DSA ASSIGNMENT-5

TANISHA KARMAKAR

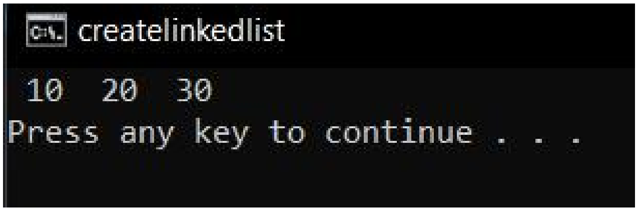
21051950

CSE 37

Q1. Write a program to create a linked list (three nodes) and print it.

```
#include<stdio.h>
struct Node {

  int data;
  struct Node*next;
};

int main()
{
  struct Node*HEAD;
  struct Node*PTR;
  struct Node N1, N2, N3;
  HEAD=&N1;
  N1.data=10;
  N1.next=&N2;
  N2.data=20;
  N2.next=&N3;
  N3.data=30;
  N3.next=NULL;

PTR=HEAD;
while(PTR!=NULL)
{
  printf(" %d ", PTR->data);
  PTR=PTR->next;
}
}
```

Output:

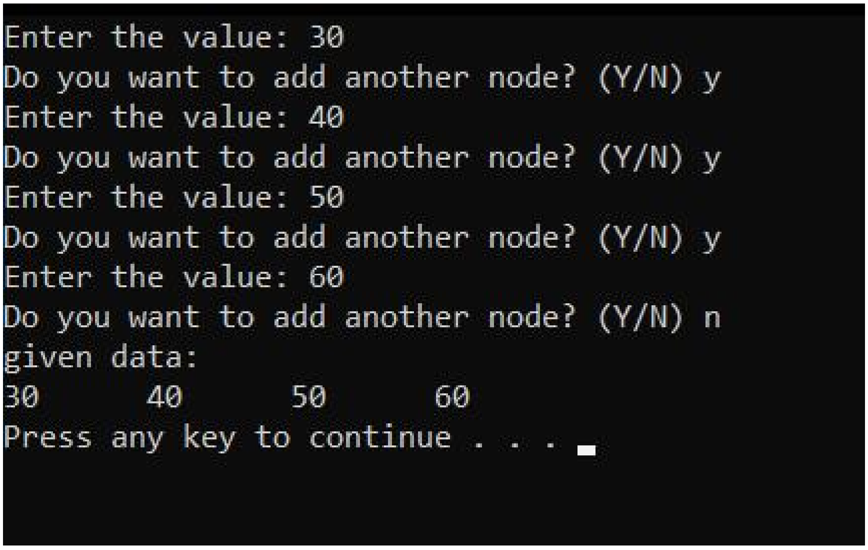


```
createlinkedlist
 10  20  30
Press any key to continue . . .
```

Q2. Write a program to create a linked list and print it (dynamically).

```
#include<stdio.h>
#include <stdlib.h>
struct Node {

  int data;
  struct Node*next;
};

int main()
{
  struct Node *Head, *New, *ptr;
  char c;
  Head=NULL;
  New=(struct Node*)malloc(sizeof(struct Node));
  printf("Enter the value: ");
  scanf("%d", &New->data);
  New->next=NULL;
  Head=New;
  ptr=Head;
  printf("Do you want to add another node? (Y/N) ");
  scanf("%c", &c);
  scanf("%c", &c);
  while(c=='y'||c=='Y')
  {
    New=(struct Node*)malloc(sizeof(struct Node));
    printf("Enter the value: ");
    scanf("%d", &New->data);
    New->next=NULL;
    ptr->next=New;
    ptr=ptr->next;
    printf("Do you want to add another node? (Y/N) ");
    scanf("%c", &c);
    scanf("%c", &c);
  }
  printf("given data: \n");
  ptr=Head;
  while(ptr!=NULL){
    printf("%d\t", ptr->data);
    ptr=ptr->next;
  }
  return 0;
}
```

Output:

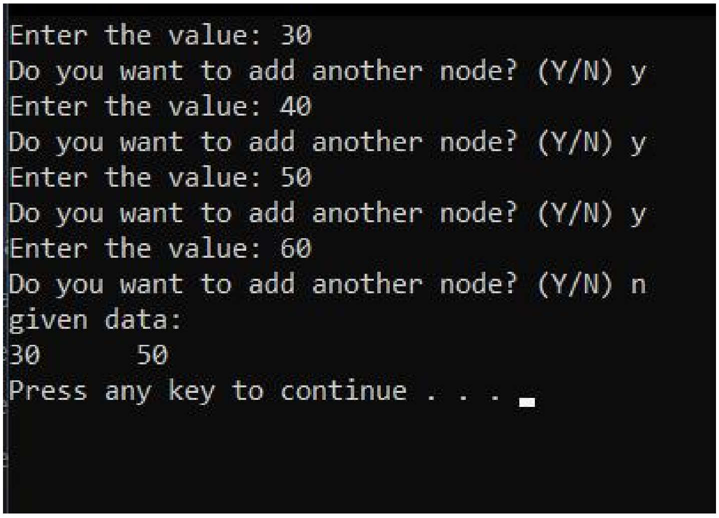


```
Enter the value: 30
Do you want to add another node? (Y/N) y
Enter the value: 40
Do you want to add another node? (Y/N) y
Enter the value: 50
Do you want to add another node? (Y/N) y
Enter the value: 60
Do you want to add another node? (Y/N) n
given data:
30      40      50      60
Press any key to continue . . .
```

Q3. Write a program to create a LL and print its alternate nodes.

```
#include<stdio.h>
#include <stdlib.h>
struct Node {

  int data;
  struct Node*next;
};

int main()
{
  struct Node *Head, *New, *ptr;
  char c;
  Head=NULL;
  New=(struct Node*)malloc(sizeof(struct Node));
  printf("Enter the value: ");
  scanf("%d", &New->data);
  New->next=NULL;
  Head=New;
  ptr=Head;
  printf("Do you want to add another node? (Y/N) ");
  scanf("%c", &c);
  scanf("%c", &c);
  while(c=='y'||c=='Y')
  {
    New=(struct Node*)malloc(sizeof(struct Node));
    printf("Enter the value: ");
    scanf("%d", &New->data);
    New->next=NULL;
    ptr->next=New;
    ptr=ptr->next;
    printf("Do you want to add another node? (Y/N) ");
    scanf("%c", &c);
    scanf("%c", &c);
  }
  printf("given data: \n");
  ptr=Head;
  while(ptr!=NULL){
    printf("%d\t", ptr->data);
    ptr=(ptr->next)->next;

  }
  return 0;
}
```

Output:



```
Enter the value: 30
Do you want to add another node? (Y/N) y
Enter the value: 40
Do you want to add another node? (Y/N) y
Enter the value: 50
Do you want to add another node? (Y/N) y
Enter the value: 60
Do you want to add another node? (Y/N) n
given data:
30      50
Press any key to continue . . .
```

Q4. WAP to Create a linked list and insert a new node as per the users choice.

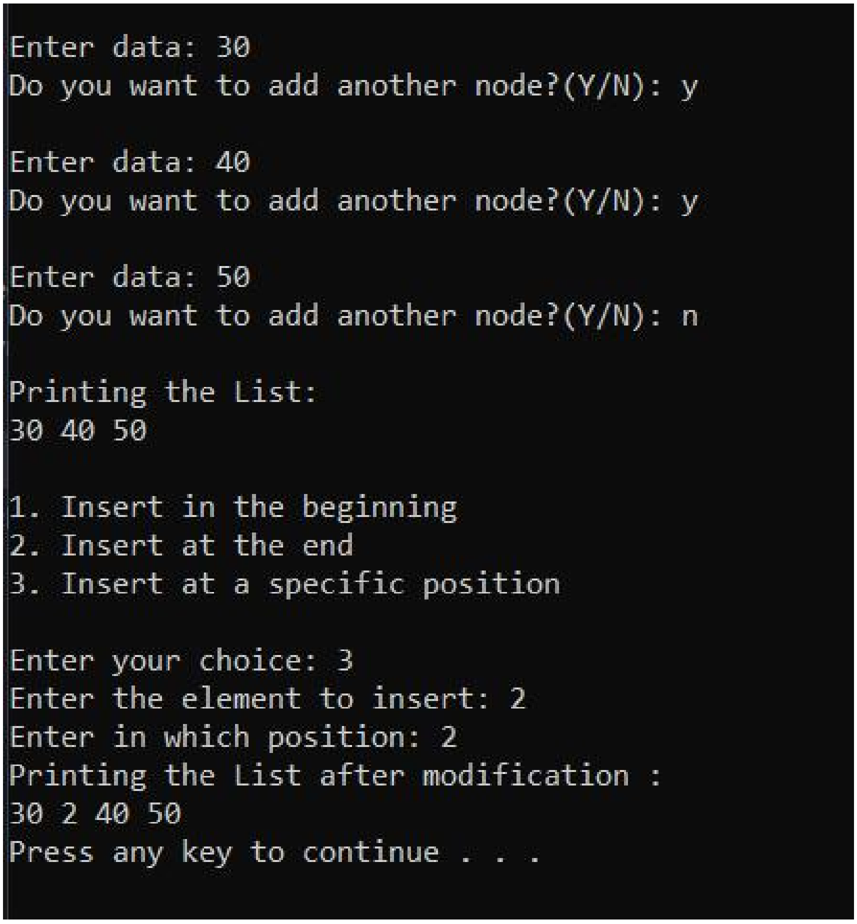
```
//Q4 Insert
#include <stdio.h>
#include <stdlib.h>

struct Node{
    int data;
    struct Node* next;
};
```

```
void display(struct Node* ptr){
   while(ptr != NULL){
      printf("%d ", ptr->data);
      ptr = ptr->next;
   }
}

struct Node* insertbegin(struct Node* HEAD){
   int new;
   printf ("Enter the element to insert in the begining: ");
   scanf ("%d", &new);
   struct Node* ptr = (struct Node*)malloc(sizeof(struct Node));
   ptr->next = HEAD;
   ptr->data = new;
   return ptr;
}
struct Node* insertAtEnd(struct Node* HEAD){
   int new;
   printf("Enter the element to insert at the end: ");
   scanf ("%d", &new);
   struct Node* ptr = (struct Node*)malloc(sizeof(struct Node));
   struct Node* p = HEAD;
   while (p->next!=NULL)
   {
      p = p->next;
   }
   ptr->data = new;
   p->next = ptr;
   ptr->next = NULL;
   return HEAD;
}
struct Node* insertAtPos(struct Node* HEAD){
   int pos, new;
   printf ("Enter the element to insert: ");
   scanf ("%d", &new);
```

```
    printf ("Enter in which position: ");
    scanf ("%d", &pos);
    struct Node* ptr = (struct Node*)malloc(sizeof(struct Node));
    struct Node* p = HEAD;
    int i = 0;
    while (i != pos-2)
    {
        p = p->next;
        i++;
    }
    ptr->data = new;
    ptr->next = p->next;
    p->next = ptr;
    return HEAD;
}

int main()
{
    struct Node *HEAD;
    struct Node *NEW;
    struct Node *PTR;

    char choice;
    HEAD = NULL;
    NEW = (struct Node *)malloc(sizeof(struct Node));

    printf("\nEnter data: ");
    scanf("%d", &NEW->data);
    fflush(stdin);
    NEW->next = NULL;
    HEAD = NEW;
    PTR = HEAD;
    printf("Do you want to add another node?(Y/N): ");
    scanf("%c", &choice);
    while (choice == 'Y' || choice == 'y')
```

```
{
   NEW = (struct Node *)malloc(sizeof(struct Node));
   printf("\nEnter data: ");
   scanf("%d", &NEW->data);
   fflush(stdin);
   NEW->next = NULL;
   PTR->next = NEW;
   PTR = PTR->next;
   printf("Do you want to add another node?(Y/N): ");
   scanf("%c", &choice);
}
PTR = HEAD;
printf("\nPrinting the List: \n");
while (PTR != NULL)
{
   printf("%d ", PTR->data);
   PTR = PTR->next;
}
printf("\n\n");

printf ("1. Insert in the beginning\n");
printf ("2. Insert at the end\n");
printf ("3. Insert at a specific position\n");
printf ("\nEnter your choice: ");
scanf ("%d", &choice);

switch (choice)
{
case 1:
   HEAD = insertbegin(HEAD);
   break;
case 2:
   HEAD = insertAtEnd(HEAD);
   break;
case 3:
        HEAD = insertAtPos(HEAD);
        break;
    default:
        printf("\nError: Invalid input\n");
        exit(0);
        break;
    }

    printf("Printing the List after modification : \n");
    display(HEAD);
}
```

Output:



```
Enter data: 30
Do you want to add another node?(Y/N): y

Enter data: 40
Do you want to add another node?(Y/N): y

Enter data: 50
Do you want to add another node?(Y/N): n

Printing the List:
30 40 50

1. Insert in the beginning
2. Insert at the end
3. Insert at a specific position

Enter your choice: 3
Enter the element to insert: 2
Enter in which position: 2
Printing the List after modification :
30 2 40 50
Press any key to continue . . .
```

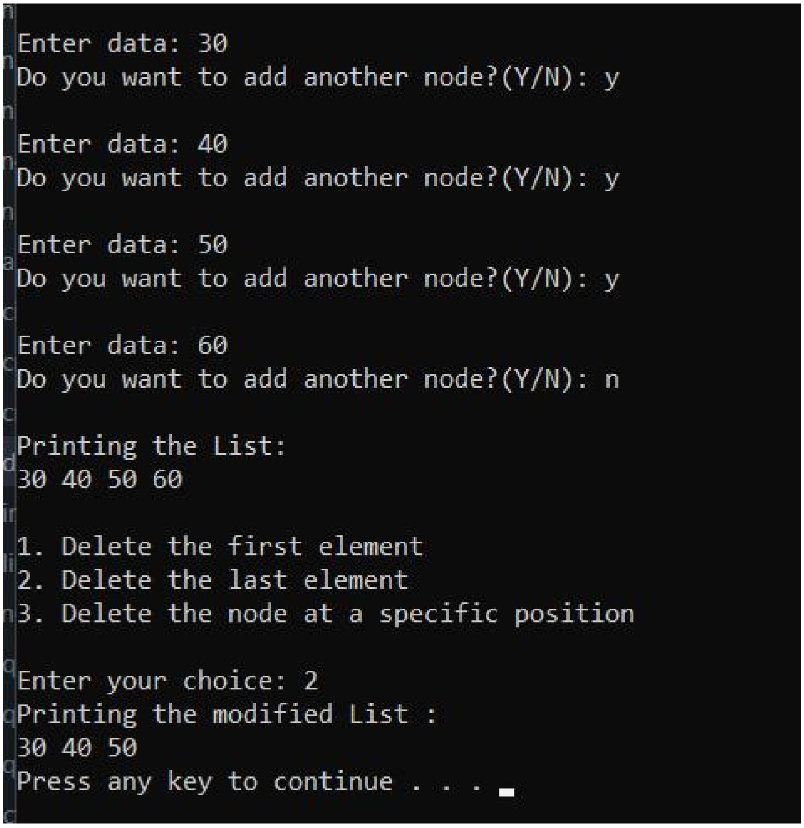
Q5. WAP to Create a linked list and delete a new node as per the users choice.

```
#include <stdio.h>
#include <stdlib.h>

struct Node{
   int data;
   struct Node* next;
};

void display(struct Node* ptr){
   while(ptr != NULL){
      printf("%d ", ptr->data);
      ptr = ptr->next;
   }
}
struct Node* deletestart(struct Node *HEAD)
{
   struct Node *p = HEAD;
   p = p->next;
   free(HEAD);

   return p;
}
struct Node* deleteAtPos(struct Node* HEAD){
   int pos;
   printf("Enter the position: ");
   scanf("%d", &pos);
        struct Node* ptr = HEAD;
        int i=0;
        while(i!=pos-2){
                ptr = ptr->next;
                i++;
        }
        struct Node* p = ptr->next;
        ptr->next = p->next;
        free(p);
        return HEAD;
}

struct Node* deleteEnd(struct Node* head){
    struct Node* ptr = head;
    struct Node* temp;
    ptr = head;

    while ((ptr->next)->next != NULL)
    {
        ptr = ptr->next;
    }
    temp = ptr->next;
    ptr->next = NULL;
    free(temp);
    return head;
}

int main()
{
    struct Node *HEAD;
    struct Node *NEW;
    struct Node *PTR;

    char choice;
    HEAD = NULL;
    NEW = (struct Node *)malloc(sizeof(struct Node));

    printf("\nEnter data: ");
    scanf("%d", &NEW->data);
    fflush(stdin);
    NEW->next = NULL;
    HEAD = NEW;
```

```
PTR = HEAD;
printf("Do you want to add another node?(Y/N): ");
scanf("%c", &choice);
while (choice == 'Y' || choice == 'y')
{
   NEW = (struct Node *)malloc(sizeof(struct Node));
   printf("\nEnter data: ");
   scanf("%d", &NEW->data);
   fflush(stdin);
   NEW->next = NULL;
   PTR->next = NEW;
   PTR = PTR->next;
   printf("Do you want to add another node?(Y/N): ");
   scanf("%c", &choice);
}
PTR = HEAD;
printf("\nPrinting the List: \n");
while (PTR != NULL)
{
   printf("%d ", PTR->data);
   PTR = PTR->next;
}
printf("\n\n");

printf ("1. Delete the first element\n");
printf ("2. Delete the last element\n");
printf ("3. Delete the node at a specific position\n");
printf ("\nEnter your choice: ");
scanf ("%d", &choice);

switch (choice)
{
case 1:
   HEAD = deletestart(HEAD);
   break;
```

```
    case 2:
      HEAD = deleteEnd(HEAD);
      break;
    case 3:
      HEAD = deleteAtPos(HEAD);
      break;
    default:
      printf("\nError: Invalid input\n");
      exit(0);
      break;
    }

    printf("Printing the modified List : \n");
    display(HEAD);
    return 0;
}
```

Output:



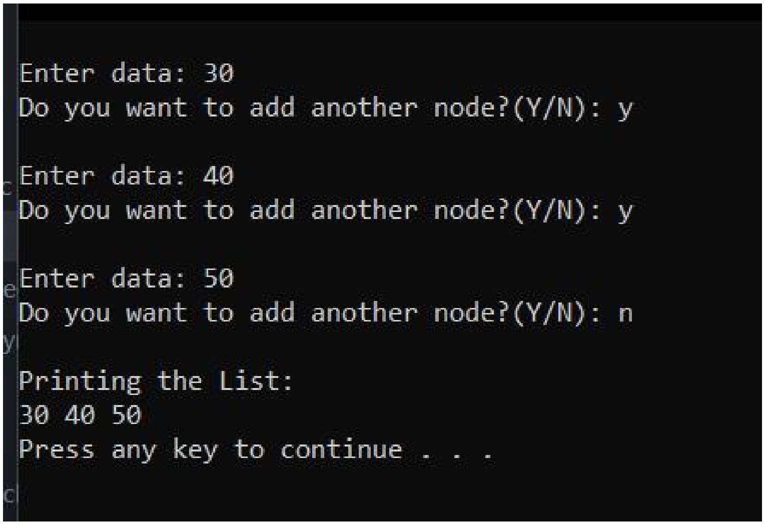
```
Enter data: 30
Do you want to add another node?(Y/N): y

Enter data: 40
Do you want to add another node?(Y/N): y

Enter data: 50
Do you want to add another node?(Y/N): y

Enter data: 60
Do you want to add another node?(Y/N): n

Printing the List:
30 40 50 60

1. Delete the first element
2. Delete the last element
3. Delete the node at a specific position

Enter your choice: 2
Printing the modified List :
30 40 50
Press any key to continue . . .
```

Q6. WAP to create a circular linked list and print all the elements.

```
#include <stdio.h>
#include <stdlib.h>
struct Node
{
   int data;
   struct Node *next;
};

int main(void)
{
   struct Node *HEAD;
   struct Node *NEW;
   struct Node *PTR;

   char choice;
   NEW = (struct Node *)malloc(sizeof(struct Node));

   printf("\nEnter data: ");
   scanf("%d", &NEW->data);
   fflush(stdin);
   NEW->next = HEAD;
   HEAD = NEW;
   PTR = HEAD;
   printf("Do you want to add another node?(Y/N): ");
   scanf("%c", &choice);
   while (choice == 'Y' || choice == 'y')
   {
      NEW = (struct Node *)malloc(sizeof(struct Node));
      printf("\nEnter data: ");
      scanf("%d", &NEW->data);
      fflush(stdin);
      NEW->next = HEAD;
      PTR->next = NEW;
```

```
        PTR = PTR->next;
        printf("Do you want to add another node?(Y/N): ");
        scanf("%c", &choice);
    }
    PTR = HEAD;
    printf("\nPrinting the List: \n");
    do{
        printf("%d ", PTR->data);
        PTR = PTR->next;
    }while (PTR != HEAD);
    return 0;
}
```

Output:

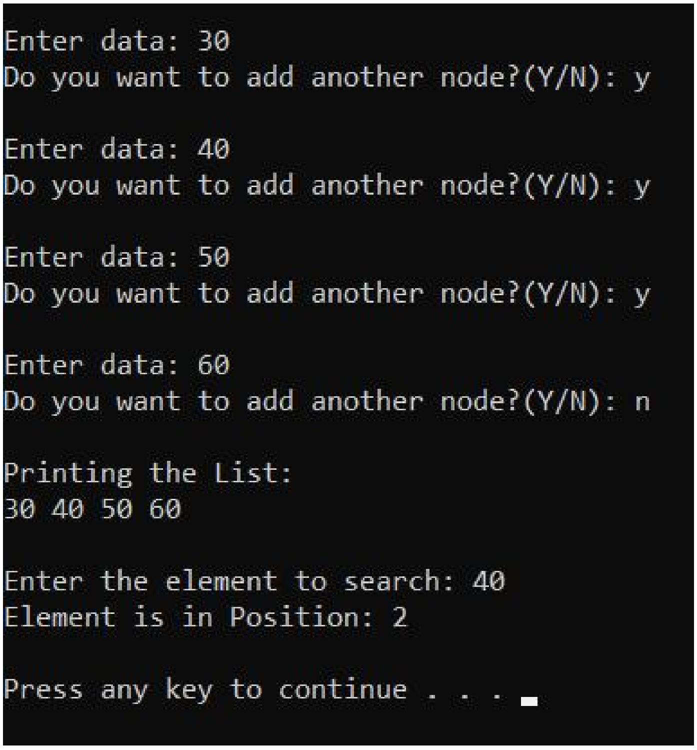


```
Enter data: 30
Do you want to add another node?(Y/N): y

Enter data: 40
Do you want to add another node?(Y/N): y

Enter data: 50
Do you want to add another node?(Y/N): n

Printing the List:
30 40 50
Press any key to continue . . .
```

Q7. WAP to create a linked list and perform linear search.

```
#include <stdio.h>
#include <stdlib.h>
struct Node
{
    int data;
    struct Node *next;
};

void display(struct Node* ptr)
{
    printf("\nPrinting the List: \n");
    while (ptr != NULL)
    {
        printf("%d ", ptr->data);
        ptr = ptr->next;
    }
}

int LinearSearch(struct Node* head, int item)
{
    struct Node* ptr = head;
    int pos = 1;
    while (ptr != NULL)
    {
        if (ptr->data == item){
            return pos;
        }
        ptr = ptr->next;
        pos++;
    }
    return -1;
}

int main(void)
{
    struct Node *HEAD;
    struct Node *NEW;
    struct Node *PTR;

    char choice;
    HEAD = NULL;
    NEW = (struct Node *)malloc(sizeof(struct Node));

    printf("\nEnter data: ");
    scanf("%d", &NEW->data);
    fflush(stdin);
    NEW->next = NULL;
    HEAD = NEW;
    PTR = HEAD;
    printf("Do you want to add another node?(Y/N): ");
    scanf("%c", &choice);
    while (choice == 'Y' || choice == 'y')
    {
        NEW = (struct Node *)malloc(sizeof(struct Node));
        printf("\nEnter data: ");
        scanf("%d", &NEW->data);
        fflush(stdin);
        NEW->next = NULL;
        PTR->next = NEW;
        PTR = PTR->next;
        printf("Do you want to add another node?(Y/N): ");
        scanf("%c", &choice);
    }
    display(HEAD);

    int x;
    printf ("\n\nEnter the element to search: ");
    scanf ("%d", &x);
    x = LinearSearch(HEAD, x);
    if (x!=-1)
    printf ("Element is in Position: %d\n", x);
    else
    printf ("Element not found\n");

    return 0;
}
```

Output:



```
Enter data: 30
Do you want to add another node?(Y/N): y

Enter data: 40
Do you want to add another node?(Y/N): y

Enter data: 50
Do you want to add another node?(Y/N): y

Enter data: 60
Do you want to add another node?(Y/N): n

Printing the List:
30 40 50 60

Enter the element to search: 40
Element is in Position: 2

Press any key to continue . . .
```