Course: MIS 661A Problem Solving Methods and Tools

Assignment: Project

Grading Scale: 0-100 points (with a weight of 14% for the course grade)

General Instructions

This assignment is for completion individually or in groups as assigned. Those working in groups will complete a peer evaluation (form to be provided), which will be considered in determining individual grades on the assignment. You may not consult with anyone else except for clarifications on the requirements. The assignment is to create a set of programs in Python that addresses the Specific Requirements below. All the code files and input/output data files should be in a single folder, which should be named such that it includes your last name(s). If there is more than one code file, the folder should also contain a Microsoft Word file with any brief instructions that may be needed by the user, e.g., the broad purpose of each code and/or data file, order in which they should be executed, etc. Zip the folder using the Windows utility (right-click on folder, Send To, Compressed (zipped) folder.) Upload the zipped folder to Project in Modules.

The project will be evaluated primarily on the extent to which it meets the Specific Requirements successfully as well as on robustness (in preventing/handling user/data errors), ease of use/maintenance/changes, code documentation, etc.

Specific Requirements

ABC Consulting, Inc. needs some support for its analysis of annual employee performance bonuses for its professional staff. Professional staff are one of two types: Consultants or Directors. All professional staff work on client projects. In addition, Directors are responsible for generating new revenue, i.e., sales. The *sales.txt* file contains a maximum of one entry per Director structured as the employee ID and the total sales for the year separated by a comma. There would be no entry for a Director who may not have had any sales in the year.

A metric used for figuring performance bonuses is the project utilization rate, which is the ratio of total hours worked annually on projects to a benchmark rate of 2,250 hours per year (based on a norm of 45 hours per week for 50 weeks in a year) rounded off to the nearest integer. For instance, an employee who works 1,800 hours across all assigned projects would have a utilization of 80% (i.e., 1800 / 2250 * 100). This metric could be more than 100% for an employee, e.g., works more than 45 hours per week, does not take time off, etc. It could be 0 if an employee has not worked on client projects all year. The *timesheet.txt* file contains the number of hours worked by each employee on each project during the year. There would be no entry for an employee who may not have had any client engagement in the year. (Project information has been removed from the file leaving only the employee ID and hours for a project separated by a comma; note that there could be multiple entries for an employee if multiple projects were involved.)

Consultants (but not Directors) are evaluated on their performance by their project managers, home office managers, clients, etc. These evaluations are qualitative, i.e., just text, although evaluators are asked to use certain keywords in their comments. All comments for an individual employee are compiled and stored in the *evaluation.txt* file, which has at most one entry per employee consisting of

the employee ID followed by the # symbol followed by the compiled comments. Since these evaluations are a factor in performance bonuses and typically all employees are not evaluated by the same number of evaluators, a metric is used. This metric is computed as the ratio of the number of positive keywords to the number of negative keywords in an employee's evaluation, rounded off to one decimal place. For instance, if the comments about an employee contain three positive keywords and two negative keywords, the employee's qualitative evaluation score would be 1.5 (i.e., 3/2) on this metric. If there are no evaluations for an employee (or no keywords in the evaluation), the employee is to be assigned a score of 1. If there are no negative keywords in the evaluation, the employee is to be assigned a score of 10. For now, positive keywords are: excellent, good, dependable, prompt. Negative keywords are: poor, error, unreliable, late.

Only those employees with a utilization rate above the 65th percentile of all employees are eligible for a bonus. Further, Consultants must have a qualitative evaluation score of 3.5 or better to receive a bonus. A single bonus percentage rate supplied by the management team is used for all those who qualify. For Consultants, this rate is applied to their base pay to compute the bonus. For Directors, the same rate is applied to their total sales to compute the bonus. However, the bonus is capped at $50,000 for Consultants and $150,000 for Directors.

The *emp_beg_yr.txt* file contains initial data for all employees structured as indicated by the first row in the comma separated file. Note that a JobCode of C indicates Consultant and D indicates Director. After all bonuses have been computed, a similar file – *emp_end_yr.txt* – file should be created for record keeping and querying/analytics purposes. However, this file should also contain the utilization rate, either the evaluation metric or total sales amount (depending on type of employee), and bonus amount (which should be 0 for those who do not qualify.) The header row for this file is identified below.

In addition to the above, note the following requirements:

1. The management team should be able to enter a bonus percentage rate and see the resulting total bonus payout, i.e., sum across all employees (to help budget for the bonus.) They should be able to try out different rates before finalizing the rate. The bonus calculated according to the finalized rate should be stored in the *emp_end_yr.txt* file (along with other data separated by commas formatted as in the *emp_beg_yr.txt* file) as indicated by this header row for the file:
   ID,LastName,FirstName,JobCode,BasePay,Utilization,Evaluation/Sales,Bonus
   Note that if an employee does not qualify for a bonus, a bonus value of 0 should be stored.
2. The program should allow users to search for a particular employee's information by entering the employee ID. In response, the details for an employee should be displayed in this format depending on the type of employee, i.e., for Consultants:

   ID: 101
   Consultant: Jack Smith
   Utilization: 30
   Evaluation score: 2.0
   Base pay: $50,000.00
   Bonus: $0

   or for Directors:

   ID: 102
   Director: Mary Jones

Utilization: 105
New sales: $1,100,000.00
Base pay: $300,000.00
Bonus: $55,000.00

3. Users should be able to obtain basic descriptive analytics (i.e., number of data points, minimum, maximum, median, mean, and standard deviation) for the utilization rate (across all employees), sales (for Directors only), evaluation score (for Consultants only), and bonus amount (for only those cases that qualified for a bonus.)
4. Users should be shown the details (in the format specified in #2 above in this list) of the person(s) with the maximum on the utilization metric and on the sales metric (so they can be sent a letter of recognition.)
5. Users should be able to obtain a list of Consultants with poor performance, if any, so they can be put on probation. Poor performance is based on a combination of two criteria: i) utilization less than one standard deviation below the mean, i.e., less than mean minus standard deviation, and ii) evaluation score less than 1.
6. Any data that could not be processed should be logged in an *error.txt* file. For instance, if there is a sales, timesheet, or evaluation record for an employee that is no longer with the company, that employee ID and the name of the relevant file/record, e.g., "101 in timesheet.txt" should be added to the error log file. The *emp_beg_yr.txt* file has an accurate list of all employees.

Note: Items 4-6 above are optional for students working individually on this project.