Classes in C++

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	C	C++	Java
Keyword	struct	class/struct	class
Attributes	Yes	Yes	Yes
Methods	No	Yes	Yes
Access control	all public	public or private	public or private
Memory	stack/heap	stack/heap	heap
Operators	No	Yes	No
Filename	any (usually: name.h)	any (usually: name.hpp name.cpp)	name.java

structs and classes

Where did structs go?

 In C++ class==struct, except that by default struct members are public and class members are private:

```
int main()
struct MyStruct
                          MyStruct s;
   int x;
                          s.x = 1; // ok
                          MyClass c;
class MyClass
                          c.x = 1; // error
   int x;
```

structs & classes

```
All of these are the same:
struct A
   int x;
};
struct A
   public:
   int x;
};
class A
   public:
   int x;
};
```

```
All of these are the same (and useless):
class A
   int x;
};
class A
   private:
   int x;
};
struct A
   private:
   int x;
};
```

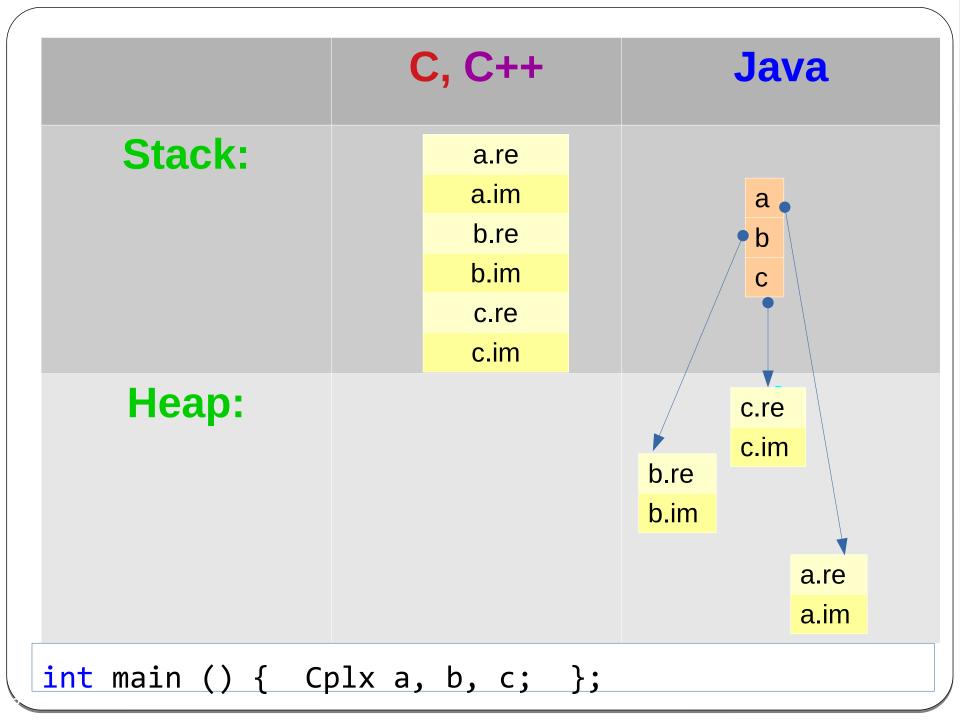
Arrangement of Classes in Memory

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}; Cplx sumCplx(Cplx a, Cplx b) Cplx **{...**} (double re, double im) {...} **}**;

public Cplx (double re, double im) {...} **}**;

```
Java
                 int main() {
                                    void main(...) {
int main() {
                    Cplx a(5,10);
                                       Cplx a =
   Cplx a;
                                       new
   a.re=5;
                                         Cplx(5,10);
   a.im=10;
```



Two ways to implement a method (folder 1)

```
class Complex {
  double re, im;
public:
Complex () { re=0; im=0; }// inline constructor
Complex (double re, double im); // "outline"
Complex sum (Complex b) { return
Complex(a.re+b.re, a.im+b.im); } // inline method
Complex diff (Complex b);  // "outline"
};
```

Implementing methods out-of-line (folder 1)

```
Complex::Complex (double re, double im) {
```

```
this→re = re;
this→im = im;
```

Scope operator

The address of the instance for which the member method was invoked.

```
Complex Complex::diff(Complex b) {
   return Complex(a.re-b.re, a.im-b.im);
}
```

What file-names should we use?

- The C++ compiler does not care how your files are called.
- It is common to put a class declaration in file ClassName.hpp (or ClassName.h) and the class implementation in file ClassName.cpp.
- Why is it better?
 - Hiding implementation details.
 - Saving comiplation time when you have a good **Makefile** (see folder 2).

```
Class Basics – member/static (folder 3)
```

```
class List
public:
   static int getMaxSize();
   int getSize();
   static int max_size; //=1000; //error! (declare outside)
   int size=0;
};
int List::max_size=1000; //ok, in one cpp file
int main()
   List 1;
   1.getSize();
   List::getMaxSize();
   l.getMaxSize(); //compiles ok, but bad style
```

this

```
static int List::getMaxSize() //no this!
{
    return this->size; // compile error!
    return max_size; // ok
}
int List::getSize()
{
    return this->size; //ok
}
```