UNIVERSITY OF VOCATIONAL TECHNOLOGY

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Bachelor of Technology in Software Technology

Computer Programming

1st Semester

Assignment 01

M.N.M. Nifraz

SOF/21/B2/21

UNIVERSITY OF VOCATIONAL TECHNOLOGY

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Assignment Template & Feedback Form

Course Title	Bachelor of Technology in Software Technology	Module	IT104021
Student's Name	M.N.M. Nifraz	Batch No.	B2
Reg. No.	SOF/21/B2/21	Semester	01
Resource Person	Mr. Nishantha Anuruddha	Assignment No.	01
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Feedback from the Resource Person:

Key Strength:
To Improve Report:
General Comments:

Grade:

Date: .....

....

Resource Person's Signature Resource Person's Signature

1. Ask User to enter length & unit of measure of a cube. Print perimeter of a side, volume & surface area.

Source Code:

```
#include <iostream>
#include <iomanip>
#include <cmath>
// WinAPI - to support exponent symbols
#include <windows.h>

using namespace std;

int main()
{
     // set console output code page to CP-1252
     // reference - http://zuga.net/articles/text-ascii-vs-cp-1252-vs-cp-437/
     SetConsoleOutputCP(1252);

     cout << "Qubic Measurements Calculator\n"
          << setfill('=') << setw(30) << "\n";

     // read length
     cout << "Enter the length of a side : ";
     double length;
     cin >> length;

     if (length <= 0) // check if length is negative or 0
     {
          cout << "Length must be positive!\n"
               << "The program will exit now...";
          return 0; // return main
     }

     // read unit
     cout << "Enter the measurement unit ( m | cm | mm ) : ";
     string unit;
     cin >> unit;

     // calculations
     double squarePerimeter = length * 4;         // calculate perimeter
     double cubeVolume = pow(length, 3);          // calculate volume
     double cubeSurfaceArea = pow(length, 2) * 6; // calculate surface area
```

```
    // print results (x)² = (char)178, (x)³ = (char)179
    cout << "\n"
         << "Results\n"
         << setfill('=') << setw(8) << "\n";
    cout << "Perimeter of a square side = " << squarePerimeter << unit << "\n"
         << "Volume of the cube = " << cubeVolume << unit << (char)179 << "\n"
         << "Surface area of the cube = " << cubeSurfaceArea << unit <<
(char)178 << "\n";
}
```

Sample Output:

```
Qubic Measurements Calculator
=============================
Enter the length of a side : 19
Enter the measurement unit ( m | cm | mm ) : m

Results
=======
Perimeter of a square side = 76m
Volume of the cube = 6859m³
Surface area of the cube = 2166m²
PS C:\Users\NifraZ\Desktop\CPP\Computer-Programming\Assignment-1>
```

2. Write a program that accepts an integer (n) and computes the value of n+nn+nnn+nnnn+nnnnn.

Source Code:

```
#include <iostream>
#include <iomanip>
#include <cmath>

using namespace std;

int main()
{
    // read digit
    cout << "Enter a digit (1-9) : ";
    int digit;
    cin >> digit;

    if (digit < 1 || digit > 9) // check if valid single digit
    {
        cout << "Input must be a valid single digit (1-9)!\n"
             << "The program will exit now...";
        return 0; // return main
    }

    cout << "\n";
    int term;
    int sum = 0;

    // generate 5 terms
    for (int i = 1; i <= 5; i++)
    {
        // build term
        term = 0;
        for (int j = 0; j < i; j++)
        {
            term += digit * pow(10, j);
        }
        // print term
        cout << "+" << setw(8) << term << "\n";
        sum += term; // add term to sum
    }

    // print result
```

```
    cout << setfill('-') << setw(10) << "\n"
         << setfill(' ') << "=" << setw(8) << sum << "\n"
         << setfill('-') << setw(10) << "\n";
}
```

Sample Output:

```
Enter a digit (1-9) : 6

+       6
+      66
+     666
+    6666
+   66666
---------
=   74070
---------
PS C:\Users\NifraZ\Desktop\CPP\Computer-Programming\Assignment-1>
```

3. User will enter a value (year). Print if that is a leap year or not.

a. Any number which can be divided by 4 is a leap year (2016, 2020, 2024)

b. Except if that can be divided by 100 (2100, 2200, 2300 are not leap year)

c. But if that is possible to divided by 400 then it is a leap year (2000, 2400, 2800)

d. Why this is → Earth will take 365.242375 days to rotate, but we say 365 days for a year

Source Code:

```
#include <iostream>
#include <iomanip>
#include <cmath>

using namespace std;

int main()
{
    cout << "Leap Year Checker\n"
         << setfill('=') << setw(18) << "\n";

    // read year
    cout << "Enter the year : ";
    int year;
    cin >> year;

    if (year <= 0) // check if year is negative or 0
    {
        cout << "Year must be positive!\n"
             << "The program will exit now...";
        return 0; // return main
    }

    bool isLeapYear = year % 4 == 0; // year must be divided by 4
    isLeapYear &= year % 100 != 0;   // and not divided by 100
    isLeapYear |= year % 400 == 0;   // or if divided by 400

    // print results
    cout << "\n"
         << year;
    if (isLeapYear) // if leap year
    {
        cout << " is a leap year.";
    }
```

```
    else
    {
        cout << " is not a leap year.";
    }
}
```

Sample Output:

```
Leap Year Checker
=================
Enter the year : 2022

2022 is not a leap year.
PS C:\Users\NifraZ\Desktop\CPP\Computer-Programming\Assignment-1>
```

4. Create a program to build a simple calculator using switch Statement. Initially, user will enter 2 values. Then ask for the operation (+,-,*,/,%). Then print the result. Handle the errors (like % can't use with doubles…).

Source Code:

```
#include <iostream>
#include <iomanip>
#include <cmath>

using namespace std;

int main()
{
    cout << "Simple Calculator\n"
         << setfill('=') << setw(18) << "\n";

    // read number 1
    cout << "Enter Number 1 : ";
    double number1;
    cin >> number1;

    // read number 2
    cout << "Enter Number 2 : ";
    double number2;
    cin >> number2;

    // read operator symbol
    cout << "Enter the symbol for operation ( + | - | * | / | % ) : ";
    char operatorSymbol;
    cin >> operatorSymbol;

    // print answer
    cout << "\n"
         << "Answer\n"
         << setfill('=') << setw(7) << "\n";

    switch (operatorSymbol)
    {
    case '+': // addition
        cout << number1 << " + " << number2 << " = " << (number1 + number2);
        break;
    case '-': // subtraction
        cout << number1 << " - " << number2 << " = " << (number1 - number2);
```

```
        break;
    case '*': // multiplication
        cout << number1 << " * " << number2 << " = " << (number1 * number2);
        break;
    case '/': // division
    {
        if (number2 != 0) // check if divisor is not 0
        {
            cout << number1 << " / " << number2 << " = " << (number1 / number2);
        }
        else
        {
            cout << "Divisor (Number 2) cannot be zer0!";
        }
    }
    break;
    case '%': // modulus
    {
        int number1IntValue = (int)number1; // convert number 1 to int
        int number2IntValue = (int)number2; // convert number 2 to int
        // check if both the numbers are integers
        bool isInteger = (number1 == number1IntValue) && (number2 ==
number2IntValue);
        if (isInteger)
        {
            cout << number1IntValue << " % " << number2IntValue << " = " <<
(number1IntValue % number2IntValue);
        }
        else
        {
            cout << "Numbers must be integers to perform Modulus operation!";
        }
    }
    break;
    default: // other
        cout << operatorSymbol << " - Invalid operator symbol!";
        break;
    }
}
```

Sample Output:

```
Simple Calculator
=================
Enter Number 1 : 65
Enter Number 2 : 33.45
Enter the symbol for operation ( + | - | * | / | % ) : -

Answer
======
65 - 33.45 = 31.55
PS C:\Users\NifraZ\Desktop\CPP\Computer-Programming\Assignment-1>
```

5. Find the lucky number by taking user's birthday as an input. Use following format to input birthday YYYYMMDD -19850217. → lucky number is 6.

(19850217 → 1 + 9 + 8 +5+0+2+1+7= 33 → 3+3 = 6)

Source Code:

```
#include <iostream>
#include <iomanip>
#include <cmath>

using namespace std;

int main()
{
    cout << "Lucky Number Calculator\n"
         << setfill('=') << setw(24) << "\n";

    // read birthday
    cout << "Enter your birthday (YYYYMMDD) : ";
    int birthdayNumber;
    cin >> birthdayNumber;

    if (birthdayNumber <= 0) // check if number is negative or 0
    {
        cout << "Number must be positive!\n"
             << "The program will exit now...";
        return 0; // return main
    }

    int digit;
    int luckyNumber = 0;

    while (birthdayNumber > 0)
    {                                  // repeat until 0
        digit = birthdayNumber % 10; // get last digit from bd no.
        luckyNumber += digit;        // add digit to lucky no.
        birthdayNumber /= 10;        // remove last digit off bd no.

        // check if lucky number has more than one digit
        // after adding all digits from bd no.
        if (birthdayNumber < 1 && luckyNumber > 9)
        {
            // assign lucky no. to bd no. and reset lucky no. to 0
            // then continue loop to start adding the digits again
```

```
            birthdayNumber = luckyNumber;
            luckyNumber = 0;
        }
    }

    // print lucky no.
    cout << "\n"
         << setfill('-') << setw(22) << "\n"
         << "The Lucky Number is " << luckyNumber << "\n"
         << setfill('-') << setw(22) << "\n";
}
```

Sample Output:

```
Lucky Number Calculator
=======================
Enter your birthday (YYYYMMDD) : 19930319

--------------------
The Lucky Number is 8
--------------------
PS C:\Users\NifraZ\Desktop\CPP\Computer-Programming\Assignment-1>
```

6. There are 45 students in a classroom & 25 are boys. 80% of the total students has passed the exam. Also, it says 2 girls are failed. Now find out how many boys has passed the exam.

Source Code:

```
#include <iostream>
#include <iomanip>
#include <cmath>

using namespace std;

int main()
{
    // perform calculations
    int totalStudents = 45;
    int boys = 25;
    int girls = totalStudents - boys;
    int passedStudents = totalStudents * 80 / 100;
    int failedStudents = totalStudents - passedStudents;
    int failedGirls = 2;
    int passedGirls = girls - failedGirls;
    int passedBoys = passedStudents - passedGirls;
    int failedBoys = boys - passedBoys;

    // print results
    cout << "Total Students : " << totalStudents << "\n"
         << "\t> passed : " << passedStudents << "\n"
         << "\t> failed : " << failedStudents << "\n"
         << "Total Boys : " << boys << "\n"
         << "\t> passed : " << passedBoys << "\n"
         << "\t> failed : " << failedBoys << "\n"
         << "Total Girls : " << girls << "\n"
         << "\t> passed : " << passedGirls << "\n"
         << "\t> failed : " << failedGirls << "\n";
}
```

Sample Output:

```
Total Students : 45
        > passed : 36
        > failed : 9
Total Boys : 25
        > passed : 18
        > failed : 7
Total Girls : 20
        > passed : 18
        > failed : 2
PS C:\Users\NifraZ\Desktop\CPP\Computer-Programming\Assignment-1>
```

7. Write a program that accept integers from user. Whenever user enter 0 it prints the output & exit the program. If the input is greater than 10 add reminder of 10 to final answer, if the input is even number add 2 more final answer. If the input is odd add 1 more to final answer. If number is negative ignore it. If number is divisible by 3 add 3 to final answer. Any positive number will be added to final answer. Design the algorithm to support above scenario & create a program.

Source Code:

```
#include <iostream>
#include <iomanip>
#include <cmath>

using namespace std;

int main()
{
    cout << "(Enter 0 to show the final answer)\n";
    int integerInput;
    int finalAnswer = 0;
    int count = 1;

    do
    {
        // read integer
        cout << "Enter Integer #" << count++ << " : ";
        cin >> integerInput;

        if (integerInput > 0) //check if positive
        {
            if (integerInput > 10) //check if greater than 10
            {
                //add modulus remainder of 10
                finalAnswer += integerInput % 10;
            }

            if (integerInput % 2 == 0) //if even
            {
                finalAnswer += 2; //add 2
            }
            else //if odd
            {
                finalAnswer += 1; //add 1
            }
```

```
            if (integerInput % 3 == 0) //if divisible by 3
            {
                finalAnswer += 3; // add 3
            }
        }
    } while (integerInput); // loop until user enters 0

    cout << "\n"
         << "Final Answer : " << finalAnswer;
}
```

Sample Output:

```
(Enter 0 to show the final answer)
Enter Integer #1 : 9
Enter Integer #2 : 10
Enter Integer #3 : 11
Enter Integer #4 : 12
Enter Integer #5 : 0

Final Answer : 15
PS C:\Users\NifraZ\Desktop\CPP\Computer-Programming\Assignment-1>
```

8. There is a requirement to create a new Student Evaluation System for a school to verify students' marks by themselves. First, system will ask username (String) & student ID (number). Then it asks you to enter marks for 3 subjects. Then system should print some messages according to entered vales. If student scores less than 50 for any subject, then he is repeated all 3 subjects (Means that he has got failed the exam). Therefore, print whether he should do repeat exam or not. Then, if average mark is higher than 75 then print "Very Good", 50 ~ 74 print "Good", 35~49 print "average" otherwise, print "Fail". Also, if he scored above 90 for all subjects, he would get a first class. System should handle errors, like if user enter invalid marks (-10, 120) for a given subject, system will show error message and ask to enter again. But if the 2nd time also user entered an invalid number, then system shows an error message & value will be set to zero for that subject automatically. Finally print the details in "nice" way. (You may or may not use array support)

Source Code:

```
#include <iostream>
#include <iomanip>
#include <cmath>

using namespace std;

int main()
{
    cout << "Student Evaluation System\n"
         << setfill('=') << setw(26) << "\n";

    // read username
    cout << "Enter your username : ";
    string username;
    cin >> username;

    // read student id
    cout << "Enter your student ID : ";
    int studentId;
    cin >> studentId;

    int const SUBJECT_COUNT = 3;
    int marks[SUBJECT_COUNT]; // int array for subjects
    int sum = 0;
    bool isPassed = true;
    bool isFirstClass = true;

    cout << "Enter your marks :\n";
    for (int i = 0; i < SUBJECT_COUNT; i++)
```

```
    {
        // infinite loop
        while (true)
        {
            // read marks
            cout << "\tSubject #" << (i + 1) << " : ";
            cin >> marks[i];

            // if valid marks (0 - 100)
            if (marks[i] >= 0 && marks[i] <= 100)
            {
                break; // break loop
            }
            else
            {
                // print error message and continue
                cout << "Invalid marks! Please enter a value between 0 - 100.\n";
            }
        }

        // add to total
        sum = sum + marks[i];

        // if marks greater than or equal to 50 in all 3 subjects
        isPassed &= (marks[i] >= 50);
        // if marks greater than or equal to 90 in all 3 subjects
        isFirstClass &= (marks[i] >= 90);
    }

    // print results
    cout << "\n"
         << "Your Results\n"
         << setfill('=') << setw(13) << "\n";
    cout << "Username : " << username << "\n"
         << "Student ID : " << studentId << "\n"
         << "Marks :\n";

    for (int i = 0; i < SUBJECT_COUNT; i++)
    {
        cout << "\tSubject #" << (i + 1) << " : " << marks[i] << "\n";
    }

    if (isPassed) // if passed
    {
        cout << "You have passed the exam.\n";
```

```
    }
    else // if failed
    {
        cout << "You have failed the exam.\n"
             << "You should repeat all " << SUBJECT_COUNT << " subjects!\n";
    }

    if (isFirstClass) // if first class
    {
        cout << "Congratz! You got first class. :)\n";
    }

    // calculate and print average
    double average = (double)sum / SUBJECT_COUNT;
    cout << "You have the average of " << average << ".\n";

    // print grade
    cout << "You have received the grade of ";
    if (average >= 75)
    {
        cout << "Very Good.";
    }
    else if (average >= 50)
    {
        cout << "Good.";
    }
    else if (average >= 35)
    {
        cout << "Average.";
    }
    else
    {
        cout << "Fail.";
    }
}
```

Sample Output:

```
Student Evaluation System
=========================
Enter your username : nifraz
Enter your student ID : 319456
Enter your marks :
        Subject #1 : 94
        Subject #2 : 56
        Subject #3 : 72

Your Results
============
Username : nifraz
Student ID : 319456
Marks :
        Subject #1 : 94
        Subject #2 : 56
        Subject #3 : 72
You have passed the exam.
You have the average of 74.
You have received the grade of Good.
PS C:\Users\NifraZ\Desktop\CPP\Computer-Programming\Assignment-1>
```