

# LOGIC PROGRAMMING

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*Tool:*

Python Logic Programming

# *What is Logic Programming?*

Programming paradigm that sees computation as automatic reasoning over a database of knowledge made of facts and rules (Based on formal logic).

## *a. Structure of Python Logic Programming*

These are logical clauses that express facts. We use the following syntax to write a rule (as a clause):

$$H \text{ :- } B_1, \dots, B_n$$

We can read this as:

H if B<sub>1</sub> and ... and B<sub>n</sub>.

Here, H is the head of the rule and B<sub>1</sub>, ..., B<sub>n</sub> is the body.

A fact is a rule with no body:

H.

An example would be:

$$\text{fallible}(X) \text{ :- } \text{human}(X)$$

Every logic program needs facts based on which to achieve the given goal.

Rules are constraints that get us to conclusions.

## *b. Logic Control*

Think of an algorithm as a combination of logic and control.

Algorithm = Logic + Control

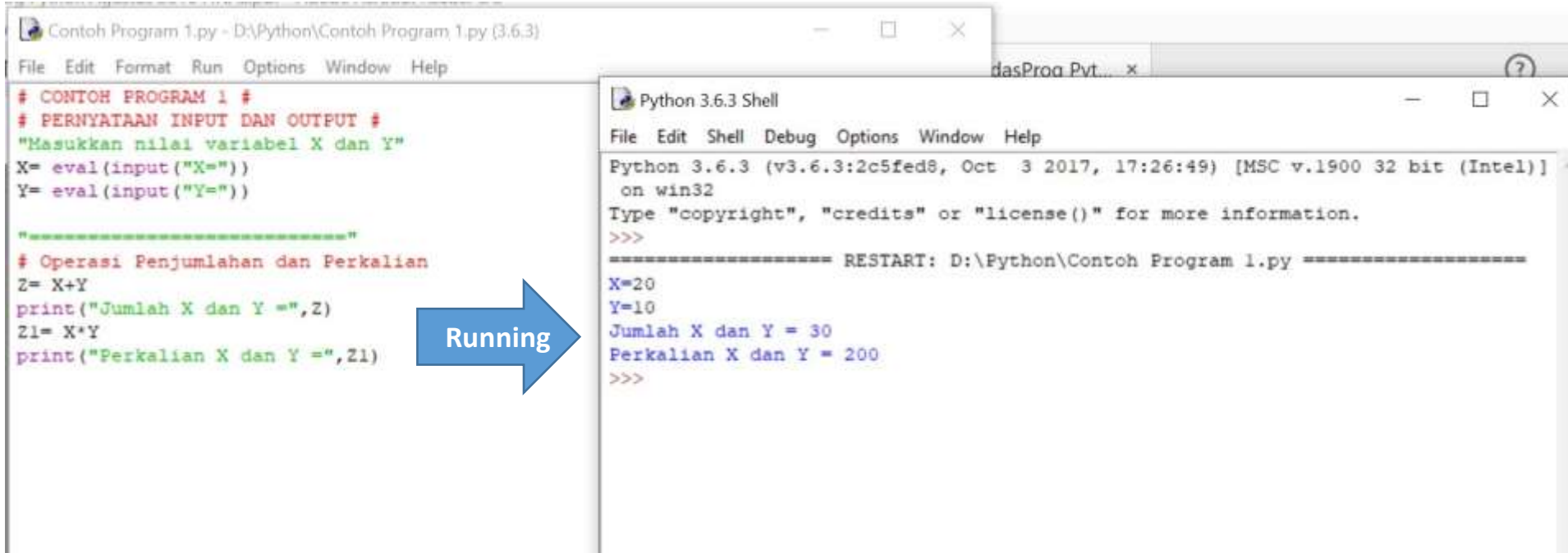
In a pure logic programming language, the logic component gets to the solution alone. However, vary the control component for other ways to execute a logic program.

## *c. Python Logic Programming*

Python syntax :

Input/Output, Structure of Selection, Structure of Repeat-Until, Function (Sub Program), etc.

# Sample Input and Output using Python



The image shows two windows from a Python IDE. The left window, titled 'Contoh Program 1.py - D:\Python\Contoh Program 1.py (3.6.3)', contains the following Python code:

```
# CONTOH PROGRAM 1 #
# PERNYATAAN INPUT DAN OUTPUT #
"Masukkan nilai variabel X dan Y"
X= eval(input("X="))
Y= eval(input("Y="))

"=====
# Operasi Penjumlahan dan Perkalian
Z= X+Y
print("Jumlah X dan Y =",Z)
Z1= X*Y
print("Perkalian X dan Y =",Z1)
```

A blue arrow labeled 'Running' points from the code in the left window to the right window. The right window, titled 'Python 3.6.3 Shell', shows the execution output:

```
Python 3.6.3 (v3.6.3:2c5fed8, Oct 3 2017, 17:26:49) [MSC v.1900 32 bit (Intel)]
on win32
Type "copyright", "credits" or "license()" for more information.
>>>
===== RESTART: D:\Python\Contoh Program 1.py =====
X=20
Y=10
Jumlah X dan Y = 30
Perkalian X dan Y = 200
>>>
```

## Exercise 1 (10 Minute)

Try to make a program for counting an average of 5 input number.

## Variable

Variable is a symbol that can be load by compilation of any number.

Variable is a name used to store certain value of address and capacity in computer memory.

*Example:* Name, Age, Address, Grade, etc....

## Given value to variable

*Sum of Total price of things by consumer buying*

1<sup>st</sup> Step:

Variable input

kode\_barang, nama\_barang, harga\_satuan\_barang, jumlah\_beli\_per\_barang,  
total\_harga\_per\_transaksi

Process:

harga\_beli\_per\_barang = harga\_satuan\_barang \* jumlah\_per\_barang\_beli  
total\_harga\_per\_transaksi = harga\_beli\_per\_barang + total\_harga\_per\_transaksi

Output: total\_harga\_per\_transaksi

## Given value to variable (cont.)

*Sum of Total price of things by consumer buying*

2<sup>nd</sup> Step:

Define type of data

kd\_brg, nama\_brg : *string*

jum\_brg : *integer*

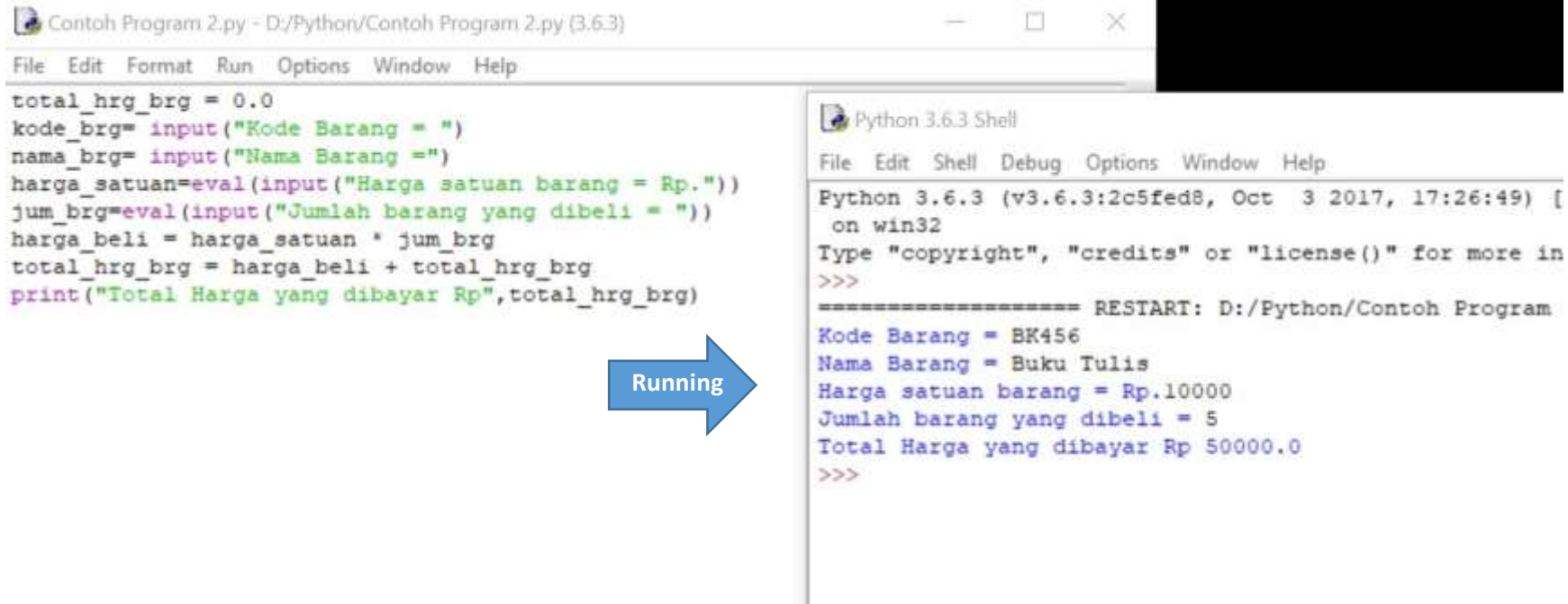
harga\_satuan, harga\_beli, total\_hrg\_brg : *float*

## Given value to variable (cont.)

*Sum of Total price of things by consumer buying*

3<sup>rd</sup> Step:

Coding Program:



The image shows a screenshot of a Python IDE window titled "Contoh Program 2.py - D:/Python/Contoh Program 2.py (3.6.3)". The code in the editor is as follows:

```
total_hrg_brg = 0.0
kode_brg= input("Kode Barang = ")
nama_brg= input("Nama Barang =")
harga_satuan=eval(input("Harga satuan barang = Rp. "))
jum_brg=eval(input("Jumlah barang yang dibeli = "))
harga_beli = harga_satuan * jum_brg
total_hrg_brg = harga_beli + total_hrg_brg
print("Total Harga yang dibayar Rp",total_hrg_brg)
```

A blue arrow labeled "Running" points from the code to the Python 3.6.3 Shell window. The shell window shows the following output:

```
Python 3.6.3 (v3.6.3:2c5fed8, Oct 3 2017, 17:26:49) [
on win32
Type "copyright", "credits" or "license()" for more in
>>>
===== RESTART: D:/Python/Contoh Program
Kode Barang = BK456
Nama Barang = Buku Tulis
Harga satuan barang = Rp.10000
Jumlah barang yang dibeli = 5
Total Harga yang dibayar Rp 50000.0
>>>
```

## Given value to variable (cont.)

*Another sample of program: Count area of the tube (using math function)*

Coding Program:

```
Contoh Program 3.py - D:/Python/Contoh Program 3.py (3.6.3)
File Edit Format Run Options Window Help
import math

#Menghitung Luas Tabung#

R=eval(input("Jari-jari Alas = "))
Tinggi=eval(input("Tinggi Tabung = "))

LuasTab= math.pi*R*R*Tinggi
print("Luas Tabung adalah %3f" %(LuasTab))
```

Running

```
Python 3.6.3 Shell
File Edit Shell Debug Options Window Help
Python 3.6.3 (v3.6.3:2c5fed8, Oct 3 2017, 17:26:49) [MSC v.1900 32 bit (Intel)]
on win32
Type "copyright", "credits" or "license()" for more information.
>>>
===== RESTART: D:/Python/Contoh Program 3.py =====
Jari-jari Alas = 4.7
Tinggi Tabung = 7.5
Luas Tabung adalah 520.483363
>>>
```

## *Exercise 2*

*Case:* Exchange the number of A, B,C,D become B,D,A,C if A,B,C,D is any decimal number.

*Question:*

- Define input/output process of the case
- Build source code to solve the problem.