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i CS

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NACA.161 Programming Fundamentals II
In-class Exercise #18 – Polymorphism

Overview

This exercise is designed to let you continue working with inherited classes and to start casting from one class to another. This is based on the lecture on polymorphism.

Building Class

1) In the file **Building.java** create a class named **Building** with one private attribute named **address**.

2) Create a default constructor that sets the address attribute to: "No address Given"

3) Compile the code and fix all errors.

House Class

4) In the file **House.java**, create a class named **House** that inherits everything from the **Building** class.

5) Create an attribute named **numBedrooms**.

6) Create a one-parameter constructor that accepts a string. Set the <u>address</u> attribute to this string. **NOTE**: <u>Do NOT create a default</u> constructor in the **House** class.

7) Compile the code. What error did you get?

address has private access in Building

Why can't you access the inherited address attribute?

Because I set access modifier to private

8) What are the two ways you can get access to inherited private attributes?

a. _____Public_____

b. _____Protected_____

What access modifier will let subclasses access an attribute? _Protected_

9) In the **House** constructor, add code that sets the number of bedrooms to 1.

10) Compile the **House** file.

BuildingTest Class

11) In the file BuildingTest.java, create a class named **BuildingTest** with a main method.

12) Create a **House** object using the default constructor.

13) Compile the **BuildingTest** file. Why did it fail to compile?
   Because I did not create a constructor + it's missing values

14) Change your code to create the **House** object with the one-parameter constructor. Pass in the value: "123 Main Street" into the constructor.

15) What type of method do you need to do in order to be able to display the attribute values?

   _____to String();_____

   Which class defines the address? _Building_

   Which class defines the number of bedrooms? _House_

16) In the **Building** class create an accessor for address.

17) In the **House** class create an accessor for number of bedrooms.

18) Compile the **Building** and **House** classes.

19) In the **BuildingTest** class, use the accessor to display the address and number of bedrooms for the **House** object

20) Compile and run the **BuildingTest** class until you get <u>123 Main Street</u> for the address and <u>1</u> for the number of bedrooms.

21) What type of method do you need to add if you want to change the number of bedrooms?

~~h~~ ~~Set Numbedrooms~~   h1. Set Num Bedrooms(3);

22) Create a mutator for the number of bedrooms.

In which class did you create the mutator?   House

23) Compile the House file.

BuildingTest Class

24) Add code in **BuildingTest** to set the number of bedrooms to 3.

Compile and run **BuildingTest** until you get 3 bedrooms to display.

25) In **BuildingTest,** declare two Building objects as follows:

Building b1;
Building b2;

26) Use the **Building** default constructor to create the **b1** object.

27) Use the **House** one-parameter constructor to create the **b2** object with a value of

10 Maple Road

28) Compile **BuildingTest**.

Why were you able to create a **Building** object using the **House** constructor?

Because House is an inherited/subclass

29) Using the appropriate accessors, add code to display the address and number of bedrooms for **b1**.

30) Compile **BuildingTest**. Why did it fail to compile?

There's no number of building in b1

31) To fix this problem remove the call to the method getNumBedrooms.

32) Compile **BuildingTest** and fix all errors.

33) Add code to display the address and the number of bedrooms for **b2**.

34) Compile **BuildingTest**. Why did it fail to compile?

There is no number of building in b2

Why can't it find the getNumBedrooms method even though it was created as a **House**?

Because we are looking in Building Class above House.

Is **b2** a Building? _Yes_

Is **b2** a House? _No Yes_   _Building b2 = new House("—")_

Since you know **b2** is a house, how do you fix the problem?

Assign b2 as a new house

35) Cast **b2** to a **House** and assign it to a **House** variable named **h2**.

36) Compile and run **BuildingTest** until it works.

37) Now cast **b1** to a **House** and assign it to a **House** variable named **h1**.

38) Compile **BuildingTest**. Run **BuildingTest**. What error did you get?

I do not have string inputted, no args.

Is **b1** a **Building**? (YES) NO

Is **b1** a **House**? YES (NO)

Since **b1** is not a **House,** it cannot have bedrooms, but the compiler doesn't check for this kind of runtime error.

39) What operator can you use to check to see if a **Building** object is also a **House** object?

.equals( )

40) Modify your code to cast and display the attributes for the **b1** object, only if the **b1** object is a **House**.

41) Compile and run **BuildingTest** until it works.

House File

42) What class does every class inherit from?

Building

What Object method is used to display the attribute values of a class?

to String()

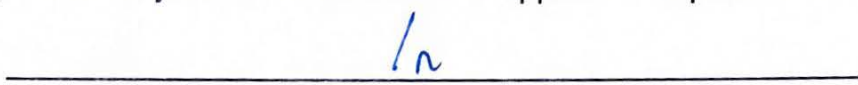43) Create a **toString** method in the **House** class that displays the 2 attribute values.

Make sure you also label what each value is. For instance, don't just display the number of bedrooms; also include words which state what it is.

What is the return type of the **toString** method? ~~custom form~~ *String. format*

44) Compile the **House** file until it works.

BuildingTest File

45) In **BuildingTest**, remove the statements where you called the 2 accessors with the **h2** object and replace it with one call to the **toString** method. Print the result of the call to the **toString** method.

46) Compile and run **BuildingTest** until it works.

47) If both attributes did not display on the screen, fix your code and run **BuildingTest** until it works.

48) How do you make the attributes appear on separate lines?

/n
_____

49) Make the appropriate changes in your code until it all works.

When you complete all of the steps successfully and answer all of the questions, contact your instructor to check if your application(s) executes correctly and to review your code. We will initial the line below.

_____Successful execution of code

If you do not finish the program during the class period, contact your instructor to check to review your code and initial below.

_____Code not completed during lab time

You may then submit your work at the <u>start</u> of next class. <u>You may not use the work period of the next class to complete this assignment</u>. If you do not have a signature, then you cannot receive any points for this assignment.