

# INTRODUCTION OF C++ SECTION 3

Dr/Ghada Maher  
Eng/ Hossam Medhat

# C++ MATH

## ❖ C++ <cmath> Header :

- Other functions, such as **sqrt (square root)**, **round (rounds a number)**

```
*main.cpp X
1  #include <iostream>
2  #include <cmath>
3  using namespace std;
4
5  int main()
6  {
7      cout << sqrt(64) << endl;
8      cout << round(3.6) << endl;
9      cout << log(2);
10
11      return 0;
12 }
```

C:\Users\hossam\Desktop\stringg\string\bin\Debug\string.exe

```
8
4
0.693147
Process returned 0 (0x0)   execution time : 0.053 s
Press any key to continue.
```

# C++ MATH “CONT”

## ❖ C++ <cmath> Header :

➤ C++ has **many functions** that allows you to perform **mathematical tasks** on numbers.

### 1) Max (x,y) function :

➤ Max (x,y) function can be **used to find the highest value** of x and y.

➤ **Example :**

```
main.cpp x
1  #include <iostream>
2  #include <cmath>
3  using namespace std;
4
5  int main()
6  {
7      cout << max(5, 10);
8      return 0;
9  }
```

C:\Users\hossam\Desktop\stringg\string\bin\Debug\string.exe

```
10
Process returned 0 (0x0)   execution time : 0.031 s
Press any key to continue.
```

# C++ MATH “CONT”

## ❖ C++ <cmath> Header :

- C++ has **many functions** that allows you to perform **mathematical tasks** on numbers.

### 2) Min(x,y) function :

- Min(x,y) function can be **used to find the lowest value of x and y.**

```
*main.cpp x
1  #include <iostream>
2  #include <cmath>
3  using namespace std;
4
5  int main()
6  {
7      cout << min(5, 10);
8      return 0;
9  }
```

C:\Users\hossam\Desktop\stringg\string\bin\Debug\string.exe

```
5
Process returned 0 (0x0)   execution time : 0.047 s
Press any key to continue.
```

# C++ STRING CONCATENATION

❖ The **+** operator can be used between strings to add them together to make a new string. This is called concatenation.

```
17  #include <iostream>
18  using namespace std;
19  int main()
20  {
21      string firstName = "John ";
22      string lastName = "Doe";
23      string fullName = firstName + lastName;
24      cout << fullName;
25      return 0;
26  }
```

C:\Users\hossam\Desktop\stringg\string\bin\Debug\string.exe

```
John Doe
Process returned 0 (0x0)   execution time : 0.053 s
Press any key to continue.
```

# C++ STRING CONCATENATION “ CONT”

## ❖ Append() function:

➤ Append() function used also to concatenate strings .

```
33     #include <iostream>
34
35     using namespace std;
36
37     int main()
38     {
39         string firstName = "John ";
40         string lastName = "Doe";
41         string fullName = firstName.append(lastName);
42         cout << fullName;
43         return 0;
44     }
```

C:\Users\hossam\Desktop\stringg\string\bin\Debug\string.exe

```
John Doe
Process returned 0 (0x0)   execution time : 0.062 s
Press any key to continue.
```

# C++ GETLINE() FUNCTION


## ❖ getline() function :

➤ **getline() function** used to read a line of text.

➤ **Syntax :**

**getline (cin,  
variable\_name);**

```
47 #include <iostream>
48
49 using namespace std;
50
51 int main()
52 {
53     string fullName;
54     cout << "Type your full name: ";
55     getline (cin, fullName);
56     cout << "Your name is: " << fullName;
57     return 0;
58 }
```

 C:\Users\hossam\Desktop\stringg\string\bin\Debug\string.exe

```
Type your full name: hossam
Your name is: hossam
Process returned 0 (0x0)   execution time : 5.351 s
Press any key to continue.
```


# C++ ADDING NUMBERS AND STRINGS

❖ C++ uses the + operator for both addition and concatenation.

➤ Numbers are added. Strings are concatenated.

1) Add two numbers :

```
63      #include <iostream>
64
65      using namespace std;
66
67      int main()
68      {
69          int x = 10;
70          int y = 20;
71          int z = x + y;
72          cout << z;
73          return 0;
74      }
```

 C:\Users\hossam\Desktop\stringg\string\bin\Debug\string.exe

```
30
Process returned 0 (0x0)   execution time : 0.038 s
Press any key to continue.
```




## C++ ADDING NUMBERS AND STRINGS “ CONT”

❖ C++ uses the + operator for both addition and concatenation.

➤ Numbers are added. Strings are concatenated.

1) Add two strings :

```
78      #include <iostream>
79
80      using namespace std;
81
82      int main()
83      {
84          string x = "10";
85          string y = "20";
86          string z = x + y;
87          cout << z;
88          return 0;
89      }
```

 C:\Users\hossam\Desktop\stringg\string\bin\Debug\string.exe

```
1020
Process returned 0 (0x0)   execution time : 0.047 s
Press any key to continue.
```

# C++ ADDING NUMBERS AND STRINGS “CONT”

## ❖ What will happen when add number to string ?

```
93      #include <iostream>
94
95      using namespace std;
96
97      int main()
98      {
99      string x = "10";
100     int y = 20;
101     string z = x + y;
102     cout << z;
103     return 0;
104 }
```

```
93      #include <iostream>
94
95      using namespace std;
96
97      int main()
98      {
99      string x = "10";
100     int y = 20;
101     string z = x + y;
102     cout << z;
103     return 0;
104 }
```


Logs & others		
Code::Blocks X Search results X Cccc X Build log X Build messages X CppCheck/Vera++ X CppCheck/Vera++		
File	Line	Message
=== Build: Debug in string (compiler: GNU GCC Compiler) ===		
In function 'int main()':		
C:\Users\hoss...	101	error: no match for 'operator+' (operand types are 'std::__cxx11::string' {aka 'std::__...

# C++ STRING LENGTH() OR SIZE():

❖ **String Length() or size()** is used to get the length or size of a string .

```
107 #include <iostream>
108
109 using namespace std;
110
111 int main()
112 {
113     string txt = "Hossam Medhat";
114     cout << "The length of the txt string is: " << txt.length();
115     return 0;
116 }
```

```
107 #include <iostream>
108
109 using namespace std;
110
111 int main()
112 {
113     string txt = "Hossam Medhat";
114     cout << "The length of the txt string is: " << txt.size();
115     return 0;
116 }
```

 C:\Users\hossam\Desktop\stringg\string\bin\Debug\string.exe

The length of the txt string is: 13  
Process returned 0 (0x0) execution time : 0.031 s  
Press any key to continue.

# C++ ACCESS STRINGS

❖ In C++ You can access the characters in a string by referring to its index number inside square brackets [ ].

❖ String indexes start with 0: [0] is the first character, [1] is the

```
124 // index of string
125 #include <iostream>
126
127 using namespace std;
128
129 int main()
130 {
131     string myString = "Hello";
132     cout << myString[0] << endl;
133     cout << myString[1];
134     return 0;
135 }
```

C:\Users\hossam\Desktop\stringg\string\bin\Debug\string.exe

```
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e
Process returned 0 (0x0)   execution time : 0.031 s
Press any key to continue.
```

# C++ ACCESS STRINGS “CONT”

❖ In C++ if you need To change the value of a specific character in a string, refer to **the index number, and use single quotes.**

```
125     #include <iostream>
126
127     using namespace std;
128
129     int main()
130     {
131         string myString = "Hello";
132         myString[0] = 'J';
133         cout << myString;
134         return 0;
135     }
136
```

**Outputs Jello instead of  
Hello**

# IF STATEMENT IN C++

- ❖ In C++ programming, **if statement** is used to **test the condition**.
- ❖ There are **various types** of if statements in C++ :
  - 1) if statement
  - 2) if-else statement
  - 3) nested if statement

# IF STATEMENT IN C++ “CONT”

## ❖ Decision Making:

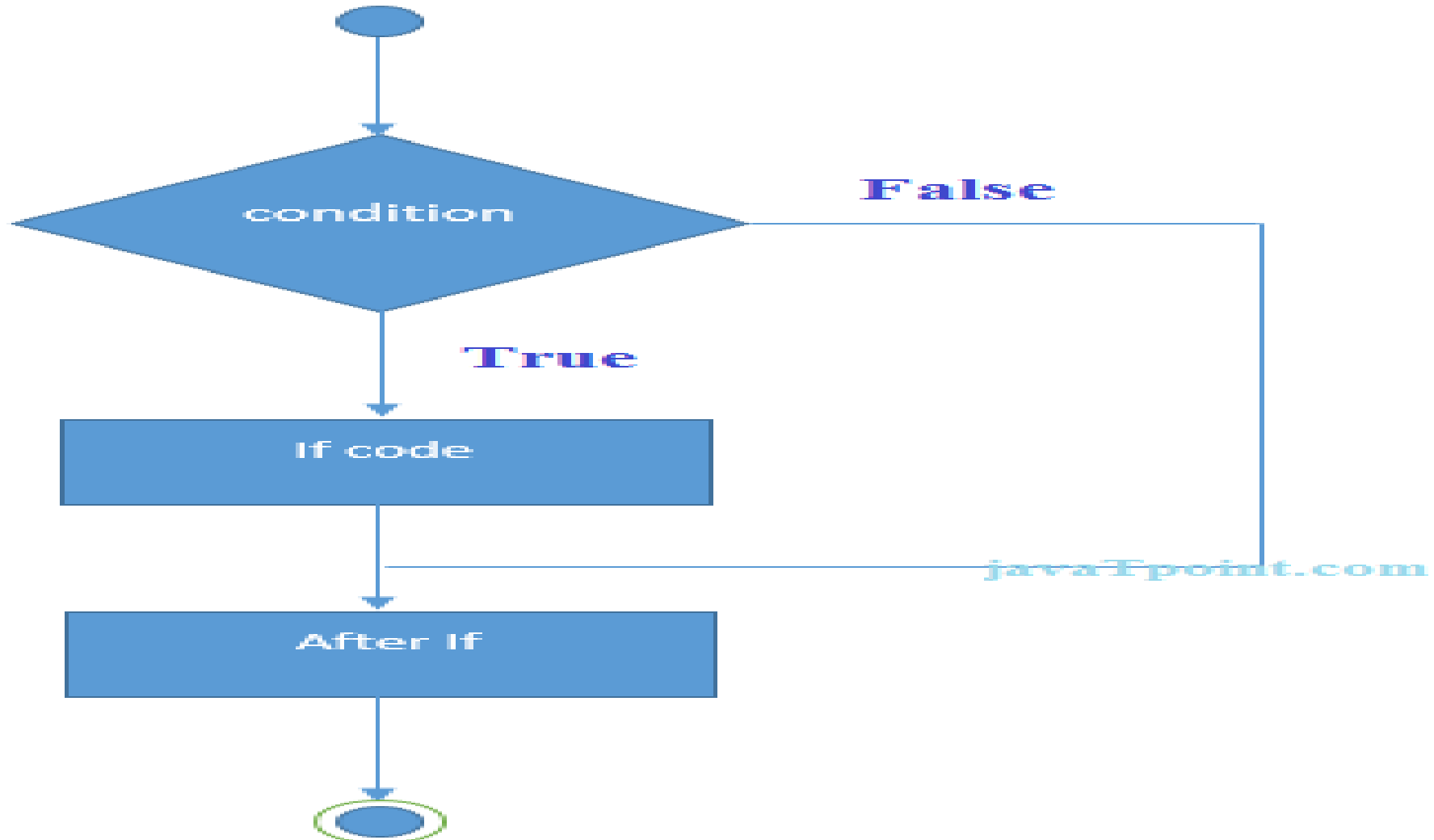
➤ The if statement is used to **execute** some code if a condition **is true**.

➤ **Syntax:**

```
if(condition)
{
//statements
}
```

➤ The condition specifies which expression is to be evaluated. **If the condition is true, the statements in curly brackets are executed.**

# IF STATEMENT IN C++“ CONT”






# IF STATEMENT IN C++ “CONT”

❖ Use relational operators to evaluate conditions.

## Example

```
main.cpp x
1
2 //C++ If Example
3 #include <iostream>
4 using namespace std;
5
6 int main () {
7     int num = 10;
8     if (num % 2 == 0)
9     {
10         cout<<"It is even number";
11     }
12     return 0;
13 }
```

 "C:\Users\hossam\Desktop\if\if condition\bin\Debug\if condition.exe"

```
It is even number
Process returned 0 (0x0)   execution time : 0.022 s
Press any key to continue.
```

# IF ELSE STATEMENT IN C++

## ❖ Else statement:

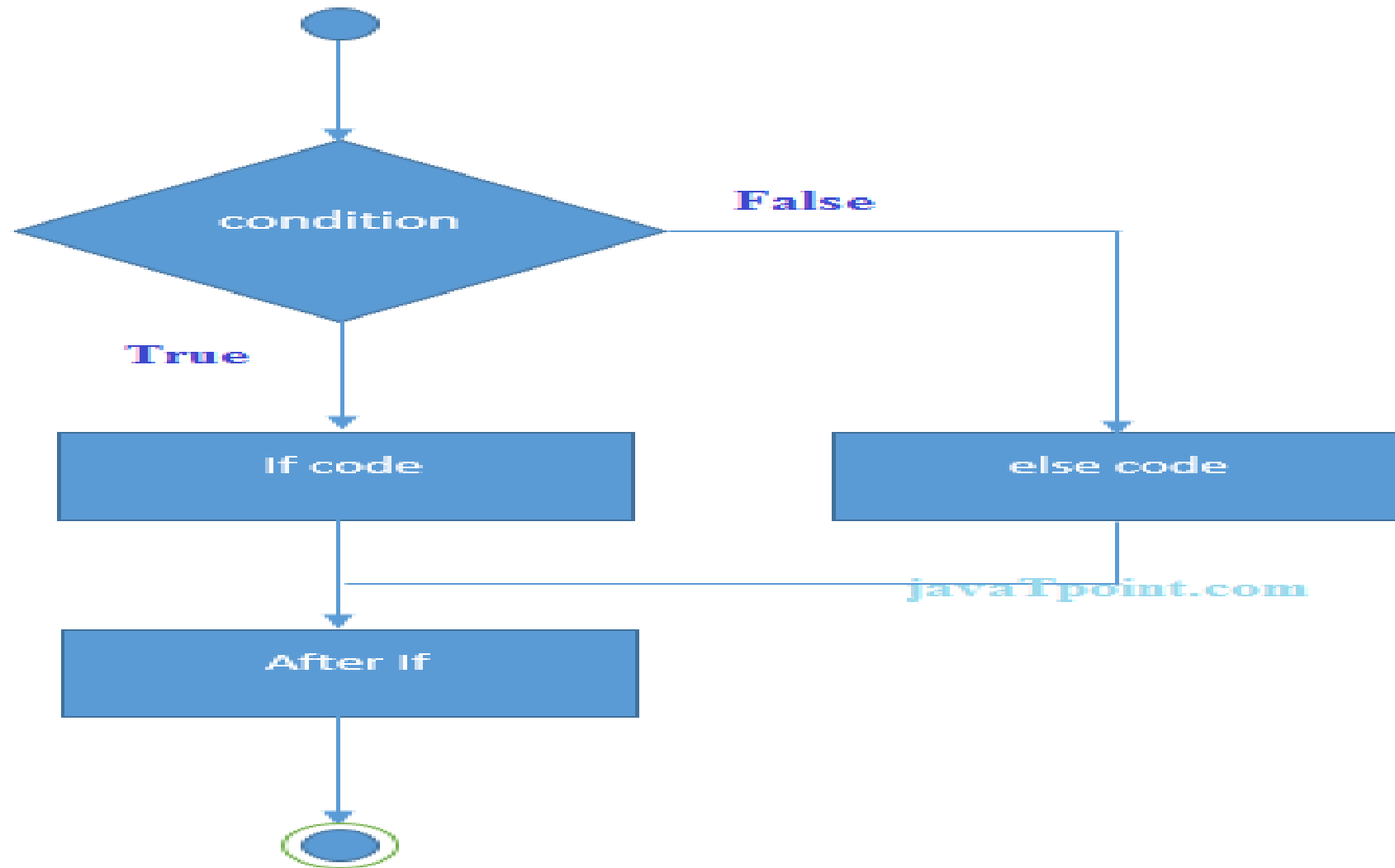
- An if statement can be followed by an optional else statement, which executes when the condition is false.

### ➤ Syntax:

```
if(condition) {  
    //statements  
}  
else {  
    //statements  
}
```

- The compiler will test the condition:-
- If it evaluates to true, then the code inside the if statement will be executed
- If it evaluates to false, then the code inside the else statement will be executed

# IF ELSE STATEMENT IN C++“ CONT”



# IF ELSE STATEMENT IN C++ “CONT”

❖ Use relational operators to evaluate conditions.

## Example

```
main.cpp x
16 //C++ If-else Example
17 #include <iostream>
18 using namespace std;
19 int main () {
20     int num = 11;
21     if (num % 2 == 0)
22     {
23         cout<<"It is even number";
24     }
25     else
26     {
27         cout<<"It is odd number";
28     }
29     return 0;
30 }
```

 "C:\Users\hossam\Desktop\if\if condition\bin\Debug\if condition.exe"

It is odd number

Process returned 0 (0x0) execution time : 0.017 s

Press any key to continue.

# IF ELSE STATEMENT IN C++ “CONT”

## Example

```
int mark = 90;  
if(mark<33) {  
    cout<<"You failed"<<endl;  
}  
else{  
    cout<<"You passed"<<endl;  
}
```

**Outputs : "You passed"**

# IF ELSE STATEMENT IN C++ “CONT”

## Example

```
int time = 22;  
if (time < 10) {  
    cout << "Good morning.";  
} else if (time < 20) {  
    cout << "Good day.";  
} else {  
    cout << "Good evening.";  
}
```

**Outputs : "Good evening."**

# C++ SHORT HAND IF ELSE

## ❖ Else statement:

- a short-hand if else which is known as the ternary operator because it consists of three operands. It can be used to replace multiple lines of code with a single line.
- It is often used to replace simple if else statements.
- **Syntax:**

```
variable = (condition) ? expressionTrue :  
expressionFalse;
```

# C++ SHORT HAND IF ELSE “CONT”

## Example

```
33 //example of Short Hand If Else
34 #include <iostream>
35 using namespace std;
36
37 int main () {
38     int time = 20;
39     if (time < 18) {
40         cout << "Good day.";
41     } else {
42         cout << "Good evening.";
43     }
44     return 0;
45 }
```

"C:\Users\hossam\Desktop\if\if condition\bin\Debug\if condition.exe"

Good evening.

Process returned 0 (0x0) execution time : 0.031 s

Press any key to continue.



# C++ SHORT HAND IF ELSE “CONT”

❖ You can simply write :

## Example

main.cpp X

```
47 //-----  
48  
49 //You can simply write:  
50 #include <iostream>  
51 using namespace std;  
52  
53 int main () {  
54     int time = 20;  
55     string result = (time < 18) ? "Good day." : "Good evening.";  
56     cout << result;  
57     return 0;  
58 }
```

Select "C:\Users\hossam\Desktop\if if condition\bin\Debug\if condition.exe"

Good evening.

Process returned 0 (0x0) execution time : 0.031 s

Press any key to continue.

# NESTED IF & IF/ELSE STATEMENTS IN C++

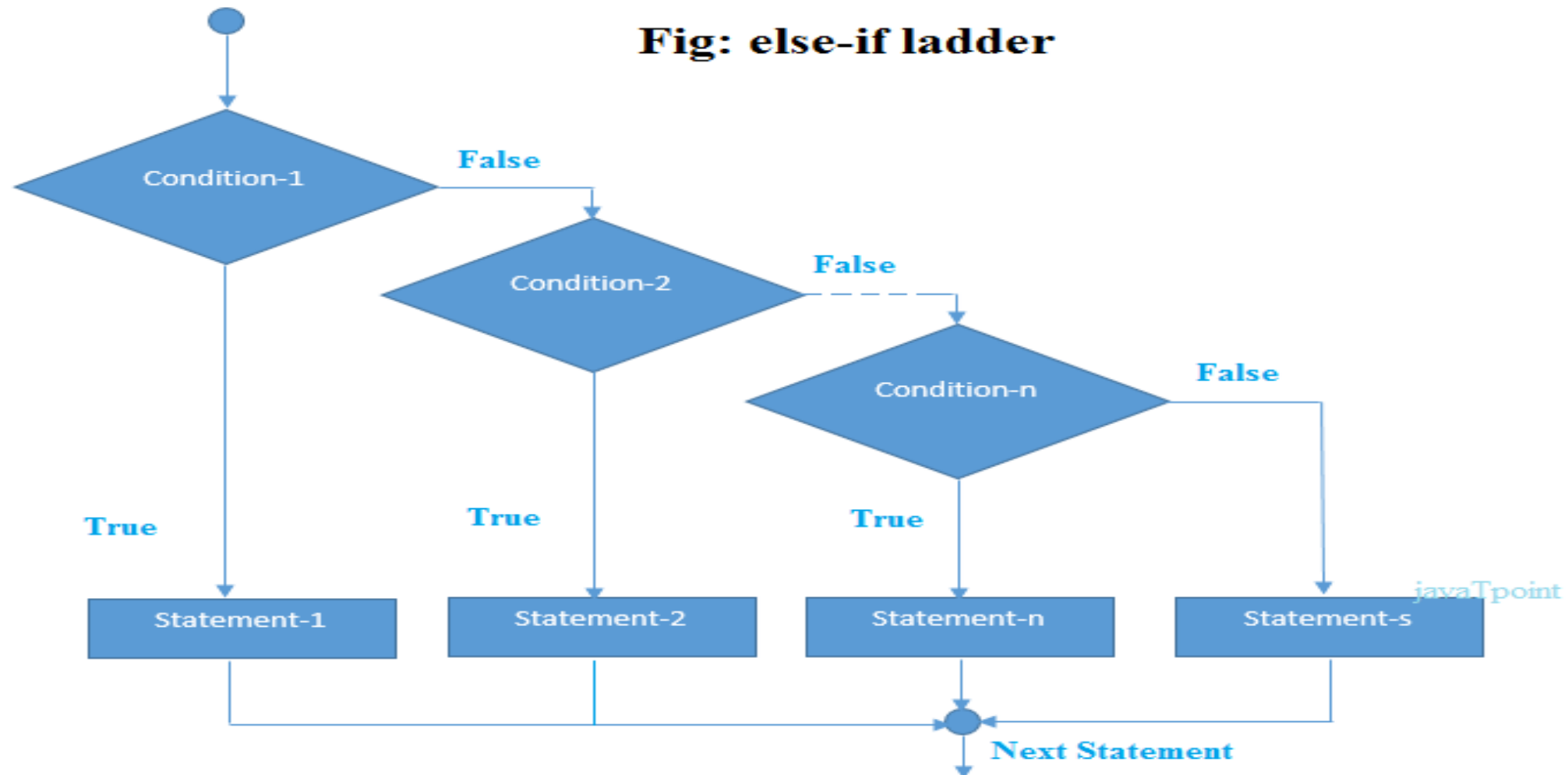
❖ **Nested if statements:** nesting **an unlimited number** of if/else statements.

❖ **Syntax:**

```
if(condition1){  
    //code to be executed if condition1 is true  
}  
else if(condition2){  
    //code to be executed if condition2 is true  
}  
else if(condition3){  
    //code to be executed if condition3 is true  
}  
else{  
    //code to be executed if all the conditions are  
    false  
}
```

## NESTED IF & IF/ELSE STATEMENTS IN C++“ CONT”

**Fig: else-if ladder**



## NESTED IF & IF/ELSE STATEMENTS IN C++“ CONT”

### Example

\*main.cpp X

```
81
82     #include <iostream>
83     using namespace std;
84     int main () {
85         int time = 22;
86         if (time < 10) {
87             cout << "Good morning.";
88         } else if (time < 20) {
89             cout << "Good day.";
90         } else {
91             cout << "Good evening.";
92         }
93         return 0;
94     }
```

"C:\Users\hossam\Desktop\if\if condition\bin\Debug\if condition.exe"

Good evening.

Process returned 0 (0x0) execution time : 0.047 s

Press any key to continue.

## NESTED IF & IF/ELSE STATEMENTS IN C++“ CONT”

### Example

```
int mark = 100;
if (mark >= 50) {
    cout << "You passed." << endl;
    if (mark == 100) {
        cout <<"Perfect!" << endl; }
} else {
    cout << "You failed." << endl;
}
```

**Outputs :** “ You passed “  
“ Perfect! “

# C++ SWITCH STATEMENTS

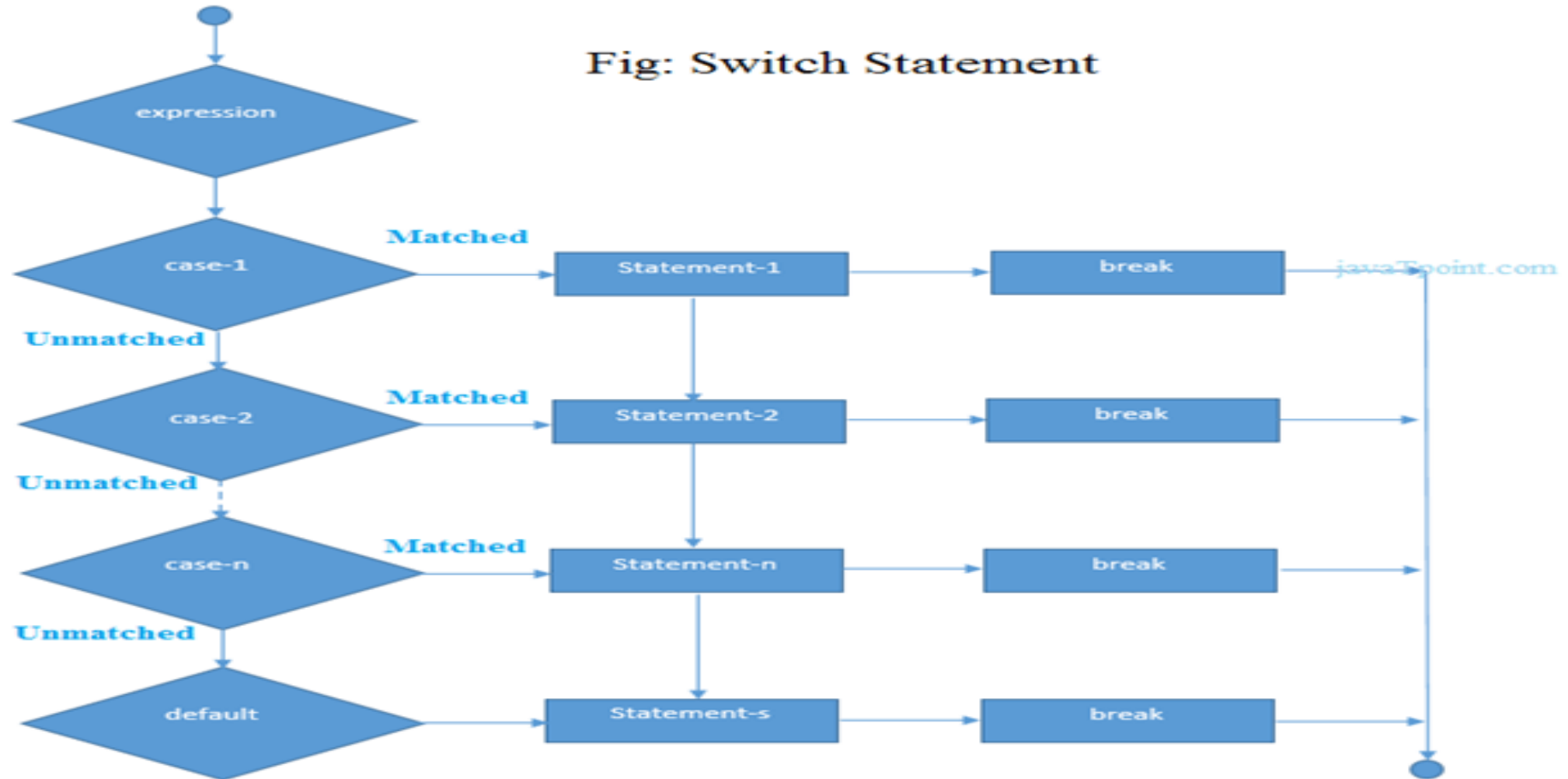
- ❖ C++ switch statement **is like** nested if statement in C++.
- ❖ Use the switch statement **to select one of many code blocks** to be executed.

➤ **Syntax:**

```
switch(expression) {  
    case x: // code block  
    break;  
    case y: // code block  
    break;  
    default:  
    // code block  
}
```

- The switch expression **is evaluated once**
- The value of the expression **is compared with** the values of each case,  
**If there is a match,** the associated block of code is executed.

# C++ SWITCH STATEMENTS “CONT”



# C++ BREAK STATEMENT

- ❖ When C++ reaches a break keyword, it breaks out of the switch block.
- ❖ A break can save a lot of execution time because it "ignores" the execution of all the rest of the code in the switch block.

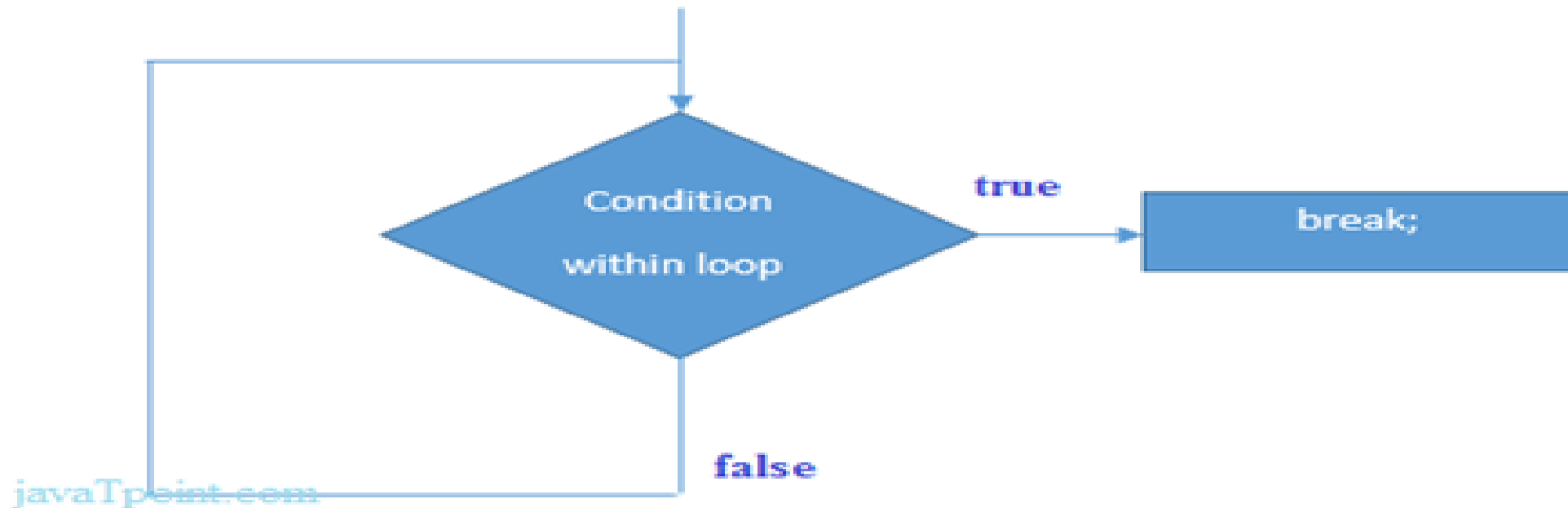


Figure: Flowchart of break statement



## C++ BREAK STATEMENT“ CONT”

❖ what is the output of this code ?

```
3  #include <iostream>
4  using namespace std;
5  int main() {
6      for (int i = 1; i <= 10; i++)
7      {
8          if (i == 5)
9          {
10             break;
11         }
12         cout<<i<<"\n";
13     }
14 }
```

"C:\Users\hossam\Desktop\switchh\break and continue\bin\Debug\break and continu

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# C++ CONTINUE STATEMENT

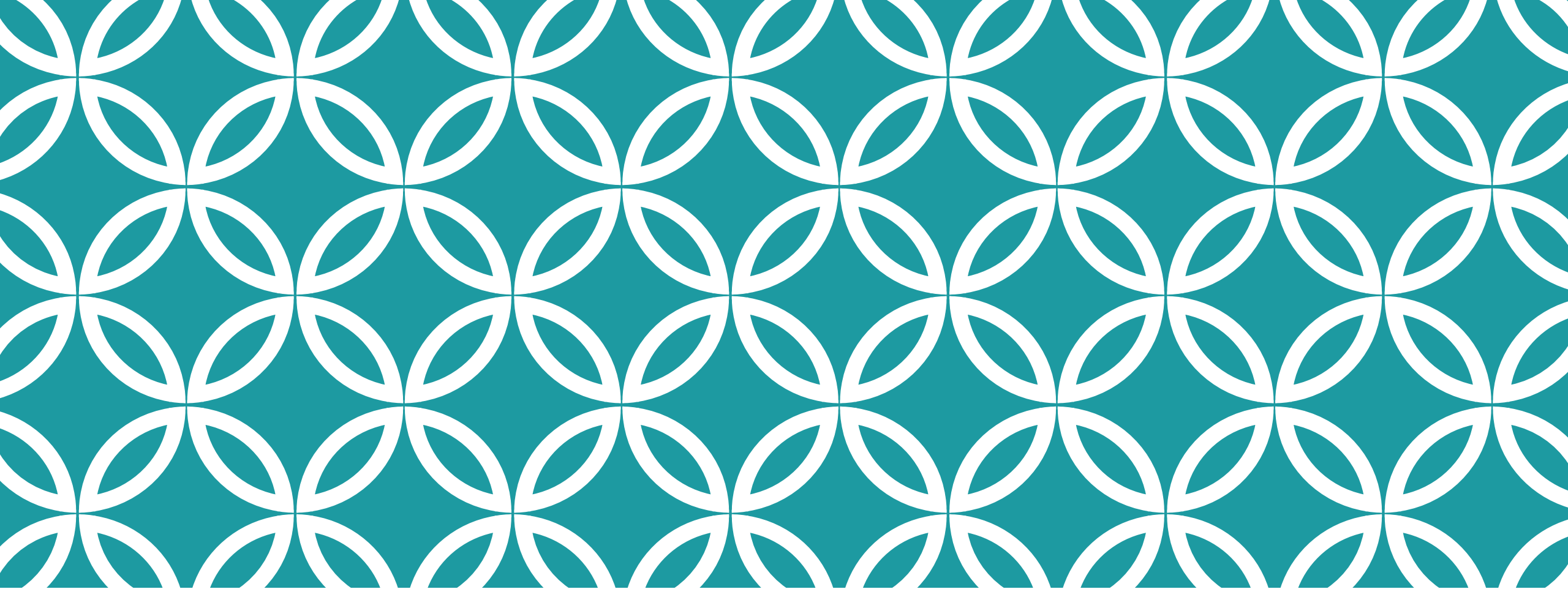
- ❖ C++ continue statement is used to continue loop.
- ❖ It continues the current flow of the program and skips the remaining code at specified condition.

```
34 //continue examples
35 #include <iostream>
36 using namespace std;
37 int main()
38 {
39     for(int i=1;i<=10;i++){
40         if(i==5){
41             continue;
42         }
43         cout<<i<<"\n";
44     }
45 }
```

"C:\Users\hossam\Desktop\switchh\break and continue\bin\Debug\break

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Process returned 0 (0x0) execution time : 0.078 s  
Press any key to continue.



**THANKS**

**Dr/Ghada Maher**  
**Eng/ Hossam**  
**Medhat**