

Templates and Inheritance

A Base Template...

... and a Derived Template

Using InspectableQueue Template

NonTemplate Derived from Template

Using the Polygon Class

## Options:

- a template may be derived from another template.
- a non-template class may be derived from a template.
- a template may be derived from a non-template.
- templates may use multiple inheritance.

We will briefly examine the first two cases here; the remaining cases are left to the reader.

Recall the queue template QueueT from earlier notes:

```
const int Size = 100;

template <class Foo> class QueueT {

private:
    Foo buffer[Size];
    int  Head, Tail, Count;

public:
    QueueT();
    void Enqueue(Foo Item);
    Foo  Dequeue();
    int  getSize() const;
    bool isEmpty() const;
    bool isFull() const;
    ~QueueT();
};
```

We can derive an extended queue template that adds the ability to “peek” at the element at the front of the queue:

```
template <class Foo>
class InspectableQueue : public Queue<Foo> {

public:
    InspectableQueue();
    Foo Inspect();
    ~InspectableQueue();
};
```

```
InspectableQueue<Location> Path;  
Location loc1(...);  
Location loc2(...);  
...  
Path.Enqueue(loc1);           // base class method  
Path.Enqueue(loc2);         // base class method  
...  
Location Front      = Path.Dequeue(); // base class method  
Location newFront = Path.Inspect();  // derived class  
                               // method
```

Recalling the linked list template, `LinkedListT`, discussed earlier, we can derive a `Polygon` class from it:

```
class Polygon : public LinkedListT<Location> {
public:
    Polygon();
    void WidderShins();           // sort points
    void Print(ostream& Canvas); // draw itself
};
```

Note that the template `LinkedListT` is elaborated with a specific type.

```
Polygon Hex;  
    ...  
Hex.AppendNode(Location(20,20)); // inherited from  
Hex.AppendNode(Location(30,30)); // LinkListT template  
  
// insert other locations  
  
Hex.Draw(cout); // derived class method
```