

Data Structures and Algorithms

Lab Report

Lab04



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Class	Data Structures and Algorithms CSC211 (BCE-3B)
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In Lab Tasks

Task:1

Debugging code for errors.

Solution:

I debugged the code and resolved the issues, the code had four syntax errors with the prototypes.

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Task:2

Implementing Node Removal and Node Insertion Tasks

Solution

The code is shown below,

DELETING FROM THE BEGINING

The code is shown below,

```
void deleteNodeFromStart(struct node_d ** head)
{
    /**/ To be completed by the students ***/
    struct node_d * move=*head;
    struct node_d * stat=*head;
    struct node_d * prevvv;
    while(move->next!=stat)
    {
        move=move->next;
    }

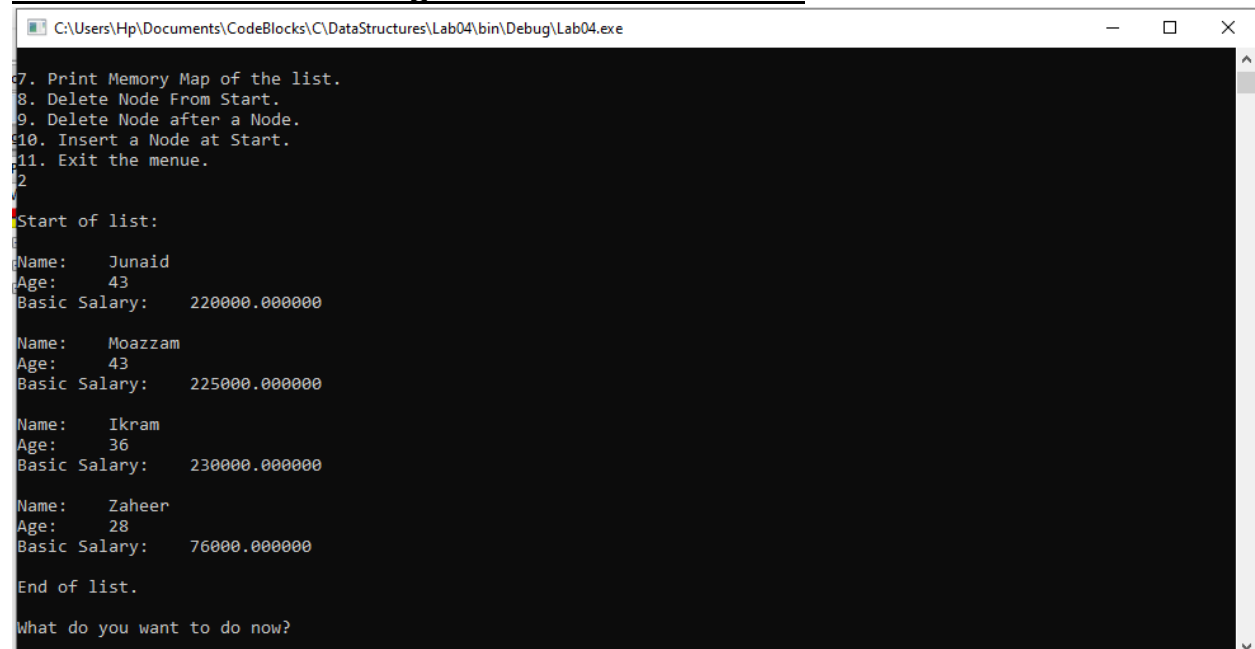
    move->next=stat->next;
    prevvv=stat->next;

    prevvv->prev=move;
    free(*head);
    *head=move->next;

    (*head)->prev=move;

    printf("\nNode from start deleted Successfully\n\n");
}
```

The Result of the following code is attached below:



```
C:\Users\Hp\Documents\CodeBlocks\C\DataStructures\Lab04\bin\Debug\Lab04.exe
7. Print Memory Map of the list.
8. Delete Node From Start.
9. Delete Node after a Node.
10. Insert a Node at Start.
11. Exit the menu.
12
v
Start of list:
Name: Junaid
Age: 43
Basic Salary: 220000.000000

Name: Moazzam
Age: 43
Basic Salary: 225000.000000

Name: Ikram
Age: 36
Basic Salary: 230000.000000

Name: Zaheer
Age: 28
Basic Salary: 76000.000000

End of list.

What do you want to do now?
```

DELETING AFTER A NODE

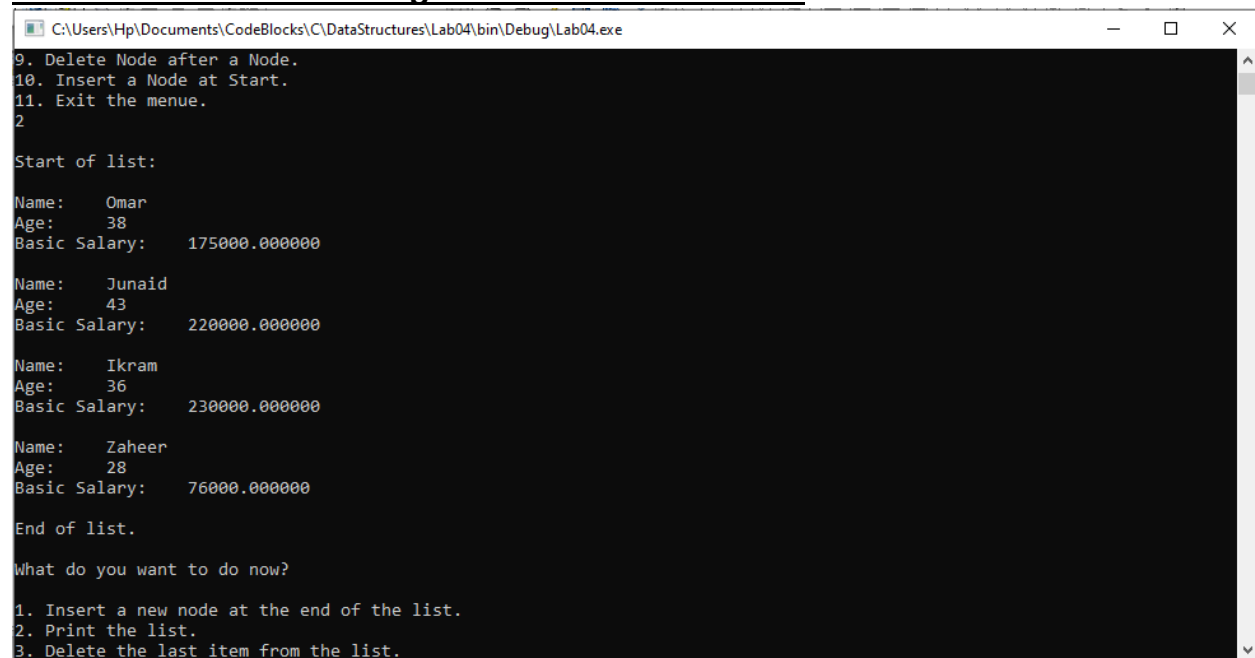
The code is shown below,

```
int deleteNodeAfter(struct node_d * head, int idx)
{
    /** To be completed by the students ***/
    int index=1;
    struct node_d *temp=head;
    struct node_d *del;
    struct node_d *a;
    struct node_d *b;
    while((temp->next!=NULL)&&(index!=idx))
    {
        temp=temp->next;
        index++;
    }

    del=temp->next;
    a=del->next;
    b=del->prev;

    a->prev=b;
    b->next=a;
    //head=temp->next->next;
    free(del);
    return(0);
}
```

The Result of the following code is attached below:



```
C:\Users\Hp\Documents\CodeBlocks\C\DataStructures\Lab04\bin\Debug\Lab04.exe
9. Delete Node after a Node.
10. Insert a Node at Start.
11. Exit the menu.
2

Start of list:

Name: Omar
Age: 38
Basic Salary: 175000.000000

Name: Junaaid
Age: 43
Basic Salary: 220000.000000

Name: Ikram
Age: 36
Basic Salary: 230000.000000

Name: Zaheer
Age: 28
Basic Salary: 76000.000000

End of list.

What do you want to do now?

1. Insert a new node at the end of the list.
2. Print the list.
3. Delete the last item from the list.
```

INSERT A NODE AT START

The code is shown below,

```
void insertNodeAtStart(struct node_d ** head)
{
    /*** To be completed by the students ***/
    if(head==NULL)
    {
        *head= (struct node_d *) malloc(sizeof(struct node_d));

    }

    struct node_d * prevhead=*head;
    struct node_d * temp=*head;

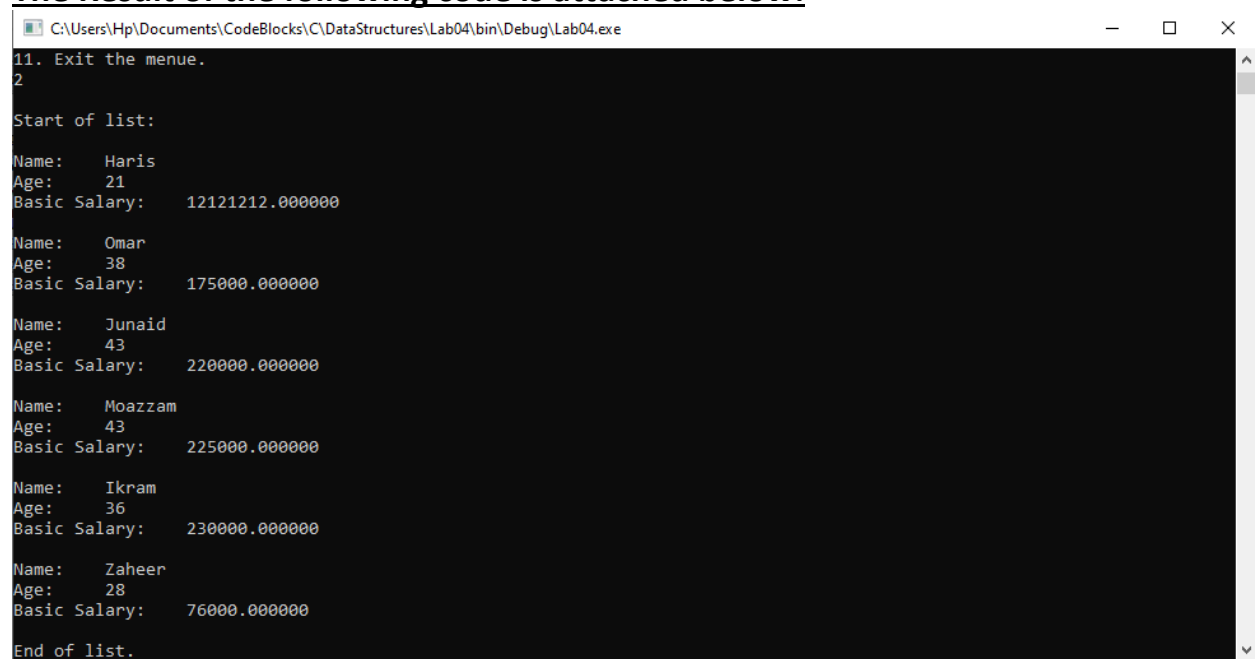
    struct node_d * new_node=(struct node_d *)malloc(sizeof(struct node_d));
    inputNodeData(new_node);

    free(head);
    *head=new_node;
    (*head)->next=temp;
    (*head)->prev=temp->prev;

    while(temp->next!=prevhead)
    {
        temp=temp->next;
    }

    temp->next=*head;
}
```

The Result of the following code is attached below:



```
C:\Users\Hp\Documents\CodeBlocks\C\DataStructures\Lab04\bin\Debug\Lab04.exe
11. Exit the menu.
2

Start of list:

Name:   Haris
Age:    21
Basic Salary:  12121212.000000

Name:   Omar
Age:    38
Basic Salary:  175000.000000

Name:   Junaaid
Age:    43
Basic Salary:  220000.000000

Name:   Moazzam
Age:    43
Basic Salary:  225000.000000

Name:   Ikram
Age:    36
Basic Salary:  230000.000000

Name:   Zaheer
Age:    28
Basic Salary:  76000.000000

End of list.
```

PRINTING MEMORY MAP

The code is shown below,

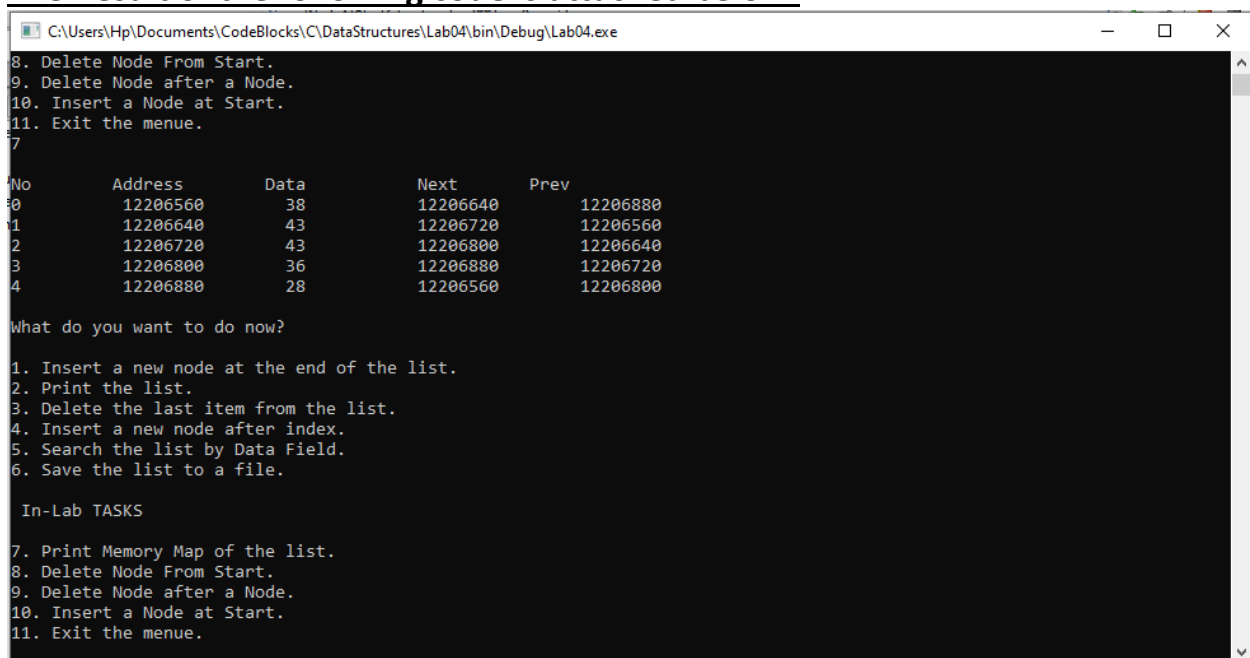
```
void printMemMap(struct node_d * head)
{
    /** To be completed by the students **/
    struct node_d *temp=head;
    struct node_d *fixedhead=head;

    int i=0;
    printf("\nNo      Address      Data      Next      Prev  \n");

    while(temp->next!=fixedhead)
    {
        printf("%d      %u      %d      %u      %u      \n",i,&temp->data,temp->data.age,temp->next,temp->prev);

        temp=temp->next;
        i++;
    }
    printf("%d      %u      %d      %u      %u      \n",i,&temp->data,temp->data.age,temp->next,temp->prev);
}
```

The Result of the following code is attached below:



```
C:\Users\Hp\Documents\CodeBlocks\C\DataStructures\Lab04\bin\Debug\Lab04.exe
8. Delete Node From Start.
9. Delete Node after a Node.
10. Insert a Node at Start.
11. Exit the menu.
7
No      Address      Data      Next      Prev
0       12206560      38       12206640      12206880
1       12206640      43       12206720      12206560
2       12206720      43       12206800      12206640
3       12206800      36       12206880      12206720
4       12206880      28       12206560      12206800

What do you want to do now?
1. Insert a new node at the end of the list.
2. Print the list.
3. Delete the last item from the list.
4. Insert a new node after index.
5. Search the list by Data Field.
6. Save the list to a file.

In-Lab TASKS
7. Print Memory Map of the list.
8. Delete Node From Start.
9. Delete Node after a Node.
10. Insert a Node at Start.
11. Exit the menu.
```

POST LAB

Question no:3

Learn more about at the Josephus Problem from the following links and make a Circular Doubly Linked List simulation of this problem. (Your program should print the remaining people in each iteration).

Solution

The code is shown below for the given program and its results are given below,

```
int josephus(int m,node *front)
{
    node *f;
    int c=1;
    while(front->next!=front)
    {
        c=1;
        while(c!=m)
        {
            f=front;
            front=front->next;
            c++;
        }
        f->next=front->next;
        printf("%d->",front->data); //sequence in which nodes getting deleted
        front=f->next;
    }
    printf("\n");
    printf("Winner is:%d\n",front->data);
    return;
}
```

The Result of the following code is attached below:

C:\Users\Hp\Documents\CodeBlocks\C\DataStructures\joseph\bin\Debug\joseph.exe

enter the value of n:

5

enter the value of m:

7

circular linklist is:

1->2->3->4->5

2->5->1->3->

Winner is:4

Process returned 12 (0xC) execution time : 6.882 s

Press any key to continue.

THE END