Data Structure Lab Experiment

Insertion sort

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The Psuedocode:

- Fisrt we declare the header files.
- Then the functions are declared for character insertion sort and number insertion sort.
- Then we call the main function to get the user's choice and no of elements in the array and the elements.
- Depending on the users choice the program flows to Insert_C or Inert_N functions.
- Then the user is asked for ascending or descending order.
- Depending on that the program flow takes place.
- Hence the desired output is received.

The Code:

```
#include<stdlib.h>
#include<stdio.h>
#include<string.h>
#include<ctype.h>
void Insert_N(int a[50],int n)
{
   int ch,i,j,key;
   printf("Enter 1.for Ascending order or 2. for Descending order : ");
   scanf("%d",&ch);

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

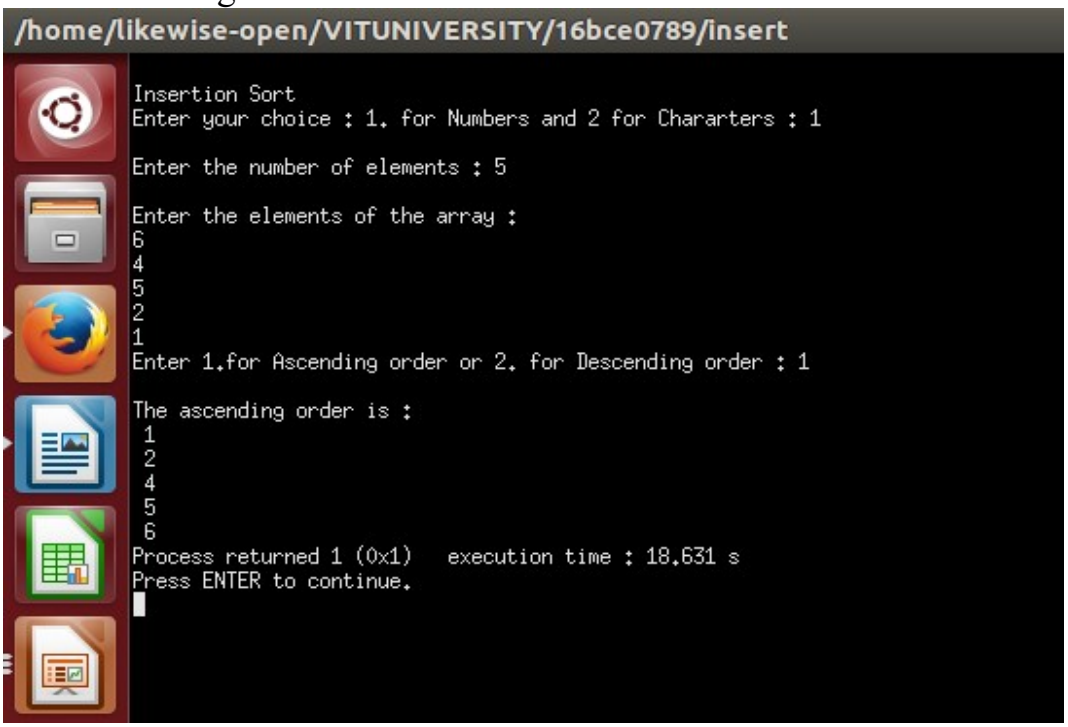
```
            j--;
        }
        a[j+1]=key;
    }

    printf("\nThe ascending order is : ");

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

  if(ch==2)
  {
    for(i=0;i<n;i++)
    {
      key=a[i];
      j=i-1;
      while(j>=0 && key>a[j])
      {
        a[j+1]=a[j];
        j--;
      }
      a[j+1]=key;
    }

    printf("\nThe descending order is : ");

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

  if(ch!=1 && ch!=2)
  {
    printf("\nWrong choice");
  }
}

void Insert_C(char b[100][100],int n)
{
  int ch,i,j=0;
  char key[100];
  printf("Enter 1.for Ascending order or 2. for Descending order : ");
  scanf("%d",&ch);
  if(ch==1)
  {
```

```
        for(i=1;i<n;i++)
        {
            strcpy(key,b[i]);
            j=i-1;
            while(j>=0 && strcmp(b[j],key)>0)
            {
                strcpy(b[j+1],b[j]);
                j--;
            }
            strcpy(b[j+1],key);
        }

        printf("\nThe ascending order is : ");

        for(i=0;i<n;i++)
            printf("\n %s",b[i]);
    }

    if(ch==2)
    {
        for(i=1;i<n;i++)
        {
            strcpy(key,b[i]);
            j=i-1;
            while(j>=0 && strcmp(b[j],key)<0)
            {
                strcpy(b[j+1],b[j]);
                j--;
            }
            strcpy(b[j+1],key);
        }

        printf("\nThe descending order is : ");

        for(i=0;i<n;i++)
        printf("\n%s",b[i]);
    }

    if(ch!=1 && ch!=2)
    {
        printf("\nWrong choice");
    }
}
```

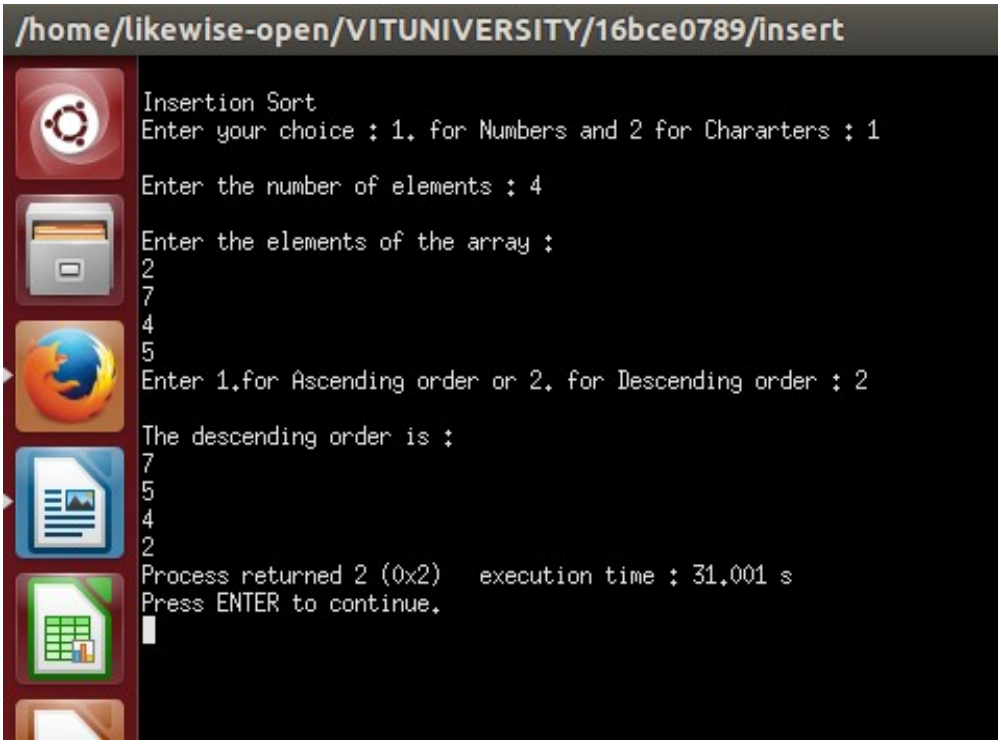
```
void main()
{
   int choice,n,i,a[50];
   char b[100][100];
   printf("\nInsertion Sort \nEnter your choice : 1. for Numbers and 2 for Chararters :
");
   scanf("%d",&choice);
   if(choice==1)
   {
      printf("\nEnter the number of elements : " );
      scanf("%d",&n);
      printf("\nEnter the elements of the array : ");
      for(i=0;i<n;i++)
      scanf("%d",&a[i]);
      Insert_N(a,n);
   }
   else if(choice==2)
   {
      printf("\nEnter the number of elements : " );
      scanf("%d",&n);
      printf("\nEnter the elements of the array : ");
      for(i=0;i<n;i++)
      scanf("%s",&b[i]);
      Insert_C(b,n);
   }
   else
   {
      printf("\n Wrong Choice");
   }
}
```

The Output:

The Numbers in Ascending order : -



The Numbers in Descending order: -



The Characters in Ascending order: -

```
Insertion Sort
Enter your choice : 1. for Numbers and 2 for Chararters : 2

Enter the number of elements : 4

Enter the elements of the array :
COW
ANT
ELEPHANT
DOG
Enter 1.for Ascending order or 2. for Descending order : 1

The ascending order is :
 ANT
 COW
 DOG
 ELEPHANT
Process returned 1 (0x1)   execution time : 50.479 s
Press any key to continue.
```

The Characters in Descending order: -

```
Insertion Sort
Enter your choice : 1. for Numbers and 2 for Chararters : 2

Enter the number of elements : 4

Enter the elements of the array :
OM
PRAYAG
KESHAV
SATMAN
Enter 1.for Ascending order or 2. for Descending order : 2

The descending order is :
SATMAN
PRAYAG
OM
KESHAV
Process returned 2 (0x2)   execution time : 38.266 s
Press any key to continue.
```

THANK YOU