#8: Templates
September 15, 2017

Reasoning about derived classes:

### derived-defaultCtor.cpp
```cpp
class Sphere {
public:
    Sphere(double d) { /* ... */ }
};

class Ball : Sphere() {
}

int main() {
    Ball b;
}
```

## Abstract Class:

1. [Requirement]:

2. [Syntax]:

3. [As a result]:

### Reasoning about virtual classes:

```cpp
class Sphere {
    public:
        virtual Sphere();
};
class Ball : Sphere() {
    public:
        virtual ~Sphere();
    }

class Sphere {
    public:
        virtual ~ Sphere();
};
class Ball : Sphere() {
    public:
        virtual ~ Sphere();
    }
```

In what order does the derived classes ctor/dtor get called?

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**Assignment Operator**

*I glossed over a crazy important detail of the assignment operator:*

Consider the following program:

### assignmentOpSelf.cpp
```cpp
#include "Sphere.h"

int main() {
    cs225::Sphere s(10);
    s = s;
    return 0;
}
```

### Sphere.cpp
```cpp
void Sphere:: ~_destroy() { delete[] props_; }
void Sphere:: _copy(const Sphere &other) {
    r_ = other.r;
    props_max_ = other.props_max_;
    props_ct_ = other.props_ct_;
    props_ = new std::string[10];
    for (unsigned i = 0; i < props_ct_; i++) {
        props_[i] = other.props_[i];
    }
}
Sphere& Sphere::operator=(const Sphere &other) {
    _destroy();
    _copy(other);
    return *this;
}
```
Big Idea: Abstract Data Type

List ADT

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<th>Function Definition</th>
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What types of List do we want?

Solution:

Function templates:

```
functionTemplate1.cpp
1
2
3 T maximum(T a, T b) {
4    T result;
5    result = (a > b) ? a : b;
6    return result;
7 }
```

class templates:

```
List.h
1    #ifndef LIST_H
2    #define LIST_H
3
4    class List {
5        public:
6
7        private:
8
9    };
10
11    #endif
```

```
List.cpp
1
2
3
4
5
6
7
8
9
10
11
12
```

CS 225 – Things To Be Doing:

1. Exam #2 (Programming) begins on Monday
2. MP2 is due Sept. 25; Max EC w/ Part 1 by Sept. 18
3. Lab Extra Credit → Attendance in your registered lab section!
4. Daily POTDs