Basics

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Programming languages

- Defines the set of instructions to communicate with computers.
- Used for creating software and applications.
- Intermediary between human thought and machines.

Source code

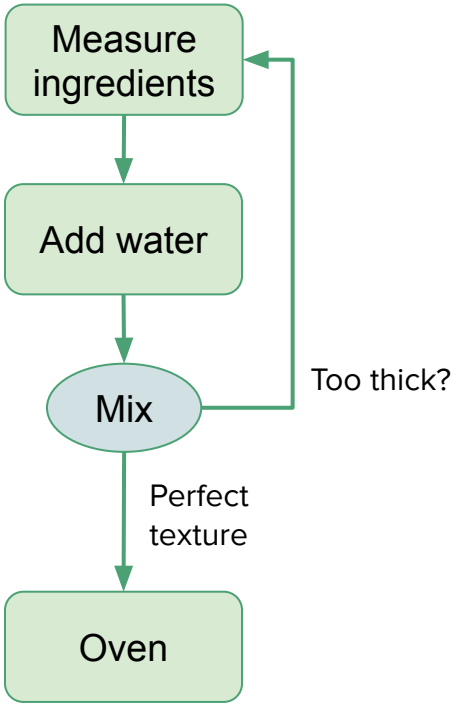
- Collection of human-readable instructions written in a programming language.
- Implements algorithms.
- Source code example:

```
bws_mbs = []
read_ratios = []
for sample in app_profile:
    bws_mbs.append(sample.bw)
    read_ratios.append(sample.read_ratio)
# Approximate read_ratios to the closest multiple of 2 for the curves
read_ratios = [utils.approximate_read_ratio(rr) for rr in read_ratios]
# Calculate latencies
lats_cyc = [cvs.get_lat(rr, bw) for bw, rr in zip(bws_mbs, read_ratios)]
bws_gbs = [bw.as_unit('GBps') for bw in bws_mbs]
return bws_gbs, lats_cyc
```

Algorithms

- Set of rules that define how to perform a task.
- Examples:
  - Cooking recipe.
  - Mathematical addition by hand.
  - Computer programs.
- Important in engineering, mathematics, computer science, etc.

Algorithms


Measure ingredients
Add water
Mix
Too thick?
Perfect texture
Oven

CPU

- Source code is executed by the Central Processing Unit (CPU)
- CPU is the “brain” of a computers, smartphones...
- Executes instructions and processes data, among others.

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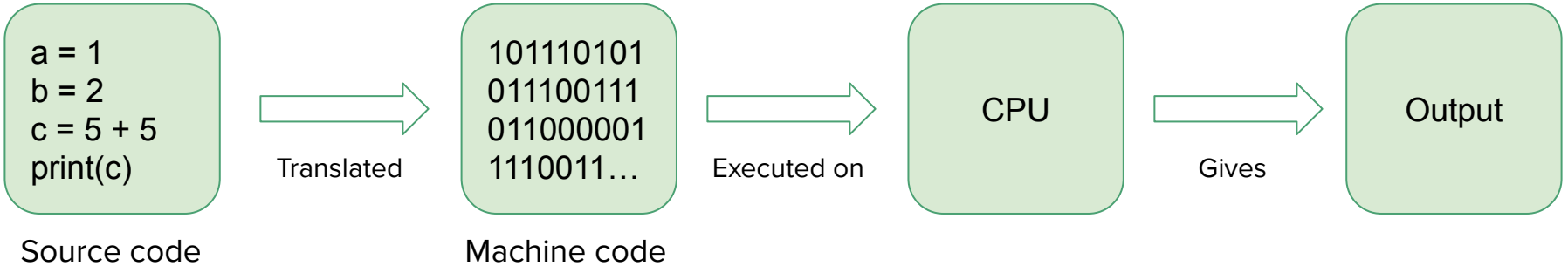
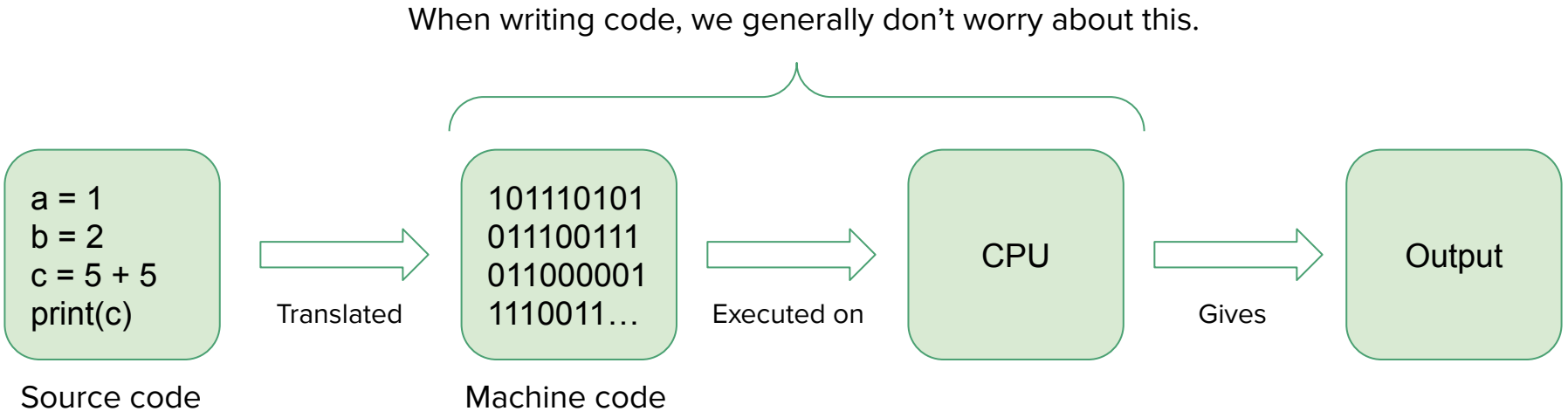
CPU


a = 1
b = 2
c = 5 + 5
print(c)
Translated
101110101
011100111
011000001
1110011…
Executed on
CPU
Gives
Output
Source code
Machine code

CPU


When writing code, we generally don't worry about this.
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print(c)
Translated
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011100111
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CPU
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Source code translation

- Main categories:
  - Compiled languages.
  - Interpreted languages.
- Some programming languages are hybrid.

Compiled languages

- Source code is transformed by a compiler.

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- Translating it into machine code or bytecode before runtime.
- Examples: C, C++, Java.

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- Examples: C, C++, Java.
- Characteristics:
  - Faster execution speed.
  - Code optimization.
  - Binary distribution.

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- Examples: Python, JavaScript, Ruby.

Interpreted languages

- Source code executed by interpreter.
- Translation to machine code on-the-fly.
- Examples: Python, JavaScript, Ruby.
- Characteristics:
  - Faster development.
  - Platform independence.
  - Code can be modified during runtime (dynamic behavior).