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

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)
• Simplify code that must check types of objects
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 (e.g., 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 misused (esp. inheritance)
- Care required to ensure extensibility and flexibility of program