9/1/2024

Data Structures

Lab 2 Exercise Solutions

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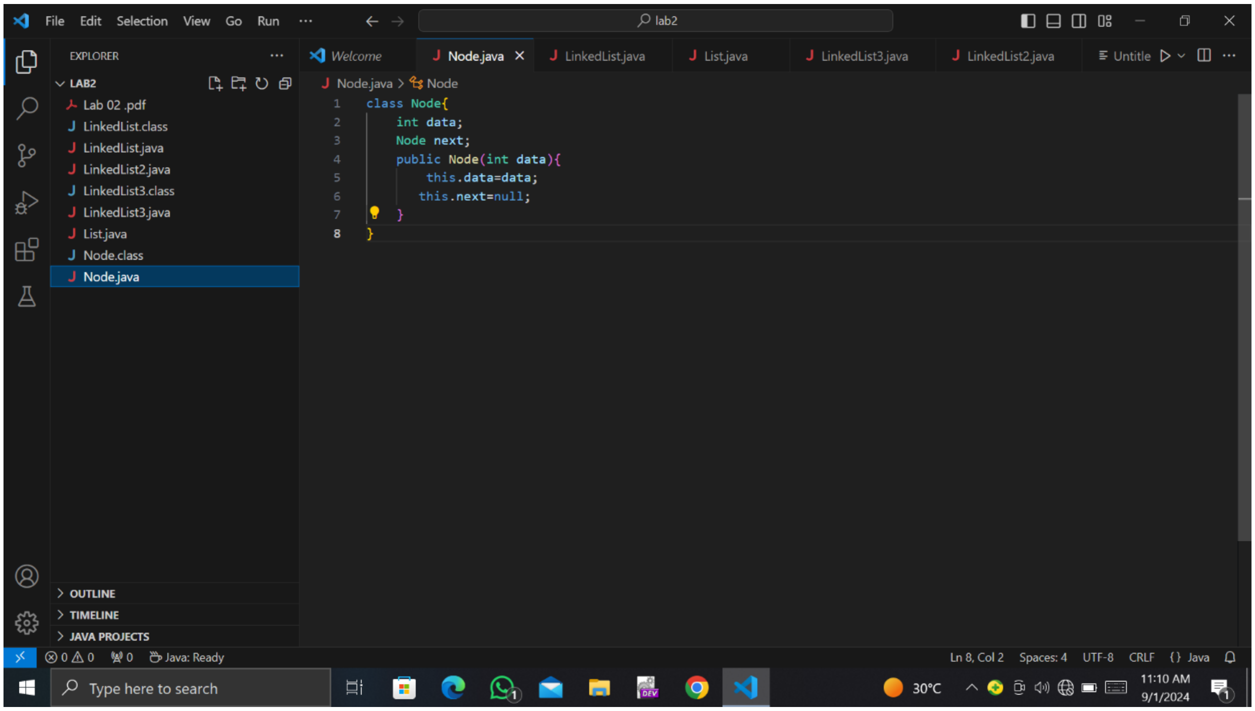
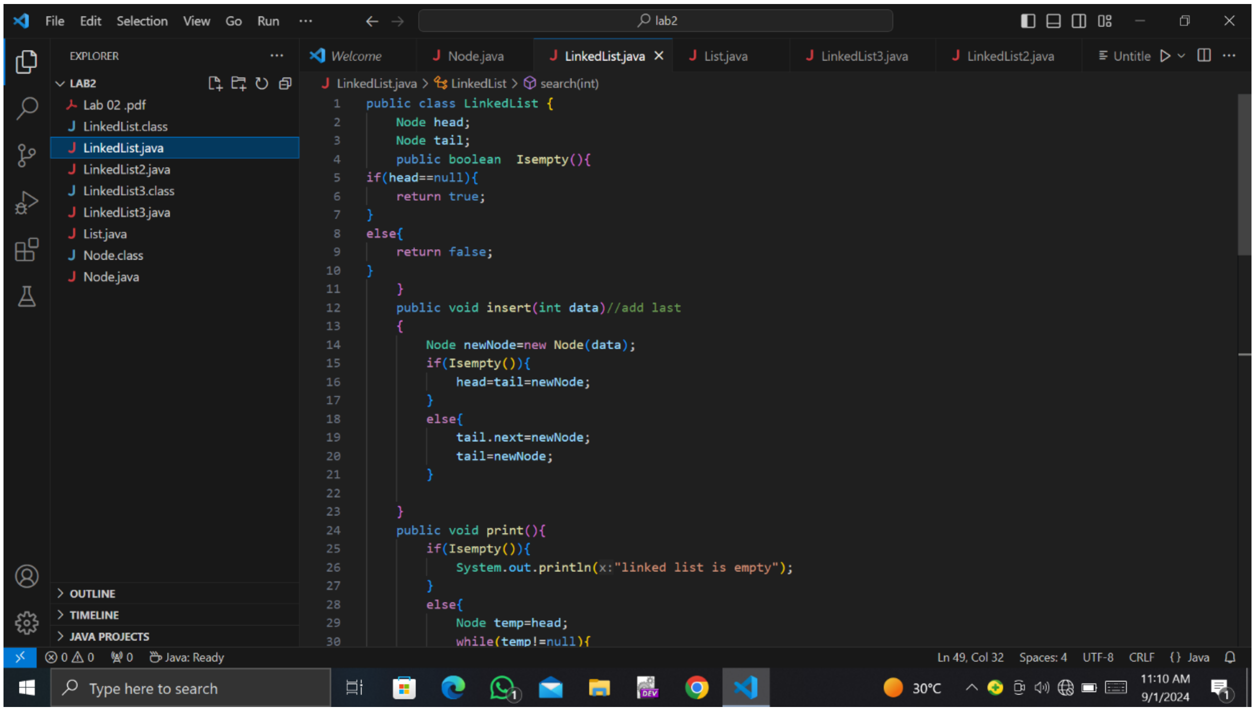
Task #1

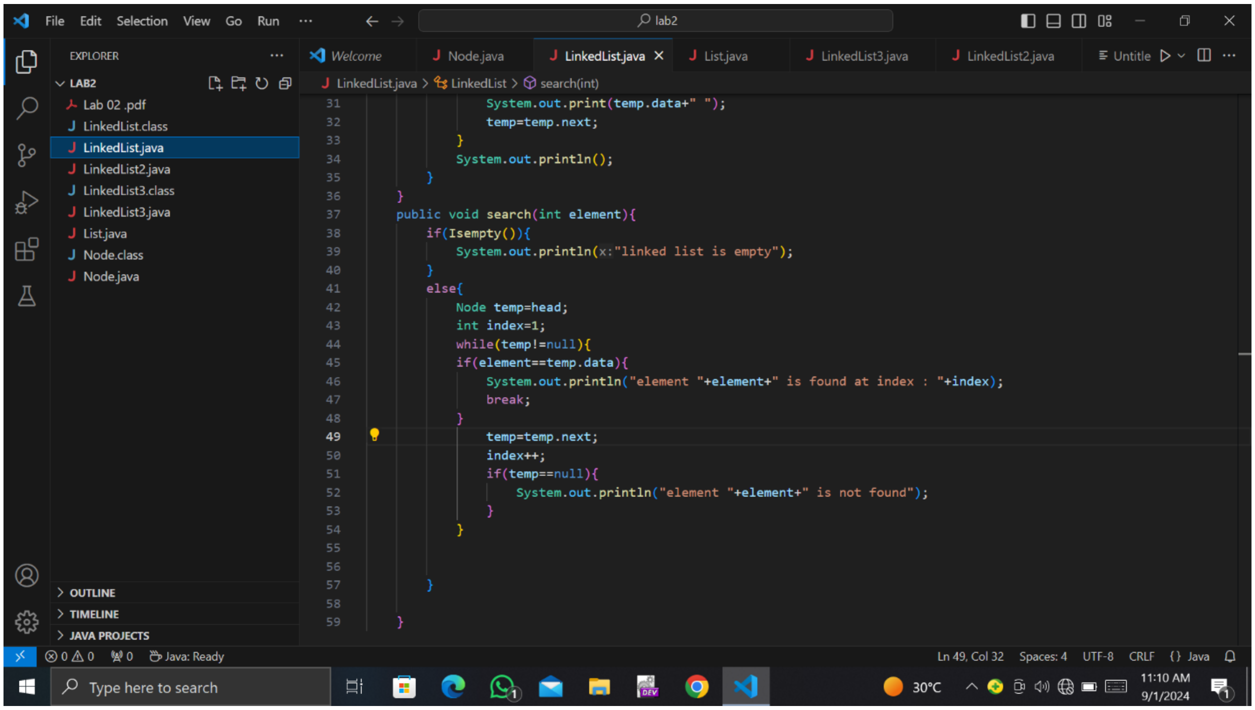
Solution:



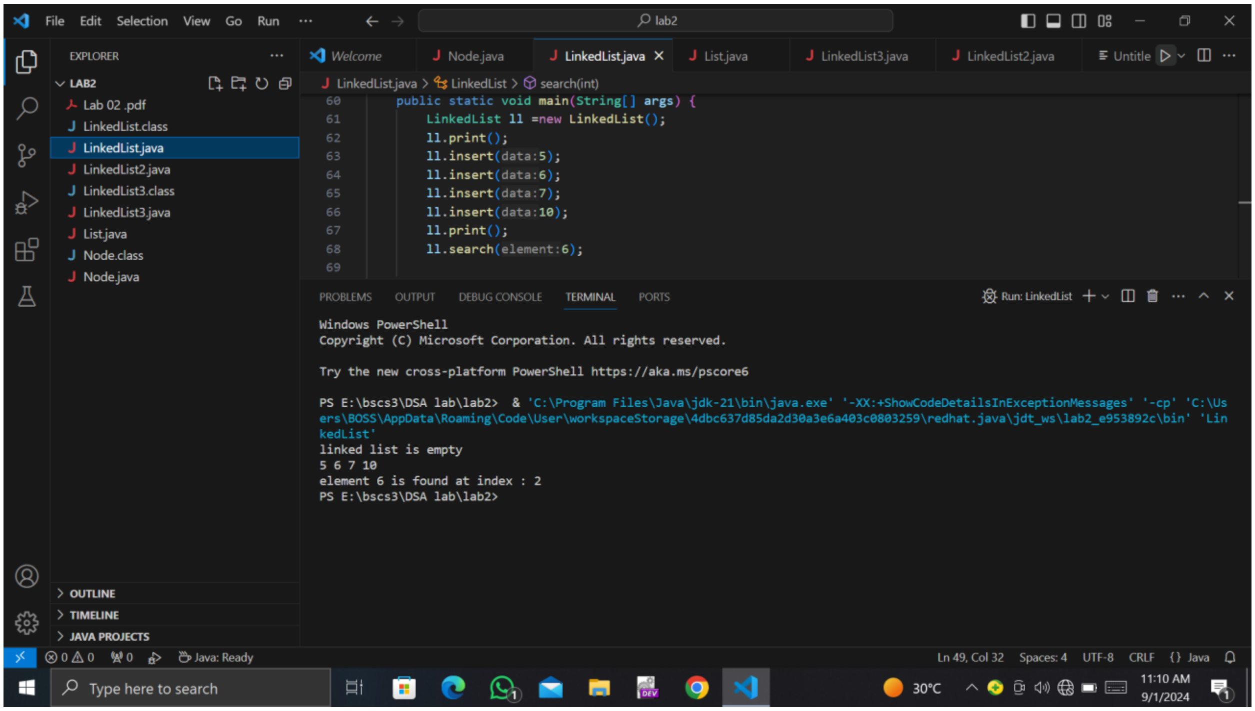
```java
class Node{
    int data;
    Node next;
    public Node(int data){
        this.data=data;
       this.next=null;
    }
}
```



```java
public class LinkedList {
    Node head;
    Node tail;
    public boolean  Isempty(){
if(head==null){
    return true;
}
else{
    return false;
}
    }
    public void insert(int data)//add last
    {
        Node newNode=new Node(data);
        if(Isempty()){
            head=tail=newNode;
        }
        else{
            tail.next=newNode;
            tail=newNode;
        }

    }
    public void print(){
        if(Isempty()){
            System.out.println(x:"linked list is empty");
        }
        else{
            Node temp=head;
            while(temp!=null){
```



```
            System.out.print(temp.data+" ");
            temp=temp.next;
        }
        System.out.println();
    }
}
public void search(int element){
    if(Isempty()){
        System.out.println(x:"linked list is empty");
    }
    else{
        Node temp=head;
        int index=1;
        while(temp!=null){
        if(element==temp.data){
            System.out.println("element "+element+" is found at index : "+index);
            break;
        }
            temp=temp.next;
            index++;
            if(temp==null){
                System.out.println("element "+element+" is not found");
            }
        }


    }

}
```



```
public static void main(String[] args) {
    LinkedList ll =new LinkedList();
    ll.print();
    ll.insert(data:5);
    ll.insert(data:6);
    ll.insert(data:7);
    ll.insert(data:10);
    ll.print();
    ll.search(element:6);
```

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

PS E:\bscs3\DSA lab\lab2>  & 'C:\Program Files\Java\jdk-21\bin\java.exe' '-XX:+ShowCodeDetailsInExceptionMessages' '-cp' 'C:\Us
ers\BOSS\AppData\Roaming\Code\User\workspaceStorage\4dbc637d85da2d30a3e6a403c0803259\redhat.java\jdt_ws\lab2_e953892c\bin' 'Lin
kedList'
linked list is empty
5 6 7 10
element 6 is found at index : 2
PS E:\bscs3\DSA lab\lab2>
```
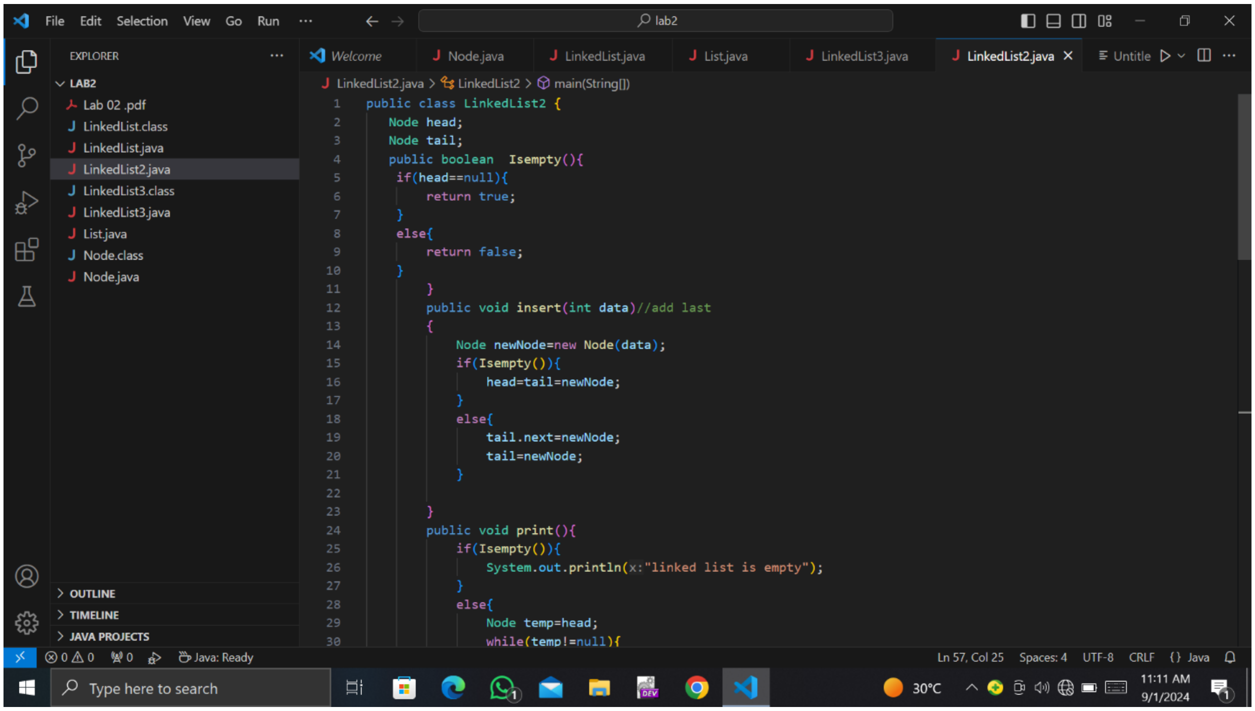
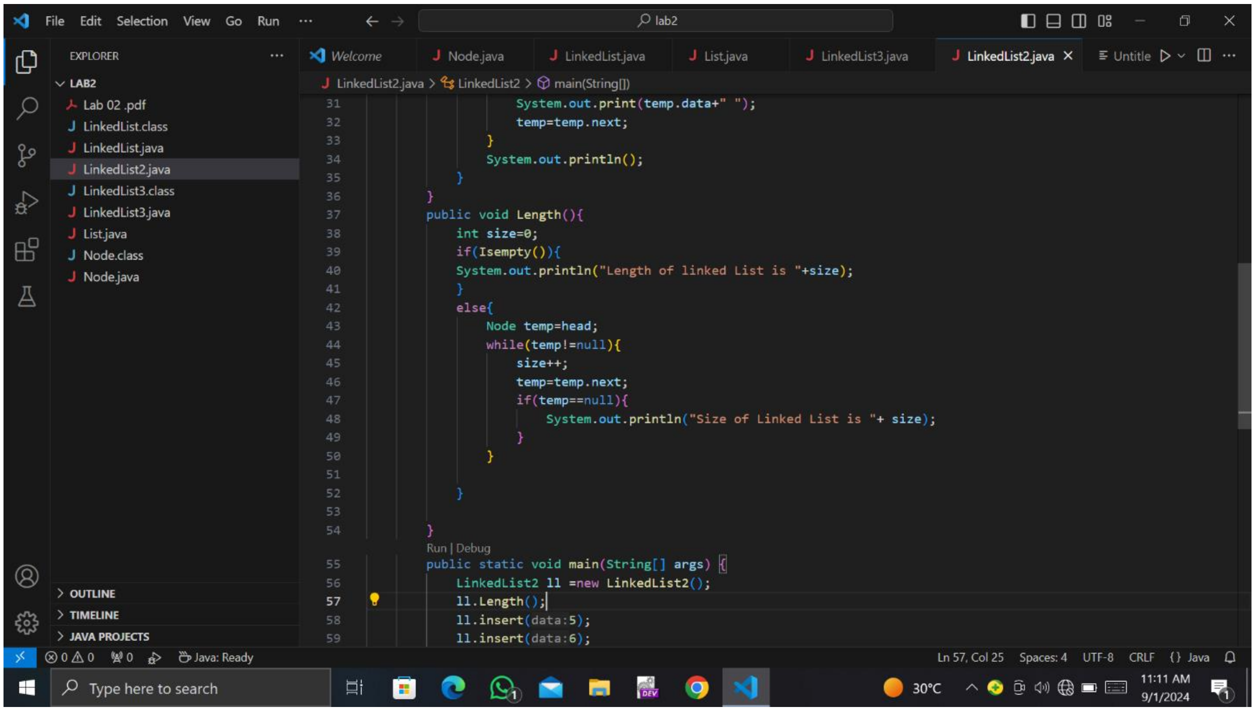

Task #2

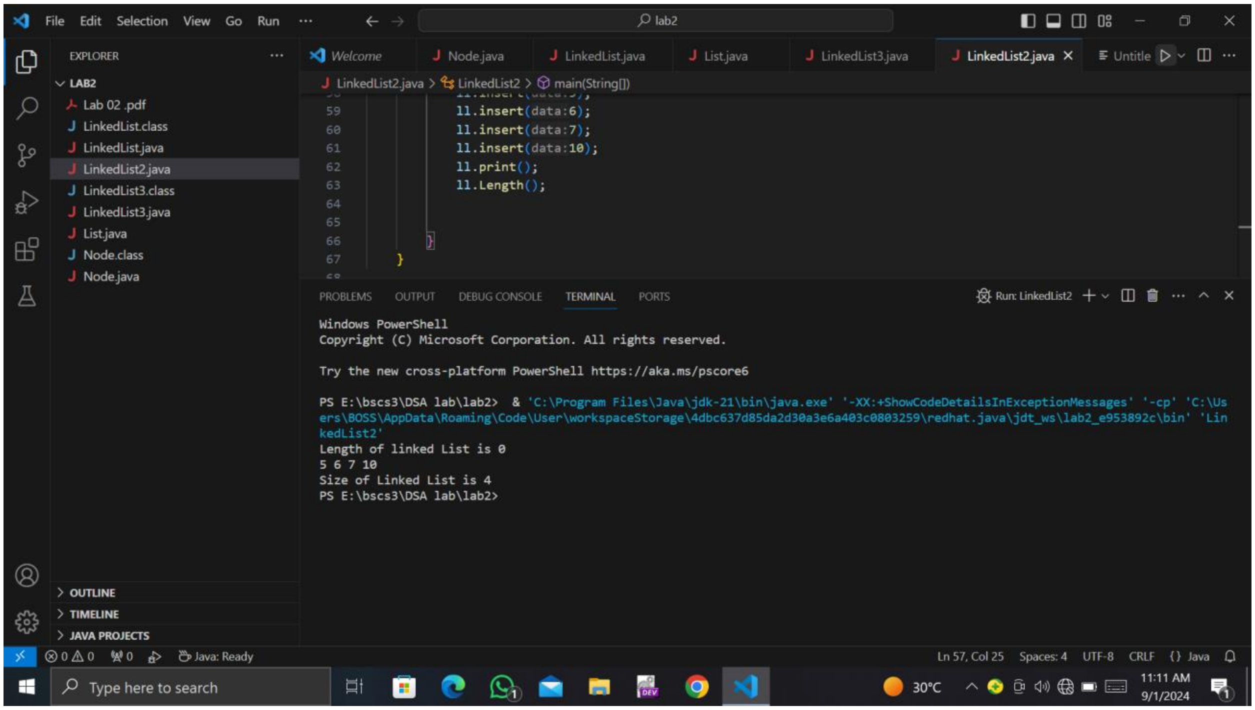
Solution:



```
public class LinkedList2 {
   Node head;
   Node tail;
   public boolean  Isempty(){
    if(head==null){
        return true;
    }
    else{
        return false;
    }
        }
        public void insert(int data)//add last
        {
            Node newNode=new Node(data);
            if(Isempty()){
                head=tail=newNode;
            }
            else{
                tail.next=newNode;
                tail=newNode;
            }

        }
        public void print(){
            if(Isempty()){
                System.out.println(x:"linked list is empty");
            }
            else{
                Node temp=head;
                while(temp!=null){
```



```
                    System.out.print(temp.data+" ");
                    temp=temp.next;
                }
                System.out.println();
            }
        }
        public void Length(){
            int size=0;
            if(Isempty()){
            System.out.println("Length of linked List is "+size);
            }
            else{
                Node temp=head;
                while(temp!=null){
                    size++;
                    temp=temp.next;
                    if(temp==null){
                        System.out.println("Size of Linked List is "+ size);
                    }
                }

            }

        }
        Run | Debug
        public static void main(String[] args) {
            LinkedList2 ll =new LinkedList2();
            ll.Length();
            ll.insert(data:5);
            ll.insert(data:6);
```



```java
                ll.insert(data:6);
                ll.insert(data:7);
                ll.insert(data:10);
                ll.print();
                ll.Length();


            }
        }
```

```
Windows PowerShell
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PS E:\bscs3\DSA lab\lab2>  & 'C:\Program Files\Java\jdk-21\bin\java.exe' '-XX:+ShowCodeDetailsInExceptionMessages' '-cp' 'C:\Us
ers\BOSS\AppData\Roaming\Code\User\workspaceStorage\4dbc637d85da2d30a3e6a403c0803259\redhat.java\jdt_ws\lab2_e953892c\bin' 'Lin
kedList2'
Length of linked List is 0
5 6 7 10
Size of Linked List is 4
PS E:\bscs3\DSA lab\lab2>
```
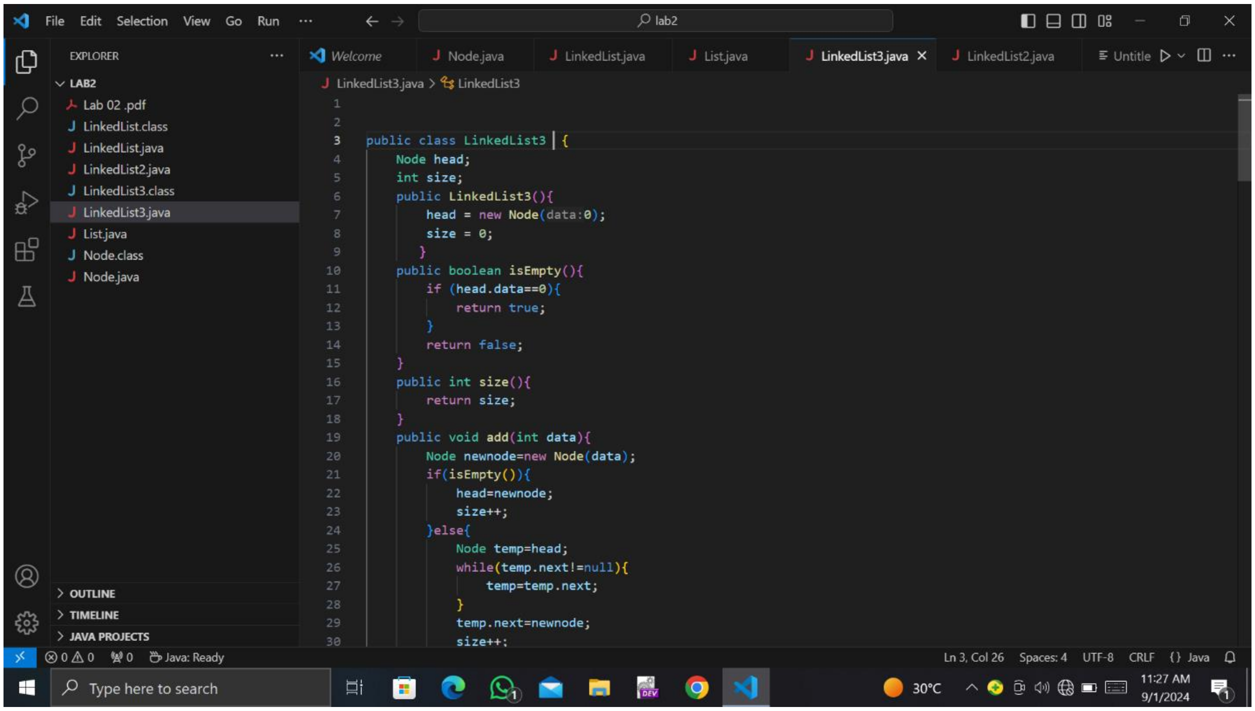
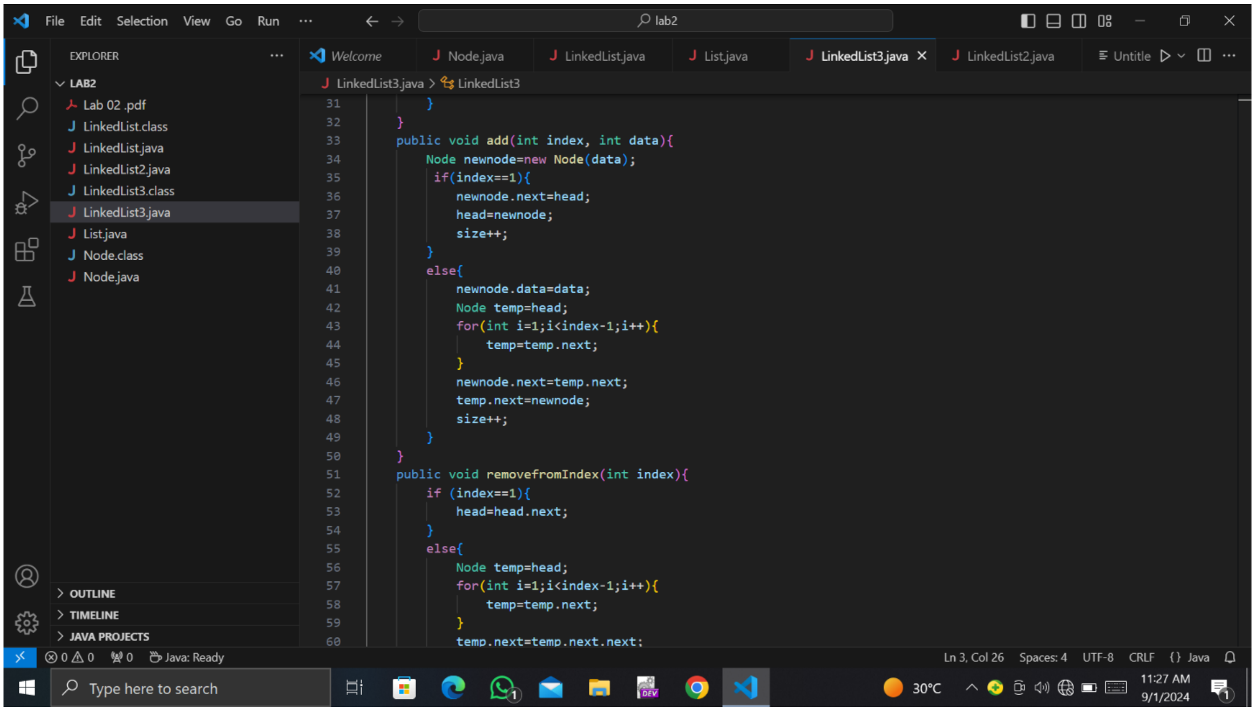

Task #3

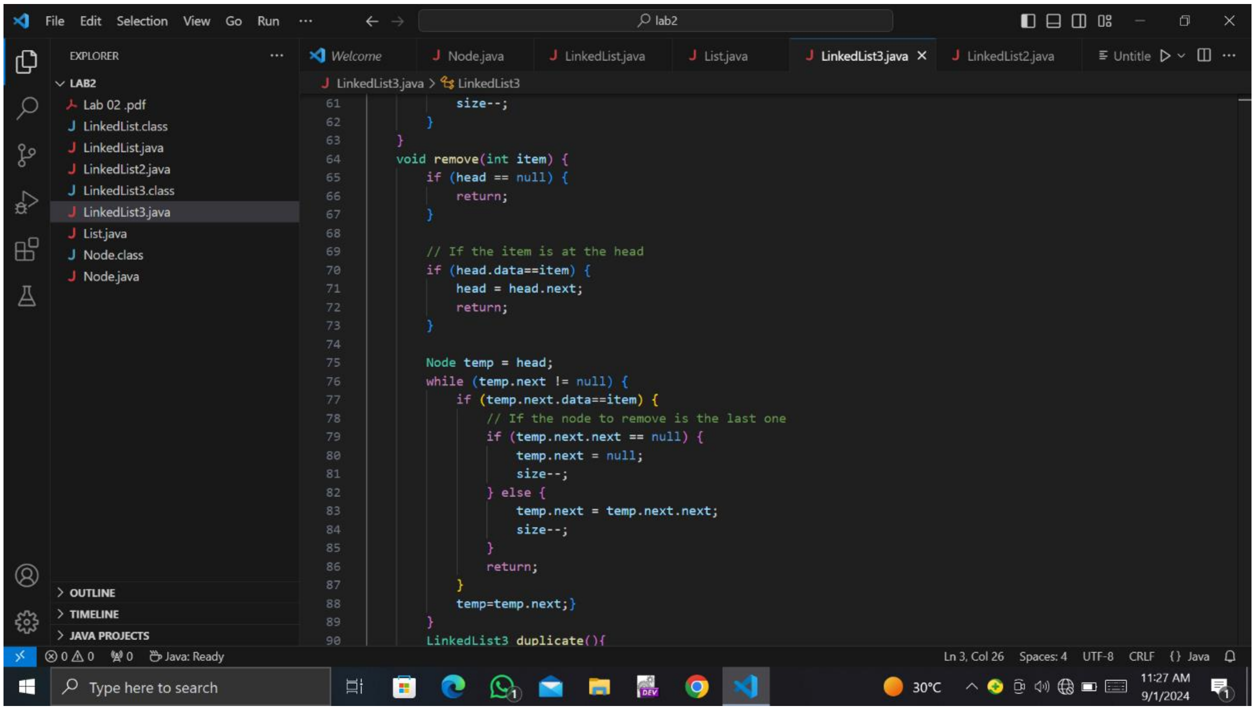
Solution:



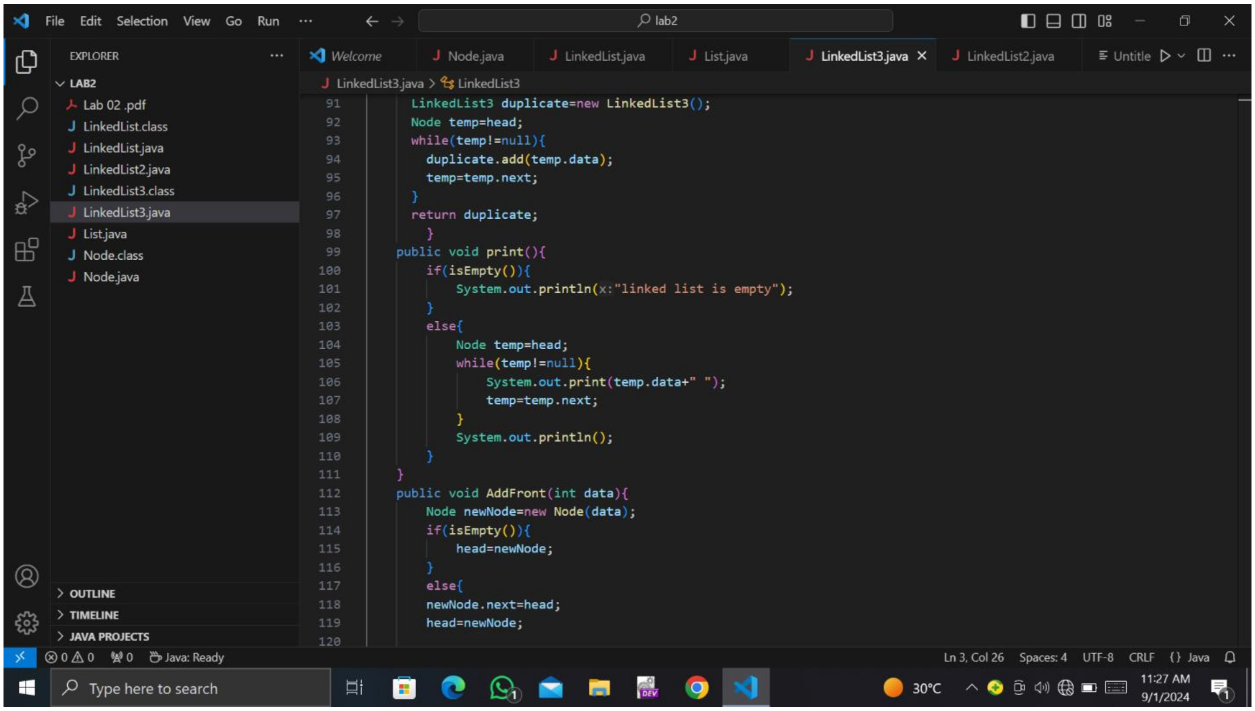
```java


public class LinkedList3 {
    Node head;
    int size;
    public LinkedList3(){
        head = new Node(data:0);
        size = 0;
       }
    public boolean isEmpty(){
        if (head.data==0){
            return true;
        }
        return false;
    }
    public int size(){
        return size;
    }
    public void add(int data){
        Node newnode=new Node(data);
        if(isEmpty()){
            head=newnode;
            size++;
        }else{
            Node temp=head;
            while(temp.next!=null){
                temp=temp.next;
            }
            temp.next=newnode;
            size++;
```



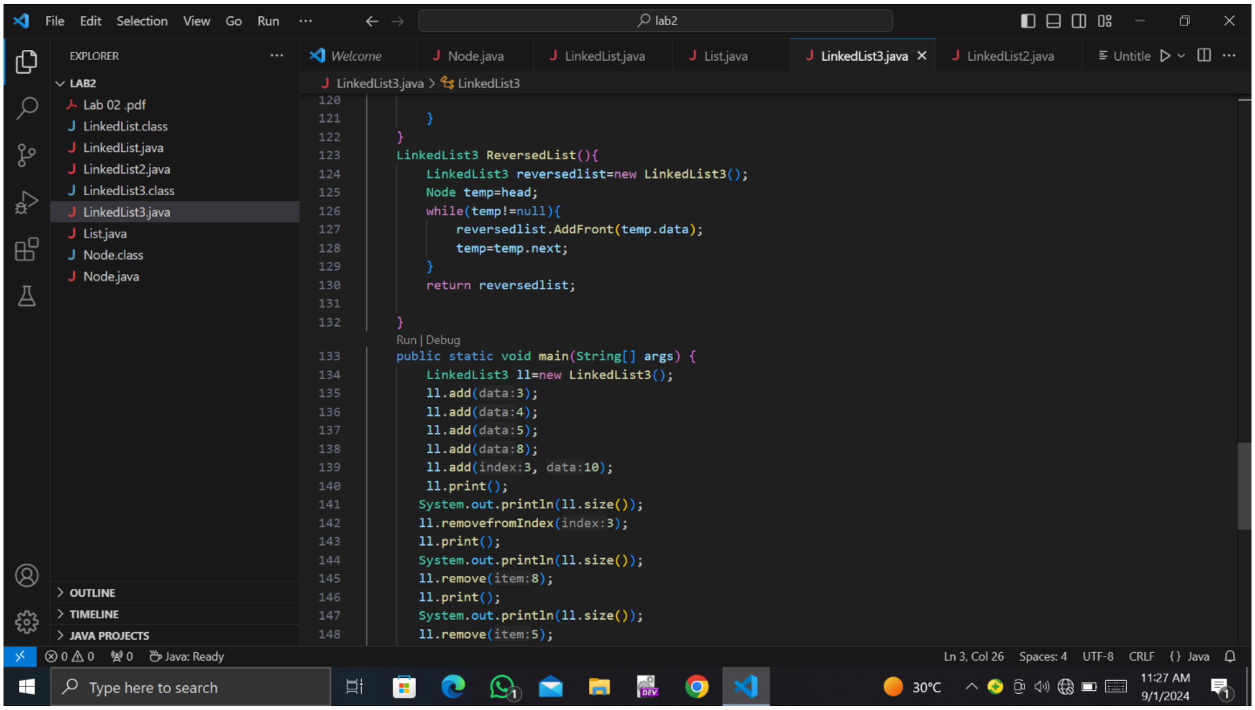
```java
        }
    }
    public void add(int index, int data){
        Node newnode=new Node(data);
         if(index==1){
            newnode.next=head;
            head=newnode;
            size++;
        }
        else{
            newnode.data=data;
            Node temp=head;
            for(int i=1;i<index-1;i++){
                temp=temp.next;
            }
            newnode.next=temp.next;
            temp.next=newnode;
            size++;
        }
    }
    public void removefromIndex(int index){
        if (index==1){
            head=head.next;
        }
        else{
            Node temp=head;
            for(int i=1;i<index-1;i++){
                temp=temp.next;
            }
            temp.next=temp.next.next;
```



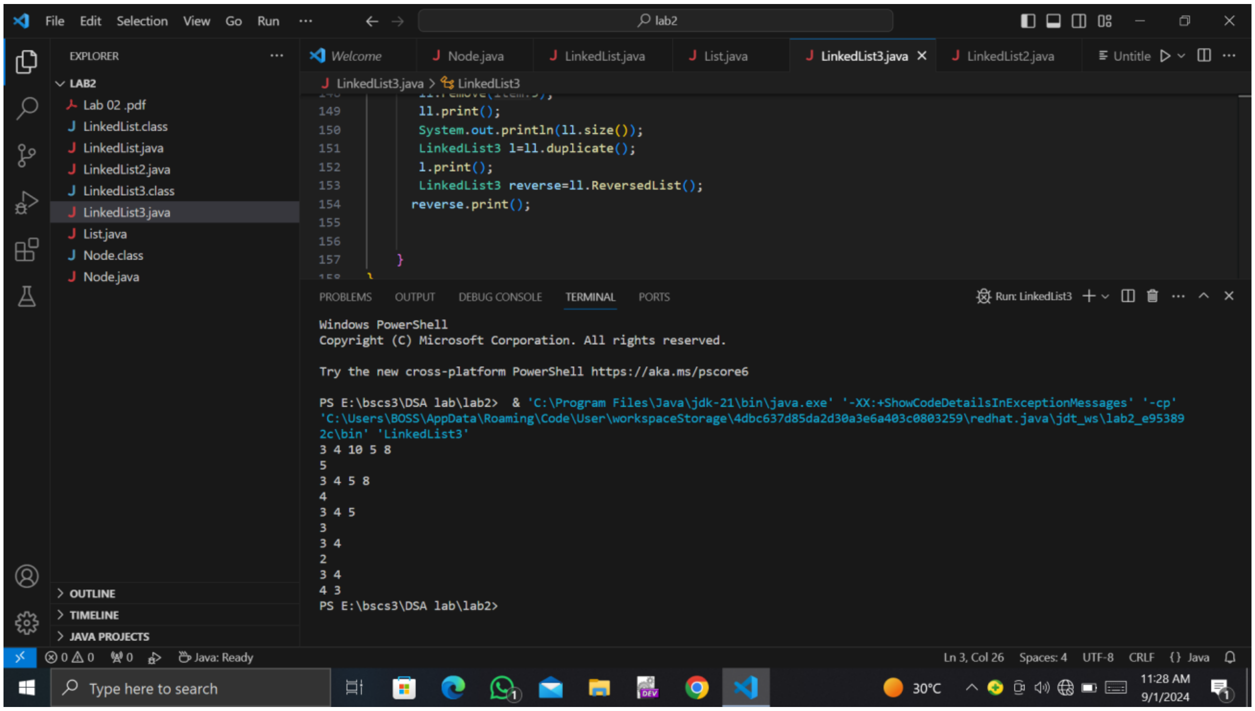
```
            size--;
        }
    }
    void remove(int item) {
        if (head == null) {
            return;
        }

        // If the item is at the head
        if (head.data==item) {
            head = head.next;
            return;
        }

        Node temp = head;
        while (temp.next != null) {
            if (temp.next.data==item) {
                // If the node to remove is the last one
                if (temp.next.next == null) {
                    temp.next = null;
                    size--;
                } else {
                    temp.next = temp.next.next;
                    size--;
                }
                return;
            }
            temp=temp.next;}
        }
        LinkedList3 duplicate(){
```



```
      LinkedList3 duplicate=new LinkedList3();
      Node temp=head;
      while(temp!=null){
        duplicate.add(temp.data);
        temp=temp.next;
      }
      return duplicate;
        }
    public void print(){
        if(isEmpty()){
            System.out.println(x:"linked list is empty");
        }
        else{
            Node temp=head;
            while(temp!=null){
                System.out.print(temp.data+" ");
                temp=temp.next;
            }
            System.out.println();
        }
    }
    public void AddFront(int data){
        Node newNode=new Node(data);
        if(isEmpty()){
            head=newNode;
        }
        else{
        newNode.next=head;
        head=newNode;

```



```java
            }
    }
    LinkedList3 ReversedList(){
        LinkedList3 reversedlist=new LinkedList3();
        Node temp=head;
        while(temp!=null){
            reversedlist.AddFront(temp.data);
            temp=temp.next;
        }
        return reversedlist;

    }
    public static void main(String[] args) {
        LinkedList3 ll=new LinkedList3();
        ll.add(data:3);
        ll.add(data:4);
        ll.add(data:5);
        ll.add(data:8);
        ll.add(index:3, data:10);
        ll.print();
       System.out.println(ll.size());
       ll.removefromIndex(index:3);
       ll.print();
       System.out.println(ll.size());
       ll.remove(item:8);
       ll.print();
       System.out.println(ll.size());
       ll.remove(item:5);
```



```java
       ll.print();
       System.out.println(ll.size());
       LinkedList3 l=ll.duplicate();
       l.print();
       LinkedList3 reverse=ll.ReversedList();
     reverse.print();


    }
```

```
Windows PowerShell
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PS E:\bscs3\DSA lab\lab2>  & 'C:\Program Files\Java\jdk-21\bin\java.exe' '-XX:+ShowCodeDetailsInExceptionMessages' '-cp'
'C:\Users\BOSS\AppData\Roaming\Code\User\workspaceStorage\4dbc637d85da2d30a3e6a403c0803259\redhat.java\jdt_ws\lab2_e95389
2c\bin' 'LinkedList3'
3 4 10 5 8
5
3 4 5 8
4
3 4 5
3
3 4
2
3 4
4 3
PS E:\bscs3\DSA lab\lab2>
```

THE END