عنوان مضمون

Visual Programming-I

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C# decision making

Flow Control

- All the C# code you've seen the program execution has proceeded from one line to the next in top-to-bottom order, missing nothing.

- This chapter describes two methods for controlling program flow that is, the order of execution of lines of C# code:

1. *Branching:*

   Branching executes code conditionally, depending on the outcome of an evaluation, such as "Execute this code only if the variable myVal is less than 10."

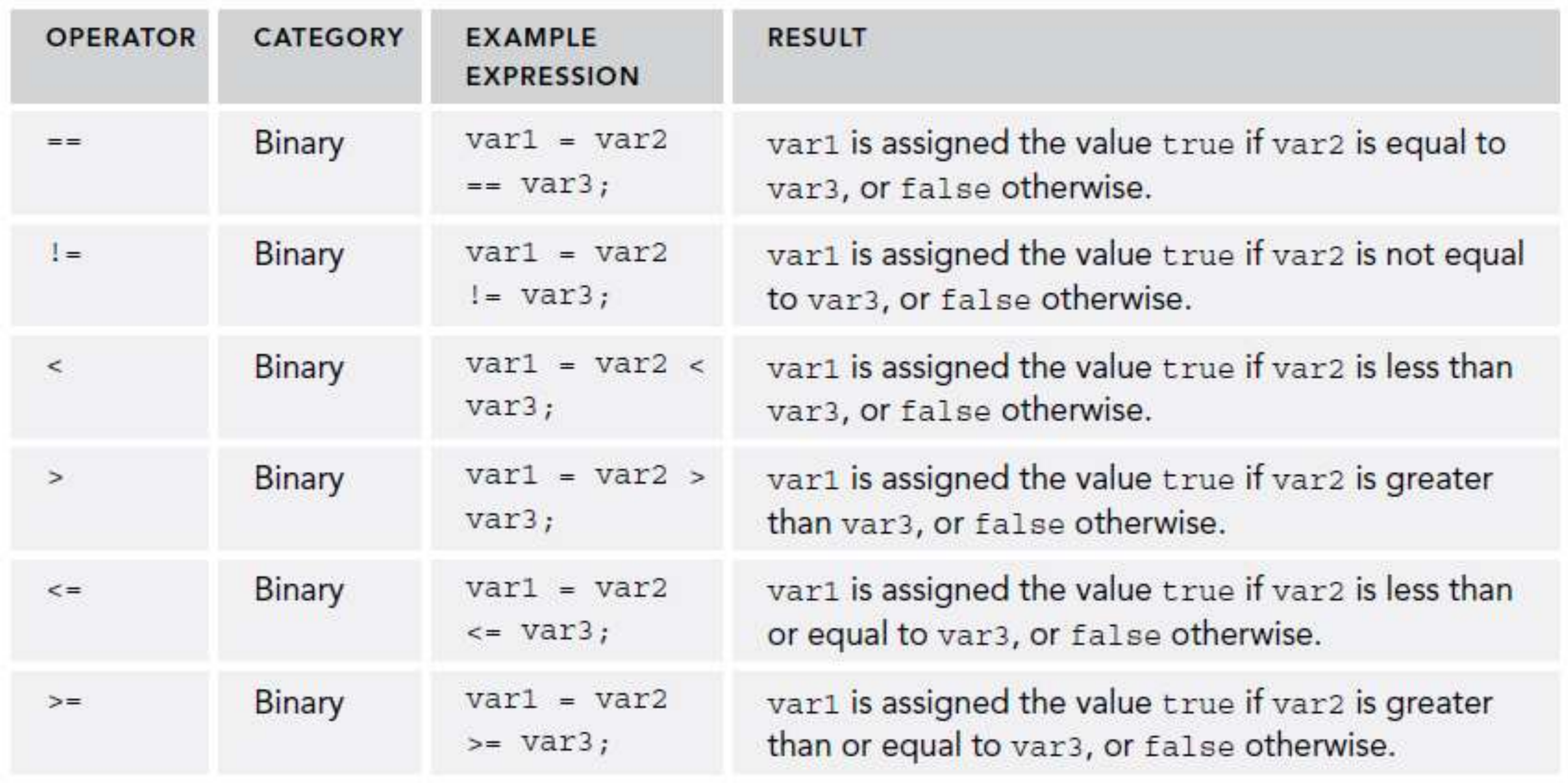
2. *Looping:*

   Looping repeatedly executes the same statements, either a certain number of times or until a test condition has been reached.

Both techniques involve the use of ***Boolean logic****.*

BOOLEAN LOGIC

- The **bool** type can hold one of only two values: **true** or **false**.
- In particular, bool types are used to store the result of a ***comparison.***



OPERATOR	CATEGORY	EXAMPLE EXPRESSION	RESULT
`==`	Binary	`var1 = var2 == var3;`	`var1` is assigned the value `true` if `var2` is equal to `var3`, or `false` otherwise.
`!=`	Binary	`var1 = var2 != var3;`	`var1` is assigned the value `true` if `var2` is not equal to `var3`, or `false` otherwise.
`<`	Binary	`var1 = var2 < var3;`	`var1` is assigned the value `true` if `var2` is less than `var3`, or `false` otherwise.
`>`	Binary	`var1 = var2 > var3;`	`var1` is assigned the value `true` if `var2` is greater than `var3`, or `false` otherwise.
`<=`	Binary	`var1 = var2 <= var3;`	`var1` is assigned the value `true` if `var2` is less than or equal to `var3`, or `false` otherwise.
`>=`	Binary	`var1 = var2 >= var3;`	`var1` is assigned the value `true` if `var2` is greater than or equal to `var3`, or `false` otherwise.

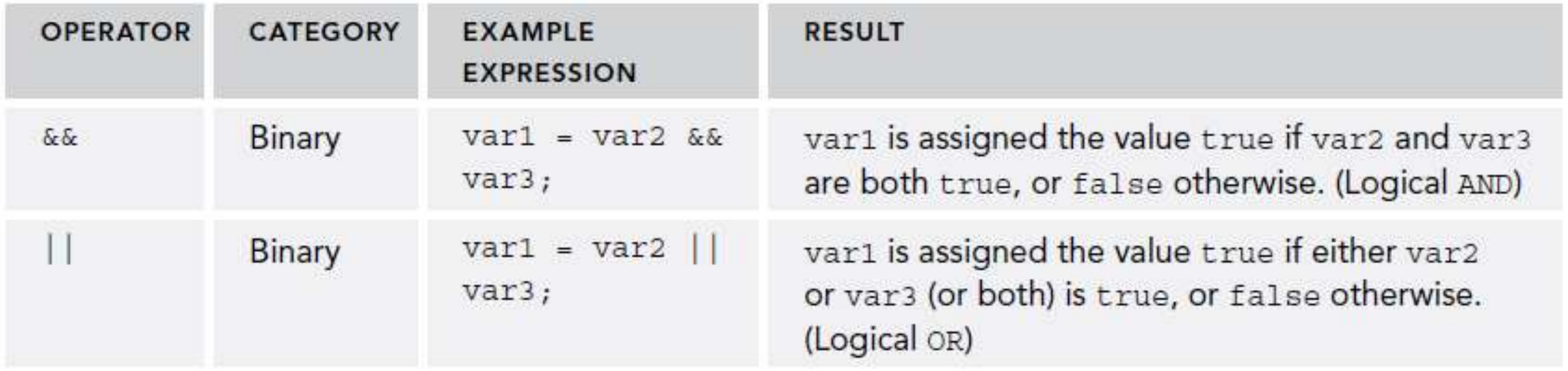
BOOLEAN LOGIC

- You might use operators such as these on numeric values in code:

  bool isLessThan10;

  isLessThan10 = myVal < 10;

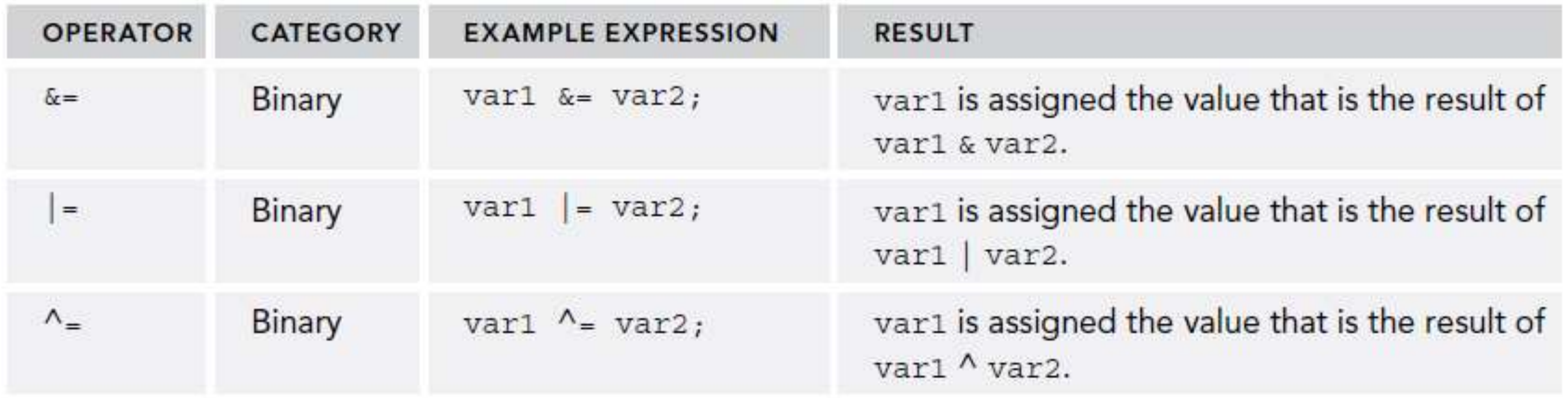
- The **&** and **|** operators also have two similar operators, known as ***conditional Boolean operators***



OPERATOR	CATEGORY	EXAMPLE EXPRESSION	RESULT
`&&`	Binary	`var1 = var2 && var3;`	`var1` is assigned the value `true` if `var2` and `var3` are both `true`, or `false` otherwise. (Logical AND)
`||`	Binary	`var1 = var2 || var3;`	`var1` is assigned the value `true` if either `var2` or `var3` (or both) is `true`, or `false` otherwise. (Logical OR)

Boolean Bitwise and Assignment Operators

- **Boolean comparisons** can be combined with **assignments** by combining **Boolean bitwise and assignment operators**.
- When expressions use both the assignment (=) and bitwise operators (&, |, and ^), the binary representation of the compared quantities are used to compute the outcome, instead of the integer, string, or similar values.



OPERATOR	CATEGORY	EXAMPLE EXPRESSION	RESULT
`&=`	Binary	`var1 &= var2;`	`var1` is assigned the value that is the result of `var1 & var2`.
`|=`	Binary	`var1 |= var2;`	`var1` is assigned the value that is the result of `var1 | var2`.
`^=`	Binary	`var1 ^= var2;`	`var1` is assigned the value that is the result of `var1 ^ var2`.

- the equation var1 ^= var2 is similar to var1 = var1 ^ var2.

```
using static System.Console;
using static System.Convert;
namespace ConsoleApplication6
{
    class Program
    {
      static void Main(string[] args)
      {     WriteLine("Enter an integer:");
            int myInt = ToInt32(ReadLine());
            bool isLessThan10 = myInt < 10;
            bool isBetween0And5 = (0 <= myInt) && (myInt <= 5);
            WriteLine($"Integer less than 10? {isLessThan10}");
            WriteLine($"Integer between 0 and 5? {isBetween0And5}");
            WriteLine($"Exactly one of the above is true? " +
            $"{isLessThan10 ^ isBetween0And5}");
            ReadKey();
      }
}
}
```

BRANCHING

- Branching is the act of controlling which line of code should be executed next.

- This section describes three branching techniques available in C#:
  - ➤ The ternary operator
  - ➤ The if statement
  - ➤ The switch statement

BRANCHING

- The Ternary Operator:

  You’ve already seen unary operators that work on one operand, and binary operators that work on two operands, so it won’t come as a surprise that this operator works on three operands. The syntax is as follows:

  <test> ? <resultIfTrue>: <resultIfFalse>

- You might use this as follows to test the value of an int variable called myInteger:

```
string resultString = (myInteger < 10) ? "Less than 10" : "Greater than or
equal to 10";
```

BRANCHING

- The if Statement:

  The simplest use of an if statement is as follows, where <*test*> is evaluated (it must evaluate to a Boolean value for the code to compile) and the line of code that follows the statement is executed if <*test*> evaluates to true:

  ```
  if (<test>)
          <code executed if <test> is true>;
  ```

- You can also specify additional code using the else statement in combination with an if statement.

  ```
  if (<test>)
          <code executed if <test> is true>;
  else
          <code executed if <test> is false>;
  ```

BRANCHING

- Because the result of the if statement cannot be assigned to a variable, you have to assign a value to the variable in a separate step:

```
string resultString;
if (myInteger < 10)
        resultString = "Less than 10";
else
        resultString = "Greater than or equal to 10";
```

BRANCHING

Checking More Conditions Using if Statements:

```
if (var1 == 1)
{           // Do something.
}
else
{           if (var1 == 2)
            {           // Do something else.
            }
            else
            {           if (var1 == 3 || var1 == 4)
                        {           // Do something else.
                        }
                        else
                        {           // Do something else.
                        }
            }
}
```

BRANCHING

The switch Statement:

This test is limited to discrete values, rather than clauses such as “greater than X,” so its use is slightly different; however, it can be a powerful technique.

- The basic structure of a switch statement is as follows:

```
switch (<testVar>)
{          case <comparisonVal1>:
                     <code to execute if <testVar> == <comparisonVal1> >
                     break;
           case <comparisonVal2>:
                     <code to execute if <testVar> == <comparisonVal2> >
                     break;
           ...
                     default:
                     <code to execute if <testVar> != comparisonVals>
                     break;
}
```

```
static void Main(string[] args)
{           const string myName = "benjamin";
            const string niceName = "andrea";
            const string sillyName = "ploppy";
            string name;
            WriteLine("What is your name?");
            name = ReadLine();
            switch (name.ToLower())
            {           case myName:
                                    WriteLine("You have the same name as me!");
                                    break;
                        case niceName:
                                    WriteLine("My, what a nice name you have!");
                                    break;
                        case sillyName:
                                    WriteLine("That's a very silly name.");
                                    break;
            }
            WriteLine($"Hello {name}!");
            ReadKey();
}
```

LOOPING

- *Looping* refers to the repeated execution of statements.

- do Loops:

  The structure of a do loop is as follows, where <Test> evaluates to a Boolean value:

```
do
{         <code to be looped>
} while (<Test>);
```

LOOPING

- For example, you could use the following to write the numbers . . .

```
int i = 1;
do
{        WriteLine("{0}", i++);
} while (i <= 10);
```

LOOPING

- while Loops:

  while loops are very similar to do loops, but they have one important difference: The Boolean test in a while loop takes place at the start of the loop cycle, not at the end.

Here's how while loops are specified:

```
while (<Test>)
{         <code to be looped>
}
```

They can be used in almost the same way as do loops:

```
int i = 1;
while (i <= 10)
{         WriteLine($"{i++}");
}
```

LOOPING

- for Loops:

  This type of loop executes a set number of times and maintains its own counter. To define a for loop you need the following information:

  ➤ A starting value to initialize the counter variable

  ➤ A condition for continuing the loop, involving the counter variable

  ➤ An operation to perform on the counter variable at the end of each loop cycle

- This information must be placed into the structure of a for loop as follows:

  for (<*initialization*>; <*condition*>; <*operation*>)

  { <*code to loop*>

  }

Interrupting Loops

- Sometimes you want finer-grained control over the processing of looping code. C# provides commands to help you here:

➤ break—Causes the loop to end immediately

➤ continue—Causes the current loop cycle to end immediately (execution continues with the next loop cycle)

➤ return—Jumps out of the loop and its containing function

Interrupting Loops

- **The break** command simply exits the loop, and execution continues at the first line of code after the loop, as shown in the following example:

```
int i = 1;
while (i <= 10)
{        if (i == 6)
                 break;
         WriteLine($"{i++}");
}
```

- This code writes out the numbers from 1 to 5 because the break command causes the loop to exit when i reaches 6.

Interrupting Loops

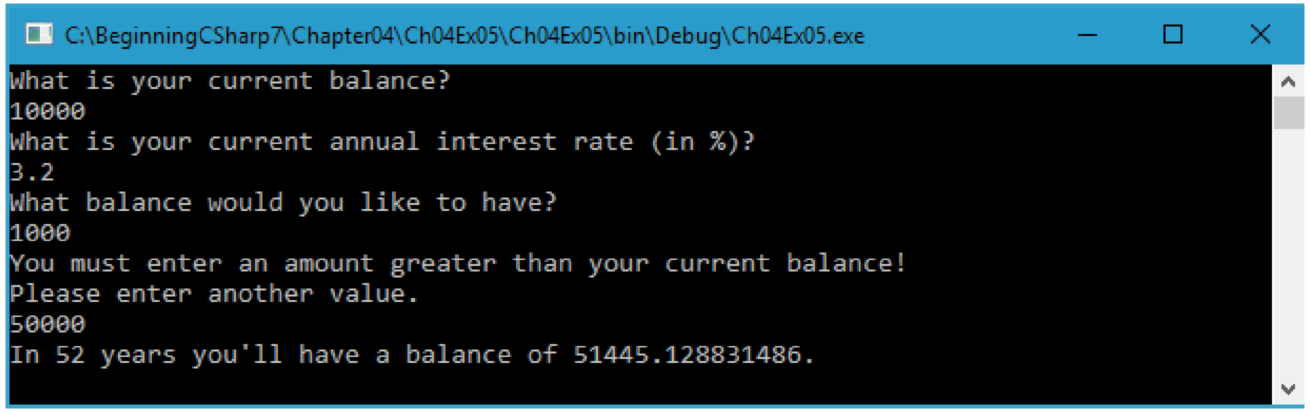
- **continue** only stops the current cycle, not the whole loop, as shown here:

```
int i;
for (i = 1; i <= 10; i++)
{       if ((i % 2) == 0)
                continue;
        WriteLine(i);
}
```

- In the preceding example, whenever the remainder of i divided by 2 is zero, the continue statement stops the execution of the current cycle, so only the numbers 1, 3, 5, 7, and 9 are displayed.

homework

- you use a loop to calculate how many years it will take to get a specified amount of money in the account, based on a starting amount and a fixed interest rate.(in winform)



C:\BeginningCSharp7\Chapter04\Ch04Ex05\Ch04Ex05\bin\Debug\Ch04Ex05.exe

```
What is your current balance?
10000
What is your current annual interest rate (in %)?
3.2
What balance would you like to have?
1000
You must enter an amount greater than your current balance!
Please enter another value.
50000
In 52 years you'll have a balance of 51445.128831486.
```