Lecture 21

CIS 208

Wednesday, April 20, 2005

Constructors

- Initialization functions for classes
- Automatically called when object is created.
- May be overloaded.

Constructors

- No return types.
- Name of constructor must be same as class.
- implemented just like any other function.

Constructors

- global variables: called before main()
- local: called when declared.
- Not necessary.

constructors

```
class X {
    int a;
public :
    X(int j) {a =j;}
  int geta() {return a;}
};

int main() {
    X ob = 99;
    X ob(99);
    cout << ob.geta();
return 0;
}
```

single parameter constructors

- X ob = 99; == X ob(99);

- only works on constructors with one parameter.

Deconstructors

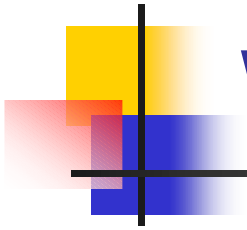
- complement of constructors
- Automatically called when object is destroyed.
- global: after program termination
- local: after code segment

Deconstructors

- class foo;

- constructor == foo(…);
- deconstructor == ~foo();

- no parameters.



why use deconstructors?

- Deal with last minute issues.
- unallocated any memory.
- Close a file.

Passing Objects

- Usual call-by-value vs. call-by-reference
- CBV: separate copy of object made
  - Exact copy, all value identical
  - regular constructor is not called
  - Deconstructor is called.

pointers to objects

- Work just like C pointers.
- use -> to access class functions/fields.

pointers

```
class cl{
 int j;
public ;
cl(int k) { j = k;}
int getJ() { return j;}
};

int main()
{ cl ob(88), *p;
  p = &ob;
  cout << p ->getJ();
  return 0;
}
```

passing pointers

- Call by reference.
- No constructor or deconstructor when creating pointers. .

dynamic memory allocation

- 2 new commands.
  - new
  - delete
- a lot like malloc() & free()

new

- returns a pointer to the new allocated memory space
- the pointer is of the correct type.
  - casting isn’t necessary

delete

- destroys memory pointed to by pointer.
- Just like free()
- unlike free(), delete calls deconstructor, and you can try to delete unallocated pointers.

new

```
int main() {
int *p,*q;

p = new int;
*p = 100;
q = new int(5);
cout<< “At “ << p << “ “;
cout << “is the value “ << *p << “\n”;
delete p;
return ;
```

initializing allocation memory

- p_var = new var_type(initial data);

- cl *p = new cl(99);
  - creates new cl object, sends 99 to constructor.

delete p;

NULL

- if using NULL, need to #include <cstdlib>

recursive constructors

```
class foo{
foo *child;
public :
foo();
~foo();
};
```

continued

```
foo:: foo() {
   child = new foo;
}

foo::~foo() {
   delete child;
}
```

bad allocation

- new doesn’t return NULL if it fails.
- It actually throws an exception.
- We’ll talk about exception handling Friday.

making new return NULL;

- use nothrow operator.

p_var= new(nothrow) *type;*

- return NULL on failure

- must #include <new> for this.