

C++ string

The **string** Class in C++

- C++ has a `<string>` library
- Include it in your programs when you wish to use strings: `#include <string>`
- In this library, a class **string** is defined and implemented
- It is very convenient and makes string processing easier than in C

Declaration of **strings**

- The following instructions are all equivalent. They declare `s1` to be an object of type `string`, and assign the string “high school” to it:

```
string s1;
```

```
    s1=“high school”;
```

```
string s2= “high school”;
```

```
string s3(“high school”);
```

In c++ there is new class called string. Its an improvement on C-strings. It removes some of the limitations of C-Strings.

- There is no need to create the array of the right size to hold string variables.

Contd.....

- The String class assumes all the responsibility for memory management.
- It allows the use of overloaded operators,so we can concatenate string objects with + operator.

Eg:- s3=s1+s2

- It is more efficient and easy to use than C-strings.

```
#include<iostream>
#include<string>
using namespace std;
main()
{
    string s1("man");
    string s2="hi";
    string s3;
    s3=s1;
    cout<<"s3="<<s3<<endl;

    s3="neither " + s1 + "nor";
    s3 += s2;
    cout<<"s3="<<s3<<endl;
    s1.swap(s2);
    cout<<s1<< "nor" <<s2 <<endl;
    return 0;
}
```

Manipulating String Objects

- `insert()`
- `erase()`
- `replace()`
- `append()`
- `length()`
- `at()`
- `find()`
- `substr()`
- `compare()`

Manipulating String Objects

- `string s1("12345");`
- `string s2("abcde");`
- `s1.insert(4, s2);` `// s1 = 1234abcde5`
- `s1.erase(4, 5);` `// s1 = 12345`
- `s2.replace(1, 3, s1);` `// s2 = a12345e`
- `s2.append(s1,2,3);` `//s2=a12345e345`


```
#include<iostream>
#include<string>
using namespace std;
main()
{
    string s1("12345");
    string s2("abcde");

    s1.append(s2);
    cout<<s1<<endl;

    s1.append(s2,1,2);
    cout<<s1;

    return 0;
}
```

```
#include<iostream>
#include<string>
using namespace std;
main()
{
    string s1("12345");
    string s2("abcde");
    cout<<s1<<" "<<s2<<endl;

    s1.insert(4, s2);
    cout<<s1<<endl;

    s1.erase(4, 5);
    cout<<s1<<endl;

    s2.replace(1, 3, s1);
    cout<<s2<<endl;
    return 0;
}
```

String Characteristics

Function	Task
size()	Number of elements currently stored
length()	Number of elements currently stored
max_size()	Maximum size of a string object that a system can support
empty()	Return true or 1 if the string is empty otherwise returns false or 0
swap()	Used to swap two string

String Characteristics

```
#include<iostream>
#include<string>
using namespace std;
int main()
{
    string str="welcome";
    cout << "Size = " << str.size() << endl;
    cout << "Length = " << str.length() << endl;
    cout << "Max Size = " << str.max_size() << endl;
    cout << "Empty: " << (str.empty() ? "yes" : "no") << endl;
    return 0;
}
```

```
#include<iostream>

#include<string>

using namespace std;

int main()

{

    string str="This is a c++ programming";

        cout<< "bytes = " <<sizeof(str)<<endl;

        cout << "Size = " << str.size() << endl;

        cout << "Length = " << str.length() << endl;

        cout << "Max Size = " << str.max_size() << endl;

        cout << "Empty: " << (str.empty() ? "yes" : "no") << endl;

    return 0;

}
```

compare

```
string s1("ABC");
```

```
string s2("XYZ");
```

```
int x = s1.compare(s2);
```

- $x == 0$ if $s1 == s2$

- $x > 0$ if $s1 > s2$

- $x < 0$ if $s1 < s2$

There is another overloaded version of compare

```
int compare(int start_1, int length_1, string s_2, int  
start_2, int length_2)
```

```
string s1, s2;
```

```
int x = s1.compare(0, 2, s2, 2, 2);
```

Program

```
#include<iostream>
#include<string>
using namespace std;
int main()
{
    string s1 = "bcme";
    string s2 = "abcrome";
    cout<<s1.compare(s2)<<endl;
    cout<<s1.compare(2,2,s2,5,2);
    return 0;
}
```

```
#include<iostream>

#include<string>

using namespace std;

int main()

{ string str1="welcome";

    string str2="welldone";

    int x=str1.compare(str2);

    if(x==0)

        cout<<"Strings are same";

    else

        cout<<"Strings are different";

    cout<<endl<<str1.compare(0,3,str2, 0,3);

    return 0;
```

```
int main ()  
  
{ string str1 ("green apple");  
  
  string str2 ("red apple");  
  
  if (str1.compare(str2) != 0)  
  
    cout << str1 << " is not " << str2 << '\n';  
  
  if (str1.compare(6,5,"apple") == 0)  
  
    cout << "still, " << str1 << " is an apple\n";  
  
  if (str1.compare(6,5,str2,4,5) == 0)  
  
    cout << "therefore, both are apples\n";  
  
  return 0;  
  
}
```


Accessing Characters in Strings

Function	Task
at()	For accessing individual characters
substr()	For retrieving a substring
find() rfind()	For finding a specific substring For finding a specific substring from right
find_first_of()	For finding the location of first occurrence of the specific character(s)
find_last_of()	For finding the location of last occurrence of the specific character(s)
getline()	For taking the string object value from user standard io function

find() and substr()

```
#include<iostream>
#include<string>
using namespace std;
```

```
int main()
{
    string s1 = "arlcome";
    string s2 = "wearomea";
    cout<<s1.find("lc")<<endl;
    cout<<s2.rfind("ea")<<endl;
    cout<<s2.find_last_of('e');

    return 0;
}
```

```
#include<iostream>
#include<string>
using namespace std;
```

```
int main()
{
    string s1 = "welcome";
    string s2;
    s2=s1.substr(0,2);
    cout<<s2;
    return 0;
}
```

```
int main ()  
  
{  
  
    string str1 ("lovely professional university");  
  
  
    cout<< str1.find("ve")<<endl;  
  
    cout<< str1.rfind("ve")<<endl<<endl;  
  
  
    cout<<str1.find_first_of('l')<<endl;  
  
    cout<<str1.find_last_of('l')<<endl<<endl;  
  
}
```

find() and substr()

```
int main () {  
    string str1 ("lovely professional university");  
    string str2 ("ve");  
    cout<<str1<<endl;  
    int x =str1.find(str2);  
    cout<<x<<endl;  
  
    string temp = str1.substr(x + str2.size() , 30 );  
    cout<<temp<<endl;  
  
    int y= temp.find(str2);  
    cout<<y;  // or cout<<y + x + str2.size();  
}
```

getline

- `string s;`
- `cout<<"Enter string";`
- `getline(cin,s);`

What is the difference between unsigned int length() and unsigned int size()?

a) Returns a different value

b) They give same result

c) Returns a different value but they are same

d) Returns a length

```
#include <iostream>
using namespace std;
int main() {
    string str1 ("The only way to do great work is to love what you do");
    string str2 ("work");
    unsigned found = str1.find(str2);
    cout << found << "\n";
    return 0;
}
```

- a) 20
- b) 23
- c) 25**
- d) 21

- Choose the correct answer:

1. `char str1[] = {'H', 'e', 'l', 'l', 'o', '\0'};`
2. `char str2[]="Hello";`
3. `string str3("hello");`

- A. `str1` is a char array and `str2` and `str3` are strings.
- B. `str1` and `str2` are char arrays and `str3` is a string.
- C. `str1`, `str2` and `str3`, they all are strings.**
- D. None of the above