

Queens College, CUNY, Department of Computer Science
Object Oriented Programming in C++
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133 Lecture 133

- This lecture contains a listing of the **automatically generated functions** for a C++ class.
- There are six functions which are automatically generated by the compiler.
- In addition, the `sizeof` operator is built into the C++ language.
- **The material on the “address of” operators is not for examination.**

133.1 Implicitly generated functions

- When we declare a C++ class, the compiler automatically generates six functions for us.
 1. **Default constructor**
 2. **Destructor**
 3. **Copy constructor**
 4. **Assignment operator**
 5. **“Address of” operator**
 6. **“Address of const” operator**
- We have studied the first four and learned how to write our own versions.
- Explicit versions are frequently written by programmers.
- The last two are almost never overloaded. Certainly I have never done so in any job.
- They are required for pointers to take the memory address of an object and a `const` object.
 1. The **“address of operator”** `&` returns the address of an object.
 2. The **“address of const operator”** `& const` returns the address of a `const` object.
- The “address of” operators return the **“this”** pointer.
- In addition, the **“sizeof”** operator is built into the C++ language, and automatically knows how to compute the memory allocation required for any user-defined class.

133.2 Class CDCEAC: create, destroy, copy, assign (eq), address, const

- Here is the C++ code for the class CDCEAC = create, destroy, copy, assign (eq), address, const.
- Each function prints a line of output to describe its functionality.

```
class CDCEAC {
public:

    CDCEAC()
    {
        cout << "create" << endl;
    }

    ~CDCEAC()
    {
        cout << "destroy" << endl;
    }

    CDCEAC(const CDCEAC& orig)
    {
        cout << "copy" << endl;
    }

    CDCEAC& operator= (const CDCEAC& rhs)
    {
        cout << "assign (eq)" << endl;
        return *this;
    }

    CDCEAC* operator& ()
    {
        cout << "address" << endl;
        return this;
    }

    const CDCEAC* operator& () const
    {
        cout << "address const" << endl;
        return this;
    }
};
```

133.3 Main program

- Here is the C++ code for a main program to use the class `CDCEAC`.
- A line of output is printed when each function is invoked.
- The destructor is invoked twice (two objects go out of scope).
- The `sizeof` operator is also called in the main program.

```
int main()
{
    CDCEAC a;                      // create
    const CDCEAC b(a);             // copy   (also const object)
    a = b;                         // assign
    CDCEAC *pa = &a;               // address
    const CDCEAC *pb = &b;         // address const

    cout << "sizeof = " << sizeof(CDCEAC) << endl;

    return 0;
}
```