Term Project: The MASTERMIND GAME

It is required to analyse, design and implement a Mastermind game using the "C" programming language. The computer based Mastermind game is a code braking game played between the computer and the player. The computer is the code-maker, while the player is the code-breaker. You should write a program that has the correct input, process and output for each phase of the game. The responses from the computer are defined below and it should be given as (X,Y) at each turn. The game and requirements from the program are defined below:

1) The computer randomly generates 4 digits (or a 4 digit number: i.e. a number between 0000 to 9999). The number can have repeating digits. For example 1000, 2222 or 9999 is also a valid number. A number such as 236 is to be assumed to be 0236 or number 58 is 0058. That is, the number will be completed to 4 digits worth by inserting zeros to the LHS of the number until 4 digits are obtained.
2) The (game) player has 10 tries limit to find the number kept in the memory of the computer. If the user tries 10 guesses and is still unsuccessful, the computer should respond: "OK!. You have run out of tries. The answer is: wxyz. Better luck next time!. Do you want to try again: ?". If Y (yes), the game will be started again. If N (no), then the user will be given some statistics about his/her games: "You have tried the Game of Mastermind X times with Y Successes and Z Failures!."
3) The program will congratulate the user on successful breaking-of the code by saying the following: "CONGRATULATIONS! You have cracked the secret code!. Do you want to try another game? "
4) The player can guess a number by entering the 4 digit number. The computer responds with an answer regarding the guess made.
5) The Computer Responses are as follows: (X, Y):
    (i) X: indicates the number of digits Correctly found and IN CORRECT POSITION!
    (ii) Y: indicates the number of digits Correctly found BUT NOT IN CORRECT POSITION.
    (iii) For example, if the computer's code is: (5,2,3,3) and the user's (codebreaker's) guess is: (3,2,6,3), then the codemaker's response would be (2,1), since the codebreaker has guessed the 2 and the "second" 3 correctly and in the correct positions, while having guessed a total of three digits correctly but one of them is in the wrong position.
6) NB: The project can be done alone or in groups of 2. Each group should work independently and develop and test their program before submitting. Modular and structured programming technique should be used. A short Project Report (written using MS-Word should include the architecture of the program code as a simplified Structure Chart. The "C" code should compile and run using the DevCpp package.

EXAMPLE GAME:

In order to understand how the computer will respond, lets assume that the number (or the "code") randomly generated by the computer is: **8527**. Below the user guesses numbers and adapts his/her strategy based on the replies by the computer:

Computer Code-Making and User GUESSES								COMPUTER RESPONSES				
GAME STEP	**SAMPLE USER EVALUATION/THOUGHT PROCESS**	**GUESSED NUMBER SEQUENCE**	**D4**	**D3**	**D2**	**D1**		**GAME STEP**	**RN**	**GCCP**	**GC but NCP**	**EXPLANATION**
1		COMPUTER Number in Memory	**8**	**5**	**2**	**7**			**N/A**	N/A	N/A	N/A
2	*Just try 1234 as a first guess (these are as good as any!)*	*Player – G1*	**1**	**2**	**3**	**4**		**3**	**(1)**	0	1	(0,1): 0 Numbers Guessed Correctly AND in Correct digit Position (GCCP) ; 1 number Guessed Correctly but NOT in Correct Position (GCNCP). --- (no:2)
4	*OK!. Only one of the numbers 1234 is in the memory and IT IS IN THE WRONG position!. Lets try (1) at a different position!! And 5,6,7 at other positions.*	*Player – G2*	**5**	**1**	**6**	**7**		**5**	**(2)**	1	1	(1,1): 2 numbers guessed correctly and one of them is in the correct position!. No indication as to which one is in correct position and which one is NOT!. Keep the code-braking player guessing!!!.

												1: for 7 (in CG and in CP) 1: for 5 (Correct digit but NOT in correct position!)
6	OK-My turn: two of the numbers are found but which ones I do not know. Lets try 5555 to eliminate 5.	*Player – G3*	**5**	**5**	**5**	**5**		**7**	**(3)**	1	0	(1,0): there is only one 5 in the code and one of them is in the correct place. (BUT WHICH ONE??? – the user needs to guess it)
8	WELL, I know that there is only one 5 in the code for sure, but I do not know its position exactly. Let me try 1111 to eliminate 1.	*Player – G4*	1	1	1	1		**9**	**(4)**	0	0	(0,0): there is no 1 in the code!. Total waste of a try!!!.
10	WoW!: I thought 1 was in the code, BUT I was WRONG!. Let me look at the previous guesses and responses I got to make an educated guess!!!. One of (2,3,4) and two of (5,6,7) is in the code. Let's eliminate 6.	*Player – G5*	6	6	6	6		**11**	**(5)**	0	0	(0,0): there is no 1 in the code!. Hi Hi Hi!. He missed another chance :-)…!
12	Oh my God!. I am running out of guesses. I will try 7.	*Player – G6*	**7**	**7**	**7**	**7**		**13**	**(6)**	1	0	(1,0): There is only one 7 and it is in the correct place.
14	OK!. 5 and 7 are there. One of (2,3,4) is also in the number. Let me try:	*Player – G7*	**2**	**5**	**7**	**8**		**15**	**(7)**	1	3	(1,3): Number 5 is in correct place and 2,7, and 8 are in the number

	2578											BUT in different positions.
16	WoW!. This is serious. I have found all the numbers!. Now, I need to position them correctly: 2 is Not in digit3. From STEP4-either 5 OR 7 is in correct position.	*Player – G8*	**5**	**7**	**2**	**8**		**17**	**(8)**	1	3	(1,3):
18	Assumed 5 in correct place leaving 5 and 8 in their places in Step16. This DID NOT increase the correct placing. Hence, 7 was in CORRECT place in S4. Place 7 to D1. Also, since 2 is NOT in D4 or D3, it must be in D2. This means that I can swap 5 and 8 too as a good try!..	*Player – G9*	**8**	**5**	**2**	**7**		**19**	**(9)**	4	0	CONGRATULATIONS! You have cracked the secret code!. Do you want to try another one?

Dx: Digit x (e.g. Digit 1/2/3 or 4) , Player-Gx: Player's GUESS# (G1… to G10)
RN: Response Number (by Computer), N/A: Not Applicable/Available,