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| Project #3: Resistor Color Code Class | |
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# Print Outs

## Main.cpp:

#include <iostream>

#include <string>

#include "Resistance.h"

using namespace std;

int main ()

{

double userRes;

int userTol;

string col1, col2, col3, col4;

while (userRes != -1 || userTol != -1) {

if(userTol == -1)

break;

cout << "Enter -1 to exit program...\n";

cout << "Please enter the desired resistance value in ohms: ";

cin >> userRes;

if(userRes == -1)

break;

while(userRes < 10 || userRes == 0 || userRes > 1000000) {

cout << "Please enter a valid resistance value. Values must be between 10 and 1,000,000 ohms, and \n"

<< "must be positive: ";

cin >> userRes;

}

cout << "\nPlease enter the desired tolerance as a percentage (5,10, or 20): ";

cin >> userTol;

cout << endl;

while(userTol != 5 && userTol !=10 && userTol != 20 && userTol != -1) {

cout << "Please enter a valid tolerance value. Values must be either 5, 10, or 20: "

<< endl;

cin >> userTol;

}

Resistance userValue(userRes, userTol);

userValue.getResistance(userRes, userTol, col1, col2, col3, col4);

cout << "Closest standard value is: " << userRes << " ohms" << endl

<< "Color band A: " << col1 << endl

<< "Color band B: " << col2 << endl

<< "Color band C: " << col3 << endl

<< "Color band D: " << col4 << endl << endl;

cout << "The max resistance with a " << userValue.getTolerance() << "% tolerance is: "

<< userValue.Rmax() << endl;

cout << "The minimum resistance with a " << userValue.getTolerance() << "% tolerance is: "

<< userValue.Rmin() << endl << endl;

}

return 0;

}

## Resistance.cpp:

#include <iostream>

#include <string>

#include <fstream>

#include <cmath>

#include "Resistance.h"

using namespace std;

//constructor

Resistance::Resistance(double R, int T) {

tolerance = T;

Get\_Standard\_Resistance(R, T);

}

void Resistance::Get\_Standard\_Resistance(double R, int T) {

//Temporary variables not included in class

double closestResistance = -1;

int diff1 = 10000, tdiff;

string tband1,tband2,tband3,tband4;

if (T == 5)

inFile.open("Resistors\_5\_Percent.txt");

else if (T == 10)

inFile.open("Resistors\_10\_Percent.txt");

else

inFile.open("Resistors\_20\_Percent.txt");

//To get to the "closest resistance value", I implemented a max difference logic. I assumed the user wouldn't

//the largest possible difference was 10000

while(inFile >> resistance >> band1 >> band2 >> band3 >> band4) {

tdiff = abs(R-resistance);

if(tdiff<diff1) {

diff1 = tdiff;

closestResistance = resistance;

tband1 = band1;

tband2 = band2;

tband3 = band3;

tband4 = band4;

}}

resistance = closestResistance;

band1 = tband1;

band2 = tband2;

band3 = tband3;

band4 = tband4;

inFile.close();

}

void Resistance::getResistance(double &res, int &tol, string& b1, string& b2, string& b3, string& b4) {

res = resistance;

tol = tolerance;

b1 = band1;

b2 = band2;

b3 = band3;

b4 = band4;

}

int Resistance::getTolerance(){

return tolerance;

}

//The maximum resistance within tolerance ex: if entered resistance is 3300 with a 10%

//tolerance, then Rmax should return 3630

double Resistance::Rmax() {

double maxRes = resistance + resistance\*tolerance/100;

return maxRes;

}

//The minimum resistance within tolerance ex: if entered resistance is 3300 with a 10%

//tolderance, then Rmin should be 2970

double Resistance::Rmin() {

double minRes = resistance - resistance\*tolerance/100;

return minRes;

}

## Resistance.h:

#include <iostream>

#include <string>

#include <fstream>

#include <cmath>

using namespace std;

class Resistance {

private:

double resistance;

int tolerance;

string band1, band2, band3, band4;

ifstream inFile;

public:

Resistance(double, int);

void Get\_Standard\_Resistance(double, int);

void getResistance(double&, int&, string&, string&, string&, string&);

int getTolerance();

double Rmax();

double Rmin();

};

# Data Files

## Resistors\_5\_Percent.txt:

10 Brown Black Black Gold

11 Brown Brown Black Gold

12 Brown Red Black Gold

13 Brown Orange Black Gold

15 Brown Green Black Gold

16 Brown Blue Black Gold

18 Brown Grey Black Gold

20 Red Black Black Gold

22 Red Red Black Gold

24 Red Yellow Black Gold

27 Red Violet Black Gold

30 Orange Black Black Gold

33 Orange Orange Black Gold

36 Orange Blue Black Gold

39 Orange White Black Gold

43 Yellow Orange Black Gold

47 Yellow Violet Black Gold

51 Green Brown Black Gold

56 Green Blue Black Gold

62 Blue Red Black Gold

68 Blue Grey Black Gold

75 Violet Green Black Gold

82 Grey Red Black Gold

91 White Brown Black Gold

100 Brown Black Brown Gold

110 Brown Brown Brown Gold

120 Brown Red Brown Gold

130 Brown Orange Brown Gold

150 Brown Green Brown Gold

160 Brown Blue Brown Gold

180 Brown Grey Brown Gold

200 Red Black Brown Gold

220 Red Red Brown Gold

240 Red Yellow Brown Gold

270 Red Violet Brown Gold

300 Orange Black Brown Gold

330 Orange Orange Brown Gold

360 Orange Blue Brown Gold

390 Orange White Brown Gold

430 Yellow Orange Brown Gold

470 Yellow Violet Brown Gold

510 Green Brown Brown Gold

560 Green Blue Brown Gold

620 Blue Red Brown Gold

680 Blue Grey Brown Gold

750 Violet Green Brown Gold

820 Grey Red Brown Gold

910 White Brown Brown Gold

1000 Brown Black Red Gold

1100 Brown Brown Red Gold

1200 Brown Red Red Gold

1300 Brown Orange Red Gold

1500 Brown Green Red Gold

1600 Brown Blue Red Gold

1800 Brown Grey Red Gold

2000 Red Black Red Gold

2200 Red Red Red Gold

2400 Red Yellow Red Gold

2700 Red Violet Red Gold

3000 Orange Black Red Gold

3300 Orange Orange Red Gold

3600 Orange Blue Red Gold

3900 Orange White Red Gold

4300 Yellow Orange Red Gold

4700 Yellow Violet Red Gold

5100 Green Brown Red Gold

5600 Green Blue Red Gold

6200 Blue Red Red Gold

6800 Blue Grey Red Gold

7500 Violet Green Red Gold

8200 Grey Red Red Gold

9100 White Brown Red Gold

10000 Brown Black Orange Gold

11000 Brown Brown Orange Gold

12000 Brown Red Orange Gold

13000 Brown Orange Orange Gold

15000 Brown Green Orange Gold

16000 Brown Blue Orange Gold

18000 Brown Grey Orange Gold

20000 Red Black Orange Gold

22000 Red Red Orange Gold

24000 Red Yellow Orange Gold

27000 Red Violet Orange Gold

30000 Orange Black Orange Gold

33000 Orange Orange Orange Gold

36000 Orange Blue Orange Gold

39000 Orange White Orange Gold

43000 Yellow Orange Orange Gold

47000 Yellow Violet Orange Gold

51000 Green Brown Orange Gold

56000 Green Blue Orange Gold

62000 Blue Red Orange Gold

68000 Blue Grey Orange Gold

75000 Violet Green Orange Gold

82000 Grey Red Orange Gold

91000 White Brown Orange Gold

100000 Brown Black Yellow Gold

110000 Brown Brown Yellow Gold

120000 Brown Red Yellow Gold

130000 Brown Orange Yellow Gold

150000 Brown Green Yellow Gold

160000 Brown Blue Yellow Gold

180000 Brown Grey Yellow Gold

200000 Red Black Yellow Gold

220000 Red Red Yellow Gold

240000 Red Yellow Yellow Gold

270000 Red Violet Yellow Gold

300000 Orange Black Yellow Gold

330000 Orange Orange Yellow Gold

360000 Orange Blue Yellow Gold

390000 Orange White Yellow Gold

430000 Yellow Orange Yellow Gold

470000 Yellow Violet Yellow Gold

510000 Green Brown Yellow Gold

560000 Green Blue Yellow Gold

620000 Blue Red Yellow Gold

680000 Blue Grey Yellow Gold

750000 Violet Green Yellow Gold

820000 Grey Red Yellow Gold

910000 White Brown Yellow Gold

1000000 Brown Black Green Gold

## Resistors\_10\_Percent:

10 Brown Black Black Silver

12 Brown Red Black Silver

15 Brown Green Black Silver

18 Brown Grey Black Silver

22 Red Red Black Silver

27 Red Violet Black Silver

33 Orange Orange Black Silver

39 Orange White Black Silver

47 Yellow Violet Black Silver

56 Green Blue Black Silver

68 Blue Grey Black Silver

82 Grey Red Black Silver

100 Brown Black Brown Silver

120 Brown Red Brown Silver

150 Brown Green Brown Silver

180 Brown Grey Brown Silver

220 Red Red Brown Silver

270 Red Violet Brown Silver

330 Orange Orange Brown Silver

390 Orange White Brown Silver

470 Yellow Violet Brown Silver

560 Green Blue Brown Silver

680 Blue Grey Brown Silver

820 Grey Red Brown Silver

1000 Brown Black Red Silver

1200 Brown Red Red Silver

1500 Brown Green Red Silver

1800 Brown Grey Red Silver

2200 Red Red Red Silver

2700 Red Violet Red Silver

3300 Orange Orange Red Silver

3900 Orange White Red Silver

4700 Yellow Violet Red Silver

5600 Green Blue Red Silver

6800 Blue Grey Red Silver

8200 Grey Red Red Silver

10000 Brown Black Orange Silver

12000 Brown Red Orange Silver

15000 Brown Green Orange Silver

18000 Brown Grey Orange Silver

22000 Red Red Orange Silver

27000 Red Violet Orange Silver

33000 Orange Orange Orange Silver

39000 Orange White Orange Silver

47000 Yellow Violet Orange Silver

56000 Green Blue Orange Silver

68000 Blue Grey Orange Silver

82000 Grey Red Orange Silver

100000 Brown Black Yellow Silver

120000 Brown Red Yellow Silver

150000 Brown Green Yellow Silver

180000 Brown Grey Yellow Silver

220000 Red Red Yellow Silver

270000 Red Violet Yellow Silver

330000 Orange Orange Yellow Silver

390000 Orange White Yellow Silver

470000 Yellow Violet Yellow Silver

560000 Green Blue Yellow Silver

680000 Blue Grey Yellow Silver

820000 Grey Red Yellow Silver

1000000 Brown Black Green Silver

## Resistors\_20\_Percent:

10 Brown Black Black None

15 Brown Green Black None

22 Red Red Black None

33 Orange Orange Black None

47 Yellow Violet Black None

68 Blue Grey Black None

100 Brown Black Brown None

150 Brown Green Brown None

220 Red Red Brown None

330 Orange Orange Brown None

470 Yellow Violet Brown None

680 Blue Grey Brown None

1000 Brown Black Red None

1500 Brown Green Red None

2200 Red Red Red None

3300 Orange Orange Red None

4700 Yellow Violet Red None

6800 Blue Grey Red None

10000 Brown Black Orange None

15000 Brown Green Orange None

22000 Red Red Orange None

33000 Orange Orange Orange None

47000 Yellow Violet Orange None

68000 Blue Grey Orange None

100000 Brown Black Yellow None

150000 Brown Green Yellow None

220000 Red Red Yellow None

330000 Orange Orange Yellow None

470000 Yellow Violet Yellow None

680000 Blue Grey Yellow None

1000000 Brown Black Green None

# Test Cases:

Enter -1 to exit program...

Please enter the desired resistance value in ohms: -69

Please enter a valid resistance value. Values must be between 10 and 1,000,000 ohms, and

must be positive: 20000000

Please enter a valid resistance value. Values must be between 10 and 1,000,000 ohms, and

must be positive: 9

Please enter a valid resistance value. Values must be between 10 and 1,000,000 ohms, and

must be positive: 270

Please enter the desired tolerance as a percentage (5,10, or 20): 69

Please enter a valid tolerance value. Values must be either 5, 10, or 20:

5

Closest standard value is: 270 ohms

Color band A: Red

Color band B: Violet

Color band C: Brown

Color band D: Gold

The max resistance with a 5% tolerance is: 283.5

The minimum resistance with a 5% tolerance is: 256.5

Enter -1 to exit program...

Please enter the desired resistance value in ohms: 3399.9

Please enter the desired tolerance as a percentage (5,10, or 20): 5

Closest standard value is: 3300 ohms

Color band A: Orange

Color band B: Orange

Color band C: Red

Color band D: Gold

The max resistance with a 5% tolerance is: 3465

The minimum resistance with a 5% tolerance is: 3135

Enter -1 to exit program...

Please enter the desired resistance value in ohms: 44444

Please enter the desired tolerance as a percentage (5,10, or 20): 5

Closest standard value is: 43000 ohms

Color band A: Yellow

Color band B: Orange

Color band C: Orange

Color band D: Gold

The max resistance with a 5% tolerance is: 45150

The minimum resistance with a 5% tolerance is: 40850

Enter -1 to exit program...

Please enter the desired resistance value in ohms: 6300000

Please enter a valid resistance value. Values must be between 10 and 1,000,000 ohms, and

must be positive: 50

Please enter the desired tolerance as a percentage (5,10, or 20): 10

Closest standard value is: 47 ohms

Color band A: Yellow

Color band B: Violet

Color band C: Black

Color band D: Silver

The max resistance with a 10% tolerance is: 51.7

The minimum resistance with a 10% tolerance is: 42.3

Enter -1 to exit program...

Please enter the desired resistance value in ohms: 3000

Please enter the desired tolerance as a percentage (5,10, or 20): 10

Closest standard value is: 2700 ohms

Color band A: Red

Color band B: Violet

Color band C: Red

Color band D: Silver

The max resistance with a 10% tolerance is: 2970

The minimum resistance with a 10% tolerance is: 2430

Enter -1 to exit program...

Please enter the desired resistance value in ohms: 20000

Please enter the desired tolerance as a percentage (5,10, or 20): 10

Closest standard value is: 18000 ohms

Color band A: Brown

Color band B: Grey

Color band C: Orange

Color band D: Silver

The max resistance with a 10% tolerance is: 19800

The minimum resistance with a 10% tolerance is: 16200

Enter -1 to exit program...

Please enter the desired resistance value in ohms: 270

Please enter the desired tolerance as a percentage (5,10, or 20): 20

Closest standard value is: 220 ohms

Color band A: Red

Color band B: Red

Color band C: Brown

Color band D: None

The max resistance with a 20% tolerance is: 264

The minimum resistance with a 20% tolerance is: 176

Enter -1 to exit program...

Please enter the desired resistance value in ohms: 3900

Please enter the desired tolerance as a percentage (5,10, or 20): 20

Closest standard value is: 3300 ohms

Color band A: Orange

Color band B: Orange

Color band C: Red

Color band D: None

The max resistance with a 20% tolerance is: 3960

The minimum resistance with a 20% tolerance is: 2640

Enter -1 to exit program...

Please enter the desired resistance value in ohms: 56000

Please enter the desired tolerance as a percentage (5,10, or 20): 20

Closest standard value is: 47000 ohms

Color band A: Yellow

Color band B: Violet

Color band C: Orange

Color band D: None

The max resistance with a 20% tolerance is: 56400

The minimum resistance with a 20% tolerance is: 37600

Enter -1 to exit program...

Please enter the desired resistance value in ohms: 820000

Please enter the desired tolerance as a percentage (5,10, or 20): 20

Closest standard value is: -1 ohms

Color band A:

Color band B:

Color band C:

Color band D:

The max resistance with a 20% tolerance is: -1.2

The minimum resistance with a 20% tolerance is: -0.8

Enter -1 to exit program...

Please enter the desired resistance value in ohms:

# Discussion

Program Performance: The program performs well. There are no limitations besides not handling everything that the user may enter like a string or char which causes the program to crash.

Extra Credit Features: None

Potential Improvements: Add exceptions for every possible user input and possibly expand the tolerance values by adding more text files.