Microprocessor Based Systems

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CHAPTER 1

PROGRAMMING LANGUAGES

What is a Computer?

= Machine that can solve problems

HOW? → YOU tell it what to do~~ IN A PROGRAM!!!

What is a Program?

- A *collection of instructions*.
- The instructions are a series of 1's and zero's that control the internal circuitry of the processor.

00101001101010010 01
1101011011110100101
1101101010000100110
10000010010010011 01

- The instructions are written in a language called:

Machine Language

Machine language

- Difficult and tedious for people to use because of simplicity
- A large gap between what is convenient for People and what for computers
- People want to do X but computers limitation is only to Y

Assembly Language

Computer languages

Machine Language	Assembly Language	High-Level Language
Collection of binary numbers	Combines algebraic language (I.e. symbolic names are used to represent operations, registers & memory locations	expressions & symbols taken from English language (ex. Pascal, COBOL FORTRAN, …etc)

Ex.
10100001 00000000 00000000
00000101 00000100 00000000
10100011 00000000 00000000
	Ex.
	MOV AX,A
	ADD AX,4
	MOV A,AX
		Ex.
		A = A + 4

Computer languages (Continue)

Machine Language	Assembly Language	High-Level Language
Directly understood by a computer	Assembler → converts to machine language	Compiler (or interpreter) → converts to machine language
	1 assembly language instruction = 1 machine language instruction	1 HLL instruction = many machine language instructions
Not standard (I.e. different machine language for every type of machine	Not standard (I.e. different assembly language for every type of machine)	Standard (I.e. programs are independent of the machine on which they will be executed)

Advantages of Assembly Language

- Performance:
  - A well-written Assembly language program produces a faster, shorter machine language program.

  For Some applications speed and size is critical

- Access to hardware:
  - Some operations, such as reading or writing to specific memory locations & I/O ports can be done easily in Assembly but may be impossible by a higher level language.

- Studying ASM language gain a feeling of the way the computer thinks and the way things happen inside the computer.