

COMPUTER SCIENCE -2004

Paper-2

(PRACTICAL)

(Planning Session : Two hours)

(Examination Session: one hour)

INSTRUCTIONS

As it is a practical examination, the candidate is expected to do the following:

- (a) Write an algorithm for the selected problem.
- (b) Prepare an Input/Process/Output table indicating the required inputs for the problem. Also state the method/formula for solving the problem and mention the required output.
- (c) Write a program in C++, test run the program on the computer using the given test data and get a print out (hard copy) in the format specified in the problem along with the program listing.

*Solve any **one** of the following problems:*

- Q1. Numbers have different representations depending on the bases on which they are expressed. For example in base 3, the number 12 is written as 110 ($1 \times 3^2 + 1 \times 3^1 + 0 \times 3^0$). but in base 8 it is written as 14 ($1 \times 8^1 + 4 \times 8^0$).

Consider for example, the integers 2 and 5. Certainly these are not equal if base 10 is used for each. But suppose 12 was a base 3 number and 5 was a base 6 number then what happens, $12 \text{ base } 3 = 1 \times 3^1 + 2 \times 3^0$, or 5 base 6 or 5 base 10 (5 in any base is equal to 5 base 10). So 12 and 5 can be equal if you select the right bases for each of them.

Write a program to input two integers, X and Y, and calculate the smallest base for X and smallest base for Y (likely different from X) so that X and Y

represents the same value. The base associated with X and y will be between 1 and 20 (both inclusive). In representing these numbers the digits 0 to 9 have their usual decimal interpretations. The upper case alphabetic characters A through J represents digits 10 through 19 respectively.

Test your program for the following data and some random data

SAMPLE DATA

INPUT:

X = 12, Y = 5

OUTPUT:

12(base 3) = 5 (base 6)

INPUT:

X = 10, Y = A

OUTPUT:

10(base 10) = a (base 11).

INPUT:

X = 12, Y = 34

OUTPUT:

12(base 17) = 34 (base 5)

INPUT:

X = 123, Y = 456

OUTPUT:

1 2 3 is not equal to 456 in any base between 2 to 20.

INPUT:

X = 42, Y = 36

OUTPUT:

42(base 7) = 36 (base 8).

Q2. The computer department of the Agency of International Espionage is trying to decode intercepted messages. The agency's spies have determined that the enemy encodes messages by first converting all characters to their ASCII values and then reversing the string.

For example, consider A_z (the underscore is just to highlight the space). The ASCII values of A, <space>, z are 65, 32, 122 respectively. Concatenate them to get 6532122, then reverse this to get 2212356 as the code message.

Write a program which reads a coded message and decodes it. The coded message will not exceed 200 characters. It will contain only alphabets (A ... Z, and a ...z) and spaces. ASCII values of A ...Z are 65 ...90 and those of a ...z are 97 ...122. Test your program for the following data and some random data.

SAMPLE DATA:

INPUT;

Encode message:

2 3 1 2 1 7 9 8 6 2 3 1 0 1 9 9 5 0 1 8 7 2 3 7 9 2 3 1 0 1 8 1 1 7 9 2 7

OUTPUT:

THE DECODED MESSAGE: H ave a N ice D ay
 * * *

INPUT;

Encode message:

2 3 5 1 10 1 1 5 0 1 7 8 2 3 5 1 1 1 2 1 7 9 9 1 1 8 0 1 5 6 2 3 4 0 1 6 1 1 7 1 1 4
1 1 4 8

OUTPUT:

THE DECODED MESSAGE: T ruth A lways W ins
 * * *

(* should be capital letters)

Q3. the manager of a company wants to analyse the machine uses from the records to find the utilization of the machine. He wants to know how long each user used the machine. When the user wants to use the machine he must login to the machine and after finishing the work he must log off the machine.

Each log record consists of:

User identification number.

Login time and date.

Logout time and date.

Time consists of:

Hours

Minutes

Date consists of:

Day

Month

You may assume all logins and logouts are in the same year and there are 100 users at the most. The time format is 24 hours and minutes.

Design a program:

- (a) To find the duration for which each user has logged. Output all records along with the duration in hours (format hours: minutes).
- (b) Output the record of the user who logged for the longest duration. You may assume that no user will login for more than 40 minutes.

Test your program for the following data and some random data.

SAMPLE DATA;

INPUT:

Number of users : 3

USER IDENTIFICATION	LOGIN TIME & DATE		LOGOUT TIME & DATE	
149	20:10	20-12	2:50	21-12
173	12:30	20-12	12:30	21-12
142	16:20	20-12	16:30	20-12

OUTPUT:

USER IDENTIFICATION	LOGIN TIME & DATE	LOGOUT TIME & DATE	DURATION HOURS : MINS
149	20:10 20-12	2:50 21-12	6 : 40
173	12:30 20-12	12:30 21-12	24 : 00
142	16:20 20-12	16:30 20-12	00 : 10

THE USER WHO LOGGED IN FOR THE LONGEST DURATION:

173	12:30 20-12	12:30 21-12	24 : 00
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