Academic Year	**2023**
Semester	☒ Fall ☐ Winter ☐ Summer
Course Code - Name	CSCI 2010U – Data Structures
Instructor	Dr. Razi Iqbal
Assessment	Exercise 7

Question 1 (Intermediate)

This exercise tests your knowledge of selection sort in Java.

Create a Java class `Student` which has `String name` and `int age` as the data members. Class should have at least 1 parameterized constructor and a `toString()` method that returns the name and age of the students (please refer to the expected output screenshot for more details).

Write a Java program that creates a class `Driver` which has a `main` method that calls `public static void selection_sort (Node head)` method that takes in the head of the LinkedList as a parameter and sorts the LinkedList by the age of the students in ascending order. Use selection sort to sort the LinkedList. You can use the following `main` method as a starting point in your `Driver` class. Do not forget to create a `Node` class.

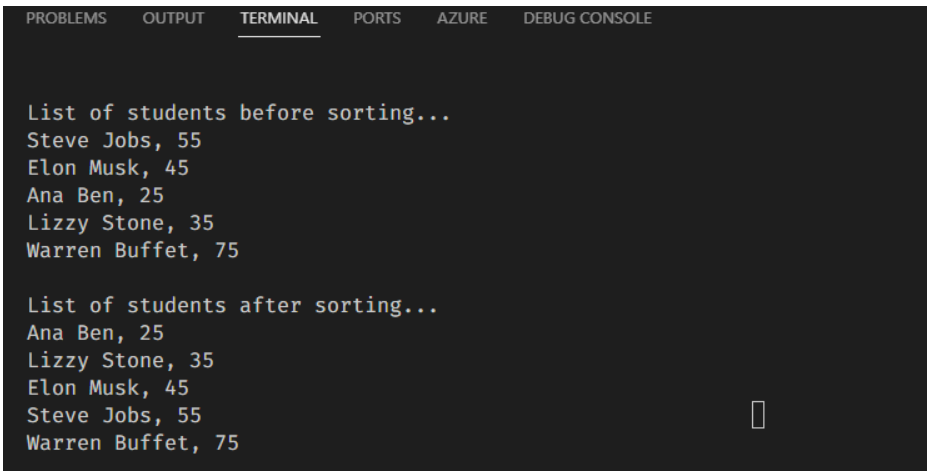
```
public static void main(String[] args)
    {
        Node head = new Node(new Student("Steve Jobs", 55));
        head.next = new Node(new Student("Elon Musk", 45));
        head.next.next = new Node(new Student("Ana Ben", 25));
        head.next.next.next = new Node(new Student("Lizzy Stone", 35));
        head.next.next.next.next = new Node(new Student("Warren Buffet", 75));

        System.out.println("\nList of students before sorting...");
        print(head);

        selection_sort(head);

        System.out.println("\nList of students after sorting...");
        print(head);
    }
```

Below is the screenshot of the expected output of this program:



Try to run the program using commands in terminal to get more practice.

Question 2 (Advanced)

This exercise tests your knowledge of insertion sort in Java.

Create a Java class `Student` which has `String name` and `int age` as the data members. Class should have at least 1 parameterized constructor and a `toString()` method that returns the name and age of the students (please refer to the expected output screenshot for more details).

Write a Java program that creates a class `Driver` which has a `main` method that calls `public static void insertion_sort (Node head)` method that takes in the head of the LinkedList as a parameter and sorts the LinkedList by the age of the students in ascending order. Use insertion sort to sort the LinkedList. You are most welcome to use helper functions if required to manage your code in different function, e.g., `insertion_sort`, `findMinValue`, `swapNodes` etc. You can use the following `main` method as a starting point in your `Driver` class. Do not forget to create a `Node` class.

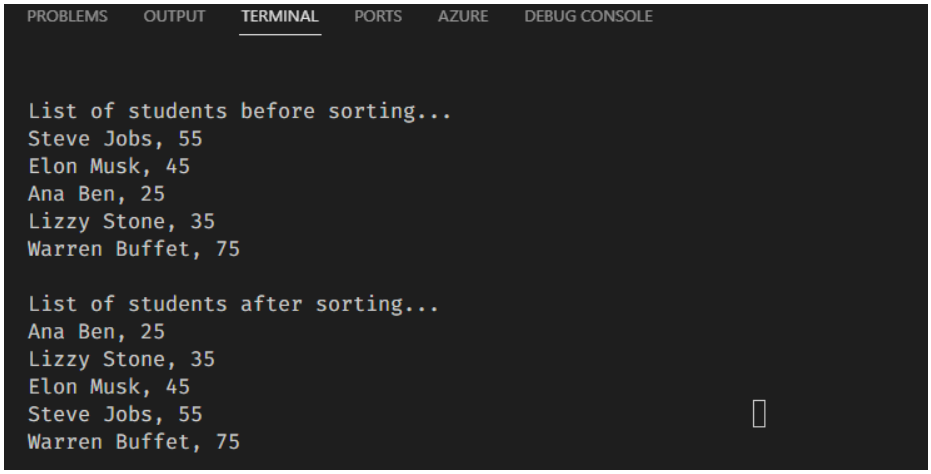
```
public static void main(String[] args)
    {
        Node head = new Node(new Student("Steve Jobs", 55));
        head.next = new Node(new Student("Elon Musk", 45));
        head.next.next = new Node(new Student("Ana Ben", 25));
        head.next.next.next = new Node(new Student("Lizzy Stone", 35));
        head.next.next.next.next = new Node(new Student("Warren Buffet", 75));

        System.out.println("\nList of students before sorting...");
        print(head);

        insertion_sort(head);

        System.out.println("\nList of students after sorting...");
        print(head);
    }
```

Below is the expected output:



Try to run the program using commands in terminal to get more practice.