```
===========================================================================
=                      Print Date: Thu Sep 22 16:57:08 2016                =
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===========================================================================
=                              Source Files                                =
===========================================================================



~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~
~                          File: StudExam.java                             ~
~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~

import java.io.*;
import java.util.*;


// ~~~~~ 3PIO Comments for StudExam class ~~~~~//
    //Purpose: Calcuate the avg and grade of valid students exams and display information by gender and grade tier groups
    //Input: Various. Depends on what method is called
    //Pre Condition: The object is created
    //Output: Various. Depends on what method is called
    //Post Condition: Depended upon what method is called
    //Note: n/a
// ~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~//
public class StudExam {

    private int stdId;
    private String studName;
    private String sex;
    private int exam1;
    private int exam2;
    private int exam3;
    private int sumOfExams;
    private double examAvg;
    private String studGrade;
    private final int NUM_OF_EXAMS = 3;
    private final int LOWER_ID = 1111;
    private final int UPPER_ID = 9999;
    private final int LOWER_EXAM = 0;
    private final int UPPER_EXAM = 100;
    private final int LOWER_A = 90;
    private final int LOWER_B = 80;
    private final int LOWER_C = 70;
    private final int LOWER_D = 60;


    // ~~~~~ 3PIO Comments for StudExam constructor (no args)~~~~~//
    //Purpose: set the defaults for the StudExam class
    //Input: n/a
    //Pre Condition: Object is created and constructor is called
    //Output: n/a
    //Post Condition: user input fields are set to 0 or null.
    //Note: n/a
    // ~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~//

    public StudExam(){
        stdId = 0;
        studName = "";
        sex = "";
        exam1 = 0;
        exam2 = 0;
        exam3 = 0;

    }
```

```
    // ~~~~~ 3PIO Comments for StudExam constructor (6 args)~~~~~//
    //Purpose: set the user data for the Class
    //Input: studID, studName, sex, exam1, exam2, exam3
    //Pre Condition: Object is created and class if called
    //Output: n/a
    //Post Condition: user input fields are set to given user input
    //Note: n/a
    // ~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~//

    public StudExam(int studIdInput, String studNameInput, String sexInput, int exam1Input, int exam2Input, int exam3Input){
        stdId = studIdInput;
        studName = studNameInput;
        sex = sexInput;
        exam1 = exam1Input;
        exam2 = exam2Input;
        exam3 = exam3Input;
    }

    // ~~~~~ 3PIO Comments for isDataValid Method ~~~~~//
    //Purpose:  determine if teh entered data is valid
    //Input: n/a
    //Pre Condition: The user inputs have been set
    //Output: true/false
    //Post Condition: The data is determined valid or invalid for use later
    //Note: n/a
    // ~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~//

    public boolean isDataValid(){
        return(exam1 >= LOWER_EXAM && exam1 <= UPPER_EXAM && exam2 >=LOWER_EXAM && exam2 <= UPPER_EXAM && exam3 >= LOWER_EXAM && exam3 <= UPPER_EXAM &&
        (sex.equals("M") || sex.equals("F")) && stdId >= LOWER_ID && stdId <= UPPER_ID);
    }

    // ~~~~~ 3PIO Comments for getDataFromFile method ~~~~~//
    //Purpose: get user data from a file
    //Input: Scanner object that is reading a file
    //Pre Condition: Scanner object is created and file exists
    //Output: n/a
    //Post Condition: user input fields are set to data from file
    //Note: without SubmitJ the "file" is just user input
    // ~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~//

    public void getDataFromFile (Scanner inFile){
        stdId  = inFile.nextInt();
        studName = inFile.next();
        sex = inFile.next();
        exam1 = inFile.nextInt();
        exam2 = inFile.nextInt();
        exam3 = inFile.nextInt();
        inFile.nextLine();

    }

    // ~~~~~ 3PIO Comments for printInvalidData method ~~~~~//
    //Purpose:  print out Invalid Data
    //Input: n/a
    //Pre Condition: User input fields are set and data is validated
    //Output: n/a
    //Post Condition: Invalid data is printed out with correct formatting.
    //Note:
    // ~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~//

    public void printInvalidData(){
        System.out.printf("%-10d %-10s %-3s %-5d %-5d %-5d ~~~> Invalid Data!\n", stdId, studName, sex, exam1, exam2, exam3);
    }
```

```
// ~~~~~ 3PIO Comments for examsAvg method ~~~~~//
//Purpose: calculate the Avg of the 3 exams
//Input: n/a
//Pre Condition: method is called and setSum method exists.
//Output: double of the Avg
//Post Condition: the Avg is calculated and returned
//Note: n/a
// ~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~//

public double examsAvg(){
    this.setSum();
    examAvg = (double)sumOfExams / NUM_OF_EXAMS;
    return examAvg;

}

// ~~~~~ 3PIO Comments for grade method ~~~~~//
//Purpose: determine the letter grade of the avg
//Input: n/a
//Pre Condition: the avg is set.
//Output: String of letter grade
//Post Condition: The letter grade is determined and returned
//Note:
// ~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~//
public String grade(){
    if (Math.ceil(examAvg) >=  LOWER_A && Math.ceil(examAvg) <= UPPER_EXAM){
        studGrade = "A";
        return studGrade;
    }
    else if (Math.ceil(examAvg) >=  LOWER_B && Math.ceil(examAvg) < LOWER_A){
        studGrade = "B";
        return studGrade;
    }
    else if (Math.ceil(examAvg) >=  LOWER_C && Math.ceil(examAvg) < LOWER_B){
        studGrade = "C";
        return studGrade;
    }
    else if (Math.ceil(examAvg) >=  LOWER_D && Math.ceil(examAvg) < LOWER_C){
        studGrade = "D";
        return studGrade;
    }
    else{
        studGrade = "F";
        return studGrade;
    }
}

// ~~~~~ 3PIO Comments for gradePlusMinus method ~~~~~//
//Purpose: adds plus or minus to grade
//Input: n/a
//Pre Condition: studGrade is calculated
//Output: n/a
//Post Condition: the plus/minus is appended to the grade if necessary.
//Note: n/a
// ~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~//
public void gradePlusMinus(){
    if (examAvg % 10 <= 3 && !studGrade.equals("F")){
        studGrade = studGrade + "-";
    }
    else if (examAvg % 10 <= 9 && examAvg >= 7 && !studGrade.equals("A") && !studGrade.equals("F")){
        studGrade = studGrade + "+";
    }
    else if (examAvg == 100){
        studGrade = studGrade + "+";
    }
}
```

```
// ~~~~~ 3PIO Comments for setSum method ~~~~~//
//Purpose:  calculate the sum of the exams for the avg methods
//Input: n/a
//Pre Condition: the exams are set to a value
//Output: n/a
//Post Condition: the sum is calculated and stored for use later
//Note: n/a
// ~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~//
public void setSum(){

    sumOfExams = exam1 + exam2 + exam3;

}

// ~~~~~ 3PIO Comments for setAvg method ~~~~~//
//Purpose: set the Avg of the students exams
//Input: n/a
//Pre Condition: Method is called; examsAvg method exists
//Output: n/a
//Post Condition: The Avg is calculated
//Note: n/a
// ~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~//
public void setAvg(){
    this.examsAvg();

}

    // ~~~~~ 3PIO Comments for getAvg method ~~~~~//
//Purpose: return the Avg
//Input: n/a
//Pre Condition: the Avg is calculated
//Output: double of the Avg
//Post Condition: the Avg is returned as a double
//Note: n/a
// ~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~//
public double getAvg(){
    return examAvg;

}

// ~~~~~ 3PIO Comments for setGrade method ~~~~~//
//Purpose: set the students grade
//Input: n/a
//Pre Condition: the avg is calculated
//Output: n/a
//Post Condition: The grade determined
//Note: n/a
// ~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~//
public void setGrade(){
    this.grade();
}

// ~~~~~ 3PIO Comments for getGrade method ~~~~~//
//Purpose: return the students grade
//Input: n/a
//Pre Condition: The grade is determined
//Output: String of the grade
//Post Condition: the grade is returned without the plus/minus
//Note: n/a
// ~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~//
public String getGrade(){
    return studGrade;
}

// ~~~~~ 3PIO Comments for printData method ~~~~~//
//Purpose: print the valid data
```

```
    //Input: n/a
    //Pre Condition: the data is determined to be valid
    //Output: n/a
    //Post Condition: the valid data is printed out in the correct formatting
    //Note: n/a
    // ~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~//
    public void printData(){

        System.out.printf("%-10d %-10s %-3s %-5d %-5d %-5d %.2f          %-5s\n", stdId, studName, sex, exam1, exam2, exam3, examAvg, studGrade);

    }

    // ~~~~~ 3PIO Comments for getSex method ~~~~~//
    //Purpose: return the students sex
    //Input: n/a
    //Pre Condition: the students sex is set
    //Output: String of the students sex
    //Post Condition: The students sex is returned for use later
    //Note: n/a
    // ~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~//
    public String getSex(){
        return sex;
    }

    // ~~~~~ 3PIO Comments for getStudId method ~~~~~//
    //Purpose:  return the students id
    //Input: n/a
    //Pre Condition: the students id is set
    //Output: String of the students id
    //Post Condition: The students id is returned for use later
    //Note:
    // ~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~//
    public String getStudId(){
        return Integer.toString(stdId);
    }

} // end of StudExam


~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~
~                              File: p2.java                               ~
~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~

// p2.java
//******************************************************************************************
// YOUR NAME: Jerome Gifford
//
// COURSE TITLE: Computer Programming II
//
// COURSE NUMBER: CS216
//
// PROF NAME: Moe Bidgoli
//
// ASSIGNMENT NUMBER: #2
//
// DUE DATE: 09-26-2016
//
// POSSIBLE POINTS: 10 Points
//
//PURPOSE: The purpose of this program is to take the input of a studenst Id, sex, and three exams scores and return
// a report by student with the avg of their exams, their grade, as well as a summary by grade tier and gender. This program also
// displays the highest avg and the id that corresponds with it.
//
//
//******************************************************************************************
```

```java
import java.io.*;
import java.util.*;
import java.text.DecimalFormat;

public class p2 {

    // ~~~~~ 3PIO Comments for Client side code ~~~~~//
        //Purpose: read in files with student information, call methods to perform task on information,
        // and results are given.
        //Input: none.
        //Pre Condition: program compiles.
        //Output:  none.
        //Post Condition: results are displayed.
        //Note: n/a
    // ~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~//

    public static void main(String[] args) {
            Scanner inFile = new Scanner(System.in);
            float validCounter = 0;
            int validA = 0;
            int validB = 0;
            int validC= 0;
            int validD = 0;
            int validF = 0;
            int validMale = 0;
            int validFemale = 0;
            String bestID = "";
            double bestAvg = 0;


            printHeader();
            while(inFile.hasNext())
            {
                StudExam studExam = new StudExam(); //create studExam object
                studExam.getDataFromFile(inFile); //call getDataFromFile method to grab the data from the input file.
                if(studExam.isDataValid()){ // call isDataValid method to determine if data is valid. Then print.
                    studExam.setAvg();
                    studExam.setGrade();
                    if (studExam.getGrade().equals("A"))
                        validA ++;
                    else if (studExam.getGrade().equals("B"))
                        validB ++;
                    else if (studExam.getGrade().equals("C"))
                        validC ++;
                    else if (studExam.getGrade().equals("D"))
                        validD ++;
                    else if (studExam.getGrade().equals("F"))
                        validF ++;

                    if (studExam.getSex().equals("M"))
                        validMale ++;
                    else
                        validFemale ++;

                    if (studExam.getAvg() > bestAvg){
                        bestAvg = studExam.getAvg();
                        bestID = studExam.getStudId();
                    }
                    studExam.gradePlusMinus();
                    studExam.printData();
                    validCounter ++;
                }
                else{
                    studExam.printInvalidData();
                }
```

```
            } // end of loop

            printSummary(validCounter, validA, validB, validC, validD, validF, validFemale, validMale, bestAvg, bestID);


    } //end of main

    // ~~~~~ 3PIO Comments for printHeader ~~~~~//
        //Purpose: print the header for the report
        //Input: n/a
        //Pre Condition: the method is called.
        //Output:  n/a
        //Post Condition: Header is printed out.
        //Note: n/a
    // ~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~//
    public static void printHeader(){
        System.out.println("~~~ Exam Report ~~~");
        System.out.printf("\n%10s %-10s %3s %5s %5s %5s %12s %5s\n", "student ID", "Name", "Sex", "Exam1", "Exam2", "Exam3", "Avg of Exams", "Grade");
        System.out.printf("%10s %-10s %3s %5s %5s %5s %12s %5s\n", "----------", "----", "---", "-----", "-----", "-----", "------------", "-----");
    }

    // ~~~~~ 3PIO Comments for printSummary ~~~~~//
        //Purpose: print the summary for the report
        //Input: all of teh validCounters, bestAvg, and bestId
        //Pre Condition: the method is calledmand all dats is valid and calculated
        //Output:  n/a
        //Post Condition: Summary is printed out.
        //Note: n/a
    // ~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~//
    public static void printSummary(float validCounter, int validA, int validB, int validC, int validD, int validF, int validFemale, int validMale, double bestA
vg, String bestID){
        DecimalFormat decimalFormat = new DecimalFormat("##.##%");

        //Print % of each grade tier
            System.out.printf("\n%10s %10s %10s %10s %10s\n", "% of A", "% of B", "% of C", "% of D", "% of F");
            System.out.printf("%10s %10s %10s %10s %10s\n", "------", "------", "------", "------", "------");
            if (validCounter > 0)
                System.out.printf("%10s %10s %10s %10s %10s\n", decimalFormat.format(validA/validCounter), decimalFormat.format(validB/validCounter),
                    decimalFormat.format(validC/validCounter), decimalFormat.format(validD/validCounter), decimalFormat.format(validF/validCounter));
            else
                System.out.printf("%10s %10s %10s %10s %10s\n", "0.00", "0.00", "0.00", "0.00", "0.00");

            //Print % of each sex
            if (validCounter > 0){
                System.out.println("\n>>> Female: " + decimalFormat.format(validFemale / validCounter));
                System.out.println(">>> Male: " + decimalFormat.format(validMale / validCounter));
            }
            else{
                System.out.println("\n>>> Female: 0.00%");
                System.out.println(">>> Male: 0.00%");
            }

            if (validCounter > 0){
            //Print best score
            System.out.println("\n~~~ The best exam performance is done by student with the ID: " + bestID + " with AVG of ");
            System.out.printf("%.2f", bestAvg);
            }
            else
                System.out.println("\n~~~ NO VALID ENTRIES");
            System.out.println("\n<* End of Report *>");
    }

}

===============================================================================
```

```
=                              Data Files                              =
======================================================================


~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~
~                        File: p2216f1.data                          ~
~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~


1234 Rose F 77 88 99
8765 Ken M 88 65 89
9999 Joe M 0 100 56
8895 Mary F 99 88 79




----------------------------------------------------------------------
-                          Execution                                 -
----------------------------------------------------------------------

~~~ Exam Report ~~~

student ID Name      Sex Exam1 Exam2 Exam3 Avg of Exams Grade
---------- ----      --- ----- ----- ----- ------------ -----
1234       Rose      F   77    88    99    88.00        B+
8765       Ken       M   88    65    89    80.67        B-
9999       Joe       M   0     100   56    52.00        F
8895       Mary      F   99    88    79    88.67        B+

    % of A     % of B     % of C     % of D     % of F
    ------     ------     ------     ------     ------
      0%         75%        0%         0%         25%

>>> Female: 50%
>>> Male: 50%

~~~ The best exam performance is done by student with the ID: 8895 with AVG of
88.67
<* End of Report *>

~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~
~                        File: p2216f2.data                          ~
~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~

1234 Rose F 77 88 99




----------------------------------------------------------------------
-                          Execution                                 -
----------------------------------------------------------------------

~~~ Exam Report ~~~

student ID Name      Sex Exam1 Exam2 Exam3 Avg of Exams Grade
---------- ----      --- ----- ----- ----- ------------ -----
1234       Rose      F   77    88    99    88.00        B+

    % of A     % of B     % of C     % of D     % of F
    ------     ------     ------     ------     ------
      0%         100%       0%         0%         0%

>>> Female: 100%
>>> Male: 0%

~~~ The best exam performance is done by student with the ID: 1234 with AVG of
```

```
88.00
<* End of Report *>

~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~
~                              File: p2216f3.data                             ~
~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~

8765 Ken Z 88 65 89


------------------------------------------------------------------------------
-                              Execution                                      -
------------------------------------------------------------------------------

~~~ Exam Report ~~~

student ID Name       Sex Exam1 Exam2 Exam3 Avg of Exams Grade
---------- ----       --- ----- ----- ----- ------------ -----
8765       Ken        Z   88    65    89    ~~~> Invalid Data!

    % of A     % of B     % of C     % of D     % of F
    ------     ------     ------     ------     ------
     0.00       0.00       0.00       0.00       0.00

>>> Female: 0.00%
>>> Male: 0.00%

~~~ NO VALID ENTRIES

<* End of Report *>

~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~
~                              File: p2216f4.data                             ~
~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~

1110 Rose F 77 88 99
8765 Ken Z 88 65 89
9999 Joe M 101 100 56
7643 Mike Z 77 -1 66
8895 Mary F 99 88 110



------------------------------------------------------------------------------
-                              Execution                                      -
------------------------------------------------------------------------------

~~~ Exam Report ~~~

student ID Name       Sex Exam1 Exam2 Exam3 Avg of Exams Grade
---------- ----       --- ----- ----- ----- ------------ -----
1110       Rose       F   77    88    99    ~~~> Invalid Data!
8765       Ken        Z   88    65    89    ~~~> Invalid Data!
9999       Joe        M   101   100   56    ~~~> Invalid Data!
7643       Mike       Z   77    -1    66    ~~~> Invalid Data!
8895       Mary       F   99    88    110   ~~~> Invalid Data!

    % of A     % of B     % of C     % of D     % of F
    ------     ------     ------     ------     ------
     0.00       0.00       0.00       0.00       0.00

>>> Female: 0.00%
>>> Male: 0.00%

~~~ NO VALID ENTRIES

<* End of Report *>
```

```
~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~
~                               File: p2216f5.data                           ~
~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~

1234 Rose F 77 88 99
8765 Ken M 88 65 89
9999 Joe M 0 100 56
8895 Mary F 99 88 79
3322 Lee M 99 99 99
8865 Ray M 71 70 70
9876 June F 60 60 59
6577 Grace F 88 99 78
1543 Abel M 90 90 90
6655 Alex F 60 60 60
9823 Alan M 80 80 80
5555 Beth F 89 98 78
4449 Cody F 70 70 70
1110 Tina F 77 88 99
8765 Hank Z 88 65 89
9999 Hope M 101 100 56
7643 Zina Z 77 -1 66
8895 Osie F 99 88 110




-------------------------------------------------------------------------------
-                               Execution                                     -
-------------------------------------------------------------------------------

~~~ Exam Report ~~~

student ID Name       Sex Exam1 Exam2 Exam3 Avg of Exams Grade
---------- ----       --- ----- ----- ----- ------------ -----
1234       Rose       F   77    88    99    88.00        B+
8765       Ken        M   88    65    89    80.67        B-
9999       Joe        M   0     100   56    52.00        F
8895       Mary       F   99    88    79    88.67        B+
3322       Lee        M   99    99    99    99.00        A
8865       Ray        M   71    70    70    70.33        C-
9876       June       F   60    60    59    59.67        D
6577       Grace      F   88    99    78    88.33        B+
1543       Abel       M   90    90    90    90.00        A-
6655       Alex       F   60    60    60    60.00        D-
9823       Alan       M   80    80    80    80.00        B-
5555       Beth       F   89    98    78    88.33        B+
4449       Cody       F   70    70    70    70.00        C-
1110       Tina       F   77    88    99    ~~~> Invalid Data!
8765       Hank       Z   88    65    89    ~~~> Invalid Data!
9999       Hope       M   101   100   56    ~~~> Invalid Data!
7643       Zina       Z   77    -1    66    ~~~> Invalid Data!
8895       Osie       F   99    88    110   ~~~> Invalid Data!

    % of A     % of B     % of C     % of D     % of F
    ------     ------     ------     ------     ------
    15.38%     46.15%     15.38%     15.38%      7.69%

>>> Female: 53.85%
>>> Male: 46.15%

~~~ The best exam performance is done by student with the ID: 3322 with AVG of
99.00
<* End of Report *>
```