

CS007A – Master Mind Project – Part 1

Master Mind is a logical game based on the old English game, *Bulls and Cows*. The object of the game is to guess four-digit number using a minimum number of attempts. All four digits in the number are different.

How to play Bulls and Cows

The game involves two players, a coder and a cracker. The coder (either a person or a computer) chooses the four-digit number with all different digits and keeps it secret. The cracker tries to guess the secret number. After a guess, the coder gives you information about number of digits which were correctly guessed but in the wrong place (they are called '*cows*') and how many are both the right digit and in the correct place (they are called '*bulls*').

For example, if the coder chooses the secret number 0419 and the cracker guesses 6039, then the coder scores this as 1 cow, since 0 is a digit in the secret number that's in the wrong place, and 1 bull (9 is in the right place.)

Your task is write a C++ program to simulate the operation of the game. The computer will play the role of the coder and use the random number generator from the `cstdlib` library to generate 4 different digits in an array of type `int` and then take guesses from the user and report back the number of cows and bulls in the user's guess in a loop that continues until the user has correctly guessed all 4 digits in the correct order.

Program 3-25 from the SOWC++ text, as shown below shows how to use the random number generator.

```
// This program demonstrates random numbers.
#include <iostream>
#include <cstdlib> // rand and srand
#include <ctime> // For the time function
using namespace std;

int main()
{
    // Get the system time.
    unsigned seed = time(0);

    // Seed the random number generator.
    srand(seed);

    // Display three random numbers.
    cout << rand() << endl;
    cout << rand() << endl;
    cout << rand() << endl;
    return 0;
}
```

Here is a flow chart for and the shell of the program to guide you.

```
// Geoff Hagopian
// This program simulates the play of cows and bulls.

#include <iostream>
#include <cstdlib> // rand and srand
#include <ctime> // For the time function
using namespace std;

int main()
{
    // declare and initialize arrays for the secret
    // code and the guesses

    // declare and initialize variables for
    // bulls and cows

    // Seed the random number generator.

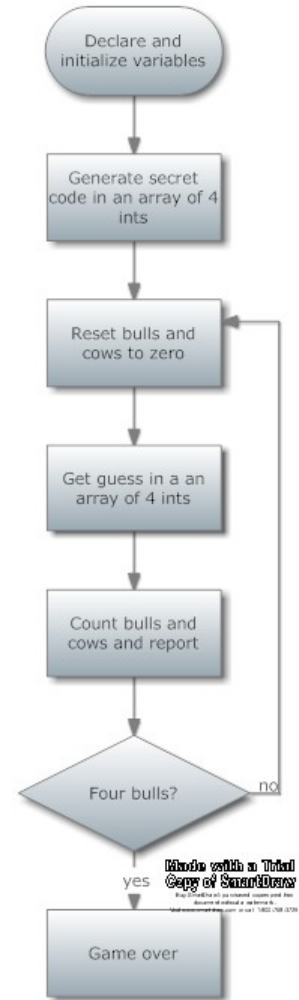
    // write a do/while loop to put four
    // different digits in the secret code array

    // Print out the secret code
    // This is for debugging and should be
    // commented out when you finish the code
    /*for(int i = 0; i < 4; ++i)
    {
        cout << scode[i];
    }*/
    // Write a while loop for the game loop
    while(bulls < 4)
    {
        // reset cows and bulls

        // get the cracker's guess

        // count cows and bulls

        // report cows and bulls
    } // end the game loop
    return 0;
}
```



Here is some typical output from playing the game with your program. Can you figure out what the secret number must be?

Enter your guess as four digits separated by spaces:
0 0 1 2

That's 2 cows and 0 bulls.
Enter your guess as four digits separated by spaces:
3 3 4 5

That's 1 cows and 0 bulls.
Enter your guess as four digits separated by spaces:
6 6 7 8

That's 0 cows and 0 bulls.
Enter your guess as four digits separated by spaces:
0 3 9 9

That's 1 cows and 1 bulls.
Enter your guess as four digits separated by spaces:
1 2 9 4

That's 3 cows and 0 bulls.
Enter your guess as four digits separated by spaces:
2 1 3 9

That's 0 cows and 3 bulls.
Enter your guess as four digits separated by spaces: