Lecture-7

Introduction to computer languages.

Programming languages

The art of writing instructions for a computer to solve the specific task is known as programming.

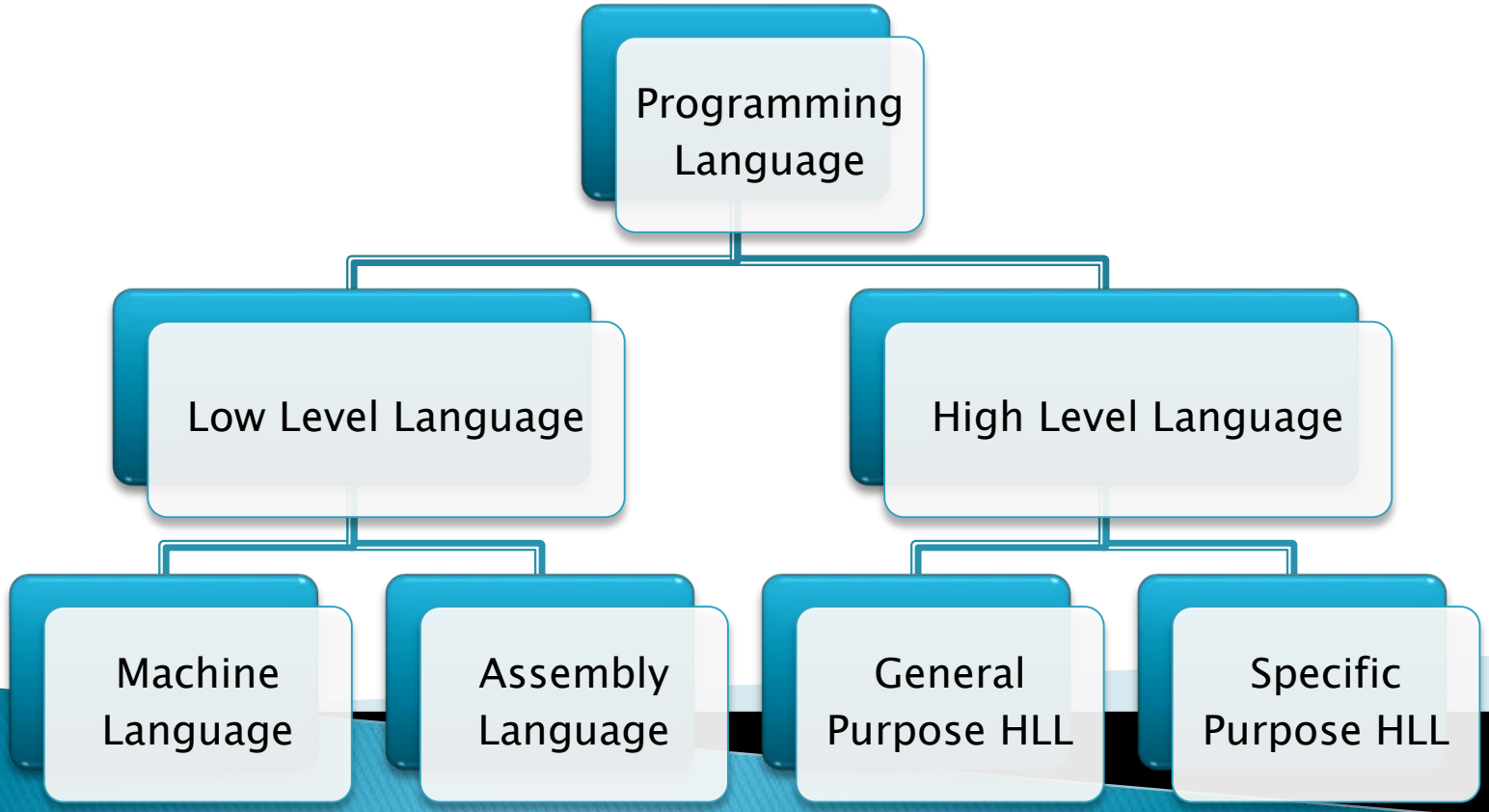
or

A vocabulary and set of grammatical rules for instructing a computer to perform specific tasks

- ✓The output of programming is a well defined set of instructions.
- ✓This is called a program
- ✓A programming language is the medium of communication between the man and the machine.
- Computer languages are classified into two levels:

- Low level languages
- High level languages

Programming languages



Low level languages

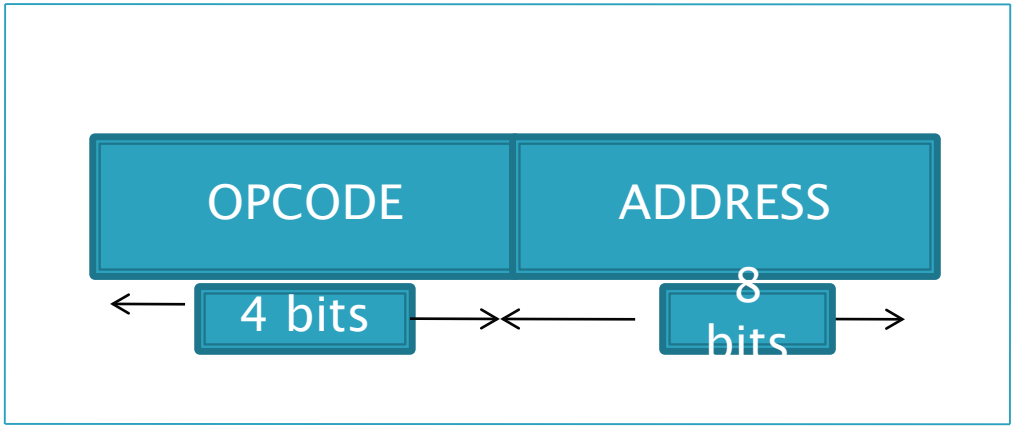
- These are easily understood by computers.
- They are machine dependent languages.
- Programs written in these languages are not transferable from one computer to another.
- The machine language and assembly language are examples of low level languages.

MACHINE LANGUAGES

- As the name itself implies, programming is done at machine level.
- The vocabulary of computer consists of only two words ,zero and one.
- The digit of a binary number system.
- A 0 indicates low voltage level and 1 indicates high voltage level
- The machine level language is considered as a first generation language
- Any sequence of 0’s and 1’s forms an instruction in this langusge. For example: 1010101011
- Each instruction has a specific format, consisting of two fields.
- First field is opcode and
- Second field is address

MACHINE LANGUAGES

Instruction Format



Opcode− (it stands for operation code). It indicates what operation is to be done .such as addition, subtraction, multiplication etc.

Address –(memory location where in the data is referenced)

The length of each instruction is 12 bits;4bit for opcode and 8bits for address.

MACHINE LANGUAGES

Advantages

- can be directly typed and executed
- No translator program is required.

Disadvantages

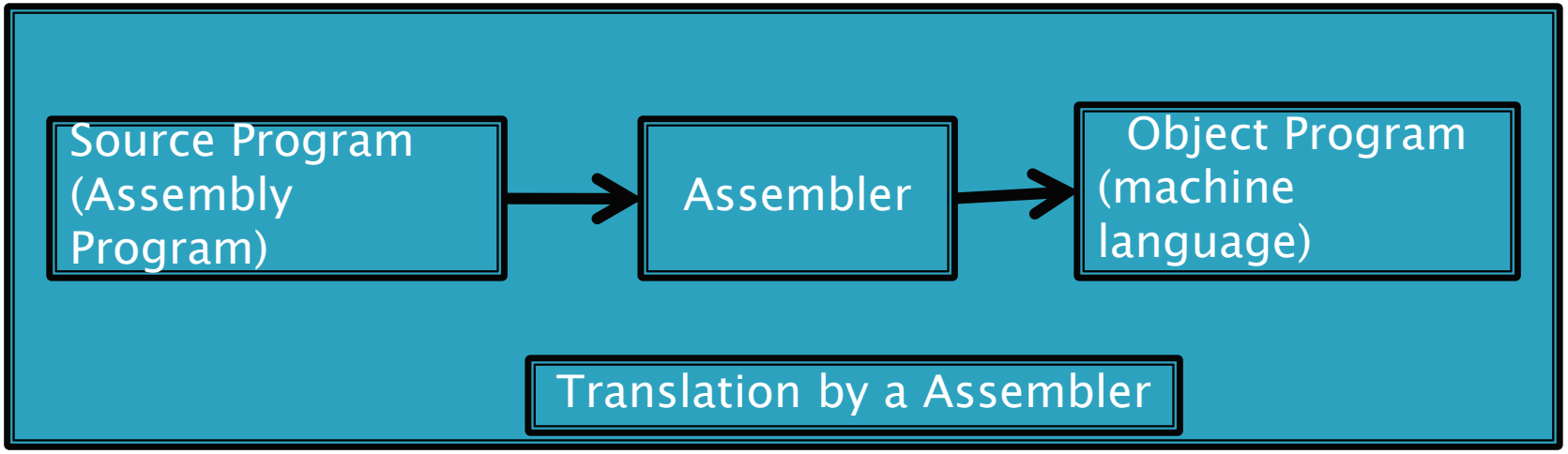
- Difficult to remember machine instructions
- Difficult to understand , modify, and debug errors
- Difficult to remember address of data and instructions
- Each and every instruction is numerical

Assembly language

- To overcome the drawbacks of the machine language ,computer engineers developed a new programming language which uses symbolic instructions.

- This symbolic instruction oriented programming language is known as assembly language.

- This is called as the second generation programming language.



Assembly language

Symbolic words used in this language are referred to as mnemonics. The meaning of mnemonic is memory sake or to remember.

For example,

ADD	For Addition
SUB	For Subtraction
MUL	For Multiplication
STA	For store at Accumulator
HALT	For Halt
JMP	For jump
INR	For increment and so on

Assembly LANGUAGES

Advantages

- Easy to remember operation codes
- Easy to write the programs, modify and debug as compared to machine language.
- Need not remember addresses of operands and instruction locations

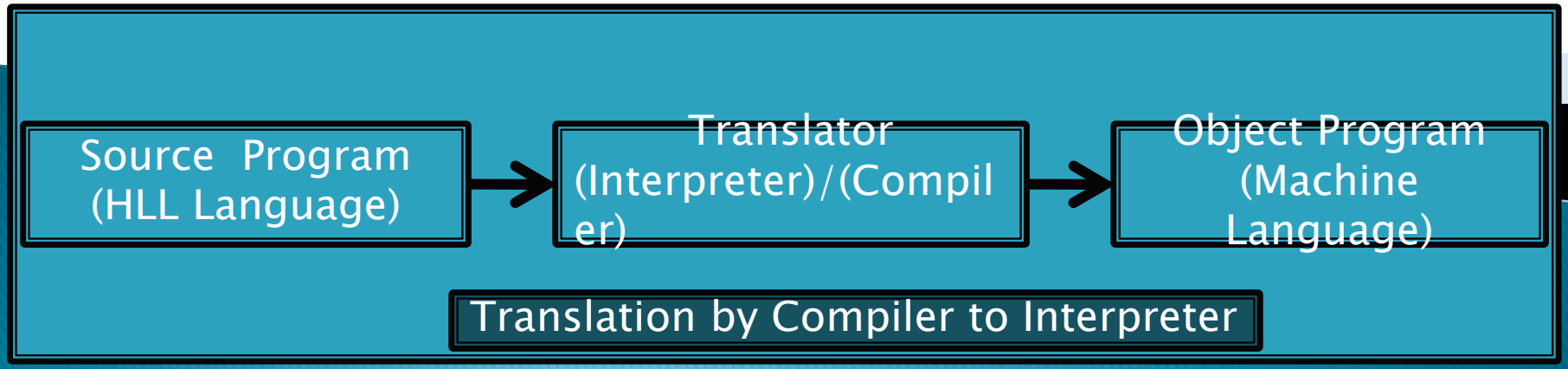
Disadvantages

- The mnemonics are machine dependent.
- Not standardized.
- Less efficient than machine language.

High level languages

- Higher-level languages are more powerful than assembly language and allow the programmer to work in a more English-like environment.
- Higher-level programming languages are divided into three "generations," each more powerful than the last:

  - **Third-generation languages**
  - **Fourth-generation languages**
  - **Fifth-generation languages**



Higher-Level Languages - Third-Generation Languages

- Third-generation languages (3GLs) are the first to use true English-like phrasing, making them easier to use than previous languages.

- 3GLs are portable, meaning the object code created for one type of system can be translated for use on a different type of system.

- The following languages are 3GLs:

FORTAN	**C**
COBOL	**C++**
BASIC	**Java**
Pascal	**ActiveX**

Higher-Level Languages - Fourth-Generation Languages

- Fourth-generation languages (4GLs) are even easier to use than 3GLs.
- 4GLs may use a text-based environment (like a 3GL) or may allow the programmer to work in a visual environment, using graphical tools.
- The following languages are 4GLs:

  Visual Basic (VB)
  VisualAge
  Authoring environments

Higher-Level Languages - Fifth-Generation Languages

- Fifth-generation languages (5GLs) are an issue of debate in the programming community – some programmers cannot agree that they even exist.

- These high-level languages would use artificial intelligence to create software, making 5GLs extremely difficult to develop.

- Solve problems using constraints rather than algorithms, used in Artificial Intelligence

  Prolog