# Code Structure Measurement of SPL I

Course Code : SE 3204
Course Title : Software Metrics

## Submitted To:

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**Noakhali Science and Technology**

# 1 Measuring Coupling in Object-Oriented System

Code structure measurement is the process of quantifying the quality of a software's structure. It involves using various metrics to evaluate the design and organization of the code. The goal is to identify potential issues and areas for improvement, as well as to track the progress of development.

The metrics uses to measure the code structure of the SPL1 project:

- Control Flow Diagrams
- Number of decision points
- Cyclomatic Complexity

## 1.1 Control Flow Diagrams

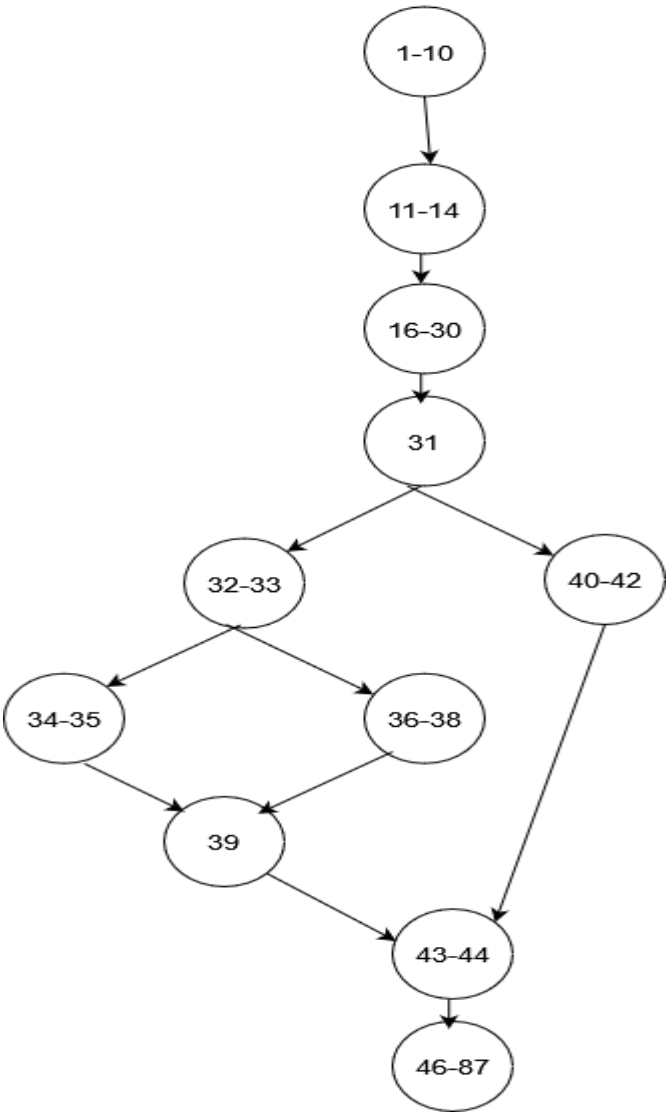
A Control Flow Diagram is a graphical representation of the control flow of a program. It depicts the sequence of operations and the paths of data through a program. The diagram can be used to identify the complexity of the program, and to detect errors in the control flow.

**Measurement process:**

Control Flow Diagrams can be created using a variety of techniques, such as structured programming, flowcharts, and data flow diagrams. The diagram should include all possible paths through the program, and should clearly indicate the sequence of operations and the flow of data.

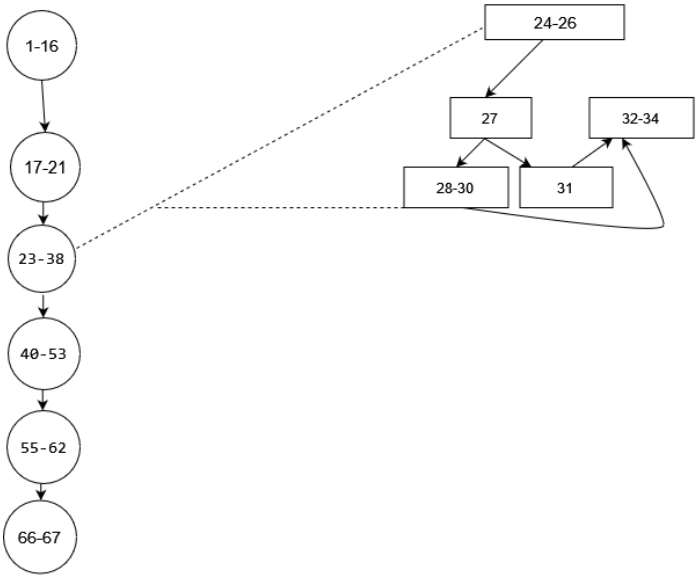
The control flow diagrams obtained from analyzing the source code of our SPL1 project are given below:

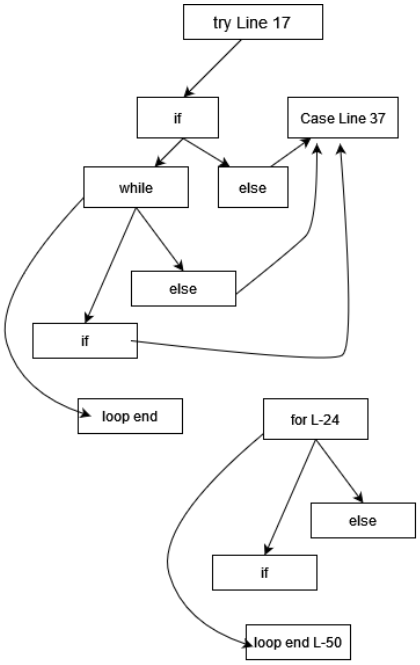
Class: WordSearch

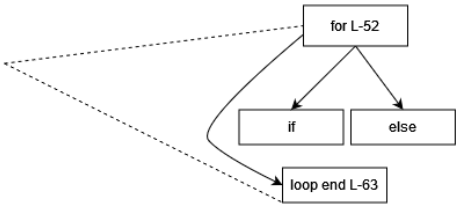



Class: userstructure

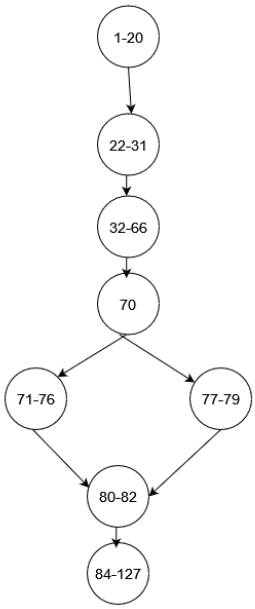
Package: Account->UserData
Class: `objectread`

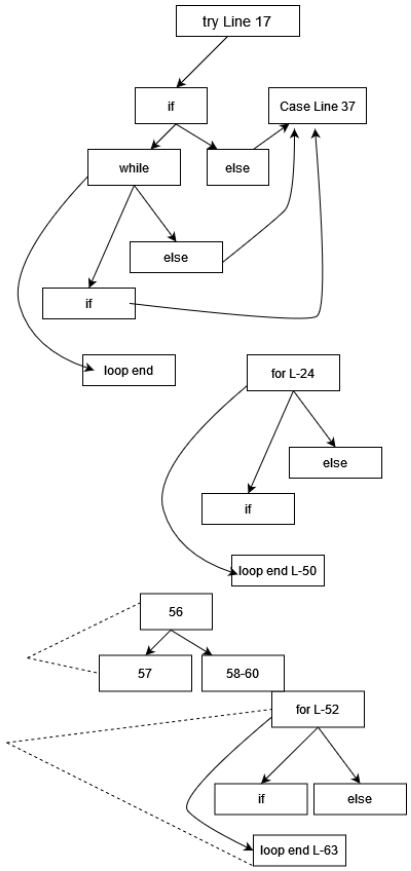


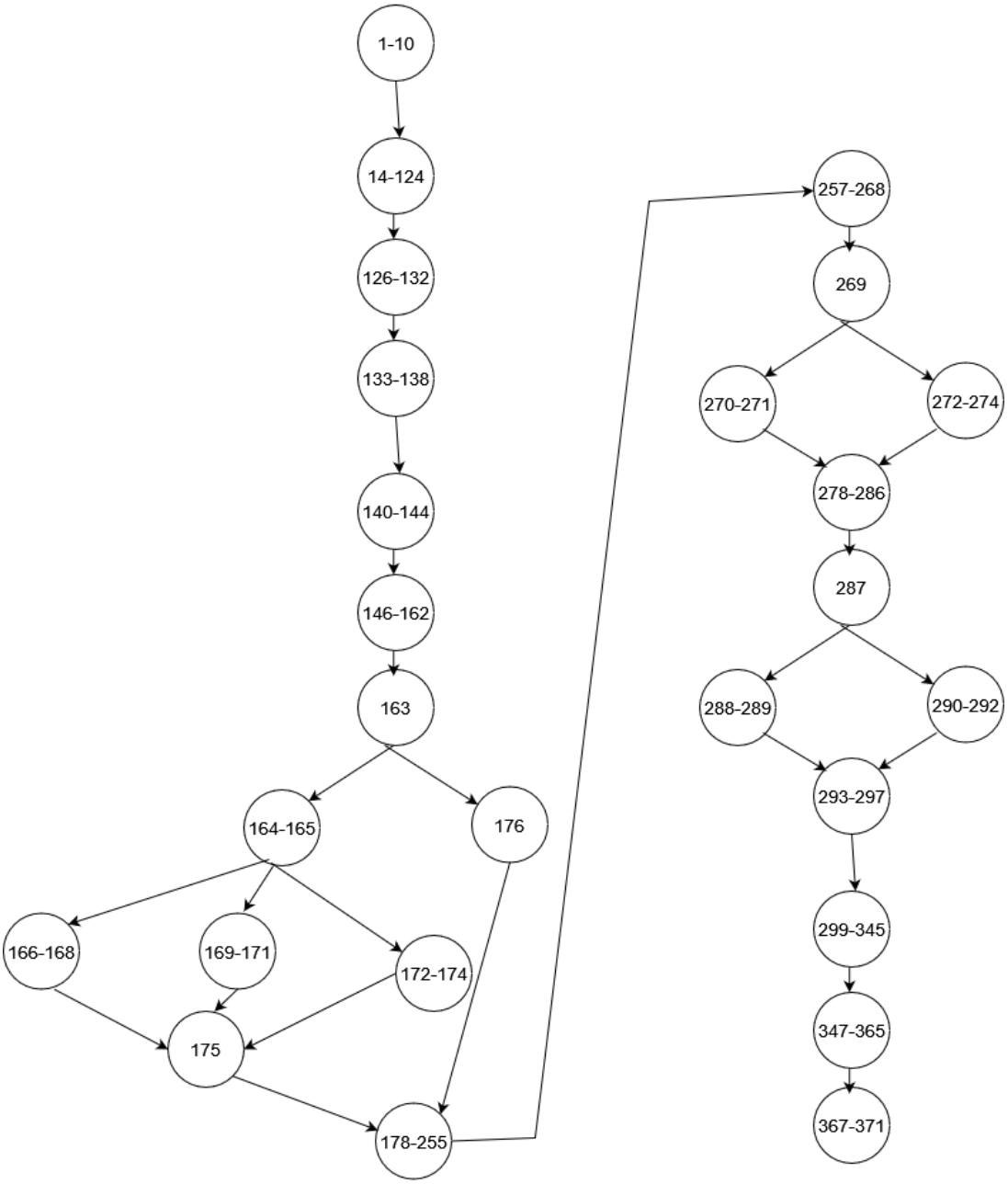



Package: Account->UserData
Class: `ImplementWord`

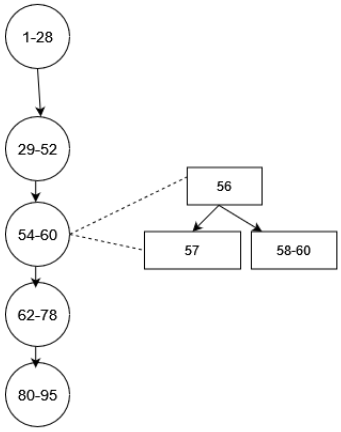


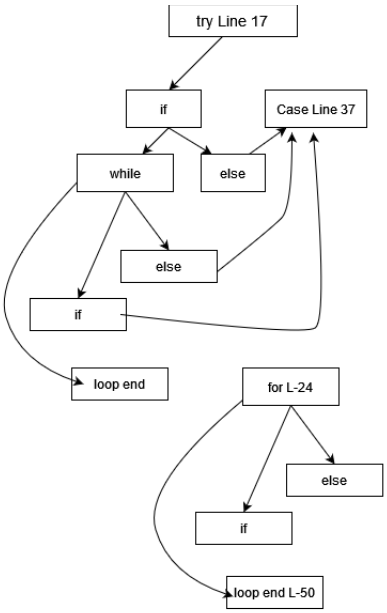



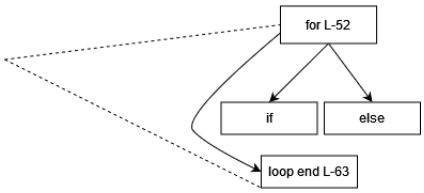
Class: DictionaryMainFrame



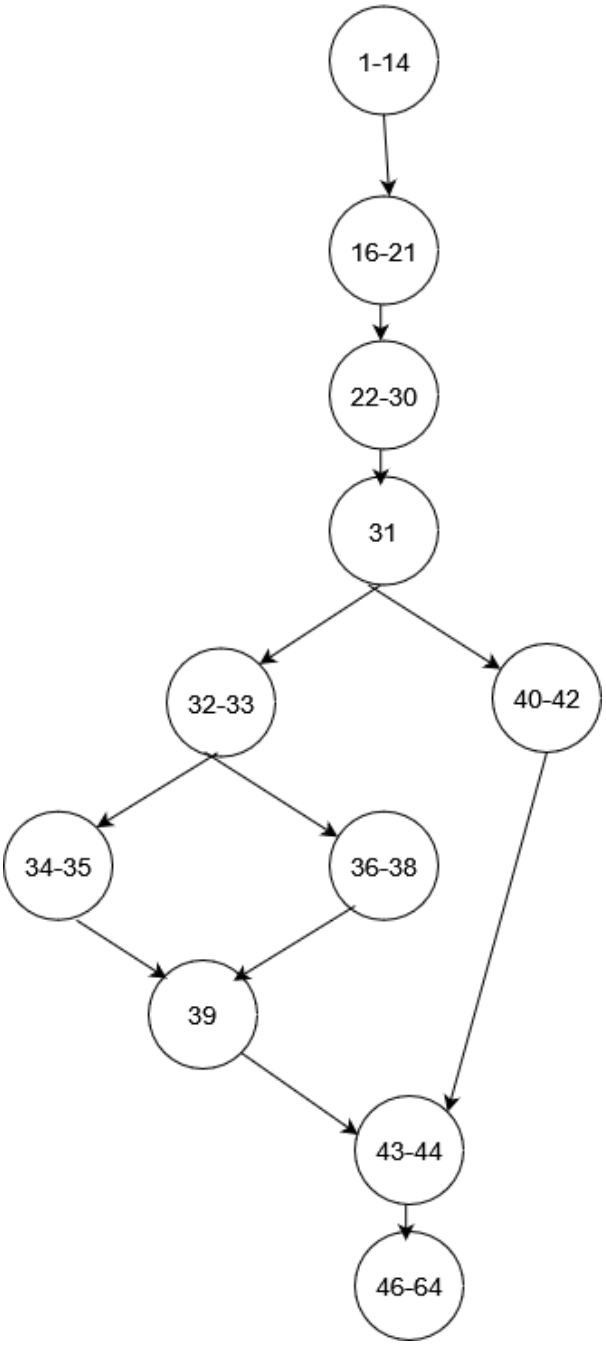
Package: Account->UserData
Class: `Dictionary`

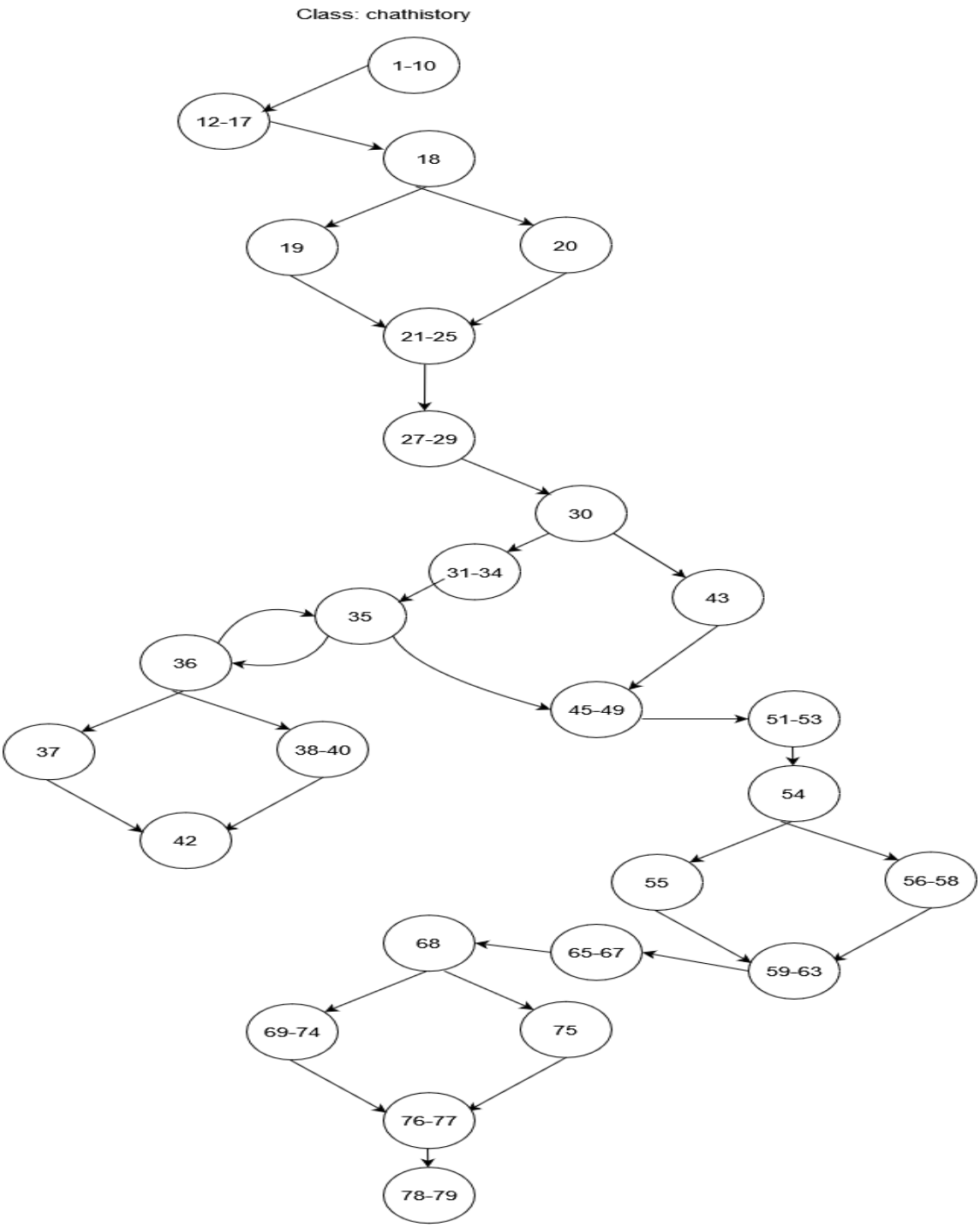


Class: DeleteListedWord




Class: chathistory
1-10
12-17
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56-58
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65-67
59-63
69-74
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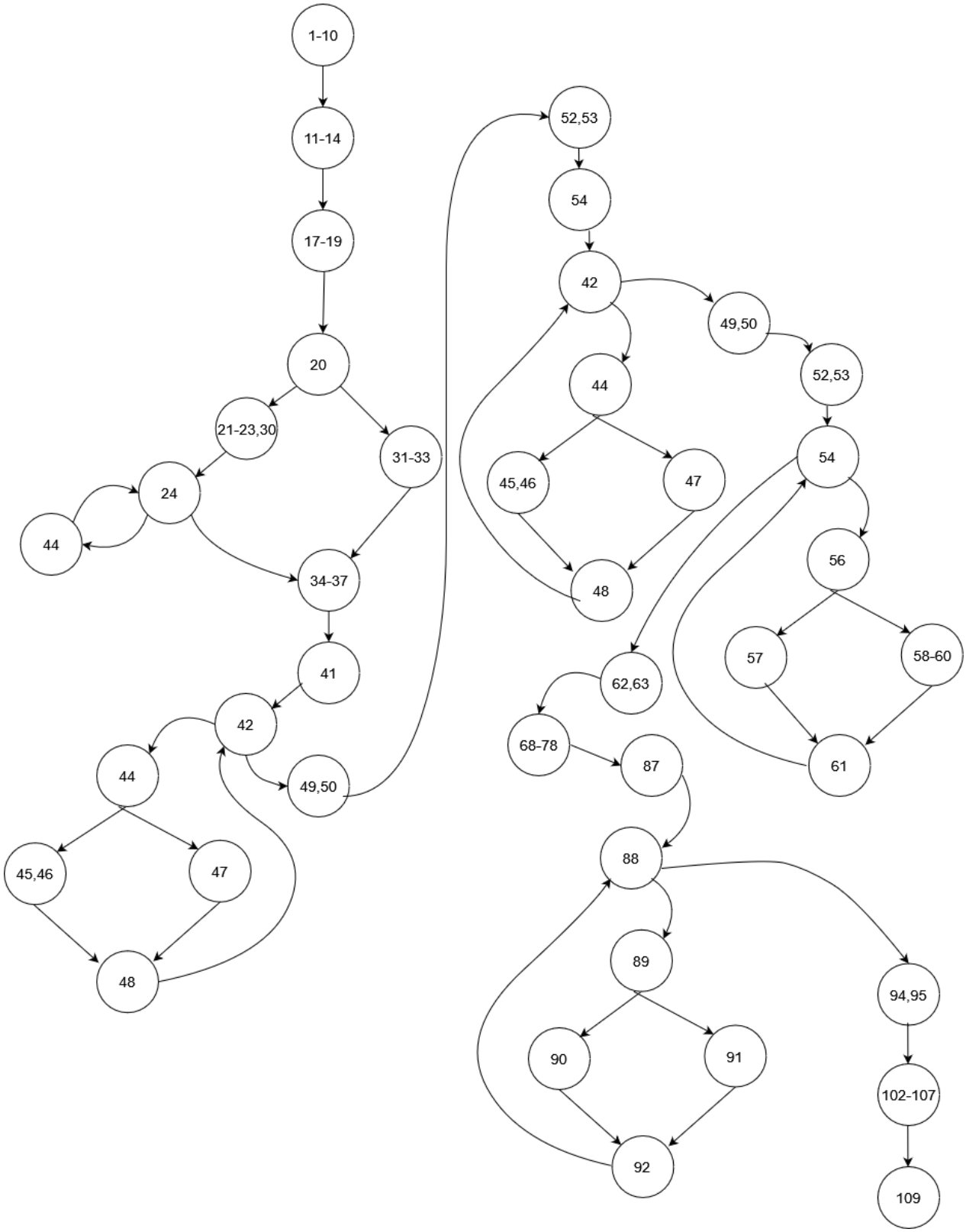
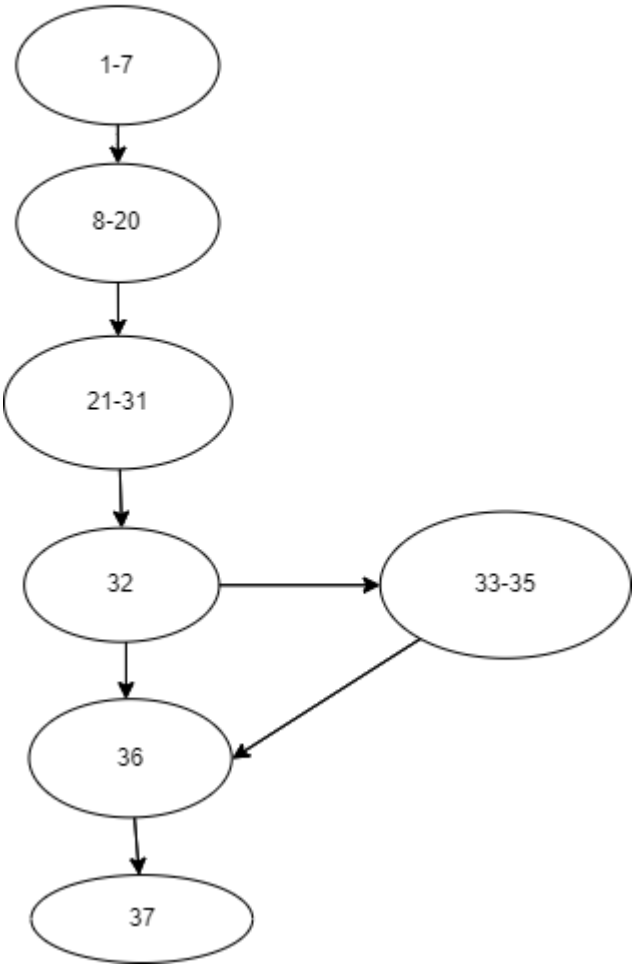
76-77
78-79

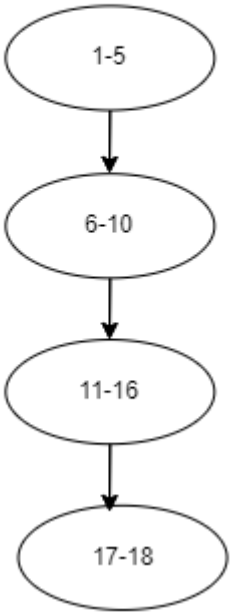
Class: accountdata

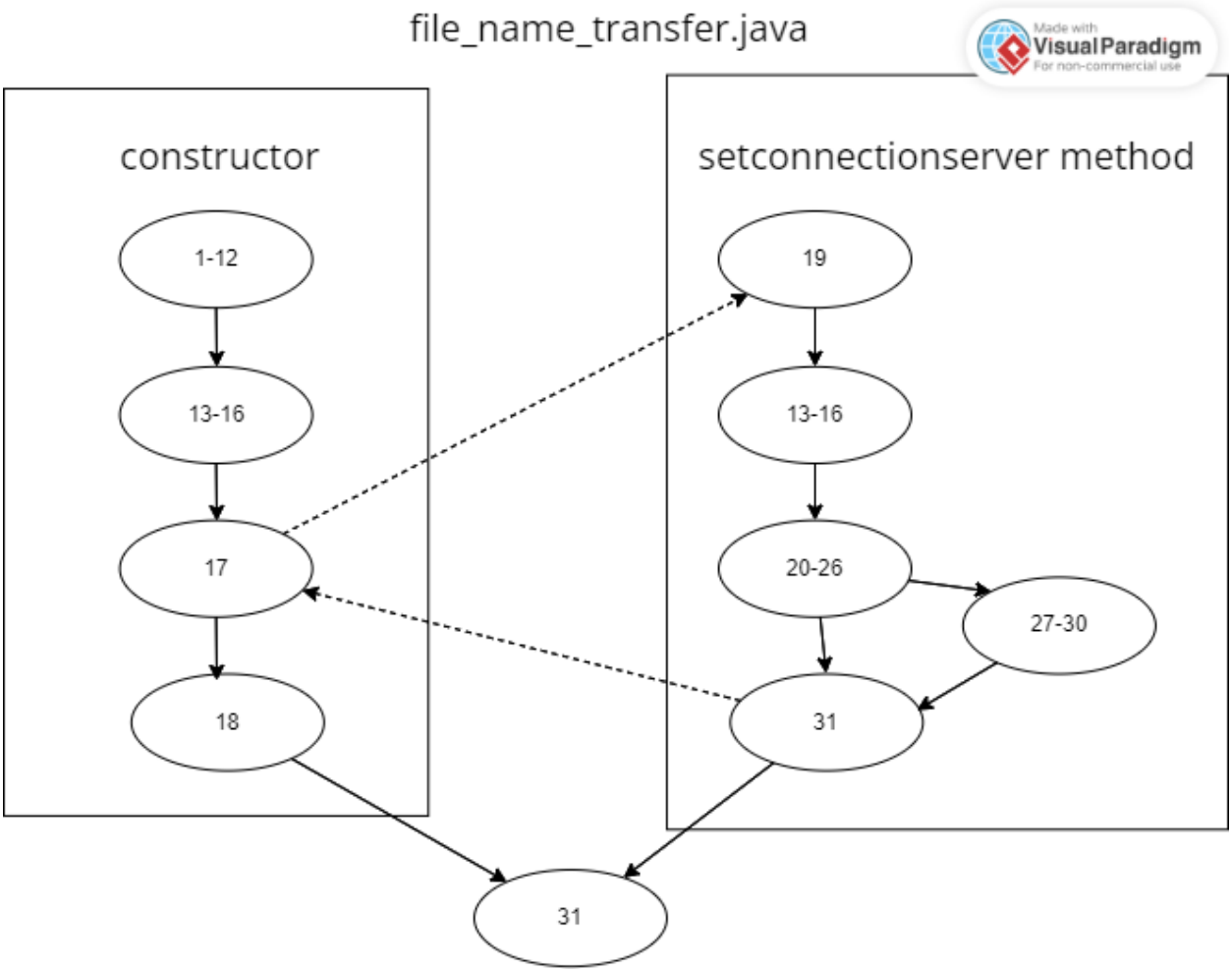


Clintsocket.java

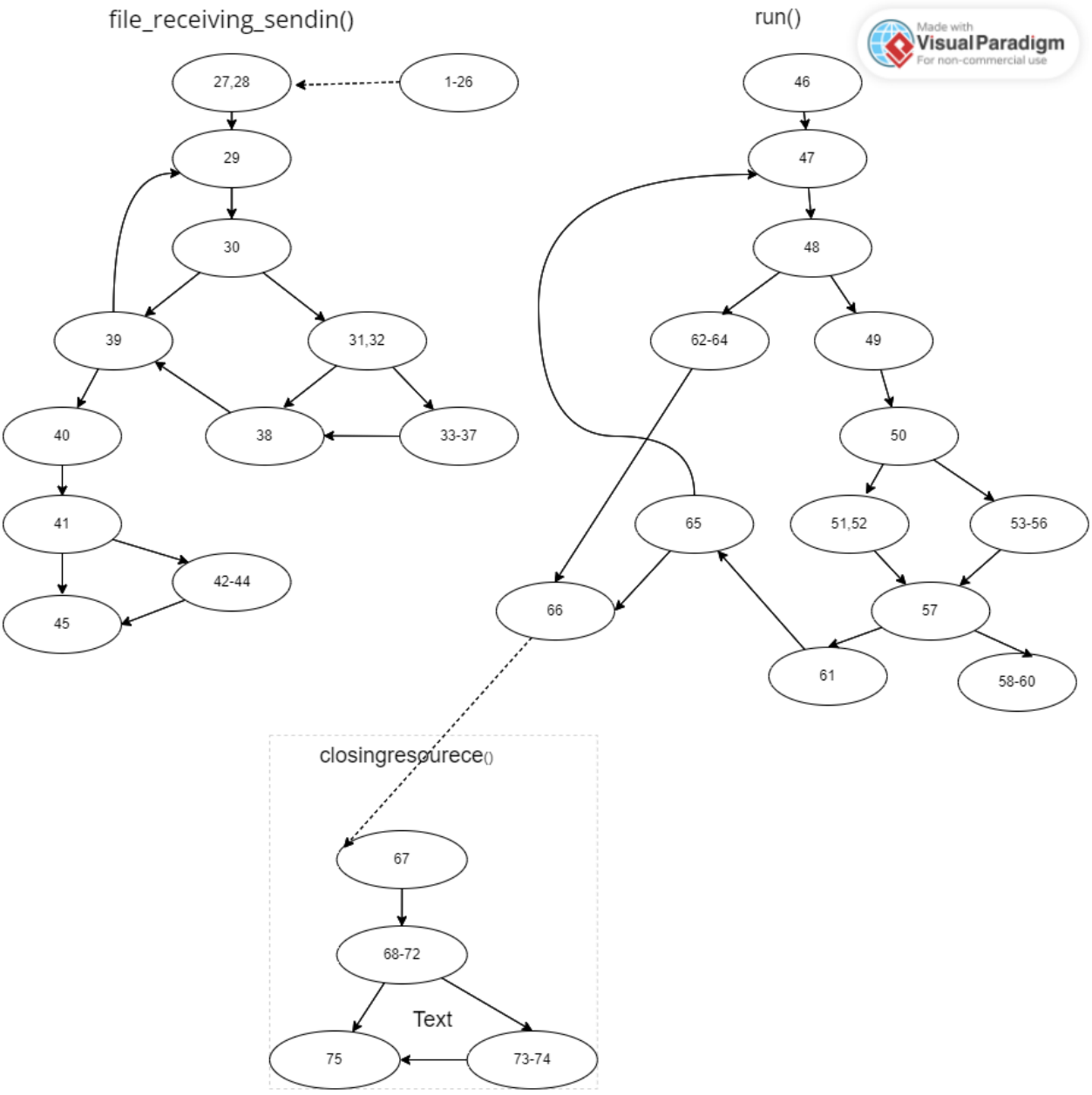



clinthread.java

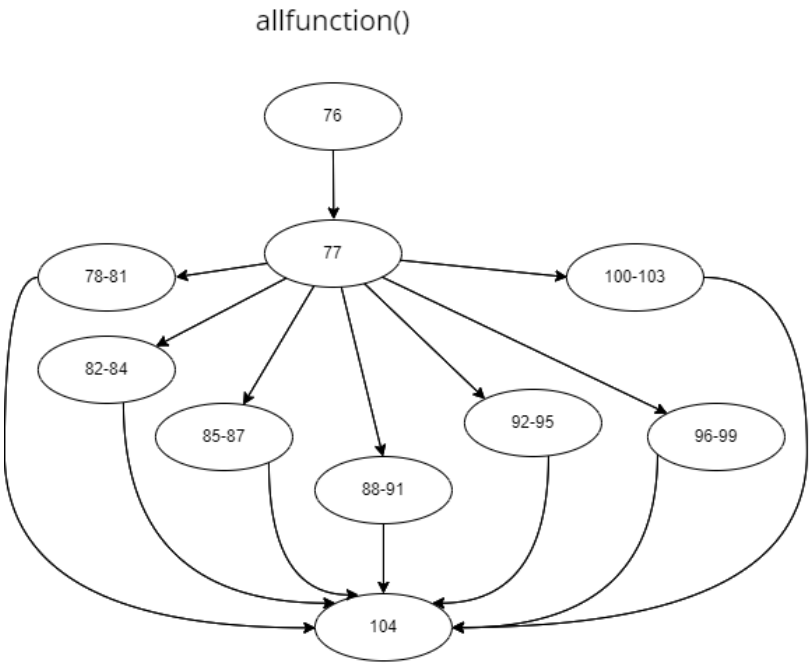


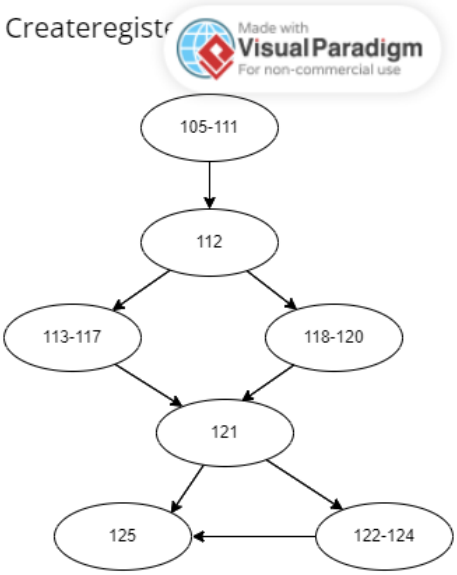

file_name_transfer.java
Made with Visual Paradigm For non-commercial use
constructor
1-12
13-16
17
18
setconnectionserver method
19
13-16
20-26
27-30
31
31

Clinthandaler2.java



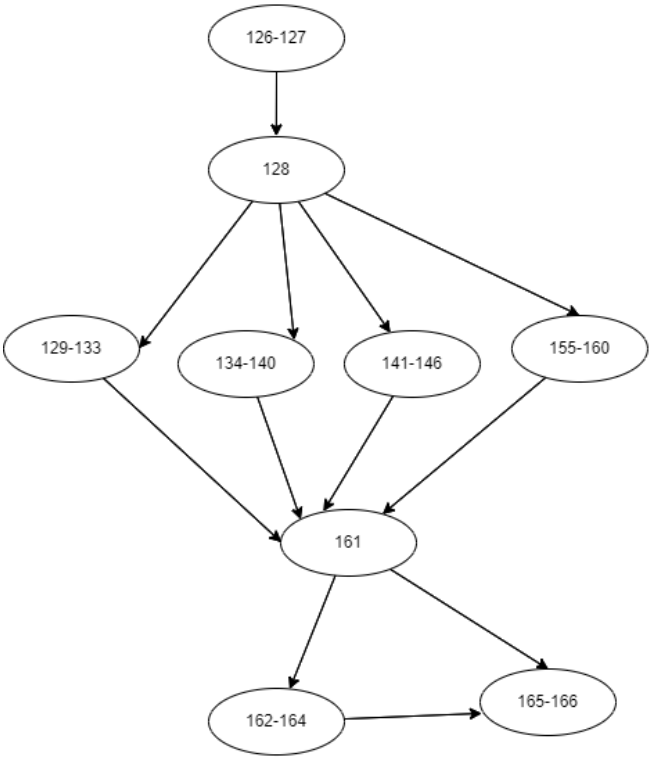
Clinthandaler2.java



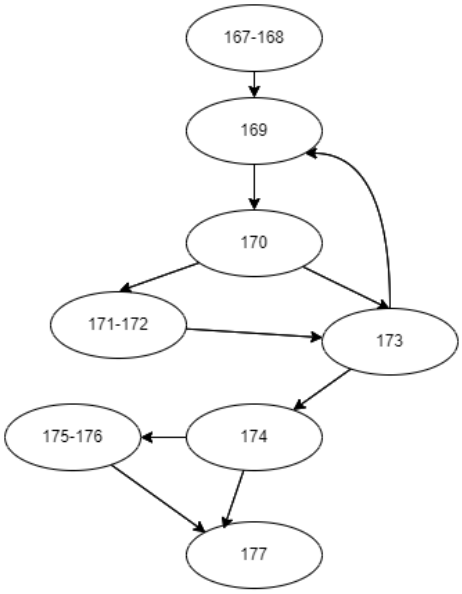



Clinthandaler2.java

msg_to_actualmsg()

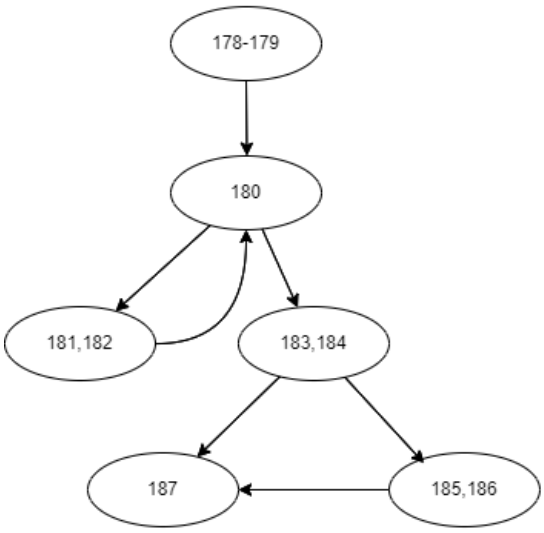




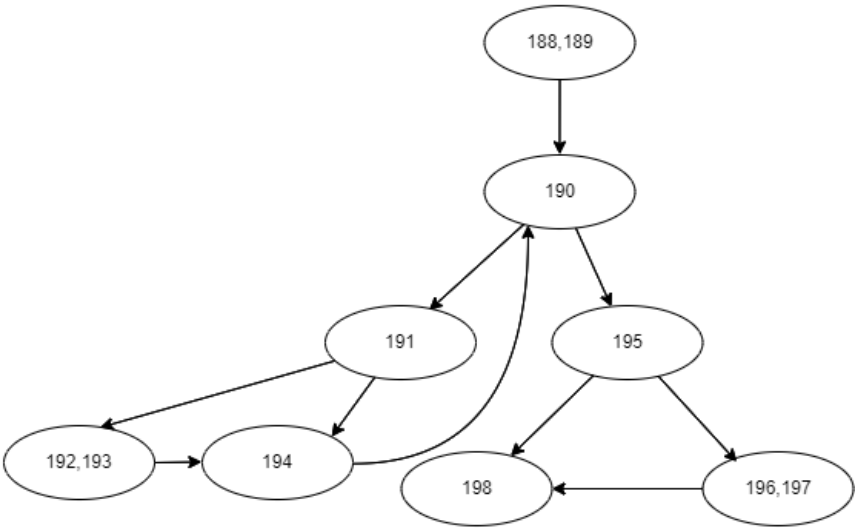
Clinthandaler2.java

alreadyconnectedpeoplelist()

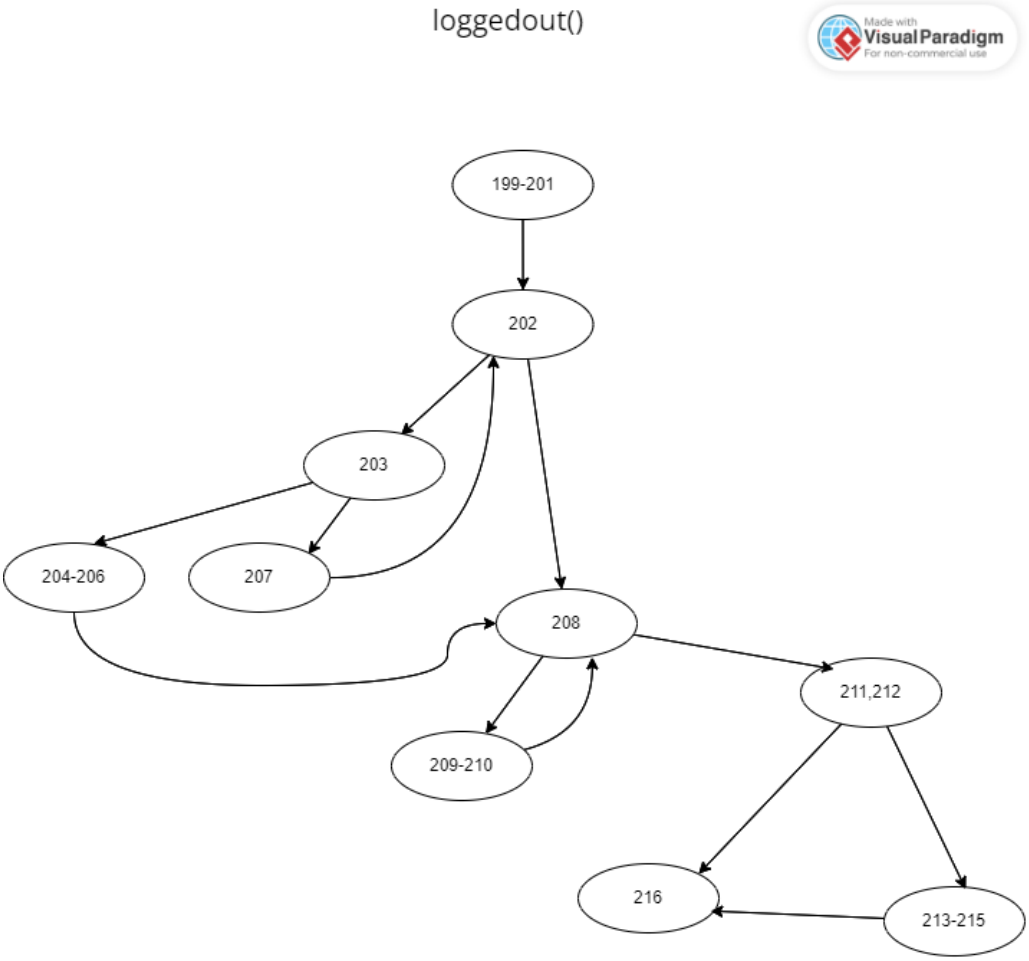



sendtoclint()

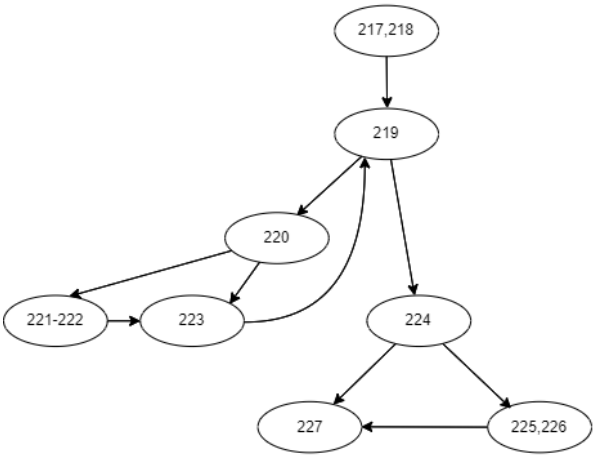




Clinthandaler2.java

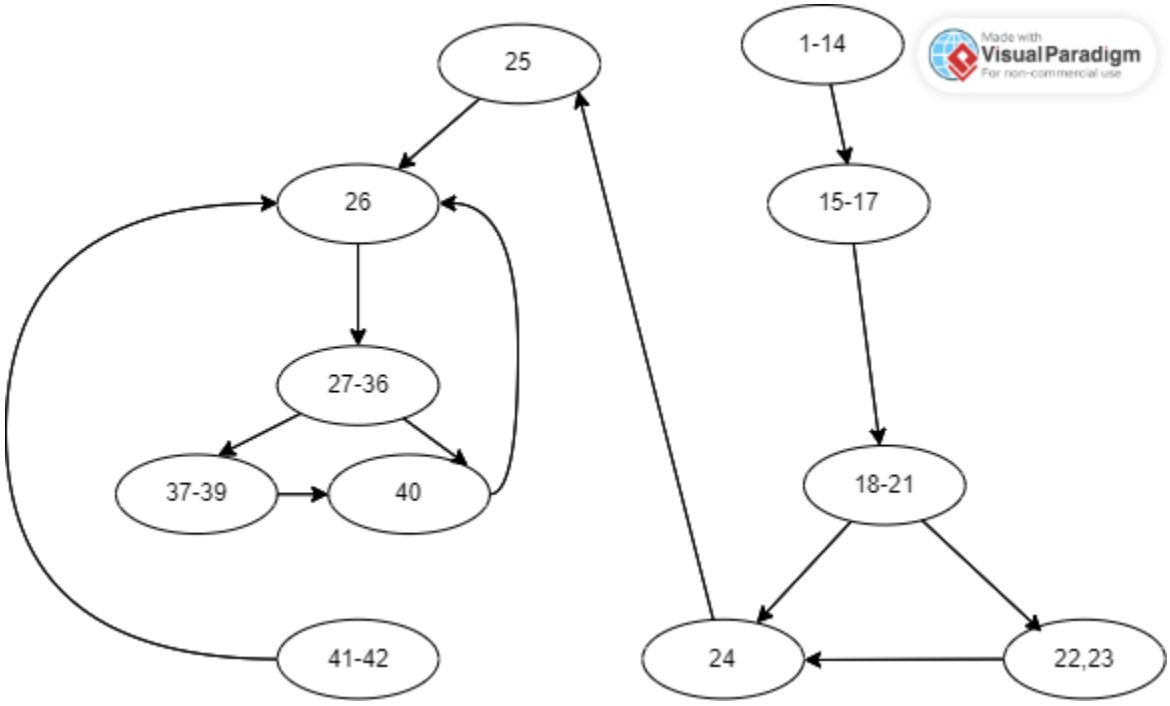


send_friendrequest()

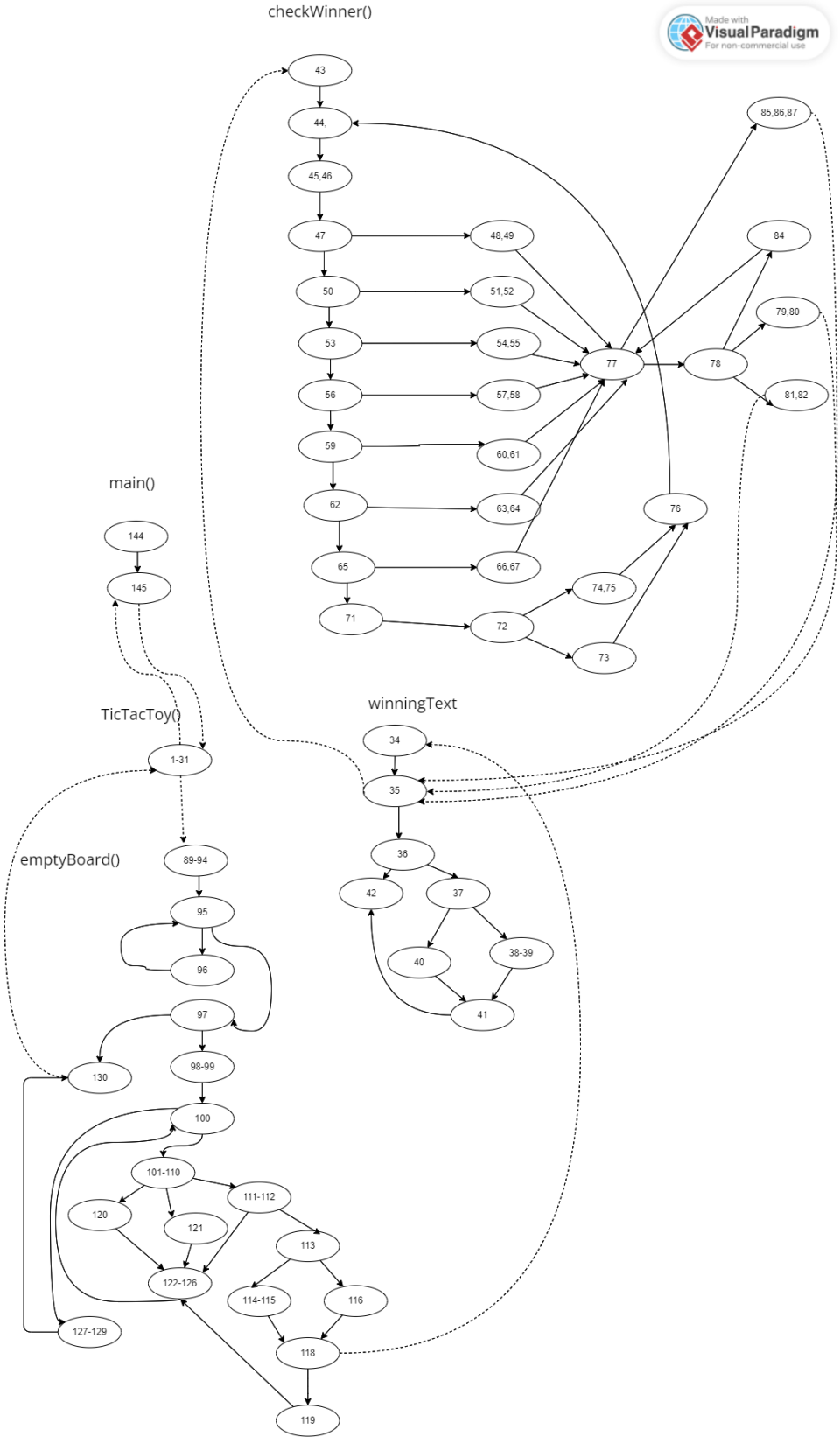


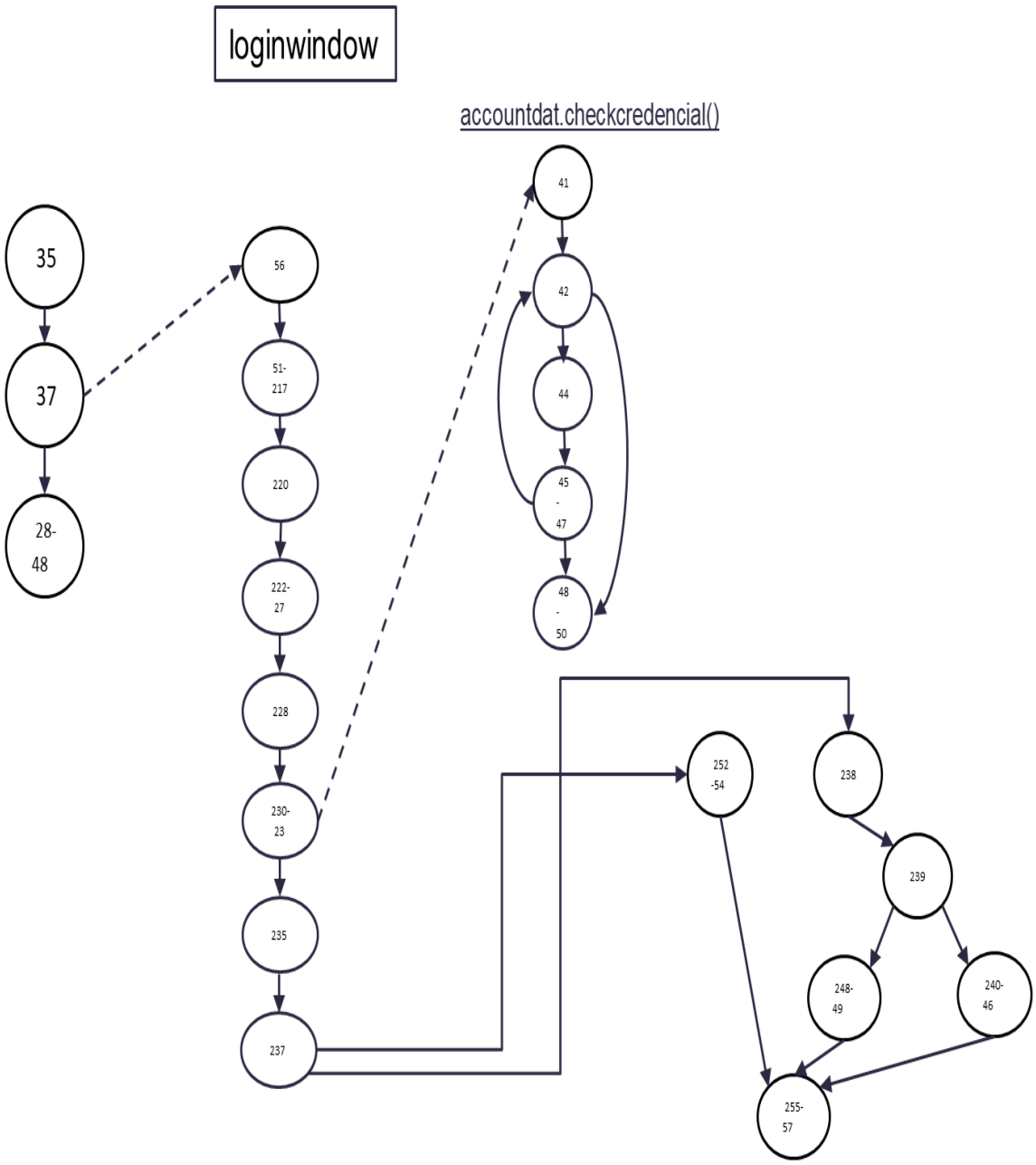

friendrequest_ans()


serversocket.java



# tictactoe.java




loginwindow
accountdat.checkcredencial()
35
37
28-
48
56
51-
217
220
222-
27
228
230-
23
235
237
41
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238
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248-
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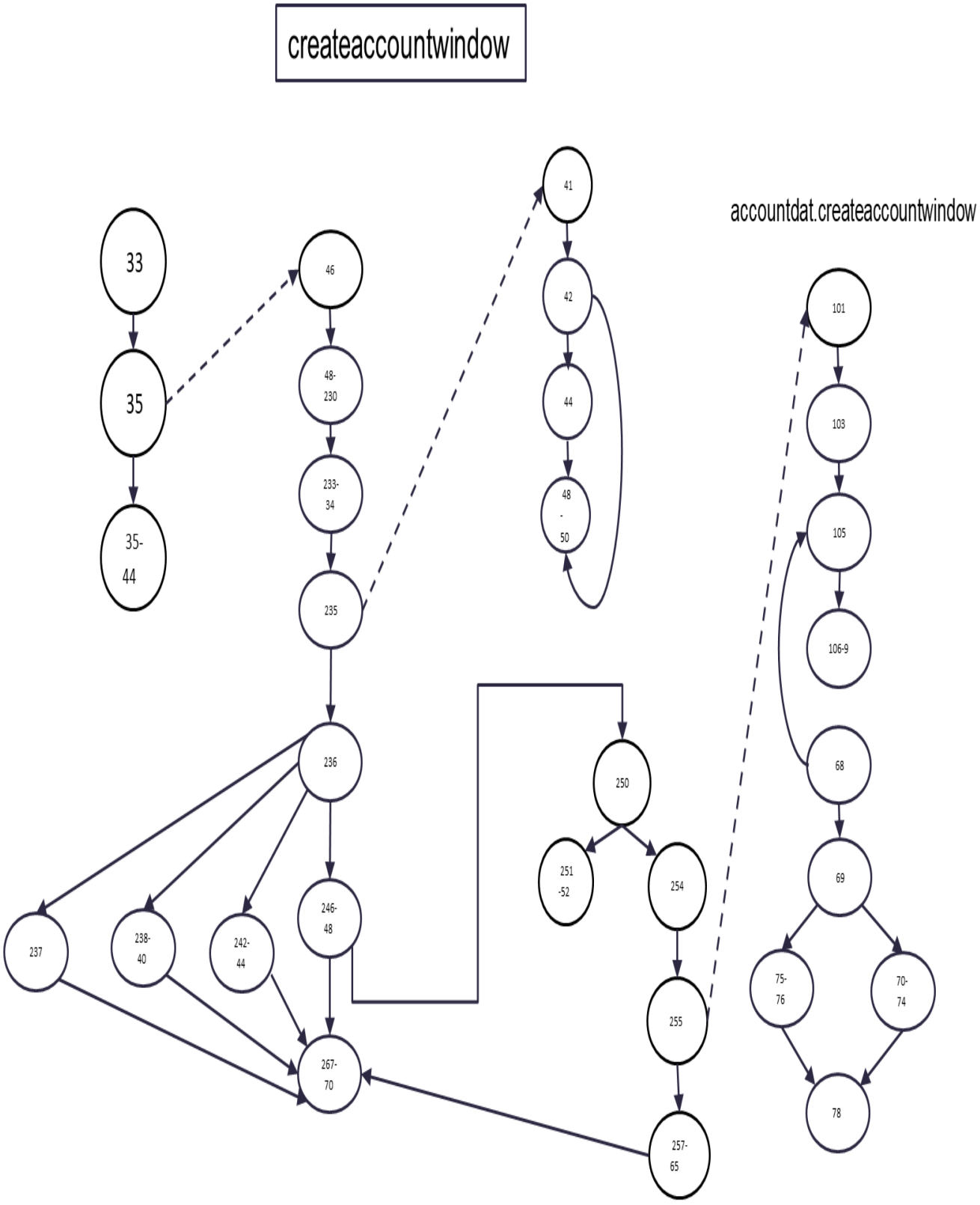
240-
46
255-
57


createaccountwindow
accountdat.createaccountwindow
33
35
35-
44
46
48-
230
233-
34
235
236
237
238-
40
242-
44
246-
48
267-
70
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50
250
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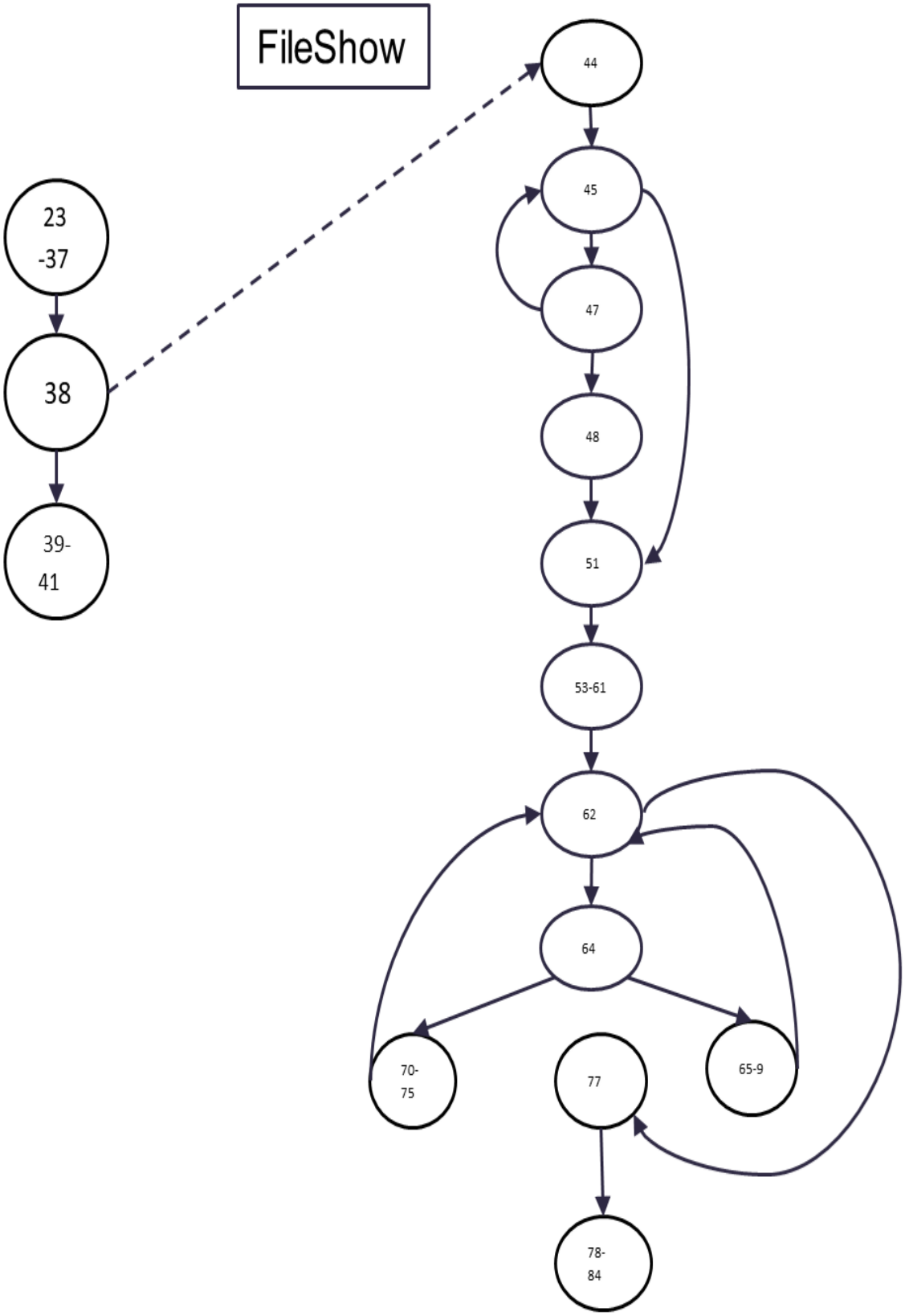
FileShow
23
-37
38
39-
41
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53-61
62
64
70-
75
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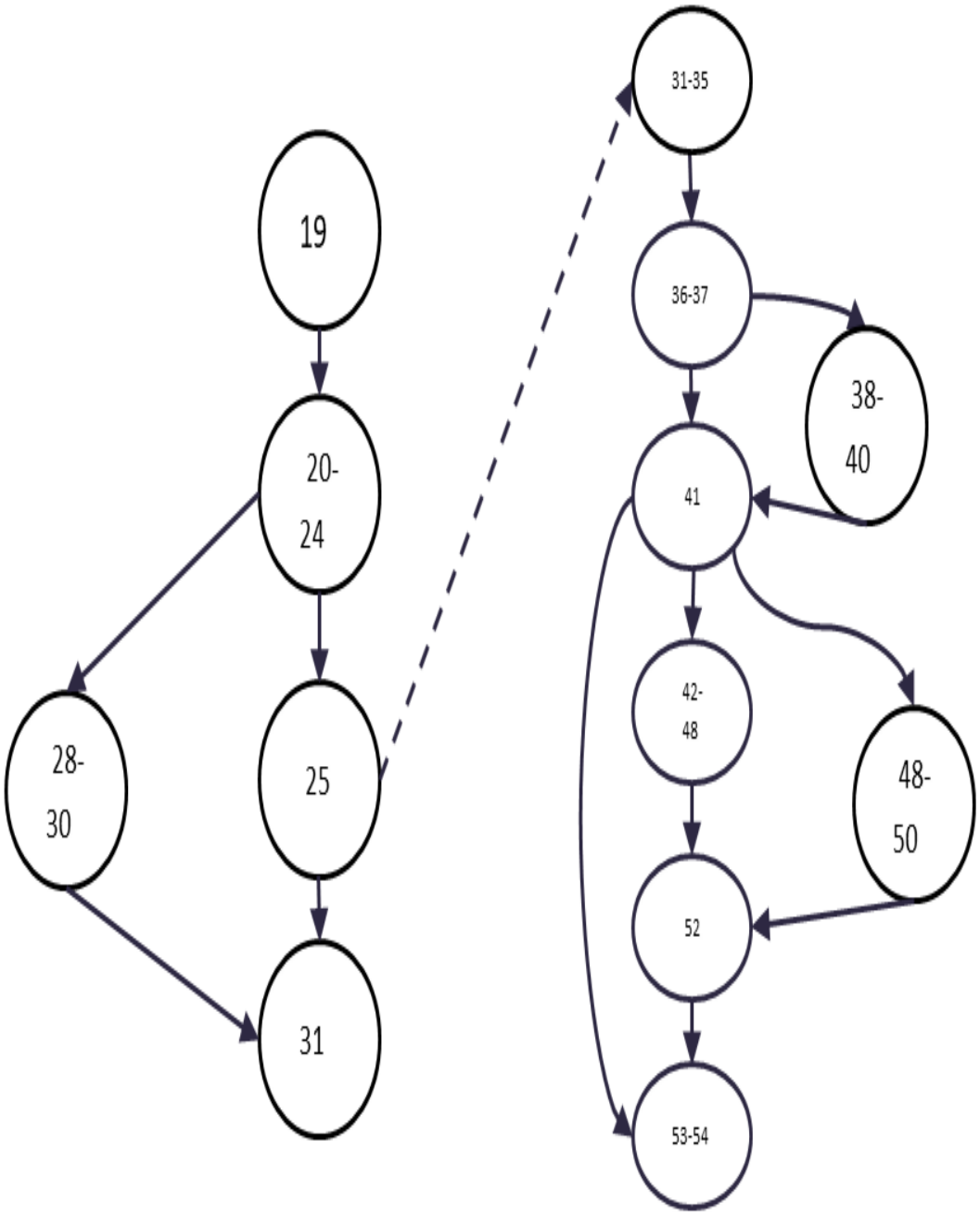
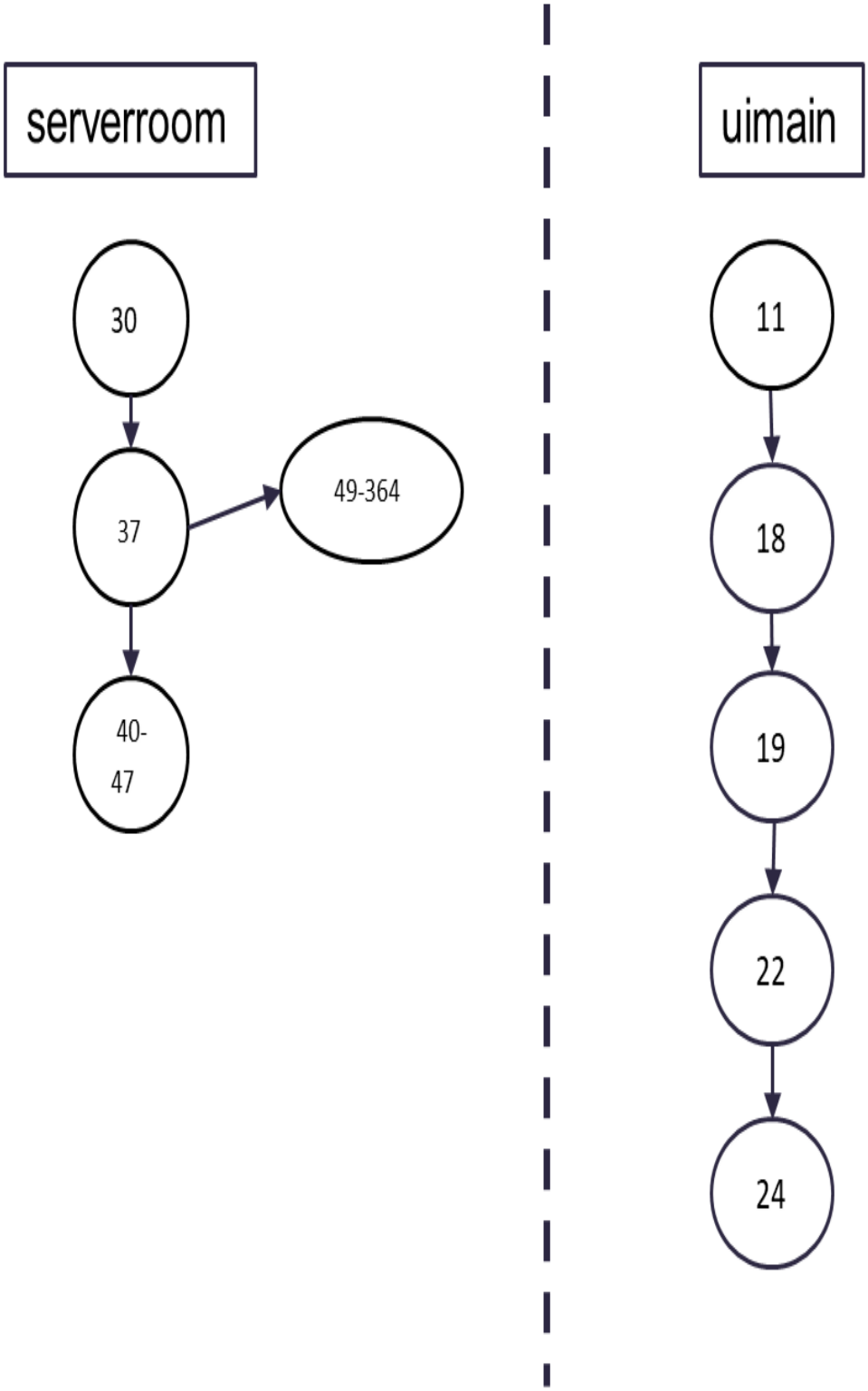
65-9
78-
84

# ObjectFileCreate




serverroom
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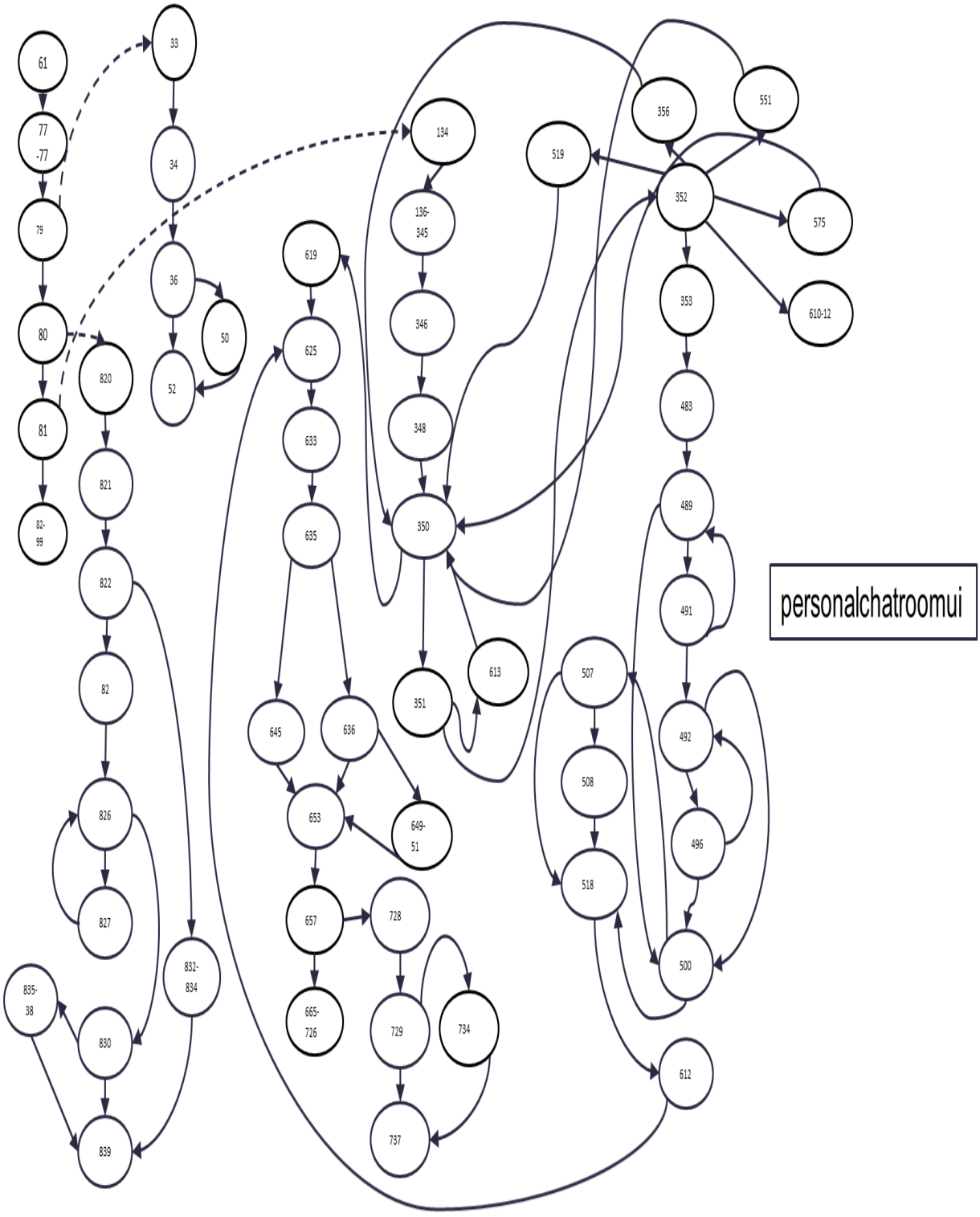
61
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832-
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835-
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649-
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665-
726
729
734
737
519
356
551
352
575
610-12
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483
489
491
492
496
500
507
508
518
612
personalchatroomui

## 1.2 Number of decision points

The number of decision points is a metric that indicates the number of points in a program where a decision is made based on a condition. These points typically include if statements, switch statements, and loops with conditions.

**Measurement approach:**

The process of measuring the number of decision points in a program involves analyzing the program's control flow and identifying the locations where decisions are made based on conditions.

The number of decision points found by analyzing the source code of our SPL1 project is given below:

| **Class** | Number of decision points |
|---|---|
| userstructure | 0 |
| accountdata | 10 |
| chathistory | 5 |
| objectread | 4 |
| FileShow | 4 |
| ObjectFileCreate | 3 |
| createaccountWindow | 6 |
| loginwindow | 4 |
| personalchatroomui | 24 |
| serverroom | 1 |
| TicTacToy | 16 |
| clintsocket | 1 |
| clintthread | 0 |
| file_name_transfer | 1 |
| clinthandaler2 | 31 |
| serversocket | 2 |

| | |
|---|---|
| DeleteListedWord | 2 |
| Dictionary | 1 |
| DictionaryMainFrame | 4 |
| ImplementWord | 0 |
| WordSearch | 1 |

## 1.3 Cyclomatic complexity

Cyclomatic Complexity is a measure of the number of independent paths through a program. It is calculated using the Control Flow Graph of the program, which represents the control flow of the program in a graphical form. Cyclomatic Complexity can be used to measure the complexity of a program, and to identify areas of the code that are more difficult to understand

**Measurement approach:**

The process of measuring Cyclomatic Complexity involves creating a Control Flow Graph and using it to calculate the Cyclomatic Complexity of the program. The metric can be obtained using the following formula:

M = E - N + 2P

where:

M is the Cyclomatic Complexity

E is the number of edges in the Control Flow Graph

N is the number of nodes in the Control Flow Graph

P is the number of connected components in the Control Flow Graph

Below is the count of Cyclomatic complexity that was obtained by analyzing the source code of our SPL1 project.

| **Class** | Cyclomatic complexity |
|---|---|
| userstructure | 1 |
| accountdata | 11 |
| chathistory | 6 |
| objectread | 5 |
| FileShow | 5 |
| ObjectFileCreate | 4 |
| createaccountWindow | 7 |
| loginwindow | 5 |
| personalchatroomui | 25 |
| serverroom | 2 |
| TicTacToy | 17 |
| clintsocket | 2 |
| clintthread | 1 |
| file_name_transfer | 2 |
| clinthandaler2 | 32 |
| serversocket | 3 |
| DeleteListedWord | 3 |
| Dictionary | 2 |
| DictionaryMainFrame | 5 |
| ImplementWord | 1 |
| WordSearch | 2 |