Theoretical Computer Science

Tutorial - week 2

January 28, 2021

Innopolis University

Agenda

- Recap
- Motivation
- Abstraction
- Languages

Recap

- What is the course going to be about?
- What is a model?
- What is a language?
- What is computational power of a model?
- What is FSA (FSM)?
- What models apart from FSA do you know?

Motivation

- Languages
- Abstraction
- Processing strings

$L_1 = \{\varepsilon, a, b, c, bc, ca\}$

$L_2 = \{aa, ab, ac, ba, bb, bc, ca, cb, cc\}$

If $\Sigma = \{a, b\}$ and L_1 is defined as

$$L_1 = \{x \in \Sigma^* \mid x \text{ ends with } aa\}$$

Does the following FSA accepts all strings represented by the language L_1?

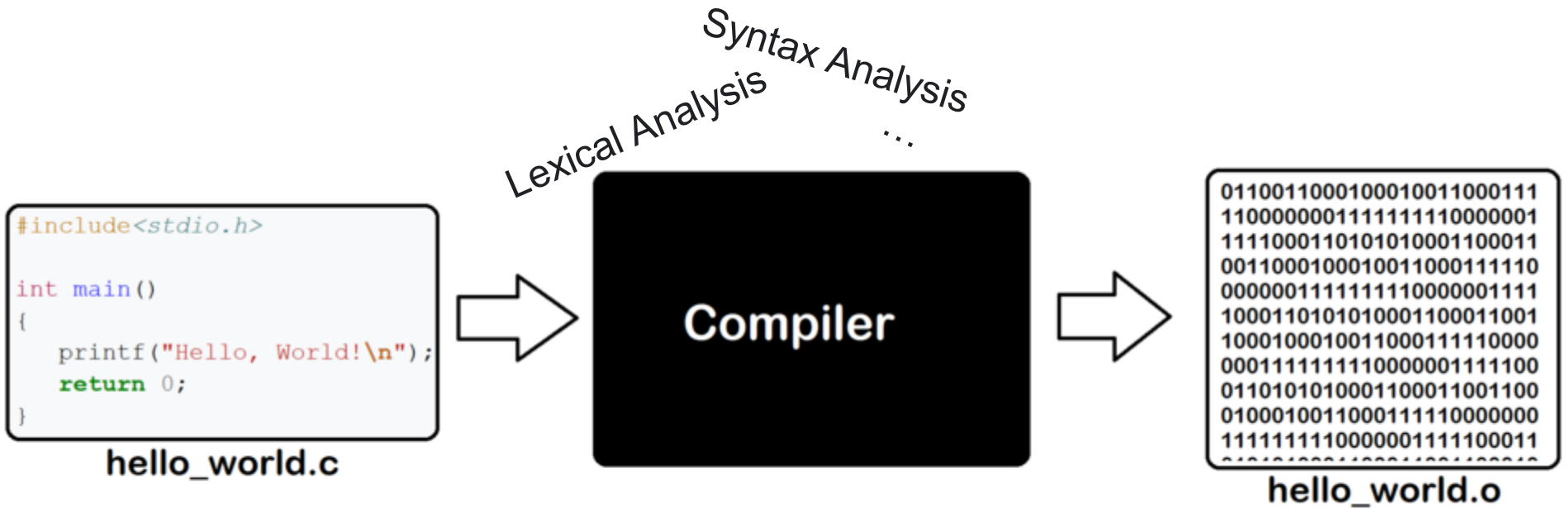
...

Languages,
Automata,
Computability

coding
testing
coding ...

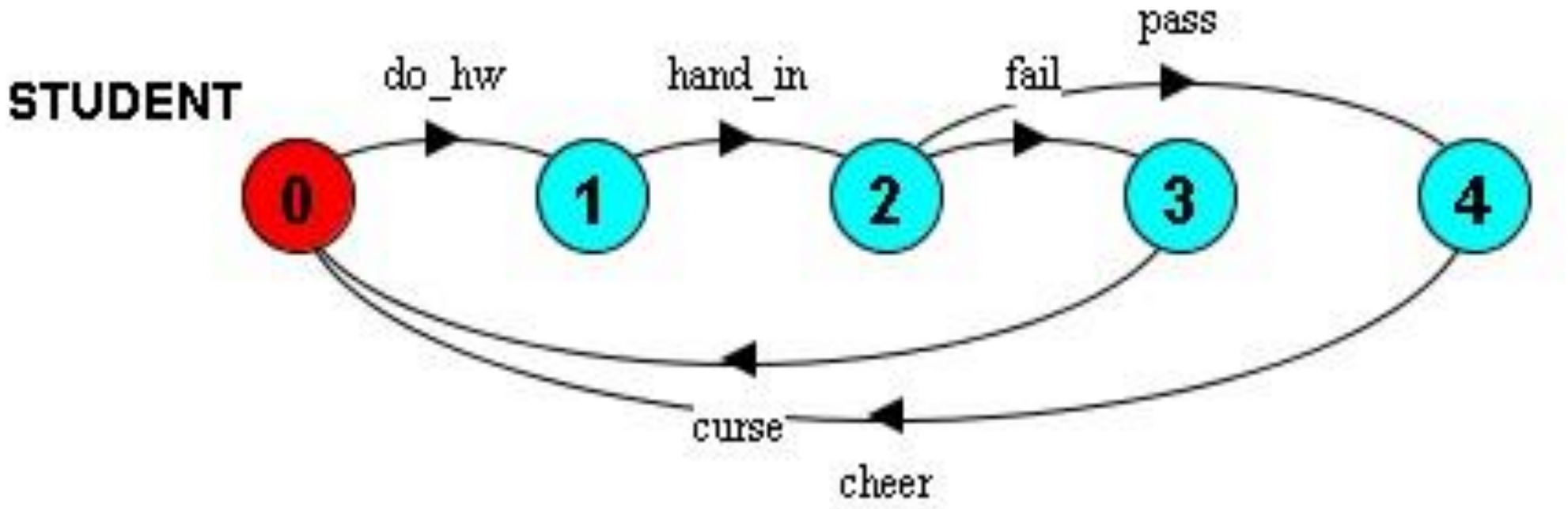
Application

- Compiler construction



Application

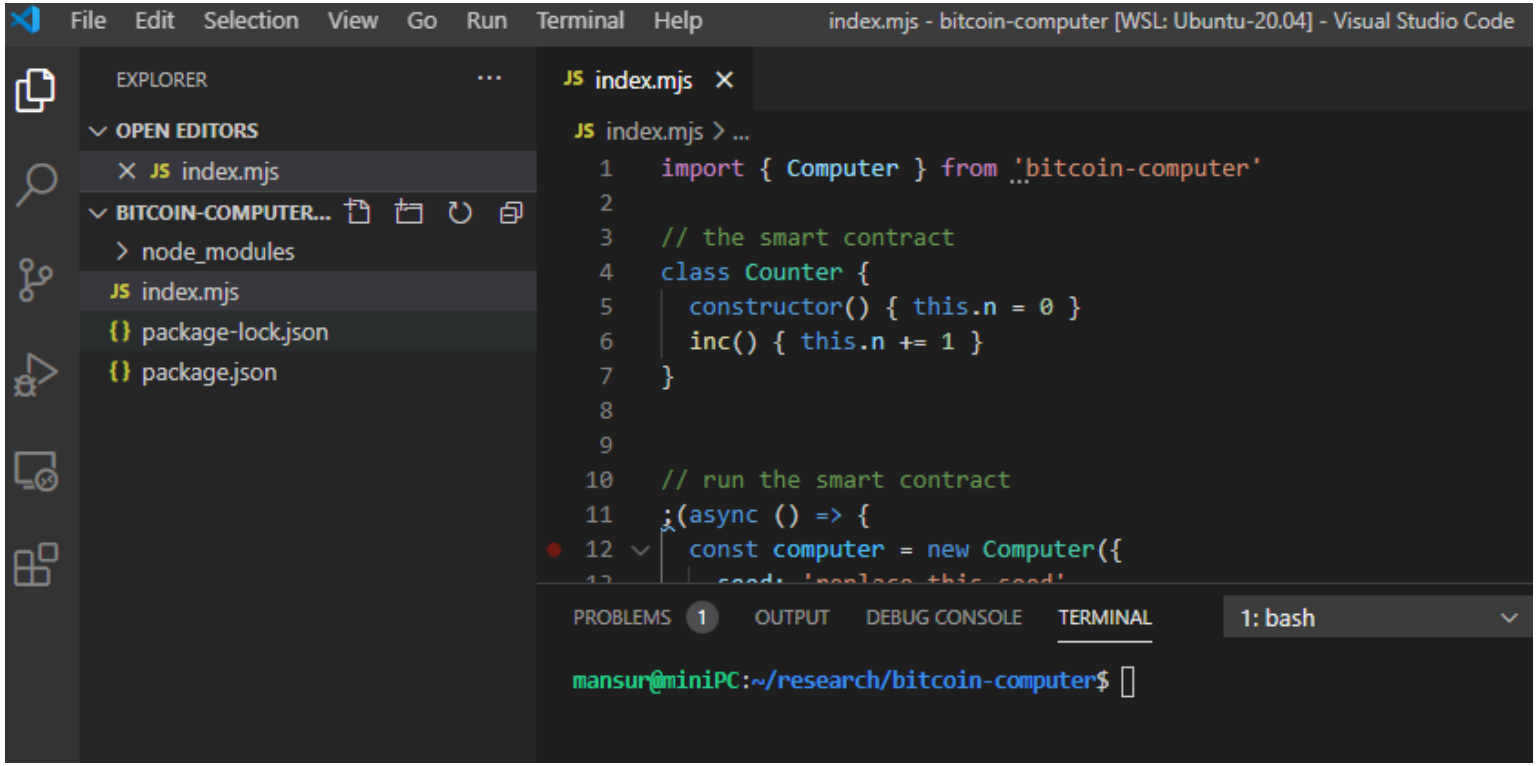
- Compiler construction
- Specification and design



- State Machine Diagram Tutorial (visual-paradigm.com)

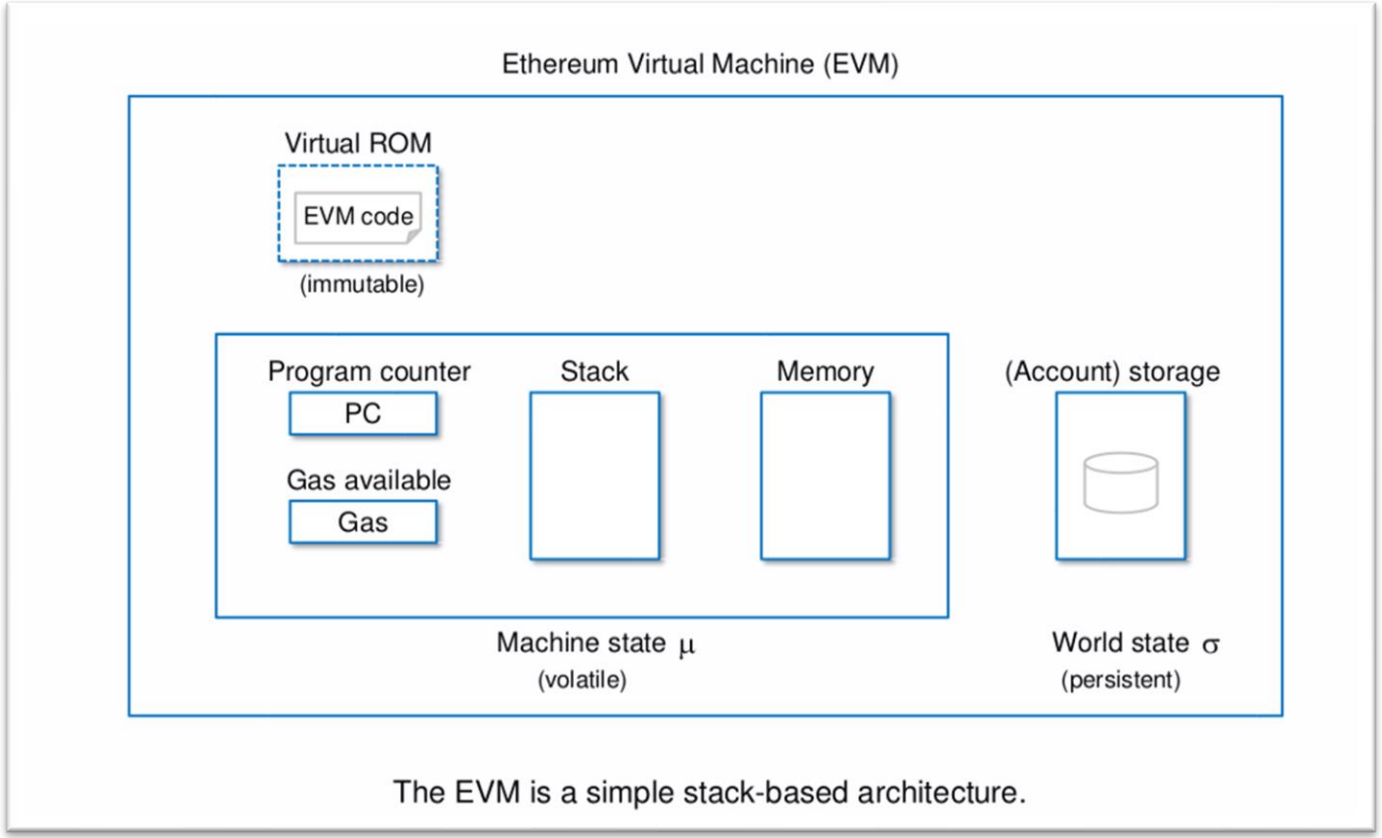
Application

- Compiler construction
- Specification and design
- Verification
  - static analysis



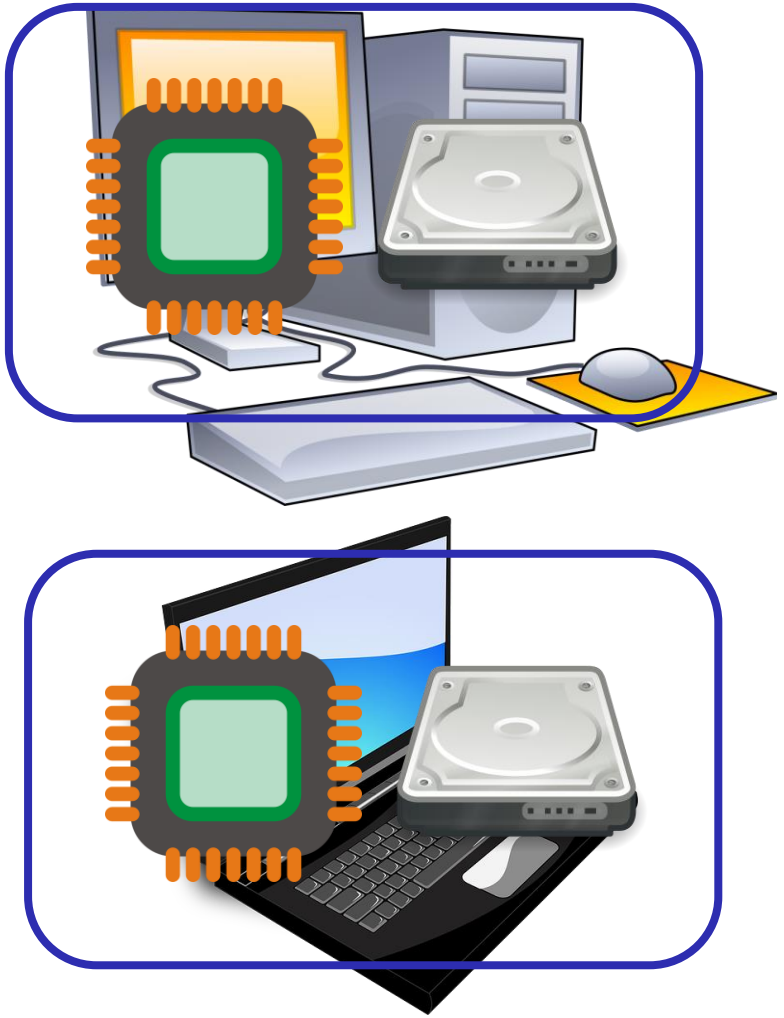
Application

- Compiler construction
- Specification and design
- Verification
  - static analysis
  - test generation
  - …
- …

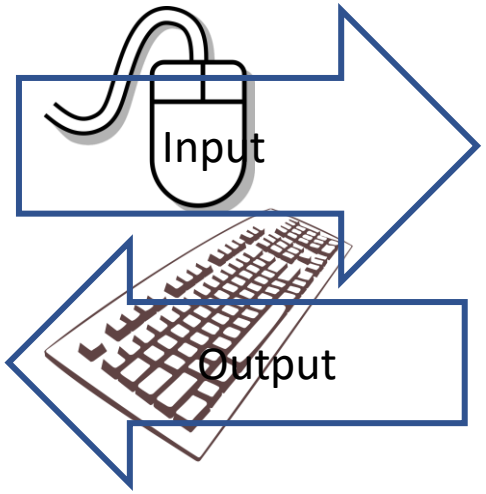


- Getting Deep Into EVM: How Ethereum Works Backstage | Hacker Noon

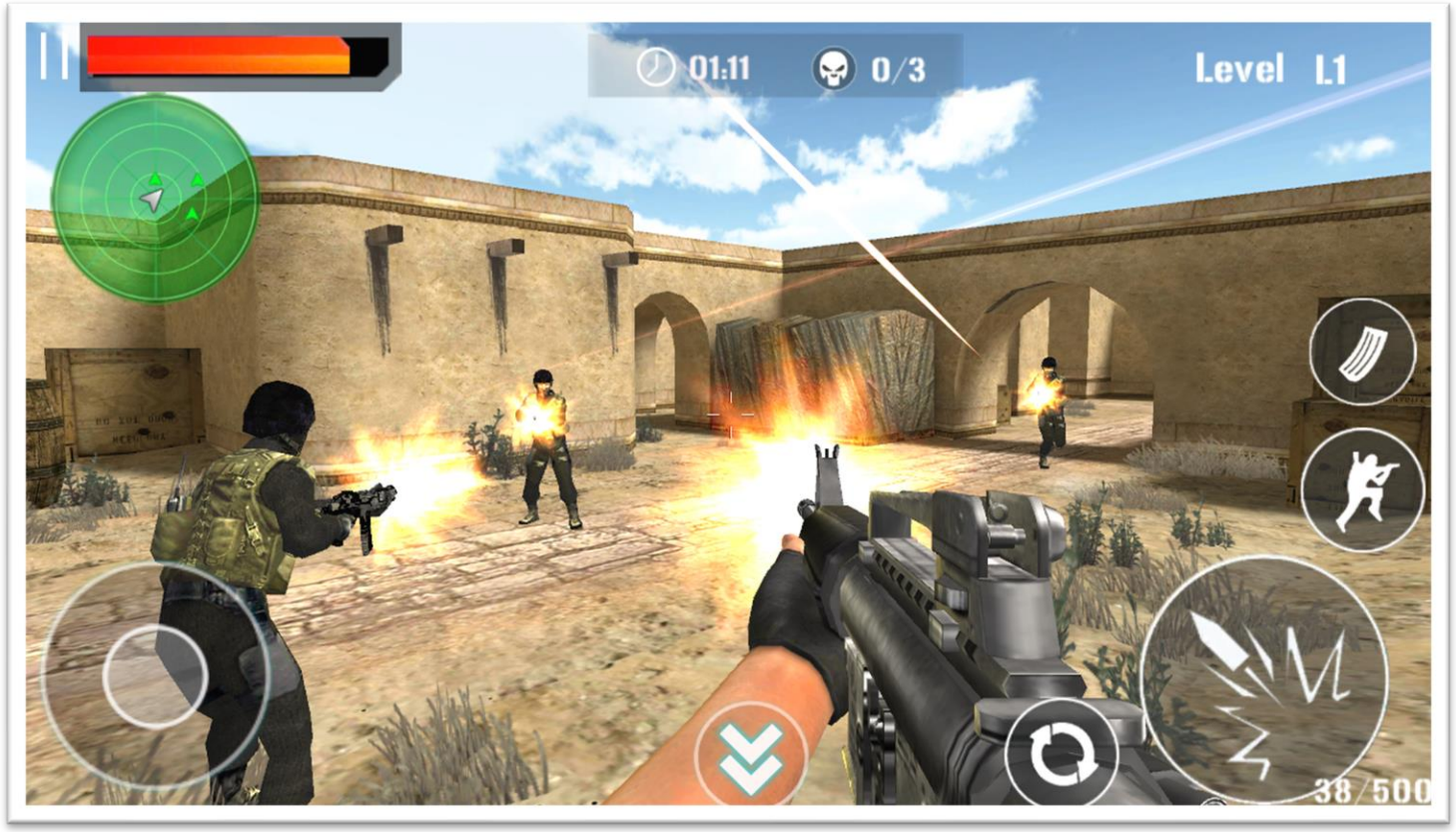
Abstraction



Abstraction



Abstraction



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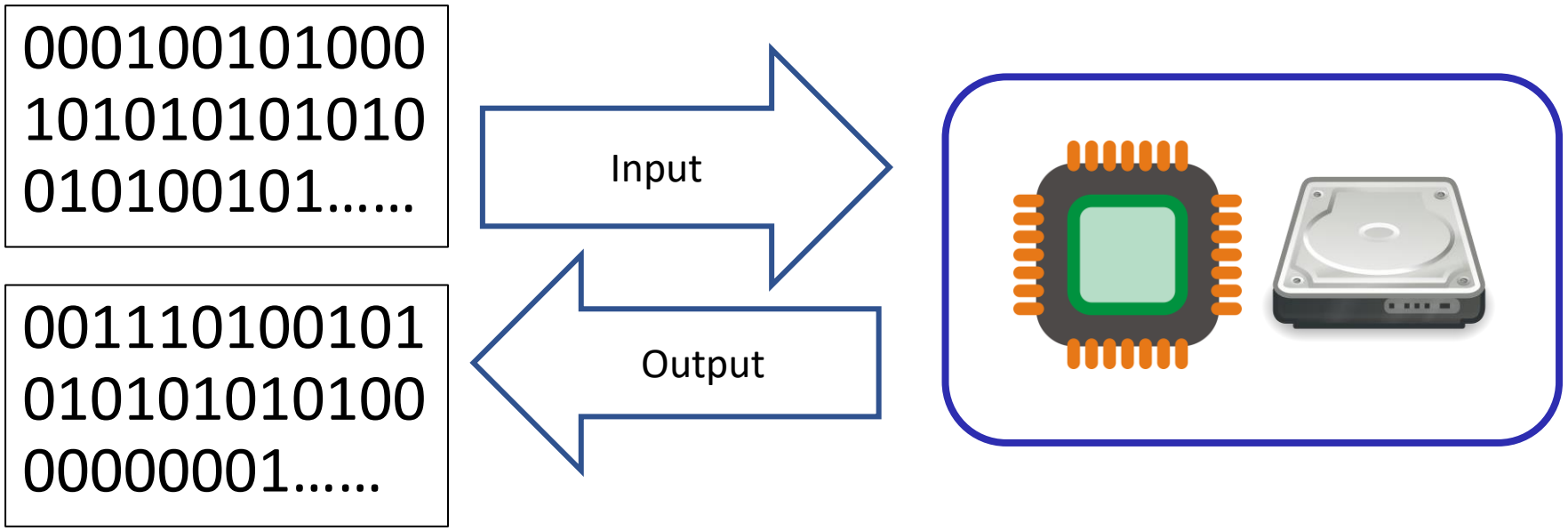

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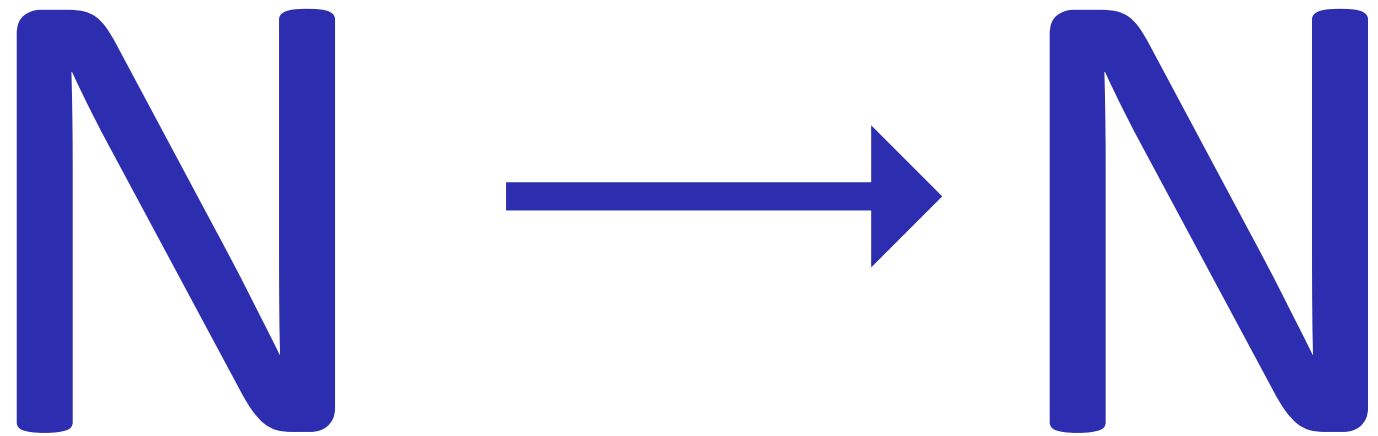
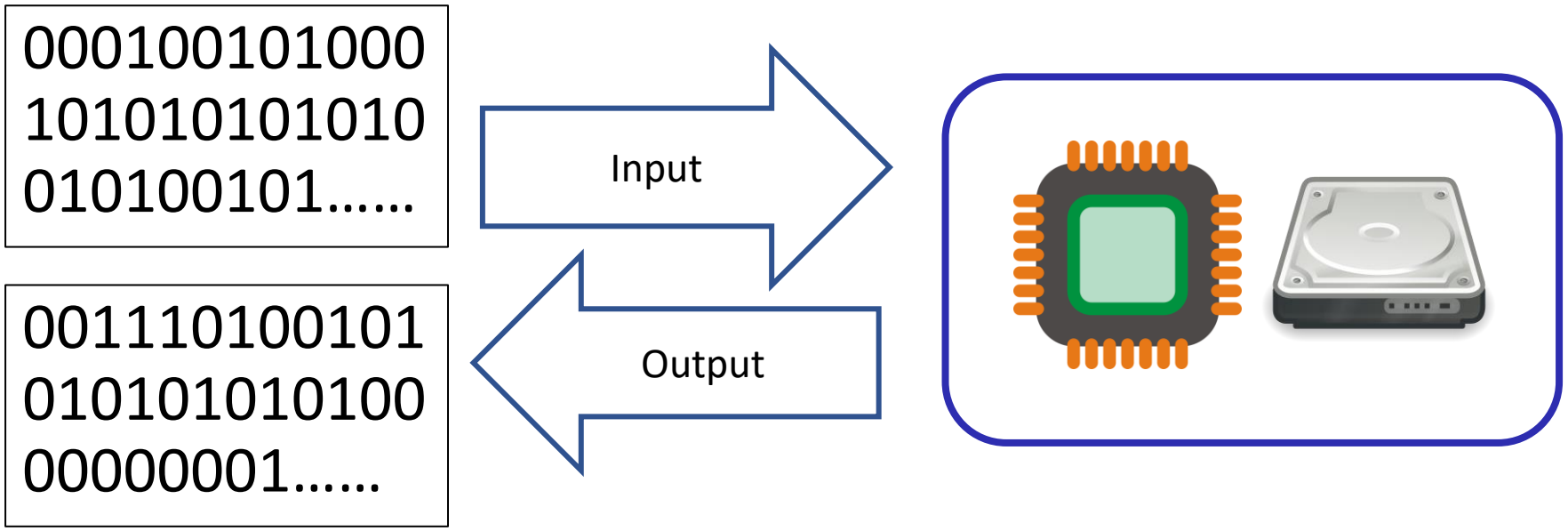


Abstraction

Focus on problem solving!



Languages

A **language is a set of strings over an alphabet**

Examples:

- Regular language
- Context-free languages
- …