A·P·U
ASIA PACIFIC UNIVERSITY
OF TECHNOLOGY & INNOVATION

INTRODUCTION TO VISUAL AND INTERACTIVE PROGRAMMING

CT803-4-0-OIVIP

Topic: Operators

Topic Learning Outcomes

At the end of this topic, you should be able to:

- Identify Boolean
- Identify Operators

Contents & Structure

- Boolean Expression
- Operators
  - Arithmetic
  - Assignment
  - Relational
  - Logical

Boolean Expressions

Sometimes, you only want a statement to be executed under certain conditions.

Such conditions are defined in terms of **Boolean expressions.**

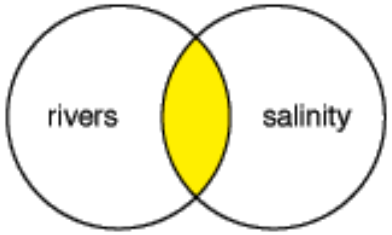
In programming, a **Boolean Expression** is an expression that either true or false.

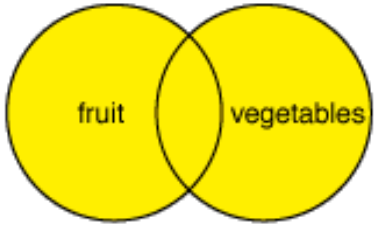
In **graphical programming**, any block shaped like an elongated diamond is a **Boolean Expression**.

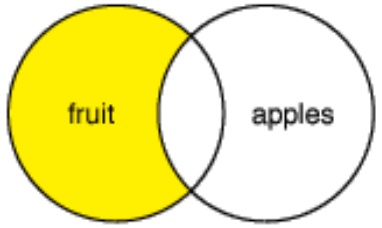
Rarely used on their own instead, they are used as input to other expressions a common example: conditional statements a programming construct that allows execution of a particular set of statements only under certain conditions.

Computing with Booleans

- George Boole, a British mathematician (1815-1864).
  - Logic and math are equivalent.
- All math functions can be determined using three primary logic operators
- These are especially useful for searching databases
  - AND narrows your search,
  - OR broadens your search, and
  - NOT is used to exclude concepts.



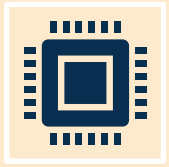




Hint: Yellow is search target

Operators

An operator is a symbol that tells the computer to perform certain mathematical or logical manipulations.



Operators are used in programs to manipulate data and variables.

Arithmetic Operator

Arithmetic operators are used to perform numerical operations

Operator	Definition	Example
+	Addition	
-	Subtraction	
*	Multiplication	
/	Division (the result is the quotient)	
mod or %	Modulo Division (the result is the remainder)	a % b 

Exercise 1

- Solve the given problem:
  - 5+4
  - 5*4
  - 5+4-3
  - 34+3*6
  - (34+3)*6
  - 40/5 + 4
  - 4+40%5

Assignment Operators

- Statement

a = a + 2

a = a - 3

a = a * 2

a = a / 4

a = a % 2

b = b + (c + 2)

d = d * (e - 5)

- Shorthand operator

a += 2

a -= 3

a *= 2

a /= 4

a %= 2

b += c + 2

d *= e - 5

Exercise 2

- Given `i = 1, j = 2, k = 3, m = 4`

- i += j + k
- j *= k - m + 5
- k -= m /= j * 2

Advantages of using shorthand operator

- The use of shorthand assignment operators has three advantages:
  - What appears on the left-hand side need not be repeated and therefore it becomes easier to write.
  - The statement is more concise and easier to read.
  - The statement is more efficient.

Relational Operators

- Also know as comparison operators
- Relational operators are used to test the relationship between two variables or constant (fix value).

Relational Operator		
Operator	**Definition**	**Syntax**
=	Equal to	
>	Greater than	
<	Less than	
⩾	Greater or equal	
⩽	Less or equal	
≠	Not equal	

Logical Operators

- Logical operators are used to combine two or more relational expression
- This operator is used to test more than one condition at a time.

Boolean Operators		
Operator	**Definition**	**Example**
!	Not	
&&	and	
||	or	

Boolean Operators – Truth Table

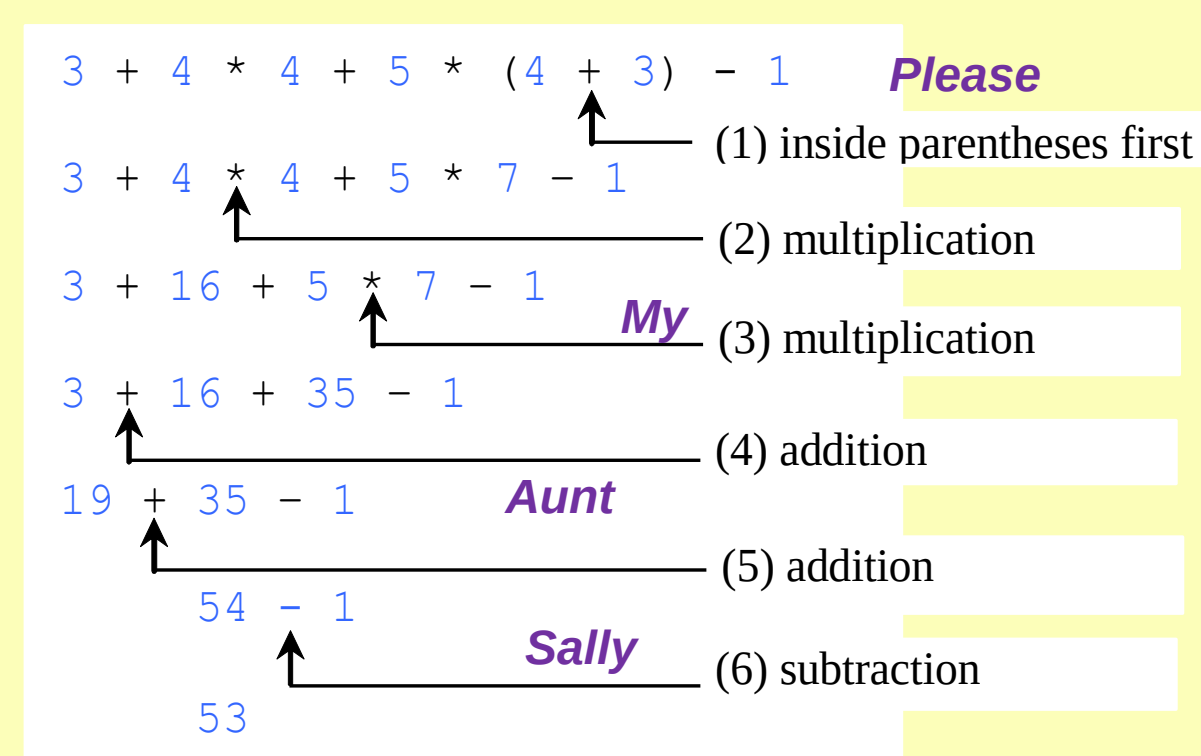
- The Boolean operators used to combine two Boolean expressions and produce a Boolean result.
- **Truth tables** ca
  - A column fo
  - A row for ea

A	B	A AND B	A OR B	NOT B
0 (False)	0(False)			
0(False)	1 (True)			
1 (True)	0(False)			
1 (True)	1 (True)			

Other Operators Block in Snap

Precedence Order

The result of a programing language expression and its corresponding arithmetic expression are the same, because they follow the same basic rules about the **order of evaluation**



1. Parentheses *Excuse*
2. Exponentiation
3. Multiplication
4. Division *Dear*
5. Addition
6. Subtraction

Task to be done

- Write a program to
  - Calculate the area of a triangle
  - Calculate the square of a number
  - Find a square root of a number
  - find factorial of a given number

Summary / Recap of Main Points

- Boolean Expression
- Operators
  - Arithmetic
  - Assignment
  - Relational
  - Logical