Mastermind (Board Game)

Minkyu Ray Park

CIS 17A

Summer 2019

46097

**About the Mastermind Board Game:**

Mastermind is a logic utilizing coding game that challenges user to solve the random codes.

Total of 6 colors are available and 4 random colors are chosen.

User must guess all the right colors as well as getting the colors in the right place to win the game.

The colors may overlap!!

There will be only 10 turns for the user to experiment different color codes. User must guess in 10 tries.

In the difficulty level 1, the Program will prompt the user if the color is right and the place is right INDIVIDUALLY.

In the difficulty level 2, the Program will prompt the user if the color is right and the place is right BROADLY.

The user must think it through to solve the code.

**How I started coding:**

Utilized random number generator.

Begin creating structures and EMUMs.

Declared all the variables needed and created two different levels.

One level will show the user if each of the guesses are in the right color or right place specifically.

Another level will show the user plain numbers to make hint broader for them to figure it out by using more logics.

Opened file to stream all the outputs into.

Converted random numbers (1-6) into colors.

Created while loop for play again function.

Used if statement to help the user pick which level of difficulty they would like to play in and to check if User guess is correct.

R = Red, B = Blue, G = Green, Y = Yellow, O = Orange,

P = Purple.

To convert numbers into characters and to set the random answers, I utilized Ternary Op and one-dimensional array using structure function.

Mainly used Array to organize the numbers.

For Loop was used to make turn counter.

Used structures, If statements, Ternary Op, Boolean statements and Arrays for the user’s guesses.

When all Boolean codes matched, returned true, displayed Win else it displayed Lose.

**Code:**

/\*

\* File: main.cpp

\* Author: Minkyu R. Park

\* Created on July 17, 2019, 08:30 PM

\* Purpose: Project 1: Mastermind V4

\*/

//System Libraries

#include <iostream>

#include <cstdlib>

#include <ctime>

#include <cstring>

#include <fstream>

using namespace std;

//User Libraries

enum colors {

RED, BLUE, GREEN, YELLOW, ORANGE, //ENUM COLORS

PURPLE

};

//Structures

struct guesses{

char guess1, guess2, guess3, guess4; //STRUCTURE GUESSES

};

//Global Constants - Math/Physics Constants, Conversions,

// 2-D Array Dimensions

const int SIZE=4;

const int NUM\_GUESS=10;

//Function Prototypes

void displayIntro();

void answer(colors , char \*);

bool check1(guesses \*, char []);

bool check2(char \*, char []);

char LEVEL(char);

//Execution Begins Here

int main(int argc, char\*\* argv) {

//Set the random number seed

srand(static\_cast<unsigned int>(time(0)));

//Your Code Goes here

guesses guess[NUM\_GUESS];

char ans[SIZE],test[SIZE]; //Number of Answers Array

bool playAgain = true;

char symbol;

char choice;

string level; //String level comment

level = "\*\*\*DIFFICULTY LEVEL\*\*\* ";

//Reading an Entire Binary File

streampos memory;

char \*memBlock;

ifstream file ("stats.txt", ios::in | ios::binary | ios::ate);

if (file.is\_open()){

memory = file.tellg();

memBlock = new char [memory];

file.seekg(0, ios::beg);

file.read(memBlock, memory);

file.close();

//Play Again Loop

while (playAgain){

choice = LEVEL(choice);

if (choice >= '1' && choice <= '2'){

switch (choice){

case '1':

{

cout<<level<<" 1 "<<endl;

//Randomize the Answer

colors set = static\_cast<colors>(rand()%PURPLE);

//Set the Answer

answer(set, ans);

//Output data

displayIntro(); //Display instruction

check1(guess, ans);//Check if User gets the correct answer

}

case '2':

{

cout<<level<<" 2 "<<endl;

//Randomize the Answer

colors set = static\_cast<colors>(rand()%PURPLE);

//Set the Answer

answer(set, ans);

//Output data

displayIntro(); //Display instruction

check2(test, ans);

}

}

}

cout<<"Would you like to play again? (Y or N)"<<endl;

cin>>symbol;

playAgain = (symbol == 'Y' || symbol == 'y') ? true : false;

}

delete[] memBlock;

}

else cout<<"Unable to open file";

//Exit stage right!

return 0;

}

//Display intro and instructions on how to play

void displayIntro()

{

cout << "======================= Welcome to Mastermind =======================" << endl;

cout << "Mastermind is a game of logic." << endl;

cout << "The goal is to guess the correct four color combination" << endl;

cout << "by using your previous guesses as clues." << endl;

cout << "Find specific colors and the orders of the colors"

<<" that matches exactly with the answer" << endl;

cout << "To guess, enter the first letter of each color." << endl;

cout << "The colors consist of : R=RED, B=BLUE, G=GREEN, Y=YELLOW,"

<< " O=ORANGE,P=PURPLE" << endl;

cout << "An sample guess would be look like this: R R G B" << endl;

cout << "=====================================================================" << endl;

cout << endl;

}

//Set answers for Difficulty Level 1

void answer(colors set, char \*ans) {

\*(ans + 0) = ((set + 0) == 0 ? 'R' : ((set + 0) == 1 ? 'B' :

((set + 0) == 2 ? 'G' : ((set + 0) == 3 ? 'Y' :

((set + 0) == 4 ? 'O' : 'P')))));

\*(ans + 1) = ((set + 1) == 0 ? 'R' : ((set + 1) == 1 ? 'B' :

((set + 1) == 2 ? 'G' : ((set + 1) == 3 ? 'Y' :

((set + 1) == 4 ? 'O' : 'P')))));

\*(ans + 2) = ((set + 2) == 0 ? 'R' : ((set + 2) == 1 ? 'B' :

((set + 2) == 2 ? 'G' : ((set + 2) == 3 ? 'Y' :

((set + 2) == 4 ? 'O' : 'P')))));

\*(ans + 3) = ((set + 3) == 0 ? 'R' : ((set + 3) == 1 ? 'B' :

((set + 3) == 2 ? 'G' : ((set + 3) == 3 ? 'Y' :

((set + 3) == 4 ? 'O' : 'P')))));

}

//Checking if the User gets the answer right for Difficulty Level 1

bool check1(guesses \*guess, char ans[]){

bool colorR[4];

bool placeR[4];

for (int i=0; i<4; i++){

colorR[i]=false;

placeR[i]=false;

}

for (int i=0; i<NUM\_GUESS; i++){

cout<<"Again, the colors consist of : R=RED, B=BLUE, G=GREEN, Y=YELLOW,"

<< " O=ORANGE,P=PURPLE" <<endl;

cout <<"Please input your guesses! "<< endl;

cin>>guess[0].guess1>>guess[1].guess2>>guess[2].guess3>>guess[3].guess4;

if (guess[0].guess1 == ans[0]){

placeR[0] = true;

cout<<"You guessed Answer 1 Right!"<<endl;

}else if (guess[0].guess1 == ans[1] || guess[0].guess1 == ans[2] || guess[0].guess1 == ans[3]){

colorR[0] = true;

cout<<"Right color but Wrong place"<<endl;

}else{

placeR[0] == false;

colorR[0] == false;

cout<<"Try again"<<endl;

}

if (guess[1].guess2 == ans[1]){

placeR[1] = true;

cout<<"You guessed Answer 2 Right!"<<endl;

}else if (guess[1].guess2 == ans[0] || guess[1].guess2 == ans[2] || guess[1].guess2 == ans[3]){

colorR[1] = true;

cout<<"Right color but Wrong place"<<endl;

}else{

placeR[1] == false;

colorR[1] == false;

cout<<"Try again"<<endl;

}

if (guess[2].guess3 == ans[2]){

placeR[2] = true;

cout<<"You guessed Answer 3 Right!"<<endl;

}else if (guess[2].guess3 == ans[0] || guess[2].guess3 == ans[1] || guess[2].guess3 == ans[3]){

colorR[2] = true;

cout<<"Right color but Wrong place"<<endl;

}else{

placeR[2] == false;

colorR[2] == false;

cout<<"Try again"<<endl;

}

if (guess[3].guess4 == ans[3]){

placeR[3] = true;

cout<<"You guessed Answer 4 Right!"<<endl;

}else if (guess[3].guess4 == ans[0] || guess[3].guess4 == ans[1] || guess[3].guess4 == ans[2]){

colorR[3] = true;

cout<<"Right color but Wrong place"<<endl;

}else{

placeR[3] == false;

colorR[3] == false;

cout<<"Try again"<<endl;

}

//End game

if (placeR[0] && placeR[1] && placeR[2] && placeR[3]){

cout<<"You won! Congrats!"<<endl;

return true;

}else if (i == NUM\_GUESS-1){

cout<<"You lost! Sorry, try again..."<<endl;

cout<<"The answer was..."<<endl;

cout<<ans[0]<<" "<<ans[1]<<" "<<ans[2]<<" "<<ans[3]<<endl;

return false;

}

cout<<endl;

}

cout<<endl;

}

//Checking if the User gets the answer right for Difficulty Level 2

bool check2(char \*test, char \*ans){

int allRight=0;

int justColor=0;

int temp;

bool colorR[4];

bool placeR[4];

bool allAnswers;

bool inList = false;

for (int i = 0; i < 4; i++){

colorR[i] = false;

placeR[i] = false;

}

cout<<"This is more difficult version!"<<endl;

cout<<"The more tries accumulated, hint becomes more confusing because it will add up"<<endl;

cout<<endl;

cout<<"GOOD LUCK!!!"<<endl;

cout<<endl;

for (int i=0; i<NUM\_GUESS; i++){

cout<<"Again, the colors consist of : R=RED, B=BLUE, G=GREEN, Y=YELLOW,"

<<" O=ORANGE,P=PURPLE"<<endl;

cout<<"Please input your guesses! "<< endl;

cin>>test[0]>>test[1]>>test[3]>>test[4];

allAnswers = false;

for (int i=0; i<4; i++){

if (test[i]==ans[i]){

allRight++;

placeR[i] = true;

}

}

for (int i=0; i<4; i++){

if (!placeR[i]){

for (int j=0; j<4; j++){

if (!placeR[j] && i != j){

if (test[i] == ans[j] && !colorR[j]){

inList = true;

temp = j;

}

}

}

if (inList){

justColor++;

inList = false;

colorR[temp] = true;

}

}

}

//End game

if (allRight == 4){

cout<<"You won! Congrats!"<<endl;

allAnswers = true;

return true;

}else{

cout<<"Just Color Correct-> "<<justColor<<" "<<

"Color and Place Correct -> "<<allRight<<endl;

allAnswers = false;

}

if (i == NUM\_GUESS-1){

cout<<"You lost! Sorry, try again..."<<endl;

cout<<"The answer was..."<<endl;

cout<<ans[0]<<" "<<ans[1]<<" "<<ans[2]<<" "<<ans[3]<<endl;

return false;

}

cout<<endl;

}

cout<<endl;

}

char LEVEL(char choice){

do {

cout << "Welcome to the Logic based game called Mastermind!"<<endl;

cout << "This version of Mastermind is more than just code solving game!"<<endl;

cout << "Think of it as code and riddle solving game"<<endl;

cout << "To continue, please choose from the following Menu" << endl;

cout << "Type 1 for MasterMind Difficulty Level 1" << endl;

cout << "Type 2 for MasterMind Difficulty Level 2" << endl;

cin>>choice;

} while (choice == 1 || choice == 2);

return choice;

}

**END OF CODE.**

**Thank You for Reviewing.**

**Reference:**

“Starting Out with C++: From Control Structures through Objects” Gaddis, Tony. 8th Edition. (Textbook)