CSE2001 (Data Structures & Algorithms) Lab-7

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20BCD7138

1. Write a program to implement the quicksort.

```
/**
Name: KHAN MOHD OWAIS RAZA
ID : 20BCD7138
Course: Data Structures & Algorithm
Code: CSE2001
Slot: L19+L20
**/
/* Lab-7 (22-10-2022)*/
/* Java code to implement quicksort */
package CSE2001_Lab7_20BCD7138;
import java.io.BufferedReader;
import java.io.InputStreamReader;
import java.util.Arrays;
import java.util.Random;
public class Question1 {
static int partition(int[] array, int low, int high) {
int j, temp, i = low + 1;
Random random = new Random();
int x = random.nextInt(high - low) + low;
temp = array[low];
array[low] = array[x];
array[x] = temp;
for (j = low + 1; j <= high; j++) {
if (array[j] <= array[low] && j != i) {
temp = array[j];
array[j] = array[i];
array[i++] = temp;
} else if (array[j] <= array[low]) {
i++;
}}
temp = array[i - 1];
array[i - 1] = array[low];
array[low] = temp;
return i - 1;
}
static void quickSort(int[] array,int low,int high){
if(low<high){
int mid = partition(array,low,high);
quickSort(array,low,mid-1);
quickSort(array,mid+1,high);
}}
public static void main(String[] args) {
BufferedReader br = new BufferedReader(new InputStreamReader(System.in));
int size;
System.out.println("Enter size of the array:");
try{
size = Integer.parseInt(br.readLine());
```

```
} catch (Exception e) {
System.out.println("Invalid input");
return;
}
int[] array = new int[size];
System.out.println("Enter array elements:");
int i;
for (i = 0; i < array.length; i++) {
try {
array[i] = Integer.parseInt(br.readLine());
} catch (Exception e) {
System.out.println("Error!!");
}}
System.out.println("Initial array :");
System.out.println(Arrays.toString(array));
quickSort(array,0,array.length-1);
System.out.println("Sorted array :");
System.out.println(Arrays.toString(array));
}}
```

```
<terminated> Question1 (3) [Java Application] C:\Program Files\Java\jdk-17.0.1\bin\javaw.exe
Enter size of the array:
10
Enter array elements:
1
2
3
4
5
6
7
8
9
10
Initial array :
[1, 2, 3, 4, 5, 6, 7, 8, 9, 10]
Sorted array :
[1, 2, 3, 4, 5, 6, 7, 8, 9, 10]
```

2. Write a program that takes the details of Students (name, roll number, address, CGPA) and sort it in a non-decreasing order using Selection sort based on CGPA.

```
/**
Name: KHAN MOHD OWAIS RAZA
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Code: CSE2001
Slot: L19+L20
**/
/* Lab-7 (22-10-2022)*/
/*Write a program that takes the details of Students
(name, roll number, address, CGPA) and sort it in a
non-decreasing order using Selection sort based on CGPA.*/
#include<stdio.h>
struct student{
char name[30];
int rollNumber;
float cgpa;
};
int main(){
struct student s[20], temp;
int i,j,n;
printf("Enter number of students:\n");
scanf("%d",&n);
for(i=0;i< n;i++){
printf("Enter name, roll number and CGPA of student:\n");
scanf("%s%d%f",s[i].name, &s[i].rollNumber, &s[i].cgpa);
}
for(i=0;i< n-1;i++){
for(j=i+1;j< n;j++){
if(s[i].cgpa>s[j].cgpa){
temp = s[i];
s[i] = s[j];
s[j] = temp;
}}}
printf("------------------");
printf("Student details:\n");
for(i=0;i< n;i++){
printf("Name: %s\n", s[i].name);
printf("Roll: %d\n", s[i].rollNumber);
printf("CGPA: %0.2f\n\n", s[i].cgpa);
}
return 0;
}
```
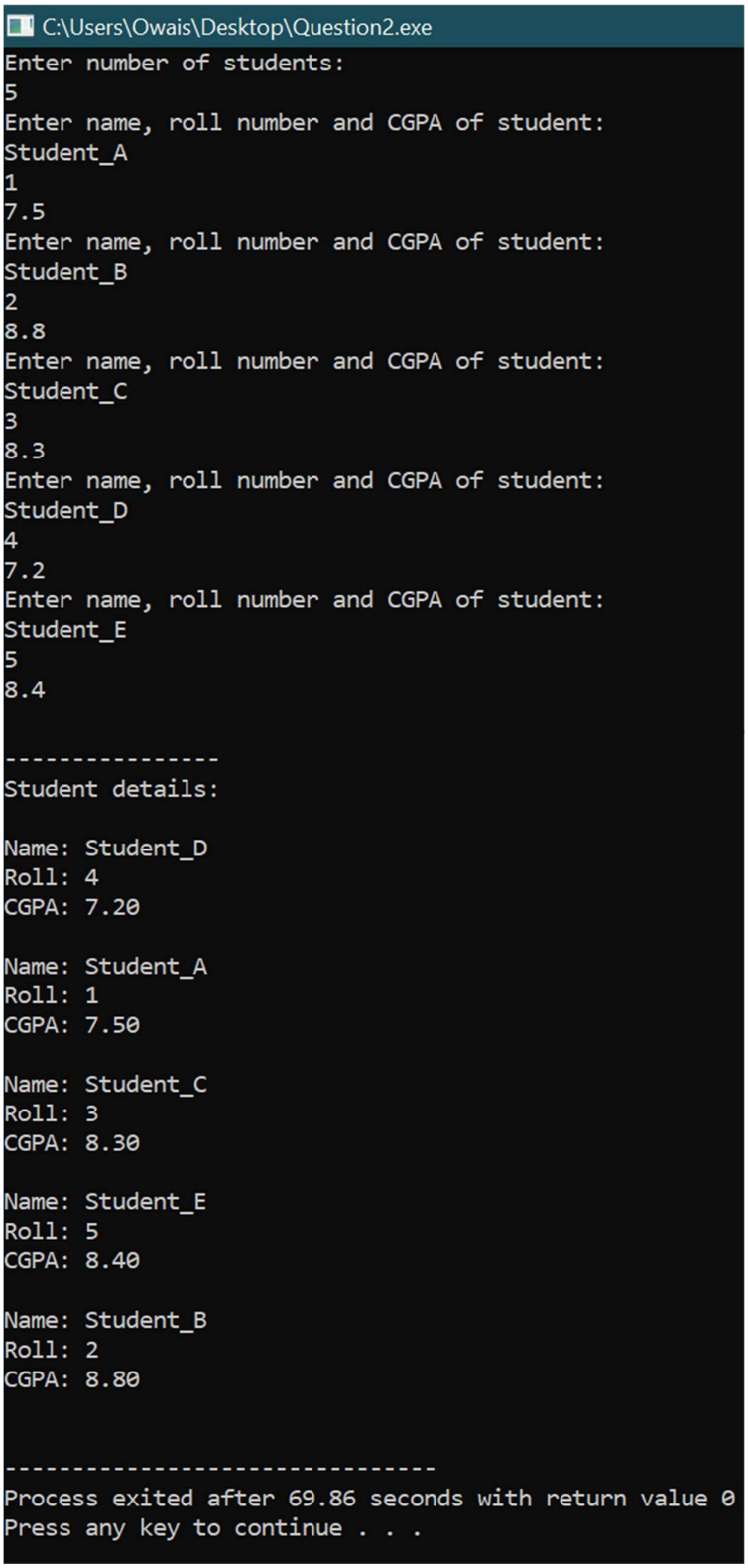

Question2.c

```c
/**
Name: KHAN MOHD OWAIS RAZA
ID : 20BCD7138
Course: Data Structures & Algorithm
Code: CSE2001
Slot: L19+L20
**/
/* Lab-7 (22-10-2022)*/
/*Write a program that takes the details of Students
(name, roll number, address, CGPA) and sort it in a
non-decreasing order using Selection sort based on CGPA.*/
#include<stdio.h>
struct student{
char name[30];
int rollNumber;
float cgpa;
};
int main(){
struct student s[20], temp;
int i,j,n;
printf("Enter number of students:\n");
scanf("%d",&n);
for(i=0;i< n;i++){
printf("Enter name, roll number and CGPA of student:\n");
scanf("%s%d%f",s[i].name, &s[i].rollNumber, &s[i].cgpa);
}
for(i=0;i< n-1;i++){
for(j=i+1;j< n;j++){
if(s[i].cgpa>s[j].cgpa){
temp = s[i];
s[i] = s[j];
s[j] = temp;
}}}
printf(" \n");
printf("----------------\n");
printf("Student details:\n");
printf(" \n");
for(i=0;i< n;i++){
printf("Name: %s\n", s[i].name);
printf("Roll: %d\n", s[i].rollNumber);
printf("CGPA: %0.2f\n\n", s[i].cgpa);
}
return 0;
}
```


C:\Users\Owais\Desktop\Question2.exe
Enter number of students:
5
Enter name, roll number and CGPA of student:
Student_A
1
7.5
Enter name, roll number and CGPA of student:
Student_B
2
8.8
Enter name, roll number and CGPA of student:
Student_C
3
8.3
Enter name, roll number and CGPA of student:
Student_D
4
7.2
Enter name, roll number and CGPA of student:
Student_E
5
8.4

Student details:
Name: Student_D
Roll: 4
CGPA: 7.20
Name: Student_A
Roll: 1
CGPA: 7.50
Name: Student_C
Roll: 3
CGPA: 8.30
Name: Student_E
Roll: 5
CGPA: 8.40
Name: Student_B
Roll: 2
CGPA: 8.80

Process exited after 69.86 seconds with return value 0
Press any key to continue . . .

3. Write a Program to read N individual characters and display them in alphabetical order using merge sort.

```
/**
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Code: CSE2001
Slot: L19+L20
**/
/* Lab-7 (22-10-2022)*/
/* Write a Program to read N individual characters and
display them in alphabetical order using merge sort.*/
#include <stdio.h>
#include <string.h>
void main(){
char characters[10][8], tcharacters[10][8], temp[8];
int i, j, n;
printf("Enter the value of N \n");
scanf("%d", &n);
printf("Enter the %d characters \n", n);
for (i = 0; i < n; i++) {
scanf("%s", characters[i]);
strcpy(tcharacters[i], characters[i]);
}
for (i = 0; i < n - 1 ; i++){
for (j = i + 1; j < n; j++){
if (strcmp(characters[i], characters[j]) > 0) {
strcpy(temp, characters[i]);
strcpy(characters[i], characters[j]);
strcpy(characters[j], temp);
}}}
printf("\n---------------------------");
printf("\nInput Names    Sorted names");
printf("\n---------------------------\n");
for (i = 0; i < n; i++){
printf("%s\t\t%s\n", tcharacters[i], characters[i]);
}}
```

Question3.c

```c
#include <stdio.h>
#include <string.h>
void main(){
char characters[10][8], tcharacters[10][8], temp[8];
int i, j, n;
printf("Enter the value of N \n");
scanf("%d", &n);
printf("Enter the %d characters \n", n);
for (i = 0; i < n; i++) {
scanf("%s", characters[i]);
strcpy(tcharacters[i], characters[i]);
}
for (i = 0; i < n - 1 ; i++){
for (j = i + 1; j < n; j++){
if (strcmp(characters[i], characters[j]) > 0) {
strcpy(temp, characters[i]);
strcpy(characters[i], characters[j]);
strcpy(characters[j], temp);
}}}
printf("\n---------------------------");
printf("\nInput Names    Sorted names");
printf("\n---------------------------\n");
for (i = 0; i < n; i++){
printf("%s\t\t%s\n", tcharacters[i], characters[i]);
}}
```

```
C:\Users\Owais\Desktop\Question3.exe
Enter the value of N
5
Enter the 5 characters
pushups
curls
cycling
pullups
running

---------------------------
Input Names    Sorted names
---------------------------
pushups         curls
curls           cycling
cycling         pullups
pullups         pushups
running         running

--------------------------------
Process exited after 15.68 seconds with return value 5
Press any key to continue . . .
```