

Spring2024-2025
CMPE124/ISYE223
Algorithms and Programming
LAB WORK #4

Sorting Methods on Arrays

Task 1:

a) Write a complete C program that sorts a one dimensional array in ascending order. Assume that the array content is initialized as {3, 6, 23, 15, 12, 8, 55, 43, 57, 90, 13, 4, 25, 72, 1, 21}. Use the following bubble sort algorithm.

```
void bubble_sort(int list[],int size)
{
    int temp;
    int i,j;
    for (i = 1; i<size; i++)                // i indicates the pass number
    {
        for (j =0; j<size - i; j++)
        {
            if (list [ j ] > list [ j+1 ] ) // swap must be made
            {
                temp =list [j+1];
                list [j+1]= list [j];
                list [j]= temp;
            }
        }
    }
}
```

b) Modify the bubble sort algorithm to sort the numbers in descending order.

Task 2:

a) Write a complete C program that sorts a one dimensional array in ascending order. Assume that the array content is initialized as {3, 6, 23, 15, 12, 8, 55, 43, 57, 90, 13, 4, 25, 72, 1, 21}. Use the following selection sort algorithm.

```
void selectionSort(int a[], int size)
{
    int i, j, min;

    for (i = 0; i < size - 1; i++)
    {
        min = i;
        for (j = i+1; j < size; j++)
            if (a[j] < a[min])
                min = j;
        swap(a[i], a[min]);
    }
}
```

b) Modify the selection sort algorithm to sort the numbers in descending order.

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Task 3:

Write a complete C program that sorts the first half of a one dimensional array in ascending order, and the second half in the descending order. Assume that the array content is initialized as {3 , 6 , 23 , 15 , 12 , 8 , 55 , 43 , 57 , 90 , 13 , 4 , 25 , 72 , 1 , 21}. Modify the bubble sort function to perform sorting in ascending / descending orders with an extra char parameter (a-ascending, d-descending). Also add two more parameters to bubble sort function to store beginning and end point of the algorithm.

```
#include <iostream>
Using namespace std;
void bubble_sort(int [], int, int, char);
int main(void)
{
    int a[16] = {3,6,23,15,12,8,55,43,57,90,13,4,25,72,1,21};
    int i;
    bubble_sort(a,0,7,'a');
    bubble_sort(a,8,15,'d');
    for(i=0;i<16;i++)
        cout<<a[i]<<" ";
    return 0;
}

void bubble_sort(int a[],int begin,int end,char type)
{
    int temp;
    int i,j;
    for(i=begin;i<=end;i++)
    {
        for(j=begin;j<begin+(end-begin);j++)
        {
            if (type == 'a')
            {
                if (a[j]>a[j+1])
                {
                    temp = a[j];
                    a[j] = a[j+1];
                    a[j+1] = temp;
                }
            }
            if (type == 'd')
            {
                if (a[j]<a[j+1])
                {
                    temp = a[j];
                    a[j] = a[j+1];
                    a[j+1] = temp;
                }
            }
        }
    }
}
```