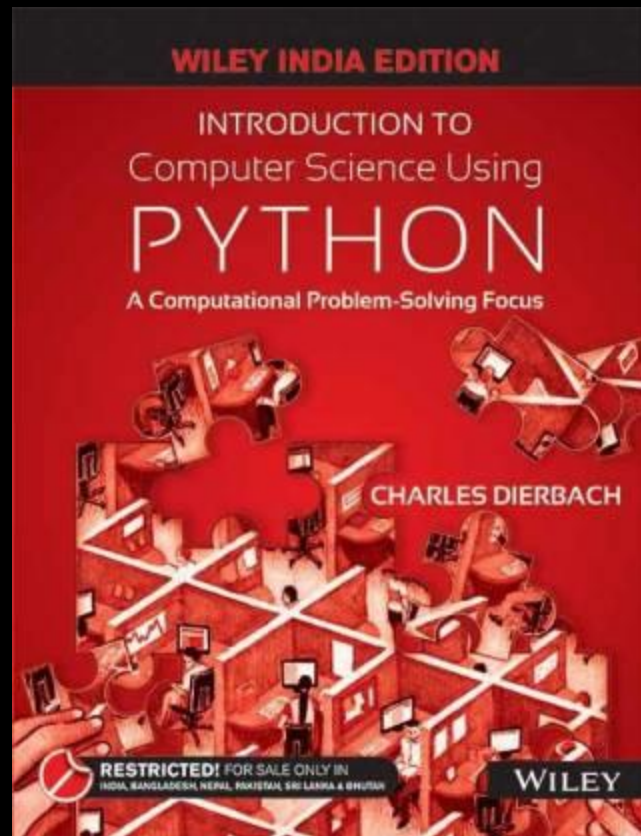




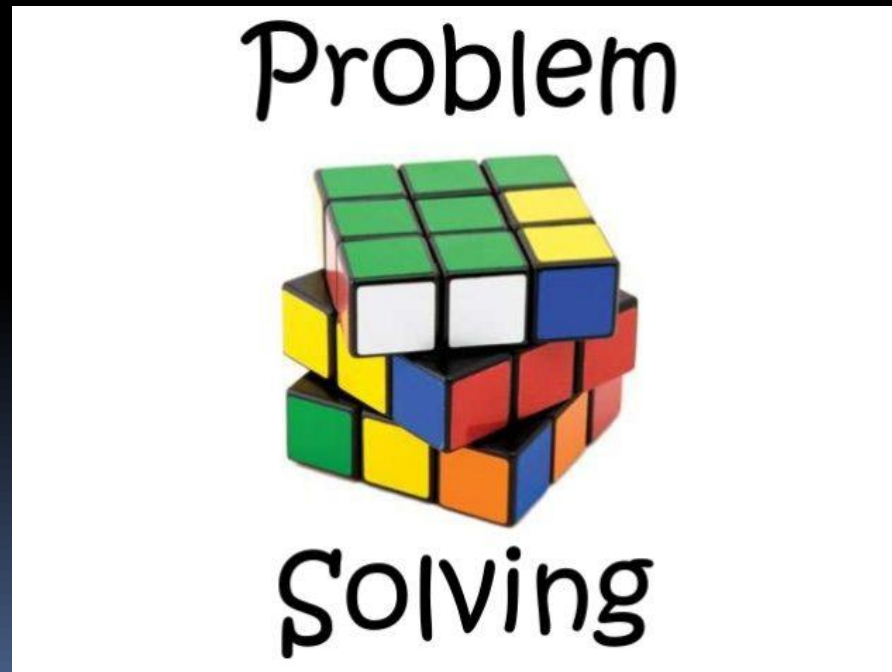
PROBLEM SOLVING USING PYTHON

BY

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ASSISTANT PROFESSOR

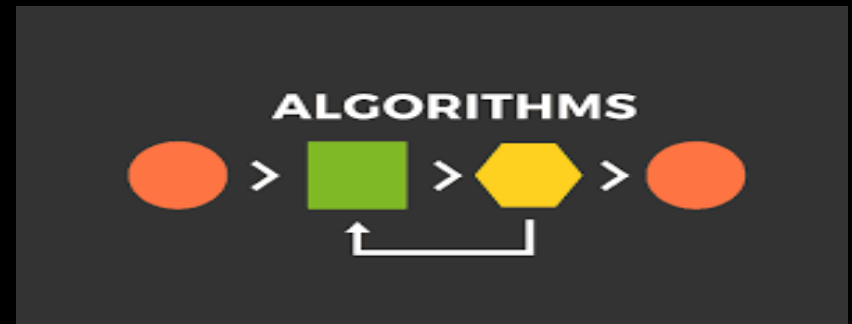
Fundamentals

What Computer science is fundamentally about
is computational problem solving



The Essence of Computational Problem Solving

- Captures all the relevant aspects of the problem
- Solves the problem by use of the representation.





Man, Cabbage, Goat, Wolf problem

Solution: The man first takes the goat across the river. He leaves the goat and returns to get the wolf. He leaves the wolf on the other side but brings back the goat. He then takes the cabbage and leaves the goat. When he is on the other side he leaves the cabbage with the wolf. The wolf will not eat the cabbage. The man goes back to pick up the goat and finally returns to the other side where the wolf and cabbage are waiting.

Representation

- ⊙ A representation that leaves out details of what is being represented is a form of abstraction
 - the start state :
man cabbage goat wolf
[E, E, E, E]
 - Goal state: [W, W, W, W]



Algorithm

- A simple algorithmic approach for solving this problem by simply trying all possible combinations of items that may be rowed back and forth across the river
 - The Python programming language provides an easy means of representing sequences of value.
- 



Brute Force Approach

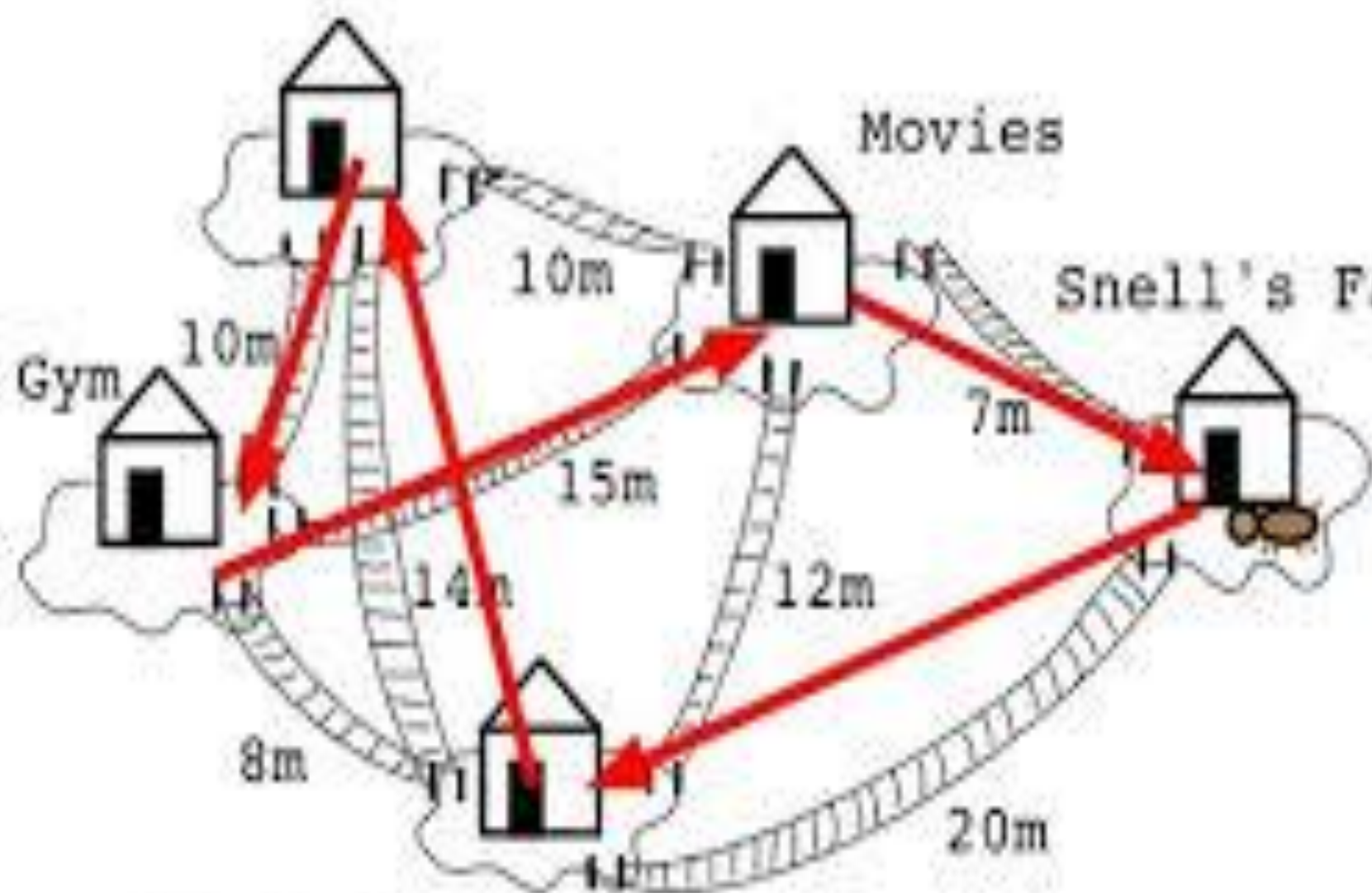
- Trying all possible solutions to a given problem
- 

School

Movies

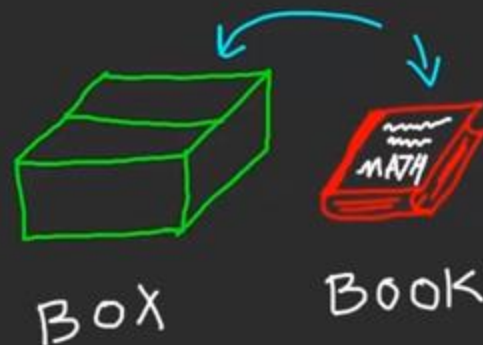
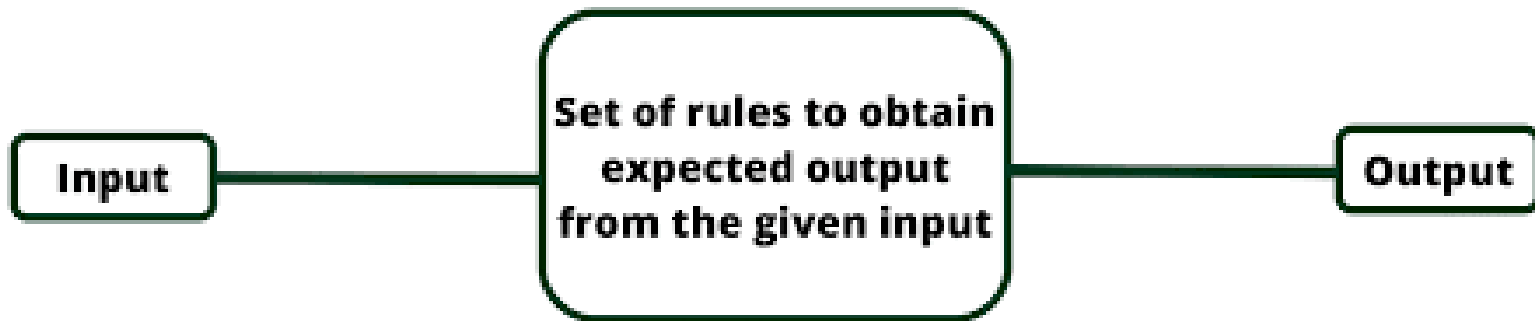
Snell's Farm

Gym



Planter's Farm

Computer Algorithms



Put the book in the box

- 1) Open the box
- 2) Pick up the book
- 3) Put the book inside the box
- 4) Close the box

Set of steps
that you can
follow to finish
a task.

1111

- 

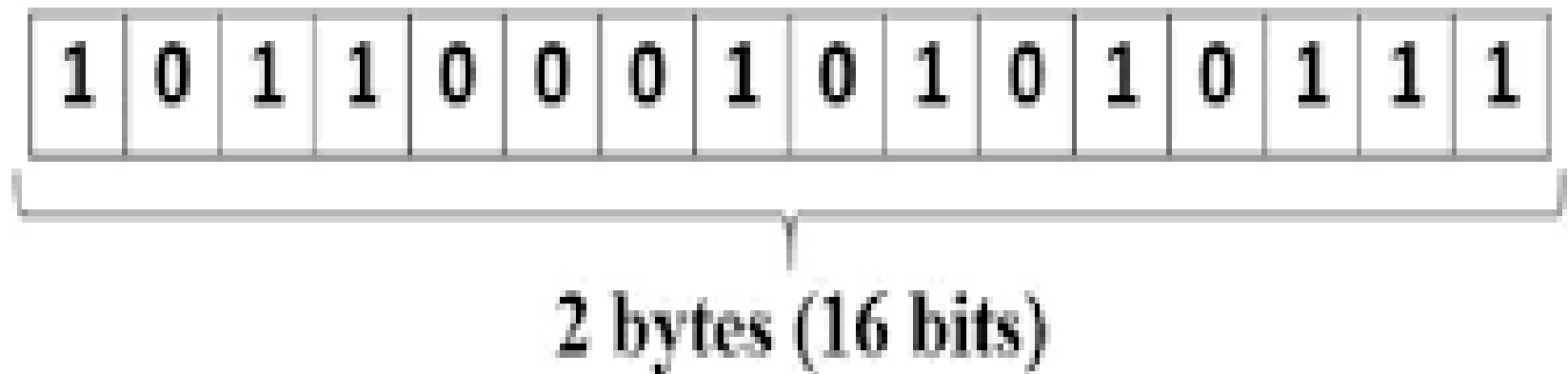
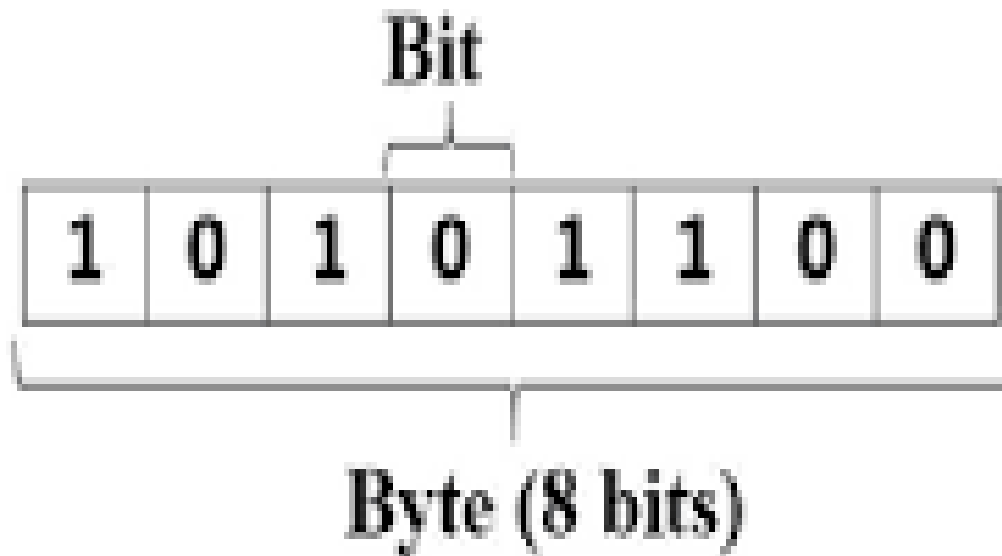
1100



† cons ns c



The Binary Number System



Fundamental Hardware Components

- The central processing unit (CPU) is the “brain” of a computer, containing digital logic circuitry that can execute instructions.
- Main memory stores programs resident in the computer and very quickly retrieves them for processing.
- Main memory is *volatile*; that is, the contents are lost when the power is turned off.





are

Memory is *nonvolatile*,
term storage of
of storage, for
(hard drive), optical

(CD or DVD
as in a USB
anything to
and key-board
printer).

- **Buses** transfer data between a computer and main memory



Secondary Storage Devices



Operating Systems



Golfftheman/Operating system placement/
Wikimedia Commons

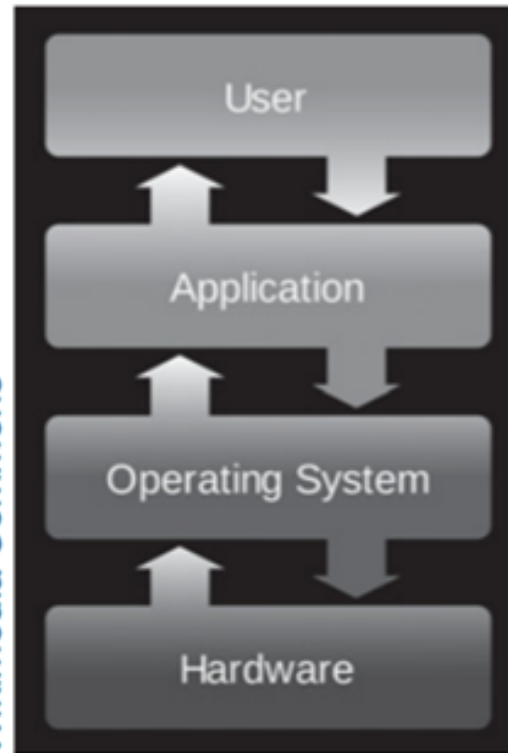


FIGURE 1-15 Operating System

Computer Software

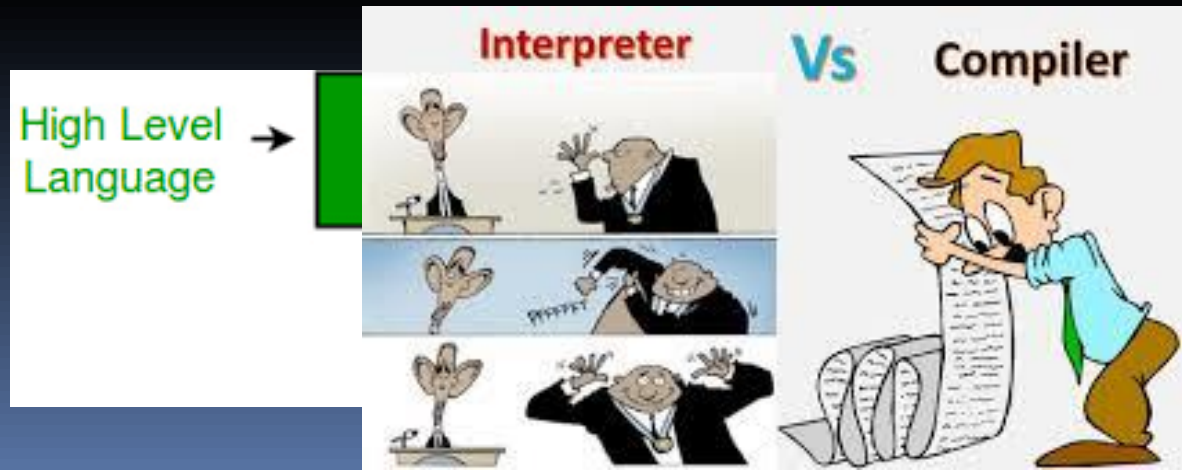


Syntax, Semantics, and Program Translation



Program Translation

- A **compiler** is a translator program that translates programs directly into machine code to be executed by the CPU.
- An **interpreter** executes program instructions in place of (“running on top of”) the CPU





Program Debugging: Syntax Errors vs. Semantic Errors

- **Syntax errors** are caused by invalid syntax.
 - The syntax of a language is a set of characters and the acceptable arrangements (sequences) of those characters
 - **Semantic (logic) errors** are caused by errors in program logic
- 



Procedural vs. Object-Oriented Programming

- Python supports both procedural and object oriented programming
 - Procedural programming and object-oriented programming are two major programming paradigms in use today.
- 

