Design and Analysis of Algorithms Sorting

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1. Write a program to implement bubble sort.

   Code:

```c
#include <stdio.h>

void bubbleSort(int arr[],int n){
    for(int i=0;i<n-1;i++){
        for(int j=0;j<n-i-1;j++){
            if(arr[j]>arr[j+1]){
                int temp=arr[j];
                arr[j]=arr[j+1];
                arr[j+1]=temp;
            }
        }
    }
}

int main() {
    int n,i;
    printf("Enter the number of elements:");
    scanf("%d",&n);
    int arr[n];
    for(i=0;i<n;i++){
        printf("Element %d:",i+1);
        scanf("%d",&arr[i]);
    }

    bubbleSort(arr, n);

    printf("Bubble Sorted array: ");
    for(i = 0; i < n; i++)
        printf("%d ", arr[i]);

    return 0;
}
```

Output:

```
C:\Sem-4\DAA\Sorting>gcc bubble.c

C:\Sem-4\DAA\Sorting>a
Enter the number of elements:5
Element 1:1906
Element 2:19
Element 3:6
Element 4:11
Element 5:3
```

2. Write a program to implement insertion sort.

Code:

```c
#include <stdio.h>

void insertionSort(int arr[],int n) {
    for(int i=1;i<n;i++) {
        int a=arr[i];
        int j = i - 1;

        while(j>=0 && arr[j]>a) {
            arr[j+1]=arr[j];
            j--;
        }
        arr[j+1]=a;
    }
}

int main() {
    int n,i;
    printf("Enter the number of elements:");
    scanf("%d",&n);
    int arr[n];
    for(i=0;i<n;i++){
        printf("Element %d:",i+1);
        scanf("%d",&arr[i]);
    }

    insertionSort(arr,n);

    printf("Insertion Sorted array: ");
    for(int i=0;i<n;i++)
```

```
        printf("%d ",arr[i]);

    return 0;
}
```

Output:

```
C:\Sem-4\DAA\Sorting>gcc insertion.c

C:\Sem-4\DAA\Sorting>a
Enter the number of elements:5
Element 1:5
Element 2:9
Element 3:1
Element 4:7
Element 5:2
Insertion Sorted array: 1 2 5 7 9
```

3. Write a program to implement selection sort.

Code:

```
#include <stdio.h>

void selectionSort(int arr[],int n) {
    for(int i=0;i<n-1;i++) {
        int min =i;

        for(int j=i+1;j<n;j++) {
            if(arr[j]<arr[min])
                min=j;
        }
        int temp=arr[min];
        arr[min]=arr[i];
        arr[i]=temp;
    }
}

int main() {
    int n,i;
    printf("Enter the number of elements:");
    scanf("%d",&n);
```

```
    int arr[n];
    for(i=0;i<n;i++){
        printf("Element %d:",i+1);
        scanf("%d",&arr[i]);
    }

    selectionSort(arr,n);

    printf("Selection Sorted array: ");
    for(int i=0;i<n;i++)
        printf("%d ",arr[i]);

    return 0;
}
```

Output:

```
C:\Sem-4\DAA\Sorting>gcc selection.c

C:\Sem-4\DAA\Sorting>a
Enter the number of elements:6
Element 1:732
Element 2:4984
Element 3:843
Element 4:8
Element 5:94
Element 6:100
Selection Sorted array: 8 94 100 732 843 4984
```