FINAL PROJECT REPORT

ABOUT

MORTGAGE CREDIT SIMULATION

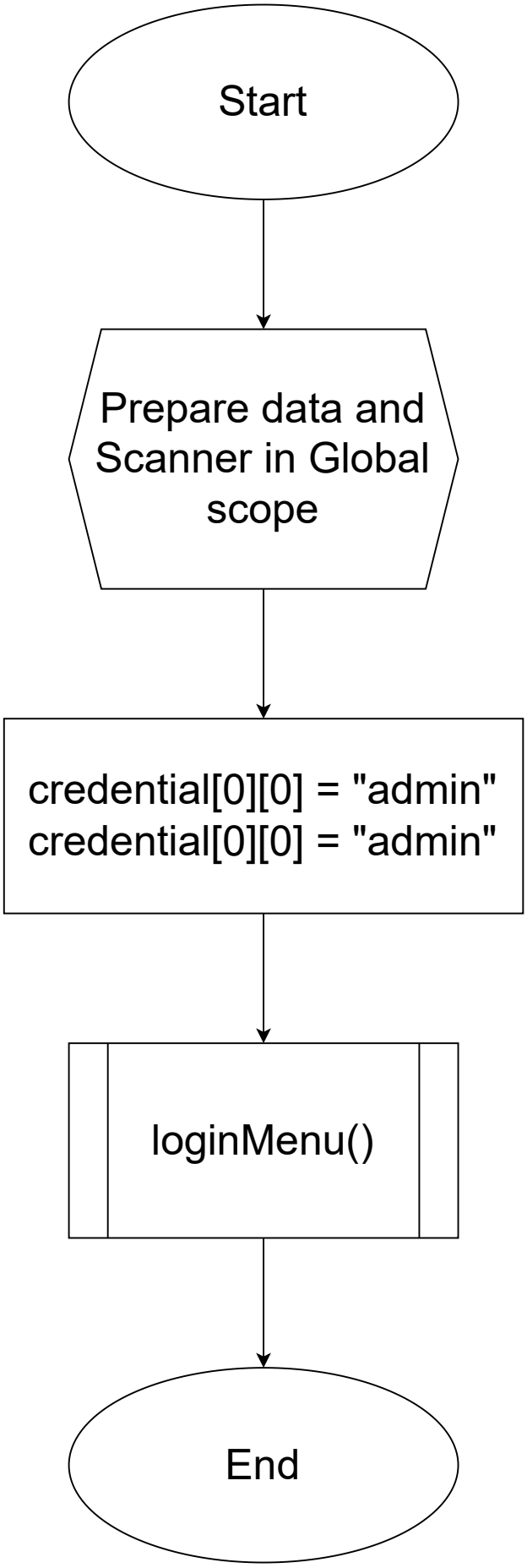
MUHAMMAD BAIHAQI AULIA ASY'ARI

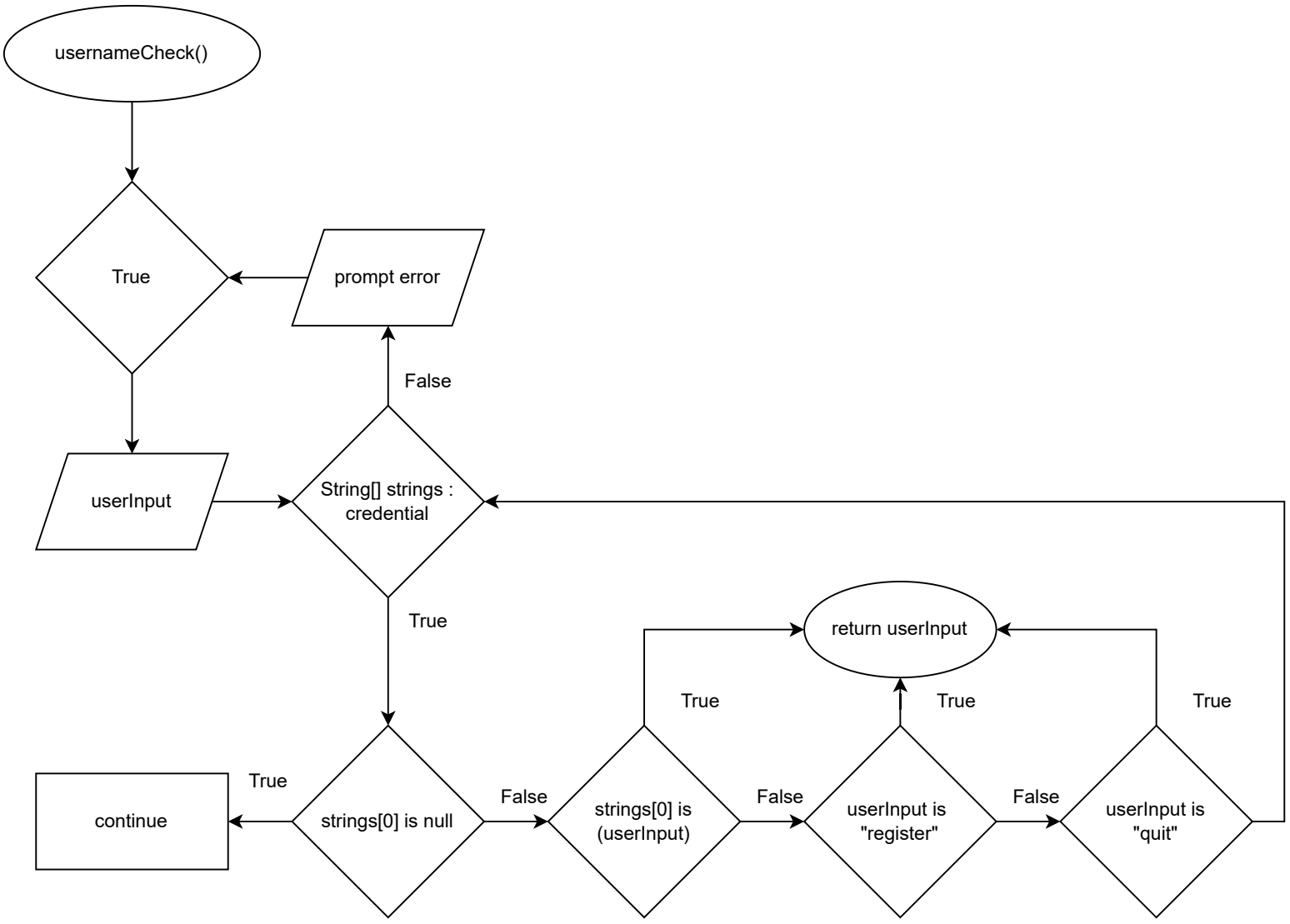
1I

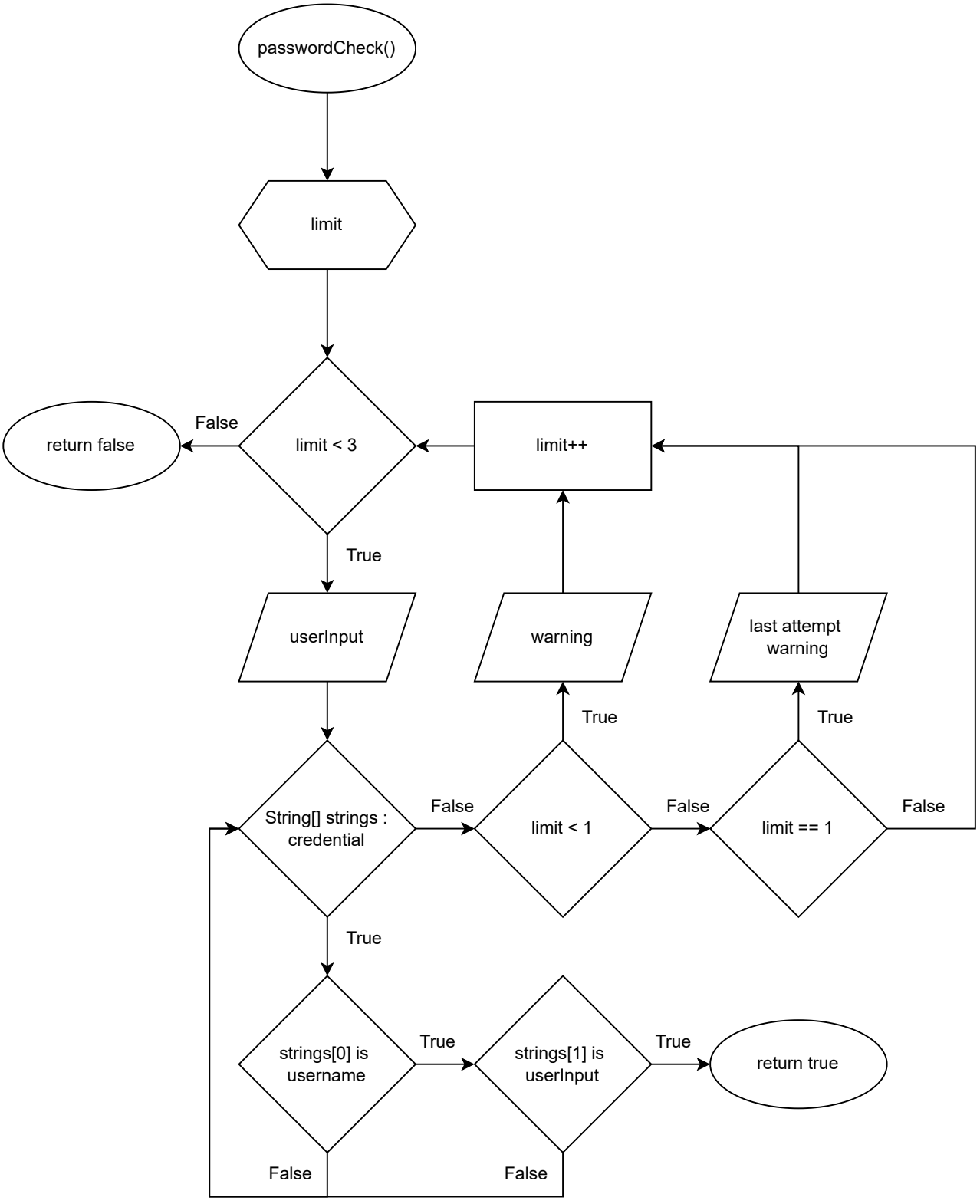
POLITEKNIK NEGERI MALANG

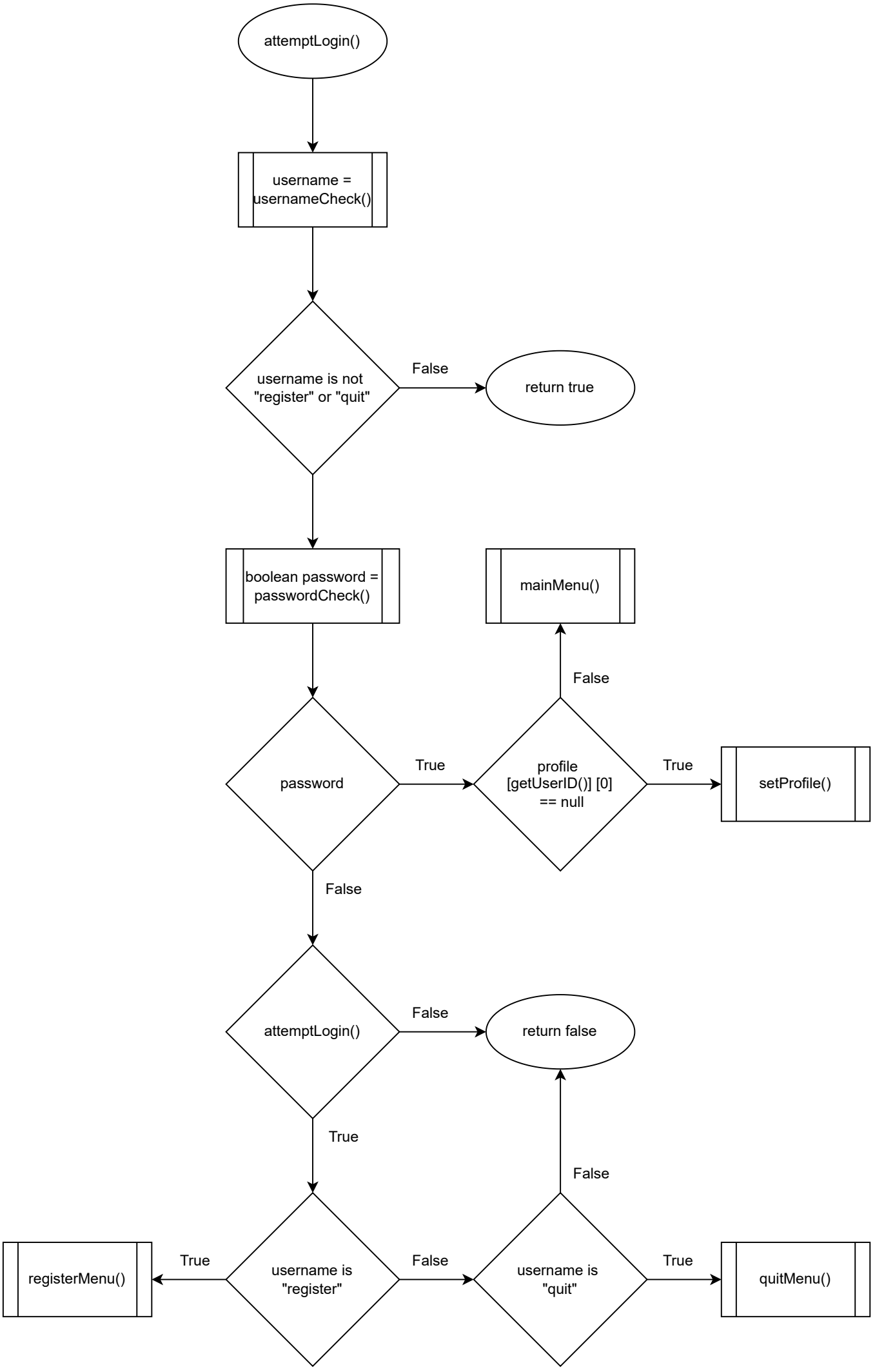
DECEMBER 2022

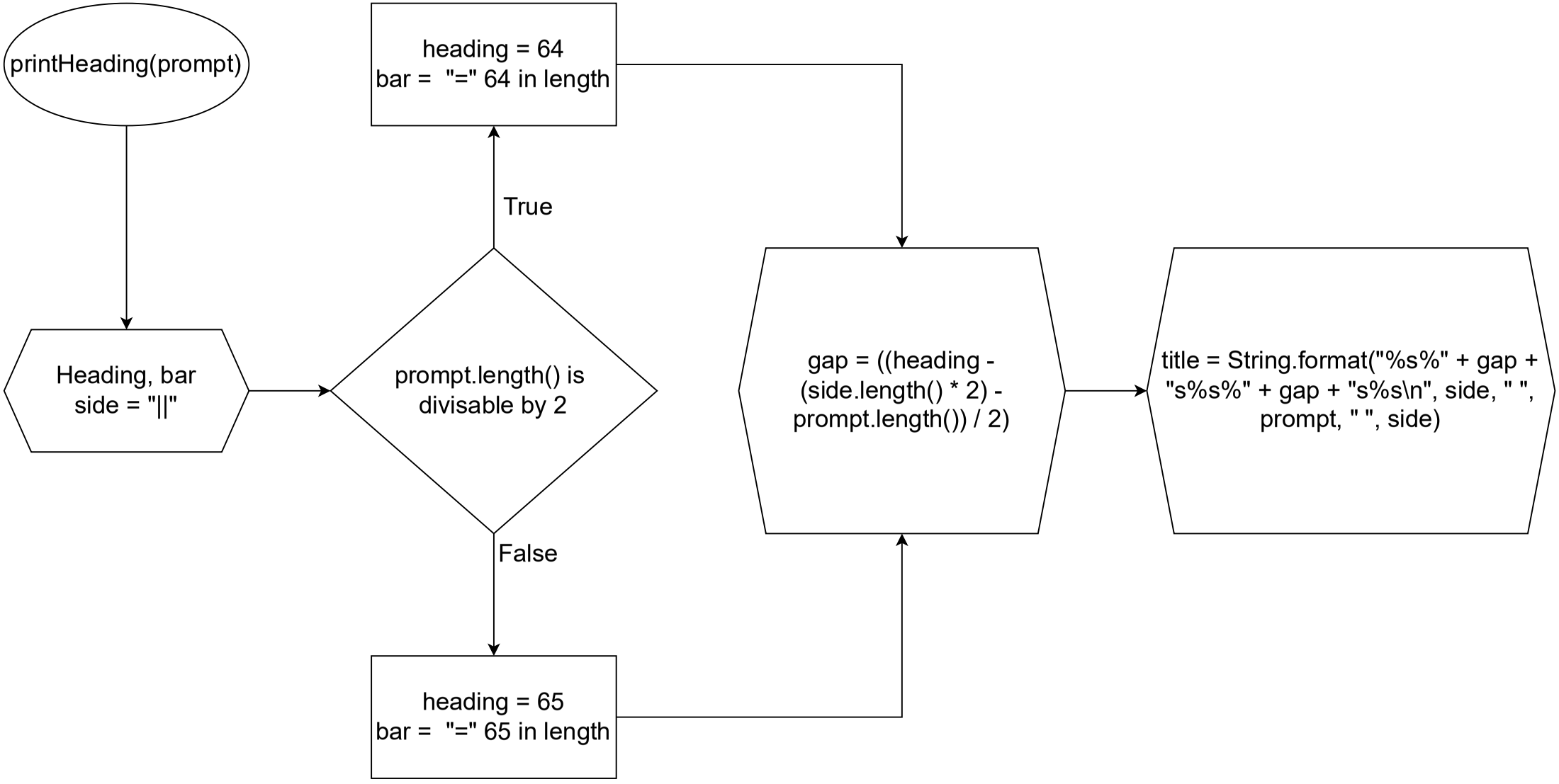
1.1 Flowchart

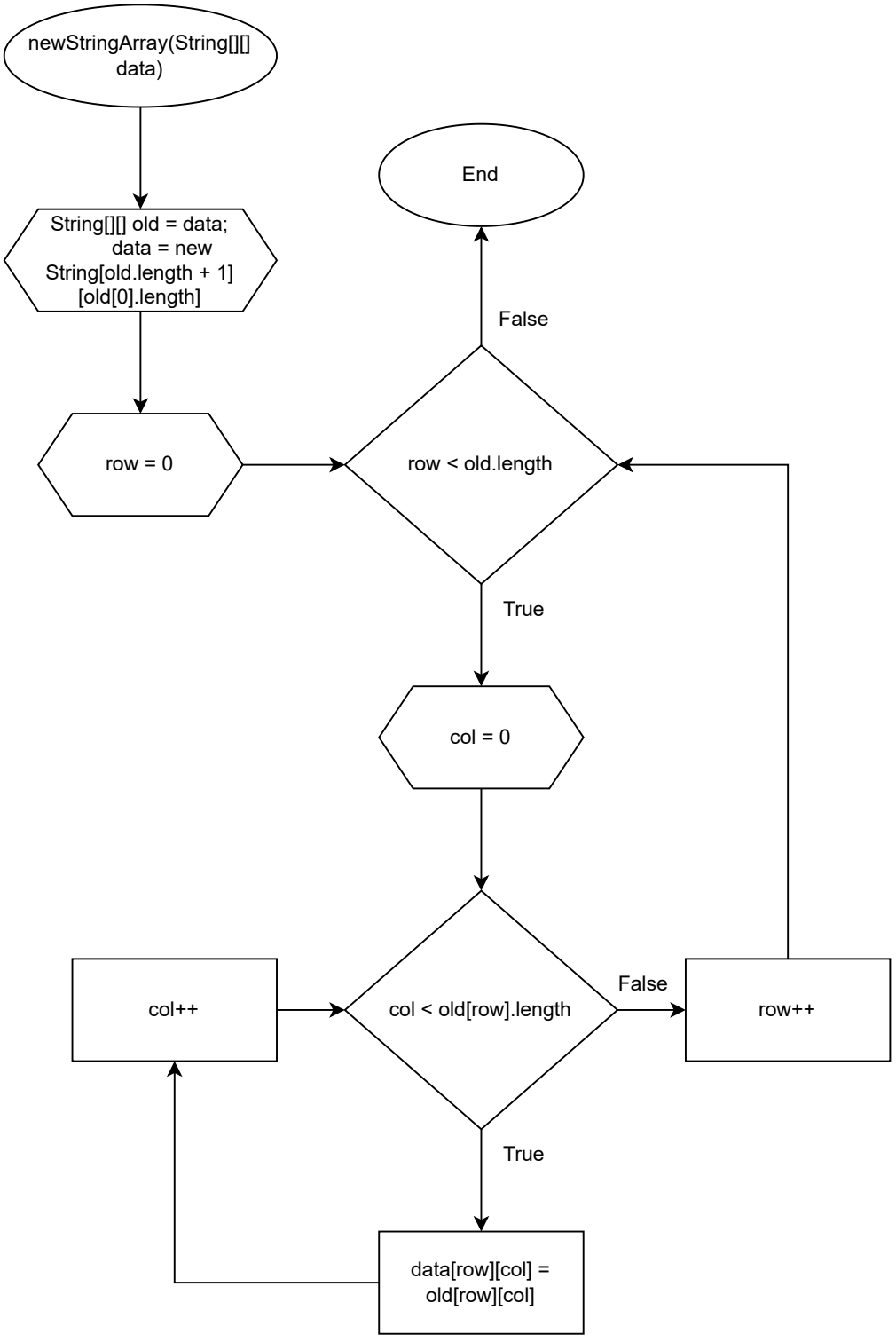

Start
Prepare data and Scanner in Global scope
credential[0][0] = "admin"
credential[0][0] = "admin"
loginMenu()
End

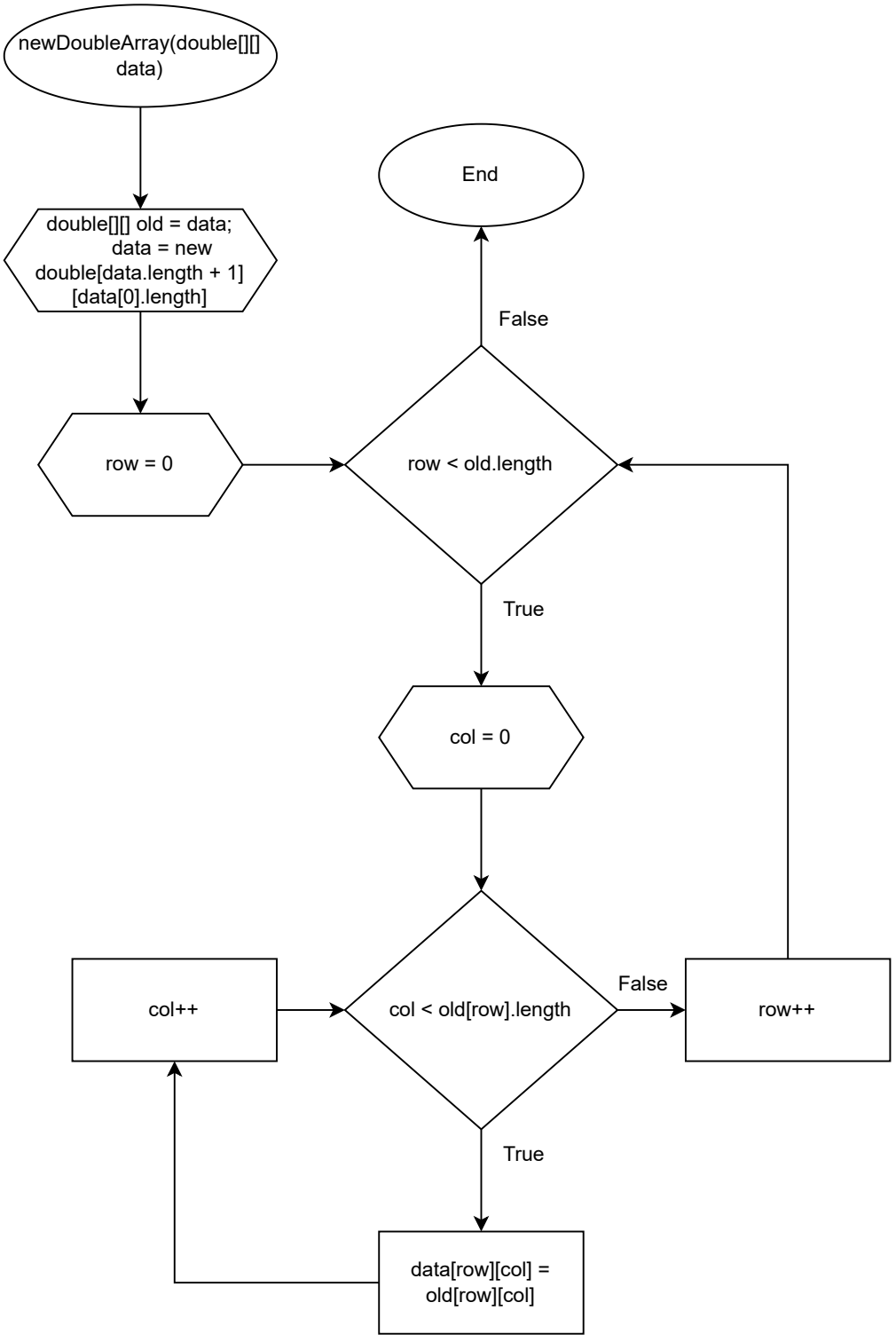

usernameCheck()
True
prompt error
False
userInput
String[] strings :
credential
True
return userInput
True
True
True
continue
True
strings[0] is null
False
strings[0] is
(userInput)
False
userInput is
"register"
False
userInput is
"quit"

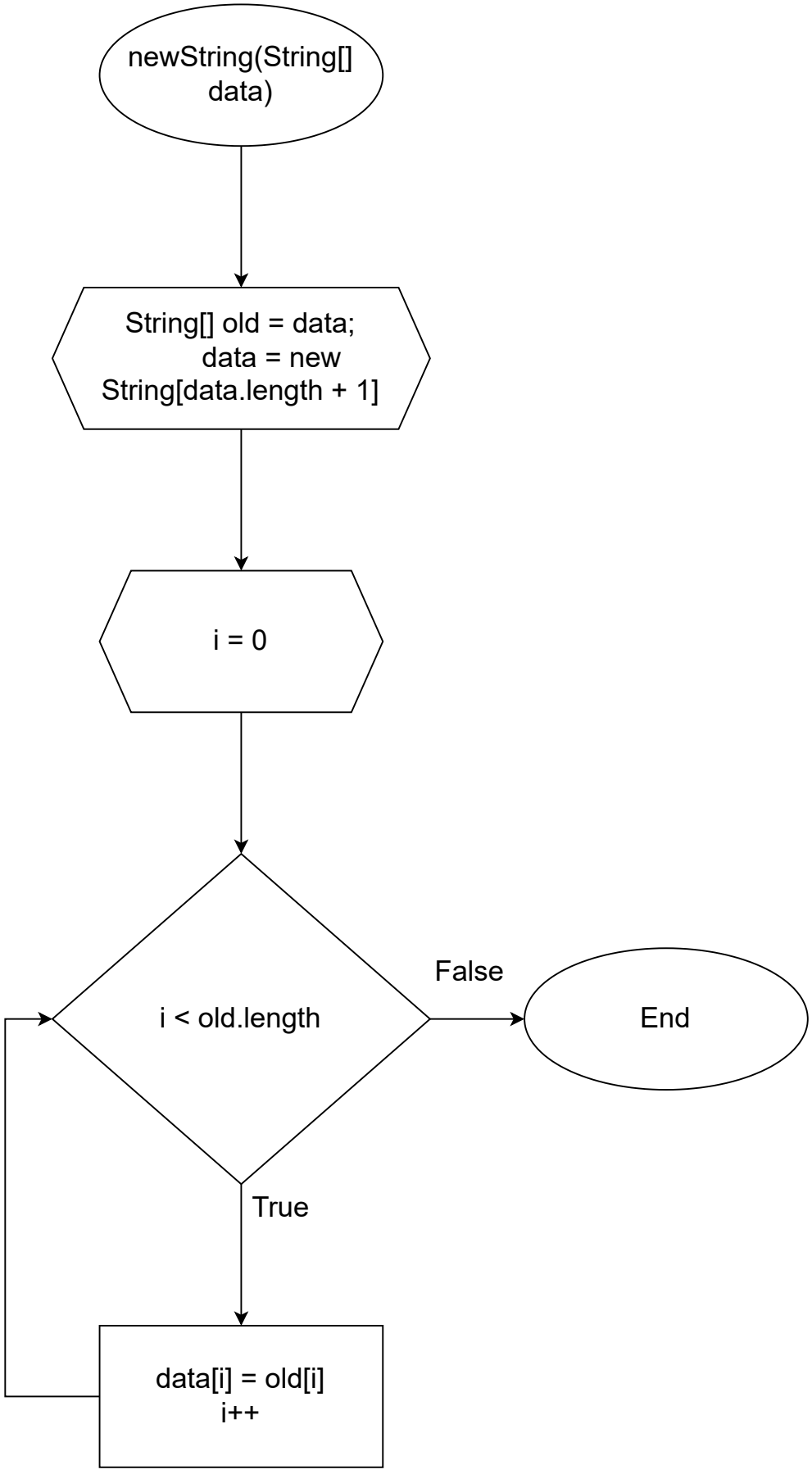

passwordCheck()
limit
limit < 3
False
return false
limit++
True
userInput
warning
last attempt
warning
True
True
String[] strings :
credential
False
limit < 1
False
limit == 1
False
True
strings[0] is
username
True
strings[1] is
userInput
True
return true
False
False

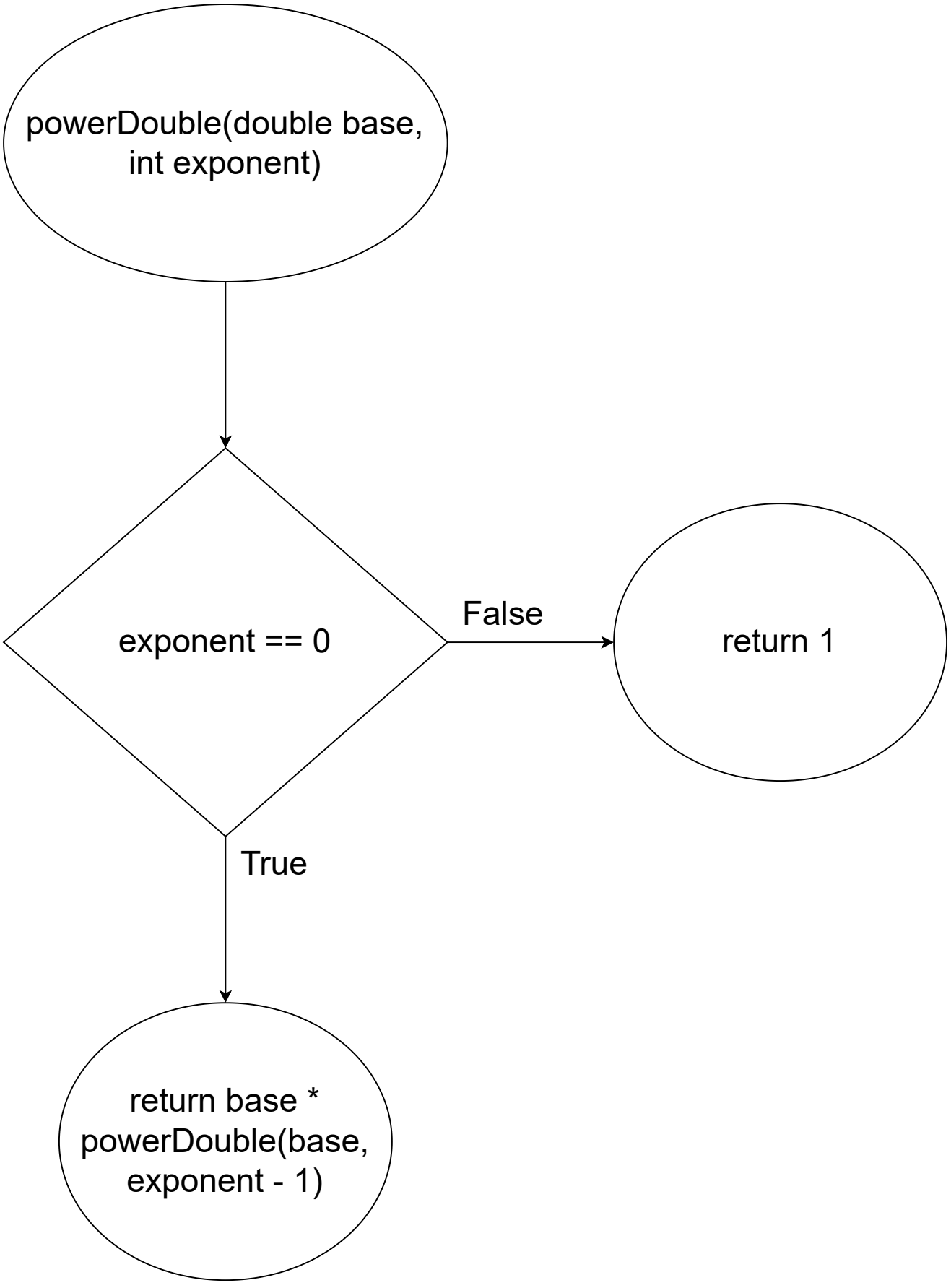

attemptLogin()
username = usernameCheck()
username is not "register" or "quit"
False
return true
boolean password = passwordCheck()
mainMenu()
False
password
True
profile [getUserID()] [0] == null
True
setProfile()
False
attemptLogin()
False
return false
True
False
registerMenu()
True
username is "register"
False
username is "quit"
True
quitMenu()

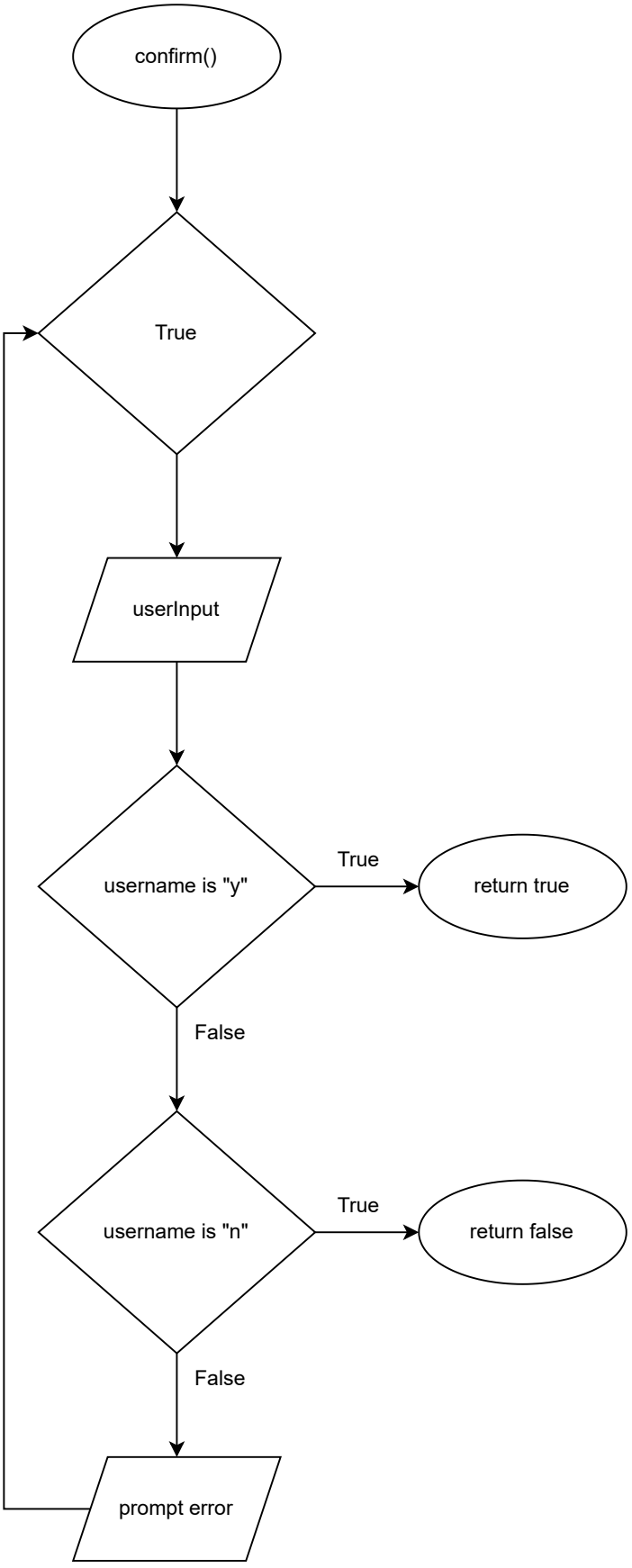

printHeading(prompt)
Heading, bar
side = "||"
prompt.length() is
divisable by 2
True
heading = 64
bar = "=" 64 in length
False
heading = 65
bar = "=" 65 in length
gap = ((heading -
(side.length() * 2) -
prompt.length()) / 2)
title = String.format("%s%" + gap +
"s%s%" + gap + "s%s\n", side, " ",
prompt, " ", side)

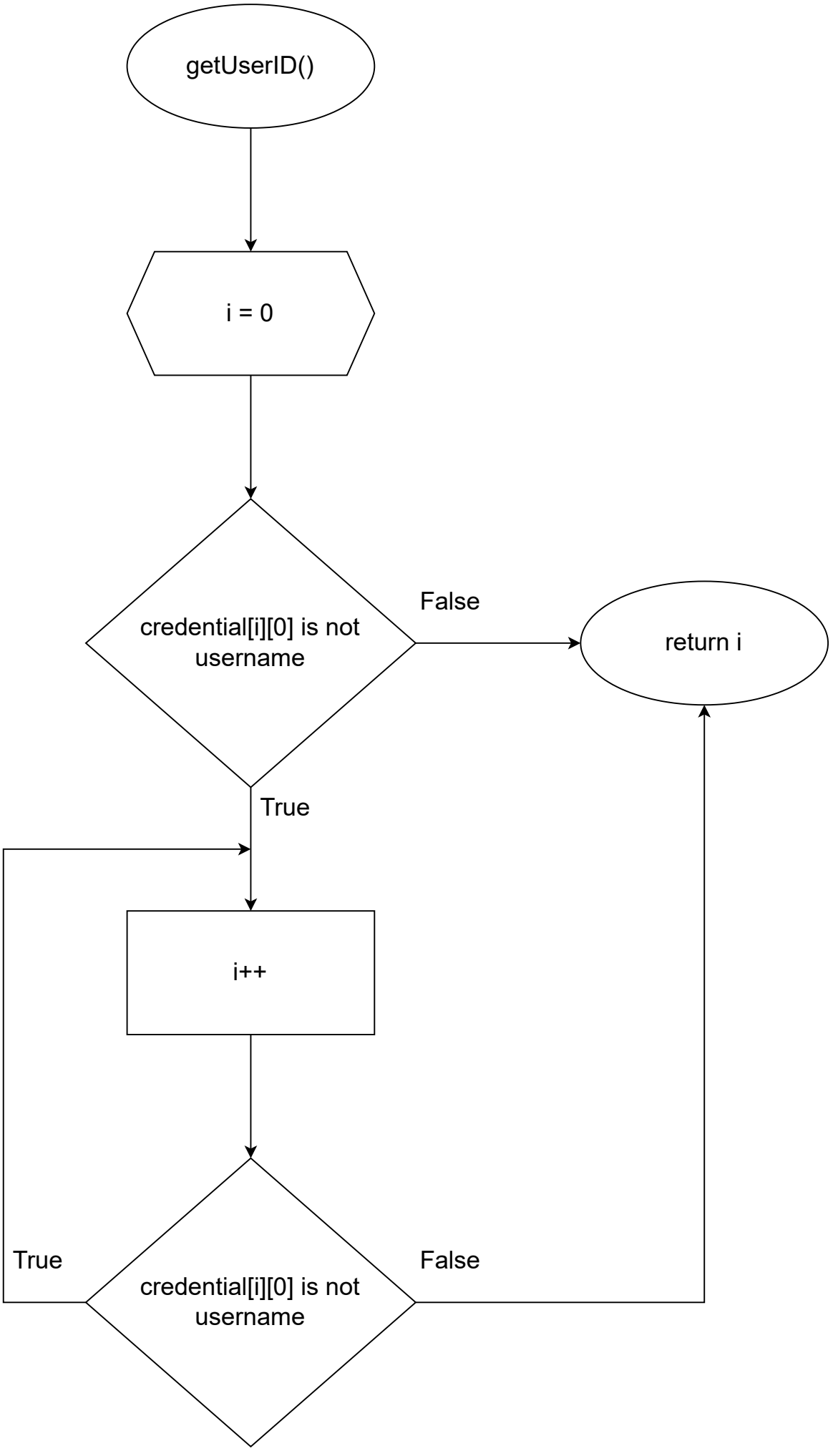

newStringArray(String[][] data)
String[][] old = data;
data = new String[old.length + 1][old[0].length]
row = 0
row < old.length
False
End
True
col = 0
col < old[row].length
False
row++
True
col++
data[row][col] = old[row][col]

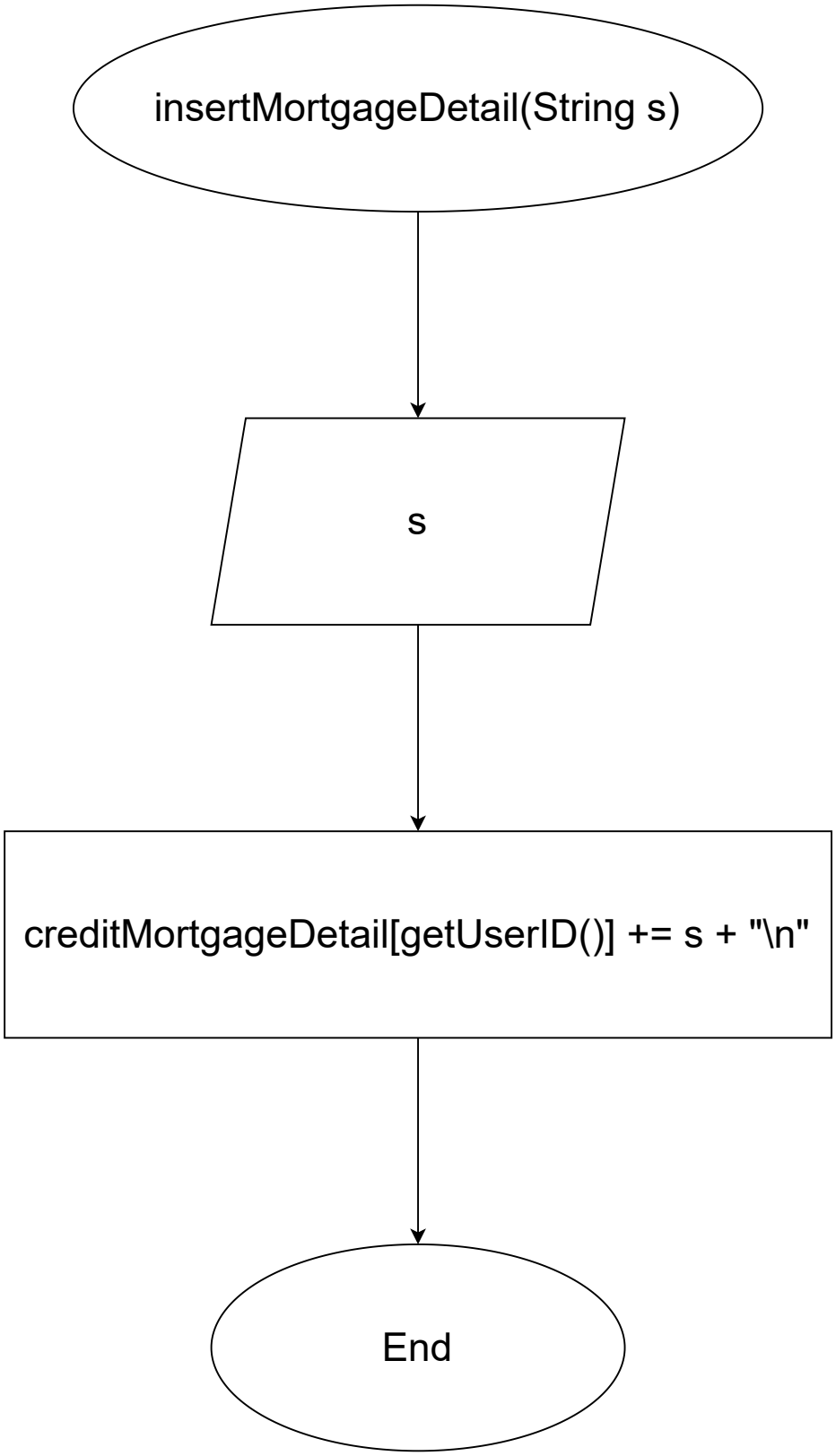

newDoubleArray(double[][] data)
double[][] old = data;
data = new double[data.length + 1][data[0].length]
row = 0
row < old.length
False
End
True
col = 0
col < old[row].length
False
row++
True
col++
data[row][col] = old[row][col]

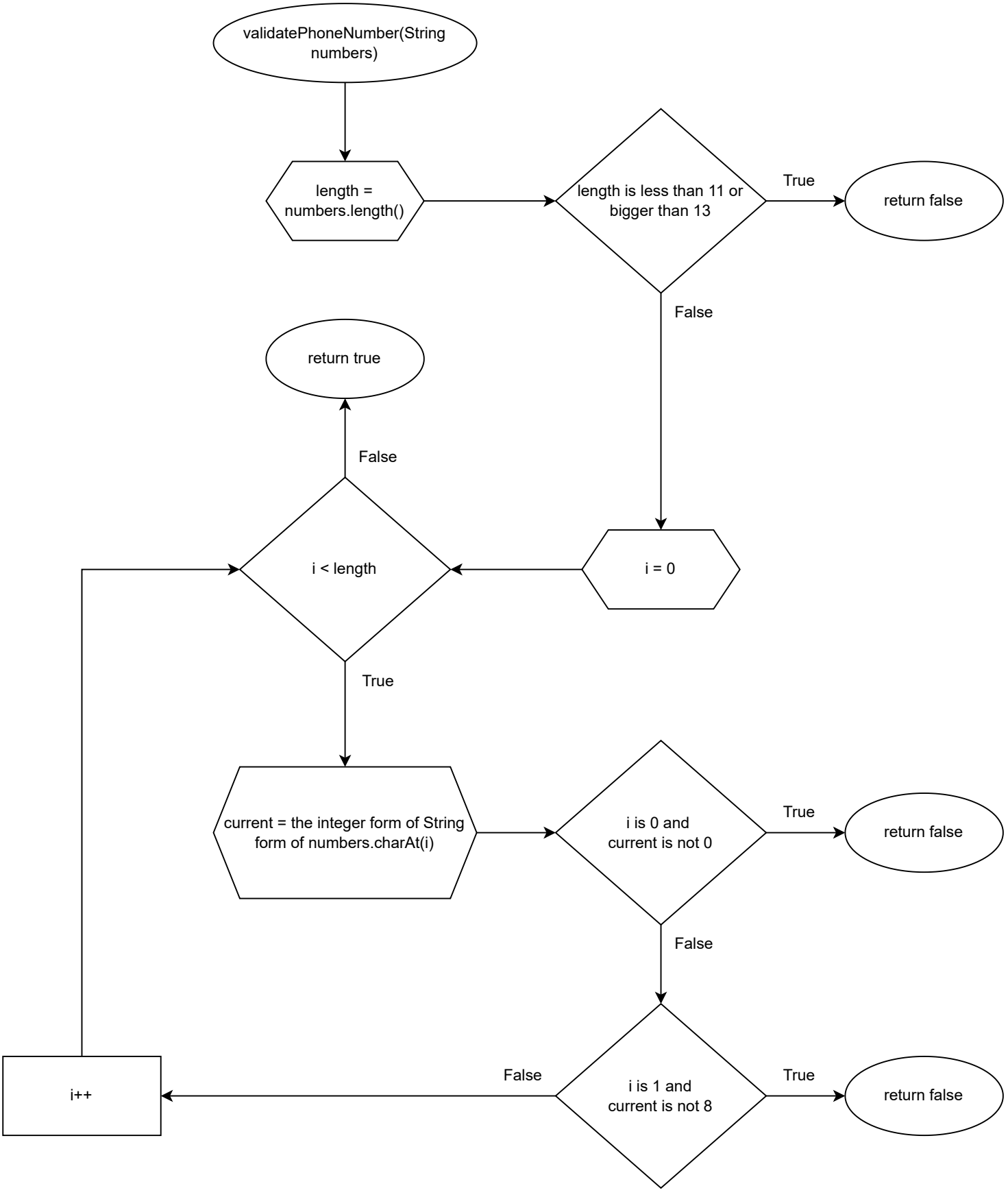

newString(String[] data)
String[] old = data;
data = new String[data.length + 1]
i = 0
i < old.length
False
End
True
data[i] = old[i]
i++

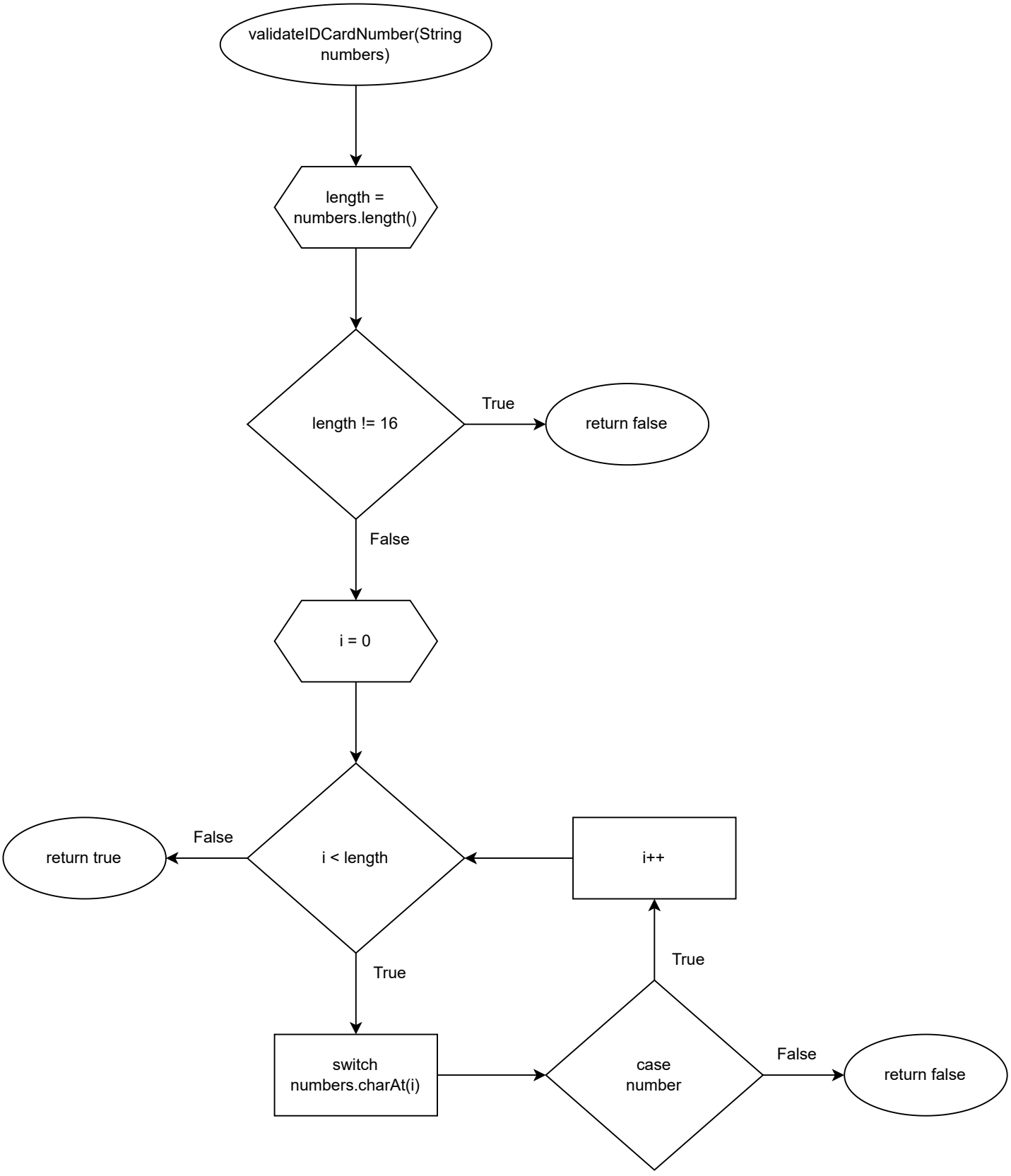

powerDouble(double base, int exponent)
exponent == 0
False
return 1
True
return base * powerDouble(base, exponent - 1)

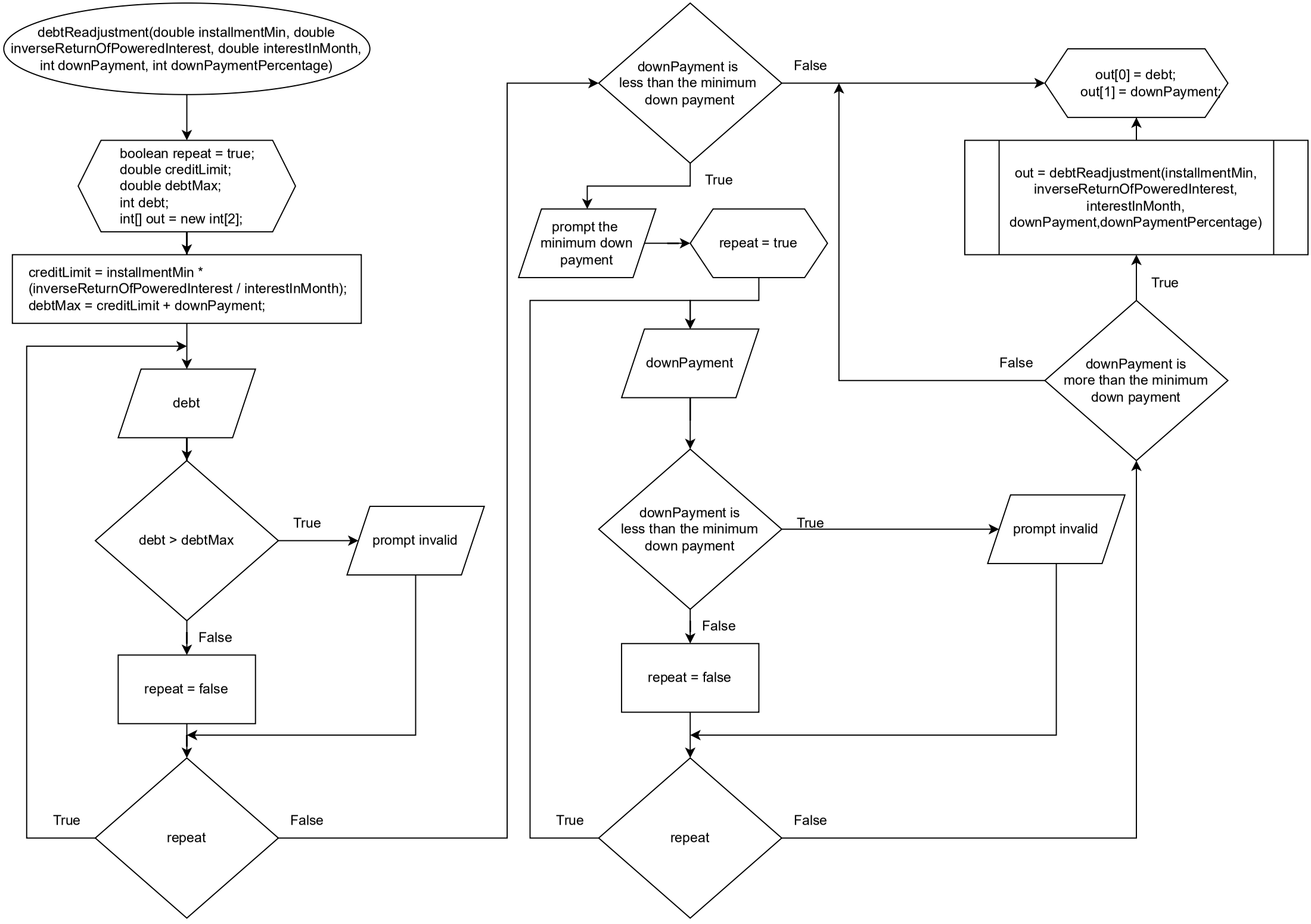

confirm()
True
userInput
username is "y"
True
return true
False
username is "n"
True
return false
False
prompt error

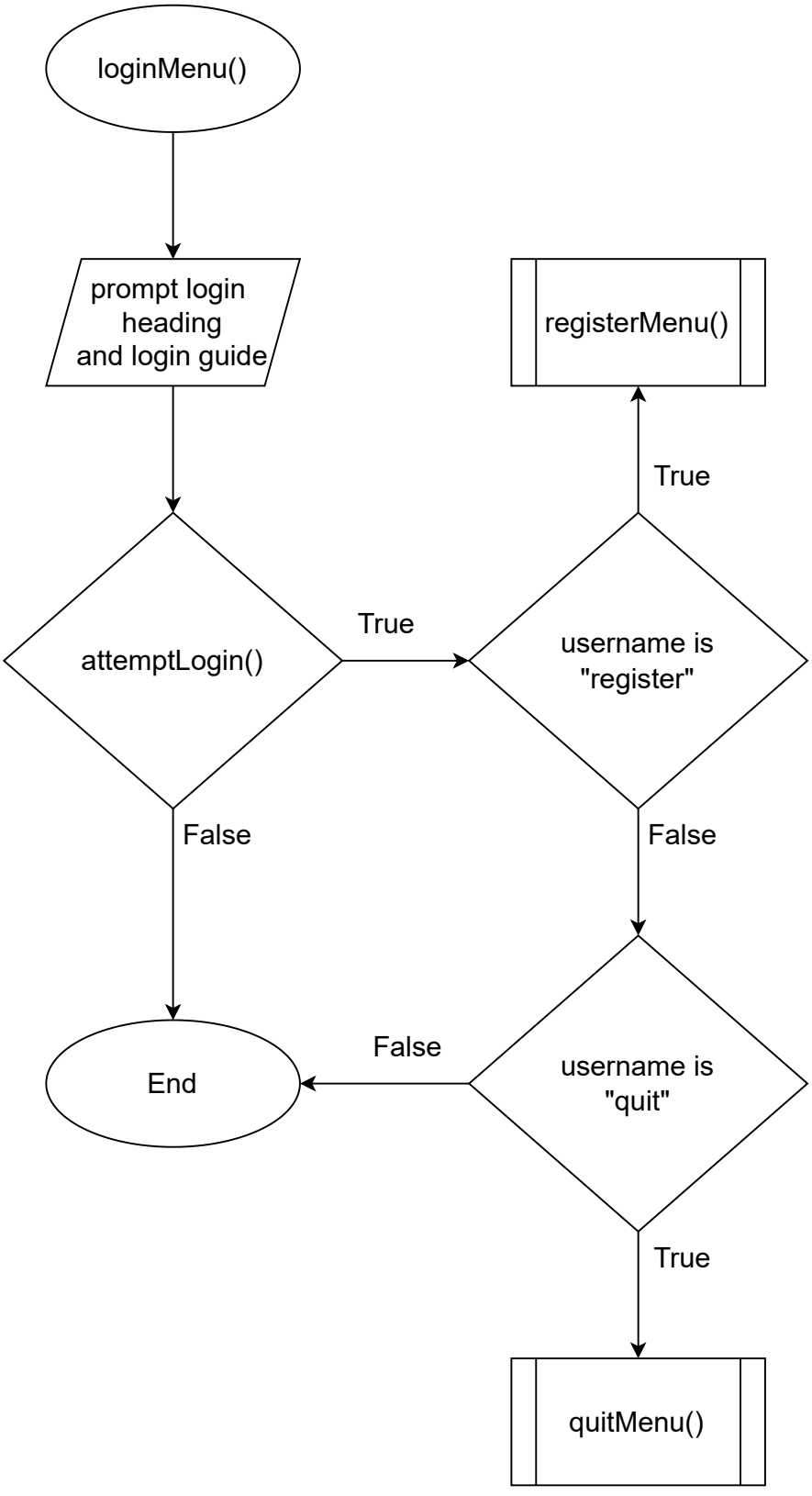

getUserID()
i = 0
credential[i][0] is not username
False
return i
True
i++
credential[i][0] is not username
True
False

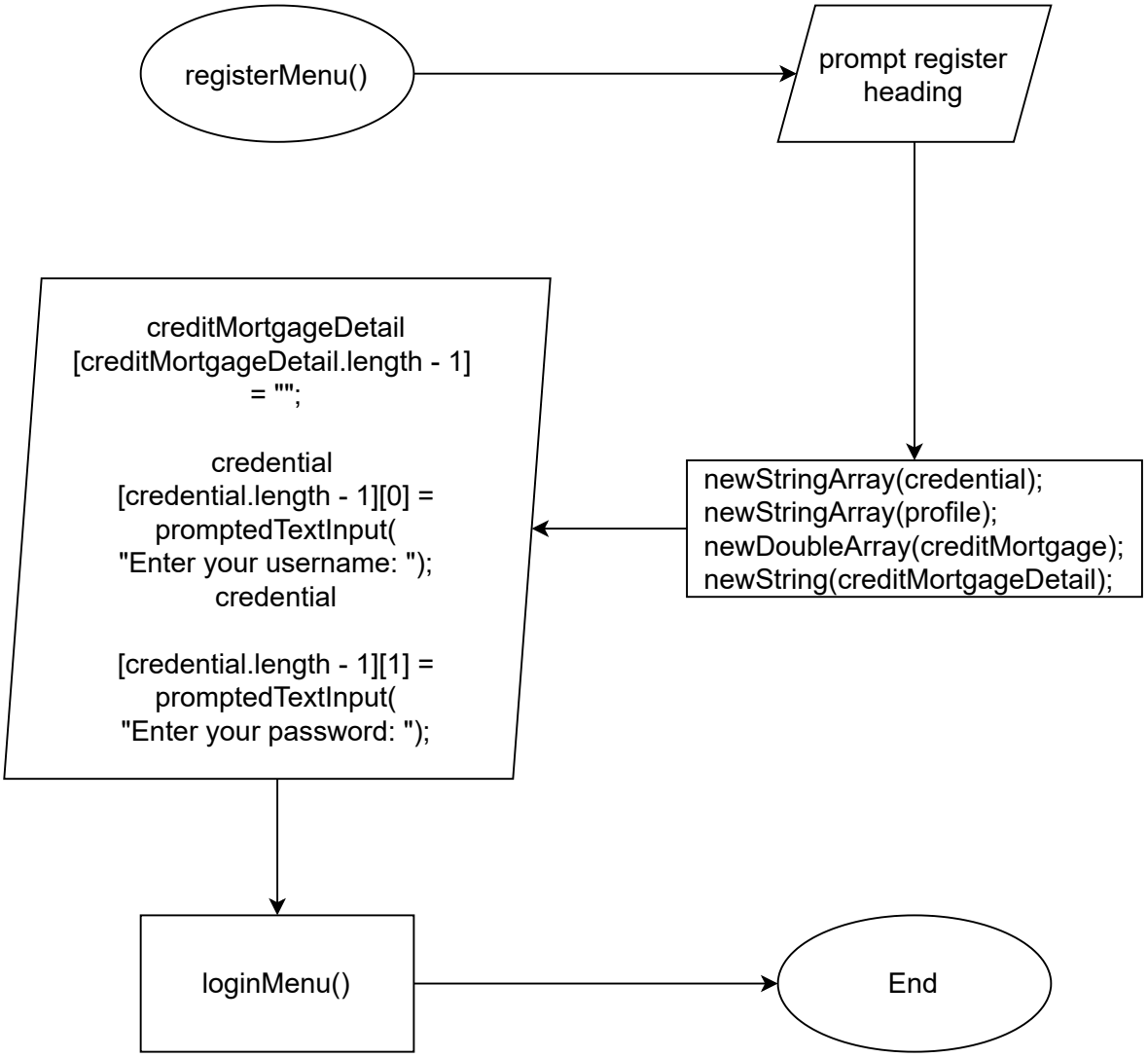

insertMortgageDetail(String s)
s
creditMortgageDetail[getUserID()] += s + "\n"
End

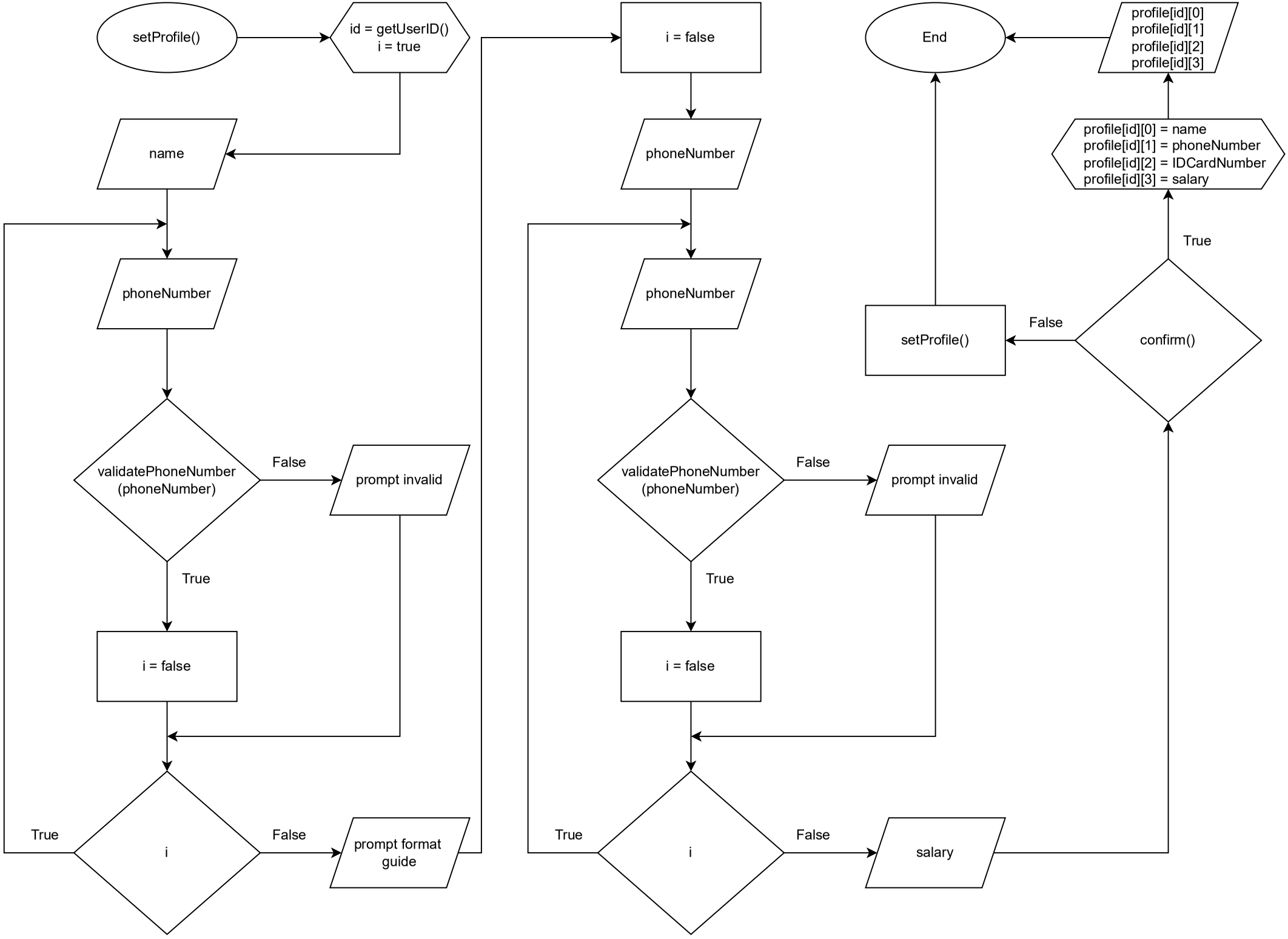

validatePhoneNumber(String numbers)
length = numbers.length()
length is less than 11 or bigger than 13
True
return false
False
return true
False
i < length
i = 0
True
current = the integer form of String form of numbers.charAt(i)
i is 0 and current is not 0
True
return false
False
i is 1 and current is not 8
True
return false
False
i++

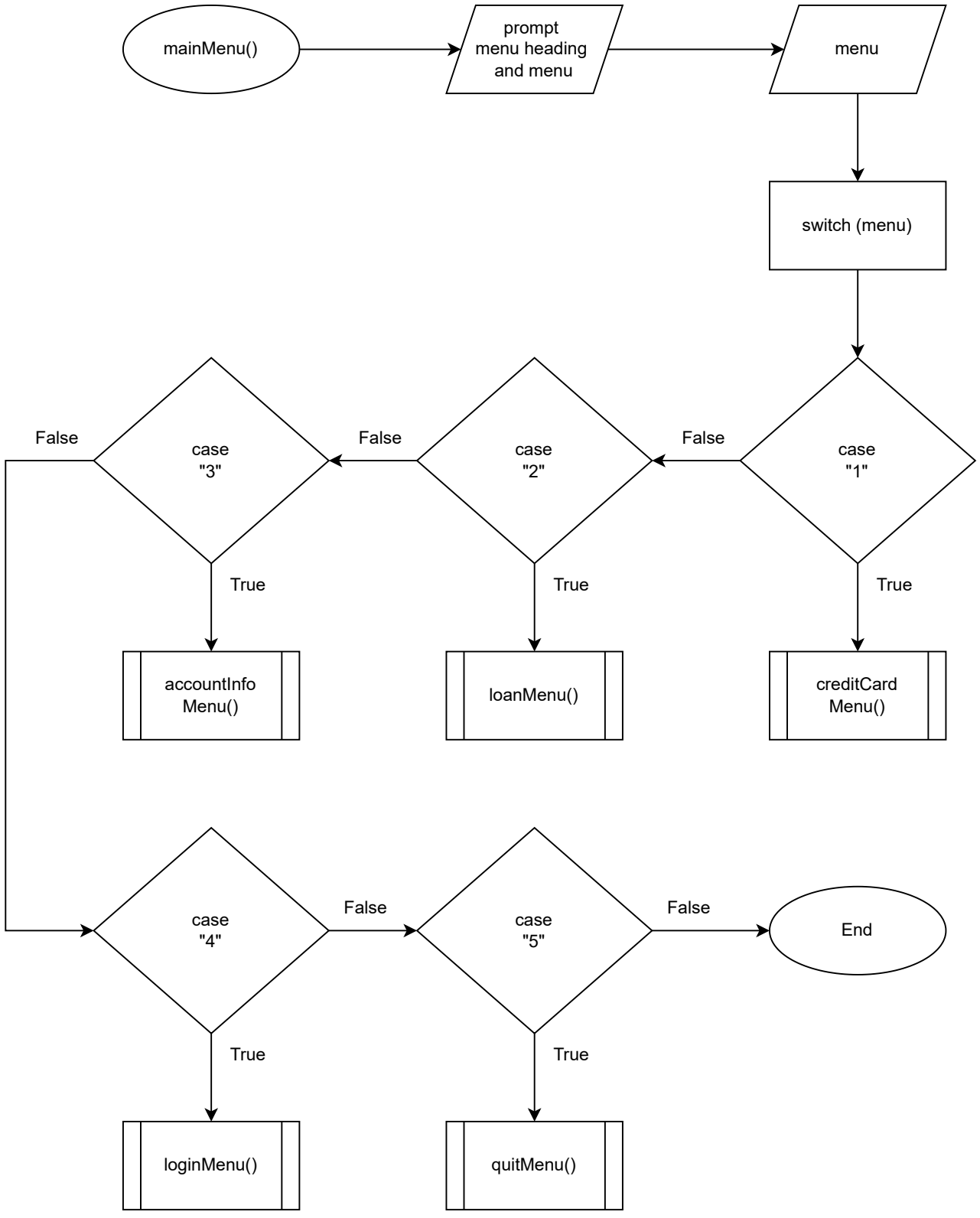

validateIDCardNumber(String numbers)
length = numbers.length()
length != 16
True
return false
False
i = 0
i < length
False
return true
i++
True
True
switch numbers.charAt(i)
case number
False
return false

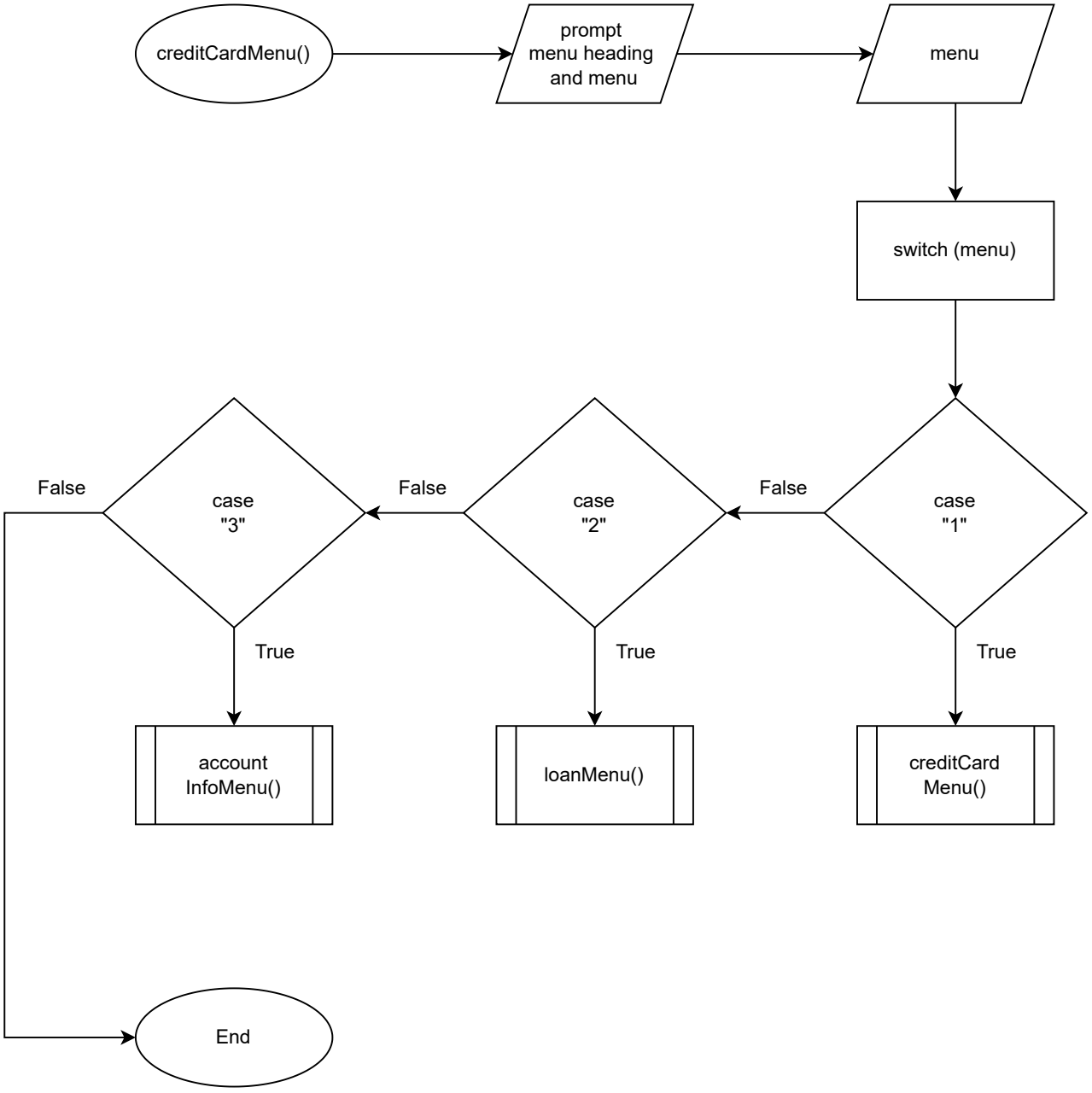

debtReadjustment(double installmentMin, double inverseReturnOfPoweredInterest, double interestInMonth, int downPayment, int downPaymentPercentage)
boolean repeat = true;
double creditLimit;
double debtMax;
int debt;
int[] out = new int[2];
creditLimit = installmentMin * (inverseReturnOfPoweredInterest / interestInMonth);
debtMax = creditLimit + downPayment;
debt
debt > debtMax
True
prompt invalid
False
repeat = false
repeat
True
False
downPayment is less than the minimum down payment
False
out[0] = debt;
out[1] = downPayment;
out = debtReadjustment(installmentMin, inverseReturnOfPoweredInterest, interestInMonth, downPayment,downPaymentPercentage)
True
prompt the minimum down payment
repeat = true
downPayment
False
downPayment is more than the minimum down payment
True
downPayment is less than the minimum down payment
True
prompt invalid
False
repeat = false
repeat
True
False

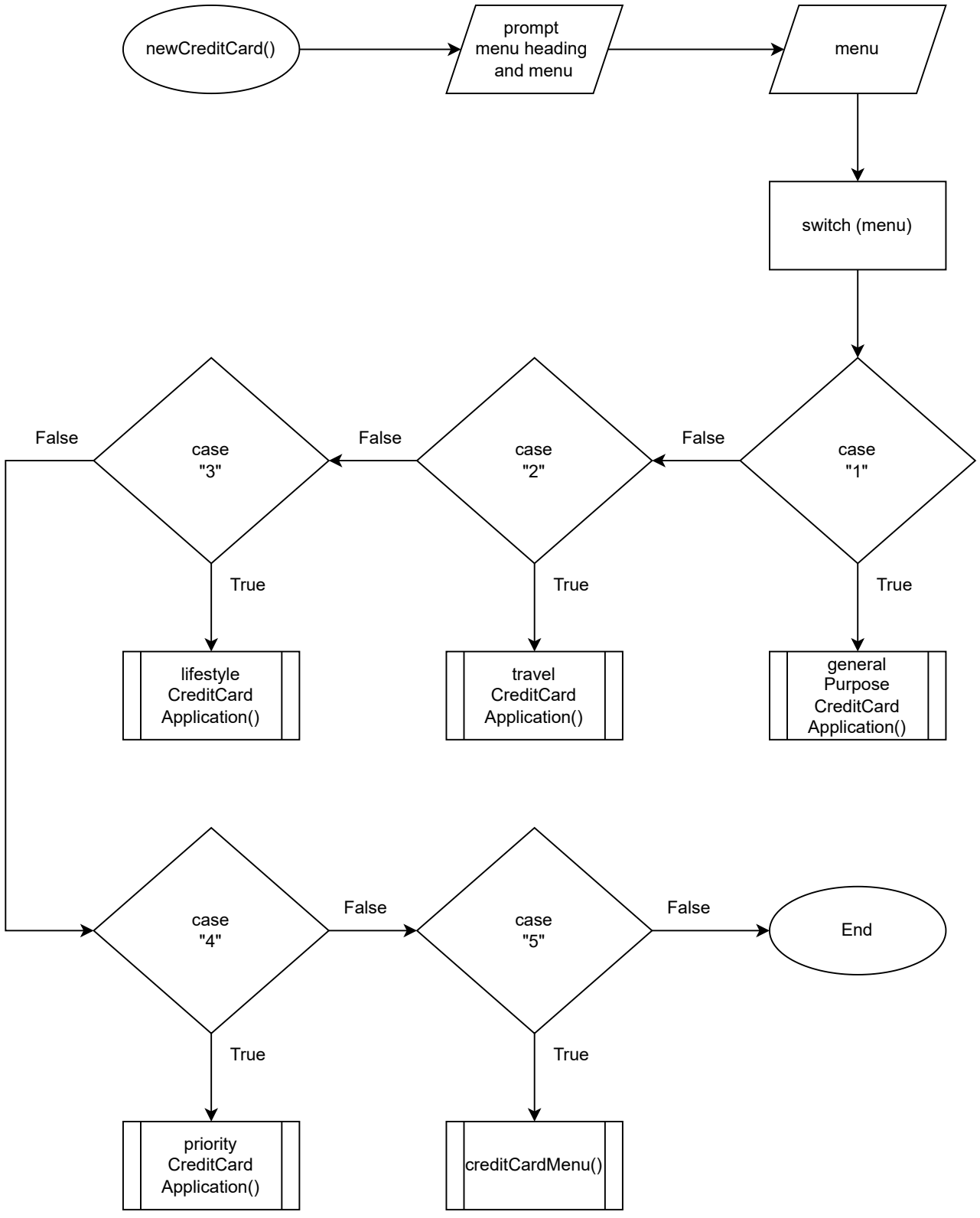

loginMenu()
prompt login
heading
and login guide
attemptLogin()
True
False
username is
"register"
True
registerMenu()
False
username is
"quit"
False
End
True
quitMenu()

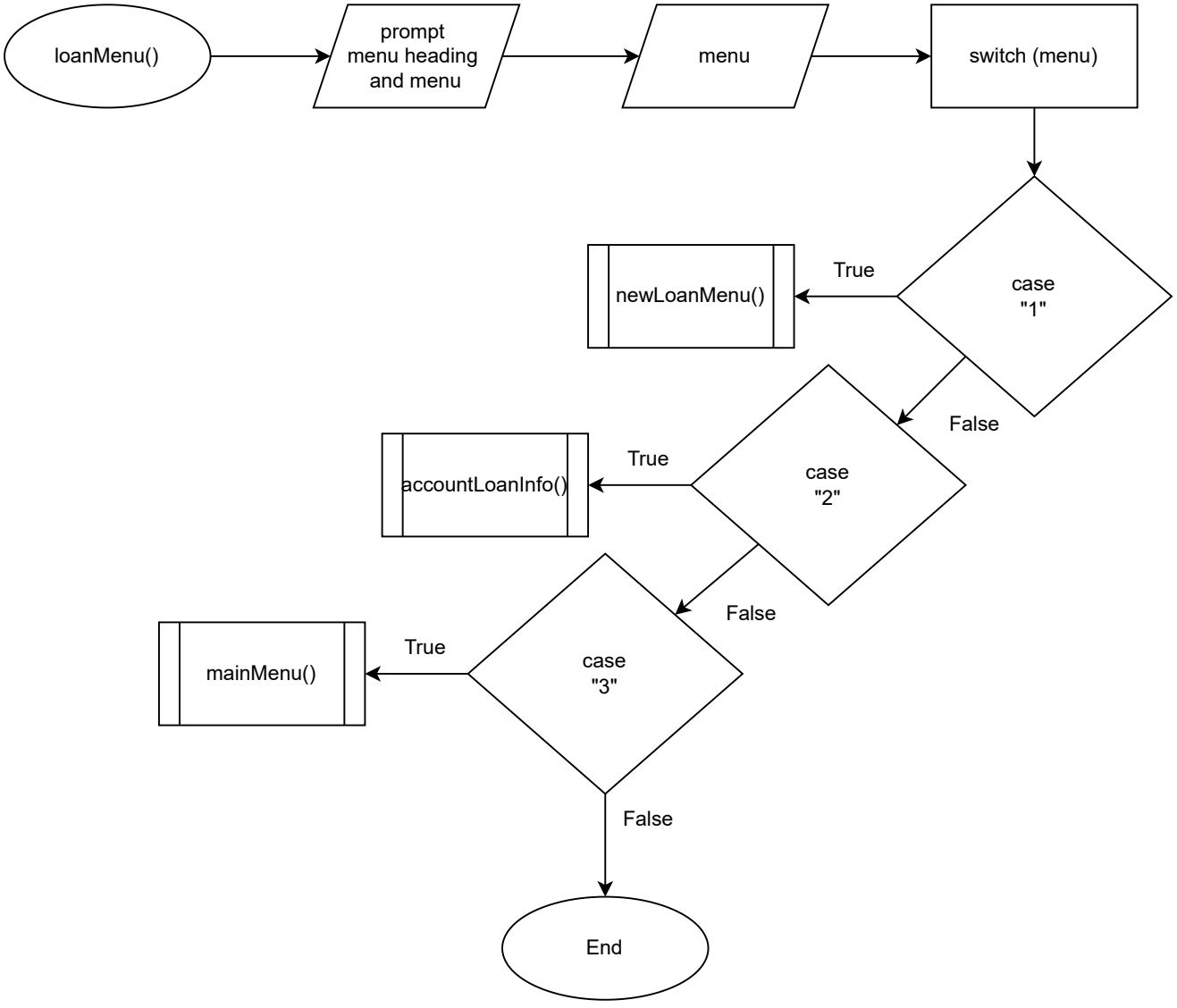

registerMenu()
prompt register heading
creditMortgageDetail [creditMortgageDetail.length - 1] = "";
credential [credential.length - 1][0] = promptedTextInput("Enter your username: ");
credential [credential.length - 1][1] = promptedTextInput("Enter your password: ");
newStringArray(credential);
newStringArray(profile);
newDoubleArray(creditMortgage);
newString(creditMortgageDetail);
loginMenu()
End

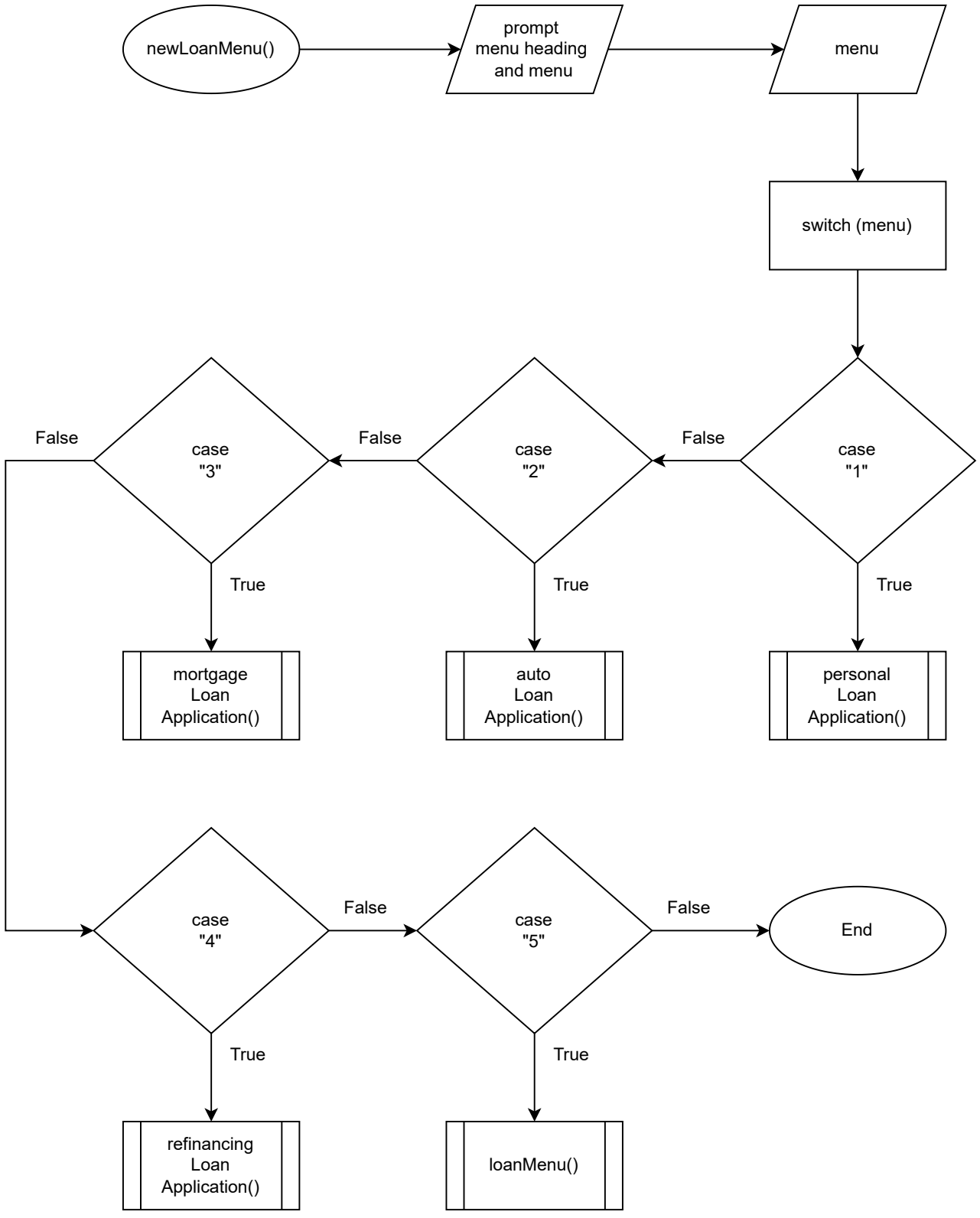

setProfile()
id = getUserID()
i = true
name
phoneNumber
validatePhoneNumber
(phoneNumber)
False
prompt invalid
True
i = false
i
True
False
prompt format
guide
i = false
phoneNumber
validatePhoneNumber
(phoneNumber)
False
prompt invalid
True
i = false
i
True
False
salary
End
profile[id][0]
profile[id][1]
profile[id][2]
profile[id][3]
profile[id][0] = name
profile[id][1] = phoneNumber
profile[id][2] = IDCardNumber
profile[id][3] = salary
True
confirm()
False
setProfile()

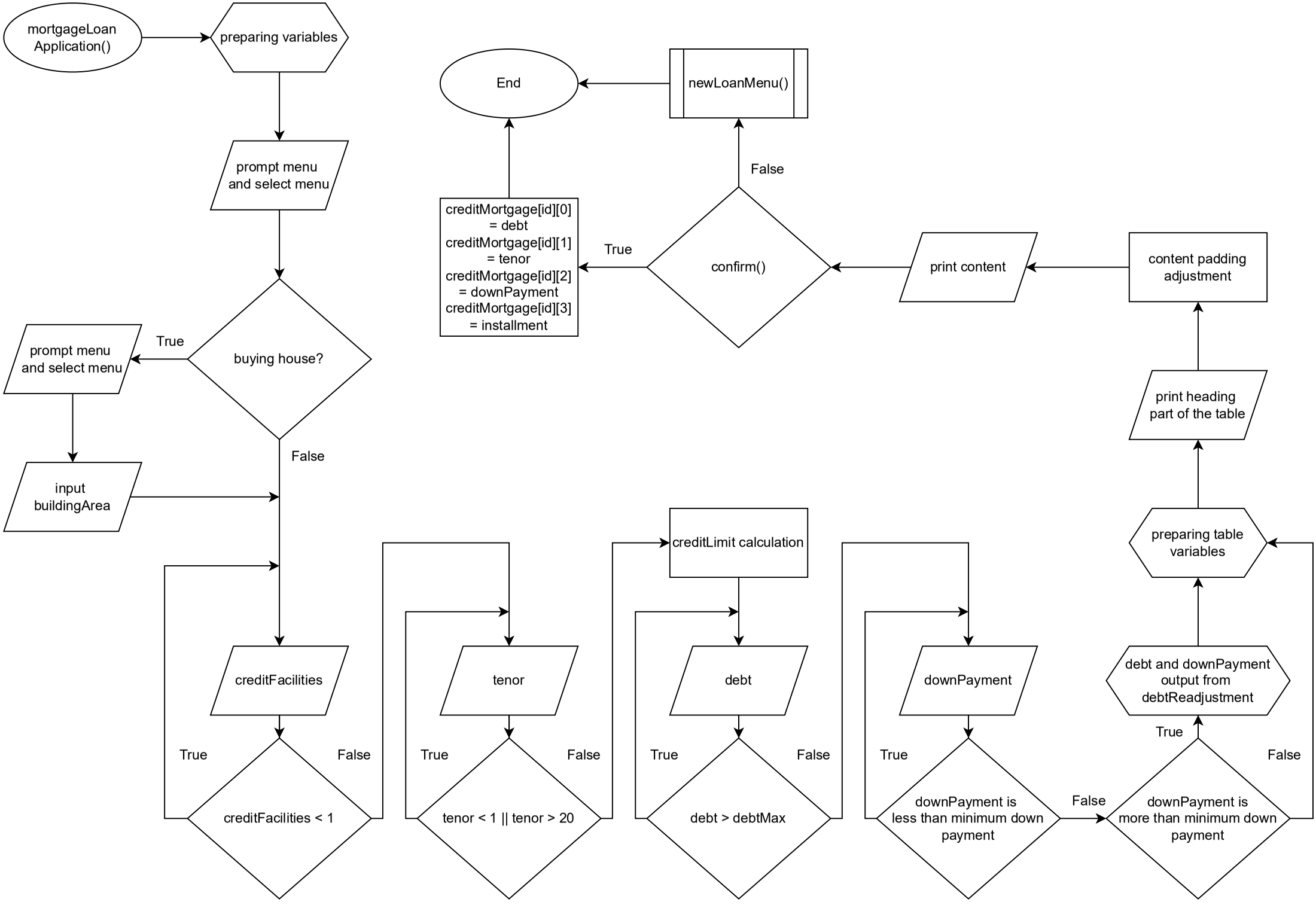

mainMenu()
prompt
menu heading
and menu
menu
switch (menu)
case
"1"
False
case
"2"
False
case
"3"
False
True
True
True
creditCard
Menu()
loanMenu()
accountInfo
Menu()
case
"4"
False
case
"5"
False
End
True
True
quitMenu()
loginMenu()

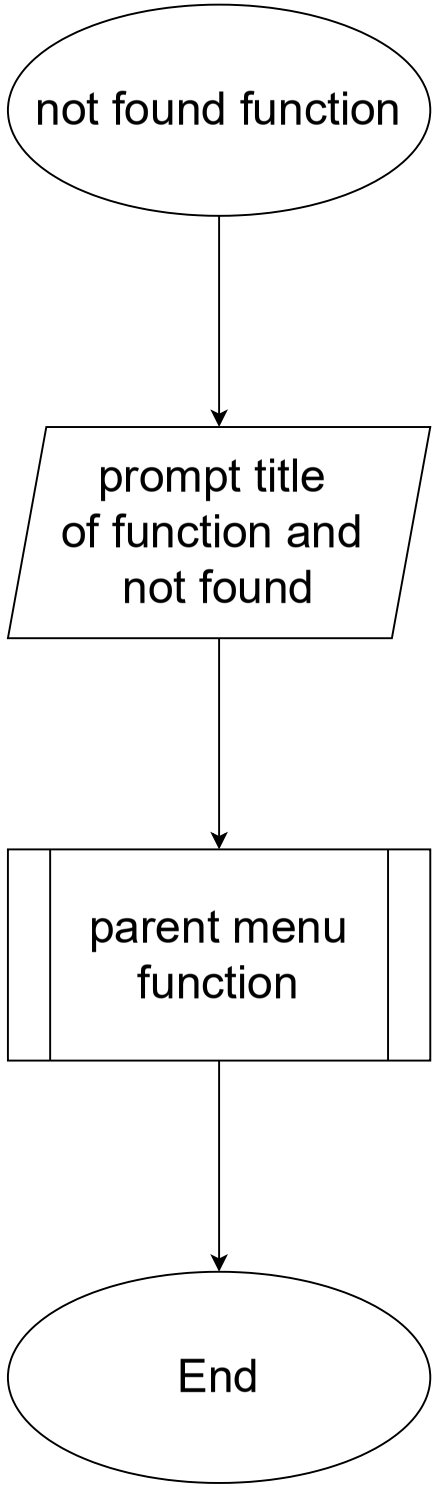

creditCardMenu()
prompt
menu heading
and menu
menu
switch (menu)
case
"1"
case
"2"
case
"3"
False
False
False
True
True
True
creditCard
Menu()
loanMenu()
account
InfoMenu()
End


newCreditCard()
prompt
menu heading
and menu
menu
switch (menu)
case
"1"
False
case
"2"
False
case
"3"
False
True
True
True
general
Purpose
CreditCard
Application()
travel
CreditCard
Application()
lifestyle
CreditCard
Application()
case
"4"
False
case
"5"
False
End
True
True
creditCardMenu()
priority
CreditCard
Application()

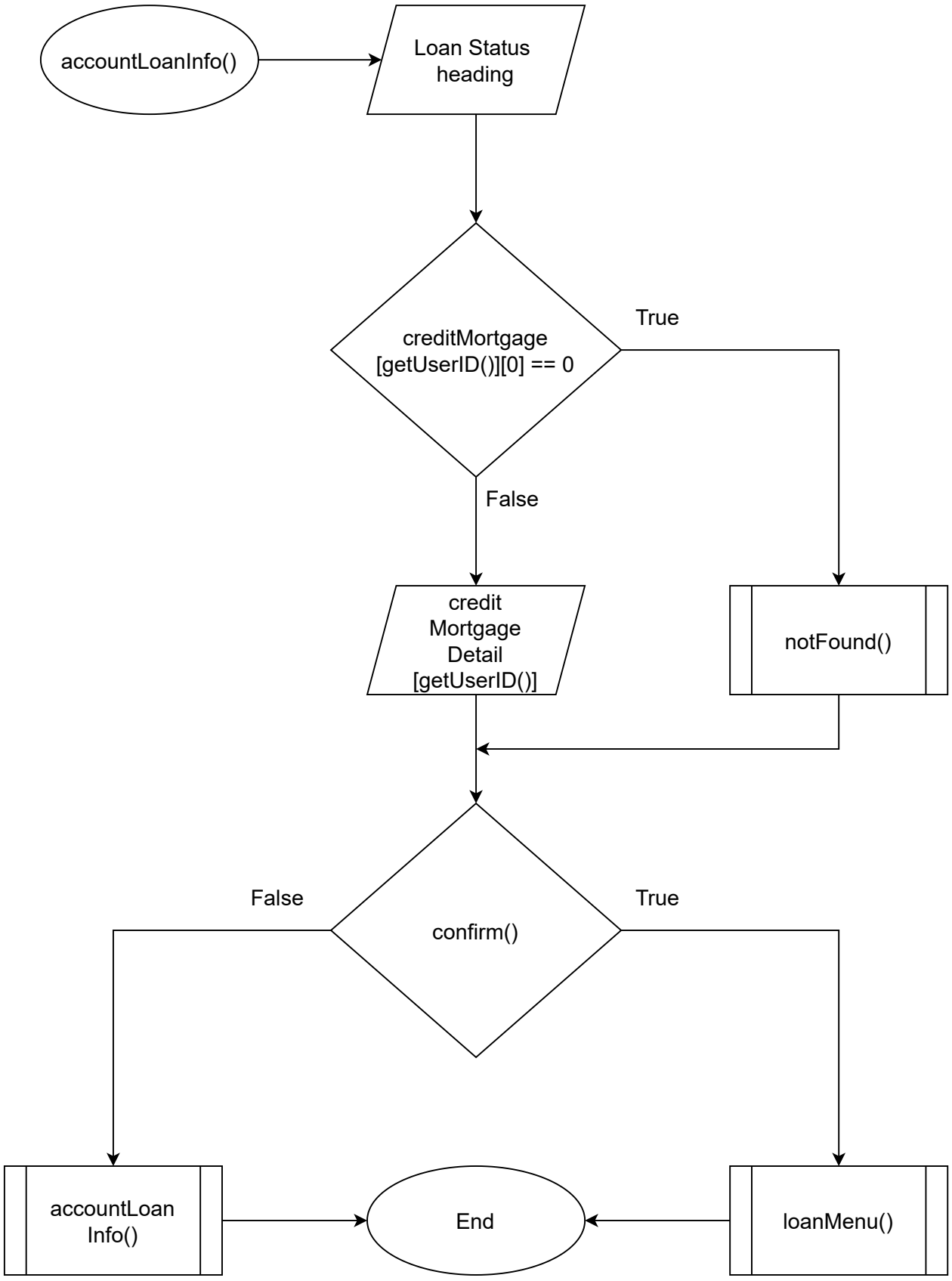

loanMenu()
prompt
menu heading
and menu
menu
switch (menu)
case
"1"
True
newLoanMenu()
False
case
"2"
True
accountLoanInfo()
False
case
"3"
True
mainMenu()
False
End

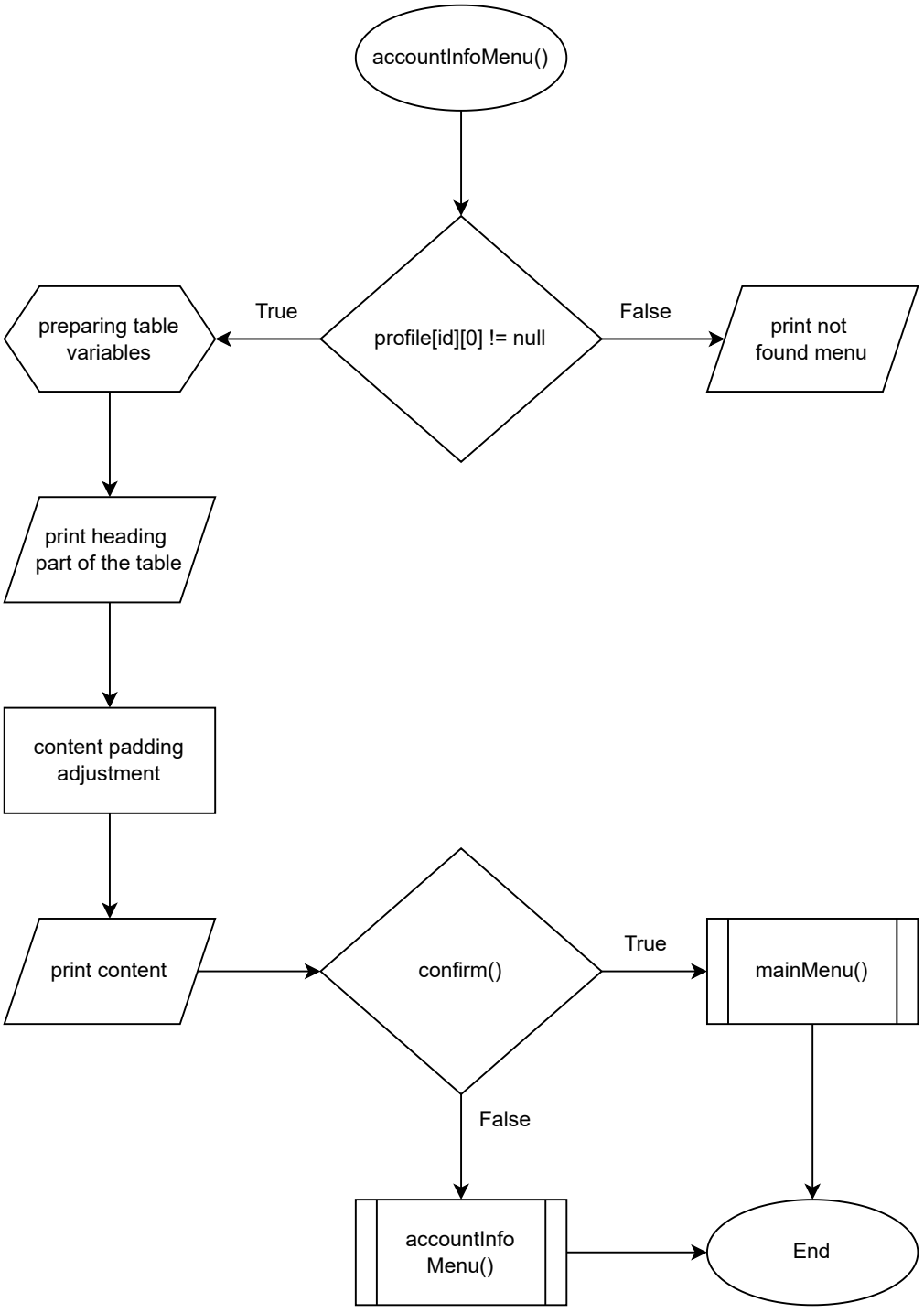

newLoanMenu()
prompt
menu heading
and menu
menu
switch (menu)
case
"1"
False
case
"2"
False
case
"3"
False
True
True
True
personal
Loan
Application()
auto
Loan
Application()
mortgage
Loan
Application()
case
"4"
False
case
"5"
False
End
True
True
loanMenu()
refinancing
Loan
Application()


mortgageLoan Application()
preparing variables
prompt menu and select menu
buying house?
True
prompt menu and select menu
input buildingArea
False
creditFacilities
True
False
creditFacilities < 1
tenor
True
False
tenor < 1 || tenor > 20
creditLimit calculation
debt
True
False
debt > debtMax
downPayment
True
downPayment is less than minimum down payment
False
downPayment is more than minimum down payment
True
False
debt and downPayment output from debtReadjustment
preparing table variables
print heading part of the table
content padding adjustment
print content
confirm()
True
creditMortgage[id][0] = debt
creditMortgage[id][1] = tenor
creditMortgage[id][2] = downPayment
creditMortgage[id][3] = installment
False
newLoanMenu()
End



not found function
generalPurposeCreditCardApplication()
travelCreditCardApplication()
lifestyleCreditCardApplication()
priorityCreditCardApplication()
ownedCreditCard()
personalLoanApplication()
autoLoanApplication()
refinancingLoanApplication()


accountLoanInfo()
Loan Status heading
creditMortgage [getUserID()][0] == 0
True
False
credit Mortgage Detail [getUserID()]
notFound()
confirm()
False
True
accountLoan Info()
End
loanMenu()

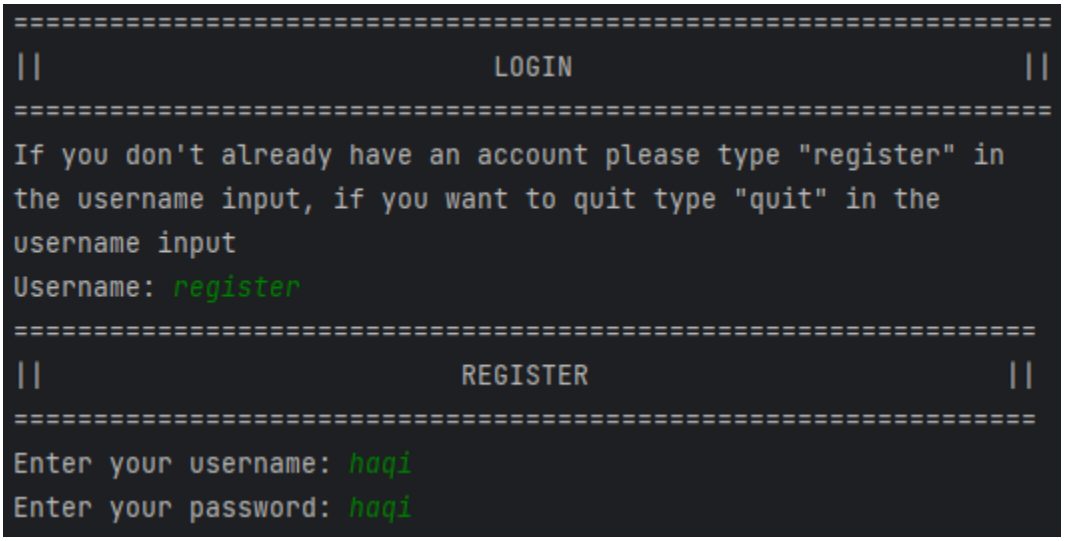

accountInfoMenu()
profile[id][0] != null
True
False
preparing table variables
print not found menu
print heading part of the table
content padding adjustment
print content
confirm()
True
mainMenu()
False
accountInfo Menu()
End

1.2 Steps to Run the Program

//contains the steps for running the application starting from the first run until all menus are tried to run

The following are the steps for running the application

1. This application consists of various menus, mainly login, register, main, and account information. When the user login the first time the login menu will also ask for the user information, afterward the user doesn't need to input their information again.



```
=====================================================================
||                            LOGIN                                ||
=====================================================================
If you don't already have an account please type "register" in
the username input, if you want to quit type "quit" in the
username input
Username: haqi
Password: haqi
Enter your name: Muhammad Baihaqi Aulia Asy'ari
Enter your phone number: 082336750134
Please enter your ID card number in this format
example: 3573052004691337
Enter your ID card number: 3573050101040001
Enter your salary: 8000000
Are you sure (y/n): y
Muhammad Baihaqi Aulia Asy'ari
082336750134
3573050101040001
8000000
```

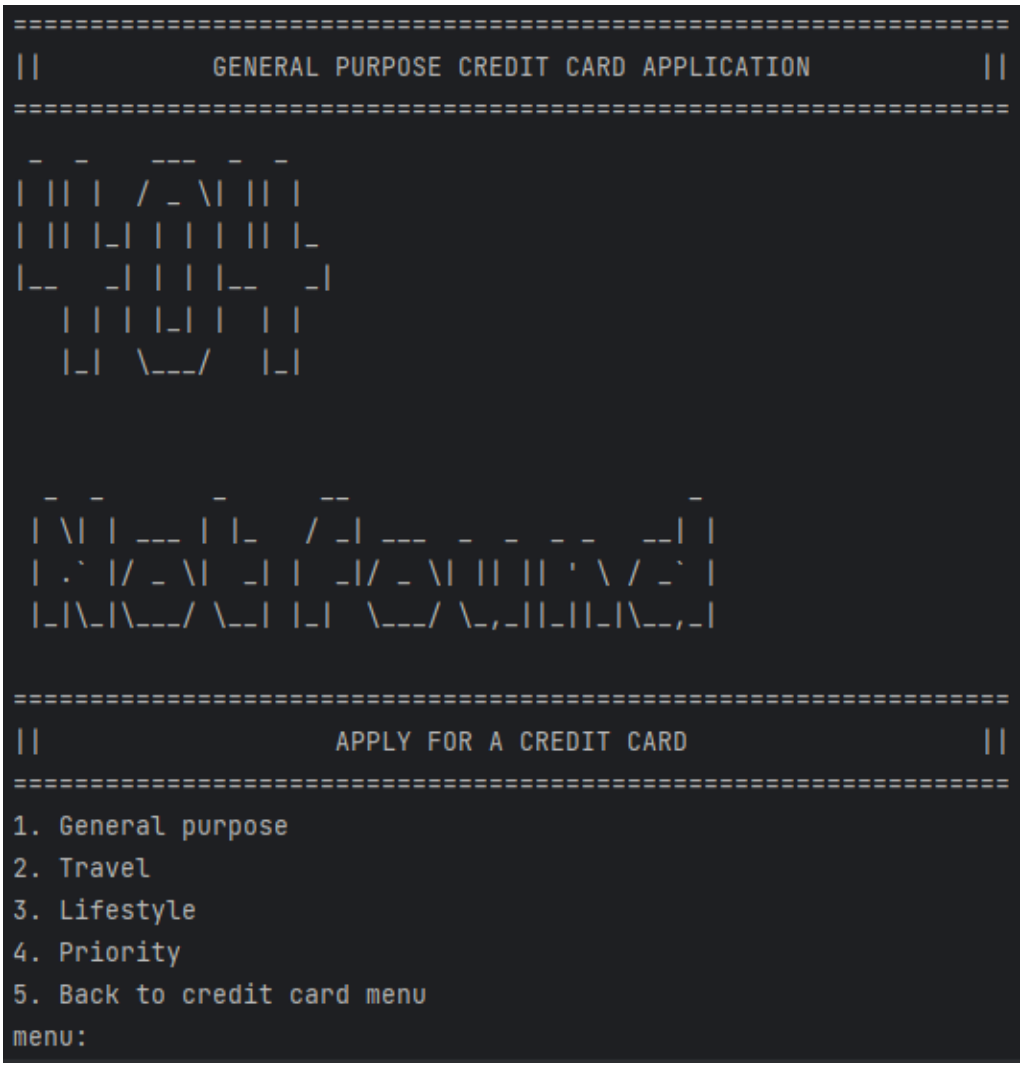
```
=====================================================================
||                            MENU                                 ||
=====================================================================
1. Credit card menu
2. Loan menu
3. Account information
4. Log out
5. Quit the program
menu: 3
```

```
================================================================================
||                                ACCOUNT INFO                                ||
||============================================================================||
||                                                                            ||
||              Name           : Muhammad Baihaqi Aulia Asy'ari               ||
||                                                                            ||
||              Phone number   : 082336750134                                 ||
||                                                                            ||
||              ID card number : 3573050101040001                             ||
||                                                                            ||
||              salary         : 8000000                                      ||
||                                                                            ||
||============================================================================||
Exit?
Are you sure (y/n): 
```

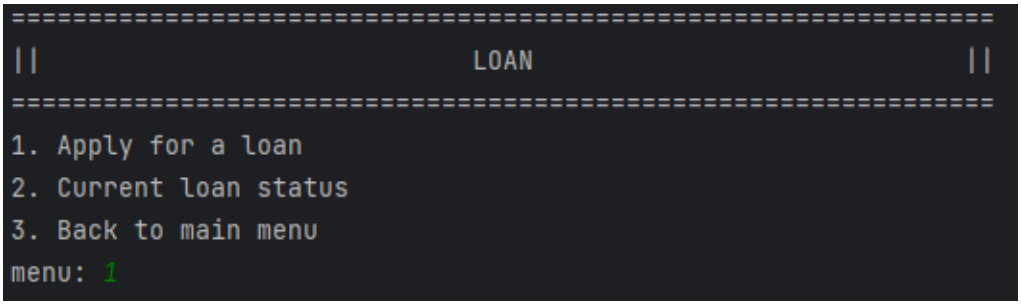
2. Some menus can be explored, unfortunately not all intended features are included. This is due to the time constraint and limitation on what's allowed to be used in Java for this project. The user will find out that any child directories of the "Credit card menu" will always result in "not found" and immediately redirected to the parent directory.

```
================================================================
||                         CREDIT CARD                          ||
================================================================
1. Apply for a credit card
2. Owned Credit card
3. Back to main menu
menu: 1
```

```
================================================================
||                   APPLY FOR A CREDIT CARD                    ||
================================================================
1. General purpose
2. Travel
3. Lifestyle
4. Priority
5. Back to credit card menu
menu: 1
```



3. The flaw above is also exhibited by “Apply for a loan” in the “Loan menu” for all loans except for “Mortgage”.



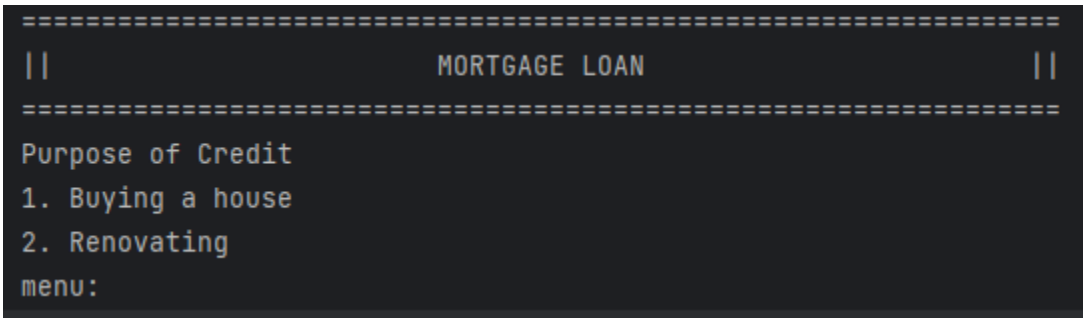
```
=====================================================================
||                       APPLY FOR A LOAN                          ||
=====================================================================
1. Personal
2. Auto
3. Mortgage
4. Refinancing
5. Back to loan menu
menu: 1
```

```
=====================================================================
||                        PERSONAL LOAN                            ||
=====================================================================
 _  _    ___  _  _
| || |  / _ \| || |
| || |_| | | | || |_
|__   _| | | |__   _|
   | | | |_| |  | |
   |_|  \___/   |_|


  _  _       _      __                    _
 | \| | ___ | |_   / _| ___  _  _  _ _   __| |
 | .` |/ _ \|  _| |  _|/ _ \| || || ' \ / _` |
 |_|\_|\___/ \__| |_|  \___/ \_,_||_||_|\__,_|

=====================================================================
||                       APPLY FOR A LOAN                          ||
=====================================================================
1. Personal
2. Auto
3. Mortgage
4. Refinancing
5. Back to loan menu
menu:
```

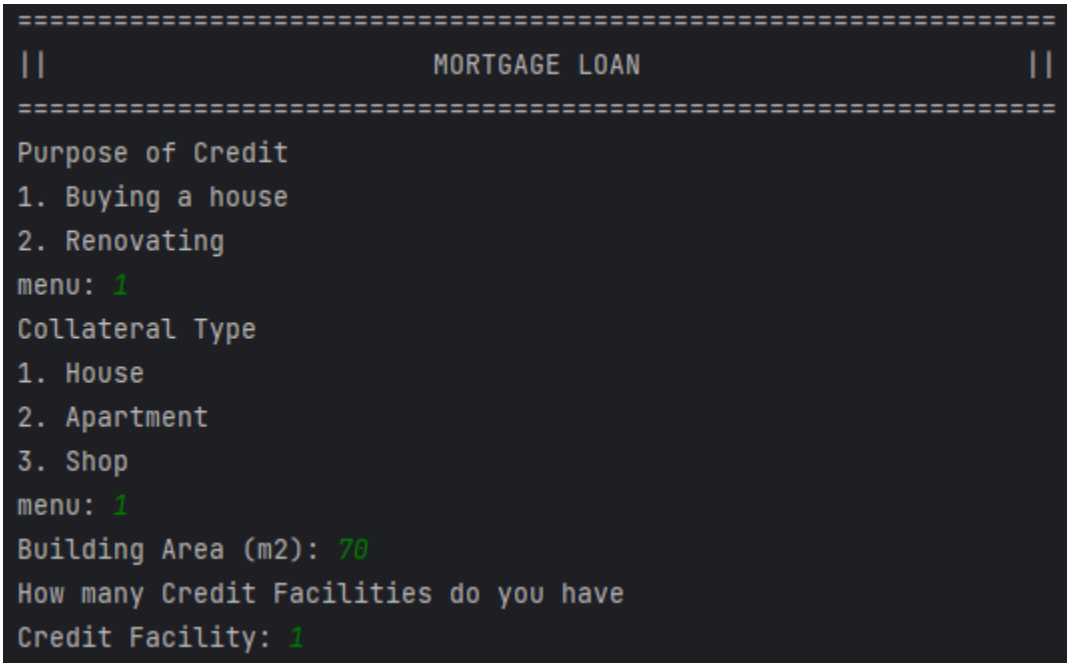
4. Although, some features are not what they'd seem to be. One function is purposely made to print "not found" if another function has not been used. This is the "Current loan status" menu, where it only outputs something besides "not found" if the user has made a "mortgage simulation" from the "Mortgage" menu in "Apply for a loan".

```
================================================================
||                            LOAN                              ||
================================================================
1. Apply for a loan
2. Current loan status
3. Back to main menu
menu: 3
================================================================
||                            MENU                              ||
================================================================
1. Credit card menu
2. Loan menu
3. Account information
4. Log out
5. Quit the program
menu: 2
================================================================
||                            LOAN                              ||
================================================================
1. Apply for a loan
2. Current loan status
3. Back to main menu
menu: 2
================================================================
||                         LOAN STATUS                          ||
================================================================
 _  _    ___  _  _
| || |  / _ \| || |
| || |_| | | | || |_
|__   _| | | |__   _|
   | | | |_| |  | |
   |_|  \___/   |_|


  _  _       _      __                    _
 | \| | ___ | |_   / _| ___  _  _  _ _   __| |
 | .` |/ _ \  _| |  _|/ _ \| || || ' \ / _` |
 |_|\_|\___/ \__| |_|  \___/ \_,_||_||_|\__,_|

Exit?Are you sure (y/n):
```

5. Like what has previously been said, the “Mortgage” menu is the only one in the “Apply for a loan” that is functional. To use the “Mortgage” menu or the “mortgage simulation” the user must input the purpose of the Mortgage.



6. When entering the buying menu, the user will be prompted with collateral type that “Renovation“ doesn’t have. After entering the collateral type the user us again prompted with the building Area. Every decision here is adding a minimum down payment percentage in the background. The last consideration for the minimum down payment percentage is the credit facility which counts the overall credit you own. But for this case, we can enter anything. But entering 2 or 3+ will increase the minimum down payment percentage by up to 10%.

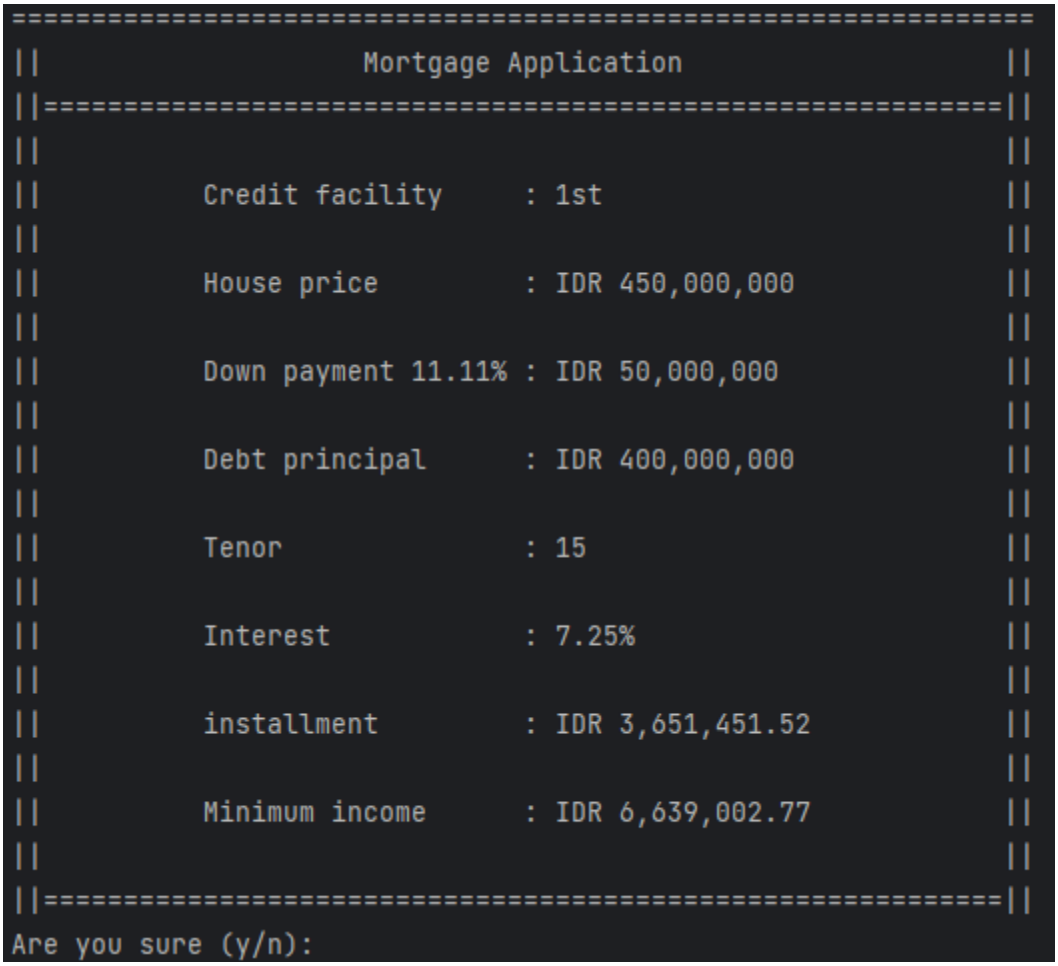


7. After entering the value to be considered for the down payment percentage the user is asked for the length of tenor for the mortgage which will affect the calculated max proposed mortgage accounting for the minimum down payment percentage previously

considered in the background. Afterward, the user is asked for their proposed mortgage and down payment. If the down payment proposed by the user is higher than the minimum down payment amount, the user is allowed to readjust their proposed mortgage if needed.

```
Building Area (m2): 70
How many Credit Facilities do you have
Credit Facility: 1
Maximum 20 years tenor
Tenor: 15
Maximum proposed debt: 535,555,667
House price: 450000000
Minimum down payment amount: 45,000,000
Down payment: 50000000
Maximum proposed debt: 532,000,100
House price: 450000000
```

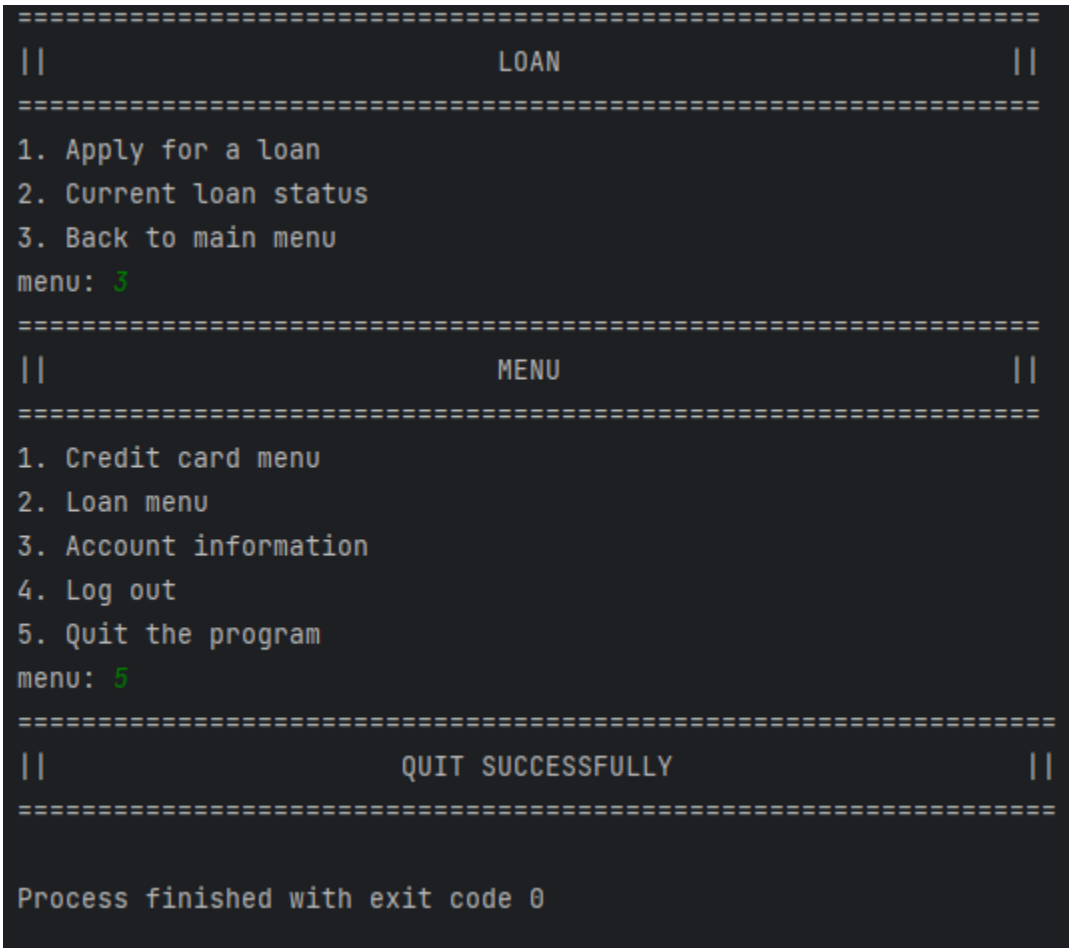
8. Next, a table will display the information the user has entered and will ask if the user is sure about the proposed mortgage, if they are, the data will be stored and the user will be directed to the parent menu, if they aren't so sure, the user will have the chance to re-enter the information again.

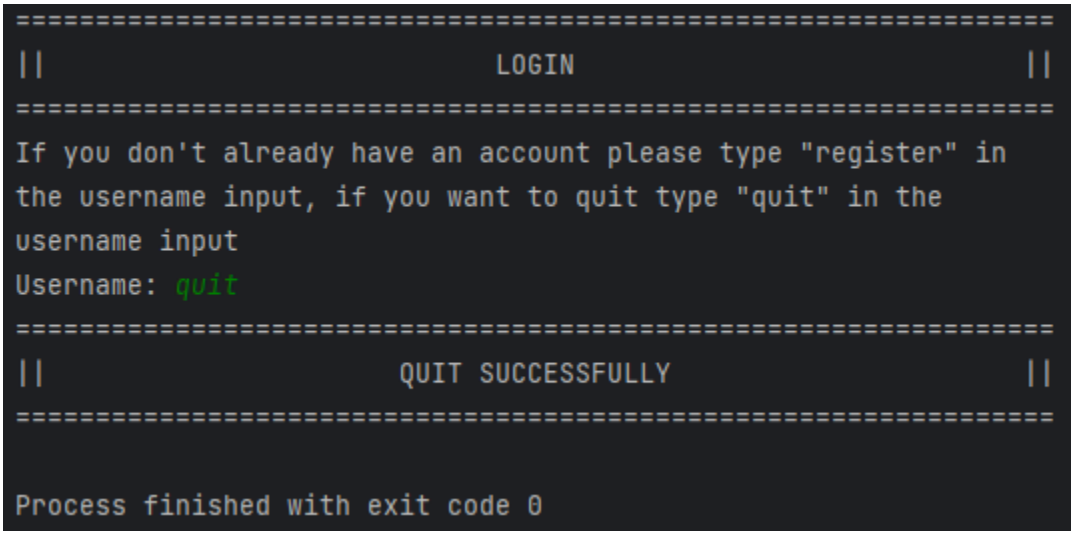


9. After the user is assured of their own decision, the user could see the information about their loan in the “Current loan status” menu.

```
=================================================================
||                      APPLY FOR A LOAN                       ||
=================================================================
1. Personal
2. Auto
3. Mortgage
4. Refinancing
5. Back to loan menu
menu: 5
=================================================================
||                           LOAN                              ||
=================================================================
1. Apply for a loan
2. Current loan status
3. Back to main menu
menu: 2
=================================================================
||                        LOAN STATUS                          ||
=================================================================
=================================================================
||                    Mortgage Application                     ||
||=============================================================||
||                                                             ||
||          Credit facility     : 1st                        ||
||                                                             ||
||          House price         : IDR 450,000,000            ||
||                                                             ||
||          Down payment 11.11% : IDR 50,000,000             ||
||                                                             ||
||          Debt principal      : IDR 400,000,000            ||
||                                                             ||
||          Tenor               : 15                         ||
||                                                             ||
||          Interest            : 7.25%                      ||
||                                                             ||
||          installment         : IDR 3,651,451.52           ||
||                                                             ||
||          Minimum income      : IDR 6,639,002.77           ||
||                                                             ||
||=============================================================||
Exit?Are you sure (y/n):
```

10. That is as far as the program goes, to quit the program the user could enter the quit menu in the main menu or log out and type quit.





1.3 Program Code

//contains the code of all the programs that have been created

```java
package com.baihaqi.bankingcreditcli;

import java.util.Scanner;

/**
*
* @author G4CE-PC
*         Muhammad Baihaqi Aulia Asy'ari
*         2241720145 - TI 1I - 19
*/
public class BankingCreditCLI {
    final static Scanner input = new Scanner(System.in);
    static String[][] credential = new String[1][2];
    static String username;
    static double[][] creditMortgage = new double[1][4];
    static String[] creditMortgageDetail = new String[1];
    static String[][] profile = new String[1][4];

    public static void main(String[] args) {
        credential[0][0] = "admin";
        credential[0][1] = "admin";
        loginMenu();
    }

    // region login
    static String usernameCheck() {
        while (true) {
            write("Username: ");
            String userInput = input.next();
            for (String[] strings : credential) {
                if (strings[0] == null)
                    continue;
                if (strings[0].equals(userInput))
                    return userInput;
                if (userInput.equalsIgnoreCase("register"))
                    return userInput;
                if (userInput.equalsIgnoreCase("quit"))
                    return userInput;
            }
            printPromptSplit(
                    "The username you've entered doesn't exist in our system please
↪ re-enter your username correctly");
        }
    }

    static boolean passwordCheck() {
        int limit = 0;
        while (limit < 3) {
            write("Password: ");
            String userInput = input.next();
            for (String[] strings : credential) {
                if (strings[0].equals(username)) {
                    if (strings[1].equals(userInput)) {
                        return true;
```

```
                    }
                }
            }
            if (limit < 1)
                writeln("Wrong password");
            if (limit == 1)
                writeln("""
                        Wrong password, Last attempt
                        if you fail again, you would need to re-enter your username""");
            limit++;
        }
        return false;
    }

    static boolean attemptLogin() {
        username = usernameCheck();
        if (!(username.equalsIgnoreCase("register") ||
    ↪ username.equalsIgnoreCase("quit"))) {
            boolean password = passwordCheck();
            if (password) {
                if (profile[getUserID()][0] == null)
                    setProfile();
                mainMenu();
            } else {
                if (attemptLogin()) {
                    if (username.equalsIgnoreCase("register"))
                        registerMenu();
                    if (username.equalsIgnoreCase("quit"))
                        quitMenu();
                }
            }
            return false;
        }
        return true;
    }

    // endregion
    // region print
    static void printHeading(String prompt) {
        int heading;
        String bar;
        String side = "||";
        if (prompt.length() % 2 == 0) {
            heading = 64;
            bar = "================================================================";
        } else {
            heading = 65;
            bar = "=================================================================";
        }
        int gap = ((heading - (side.length() * 2) - prompt.length()) / 2);
        String title = String.format("%s%" + gap + "s%s%" + gap + "s%s\n", side, " ",
    ↪ prompt, " ", side);
        writeln(bar);
        write(title);
```

```
106         writeln(bar);
107     }
108 
109     static void printPromptSplit(String prompt) {
110         String[] promptSplit = prompt.split("\\s");
111         int i = 0;
112         while (i < promptSplit.length) {
113             int limit = 0;
114             while (limit < 65 && i < promptSplit.length && (limit +
    ↪ promptSplit[i].length()) < 65) {
115                 write(String.format("%s ", promptSplit[i]));
116                 limit = limit + (promptSplit[i].length() + 1);
117                 i++;
118             }
119             writeln("");
120         }
121     }
122 
123     static void write(String s) {
124         System.out.print(s);
125     }
126 
127     static void writeln(String s) {
128         System.out.println(s);
129     }
130 
131     // endregion
132     // region etc
133     static void newStringArray(String[][] data) {
134         String[][] old = data;
135         data = new String[old.length + 1][old[0].length];
136         for (int row = 0; row < old.length; row++) {
137             for (int col = 0; col < old[row].length; col++) {
138                 data[row][col] = old[row][col];
139             }
140         }
141     }
142 
143     static void newString(String[] data) {
144         String[] old = data;
145         data = new String[data.length + 1];
146         for (int i = 0; i < old.length; i++) {
147             data[i] = old[i];
148         }
149     }
150 
151     static void newDoubleArray(double[][] data) {
152         double[][] old = data;
153         data = new double[data.length + 1][data[0].length];
154         for (int row = 0; row < old.length; row++) {
155             for (int col = 0; col < old[row].length; col++) {
156                 data[row][col] = old[row][col];
157             }
158         }
```

```
159     }
160
161     static String promptedTextInput(String prompt) {
162         write(prompt);
163         return input.next();
164     }
165
166     static double powerDouble(double base, int exponent) {
167         if (exponent == 0) {
168             return 1;
169         } else {
170             return base * powerDouble(base, exponent - 1);
171         }
172     }
173
174     static void notFound() {
175         writeln("""
176                 _  _     ___  _  _  \s
177                 | || |  / _ \\| || | \s
178                 | || |_| | | | || |_\s
179                 |__   _| | | |__   _|
180                 | | | |_| |  | | \s
181                 |_|  \\___/   |_| \s
182                                 \s
183                                 \s
184                 _  _       _      __                      _\s
185                 | \\| | ___ | |_   / _| ___  _  _  _ _   __| |
186                 | .` |/ _ \\|  _| |  _|/ _ \\| || || ' \\ / _` |
187                 |_|\\_|\\___/ \\__| |_|  \\___/ \\_,_||_||_|\\__,_|
188                                                           \s""");
189     }
190
191     static boolean confirm() {
192         while (true) {
193             write("Are you sure (y/n): ");
194             String userInput = input.next();
195             if (userInput.equalsIgnoreCase("y")) {
196                 return true;
197             } else if (userInput.equalsIgnoreCase("n")) {
198                 return false;
199             }
200             writeln("Please enter a valid input!");
201         }
202     }
203
204     static int getUserID() {
205         int i = 0;
206         if (!credential[i][0].equals(username)) {
207             do {
208                 i++;
209             } while (!credential[i][0].equals(username));
210         }
211         return i;
212     }
```

```
213
214     static void insertMortgageDetail(String s) {
215         write(s + "\n");
216         creditMortgageDetail[getUserID()] += s + "\n";
217     }
218
219     static boolean validatePhoneNumber(String numbers) {
220         // 0895388899808 -> 13 digits
221         // 082336750134 -> 12 digits
222         // 08912888374 -> 11 digits
223         int length = numbers.length();
224
225         if (length < 11 || length > 13)
226             return false;
227
228         for (int i = 0; i < length; i++) {
229             // validate if each element is a number
230
231             int current = Integer.parseInt(String.format("%c", numbers.charAt(i)));
232             // first digit should be 0
233             if (i == 0 && current != 0)
234                 return false;
235
236             // second digit should be 8
237             if (i == 1 && current != 8)
238                 return false;
239         }
240         return true;
241     }
242
243     static boolean validateIDCardNumber(String numbers) {
244         // 3573051004040001
245         // 3573056204040001
246         int length = numbers.length();
247         if (length != 16)
248             return false;
249         for (int i = 0; i < length; i++) {
250             switch (numbers.charAt(i)) {
251                 case '1', '2', '3', '4', '5', '6', '7', '8', '9', '0' -> {
252                 }
253                 default -> {
254                     return false;
255                 }
256             }
257         }
258         return true;
259     }
260
261     static int[] debtReadjustment(double installmentMin, double
    ↪ inverseReturnOfPoweredInterest, double interestInMonth, int downPayment, int
    ↪ downPaymentPercentage) {
262         boolean repeat = true;
263         double creditLimit;
264         double debtMax;
```

```
265         int debt;
266         int[] out = new int[2];
267         do {
268             creditLimit = installmentMin
269                     * (inverseReturnOfPoweredInterest / interestInMonth);
270             debtMax = creditLimit + downPayment;
271             write(String.format("Maximum proposed debt: %,.0f\n", debtMax));
272             write("House price: ");
273             debt = input.nextInt();
274             if (debt > debtMax) {
275                 writeln("Please enter a value smaller than the maximum");
276             } else {
277                 repeat = false;
278             }
279         } while (repeat);
280         if (downPayment < (double) (debt / 100) * downPaymentPercentage) {
281             write(String.format("Minimum down payment amount: %,.0f\n", (double) (debt /
    ↪ 100) * downPaymentPercentage));
282             repeat = true;
283             do {
284                 write("Down payment: ");
285                 downPayment = input.nextInt();
286                 if (downPayment < (debt / 100) * downPaymentPercentage) {
287                     writeln("Please enter a value bigger than the minimum!");
288                 } else {
289                     repeat = false;
290                 }
291             } while (repeat);
292         } else {
293             out[0] = debt;
294             out[1] = downPayment;
295             return out;
296         }
297         if (downPayment > (double) (debt / 100) * downPaymentPercentage) {
298             out = debtReadjustment(installmentMin, inverseReturnOfPoweredInterest,
    ↪ interestInMonth, downPayment,downPaymentPercentage);
299         }
300         out[0] = debt;
301         out[1] = downPayment;
302         return out;
303     }
304 
305     // endregion
306     // region menu
307     static void loginMenu() {
308         printHeading("LOGIN");
309         printPromptSplit(
310                 "If you don't already have an account please type \"register\" in the
    ↪ username input, if you want to quit type \"quit\" in the username input");
311         if (attemptLogin()) {
312             if (username.equalsIgnoreCase("register"))
313                 registerMenu();
314             if (username.equalsIgnoreCase("quit"))
315                 quitMenu();
```

```
316         }
317     }
318 
319     static void registerMenu() {
320         printHeading("REGISTER");
321         newStringArray(credential);
322         newStringArray(profile);
323         newDoubleArray(creditMortgage);
324         newString(creditMortgageDetail);
325         creditMortgageDetail[creditMortgageDetail.length - 1] = "";
326         credential[credential.length - 1][0] = promptedTextInput("Enter your username:
    ↪ ");
327         credential[credential.length - 1][1] = promptedTextInput("Enter your password:
    ↪ ");
328         loginMenu();
329     }
330 
331     static void setProfile() {
332         int id = getUserID();
333         String name, phoneNumber, IDCardNumber, salary;
334         input.nextLine();
335         write("Enter your name: ");
336         name = input.nextLine();
337         boolean i = true;
338         do {
339             write("Enter your phone number: ");
340             phoneNumber = input.next();
341             if (validatePhoneNumber(phoneNumber)) {
342                 i = false;
343             } else {
344                 writeln("Please enter a valid phone number");
345             }
346         } while (i);
347         writeln("Please enter your ID card number in this format");
348         writeln("example: 3573052004691337");
349         i = true;
350         do {
351             write("Enter your ID card number: ");
352             IDCardNumber = input.next();
353             if (validateIDCardNumber(IDCardNumber)) {
354                 i = false;
355             } else {
356                 writeln("Please enter a valid ID card number");
357             }
358         } while (i);
359         salary = promptedTextInput("Enter your salary: ");
360 
361         if (confirm()) {
362             profile[id][0] = name;
363             profile[id][1] = phoneNumber;
364             profile[id][2] = IDCardNumber;
365             profile[id][3] = salary;
366             writeln(profile[id][0]);
367             writeln(profile[id][1]);
```

```
368             writeln(profile[id][2]);
369             writeln(profile[id][3]);
370         } else {
371             setProfile();
372         }
373     }
374 
375     static void mainMenu() {
376         printHeading("MENU");
377         writeln("""
378                 1. Credit card menu
379                 2. Loan menu
380                 3. Account information
381                 4. Log out
382                 5. Quit the program""");
383         switch (promptedTextInput("menu: ")) {
384             case "1" -> creditCardMenu();
385             case "2" -> loanMenu();
386             case "3" -> accountInfoMenu();
387             case "4" -> loginMenu();
388             case "5" -> quitMenu();
389         }
390     }
391 
392     // region mainMenu
393     static void creditCardMenu() {
394         printHeading("CREDIT CARD");
395         writeln("""
396                 1. Apply for a credit card
397                 2. Owned Credit card
398                 3. Back to main menu""");
399         switch (promptedTextInput("menu: ")) {
400             case "1" -> newCreditCard();
401             case "2" -> ownedCreditCard();
402             case "3" -> mainMenu();
403         }
404     }
405 
406     // region creditCardMenu
407     static void newCreditCard() {
408         printHeading("APPLY FOR A CREDIT CARD");
409         writeln("""
410                 1. General purpose
411                 2. Travel
412                 3. Lifestyle
413                 4. Priority
414                 5. Back to credit card menu""");
415         switch (promptedTextInput("menu: ")) {
416             case "1" -> generalPurposeCreditCardApplication();
417             case "2" -> travelCreditCardApplication();
418             case "3" -> lifestyleCreditCardApplication();
419             case "4" -> priorityCreditCardApplication();
420             case "5" -> creditCardMenu();
421         }
```

```
422         }
423
424         // region newCreditCard
425         static void generalPurposeCreditCardApplication() {
426             printHeading("GENERAL PURPOSE CREDIT CARD APPLICATION");
427             notFound();
428             newCreditCard();
429         }
430
431         static void travelCreditCardApplication() {
432             printHeading("TRAVEL CREDIT CARD APPLICATION");
433             notFound();
434             newCreditCard();
435         }
436
437         static void lifestyleCreditCardApplication() {
438             printHeading("LIFESTYLE CREDIT CARD APPLICATION");
439             notFound();
440             newCreditCard();
441         }
442
443         static void priorityCreditCardApplication() {
444             printHeading("PRIORITY CREDIT CARD APPLICATION");
445             notFound();
446             newCreditCard();
447         }
448
449         // endregion
450         static void ownedCreditCard() {
451             printHeading("OWNED CREDIT CARD");
452             notFound();
453             creditCardMenu();
454         }
455
456         // endregion
457         static void loanMenu() {
458             printHeading("LOAN");
459             writeln("""
460                     1. Apply for a loan
461                     2. Current loan status
462                     3. Back to main menu""");
463             switch (promptedTextInput("menu: ")) {
464                 case "1" -> newLoanMenu();
465                 case "2" -> accountLoanInfo();
466                 case "3" -> mainMenu();
467             }
468         }
469
470         // region loanMenu
471         static void newLoanMenu() {
472             printHeading("APPLY FOR A LOAN");
473             writeln("""
474                     1. Personal
475                     2. Auto
```

```
                3. Mortgage
                4. Refinancing
                5. Back to loan menu""");
        switch (promptedTextInput("menu: ")) {
            case "1" -> personalLoanApplication();
            case "2" -> autoLoanApplication();
            case "3" -> mortgageLoanApplication();
            case "4" -> refinancingLoanApplication();
            case "5" -> loanMenu();
        }
    }

    // region newLoanMenu
    static void personalLoanApplication() {
        printHeading("PERSONAL LOAN");
        notFound();
        newLoanMenu();
    }

    static void autoLoanApplication() {
        printHeading("AUTO LOAN");
        notFound();
        newLoanMenu();
    }

    static void mortgageLoanApplication() {
        int id = getUserID();
        int buildingArea;
        int creditFacilities;
        int downPayment;
        int downPaymentPercentage = 10;
        int tenor;
        int debt;
        int salary = Integer.parseInt(profile[id][3]);
        double installment;
        double interest = 7.25;
        double creditLimit;
        double debtMax;
        double installmentMin = salary < 5_000_000 ? salary * 0.5 : salary * 0.55;
        double salaryMin;
        printHeading("MORTGAGE LOAN");
        writeln("""
                Purpose of Credit
                1. Buying a house
                2. Renovating""");
        String menu = promptedTextInput("menu: ");
        if (menu.equals("1")) {
            writeln("""
                    Collateral Type
                    1. House
                    2. Apartment
                    3. Shop""");
            String collateralType = promptedTextInput("menu: ");
            if (collateralType.equals("1") || collateralType.equals("2")) {
```

```
                write("Building Area (m2): ");
                buildingArea = input.nextInt();
                if (buildingArea > 70)
                    downPaymentPercentage += 5;
            }
        } else if (menu.equals("2")) {
            downPaymentPercentage += 20;
        }
        writeln("How many Credit Facilities do you have");
        boolean repeat = true;
        do {
            write("Credit Facility: ");
            creditFacilities = input.nextInt();
            if (creditFacilities < 1) {
                writeln("Please enter a positive value!");
            } else {
                repeat = false;
            }
        } while (repeat);
        if (creditFacilities > 2)
            downPaymentPercentage += 10;
        writeln("Maximum 20 years tenor");
        repeat = true;
        do {
            write("Tenor: ");
            tenor = input.nextInt();
            if (tenor < 1 || tenor > 20) {
                writeln("Please enter a value between 1 to 20");
            } else {
                repeat = false;
            }
        } while (repeat);
        double interestInMonth = ((interest / 100) / 12);
        double interestPowerBase = (1 + ((interest / 100) / 12));
        int tenorMonth = tenor * 12;
        double inverseReturnOfPoweredInterest = 1 - (1 / powerDouble(interestPowerBase,
    ↪  tenorMonth));
        repeat = true;
        do {
            creditLimit = installmentMin
                    * (inverseReturnOfPoweredInterest / interestInMonth);
            debtMax = creditLimit * (1 / ((double) (100 - downPaymentPercentage) / 100));
            write(String.format("Maximum proposed debt: %,.0f\n", debtMax));
            write("House price: ");
            debt = input.nextInt();
            if (debt > debtMax) {
                writeln("Please enter a value smaller than the maximum");
            } else {
                repeat = false;
            }
        } while (repeat);
        write(String.format("Minimum down payment amount: %,.0f\n", (double) (debt / 100)
    ↪  * downPaymentPercentage));
        repeat = true;
```

```
582         do {
583             write("Down payment: ");
584             downPayment = input.nextInt();
585             if (downPayment < (debt / 100) * downPaymentPercentage) {
586                 writeln("Please enter a value bigger than the minimum!");
587             } else {
588                 repeat = false;
589             }
590         } while (repeat);
591         // region to be refactored as a function
592         if (downPayment > (double) (debt / 100) * downPaymentPercentage) {
593             int[] out = debtReadjustment(installmentMin, inverseReturnOfPoweredInterest,
    ↪  interestInMonth, downPayment,downPaymentPercentage);
594             debt = out[0];
595             downPayment = out[1];
596         }
597         // endregion
598         double debtInterest = (debt - downPayment) * interestInMonth;
599 
600         installment = debtInterest / inverseReturnOfPoweredInterest;
601         salaryMin = installment < 2_500_000 ? installment * 2 : installment * (1 / 0.55);
602         write(String.format("%14s IDR %,d\n", "Installment", (long) installment));
603         write(String.format("%14s IDR %,d\n", "Debt principal", (debt - downPayment)));
604         write(String.format("%14s IDR %,d\n", "Minimum Income", (long) salaryMin));
605 
606         String prompt = "Mortgage Application";
607         String ordinal;
608         switch
    ↪  (String.valueOf(creditFacilities).charAt(String.valueOf(creditFacilities).length() -
    ↪  1)) {
609             case '1' -> ordinal = "st";
610             case '2' -> ordinal = "nd";
611             case '3' -> ordinal = "rd";
612             default -> ordinal = "th";
613         }
614         double downPaymentPercentageByDebt = ((double) downPayment / debt) * 100;
615 
616         String[] varValue = {
617                 String.format(": %d%s", creditFacilities, ordinal),
618                 String.format(": IDR %,d", debt),
619                 String.format(": IDR %,d", downPayment),
620                 String.format(": IDR %,d", (debt - downPayment)),
621                 String.format(": %d", tenor),
622                 String.format(": %.2f%s", interest, "%"),
623                 String.format(": IDR %,.2f", installment),
624                 String.format(": IDR %,.2f", salaryMin)
625         };
626 
627         String[] varName = {
628 
629                 "Credit facility ",
630                 "House price ",
631                 String.format("Down payment %.2f%s ", downPaymentPercentageByDebt, "%"),
632                 "Debt principal ",
```

```
633                 "Tenor ",
634                 "Interest ",
635                 "installment ",
636                 "Minimum income "
637         };
638
639         String barTop =
    ↪ "================================================================";
640         String barBot =
    ↪ "||============================================================||";
641         String side = "||";
642         int heading = barTop.length();
643         int headingSpacing = (heading - (2 * side.length()) - prompt.length()) / 2;
644         String contentSpacing = String.format("%s%" + (heading - (2 * side.length())) +
    ↪ "s%s", side, " ", side);
645         String title = String.format("%s%" + headingSpacing + "s%s%" + headingSpacing +
    ↪ "s%s", side, " ", prompt, " ",
646                 side);
647         int fit = 0;
648         for (String varNameElement : varName) {
649             if (fit < varNameElement.length()) {
650                 fit = varNameElement.length();
651             }
652         }
653         insertMortgageDetail(barTop);
654         insertMortgageDetail(title);
655         insertMortgageDetail(barBot);
656         insertMortgageDetail(contentSpacing);
657         for (int i = 0; i < varName.length; i++) {
658             int paddingLeft = ((heading / 2) - side.length() - fit);
659             int paddingRight = ((heading / 2) - side.length() - varValue[i].length());
660             String content = String.format("%s%" + paddingLeft + "s%-" + fit + "s%s%" +
    ↪ paddingRight + "s%s", side,
661                     " ", varName[i], varValue[i], " ", side);
662             insertMortgageDetail(content);
663             insertMortgageDetail(contentSpacing);
664         }
665         insertMortgageDetail(barBot);
666
667         if (confirm()) {
668             creditMortgage[id][0] = debt;
669             creditMortgage[id][1] = tenor;
670             creditMortgage[id][2] = downPayment;
671             creditMortgage[id][3] = installment;
672         }
673         newLoanMenu();
674     }
675
676     static void refinancingLoanApplication() {
677         printHeading("REFINANCING LOAN");
678         notFound();
679         newLoanMenu();
680     }
681
```

```
682     // endregion
683     static void accountLoanInfo() {
684         printHeading("LOAN STATUS");
685         if (creditMortgage[getUserID()][0] == 0) {
686             notFound();
687         } else {
688             write(creditMortgageDetail[getUserID()]);
689         }
690         write("Exit?");
691         if (confirm()) {
692             loanMenu();
693         } else {
694             accountLoanInfo();
695         }
696     }
697 
698     // endregion
699     static void accountInfoMenu() {
700         int id = getUserID();
701         if (profile[id][0] != null) {
702             String content;
703             String prompt = "ACCOUNT INFO";
704             String barTop =
    ↪ "================================================================================";
705             String barBot =
    ↪ "||============================================================================||";
706             String side = "||";
707             int heading = barTop.length();
708             String contentSpacing = String.format("%s%" + (heading - (2 * side.length()))
    ↪ + "s%s", side, " ", side);
709             int titlePadding = (heading - (2 * side.length()) - prompt.length()) / 2;
710 
711             String[] varName = {
712                     "Name ",
713                     "Phone number ",
714                     "ID card number ",
715                     "salary "
716             };
717             String title = String.format("%s%" + titlePadding + "s%s%" + titlePadding +
    ↪ "s%s", side, " ", prompt, " ",
718                     side);
719 
720             writeln(barTop);
721             writeln(title);
722             writeln(barBot);
723             writeln(contentSpacing);
724 
725             int fitVarName = 0;
726             for (String varNameElement : varName) {
727                 if (fitVarName < varNameElement.length()) {
728                     fitVarName = varNameElement.length();
729                 }
730             }
731             int fitVarValue = 0;
```

```
732             for (String varValueElement : profile[id]) {
733                 if (fitVarValue < varValueElement.length()) {
734                     fitVarValue = varValueElement.length();
735                 }
736             }
737 
738             for (int i = 0; i < varName.length; i++) {
739                 String var = String.format("%-" + fitVarName + "s: %-" + fitVarValue +
    ↪  "s", varName[i], profile[id][i]);
740                 int padding = (heading - (side.length() * 2)
741                         - (var.length() % 2 == 0 ? var.length() : (var.length() + 1))) /
    ↪  2;
742                 if (var.length() % 2 != 0) {
743                     content = String.format("%s%" + padding + "s%s%" + padding + "s %s",
    ↪  side, " ", var, " ", side);
744                 } else {
745                     content = String.format("%s%" + padding + "s%s%" + padding + "s%s",
    ↪  side, " ", var, " ", side);
746                 }
747                 writeln(content);
748                 writeln(contentSpacing);
749             }
750             writeln(barBot);
751         } else {
752             printHeading("ACCOUNT INFO");
753             notFound();
754         }
755         write("Exit?\n");
756         if (confirm()) {
757             mainMenu();
758         } else {
759             accountInfoMenu();
760         }
761     }
762 
763     static void quitMenu() {
764         printHeading("QUIT SUCCESSFULLY");
765     }
766     // endregion
767     // endregion
768 }
```