CS118

Programming

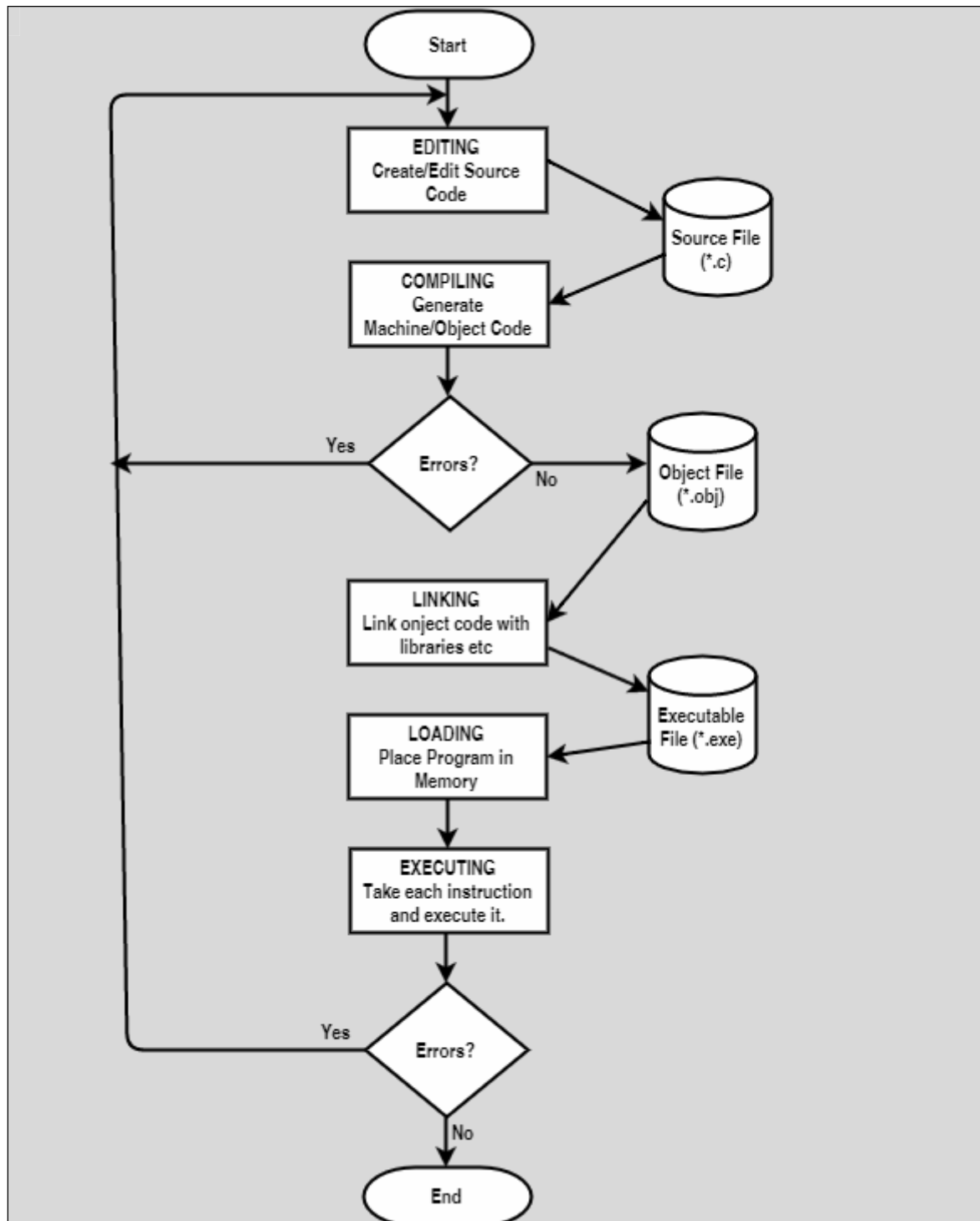## Fundamentals

LAB 03
Introduction to CProgramming

NATIONAL UNIVERSITY OF COMPUTER AND EMERGING SCIENCES

C-LANGUAGE

C is a high-level programming language developed in 1972 by Dennis Ritchie at AT&T Bell Laboratories. C is a powerful general-purpose language. It is fast, portable (i.e they can be run on any Compiler with Little or no Modification) and available in all platforms.

TYPICAL C PROGRAM DEVELOPMENT ENVIRONMENT

COMPILER VSIDE

IDE - Integrated Development Environment

IDE is the software that helps to write code, provides code completion, code suggestions and other neat stuff. Therefore, Dev-C++ is an IDE and not Compiler but it lets us compile code too by using something else.

Compiler

Compiler is also software or program. It doesn't do the neat stuff that the IDE does but it is very important. Without it IDE won't be able to produce the executable programs from the source codes. The most common reason for wanting to transform source code is to create an executable program.

EXAMPLE

Dev-C++ is a full-featured Integrated Development Environment (IDE) for the C/C++ programming language. It uses MinGW (Minimalist GNU for Windows) port of GCC (GNU Compiler Collection) as its compiler.

C - DATATYPES:

Already Discussed in Lab 01.

Variables are classified according to their data type, which determines the kind of information that may be stored in them.

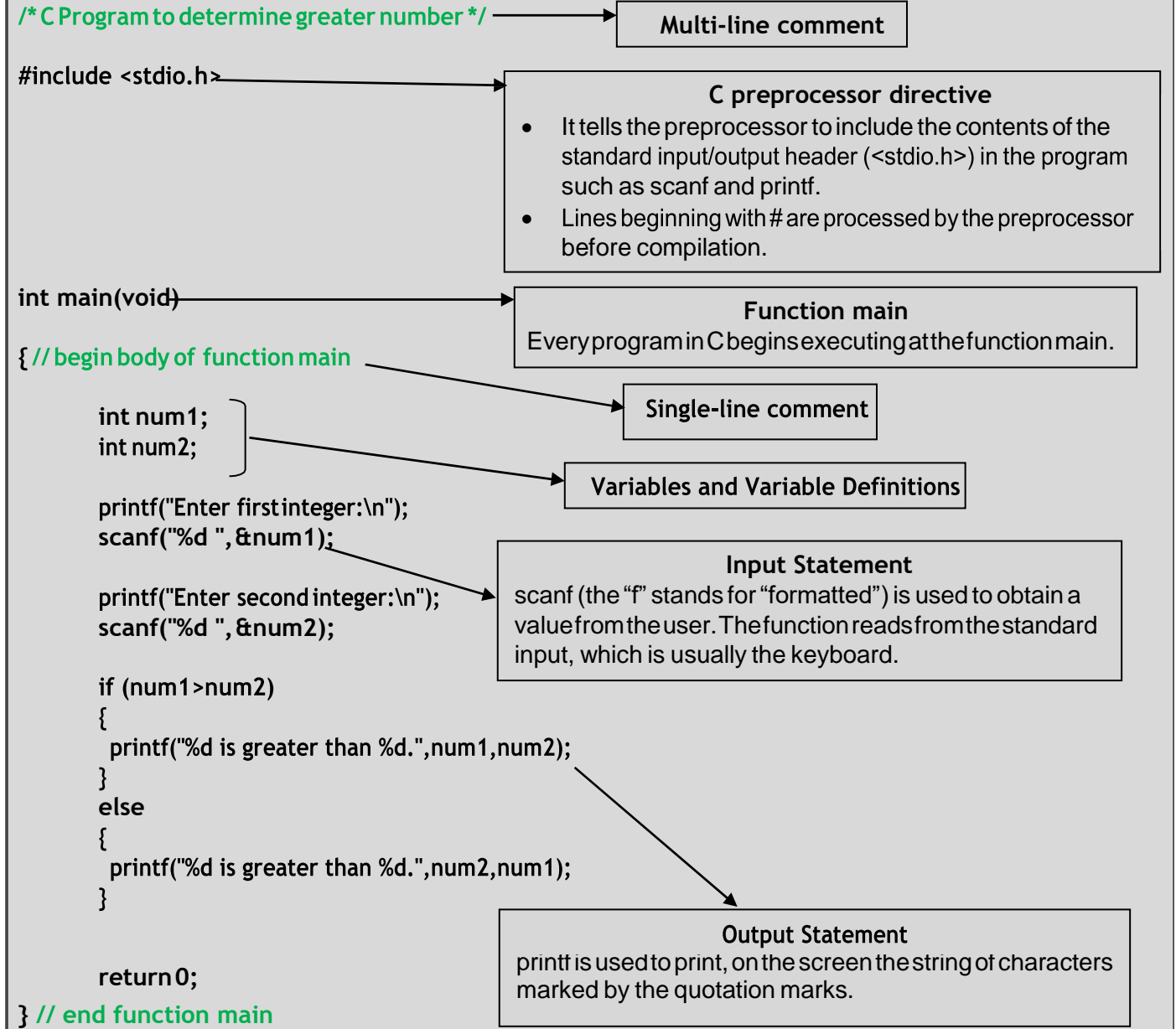| DataType	Description	C-language Keyword	Format Specifier
Integer	Integers are whole numbers that can have both positive and negative values but no decimal values.	int	%d
Float	Floating type variables can hold real numbers precision of 6 digits	float	%f
Double	can hold real numbers with precision of 14 digits	double	%f
Character	Character data type allows a variable to store only one character.	char	%c

C -OPERATORS:

Already Discussed in Lab 01.

There are many operators in C for manipulating data which include arithmetic Operators, Relational Operators, Logical operators and many more which will be discussed accordingly. Some of the fundamental operators are:

Operator	Description
+	Addition
-	Subtraction
*	Multiplication
/	Division
%	Modulo
=	Assignment Operator
==	Equal to
!=	Not equal to
<	Less than
<=	Less than or equal to
&&	Logical AND Operator
| |	Logical OR Operator
!	NOT Operator

C - EXAMPLE PROGRAM

```
/* C Program to determine greater number */
```
Multi-line comment

```
#include <stdio.h>
```
C preprocessor directive
- It tells the preprocessor to include the contents of the standard input/output header (<stdio.h>) in the program such as scanf and printf.
- Lines beginning with # are processed by the preprocessor before compilation.

```
int main(void)
```
Function main
Every program in C begins executing at the function main.

```
{ // begin body of function main
```
Single-line comment

```
    int num1;
    int num2;
```
Variables and Variable Definitions

```
    printf("Enter first integer:\n");
    scanf("%d ",&num1);

    printf("Enter second integer:\n");
    scanf("%d ",&num2);
```
Input Statement
scanf (the "f" stands for "formatted") is used to obtain a value from the user. The function reads from the standard input, which is usually the keyboard.

```
    if (num1>num2)
    {
      printf("%d is greater than %d.",num1,num2);
    }
    else
    {
      printf("%d is greater than %d.",num2,num1);
    }
```

Output Statement
printf is used to print, on the screen the string of characters marked by the quotation marks.

```
    return 0;
} // end function main
```

COMMON ESCAPE SEQUENCES:

The backslash (\) is called an escape character. When encountering a backslash in a string, the compiler looks ahead at the next character and combines it with the backslash to form an escape sequence.

Escape Sequence	Name	Description
\n	Newline	Newline. Position the cursor at the beginning of the next line.
\t	Horizontal tab	Horizontal tab. Move the cursor to the next tab stop.
\\	Backslash	Backslash. Insert a backslash character in a string.
\"	Double quote	Double quote. Insert a double-quote character in a string.

LAB 02EXERCISES

QUESTION#1
Draw a flowchart to print Hello World 10 times and also for the following case:
Input the length L and the breadth B, calculate and output the area of a rectangle.

QUESTION#2
Draw a flowchart to log in to Facebook account

QUESTION#3
Draw a flowchart of the following algorithm.

- Start
- Do you like animals? yes: continue
- no: Advice: take none.
  Exit procedure: go to end.
- Do you live on a farm?
  yes: continue
- no: go to apartment branch
- ADVICE: You need at least one dog.
-
  Do rats and mice bother you? Yes. Advice: take also a cat.
  No. Advice: cat is optional. Any other animals are possible.
  Exit, go to end.
- Branch for apartments:
-
  Have you got one room only? Yes: only aquarium fish allowed. Exit, go to end.
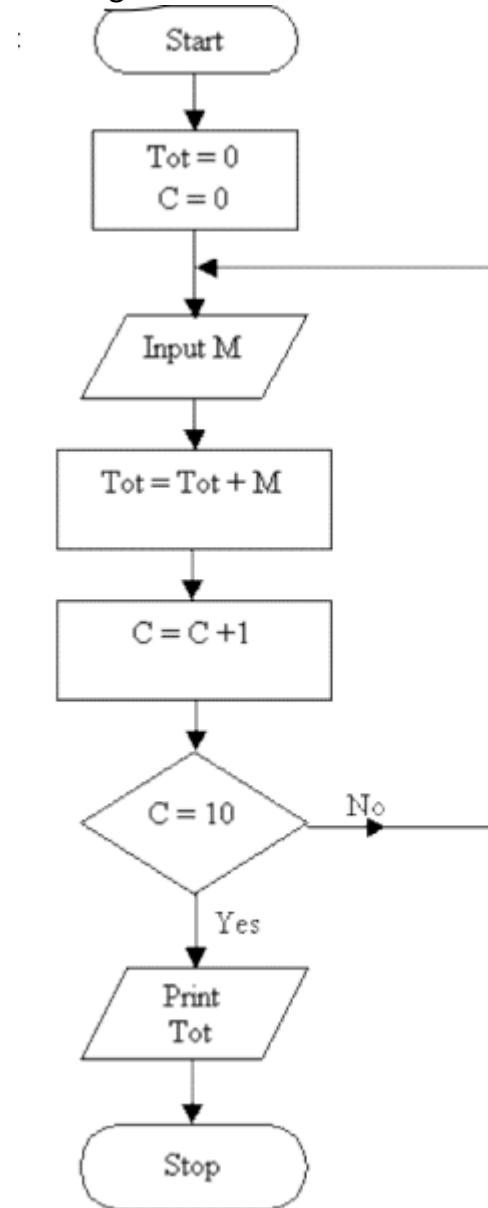 No: continue.
- Etc.
- End

QUESTION#4
Design a flowchart that will take as input the type of restaurant the user ate at, the cost of the meal, the number of people in his/her party, and how good the service was.
*Determine the **dollar amount** of the tip:*

Base Tip: Diner: 12%
Good Restaurant: 15%
Fancy Restaurant: 20%

Additions/Subtractions: Poor Service: -2%
Good Service: +0%
Excellent Service: +2%
1-5 in party: +0%
6-10 in party: +3%
more than 10: +5%

QUESTION#5

Write an algorithm of the following flowchart.

```
        Start
          |
      Tot = 0
       C = 0
          |
       Input M   <-----+
          |            |
     Tot = Tot + M     |
          |            |
       C = C + 1       |
          |            |
       C = 10 --No-----+
          |
         Yes
          |
        Print
         Tot
          |
        Stop
```

QUESTION#6

An admission charge for The Little Rep Theater varies according to the age of the person. Draw a flowchart to print the ticket charge given the age of the person. The charges are as follows:

    a. Over 55: PKR 10.00
    b. 21–54: PKR 15.00
    c. 13–20: PKR 10.00
    d. 3–12: PKR 5.00
    e. Under 3: Free.

.

QUESTION#7

Write a C program for the following scenarios:
- ❖ Find the sum of five numbers
- ❖ Enter radius of a circle and find its diameter, circumference and area.
  - o Diameter = 2 x radius
  - o Circumference = 2 x π x radius
  - o Area = π x radius x radius
- ❖ Input two numbers and perform all arithmetic operations

  Example

  Input
  - o First number: 10
  - o Second number: 5

  Output
  - o Sum = 15
  - o Difference = 5
  - o Product = 50
  - o Quotient = 2
  - o Modulus = 0

- ❖ Take name, address, age and height in feet (a float value should be entered), print all values in new lines.
- ❖ *Solve the equation $2x^2 + x + 5$ for all values of x.*