The Structure of `if` Statements

The `if` construct allows the programmer to specify that a statement should be executed under some circumstances and not executed under others. It allows the program to make decisions: "If this condition is true, then do that." The syntax is:

```
if (boolean condition)
{
  statement(s) to be executed if condition is true
}
else
{
  statement(s) to be executed if condition is false
}
```

Some remarks: the braces are optional if there is only a single statement, and the `else` clause is always optional. John Boole was a mathematician that studied logic so a boolean condition is an expression that must evaluate to either a zero value (false) or a non-zero value (true). In C++, nearly every expression evaluates to some value—even assignments, which evaluate to the right-hand value of the statement. The condition must always be placed in parentheses.

Example

```
if (a < b)
{
  cout << "Hey, " << a << " is less than " << b << "!\n";
}
else
{
  cout << a << " must be greater than or equal to " << b << "!\n";
}
```

Boolean Operator	Meaning of test
==	equal?
!=	not equal?
<=	less than or equal to?
>=	greater than or equal to?
<	less than?
>	greater than?
&&	and
||	or

if-else Ladder

Sometimes there are multiple dependent conditions that must be evaluated to determine the action to be executed. The syntax is:

```
if (boolean condition 1)
{
  statement(s) to be executed if condition 1 is true
}
else if (boolean condition 2)
{
  statement(s) to be executed if condition 2
  is true and condition 1 is false
}
else if (boolean condition 3)
{
  statement(s) to be executed if condition 3
  is true, and condition 1 and condition 2 are false)
}
```

***Note:** The curly braces {} are necessary if you have more than one line of code to be run under each condition. They are optional if there is only one line of code to run.

Example

```
if ((time >= 8) && (day == weekday))
{
  cout << "You are late for school!" << endl;
}
else if ((day == weekend) || (time < 5))
{
  cout << "Sleep as much as you want." << endl;
}
else
{
  cout << "Enjoy your classes." << endl;
}
```

The table below shows the output produced from the code above depending on the values of the variables `time` and `day`.

time	**day**	**Output Produced from Code**
9	=weekend	Sleep as much as you want.
9	=weekday	You are late for school!
7	=weekday	Enjoy your classes.