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**Structure of Computers
and Applications**
1st year ST – ENG & LMD

➡ **Part 2: The basics of Algorithm and Program**

Course 06: C Language

By

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7- Introduction to C Language

❑ What is a program/ programming language ?

- A **program** is a sequence of instructions that a computer follows to solve a problem
- A **programming language** is a set of words and symbols and codes that enables human to write a computer program.

❑ What is C?

- C is a programming language developed at **AT & T's Bell Laboratories of USA in 1972**. It was designed and written by **Dennis Ritchie**. **Dennis Ritchie** is known as the **founder of c language**.

❑ Features of C

1. Portability or machine independent
2. Sound and versatile language
3. Fast program execution.
4. An extendible language.
5. Tends to be a structured language.

8- STRUCTURE OF A C PROGRAM

<i>Header</i>	<code>#include <stdio.h></code>
<i>main()</i>	<code>int main()</code> <code>{</code>
<i>Variable declaration</i>	<code>int a = 10;</code>
<i>Body</i>	<code>printf("%d ", a);</code>
<i>Return</i>	<code>return 0;</code> <code>}</code>

8.1 Header Files Inclusion: The first and foremost component is the inclusion of the Header files in a C program.

- A header file is a file with **extension .h** which contains C function declarations and macro definitions to be shared between several source files.
- Some of C Header files:
 - **stdio.h** – Defines core input and output function.
 - **stdlib.h** – Defines numeric conversion functions.
 - **math.h** – Defines common mathematical functions.
- Syntax to include a header file in C: **#include**

8- STRUCTURE OF A C PROGRAM

8.2 Main Method Declaration: The next part of a C program is to declare the main() function.

Syntax to Declare main method:

```
int main()
{ }
```

8.3 Variable Declaration: It refers to the variables that are to be used in the function, the variables are to be declared before any operation in the function.

Example:

```
int main() {
    int a;

    ...
}
```

8.4 Body: Body of a function in C program, refers to the operations that are performed in the functions. It can be anything like manipulations, searching, sorting, printing, etc.

Example:

```
int main() {
    int A;
    printf("%d", A);

    ..
}
```

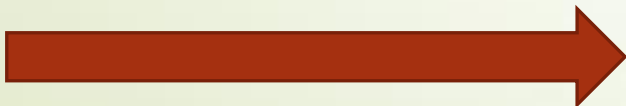
8- STRUCTURE OF A C PROGRAM

8.5 Return Statement: The return statement refers to the returning of the values from a function. This return statement and return value depend upon the return type of the function.

- For example, if the return type is void, then there will be no return statement. In any other case, there will be a return statement and the return value will be of the type of the specified return type.

Example: `int main() {
 int A;
 printf("%d", A);
 return 0; }`

❑ **Writing first program:**



```
1  #include <stdio.h>
2  int main()
3  {
4  int number1, number2, sum;
5  printf("Enter two integers: ");
6  scanf("%d %d", &number1, &number2)
7  sum = number1 + number2;
8  printf("%d + %d = %d", number1, number2, sum);
9  return 0;
10 }
```

9- KEYWORDS IN C

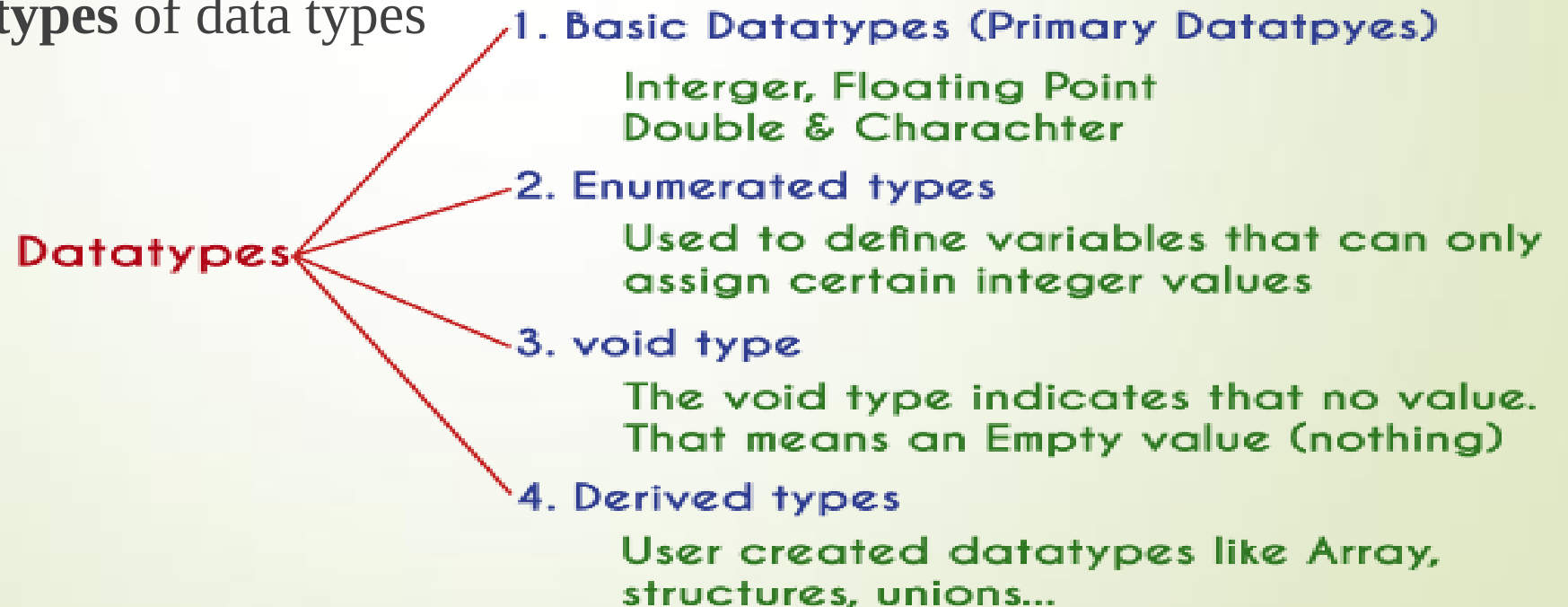
- A keyword is a **reserved word**.
- All keywords have fixed meaning that means we cannot change.
- Keywords serve as basic building blocks for program statements.
- All keywords must be written in lowercase.
- A list of 32 keywords in c language is given below:

*double- float- int- short- struct- unsigned-break-
continue -else forlong- signed- switch- void-case-
default- enum – goto - registersizeof- typedef- volatile-
char- do- extern- if- return- static –unionwhile- Auto-
const.*

10- DATA TYPES / TYPES IN C

► What are the data types in C?

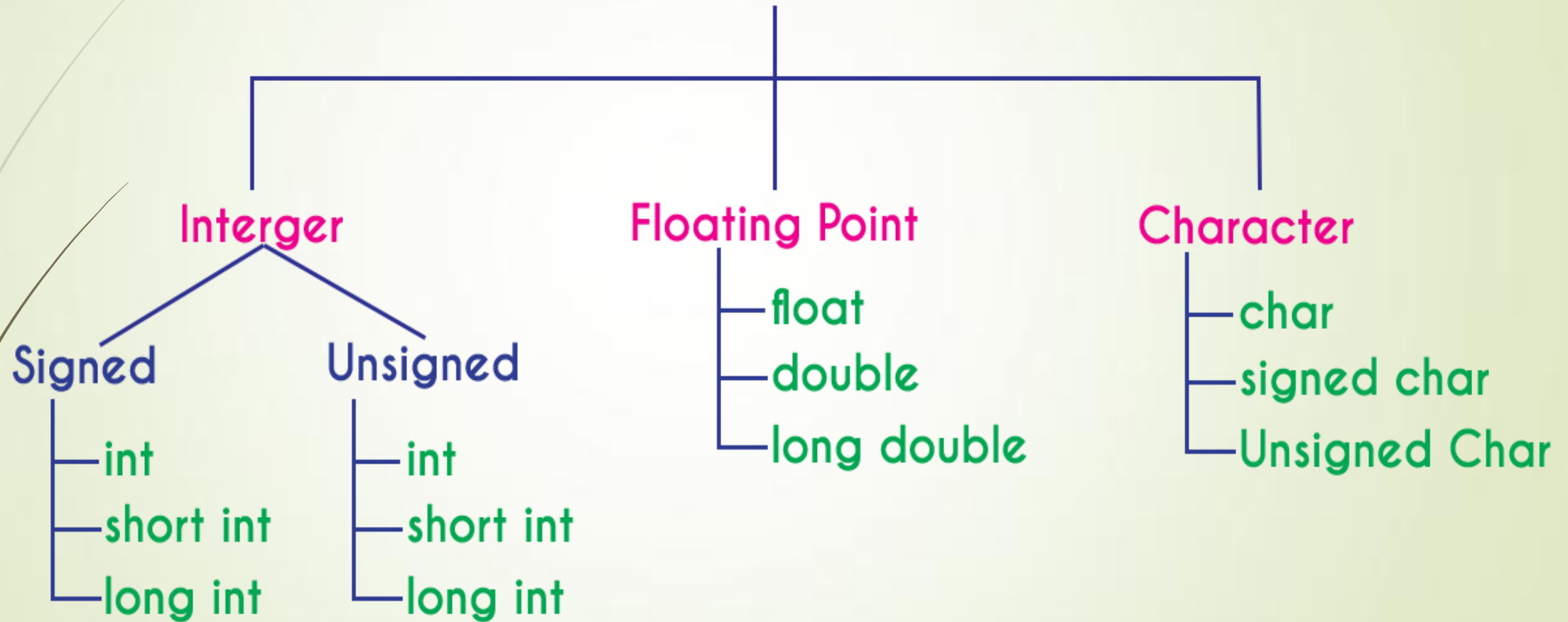
- Data types refer to an extensive system used for **declaring/defining** variables or functions of different types before its use.
- The type of a variable determines how much **space** it occupies in storage and how the **bit** pattern stored is interpreted.
- There are **4 types** of data types



10- DATA TYPES / TYPES IN C

Basic Data Types

Basic Datatypes (Primary Datatypes)



11- VARIABLES

- A variable is a name of memory location. It is used to store data. Variables are changeable, we can change value of a variable during execution of a program.
- It can be reused many times.

Note: Variable are nothing but identifiers.

❑ Rules to write variable names:

1. A variable name contains maximum of 30 characters/ Variable name must be upto 8 characters.
2. A variable name includes alphabets and numbers, but it must start with an alphabet.
3. It cannot accept any special characters, blank spaces except under score(_).
4. It should not be a reserved word.

Example:

a num1 MAX min St_name StName class_mark

11- VARIABLES

- ❑ **Declaration of Variables :** A variable can be used to store a value of any data type. The declaration of variables must be done before they are used in the program.
 - The general format for declaring a variable.
Syntax : `data_type variable-1,variable-2,-----, variable-n;`
 - Variables are separated by **commas** and declaration statement ends with a **semicolon**.
Example: `int x,y,z;      float a,b;      char m,n;`
- ❑ **Assigning values to variables :** values can be assigned to variables using the assignment operator (=).
 - The general format statement is :
Syntax : `variable = constant;` OR `data_type variable = constant;`
 - **Example :** `x=10;   a= 10.2;   n="k";` OR `int x=10;   float a= 10.2;   char n="k";`

12- CONSTANTS

- Constants **refer** to **fixed** values that do **not change** during the execution of a program.

Note: constants are also called literals.

❑ **declaring constant:**

There are two ways of declaring constant:

- ✓ Using **const** keyword

Syntax to Define Constant: **const data_type var_name = value;**

Example: **const int int_const = 25;**

const float float_const = 15.66;

- ✓ Using **#define** pre-processor

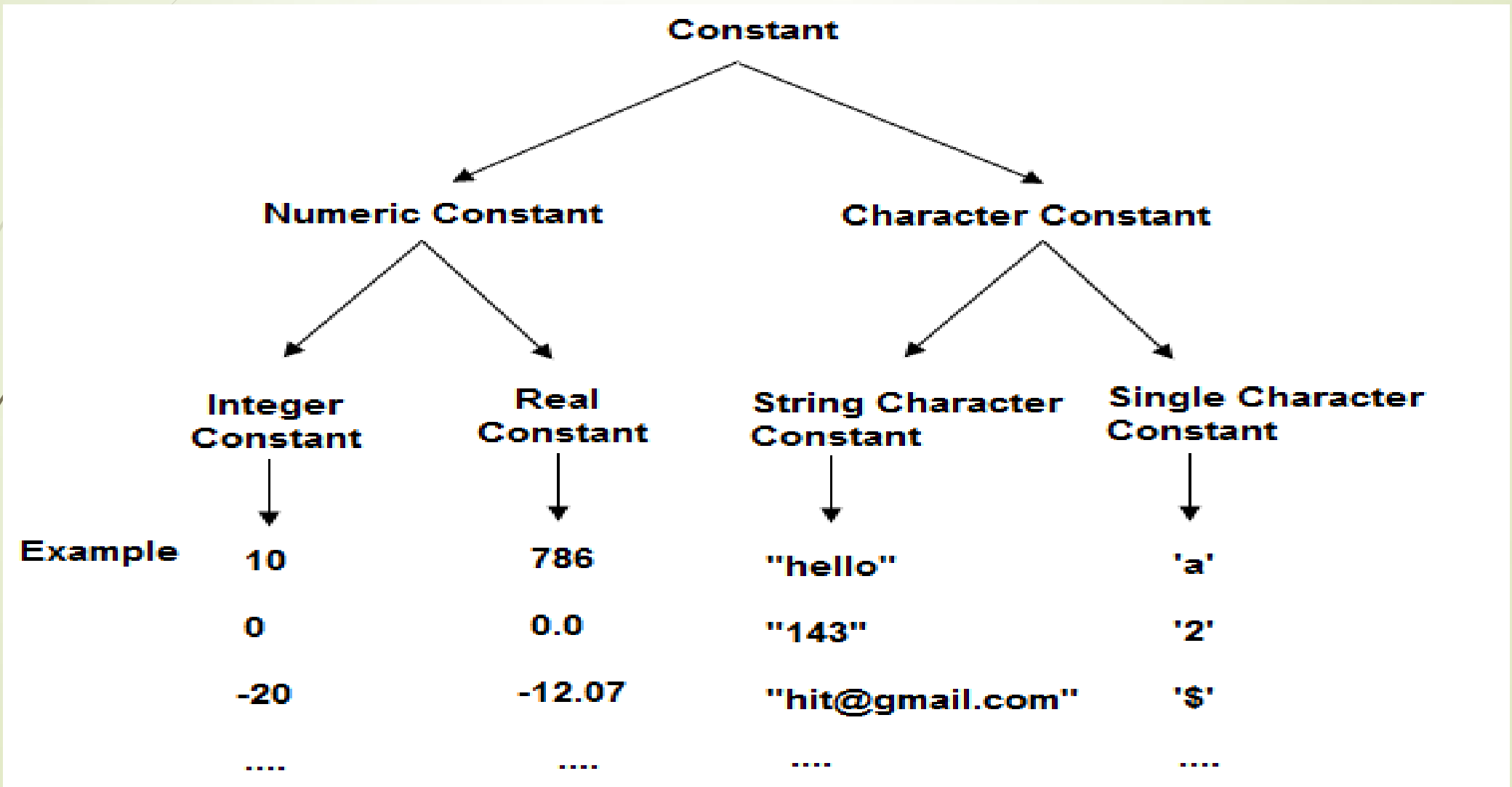
Syntax : **#define const_name value**

Example: 

```
#include <stdio.h>
#define pi 3.14
int main() {
    printf("The value of pi: %.2f", pi);
    return 0; }
```

12- CONSTANTS

Types of Constants in C



❑ Special characters and their purpose

Backslash Character	Meaning
\n	New line
\t	Horizontal tab
\v	Vertical tab
\0	Nul value

❑ Data Types conversion Specifiers:

Specifier	Meaning
%d (or) %i	Used to read and displays integer values
%f	Used to read and display real values in decimal notations. Example: 10.256
%e	Used to read and display real values in scientific notation. Example: 3.6e7
%E	Used to read and display real values in scientific notation with capital letter. Example: 3.6E7
%c	Used to read and display characters
%lf	Used to read and display long double values