

STL
member fun.

char 的 数组

Chapter 3: Strings, Vectors and Arrays

各种 type 的 数组

fixed-size array



这个 是 记忆体, 有
index 的 元素

Namespace

- Mechanism for putting names defined by a library into a single logical place.
- Namespaces help avoid name clashes (抵觸). The names defined by the C++ library are in the namespace **std**.

`std::cout`

- A using declaration allows us to access a name from a namespace without the cumbersome prefix **namespace_name::** (e.g., `std::`)

See Note

Headers **Should Not** Include **using** Declaration

- Inside header files, we should *always* use the fully qualified library names, that is, **DO NOT** use **using** declaration. (**why?**)

```
#ifndef COORDH
#define COORDH

struct Coord {
    double x;
    double y;
    double z;
    void print_x() {std::cout << x;}
};
#endif
```

```
#ifndef COORDH
#define COORDH
using namespace std;
```

```
struct Coord {
    double x;
    double y;
    double z;
    void print_x() {cout << x;}
};
#endif
```



string type

- The string type supports variable-length character strings.
- The library takes care of managing the memory and provides various useful operations.

string s1; <i>u</i> <i>" "</i> <i>to string</i>	Default constructor; s1 is the empty string
string s2(s1); <i>string s2 = s1;</i>	Initialize s2 as a copy of s1
string s3("value");	Initialize s3 as a copy of the string literal
string s4(n, 'c');	Initialize s4 with n copies of the character 'c'

string I/O

```
string s;  
cin >> s;
```

string s1, s2;
cin >> s1 >> s2;

□□□ Hello □□□ World
↑ ↑

- Reads and discards any leading whitespace (e.g., spaces, newlines, tabs)
- It then reads characters until the next whitespace character is encountered.

```
string line;  
getline(cin, line);
```

→ string.h ~~~~~ ↓

- Reads the next line of input stream and store what it reads, not including the newline.

See Note

Dealing with characters in a string

- See Table 3.3 ctype function (see note).


```
for (string::size_type index = 0; index != s.size();  
    ++index)
```



```
    if (ispunct(s[index])) ++punct_cnt;
```

int

```
for (auto index = 0; index != s.size(); ++index)  
    if (ispunct(s[index])) ++punct_cnt;
```



```
for (auto e: s)  
    if (ispunct(e)) ++punct_cnt;
```

Exercise, see note

vector type

- A **vector** is a collection of objects of a single type, each of which has an associated integer index.
- A **vector** is a class template. To declare objects of a type generated from **vector**, we must supply what **type** of objects the **vector** will contain. We **specify the type** by putting it between a pair of **angle brackets** following the template's name:

```
vector<int> ivec;  
vector<Sales_item> salesVec;  
vector<vector<int> > matInt;
```

↑
参数

□
+

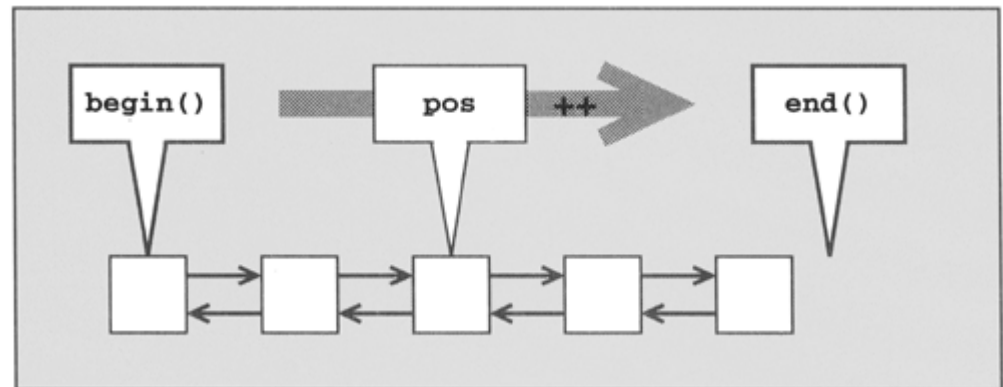
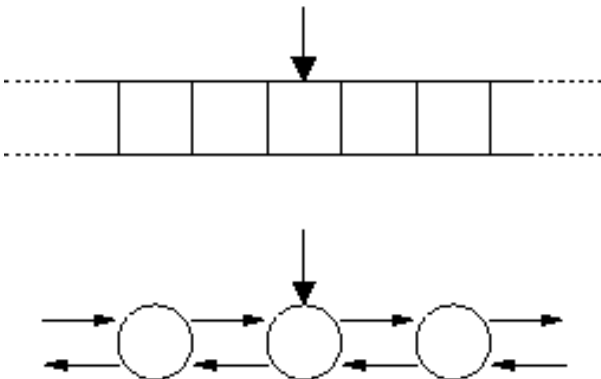
C++11

vector < T >

See Note

Iterator

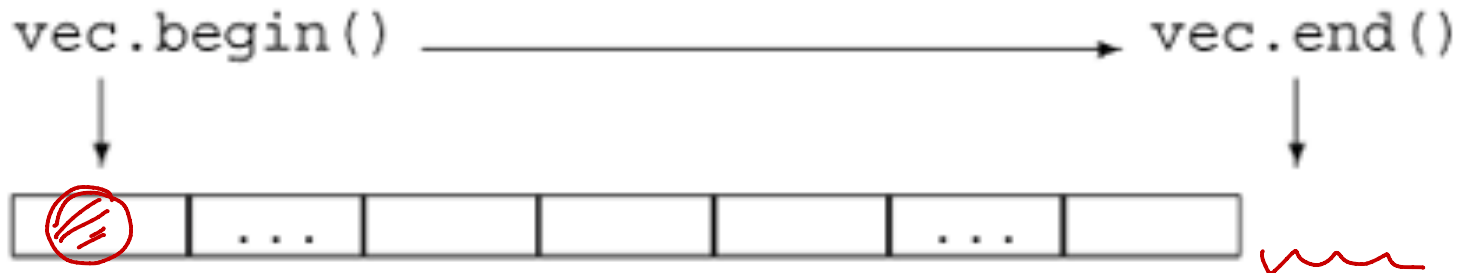
- An **iterator** is a generalized pointer with a mechanism that lets us:
 - identify the position and access the elements in a container
 - navigate from one element to another
- Except for **vector**, modern C++ programs tend to use iterators rather than subscripts to access container elements.



- Each container defines its own iterator type.

```
vector<int>::iterator iter;
vector<Sales_item>::iterator it;
set<double>::iterator it2;
```

- Each container defines a pair of functions begin and end that return iterators and cbegin and cend that return const_iterators.



vec.end(): an iterator positioned "one past the end"

- In general, we do not care the precise type of iterator

```
vector<int> vec; ...
auto b = vec.begin()
```

- Iterator is a **pointer** and it uses the dereference operator (the ***** operator) to access the element to which the iterator refers

```
*iter = 0;
```

- Iterators use the **increment operator** **(++)** to advance an iterator to the next element in the container.

```
++iter;
```

iter + 1 X

- Looping through a container using iterator and **const_iterator** for reading only (see note).



Array

- An array consists of **a type specifier (如int)**, **an identifier (如myArray, yourArray)**, and **a dimension**.
- The type specifier indicates **what type the elements stored in the array**. The dimension specifies **how many elements the array will contain**.

int intArray[10]; // an array of 10 **ints**

Sales_item item[10]; // an array of 10 **Sales_items**

- Unlike vector, **array has fixed size** for better run-time performance (but at the cost of lost flexibility)
- The dimension must be a constant expression (see note).

Initializing Array Elements

```
int intArray[3] = {0, 1, 2}; // element initialization
```

```
int intArray[] = {0, 1, 2}; // element initialization
```

```
char ca1[] = {'C', '+', '+'}; // dim = 3
```

```
char ca2[] = {'C', '+', '+', '\0'}; // dim = 4
```

```
char ca3[] = "C++"; // dim = 4
```

char array is special

- If we do not supply explicit initialization, elements in an array are default initialized.

```
int intArray[3];  
string sArray[3];
```

See Note

Pointers and Arrays

- When we use the name of an array in an expression, that name is **automatically** converted into a pointer to the first element of the array:

```
int ia[] = {0,2,4,6,8};  
int *ip = ia; // ip points to ia[0]
```

- We can use pointer arithmetic to compute a pointer to an element by adding (or subtracting) an integral value to (or from) a pointer to another element in the array:

```
int *ip2 = ip+4; // ip2 points to ia[4]
```

See Note

Until Next Time

- Lab will start at 6:00 pm on Thurs.
- HW2 will be due ^{last week} tonight at 0900 pm.
- HW3 will be issued during the Lab.
- [Reading] Chapter 6 (function) and Chapter 7 (Class).