CS 225

Data Structures

January 27 – Classes and Reference Variables

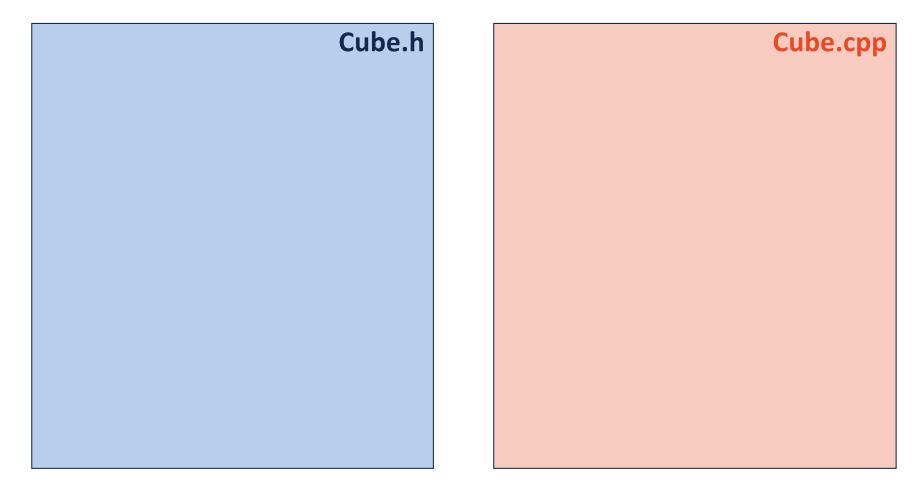
G Carl Evans

Stream Rules

TL;DR: Treat the stream like a classroom, don't say anything that would send you to the Dean of Students. Mods will strongly enforce timeouts and bans.

- Be kind and excellent to each other.
- No racist, sexist, bullying, sexual, or hate-based comments or remarks.
- Constructive criticism is always welcome, insulting or offhand remarks are not.
- No excessive disruptive conversation; keep your contributions academic.
- The staff/moderation team has final say; don't argue with them.

Encapsulation



```
Cube.h
   #pragma once
   class Cube {
     public:
 9
10
11
     private:
12
13
14
   };
15
16
17
18
19
20
```

```
#include "Cube.h"
   double Cube::getVolume() {
10
11
12
13
14
15
16
17
18
19
20
```

```
Cube.h

4 class Cube {
5 public:
6 double getVolume();
```

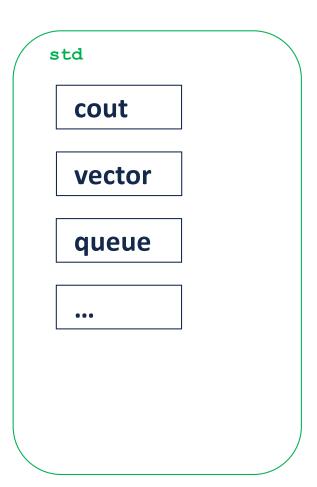
```
Cube.cpp
   #include "Cube.h"
 2
 3
   double Cube::getVolume() {
 4
 5
 6
 7
 9
10
11
12
13
14
15
16
17
18
```

```
#pragma once
   class Cube {
     public:
 4
        double getVolume();
 6
 8
 9
10
11
     private:
12
13
14
   };
15
16
17
18
19
20
```

Namespaces

Namespaces

Cube
PNG
HSLAPixel



• •

```
#pragma once
   namespace cs225 {
     class Cube {
 4
       public:
 6
          double getVolume();
          double getSurfaceArea();
 9
10
11
12
       private:
          double length ;
13
14
15
     };
16 }
17
18
19
20
```

```
#include "Cube.h"
   namespace cs225 {
     double Cube::getVolume() {
       return length * length *
              length ;
 6
 8
     double
     Cube::getSurfaceArea() {
       return 6 * length *
 9
              length ;
10
11
12
13
14
15
16
17
```

```
Cube.cpp
                                          #include "Cube.h"
   #pragma once
   namespace cs225 {
                                          namespace cs225 {
     class Cube {
                                            double Cube::getVolume() {
       public:
                                              return length * length *
 6
         double getVolume();
                                                      length ;
         double getSurfaceArea();
                                        6
                                            double
 9
10
                                            Cube::getSurfaceArea() {
11
                                              return 6 * length *
                                        9
12
       1 #include "Cube.h"
13
       2 | #include <iostream>
14
15
       4 int main() {
16 }
          cs225::Cube c;
17
          std::cout << "Volume: " << c.getVolume() << std::endl;</pre>
18
           return 0;
19
       8 | }
20
```

main.cpp

```
#include "Cube.h"
#include <iostream>

int main() {

cs225::Cube c;
 std::cout << "Volume: " << c.getVolume() << std::endl;
 return 0;
}</pre>
```

main.cpp

```
1 #include "Cube.h"
2 #include <iostream>
3
4 int main() {
5   cs225::Cube c;
6   std::cout << "Volume: " << c.getVolume() << std::endl;
7   return 0;
8 }</pre>
```

main.cpp

```
#include "Cube.h"
#include <iostream>

int main() {
    cs225::Cube c;
    std::cout << "Volume: " << c.getVolume() << std::endl;
    return 0;
}</pre>
```

Constructor

```
#pragma once
 3 namespace cs225 {
     class Cube {
       public:
 6
          Cube();
          double getVolume();
 7
          double getSurfaceArea();
 9
10
11
12
13
       private:
14
          double length ;
15
16
     };
17 l
18
19
20
```

```
#include "Cube.h"
 2 namespace cs225 {
     Cube::Cube() {
 8
     double Cube::getVolume() {
 9
       return length * length *
10
              length ;
11
12
13
     double
     Cube::getSurfaceArea() {
14
       return 6 * length *
15
16
              length ;
17
18
19
20
```

```
#pragma once
 3 namespace cs225 {
     class Cube {
       public:
 6
          Cube (double length);
 7
          double getVolume();
          double getSurfaceArea();
 9
10
11
12
13
       private:
14
          double length ;
15
16
     };
17
18
19
20
```

```
#include "Cube.h"
 2 namespace cs225 {
     Cube::Cube(double length) {
 8
     double Cube::getVolume() {
 9
       return length * length *
10
              length ;
11
12
13
     double
     Cube::getSurfaceArea() {
14
       return 6 * length *
15
16
              length ;
17
18
19
20
```

Cube.h Cube.cpp

```
#include "Cube.h"
   #pragma once
 1
                                           namespace cs225 {
                                         3
   namespace cs225 {
                                             Cube::Cube(double length) {
     class Cube {
 4
                                         4
                                               length = length;
       public:
 6
         Cube (double length);
                                         6
         double getVolume();
                                         7
 8
         double getSurfaceArea();
                                             double Cube::getVolume()
 9
       1 #include "Cube.h"
                                                            puzzle.cpp
10
      2 using cs225::Cube;
11
         #include <iostream>
12
         using std::cout;
13
      5
         using std::endl;
14
      6
15
         int main() {
16
      8
           Cube c;
17
           cout << "Volume: " << c.getVolume() << endl;</pre>
18
     10
           return 0;
19
     11 | }
20
```

Hate Typing cout:: and cs225::?

Useful Shortcut:

```
using std::cout;  // Imports cout into global scope
using std::endl;  // Imports endl into global scope
using cs225::Cube; // Imports Cube into global scope
```

Strongly Discouraged Shortcut

Cube.h

Cube.cpp

1 #include "Cube h"

```
#include "Cube.h"
   #pragma once
 1
                                           namespace cs225 {
                                         3
   namespace cs225 {
     class Cube {
 4
       public:
 6
                                         6
          Cube (double length);
                                             Cube::Cube(double length) {
          double getVolume();
                                         8
                                                length = length;
 9
          double getSurfaceArea();
                                         9
10
                                        10
11
                                        11
                                             double Cube::getVolume() {
12
                                                             puzzle.cpp
         int main() {
13
           Cube c;
14
           cout << "Volume: " << c.getVolume() << endl;</pre>
15
      10
           return 0;
16
      11
17
18
19
20
```

Cube.h

Cube.cpp

1 #include "Cube h"

```
#include "Cube.h"
   #pragma once
 1
                                           namespace cs225 {
                                         3
   namespace cs225 {
     class Cube {
 4
       public:
 6
                                         6
          Cube (double length);
                                             Cube::Cube(double length) {
          double getVolume();
                                         8
                                                length = length;
 9
          double getSurfaceArea();
                                         9
10
                                        10
11
                                        11
                                             double Cube::getVolume() {
12
                                                             puzzle.cpp
         int main() {
13
           Cube c;
14
           cout << "Volume: " << c.getVolume() << endl;</pre>
15
      10
           return 0;
16
      11
17
18
19
20
```

CS 225 – Things To Be Doing

lab_intro start in lab (Due Feb. 7th)

Make sure to attend your lab section every week

- they're worth points and EC starting the third week!

MP1 is released Today!

Due: Monday, Feb. 8th (~12 days after release)

Ensure you are on our Piazza

Details on the course website: https://courses.engr.illinois.edu/cs225/

See you Friday!