Lecture 1

C Language, Token, Keywords, Constant, variable

What is C?

- A language written by Brian Kernighan and Dennis Ritchie. This was to be the language that UNIX was written in to become the first "portable" language.
- C Language is successor of earlier language B.

Continue…

- **C language** is a general purpose and structured programming language developed by 'Dennis Ritchie' at AT &T's Bell Laboratories in the 1972s in USA.
- It is also called as 'Procedure oriented programming language.‘
- C is not specially designed for specific applications areas like COBOL (Common Business-Oriented Language) or FORTRAN (Formula Translation). It is well suited for business and scientific applications.

C is Used:

- System software Compilers, Editors, embedded systems
- Data compression, graphics and computational geometry, utility programs
- Databases, operating systems, device drivers, system level routines

  there are zillions of lines of C legacy code

  Also used in application programs

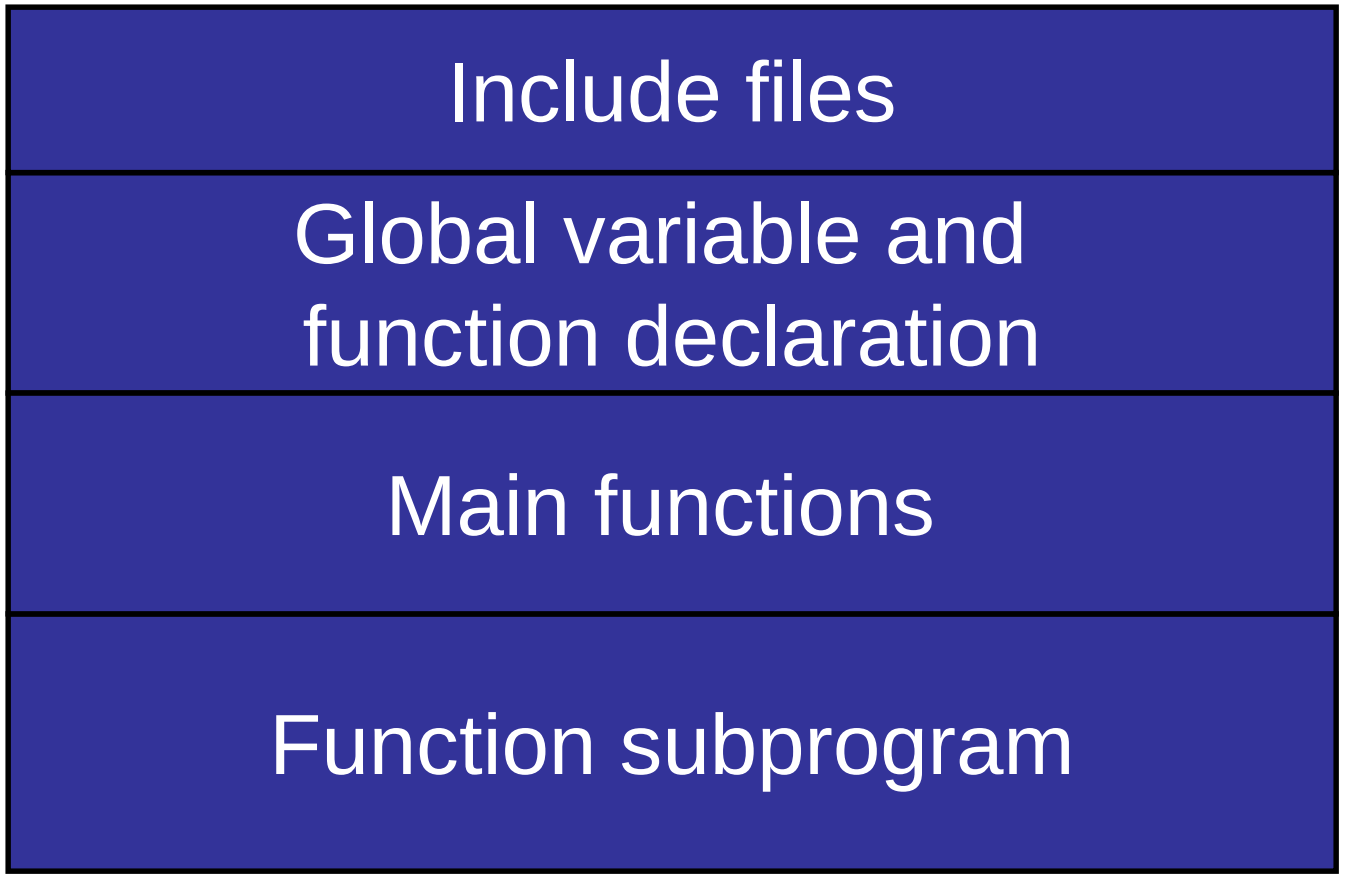
Development with C

- **Four stages**
  - **Editing:** Writing the source code by using some IDE or editor
  - **Preprocessing or libraries:** Already available routines
  - **compiling**: translates or converts source to object code for a specific platform source code -> object code
  - **linking**: resolves external references and produces the executable module

- **Portable** programs will run on any machine but…..

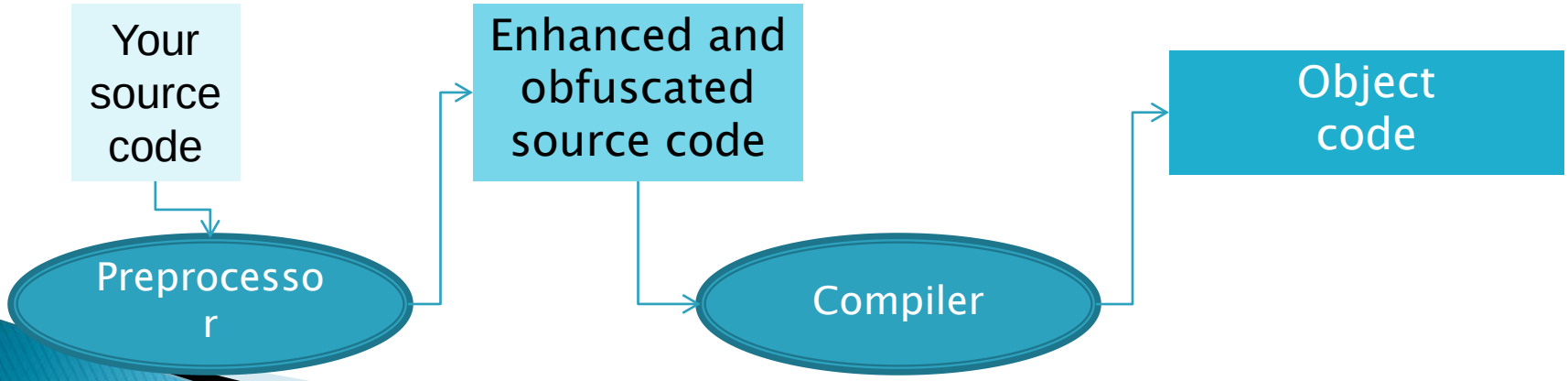
- Note! Program **correctness** and **robustness** are most important than program *efficiency*

Structure of C program



The preprocessor

- The preprocessor takes your source code and – following certain directives that you give it – tweaks it in various ways before compilation.
- A directive is given as a line of source code starting with the # symbol
- The preprocessor works in a very crude, "word-processor" way, simply cutting and pasting – it doesn't really know anything about C!



Simple C Program

```
/* A first C Program*/

#include <stdio.h>

void main()

{
        printf("Hello World \n");

}
```

Simple C Program

- **Line 1: #include <stdio.h>**

- As part of compilation, the C compiler runs a program called the **C preprocessor**. The preprocessor is able to add and remove code from your source file.
- In this case, the **directive #include** tells the preprocessor to include code from the file **stdio.h.**
- This file contains declarations for functions that the program needs to use. A declaration for the **printf** function is in this file.

Simple C Program

- **Line 2: void main()**

- This statement declares the **main function.**
- A C program can contain many functions but must always have one main function.
- A function is a self-contained module of code that can accomplish some task.
- Functions are examined later.
- The "void" specifies the return type of main. In this case, nothing is returned to the operating system.

Simple C Program

- **Line 3: {**

- This opening bracket denotes the start of the program.

Simple C Program

- **Line 4: printf("Hello World From About\n");**

- **Printf** is a function from a standard C library that is used to print strings to the standard output, normally your screen.
- The compiler links code from these standard libraries to the code you have written to produce the final executable.
- The **"\n"** is a special format modifier that tells the **printf** to put a line feed at the end of the line.
- If there were another **printf** in this program, its string would print on the next line.

Simple C Program

- **Line 5: }**
- This closing bracket denotes the end of the program.

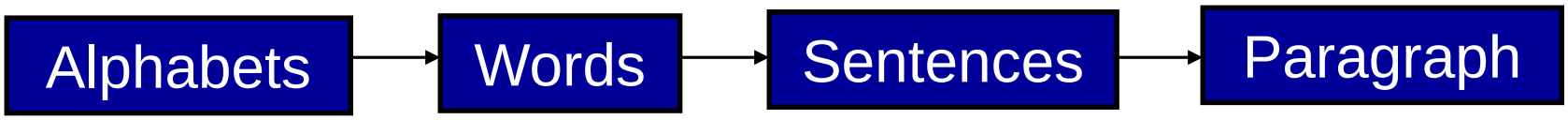
Escape Sequence

- \n new line
- \t tab
- \a alert
- \\ backslash
- \” double quote

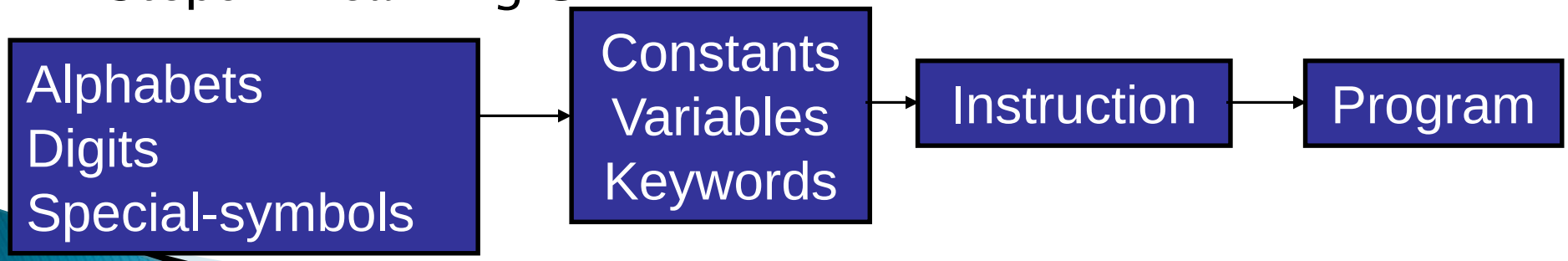
- Comment should be enclosed between /* */
- It is used to increase the readability of the program.
- Any number of comments can be given at any place in the program.
- Comment cannot be nested
- It can be split over more than one line

Getting started with C

- Communicating with a computer involves speaking the language the computer understands.
  - Steps in learning English language



  - Steps in learning C



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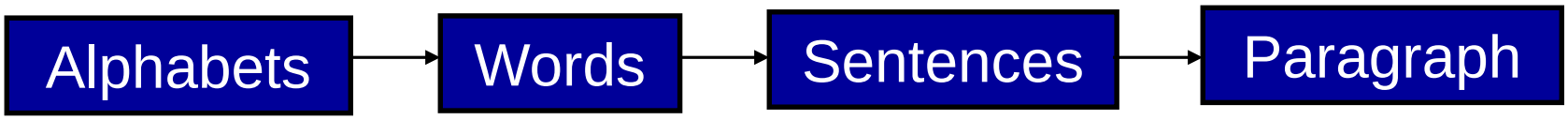

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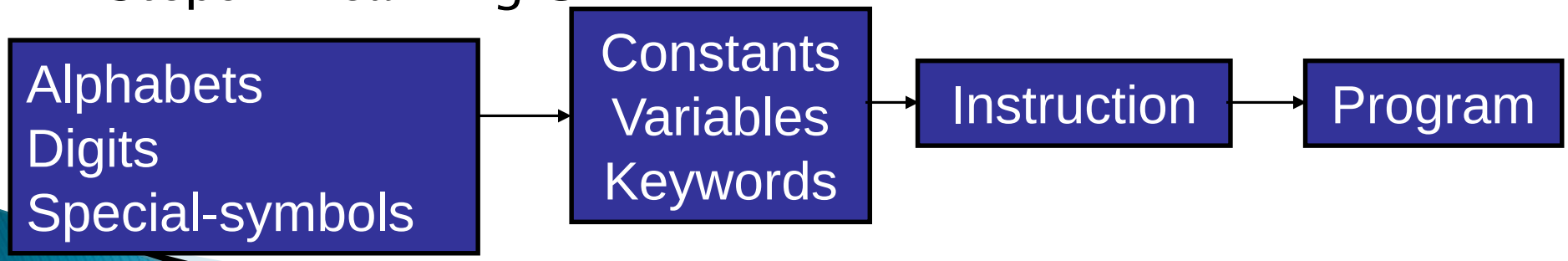


The C character Set

A character denotes any alphabet, digit or special symbol used to represent information.

Alphabets	A,B, …. ,Y, Z a,b, ….. ,y, z
Digits	0,1,2,3,4,5,6,7,8,9
Special Symbols	~ ‘ ! @ # % ^ & * ( ) _ - + = | \ { } [ ] : ; “ ‘ < > , . ? /

Identifiers

- Identifiers are names given to various program elements, such as variables, functions and arrays
- A variable name is any combination of alphabets, digits or underscores
- The first character in the variable name must be an alphabet

Variable

- It is a data name which is used to store data and may change during program execution.
- It is opposite to constant. Variable name is a name given to memory cells location of a computer where data is stored.

Rules for varibales:

- First character should be letter or alphabet.
- Keywords are not allowed to use as a variable name.
- White space is not allowed.
- C is case sensitive i.e. UPPER and lower case are significant.
- Only underscore, special symbol is allowed between two characters.
- The length of indentifier may be upto 31 characters but only only the first 8 characters are significant by compiler.

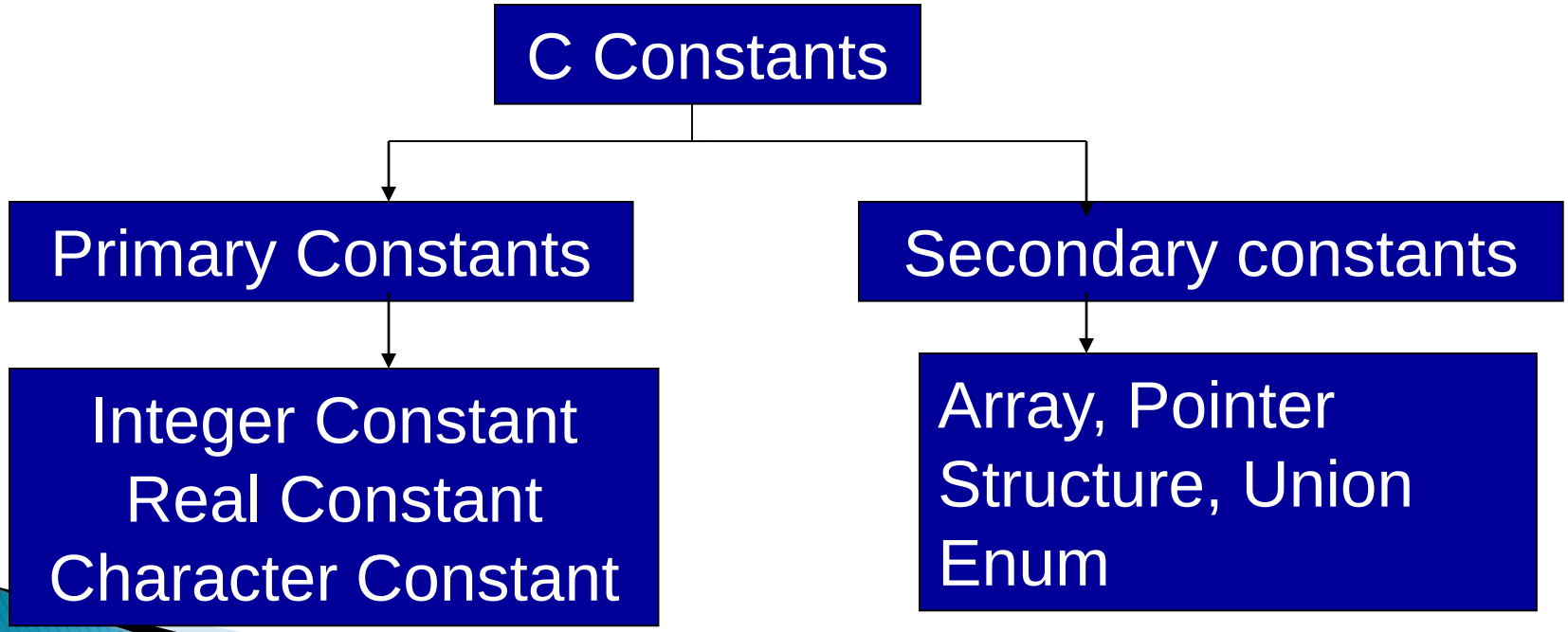
Constant

- A constant is a quantity that doesn't change. This quantity can be stored at a locations in the memory of the computer.

- Eg $3x + y = 20$
- 3 & 20 are constants, which cannot change
- x & y can vary or change hence are called variables

Types of C Constants

- C constants can be divided into two major categories
  - Primary Constants
  - Secondary Constants



Integer Constants

- An integer constant must have at least one digit
- It must not have a decimal point
- It could be either positive or negative
- If no sign precedes an integer constant, it is assumed to be positive
- No commas or blanks are allowed within an integer constant

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Real Constants

- Real constants(RC) must have at least one digit
- It must have a decimal point
- It could be either positive or negative
- Default sign is positive
- No commas or blank are allowed within a RC

194.143, -416.41

Character Constants

- A character constant is either a single alphabet, a single digit or a single special symbol enclosed within single inverted commas
- The maximum length of a character constant can be 1 character

Eg ‘a’, ‘1’, ‘5’, ‘=‘ (Valid)
‘asd’, ‘12’ (Invalid)

String Constants

- A String Constant consists of any number consecutive characters enclosed in double quotation marks
- Escape sequence can be embedded within the string.

Keywords

Keywords are the words whose meaning has already been explained to the C compiler

They cannot be used as variable names.

There are only 32 keywords available in c

auto	double	if	static	do
break	else	int	struct	goto
case	enum	long	switch	signed
char	extern	near	typedef	while
const	float	register	union	default
continue	far	return	unsigned	for
short	void			

Data Types

- C Supports several different types of data, each of which may be represented differently within the computers memory.
- Basic data types are listed below:

Data Type	Description	Typical Memory
int	integer quantity	2 bytes
char	single character	1 bytes
float	floating point number	4 bytes
double	double-precision floating point number	8 bytes