

1. Define CMyString class with demands as follows:

- 1.1 The class, CMyString, can save any string which means an arbitrary length;
- 1.2 Overload appropriate operators to operate instance of CMyString;
- 1.3 Define Find() member function to locate the first position of searching a character or a string;
- 1.4 Define Mid() member function to get substring from one string;
- 1.5 Define ToInt() member function to convert digital string to integer.
- 1.6 Define ToDouble() member function to convert digital string to double.
- 1.7 Define other member functions if you need.
- 1.8 The client can use CMyString you defined like as in the main:

```
void main()
{
    CMyString s1("BIT"), s2;

    s2 = "love";
    s2[0] = 'L'
    cout << "I " + s2 + << " " << s1 << endl;    // The output is:  I Love BIT

    int pos = s1.Find('T');    // pos is 2, or -1 if 'T' is not found.
    pos = s1.Find("IT");    // pos is 1, or -1 if "IT" is not found.
    pos = s1.Find("b");    // pos is -1

    int startPos = 1, len = 2;
    // startPos represents starting position, len represents the length of substring. So Mid can
    get a substring:  ov.
    CMyString my = s2.Mid(startPos, len);

    CMyString str_num(123);
    int a = str_num.ToInt();

    str_num = -123.456;
    double b = str_num.ToDouble();
}
```

NOTE: The type such as string or template in C++, and string library in C and C++ are both FORBIDDEN in your program.

The only one you can define is char*.

2. Define CInternetURL class to save a URL string like as "www.bit.edu.cn", and finish the demands as follows:

2.1 Use CMyString you just finished before to save URL string;

2.2 Define member function GetDomain() to get domain from URL.

For example, we can get "www.bit.edu.cn" from "https://jwc.bit.edu.cn/index.htm";

2.3 Define member function GetDomainCountry() to get country name in the domain from URL, such as "us", "uk", etc.

For example, we can get "cn" from "https://jwc.bit.edu.cn/index.htm";

2.4 Define member function GetDomainType() to get domain type from URL, such as "gov", "com", "org", and so on.

For example, we can get "edu" from "https://jwc.bit.edu.cn/index.htm";

2.5 Define member function GetHomePage() to get home page from URL, such as "index.htm", "default.htm", and so on.

For example, we can get "index" from "https://jwc.bit.edu.cn/index.htm";

2.6 The string you can use is CMyString in the main:

```
void main()
{
    CInternetURL URL("https://jwc.bit.edu.cn/index.htm"), s2;

    cout << URL.GetDomain();           // The result is:  www.bit.edu.cn
    cout << URL.GetDomainCountry();    // The result is:  cn
    cout << URL.GetDomainType();       // The result is:  edu
    cout << URL.GetHomePage();         // The result is:  index.htm
}
```

3. Here is the definition of class CShape:

```
class CShape
{
public:
    virtual double Area() = 0;        // area
    virtual double Volume() = 0;     // volume
};
```

As a base class, CShape, define its derived class , CSphere and CCylinder, to override the pure virtual functions in it.

So client can unify operation for CSphere and CCylinder through CAD class.

```
class CAD
{
private:
    CShape& shape;
public:
    CAD(Shape& S);
    double Area( )      { return shape.Area(); }
    double Volume( )    { return shape.Volume(); }
};
```