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| **NAME:** | Atul Sharma |
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| **SUBJECT** | DAA |
| **EXPERIMENT NO :** | 1-B |
| **AIM:** | **Experiment on finding the running time of an algorithm.** |
| **ALGORITHM** | 1.Start  2.initialize array a with size=100000  3for i=0 to i<1000  4.call function getData(i+1,a)  5.initialize start and end values of clock() function  6.call function insertionSort(a,(i+1)\*100)  7.print array  8. call function getData(i+1,a)  9.initialize start and end values of clock() function  10.call function selectionSort(a,(i+1)\*100)  11.print array  12.end for  insertionSort() :  n=length(A)  for i=1 to n-1 do  j=i  while j>0 and A[j-1]>A[j] do  swap (A[j],A[j-1])  j=j-1  end while  end for  procedure selection sort  list : array of items  n : size of list  for i = 1 to n - 1  /\* set current element as minimum\*/  min = i    /\* check the element to be minimum \*/  for j = i+1 to n  if list[j] < list[min] then  min = j;  end if  end for  /\* swap the minimum element with the current element\*/  if indexMin != i then  swap list[min] and list[i]  end if  end for    end procedure |
| **PROGRAM:** | #include <stdio.h>  #include <math.h>  #include <conio.h>  #include <stdlib.h>  #include <time.h>  void getInput()  {  *FILE* \*fp;    fp = fopen("input.text","w");    for(int i=0;i<100000;i++)    fprintf(fp,"%d ",rand()%100000);    fclose(fp);  }  void insertionSort(int arr*[]*, int size) {      for (int i = 1; i < size; i++) {          int key = arr[i];          int j = i - 1;          while (key < arr[j] && j >= 0) {              arr[j + 1] = arr[j];              --j;          }          arr[j + 1] = key;      }  }  void selectionSort(int arr*[]*, int len){      int minIndex, temp;      for(int i=0; i<len; i++){          minIndex = i;          for(int j=i+1; j<len; j++){              if(arr[j] < arr[minIndex]){                  minIndex = j;              }          }          temp = arr[minIndex];          arr[minIndex] = arr[i];          arr[i] = temp;      }  }  int main(){      getInput();  *FILE* \*fp, \*Wptr;      int index=99;      int arrNums[100000];  *clock\_t* t;      fp = fopen("input.text", "r");      Wptr = fopen("iTimes.txt", "w");      for(int i=0; i<300; i++){          for(int j=0; j<=index; j++){              fscanf(fp, "%d", &arrNums[j]);          }          t = clock();          insertionSort(arrNums, index+1);          t = clock() - t;          double time\_taken = ((double)t)/CLOCKS\_PER\_SEC;          fprintf(Wptr, "time taken for %d iteration is %Lf\n", (i+1), time\_taken);          printf("%d\t%lf\n", (i+1), time\_taken);          index = index + 100;          fseek(fp, 0, SEEK\_SET);      }      fclose(Wptr);      Wptr = fopen("STimes.txt", "w");      index=99;      for(int i=0; i<300; i++){          for(int j=0; j<=index; j++){              fscanf(fp, "%d", &arrNums[j]);          }          t = clock();          selectionSort(arrNums, index+1);          t = clock() - t;          double time\_taken = ((double)t)/CLOCKS\_PER\_SEC;          fprintf(Wptr, "time taken for %d iteration is %Lf\n", (i+1), time\_taken);          printf("%d\t%lf\n", (i+1), time\_taken);          index = index + 100;          fseek(fp, 0, SEEK\_SET);      }      fclose(Wptr);      fclose(fp);      return 0;  } |
| **RESULT ( SNAPSHOT)**  Time complexity:  Insertion sort: Best case-O(n)  Worst case-O(n^2)  Selection sort: Best and worst case- O(n^2) | |
| **CONCLUSION:** | Through this experiment, I understood the concept of time complexity and as we increase the number of inputs the program take more time. Also through the analysis I came to know that for larger value of input number it is better to use insertion sort instead of selection sort. |