Jaypee University of Engineering and Technology, Guna

Department of Computer Science and Engineering
Object Oriented Programming Lab
(18B17CI271)
Lab Exercise-3
(Reference variables, function overloading, static variables)

Lab Exercise -3

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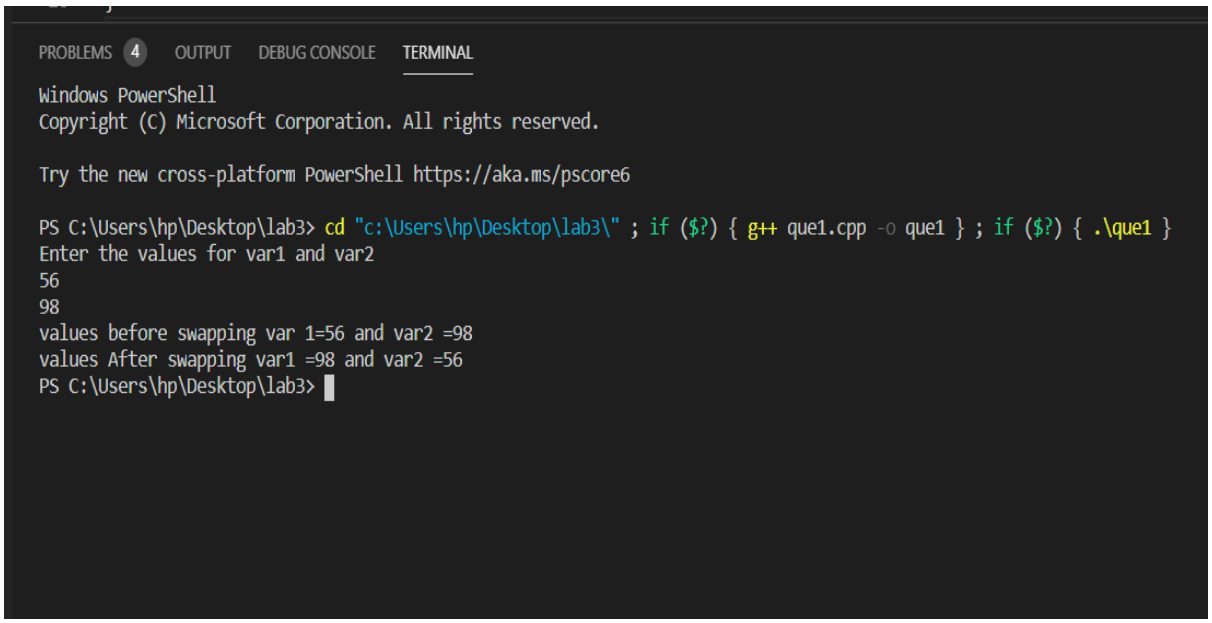
Question 1:

1. Write C++ Program to swap two variable using reference variables.

```cpp
#include <iostream>
using namespace std;
int main()
{
    int var1, var2, temp;
    int &ref1 = var1, &ref2 = var2;
    cout << "Enter the values for var1 and var2" << endl;
    cin >> var1 >> var2;
    cout << "values before swapping var 1=" << ref1 << " and var2 =" << ref2 << endl;
    temp = ref1;
    ref1 = ref2;
    ref2 = temp;
    cout << "values After swapping var1 =" << ref1 << " and var2 =" << ref2 << endl;

    return 0;
}
```

Output:



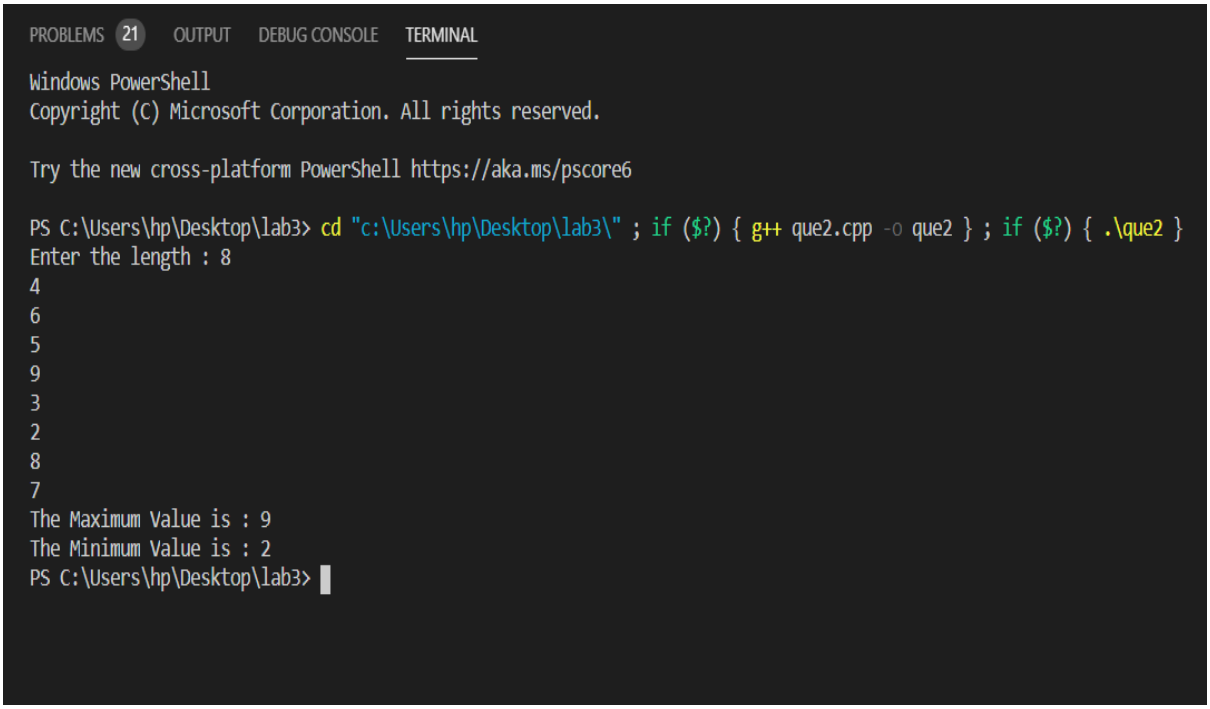
Question 2:

2. Write a function that finds the minimum and the maximum value in an array of N integers.
Inputs to the function are the array of integers, an integer variable containing the length of the
array and references to integer variables that will contain the minimum and the maximum
values. The function prototype is:
void minmax (int array[], int length, int& min, int & max);

```
#include <iostream>

using namespace std;

void minmax(int arr[], int length, int &min, int &max)

{

    int temp;

    for (int i = 0; i < length; i++)

    {

        for (int j = 0; j < length - 1; j++)

        {

            if (arr[j] < arr[j + 1])

            {

                temp = arr[j];

                arr[j] = arr[j + 1];

                arr[j + 1] = temp;

            }

        }

    }
```

```
    min = arr[length - 1];
    max = arr[0];
    cout<<"The Maximum Value is : "<<max<<endl<<"The Minim
um Value is : "<<min;
}
int main()
{
    int len, maxi, mini;
    cout<<"Enter the length : ";
    cin>>len;
    int arr[len];
    for (int i = 0; i < len; i++)
    {
        cin>>arr[i];
    }
    int *ptr = arr;
    minmax(ptr, len, mini, maxi);
    return 0;
}
```

Output:


PROBLEMS 21
OUTPUT
DEBUG CONSOLE
TERMINAL
Windows PowerShell
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Try the new cross-platform PowerShell https://aka.ms/pscore6
PS C:\Users\hp\Desktop\lab3> cd "c:\Users\hp\Desktop\lab3\" ; if ($?) { g++ que2.cpp -o que2 } ; if ($?) { .\que2 }
Enter the length : 8
4
6
5
9
3
2
8
7
The Maximum Value is : 9
The Minimum Value is : 2
PS C:\Users\hp\Desktop\lab3>

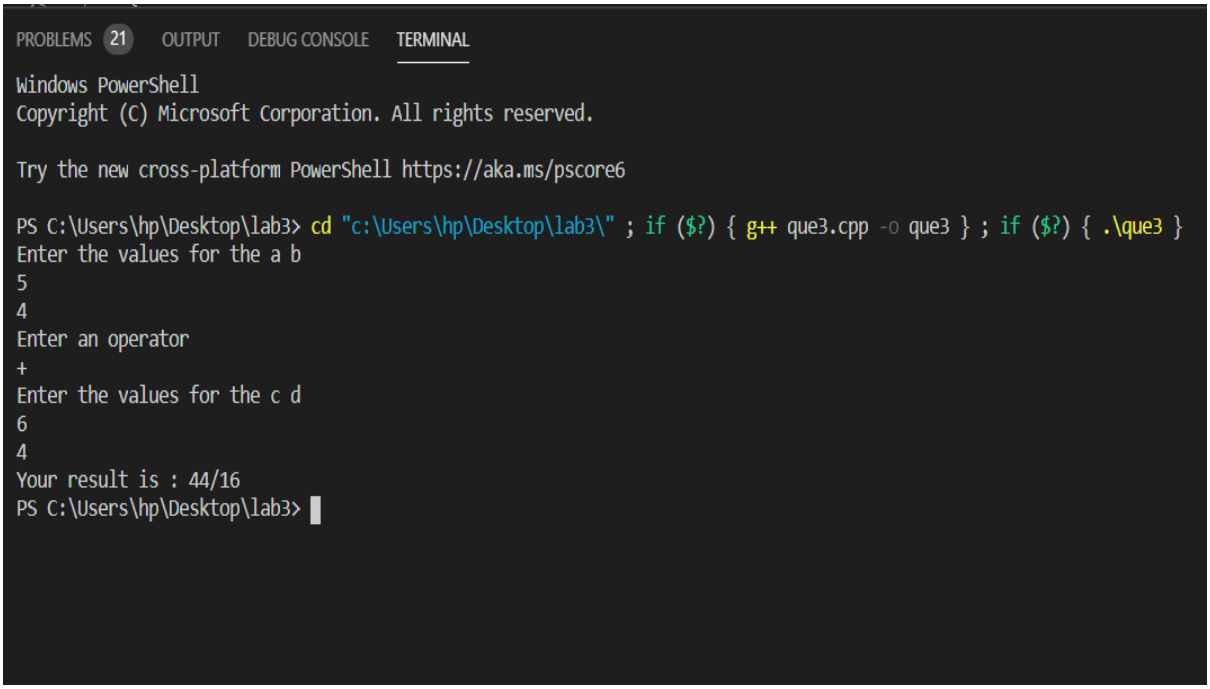
Question 3:

3. Create a four-function calculator for fractions. Here are the formulas for the four arithmetic operations applied to fractions:
Addition: a/b + c/d = (a*d + b*c) / (b*d)
Subtraction: a/b - c/d = (a*d - b*c) / (b*d)
Multiplication: a/b * c/d = (a*c) / (b*d)
Division: a/b / c/d = (a*d) / (b*c)
The user should type the first fraction (two values a and b), an operator, and a second fraction (two values c and d). The program should then display the results in fraction ie. (Numerator/ denominator).

```
#include <iostream>
using namespace std;
int main()
{
    float a, b, c, d;

    char res;
    cout << "Enter the values for the a b " << endl;
    cin >> a >> b;
    cout << "Enter an operator " << endl;
    cin >> res;
    cout << "Enter the values for the c d " << endl;
    cin >> c >> d;
    cout<<"Your result is : ";
    if (res == '+')

    {
        cout << (a * d + b * c) <<"/"<<(b * d);
    }
    else if (res == '-')
    {
        cout << ((a * d) - (b * c))<<"/"<<(b * d);
    }
    else if (res == '*')
    {
        cout << (a * c)<<"/"<<(b * d);
    }
    else if (res == '/')
    {
        cout << (a * d)<<"/"<<(b * c);
```

```
    }
    else
    {
        cout << "Please enter the correct response" << endl;
    }

    return 0;
}
```

Output:

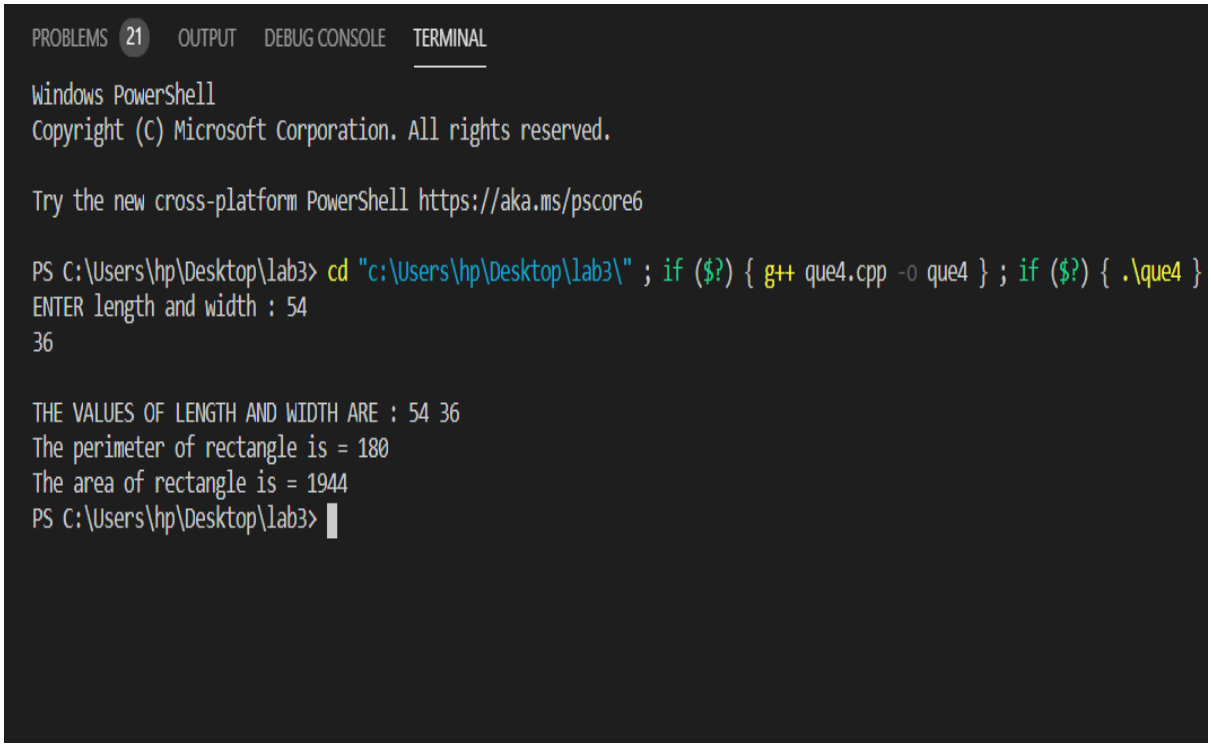


Question 4:

4. Create a class rectangle with attributes length and width. Provide member functions that calculate the perimeter and area of the rectangle. Provide member functions to get the values from users and display the values of member variables. Write a program to test the class.

```
#include<iostream>
using namespace std;

class rectangle
{
    private:
        float length ,width;
        float a , p;
    public:
        void get_value()
        {
            cout<<"ENTER length and width : ";
            cin>>length>>width;
        }
        void display()
        {
            cout<<"\n"<<"THE VALUES OF LENGTH AND WIDTH ARE : "<<length<<" "<<
width;
        }
        float perimeter()
        {
            p=2*(length+width);
            return p;
        }
        float area()
        {
            a=length * width ;
            return a;
        }
};
int main()
{
    rectangle r;
    r.get_value();
    r.display();
    cout<<"\n"<<"The perimeter of rectangle is = "<<r.perimeter()<<"\nThe area
 of rectangle is = "<<r.area();
    return 0;}
```

Output:


PROBLEMS 21 OUTPUT DEBUG CONSOLE TERMINAL
Windows PowerShell
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PS C:\Users\hp\Desktop\lab3> cd "c:\Users\hp\Desktop\lab3\" ; if ($?) { g++ que4.cpp -o que4 } ; if ($?) { .\que4 }
ENTER length and width : 54
36
THE VALUES OF LENGTH AND WIDTH ARE : 54 36
The perimeter of rectangle is = 180
The area of rectangle is = 1944
PS C:\Users\hp\Desktop\lab3>

Question 5:

5. Write a function that accepts two arguments: a string name of a movie and an integer running time in minutes. Provide a default value for the minutes so that if you call the function without an integer argument, the minutes default to 90. Write a main() function that proves you can call the function with a string argument alone as well as with a string and an integer.

```
#include <iostream>
using namespace std;
void movie(char name[], int = 90)
{
}
int main()
{
    char mo_name[20];
    int mo_time;
    movie(mo_name, mo_time);
    movie(mo_name);
}
```

Output:

No output and No error.

Question 6:

6. Create a class named *Shirt* that has the public data members *collarsize* and *sleeveLength*.
Create a class named *Pants* that has the public data members *waistSize* and *inSeam*. Write a program that declares one object of each type Shirt and Pants and assigns values to the objects' data fields. Write two overloaded functions named *displayClothingFacts()*. One version of the function takes a Shirt object as an argument; the other version takes a Pants object. Each version displays the facts about the piece of clothing. Your main() function should demonstrate that you can call *displayClothingFacts()* with either type of clothing.

```
#include <iostream>
using namespace std;
class Shirt
{
public:
    float collarsize, sleeveLength;
};
class Pants
{
public:
    float inSeam, waistSize;
};
void displayClothingFacts(Shirt s)
{
    cout << "\n"
         << "COLLARSIZE : " << s.collarsize << "\nSLEEVE LENGTH : " << s.sleev
eLength;
}
void displayClothingFacts(Pants p)
{
    cout << "\n"
         << "INSEAM : " << p.inSeam << "\nwaistsize : " << p.waistSize;
}
int main()
{
    Shirt s1;
    Pants p1;
    s1.collarsize = 15.5;
    s1.sleeveLength = 45.98;
    p1.inSeam = 60.5;
    p1.waistSize = 55.4;
```

```
    displayClothingFacts(s1);
    displayClothingFacts(p1);
    return 0;
}
```

Output:

```
PROBLEMS 21  OUTPUT  DEBUG CONSOLE  TERMINAL

Windows PowerShell
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PS C:\Users\hp\Desktop\lab3> cd "c:\Users\hp\Desktop\lab3\" ; if ($?) { g++ que6.cpp -o que6 } ; if ($?) { .\que6 }

COLLARSIZE : 15.5
SLEEVE LENGTH : 45.98
INSEAM : 60.5
waistsize : 55.4
PS C:\Users\hp\Desktop\lab3>
```

Question 7:

7. Define a class named Movie. Include private fields for the title, year, and name of the director. Include three public functions with the prototypes void Movie::setTitle(string); , void Movie::setYear(int); and void Movie::setDirector(string);. Include another function that displays all the information about a Movie. Write a main() function that declares a movie object named myFavoriteMovie. Set and display the object's fields.

```
#include <iostream>
#include <string.h>
using namespace std;
class Movie
{
    char title[20];
    int year;
    char name[20];

public:
    void setTitle(char t[])
    {
        strcpy(title, t);
    }
    void setYear(int y)
    {
        year = y;
    }

    void setDirector(char n[])
    {
        strcpy(name,n);
    }
    void display()
    {
        cout << title <<endl << year <<endl << name <<endl;
    }
};
int main()
{
    Movie myFavoriteMovie;

    myFavoriteMovie.setTitle("Jungle Book");
```

```
    myFavoriteMovie.setYear(2016);

    myFavoriteMovie.setDirector("Jon Favreau");
    myFavoriteMovie.display();
    return 0;
}
```

Output:

```
Windows PowerShell
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Try the new cross-platform PowerShell https://aka.ms/pscore6

PS C:\Users\hp\Desktop\lab3> cd "c:\Users\hp\Desktop\lab3\" ; if ($?) { g++ que7.cpp -o que7 } ; if ($?) { .\que7 }
que7.cpp: In function 'int main()':
que7.cpp:33:30: warning: ISO C++ forbids converting a string constant to 'char*' [-Wwrite-strings]
   33 |     myFavoriteMovie.setTitle("Jungle Book");
      |                              ^~~~~~~~~~~~~
que7.cpp:36:33: warning: ISO C++ forbids converting a string constant to 'char*' [-Wwrite-strings]
   36 |     myFavoriteMovie.setDirector("Jon Favreau");
      |                                 ^~~~~~~~~~~~~
Jungle Book
2016
Jon Favreau
PS C:\Users\hp\Desktop\lab3>
```

Question 8:

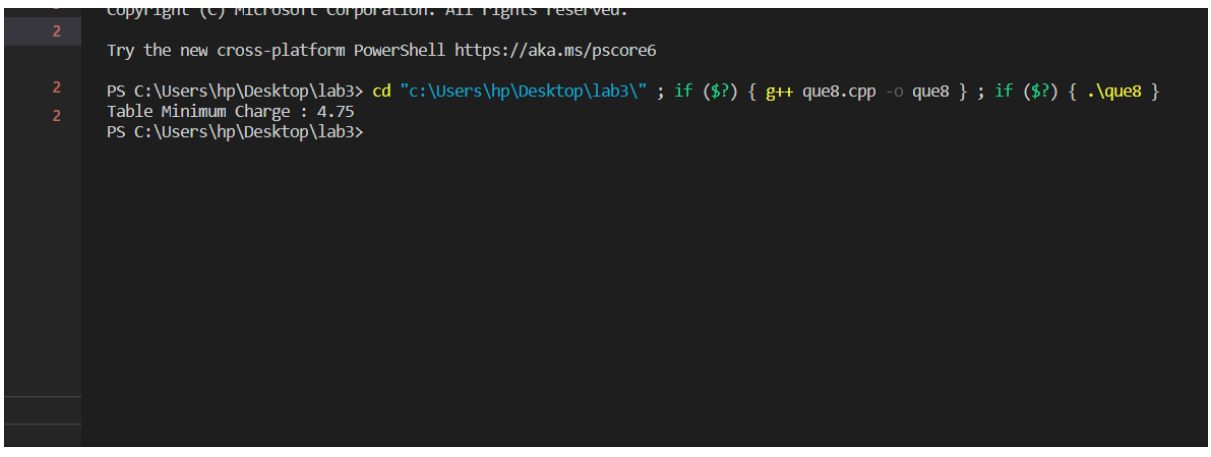
8. Write a class definition for an ***order*** class for a nightclub that contains a table number, a server's name, and the number of patrons at the table. Include a private static data member for the table minimum charge, which is $4.75. Write a main() function that declares no object of ***order*** class type, but uses a static member function to display the table minimum charge.

```
#include <iostream>
using namespace std;
class order
{
    static float min_charge;

public:
    int tb_num, num_patrons;
    char ser_name[20];

    static void display()
    {
        cout <<"Table Minimum Charge : "<< min_charge;
    }
};
float order::min_charge=4.75;
int main()
{
    order::display();
}
```

Output:



Question 9:

Advanced Problems:

9. Write a c++ program to find the highest occurring digit in prime numbers in a given range.

Given a range L to R, the task is to find the highest occurring digit in prime numbers lie between
L and R (both inclusive). If multiple digits have same highest frequency print the largest of them.
If no prime number occurs between L and R, output -1.
Examples:
Input : L = 1 and R = 20.
Output : 1
Prime number between 1 and 20 are 2, 3, 5, 7, 11, 13, 17, 19.
1 occur maximum i.e 5 times among 0 to 9.

```
#include <iostream>
using namespace std;
int arr[10], temp;
void prime(int);
int main(void)
{
  int a, b, i, max, no;

  cout<<"enter the two no:"<<endl;
  cin>>a>>b;
  for (i = a; i <= b; i++)
    prime(i);
  if (temp == 0)
  {
   cout<<"NO ANY PRIME NO"<<endl;
  }
  else
  {
    max = arr[0];
    no = 0;
    for (i = 1; i <= 9; i++)
    {
      if (arr[i] >= max)
      {
        max = arr[i];
        no = i;
      }
    }
    cout<<"Output:"<<no;

  }
```

```
  return 0;
}
void prime(int m)
{
  int a;
  for (a = 2; a <= m / 2; a++)
  {
    if (m % a == 0)
      return;
  }
  temp = 1;
  while (m > 0)
  {
    a = m % 10;
    m = m / 10;
    arr[a] += 1;
  }
}
```

Output: