

# Template Classes

Lecture 10  
Section 16.3

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- 1 Template Classes
- 2 Template Member Functions
- 3 Assignment

# Outline

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- 2 Template Member Functions
- 3 Assignment

# Template Classes

- To make a class a template class, write `template <class T>` before the class definition.
- The class name *Name* becomes *Name*<*T*> in all places except:
  - The class name in the heading.
  - The constructor names in the prototypes.
  - The destructor name in the prototype.

# Template Classes

## Example (Template Classes)

```
template <class T>
class Vectr
{
    public:
        Vectr();
        Vectr(const Vectr<T>& v);
        ~Vectr();
        Vectr<T> add(const Vectr<T>& v) const;
        :
    private:
        int m_size;
        T* m_element;
};

template <class T>
operator+(const Vectr<T>& v1, const Vectr<T>& v2);
```

## Example (Instantiating Template Objects)

```
Vectr<int> v1(2, 123);  
Vectr<double> v2(3, 4.56);  
Vectr<Point> v3(3, Point(1, 2))  
Vectr<Date> v4(4, Date("Feb", 8, 2016));
```

- Objects of the class are instantiated using

*Name<Type> Object;*

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# Implementing Member Functions

- Each member function of a template class is a template function.
- The member functions are instantiated and compiled individually *only as necessary*.
- The class definition is stored as uncompiled text until the compiler determines that it is needed.
- That determination cannot be made until the file that uses the class is compiled.

# Implementing Member Functions

- Therefore, we write the member functions in the header file, to be included by the program.
- There is no separate implementation file for a template class.
- Why not?

# Testing Member Functions

- To test a template, just to see if the member functions compile, each member function must be invoked.
- Further testing may be necessary to see if the member functions are correct.

# A Vector of Vectors

- Is it possible to create a “vector of vectors?”

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# Assignment

## Assignment

- Read Section 16.3.