

**1999/2000 SOUTHERN CALIFORNIA REGIONAL
ACM INTERNATIONAL COLLEGIATE PROGRAMMING CONTEST**

**Problem 1
Vacation Accrual**

Automated Payroll Services (APS) provides payroll services to California employers. APS's executives have decided they need to enhance their product in order to retain existing customers and attract new ones. Although not required by law, most of their existing customers provide vacation to their employees and track it manually. Some of them also have "use it or lose it" vacation policies, which are a violation of current California labor law. APS has hired your team to add a module which will track vacation for salaried employees and bring their customers into compliance with California law.

Employers who do provide vacation are required to accrue it incrementally. A typical plan provides new employees with vacation at the rate of two (40 hour) weeks per year. After a certain number of years of service, the rate increases to three weeks per year; further service may eventually result in additional increases in the rate of vacation accrual. Some customers do not start to accrue vacation for employees until they have completed an initial "probationary period"—such employees initially accrue vacation at the rate of zero hours per pay period.

An employer is allowed to specify a reasonable maximum amount of vacation that an employee may have; once the limit is reached, an employee will earn no further vacation until s/he uses some of the vacation time already "on the books." If an employee leaves for any reason, s/he must be paid for all accrued vacation at his or her current rate of pay.

Under certain circumstances, a few employers allow employees to take vacation before they have accrued it. Such employees will have negative vacation balances until they have accrued enough vacation time to make up the vacation time used in advance.

Your team is to develop a program to produce a quarterly report showing the accrued vacation balance for each employee as of the end of the last pay period of a calendar quarter. You will be given the vacation accrual rates, employee hire dates, employee vacation balances as of the end of the last pay period of the previous quarter, and the dates each employee took vacation during the calendar quarter. The program must handle varying payroll cycles—some customers have weekly payrolls, others have bi-weekly, semi-monthly, or monthly payrolls.

Vacation accrual is handled as follows: At the end of each pay period, an employee is first credited with the vacation earned during the pay period, then deductions are made for whole eight-hour days taken during that pay period. If after these computations are made an employee would exceed the vacation limit, the vacation balance is reduced to that limit. Employees start to earn vacation as of the beginning of the first pay period after their hire date, and start to accrue vacation at a new rate as of the beginning of the first pay period after they have completed the required number of months of service.

The rate at which vacation is accrued per pay period is determined by taking the total number of hours per year an employee is entitled to and dividing by 52 for weekly pay periods, 26 for bi-weekly pay periods, 24 for semi-monthly pay periods, or 12 for monthly pay periods. The division is carried to four decimal places, with any remaining fraction always rounded up.

Input to your program will be a table of vacation rates, followed by a list of employee information. The vacation rate table consists of a series of lines, terminated by an empty line. The first line in the vacation rate table specifies the frequency of pay periods: weekly (W), bi-weekly (B), semi-monthly (S), or monthly (M). The letter representing the payroll frequency will appear in the first column. This letter will be followed by a space and the ending date of the last pay period of the current quarter in yyyy/mm/dd format. (Semi-monthly payroll periods always end on the 15th and last days of a month, while monthly payroll periods always end on the last day of a month.) Your program must be able to handle payroll periods ending in the years 1970 through 2099.

Problem 1
Vacation Accrual (continued)

Each remaining line in the vacation rate table contains a number representing months of service, a single space, the number of eight-hour days an employee who has completed the given number of months of service earns annually, another single space, and the maximum number of eight-hour vacation days such an employee may accrue. For example, the first row of the sample input means that an employee who has completed 240 months of service earns 23 days (184 hours) of vacation annually and may accrue up to 48 days of vacation. Entries in this table will appear in descending order of months of service. This table is ended by an empty line (a line containing no characters other than end-of-line.)

The remainder of the input will be employee information. Information for each employee will be a series of lines, ending with an empty line. The first input line for each employee will contain the employee name (last name, comma, space, first name) enclosed in single quotes starting in the first column, a single space, the employee start date in yyyy/mm/dd format, another single space, and the number of vacation hours the employee had at the end of the last pay period of the previous quarter according to the customer (expressed as a floating point number to four decimal places). The following lines will list the dates the employee took vacation in chronological order, each on a separate line starting in the first column in yyyy/mm/dd format. Employment is always considered continuous from the start date, and no employee started their employment before the year 1950.

Output from your program is to be a report of employees and their new vacation balances. Employees are to be listed in the report in alphabetical order (first by last name, then first name, ignoring case) along with their vacation balances expressed in hours to four decimal places. The employee names are to appear as they did in the input starting in the first column, and the vacation balances are to be printed right-justified ending in the 55th column. Print spaces between the employee name and the vacation balance column. No trailing spaces are to appear after the vacation balance.

Sample Input

```
M 1999/03/31
240 23 48
180 21 48
120 19 48
36 15 34
0 10 34

'Chandler, John' 1997/03/16 12.0000

'Anson, Jane' 1987/11/04 120.6667
1999/02/16
1999/02/17
1999/02/18
1999/02/19
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Sample Output

```
Anson, Jane                126.6668
Chandler, John              32.0001
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