Fundamentals of C Programming (Part 1)

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Overview

- ✓A formal introduction to the C programming language.
- ✓Fundamental components in a program code.
- ✓Simple C programming example.
- ✓Rules to write C program.

Learning Outcomes

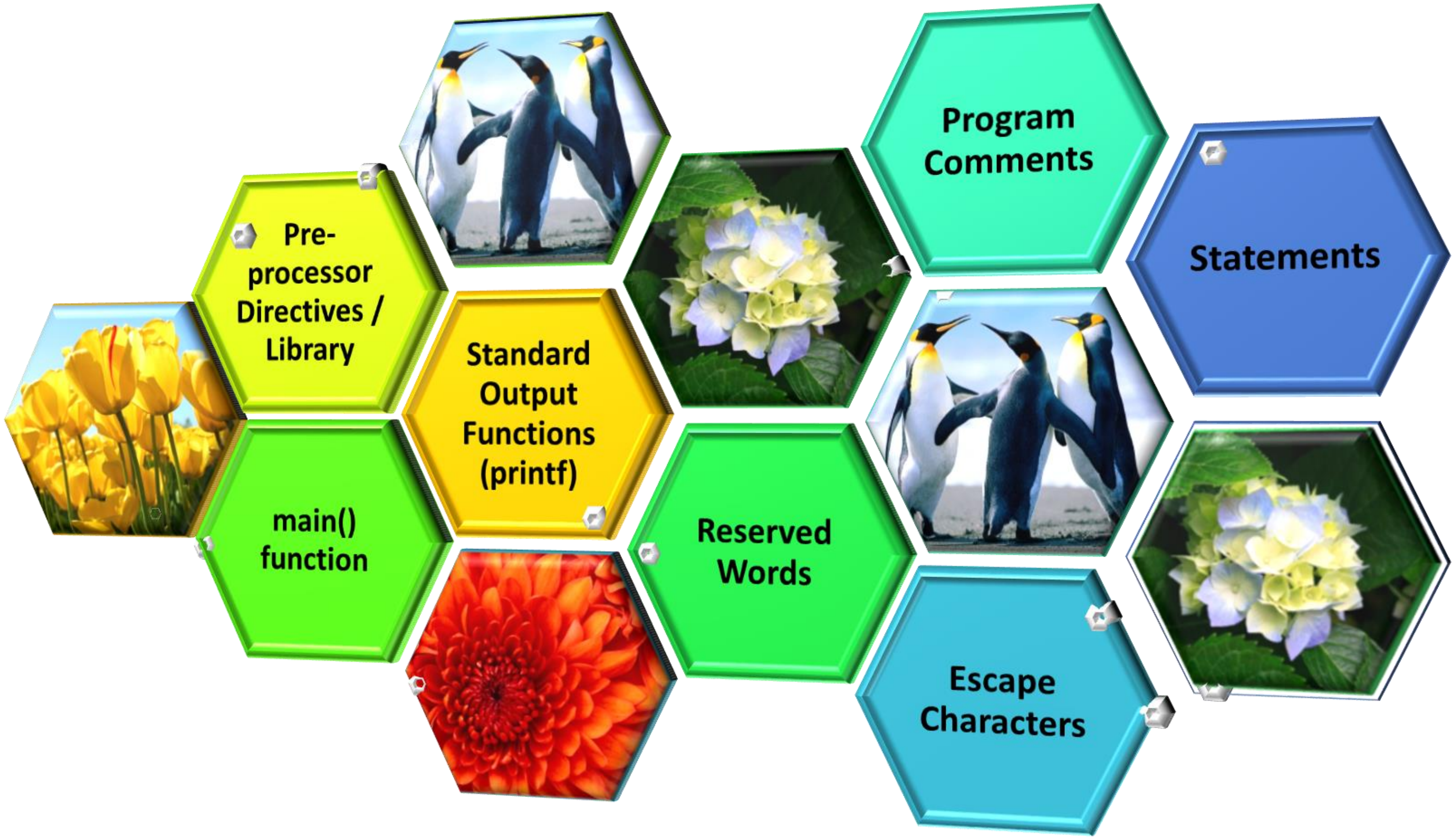
On completion of this unit, you should be able to:

✓Define the components in a program code.

✓Write a simple C program.

✓Apply comments for documentation.

In general, a C Program consists of the following components:



Pre-processor Directives / Library

main() function

Standard Output Functions (printf)

Reserved Words

Program Comments

Escape Characters

Statements

Simple C Program-Version 1

```c
/*Program Name: Student Details Program
Author Name: Noor Hazlini
Descriptions:This is a simple C Program. In this program, some basic
components of C such as constant, variables, scanf statement,
format specifiers and data types will be applied.*/

#include<stdio.h>              //pre-processor directives
int main()                     //int main() function

{                              //open curly brace

   printf("Welcome to C Programming Course!!\n"); //printf statement
   printf("This program is to save the student details");
return 0;
}                              //close curly brace
```

Multi line comments

Single line comment

Escape character

Reserved word

Program Comments

- Are explanations or annotations that are included in a program for documentation and clarification purposes.
- A way of documentation within the coding.
- There are two ways to write the program comments:

Single line comment	Multi lines comment
// This is a single line comment	/*This is multi lines comment*/

Example:
 	
//main function
//to calculate the average marks
	Example:
	
	/*This program is to calculate the average marks for six students*/

Advantages of comments:

- Comments are used primarily to document the meaning and purpose of your source code.
- Can use a comment to temporarily remove a line of code.
- Can help the reader to understand the program by looking at the comments.
- Easier to make the modifications of the code in future.

CAUTIONS!!

- Multi lines/Single Line Comment can be **placed Anywhere.**
- Single line comment starts with ‘//’.
- Any symbols written after ‘//’ are ignored by Compiler .
- Multi lines comment start with **/*** and ends with ***/**.
- Any symbols written between /* and */ are ignored by compiler**.**

Pre-processor Directives / Library

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- In C, the preprocessor directives will start with **#include**
- It is the specific line to tell the preprocessor to include the contents of the predefined function into the program from the header file.
- 2 types of header file:

(i) **standard** – supplied by vendor of the C compiler system

Example:

```
#include <stdio.h>
```

(ii) **programmer defined** – C code written by the programmer and stored in some directory.

Example:

```
#include “c:sample.h”
```

Types of Header files

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Each header file consists of specific function to be applied.
Examples:

Header File	Purpose
<stdio.h>	Input/output
<stdlib.h>	General utilities: memory management, program utilities, string conversions, random numbers
<string.h>	String handling
<time.h>	Time/date utilities
<math.h>	Common Mathematics functions

main() function

- ✓Each C program must have one main function.
- ✓Once you run the program the compiler will look for the main function.
- ✓{} also known as a block of code that performs a specific task.
- ✓return statement ensures that the constant value 0, the program status code, is returned to the program or the operating system that has triggered the execution of this function main (return 0).
- ✓The type of specifier for functions can be int, double, char, void, and so on, depending on the type of data that it returns.

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}                               //close curly brace
```

int main()
function

Standard Output Functions

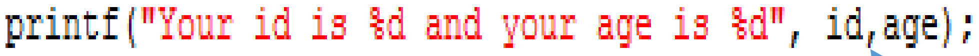
printf()

- printf() is a library function declared in <stdio.h>
- printf() is used for printing output, the standard output device, the monitor screen.
- When printf() is called it is passed a list of arguments of the form:

  control string & other arguments

- The arguments to printf() are separated by commas.

Ex:

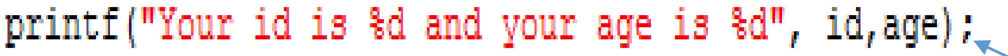


```
printf("Your id is %d and your age is %d", id,age);
```

Arguments, separated by comma

Statements

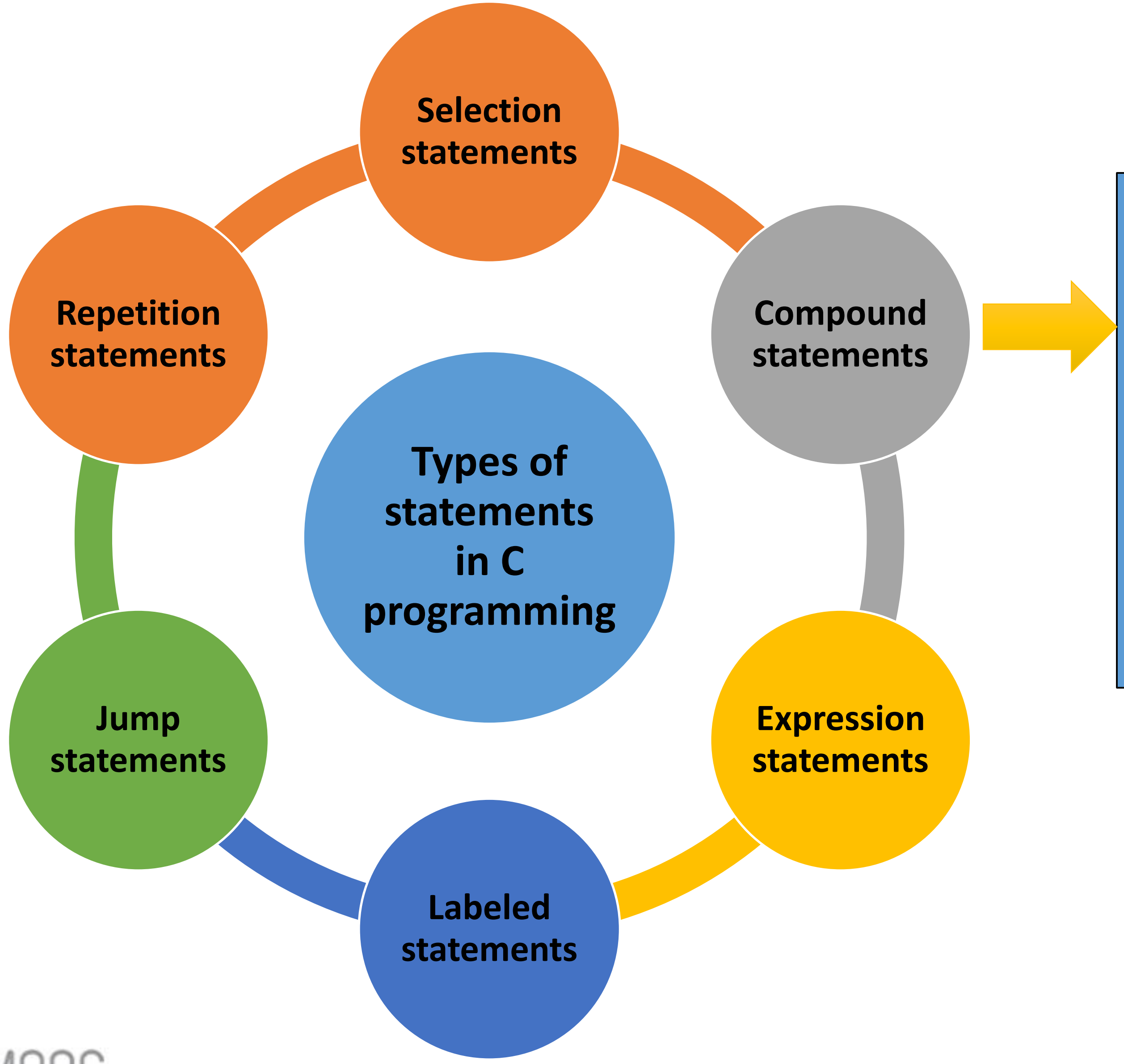
- A statement is a specification of an action to be taken by the computer as the program executes.
- Each such line is a statement.
- Each statement causes the processor to do something.
- Each statement will end with semicolon (;).
- Ex:



```
printf("Your id is %d and your age is %d", id,age);
```

Semicolon (;)

Types of statements in C programming



Types of statements in C programming

Selection statements

Compound statements

Expression statements

Labeled statements

Jump statements

Repetition statements

- Is a list of statements enclosed in braces, { }.
- Even though all statements must end with semicolons, a compound statement does not need the semicolon delimiter after right brace, }.

Reserved Words

- A keyword is a reserved word.
- In C, they are 32 keywords.
- They have special meaning to compiler.
- They are explicitly reserved and cannot be redefined.
- Reserved words also cannot be a variable name or constant name.
- Case sensitive: differentiates between lowercase & uppercase letter.

Sample of Reserved Words in C

Data types
int
char
double
float

Storage classes
auto
extern
register
static

Jump
goto
continue
break

Function
void
return

Qualifiers
signed
unsigned
short
long

Loop
for
while
do

Derived
struct
union

Decision
if
else
switch
case
default

User-defined
typedef
enum

Others
const
volatile
sizeof

Escape Characters

- Escape characters indicates “special” character output.
- Escape characters consist of \ followed by one character.

Example: Escape Characters

Constant	Meaning
\a	Audible Alert (Bell)
\b	Back Space
\f	Form Feed (start a new screen)
\n	New Line (moves to the next line)
\r	Carriage Return (moves to beginning of current line)
\t	Horizontal Tab (moves to next tab position)
\v	Vertical Tab
\’	Single Quote (prints a single quotation mark)
\”	Double Quote (prints a double quotation mark)
\?	Question Mark (prints a quotation mark)
\\	Backslash (prints a backslash)
\0	Null

Rules to write a C Program

1. All C statements must end with semicolon (;).

2. C is case-sensitive. Upper case and lower case characters are different. Generally the statements are typed in lower case.

3. A C statement can be written in one line or it can split into multiple lines.

4. Braces must always match upon pairs, i.e. every opening brace { must have a matching closing brace }.

5. Every C program starts with main () function.

6. Comments cannot be nested. For example,

```
/*Welcome to C,/*programming course*/*/
```

A comment can be split into more than one line.