

Chapter 13

Inheritance and Polymorphism

OBJECTIVES

After you have read and studied this chapter, you should be able to

- Write programs that are easily extensible and modifiable by applying polymorphism in program design.
- Define reusable classes based on inheritance and abstract classes and abstract methods.
- Define methods using the protected modifier.
- Parse strings using a StringTokenizer object.

FIGURE 13.1 A superclass **Student** and its subclasses **GraduateStudent** and **UndergraduateStudent**.

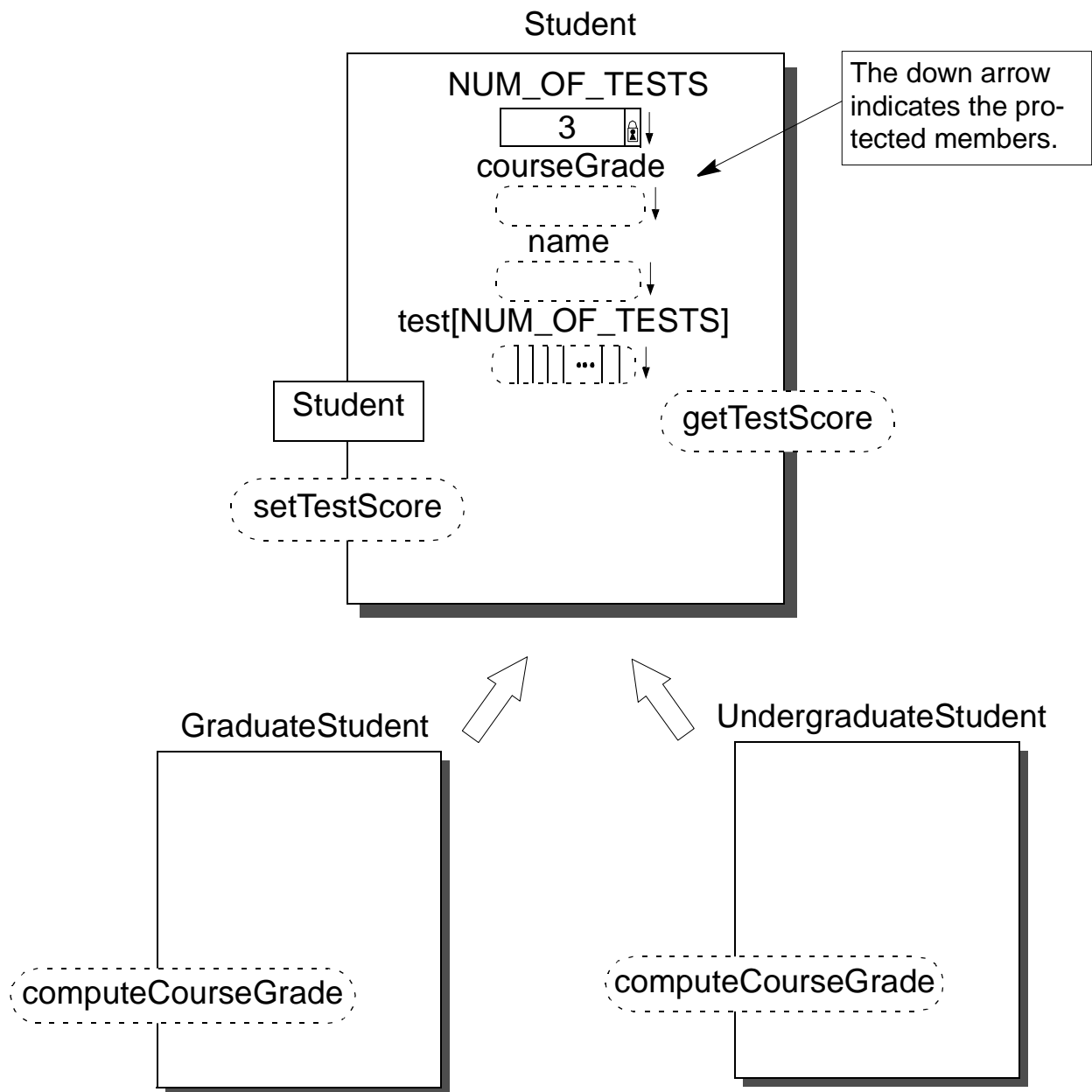


FIGURE 13.2 The **roster** array with elements referring to instances of **GraduateStudent** or **UndergraduateStudent** classes.

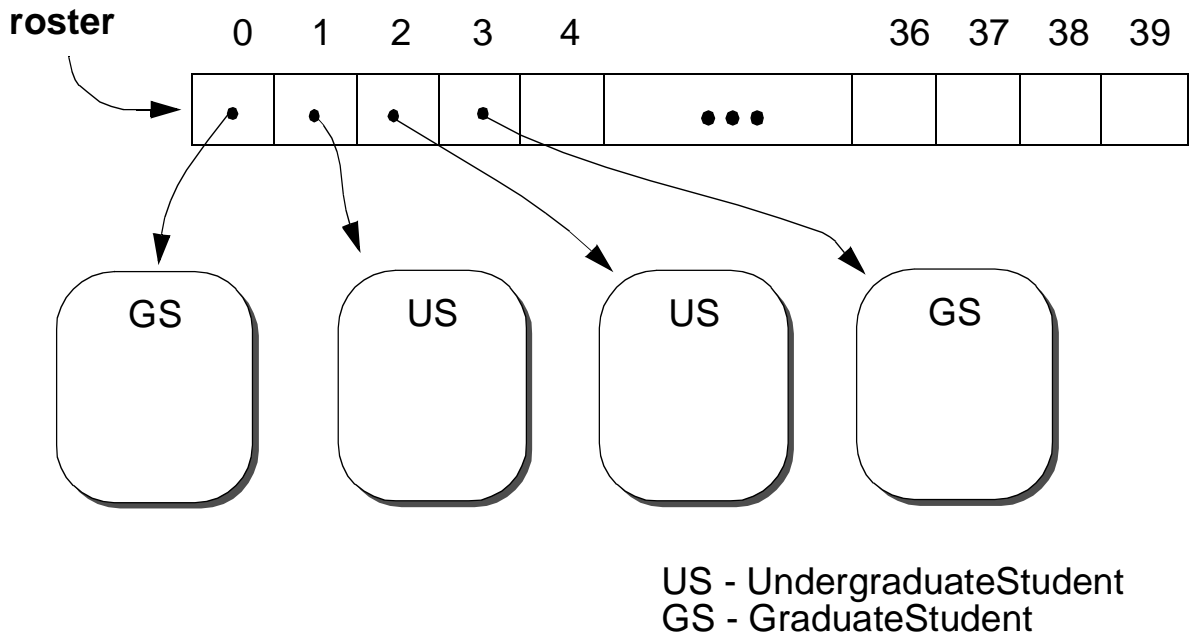


FIGURE 13.3 A graphical representation of super and subclasses with **public**, **private**, and **protected** members.

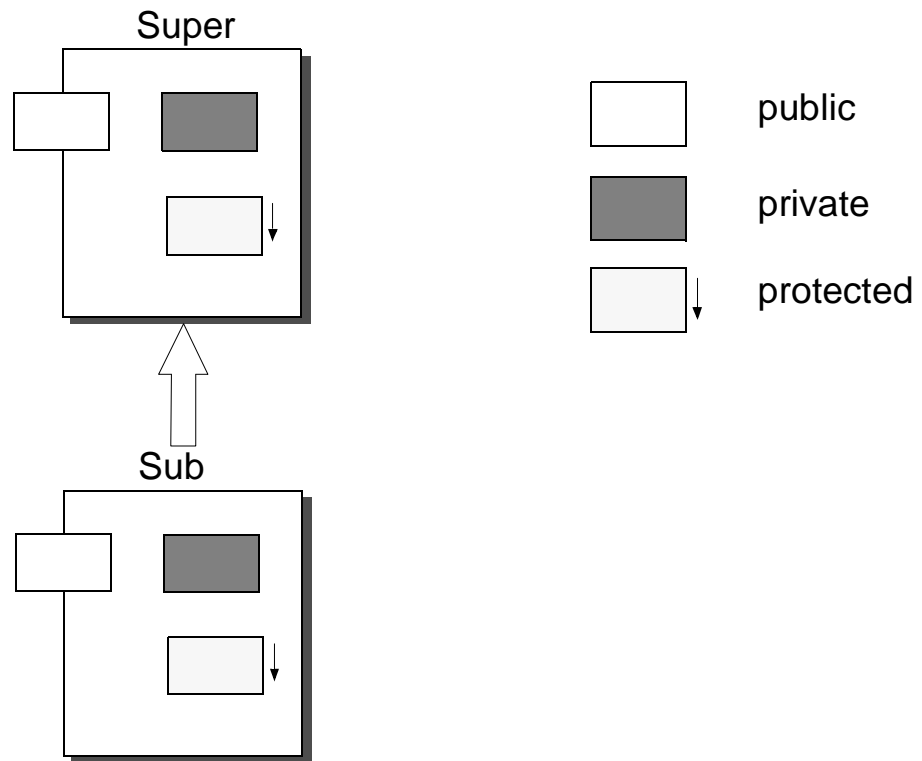
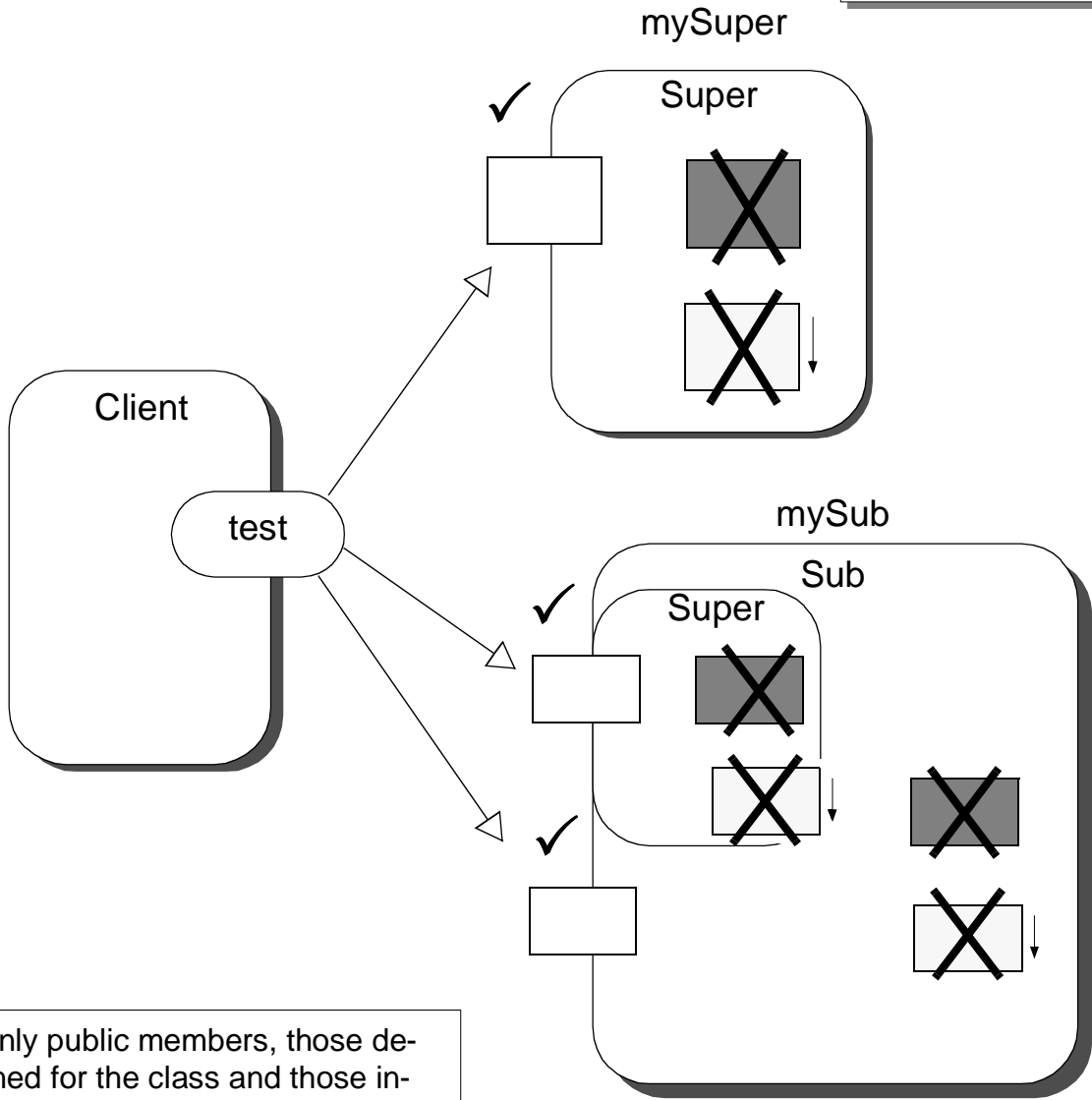


FIGURE 13.4 The difference between **public**, **private**, and **protected** modifiers. Only public members are visible from outside.

Accessibility from the Client method

✓ – accessible
 ✗ – inaccessible

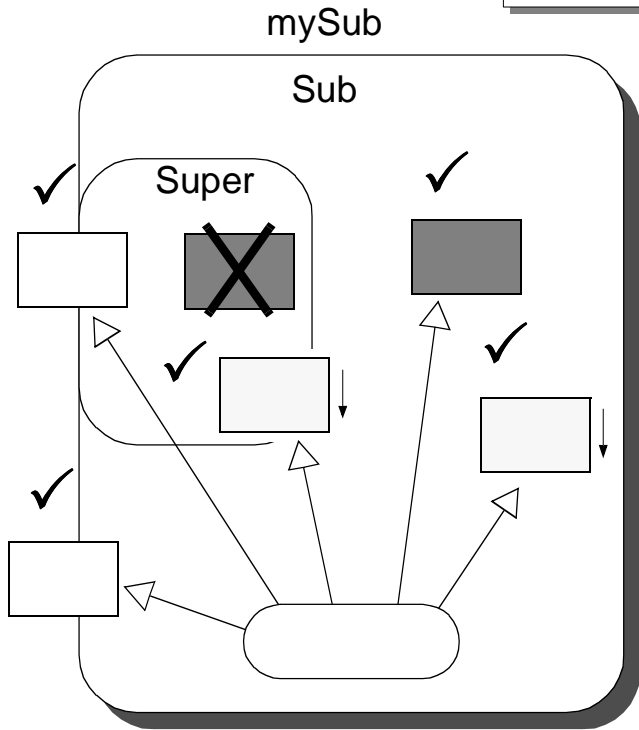


Only public members, those defined for the class and those inherited, are visible from outside. All else is hidden from outside.

FIGURE 13.5 The difference between **public**, **private**, and **protected** modifiers. Everything except the **private** members of the **Super** class is visible from a method of the **Sub** class.

Accessibility from a method of the Sub class

✓ – accessible
 ✗ – inaccessible



From a method of **Sub**, everything is visible, except the private members of its superclass.

FIGURE 13.6 Data members accessible from an instance are also accessible from other instances of the same class.

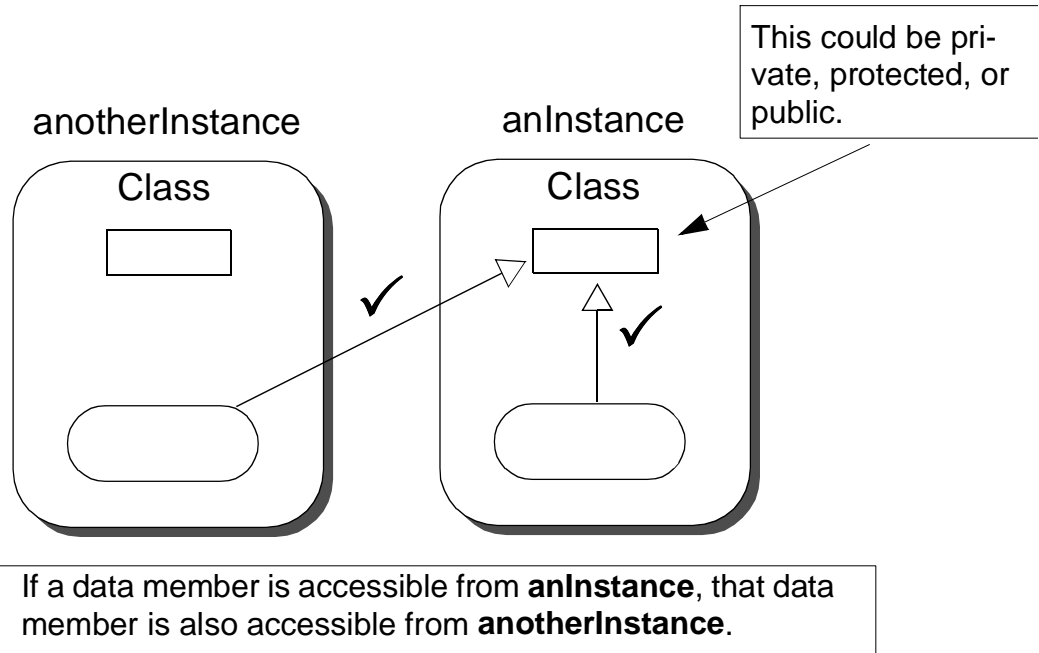


FIGURE 13.7 An object diagram of the abstract superclass **Student** and its three subclasses.

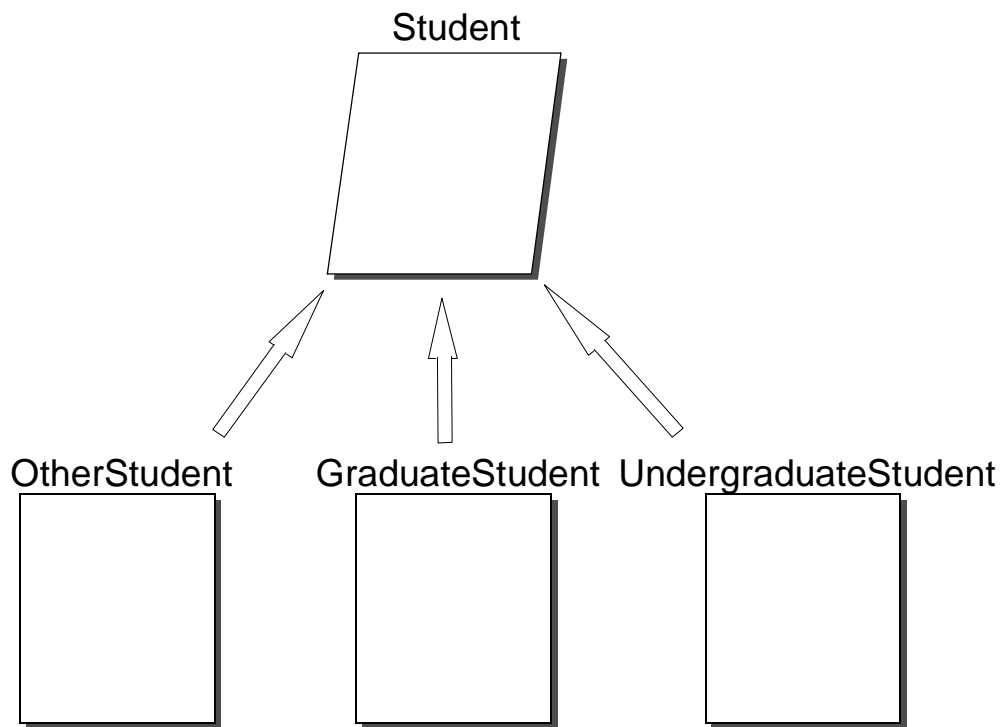


FIGURE 13.8 A sample textfile containing student names and test scores. **U** at the beginning of a line designates an undergraduate student and **G** designates a graduate student.

<Type>	<Name>	<Test 1>	<Test 2>	<Test 3>
U	John Doe	87	78	90
G	Jill Jones	90	95	87
G	Jack Smith	67	77	68
U	Mary Hines	80	85	80
U	Mick Taylor	76	69	79
END				

FIGURE 13.9 An object diagram of the **ComputeGrades** program. **javabook** and **FileDialog** objects are not shown.

