COMSATS University Islamabad, Vehari Campus

Department of Computer Science

Class: BCS-SP22(A) **Submission Deadline: 9 Oct 2023**

Subject: Data Structures and Algorithms-Lab **Instructor: Yasmeen Jana**

Reg. No: SP22-BCS-035

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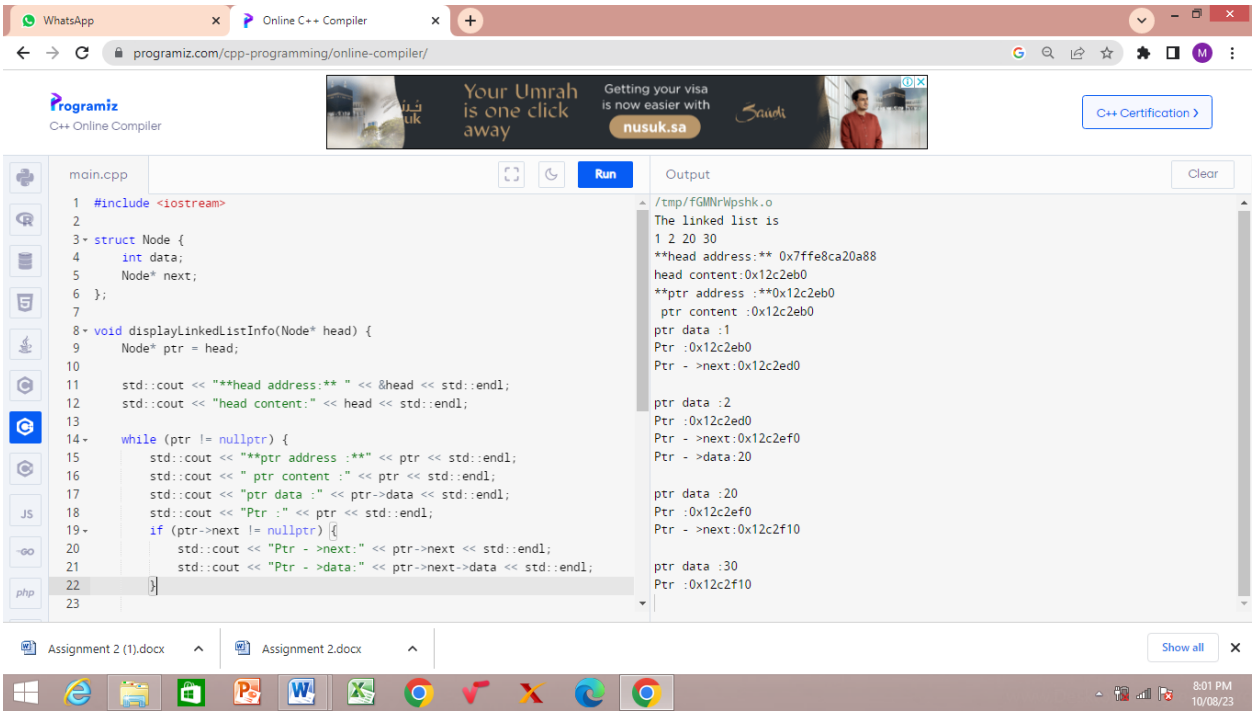
Activity 01

```
#include <iostream>


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


void displayLinkedListInfo(Node* head) {
   Node* ptr = head;


   std::cout << "**head address:** " << &head << std::endl;
   std::cout << "head content:" << head << std::endl;
```

```
    while (ptr != nullptr) {
        std::cout << "**ptr address :**" << ptr << std::endl;
        std::cout << " ptr content :" << ptr << std::endl;
        std::cout << "ptr data :" << ptr->data << std::endl;
        std::cout << "Ptr :" << ptr << std::endl;
        if (ptr->next != nullptr) {
            std::cout << "Ptr - >next:" << ptr->next << std::endl;
            std::cout << "Ptr - >data:" << ptr->next->data << std::endl;
        }

        ptr = ptr->next;
    }
}

int main() {

    Node* head = new Node{1, nullptr};
    head->next = new Node{2, nullptr};
    head->next->next = new Node{20, nullptr};
    head->next->next->next = new Node{30, nullptr};

    displayLinkedListInfo(head);

    while (head != nullptr) {
        Node* temp = head;
        head = head->next;
        delete temp;
    }
```

```
    return 0;
}
```



Activity 02

```
#include <iostream>

using namespace std;


struct Node {

    int data;

    Node* next;

};
```

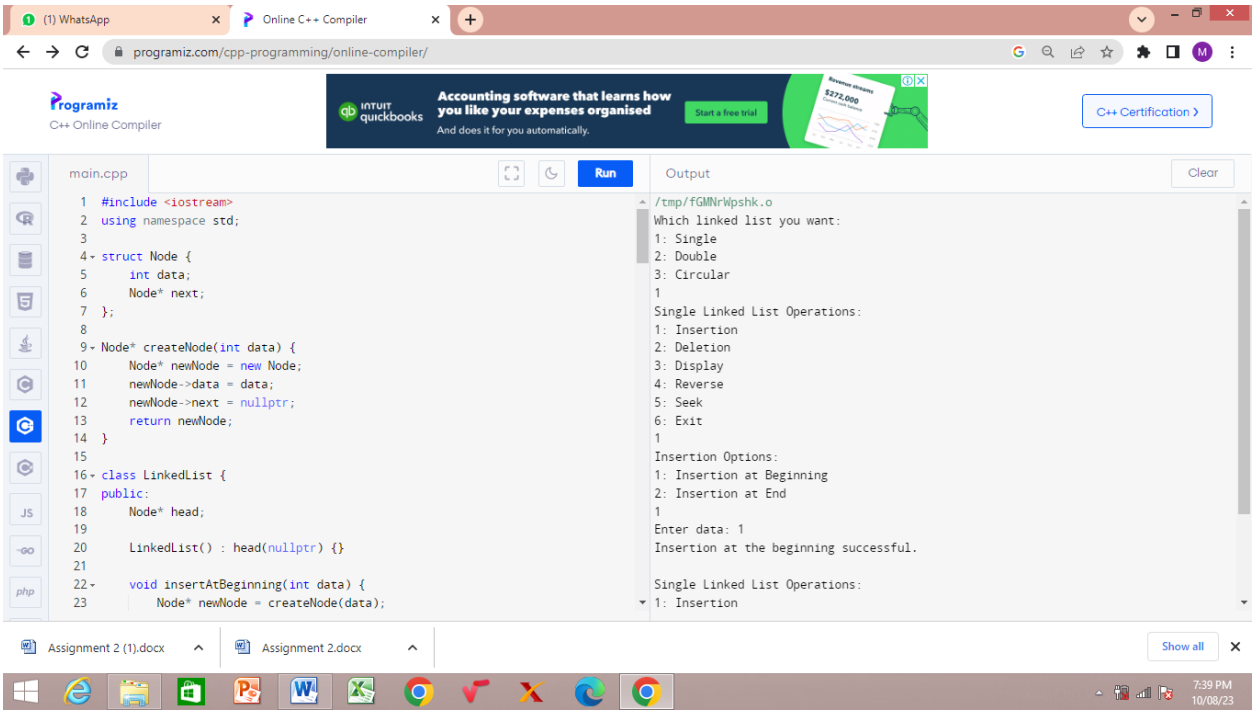
```
Node* createNode(int data) {
    Node* newNode = new Node;
    newNode->data = data;
    newNode->next = nullptr;
    return newNode;
}

class LinkedList {
public:
    Node* head;

    LinkedList() : head(nullptr) {}

    void insertAtBeginning(int data) {
        Node* newNode = createNode(data);
        newNode->next = head;
        head = newNode;
        cout << "Insertion at the beginning successful." << endl;
    }

    void insertAtEnd(int data) {
        Node* newNode = createNode(data);
        if (!head) {
            head = newNode;
            cout << "Insertion at the end successful." << endl;
            return;
        }
        Node* current = head;
        while (current->next) {
            current = current->next;
```

```
    }
    current->next = newNode;
    cout << "Insertion at the end successful." << endl;
}

void deleteNode(int data) {
    if (!head) {
        cout << "List is empty. Deletion not possible." << endl;
        return;
    }
    if (head->data == data) {
        Node* temp = head;
        head = head->next;
        delete temp;
        cout << "Deletion successful." << endl;
        return;
    }
    Node* current = head;
    while (current->next) {
        if (current->next->data == data) {
            Node* temp = current->next;
            current->next = current->next->next;
            delete temp;
            cout << "Deletion successful." << endl;
            return;
        }
        current = current->next;
    }
    cout << "Element not found. Deletion not possible." << endl;
}
```

```
    void reverse() {
        Node* prev = nullptr;
        Node* current = head;
        Node* nextNode = nullptr;

        while (current) {
            nextNode = current->next;
            current->next = prev;
            prev = current;
            current = nextNode;
        }

        head = prev;
        cout << "Reversal successful." << endl;
    }

    void display() {
        Node* current = head;
        while (current) {
            cout << current->data << " -> ";
            current = current->next;
        }
        cout << "nullptr" << endl;
    }
};

int main() {
    LinkedList singleLinkedList;

    while (true) {
        cout << "Which linked list you want:" << endl;
```

```
cout << "1: Single" << endl;
cout << "2: Double" << endl;
cout << "3: Circular" << endl;

int listChoice;
cin >> listChoice;

if (listChoice == 1) {
    int choice;
    while (true) {
        cout << "\nSingle Linked List Operations:" << endl;
        cout << "1: Insertion" << endl;
        cout << "2: Deletion" << endl;
        cout << "3: Display" << endl;
        cout << "4: Reverse" << endl;
        cout << "5: Seek" << endl;
        cout << "6: Exit" << endl;

        cin >> choice;

        if (choice == 1) {
            int insertionChoice;
            cout << "Insertion Options:" << endl;
            cout << "1: Insertion at Beginning" << endl;
            cout << "2: Insertion at End" << endl;
            cin >> insertionChoice;

            if (insertionChoice == 1) {
                int data;
                cout << "Enter data: ";
                cin >> data;
```

```
                singleLinkedList.insertAtBeginning(data);
            } else if (insertionChoice == 2) {
                int data;
                cout << "Enter data: ";
                cin >> data;
                singleLinkedList.insertAtEnd(data);
            }
        } else if (choice == 2) {
            int data;
            cout << "Enter data to delete: ";
            cin >> data;
            singleLinkedList.deleteNode(data);
        } else if (choice == 3) {
            singleLinkedList.display();
        } else if (choice == 4) {
            singleLinkedList.reverse();
        } else if (choice == 5) {
            // Handle seek option
        } else if (choice == 6) {
            // Exit the program
            return 0;
        } else {
            cout << "Invalid choice. Please enter a valid option." << endl;
        }
      }
    }
  }

  return 0;
}
```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Online C++ Compiler
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main.cpp
Run
Output
Clear
#include <iostream>
using namespace std;
struct Node {
int data;
Node* next;
};
Node* createNode(int data) {
Node* newNode = new Node;
newNode->data = data;
newNode->next = nullptr;
return newNode;
}
class LinkedList {
public:
Node* head;
LinkedList() : head(nullptr) {}
void insertAtBeginning(int data) {
Node* newNode = createNode(data);
/tmp/fGMNrWpshk.o
Which linked list you want:
1: Single
2: Double
3: Circular
1
Single Linked List Operations:
1: Insertion
2: Deletion
3: Display
4: Reverse
5: Seek
6: Exit
1
Insertion Options:
1: Insertion at Beginning
2: Insertion at End
1
Enter data: 1
Insertion at the beginning successful.
Single Linked List Operations:
1: Insertion
Assignment 2 (1).docx
Assignment 2.docx
Show all
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