

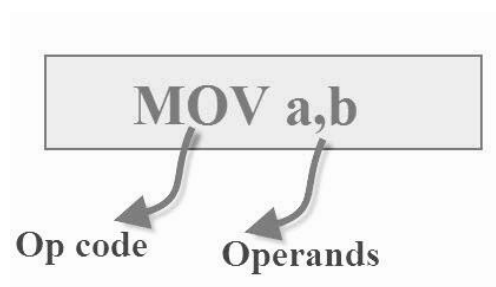
Assembly language programming

The assembly language is made up of elements which all are used to write the program in sequential manner. Follow the given rules to write programming in assembly language.

Rules of Assembly Language

- The assembly code must be written in upper case letters
- The labels must be followed by a colon (label:)
- All symbols and labels must begin with a letter
- All comments are typed in lower case
- The last line of the program must be the END directive

The assembly language mnemonics are in the form of op-code, such as MOV, ADD, JMP, and so on, which are used to perform the operations.



Op-code: The op-code is a single instruction that can be executed by the CPU. Here the op-code is a MOV instruction.

Operands: The operands are a single piece of data that can be operated by the op-code. Example, multiplication operation is performed by the operands that are multiplied by the operand.

Syntax: MUL a,b;

The Elements of an Assembly Language Programming:

- Assembler Directives
- Instruction Set
- Addressing Modes

Operation	Opcode	Operand	Description
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Addition	ADD	A, Rn	$[A] \leftarrow [A] + [Rn]$
	ADD	A, Address	$[A] \leftarrow [A] + [\text{Data at Address}]$
	ADD	A, @Rn	$[A] \leftarrow [A] + [\text{Data at Address pointed by Rn}]$
	ADD	A, #data	$[A] \leftarrow [A] + [\text{Data}]$
	ADDC	A, Rn	$[A] \leftarrow [A] + [Rn] + [\text{Carry flag}]$
	ADDC	A, Address	$[A] \leftarrow [A] + [\text{Data at Address}] + [\text{Carry flag}]$
	ADDC	A, @Rn	$[A] \leftarrow [A] + [\text{Data at Address pointed by Rn}] + [\text{Carry flag}]$
	ADDC	A, #data	$[A] \leftarrow [A] + [\text{Data}] + [\text{Carry flag}]$
Subtraction	SUBB	A, Rn	$[A] \leftarrow [A] - [Rn]$
	SUBB	A, Address	$[A] \leftarrow [A] - [\text{Data at Address}]$
	SUBB	A, @Rn	$[A] \leftarrow [A] - [\text{Data at Address pointed by Rn}]$
	SUBB	A, #data	$[A] \leftarrow [A] - [\text{Data}]$
Increment	INC	A	$[A] \leftarrow [A + 1]$
	INC	Rn	$[Rn] \leftarrow [Rn + 1]$
	INC	Address	$[\text{Data at Address}] \leftarrow [\text{Data at Address} + 1]$
	INC	@Rn	$[\text{Data at Address pointed by register}] \leftarrow [\text{Data at Address pointed by register} + 1]$

	INC	DPTR	$[DPTR] \leftarrow [DPTR + 1]$
Decrement	DEC	A	$[A] \leftarrow [A - 1]$
	DEC	Rn	$[Rn] \leftarrow [Rn - 1]$
	DEC	Address	$[Data\ at\ Address] \leftarrow [Data\ at\ Address - 1]$
	DEC	@Rn	$[Data\ at\ Address\ pointed\ by\ register] \leftarrow [Data\ at\ Address\ pointed\ by\ register - 1]$
Multiplication	MUL	A,B	$[A] \leftarrow [A] * [B]$
Division	DIV	A,B	$[A] \leftarrow [A] / [B]$
Decimal adjust	DA	A	Converts binary addition to BCD