10 September 2025

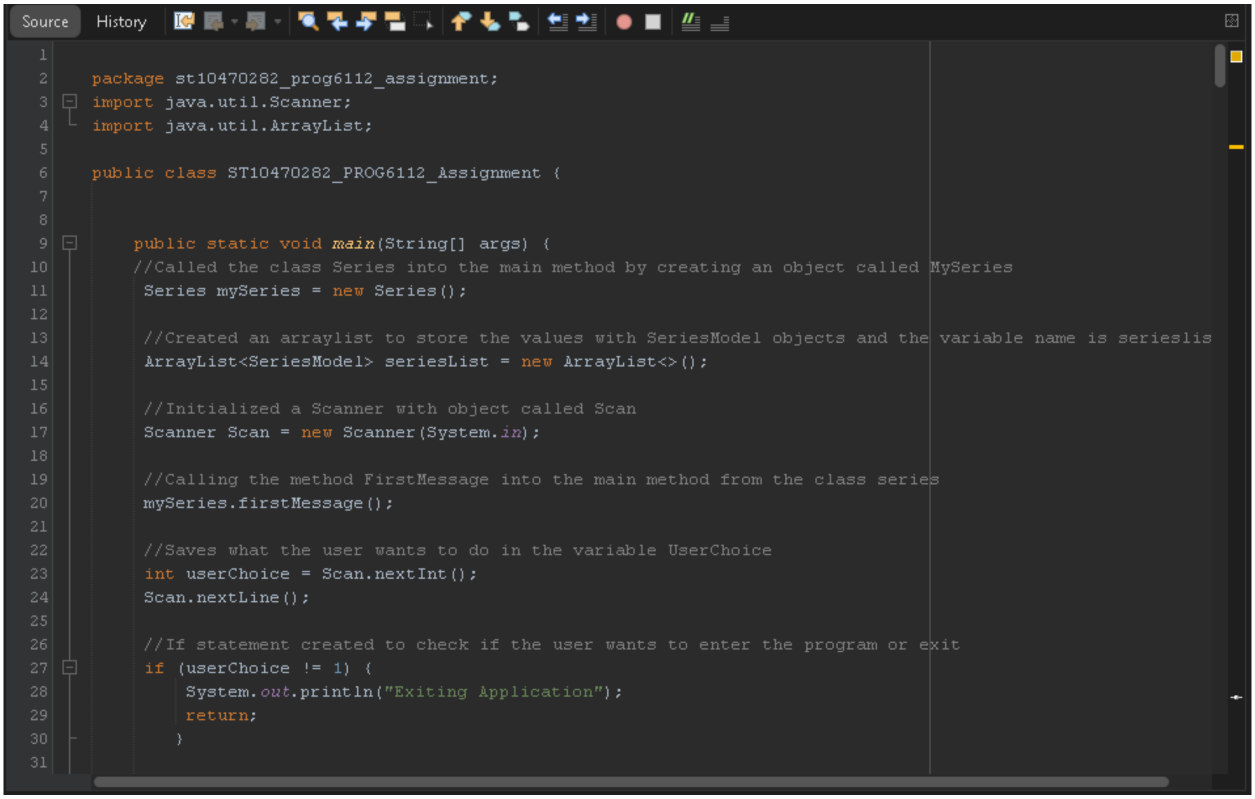
PROG6112 Assignment

ST10470282

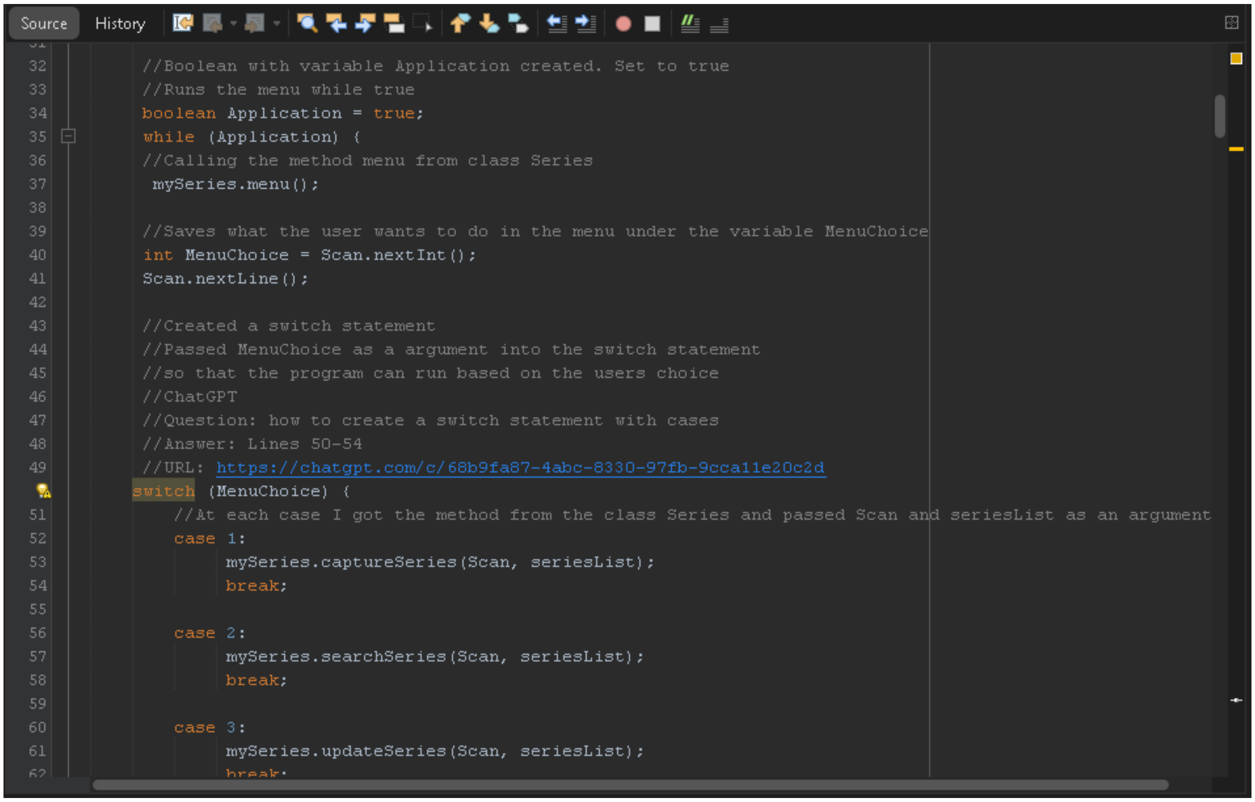
Keenan Mouton
VARSITY COLLEGE CAPE TOWN, BCA1, GR3

Table of Contents

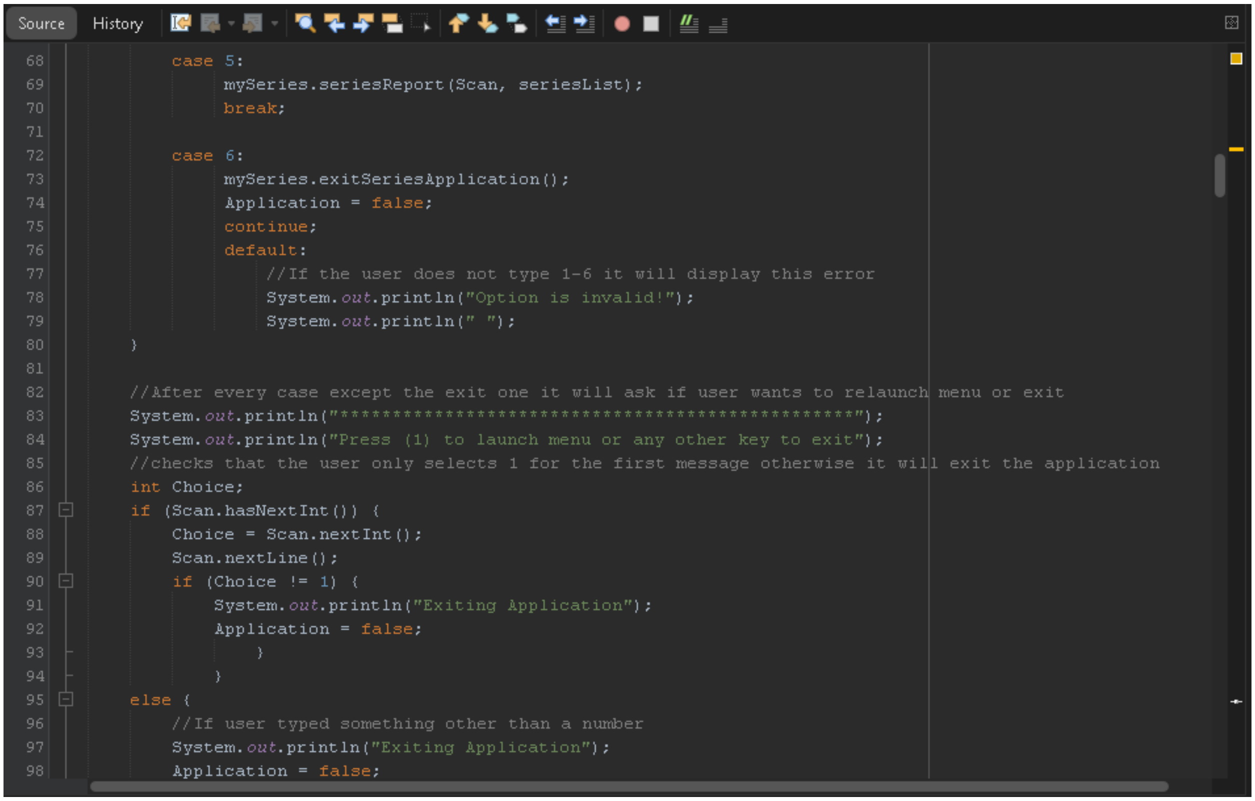
Question 1: Code



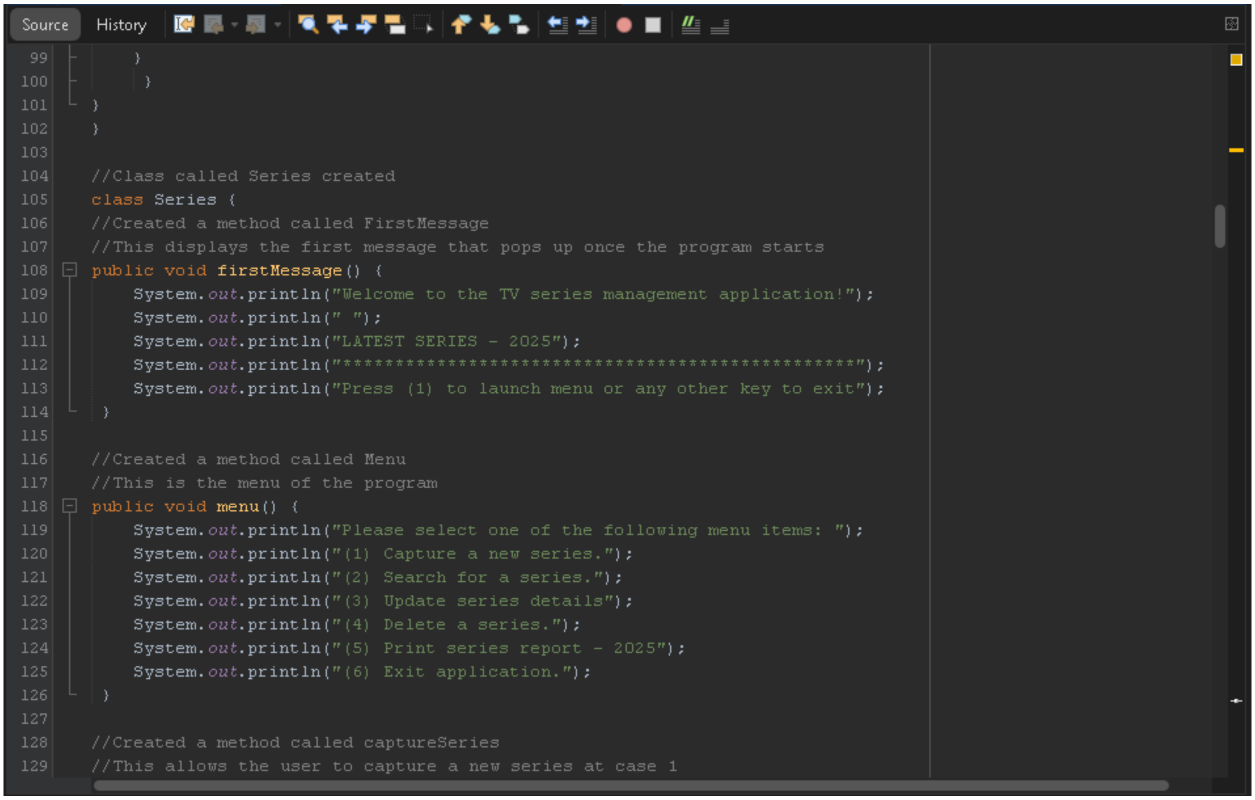
```
 1
 2  package st10470282_prog6112_assignment;
 3  import java.util.Scanner;
 4  import java.util.ArrayList;
 5
 6  public class ST10470282_PROG6112_Assignment {
 7
 8
 9      public static void main(String[] args) {
10      //Called the class Series into the main method by creating an object called MySeries
11       Series mySeries = new Series();
12
13       //Created an arraylist to store the values with SeriesModel objects and the variable name is serieslis
14       ArrayList<SeriesModel> seriesList = new ArrayList<>();
15
16       //Initialized a Scanner with object called Scan
17       Scanner Scan = new Scanner(System.in);
18
19       //Calling the method FirstMessage into the main method from the class series
20       mySeries.firstMessage();
21
22       //Saves what the user wants to do in the variable UserChoice
23       int userChoice = Scan.nextInt();
24       Scan.nextLine();
25
26       //If statement created to check if the user wants to enter the program or exit
27       if (userChoice != 1) {
28           System.out.println("Exiting Application");
29           return;
30         }
31
```



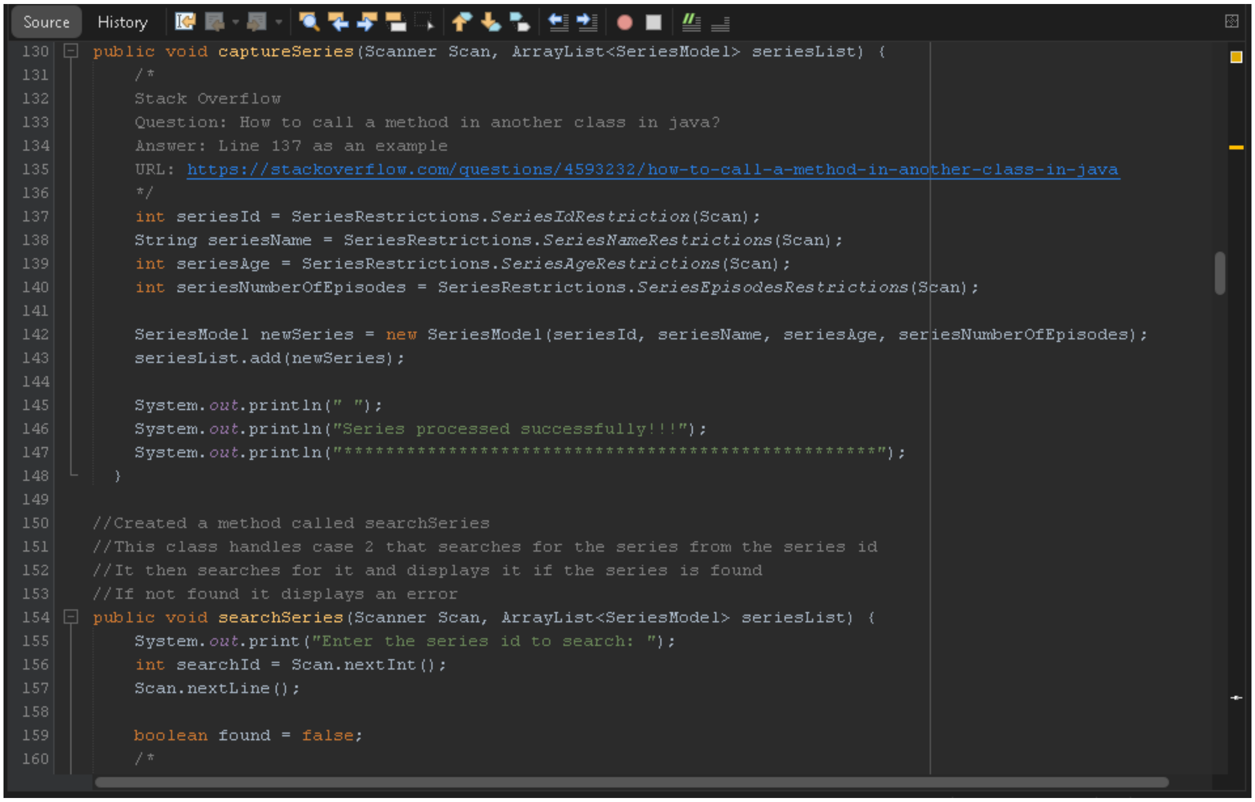
```
32       //Boolean with variable Application created. Set to true
33       //Runs the menu while true
34       boolean Application = true;
35       while (Application) {
36       //Calling the method menu from class Series
37        mySeries.menu();
38
39       //Saves what the user wants to do in the menu under the variable MenuChoice
40       int MenuChoice = Scan.nextInt();
41       Scan.nextLine();
42
43       //Created a switch statement
44       //Passed MenuChoice as a argument into the switch statement
45       //so that the program can run based on the users choice
46       //ChatGPT
47       //Question: how to create a switch statement with cases
48       //Answer: Lines 50-54
49       //URL: https://chatgpt.com/c/68b9fa87-4abc-8330-97fb-9cca11e20c2d
50       switch (MenuChoice) {
51           //At each case I got the method from the class Series and passed Scan and seriesList as an argument
52           case 1:
53               mySeries.captureSeries(Scan, seriesList);
54               break;
55
56           case 2:
57               mySeries.searchSeries(Scan, seriesList);
58               break;
59
60           case 3:
61               mySeries.updateSeries(Scan, seriesList);
62               break;
```



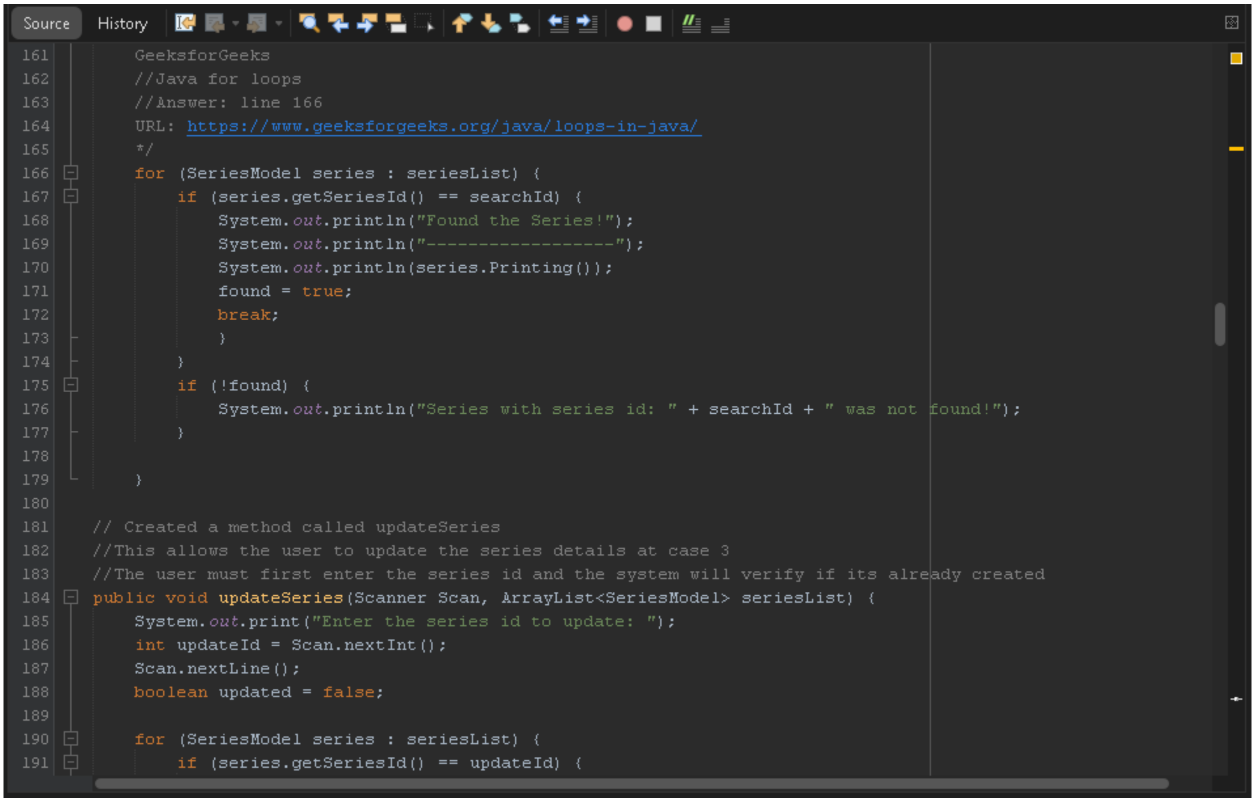
```
            case 5:
                mySeries.seriesReport(Scan, seriesList);
                break;

            case 6:
                mySeries.exitSeriesApplication();
                Application = false;
                continue;
                default:
                    //If the user does not type 1-6 it will display this error
                    System.out.println("Option is invalid!");
                    System.out.println(" ");
        }

        //After every case except the exit one it will ask if user wants to relaunch menu or exit
        System.out.println("**************************************************");
        System.out.println("Press (1) to launch menu or any other key to exit");
        //checks that the user only selects 1 for the first message otherwise it will exit the application
        int Choice;
        if (Scan.hasNextInt()) {
            Choice = Scan.nextInt();
            Scan.nextLine();
            if (Choice != 1) {
                System.out.println("Exiting Application");
                Application = false;
                    }
                }
        else {
            //If user typed something other than a number
            System.out.println("Exiting Application");
            Application = false;
```



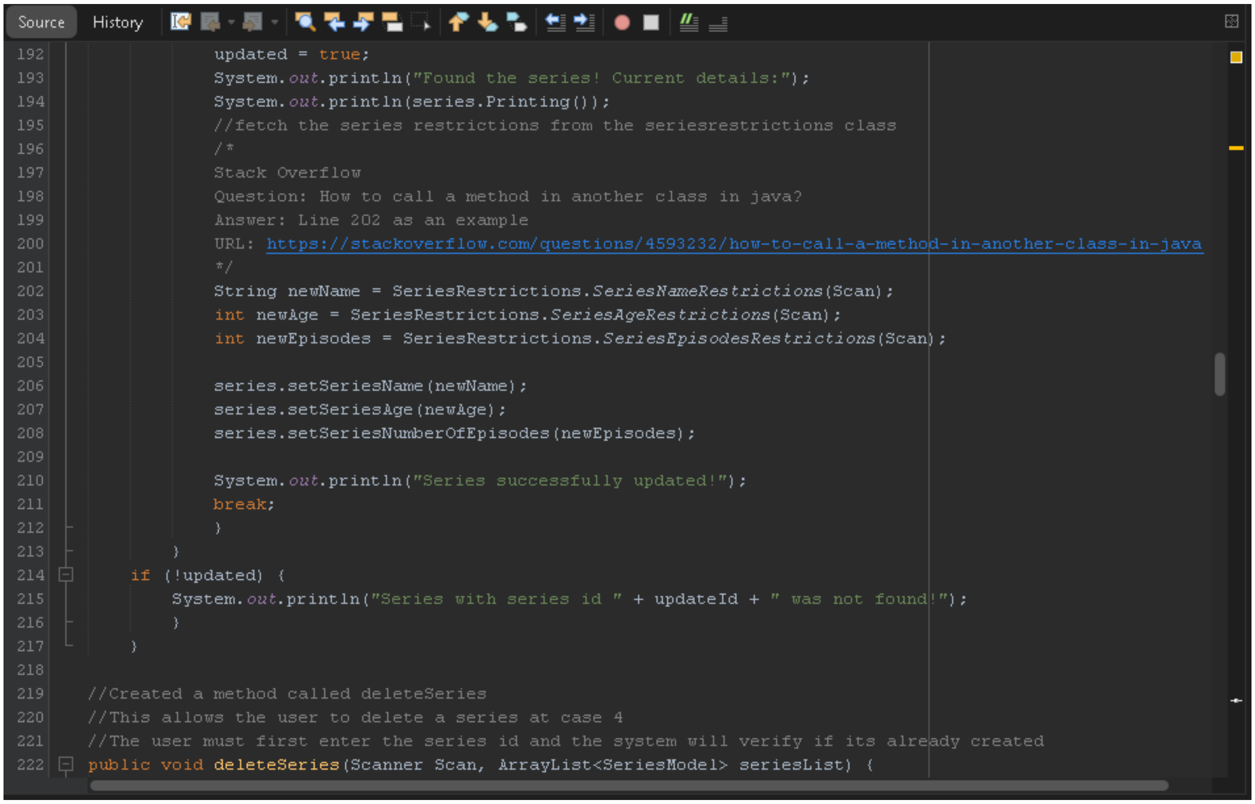
```
    }
     }
}
}

//Class called Series created
class Series {
//Created a method called FirstMessage
//This displays the first message that pops up once the program starts
public void firstMessage() {
    System.out.println("Welcome to the TV series management application!");
    System.out.println(" ");
    System.out.println("LATEST SERIES - 2025");
    System.out.println("**************************************************");
    System.out.println("Press (1) to launch menu or any other key to exit");
 }

//Created a method called Menu
//This is the menu of the program
public void menu() {
    System.out.println("Please select one of the following menu items: ");
    System.out.println("(1) Capture a new series.");
    System.out.println("(2) Search for a series.");
    System.out.println("(3) Update series details");
    System.out.println("(4) Delete a series.");
    System.out.println("(5) Print series report - 2025");
    System.out.println("(6) Exit application.");
 }

//Created a method called captureSeries
//This allows the user to capture a new series at case 1
```



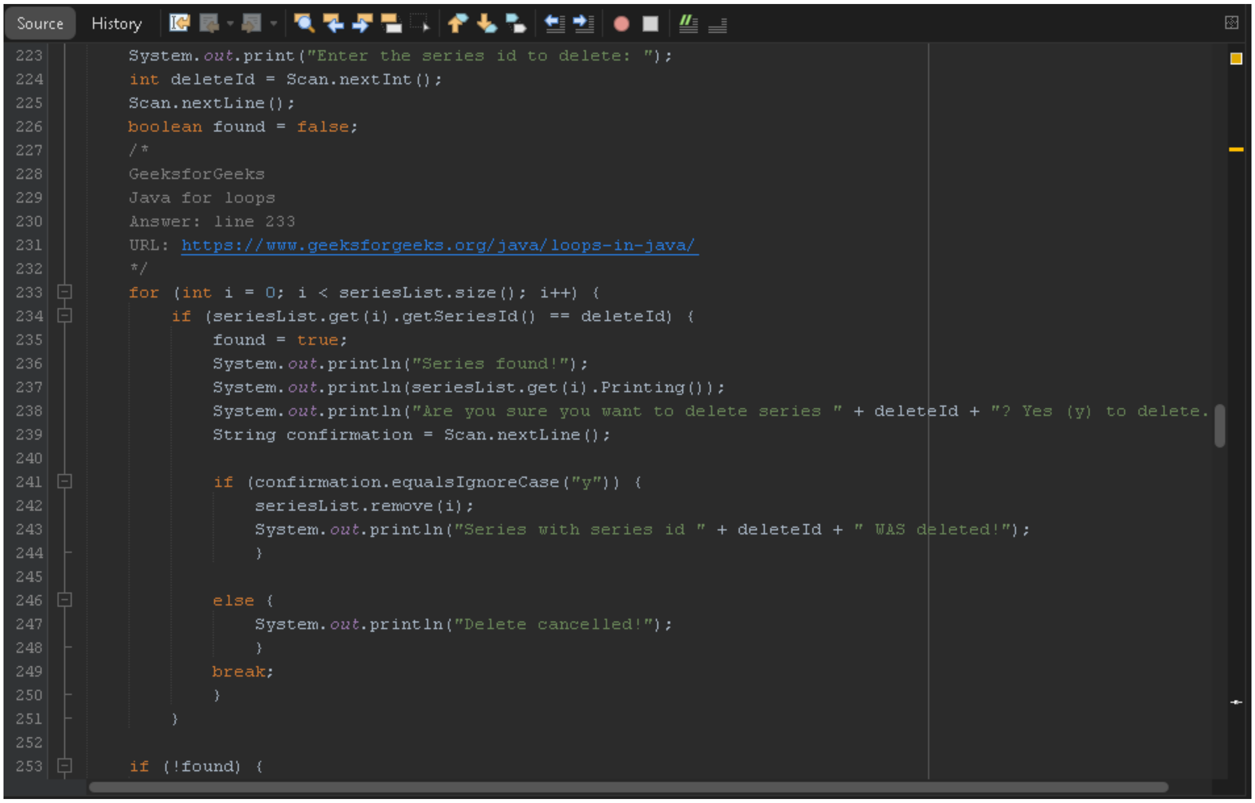
```
130 public void captureSeries(Scanner Scan, ArrayList<SeriesModel> seriesList) {
131     /*
132     Stack Overflow
133     Question: How to call a method in another class in java?
134     Answer: Line 137 as an example
135     URL: https://stackoverflow.com/questions/4593232/how-to-call-a-method-in-another-class-in-java
136     */
137     int seriesId = SeriesRestrictions.SeriesIdRestriction(Scan);
138     String seriesName = SeriesRestrictions.SeriesNameRestrictions(Scan);
139     int seriesAge = SeriesRestrictions.SeriesAgeRestrictions(Scan);
140     int seriesNumberOfEpisodes = SeriesRestrictions.SeriesEpisodesRestrictions(Scan);
141 
142     SeriesModel newSeries = new SeriesModel(seriesId, seriesName, seriesAge, seriesNumberOfEpisodes);
143     seriesList.add(newSeries);
144 
145     System.out.println(" ");
146     System.out.println("Series processed successfully!!!");
147     System.out.println("***************************************************");
148   }
149 
150 //Created a method called searchSeries
151 //This class handles case 2 that searches for the series from the series id
152 //It then searches for it and displays it if the series is found
153 //If not found it displays an error
154 public void searchSeries(Scanner Scan, ArrayList<SeriesModel> seriesList) {
155     System.out.print("Enter the series id to search: ");
156     int searchId = Scan.nextInt();
157     Scan.nextLine();
158 
159     boolean found = false;
160     /*
```



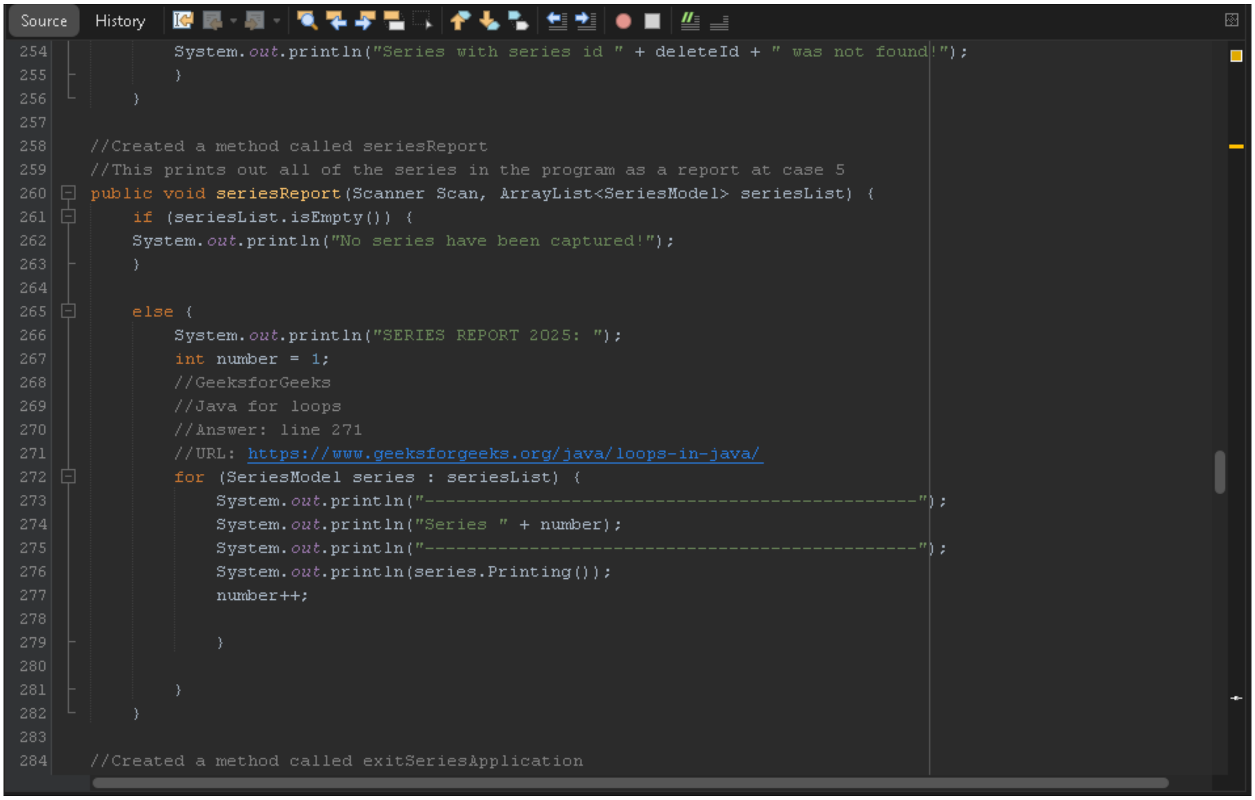
```
161     GeeksforGeeks
162     //Java for loops
163     //Answer: line 166
164     URL: https://www.geeksforgeeks.org/java/loops-in-java/
165     */
166     for (SeriesModel series : seriesList) {
167         if (series.getSeriesId() == searchId) {
168             System.out.println("Found the Series!");
169             System.out.println("------------------");
170             System.out.println(series.Printing());
171             found = true;
172             break;
173             }
174         }
175         if (!found) {
176             System.out.println("Series with series id: " + searchId + " was not found!");
177         }
178 
179     }
180 
181 // Created a method called updateSeries
182 //This allows the user to update the series details at case 3
183 //The user must first enter the series id and the system will verify if its already created
184 public void updateSeries(Scanner Scan, ArrayList<SeriesModel> seriesList) {
185     System.out.print("Enter the series id to update: ");
186     int updateId = Scan.nextInt();
187     Scan.nextLine();
188     boolean updated = false;
189 
190     for (SeriesModel series : seriesList) {
191         if (series.getSeriesId() == updateId) {
```



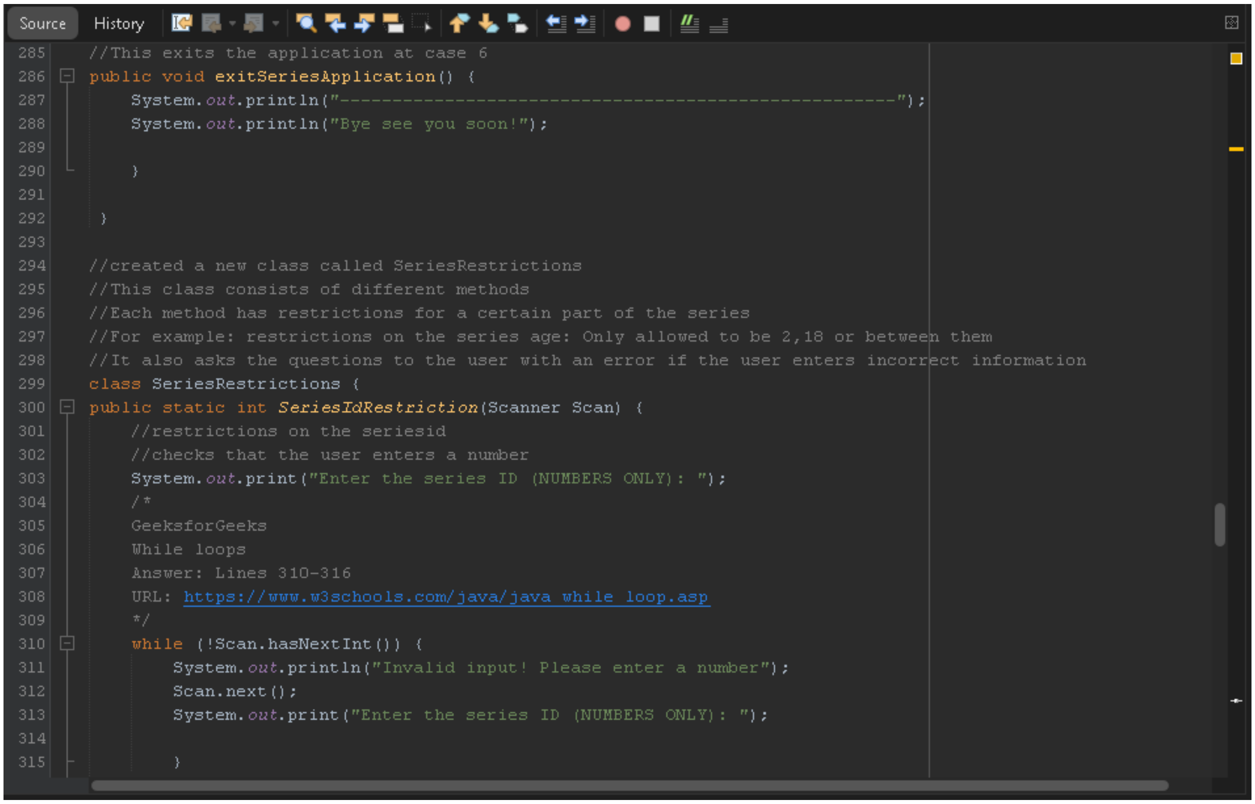
```
192                 updated = true;
193                 System.out.println("Found the series! Current details:");
194                 System.out.println(series.Printing());
195                 //fetch the series restrictions from the seriesrestrictions class
196                 /*
197                 Stack Overflow
198                 Question: How to call a method in another class in java?
199                 Answer: Line 202 as an example
200                 URL: https://stackoverflow.com/questions/4593232/how-to-call-a-method-in-another-class-in-java
201                 */
202                 String newName = SeriesRestrictions.SeriesNameRestrictions(Scan);
203                 int newAge = SeriesRestrictions.SeriesAgeRestrictions(Scan);
204                 int newEpisodes = SeriesRestrictions.SeriesEpisodesRestrictions(Scan);
205 
206                 series.setSeriesName(newName);
207                 series.setSeriesAge(newAge);
208                 series.setSeriesNumberOfEpisodes(newEpisodes);
209 
210                 System.out.println("Series successfully updated!");
211                 break;
212                 }
213             }
214         if (!updated) {
215             System.out.println("Series with series id " + updateId + " was not found!");
216             }
217         }
218 
219     //Created a method called deleteSeries
220     //This allows the user to delete a series at case 4
221     //The user must first enter the series id and the system will verify if its already created
222     public void deleteSeries(Scanner Scan, ArrayList<SeriesModel> seriesList) {
```



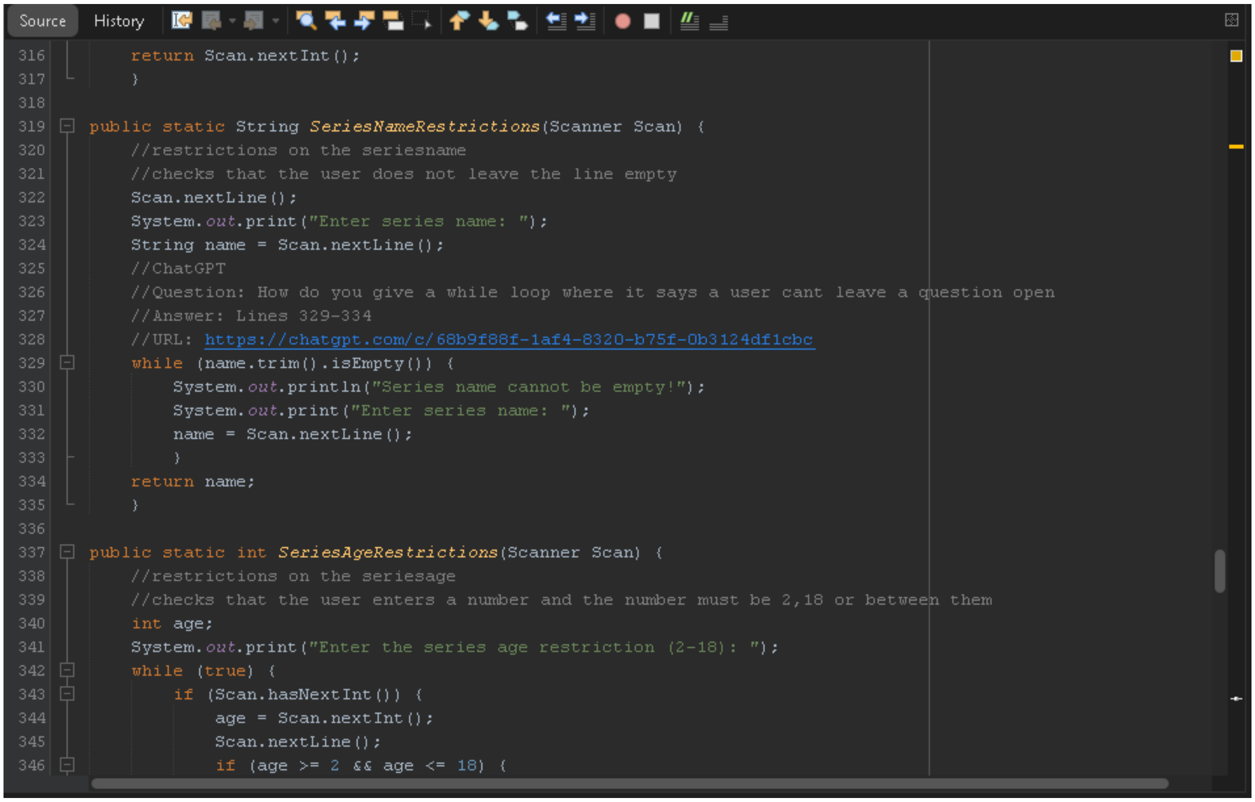
```
223         System.out.print("Enter the series id to delete: ");
224         int deleteId = Scan.nextInt();
225         Scan.nextLine();
226         boolean found = false;
227         /*
228         GeeksforGeeks
229         Java for loops
230         Answer: line 233
231         URL: https://www.geeksforgeeks.org/java/loops-in-java/
232         */
233         for (int i = 0; i < seriesList.size(); i++) {
234             if (seriesList.get(i).getSeriesId() == deleteId) {
235                 found = true;
236                 System.out.println("Series found!");
237                 System.out.println(seriesList.get(i).Printing());
238                 System.out.println("Are you sure you want to delete series " + deleteId + "? Yes (y) to delete.
239                 String confirmation = Scan.nextLine();
240 
241                 if (confirmation.equalsIgnoreCase("y")) {
242                     seriesList.remove(i);
243                     System.out.println("Series with series id " + deleteId + " WAS deleted!");
244                     }
245 
246                 else {
247                     System.out.println("Delete cancelled!");
248                     }
249                 break;
250                 }
251             }
252 
253         if (!found) {
```



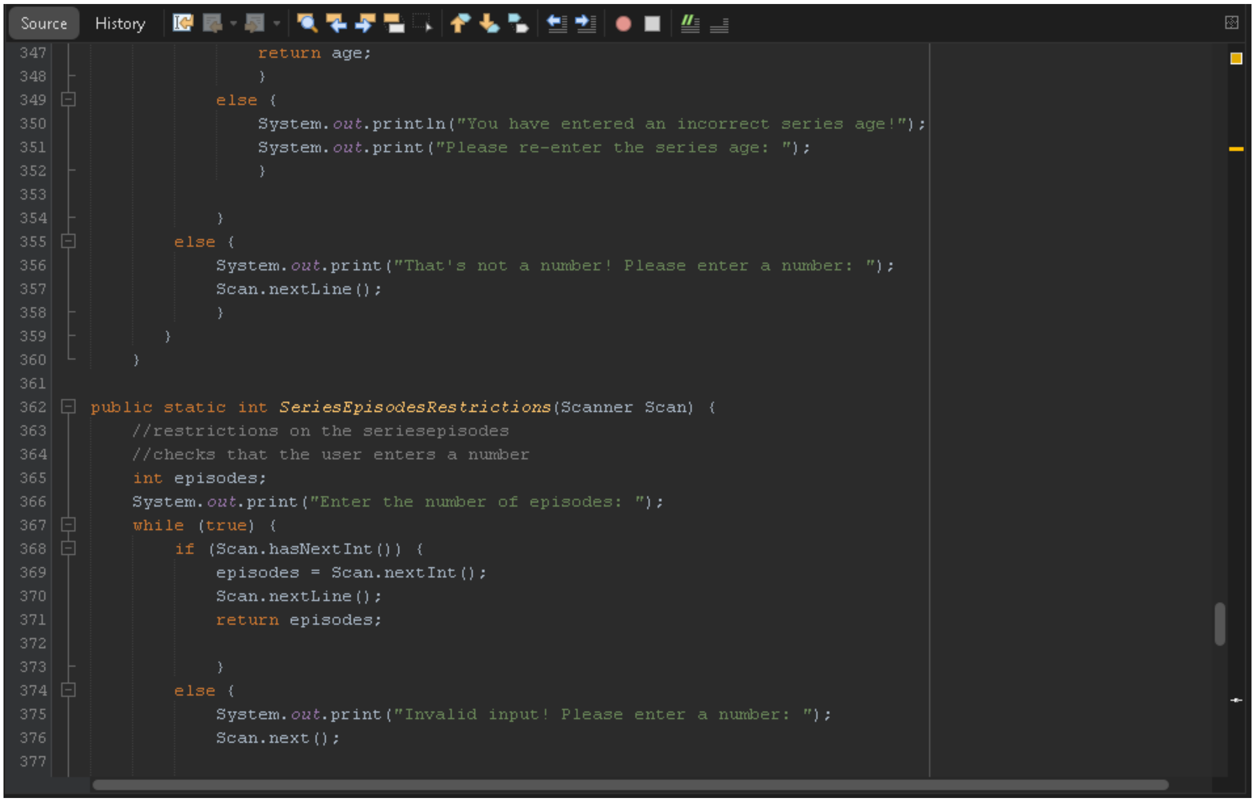
```
254          System.out.println("Series with series id " + deleteId + " was not found!");
255          }
256      }
257
258  //Created a method called seriesReport
259  //This prints out all of the series in the program as a report at case 5
260  public void seriesReport(Scanner Scan, ArrayList<SeriesModel> seriesList) {
261      if (seriesList.isEmpty()) {
262      System.out.println("No series have been captured!");
263      }
264
265      else {
266          System.out.println("SERIES REPORT 2025: ");
267          int number = 1;
268          //GeeksforGeeks
269          //Java for loops
270          //Answer: line 271
271          //URL: https://www.geeksforgeeks.org/java/loops-in-java/
272          for (SeriesModel series : seriesList) {
273              System.out.println("-----------------------------------------------");
274              System.out.println("Series " + number);
275              System.out.println("-----------------------------------------------");
276              System.out.println(series.Printing());
277              number++;
278
279              }
280
281          }
282      }
283
284  //Created a method called exitSeriesApplication
```



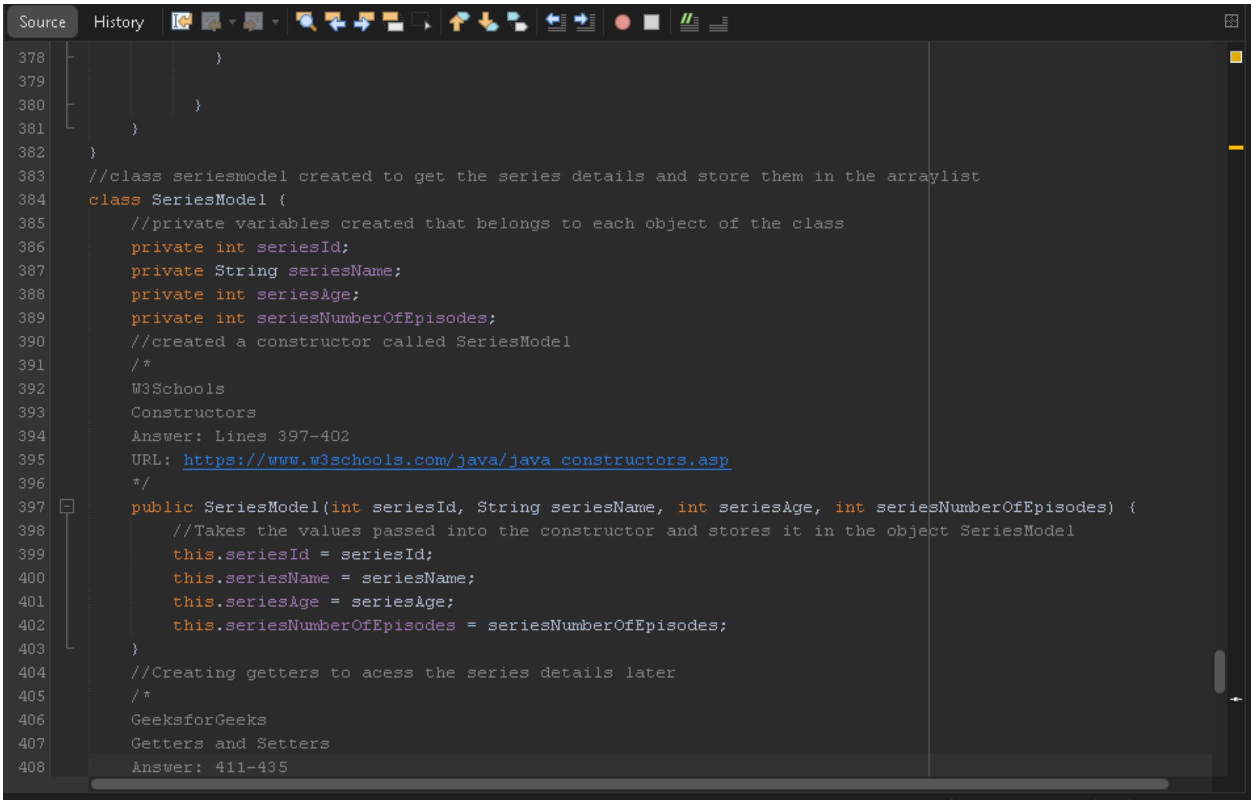
```
285  //This exits the application at case 6
286  public void exitSeriesApplication() {
287      System.out.println("-----------------------------------------------------");
288      System.out.println("Bye see you soon!");
289
290      }
291
292   }
293
294  //created a new class called SeriesRestrictions
295  //This class consists of different methods
296  //Each method has restrictions for a certain part of the series
297  //For example: restrictions on the series age: Only allowed to be 2,18 or between them
298  //It also asks the questions to the user with an error if the user enters incorrect information
299  class SeriesRestrictions {
300  public static int SeriesIdRestriction(Scanner Scan) {
301      //restrictions on the seriesid
302      //checks that the user enters a number
303      System.out.print("Enter the series ID (NUMBERS ONLY): ");
304      /*
305      GeeksforGeeks
306      While loops
307      Answer: Lines 310-316
308      URL: https://www.w3schools.com/java/java_while_loop.asp
309      */
310      while (!Scan.hasNextInt()) {
311          System.out.println("Invalid input! Please enter a number");
312          Scan.next();
313          System.out.print("Enter the series ID (NUMBERS ONLY): ");
314
315          }
```



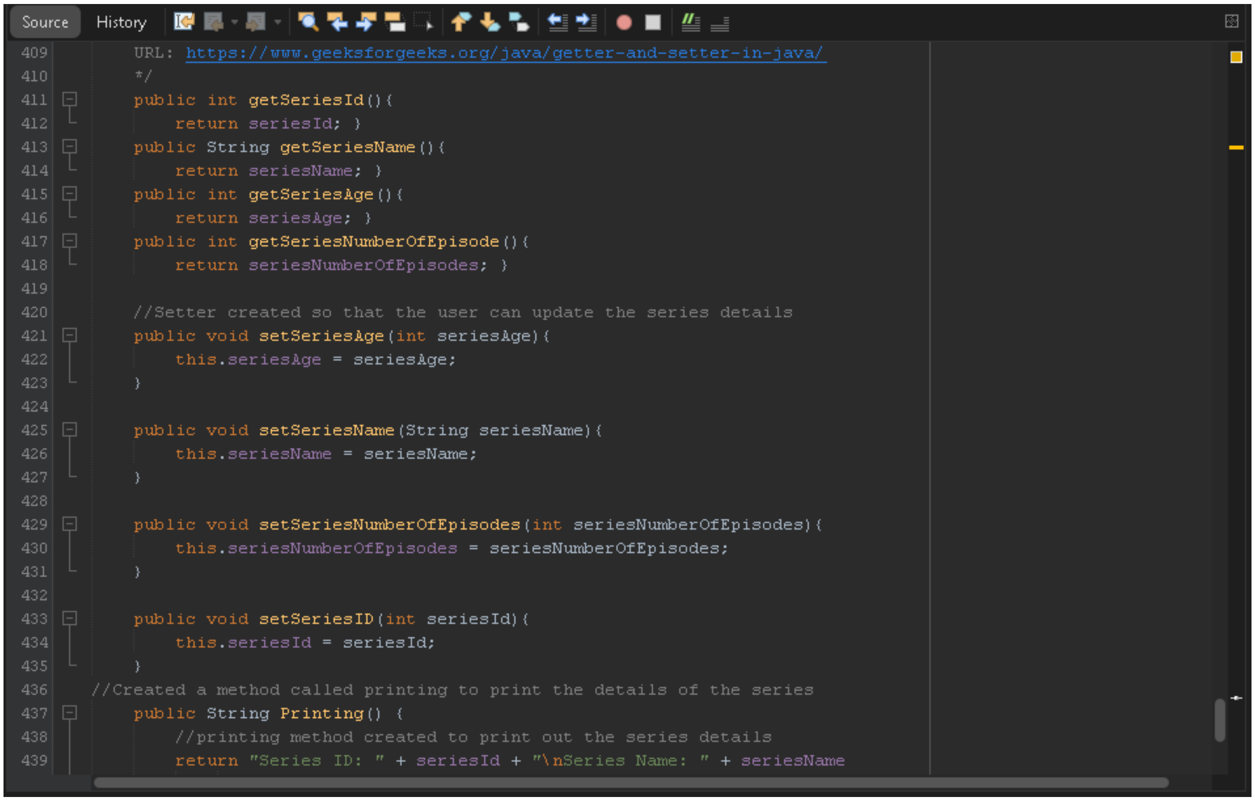
```
316         return Scan.nextInt();
317     }
318 
319     public static String SeriesNameRestrictions(Scanner Scan) {
320         //restrictions on the seriesname
321         //checks that the user does not leave the line empty
322         Scan.nextLine();
323         System.out.print("Enter series name: ");
324         String name = Scan.nextLine();
325         //ChatGPT
326         //Question: How do you give a while loop where it says a user cant leave a question open
327         //Answer: Lines 329-334
328         //URL: https://chatgpt.com/c/68b9f88f-1af4-8320-b75f-0b3124df1cbc
329         while (name.trim().isEmpty()) {
330             System.out.println("Series name cannot be empty!");
331             System.out.print("Enter series name: ");
332             name = Scan.nextLine();
333         }
334         return name;
335     }
336 
337     public static int SeriesAgeRestrictions(Scanner Scan) {
338         //restrictions on the seriesage
339         //checks that the user enters a number and the number must be 2,18 or between them
340         int age;
341         System.out.print("Enter the series age restriction (2-18): ");
342         while (true) {
343             if (Scan.hasNextInt()) {
344                 age = Scan.nextInt();
345                 Scan.nextLine();
346                 if (age >= 2 && age <= 18) {
```



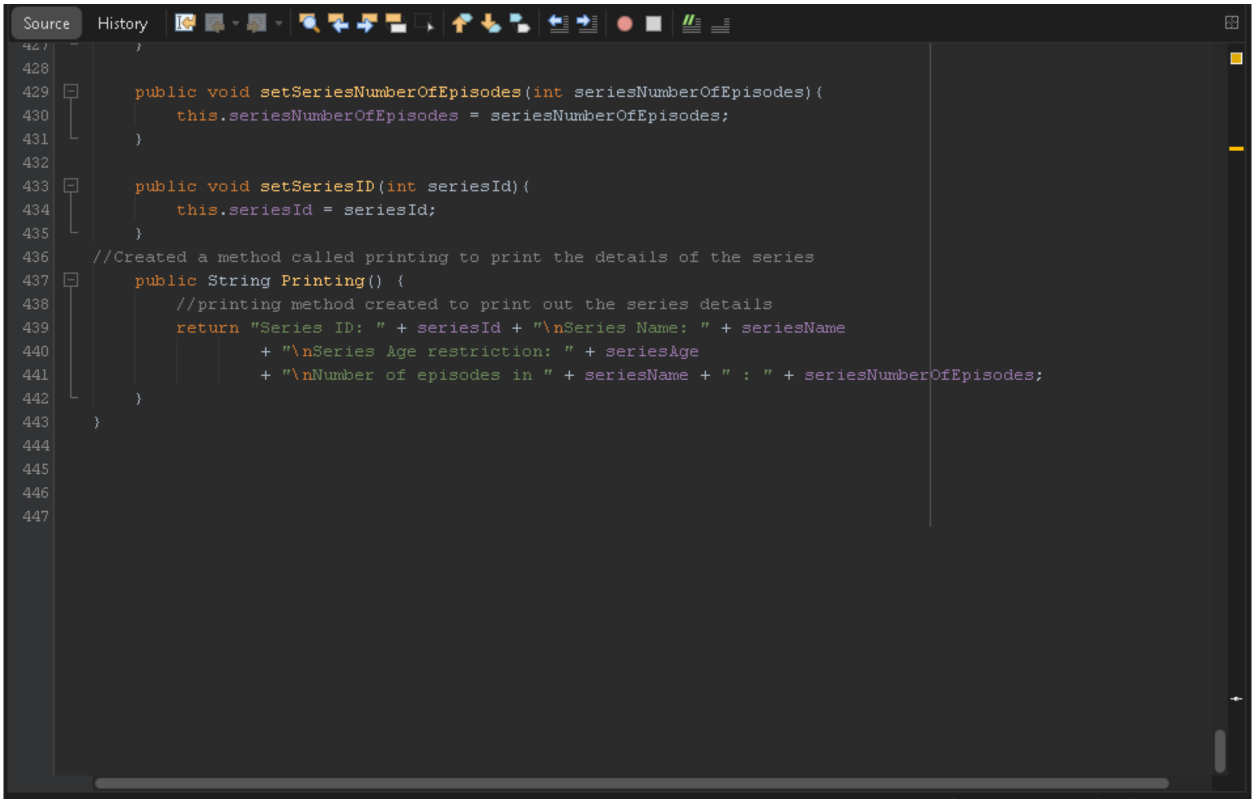
```
347                     return age;
348                 }
349                 else {
350                     System.out.println("You have entered an incorrect series age!");
351                     System.out.print("Please re-enter the series age: ");
352                 }
353 
354             }
355             else {
356                 System.out.print("That's not a number! Please enter a number: ");
357                 Scan.nextLine();
358             }
359         }
360     }
361 
362     public static int SeriesEpisodesRestrictions(Scanner Scan) {
363         //restrictions on the seriesepisodes
364         //checks that the user enters a number
365         int episodes;
366         System.out.print("Enter the number of episodes: ");
367         while (true) {
368             if (Scan.hasNextInt()) {
369                 episodes = Scan.nextInt();
370                 Scan.nextLine();
371                 return episodes;
372 
373             }
374             else {
375                 System.out.print("Invalid input! Please enter a number: ");
376                 Scan.next();
377 
```



```
378                 }
379 
380                }
381         }
382 }
383 //class seriesmodel created to get the series details and store them in the arraylist
384 class SeriesModel {
385     //private variables created that belongs to each object of the class
386     private int seriesId;
387     private String seriesName;
388     private int seriesAge;
389     private int seriesNumberOfEpisodes;
390     //created a constructor called SeriesModel
391     /*
392     W3Schools
393     Constructors
394     Answer: Lines 397-402
395     URL: https://www.w3schools.com/java/java_constructors.asp
396     */
397     public SeriesModel(int seriesId, String seriesName, int seriesAge, int seriesNumberOfEpisodes) {
398         //Takes the values passed into the constructor and stores it in the object SeriesModel
399         this.seriesId = seriesId;
400         this.seriesName = seriesName;
401         this.seriesAge = seriesAge;
402         this.seriesNumberOfEpisodes = seriesNumberOfEpisodes;
403     }
404     //Creating getters to acess the series details later
405     /*
406     GeeksforGeeks
407     Getters and Setters
408     Answer: 411-435
```

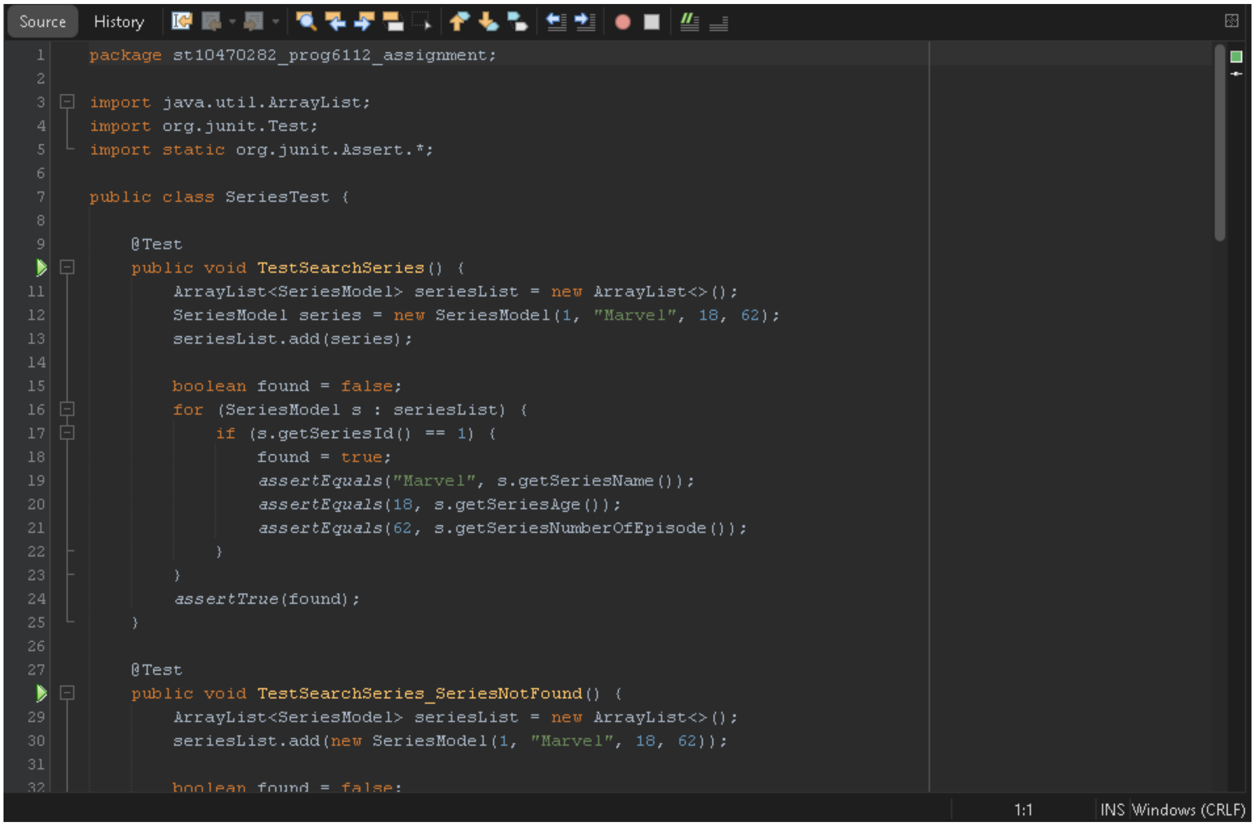


```
409     URL: https://www.geeksforgeeks.org/java/getter-and-setter-in-java/
410     */
411     public int getSeriesId(){
412         return seriesId; }
413     public String getSeriesName(){
414         return seriesName; }
415     public int getSeriesAge(){
416         return seriesAge; }
417     public int getSeriesNumberOfEpisode(){
418         return seriesNumberOfEpisodes; }
419 
420     //Setter created so that the user can update the series details
421     public void setSeriesAge(int seriesAge){
422         this.seriesAge = seriesAge;
423     }
424 
425     public void setSeriesName(String seriesName){
426         this.seriesName = seriesName;
427     }
428 
429     public void setSeriesNumberOfEpisodes(int seriesNumberOfEpisodes){
430         this.seriesNumberOfEpisodes = seriesNumberOfEpisodes;
431     }
432 
433     public void setSeriesID(int seriesId){
434         this.seriesId = seriesId;
435     }
436 //Created a method called printing to print the details of the series
437     public String Printing() {
438         //printing method created to print out the series details
439         return "Series ID: " + seriesId + "\nSeries Name: " + seriesName
```

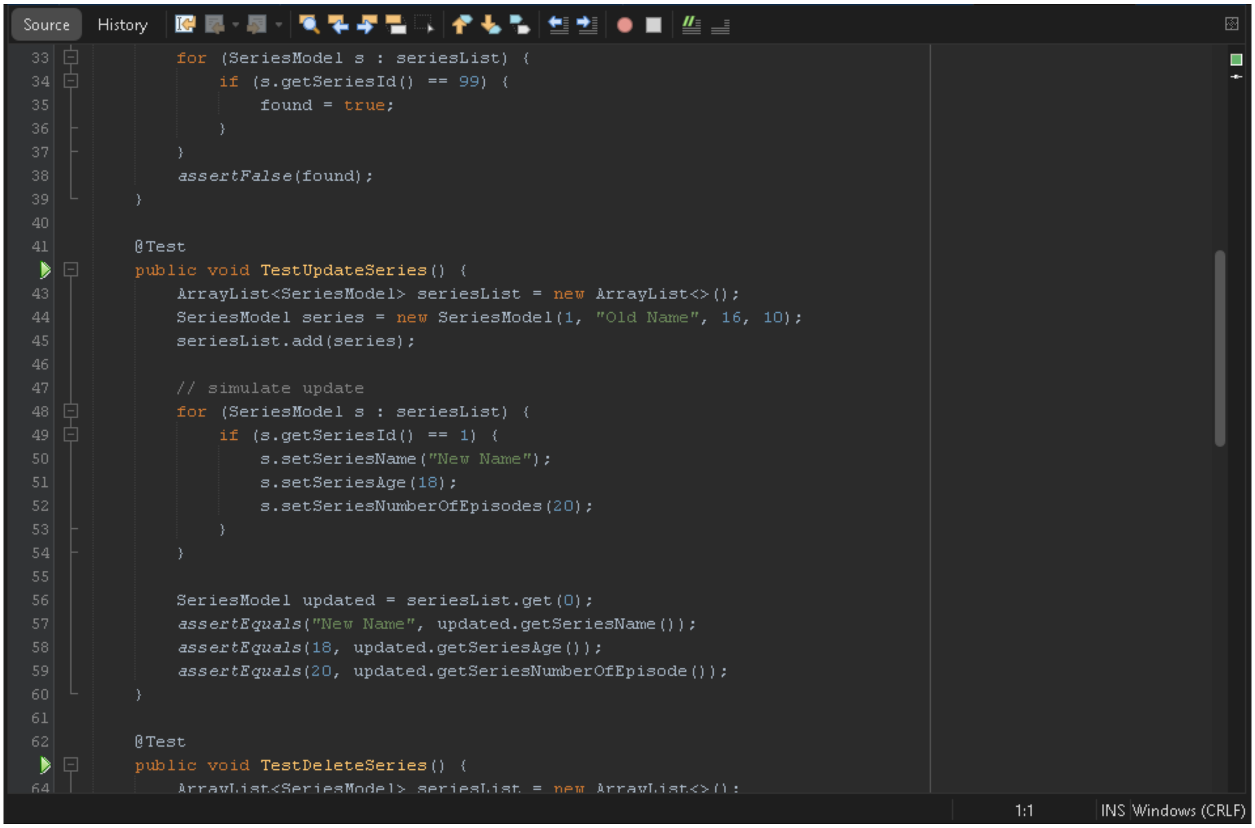


```
    }

    public void setSeriesNumberOfEpisodes(int seriesNumberOfEpisodes){
        this.seriesNumberOfEpisodes = seriesNumberOfEpisodes;
    }

    public void setSeriesID(int seriesId){
        this.seriesId = seriesId;
    }
//Created a method called printing to print the details of the series
    public String Printing() {
        //printing method created to print out the series details
        return "Series ID: " + seriesId + "\nSeries Name: " + seriesName
                + "\nSeries Age restriction: " + seriesAge
                + "\nNumber of episodes in " + seriesName + " : " + seriesNumberOfEpisodes;
    }
}
```

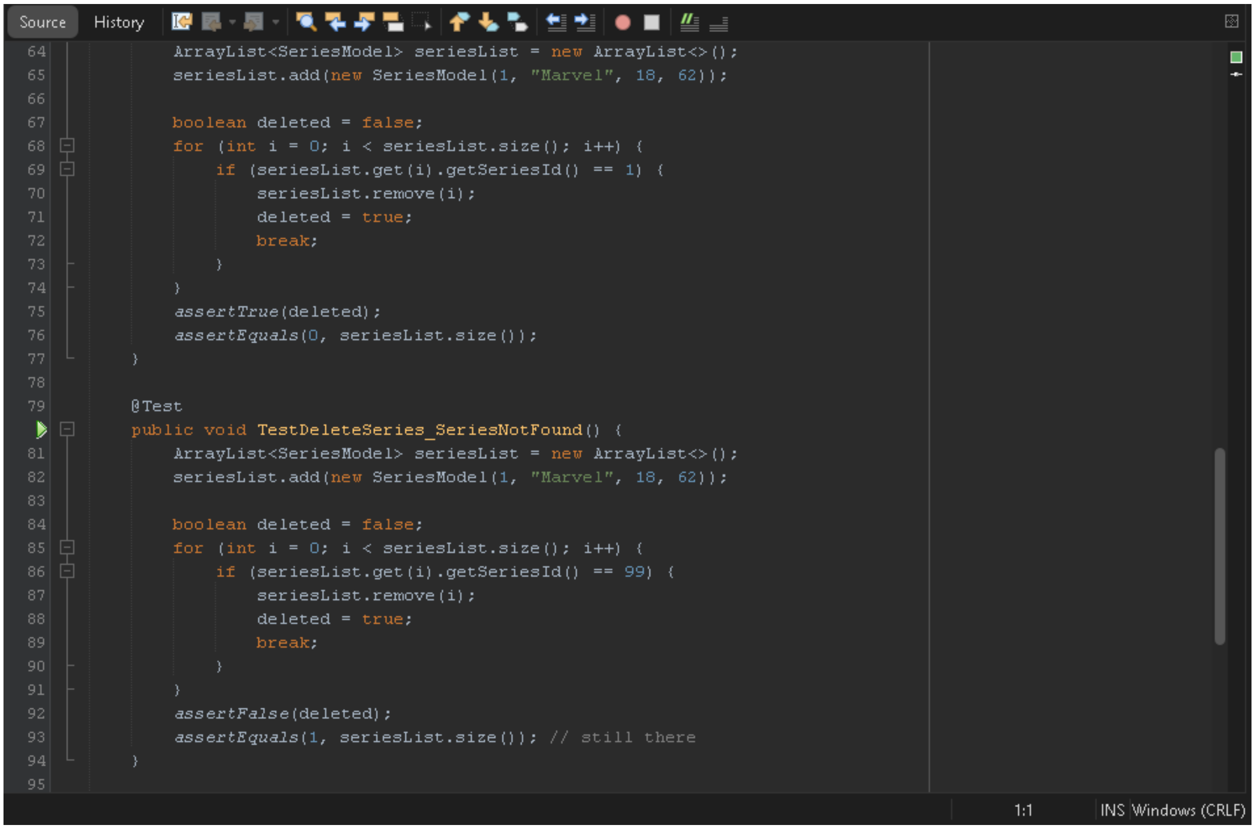
Unit Test for Question 1:



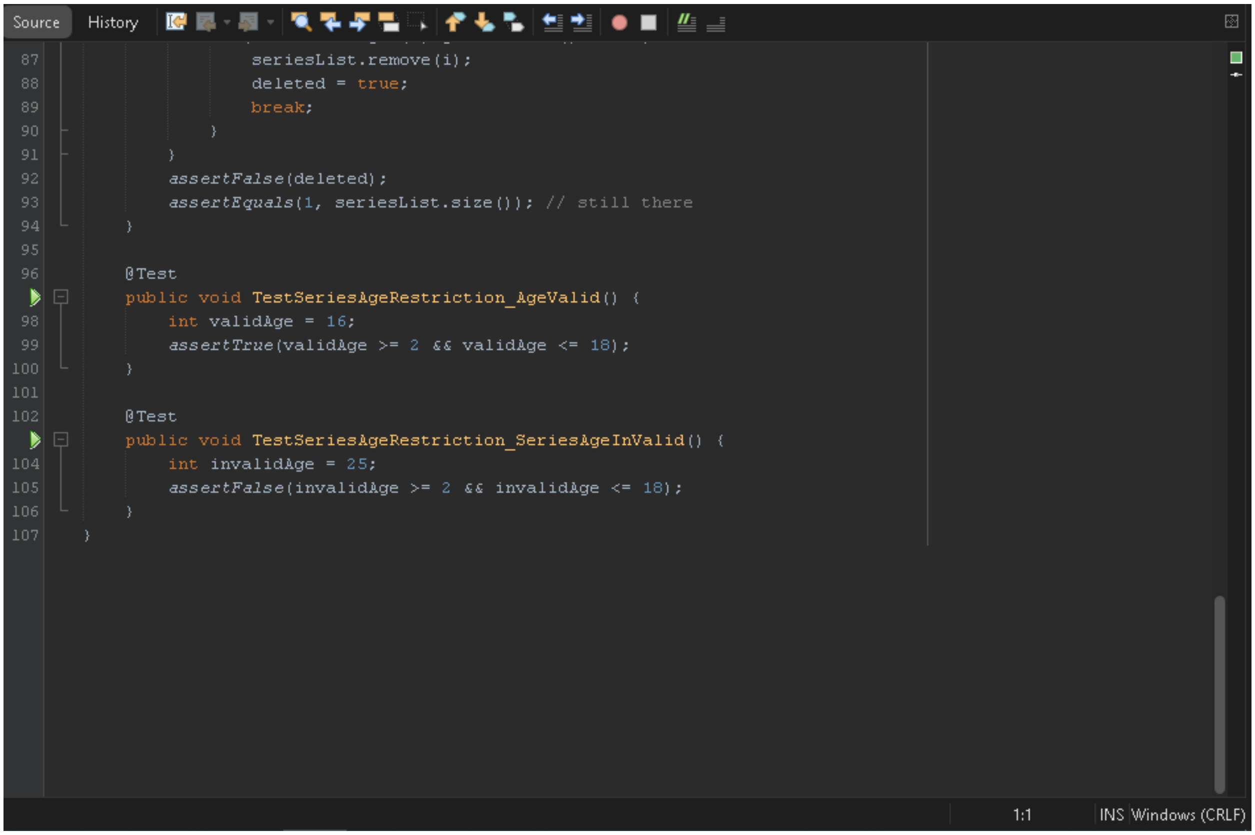
```java
package st10470282_prog6112_assignment;

import java.util.ArrayList;
import org.junit.Test;
import static org.junit.Assert.*;

public class SeriesTest {

    @Test
    public void TestSearchSeries() {
        ArrayList<SeriesModel> seriesList = new ArrayList<>();
        SeriesModel series = new SeriesModel(1, "Marvel", 18, 62);
        seriesList.add(series);

        boolean found = false;
        for (SeriesModel s : seriesList) {
            if (s.getSeriesId() == 1) {
                found = true;
                assertEquals("Marvel", s.getSeriesName());
                assertEquals(18, s.getSeriesAge());
                assertEquals(62, s.getSeriesNumberOfEpisode());
            }
        }
        assertTrue(found);
    }

    @Test
    public void TestSearchSeries_SeriesNotFound() {
        ArrayList<SeriesModel> seriesList = new ArrayList<>();
        seriesList.add(new SeriesModel(1, "Marvel", 18, 62));

        boolean found = false;
```



```java
        for (SeriesModel s : seriesList) {
            if (s.getSeriesId() == 99) {
                found = true;
            }
        }
        assertFalse(found);
    }

    @Test
    public void TestUpdateSeries() {
        ArrayList<SeriesModel> seriesList = new ArrayList<>();
        SeriesModel series = new SeriesModel(1, "Old Name", 16, 10);
        seriesList.add(series);

        // simulate update
        for (SeriesModel s : seriesList) {
            if (s.getSeriesId() == 1) {
                s.setSeriesName("New Name");
                s.setSeriesAge(18);
                s.setSeriesNumberOfEpisodes(20);
            }
        }

        SeriesModel updated = seriesList.get(0);
        assertEquals("New Name", updated.getSeriesName());
        assertEquals(18, updated.getSeriesAge());
        assertEquals(20, updated.getSeriesNumberOfEpisode());
    }

    @Test
    public void TestDeleteSeries() {
        ArrayList<SeriesModel> seriesList = new ArrayList<>();
```

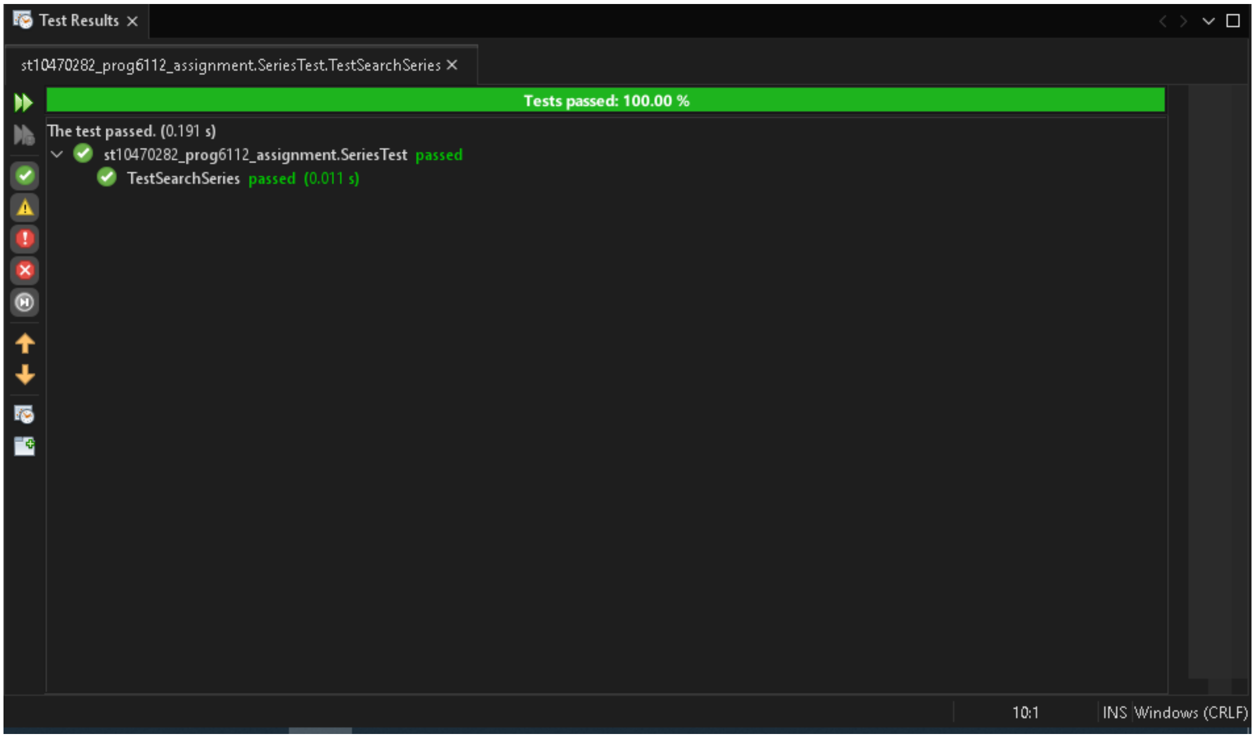


```java
        ArrayList<SeriesModel> seriesList = new ArrayList<>();
        seriesList.add(new SeriesModel(1, "Marvel", 18, 62));

        boolean deleted = false;
        for (int i = 0; i < seriesList.size(); i++) {
            if (seriesList.get(i).getSeriesId() == 1) {
                seriesList.remove(i);
                deleted = true;
                break;
            }
        }
        assertTrue(deleted);
        assertEquals(0, seriesList.size());
    }

    @Test
    public void TestDeleteSeries_SeriesNotFound() {
        ArrayList<SeriesModel> seriesList = new ArrayList<>();
        seriesList.add(new SeriesModel(1, "Marvel", 18, 62));

        boolean deleted = false;
        for (int i = 0; i < seriesList.size(); i++) {
            if (seriesList.get(i).getSeriesId() == 99) {
                seriesList.remove(i);
                deleted = true;
                break;
            }
        }
        assertFalse(deleted);
        assertEquals(1, seriesList.size()); // still there
    }

```

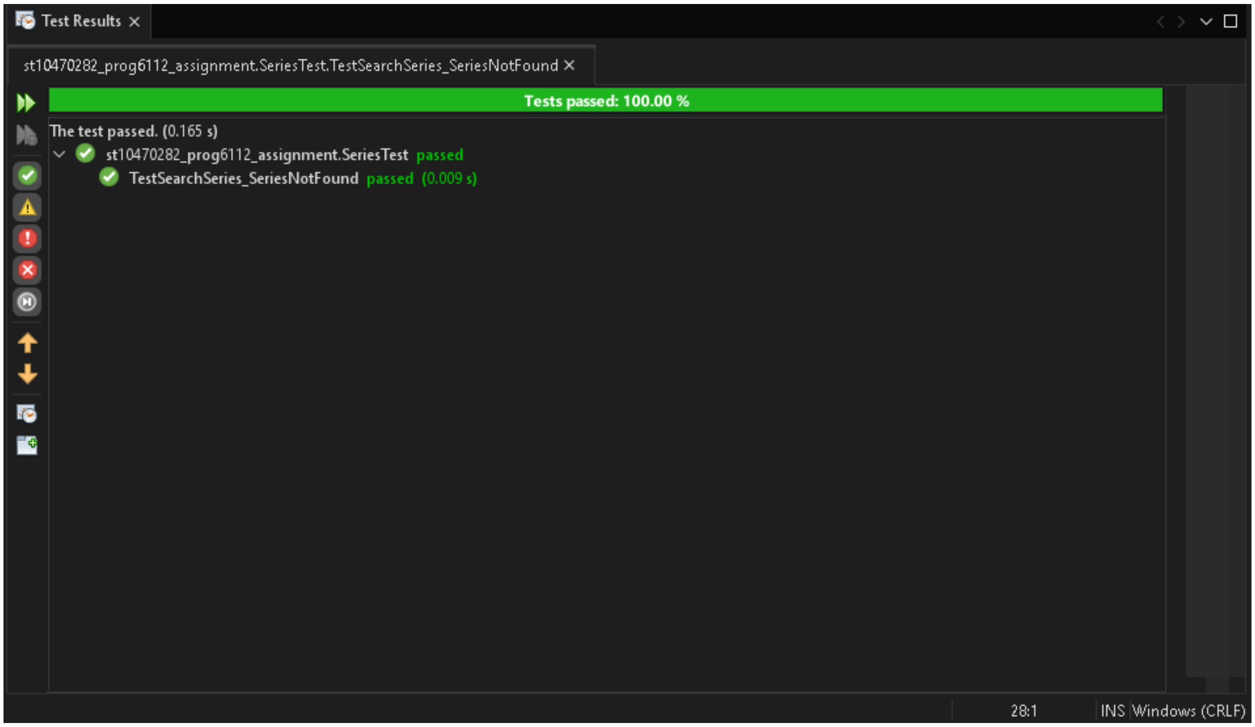


```java
                seriesList.remove(i);
                deleted = true;
                break;
            }
        }
        assertFalse(deleted);
        assertEquals(1, seriesList.size()); // still there
    }

    @Test
    public void TestSeriesAgeRestriction_AgeValid() {
        int validAge = 16;
        assertTrue(validAge >= 2 && validAge <= 18);
    }

    @Test
    public void TestSeriesAgeRestriction_SeriesAgeInValid() {
        int invalidAge = 25;
        assertFalse(invalidAge >= 2 && invalidAge <= 18);
    }
}
```

Test Results of the Unit Tests for Question 1:

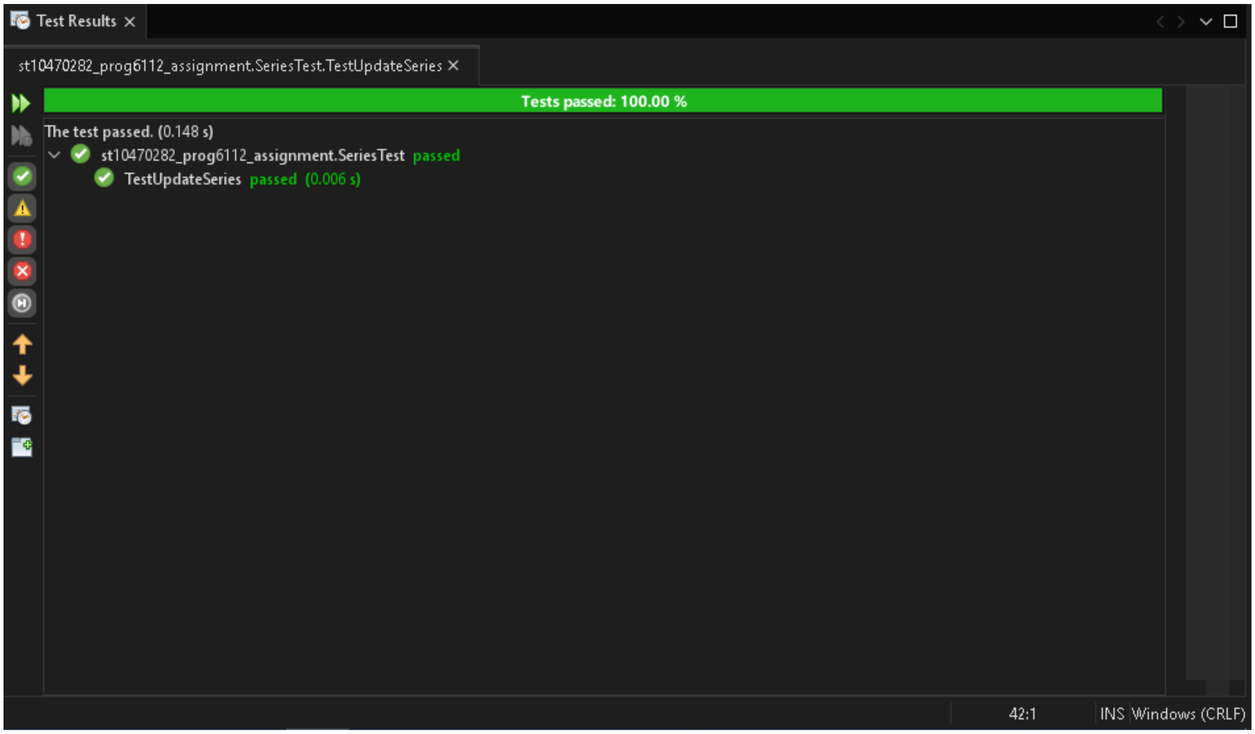


```
Tests passed: 100.00 %
The test passed. (0.191 s)
  st10470282_prog6112_assignment.SeriesTest passed
    TestSearchSeries passed (0.011 s)
```

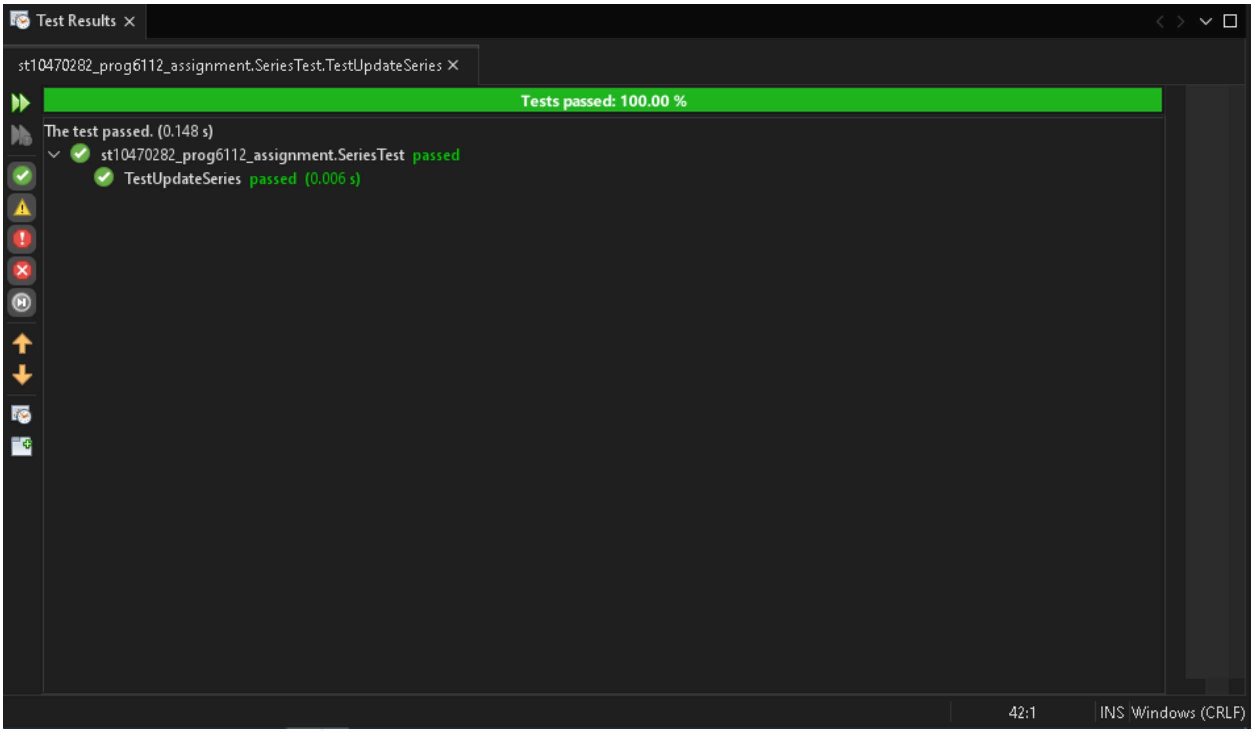


Test Results
st10470282_prog6112_assignment.SeriesTest.TestSearchSeries_SeriesNotFound
28:1
INS
Windows (CRLF)

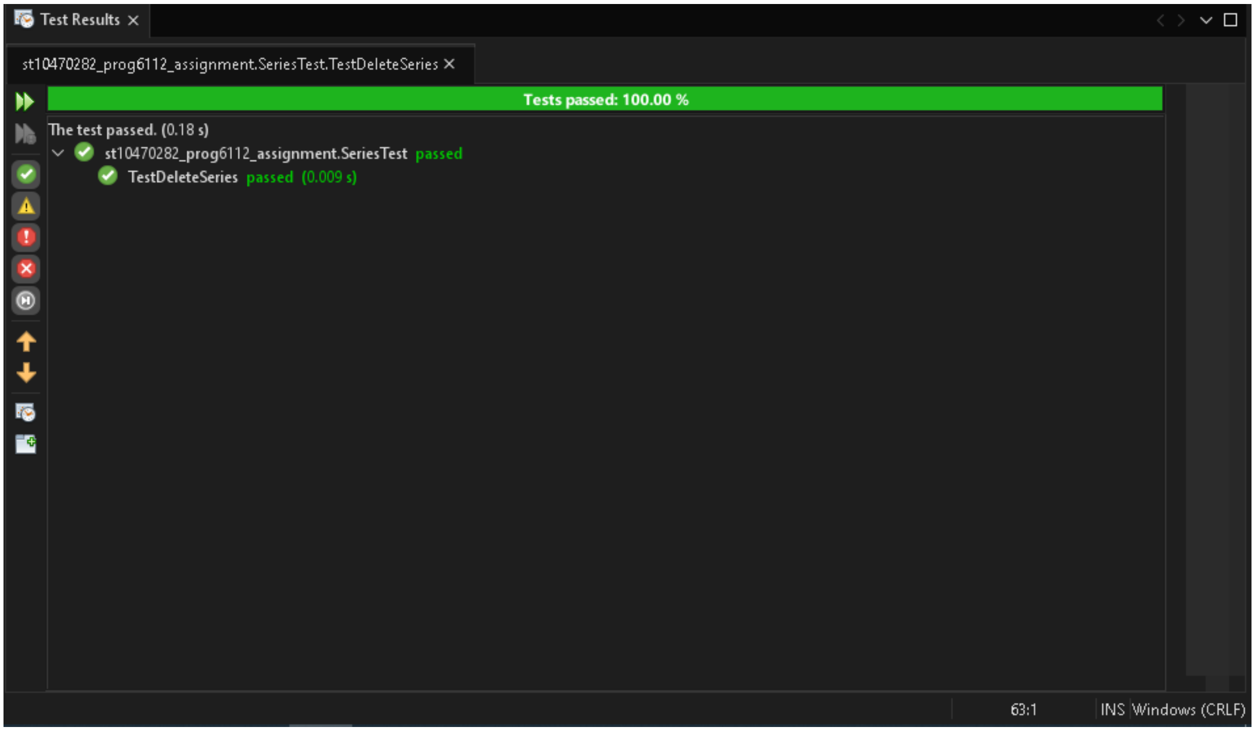
```
Tests passed: 100.00 %
The test passed. (0.165 s)
  st10470282_prog6112_assignment.SeriesTest passed
    TestSearchSeries_SeriesNotFound passed (0.009 s)
```



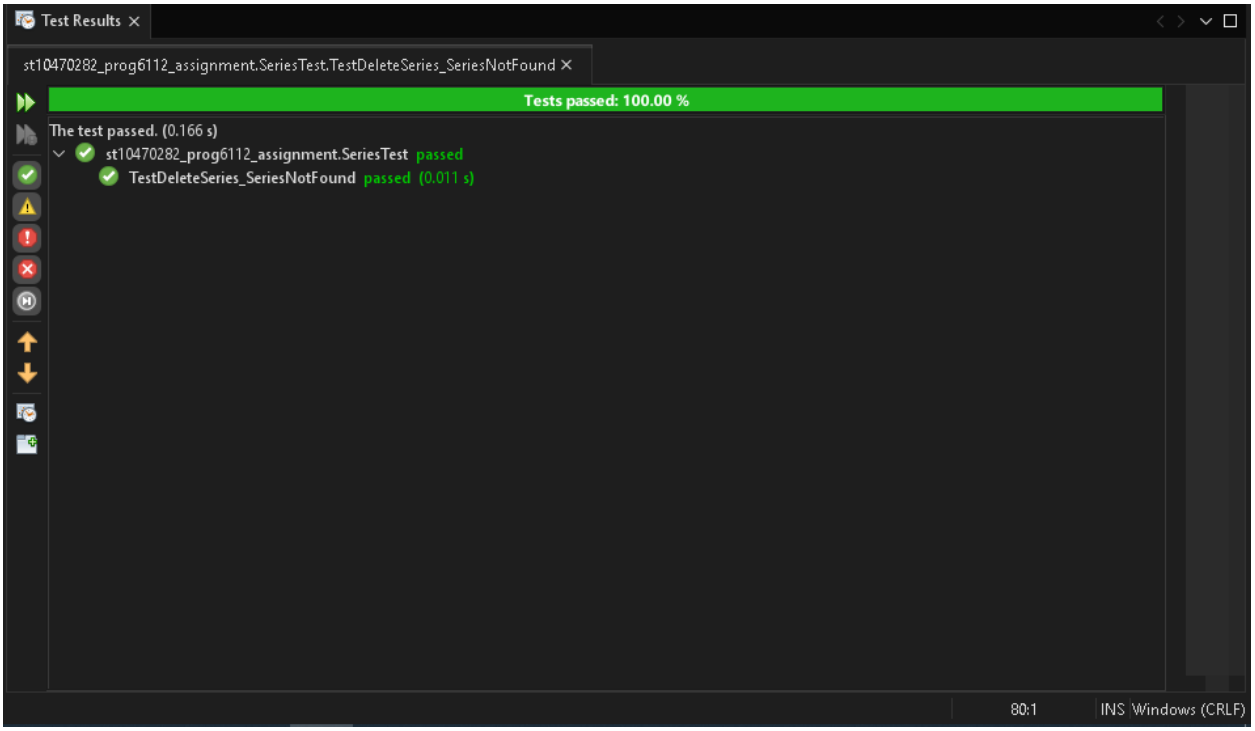
```
Tests passed: 100.00 %
The test passed. (0.148 s)
  st10470282_prog6112_assignment.SeriesTest passed
    TestUpdateSeries passed (0.006 s)
```



```
Tests passed: 100.00 %
The test passed. (0.148 s)
  st10470282_prog6112_assignment.SeriesTest passed
    TestUpdateSeries passed (0.006 s)
```

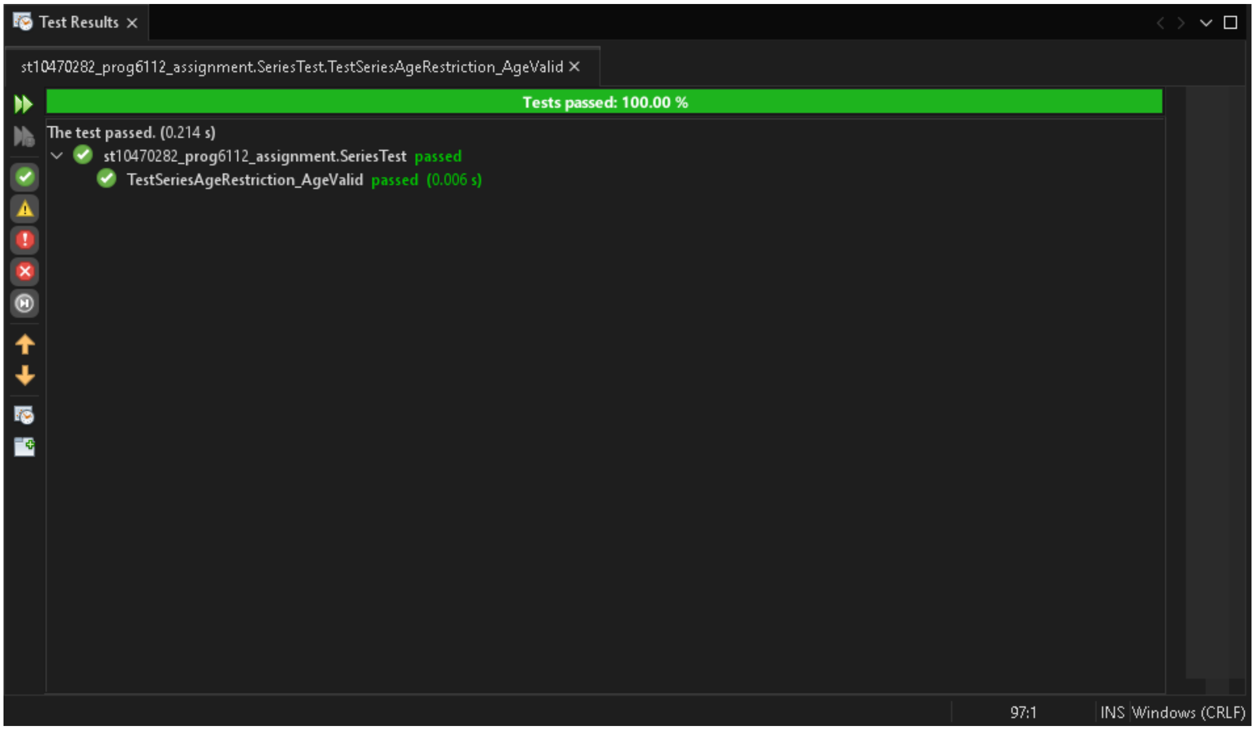


```
The test passed. (0.18 s)
  st10470282_prog6112_assignment.SeriesTest passed
    TestDeleteSeries passed (0.009 s)
```

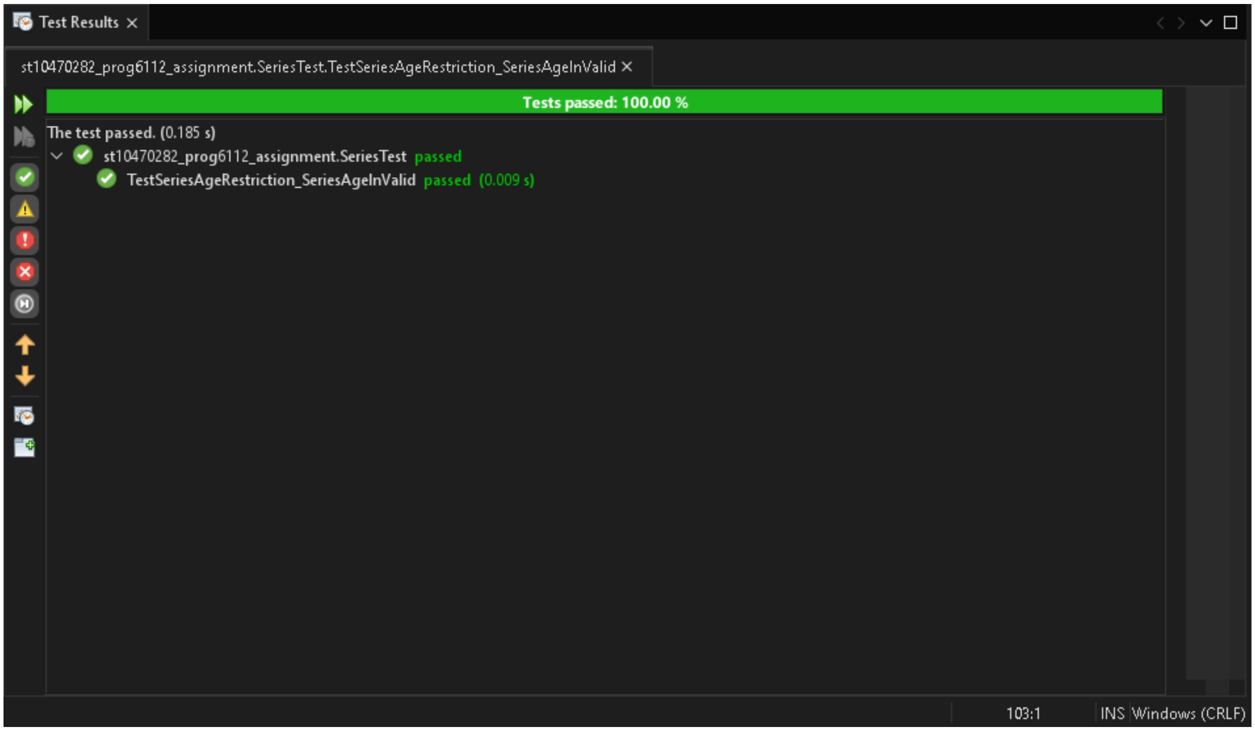


Test Results
st10470282_prog6112_assignment.SeriesTest.TestDeleteSeries_SeriesNotFound
Tests passed: 100.00 %
80:1
INS Windows (CRLF)

```
The test passed. (0.166 s)
  st10470282_prog6112_assignment.SeriesTest passed
    TestDeleteSeries_SeriesNotFound passed (0.011 s)
```

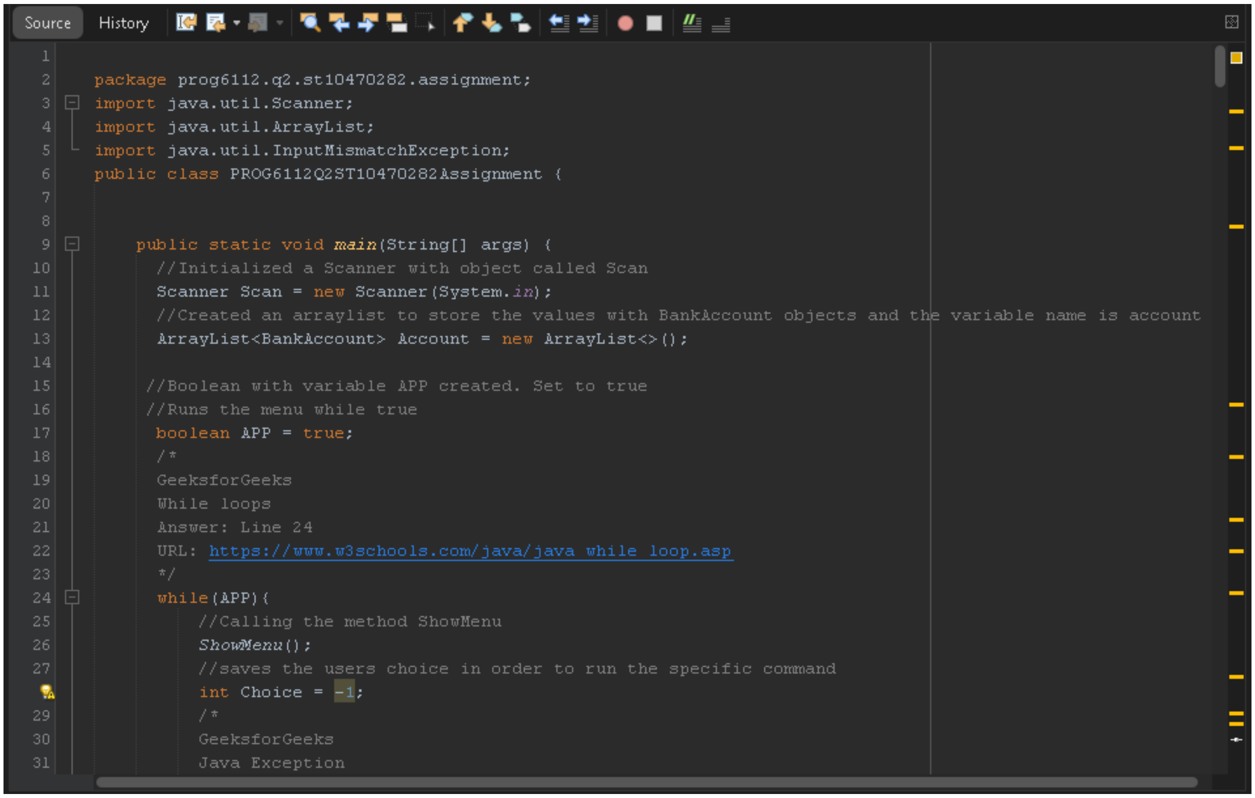

Test Results
st10470282_prog6112_assignment.SeriesTest.TestSeriesAgeRestriction_AgeValid
97:1
INS
Windows (CRLF)

```
Tests passed: 100.00 %
The test passed. (0.214 s)
  st10470282_prog6112_assignment.SeriesTest passed
    TestSeriesAgeRestriction_AgeValid passed (0.006 s)
```

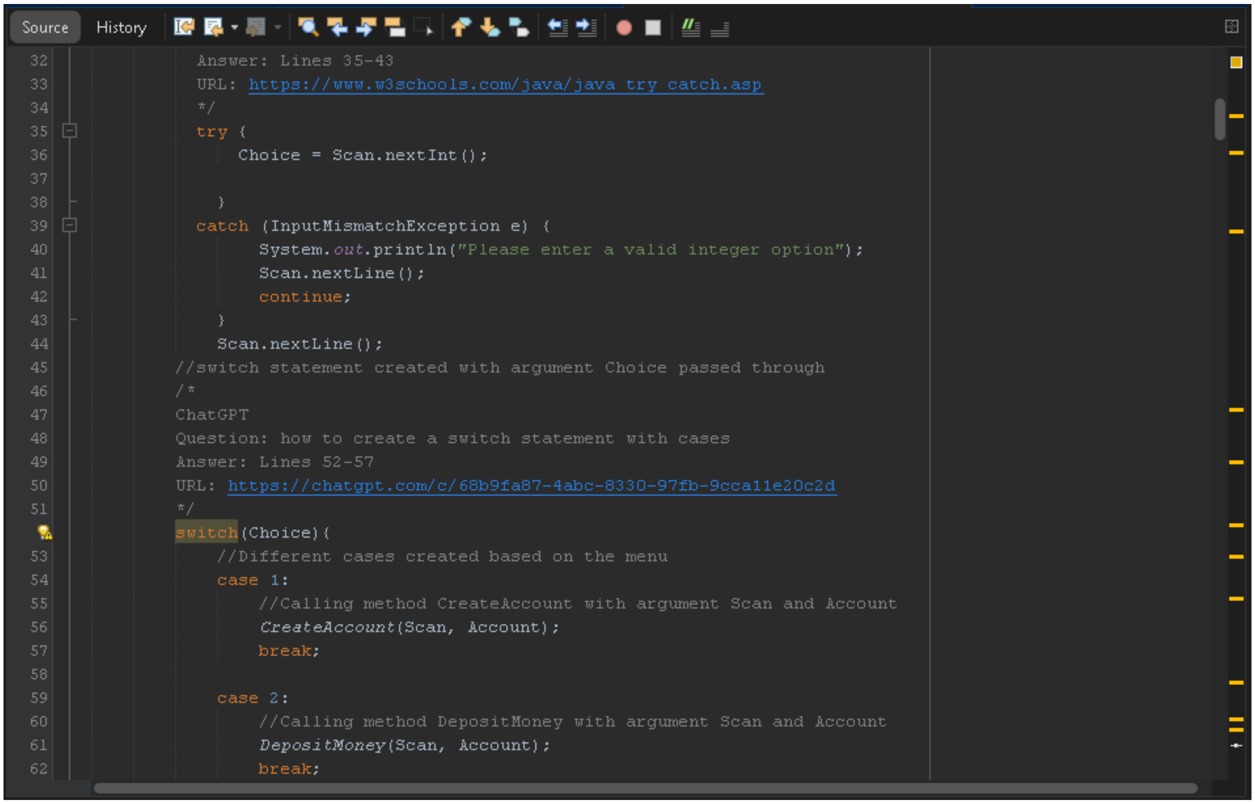

Test Results
st10470282_prog6112_assignment.SeriesTest.TestSeriesAgeRestriction_SeriesAgeInValid
103:1
INS
Windows (CRLF)

```
Tests passed: 100.00 %
The test passed. (0.185 s)
  st10470282_prog6112_assignment.SeriesTest passed
    TestSeriesAgeRestriction_SeriesAgeInValid passed (0.009 s)
```

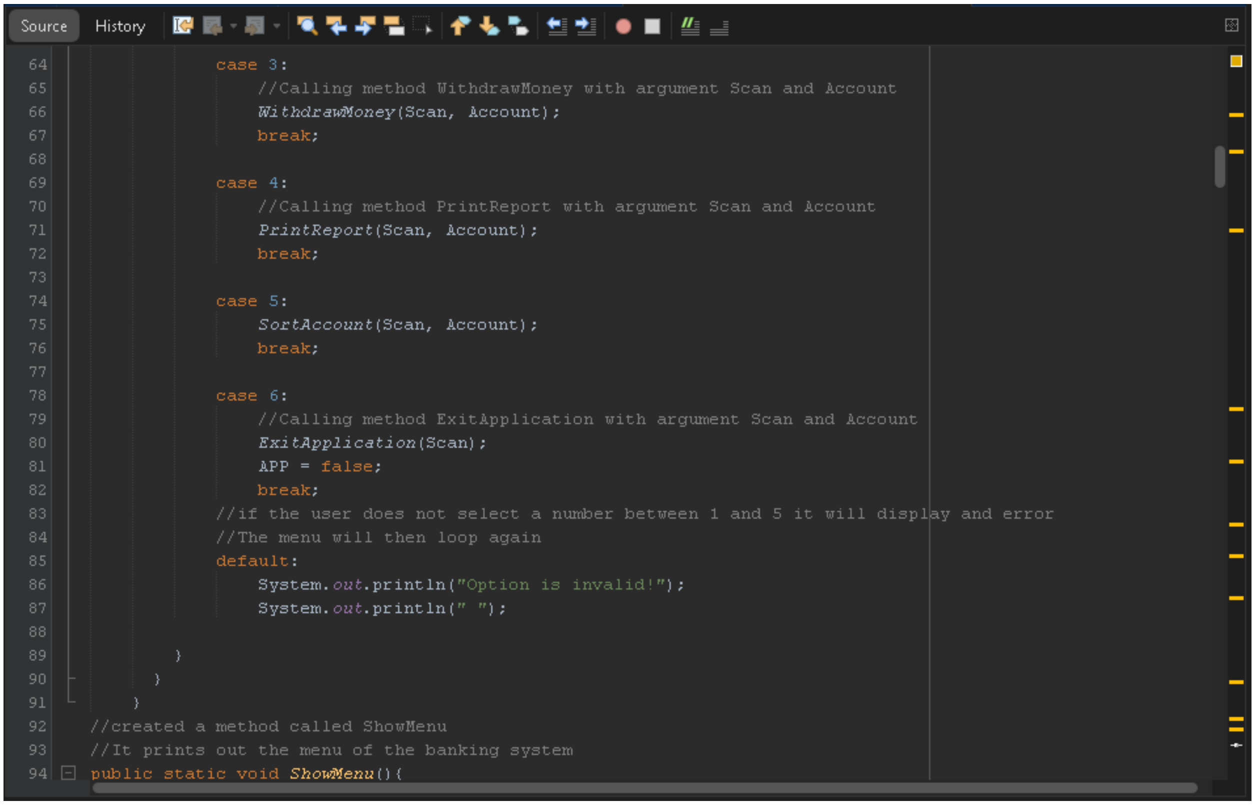
Question 2 Code:



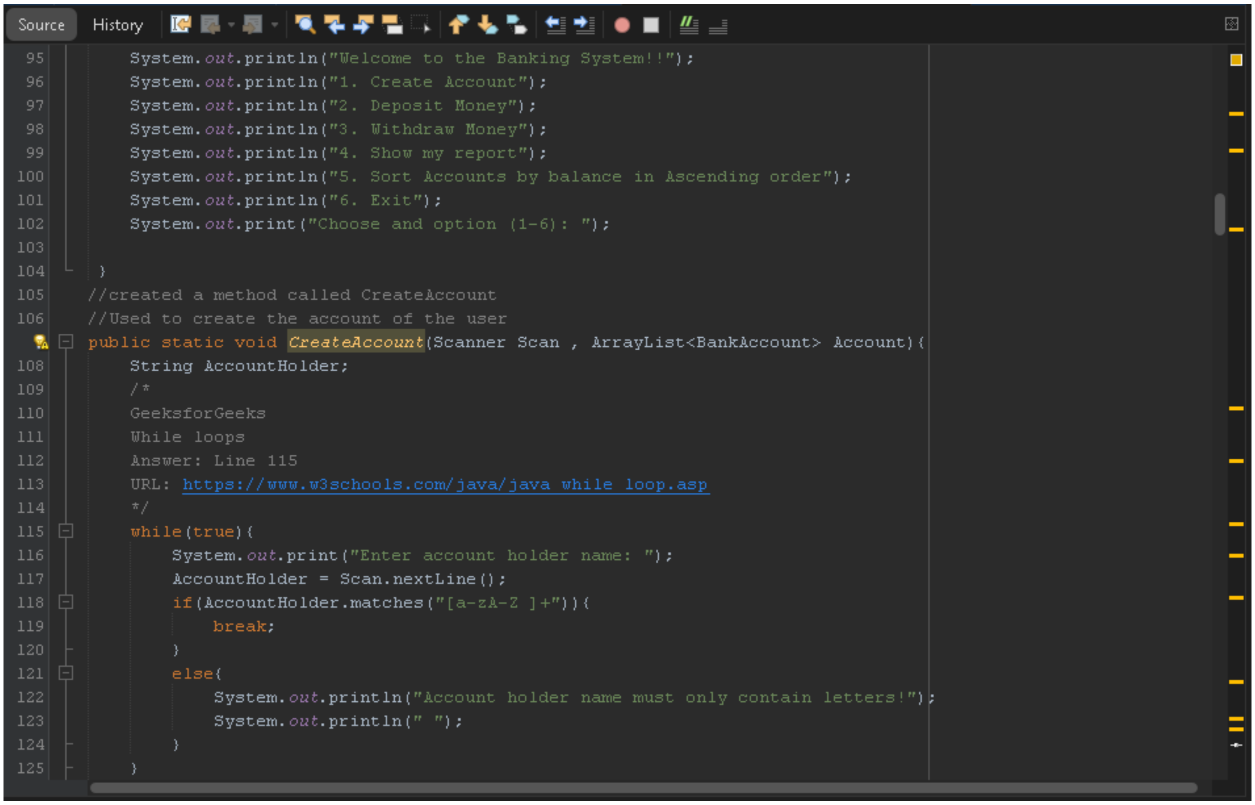
```
 1
 2  package prog6112.q2.st10470282.assignment;
 3  import java.util.Scanner;
 4  import java.util.ArrayList;
 5  import java.util.InputMismatchException;
 6  public class PROG6112Q2ST10470282Assignment {
 7
 8
 9      public static void main(String[] args) {
10        //Initialized a Scanner with object called Scan
11        Scanner Scan = new Scanner(System.in);
12        //Created an arraylist to store the values with BankAccount objects and the variable name is account
13        ArrayList<BankAccount> Account = new ArrayList<>();
14
15       //Boolean with variable APP created. Set to true
16       //Runs the menu while true
17        boolean APP = true;
18        /*
19        GeeksforGeeks
20        While loops
21        Answer: Line 24
22        URL: https://www.w3schools.com/java/java_while_loop.asp
23        */
24        while(APP){
25            //Calling the method ShowMenu
26            ShowMenu();
27            //saves the users choice in order to run the specific command
              int Choice = -1;
29            /*
30            GeeksforGeeks
31            Java Exception
```



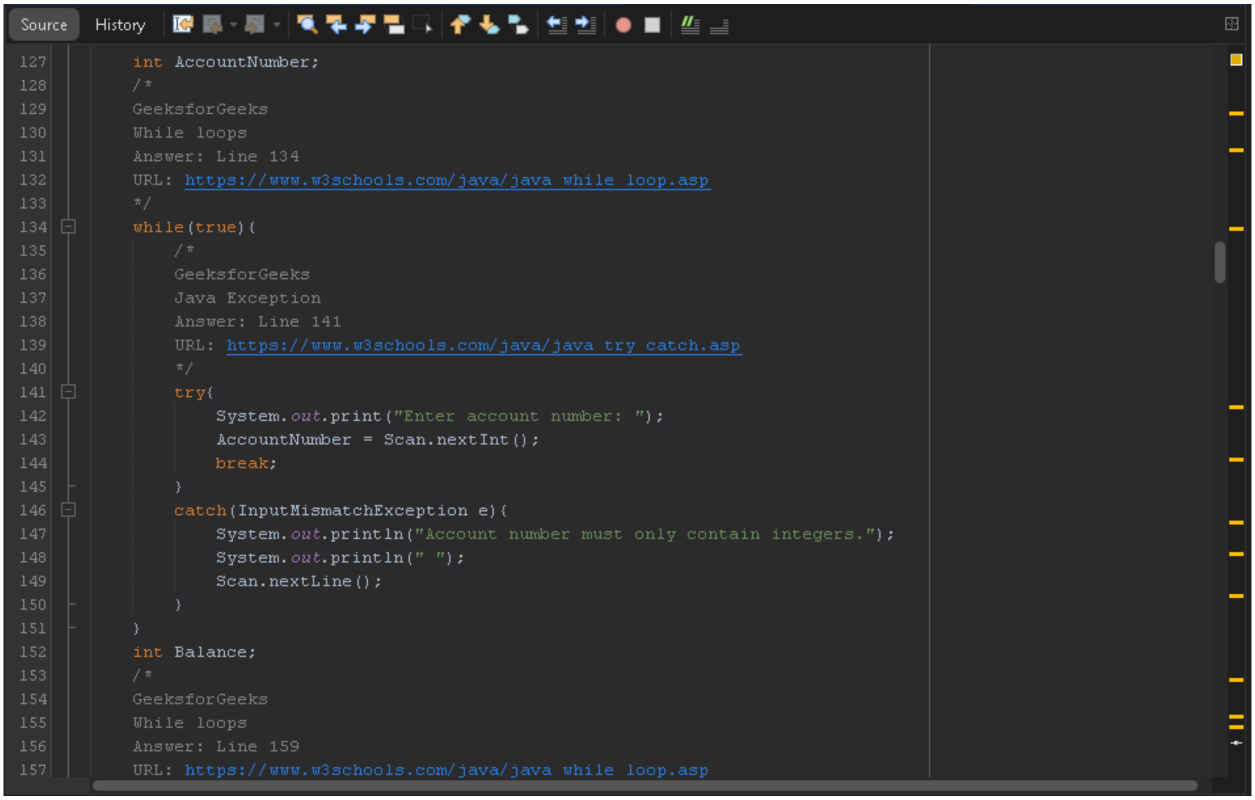
```
32            Answer: Lines 35-43
33            URL: https://www.w3schools.com/java/java_try_catch.asp
34            */
35            try {
36                Choice = Scan.nextInt();
37
38              }
39            catch (InputMismatchException e) {
40                  System.out.println("Please enter a valid integer option");
41                  Scan.nextLine();
42                  continue;
43              }
44              Scan.nextLine();
45          //switch statement created with argument Choice passed through
46          /*
47          ChatGPT
48          Question: how to create a switch statement with cases
49          Answer: Lines 52-57
50          URL: https://chatgpt.com/c/68b9fa87-4abc-8330-97fb-9cca11e20c2d
51          */
            switch(Choice){
53              //Different cases created based on the menu
54              case 1:
55                  //Calling method CreateAccount with argument Scan and Account
56                  CreateAccount(Scan, Account);
57                  break;
58
59              case 2:
60                  //Calling method DepositMoney with argument Scan and Account
61                  DepositMoney(Scan, Account);
62                  break;
```



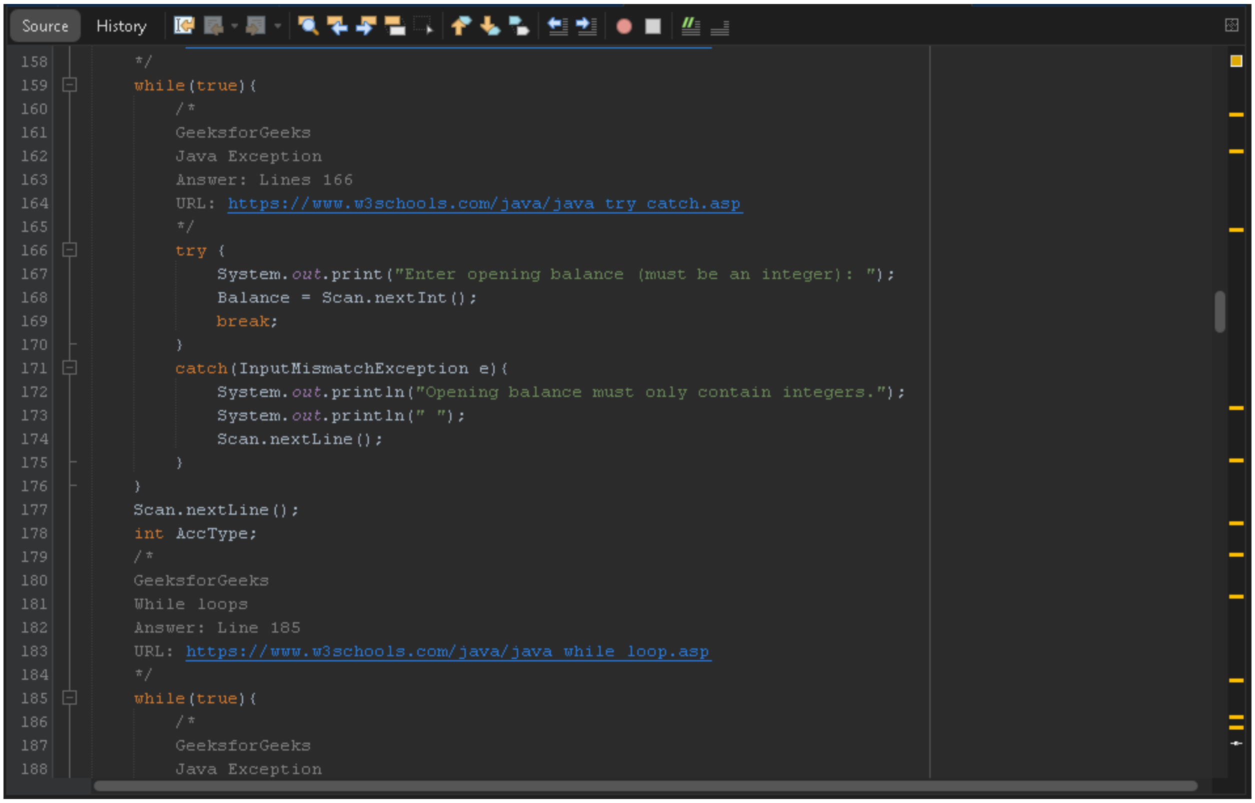
```
            case 3:
                //Calling method WithdrawMoney with argument Scan and Account
                WithdrawMoney(Scan, Account);
                break;

            case 4:
                //Calling method PrintReport with argument Scan and Account
                PrintReport(Scan, Account);
                break;

            case 5:
                SortAccount(Scan, Account);
                break;

            case 6:
                //Calling method ExitApplication with argument Scan and Account
                ExitApplication(Scan);
                APP = false;
                break;
            //if the user does not select a number between 1 and 5 it will display and error
            //The menu will then loop again
            default:
                System.out.println("Option is invalid!");
                System.out.println(" ");

        }
      }
    }
//created a method called ShowMenu
//It prints out the menu of the banking system
public static void ShowMenu(){
```



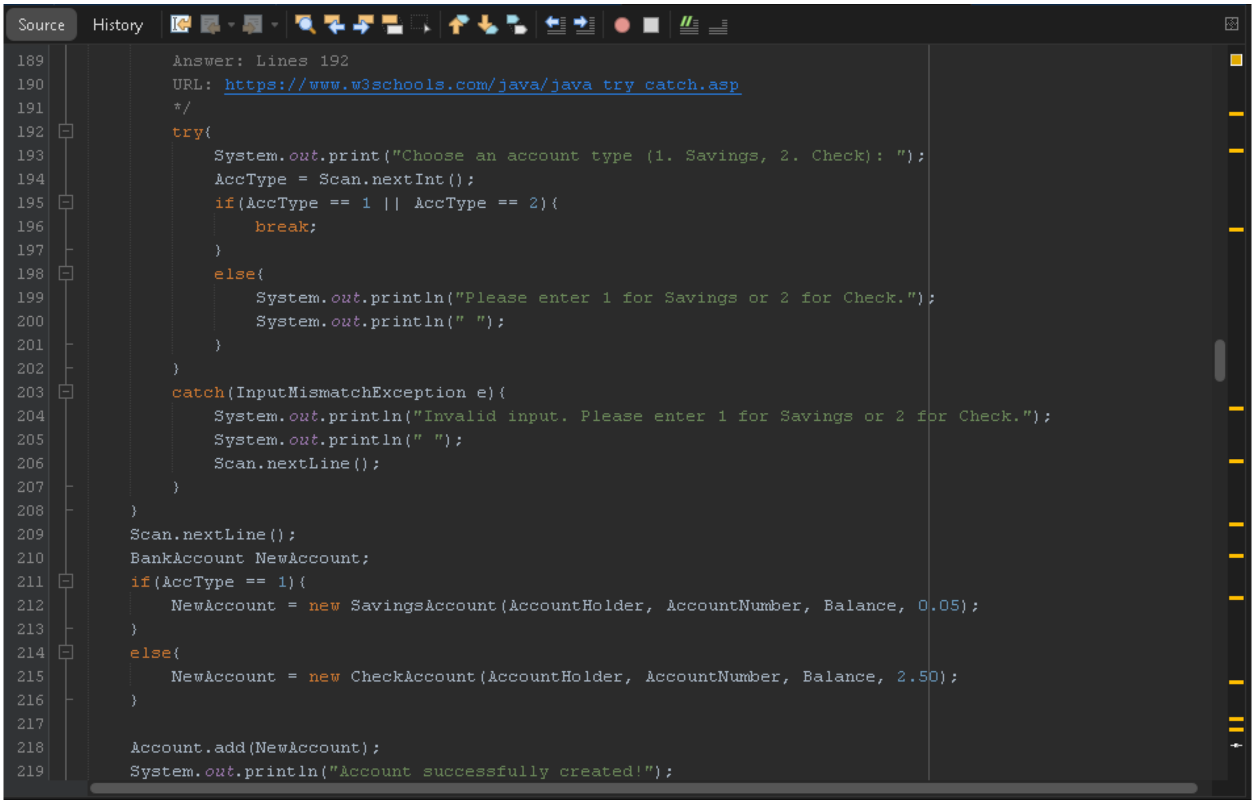
```
    System.out.println("Welcome to the Banking System!!");
    System.out.println("1. Create Account");
    System.out.println("2. Deposit Money");
    System.out.println("3. Withdraw Money");
    System.out.println("4. Show my report");
    System.out.println("5. Sort Accounts by balance in Ascending order");
    System.out.println("6. Exit");
    System.out.print("Choose and option (1-6): ");

 }
//created a method called CreateAccount
//Used to create the account of the user
public static void CreateAccount(Scanner Scan , ArrayList<BankAccount> Account){
    String AccountHolder;
    /*
    GeeksforGeeks
    While loops
    Answer: Line 115
    URL: https://www.w3schools.com/java/java_while_loop.asp
    */
    while(true){
        System.out.print("Enter account holder name: ");
        AccountHolder = Scan.nextLine();
        if(AccountHolder.matches("[a-zA-Z ]+")){
            break;
        }
        else{
            System.out.println("Account holder name must only contain letters!");
            System.out.println(" ");
        }
    }
```



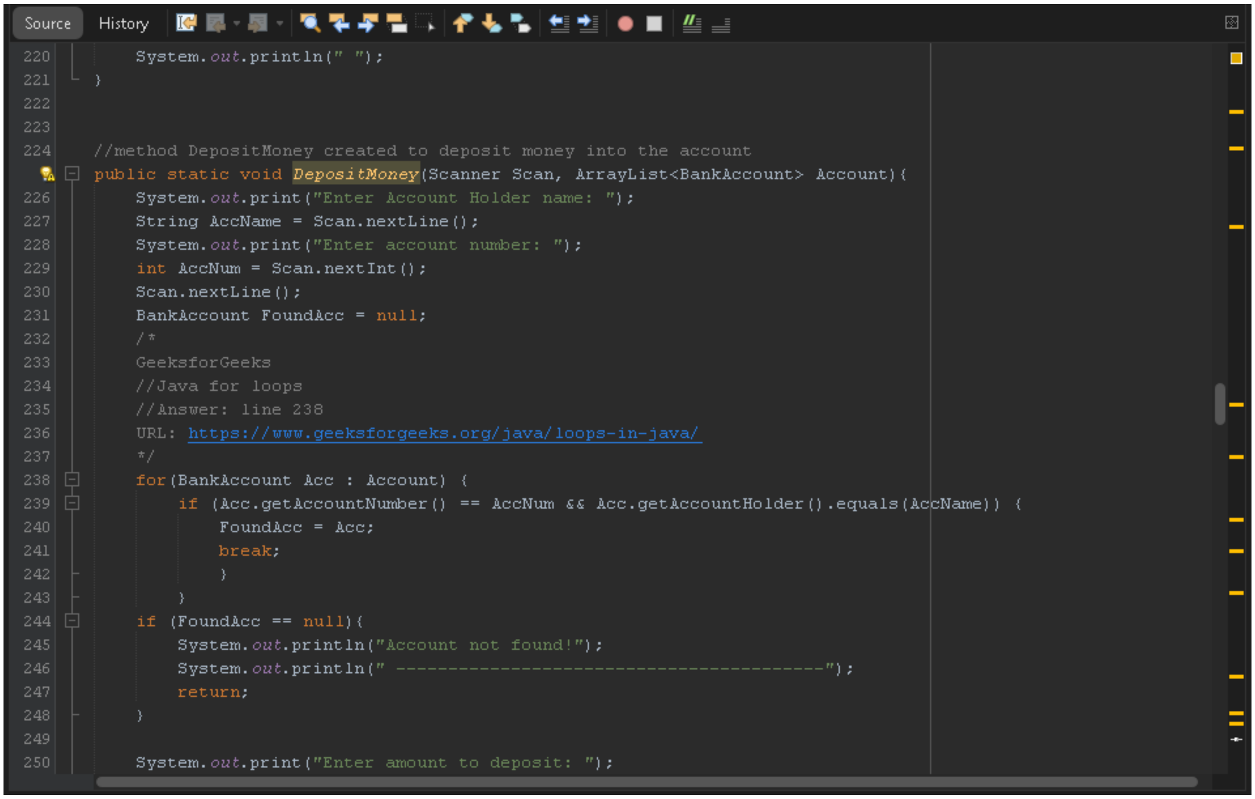
```
127         int AccountNumber;
128         /*
129         GeeksforGeeks
130         While loops
131         Answer: Line 134
132         URL: https://www.w3schools.com/java/java_while_loop.asp
133         */
134         while(true){
135             /*
136             GeeksforGeeks
137             Java Exception
138             Answer: Line 141
139             URL: https://www.w3schools.com/java/java_try_catch.asp
140             */
141             try{
142                 System.out.print("Enter account number: ");
143                 AccountNumber = Scan.nextInt();
144                 break;
145             }
146             catch(InputMismatchException e){
147                 System.out.println("Account number must only contain integers.");
148                 System.out.println(" ");
149                 Scan.nextLine();
150             }
151         }
152         int Balance;
153         /*
154         GeeksforGeeks
155         While loops
156         Answer: Line 159
157         URL: https://www.w3schools.com/java/java_while_loop.asp
```



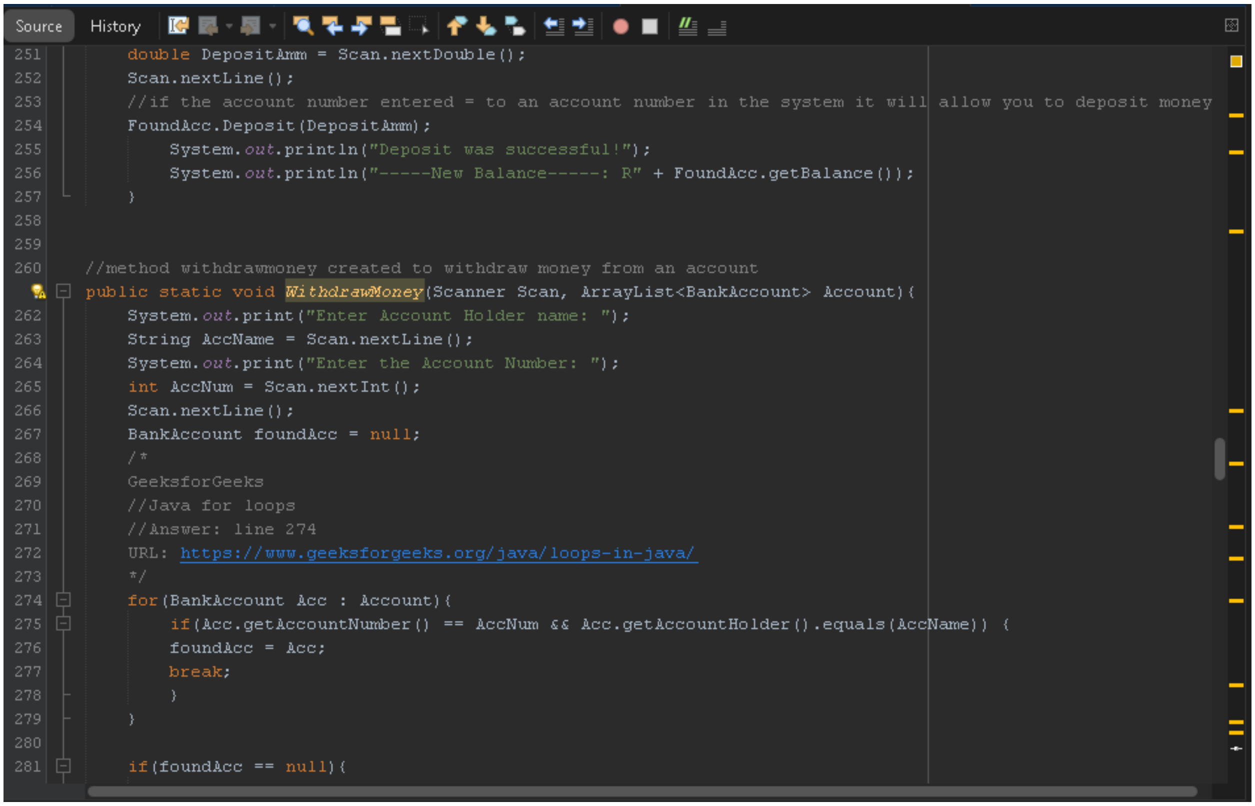
```
158         */
159         while(true){
160             /*
161             GeeksforGeeks
162             Java Exception
163             Answer: Lines 166
164             URL: https://www.w3schools.com/java/java_try_catch.asp
165             */
166             try {
167                 System.out.print("Enter opening balance (must be an integer): ");
168                 Balance = Scan.nextInt();
169                 break;
170             }
171             catch(InputMismatchException e){
172                 System.out.println("Opening balance must only contain integers.");
173                 System.out.println(" ");
174                 Scan.nextLine();
175             }
176         }
177         Scan.nextLine();
178         int AccType;
179         /*
180         GeeksforGeeks
181         While loops
182         Answer: Line 185
183         URL: https://www.w3schools.com/java/java_while_loop.asp
184         */
185         while(true){
186             /*
187             GeeksforGeeks
188             Java Exception
```



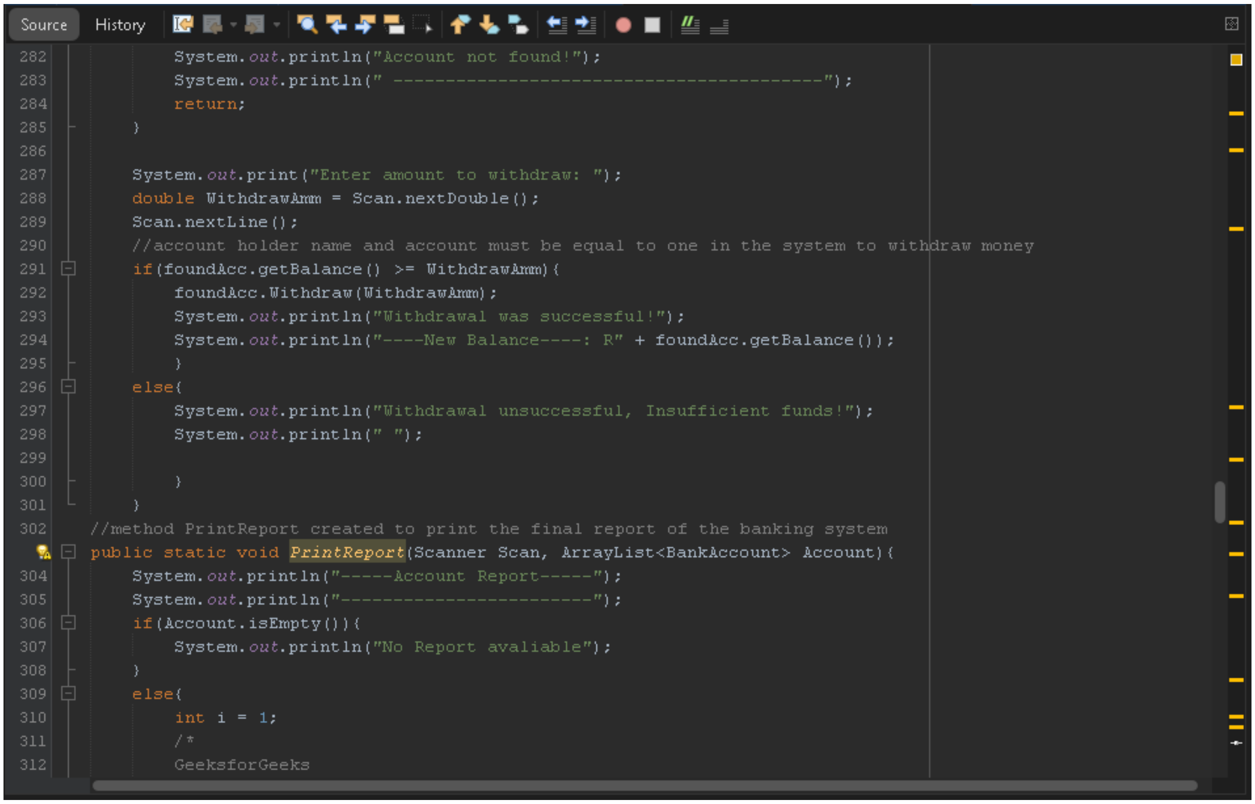
```
189             Answer: Lines 192
190             URL: https://www.w3schools.com/java/java_try_catch.asp
191             */
192             try{
193                 System.out.print("Choose an account type (1. Savings, 2. Check): ");
194                 AccType = Scan.nextInt();
195                 if(AccType == 1 || AccType == 2){
196                     break;
197                 }
198                 else{
199                     System.out.println("Please enter 1 for Savings or 2 for Check.");
200                     System.out.println(" ");
201                 }
202             }
203             catch(InputMismatchException e){
204                 System.out.println("Invalid input. Please enter 1 for Savings or 2 for Check.");
205                 System.out.println(" ");
206                 Scan.nextLine();
207             }
208         }
209         Scan.nextLine();
210         BankAccount NewAccount;
211         if(AccType == 1){
212             NewAccount = new SavingsAccount(AccountHolder, AccountNumber, Balance, 0.05);
213         }
214         else{
215             NewAccount = new CheckAccount(AccountHolder, AccountNumber, Balance, 2.50);
216         }
217
218         Account.add(NewAccount);
219         System.out.println("Account successfully created!");
```



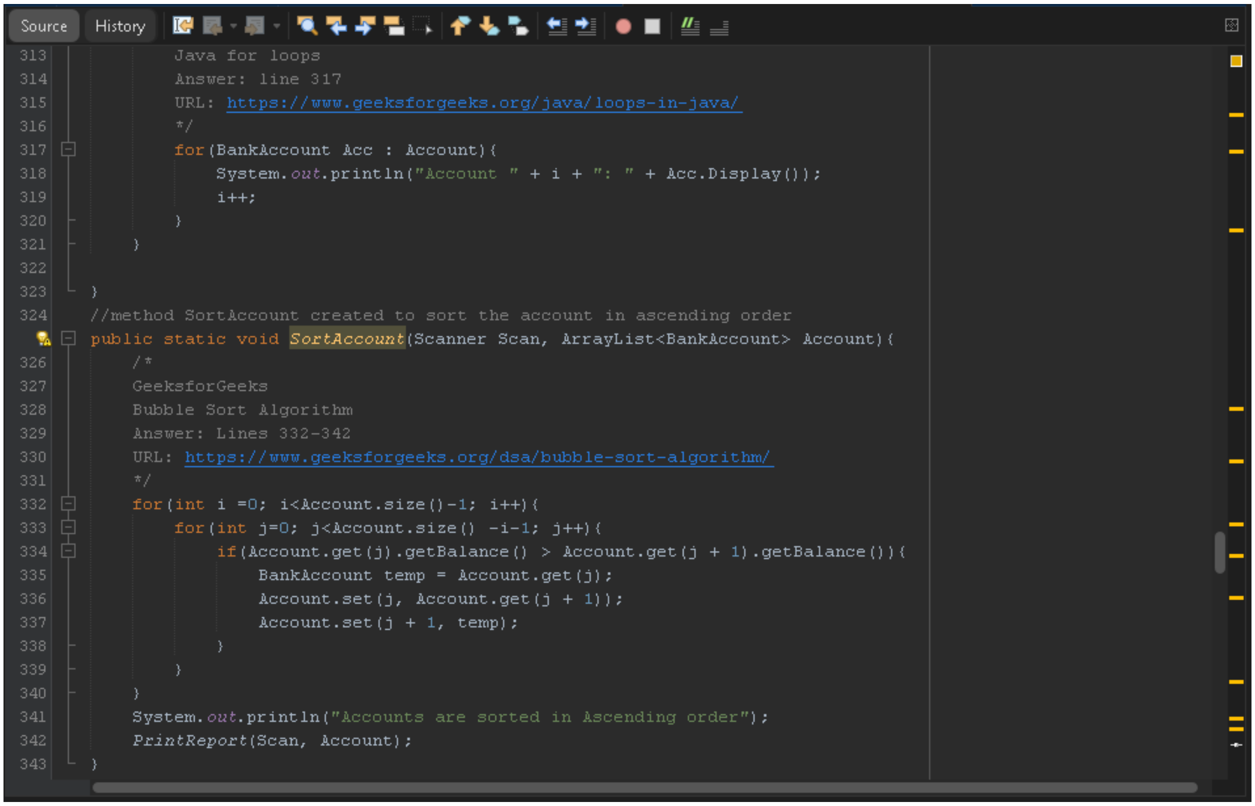
```
220         System.out.println(" ");
221     }
222
223
224     //method DepositMoney created to deposit money into the account
        public static void DepositMoney(Scanner Scan, ArrayList<BankAccount> Account){
226         System.out.print("Enter Account Holder name: ");
227         String AccName = Scan.nextLine();
228         System.out.print("Enter account number: ");
229         int AccNum = Scan.nextInt();
230         Scan.nextLine();
231         BankAccount FoundAcc = null;
232         /*
233         GeeksforGeeks
234         //Java for loops
235         //Answer: line 238
236         URL: https://www.geeksforgeeks.org/java/loops-in-java/
237         */
238         for(BankAccount Acc : Account) {
239             if (Acc.getAccountNumber() == AccNum && Acc.getAccountHolder().equals(AccName)) {
240                 FoundAcc = Acc;
241                 break;
242                 }
243             }
244         if (FoundAcc == null){
245             System.out.println("Account not found!");
246             System.out.println(" -----------------------------------------");
247             return;
248         }
249
250         System.out.print("Enter amount to deposit: ");
```



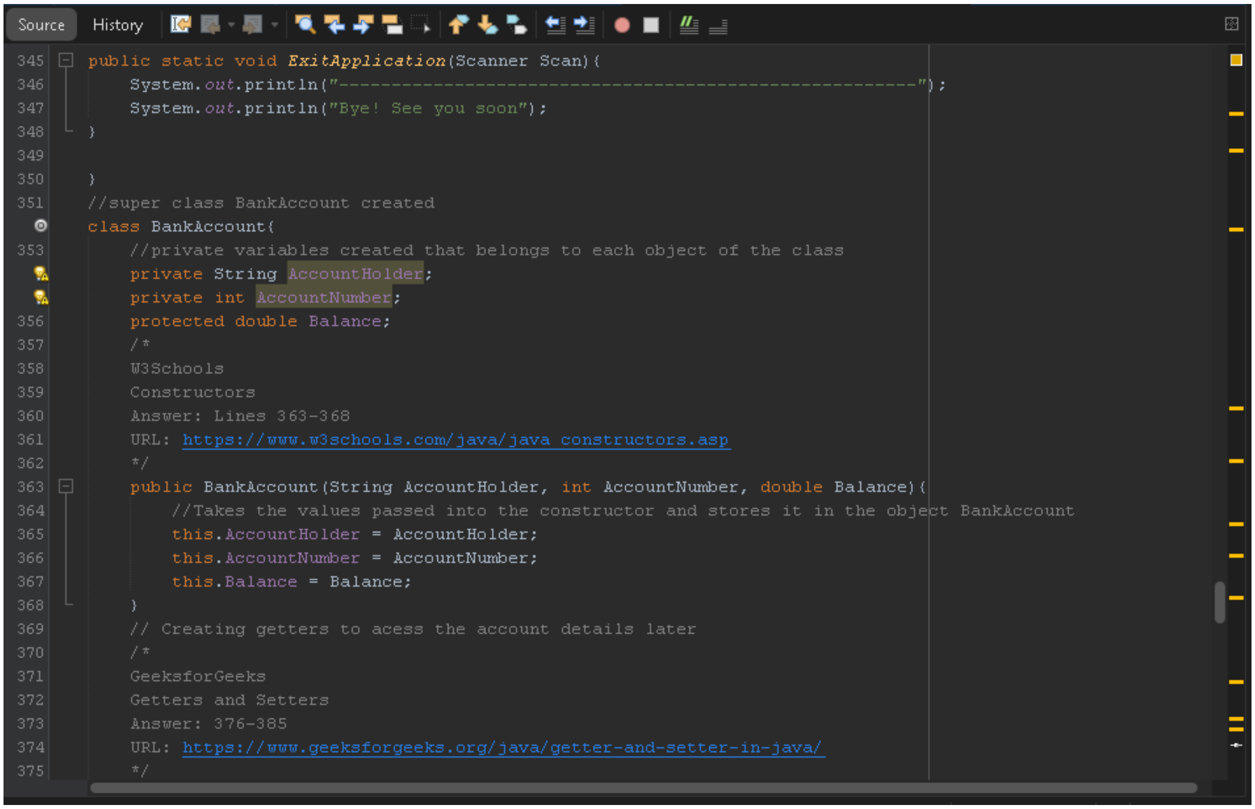
```
251         double DepositAmm = Scan.nextDouble();
252         Scan.nextLine();
253         //if the account number entered = to an account number in the system it will allow you to deposit money
254         FoundAcc.Deposit(DepositAmm);
255             System.out.println("Deposit was successful!");
256             System.out.println("-----New Balance-----: R" + FoundAcc.getBalance());
257         }
258 
259 
260     //method withdrawmoney created to withdraw money from an account
        public static void WithdrawMoney(Scanner Scan, ArrayList<BankAccount> Account){
262         System.out.print("Enter Account Holder name: ");
263         String AccName = Scan.nextLine();
264         System.out.print("Enter the Account Number: ");
265         int AccNum = Scan.nextInt();
266         Scan.nextLine();
267         BankAccount foundAcc = null;
268         /*
269         GeeksforGeeks
270         //Java for loops
271         //Answer: line 274
272         URL: https://www.geeksforgeeks.org/java/loops-in-java/
273         */
274         for(BankAccount Acc : Account){
275             if(Acc.getAccountNumber() == AccNum && Acc.getAccountHolder().equals(AccName)) {
276             foundAcc = Acc;
277             break;
278             }
279         }
280 
281         if(foundAcc == null){
```



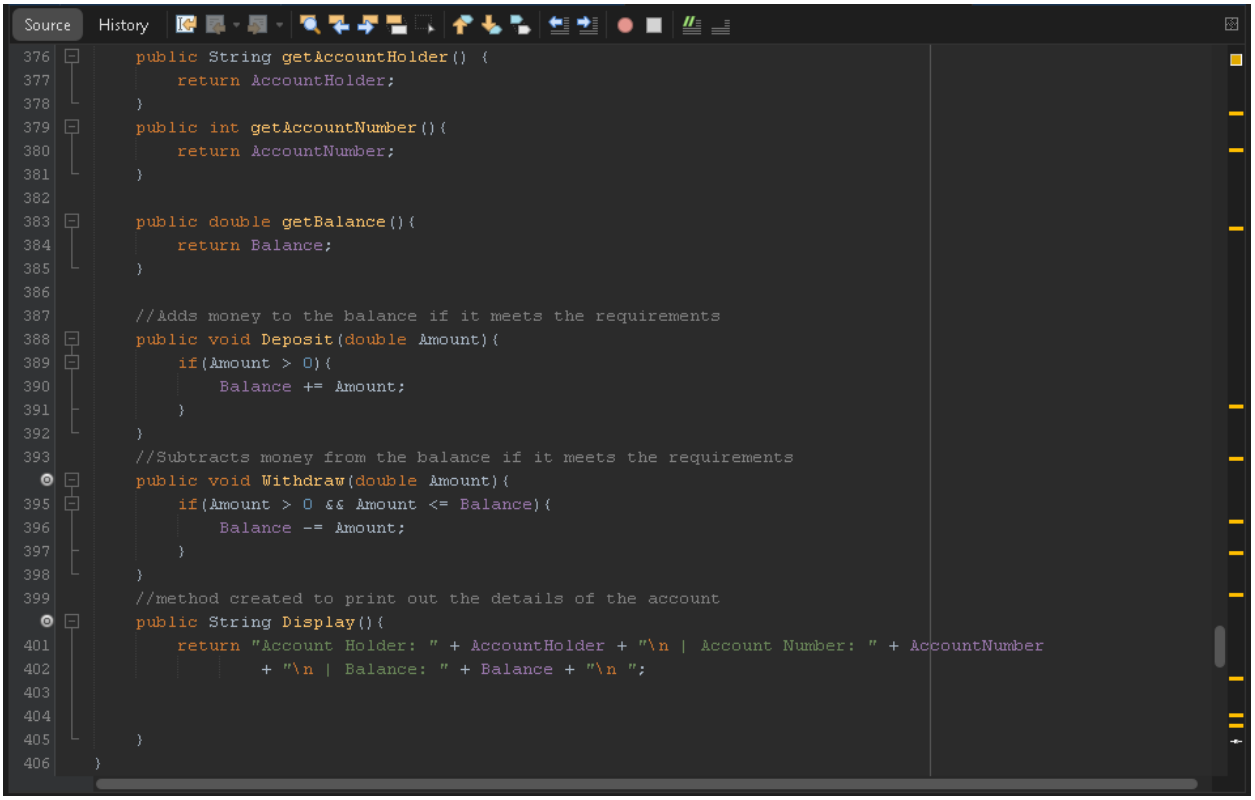
```
282             System.out.println("Account not found!");
283             System.out.println(" ------------------------------------------");
284             return;
285         }
286 
287         System.out.print("Enter amount to withdraw: ");
288         double WithdrawAmm = Scan.nextDouble();
289         Scan.nextLine();
290         //account holder name and account must be equal to one in the system to withdraw money
291         if(foundAcc.getBalance() >= WithdrawAmm){
292             foundAcc.Withdraw(WithdrawAmm);
293             System.out.println("Withdrawal was successful!");
294             System.out.println("----New Balance----: R" + foundAcc.getBalance());
295             }
296         else{
297             System.out.println("Withdrawal unsuccessful, Insufficient funds!");
298             System.out.println(" ");
299 
300             }
301         }
302     //method PrintReport created to print the final report of the banking system
        public static void PrintReport(Scanner Scan, ArrayList<BankAccount> Account){
304         System.out.println("-----Account Report-----");
305         System.out.println("------------------------");
306         if(Account.isEmpty()){
307             System.out.println("No Report avaliable");
308         }
309         else{
310             int i = 1;
311             /*
312             GeeksforGeeks
```



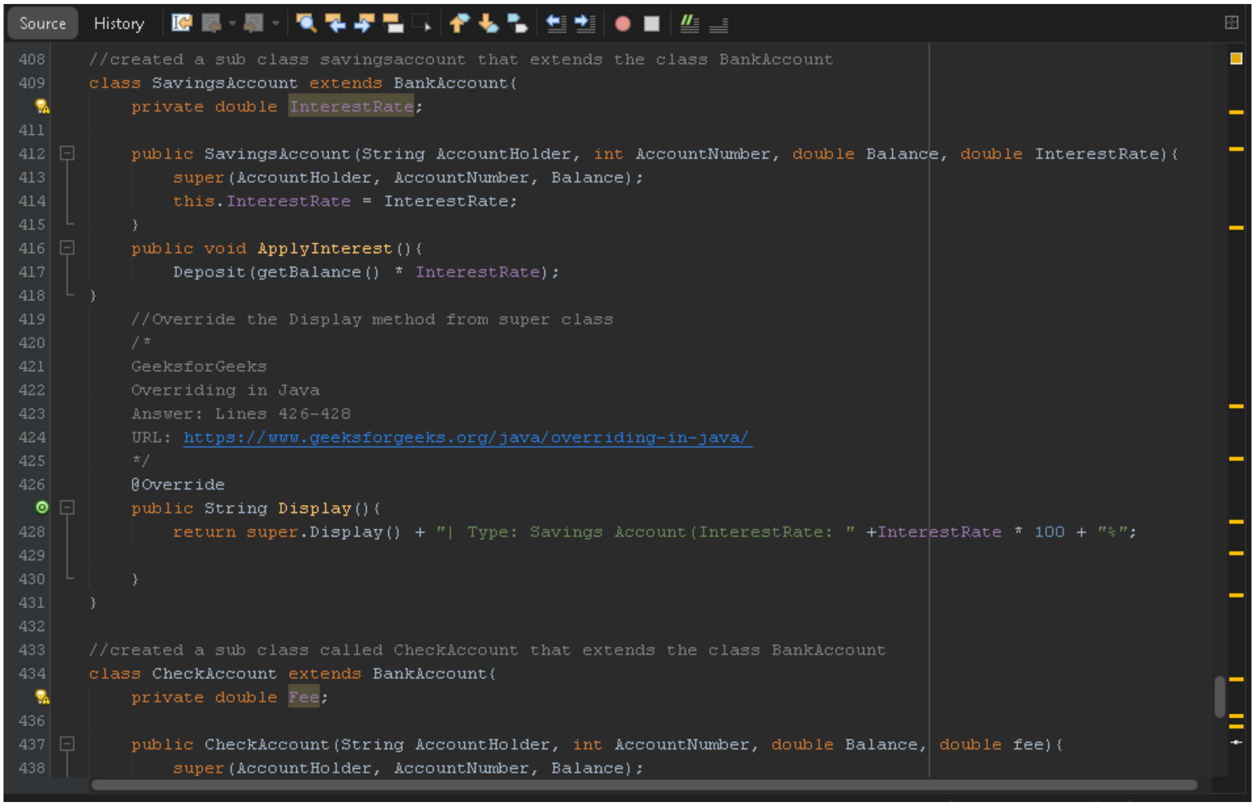
```
313             Java for loops
314             Answer: line 317
315             URL: https://www.geeksforgeeks.org/java/loops-in-java/
316             */
317             for(BankAccount Acc : Account){
318                 System.out.println("Account " + i + ": " + Acc.Display());
319                 i++;
320             }
321         }
322 
323     }
324     //method SortAccount created to sort the account in ascending order
        public static void SortAccount(Scanner Scan, ArrayList<BankAccount> Account){
326         /*
327         GeeksforGeeks
328         Bubble Sort Algorithm
329         Answer: Lines 332-342
330         URL: https://www.geeksforgeeks.org/dsa/bubble-sort-algorithm/
331         */
332         for(int i =0; i<Account.size()-1; i++){
333             for(int j=0; j<Account.size() -i-1; j++){
334                 if(Account.get(j).getBalance() > Account.get(j + 1).getBalance()){
335                     BankAccount temp = Account.get(j);
336                     Account.set(j, Account.get(j + 1));
337                     Account.set(j + 1, temp);
338                 }
339             }
340         }
341         System.out.println("Accounts are sorted in Ascending order");
342         PrintReport(Scan, Account);
343     }
```



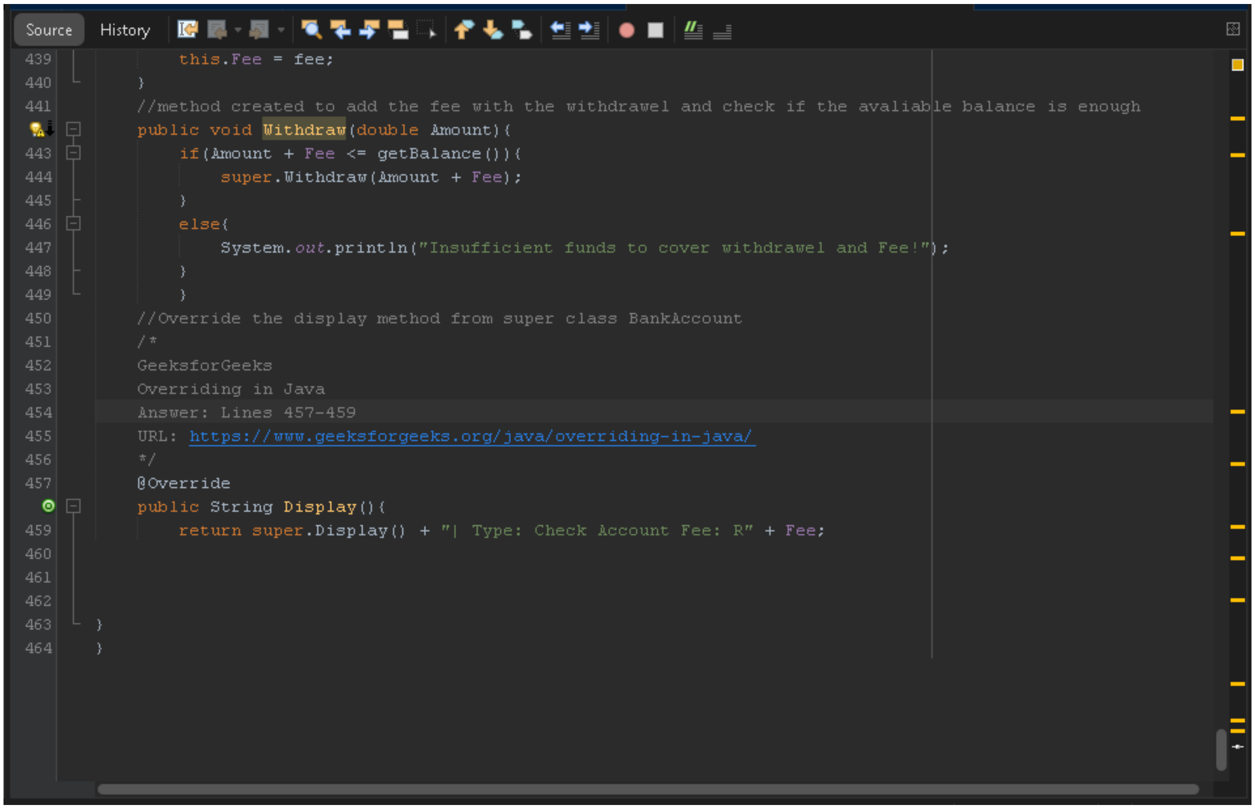
```
345     public static void ExitApplication(Scanner Scan){
346         System.out.println("-------------------------------------------------------");
347         System.out.println("Bye! See you soon");
348     }
349 
350     }
351     //super class BankAccount created
        class BankAccount{
353         //private variables created that belongs to each object of the class
            private String AccountHolder;
            private int AccountNumber;
356         protected double Balance;
357         /*
358         W3Schools
359         Constructors
360         Answer: Lines 363-368
361         URL: https://www.w3schools.com/java/java_constructors.asp
362         */
363         public BankAccount(String AccountHolder, int AccountNumber, double Balance){
364             //Takes the values passed into the constructor and stores it in the object BankAccount
365             this.AccountHolder = AccountHolder;
366             this.AccountNumber = AccountNumber;
367             this.Balance = Balance;
368         }
369         // Creating getters to acess the account details later
370         /*
371         GeeksforGeeks
372         Getters and Setters
373         Answer: 376-385
374         URL: https://www.geeksforgeeks.org/java/getter-and-setter-in-java/
375         */
```



```
376     public String getAccountHolder() {
377         return AccountHolder;
378     }
379     public int getAccountNumber(){
380         return AccountNumber;
381     }
382 
383     public double getBalance(){
384         return Balance;
385     }
386 
387     //Adds money to the balance if it meets the requirements
388     public void Deposit(double Amount){
389         if(Amount > 0){
390             Balance += Amount;
391         }
392     }
393     //Subtracts money from the balance if it meets the requirements
        public void Withdraw(double Amount){
395         if(Amount > 0 && Amount <= Balance){
396             Balance -= Amount;
397         }
398     }
399     //method created to print out the details of the account
        public String Display(){
401         return "Account Holder: " + AccountHolder + "\n | Account Number: " + AccountNumber
402                 + "\n | Balance: " + Balance + "\n ";
403 
404 
405     }
406 }
```

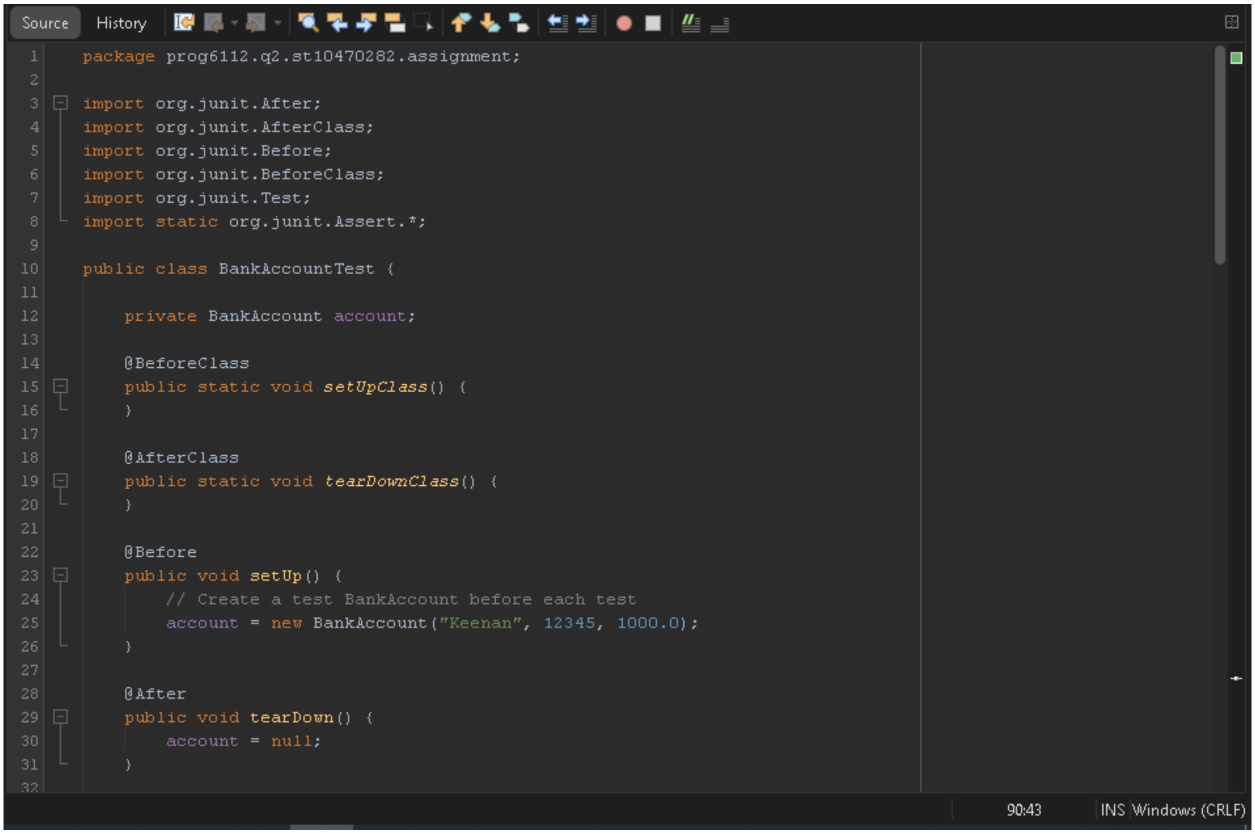


```
408 //created a sub class savingsaccount that extends the class BankAccount
409 class SavingsAccount extends BankAccount{
        private double InterestRate;
411 
412     public SavingsAccount(String AccountHolder, int AccountNumber, double Balance, double InterestRate){
413         super(AccountHolder, AccountNumber, Balance);
414         this.InterestRate = InterestRate;
415     }
416     public void ApplyInterest(){
417         Deposit(getBalance() * InterestRate);
418 }
419     //Override the Display method from super class
420     /*
421     GeeksforGeeks
422     Overriding in Java
423     Answer: Lines 426-428
424     URL: https://www.geeksforgeeks.org/java/overriding-in-java/
425     */
426     @Override
        public String Display(){
428         return super.Display() + "| Type: Savings Account(InterestRate: " +InterestRate * 100 + "%";
429 
430     }
431 }
432 
433 //created a sub class called CheckAccount that extends the class BankAccount
434 class CheckAccount extends BankAccount{
        private double Fee;
436 
437     public CheckAccount(String AccountHolder, int AccountNumber, double Balance, double fee){
438         super(AccountHolder, AccountNumber, Balance);
```

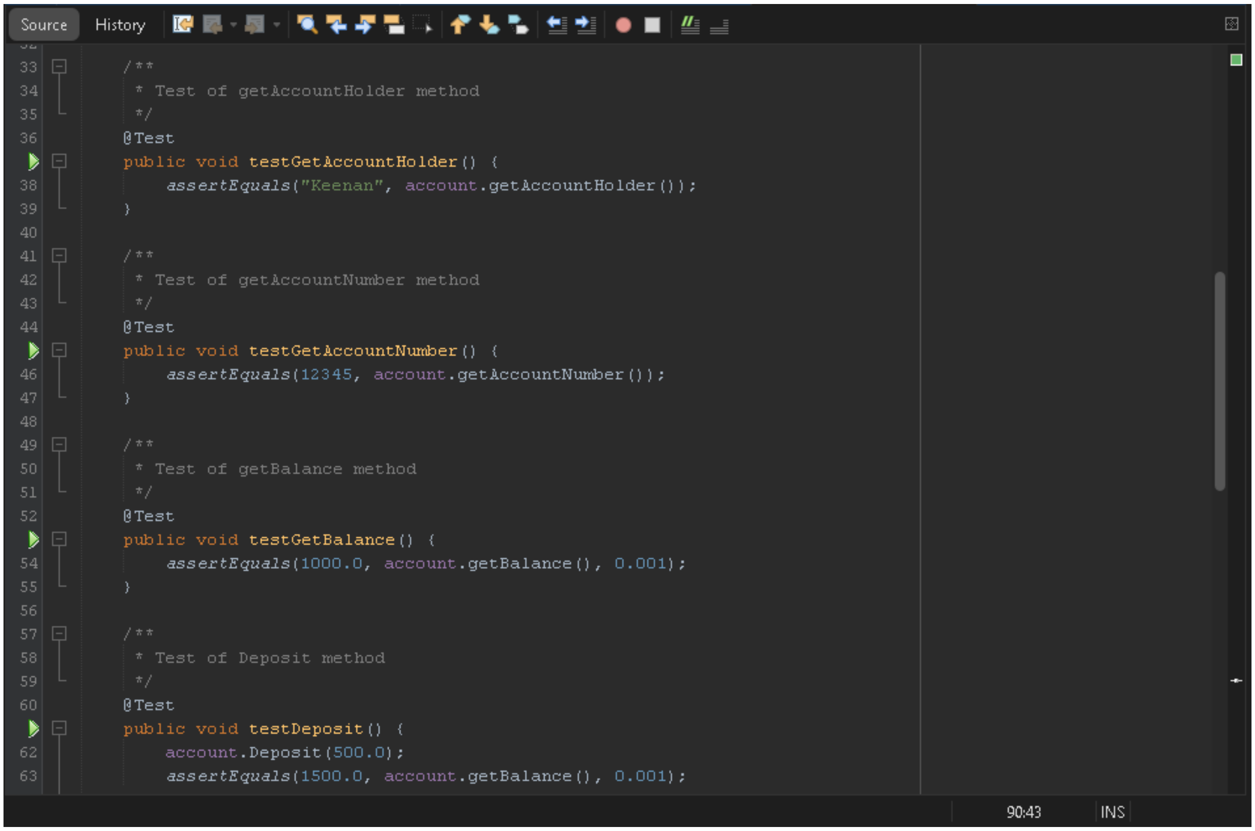


```
439         this.Fee = fee;
440     }
441     //method created to add the fee with the withdrawel and check if the avaliable balance is enough
        public void Withdraw(double Amount){
443         if(Amount + Fee <= getBalance()){
444             super.Withdraw(Amount + Fee);
445         }
446         else{
447             System.out.println("Insufficient funds to cover withdrawel and Fee!");
448         }
449         }
450     //Override the display method from super class BankAccount
451     /*
452     GeeksforGeeks
453     Overriding in Java
454     Answer: Lines 457-459
455     URL: https://www.geeksforgeeks.org/java/overriding-in-java/
456     */
457     @Override
        public String Display(){
459         return super.Display() + "| Type: Check Account Fee: R" + Fee;
460
461
462
463 }
464 }
```

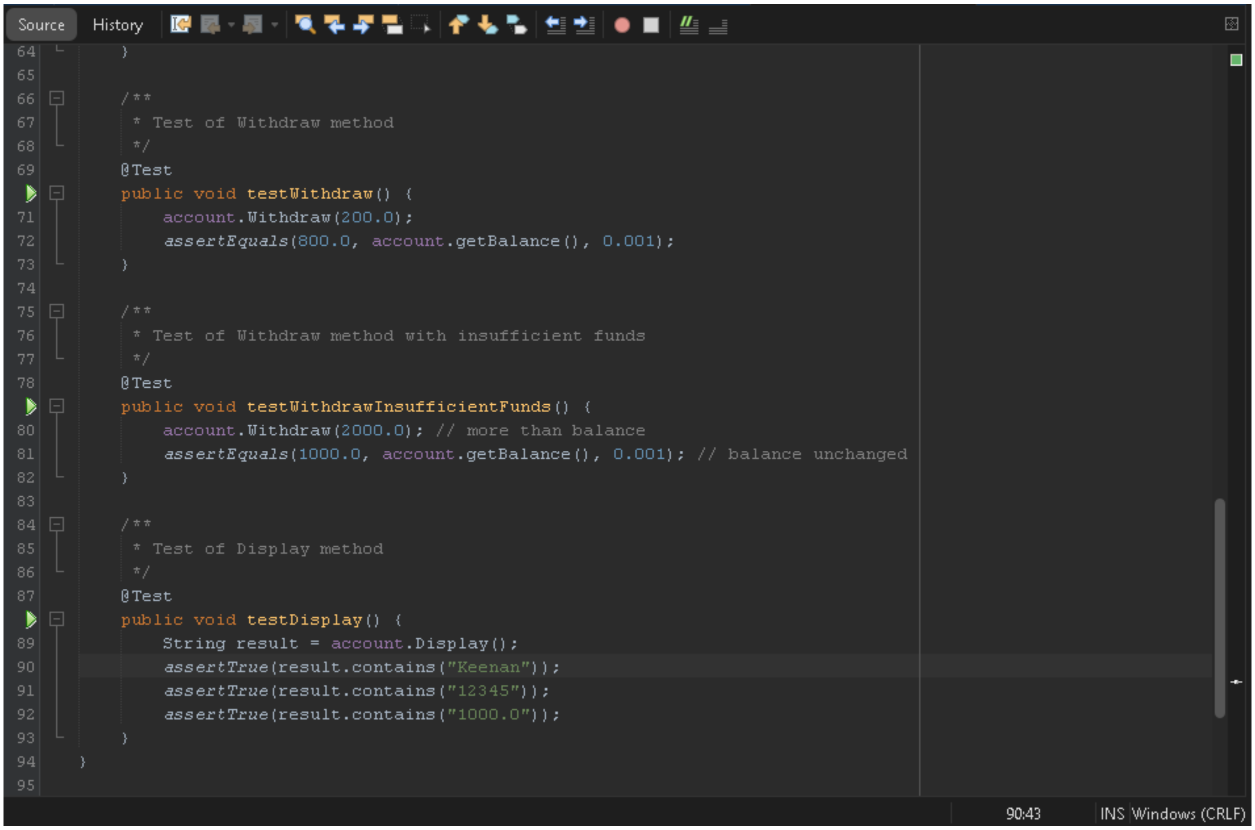
Unit Test for Question 2 (Class Bank Account):



```java
package prog6112.q2.st10470282.assignment;

import org.junit.After;
import org.junit.AfterClass;
import org.junit.Before;
import org.junit.BeforeClass;
import org.junit.Test;
import static org.junit.Assert.*;

public class BankAccountTest {

    private BankAccount account;

    @BeforeClass
    public static void setUpClass() {
    }

    @AfterClass
    public static void tearDownClass() {
    }

    @Before
    public void setUp() {
        // Create a test BankAccount before each test
        account = new BankAccount("Keenan", 12345, 1000.0);
    }

    @After
    public void tearDown() {
        account = null;
    }
```

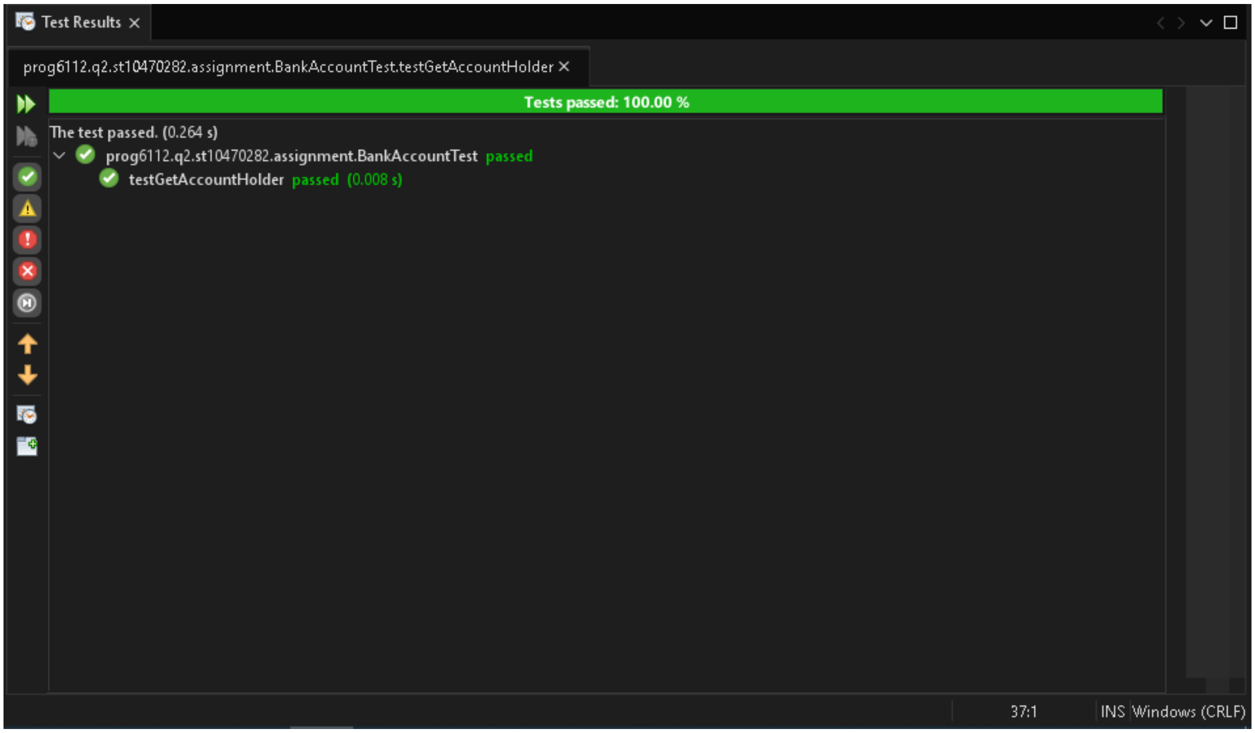


```java
    /**
     * Test of getAccountHolder method
     */
    @Test
    public void testGetAccountHolder() {
        assertEquals("Keenan", account.getAccountHolder());
    }

    /**
     * Test of getAccountNumber method
     */
    @Test
    public void testGetAccountNumber() {
        assertEquals(12345, account.getAccountNumber());
    }

    /**
     * Test of getBalance method
     */
    @Test
    public void testGetBalance() {
        assertEquals(1000.0, account.getBalance(), 0.001);
    }

    /**
     * Test of Deposit method
     */
    @Test
    public void testDeposit() {
        account.Deposit(500.0);
        assertEquals(1500.0, account.getBalance(), 0.001);
```

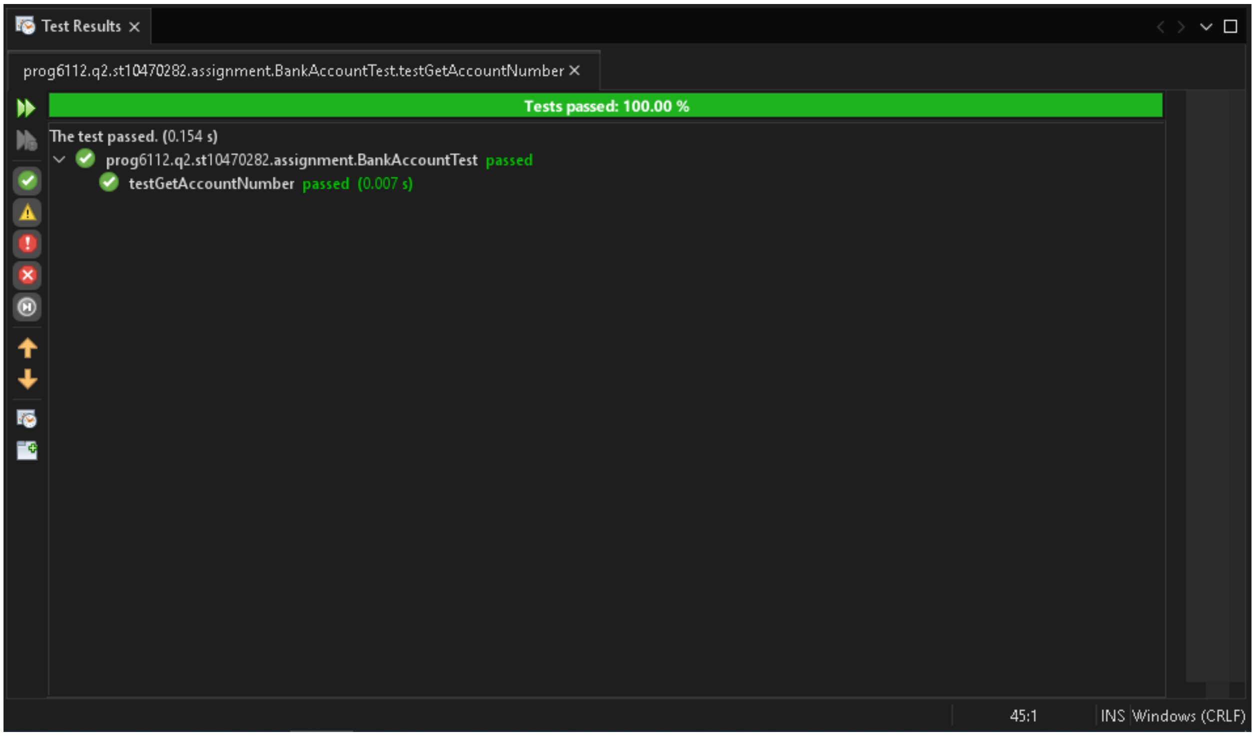


```java
    }

    /**
     * Test of Withdraw method
     */
    @Test
    public void testWithdraw() {
        account.Withdraw(200.0);
        assertEquals(800.0, account.getBalance(), 0.001);
    }

    /**
     * Test of Withdraw method with insufficient funds
     */
    @Test
    public void testWithdrawInsufficientFunds() {
        account.Withdraw(2000.0); // more than balance
        assertEquals(1000.0, account.getBalance(), 0.001); // balance unchanged
    }

    /**
     * Test of Display method
     */
    @Test
    public void testDisplay() {
        String result = account.Display();
        assertTrue(result.contains("Keenan"));
        assertTrue(result.contains("12345"));
        assertTrue(result.contains("1000.0"));
    }
}
```

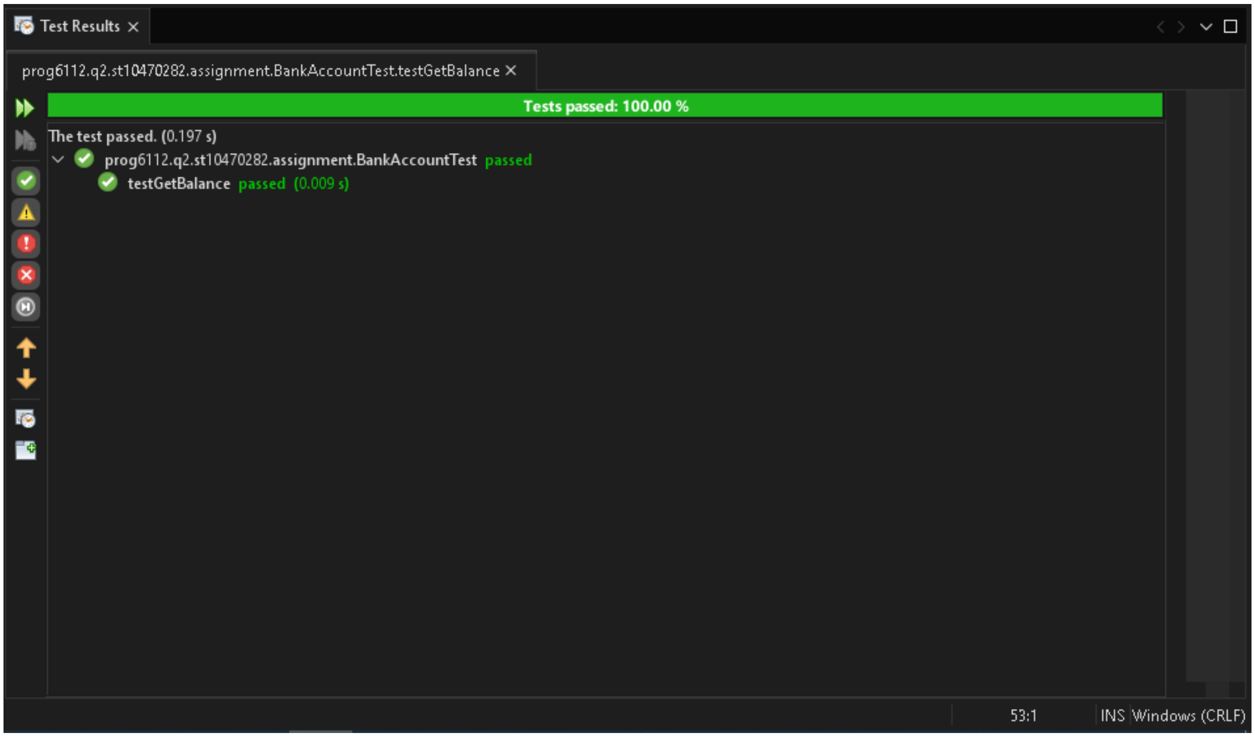
Unit Test Results for Bank Account:



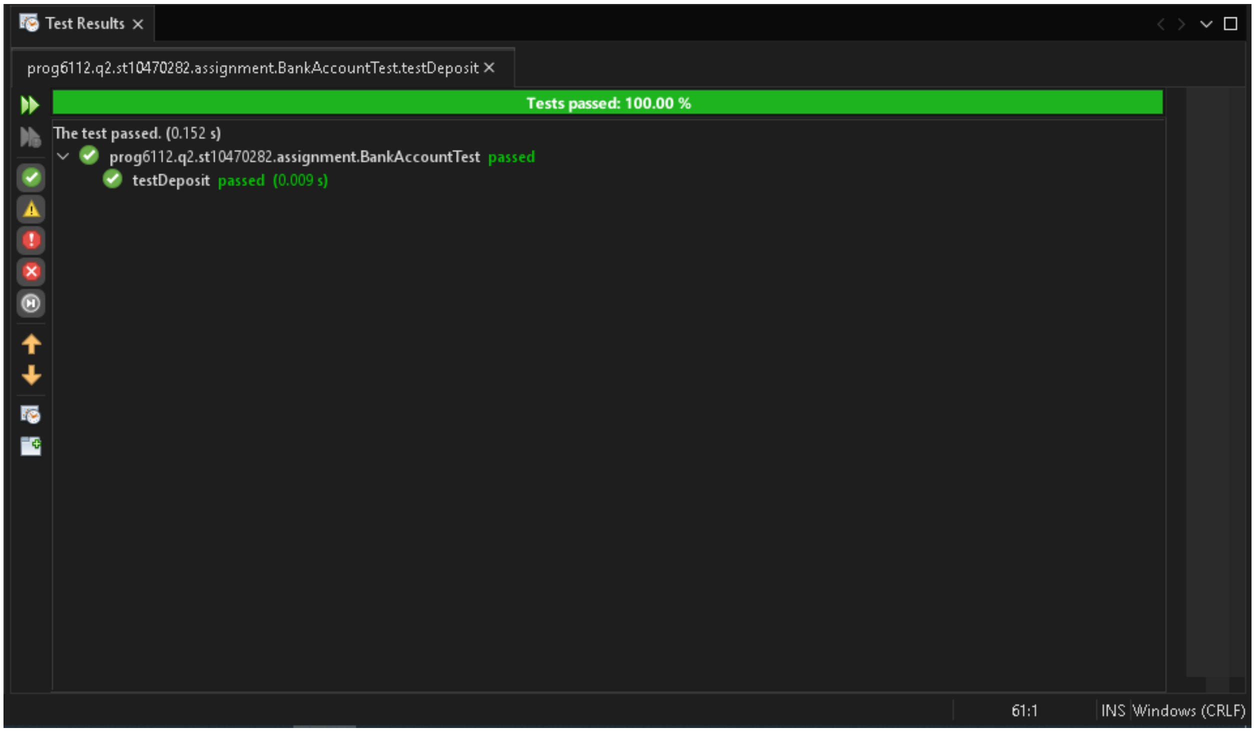
```
prog6112.q2.st10470282.assignment.BankAccountTest.testGetAccountHolder
Tests passed: 100.00 %
The test passed. (0.264 s)
prog6112.q2.st10470282.assignment.BankAccountTest passed
    testGetAccountHolder passed (0.008 s)
```


Test Results
prog6112.q2.st10470282.assignment.BankAccountTest.testGetAccountNumber
45:1
INS
Windows (CRLF)

```
Tests passed: 100.00 %
The test passed. (0.154 s)
  prog6112.q2.st10470282.assignment.BankAccountTest passed
    testGetAccountNumber passed (0.007 s)
```

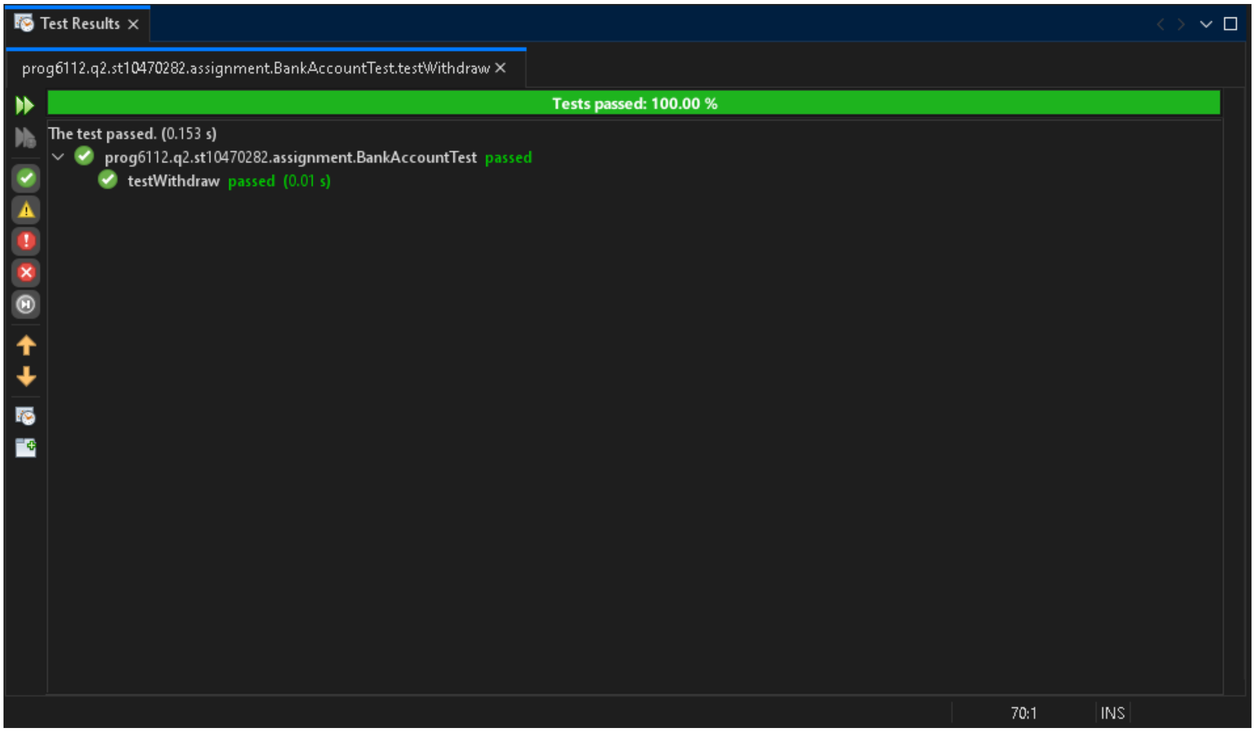

Test Results
prog6112.q2.st10470282.assignment.BankAccountTest.testGetBalance
53:1
INS
Windows (CRLF)

```
Tests passed: 100.00 %
The test passed. (0.197 s)
  prog6112.q2.st10470282.assignment.BankAccountTest passed
    testGetBalance passed (0.009 s)
```



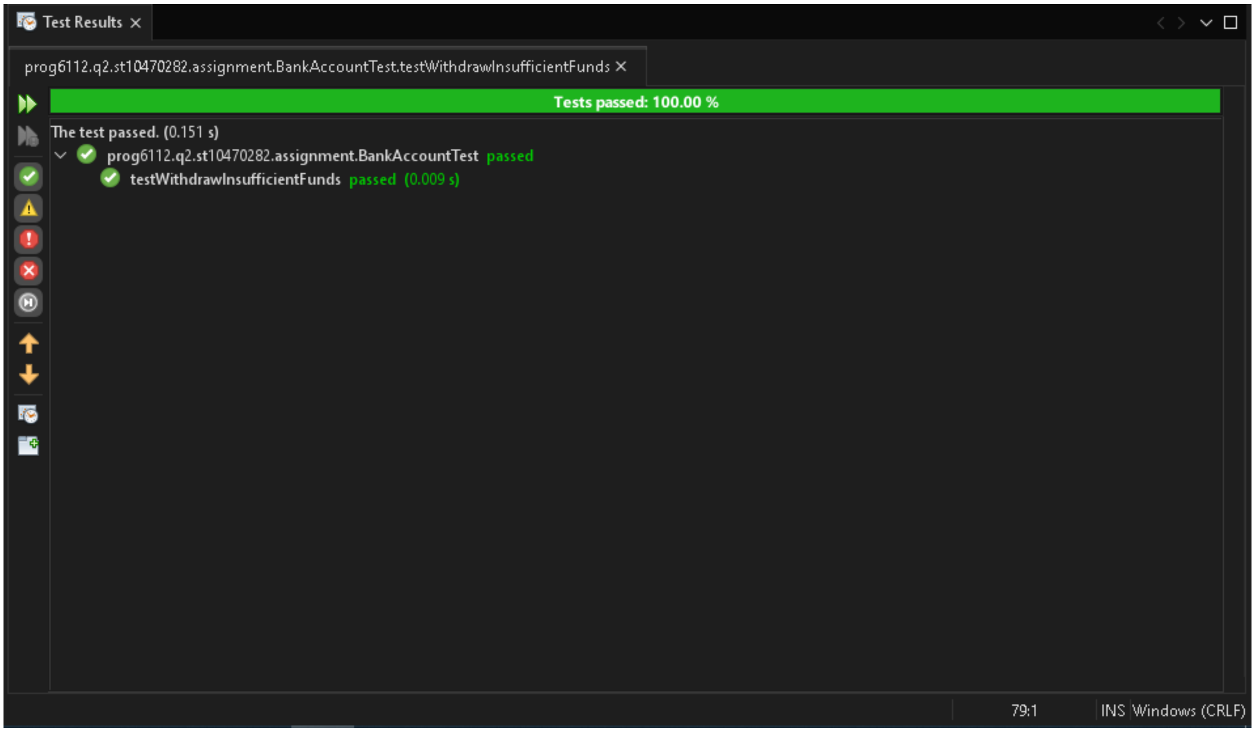
Test Results
prog6112.q2.st10470282.assignment.BankAccountTest.testDeposit
61:1
INS
Windows (CRLF)

```
Tests passed: 100.00 %
The test passed. (0.152 s)
  prog6112.q2.st10470282.assignment.BankAccountTest passed
    testDeposit passed (0.009 s)
```

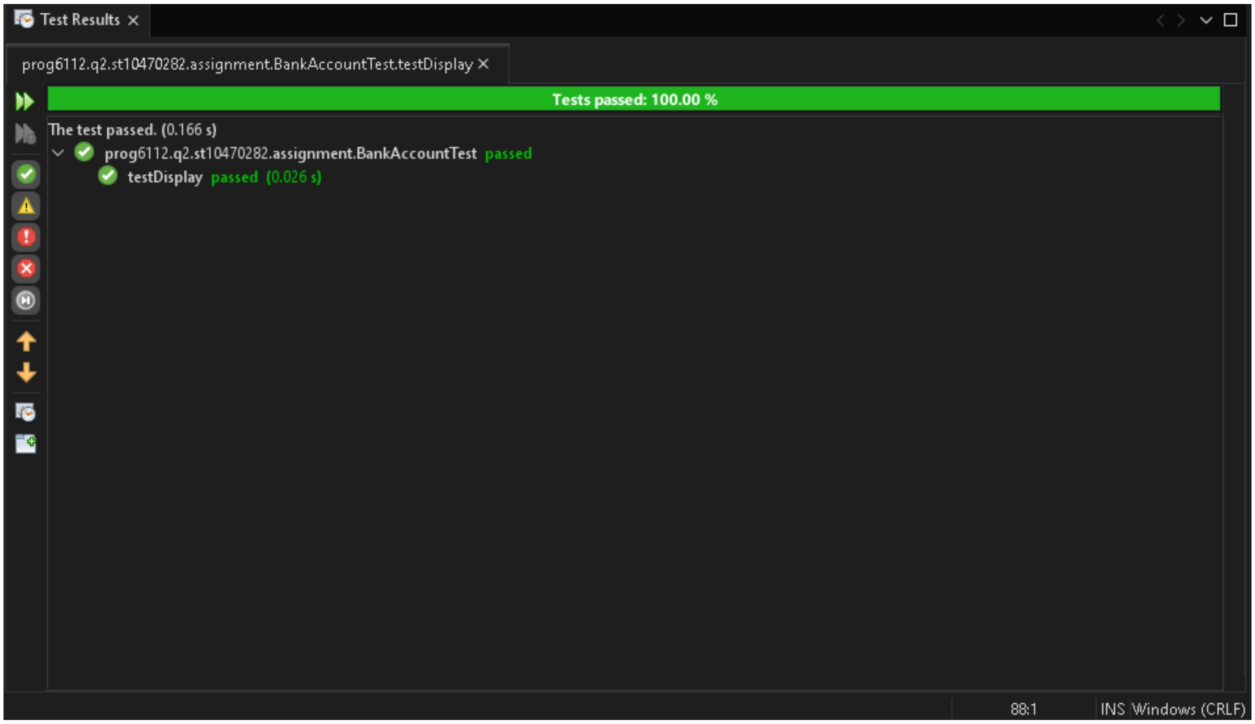


Test Results
prog6112.q2.st10470282.assignment.BankAccountTest.testWithdraw
70:1
INS

```
Tests passed: 100.00 %
The test passed. (0.153 s)
  prog6112.q2.st10470282.assignment.BankAccountTest passed
    testWithdraw passed (0.01 s)
```

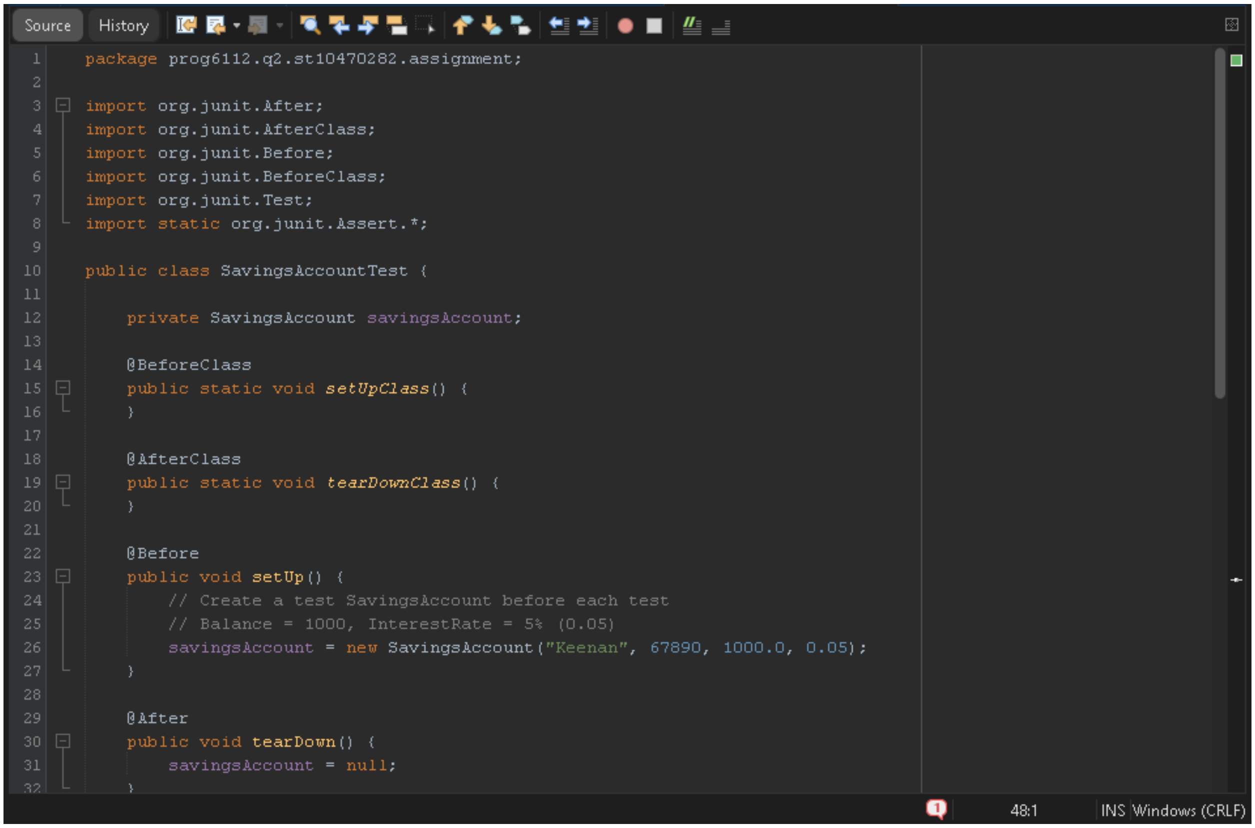


```
prog6112.q2.st10470282.assignment.BankAccountTest.testWithdrawInsufficientFunds
Tests passed: 100.00 %
The test passed. (0.151 s)
  prog6112.q2.st10470282.assignment.BankAccountTest passed
    testWithdrawInsufficientFunds passed (0.009 s)
```

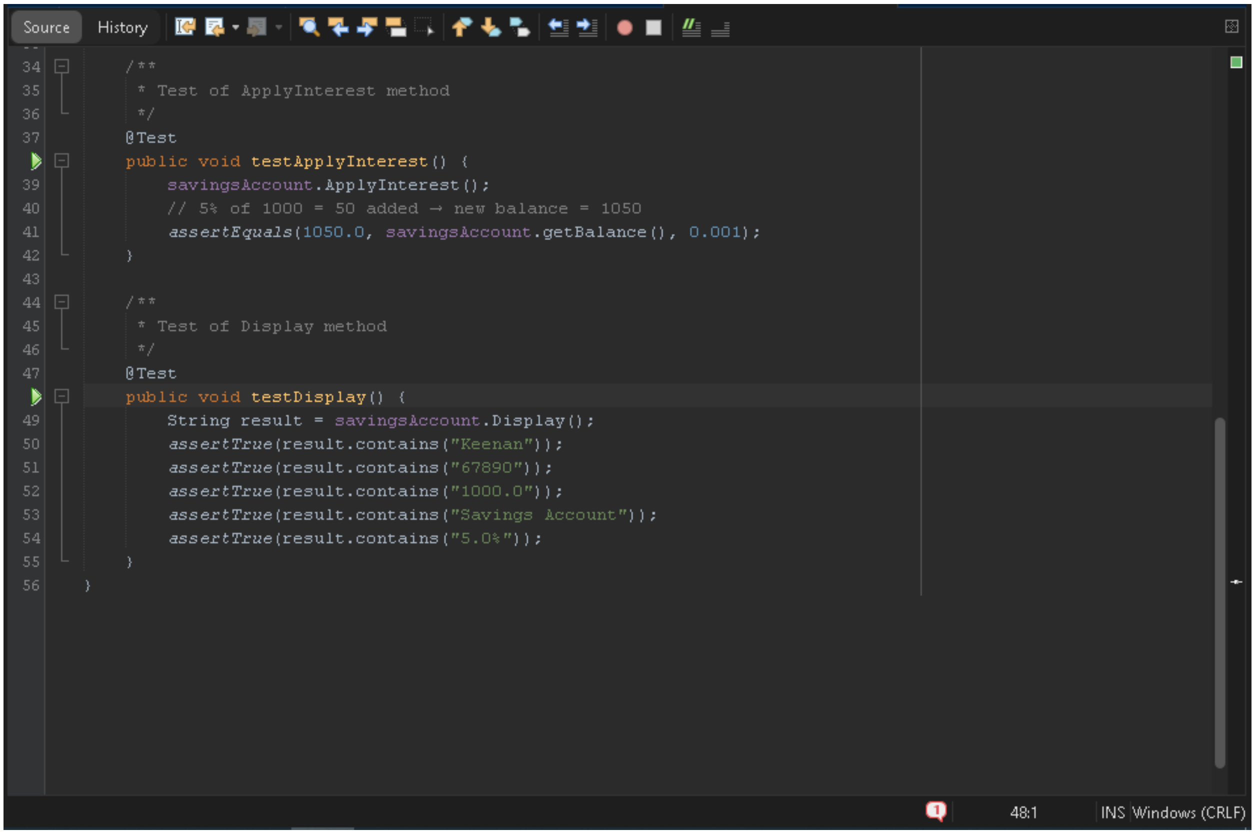


```
prog6112.q2.st10470282.assignment.BankAccountTest.testDisplay
Tests passed: 100.00 %
The test passed. (0.166 s)
  prog6112.q2.st10470282.assignment.BankAccountTest passed
    testDisplay passed (0.026 s)
```

Unit Test for class Savings Account:

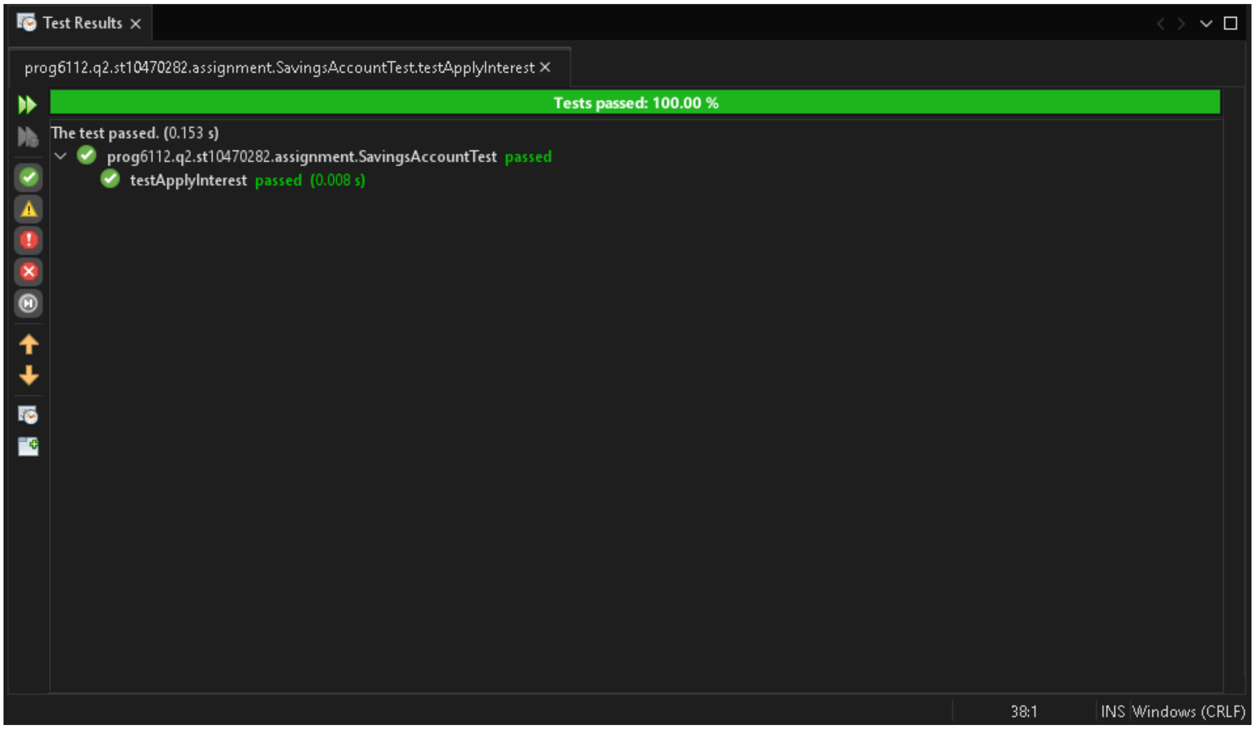


```java
package prog6112.q2.st10470282.assignment;

import org.junit.After;
import org.junit.AfterClass;
import org.junit.Before;
import org.junit.BeforeClass;
import org.junit.Test;
import static org.junit.Assert.*;

public class SavingsAccountTest {

    private SavingsAccount savingsAccount;

    @BeforeClass
    public static void setUpClass() {
    }

    @AfterClass
    public static void tearDownClass() {
    }

    @Before
    public void setUp() {
        // Create a test SavingsAccount before each test
        // Balance = 1000, InterestRate = 5% (0.05)
        savingsAccount = new SavingsAccount("Keenan", 67890, 1000.0, 0.05);
    }

    @After
    public void tearDown() {
        savingsAccount = null;
    }
```

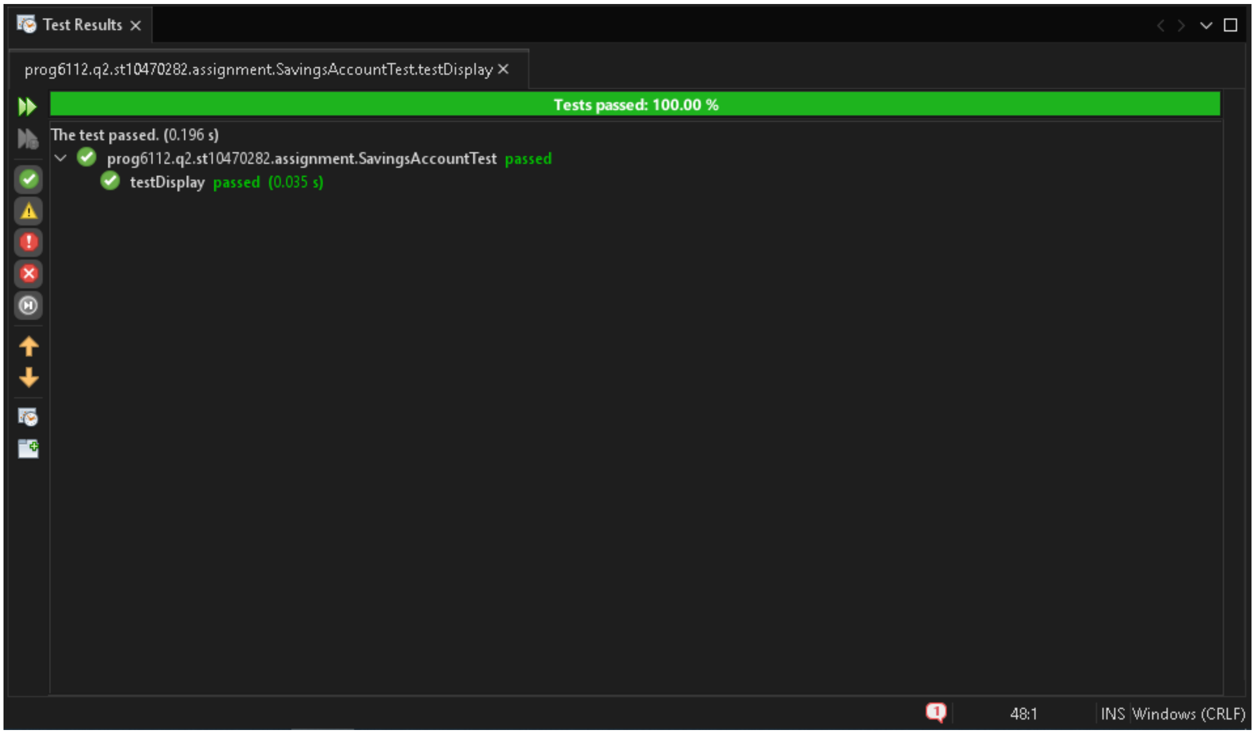


```java
    /**
     * Test of ApplyInterest method
     */
    @Test
    public void testApplyInterest() {
        savingsAccount.ApplyInterest();
        // 5% of 1000 = 50 added → new balance = 1050
        assertEquals(1050.0, savingsAccount.getBalance(), 0.001);
    }

    /**
     * Test of Display method
     */
    @Test
    public void testDisplay() {
        String result = savingsAccount.Display();
        assertTrue(result.contains("Keenan"));
        assertTrue(result.contains("67890"));
        assertTrue(result.contains("1000.0"));
        assertTrue(result.contains("Savings Account"));
        assertTrue(result.contains("5.0%"));
    }
}
```

Unit Test Results for class Savings Account:

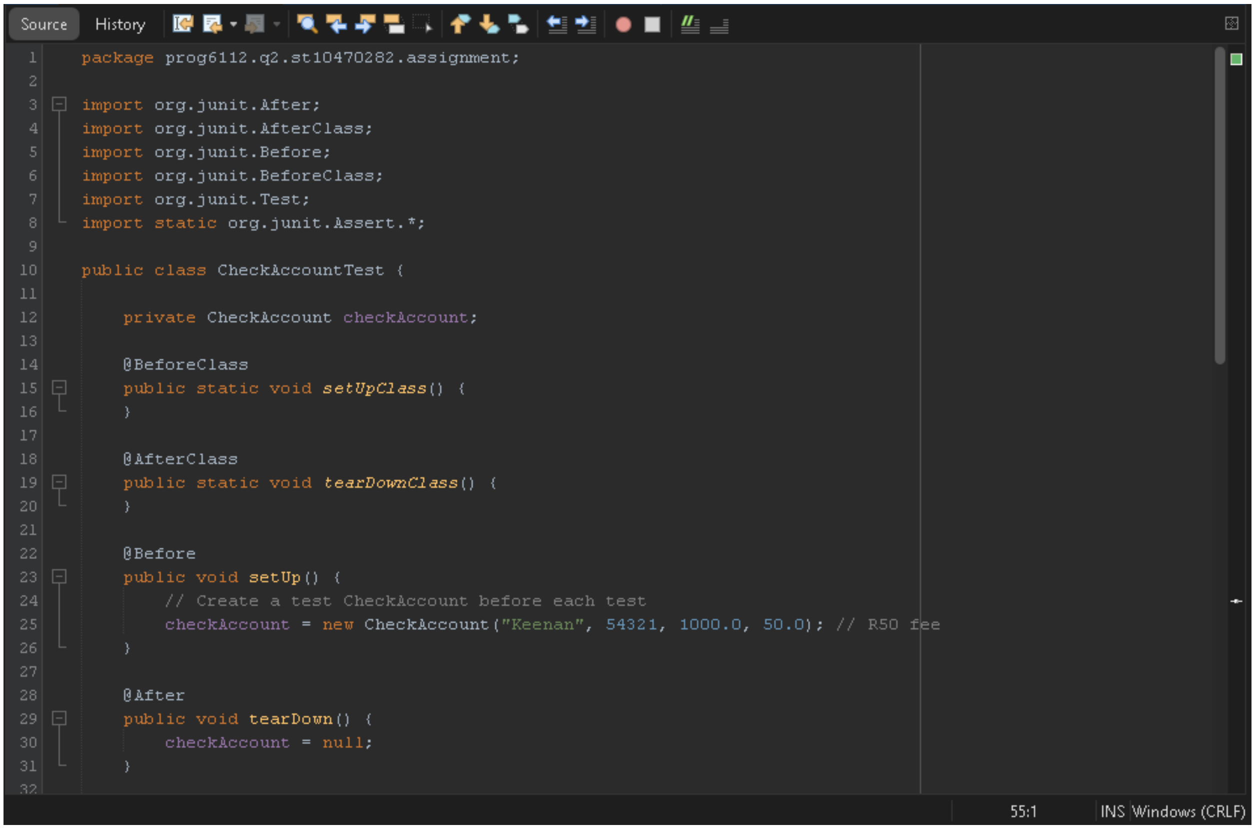

Test Results
prog6112.q2.st10470282.assignment.SavingsAccountTest.testApplyInterest
38:1
INS
Windows (CRLF)

```
Tests passed: 100.00 %
The test passed. (0.153 s)
  prog6112.q2.st10470282.assignment.SavingsAccountTest passed
    testApplyInterest passed (0.008 s)
```

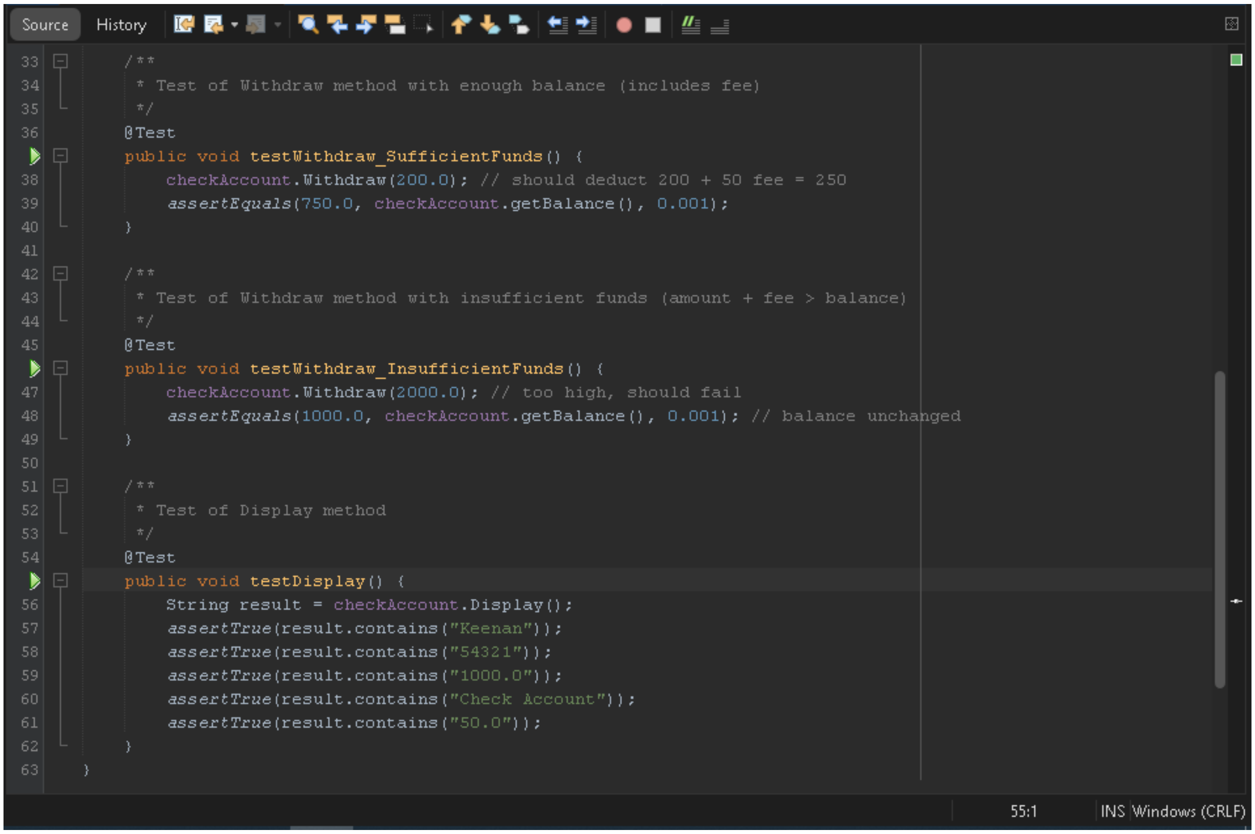

Test Results
prog6112.q2.st10470282.assignment.SavingsAccountTest.testDisplay
48:1
INS
Windows (CRLF)

```
Tests passed: 100.00 %
The test passed. (0.196 s)
  prog6112.q2.st10470282.assignment.SavingsAccountTest passed
    testDisplay passed (0.035 s)
```

Unit Test for class Check Account:

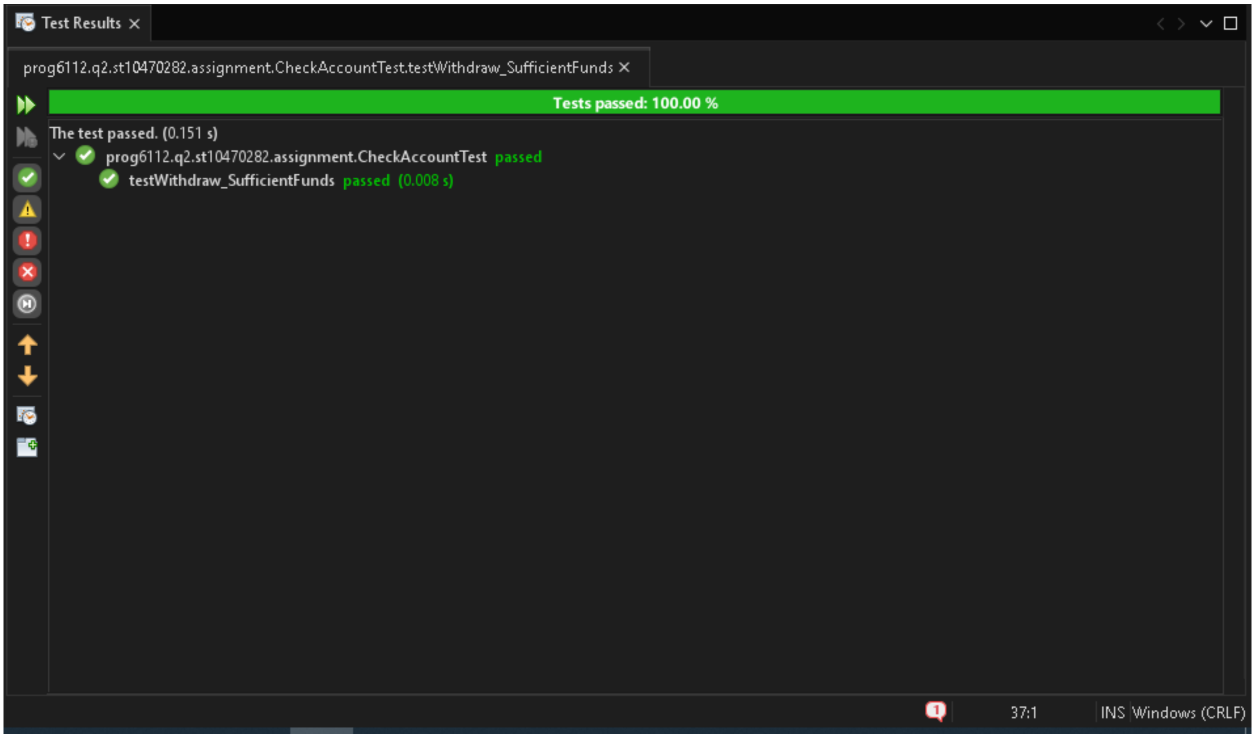


```java
package prog6112.q2.st10470282.assignment;

import org.junit.After;
import org.junit.AfterClass;
import org.junit.Before;
import org.junit.BeforeClass;
import org.junit.Test;
import static org.junit.Assert.*;

public class CheckAccountTest {

    private CheckAccount checkAccount;

    @BeforeClass
    public static void setUpClass() {
    }

    @AfterClass
    public static void tearDownClass() {
    }

    @Before
    public void setUp() {
        // Create a test CheckAccount before each test
        checkAccount = new CheckAccount("Keenan", 54321, 1000.0, 50.0); // R50 fee
    }

    @After
    public void tearDown() {
        checkAccount = null;
    }
```

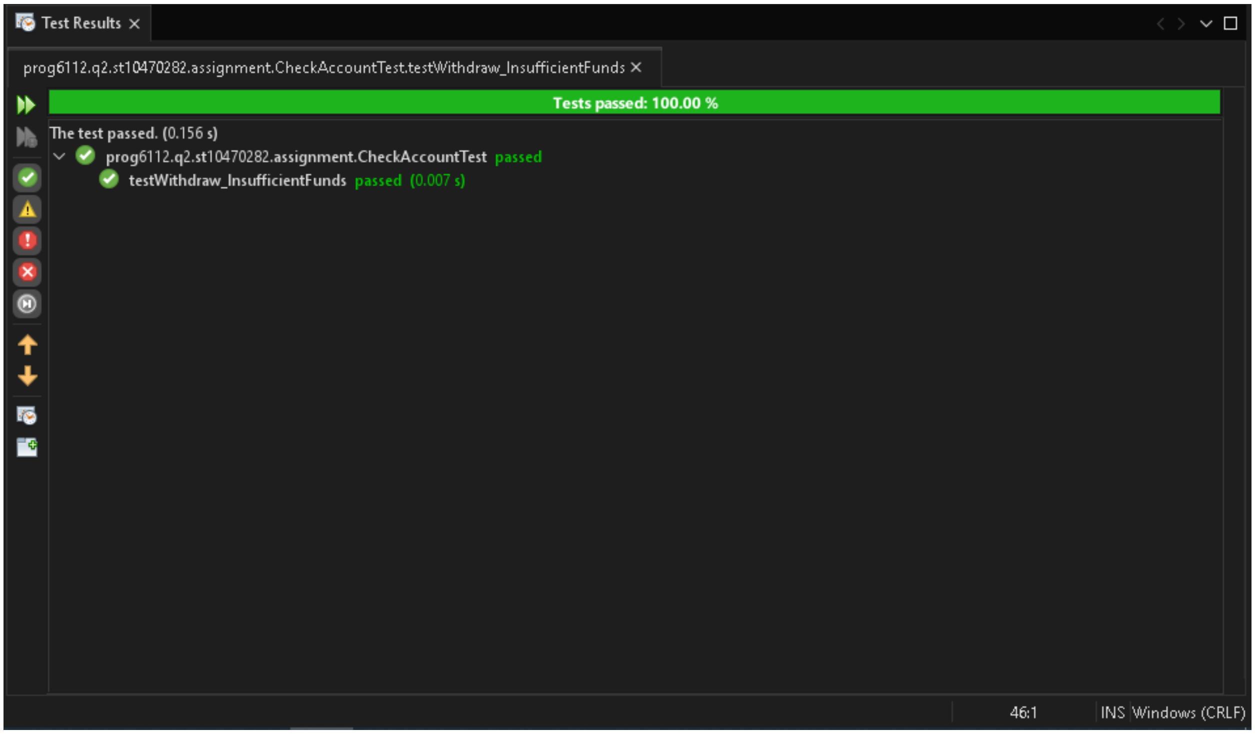


```java
    /**
     * Test of Withdraw method with enough balance (includes fee)
     */
    @Test
    public void testWithdraw_SufficientFunds() {
        checkAccount.Withdraw(200.0); // should deduct 200 + 50 fee = 250
        assertEquals(750.0, checkAccount.getBalance(), 0.001);
    }

    /**
     * Test of Withdraw method with insufficient funds (amount + fee > balance)
     */
    @Test
    public void testWithdraw_InsufficientFunds() {
        checkAccount.Withdraw(2000.0); // too high, should fail
        assertEquals(1000.0, checkAccount.getBalance(), 0.001); // balance unchanged
    }

    /**
     * Test of Display method
     */
    @Test
    public void testDisplay() {
        String result = checkAccount.Display();
        assertTrue(result.contains("Keenan"));
        assertTrue(result.contains("54321"));
        assertTrue(result.contains("1000.0"));
        assertTrue(result.contains("Check Account"));
        assertTrue(result.contains("50.0"));
    }
}
```

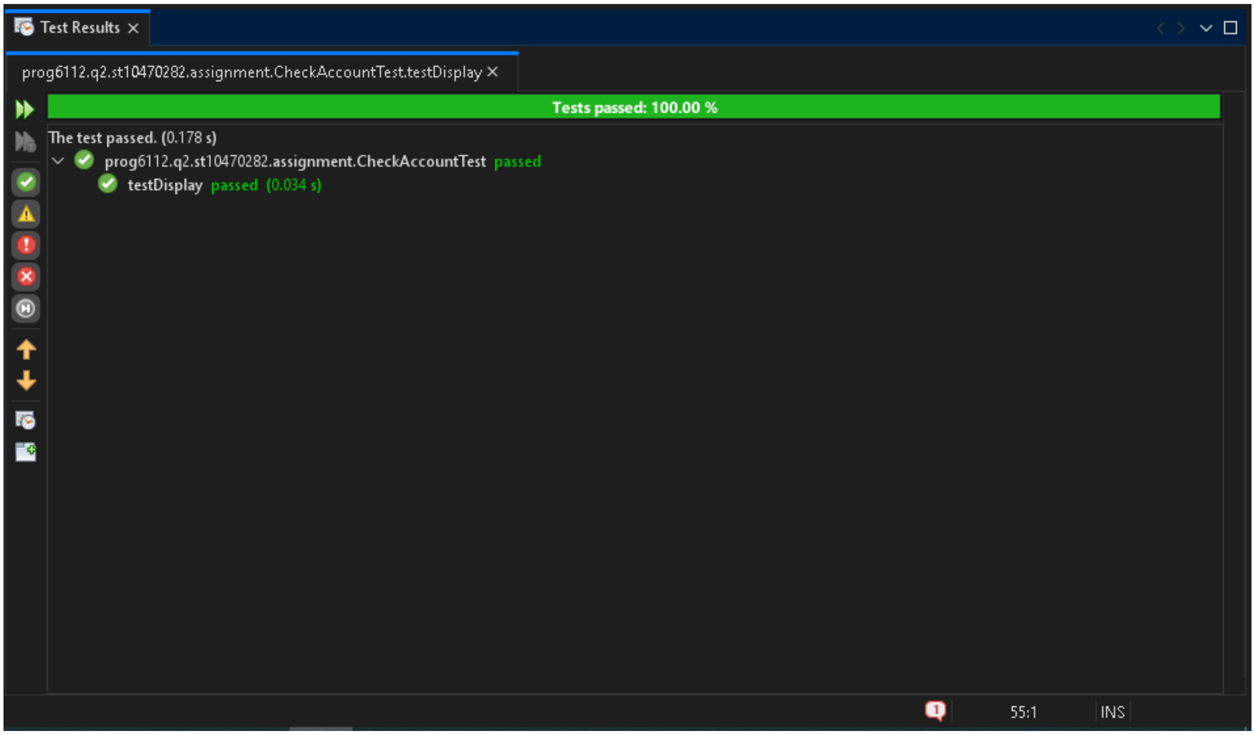
Unit Test Results for class Check Account:


Test Results ×
prog6112.q2.st10470282.assignment.CheckAccountTest.testWithdraw_SufficientFunds ×
Tests passed: 100.00 %

```
The test passed. (0.151 s)
  prog6112.q2.st10470282.assignment.CheckAccountTest passed
    testWithdraw_SufficientFunds passed (0.008 s)
```


Test Results ×
prog6112.q2.st10470282.assignment.CheckAccountTest.testWithdraw_InsufficientFunds ×
Tests passed: 100.00 %

```
The test passed. (0.156 s)
  prog6112.q2.st10470282.assignment.CheckAccountTest passed
    testWithdraw_InsufficientFunds passed (0.007 s)
```



Test Results
prog6112.q2.st10470282.assignment.CheckAccountTest.testDisplay
55:1
INS

```
Tests passed: 100.00 %
The test passed. (0.178 s)
prog6112.q2.st10470282.assignment.CheckAccountTest passed
    testDisplay passed (0.034 s)
```

Github Repository link:

https://github.com/VCCT-PROG6112-2025-G3/ST10470282-PROG6112-Assignment-Keenan.git