DATA STRUCTURE ASSIGNMENT 3.

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SORTING PROGRAMS.[B.TECH AI &DS]

23102009.

1.Write a program to perform binary Search.

AIM:

To perform binary Search.

ALGORITHM:

```
Step1: Start
Step2: Set low to 0
Step3: Set high to the index of the last element in the array.
Step4:  low is less than or equal to high.
 Step5: End
```

PROGRAM:

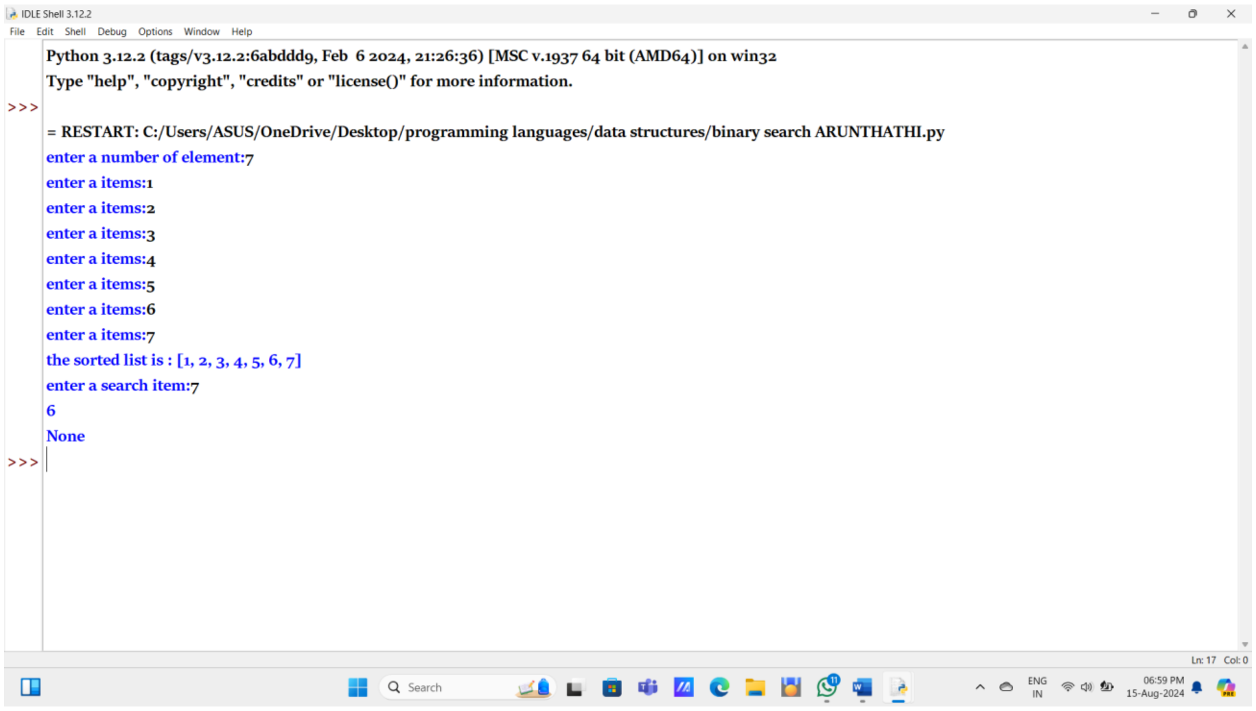
```
def binary_search(start,end,a,k):
for i in a:
    mid=(start+end)//2
    if a[mid]==k:
        print(mid)
```

```
            break
        elif a[mid]>k:
            return binary_search(start,mid,a,k)
            break
        else:
            return binary_search(mid+1,end,a,k)
n=int(input('enter a number of element:'))
a=[]
for i in range(n):
    a.append(int(input('enter a items:')))
for i in range(0,n):
    for j in range(0,n-i-1):
        if a[j]>a[j+1]:
            a[j],a[j+1]=a[j+1],a[j]
print('the sorted list is :',a)

k=int(input('enter a search item:'))

print(binary_search(0,n-1,a,k))
```

OUTPUT:



```
Python 3.12.2 (tags/v3.12.2:6abddd9, Feb  6 2024, 21:26:36) [MSC v.1937 64 bit (AMD64)] on win32
Type "help", "copyright", "credits" or "license()" for more information.
>>>
= RESTART: C:/Users/ASUS/OneDrive/Desktop/programming languages/data structures/binary search ARUNTHATHI.py
enter a number of element:7
enter a items:1
enter a items:2
enter a items:3
enter a items:4
enter a items:5
enter a items:6
enter a items:7
the sorted list is : [1, 2, 3, 4, 5, 6, 7]
enter a search item:7
6
None
>>>
```

RESULT:

To implement the binary search is completed successfully.

2. Write a program to perform Linear Search.

AIM:

To perform Linear Search.

ALGORITHM:

1. Start: Begin the algorithm.
2. Initialize: Set the initial index to 0.
3. Input: Read the array and the target value.
4. Iterate: Loop through the array, checking each element.
5. Check: If the current element matches the target, return the index.
6. Increment: Move to the next element.
7. Not Found: If the loop completes without finding the target, return -1.
8. End: End the algorithm.

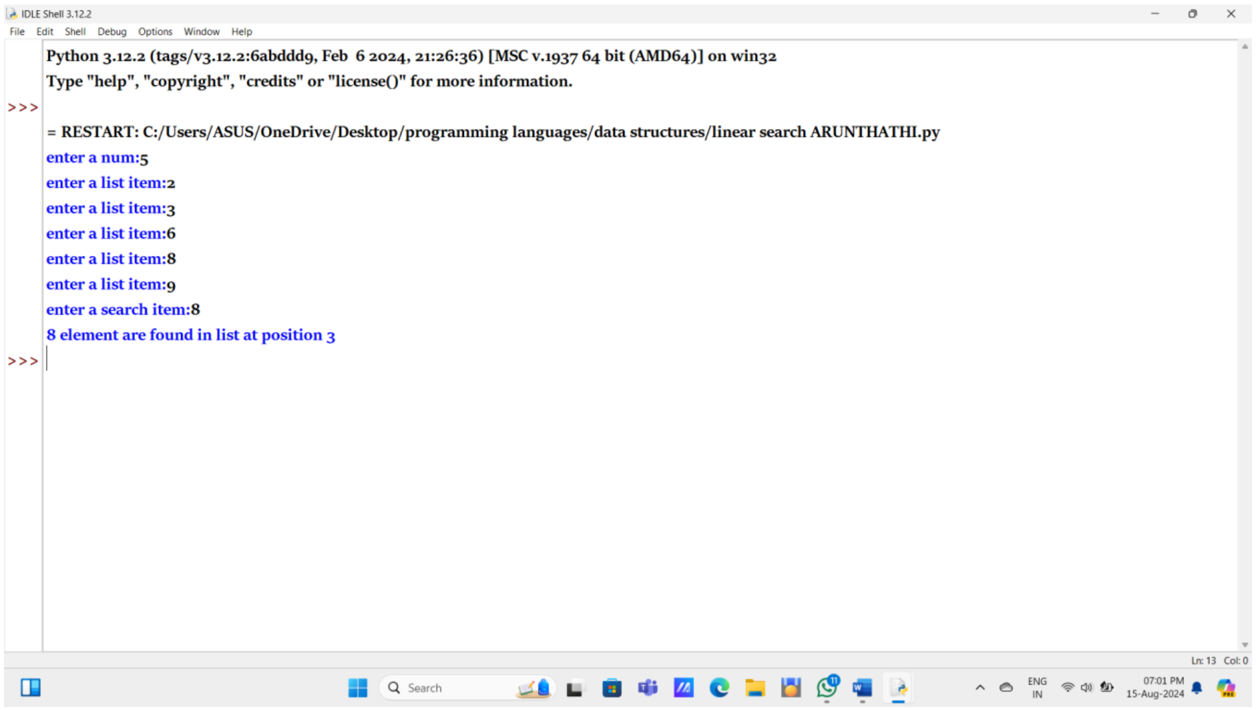
PROGRAM:

```
n=int(input('enter a num:'))
a=[]
for i in range (n):
   a.append(int(input('enter a list item:')))
search_item=int(input('enter a search item:'))
```

```
found=False
for i in range(len(a)):

    if (a[i]==search_item):
        found=True
        break
if found:
        print(search_item,'element are found in list at position',i)
else:
        print("search element is not found")
```

OUTPUT:



```
Python 3.12.2 (tags/v3.12.2:6abddd9, Feb  6 2024, 21:26:36) [MSC v.1937 64 bit (AMD64)] on win32
Type "help", "copyright", "credits" or "license()" for more information.
>>>
= RESTART: C:/Users/ASUS/OneDrive/Desktop/programming languages/data structures/linear search ARUNTHATHI.py
enter a num:5
enter a list item:2
enter a list item:3
enter a list item:6
enter a list item:8
enter a list item:9
enter a search item:8
8 element are found in list at position 3
>>>
```

RESULT:

Performed the linear search is Completed successfully.

3. Write a program to perform Selection Sort.

AIM:

To perform Selection Sort.

ALGORITHM:

1. Start: Begin the algorithm.
2. Initialize: Set the initial index i to 0.
3. Input: Read the array to be sorted.
4. Iterate: Loop through the array, assuming the current element is the minimum.
5. Inner Loop: Check each subsequent element to find the actual minimum.
6. Swap: Swap the current element with the found minimum element.
7. Increment: Move to the next element.

PROGRAM:

```
def selection_sort(arr):
    n = len(arr)
    for i in range(n):
        min_index = i
        for j in range(i + 1, n):
            if arr[j] < arr[min_index]:
                min_index = j
        arr[i], arr[min_index] = arr[min_index], arr[i]
```

Example usage

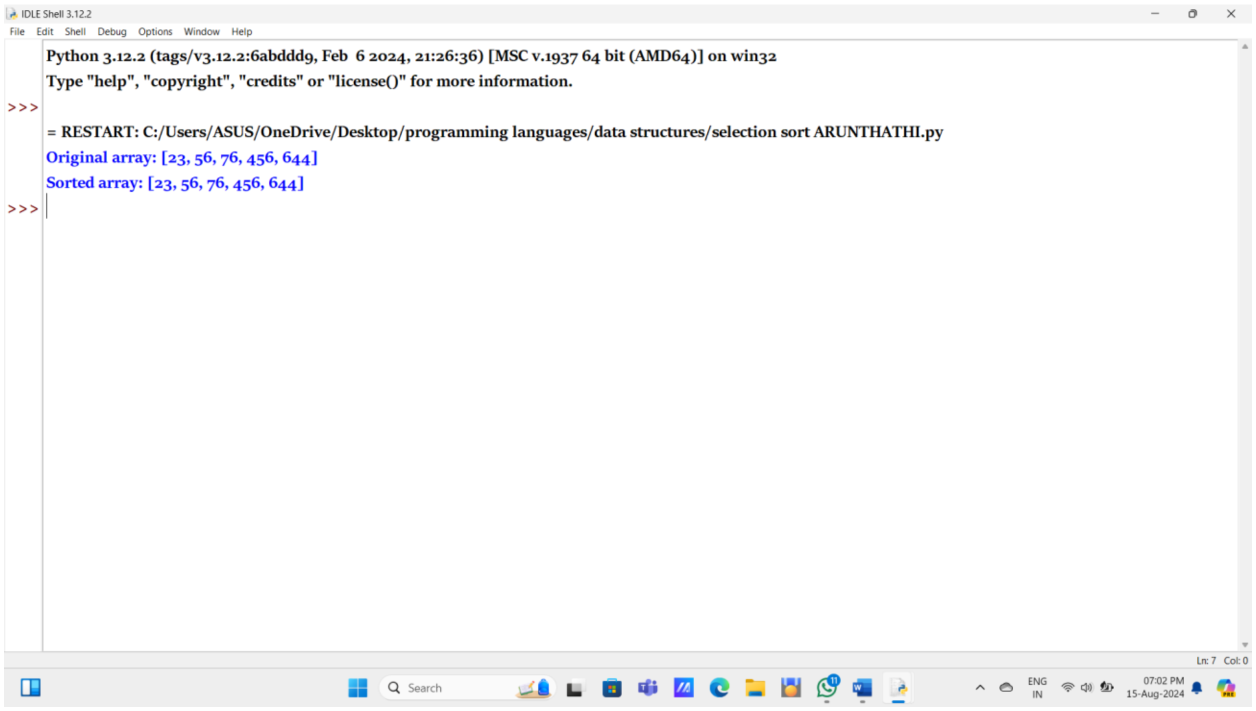
arr = [45,49,9,87,65]

print("Original array:", arr)

selection_sort(arr)

print("Sorted array:", arr)

OUTPUT:



```
Python 3.12.2 (tags/v3.12.2:6abddd9, Feb  6 2024, 21:26:36) [MSC v.1937 64 bit (AMD64)] on win32
Type "help", "copyright", "credits" or "license()" for more information.
>>>
= RESTART: C:/Users/ASUS/OneDrive/Desktop/programming languages/data structures/selection sort ARUNTHATHI.py
Original array: [23, 56, 76, 456, 644]
Sorted array: [23, 56, 76, 456, 644]
>>>
```

RESULT:

To implement the selection sort is completed successfully.

4. Write a program to perform Insertion Sort.

AIM:

To perform Insertion Sort.

ALGORITHM:

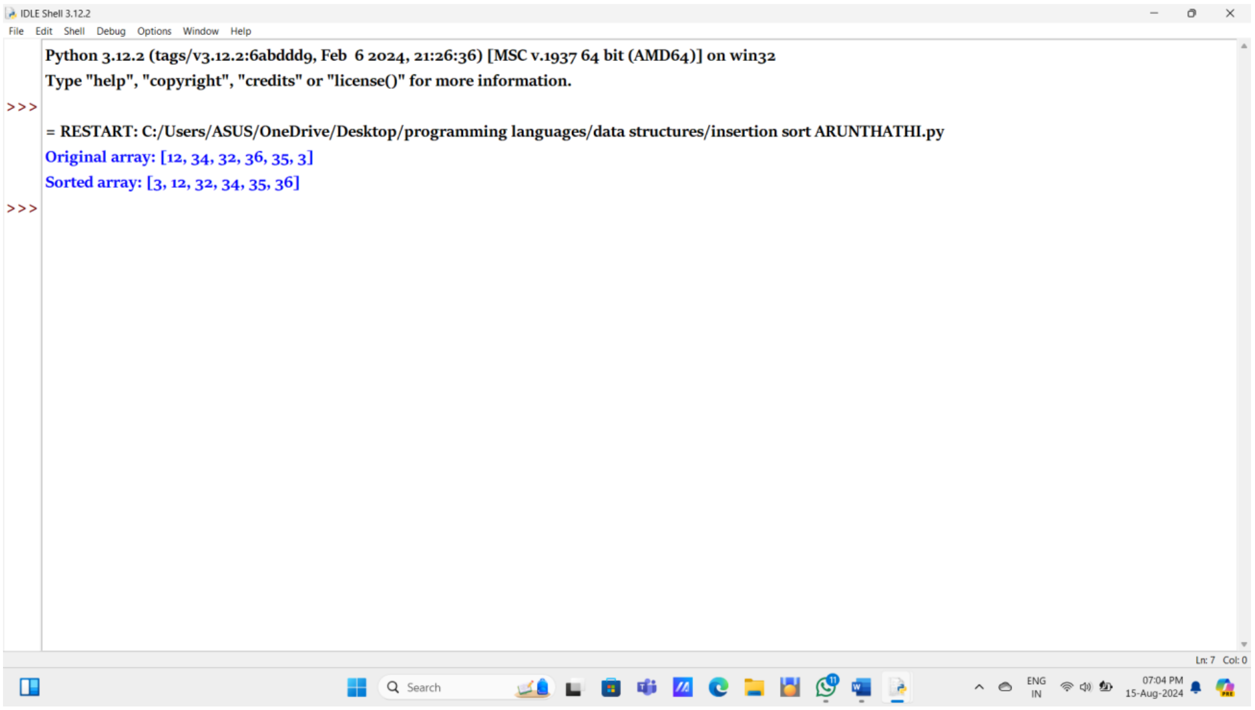
1. Start: Begin the algorithm.
2. Initialize: Set the initial index i to 1.
3. Input: Read the array to be sorted.
4. Iterate: Loop through the array, starting from the second element.
5. Set: Store the current element in a variable key.
6. Inner Loop: Compare and shift elements in the sorted portion of the array.
7. Insert: Place the key in its correct position.
8. End: End the algorithm when the entire array is sorted.

PROGRAM:

```
def insertion_sort(arr):
    for i in range(1, len(arr)):
        key = arr[i]
        j = i - 1
        while j >= 0 and arr[j] > key:
            arr[j + 1] = arr[j]
        j -= 1
    arr[j + 1] = key

# Example usage
arr = [77,87,97,67,57]
print("Original array:", arr)
insertion_sort(arr)
print("Sorted array:", arr)
```

OUTPUT:



```
Python 3.12.2 (tags/v3.12.2:6abddd9, Feb  6 2024, 21:26:36) [MSC v.1937 64 bit (AMD64)] on win32
Type "help", "copyright", "credits" or "license()" for more information.
>>>
= RESTART: C:/Users/ASUS/OneDrive/Desktop/programming languages/data structures/insertion sort ARUNTHATHI.py
Original array: [12, 34, 32, 36, 35, 3]
Sorted array: [3, 12, 32, 34, 35, 36]
>>>
```

RESULT:

To perform Insertion Sort is completed successfully.