Lab Programs

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CSE-‘H’

1. Write a program for the Insertion sort algorithm.

/\* C program for Insertion Sort \*/

#include <stdio.h>

int main()

{

int n, i, j, temp;

int arr[64];

printf("Enter number of elements\n");

scanf("%d", &n);

printf("Enter %d integers\n", n);

for (i = 0; i < n; i++)

{

scanf("%d", &arr[i]);

}

for (i = 1 ; i <= n - 1; i++)

{

j = i;

while ( j > 0 && arr[j-1] > arr[j])

{

temp = arr[j];

arr[j] = arr[j-1];

arr[j-1] = temp;

j--;

}

}

printf("Sorted list in ascending order:\n");

for (i = 0; i <= n - 1; i++)

{

printf(" %d ", arr[i]);

}

return 0;

}

Output1

Enter number of elements

7

Enter the 7 integers

25 32 14 5 6 87 96

Sorted list in ascending order:

5 6 14 25 32 87 96

2. Write a program for the Selection sort algorithm.

/\* C program for Selection Sort \*/

#include<stdio.h>

int main()

{

int i, j, count, temp, number[25];

printf("Enter the number of elements\n");

scanf("%d",&count);

printf("Enter %d elements:\n", count);

for(i=0;i<count;i++)

scanf("%d",&number[i]);

for(i=0;i<count;i++){

for(j=i+1;j<count;j++){

if(number[i]>number[j]){

temp=number[i];

number[i]=number[j];

number[j]=temp;

}

}

}

printf("Sorted elements is:\n");

for(i=0;i<count;i++)

printf(" %d",number[i]);

return 0;

}

Output2

Enter the number of elements

8

Enter 8 elements:

11 25 85 3 47 56 20 5

Sorted elements is:

3 5 11 20 25 47 56 85

3. Write a program for Bubble sort algorithm.

/\* C program for Bubble Sort \*/

#include <stdio.h>

void bubble\_sort(int a[], int n)

{

int i = 0, j = 0, tmp;

for (i = 0; i < n; i++){

for (j = 0; j < n - i - 1; j++){

if (a[j] > a[j + 1]){

tmp = a[j];

a[j] = a[j + 1];

a[j + 1] = tmp;

}

}

}

}

int main()

{

int a[100], n, i, d, swap;

printf("Enter number of elements in the array:\n");

scanf("%d", &n);

printf("Enter %d integers:\n", n);

for (i = 0; i < n; i++)

scanf("%d", &a[i]);

bubble\_sort(a, n);

printf("The sorted order of this bubble sort is:\n");

for (i = 0; i < n; i++)

printf("%d\n", a[i]);

return 0;

}

Output3

Enter the number of elements in the array:

6

Enter 6 elements:

54 85 6 2 47 8

The sorted order of this bubble sort is:

2 6 8 47 54 85

4. Write a program for the Merge sort algorithm.

/\* C program for Merge Sort \*/

#include<stdlib.h>

#include<stdio.h>

void merge(int arr[], int l, int m, int r)

{

int i, j, k;

int n1 = m - l + 1;

int n2 = r - m;

/\* create temp arrays \*/

int L[n1], R[n2];

/\* Copy data to temp arrays L[] and R[] \*/

for (i = 0; i < n1; i++)

L[i] = arr[l + i];

for (j = 0; j < n2; j++)

R[j] = arr[m + 1+ j];

/\* Merge the temp arrays back into arr[l..r]\*/

i = 0;

j = 0;

k = l;

while (i < n1 && j < n2)

{

if (L[i] <= R[j])

{

arr[k] = L[i];

i++;

}

else

{

arr[k] = R[j];

j++;

}

k++;

}

while (i < n1)

{

arr[k] = L[i];

i++;

k++;

}

while (j < n2)

{

arr[k] = R[j];

j++;

k++;

}

}

void mergeSort(int arr[], int l, int r)

{

if (l < r)

{

int m = l+(r-l)/2;

mergeSort(arr, l, m);

mergeSort(arr, m+1, r);

merge(arr, l, m, r);

}

}

void printArray(int A[], int size)

{

int i;

for (i=0; i < size; i++)

printf("%d ", A[i]);

printf("\n");

}

int main()

{

int arr[] = {54,6,25,35,12,45,30};

int arr\_size = sizeof(arr)/sizeof(arr[0]);

printf("The array is given as \n");

printArray(arr, arr\_size);

mergeSort(arr, 0, arr\_size - 1);

printf("\nSorted array is \n");

printArray(arr, arr\_size);

return 0;

}

Output4

The array is given as

54 6 25 35 15 45 30

Sorted array is

6 12 25 30 35 45 54

5. Write a program for the Heap sort algorithm.

/\* C Program to sort an array based on heap sort algorithm\*/

#include <stdio.h>

void main()

{

int heap[10], n, i, j, c, root, temp;

printf("Enter number of elements:\n");

scanf("%d", &n);

printf("Enter %d elements:\n");

for (i = 0; i < n; i++)

scanf("%d", &heap[i]);

for (i = 1; i < n; i++)

{

c = i;

do

{

root = (c - 1) / 2;

if (heap[root] < heap[c])

{

temp = heap[root];

heap[root] = heap[c];

heap[c] = temp;

}

c = root;

} while (c != 0);

}

printf("Heap array:\n");

for (i = 0; i < n; i++)

printf("%d\t ", heap[i]);

for (j = n - 1; j >= 0; j--)

{

temp = heap[0];

heap[0] = heap[j];

heap[j] = temp;

root = 0;

do

{

c = 2 \* root + 1;

if ((heap[c] < heap[c + 1]) && c < j-1)

c++;

if (heap[root]<heap[c] && c<j)

{

temp = heap[root];

heap[root] = heap[c];

heap[c] = temp;

}

root = c;

} while (c < j);

}

printf("The sorted array is:\n");

for (i = 0; i < n; i++)

printf("\t %d", heap[i]);

}

Output5

Enter the number of elments:

5

Enter elements:

56 85 45 16 4

Heap array:

85 56 45 16 4

The sorted array is:

4 16 45 56 85