What Are Programming Tools?

# What are tools?

Tools are objects that aid in performing an activity.

Cooking – pots, pans, oven, stove, flour

Building – bricks, cement, steel, shovels, excavators, cement trucks

# What are common programming tools?

Comments

Arithmetic

Character Strings

Files – program files, data files

Variables

Decisions / Flow of control

Loops

Output / Printing

Compound / grouped /aggregate

Array / List / Dictionary

# Python tool examples

## Practice / Playing Around

Often it is useful to practice with new tools. For Python one use the python interpreter or a friendly IDE (Interactive Development and Learning Environment) Our examples will use the “cmd” shell.

Microsoft Windows [Version 10.0.19045.4170]

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C:\Users\raysm>python

Python 3.12.0 (tags/v3.12.0:0fb18b0, Oct 2 2023, 13:03:39) [MSC v.1935 64 bit (AMD64)] on win32

Type "help", "copyright", "credits" or "license" for more information.

>>> # Comments - ignored by the computer but helpful to the human reader

>>> # Arithmetic - common to people and most programming languages

>>> 2+2

4

>>> 2\*3

6

>>> 3-4

-1

>>> 5/6

0.8333333333333334

>>> 7\*\*8 # exponentiation

5764801

>>> 10\*2

20

>>> 10\*\*100

10000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000

>>> 10\*\*100-1

9999999999999999999999999999999999999999999999999999999999999999999999999999999999999999999999999999

>>>

>>> # Character Strings

>>> "This is a quoted string."

'This is a quoted string.'

>>>

>>> # Character Strings

>>> "This is a quoted string."

'This is a quoted string.'

>>> "Ray" + " " + "Smith"

'Ray Smith'

>>>

>>> # Variables - a named place to store stuff

>>> first = "Ray"

>>> second = " "

>>> third = "Smith"

>>> first + second + third

'Ray Smith'

>>> a = 1

>>> b = 2

>>> c = 3

>>> a + b + c

6

>>> # More math stuff

>>> from math import \* # Get all math stuff

>>> dir(math) # list all functions / definitions

Traceback (most recent call last):

File "<stdin>", line 1, in <module>

NameError: name 'math' is not defined. Did you forget to import 'math'?

>>> import math # Not the parts just the module

>>> dir(math)

['\_\_doc\_\_', '\_\_loader\_\_', '\_\_name\_\_', '\_\_package\_\_', '\_\_spec\_\_', 'acos', 'acosh', 'asin', 'asinh', 'atan', 'atan2', 'atanh', 'cbrt', 'ceil', 'comb', 'copysign', 'cos', 'cosh', 'degrees', 'dist', 'e', 'erf', 'erfc', 'exp', 'exp2', 'expm1', 'fabs', 'factorial', 'floor', 'fmod', 'frexp', 'fsum', 'gamma', 'gcd', 'hypot', 'inf', 'isclose', 'isfinite', 'isinf', 'isnan', 'isqrt', 'lcm', 'ldexp', 'lgamma', 'log', 'log10', 'log1p', 'log2', 'modf', 'nan', 'nextafter', 'perm', 'pi', 'pow', 'prod', 'radians', 'remainder', 'sin', 'sinh', 'sqrt', 'sumprod', 'tan', 'tanh', 'tau', 'trunc', 'ulp']

>>> # Decisions - control program flow

>>> # if, else

>>> if "a" != "a":

... print('"a" != "a"')

... elif "a" == "a":

... print('"a" == "a"')

...

"a" == "a"

>>>>>>

>>> # Loops - while, for

>>> max = 5

>>> i = 0

>>> while i < max:

... print("i:",i, "max:",max)

... i = i + 1

...

i: 0 max: 5

i: 1 max: 5

i: 2 max: 5

i: 3 max: 5

i: 4 max: 5

>>>>>>

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i: 1 max: 5

i: 2 max: 5

i: 3 max: 5

i: 4 max: 5

>>> lst = ["red", "orange", "yellow"]

>>> for colr in lst:

... print("colr:", colr)

...

colr: red

colr: orange

colr: yellow

>>>