NAME:	Khan Adnan Tanweer Alam
UID:	2022301008
SUBJECT	DAA
EXPERIMENT NO :	1B
AIM:	Experiment on finding the running time of an algorithm.
OBJECTIVE:	To find out running time of 2 sorting algorithms like Selection sort and Insertion sort.
ALGORITHM	Main function: step 1: start Step2: call generate_numbers() function Step 2: call operation()function Step 3: end generate_numbers() function: step 1: start step 2: crate the file pointer step 3: open the file in writing mode step 3: starts the loop from 0 to 100000 step 4: insert the 100000 random numbers in the file step 5: close the file handle step 6: end operation function(): step 1: start step 2: open the file in reading mode step 3: start the loop from 0 to 100000 and increment it with 100 step 4: create two arrays

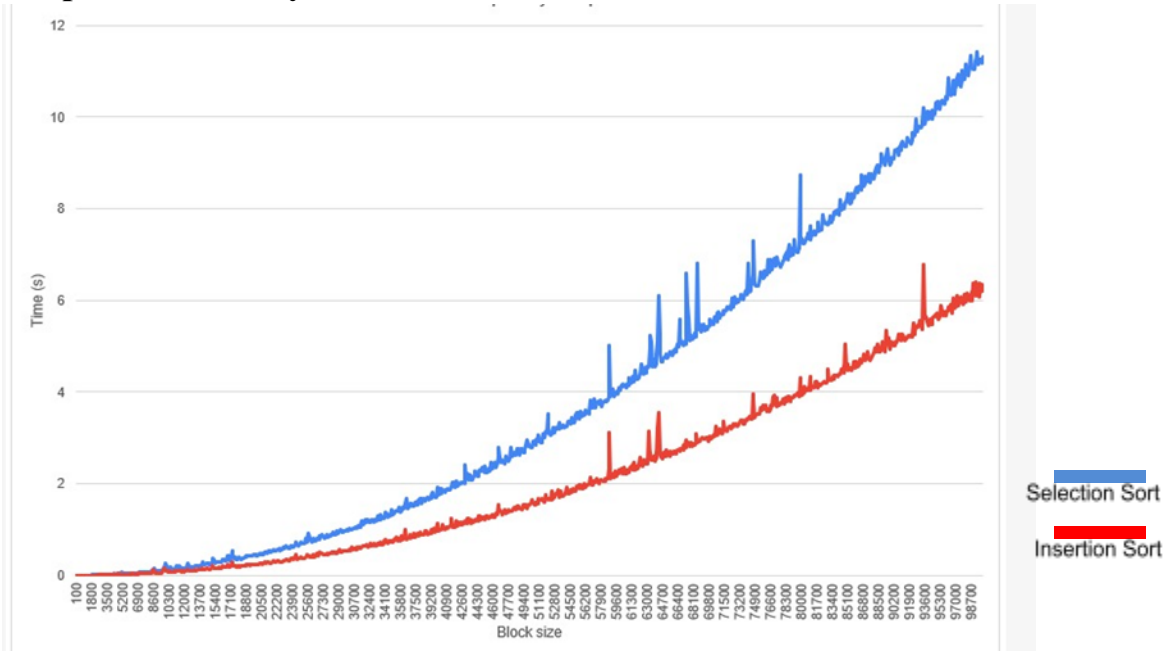
	step 5: start the loop from 0 to j and scan the data from file step 6: before sorting store the time step 7: perform selection sort step 8: check the time after after the sorting step 9: calculate the time taken by the algorithm step 10: before sorting store the time step 11: perform selection sort step 12: check the time after after the sorting step 13: calculate the time taken by the algorithm selection sort: step 1: start step 2: start the loop step 3: initialize the min element step 4: start the loop from i+1 to n step 5: check the condition: if jth element less than min element then minimum element will be j. step 6: if minimum element not equal to i, then initialize variable t with array(i) perform ith element = array of min array(min) = t step 7: end. Insertion sort: Step 1: start Step 2: start the loop from 1 to n Step 3: initialize j with i-1 Step 4: current element is array(i) Step 5: if array(key)>0 and j>=0 Repeat below steps 6,7 Step 6: j+1th element will jth element Step 7: decrement j Step 8: array(j+1) = current.

	Step 9: end.
PROGRAM:	

```c
#include<stdio.h>
#include<math.h>
#include<stdlib.h>
#include<time.h>
void selectionsort(int arr[],int n)
{
   for(int i=0;i<n;i++)
   {
      int min_ind=i;
      for(int j=i+1;j<n;j++)
      {
         if(arr[j]<arr[min_ind])
        min_ind=j;
      }
      if(min_ind!=i)
      {
         int t=arr[i];
         arr[i]=arr[min_ind];
     arr[min_ind]=t;
      }
   }
}
void insertionsort(int arr[],int n)
{
   for(int i=1;i<n;i++)
   {
      int j=i-1;
      int key=arr[i];
      while(j>=0 && arr[j]>key)
      {
            arr[j + 1] = arr[j];
            j = j - 1;
      }
      arr[j + 1] = key;
   }
}

void generate_numbers()
{

  FILE *ptr;
  ptr=fopen("number.txt","w");
```

```
  for(int i=0;i<100000;i++)
  {
     fprintf(ptr,"%d\n",rand() % 100000);
  }
  fclose(ptr);
}
void operation()
{
  FILE *ptr;
  ptr=fopen("number.txt","r");
  for(int j=0;j<100000;j+=100)
  {
      int arr1[j];
      int arr2[j];
      for(int i=0;i<j;i++)
      {
          fscanf(ptr,"%d\n",&arr1[i]);
      }
      for(int i=0;i<j;i++)
      {
         arr2[i]=arr1[i];
      }
      clock_t start_selection=clock();
      selectionsort(arr1,j);
      clock_t end_selection = clock();
      double
currs=(double)(end_selection-start_selection)/CLOCKS_PER_SEC;


      clock_t start_insertion=clock();
      insertionsort(arr2,j);
      clock_t end_insertion=clock();
      double
curri=(double)(end_insertion-start_insertion)/CLOCKS_PER_SEC;
      printf("\n%d\t%f\t%f",j,currs,curri);
  }
}
int main()
{
   generate_numbers();
   operation();
   return 0;
}
```

Observation:
Graph for taken by Selection sort and Insertion sort:



Observation:
As shown in the Graph, selection sort's graph increases above the Insertion sort graph. Selection sort takes more time to execute than Insertion sort. So**, Insertion sort is more fast, efficient than selection sort.**

CONCLUSION:	In this Practical, I learnt about Selection sort, insertion sort and found the running time for each sorting algorithm. I worked on random numbers and stored them into blocks and performed sorting on each block and calculated the time time take by each block to sort the random data.