Lecture-2

Object Oriented Programming

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Conditions in C++

'if' Statement is statement allows you to execute a block of code based on a condition.

Remember: The condition inside the parentheses can be any expression that evaluates to a boolean value (true or false).

Structure of 'if'

```
#include <iostream>
using namespace std;
int main() {
    if (condition) {
    // code to execute if condition is true
}
}
```

Q\ Write a program in C++ to compares the values of x = 20 and y = 18, and if x is greater than y, it outputs a message?

```
#include <iostream>
using namespace std;
int main() {
int x = 20;
int y = 18;
if (x > y) {
cout << "x is greater than y";
}
}
```

Remember: It's good practice to use curly braces {} in each 'if'.
Remember: Common mistake Using = instead of ==: Ensure you use == for comparisons. A single = is an assignment operator, which can lead to logical errors.

'else' Statements Used the else statement to specify a block of code to be executed if the condition is false.
Remember: you can add an else clause to execute code when the if condition is false.

Structure of 'else'

```
#include <iostream>
using namespace std;
int main() {
if (condition) {
// block of code to be executed if the condition is true}
else {
// block of code to be executed if the condition is false}
}
```

Q\ Write a program in C++ to check the student pass exam or not?

```
#include <iostream>
using namespace std;
int main() {
   int marks = 90;

    if (marks >= 50) {
        cout <<"The student has passed."<<endl;
    } else {
        cout << "The student has failed."<<endl;
    }
}
```

Q\ Write a program in C++ to read number and check it is even or odd?

```
#include <iostream>
using namespace std;
void main() {
    cout << "Enter an integer: ";
    cin >> number;
    if (number % 2 == 0) {
        cout << number << " is even." << endl;
    } else {
        cout << number << " is odd." << endl;
    }
}
```

Q\ Write a program in C++ to read number and check it is positive or negative?

```
#include <iostream>
using namespace std;
void main() {
     float number;
    cout << "Enter a number: ";
    cin >> number;

    if (number >= 0) {
        cout << number << " is positive." << endl;
    } else (number < 0) {
        cout << number << " is negative." << endl;
    }
}
```

Q\ Write a program in C++ to read age of person and check it is adult or not?

```
#include <iostream>
using namespace std;
void main() {
     int age;
    cout << "Enter your age: ";
    cin >> age;

    if (age >= 18) {
        cout << "Adult." << endl;
    } else {
        cout << "Not Adult" << endl;
    }
}
```

Q\ Write a program in C++ to check letter vowel or not?

```
#include <iostream>
using namespace std;
int main() {
    char ch = 'a';
      if (ch == 'a' || ch == 'e' || ch == 'i' || ch == 'o' || ch == 'u' ||
            ch == 'A' || ch == 'E' || ch == 'I' || ch == 'O' || ch == 'U')
{
            cout << ch << " is a vowel." << endl;
```

```
        } else {
            cout << ch << " is not Vowel" << endl;
        }
    }
```

'else if' Statment used the else if statement to specify a new condition if the first condition is false.

Remember: for multiple conditions, you can use else if.

Structure of 'else if'

```
#include <iostream>
using namespace std;
int main() {
  if (condition1) {
// block of code to be executed if condition1 is true
} else if (condition2) {
// block of code to be executed if the condition1 is false and
condition2 is true
} else {
// block of code to be executed if the condition1 is false and
condition2 is false}}
```

Q\ Write a program to takes a student's marks as input and categorizes them into descriptive grades based on the input value?

```
#include <iostream>
using namespace std;
int main() {
 int mark;
    cout << "Enter your marks: ";
    cin >> marks;

    if (marks >= 90) {
        cout << "Excellent" << endl;
    } else if (marks >= 80) {
        cout << "very Good" << endl;
    } else if (marks >= 70) {
        cout << "good" << endl;
```

```
    } else if (marks >= 60) {
        cout << "Satisfactory" << endl;
    } else if (marks >= 50){
        cout << "acceptable " << endl;
    }else {
        cout << "Failed" << endl;}
```

Q\ Write program in C++ to create system to allow to students allow entering to lecture or no based on time?

```
#include <iostream>
using namespace std;
void main() {
     float time;
    cout << "Enter time of entering: ";
    cin >> time;
    if (time == 8) {
        cout << "Allow" << endl;
    }else if (time > 8 && time <= 8.30){
        cout << "Allow with reminder of instructions" << endl;
    }else {
        cout << "Not allow" << endl;
    }
}
```

Q\ Write a program in C++ to checks if the temperature is cold, warm, or hot?

```
#include <iostream>
using namespace std;
int main() {
       float temperature;
    cout << "Enter the temperature in Celsius: ";
    cin >> temperature;
    if (temperature < 0) {
        cout << "It's cold." << endl;
    }
    else if (temperature >= 0 && temperature <= 25) {
        cout << "It's warm." << endl;
    }
    else {
        cout << "It's hot." << endl;
    }}
```

Q\ Write a program in C++ to check if a person is eligible for a loan based on their income?

```
#include <iostream>
using namespace std;
int main() {
      float income;
    cout << "Enter your monthly income: ";
    cin >> income;
    if (income < 0) {
        cout << "Invalid income entered!" << endl;
    }
    else if (income < 2000) {
        cout << "Loan eligibility: Low" << endl;
    }
    else if (income < 5000) {
        cout << "Loan eligibility: Moderate" << endl;
    }
    else {
        cout << "Loan eligibility: High" << endl;
    }
    }
```

Q\ Write a program in C++ to simulates a basic traffic light system?

```
#include <iostream>
using namespace std;
int main() {
       char light;
    cout << "Enter traffic light color (R for Red, Y for Yellow, G for Green): ";
    cin >> light;
    if (light == 'R' || light == 'r') {
        cout << "Stop!" << endl;}
    else if (light == 'Y' || light == 'y') {
        cout << "Caution! Prepare to stop." << endl; }
    else if (light == 'G' || light == 'g') {
        cout << "Go!" << endl;  }
    else {
        cout << "Invalid color!" << endl; }
    }
```

Switch Statements

Switch Statements used to select one of many code blocks to be executed.

Remember: The expression inside the switch must be of an integral type (e.g., int, char, or ect..). Floating-point types are not allowed.
Remember: the default case is optional and executes if none of the specified cases match. It is often used for error handling or fallback logic.
Remember: the order of case statements does not matter, but ensure each case has a unique value to avoid ambiguity.

Structure of 'Switch'

```
#include <iostream>
using namespace std;
void main() {
    switch(expression) {
                        case x:
                        // code block
                        break;
                        case y:
                        // code block
                        break;
                        default:
                        // code block
}
}
```

Q\ Write a program in C++ to tells the user if the number is 1, 2, or something else using switch?

```
#include <iostream>
using namespace std;
int main() {
       int number;
    cout << "Enter a number (1 or 2): ";
    cin >> number;

    switch (number) {
        case 1:
            cout << "You entered one." << endl;
            break;
```

```
        case 2:
            cout << "You entered two." << endl;
            break;
        default:
            cout << "You entered a different number." << endl;
            break;
    }
    }
```

Q\ Write program in C++ Select days based on squence using switch?

```
# include <iostream>
using namespace std;
void main() {
   int day;
    cout << "Enter a day number (1-7): ";
   cin>>day;
switch (day) {
case 1:
cout << "Monday";
break;
case 2:
cout << "Tuesday";
break;
case 3:
cout << "Wednesday";
break;
case 4:
cout << "Thursday";
break;
case 5:
cout << "Friday";
break;
case 6:
cout << "Saturday";
break;
case 7:
cout << "Sunday";
break;
```

```
}
}
```

Q/ Write program in C++ Select months based on squence using switch?

```
include <iostream>
using namespace std;
void main() {
  int month;
    cout << "Enter a month number (1-12): ";
    cin >> month;
    switch (month) {
        case 1:
            cout << "January";
            break;
        case 2:
            cout << "February";
            break;
        case 3:
            cout << "March";
            break;
        case 4:
            cout << "April";
            break;
        case 5:
            cout << "May";
            break;
        case 6:
            cout << "June";
            break;
        case 7:
            cout << "July";
            break;
        case 8:
            cout << "August";
            break;
        case 9:
            cout << "September";
```

```
            break;
        case 10:
            cout << "October";
            break;
        case 11:
            cout << "November";
            break;
        case 12:
            cout << "December";
            break;
        default:
            cout << "Invalid month!
    }
}
```

Q\ Rewrite above code using if condition?

```
#include <iostream>
using namespace std;
void main() {
       int month;
    cout << "Enter a month number (1-12): ";
    cin >> month;

    if (month == 1) {
        cout << "January";
    } else if (month == 2) {
        cout << "February";
    } else if (month == 3) {
        cout << "March";
    } else if (month == 4) {
        cout << "April";
    } else if (month == 5) {
        cout << "May";
    } else if (month == 6) {
        cout << "June";
    } else if (month == 7) {
        cout << "July";
    } else if (month == 8) {
        cout << "August";
```

```
    } else if (month == 9) {
        cout << "September";
    } else if (month == 10) {
        cout << "October";
    } else if (month == 11) {
        cout << "November";
    } else if (month == 12) {
        cout << "December";
    } else {
        cout << "Invalid month! Please enter a number between 1 and 12.";
    }
}
```

Q\ Write a program in C++ to emonstrate a basic calculator that performs addition, subtraction, multiplication, or division based on user input using switch?

```
#include <iostream>
using namespace std;
int main() {
      char operation;
    float num1, num2;
    cout << "Enter first number: ";
    cin >> num1;
    cout << "Enter an operator (+, -, *, /): ";
    cin >> operation;
    cout << "Enter second number: ";
    cin >> num2;
    switch (operation) {
        case '+':
            cout << "Result: " << num1 + num2 << endl;
            break;
        case '-':
            cout << "Result: " << num1 - num2 << endl;
            break;
        case '*':
            cout << "Result: " << num1 * num2 << endl;
            break;
```

```
        case '/':
            if (num2 != 0) {
                cout << "Result: " << num1 / num2 << endl;
            } else {
                cout << "Error: Division by zero!" << endl;
            }
            break;
        default:
            cout << "Invalid operator!" << endl;
            break;
    }
    }
```

Loops Statements

'Loops Statements' can execute a block of code as long as a specified condition is reached, aslo loops are handy because they save time, reduce errors, and they make code more readable.

'for' Execute a sequence of statements multiple times and abbreviates the code that manages the loop variable.

Structure of 'for'

```
#include <iostream>
using namespace std;
void main() {
     for (var = initial value; condition; increment or decrement ) {
// code block to be executed
}
}
```

Q\Write a program in C++ to print numbers 1- 4 using for loop?

```
#include <iostream>
using namespace std;
void main() {
    for (int i = 1; i <= 4; i++) {
        cout << i << endl;
    }
}
```

Q\Write a program in C++ to print numbers 4-1 using for loop?

```
#include <iostream>
using namespace std;
void main() {
     for (int i = 4; i >= 1; i--) {
        cout << i << endl;
    }
}
```

Q\Write a program in C++ to print sequence from numbers 2-4-6-8-10 using for loop?

```
#include <iostream>
using namespace std;
void main() {
      for (int i = 2; i <= 10; i += 2) {
        cout << i << endl;
    }
}
```

Q\Write a program in C++ to print sequence from numbers 9-6-3-0 using for loop?

```
#include <iostream>
using namespace std;
void main() {
        for (int i = 9; i >= 0; i -= 3) {
        cout << i << endl;
    }
}
```

Q\Write a program in C++ to find multiply 2 to sequence 1-5 using for loop?

```
#include <iostream>
using namespace std;
void main() {
     int multiplier = 2;
    for (int i = 1; i <= 5; i++) {
        int result = multiplier * i; // Multiply 2 by i
        cout << multiplier << " x " << i << " = " << result << endl;
    }}
```

Q\Write a program in C++ to find Factorial number 5 using for loop?

```
#include <iostream>
using namespace std;
void main() {
```

```
   int number = 5;
    int factorial = 1;
    for (int i = 1; i <= number; i++) {
        factorial *= i; // Multiply factorial by i}
    cout << "Factorial of " << number << " is: " << factorial << endl;
}
```

'Nested For'

Nested for loops are used when you want to perform a loop inside another loop. This is commonly used for tasks that require multi-dimensional iteration, such as working with matrices or creating patterns.

Structure of 'nasted for loop'

```
#include <iostream>
using namespace std;
void main() {
  for ( init; condition; increment ) {
for ( init; condition; increment ) {
statement(s);
}
statement(s); // you can put more statements.
}
}
```

Q\ Write a program in C++ to print below shape?
1
12
123
1234
12345

```
#include <iostream>
using namespace std;
int main() {
      int rows = 5; // Number of rows
    for (int i = 1; i <= rows; i++) {
        // Inner loop for the columns
        for (int j = 1; j <= i; j++) {
            cout << j; // Print the current column number
        }
        cout << endl; // New line after each row
```

```
    }
}
```

Q\ Write a program in C++ to print below numbers?

```
1       2       3       4
2       4       6       8
3       6       9       12
4       8       12      16
```

```
#include <iostream>
using namespace std;
int main() {
    for (int i = 1; i <= 4; i++) {
        for (int j = 1; j <= 4; j++) {
            cout << i * j << "\t";  // Print the product
        }
        cout << endl;  // New line after each row
    }
    }
```

While repeats a statement or group of statements while a given condition is true. It tests the condition before executing the loop body.

Structure of 'while'

```
#include <iostream>
using namespace std;
int main() {
     while (condition) {
// code block to be executed
}
}
```

Q\ Write a program in C++ to print 1-5 using while?

```
#include <iostream>
using namespace std;
int main() {
   int i = 1; // Initialize the counter
    // Use a while loop to print numbers from 1 to 5
    while (i <= 5) {
```

```
        cout << i << endl; // Print the current number
        i++; // Increment the counter
    }
}
```

Q\ Rewrite above code using 'for'?

```
#include <iostream>
using namespace std;
int main() {
      // Use a for loop to print numbers from 1 to 5
    for (int i = 1; i <= 5; i++) {
        cout << i << endl; // Print the current number
    }
}
```

Q\ Write a program in C++ to uses a while loop to print the squares of the first 5 natural numbers?

```
#include <iostream>
using namespace std;
int main() {
    int i = 1;  // Starting number
    cout << "The squares of the first 5 natural numbers are:\n";
    while (i <= 5) {
        cout << "Square of " << i << " is " << i * i << endl;
        i++;  // Increment the counter
    }
    }
```

do while like a 'while' statement, except that it tests the condition at the end of the loop body.

Structure of ' do while'

```
#include <iostream>
using namespace std;
int main() {
   do {
// code block to be executed
}
while (condition);
}
```

Q\ Write a program in C++ to print 1-5 using 'do while'?

```
#include <iostream>
using namespace std;
int main() {
     int i = 1; // Initialize the counter
    // Use a do while loop to print numbers from 1 to 5
    do {
        cout << i << endl; // Print the current number
        i++; // Increment the counter
    } while (i <= 5); // Condition checked after executing the loop
}
```

Q\ Rewrite below code using do while?

```
#include <iostream>
using namespace std;
int main() {
    int i = 1;  // Starting number
    cout << "The squares of the first 5 natural numbers are:\n";
    while (i <= 5) {
        cout << "Square of " << i << " is " << i * i << endl;
        i++;  // Increment the counter
    }
    }
```

```
#include <iostream>
using namespace std;
int main() {
```

```
    int i = 1;  // Starting number

    cout << "The squares of the first 5 natural numbers are:\n";

    do {
        cout << "Square of " << i << " is " << i * i << endl;
        i++;  // Increment the counter
    } while (i <= 5);
    }
```

H.W

Q\ Write a program in C++ to check the year is leap or not?

Q\ Write a program in C++ to that prompts the user to enter two integers and checks if the first number is divisible by the second. Print an appropriate message based on the result?

Q\ Write a program in C++ to find the first 10 natural numbers?

Q\ Write a program in C++ to find the sum of the first 10 natural numbers?

Q\ Write a program in C++ to find foctorial number using while?