Polymorphism

- A function that can do the same operation on multiple kinds of data
  - Add more than one kind of number
  - Sort lists that hold different kinds of information
- A container class that can hold different kinds of data (homogeneous, heterogeneous)

Polymorphism in C++

- Dynamic forms
  - Inheritance
  - Virtual methods
- Static forms
  - Operator overloading
  - Templates

Inheritance with Casting

- Define “is-a” relationship between classes
- Object of derived class can be used as an object of base class
- Polymorphism: Allows heterogeneous collections of objects from inheritance hierarchy
- Requires runtime casting

Virtual Methods

- Allows use of derived class methods when treating derived class object as base object
- Polymorphism: The virtual method operates on different types of objects
- Requires runtime binding of method call to method (dynamic dispatch)
Operator Overloading

- Define “standard” operators for new classes
- Important to making classes
  - have “look and feel” of primitive types, or
  - meet needs of template classes (ex., STL)
- Recognized at compile time (no runtime overhead)

Templates

- Define functions or classes that can operate on/contain different kinds of objects
- Template gives classes as parameter to definition
- Compiler makes copy of definition for each instantiation
- No runtime overhead

Overview

- Polymorphism can simplify program
- Allows reuse of code
- C++ mechanisms can be troublesome (esp., inheritance)