Shri Ramdeobaba College of Engineering & Management Nagpur-13

Department of Computer Application

Session: 2023-2024

Submission for

Course Name: Design Analysis and Algorithm Lab

Course Code: MCP546

Name of the Student: Jayesh Lalit Nandanwar

Class Roll No: 26

Semester: MCA II semester

Shift: 2

Batch: 2

Under the Guidance of

Prof. Manda Ukey

Date of submission: 20/02/2024

Practical 2

Aim: Perform selection sort on all the three data sets which you have created in practical_0.

Display the time taken to sort the elements from the files in ascending order. Consider all the three files.

Compare the time taken for all these cases.

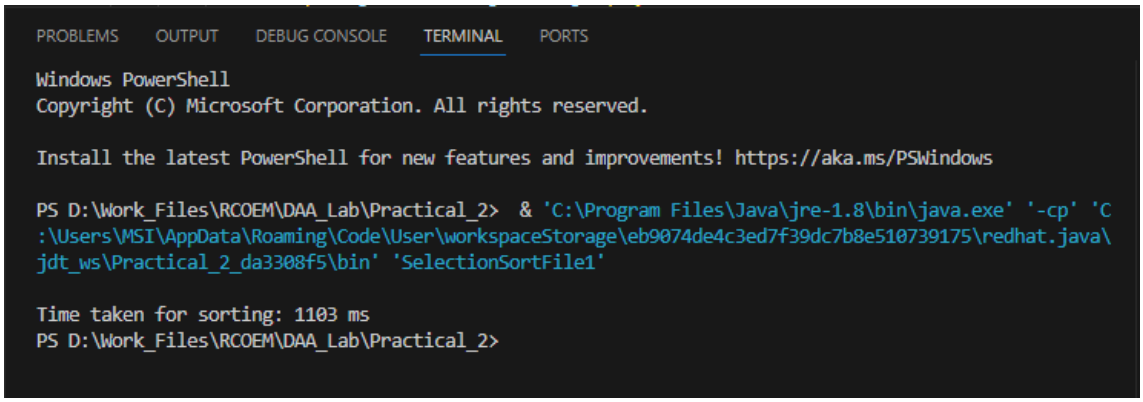
For file 1 (Sequential unrepeated numbers):

Code:

```
import java.io.FileReader;
import java.io.IOException;
import java.util.Scanner;

public class SelectionSortFile1 {
   public static void main(String[] args) throws IOException {
      Scanner scanner = new Scanner(System.in);
      FileReader f = new FileReader("./sequentialUnrepeatedNumbers.txt");

      Scanner fileScanner = new Scanner(f);
      int[] array = new int[100001]; // maximum of 100000 elements in the file
      int size = 0;

      while (fileScanner.hasNextInt()) {
         array[size++] = fileScanner.nextInt();
      }
      fileScanner.close();

      long start = System.currentTimeMillis();
      selectionSort(array, size);
      long finish = System.currentTimeMillis();
      long timeElapsed = finish - start;

      System.out.println("\nTime taken for sorting: " + timeElapsed + " ms");

      FileWriter writer = new
     FileWriter("./sequentialUnrepeatedNumbersSortedOutput.txt");
      for (int i = 0; i < size; i++) {
         writer.write(array[i]+"\n");
      }
      writer.close();

      scanner.close();
   }
```

```
public static void selectionSort(int[] arr, int n) {
    for (int i = 0; i < n - 1; i++) {
        int minIndex = i;
        for (int j = i + 1; j < n; j++) {
            if (arr[j] < arr[minIndex]) {
                minIndex = j;
            }
        }
        int temp = arr[minIndex];
        arr[minIndex] = arr[i];
        arr[i] = temp;
    }
}
```

Output:



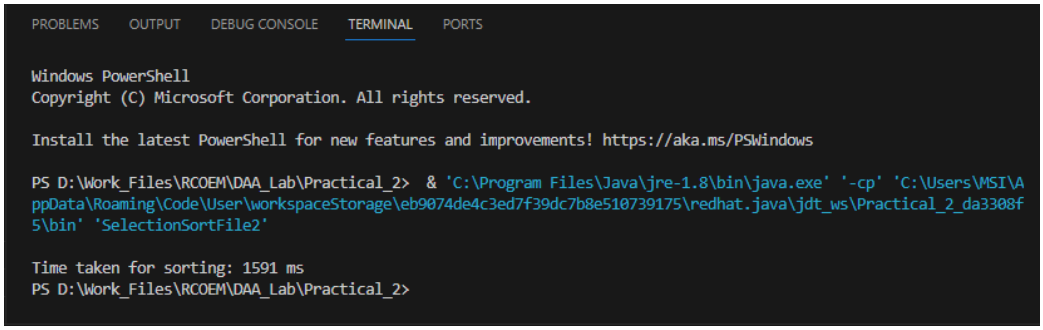
For file 2 (Random unrepeated numbers):

Code:

```
import java.io.FileReader;
import java.io.IOException;
import java.util.Scanner;

public class SelectionSortFile2 {
   public static void main(String[] args) throws IOException {
      Scanner scanner = new Scanner(System.in);
      FileReader f = new FileReader("./randomUnrepeatedNumbers.txt");

      Scanner fileScanner = new Scanner(f);
      int[] array = new int[100001]; // maximum of 100000 elements in the file
      int size = 0;

      while (fileScanner.hasNextInt()) {
         array[size++] = fileScanner.nextInt();
      }
      fileScanner.close();

      long start = System.currentTimeMillis();
      selectionSort(array, size);
      long finish = System.currentTimeMillis();
      long timeElapsed = finish - start;

      System.out.println("\nTime taken for sorting: " + timeElapsed + " ms");

      FileWriter writer = new
     FileWriter("./randomUrepeatedNumbersSortedOutput.txt");
      for (int i = 0; i < size; i++) {
         writer.write(array[i]+"\n");
      }
      writer.close();

      scanner.close();
   }

   public static void selectionSort(int[] arr, int n) {
      for (int i = 0; i < n - 1; i++) {
         int minIndex = i;
         for (int j = i + 1; j < n; j++) {
            if (arr[j] < arr[minIndex]) {
               minIndex = j;
            }
         }
         int temp = arr[minIndex];
         arr[minIndex] = arr[i];
```

```
            arr[i] = temp;
        }
    }
```

Output:



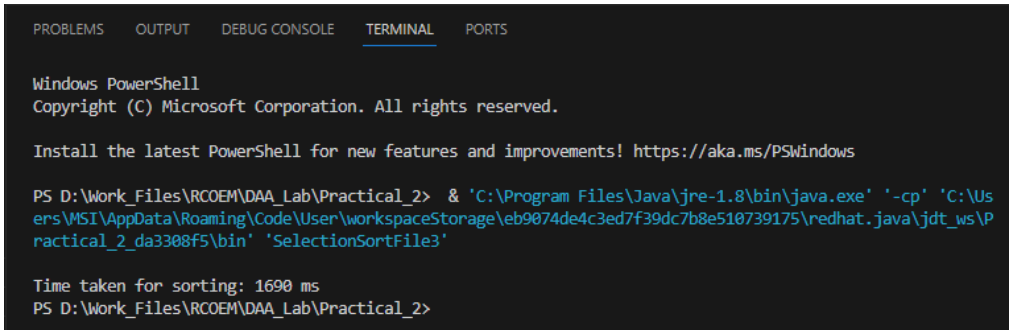
For file 3 (Random repeated numbers):

Code:

```
import java.io.FileReader;
import java.io.IOException;
import java.util.Scanner;

public class SelectionSortFile3 {
   public static void main(String[] args) throws IOException {
      Scanner scanner = new Scanner(System.in);
      FileReader f = new FileReader("./randomRepeatedNumbers.txt");

      Scanner fileScanner = new Scanner(f);
      int[] array = new int[100001]; // maximum of 100000 elements in the file
      int size = 0;

      while (fileScanner.hasNextInt()) {
         array[size++] = fileScanner.nextInt();
      }
      fileScanner.close();

      long start = System.currentTimeMillis();
      selectionSort(array, size);
      long finish = System.currentTimeMillis();
      long timeElapsed = finish - start;

      System.out.println("\nTime taken for sorting: " + timeElapsed + " ms");

      FileWriter writer = new
      FileWriter("./randomRepeatedNumbersSortedOutput.txt");
      for (int i = 0; i < size; i++) {
         writer.write(array[i]+"\n");
      }
      writer.close();

      scanner.close();
   }

   public static void selectionSort(int[] arr, int n) {
      for (int i = 0; i < n - 1; i++) {
         int minIndex = i;
         for (int j = i + 1; j < n; j++) {
            if (arr[j] < arr[minIndex]) {
               minIndex = j;
            }
         }
         int temp = arr[minIndex];
         arr[minIndex] = arr[i];
```

```
            arr[i] = temp;
        }
    }
```

Output:



Comparison between time taken:

File	File 1	File 2	File 3
Data Type	Sequential Unrepeated Numbers	Random Unrepeated Numbers	Random Repeated Numbers
Time Taken (ms)	1103	1591	1690

Observations:

- Time taken to sort Random Repeated Numbers is maximum (1690 ms)
- Time taken to sort Sequential Unrepeated Numbers is minimum (1103 ms)
- Time taken for :

  Sequential Unrepeated Numbers < Random Unrepeated Numbers < Random Repeated Numbers