RATHINAM TECHNICAL CAMPUS (AUTONOMOUS)

DATA STRUCTURES

DEPARTMENT OF ECE

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OBJECTIVE OF THE PROBLEM STATEMENT:

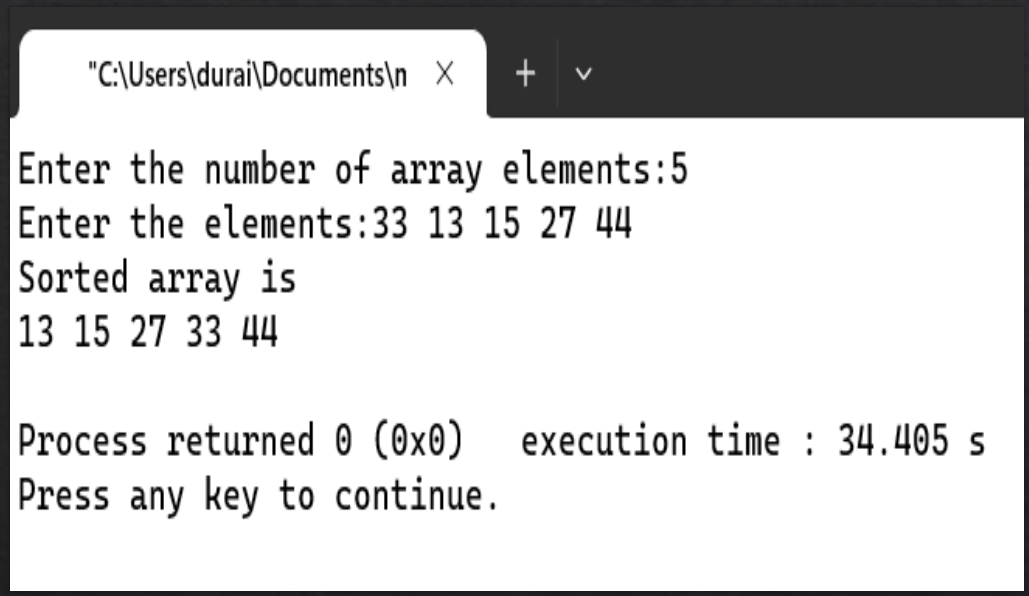
- Accept input from the user.
- Start sorting the elements.
- Sort until the elements is in accending order.
- Display the result.

PROGRAM FOR MERGE SORT:

```c
#include <stdio.h>

// Merge two subarrays of arr[]
// First subarray is arr[l..m]
// Second subarray is arr[m+1..r]
void merge(int arr[], int l, int m, int r) {
    int i, j, k;
    int n1 = m - l + 1;
    int n2 = r - m;

    // Create temporary arrays
    int L[n1], R[n2];

    // Copy data to temporary arrays L[] and R[]
    for (i = 0; i < n1; i++)
        L[i] = arr[l + i];
    for (j = 0; j < n2; j++)
        R[j] = arr[m + 1 + j];

    // Merge the temporary arrays back into arr[l..r]
    i = 0;
    j = 0;
    k = l;
    while (i < n1 && j < n2) {
        if (L[i] <= R[j]) {
            arr[k] = L[i];
            i++;
        } else {
            arr[k] = R[j];
            j++;
        }
        k++;
    }

    // Copy the remaining elements of L[], if any
    while (i < n1) {
        arr[k] = L[i];
        i++;
        k++;
    }

    // Copy the remaining elements of R[], if any
    while (j < n2) {
        arr[k] = R[j];
        j++;
        k++;
    }
}
int main() {
    int n,i;
    printf("Enter the number of array elements:");
    scanf("%d",&n);
    int arr[n];
    printf("Enter the elements:");
    for(i=0;i<n;i++)
    {
        scanf("%d",&arr[i]);
    }

    int arr size = sizeof(arr) / sizeof(arr[0]);
```

```
61
62      int current_size;
63      int left_start;
64
65      // Merge subarrays in bottom-up manner
66      for (current_size = 1; current_size <= arr_size - 1; current_size = 2 * current_size) {
67          for (left_start = 0; left_start < arr_size - 1; left_start += 2 * current_size) {
68              int mid = left_start + current_size - 1;
69              int right_end = (left_start + 2 * current_size - 1 < arr_size - 1) ? left_start + 2 * current_size - 1 : arr_size - 1;
70
71              merge(arr, left_start, mid, right_end);
72          }
73      }
74
75      printf("Sorted array is \n");
76      for (int i = 0; i < arr_size; i++)
77          printf("%d ", arr[i]);
78      printf("\n");
79
80      return 0;
81  }
82
```

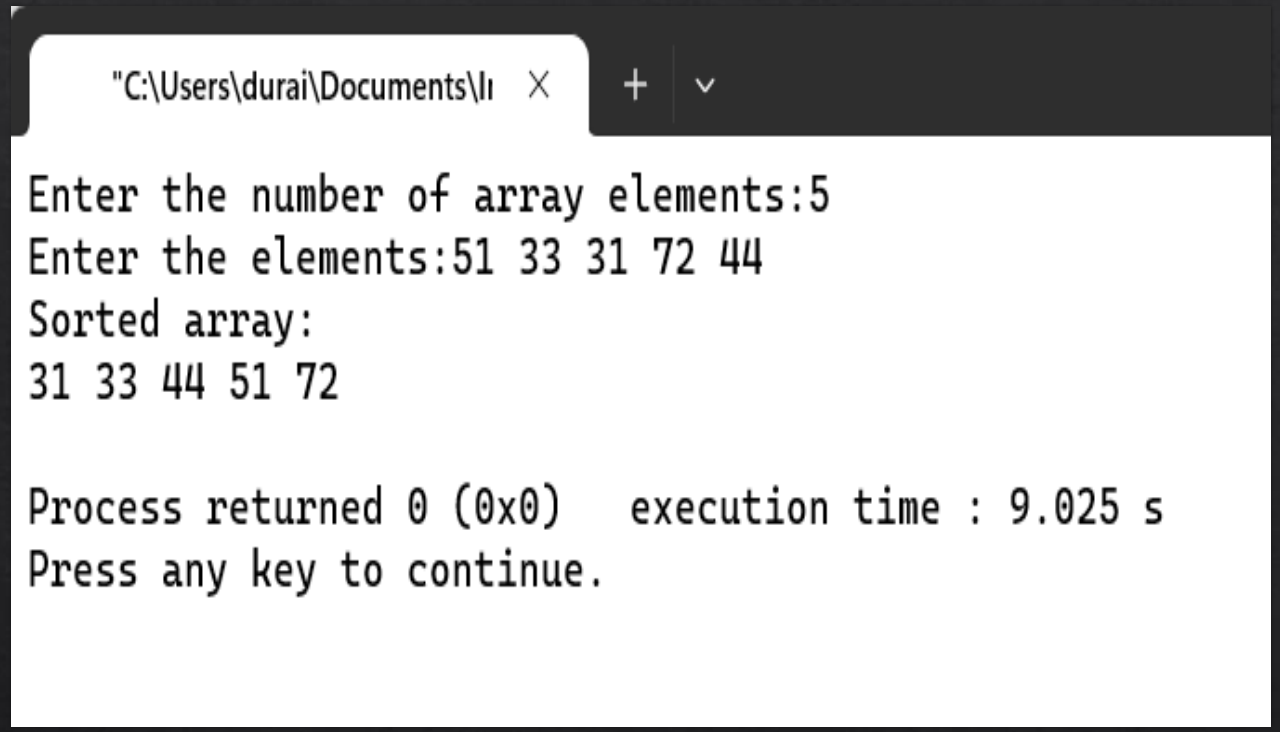
OUTPUT:



PROGRAM FOR INSERTION SORT:

```c
#include <stdio.h>
int main() {
    int num,i;
    printf("Enter the number of array elements:");
    scanf("%d",&num);
    int arr[num];
    printf("Enter the elements:");
    for(i=0;i<num;i++)
        {
        scanf("%d",&arr[i]);
    }
    int n = sizeof(arr) / sizeof(arr[0]);

    for (int i = 1; i < n; i++) {
        int key = arr[i];
        int j = i - 1;

        while (j >= 0 && arr[j] > key) {
            arr[j + 1] = arr[j];
            j = j - 1;
        }
        arr[j + 1] = key;
    }
    printf("Sorted array: \n");
    for (int i = 0; i < n; i++) {
        printf("%d ", arr[i]);
    }
    printf("\n");
    return 0;
}
```

OUTPUT :


"C:\Users\durai\Documents\I
Enter the number of array elements:5
Enter the elements:51 33 31 72 44
Sorted array:
31 33 44 51 72
Process returned 0 (0x0)   execution time : 9.025 s
Press any key to continue.

THANK YOU