



# PYTHON FOR COMPUTATIONAL PROBLEM SOLVING

Syntax, Semantics and Translation Models

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**Prof. Sindhu R Pai**

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Department of Computer Science and Engineering

- English, for example, includes the letters of punctuation and properly spelled words punctuated sentences.
- The **syntax** of a language is a set of characters and the acceptable sequences (arrangements) of those characters.

The following is a syntactically correct sentence in English,

**I will read tomorrow**

The following, however, is not syntactically correct,

**I tomorrow read will**

- Consider the following sentence: **I will read yesterday**
- This sentence is syntactically correct, but has no meaning. It is *semantically incorrect*.
- The **semantics** of a language is the meaning associated with each syntactically correct sequence of characters.

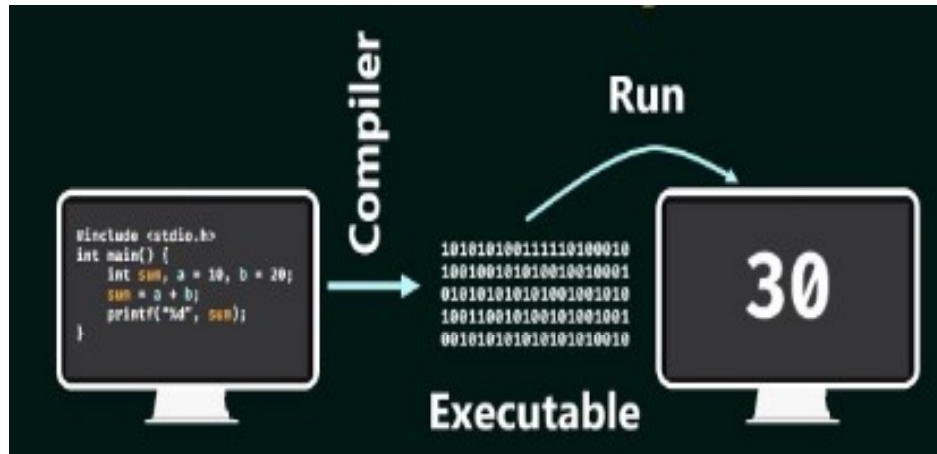
**Note: Every language has its own syntax and semantics.**

- A programming language provides the necessary constructs to instruct the computer to do the tasks for us.
- Levels – High, medium, low
- Generations – 1 to 5
- Translation models describe the mathematical relationship between two or more languages.
  - **Models of translational equivalence** - Whether expressions in different languages have equivalent meanings.

- **Compilers, Interpreters, and Assemblers, ...**
- Compiler converts entire high-level language programs to machine language at once.
- Interpreter converts high-level language to machine language line by line and execute instructions in place of CPU

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## Compiler



*program in a  
high-level language*

```
a = 10
b = 20
sum = a + b
print sum
```

compiler

*machine code  
version of program*

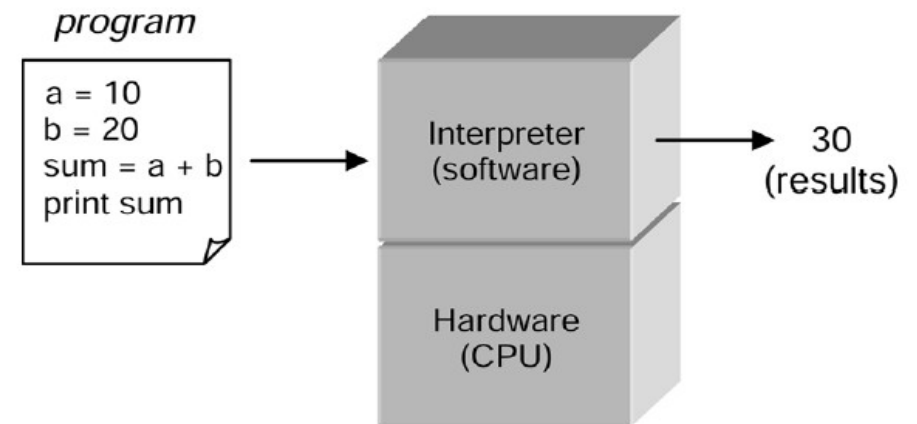
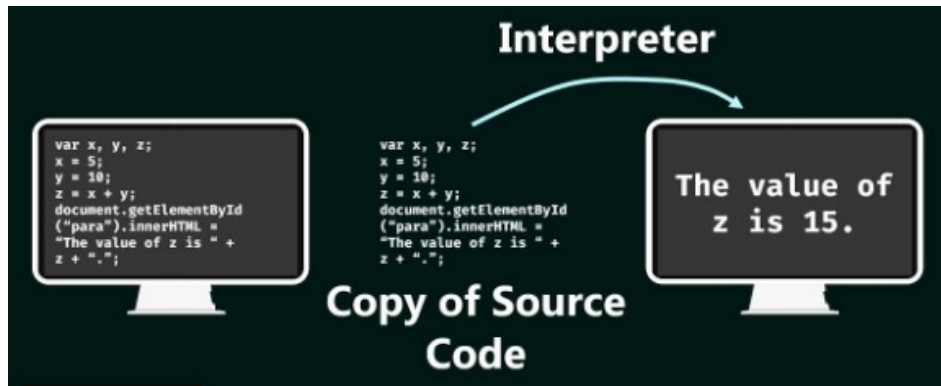
```
01110
11011
10100
00100
```

Hardware  
(CPU)

30  
(results)

# PYTHON FOR COMPUTATIONAL PROBLEM SOLVING

## Interpreter





## THANK YOU

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Introduction to Computer Science Using Python – Dierbach  
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Department of Computer Science and Engineering

Dr. Shylaja S S, Director, CCBD & CDSAML, PESU

Prof. Sindhu R Pai – [sindhurpai@pes.edu](mailto:sindhurpai@pes.edu)

Prof. Chitra G M

Prof. Gayatri S