0301102 LOGIC DEVELOPMENT & PROGRAMMING

UNIT – 2

Principles of Programming Language

Operators & Expressions

- The symbols which are used to perform logical and mathematical operations in a C program are called C operators.
- These C operators join individual constants and variables to form expressions.
- Operators, functions, constants and variables are combined together to form expressions.
- ***Consider the expression A + B * 5. where, +, * are operators, A, B are variables, 5 is constant and A + B * 5 is an expression.***

Operators

- C language supports a rich set of built-in operators. **An operator is a symbol that tells the compiler to perform a certain mathematical or logical operations.**
- Operators are used in programs to manipulate data and variables.
- **An operator is a symbol that operates on a value or a variable. For example: + is an operator to perform addition.**
- **Unary Operator:** A unary operator is an operator applied to the ***single operand.*** For example: increment operator (++), decrement operator (--), sizeof, (type)*.
- **Binary Operator:** The binary operator is an operator applied between ***two operands***. The following is the list of the binary operators:

Operators

- **C operators can be classified into following types:**
  - **Arithmetic operators**
  - **Relational operators**
  - **Logical operators**
  - **Bitwise operators**
  - **Assignment operators**
  - **Conditional operators**
  - **Special/Misc operators**

Operators

- **Unary operators:** It has two operators increment ++ and decrement -- to change the value of an operand (varible) by 1.
- Increment ++ increases the value by 1 whereas decrement -- decreases the value by 1. These two operators are unary operators, that is it only operate on a single operand.
- **Syntax:**
  - Increment operator: ++var_name; (or) var_name++;
  - Decrement operator: – -var_name; (or) var_name – -;
- **Example:**
  - Increment operator : ++ i ; i ++ ;
  - Decrement operator : – – i ; i – – ;

Operators

- **Prefix and Postfix in C**
- If you observe the above syntax, we can assign the C increment and decrement operators either before operand or after the operand. When ++ or — is used before operand like: ++x, –x then we call it as prefix, if ++ or — is used after the operand like: x++ or x– then we called it as postfix.
- Let’s explore the prefix and postfix of increment and decrement operators in C:
  - **++i (Pre-increment):** It will increment the value of i even before assigning it to the variable i.
  - **i++ (Post-increment):** The operator will return the variable value first (i.e, i value) then only i value is incremented by 1.
  - **–i (Pre decrement)**: It will decrement the value of i even before assigning it to the variable i.
  - **i– (Post decrement):** The operator returns the variable value first (i.e., i value), then only i value decremented by 1.

Operators

- **Arithmetic operators:** An arithmetic operator performs mathematical operations such as addition, subtraction, multiplication, division etc on numerical values.

Operator	Meaning of Operator
+	addition or unary plus
-	subtraction or unary minus
*	multiplication
/	division
%	remainder after division (modulo division)

Operators

- **Assignment Operators:** An assignment operator is **used for assigning a value** to a variable. The most common assignment operator is =.

Operator	Example	Same as
=	a = b	a = b
+=	a += b	a = a+b
-=	a -= b	a = a-b
*=	a *= b	a = a*b
/=	a /= b	a = a/b
%=	a %= b	a = a%b

Operators

- **Relational Operators:** A relational operator checks the **relationship** between **two** operands. If the relation is true, it returns 1; if the relation is false, it returns value 0.
- Relational operators are used in decision making and loops.

Operator	Meaning of Operator	Example
==	Equal to	`5 == 3` is evaluated to 0
>	Greater than	`5 > 3` is evaluated to 1
<	Less than	`5 < 3` is evaluated to 0
!=	Not equal to	`5 != 3` is evaluated to 1
>=	Greater than or equal to	`5 >= 3` is evaluated to 1
<=	Less than or equal to	`5 <= 3` is evaluated to 0

Operators

- **Logical Operators:** An expression containing logical operator returns either 0 or 1 depending upon whether expression results true or false.
- Logical operators are commonly used in decision making in C programming.

Operator	Meaning	Example
&&	Logical AND. True only if all operands are true	If c = 5 and d = 2 then, expression `((c==5) && (d>5))` equals to 0.
||	Logical OR. True only if either one operand is true	If c = 5 and d = 2 then, expression `((c==5) || (d>5))` equals to 1.
!	Logical NOT. True only if the operand is 0	If c = 5 then, expression `!(c==5)` equals to 0.