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NACA.161 Programming Fundamentals II
In-class Exercise #15 – foreach loop and instanceof

Objectives

To use the following constructs in a program:

- The foreach loop
- The **instanceof** operator.

Putting Items into a Collection

1) Write a class named **WorkingWithCollections** that contains a main method.

2) Create a typed ArrayList collection named **vehicle** using the default constructor of the ArrayList.

3) What package do you need to import?

   import java.util.ArrayList;

4) Compile this class and fix any errors.

5) You will be using the **Boat** class from the previous class. If you do not have this file, ask your instructor for a copy of the file.

6) Create the following **Boat** objects and add each of them to the **vehicle** collection.
   A blue boat with a price of $45,000
   A red boat with a price of $82,000 ✓
   A white boat with a price of $64,500

   Create a foreach loop to retrieve each object from the collection and print the colour and price of each **Boat** object using the accessor methods in the form
   `Boat: color=<boat-color>  price=<boat-price>`

7) Compile and run the code until all of the boats are successfully printed. ✓

Car Class

8) Create a class called **Car** with two attributes. One attribute has the price of the car as a double and the other has the name of the maker as a string. Again, keep the class simple as possible.

9) Create a constructor with two parameters. The first parameter has the name of the maker car such as Volvo, Subaru, Chrysler, etc. The second has the price of the car.

10) Create an accessor for each attribute.

11) Compile the code until you get it working.

Back to the WorkingWithCollections Class

12) Now modify the program to add the following boats and cars to the collection in the order shown:

    A blue boat with a price of $45,000
    A Volvo with a price of $42,000
    A BMW with a price of $125,000
    A red boat with a price of $82,000
    A white boat with a price of $64,500
    A Hummer with a price of $55,500 ✓

    Note that the boats are the same as before so that you need only add the lines for the cars.

13) Since the collection will have both **Boat** and **Car** objects, you must modify the collection **vehicle** to be a generic collection.

14) What is the type of each object as it is retrieve from the collection? Object ?

15) Modify your foreach loop as the objects in the collection are now type Object

16) What is the operator that can be used to determine the type of object that has been retrieved from the collection?

for (Object a : collection)

17) Using the **instanceof** operator, write the condition for an if statement to determine if the object retrieved from the collection is of type **Boat**.

if (a instanceof Car)

18) If the object is a **Boat** object, write out the boat information the same as before.

19) If the object is not of type Boat, test the object to determine if it is of type **Car.** Write out the car information in the following form:
`Car: maker= <car-maker>  price= <car-price>`

20) If the object is not of either class, print the message "Unknown object type".

21) Run your program until it successfully prints out all of the boats and cars.

22) Modify your program to calculate and print the sum of the price of all boats and the sum of the price of all cars.

    If you are unsure of the results of your program, ask your instructor or TA to verify that your program is working correctly.

23) Copy your files into another directory before making these changes.

    Add two more objects to the collection of type String – remember data type String is an object. Add one string as the first object in the collection and the second as the next to last object in the collection. Since these objects are not **Cars** or **Boats**, the message "Unknown object type" from above should be printed.

24) Copy your files into another directory before making these changes.

    After printing the message "Remove unknown object type", remove the object from the collection. To verify that the objects have been removed, copy your loop from above to print all of the objects in the collection and the totals a second time. The objects of unknown type should not be present.

When you complete all of the steps successfully and answer all of the questions, contact the TA or your instructor to check if your program(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 or teaching assistant to initial below so that you can complete it before the next class period.

_____Code not completed during lab time

You may then have the TA or your instructor verify your work at the start of work period in the next class. If you do not have a signature, then you can not receive any points for this assignment.