OOP 23-24春夏

CC98 马二马纯上

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单选题

- **1.** Copy constructor is a constructor which _____
- A. Creates an object by copying values from another object of another class
- B. Creates an object by copying values from any other object of same class
- C. Creates an object by initializing it with another previously created object of same class
- D. Creates an object by copying values from first object created for that class
- 2. In multi-level inheritance(all public), the public members of parent/superclass will ______
- A. Will continue to get inherited subsequently
- B. Will not be available to be called outside class
- C. Will not be inherited after one subclass inheritance
- D. Will not be able to allocated with any memory space
- **3.** Which code below fails compilation?

A.

```
struct U {};
struct V : public U {};
struct W : public U {};
int main()
{
  U * p = new V;
  W * q = static_cast<W*>(p);
  return q == nullptr;
}
```

```
struct U { virtual void foo() {} };
struct V : public U {};
struct W {};
int main()
{
    U * p = new V;
    W * q = dynamic_cast<W*>(p);
    return q == nullptr;
}
```

C.

```
struct U { virtual void foo() {} };
struct V : public U {};
struct W : public U {};
int main()
{
    U * p = new V;
    W * q = dynamic_cast<W*>(p);
    return q == nullptr;
}
```

D.

```
struct U {};
struct V : public U {};
struct W {};
int main()
{
    U * p = new V;
    W * q = static_cast<W*>(p);
    return q == nullptr;
}
```

- **4.** If programmer have defined parameterized constructor only, then ______
- A. Default constructor will not be created by the compiler implicitly
- B. Default constructor will not be created but called at runtime
- C. Default constructor will be created by the compiler implicitly
- D. Compile time error
- **5.** Which of the following operator cannot be used to overload when that function is declared as friend function?
- A. | | |
- B. ==
- C. -=

- **6.** If a class have default constructor defined in private access, and one parameter constructor in protected mode, how will it be possible to create instance of object?
- A. Directly create the object in the subclass
- B. Define a constructor in public access with different signature
- C. Directly create the object in main() function
- D. Not possible

```
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```

- 7. Which programming paradigm below is not well supported in C++?
- A. Object-oriented programming
- B. Procedural programming
- C. Declarative programming
- D. Generic programming
- 8. Which statement below is not a requirement for an object-oriented programming language?
- A. Objects have an associated type [class].
- B. Types [classes] may inherit attributes from supertypes [superclasses].
- C. It uses algorithms as its fundamental logical building blocks.
- D. It supports objects that are data abstractions with an interface of named operations and a hidden local state.
- **9.** Which among the following is multiple inheritance?

A.

```
class student { };
class stream { };
class topper { };
```

```
class student {
  public:
    int marks;
} s;
class stream {
    int total;
};
class topper : public student, public stream { };
```

C.

```
class student {
  int marks;
};
class stream { };
class topper : public student { };
```

D.

```
class student {
  int marks;
};
class stream : public student { };
```

10. How many times is the destructor of class A called during execution?

```
#include <iostream>
using namespace std;
class A {
public:
A() { cout << "A()" << endl; }
 ~A() { cout << "~A()" << end1; }
};
void foo(A a) {
 A arr[5];
 A *p = new A[3];
 throw p;
}
int main()
 try {
   A a;
   foo(a);
  } catch (A *p) {
  delete[] p;
   cout << "catched" << endl;</pre>
 }
}
```

A. 5

B. 7

C. 10

D. 3

结果填空题

1.

```
#include <iostream.h>
#include <string.h>
#include <cstdlib.h>
using namespace std;
void func(int a, int b)
 if (b < 1) {
  throw b;
 }
 else {
  cout << "Product of " << a << " and " << b << " is: " << a*b << endl;</pre>
 }
}
int main()
 try
 {
   try
    func(5,-1);
   }
   catch (int b)
    if (b==0)
      throw "value of b is zero\n";
       throw "value of b is less than zero\n";
   }
 }
 catch (const char* e)
  cout << e;
 }
}
```

Line 1: _____ (3分)

2. The output of the code below is:

```
#include <iostream>
using namespace std;
class AnyError
public:
    AnyError() { }
};
class RangeError :public AnyError
{
public:
    RangeError(int ID) { m_ID = ID; }
    void print() { cout << "ID:" << m_ID << endl; }</pre>
protected:
    int m_ID;
};
void FuncA(int ID)
    if (ID > 8)
       throw RangeError(ID);
    cout << "FuncA" << endl;</pre>
}
void FuncB()
{
    try
    {
        FuncA(4);
        FuncA(10);
    }
    catch (RangeError& re)
        cout << "FuncB" << endl;</pre>
        re.print();
        throw AnyError();
    }
}
int main()
    try {
        FuncB();
    }
    catch (...)
        cout << "Main" << endl;</pre>
    }
    return 0;
}
```

- The first line is: _____ (1分)
- The second line is: _____ (1分)
- The third line is: _____ (1分)

• The fourth line is: _____ (1分)

3.

```
#include <iostream>
using namespace std;
template <class T>
class A {
public:
    A() { }
    void print() const
        cout << "A<T>" << endl;</pre>
    }
};
template <>
class A<double> {
    double a1, a2, a3;
public:
    A()
    {}
    void print() const
        cout << "A<double>" << endl;</pre>
        return;
    }
};
template <>
class A<int> {
    double a1, a2, a3;
public:
    A()
    void print() const
        cout << "A<int>" << endl;</pre>
        return;
    }
};
int main()
    A<double> t1;
    A<char> t2;
    A<int> t3;
    t1.print();
    t2.print();
    t3.print();
}
```

The output of this program should be:

Line 1: _____ (1分)

```
Line 2: _____ (1分)
Line 3: _____ (1分)
```

4. What is the output of the following code?

```
#include <iostream>
#include <string>
using namespace std;
class WeirdString
{
 public:
  WeirdString() = default;
  WeirdString& operator++() {
    s += "Hey";
    return *this;
  WeirdString operator++(int) {
   WeirdString old = *this;
   s += "Ho";
    return old;
  WeirdString& operator+=(const WeirdString& rhs) {
   s += ("Ha" + rhs.str());
    return *this;
  }
  string str() const { return s; }
 private:
  string s;
};
-- CC98 MaErMaChunShang --
int main()
 WeirdString w;
  WeirdString t = w++;
 ++(w += (t++));
  cout << w.str() << endl;</pre>
}
```

Line 1: _____ (3分)

5.

Content of header file h1.h

```
// h1.h
#include <iostream.h>
using namespace std;
namespace A {
  int func(int a) {
    cout << "using namespace A";
    return 2*a;
  }
}</pre>
```

Content of header file h2.h

```
// h2.h
#include <iostream.h>
using namespace std;
namespace B {
  float func(float a) {
    cout << "using namespace B";
    return 2*a;
  }
}</pre>
```

Content of program.cpp

```
#include <iostream.h>
#include "h1.h"
#include "h2.h"

using namespace std;
using namespace A;
using namespace B;

int main(int argc, char const *argv[]) {
    /* code */
    int a = 10;
    float b = 10.0;
    cout << func(a) <<endl;
    cout << func(b);
    return 0;
}</pre>
```

```
Line 1: _____ (2分)
```

Line 2: _____ (2分)

6. What will be the output of the following code?

```
#define __MaErMaChunShang_CC98__
#include <iostream>
using namespace std;
class C1
```

```
{
public:
    C1() {
        cout << "$C1()$";
    C1(const C1& a) {
        cout << "$C1(const C1&)$";</pre>
    virtual ~C1() {
        cout << "$~C1()$";
    }
};
class C2 : public C1
public:
    C2() {
       cout << "$C2()$";
    }
    ~C2() {
       cout << "$~C2()$";
    }
};
int main()
    C2* pC2 = new C2();
    cout << endl;</pre>
    {
        c1 a = *pc2;
        cout << endl;</pre>
    }
    C1* pC1 = pC2;
    delete pC1;
    cout << endl;</pre>
}
```

The output is:

Line 1: _____ (1分)

Line 2: _____ (1分)

Line 3: _____ (1分)

程序填空题

1. Array is a template that implements a dynamically expandable array. next is used to link to the next block of the array. Fill in the blanks to complete the code.

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

```
template <typename T>
class Array {
public:
   Array() {
       data = new T[BLK_SIZE];
       next = ____(1分);
    }
   ~Array() {
       delete [] data;
       delete next;
   T& operator[](int i);
   void iterate(void (*f)(T&));
   _____(2分) *data; // data of type T
   static const int BLK_SIZE=32; // fixed block size
       ____(1分) *next; // the next array block
};
template <typename T>
T& _____(1分) operator[](int i) {
   if (i < BLK_SIZE) {</pre>
       return _____(2分);
    } else {
       if (next == NULL) {
          next = new ____(2分);
       return (*next)[i-BLK_SIZE];
   }
}
template <typename T>
void _____(2分) iterate(void (*f)(T&)) {
   for (int i = 0; i < BLK_SIZE; i++) {
       f(data[i]);
   }
   if (next != NULL) {
      next-> _____(2分);
   }
}
int main()
   Array ____(2分) a;
   int size = 100;
   cin >> size;
   for (int i = 0; i < size; i++) {
      a[i] = i;
   a.iterate([](int &x) { cout << x << end1; });
}
```

2. The function <code>inner_product</code> computes the inner product (i.e., sum of products) between the elements in the range <code>[first1, last1)</code> and those in the same size range beginning at <code>first2</code>. Please fill in the blanks of the following code to finish the implementation.

The code to complete:

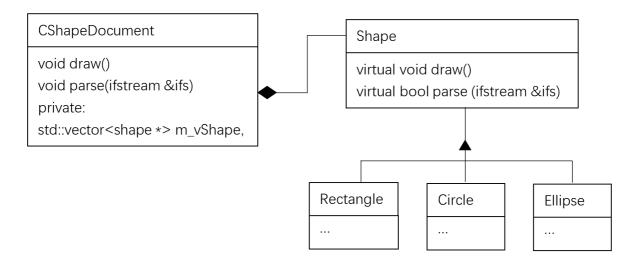
```
#include <functional>
#include <iostream>
#include <vector>
    ____(1分) <class InputIt1, class InputIt2, class T, class BinaryOp1, class
BinaryOp2>
T inner_product(InputIt1 first1, InputIt1 last1, InputIt2 first2, T init,
   _____(3分) op1, _____(3分) op2)
 while (first1 != last1)
   init = _____(3分) (init, op2( _____(3分) ));
   ++first1;
    _____(2分);
 return init;
}
int main()
 std::vector<int> a{0, 1, 2, 3, 4};
 std::vector<int> b{5, 4, 2, 3, 1};
 int r1 = inner_product(a.begin(), a.end(), b.begin(), 0, std::plus<>(),
std::multiplies<>());
 std::cout << "Inner product of a and b: " << r1 << '\n';
 int r2 = inner_product(a.begin(), a.end(), b.begin(), 0, std::plus<>(),
std::equal_to<>());
 std::cout << "Number of pairwise matches between a and b: " << r2 << '\n';
}
```

Required output:

```
Inner product of a and b: 21
Number of pairwise matches between a and b: 2
```

主观题

The class hierarchy in this program design task is as follows:



Note that the shapes are contained in the CShapeDocument, and they are read from the file using its member function parse(ifstream &ifs). The text stored in the file to describe the shapes in the document are as follows:

```
Rectangle left-bottom 1.0 1.0 W&H 10.0 20.0 Circle center 10.0 10 radius 5.0 Ellipse center 9.0 9.0 radius 10.0 30.0
```

The first string is the type of the shape and the rest texts describe its attributes. Specifically, left-bottom means 1 and 1 are the 2D coordinate of the rectangle, and W&H means 10 and 20 are the width and height of the rectangle. The descriptions of the circle and ellipse are similar.

Suppose the following texts are stored in the D:\shapes.txt:

```
Rectangle left-bottom 20.0 50.0 w&H 20.0 40.0 Circle center 8.0 8.0 radius 7.0 Ellipse center 5.0 5.0 radius 10.0 2.0
```

Please read the implementation of CShapeDocument and main function and implement the required shape classes, such as Rectangle, Ellipse and Circle such that the shapes are analyzed from the file D:\shapes.txt and stored in an object of the class CShapeDocument.

```
#include <iostream>
#include <fstream>
#include <vector>
using namespace std;

class shape
{
  public:
    virtual ~shape() {}

    virtual void draw() = 0;
    virtual bool parseattribute(ifstream &ifs) = 0;
};

class Rectangle : public shape
{
    ...
```

```
};
class Circle: public shape
{
};
class Ellipse : public shape
};
== CC98 马二马纯上 ==
class CShapeDocument
{
public:
    CShapeDocument() {}
    ~CShapeDocument();
public:
   void draw();
   void parse(ifstream& ifs);
private:
    std::vector<shape*> m_vShape;
};
CShapeDocument()
    std::vector<shape*>::iterator itShape;
    for (itShape = m_vShape.begin(); itShape != m_vShape.end(); itShape++)
        delete* itShape;
}
void CShapeDocument::draw()
    std::vector<shape*>::iterator itShape;
    for (itShape = m_vShape.begin(); itShape != m_vShape.end(); itShape++)
        (*itShape)->draw();
}
template<class X>
void parseattribute(ifstream& ifs, std::vector<shape*> &vShape)
    shape* pX = new X();
    if (!pX->parseattribute(ifs))
    {
       delete pX;
       return;
    vShape.push_back(pX);
}
void CShapeDocument::parse(ifstream &ifs)
{
    std::string str;
```

```
while(1)
    {
        str = "";
        ifs >> str;
        if (str == "Rectangle")
            parseattribute<Rectangle>(ifs, m_vShape);
        else if (str == "Circle")
            parseattribute<Circle>(ifs, m_vShape);
        else if (str == "Ellipse")
            parseattribute<Ellipse>(ifs, m_vShape);
        else
            break;
    }
}
int main()
    std::ifstream ifs("D:\\shape.txt");
    CShapeDocument shapedoc;
    shapedoc.parse(ifs);
    shapedoc.draw();
}
```

And the output of the program is as follows:

```
Rectangle 20 50 W&H 20 40
Circle 8 8 radius 7
Ellipse 5 5 radius 10 2
```

单选题答案

CADAD BCCBC

注: 单选第3题答案不能确定, 待考

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