Project Report:

Critical Thinking 6 – Sort Students

Alejandro Ricciardi

Colorado State University Global

CSC372: Programming 2

Professor: Dr. Vanessa Cooper

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This documentation is part of the Critical Thinking 6 Assignment from CSC372: Programming 2 at Colorado State University Global. This Project Report is an overview of the program's functionality and testing scenarios including console output screenshots. The program is coded in Java JDK-21; and is named Critical Thinking 6 (Sort Students). The program is composed of the Student class, SortingUtil class, and SortStudents which extends the Application class from the JavaFX library.

The Assignment Direction:

Option #1: **Storing an ArrayList**
Create a Java program that will store 10 student objects in an ArrayList, ArrayList<Student>. A student object consists of the following fields:

- int rollno
- String name
- String address

Implement two comparator classes to sort student objects by name and by rollno (roll number). Implement your own selection sort method and place your code in a separate Java source file. Do not use a sort method from the Java collections library.

Students must use appropriate version control for all programmatic assignments created. GIT repositories should be established and screen captures of repositories submitted with each assignment.

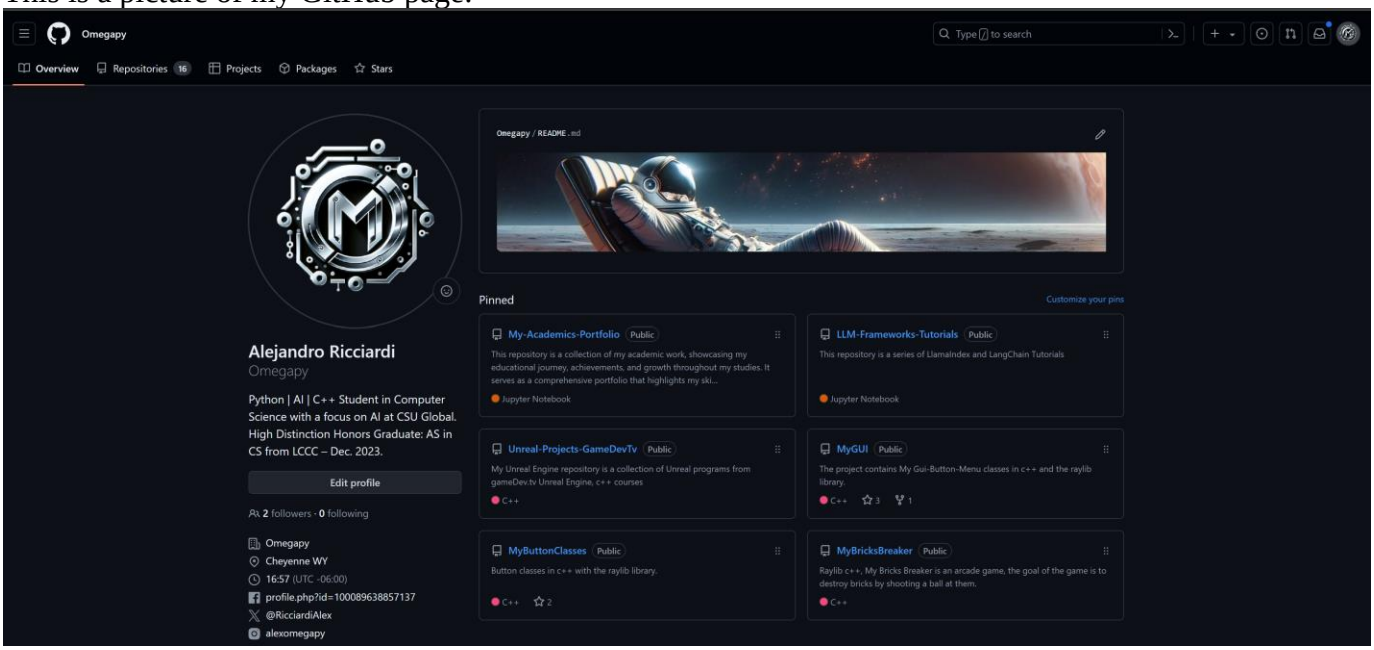
⚠️ **My notes:**

- I got permission from Dr. Cooper to use the JavaFX library to display the program outputs.
- I added my own icon to the window frame – logo.png
- **For the source code please see Student.java, SortingUtil.java, and SortStudents.java files.**

Program Description:
The Sort Students program sorts a list of students, allowing users to view and sort students by first name or roll number.
The program uses selection sort to sort the students.

Git Repository

This is a picture of my GitHub page:



I use GitHub as my Distributed Version Control System (DVCS), the following is a link to my GitHub, Omegapy.
My GitHub repository that is used to store this assignment is named My-Academics-Portfolio and the link to this specific assignment is: https://github.com/Omegapy/My-Academics-Portfolio/tree/main/Programming-2-CSC372/Critical-Thinking-6

Classes Description:

- **Student Class:**
  The class creates a student object with rollno (roll number), name, and address.

- **SortingUtil** Class
  The class is a utility class providing sorting algorithms for Student objects.
  In this version, the class only provides the selection sort algorithm.
  The class also contains the inner classes:
  - The NameComparator class implements the Comparator Interface to compare student names.
  - The RoolNoComparator class implements the Comparator Interface to compare student roll numbers.

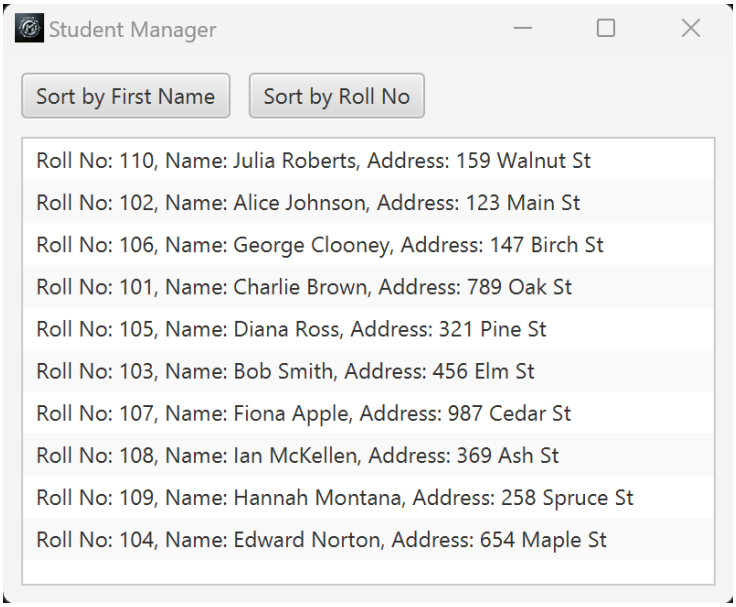
- **SortStudents Class:**
  The class sorts Students and displays results, extends JavaFX's Application class, and contains the main method.

Screenshot

Program Functionality

Figure 1

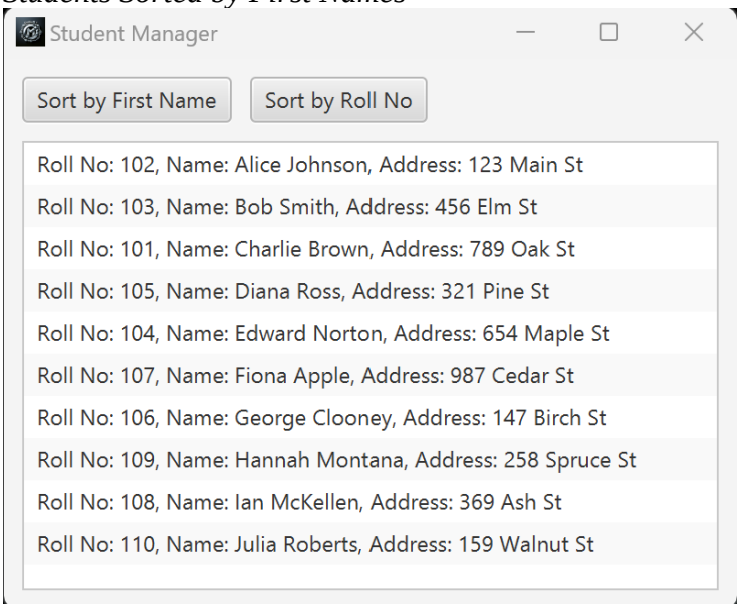
Welcome Window



Note: The students are not sorted.

Figure 2

Students Sorted by First Names



Note: The students are sorted by first names (names).

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Figure 3

Console Students Sorted by First Names Selection Sort Steps

```
-----------------------------------------------------
               Sorted by First Name
-----------------------------------------------------
-----------------------------------------------------
minIndex (i): 0
-----------------------------------------------------
i: 0, j: 1
minIndex (j): 1
-----------------------------------------------------
Swapping Index (i): 0 with index (j): 1
Swapping Object (i): Roll No: 110, Name: Julia Roberts, Address: 159 Walnut St
with Object (j): Roll No: 102, Name: Alice Johnson, Address: 123 Main St
-----------------------------------------------------
minIndex (i): 1
-----------------------------------------------------
i: 1, j: 2
minIndex (j): 2
-----------------------------------------------------
i: 1, j: 3
minIndex (j): 3
-----------------------------------------------------
i: 1, j: 5
minIndex (j): 5
-----------------------------------------------------
Swapping Index (i): 1 with index (j): 5
Swapping Object (i): Roll No: 110, Name: Julia Roberts, Address: 159 Walnut St
with Object (j): Roll No: 103, Name: Bob Smith, Address: 456 Elm St
-----------------------------------------------------
minIndex (i): 2
-----------------------------------------------------
i: 2, j: 3
minIndex (j): 3
-----------------------------------------------------
Swapping Index (i): 2 with index (j): 3
Swapping Object (i): Roll No: 106, Name: George Clooney, Address: 147 Birch St
with Object (j): Roll No: 101, Name: Charlie Brown, Address: 789 Oak St
-----------------------------------------------------
minIndex (i): 3
-----------------------------------------------------
i: 3, j: 4
minIndex (j): 4
-----------------------------------------------------
Swapping Index (i): 3 with index (j): 4
Swapping Object (i): Roll No: 106, Name: George Clooney, Address: 147 Birch St
with Object (j): Roll No: 105, Name: Diana Ross, Address: 321 Pine St
-----------------------------------------------------
minIndex (i): 4
-----------------------------------------------------
i: 4, j: 6
minIndex (j): 6
-----------------------------------------------------
```

```
i: 4, j: 9
minIndex (j): 9
-----------------------------------------------------
Swapping Index (i): 4 with index (j): 9
Swapping Object (i): Roll No: 106, Name: George Clooney, Address: 147 Birch St
with Object (j): Roll No: 104, Name: Edward Norton, Address: 654 Maple St
-----------------------------------------------------
minIndex (i): 5
-----------------------------------------------------
i: 5, j: 6
minIndex (j): 6
-----------------------------------------------------
Swapping Index (i): 5 with index (j): 6
Swapping Object (i): Roll No: 110, Name: Julia Roberts, Address: 159 Walnut St
with Object (j): Roll No: 107, Name: Fiona Apple, Address: 987 Cedar St
-----------------------------------------------------
minIndex (i): 6
-----------------------------------------------------
i: 6, j: 7
minIndex (j): 7
-----------------------------------------------------
i: 6, j: 8
minIndex (j): 8
-----------------------------------------------------
i: 6, j: 9
minIndex (j): 9
-----------------------------------------------------
Swapping Index (i): 6 with index (j): 9
Swapping Object (i): Roll No: 110, Name: Julia Roberts, Address: 159 Walnut St
with Object (j): Roll No: 106, Name: George Clooney, Address: 147 Birch St
-----------------------------------------------------
minIndex (i): 7
-----------------------------------------------------
i: 7, j: 8
minIndex (j): 8
-----------------------------------------------------
Swapping Index (i): 7 with index (j): 8
Swapping Object (i): Roll No: 108, Name: Ian McKellen, Address: 369 Ash St
with Object (j): Roll No: 109, Name: Hannah Montana, Address: 258 Spruce St
-----------------------------------------------------
minIndex (i): 8
```

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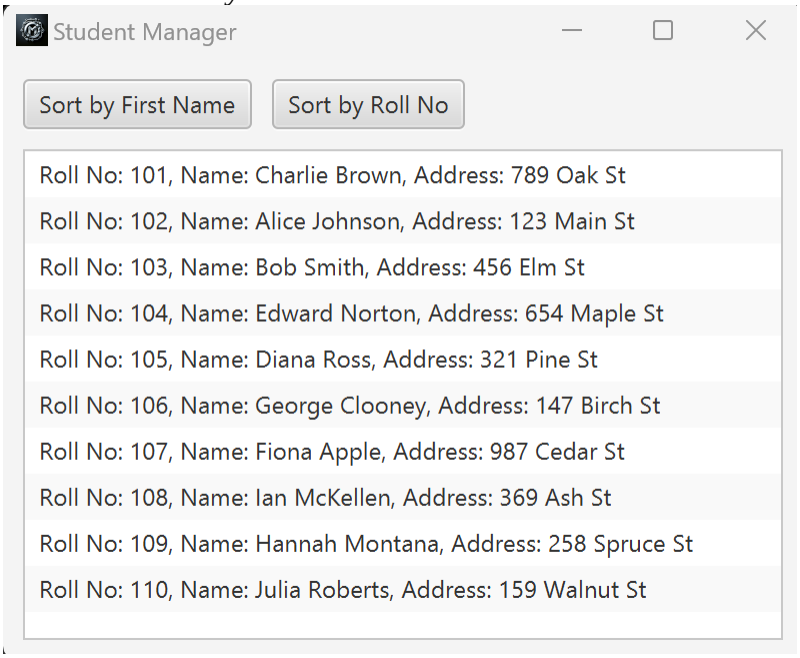
Figure 4

Students Sorted by Roll Number



Note: The students are sorted by roll numbers.

Figure 5

Console Students Sorted by Roll Number Selection Sort Steps

```
-----------------------------------------------------
               Sorted by Roll No
-----------------------------------------------------
-----------------------------------------------------
minIndex (i): 0
-----------------------------------------------------
i: 0, j: 2
minIndex (j): 2
-----------------------------------------------------
Swapping Index (i): 0 with index (j): 2
Swapping Object (i): Roll No: 102, Name: Alice Johnson, Address: 123 Main St
with Object (j): Roll No: 101, Name: Charlie Brown, Address: 789 Oak St
-----------------------------------------------------
minIndex (i): 1
-----------------------------------------------------
i: 1, j: 2
minIndex (j): 2
-----------------------------------------------------
Swapping Index (i): 1 with index (j): 2
Swapping Object (i): Roll No: 103, Name: Bob Smith, Address: 456 Elm St
with Object (j): Roll No: 102, Name: Alice Johnson, Address: 123 Main St
-----------------------------------------------------
minIndex (i): 2
-----------------------------------------------------
minIndex (i): 3
-----------------------------------------------------
```

```
i: 3, j: 4
minIndex (j): 4
-----------------------------------------------------
Swapping Index (i): 3 with index (j): 4
Swapping Object (i): Roll No: 105, Name: Diana Ross, Address: 321 Pine St
with Object (j): Roll No: 104, Name: Edward Norton, Address: 654 Maple St
-----------------------------------------------------
minIndex (i): 4
-----------------------------------------------------
minIndex (i): 5
-----------------------------------------------------
i: 5, j: 6
minIndex (j): 6
-----------------------------------------------------
Swapping Index (i): 5 with index (j): 6
Swapping Object (i): Roll No: 107, Name: Fiona Apple, Address: 987 Cedar St
with Object (j): Roll No: 106, Name: George Clooney, Address: 147 Birch St
-----------------------------------------------------
minIndex (i): 6
-----------------------------------------------------
minIndex (i): 7
-----------------------------------------------------
i: 7, j: 8
minIndex (j): 8
-----------------------------------------------------
Swapping Index (i): 7 with index (j): 8
Swapping Object (i): Roll No: 109, Name: Hannah Montana, Address: 258 Spruce St
with Object (j): Roll No: 108, Name: Ian McKellen, Address: 369 Ash St
-----------------------------------------------------
minIndex (i): 8
```

As shown in Figure 1 through Figure 3 the program runs without any issues displaying the correct outputs as expected.