AMIRAJ
COLLEGE OF ENGINEERING & TECHNOLOGY

CHAPTER -2
FUNDAMENTALS OF C

Data Types in C

- Primitive
  - int
  - char
  - float
  - double
- Derived
  - Array
  - Structure
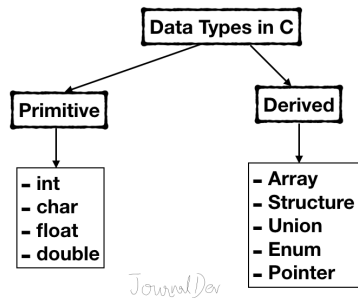 - Union
  - Enum
  - Pointer

JournalDev

Best C Compilers

Borland Turbo C   GCC

Tiny C Compiler   Clang

Portable C Compiler

www.educba.com

Operators

Arithmatic		Relational	Assignment	Logical
Unary	Binary	<	=	&
++	+	>	+=	|
--	-	<=	-=	!
	/	>=	*=	&&
	*	==	/=	||
	%	!=		

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Basics of C Programs

A C program basically consists of the following parts

Preprocessor Commands

Functions

Variables

Statements & Expressions

Comments

CODE:

```
#include <stdio.h>
int main()
{
        printf("Hello, World! \n");
        return 0;
}
```

Basics of C Programs (cont..)

1. The first line of the program #include <stdio.h> is a preprocessor command, which tells a C compiler to include stdio.h file before going to actual compilation.
2. The next line int main() is the main function where the program execution begins.
3. The next line /*...*/ will be ignored by the compiler and it has been put to add additional comments in the program. So such lines are called comments in the program.
4. The next line printf(...) is another function available in C which causes the message "Hello, World!" to be displayed on the screen.
5. The next line return 0; terminates the main() function and returns the value 0.

Basics of C Programs (cont..)

Comments : A comment starts with a slash asterisk /* and ends with a asterisk slash */ and can be anywhere in your program.
comment on a single line: // Author: TechOnTheNet.com

C header files : Header files are helping file of your C program which holds the definitions of various functions and their associated variables that needs to be imported into your C program with the help of pre processor *#include* statement. All the header file have a '.h' an extension that contains C function declaration and macro definitions.
The default header file that comes with the C compiler is the *stdio.h*.

<u>**Syntax:**</u>
#include <file>

Basics of C Programs (cont..)

Variables: In programming, a variable is a container (storage area) to hold data. To indicate the storage area, each variable should be given a unique name (identifier).

Example: int playerScore = 95;

Rules for naming a variable

1. A variable name can only have letters (both uppercase and lowercase letters), digits and underscore.
2. The first letter of a variable should be either a letter or an underscore.
3. There is no rule on how long a variable name (identifier) can be. However, you may run into problems in some compilers if the variable name is longer than 31 characters.

C Data Types

In C programming, data types are declarations for variables. This determines the type and size of data associated with variables.
Example:
int myVar;

Here, myVar is a variable of int (integer) type. The size of int is 4 bytes.

C Data Types (cont..)

Type	Size (bytes)	Format Specifier
int	at least 2, usually 4	%d
char	1	%c
float	4	%f
double	8	%lf
short int	2 usually	%hd
unsigned int	at least 2, usually 4	%u
long int	at least 4, usually 8	%li
long long int	at least 8	%lli
unsigned long int	at least 4	%lu
unsigned long long int	at least 8	%llu
signed char	1	%c
unsigned char	1	%c
long double	at least 10, usually 12 or 16	%Lf

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C Programming Operators

An operator is a symbol that operates on a value or a variable.
For example: + is an operator to perform addition.

C has a wide range of operators to perform various operations.
- Arithmetic operator
- Assignment Operators
- Relational Operators
- Logical Operators
- Bitwise Operators
- Comma Operator
- sizeof operator

C Programming Operators (cont..)

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)
++	increment
--	decrement

C Programming Operators (cont..)

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

C Programming Operators (cont..)

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

C Programming Operators (cont..)

Bitwise operators are used in C programming to perform bit-level operations. During computation, mathematical operations like: addition, subtraction, multiplication, division, etc are converted to bit-level which makes processing faster and saves power.

Operators	Meaning of operators
&	Bitwise AND
|	Bitwise OR
^	Bitwise exclusive OR
~	Bitwise complement
<<	Shift left
>>	Shift right

C Programming Operators (cont..)

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.

C Programming Operators (cont..)

Comma Operator

Comma operators are used to link related expressions together. For example:
int a, c = 5, d;

The sizeof operator

The sizeof is a unary operator that returns the size of data (constants, variables, array, structure, etc).

Associativity of Operators

The associativity of operators determines the direction in which an expression is evaluated. For example,
b = a;

C Input Output (I/O)

C Output

In C programming, printf() is one of the main output function. The function sends formatted output to the screen. For example,

Example : C Output

```c
#include <stdio.h>
int main()
{
    printf("C Programming");
    return 0;
}
```

C Input Output (I/O) (cont..)

C Input

In C programming, scanf() is one of the commonly used function to take input from the user. The scanf() function reads formatted input from the standard input such as keyboards.

Example: Integer Input/Output
```c
#include <stdio.h>
int main()
{
    int testInteger;
    printf("Enter an integer: ");
    scanf("%d", &testInteger);
    printf("Number = %d",testInteger);
    return 0;
}
```

Thank you

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