Lab Report 08

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List of Tasks

1. Class PNode
2. Class PQueue
3. Enqueue
4. Dqueue
5. isEmpty
6. rearValue
7. front Value
8. Delete all in one Go

Source Code PNode.h

```
#include <iostream>
#include "E:\BSCS 3rd Semester\DSA\lab code\L3P3 Singular link List\node.h"
using namespace std;
template <class t>
class PNode : public Node<t>
{
private:
    int prio;

public:
    PNode(int prio, t data, Node<t> *next) : Node<t>(data,next)
    {
        this->prio = prio;
    }

    void setprio(int prio);
    int getprio();
    void displayPNode();

}; // End of PNode class

template <class t>
void PNode<t>::setprio(int prio)
{
    this->prio = prio;
} // End

template <class t>
int PNode<t>::getprio()
{
    return this->prio;
} // end

template <class t>
void PNode<t>::displayPNode()
{
    cout << this->data << "\t";
    cout << this->next << "\t";
    cout << this->prio;
}
```

Description of PNode

- The code defines a class **PNode** that is derived from the **Node** class.
- **PNode** is a template class that takes a generic data type **t**.
- The class has a private member variable **prio** of type **int** to store the priority value.
- The constructor of **PNode** takes three parameters: **prio**, **data**, and **next**. It calls the base class (**Node**) constructor to initialize the data and next pointers.
- The **setprio()** function is a member function that sets the priority value of the **PNode** object.
- The **getprio()** function is a member function that returns the priority value of the **PNode** object.
- The **displayPNode()** function is a member function that displays the data, next pointer, and priority value of the **PNode** object.

Source Code PQueue.h

```
#include <iostream>
#include "PNode.h"
using namespace std;
template <class t>
class PQueue
{
private:
    PNode<t> *front; // head
    PNode<t> *rear;  // tail
```

```
public:
    PQueue()
    {
        rear = 0;
        front = 0;
    }

    void Enqueue(int prio, t element);
    t Dqueue();
    bool isEmpty();
    t rearvalue();
    t frontValue();
    t allDelete();
}; // End of Class

template <class t>
void PQueue<t>::Enqueue(int prio, t element)
{
    PNode<t> *n = new PNode<t>(prio, element, 0);

    if (rear == 0 && front == 0)
    {
        rear = front = n;
    }

    else if (n->getprio() < rear->getprio()) // rear/tail modify or rear has
greater priority than n
    {
        rear->setNext(n);
        rear = n;
    }

    else if (n->getprio() > front->getprio()) // front/head modify or front has
less priority than n
    {
        rear->setNext(n);
        rear = n;
    }

    else // in between case
    {
        PNode<t> *ptr = front;
        while (((PNode<t> *)ptr->getNext())->getprio() >= n->getprio())
        {
            ptr = (PNode<t> *)ptr->getNext();
        }
        ptr->setNext(n);
        n->setNext(ptr->getNext());
    }
} // End

template <class t>
t PQueue<t>::Dqueue()
{
     t element;
    if (rear == 0 && front == 0)
    {
        cerr << "Queue is empty \n";

    }

    else if (rear == front)
    {
        element = front->getInfo();
        delete front;
        front = rear = 0;

    }
    else
    {
        PNode<t> *temp = front;
         element =front->getInfo();
        front = (PNode<t> *)front->getNext();
        delete temp;

    }
  return element;
} // end Dequeue

template<class t>
bool PQueue<t>::isEmpty()
{
    if(rear==0 && front==0)
    return true;

    else
    return false;
}

template<class t>
```

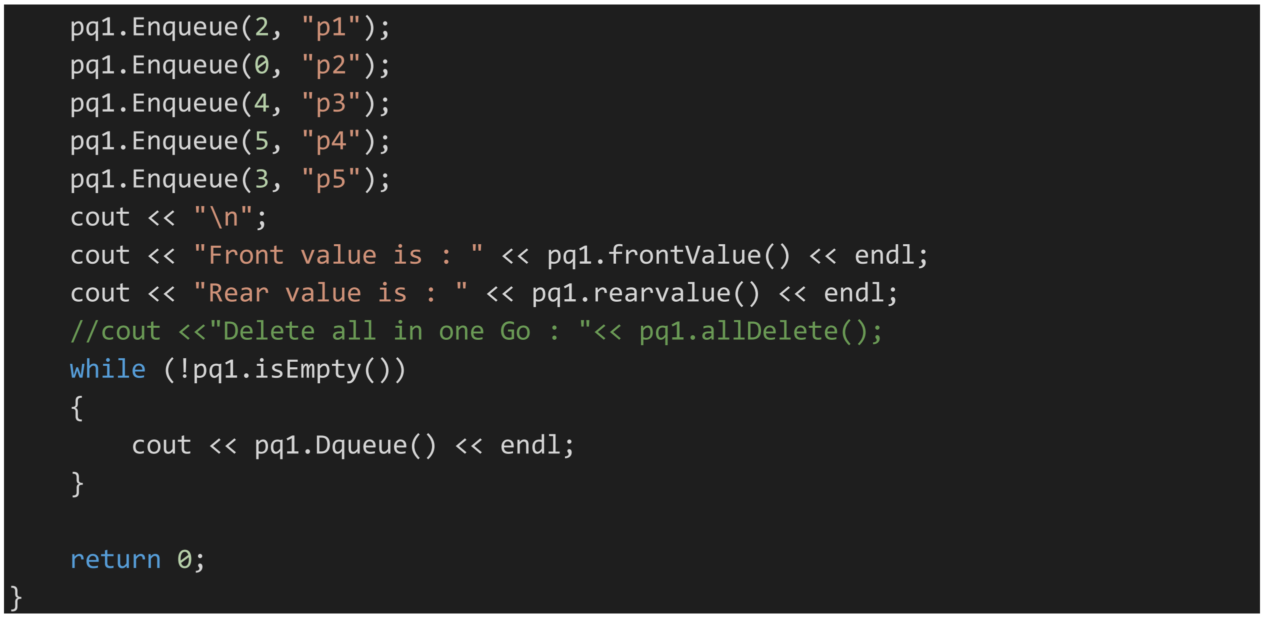
```
t PQueue<t>::rearvalue()
{
    if(rear==0 && front==0)
{
        cerr<<"Queue is empty \n";
}
    else
    {
        t element = rear->getInfo();

    return element;
    }
}

template<class t>
t PQueue<t>::frontValue()
{
    if(rear==0 && front==0)
    {
    cerr<<"Queue is empty \n";
}
    else
    {
        t element = front->getInfo();
     return element;
    }
}

template<class t>
t PQueue<t>::allDelete()
{
    if(rear==0 && front==0)
    {
    cerr<<"Queue is empty \n";
  }

    PNode<t> *ptr=front;
    t element;
    while(ptr!=NULL)
    {
        element+=Dqueue();
        ptr=(PNode<t>*)ptr->getNext();
    }
    return element;
}
```

Description of PQueue.h

- The code defines a class **PQueue** which represents a priority queue.
- The class uses a linked list implementation using **PNode** objects.
- The **PQueue** class is a template class that takes a generic data type **t**.
- The class has two private member variables: **front** and **rear**, which represent the head and tail of the priority queue, respectively.
- The constructor initializes **front** and **rear** to 0, indicating an empty priority queue.
- The **Enqueue()** function adds an element with a given priority to the priority queue.
- The **Dequeue()** function removes and returns the element with the highest priority from the priority queue.
- The **isEmpty()** function checks if the priority queue is empty and returns a boolean value indicating its status.
- The **rearvalue()** function returns the value of the element with the highest priority without removing it from the priority queue.
- The **frontValue()** function returns the value of the element with the lowest priority without removing it from the priority queue.
- The **allDelete()** function removes all elements from the priority queue and returns their sum.

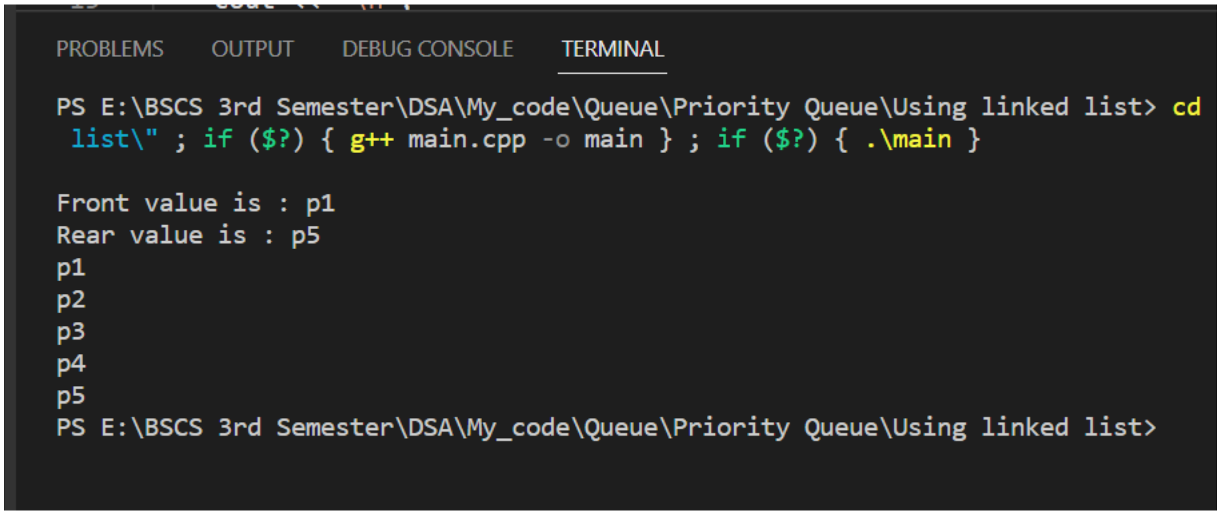
Source Code main class

```
#include <iostream>
#include "PQueue.h"
using namespace std;
/* run this program using the console pauser or add your own getch,
system("pause") or input loop */

int main(int argc, char **argv)
{

    PQueue<string> pq1;
```



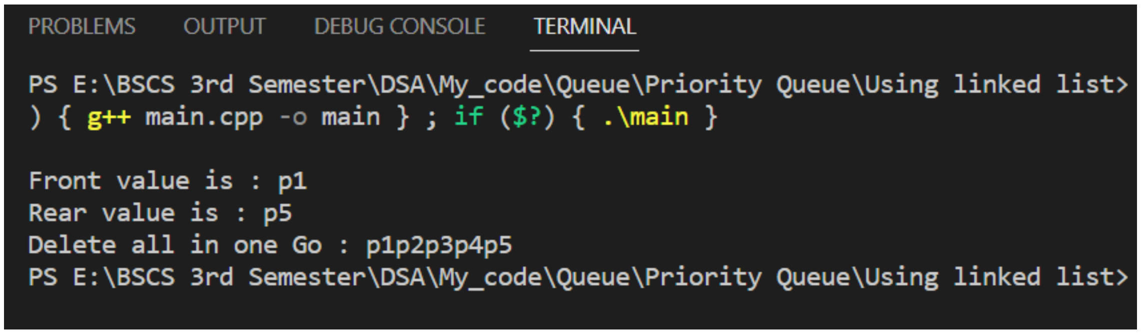
```
    pq1.Enqueue(2, "p1");
    pq1.Enqueue(0, "p2");
    pq1.Enqueue(4, "p3");
    pq1.Enqueue(5, "p4");
    pq1.Enqueue(3, "p5");
    cout << "\n";
    cout << "Front value is : " << pq1.frontValue() << endl;
    cout << "Rear value is : " << pq1.rearvalue() << endl;
    //cout <<"Delete all in one Go : "<< pq1.allDelete();
    while (!pq1.isEmpty())
    {
        cout << pq1.Dqueue() << endl;
    }

    return 0;
}
```

Output



```
PS E:\BSCS 3rd Semester\DSA\My_code\Queue\Priority Queue\Using linked list> cd
 list\" ; if ($?) { g++ main.cpp -o main } ; if ($?) { .\main }

Front value is : p1
Rear value is : p5
p1
p2
p3
p4
p5
PS E:\BSCS 3rd Semester\DSA\My_code\Queue\Priority Queue\Using linked list>
```

If Call allDelete();



```
PS E:\BSCS 3rd Semester\DSA\My_code\Queue\Priority Queue\Using linked list>
) { g++ main.cpp -o main } ; if ($?) { .\main }

Front value is : p1
Rear value is : p5
Delete all in one Go : p1p2p3p4p5
PS E:\BSCS 3rd Semester\DSA\My_code\Queue\Priority Queue\Using linked list>
```

End of Lab 08