Gebze Technical University
Computer Engineering

CSE 222 - 2019 Spring

HOMEWORK 2 REPORT

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1 INTRODUCTION

1.1 Problem Definition

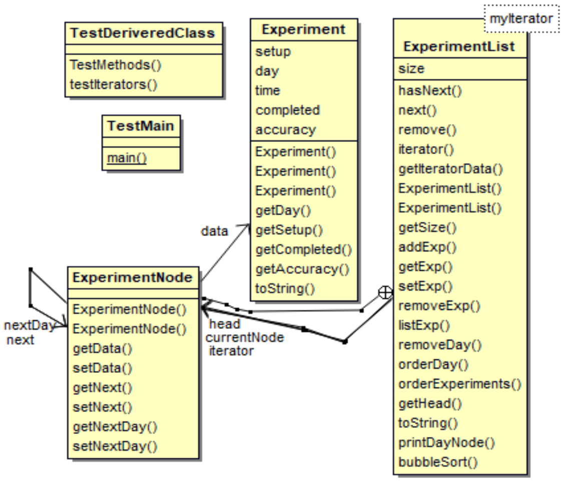
In this assignment, we want to make a desired single LinkedList and sort the Experiments according to their order in normal order and day order. There are many parts that need to be considered when connecting these experiments. The addition to the head, middle and end section should be checked separately. It is also desirable to be LinkedList in Iterable.

1.2 System Requirements

In order to carry out the procedures described in the problem description, an Experiment class is needed. We need two data structures to sort these experiments. Because two different sequences were requested. A building that holds only the first days and the building that combines all days. The data structure, which merely combines the first Experiment of the days, will provide us with a lot of convenience in adding or subtracting. Because there is a variable that holds the next data structure within these data structures, there will be no need to create a new data structure. To do this, you need to create a node structure. After creating this node structure, we need to create a head node. This head node shows the head element of the list and shows another node after it. The desired operations in the list are made using this head node.

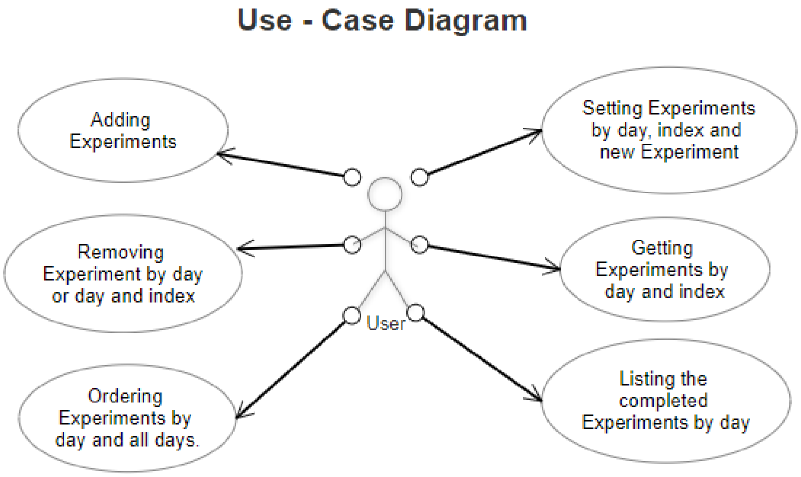
2 METHOD

2.1 Class Diagrams



2.2 Use Case Diagrams

Use-Case diagram is not required, but we can draw as follows in a simple way.


Use - Case Diagram
Adding Experiments
Setting Experiments by day, index and new Experiment
Removing Experiment by day or day and index
Getting Experiments by day and index
User
Ordering Experiments by day and all days.
Listing the completed Experiments by day

2.3 Problem Solution Approach

In order to solve this problem, I created four different classes and an inner class. Experiment class from this class keeps the types like day, time, completed and accuracy There are getDay (), getSetup (), getAccuracy (), and toString () methods in the class. The getDay () method is the most commonly used method. The sets of these methods could also be written, but I didn't add them because I didn't use them. Changing accidentally could have caused an error. The most required class for a linkedList class is the node class. I named the node class ExperimentNode. ExperimentNode class has Experiment type data, ExperimentNode type next and nextDay variables. The data variable is keeping the experiment. The next node keeps the next node. and the nextDay variable is the first experiment of a different day. Set and Get methods are also defined.

The ExperimentList class implements both Iterable and Iterator interfaces. There are three variables and two of them are ExperimentNode type and the other is int type. The ExperimentNode type holds the head node and iterator. Size (int) is the size of the list is holding. In the ExperimentList class, the hasNext (), next (), remove () and iterator () methods from the Iterator and Iterable interfaces are defined. In the same way addExp, getExp, setExp, removeExp, listExp, removeDay, orderDay and orderExperiments methods are defined and how to use these methods is explained in JavaDoc. Some helpful methods have been written in this class, such as bubbleSort, getHead, printDayNode. To test these methods, a derivered class was written and the results were included in the results.

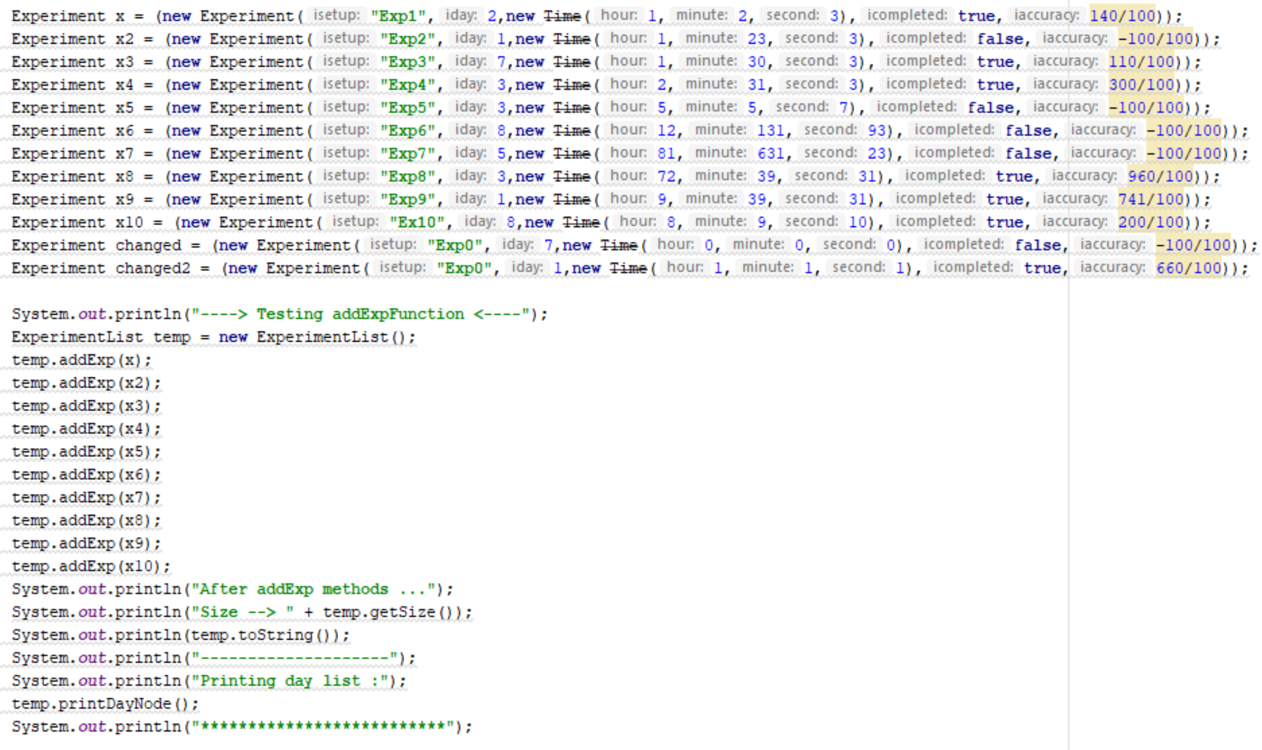
3 RESULT

3.1 Test Cases

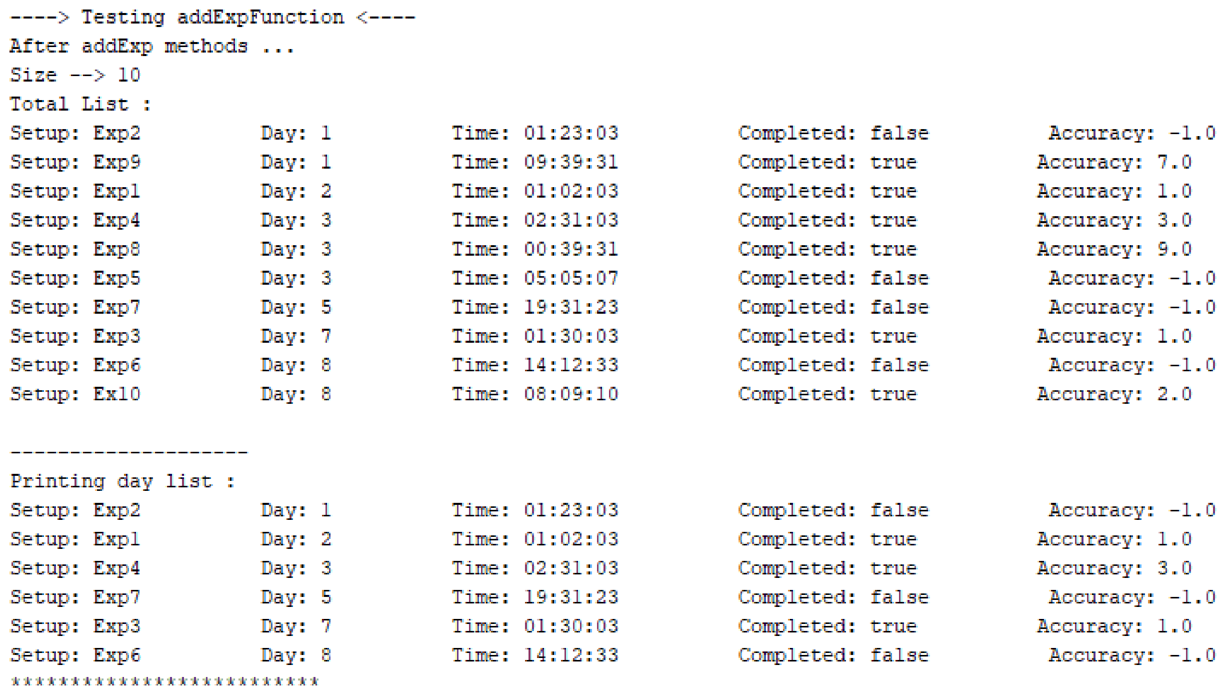
2,1,7,3,3,8,5,3,1,8 days were added to the list with addExp method, and the results were printed on both the normal list and the list holding only the first days. All methods were tried in the head node, in the middle and in the last node. For example, adding or removing the head node. Add or remove the end of the list in the same way. Add or subtract to days with more than one experiment. At the end of each transaction, the normal list and day list were written on the screen, making it easy to control.

3.2 Running Results

3.2.1 Test addExp(Experiment) Method

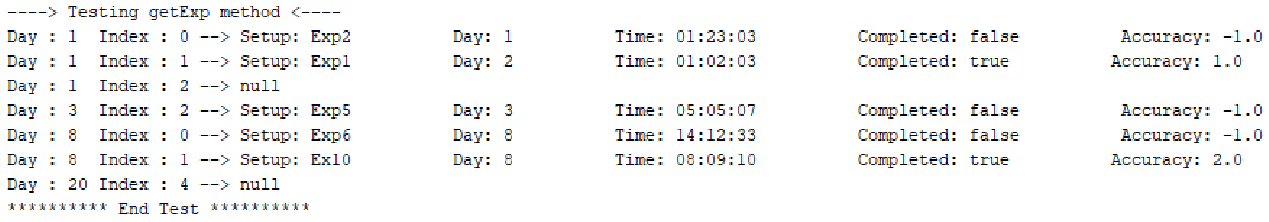


```
Experiment x = (new Experiment( isetup: "Exp1", iday: 2,new ~~Time~~( hour: 1, minute: 2, second: 3), icompleted: true, iaccuracy: 140/100));
Experiment x2 = (new Experiment( isetup: "Exp2", iday: 1,new ~~Time~~( hour: 1, minute: 23, second: 3), icompleted: false, iaccuracy: -100/100));
Experiment x3 = (new Experiment( isetup: "Exp3", iday: 7,new ~~Time~~( hour: 1, minute: 30, second: 3), icompleted: true, iaccuracy: 110/100));
Experiment x4 = (new Experiment( isetup: "Exp4", iday: 3,new ~~Time~~( hour: 2, minute: 31, second: 3), icompleted: true, iaccuracy: 300/100));
Experiment x5 = (new Experiment( isetup: "Exp5", iday: 3,new ~~Time~~( hour: 5, minute: 5, second: 7), icompleted: false, iaccuracy: -100/100));
Experiment x6 = (new Experiment( isetup: "Exp6", iday: 8,new ~~Time~~( hour: 12, minute: 131, second: 93), icompleted: false, iaccuracy: -100/100));
Experiment x7 = (new Experiment( isetup: "Exp7", iday: 5,new ~~Time~~( hour: 81, minute: 631, second: 23), icompleted: false, iaccuracy: -100/100));
Experiment x8 = (new Experiment( isetup: "Exp8", iday: 3,new ~~Time~~( hour: 72, minute: 39, second: 31), icompleted: true, iaccuracy: 960/100));
Experiment x9 = (new Experiment( isetup: "Exp9", iday: 1,new ~~Time~~( hour: 9, minute: 39, second: 31), icompleted: true, iaccuracy: 741/100));
Experiment x10 = (new Experiment( isetup: "Ex10", iday: 8,new ~~Time~~( hour: 8, minute: 9, second: 10), icompleted: true, iaccuracy: 200/100));
Experiment changed = (new Experiment( isetup: "Exp0", iday: 7,new ~~Time~~( hour: 0, minute: 0, second: 0), icompleted: false, iaccuracy: -100/100));
Experiment changed2 = (new Experiment( isetup: "Exp0", iday: 1,new ~~Time~~( hour: 1, minute: 1, second: 1), icompleted: true, iaccuracy: 660/100));

System.out.println("----> Testing addExpFunction <----");
ExperimentList temp = new ExperimentList();
temp.addExp(x);
temp.addExp(x2);
temp.addExp(x3);
temp.addExp(x4);
temp.addExp(x5);
temp.addExp(x6);
temp.addExp(x7);
temp.addExp(x8);
temp.addExp(x9);
temp.addExp(x10);
System.out.println("After addExp methods ...");
System.out.println("Size --> " + temp.getSize());
System.out.println(temp.toString());
System.out.println("--------------------");
System.out.println("Printing day list :");
temp.printDayNode();
System.out.println("**************************");
```



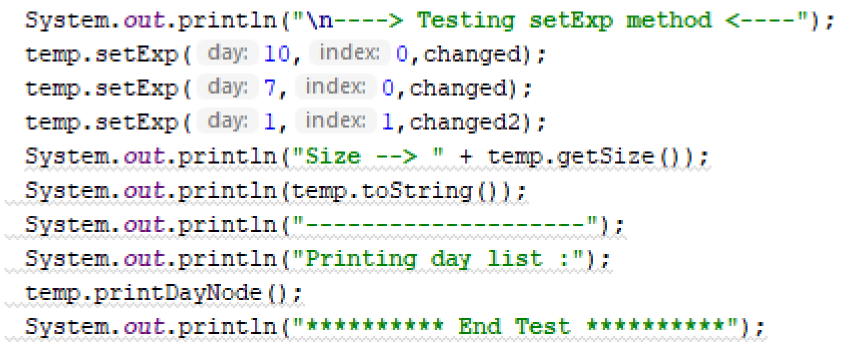
```
----> Testing addExpFunction <----
After addExp methods ...
Size --> 10
Total List :
Setup: Exp2          Day: 1          Time: 01:23:03          Completed: false          Accuracy: -1.0
Setup: Exp9          Day: 1          Time: 09:39:31          Completed: true          Accuracy: 7.0
Setup: Exp1          Day: 2          Time: 01:02:03          Completed: true          Accuracy: 1.0
Setup: Exp4          Day: 3          Time: 02:31:03          Completed: true          Accuracy: 3.0
Setup: Exp8          Day: 3          Time: 00:39:31          Completed: true          Accuracy: 9.0
Setup: Exp5          Day: 3          Time: 05:05:07          Completed: false          Accuracy: -1.0
Setup: Exp7          Day: 5          Time: 19:31:23          Completed: false          Accuracy: -1.0
Setup: Exp3          Day: 7          Time: 01:30:03          Completed: true          Accuracy: 1.0
Setup: Exp6          Day: 8          Time: 14:12:33          Completed: false          Accuracy: -1.0
Setup: Ex10          Day: 8          Time: 08:09:10          Completed: true          Accuracy: 2.0

--------------------
Printing day list :
Setup: Exp2          Day: 1          Time: 01:23:03          Completed: false          Accuracy: -1.0
Setup: Exp1          Day: 2          Time: 01:02:03          Completed: true          Accuracy: 1.0
Setup: Exp4          Day: 3          Time: 02:31:03          Completed: true          Accuracy: 3.0
Setup: Exp7          Day: 5          Time: 19:31:23          Completed: false          Accuracy: -1.0
Setup: Exp3          Day: 7          Time: 01:30:03          Completed: true          Accuracy: 1.0
Setup: Exp6          Day: 8          Time: 14:12:33          Completed: false          Accuracy: -1.0
**************************
```

3.2.2 Testing getExp(day,index) Method

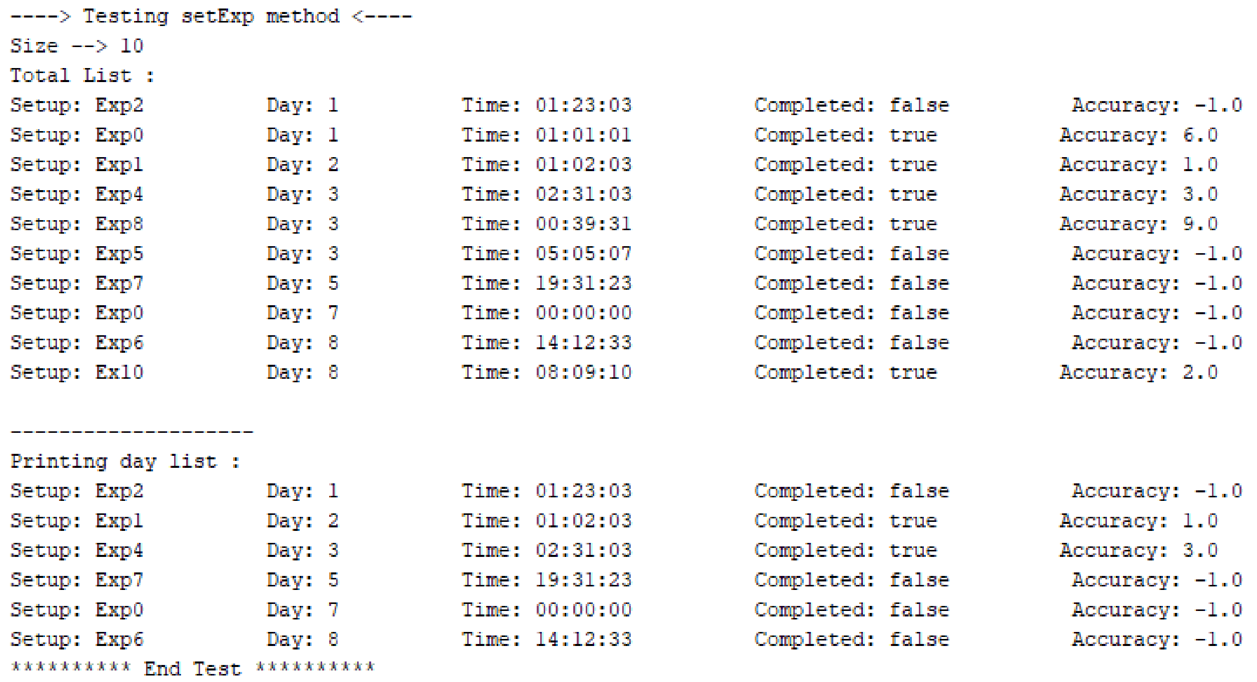


```
----> Testing getExp method <----
Day : 1  Index : 0 --> Setup: Exp2             Day: 1           Time: 01:23:03           Completed: false          Accuracy: -1.0
Day : 1  Index : 1 --> Setup: Exp1             Day: 2           Time: 01:02:03           Completed: true          Accuracy: 1.0
Day : 1  Index : 2 --> null
Day : 3  Index : 2 --> Setup: Exp5             Day: 3           Time: 05:05:07           Completed: false          Accuracy: -1.0
Day : 8  Index : 0 --> Setup: Exp6             Day: 8           Time: 14:12:33           Completed: false          Accuracy: -1.0
Day : 8  Index : 1 --> Setup: Ex10             Day: 8           Time: 08:09:10           Completed: true          Accuracy: 2.0
Day : 20 Index : 4 --> null
********** End Test **********
```

3.2.3 Testing setExp(day,index,experiment) Method

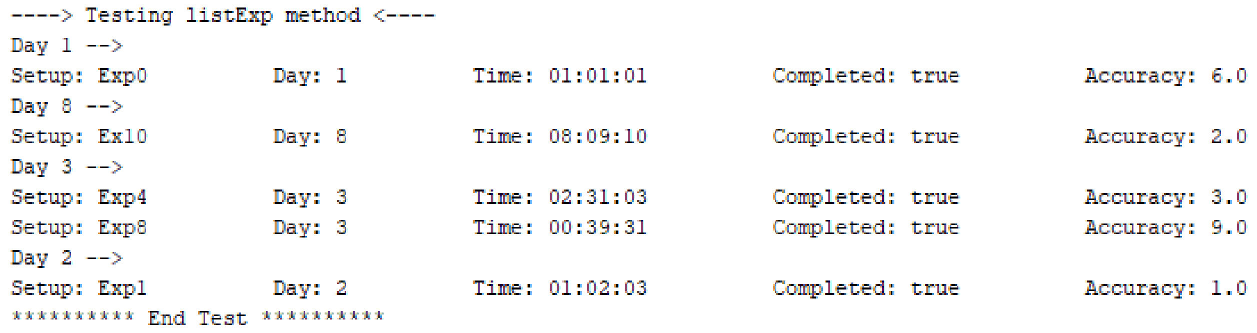


```
System.out.println("\n----> Testing setExp method <----");
temp.setExp( day: 10, index: 0,changed);
temp.setExp( day: 7, index: 0,changed);
temp.setExp( day: 1, index: 1,changed2);
System.out.println("Size --> " + temp.getSize());
System.out.println(temp.toString());
System.out.println("--------------------");
System.out.println("Printing day list :");
temp.printDayNode();
System.out.println("********** End Test **********");
```



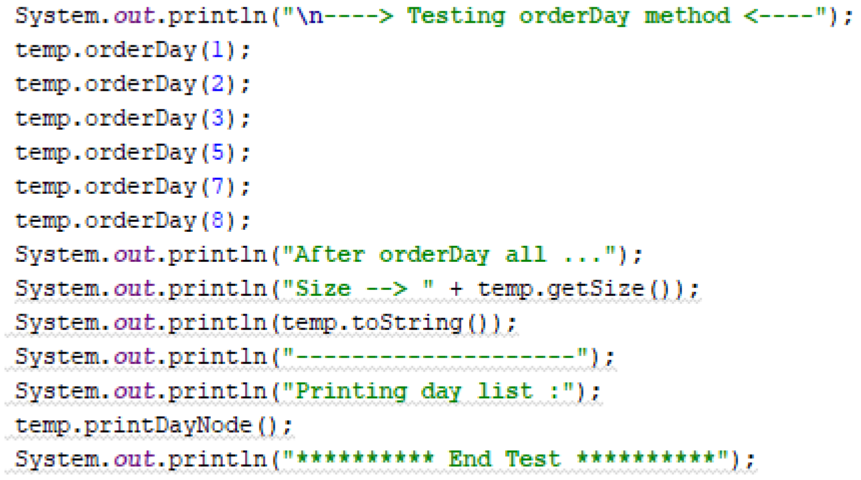
```
----> Testing setExp method <----
Size --> 10
Total List :
Setup: Exp2         Day: 1        Time: 01:23:03        Completed: false        Accuracy: -1.0
Setup: Exp0         Day: 1        Time: 01:01:01        Completed: true        Accuracy: 6.0
Setup: Exp1         Day: 2        Time: 01:02:03        Completed: true        Accuracy: 1.0
Setup: Exp4         Day: 3        Time: 02:31:03        Completed: true        Accuracy: 3.0
Setup: Exp8         Day: 3        Time: 00:39:31        Completed: true        Accuracy: 9.0
Setup: Exp5         Day: 3        Time: 05:05:07        Completed: false        Accuracy: -1.0
Setup: Exp7         Day: 5        Time: 19:31:23        Completed: false        Accuracy: -1.0
Setup: Exp0         Day: 7        Time: 00:00:00        Completed: false        Accuracy: -1.0
Setup: Exp6         Day: 8        Time: 14:12:33        Completed: false        Accuracy: -1.0
Setup: Ex10         Day: 8        Time: 08:09:10        Completed: true        Accuracy: 2.0

--------------------
Printing day list :
Setup: Exp2         Day: 1        Time: 01:23:03        Completed: false        Accuracy: -1.0
Setup: Exp1         Day: 2        Time: 01:02:03        Completed: true        Accuracy: 1.0
Setup: Exp4         Day: 3        Time: 02:31:03        Completed: true        Accuracy: 3.0
Setup: Exp7         Day: 5        Time: 19:31:23        Completed: false        Accuracy: -1.0
Setup: Exp0         Day: 7        Time: 00:00:00        Completed: false        Accuracy: -1.0
Setup: Exp6         Day: 8        Time: 14:12:33        Completed: false        Accuracy: -1.0
********** End Test **********
```

3.2.4 Testing listExp(day) Method

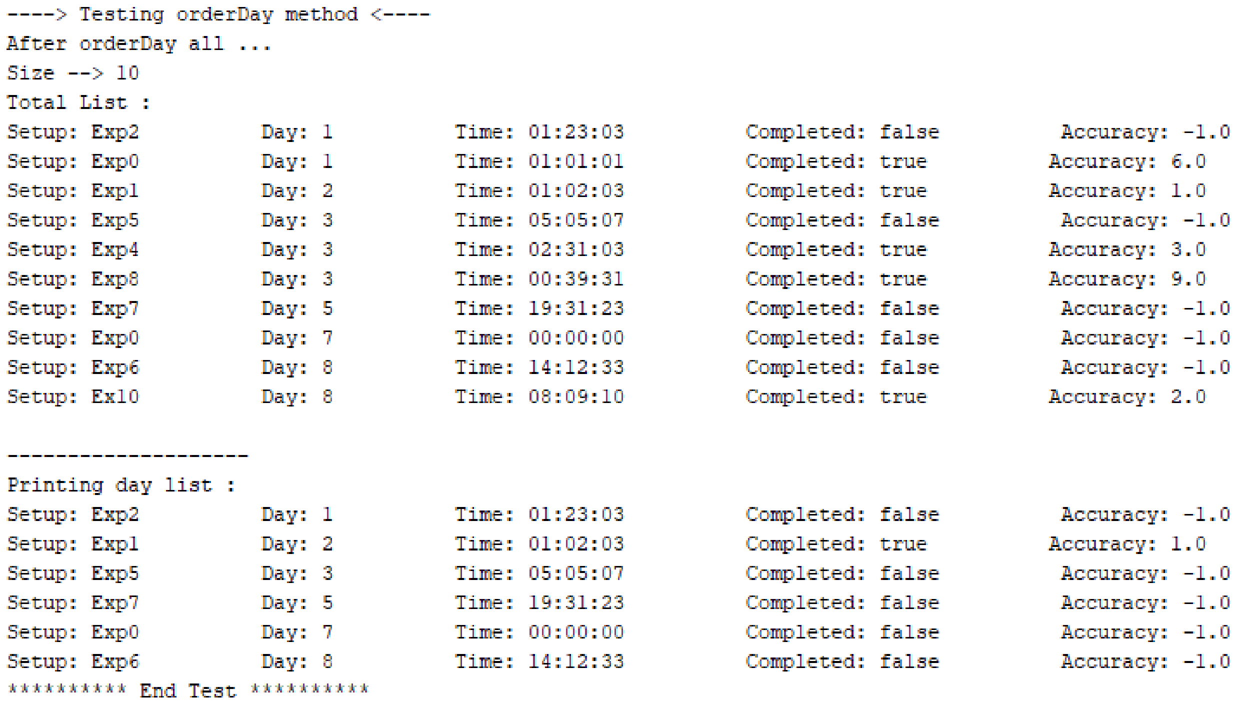


```
----> Testing listExp method <----
Day 1 -->
Setup: Exp0         Day: 1        Time: 01:01:01        Completed: true        Accuracy: 6.0
Day 8 -->
Setup: Ex10         Day: 8        Time: 08:09:10        Completed: true        Accuracy: 2.0
Day 3 -->
Setup: Exp4         Day: 3        Time: 02:31:03        Completed: true        Accuracy: 3.0
Setup: Exp8         Day: 3        Time: 00:39:31        Completed: true        Accuracy: 9.0
Day 2 -->
Setup: Exp1         Day: 2        Time: 01:02:03        Completed: true        Accuracy: 1.0
********** End Test **********
```

3.2.5 Testing orderDay(day) Method

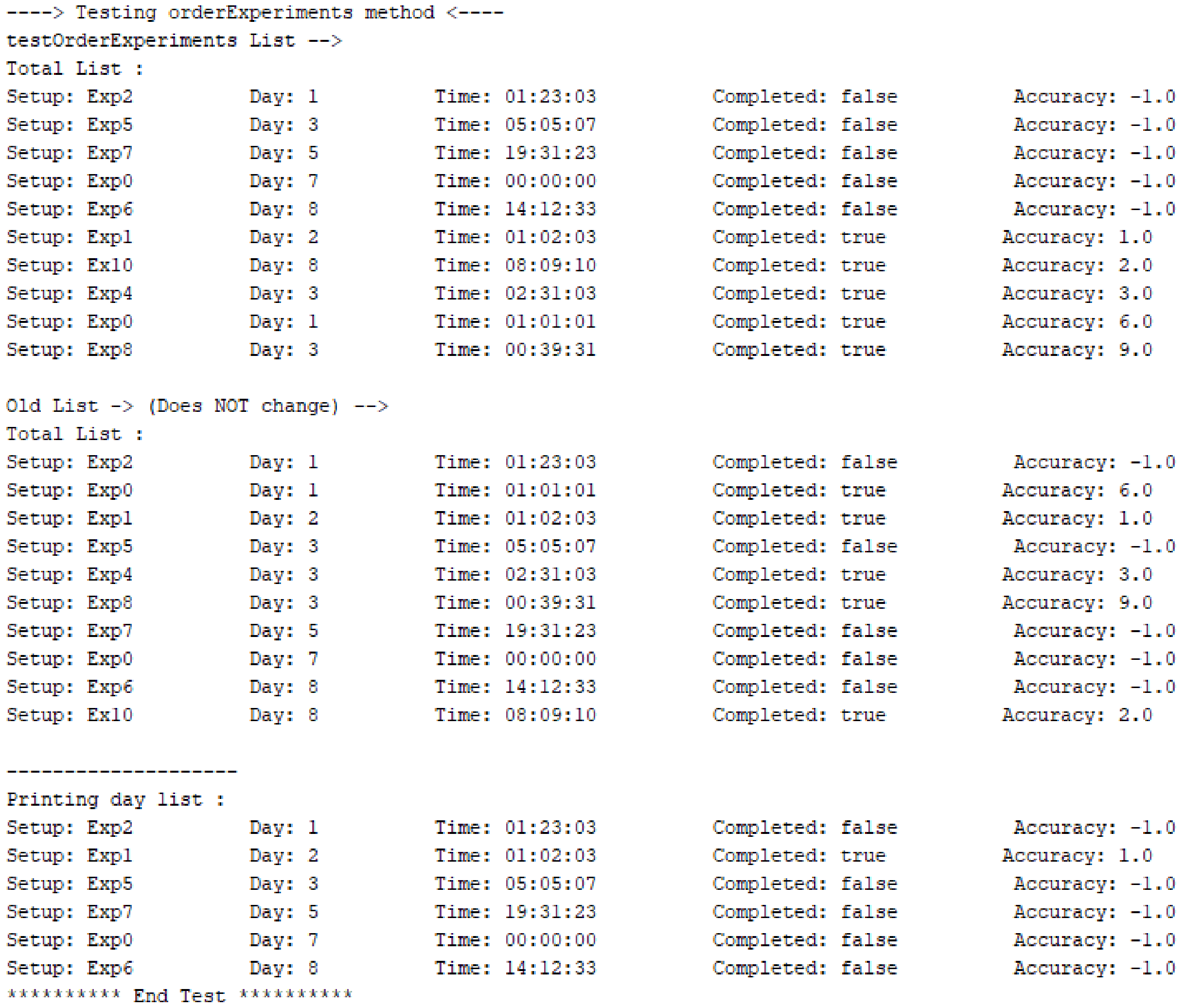


```
System.out.println("\n----> Testing orderDay method <----");
temp.orderDay(1);
temp.orderDay(2);
temp.orderDay(3);
temp.orderDay(5);
temp.orderDay(7);
temp.orderDay(8);
System.out.println("After orderDay all ...");
System.out.println("Size --> " + temp.getSize());
System.out.println(temp.toString());
System.out.println("--------------------");
System.out.println("Printing day list :");
temp.printDayNode();
System.out.println("********** End Test **********");
```



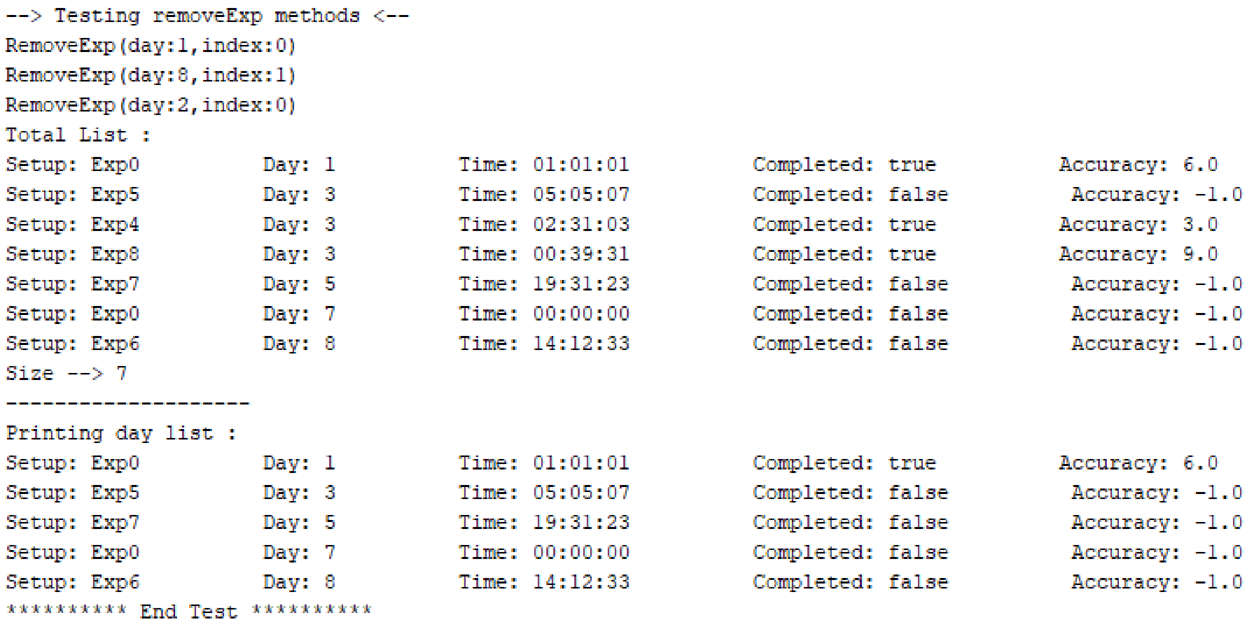
```
----> Testing orderDay method <----
After orderDay all ...
Size --> 10
Total List :
Setup: Exp2          Day: 1          Time: 01:23:03          Completed: false          Accuracy: -1.0
Setup: Exp0          Day: 1          Time: 01:01:01          Completed: true          Accuracy: 6.0
Setup: Exp1          Day: 2          Time: 01:02:03          Completed: true          Accuracy: 1.0
Setup: Exp5          Day: 3          Time: 05:05:07          Completed: false          Accuracy: -1.0
Setup: Exp4          Day: 3          Time: 02:31:03          Completed: true          Accuracy: 3.0
Setup: Exp8          Day: 3          Time: 00:39:31          Completed: true          Accuracy: 9.0
Setup: Exp7          Day: 5          Time: 19:31:23          Completed: false          Accuracy: -1.0
Setup: Exp0          Day: 7          Time: 00:00:00          Completed: false          Accuracy: -1.0
Setup: Exp6          Day: 8          Time: 14:12:33          Completed: false          Accuracy: -1.0
Setup: Ex10          Day: 8          Time: 08:09:10          Completed: true          Accuracy: 2.0

--------------------
Printing day list :
Setup: Exp2          Day: 1          Time: 01:23:03          Completed: false          Accuracy: -1.0
Setup: Exp1          Day: 2          Time: 01:02:03          Completed: true          Accuracy: 1.0
Setup: Exp5          Day: 3          Time: 05:05:07          Completed: false          Accuracy: -1.0
Setup: Exp7          Day: 5          Time: 19:31:23          Completed: false          Accuracy: -1.0
Setup: Exp0          Day: 7          Time: 00:00:00          Completed: false          Accuracy: -1.0
Setup: Exp6          Day: 8          Time: 14:12:33          Completed: false          Accuracy: -1.0
********** End Test **********
```

3.2.6 Testing order Experiments() Method



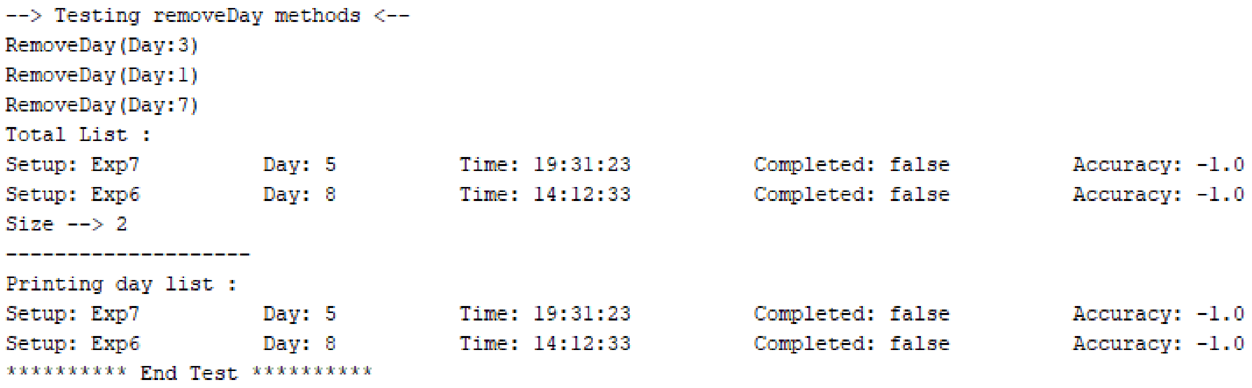
```
----> Testing orderExperiments method <----
testOrderExperiments List -->
Total List :
Setup: Exp2          Day: 1          Time: 01:23:03          Completed: false          Accuracy: -1.0
Setup: Exp5          Day: 3          Time: 05:05:07          Completed: false          Accuracy: -1.0
Setup: Exp7          Day: 5          Time: 19:31:23          Completed: false          Accuracy: -1.0
Setup: Exp0          Day: 7          Time: 00:00:00          Completed: false          Accuracy: -1.0
Setup: Exp6          Day: 8          Time: 14:12:33          Completed: false          Accuracy: -1.0
Setup: Exp1          Day: 2          Time: 01:02:03          Completed: true          Accuracy: 1.0
Setup: Ex10          Day: 8          Time: 08:09:10          Completed: true          Accuracy: 2.0
Setup: Exp4          Day: 3          Time: 02:31:03          Completed: true          Accuracy: 3.0
Setup: Exp0          Day: 1          Time: 01:01:01          Completed: true          Accuracy: 6.0
Setup: Exp8          Day: 3          Time: 00:39:31          Completed: true          Accuracy: 9.0

Old List -> (Does NOT change) -->
Total List :
Setup: Exp2          Day: 1          Time: 01:23:03          Completed: false          Accuracy: -1.0
Setup: Exp0          Day: 1          Time: 01:01:01          Completed: true          Accuracy: 6.0
Setup: Exp1          Day: 2          Time: 01:02:03          Completed: true          Accuracy: 1.0
Setup: Exp5          Day: 3          Time: 05:05:07          Completed: false          Accuracy: -1.0
Setup: Exp4          Day: 3          Time: 02:31:03          Completed: true          Accuracy: 3.0
Setup: Exp8          Day: 3          Time: 00:39:31          Completed: true          Accuracy: 9.0
Setup: Exp7          Day: 5          Time: 19:31:23          Completed: false          Accuracy: -1.0
Setup: Exp0          Day: 7          Time: 00:00:00          Completed: false          Accuracy: -1.0
Setup: Exp6          Day: 8          Time: 14:12:33          Completed: false          Accuracy: -1.0
Setup: Ex10          Day: 8          Time: 08:09:10          Completed: true          Accuracy: 2.0

--------------------
Printing day list :
Setup: Exp2          Day: 1          Time: 01:23:03          Completed: false          Accuracy: -1.0
Setup: Exp1          Day: 2          Time: 01:02:03          Completed: true          Accuracy: 1.0
Setup: Exp5          Day: 3          Time: 05:05:07          Completed: false          Accuracy: -1.0
Setup: Exp7          Day: 5          Time: 19:31:23          Completed: false          Accuracy: -1.0
Setup: Exp0          Day: 7          Time: 00:00:00          Completed: false          Accuracy: -1.0
Setup: Exp6          Day: 8          Time: 14:12:33          Completed: false          Accuracy: -1.0
********** End Test **********
```

3.2.7 Testing removeExp(day,index) Method



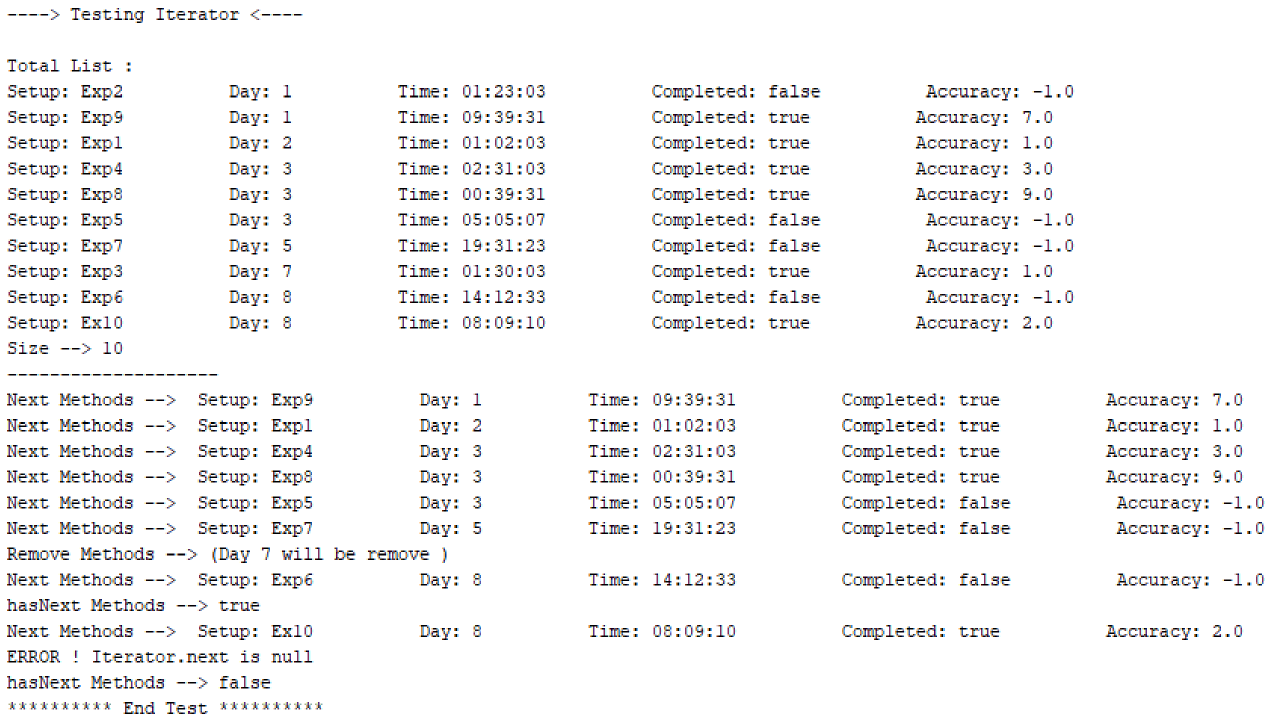
```
--> Testing removeExp methods <--
RemoveExp(day:1,index:0)
RemoveExp(day:8,index:1)
RemoveExp(day:2,index:0)
Total List :
Setup: Exp0          Day: 1          Time: 01:01:01          Completed: true          Accuracy: 6.0
Setup: Exp5          Day: 3          Time: 05:05:07          Completed: false          Accuracy: -1.0
Setup: Exp4          Day: 3          Time: 02:31:03          Completed: true          Accuracy: 3.0
Setup: Exp8          Day: 3          Time: 00:39:31          Completed: true          Accuracy: 9.0
Setup: Exp7          Day: 5          Time: 19:31:23          Completed: false          Accuracy: -1.0
Setup: Exp0          Day: 7          Time: 00:00:00          Completed: false          Accuracy: -1.0
Setup: Exp6          Day: 8          Time: 14:12:33          Completed: false          Accuracy: -1.0
Size --> 7
--------------------
Printing day list :
Setup: Exp0          Day: 1          Time: 01:01:01          Completed: true          Accuracy: 6.0
Setup: Exp5          Day: 3          Time: 05:05:07          Completed: false          Accuracy: -1.0
Setup: Exp7          Day: 5          Time: 19:31:23          Completed: false          Accuracy: -1.0
Setup: Exp0          Day: 7          Time: 00:00:00          Completed: false          Accuracy: -1.0
Setup: Exp6          Day: 8          Time: 14:12:33          Completed: false          Accuracy: -1.0
********** End Test **********
```

3.2.8 Testing removeDay(day) Method



```
--> Testing removeDay methods <--
RemoveDay(Day:3)
RemoveDay(Day:1)
RemoveDay(Day:7)
Total List :
Setup: Exp7          Day: 5          Time: 19:31:23          Completed: false          Accuracy: -1.0
Setup: Exp6          Day: 8          Time: 14:12:33          Completed: false          Accuracy: -1.0
Size --> 2
--------------------
Printing day list :
Setup: Exp7          Day: 5          Time: 19:31:23          Completed: false          Accuracy: -1.0
Setup: Exp6          Day: 8          Time: 14:12:33          Completed: false          Accuracy: -1.0
********** End Test **********
```

3.2.9 Testing Iterator Methods



```
----> Testing Iterator <----

Total List :
Setup: Exp2         Day: 1       Time: 01:23:03       Completed: false        Accuracy: -1.0
Setup: Exp9         Day: 1       Time: 09:39:31       Completed: true        Accuracy: 7.0
Setup: Exp1         Day: 2       Time: 01:02:03       Completed: true        Accuracy: 1.0
Setup: Exp4         Day: 3       Time: 02:31:03       Completed: true        Accuracy: 3.0
Setup: Exp8         Day: 3       Time: 00:39:31       Completed: true        Accuracy: 9.0
Setup: Exp5         Day: 3       Time: 05:05:07       Completed: false        Accuracy: -1.0
Setup: Exp7         Day: 5       Time: 19:31:23       Completed: false        Accuracy: -1.0
Setup: Exp3         Day: 7       Time: 01:30:03       Completed: true        Accuracy: 1.0
Setup: Exp6         Day: 8       Time: 14:12:33       Completed: false        Accuracy: -1.0
Setup: Ex10         Day: 8       Time: 08:09:10       Completed: true        Accuracy: 2.0
Size --> 10
--------------------
Next Methods -->  Setup: Exp9         Day: 1       Time: 09:39:31       Completed: true        Accuracy: 7.0
Next Methods -->  Setup: Exp1         Day: 2       Time: 01:02:03       Completed: true        Accuracy: 1.0
Next Methods -->  Setup: Exp4         Day: 3       Time: 02:31:03       Completed: true        Accuracy: 3.0
Next Methods -->  Setup: Exp8         Day: 3       Time: 00:39:31       Completed: true        Accuracy: 9.0
Next Methods -->  Setup: Exp5         Day: 3       Time: 05:05:07       Completed: false        Accuracy: -1.0
Next Methods -->  Setup: Exp7         Day: 5       Time: 19:31:23       Completed: false        Accuracy: -1.0
Remove Methods --> (Day 7 will be remove )
Next Methods -->  Setup: Exp6         Day: 8       Time: 14:12:33       Completed: false        Accuracy: -1.0
hasNext Methods --> true
Next Methods -->  Setup: Ex10         Day: 8       Time: 08:09:10       Completed: true        Accuracy: 2.0
ERROR ! Iterator.next is null
hasNext Methods --> false
********** End Test **********
```

4 Time Complexity

4.1 Experiment Class

All methods have O(1). Because they have not any loops or statements. They do the same things.(Constructors, getDay , getSetup , getCompleted, getAccuracy and toString methods)

4.2 ExperimentNode Class

This class also like Experiment Class.Because its methods and constructors only set or return property.So all methods (Constructors, getData , setData, getNext, setNext, getNextDay, setNextDay) have O(1).

4.3 ExperimentList Class

4.3.1 hasNext Method

This method only control.So it has O(1).Just returning true or false.

4.3.2 next Method

This method like hasNext method.Only control and return something.So it has O(1).

4.3.3 remove Method

This method has O(1). Because it is only exist of if-else statement.

4.3.4 iterator Method

It is O(1).Because just return a node.

4.3.5 getIteratorData Method

Only returning experiment, so it has O(1).

4.3.6 Constructors

Constructors have O(1).They make only set.

4.3.7 getSize Method

O(1).Because only return size property.

4.3.8 addExp Method

This method is complex method.It consist of a lot of if-else block and while loops.But it does not have any nested loops. If-else blocks have no effect on complexity.(Of course, there is no way to change the degree of the method). O(1) becomes the case when the head is added (Best case). But in other cases until the day to be added to O (n) is.

4.3.9 getExp Method

This method is also complex method.But time complexity is like addExp method.It has while loop.So, time complexity is O(n).

4.3.10 setExp Method

Methods also include coefficients before n.But time complexity does not change.So, ı do not write coefficients.This method has O(n).Because of while loop.

4.3.11 removeExp Method

It has O(n).Because it will be go to index position by while loop.

4.3.12 listExp Method

Best case is O(1) (If the head and index is 0). Otherwise it has O(n).Same way by the while loop.

4.3.13 removeDay Method

It has O(n).Because of while loop.It calculates the size again.So it has all O(n).

4.3.14 orderDay Method

It uses bubleSort method . The bubleSort method has nested loops.So time complextiy is $O(n^2)$. Time complexity is determined by the slow running method. In this method, because it is a slow running bublesort method, time complexity is $O(n^2)$.

4.3.15 orderExperiments Method

It has bubleSort method, like orderDay method.So time complexity is $O(n^2)$.

4.3.16 getHead Method

It just return head node.So time complexity is O(1).

4.3.17 toString Method

It has while loop.So time complexity is O(n).

4.3.18 printDayNode Method

It has while loop.So time complexity is O(n).

4.3.19 bubleSort Method

The bubleSort method has nested loops.So time complextiy is $O(n^2)$.

CLASS NAME	METHOD NAME	TIME COMPLEXITY
Experiment	All Methods	O(1)
ExperimentNode	All Methods	O(1)
ExperimentList	hasNext	O(1)
ExperimentList	next	O(1)
ExperimentList	remove	O(1)
ExperimentList	iterator	O(1)
ExperimentList	getIteratorData	O(1)
ExperimentList	ExperimentList	O(1)
ExperimentList	ExperimentList	O(1)
ExperimentList	getSize	O(1)
ExperimentList	addExp	O(n)
ExperimentList	getExp	O(n)
ExperimentList	setExp	O(n)
ExperimentList	removeExp	O(n)
ExperimentList	listExp	O(n)
ExperimentList	removeDay	O(n)
ExperimentList	orderDay	$O(n^2)$
ExperimentList	orderExperiments	$O(n^2)$
ExperimentList	getHead	O(1)
ExperimentList	toString	O(n)
ExperimentList	printDayNode	O(n)
ExperimentList	bubleSort	$O(n^2)$