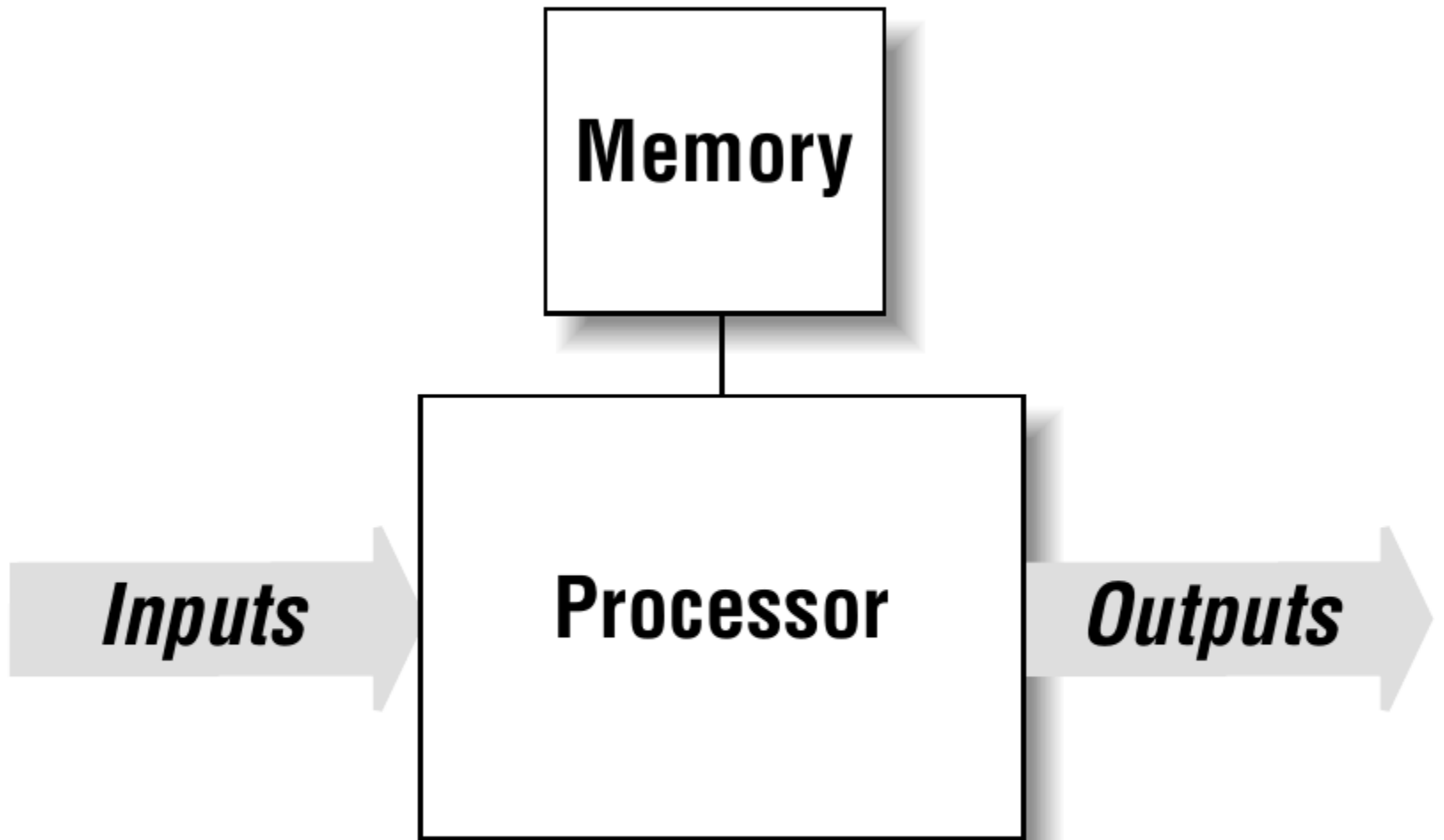# Introduction to Programming

Tassadaq Hussain
Riphah International University
Barcelona Supercomputing Center
Universitat Politècnica de Catalunya
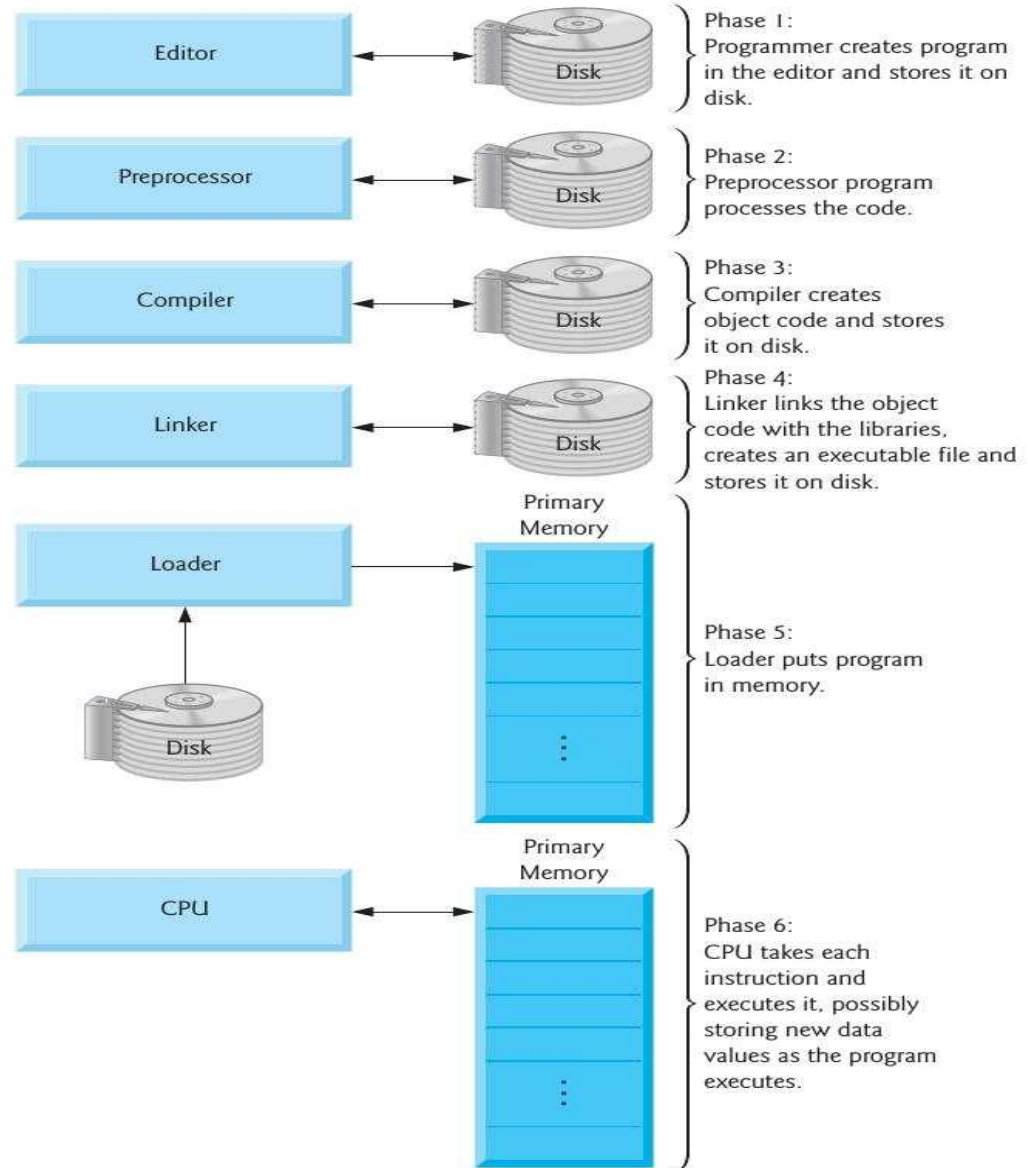
Introduction to Programming

```c
#include "stdio.h"

int main()

{

printf("welcome to
RIU");

return 0;

}
```


Phase 1:
Programmer creates program in the editor and stores it on disk.

Phase 2:
Preprocessor program processes the code.

Phase 3:
Compiler creates object code and stores it on disk.

Phase 4:
Linker links the object code with the libraries, creates an executable file and stores it on disk.

Phase 5:
Loader puts program in memory.

Phase 6:
CPU takes each instruction and executes it, possibly storing new data values as the program executes.

Compiler

The job of a compiler is mainly to translate programs written in some human readable language into an equivalent set of opcodes for a particular processor.

Linker

Linker takes one or more object files generated by a compiler and combines them into a single executable file, library file, or another object file

Loader

Loader is the part system that is responsible for loading programs and libraries.

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Debugger

A debugger or debugging tool is a computer program that is used to test and debug other programs.

Interpreter

- An interpreter is a computer program that directly executes, i.e. performs, instructions written in a programming or scripting language, without requiring compilation and machine code generation

- An interpreter generally uses one of the following strategies for program execution

  - Parse the source code and perform generate its behavior.

  - Translate source code into some efficient intermediate representation and immediately execute it.

  - Explicitly execute stored precompiled code made by a compiler which is part of the interpreter system.

Requirement to solve a problem

- Data =>   comes from Problem

- Data Type => store data temporarily or permanently

- Operations => Perform computation/processing

- Conditions

- Repetition => How long operation needs to perform

- Function Call => Supports programmer to use others programs

Size and Range of Data Types

Data Type	Range	Bytes	Format
signed char	-128 to + 127	1	%c
unsigned char	0 to 255	1	%c
short signed int	-32768 to +32767	2	%d
short unsigned int	0 to 65535	2	%u
signed int	-32768 to +32767	2	%d
unsigned int	0 to 65535	2	%u
long signed int	-2147483648 to +2147483647	4	%ld
long unsigned int	0 to 4294967295	4	%lu
float	-3.4e38 to +3.4e38	4	%f
double	-1.7e308 to +1.7e308	8	%lf
long double	-1.7e4932 to +1.7e4932	10	%Lf

Note: The sizes and ranges of int, short and long are compiler dependent. Sizes in this figure are for 16-bit compiler.

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Data types

int a; // holds 4 byte

char b;

float c;

string z;

Int a[1024]; // a data type of int size of 1024 words

Main Memory Reservation: Pointers

- int *pntr;

- pntr=(int *) malloc(1024*sizeof(int *)); // holds space in main memory of size 4096 bytes

- pntr[0]= 2121;

- pntr[1023] = 12121;

Assignment

- Define two types of variables, one for local memory and other for the main memory.
  - Local Memory variable can store values upto 4 K words.
  - Main Memory variable has capacity to store 4 K words of its type.
  -
  - Calculate the time take by local memory to 4K read and write data from the variable.
  - Calculate time taken by the main memory to access 4K data.

Operations

Operators	Associativity	Type
:: ()	*[See parentheses caution in Fig. 2.10]*	scope resolution
() []	left to right	function call/array access
++ -- static_cast<*type*>(*operand*)	left to right	unary (postfix)
++ -- + - !	right to left	unary (prefix)
* / %	left to right	multiplicative
+ -	left to right	additive
<< >>	left to right	insertion/extraction
< <= > >=	left to right	relational
== !=	left to right	equality
&&	left to right	logical AND
||	left to right	logical OR
?:	right to left	conditional
= += -= *= /= %=	right to left	assignment
,	left to right	comma

Condition Operation

- If
  - if (condition true)
    - Then run this
- Else if
- Switch

Reparation Statement

- For Loop
  - for (int a=1; a<100; a=a+1)

- While
  - while (a <100)

    a=a+1;

Function Calls

- A function call is a program or script that performs a predetermined processing or operations.