



How We Can Represent a Problem with Python

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به یاد استاد عباس نوذری عزیز...





Last Lecture

- Short Presentations
- Review the Last Lecture
- Primitive Instructions
- Language Structure
- Python Programming Language
- **Application of Programming in the Digital Age!**



Today

- Short Presentation
- Review the Last Lecture
- Problem Modeling
- Data types in Python
- Interpret your commands with Python
- Programming with Python
- **Application of Programming in the Digital Age!**



Together

Send your feedback about the
class whenever you want!



Contact me

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Main links for our class

گروه خصوصی شد!

- Telegram group: *
- GitHub organization: github.com/SharifPythonSpace





Grading

راه جبران هم تحت شرایطی
وجود داره!

- Approx. 25% Programming Assignments (judgment with Quera)
- Approx. 14% Mid-term Project (alone, judgment with TAs and Quera)
- Approx. 37% Final Project (team work~5 member, judgment with TAs and Quera)
 - *Proposal (about real needs)*
 - *Coding*
 - *Release*
- Approx. 30% Final Exam (algorithm-based paper exam)
- Approx. 5% Short Presentation(extra score , for the next week lecture, only for the first two person)
- Approx. 2% Challenging Questions and Contributions in Class (extra score)
- Approx. 7% long presentation (extra score)

Short Presentations



We have six core (primitive) instructions. What are these and WHY are these?

Who is volunteer for the short presentation?

Short Presentation

Review the Last Lecture



Main vocabs

- Computation
- Computer
- Algorithm
- Program
- Programming language
- ...



Building block of languages

- Today programming languages have more convenient set of primitives.
- We can create new primitives...
- Anything computable in one language is computable/ transformable in/to another languages.



Level of processing in a language!

- Word-level (primitives)
- Syntax
- Semantic
- Discourse (valid result)



Every things have a language!?

Genes

Humans

Computer

Mechanical
device

Trees

Animals

Algorithms

Programming
(formal)

...

Problem Modeling



How to convert a problem to a machine language?

Needs analysis

Well-defined problem definition

Write an algorithm in a paper or your brain!

Select a suitable programming language

Write a program

Run compiler or interpreter

...



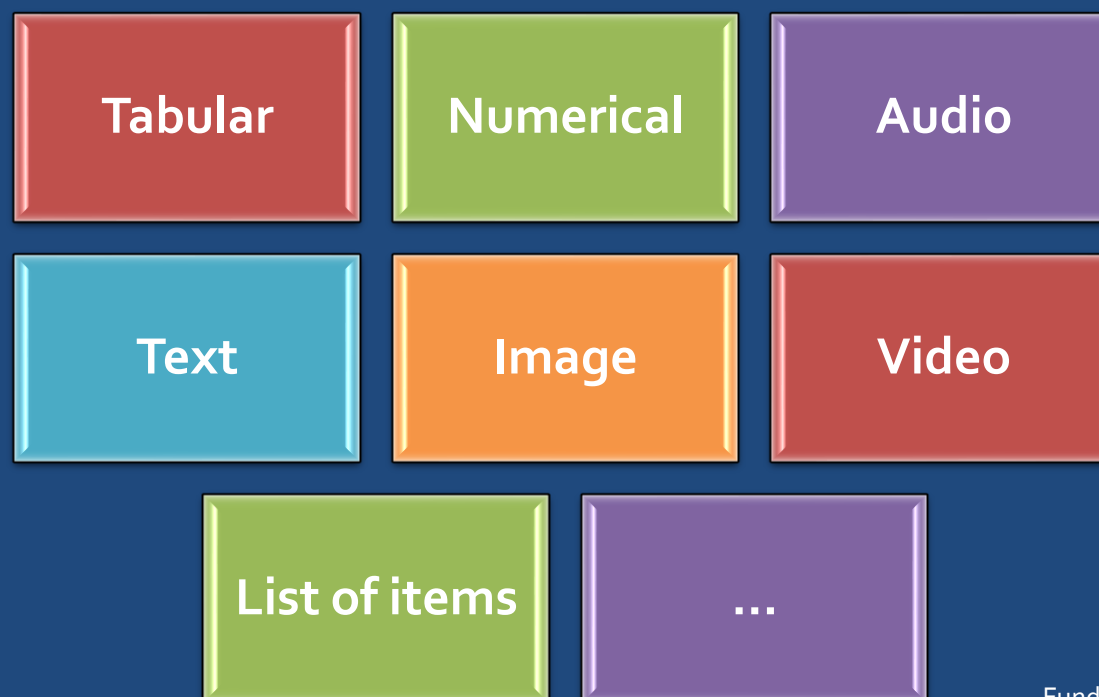
From question to algorithm!

- Understand your needs or questions!
 - explain easily for someone else
- Decompose your problem (make some steps)!
- Make a flowchart for the decomposed version of your problem
- Explain each steps in one or two sentences (paper-based or paperless)
 - input, output, process
- Explain each steps mathematically...
- Develop your algorithms for each steps
- Check your process flow from the first step to the last one!



Different problem, different data!

- You can encounter with different types of data in input, output, or even in process (auxiliary)



Data Types in Python

Welcome to Python!





Python Features

- Easy to read
- Easy to learn
- Interactive mode
- Portable
- Fast to develop
- Many different libraries
- Excellent community and support
- Open-source
- Scalable
- ...



How we can encode your data with computer language!?

- We should convert your data to binary format!
- Different data, different strategy to convert the data!
 - number: number to binary, binary to number,...
 - string: unicode, ...
 - ...



Data in Python

- **Primitive data**
 - Numbers
 - Int, float, complex
 - String
 - List
 - Tuple
 - Set
 - dictionary
- **User-defined data**
 - Class





Continue your learning with Parsa!

- Parsa's Workshop is about Data Representation!

Interpret your commands with Python



Compiler vs. interpreter

Understanding The Different Computer Language Translators

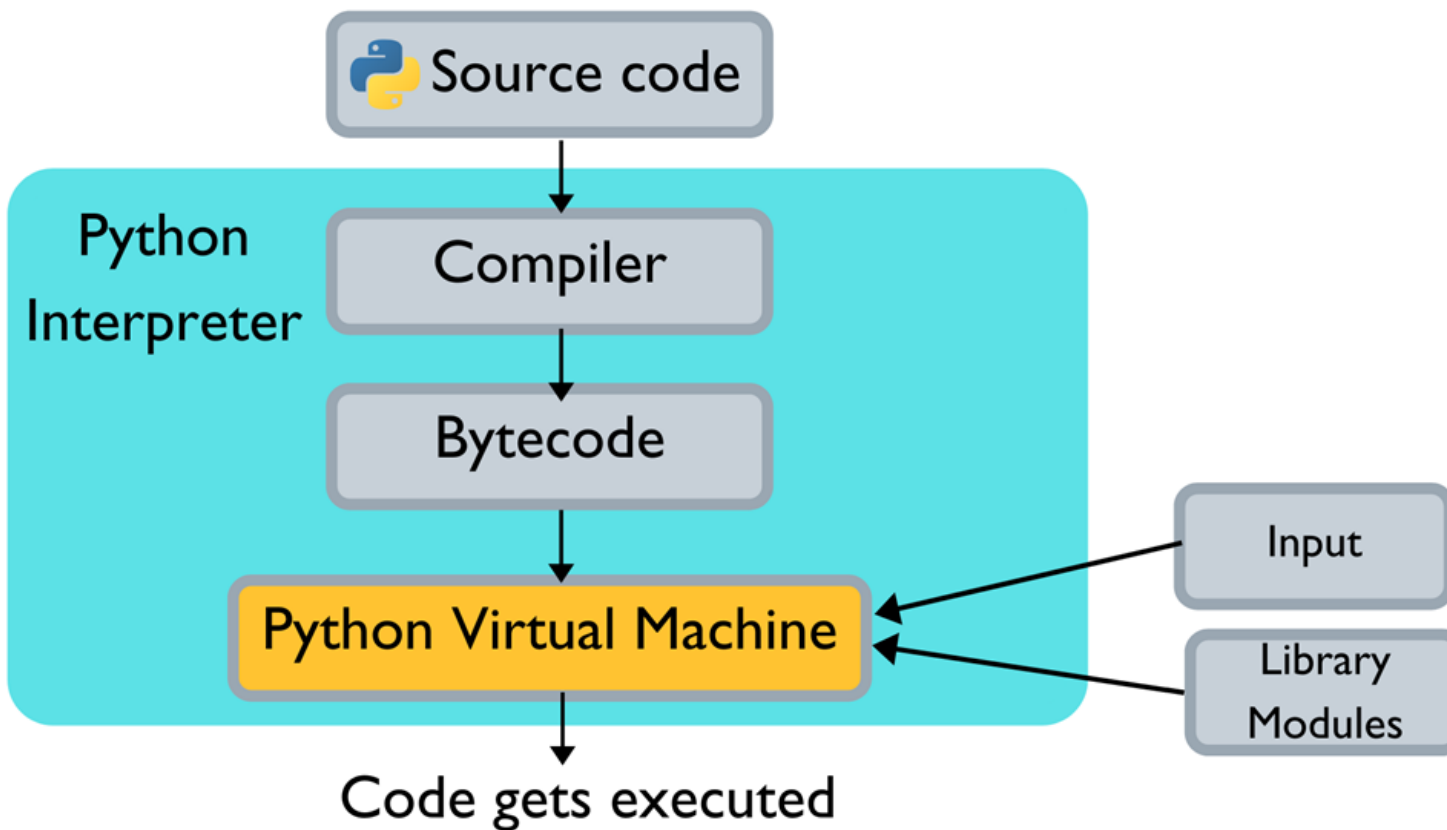
Assembler
LLL \rightarrow ML

Interpreter
HLL \rightarrow ML

Compiler
HLL \rightarrow ML



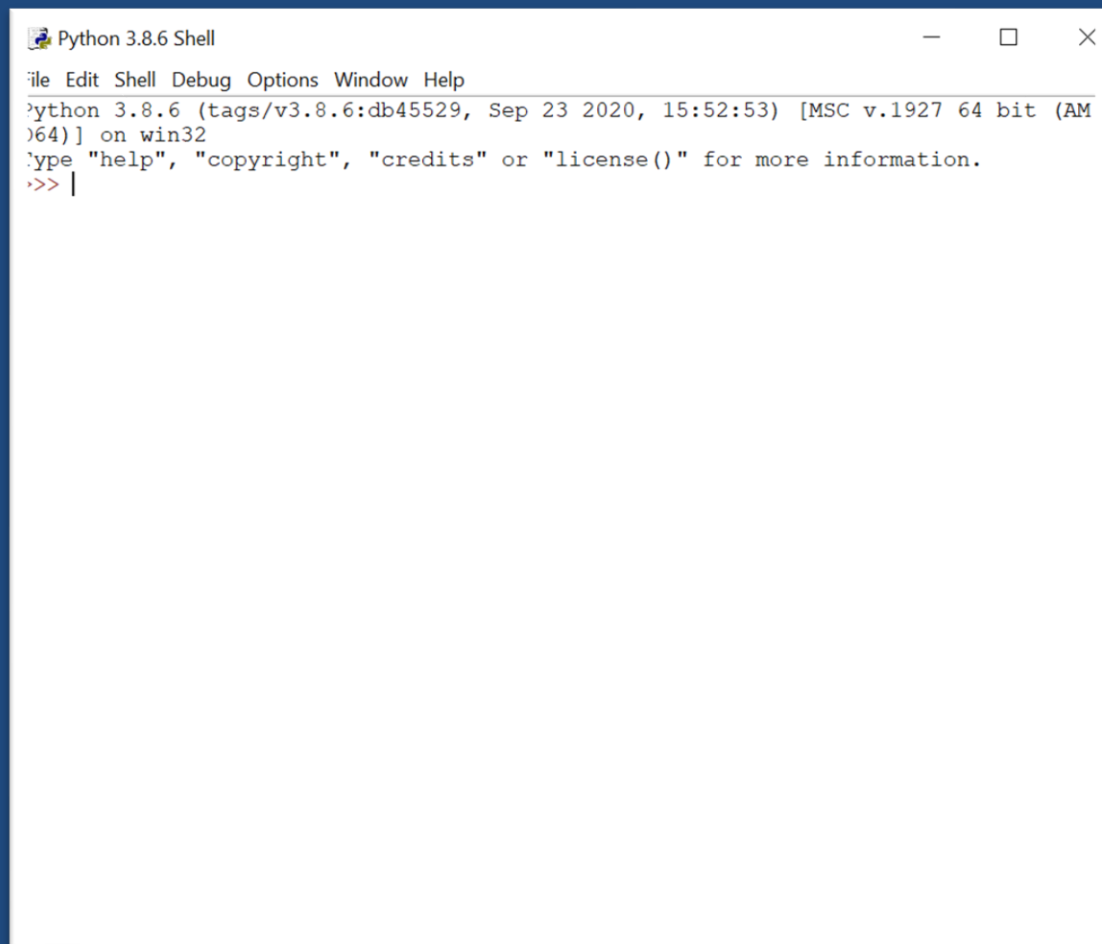
How Python Works





IDLE: simple IDE for Python

- Execute line by line,
- Let's do it!



```
Python 3.8.6 Shell
File Edit Shell Debug Options Window Help
Python 3.8.6 (tags/v3.8.6:db45529, Sep 23 2020, 15:52:53) [MSC v.1927 64 bit (AMD64)] on win32
Type "help", "copyright", "credits" or "license()" for more information.
>>> |
```

Programming with Python



Question

What is the website need?

- How can we get more users for our news website?



From question to algorithm!

- Understand your needs or questions!
 - explain easily for someone else
- Decompose your problem (make some steps)!
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Find dictionary of a text

- Input: text
- Output: some statistics (count)

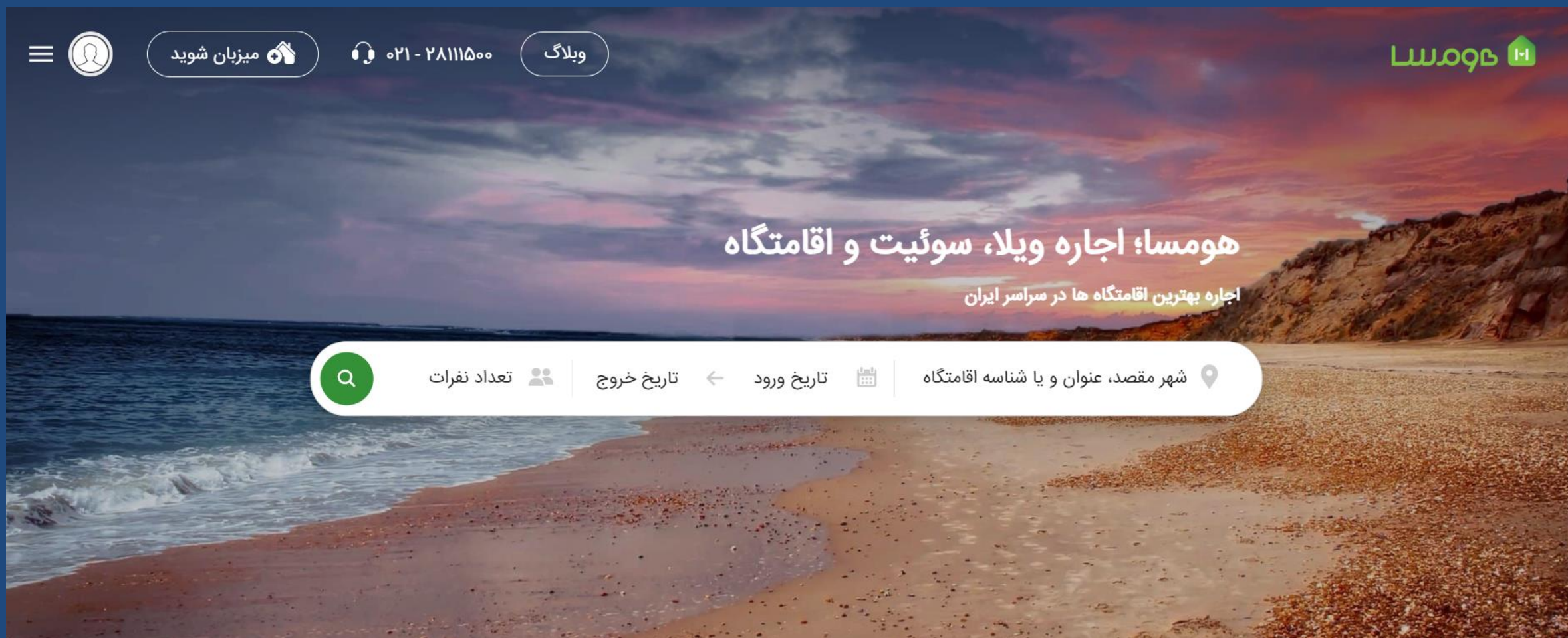


خبر خوبووپ!

Application of Programming in the Digital Age!



Trip...





Design and explain a flowchart for a simple Homsa! You can propose new features!

Who is volunteer for the short presentation?

Short Presentation



Lecture Resources