9. Binary Search

Aim:
To search an element in a sorted array using binary search.

Algorithm:

1. **Read `n` sorted elements.**
2. **Read search element `key`.**
3. **Set `low=0, high=n-1`.**
4. **While `low<=high`:**
    - **Find mid.**
    - **If `a[mid]==key` → success.**
    - **If `a[mid]>key` → search left.**
    - **Else → search right.**
5. **If not found → print not found.**

Code:

```
#include <stdio.h>


int main() {
    int a[20], n, key, low, high, mid, i;
    printf("Enter size: ");
    scanf("%d", &n);
    printf("Enter sorted elements: ");
    for (i=0; i<n; i++) scanf("%d", &a[i]);
    printf("Enter element to search: ");
```

```
    scanf("%d", &key);
    low=0; high=n-1;
    while (low<=high) {
        mid=(low+high)/2;
        if (a[mid]==key) {
            printf("Element found at position %d\n", mid);
            return 0;
        } else if (a[mid]>key)
            high=mid-1;
        else
            low=mid+1;
    }
    printf("Element not found\n");
    return 0;
}
```

Input & Output:

```
Enter size: 5
Enter sorted elements: 10 20 30 40 50
Enter element to search: 40
Element found at position 3
```

Result:

Binary search is successfully implemented.