

`void push_front( const T& value );`	
`void push_front( T&& value );`	(since C++11)

Prepends the given element `value` to the beginning of the container.

No iterators or references are invalidated.

Parameters

`value` - the value of the element to prepend

Return value

(none)

Complexity

Constant.

Exceptions

If an exception is thrown, this function has no effect (strong exception guarantee).

See also

`emplace_front` (C++11)	constructs elements in-place at the beginning (public member function)
`push_back`	adds elements to the end (public member function)
`pop_front`	removes the first element (public member function)

Retrieved from "http://en.cppreference.com/mwiki/index.php?title=cpp/container/list/push_front&oldid=50536"

std::list::emplace_front

```
template< class... Args >
void emplace_front( Args&&... args );
```
(since C++11)

Inserts a new element to the beginning of the container. The element is constructed through `std::allocator_traits::construct`, which typically uses placement-new to construct the element in-place at the location provided by the container. The arguments `args...` are forwarded to the constructor as `std::forward<Args>(args)...` .

No iterators or references are invalidated.

Parameters

`args` - arguments to forward to the constructor of the element

Type requirements

- `T (the container's element type)` must meet the requirements of `EmplaceConstructible`.

Return value

(none)

Complexity

Constant.

Exceptions

If an exception is thrown, this function has no effect (strong exception guarantee).

See also

`push_front`	inserts elements to the beginning (public member function)

Retrieved from "http://en.cppreference.com/mwiki/index.php?title=cpp/container/list/emplace_front&oldid=50522"

std::list::pop_front

```
void pop_front();
```

Removes the first element of the container.

References and iterators to the erased element are invalidated.

Parameters

(none)

Return value

(none)

Complexity

Constant.

Exceptions

Does not throw.

See also

pop_back	removes the last element (public member function)
push_front	inserts elements to the beginning (public member function)

Retrieved from "http://en.cppreference.com/mwiki/index.php?title=cpp/container/list/pop_front&oldid=50534"

std::list::push_back

`void push_back( const T& value );`	(1)	
`void push_back( T&& value );`	(2)	(since C++11)

Appends the given element `value` to the end of the container.

1) The new element is initialized as a copy of `value`.
2) `value` is moved into the new element.

No iterators or references are invalidated.

Parameters

`value` - the value of the element to append

Type requirements

- `T` must meet the requirements of `CopyInsertable` in order to use overload (1).
- `T` must meet the requirements of `MoveInsertable` in order to use overload (2).

Return value

(none)

Complexity

Constant.

Exceptions

If an exception is thrown, this function has no effect (strong exception guarantee).

Example

Run this code

```
#include <list>
#include <iostream>
#include <iomanip>

int main()
{
    std::list<std::string> numbers;

    numbers.push_back("abc");
    std::string s = "def";
    numbers.push_back(std::move(s));

    std::cout << "list holds: ";
    for (auto&& i : numbers) std::cout << std::quoted(i) << ' ';
    std::cout << "\nMoved-from string holds " << std::quoted(s) << '\n';
}
```

Output:

```
vector holds: "abc" "def"
Moved-from string holds ""
```

See also

emplace_back (C++11)	constructs elements in-place at the end (public member function)
push_front	inserts elements to the beginning (public member function)
pop_back	removes the last element (public member function)

Retrieved from "http://en.cppreference.com/mwiki/index.php?title=cpp/container/list/push_back&oldid=50535"

std::list::emplace_back

```
template< class... Args >
void emplace_back( Args&&... args );
```
(since C++11)

Appends a new element to the end of the container. The element is constructed through `std::allocator_traits::construct`, which typically uses placement-new to construct the element in-place at the location provided by the container. The arguments `args...` are forwarded to the constructor as `std::forward<Args>(args)...`.

No iterators or references are invalidated.

Parameters

args - arguments to forward to the constructor of the element

Type requirements

- `T (the container's element type)` must meet the requirements of `EmplaceConstructible`.

Return value

(none)

Complexity

Constant.

Exceptions

If an exception is thrown, this function has no effect (strong exception guarantee).

Example

The following code uses `emplace_back` to append an object of type `President` to a `std::list`. It demonstrates how `emplace_back` forwards parameters to the `President` constructor and shows how using `emplace_back` avoids the extra copy or move operation required when using `push_back`.

Run this code

```
#include <list>
#include <string>
#include <iostream>

struct President
{
    std::string name;
    std::string country;
    int year;

    President(std::string p_name, std::string p_country, int p_year)
        : name(std::move(p_name)), country(std::move(p_country)), year(p_year)
    {
        std::cout << "I am being constructed.\n";
    }
    President(President&& other)
        : name(std::move(other.name)), country(std::move(other.country)), year(other.year)
    {
        std::cout << "I am being moved.\n";
    }
    President& operator=(const President& other) = default;
};
```

```
int main()
{
    std::list<President> elections;
    std::cout << "emplace_back:\n";
    elections.emplace_back("Nelson Mandela", "South Africa", 1994);

    std::list<President> reElections;
    std::cout << "\npush_back:\n";
    reElections.push_back(President("Franklin Delano Roosevelt", "the USA", 1936));

    std::cout << "\nContents:\n";
    for (President const& president: elections) {
        std::cout << president.name << " was elected president of "
                  << president.country << " in " << president.year << ".\n";
    }
    for (President const& president: reElections) {
        std::cout << president.name << " was re-elected president of "
                  << president.country << " in " << president.year << ".\n";
    }
}
```

Output:

```
emplace_back:
I am being constructed.

push_back:
I am being constructed.
I am being moved.

Contents:
Nelson Mandela was elected president of South Africa in 1994.
Franklin Delano Roosevelt was re-elected president of the USA in 1936.
```

See also

push_back	adds elements to the end (public member function)

Retrieved from "http://en.cppreference.com/mwiki/index.php?title=cpp/container/list/emplace_back&oldid=50521"

std::list::pop_back

```
void pop_back();
```

Removes the last element of the container.

Calling `pop_back` on an empty container is undefined.

References and iterators to the erased element are invalidated.

Parameters

(none)

Return value

(none)

Complexity

Constant.

Exceptions

(none)

See also

`pop_front`	removes the first element (public member function)
`push_back`	adds elements to the end (public member function)

Retrieved from "http://en.cppreference.com/mwiki/index.php?title=cpp/container/list/pop_back&oldid=50533"

std::list::resize

`void resize( size_type count, T value = T() );`		(until C++11)
`void resize( size_type count );`	(1)	(since C++11)
`void resize( size_type count, const value_type& value );`	(2)	(since C++11)

Resizes the container to contain `count` elements.

If the current size is greater than `count`, the container is reduced to its first `count` elements.

If the current size is less than `count`, additional elements are appended and initialized with copies of `value`.	(until C++11)
If the current size is less than `count`, 1) additional default-inserted elements are appended 2) additional copies of `value` are appended	(since C++11)

Parameters

`count`	-	new size of the container
`value`	-	the value to initialize the new elements with

Type requirements

- `T` must meet the requirements of `DefaultInsertable` in order to use overload (1).
- `T` must meet the requirements of `CopyInsertable` in order to use overload (2).

Return value

(none)

Complexity

Linear in the difference between the current size and `count`.

Example

Run this code

```
#include <iostream>
#include <list>
int main()
{
    std::list<int> c = {1, 2, 3};
    std::cout << "The list holds: ";
    for(auto& el: c) std::cout << el << ' ';
    std::cout << '\n';
    c.resize(5);
    std::cout << "After resize up 5: ";
    for(auto& el: c) std::cout << el << ' ';
    std::cout << '\n';
    c.resize(2);
    std::cout << "After resize down to 2: ";
    for(auto& el: c) std::cout << el << ' ';
    std::cout << '\n';
}
```

Output:

```
The list holds: 1 2 3
After resize up 5: 1 2 3 0 0
After resize down to 2: 1 2
```

See also

size	returns the number of elements (public member function)
insert	inserts elements (public member function)
erase	erases elements (public member function)

Retrieved from "http://en.cppreference.com/mwiki/index.php?title=cpp/container/list/resize&oldid=50540"

std::list::swap

```
void swap( list& other );
```

Exchanges the contents of the container with those of `other`. Does not invoke any move, copy, or swap operations on individual elements.

All iterators and references remain valid. It is unspecified whether an iterator holding the past-the-end value in this container will refer to the this or the other container after the operation.

If `std::allocator_traits<allocator_type>::propagate_on_container_swap::value` is true, then the allocators are exchanged using an unqualified call to non-member `swap`. Otherwise, they are not swapped (and if `get_allocator() != other.get_allocator()`, the behavior is undefined).	(since C++11)

Parameters

`other` - container to exchange the contents with

Return value

(none)

Exceptions

(none)	(until C++17)
`noexcept` specification: `noexcept(std::allocator_traits<Allocator>::is_always_equal::value)`	(since C++17)

Complexity

Constant.

See also

`std::swap``(std::list)`	specializes the `std::swap` algorithm (function template)

Retrieved from "http://en.cppreference.com/mwiki/index.php?title=cpp/container/list/swap&oldid=50545"

std::list::merge

`void merge( list& other );`	(1)	
`void merge( list&& other );`	(1)	(since C++11)

`template <class Compare>`
`void merge( list& other, Compare comp );`
	(2)	

`template <class Compare>`
`void merge( list&& other, Compare comp );`
	(2)	(since C++11)

Merges two sorted lists into one. The lists should be sorted into ascending order.

No elements are copied. The container `other` becomes empty after the operation. The function does nothing if `this == &other`. If `get_allocator() != other.get_allocator()`, the behavior is undefined. No iterators or references become invalidated, except that the iterators of moved elements now refer into `*this`, not into `other`. The first version uses `operator<` to compare the elements, the second version uses the given comparison function `comp`.

This operation is stable: for equivalent elements in the two lists, the elements from `*this` shall always precede the elements from `other`, and the order of equivalent elements of `*this` and `other` does not change.

Parameters

other - another container to merge

comp - comparison function object (i.e. an object that satisfies the requirements of `Compare`) which returns `true` if the first argument is *less* than (i.e. is ordered *before*) the second.

The signature of the comparison function should be equivalent to the following:

```
bool cmp(const Type1 &a, const Type2 &b);
```

The signature does not need to have `const &`, but the function object must not modify the objects passed to it.
The types `Type1` and `Type2` must be such that an object of type `list<T,Allocator>::const_iterator` can be dereferenced and then implicitly converted to both of them.

Return value

(none)

Example

Run this code

```
#include <iostream>
#include <list>

std::ostream& operator<<(std::ostream& ostr, const std::list<int>& list)
{
    for (auto &i : list) {
        ostr << " " << i;
    }
    return ostr;
}

int main()
{
    std::list<int> list1 = { 5,9,0,1,3 };
    std::list<int> list2 = { 8,7,2,6,4 };

    list1.sort();
    list2.sort();
    std::cout << "list1:  " << list1 << "\n";
    std::cout << "list2:  " << list2 << "\n";
    list1.merge(list2);
    std::cout << "merged: " << list1 << "\n";
}
```

Output:

```
list1:   0 1 3 5 9
list2:   2 4 6 7 8
merged:  0 1 2 3 4 5 6 7 8 9
```

Complexity

at most `size() + other.size() - 1` comparisons.

See also

`splice`	moves elements from another `list` (public member function)

Retrieved from "http://en.cppreference.com/mwiki/index.php?title=cpp/container/list/merge&oldid=50531"

std::list::splice

`void splice( const_iterator pos, list& other );`	(1)	
`void splice( const_iterator pos, list&& other );`	(1)	(since C++11)
`void splice( const_iterator pos, list& other, const_iterator it );`	(2)	
`void splice( const_iterator pos, list&& other, const_iterator it );`	(2)	(since C++11)

`void splice( const_iterator pos, list& other,`
`const_iterator first, const_iterator last);`
	(3)	

`void splice( const_iterator pos, list&& other,`
`const_iterator first, const_iterator last );`
	(3)	(since C++11)

Transfers elements from one list to another.

No elements are copied or moved, only the internal pointers of the list nodes are re-pointed. The behavior is undefined if: `get_allocator() != other.get_allocator()`. No iterators or references become invalidated, the iterators to moved elements remain valid, but now refer into `*this`, not into `other`.

1) Transfers all elements from `other` into `*this`. The elements are inserted before the element pointed to by `pos`. The container `other` becomes empty after the operation. The behavior is undefined if `this == &other`.

2) Transfers the element pointed to by `it` from `other` into `*this`. The element is inserted before the element pointed to by `pos`.

3) Transfers the elements in the range `[first, last)` from `other` into `*this`. The elements are inserted before the element pointed to by `pos`. The behavior is undefined if `pos` is an iterator in the range `[first,last)`.

Parameters

pos	-	element before which the content will be inserted
other	-	another container to transfer the content from
it	-	the element to transfer from `other` to `*this`
first, last	-	the range of elements to transfer from `other` to `*this`

Return value

(none)

Complexity

1-2) Constant.

3) Constant if `this == &other`, otherwise linear in `std::distance(first, last)`.

Example

Run this code

```
#include <iostream>
#include <list>

std::ostream& operator<<(std::ostream& ostr, const std::list<int>& list)
{
    for (auto &i : list) {
        ostr << " " << i;
    }
    return ostr;
}
```

```
int main ()
{
    std::list<int> list1 = { 1, 2, 3, 4, 5 };
    std::list<int> list2 = { 10, 20, 30, 40, 50 };

    auto it = list1.begin();
    std::advance(it, 2);

    list1.splice(it, list2);

    std::cout << "list1: " << list1 << "\n";
    std::cout << "list2: " << list2 << "\n";

    list2.splice(list2.begin(), list1, it, list1.end());

    std::cout << "list1: " << list1 << "\n";
    std::cout << "list2: " << list2 << "\n";
}
```

Output:

```
list1:  1 2 10 20 30 40 50 3 4 5
list2:
list1:  1 2 10 20 30 40 50
list2:  3 4 5
```

See also

merge	merges two sorted lists (public member function)
remove **remove_if**	removes elements satisfying specific criteria (public member function)

Retrieved from "http://en.cppreference.com/mwiki/index.php?title=cpp/container/list/splice&oldid=50544"

std::list::remove, remove_if

```
void remove( const T& value );
```

```
template< class UnaryPredicate >
void remove_if( UnaryPredicate p );
```

Removes all elements satisfying specific criteria. The first version removes all elements that are equal to `value`, the second version removes all elements for which predicate `p` returns `true`.

Parameters

value - value of the elements to remove

p - unary predicate which returns `true` if the element should be removed.

The signature of the predicate function should be equivalent to the following:

```
bool pred(const Type &a);
```

The signature does not need to have `const &`, but the function must not modify the objects passed to it.
The type `Type` must be such that an object of type `list<T,Allocator>::const_iterator` can be dereferenced and then implicitly converted to `Type`.

Return value

(none)

Complexity

Linear in the size of the container

Example

Run this code

```
#include <list>
#include <iostream>

int main()
{
    std::list<int> l = { 1,100,2,3,10,1,11,-1,12 };

    l.remove(1); // remove both elements equal to 1
    l.remove_if([](int n){ return n > 10; }); // remove all elements greater than 10

    for (int n : l) {
        std::cout << n << ' ';
    }
    std::cout << '\n';
}
```

Output:

```
2 3 10 -1
```

See also

remove **remove_if**	removes elements satisfying specific criteria (function template)

Retrieved from "http://en.cppreference.com/mwiki/index.php?title=cpp/container/list/remove&oldid=50538"

std::list::reverse

```
void reverse();
```

Reverses the order of the elements in the container. No references or iterators become invalidated.

Parameters

(none)

Return value

(none)

Example

Run this code

```
#include <iostream>
#include <list>

std::ostream& operator<<(std::ostream& ostr, const std::list<int>& list)
{
    for (auto &i : list) {
        ostr << " " << i;
    }
    return ostr;
}

int main()
{
    std::list<int> list = { 8,7,5,9,0,1,3,2,6,4 };

    std::cout << "before:     " << list << "\n";
    list.sort();
    std::cout << "ascending:  " << list << "\n";
    list.reverse();
    std::cout << "descending: " << list << "\n";
}
```

Output:

```
before:      8 7 5 9 0 1 3 2 6 4
ascending:   0 1 2 3 4 5 6 7 8 9
descending:  9 8 7 6 5 4 3 2 1 0
```

Complexity

Linear in the size of the container

See also

`sort`	sorts the elements (public member function)

Retrieved from "http://en.cppreference.com/mwiki/index.php?title=cpp/container/list/reverse&oldid=50541"

std::list::unique

`void unique();`	(1)

`template< class BinaryPredicate >`
`void unique( BinaryPredicate p );`
	(2)

Removes all *consecutive* duplicate elements from the container. Only the first element in each group of equal elements is left. The first version uses `operator==` to compare the elements, the second version uses the given binary predicate `p`.

Parameters

p - binary predicate which returns `true` if the elements should be treated as equal.

The signature of the predicate function should be equivalent to the following:

```
bool pred(const Type1 &a, const Type2 &b);
```

The signature does not need to have `const &`, but the function must not modify the objects passed to it.
The types `Type1` and `Type2` must be such that an object of type `list<T,Allocator>::const_iterator` can be dereferenced and then implicitly converted to both of them.

Return value

(none)

Complexity

Linear in the size of the container

Example

Run this code

```
#include <iostream>
#include <list>

int main()
{
  std::list<int> x = {1, 2, 2, 3, 3, 2, 1, 1, 2};

  std::cout << "contents before:";
  for (auto val : x)
    std::cout << ' ' << val;
  std::cout << '\n';

  x.unique();
  std::cout << "contents after unique():";
  for (auto val : x)
    std::cout << ' ' << val;
  std::cout << '\n';

  return 0;
}
```

Output:

```
contents before: 1 2 2 3 3 2 1 1 2
contents after unique(): 1 2 3 2 1 2
```

See also

`unique`	removes consecutive duplicate elements in a range (function template)

Retrieved from "http://en.cppreference.com/mwiki/index.php?title=cpp/container/list/unique&oldid=50547"

std::list::sort

```
void sort();
```
(1)

```
template< class Compare >
void sort( Compare comp );
```
(2)

Sorts the elements in ascending order. The order of equal elements is preserved. The first version uses `operator<` to compare the elements, the second version uses the given comparison function `comp`.

Parameters

comp - comparison function object (i.e. an object that satisfies the requirements of `Compare`) which returns `true` if the first argument is *less* than (i.e. is ordered *before*) the second.

The signature of the comparison function should be equivalent to the following:

```
bool cmp(const Type1 &a, const Type2 &b);
```

The signature does not need to have `const &`, but the function object must not modify the objects passed to it.
The types `Type1` and `Type2` must be such that an object of type `list<T,Allocator>::const_iterator` can be dereferenced and then implicitly converted to both of them.

Return value

(none)

Example

Run this code

```
#include <iostream>
#include <functional>
#include <list>

std::ostream& operator<<(std::ostream& ostr, const std::list<int>& list)
{
    for (auto &i : list) {
        ostr << " " << i;
    }
    return ostr;
}

int main()
{
    std::list<int> list = { 8,7,5,9,0,1,3,2,6,4 };

    std::cout << "before:     " << list << "\n";
    list.sort();
    std::cout << "ascending:  " << list << "\n";
    list.sort(std::greater<int>());
    std::cout << "descending: " << list << "\n";
}
```

Output:

```
before:      8 7 5 9 0 1 3 2 6 4
ascending:   0 1 2 3 4 5 6 7 8 9
descending:  9 8 7 6 5 4 3 2 1 0
```

Complexity

N · log(N) comparisons, where `N` is the size of the container.

Retrieved from "http://en.cppreference.com/mwiki/index.php?title=cpp/container/list/sort&oldid=50543"

operator==,!=,<,<=,>,>=(std::list)

```
template< class T, class Alloc >
bool operator==( const list<T,Alloc>& lhs,                 (1)
                 const list<T,Alloc>& rhs );
template< class T, class Alloc >
bool operator!=( const list<T,Alloc>& lhs,                 (2)
                 const list<T,Alloc>& rhs );
template< class T, class Alloc >
bool operator<( const list<T,Alloc>& lhs,                  (3)
                const list<T,Alloc>& rhs );
template< class T, class Alloc >
bool operator<=( const list<T,Alloc>& lhs,                 (4)
                 const list<T,Alloc>& rhs );
template< class T, class Alloc >
bool operator>( const list<T,Alloc>& lhs,                  (5)
                const list<T,Alloc>& rhs );
template< class T, class Alloc >
bool operator>=( const list<T,Alloc>& lhs,                 (6)
                 const list<T,Alloc>& rhs );
```

Compares the contents of two containers.

1-2) Checks if the contents of `lhs` and `rhs` are equal, that is, whether `lhs.size() == rhs.size()` and each element in `lhs` compares equal with the element in `rhs` at the same position.

3-6) Compares the contents of `lhs` and `rhs` lexicographically. The comparison is performed by a function equivalent to `std::lexicographical_compare`.

Parameters

`lhs, rhs` - containers whose contents to compare

- `T` must meet the requirements of `EqualityComparable` in order to use overloads (1-2).

- `T` must meet the requirements of `LessThanComparable` in order to use overloads (3-6). The ordering relation must establish total order.

Return value

1) `true` if the contents of the containers are equal, `false` otherwise

2) `true` if the contents of the containers are not equal, `false` otherwise

3) `true` if the contents of the `lhs` are lexicographically *less* than the contents of `rhs`, `false` otherwise

4) `true` if the contents of the `lhs` are lexicographically *less* than or *equal* the contents of `rhs`, `false` otherwise

5) `true` if the contents of the `lhs` are lexicographically *greater* than the contents of `rhs`, `false` otherwise

6) `true` if the contents of the `lhs` are lexicographically *greater* than or *equal* the contents of `rhs`, `false` otherwise

Complexity

Linear in the size of the container

Retrieved from "http://en.cppreference.com/mwiki/index.php?title=cpp/container/list/operator_cmp&oldid=50532"

std::swap(std::list)

```
template< class T, class Alloc >
void swap( list<T,Alloc>& lhs,
           list<T,Alloc>& rhs );
```

Specializes the `std::swap` algorithm for `std::list`. Swaps the contents of `lhs` and `rhs`. Calls `lhs.swap(rhs)`.

Parameters

lhs, rhs	-	containers whose contents to swap

Return value

(none)

Complexity

Constant.

Exceptions

(since C++17)

`noexcept` specification:

```
noexcept(noexcept(lhs.swap(rhs)))
```

See also

swap	swaps the contents (public member function)

Retrieved from "http://en.cppreference.com/mwiki/index.php?title=cpp/container/list/swap2&oldid=50546"