

Design and Analysis of Algorithms

Week-2 Assignment

1. Bubble Sort

PROGRAM:

```
#include <stdio.h>
int main() {
    int n;
    printf("ENTER NO.OF.ELEMENTS:");
    scanf("%d",&n);
    int arr[n];
    printf("ENTER THE VALUES:");
    for(int i=0;i < n;i++){
        scanf("%d",&arr[i]);
    }
    for (int i = 0; i < n - 1; i++) {
        for (int j = 0; j < n - i - 1; j++) {
            if (arr[j] > arr[j + 1]) {
                int temp = arr[j];
                arr[j] = arr[j + 1];
                arr[j + 1] = temp;
            }
        }
    }
    printf("Sorted array: ");
    for (int i = 0; i < n; i++) {
        printf("\t%d\t",arr[i]);
    }
    return 0;
}
```

```
amma@amma16: ~/Documents/CH.SC.U4CSE24219/DAA
amma@amma16:~$ cd Documents/CH.SC.U4CSE24219/DAA
amma@amma16:~/Documents/CH.SC.U4CSE24219/DAA$ gcc bubblesort.c -o bubblesort
amma@amma16:~/Documents/CH.SC.U4CSE24219/DAA$ ./bubblesort
ENTER NO.OF.ELEMENTS:5
ENTER THE VALUES:123
21
1234
112
890
Sorted array: 21 , 112 , 123 , 890 , 1234 , amma@amma16
```

2. Insertion Sort

PROGRAM:

```
#include <stdio.h>

int main() {
    int n;

    printf("ENTER NO.OF ELEMENTS");

    scanf("%d",&n);

    int arr[n];

    printf("ENTER THE ELEMENTS:");

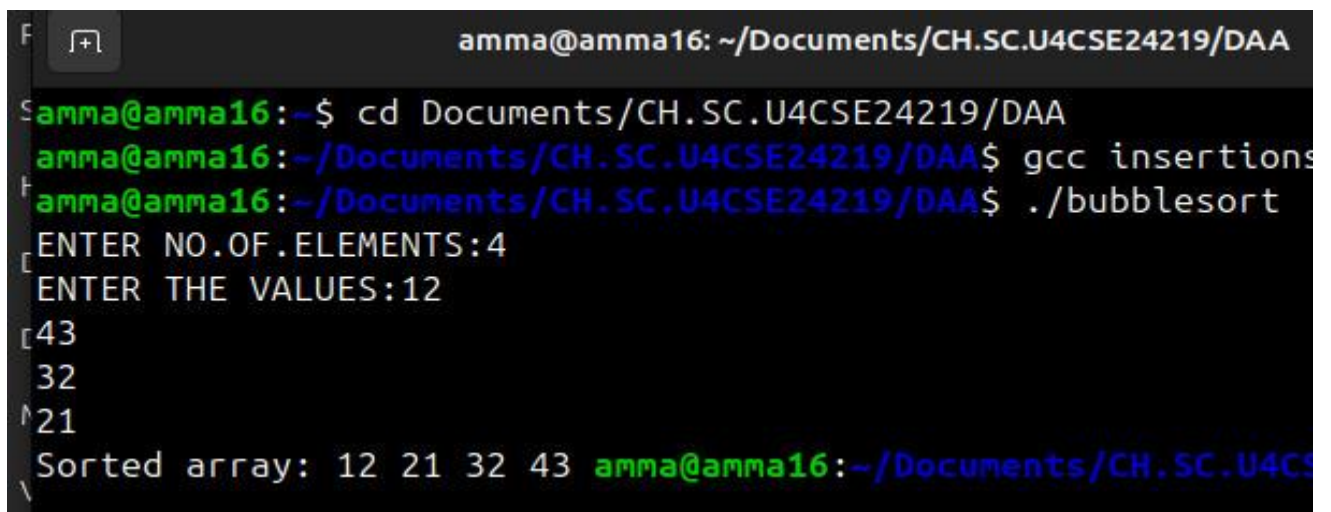
    for(int i=0; i <n;i++){
        scanf("%d",&arr[i]);
    }

    for (int i = 1; i < n; i++) {
        int key = arr[i];
        int j = i - 1;
        while (j >= 0 && arr[j] > key) {
            arr[j + 1] = arr[j];
```

```

        j--;
    }
    arr[j + 1] = key;
}
printf("Sorted array: ");
for (int i = 0; i < n; i++) {
    printf("%d ", arr[i]);
}
return 0;
}

```



A terminal window screenshot showing the execution of a bubble sort program. The user is in the directory ~/Documents/CH.SC.U4CSE24219/DAA. They compile the program with gcc and run it with ./bubblesort. The program prompts for the number of elements (4) and the values (12, 21, 32, 43). It then outputs the sorted array: 12 21 32 43.

```

amma@amma16: ~/Documents/CH.SC.U4CSE24219/DAA
amma@amma16:~$ cd Documents/CH.SC.U4CSE24219/DAA
amma@amma16:~/Documents/CH.SC.U4CSE24219/DAA$ gcc insertions
amma@amma16:~/Documents/CH.SC.U4CSE24219/DAA$ ./bubblesort
ENTER NO.OF.ELEMENTS:4
ENTER THE VALUES:12
43
32
21
Sorted array: 12 21 32 43 amma@amma16:~/Documents/CH.SC.U4C

```

3.Selection Sort

PROGRAM:

```
#include <stdio.h>

int main() {
    int n;

    printf("ENTER NO. OF ELEMENTS: ");
    scanf("%d", &n);

    int arr[n];

    printf("ENTER THE VALUES: ");
    for (int i = 0; i < n; i++) {
        scanf("%d", &arr[i]);
    }

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

```

    }
    printf("Sorted array: ");
    for (int i = 0; i < n; i++) {
        printf("%d ", arr[i]);
    }
    return 0;
}

```

```

amma@amma16:~/Documents/CH.SC.U4CSE24219/DAA$ gcc selectionsort.c -o bubblesort
amma@amma16:~/Documents/CH.SC.U4CSE24219/DAA$ ./bubblesort
ENTER NO. OF ELEMENTS: 8
ENTER THE VALUES: 12
87
56
29
95
34
49
6
Sorted array: 6 12 29 34 49 56 87 95 amma@amma16:~/Documents/CH.SC.U4CSE24219/DAA$

```

4. Bucket Sort

PROGRAM:

```
#include <stdio.h>
```

```
int main() {  
    int n;  
    printf("ENTER NO. OF ELEMENTS: ");  
    scanf("%d", &n);  
    int arr[n];  
    printf("ENTER THE VALUES (0 to 100): ");  
    for (int i = 0; i < n; i++) {  
        scanf("%d", &arr[i]);  
    }  
    int bucket[101] = {0};  
    for (int i = 0; i < n; i++) {  
        bucket[arr[i]]++;  
    }  
    printf("Sorted array: ");  
    for (int i = 0; i <= 100; i++) {  
        while (bucket[i] > 0) {  
            printf("%d ", i);  
            bucket[i]--;  
        }  
    }  
    return 0;  
}
```

```

amma@amma16:~/Documents/CH.SC.U4CSE24219/DAA$ gcc bucketsort.c -o bubblesort
amma@amma16:~/Documents/CH.SC.U4CSE24219/DAA$ ./bubblesort
ENTER NO. OF ELEMENTS: 9
ENTER THE VALUES (0 to 100): 23
34
45
98
76
54
34
10
4
Sorted array: 4 10 23 34 34 45 54 76 98 amma@amma16:~/Documents/CH.SC.U4CSE24219/DAA$

```

5.Heap Sort

PROGRAM:

```

#include<stdio.h>

int main() {
    int n;

    printf("ENTER NO. OF ELEMENTS: ");
    scanf("%d", &n);

    int arr[n];

    printf("ENTER THE VALUES: ");
    for (int i = 0; i < n; i++) {
        scanf("%d", &arr[i]);
    }

    for (int i = 1; i < n; i++) {
        int child = i;
        while (child > 0) {
            int parent = (child - 1) / 2;

```

```

    if (arr[parent] < arr[child]) {
        int temp = arr[parent];
        arr[parent] = arr[child];
        arr[child] = temp;
        child = parent;
    } else {
        break;
    }
}

for (int i = n - 1; i > 0; i--) {
    int temp = arr[0];
    arr[0] = arr[i];
    arr[i] = temp;
    int parent = 0;
    while (1) {
        int left = 2 * parent + 1;
        int right = 2 * parent + 2;
        int largest = parent;
        if (left < i && arr[left] > arr[largest])
            largest = left;
        if (right < i && arr[right] > arr[largest])

```



```
        largest = right;
    if (largest != parent) {
        int temp2 = arr[parent];
        arr[parent] = arr[largest];
        arr[largest] = temp2;
        parent = largest;
    } else {
        break;
    }
}

}

printf("Sorted array: ");
for (int i = 0; i < n; i++) {
    printf("%d ", arr[i]);
}

return 0;
}
```

```
anna@anna16:~/Documents/CH.SC.U4CSE24219/DAA$ gcc heapsort.c -o bubblesort
anna@anna16:~/Documents/CH.SC.U4CSE24219/DAA$ ./bubblesort
ENTER NO. OF ELEMENTS: 12
ENTER THE VALUES: 123
23
3
871
87
71
81
527
52
27
57
729
Sorted array: 3 23 27 52 57 71 81 87 123 527 729 871 anna@anna16:~/Documents
```

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