***DSA EXPERIMENT -05***

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*CODE:*

#include <stdio.h>

#include <stdlib.h>

#include <malloc.h>

typedef struct node

{

int data;

struct node \*next;

} node;

node \*createList();

node \*Insert\_beg(node \*head, int x);

node \*Insert\_end(node \*head, int x);

node \*Insert\_mid(node \*head, int x);

node \*Delete\_beg(node \*head);

node \*Delete\_end(node \*head);

node \*Delete\_mid(node \*head);

void PrintList(node \*head);

void main()

{

int choice, insert\_option, delete\_option, x;

node \*head = NULL;

printf("Welcome to the implementation of the singly linked list ! \n");

do

{

printf("Please select an operation to perform from the below list \n");

printf(" 1. Create a List \n 2. Insert a node \n 3. Delete a node \n 4. Print the existing list \n 5. Exit \n");

printf("Enter your choice: ");

scanf("%d", &choice);

printf("\n \n");

switch (choice)

{

case 1:

head = createList();

break;

case 2:

do

{

printf("Select a position where you to want to insert new node \n");

printf(" 1. Beginning of the List \n 2. At the end of the list \n 3. Insert in between \n 4. Exit the insert operation \n");

printf("Enter your choice: ");

scanf("%d", &insert\_option);

switch (insert\_option)

{

case 1:

printf("Enter the data to be inserted: ");

scanf("%d", &x);

head = Insert\_beg(head, x);

break;

case 2:

printf("Enter the data to be inserted: ");

scanf("%d", &x);

head = Insert\_end(head, x);

break;

case 3:

printf("Enter the data to be inserted: ");

scanf("%d", &x);

head = Insert\_mid(head, x);

break;

case 4:

printf("Insert operation Exit");

break;

default:

printf("Please enter a valid choide: 1, 2, 3, 4");

}

} while (insert\_option != 4);

printf("\n \n");

break;

case 3:

do

{

printf("Select a position from where you to want to delete the element \n");

printf(" 1. Beginning of the List \n 2. At the end of the list \n 3. Somewhere in between \n 4. Exit the delete operation \n");

printf("Enter your choice: ");

scanf("%d", &delete\_option);

switch (delete\_option)

{

case 1:

head = Delete\_beg(head);

break;

case 2:

head = Delete\_end(head);

break;

case 3:

head = Delete\_mid(head);

break;

case 4:

printf("Delete Operation Exit");

break;

default:

printf("Please enter a valid choide: 1, 2, 3, 4");

}

} while (delete\_option != 4);

printf("\n \n");

break;

case 4:

PrintList(head);

break;

case 5:

printf("Exit: Program Finished !!");

break;

default:

printf("Please enter a valid choide: 1, 2, 3, 4, 5");

}

} while (choice != 5);

}

node \*createList()

{

node \*head, \*p;

int i, n;

head = NULL;

printf("Enter the number of nodes: ");

scanf("%d", &n);

printf("Enter the data: ");

for (i = 0; i <= n - 1; i++)

{

if (head == NULL)

{

p = head = (node \*)malloc(sizeof(node));

}

else

{

p->next = (node \*)malloc(sizeof(node));

p = p->next;

}

p->next = NULL;

scanf("%d", &(p->data));

}

printf("\n \n");

return (head);

}

node \*Insert\_beg(node \*head, int x)

{

node \*p;

p = (node \*)malloc(sizeof(node));

p->data = x;

p->next = head;

head = p;

return (head);

}

node \*Insert\_end(node \*head, int x)

{

node \*p, \*q;

p = (node \*)malloc(sizeof(node));

p->data = x;

p->next = NULL;

if (head == NULL)

return (p);

for (q = head; q->next != NULL; q = q->next)

;

q->next = p;

return (head);

}

node \*Insert\_mid(node \*head, int x)

{

node \*p, \*q;

int y;

p = (node \*)malloc(sizeof(node));

p->data = x;

p->next = NULL;

printf("After which element you want to insert the new element ?");

scanf("%d", &y);

for (q = head; q != NULL && q->data != y; q = q->next)

;

if (q != NULL)

{

p->next = q->next;

q->next = p;

}

else

printf("ERROR !! Data Not Found");

return (head);

}

node \*Delete\_beg(node \*head)

{

node \*p, \*q;

if (head == NULL)

{

printf("Empty Linked List");

return (head);

}

p = head;

head = head->next;

free(p);

return (head);

}

node \*Delete\_end(node \*head)

{

node \*p, \*q;

if (head == NULL)

{

printf("Empty Linked List");

return (head);

}

p = head;

if (head->next == NULL)

{

head = NULL;

free(p);

return (head);

}

for (q = head; q->next->next != NULL; q = q->next)

p = q->next;

q->next = NULL;

free(p);

return (head);

}

node \*Delete\_mid(node \*head)

{

node \*p, \*q;

int x, i;

if (head == NULL)

{

printf("Empty Linked List");

return (head);

}

printf("Enter the data to be deleted: ");

scanf("%d", &x);

if (head->data == x)

{

p = head;

head = head->next;

free(p);

return (head);

}

for (q = head; q->next->data != x && q->next != NULL; q = q->next)

if (q->next == NULL)

{

printf("ERROR !! Data Not Found");

return (head);

}

p = q->next;

q->next = q->next->next;

free(p);

return (head);

}

void PrintList(node \*head)

{

node \*p;

printf("[ ");

for (p = head; p != NULL; p = p->next)

{

printf("%d \t", p->data);

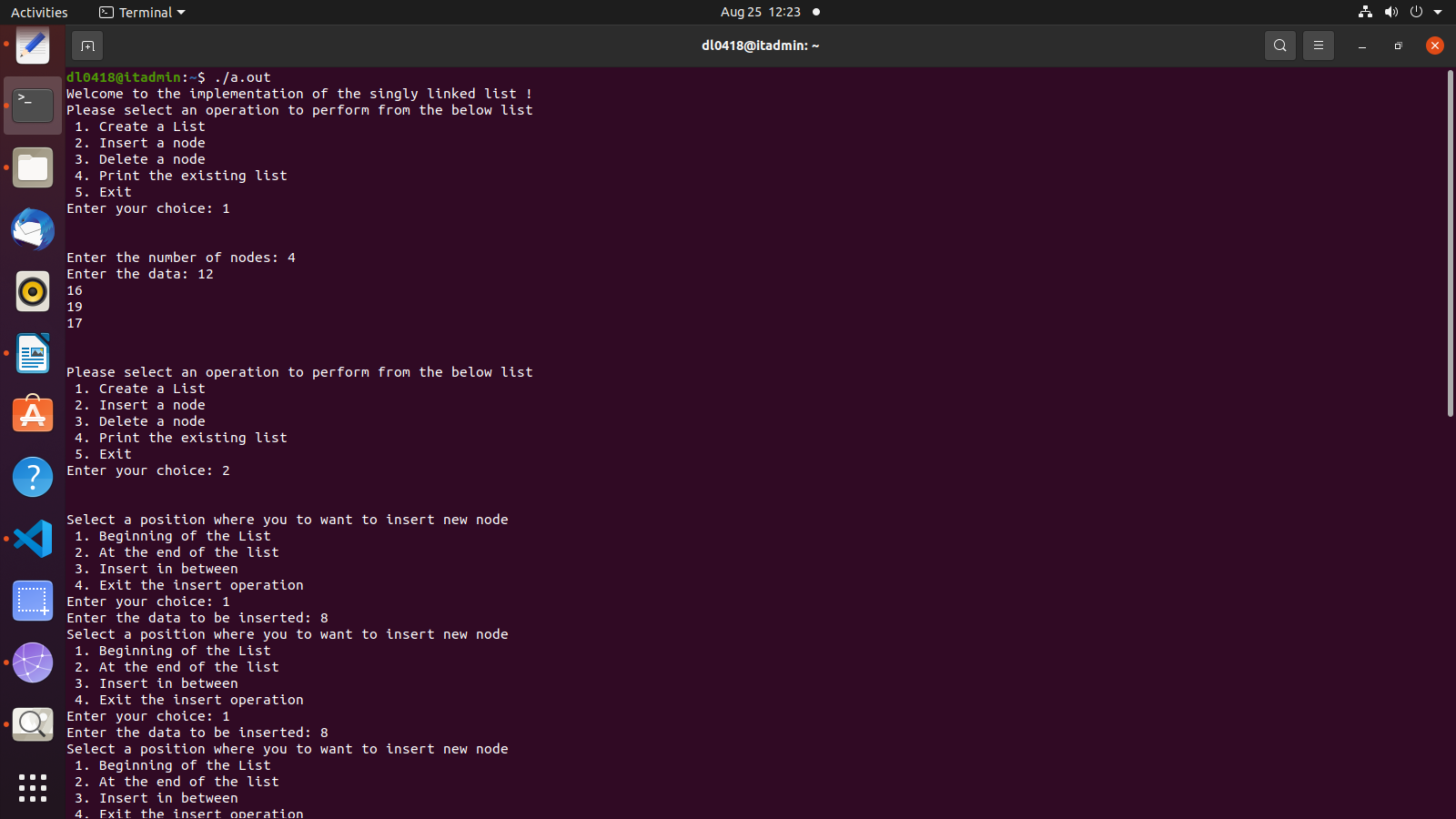
}

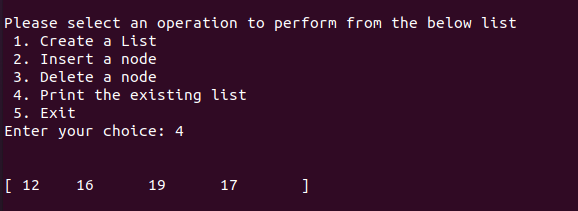
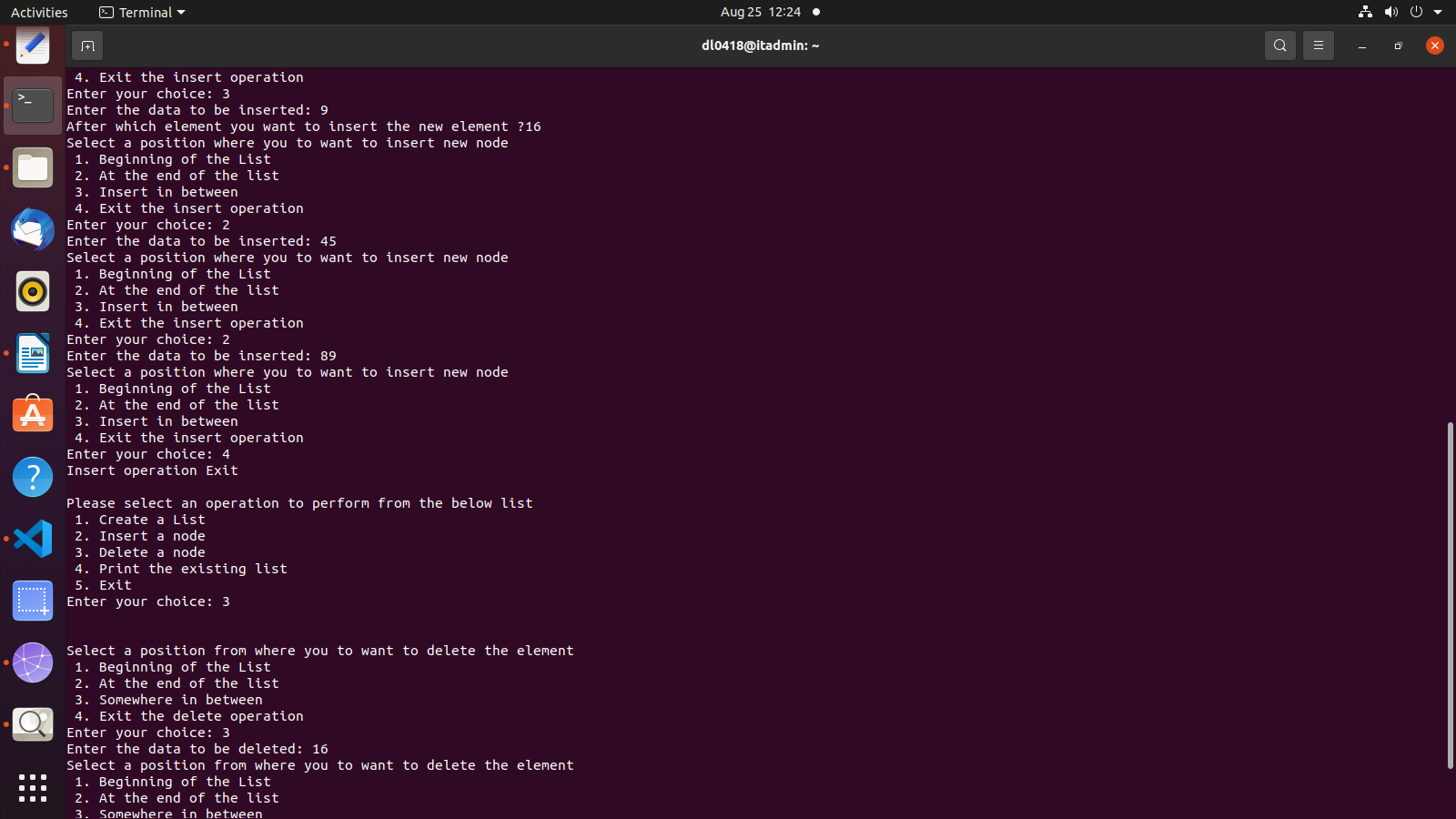
printf(" ]");

printf("\n \n");

}

OUTPUT:



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