LAB REPORT

CSE 114 : Data Structure and Algorithms Sessional

PREPARED BY

Mehrin Farzana
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SUPERVISED BY

Suman Saha
Lecturer
Department of IRE, BDU

BANGABANDHU SHEIKH MUJIBUR RAHMAN DIGITAL UNIVERSITY

(BDU)

List of Problems

1. Quick sort.

2. Heap sort.

Problem No.: 01

Problem Statement:

Quick sort.

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Code:

```
#include <stdio.h>

void quick_sort(int *a, int lb, int ub){
   if (lb>ub) return;

   int pivot = a[lb];
   int start = lb, end = ub;

   for(start; start<end; start++){
      if(a[start]>pivot){
         if(a[end]<pivot){
            int temp = a[end];
            a[end] = a[start];
            a[start] = temp;
         }
         end--;
         start--;
      }
   }
   if(a[end]>pivot){
      end--;
  int temp = a[end];
   a[end] = a[lb];
   a[lb] = temp;
   }

   else if(a[end]<pivot){
  int temp = a[end];
   a[end] = a[lb];
   a[lb] = temp;

   }
   quick_sort(a,lb,end-1);
   quick_sort(a,end+1,ub);
}
```

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

    quick_sort(a,0,n-1);

    for(int i=0; i<n; i++)
    printf("%d ", a[i]);

    return 0;
}
```

Output:

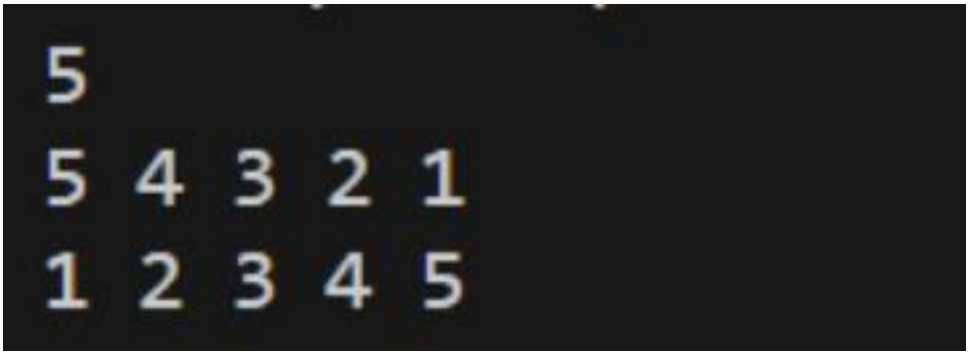

Fig 1.1: Output on console for case 1.

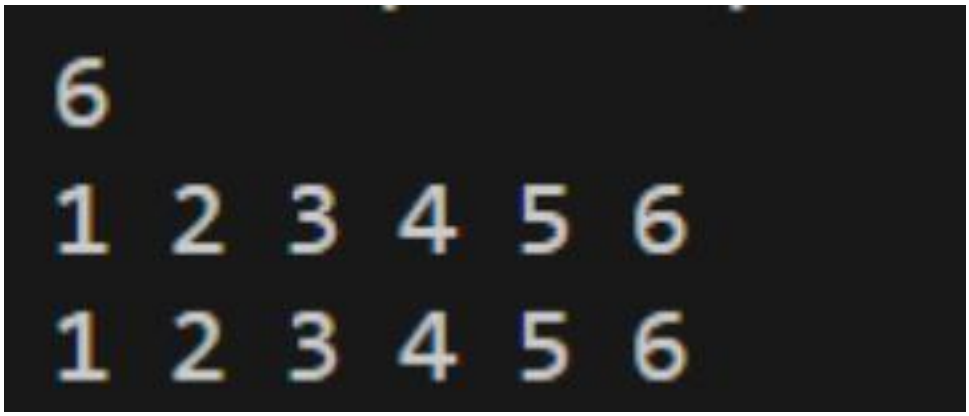

Fig 1.2: Output on console for case 2.

Fig 1.3: Output on console for case 3.

Problem No.: 02

Problem Statement:

Heap sort.

.

Code:

```
#include <stdio.h>

void swap(int* a, int* b)
{
	int temp = *a;
	*a = *b;
	*b = temp;
}

void heapify(int arr[], int N, int i)
{
	int largest = i;

	int left = 2 * i + 1;

	int right = 2 * i + 2;

	if (left < N && arr[left] > arr[largest])

		largest = left;

	if (right < N && arr[right] > arr[largest])

		largest = right;

	if (largest != i) {

		swap(&arr[i], &arr[largest]);

		heapify(arr, N, largest);
	}
}

void heap_sort(int arr[], int N)
{
```

```
        for (int i = N / 2 - 1; i >= 0; i--)

                heapify(arr, N, i);

        for (int i = N - 1; i >= 0; i--) {

                swap(&arr[0], &arr[i]);
                heapify(arr, i, 0);
        }
}

void printArray(int arr[], int N)
{
        for (int i = 0; i < N; i++)
                printf("%d ", arr[i]);
        printf("\n");
}

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

   heap_sort(a,n);

   for(int i=0; i<n; i++)
      printf("%d ", a[i]);

   return 0;
}
```

Output:

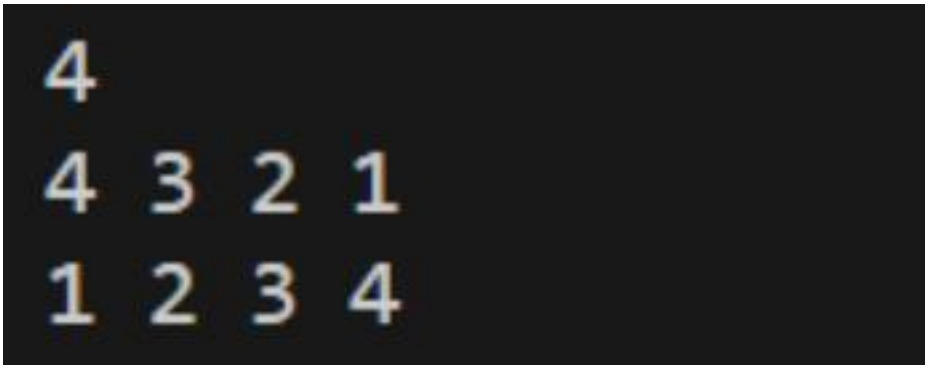

Fig 1.1: Output on console for case 1.

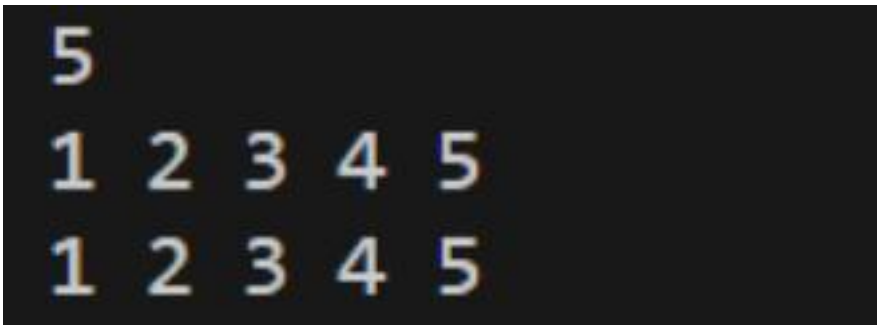

Fig 1.2: Output on console for case 2.

Fig 1.3: Output on console for case 3.