

- An assembler is a translator.
- An assembler translates directives and machine operations expressed symbolically into machine code.
- Machine code is data or machine operations that can be directly consumed by a computer.
- Machine code is loaded into memory and from memory can be executed directly.

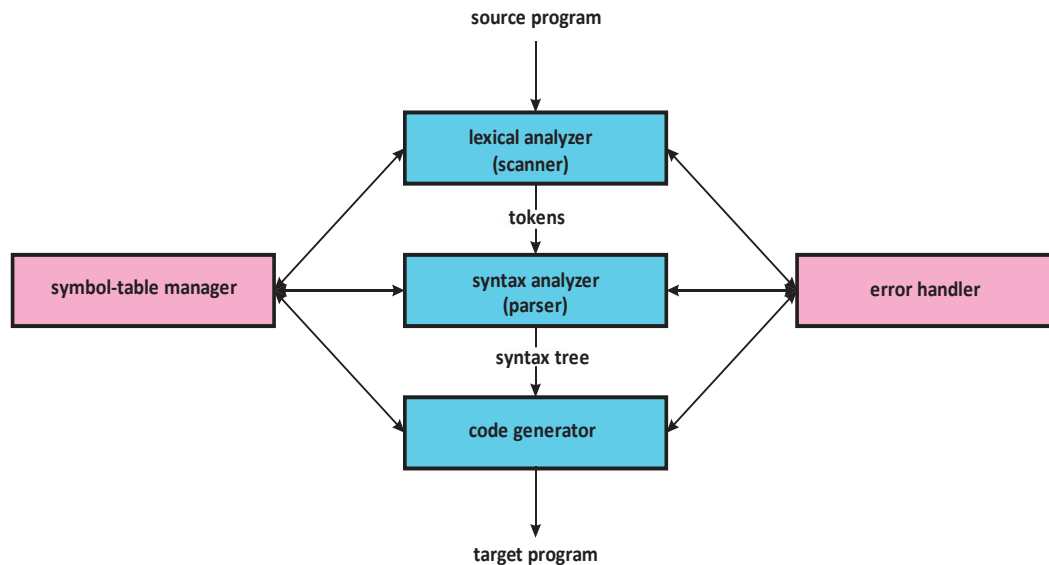


Figure 1. Anatomy of an Assembler

org	100
Load	X
Add	Y
Store	Z
Halt	
X,	Hex 0023
Y,	Hex FFE9
Z,	Dec 0000

Figure 2. Sample MARIE Program

First Pass – Create the Symbol Table

Symbol	Hex Value (address)
X	104
Y	105
Z	106

Table 1 The Symbol Table

Second Pass – Translate instructions into machine representation.

Instruction – Symbolic Form			Instruction – Machine Representation (Hex)		
Address	Mnemonic	Operand	Opcode	Operand	Combined
100	Load	X	1	104	1104
101	Add	Y	3	105	3105
102	Store	Z	2	106	2106
103	Halt		7	000	7000
104	X, Hex	0023	0	023	0023
105	Y, Hex	FFE9	F	FE9	FFE9
106	Z, Hex	0000	0	000	0000

Table 2 Translating Instructions

Hex Address	Hex Value
100	1104
101	3105
102	2106
103	7000
104	0023
105	FFE9
106	0000

Table 3. Sample MARIE
Program in Machine
Representation