

Circular Linked List

```
// Aneesh Panchal
// 2K20/MC/21

#include<bits/stdc++.h>
using namespace std;

class Node {
public:
    int data;
    Node* next=NULL;
};

class CircularLinkedList {
    Node* head;
    Node* rear;

public:
    CircularLinkedList(){head = NULL;}

    void insert(int data_){
        Node* newNode = new Node();
        newNode->data = data_;

        Node* temp=head;

        if(head == NULL){
            head = newNode;
            newNode->next = head;
            rear = newNode;
            return;
        }

        else if(head->data > data_){
            newNode->next = head;
            head = newNode;
            return;
        }

        while(temp->next != head && temp->next->data<data_){
            temp = temp->next;
        }
        if(temp->next == head){
            rear = newNode;
        }
        newNode->next = temp->next;
        temp->next = newNode;
    }

    void print(){
        Node* temp=head;
```

```

        if(head==NULL){
            cout<<"List Empty"<<endl<<endl;
            return;
        }

        while(temp!=rear){
            cout<< temp->data <<" -> ";
            temp = temp->next;
        }
        cout<<temp->data<<" and "<<rear->data<<endl<<endl;
    }

    void deleted(int data_){
        Node* temp=head;

        if(head==NULL){
            cout<<"List empty"<<endl<<endl;
            return;
        }

        else if(head->data == data_){
            if(head==rear){
                head=NULL;
                rear=NULL;
            }
            else{
                head = temp->next;
            }
            return;
        }

        while(temp->next->data!=data_){
            if(temp->next->next==head){
                cout<<data_<<" "<<"not present in the list"<<endl<<endl;
                return;
            }
            temp=temp->next;
        }
        if(temp->next==rear){
            rear = temp;
        }
        Node* del = temp->next;
        temp->next = temp->next->next;
        delete del;
    }
};

int main(){
    CircularLinkedList circularLL;
    cout<<endl;
    circularLL.deleted(10);
    circularLL.insert(1);
    circularLL.print();
    circularLL.deleted(1);
}

```

```

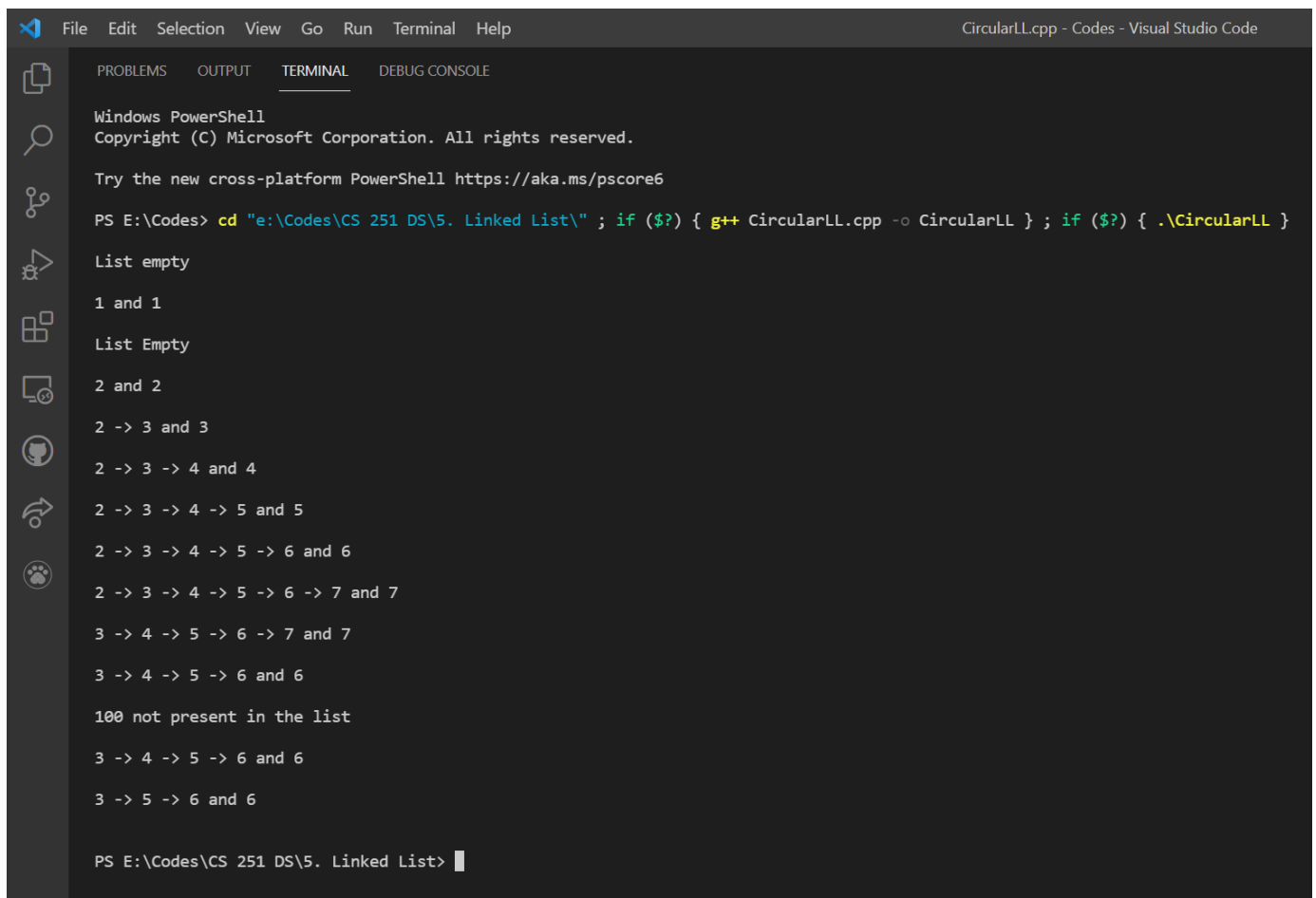
circularLL.print();
circularLL.insert(2);
circularLL.print();
circularLL.insert(3);
circularLL.print();
circularLL.insert(4);
circularLL.print();
circularLL.insert(5);
circularLL.print();
circularLL.insert(6);
circularLL.print();
circularLL.insert(7);
circularLL.print();

circularLL.deleted(2);
circularLL.print();
circularLL.deleted(7);
circularLL.print();
circularLL.deleted(100);
circularLL.print();
circularLL.deleted(4);
circularLL.print();

cout<<endl;

return 0;
}

```



Visual Studio Code interface showing the execution of a C++ program. The terminal window displays the output of the program, which includes inserting and deleting nodes and printing the list state.

```

File Edit Selection View Go Run Terminal Help
CircularLL.cpp - Codes - Visual Studio Code

PROBLEMS OUTPUT TERMINAL DEBUG CONSOLE

Windows PowerShell
Copyright (C) Microsoft Corporation. All rights reserved.

Try the new cross-platform PowerShell https://aka.ms/pscore6

PS E:\Codes> cd "e:\Codes\CS 251 DS\5. Linked List\" ; if ($?) { g++ CircularLL.cpp -o CircularLL } ; if ($?) { .\CircularLL }

List empty

1 and 1

List Empty

2 and 2

2 -> 3 and 3

2 -> 3 -> 4 and 4

2 -> 3 -> 4 -> 5 and 5

2 -> 3 -> 4 -> 5 -> 6 and 6

2 -> 3 -> 4 -> 5 -> 6 -> 7 and 7

3 -> 4 -> 5 -> 6 -> 7 and 7

3 -> 4 -> 5 -> 6 and 6

100 not present in the list

3 -> 4 -> 5 -> 6 and 6

3 -> 5 -> 6 and 6

PS E:\Codes\CS 251 DS\5. Linked List>

```

Queues using Linked List

```
// Aneesh Panchal
// 2K20/MC/21

#include<bits/stdc++.h>
using namespace std;

class Node {
public:
    int data;
    Node* next=NULL;
};

class QueueLinkedList {
    Node* head;
    Node* rear;

public:
    QueueLinkedList(){head = NULL;}

    void enqueue(int data_){
        Node* newNode = new Node();
        newNode->data = data_;

        Node* temp=head;

        if(head == NULL){
            head = newNode;
            newNode->next = head;
            rear = newNode;
            return;
        }

        while(temp->next != head){
            temp = temp->next;
        }
        if(temp->next == head){
            rear = newNode;
        }
        newNode->next = temp->next;
        temp->next = newNode;
    }

    void show(){
        Node* temp=head;

        if(head==NULL){
            cout<<"List Empty"<<endl<<endl;
            return;
        }

        while(temp!=rear){
```

```

        cout<< temp->data <<" -> ";
        temp = temp->next;
    }
    cout<<temp->data<<" and "<<rear->data<<endl<<endl;
}

void dequeue(){
    Node* temp=head;

    if(head==NULL){
        cout<<"List empty"<<endl<<endl;
        return;
    }

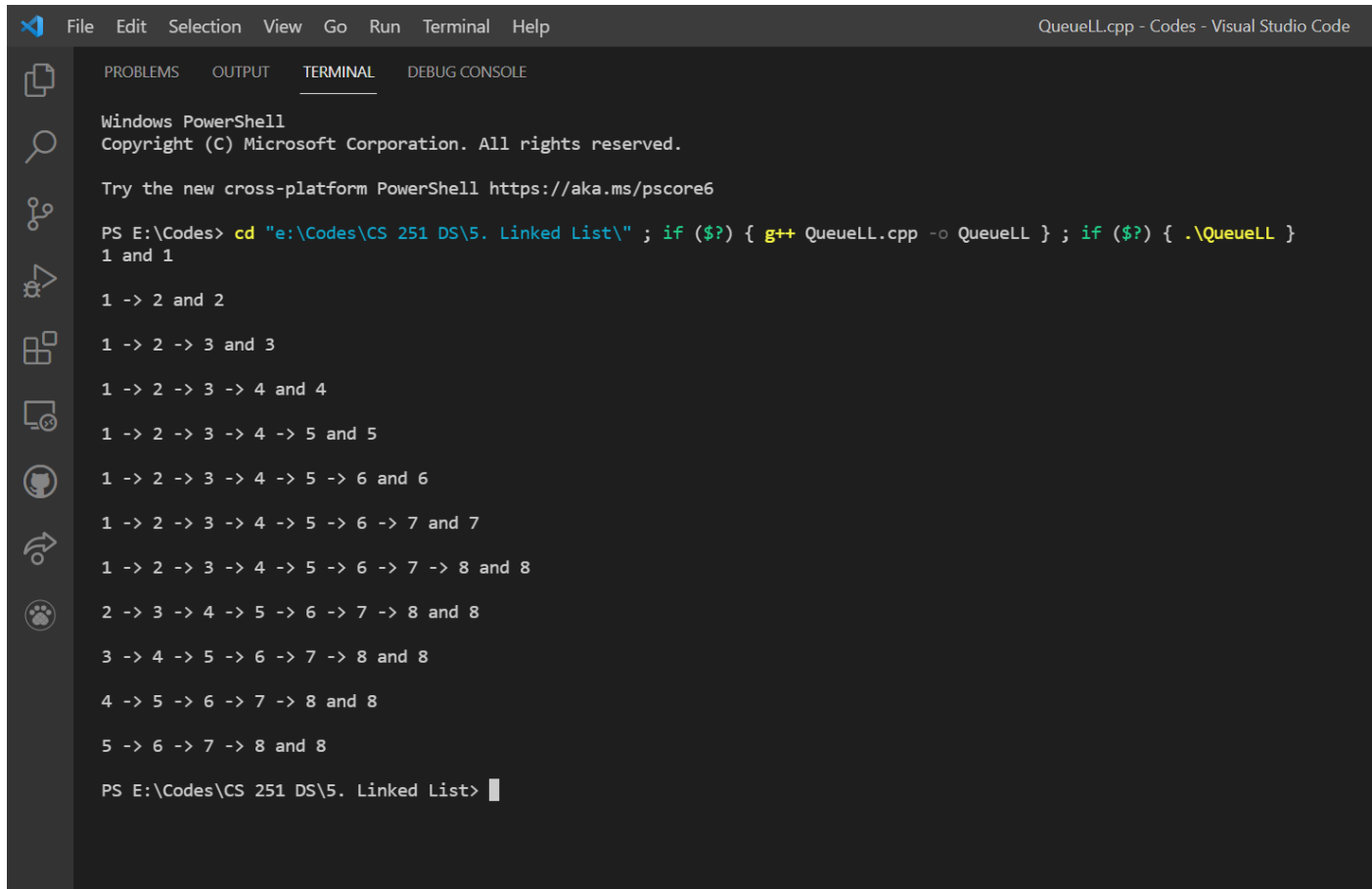
    if(head==rear){
        head=NULL;
        rear=NULL;
    }
    else{
        head = temp->next;
    }
    return;
}
};

int main()
{
    QueueLinkedList QLL;
    QLL.enqueue(1);
    QLL.show();
    QLL.enqueue(2);
    QLL.show();
    QLL.enqueue(3);
    QLL.show();
    QLL.enqueue(4);
    QLL.show();
    QLL.enqueue(5);
    QLL.show();
    QLL.enqueue(6);
    QLL.show();
    QLL.enqueue(7);
    QLL.show();
    QLL.enqueue(8);
    QLL.show();

    QLL.dequeue();
    QLL.show();
    QLL.dequeue();
    QLL.show();
    QLL.dequeue();
    QLL.show();
    QLL.dequeue();
    QLL.show();
    return 0;
}

```

}



The image shows a Visual Studio Code window with the title bar "QueueLL.cpp - Codes - Visual Studio Code". The interface includes a menu bar (File, Edit, Selection, View, Go, Run, Terminal, Help) and a sidebar with icons for Explorer, Search, Source Control, Run and Debug, and Extensions. The main area displays the "TERMINAL" tab, which contains the following text:

```
Windows PowerShell
Copyright (C) Microsoft Corporation. All rights reserved.

Try the new cross-platform PowerShell https://aka.ms/pscore6

PS E:\Codes> cd "e:\Codes\CS 251 DS\5. Linked List\" ; if ($?) { g++ QueueLL.cpp -o QueueLL } ; if ($?) { .\QueueLL }
1 and 1

1 -> 2 and 2

1 -> 2 -> 3 and 3

1 -> 2 -> 3 -> 4 and 4

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

1 -> 2 -> 3 -> 4 -> 5 -> 6 and 6

1 -> 2 -> 3 -> 4 -> 5 -> 6 -> 7 and 7

1 -> 2 -> 3 -> 4 -> 5 -> 6 -> 7 -> 8 and 8

2 -> 3 -> 4 -> 5 -> 6 -> 7 -> 8 and 8

3 -> 4 -> 5 -> 6 -> 7 -> 8 and 8

4 -> 5 -> 6 -> 7 -> 8 and 8

5 -> 6 -> 7 -> 8 and 8

PS E:\Codes\CS 251 DS\5. Linked List> |
```

Stacks using Linked List

```
// Aneesh Panchal
// 2K20/MC/21

#include<bits/stdc++.h>
using namespace std;

class Node {
public:
    int data;
    Node* next=NULL;
};

class StackLinkedList {
    Node* head;
    Node* rear;

public:
    StackLinkedList(){head = NULL;}

    void push(int data_){
        Node* newNode = new Node();
        newNode->data = data_;

        Node* temp=head;

        if(head == NULL){
            head = newNode;
            newNode->next = head;
            rear = newNode;
            return;
        }

        newNode->next = head;
        head = newNode;
        return;
    }

    void show(){
        Node* temp=head;

        if(head==NULL){
            cout<<"List Empty"<<endl<<endl;
            return;
        }

        while(temp!=rear){
            cout<< temp->data <<" -> ";
            temp = temp->next;
        }
        cout<<temp->data<<" and "<<rear->data<<endl<<endl;
    }
}
```

```

void top(){
    cout<<head->data<<endl<<endl;
}

void pop(){
    Node* temp=head;

    if(head==NULL){
        cout<<"List empty"<<endl<<endl;
        return;
    }

    if(head==rear){
        head=NULL;
        rear=NULL;
    }
    else{
        head = temp->next;
    }
    return;
}

bool isempty(){
    if(head==NULL){
        return true;
    }
    else{
        return false;
    }
}

};

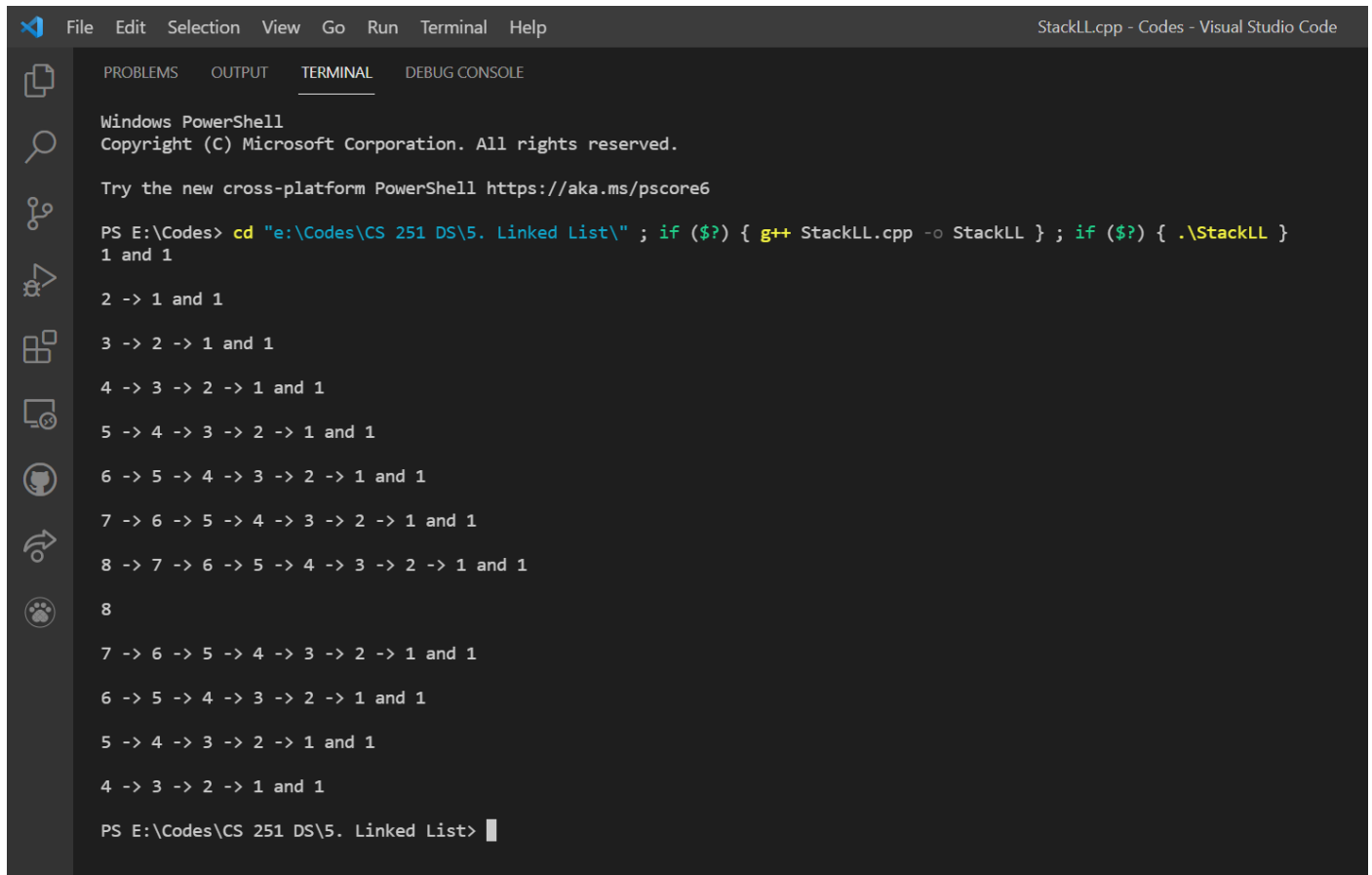
int main()
{
    StackLinkedList stackLL;
    stackLL.push(1);
    stackLL.show();
    stackLL.push(2);
    stackLL.show();
    stackLL.push(3);
    stackLL.show();
    stackLL.push(4);
    stackLL.show();
    stackLL.push(5);
    stackLL.show();
    stackLL.push(6);
    stackLL.show();
    stackLL.push(7);
    stackLL.show();
    stackLL.push(8);
    stackLL.show();

    stackLL.top();
}

```



```
stackLL.pop();
stackLL.show();
stackLL.pop();
stackLL.show();
stackLL.pop();
stackLL.show();
stackLL.pop();
stackLL.show();
return 0;
}
```



The screenshot shows the Visual Studio Code interface with the 'StackLL.cpp' file open. The 'TERMINAL' tab is active, displaying the output of a Windows PowerShell session. The terminal shows the execution of a C++ program that demonstrates a stack (StackLL) with push and pop operations. The output shows the stack state after each operation, confirming that elements are added and removed in the correct order (LIFO).

```
StackLL.cpp - Codes - Visual Studio Code

PROBLEMS  OUTPUT  TERMINAL  DEBUG CONSOLE

Windows PowerShell
Copyright (C) Microsoft Corporation. All rights reserved.

Try the new cross-platform PowerShell https://aka.ms/pscore6

PS E:\Codes> cd "e:\Codes\CS 251 DS\5. Linked List\" ; if ($?) { g++ StackLL.cpp -o StackLL } ; if ($?) { .\StackLL }
1 and 1
2 -> 1 and 1
3 -> 2 -> 1 and 1
4 -> 3 -> 2 -> 1 and 1
5 -> 4 -> 3 -> 2 -> 1 and 1
6 -> 5 -> 4 -> 3 -> 2 -> 1 and 1
7 -> 6 -> 5 -> 4 -> 3 -> 2 -> 1 and 1
8 -> 7 -> 6 -> 5 -> 4 -> 3 -> 2 -> 1 and 1
8
7 -> 6 -> 5 -> 4 -> 3 -> 2 -> 1 and 1
6 -> 5 -> 4 -> 3 -> 2 -> 1 and 1
5 -> 4 -> 3 -> 2 -> 1 and 1
4 -> 3 -> 2 -> 1 and 1
PS E:\Codes\CS 251 DS\5. Linked List>
```