



Control and Loop Structures

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Last Lecture

- Short Presentation
- Review the Last Lecture
- What are objects in real world and Python?
- What are statements from flowchart view?
- Programming with Python
- **Application of Programming in the Digital Age!**



Today



- Short Presentation
- Review the Last Lecture
- What are statements from flowchart view?
- 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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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



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

Who is volunteer for the short presentation?

Short Presentation



What is our strategy in class?

BFS





کوئیز یهویی!

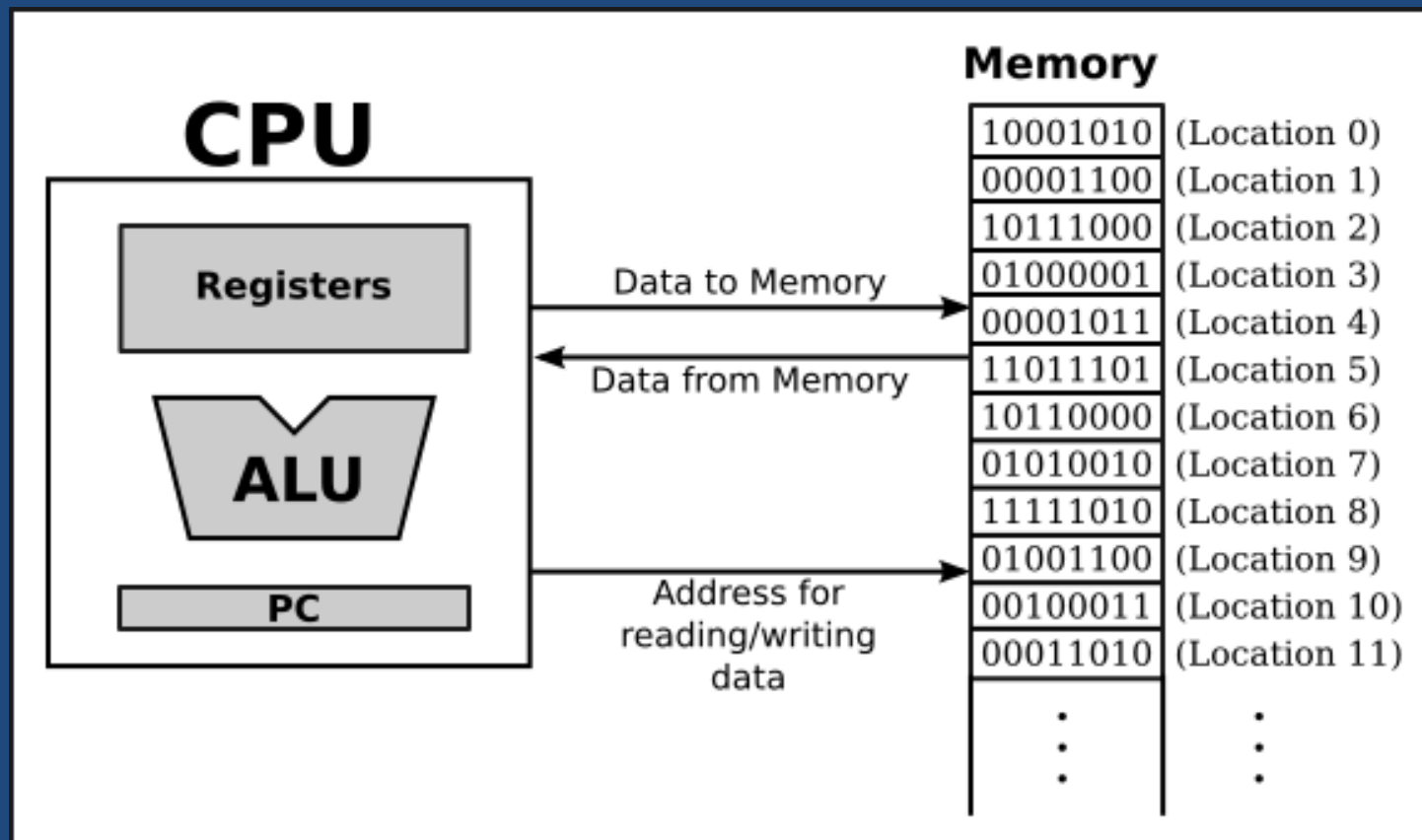
• الگوریتم چیست؟ سه معیار را برای کیفیت سنجی الگوریتم نام ببرید و در یک جمله هر کدام را توضیح دهید.

Review the Last Lecture



Memory stores information in what way?

- Program
- Data





So, where is our data???

`id(.`



How can CPU process our code?

- On the level of machine language, the operation of the CPU is fairly straightforward (although it is very complicated in detail). The CPU executes a program that is stored as a sequence of machine language instructions in main memory. It does this by repeatedly reading, or fetching, an instruction from memory and then carrying out, or executing, that instruction. This process:
 - fetch an instruction, execute it, fetch another instruction, execute it, and so on forever...

is called the fetch-and-execute cycle.



Object-oriented Thinking



Everything in Python is an
OBJECT! 😞 OOP!? 🤯

What are statements from flowchart view?



The most simple statement!

Assignment

- Variables are created by assignment (=)

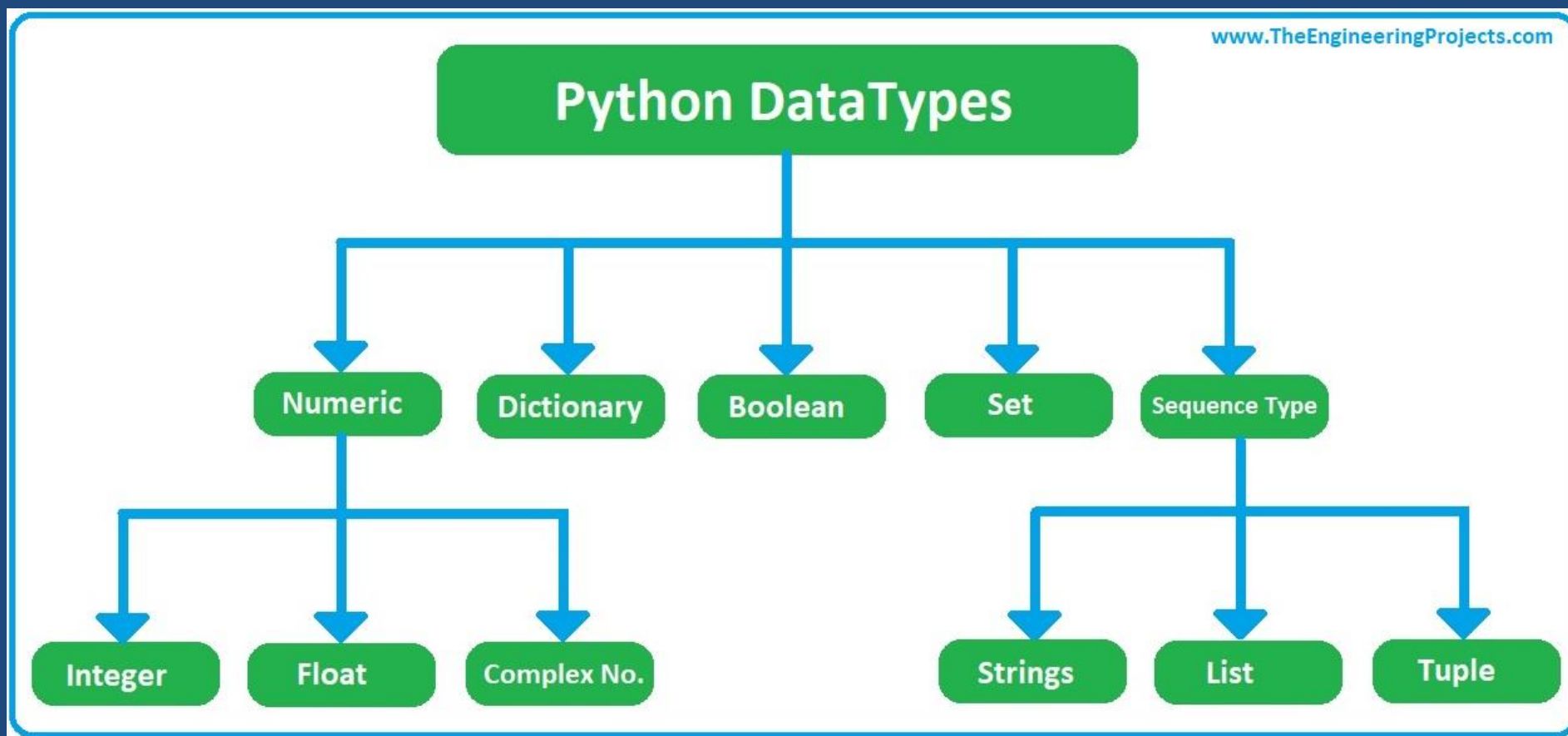


What is variable?

- One of the most powerful features of a programming language is the ability to manipulate variables. A variable is a name that refers to a value.



How python can find type of variables?





For Now...

- Numeric
- Boolean
- String
- List



Operators in Python

- Arithmetic operators
- Assignment operators
- Comparison operators
- Logical operators
- Identity operators
- Membership operators
- Bitwise operators



What is clean code? What is clean code in Python? How can we care it?

Who is volunteer for the short presentation?

Short Presentation



What is the difference between expression and statement?

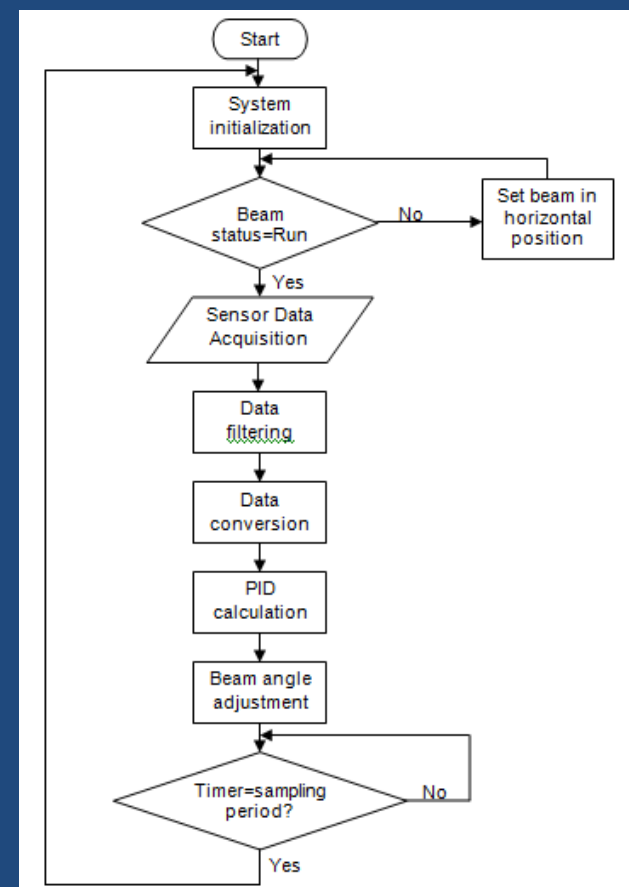


WWW



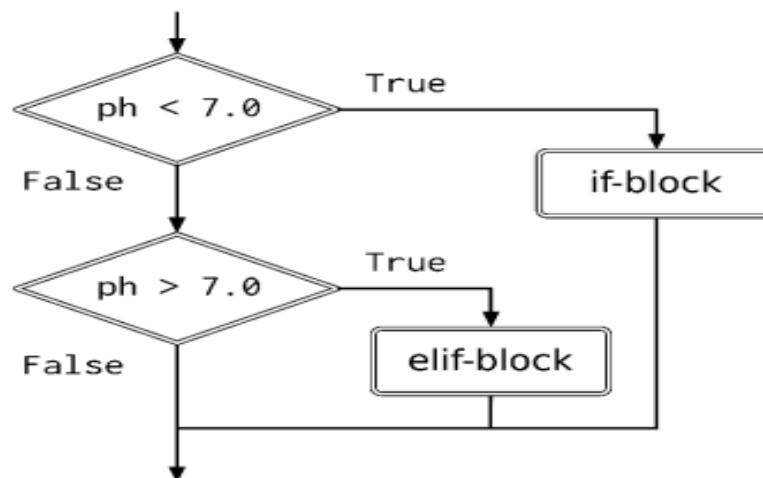
We have different types of statement!

- Simple statement (+)
- Loop statement (while, for)
- Control statement (if, else, elif)





Control statements



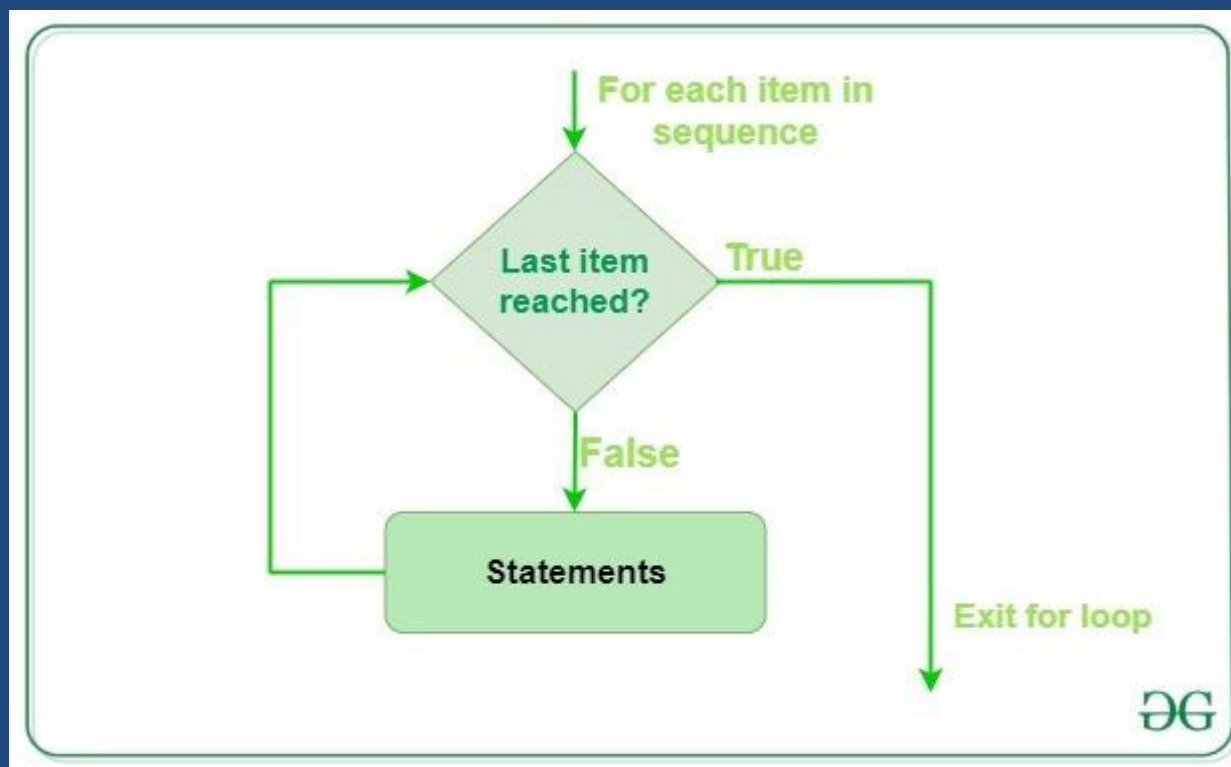
This flowchart shows that if the first condition evaluates to True, the second condition is skipped.

If the pH is exactly 7.0, neither clause matches, so nothing is printed:

```
>>> ph = float(input('Enter the pH level: '))
Enter the pH level: 7.0
>>> if ph < 7.0:
...     print(ph, "is acidic.")
... elif ph > 7.0:
...     print(ph, "is basic.")
...
>>>
```



Simple example





Loop statements

In python, a while loop is used to execute a block of statements repeatedly until a given condition is satisfied. And when the condition becomes false, the line immediately after the loop in the program is executed.

Syntax :

```
while expression:  
    statement(s)
```

All the statements indented by the same number of character spaces after a programming construct are considered to be part of a single block of code. Python uses indentation as its method of grouping statements.

Example:

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)!
- 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!



Let's go for your solutions and coding with each other 😊

- Input?
- Output?
- Process?



Application of Programming in the Digital Age!



حتی برای مرگ هم دنبال راه حل هستید...!

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We are currently running several projects focusing on the development



Lecture Resources

- https://www.w3schools.com/python/python_operators.asp
- J. Campbell, P. Gries, J. Montojo, G. Wilson. *Practical Programming: An Introduction to Computer Science Using Python*. The Pragmatic Bookshelf, 2009.
- <https://www.geeksforgeeks.org/loops-in-python/#:~:text=In%20python%2C%20a%20while%20loop,in%20othe%20program%20is%20executed.>
- <https://www.snowhillscience.com/>