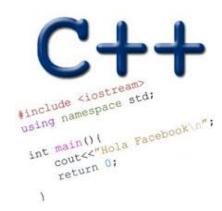
LINKED LISTS (CONTD) RULE OF THREE OPERATOR OVERLOADING

Problem Solving with Computers-II





Memory Errors

• Memory Leak: Program does not free memory allocated on the heap.

• Segmentation Fault: Code tries to access an invalid memory location

RULE OF THREE

If a class overload one (or more) of the following methods, it should overload all three methods:

- 1. Destructor
- 2. Copy constructor
- 3. Copy assignment

The questions we ask are:

- 1. What is the behavior of these defaults?
- 2. What is the desired behavior?
- 3. How should we over-ride these methods?

```
void test_append_0(){
    LinkedList 11;
    ll.append(10);
    ll.print();
}
```

Assume:

- * Default destructor
- * Default copy constructor
- * Default copy assignment

What is the result of running the above code?

- A. Compiler error
- B. Memory leak
- C. Segmentation fault
- D. None of the above

Why do we need to write a destructor for LinkedList?

- A. To free LinkedList objects
- B. To free Nodes in a LinkedList
- C. Both A and B
- D. None of the above

Behavior of default copy constructor

```
void test copy constructor(){
  LinkedList 11;
   11.append(1);
  11.append(2);
  LinkedList 12{11};
  // calls the copy c'tor
  11.print();
  12.print();
 Assume:
 destructor: overloaded
 copy constructor: default
```

What is the output?

- A. Compiler error
- B. Memory leak
- C. Segmentation fault
- D. All of the above
- E. None of the above

Behavior of default copy assignment

```
I1:1->2->5->null

void default_assignment_1(LinkedList& 11){
   LinkedList 12;
   12 = 11;
}
```

* What is the behavior of the default assignment operator? **Assume:**

- * Overloaded destructor
- * Default copy constructor
- * Default copy assignment

Behavior of default copy assignment

```
void test_default_assignment_2(){
   LinkedList 11, 12;
   11.append(1);
   11.append(2)
   12 = 11;
   12.print()
}
```

```
What is the result of running the above code?

A. Prints 1, 2

B. Segmentation fault

C. Memory leak

D. A &B

E. A, B and C
```

Assume:

- * Overloaded destructor
- * Default copy constructor
- * Default copy assignment

Behavior of default copy assignment

```
void test default assignment 3(){
   LinkedList 11;
   11.append(1);
   11.append(2)
   LinkedList 12{11};
    12.append(10);
    12.append(20);
    12 = 11;
    12.print()
 What is the result of running the above code?
 A. Prints 1, 2
 B. Segmentation fault
 C. Memory leak
D. A &B
 E. A, B and C
```

Assume:

- * Overloaded destructor
- * Overloaded copy constructor
- * Default copy assignment

Overloading Binary Comparison Operators

We would like to be able to compare two objects of the class using the following operators

```
and possibly others
void isEqual(const LinkedList & Ist1, const LinkedList &Ist2){
   if(Ist1 == Ist2)
       cout<<"Lists are equal"<<endl;
   else
      cout<<"Lists are not equal"<<endl;
```

Overloading Binary Arithmetic Operators

We would like to be able to add two points as follows

```
LinkedList 11, 12;

//append nodes to 11 and 12;

LinkedList 13 = 11 + 12;
```

Overloading input/output stream

Wouldn't it be convenient if we could do this:

```
LinkedList list;
cout<<li>t; //prints all the elements of list
```

Next time

• Recursion + PA01