

# CS 2316

## Homework 4

**Due: Wednesday, February 10th, before 11:55 PM**

**Out of 100 points**

**Files to submit: 1. HW4.py**

### **This is an INDIVIDUAL assignment!**

Collaboration at a reasonable level will not result in substantially similar code. Students may only collaborate with fellow students currently taking CS 2316, the TA's and the lecturer. Collaboration means talking through problems, assisting with debugging, explaining a concept, etc. You should not exchange code or write code for others.

For Help:

- TA Helpdesk – Schedule posted on class website.
- Email TA's or use T-Square Forums

Notes:

- *Do not forget to include the required comments and collaboration statement (as outlined on the course syllabus).*
- *Do not wait until the last minute to do this assignment in case you run into problems.*
- *Read the entire specifications document before starting this assignment.*

## **Premise**

Recently, the Office of Human Resources at Georgia Tech has been having problems keeping up with the records of employees. You've been selected as one of the best and brightest Industrial Engineering students in order to help OHR handle this problem. You have received many files of the following format:

The first line of the CSV file contains the names of each employee (Last, First). Every line after that begins with the business day number and is followed by the number of hours worked that day by each employee. Each employee can work 0-10 hours. Some records have been lost and have been filled in with N/A. Familiarize yourself with the CSV file before you begin.

## **Program specifics**

Here is the outline for your code. Read the description for all of the functions before you write any of them.

1. readCSVFile
2. writeCSVData
3. employeeInfo
4. fireEmployee
5. main

Function Name: **readCSVFile**

Parameters:  
None

Return Value: A tuple that contains two items:

2D List - the data structure containing the summary for each business day

Dictionary - the data structure containing the summary for each employee

Description:

Write a function that will ask the user to enter the name of a valid CSV file to read (for example, "employeeInfo.csv" - DO NOT hard code this value). In the event that the user provides an invalid file name or the file doesn't open, you should print a message such as "Invalid file name" and prompt the user to enter another valid file name. You should repeat, forcing the user to enter a valid filename until the file successfully opens.

Once the file is open, read in the data. Create a 2D list that consists of a list of lists. Each "inner" list should contain the following items in this order: the day number, the number of employees who worked that day, the minimum number of hours worked by an employee (not counting zero hour employees who did not actually work!), the maximum number of hours worked by an employee, and the average number of hours worked by all employees on that day. (again, not including zero hour employees in the average.)

For example, if on day 1 we had 4 employees, the 1<sup>st</sup> of whom worked 2.5 hours, the 2<sup>nd</sup> of whom worked 5.5 hours, the 3<sup>rd</sup> had no data available ("N/A") and the 4<sup>th</sup> who did not work that day, the input would look like:  
1, 2.5, 5.5, N/A, 0

Your (inner) list item generated for that day would look like:  
[1, 2, 2.5, 5.5, 4.0]

Keep in mind that there is possibility for the number of hours worked to be N/A. Make sure you do not include this value when calculating the number of employees who worked on a particular day and the average number of hours worked that day.

Also, create a dictionary, where each key is the name of an employee, and the corresponding value should be a list containing the following information: total number of hours worked by that employee (over all days), Total number of days they did work (WorkDays) and total number of days that the employee didn't work (had zero hours). Remember to close the file when you are done.

Note: The total number of days an employee didn't work is where number of hours equals 0 (For this count, ignore N/A days).

*Example returned values:*

list1[0] → [1, 7, 2, 6, 2.86]

dict1["Firstname Lastname"] → [455, 78, 6 ]

Function Name: **writeCSVData**

Parameters:

2D List - the data structure containing the summary for each business day

Return Value:

Integer - the number of business days the department was closed

Description:

Write a function that will accept one parameter, the 2D list containing the summary for each business day (as generated by the readCSVData function). Use this information to write all the records of this list into a CSV file called "dailySummary.csv" in the same order they are in the list, e.g.:

*Day, Employees, Minimum, Maximum, Average*

(Use the above as the contents of the headers on the first line of your file.) Remember to close the file when you're done writing in the information.

Also, calculate the number of days the department was closed. Hint: You can determine if the department is closed on any given day if the number of hours worked by all employees is 0. The function should return this count.

Function Name: **employeeInfo**

Parameters:

Dictionary – the data structure containing the summary for each employee  
Integer -- the number of business days the department was closed

Return Value:

None

Description:

Write a function that takes in the dictionary containing the summary for each employee. Use this information to write all the records of this dictionary into a CSV file called “workerSummary.csv” in the following format:

*EmployeeName, Total Hours, WorkDays, Personal Holidays*

(Use the above as the contents of the headers in the first line of your file.)

Note: a “Personal Holiday” is where the hours worked by an employee on a specific day is equal to 0 but does not include those days where the department is closed (department holidays). So, this will be a smaller number than in the employee summary dictionary if the number of days the entire department was closed is larger than zero.

Function Name: **fireEmployee**

Parameters:

Dictionary – the data structure containing the summary for each employee

Return Value:

Tuple – (name of employee who deserves a raise, name of employee to be fired)

Description:

Write a function that takes in the employee summary dictionary. Use this information to determine which employee deserves a raise and which employee should be fired. The employee with the most total worked hours gets the raise. If there are multiple with the same number of maximum hours, pick the first you encounter. The employee with the smallest number of total worked hours gets fired. If there are multiple with the same minimum number, you may return the first you encounter. Return the names of the two employees in a tuple.

Function Name: **main**

Parameters:

None

Return Value:

None

Description:

This function should perform all of the function calls such that your program processes the data. At the end, the function should print a statement to fire the employee determined in the function fireEmployee.

## Grading

You will earn points as follows for each function that works correctly according to the given specifications.

<b>readCSVFile</b>		<b>35</b>
Properly handles converting strings to numbers when needed (N/A)	5	
Records correctly formatted data into the list	5	
Records correctly formatted data into the dictionary	5	
Performs calculations correctly for the list	9	
Performs calculations correctly for the dictionary	9	
Closes the file before exiting function	2	
<b>writeCSVFile</b>		<b>20</b>
Writes the data to the CSV file in the correct format	10	
Correctly returns the number of days the department was closed	7	
Closes file before exiting function	3	
<b>employeeInfo</b>		<b>15</b>
Writes the data to the CSV file in the correct format	10	
Calculates the number of personal holidays correctly	5	
<b>fireEmployee</b>		<b>15</b>
Correctly determines which employee gets a raise	8	
Correctly determines which employee gets fired	7	
<b>main</b>		<b>15</b>
Correctly performs all function calls	10	
Print statement for employee to fire	5	

Homework created by Zeba Munshi