DESIGN AND ANALYSIS OF ALGORITHMS – 2CS503

Practical 1

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Batch No.: A-1

1. Iterative Bubble Sort

#include <stdio.h></stdio.h>
#include <stdlib.h></stdlib.h>
#include <time.h></time.h>
void swap(int xp, int yp)
{
int temp = xp;
xp = yp;
yp = temp;
}
void bubbleSort(int arr[], int n)
{
int i, j;
for (i = 0; i < n-1; i++)

```
for (j = 0; j < n-i-1; j++)
if (arr[j] > arr[j+1])
swap(arr[j], arr[j+1]);
void printArray(int arr[], int size)
int i;
for (i=0; i < size; i++)
printf("%d ", arr[i]);
printf("\n");
int main()
int no=10000;
int j = no;
int arr[no];
for(int i=0;i<no;i++)</pre>
arr[i]=no-j;
```

```
int n = sizeof(arr)/sizeof(arr[0]);
bubbleSort(arr, n);
printf("Sorted array: \n");
printArray(arr, n);
return 0;
}
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Process returned 0 (0x0)
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Press any key to continue.
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2. Recursive Bubble Sort

#include <stdio.h></stdio.h>
#include <time.h></time.h>
void BubbleSortRecursion(int a[],int num)
{
int i,j,temp;
i=num;
if(i>0)
{
for(j=0; j <num-1; j++)<="" td=""></num-1;>
{
if(a[j]>a[j+1])
{
temp=a[j];
a[j]=a[j+1];
a[j+1]=temp;
}
}
BubbleSortRecursion(a,num-1);
}
else
{
return;

```
void printArray(int arr[], int size)
int i;
for (i=0; i < size; i++)
printf("%d ", arr[i]);
printf("\n");
int main()
int no=10000;
int j = no;
int arr[no];
for(int i=0;i<no;i++)
arr[i]=no-j;
int n = sizeof(arr)/sizeof(arr[0]);
BubbleSortRecursion(arr, n);
printf("Sorted array: \n");
printArray(arr, n);
return 0;
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}

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Process returned 0 (0x0) execution time : 0.640 s Press any key to continue.

3. Iterative Insertion Sort

```
#include<stdio.h>
#include<time.h>
void main()
  int n=10000;
  clock tt;
  printf("Itterative Insertion Sort\n");
  printf("\nEnter number of elements : ");
  //scanf("%d",&n);
  //printf("\nEnter array : ");
  int arr[n];
  for(int i=0; i<n; i++)
    arr[i] = 10000-i;
  }
  t = clock();
  for(int i=0; i<n-1; i++)
    for(int j=i; j>=0; j--)
       if(arr[j+1]<arr[j])</pre>
         int temp;
         temp = arr[j+1];
```

```
arr[j+1]=arr[j];
    arr[j] = temp;
}

}

t=clock()-t;

for(int i=0; i<n; i++)
{
    printf("%d ",arr[i]);
}

double time_taken = ((double)t)/CLOCKS_PER_SEC;
    printf("\nExecution Time : %f", time_taken);
}</pre>
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                               execution time: 0.875 s
ress any key to continue.
```

4. Recursive Insertion Sort

```
#include<stdio.h>
#include<time.h>
void RecSelectionSort(int arr[], int num, int n)
  int i = num;
  if(n<0)
    return;
  for(int j=i; j>=0; j--)
    if(arr[j+1]<arr[j])</pre>
       int temp;
       temp = arr[j+1];
       arr[j+1]=arr[j];
       arr[j] = temp;
  }
  RecSelectionSort(arr,num+1,n-1);
```

```
void main()
  int n=10000;
  printf("Recursive Insertion Sort\n");
  //printf("\nEnter number of elements : ");
  //scanf("%d",&n);
  //printf("\nEnter array : ");
  int arr[n];
  for(int i=0; i<n; i++)
    arr[i]=10000-i;
  }
  int num=0;
  clock_t t;
  t = clock();
  RecSelectionSort(arr, num, n);
  t = clock() - t;
  double time_taken = ((double)t)/CLOCKS_PER_SEC; // in seconds
```

```
for(int i=0; i<n; i++)
{
    printf("%d ",arr[i]);
}
printf("\nExecution Time : %f", time_taken);
}</pre>
```

```
"C:\Users\mihir\Desktop\College\Study\3rd Year\DAA\LAB 1\R.InsertionSort\R.InsertionSort.exe"
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Execution Time : 0.140000
Process returned 26 (0x1A)
                               execution time: 0.812 s
Press any key to continue.
```

5. Iterative Selection Sort

```
#include<stdio.h>
void main()
  int n=10000;
  printf("Itterative Selection Sort\n");
  printf("\nEnter number of elements : ");
  //scanf("%d",&n);
  printf("\nEnter array : ");
  int arr[n];
  for(int i=0; i<n; i++)
    arr[i] = 10000-i;
  int index;
  for(int i=0; i<n-1; i++)
    index = i;
    for(int j=i+1; j<n; j++)
       if(arr[index]>arr[j])
         index = j;
```

```
}

int temp;

temp = arr[i];

arr[i] = arr[index];

arr[index] = temp;
}

for(int i=0; i<n; i++)
{
    printf("%d ",arr[i]);
}
</pre>
```

```
"C:\Users\mihir\Desktop\College\Study\3rd Year\DAA\LAB 1\I.SelectionSort\I.SelectionSort.exe
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Press any key to continue.
```

6. Recursive Selection Sort

```
#include<stdio.h>
void RecSelectionSort(int arr[], int num, int n)
{
  int index,i;
  i=num;
  if(n<0)
    return;
  index = i;
  for(int j=i+1; j<n; j++)
    if(arr[index]>arr[j])
       index = j;
  int temp;
  temp = arr[i];
  arr[i] = arr[index];
  arr[index] = temp;
  RecSelectionSort(arr,num+1,n-1);
```

```
void main()
{
  int n=10000;
  printf("Recursive Selection Sort\n");
  printf("\nEnter number of elements : ");
  //scanf("%d",&n);
  printf("\nEnter array : ");
  int arr[n];
  for(int i=0; i<n; i++)
    arr[i] = 10000-i;
  }
  int num=0;
  RecSelectionSort(arr, num, n);
  for(int i=0; i<n; i++)
    printf("%d ",arr[i]);
```

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Process returned 10000 (0x2710)
                                    execution time: 0.781
ress any key to continue.
```

Observation Table:

FOR N=10,000

	Iterative	Recursive
Bubble Sort	0.689 s	0.640 s
Insertion Sort	0.875 s	0.812 s
Selection Sort	0.859 s	0.781 s