3.8.3. timeit

Fig. 3.8.3.1 Photo by Djim Loic on Unsplash

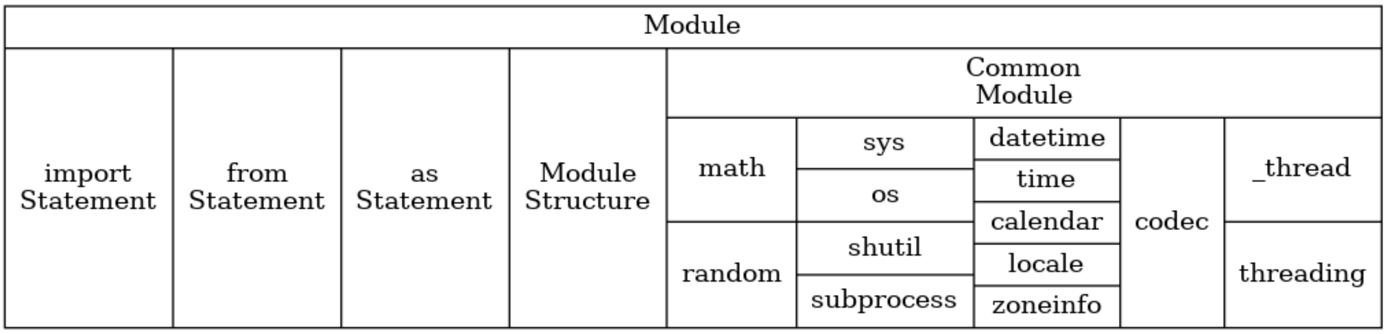
Note

Outline

Note

Roadmap

1. This topic: Module



<table>
<tr><th colspan="9">Module</th></tr>
<tr><td rowspan="21">import Statement</td><td rowspan="21">from Statement</td><td rowspan="21">as Statement</td><td rowspan="21">Module Structure</td><td colspan="5">Common Module</td></tr>
<tr><td rowspan="10">math</td><td rowspan="5">sys</td><td rowspan="4">datetime</td><td rowspan="20">codec</td><td rowspan="10">_thread</td></tr>
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<tr><td rowspan="4">time</td></tr>
<tr><td rowspan="5">os</td></tr>
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<tr><td rowspan="4">calendar</td></tr>
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<tr><td rowspan="10">random</td><td rowspan="5">shutil</td><td rowspan="10">threading</td></tr>
<tr></tr>
<tr><td rowspan="4">locale</td></tr>
<tr></tr>
<tr></tr>
<tr><td rowspan="5">subprocess</td></tr>
<tr><td rowspan="4">zoneinfo</td></tr>
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2. Course: Python 1
3. Subject: Programming
4. Field

    a. Software Engineering (SE)

    b. Computer Science and Information Engineering (CSIE)

    c. Electrical/Electronics Engineering (EE)

3.8.3.1. Overview

1. Syntax

```
timeit.timeit(stmt, setup, timer, number)
```

2. Parameters

Parameter	Description
stmt	This will take the code for which you want to measure the execution time. The default value is "pass".
setup	This will have setup details that need to be executed before stmt. The default value is "pass."
timer	This will have the timer value, timeit() already has a default value set, and we can ignore it.
number	The stmt will execute as per the number is given here. The default value is 1000000.

3.8.3.2. Ex1: Single Line

1. Code+Output

Ex1.py Output

Listing 3.8.3.2.1 /src/DateTime/timeit/Ex1/Ex1.py

```
import timeit

print(f"{timeit.timeit('output = 10**10'):.3f} seconds")
```

3.8.3.3. Ex2a: Multiple Lines

1. Code+Output

Ex2a.py Output

Listing 3.8.3.3.1 /src/DateTime/timeit/Ex2a/Ex2a.py

```
import timeit

print(f"{timeit.timeit(stmt='a=1; b=2; sum=a+b'):.3f} seconds")
```

3.8.3.4. Ex2b: Multiple Lines 2

1. Use setup parameter to import required library.
2. Use triple quotes.
3. Code+Output

Ex2b.py Output

Listing 3.8.3.4.1 /src/DateTime/timeit/Ex2b/Ex2b.py

```
import timeit

importModule = "import random"

testCode = '''
def test():
    return random.randint(10, 100)
'''
print(f"{timeit.timeit(stmt=testCode, setup=importModule):.3f} seconds")
```

3.8.3.5. Ex3: timeit.default_timer()

1. This will return the default time when executed.
2. Code+Output

Ex3.py Output

Listing 3.8.3.5.1 /src/DateTime/timeit/Ex3/Ex3.py

```
import timeit

def test(n):
    return(n**n)

startTime = timeit.default_timer()
test(10000)
endTime = timeit.default_timer()
print("The start time is :", startTime)
print("The end   time is :", endTime)
print(f"The time expenses : {endTime - startTime:.7f} seconds")
```

3.8.3.6. Ex4: timeit.repeat()

1. The same as timeit(), but with repeat the timeit() is called the number of times repeat is given.
2. Syntax

```
timeit.repeat(stmt, setup, timer, repeat, number)
```

3. Code+Output

Ex4.py Output

Listing 3.8.3.6.1 /src/DateTime/timeit/Ex4/Ex4.py

```
import timeit

importModule = "import random"
testCode = '''
def test():
    return random.randint(10, 100)
'''
ltTime = timeit.repeat(stmt=importModule,
                       setup=importModule,
                       repeat=5)
tSum = 0
i = 1
for t in ltTime:
    print(f'{i}: {t} seconds')
    tSum += t
    i += 1

tAvg = tSum / len(ltTime)
print(f'Average time expense: {tAvg:.3f} seconds')
```

4. timeit.repeat() works similar to timeit.timeit() function, with the only difference it takes in the repeat argument and gives back the execution time in array format with values as per the repeat number.
5. The above example takes average time expense is 0.097 seconds.

Note

1. Start: 20170719
2. System Environment:

Listing 3.8.3.6.2 requirements.txt

```
sphinx==7.1.2                           # Sphinx
graphviz>=0.20.1                        # Graphviz
sphinxbootstrap4theme>=0.6.0            # Theme: Bootstrap
sphinx-material>=0.0.35                 # Theme: Material
sphinxcontrib-plantuml>=0.25            # PlantUML
sphinxcontrib.bibtex>=2.5.0             # Bibliography
sphinx-autorun>=1.1.1                   # ExecCode: pycon
sphinx-execute-code-python3>=0.3        # ExecCode
btd.sphinx.inheritance-diagram>=2.3.1   # Diagram
sphinx-copybutton>=0.5.1                # Copy button
sphinx_code_tabs>=0.5.3                 # Tabs
sphinx-immaterial>=0.11.3               # Tabs

#-----------------------------------------------------
#-- Library Upgrade Error by Library Itself
#   >> It needs to fix by library owner
#   >> After fixed, we need to try it later
#-----------------------------------------------------
pydantic==1.10.10                       # 2.0: sphinx compiler error, 20230701

#-----------------------------------------------------
#-- Minor Extension
#-----------------------------------------------------
sphinxcontrib.httpdomain>=1.8.1         # HTTP API

#sphinxcontrib-blockdiag>=3.0.0         # Diagram: block
#sphinxcontrib-actdiag>=3.0.0           # Diagram: activity
#sphinxcontrib-nwdiag>=2.0.0            # Diagram: network
#sphinxcontrib-seqdiag>=3.0.0           # Diagram: sequence

#-----------------------------------------------------
#-- Still Wait For Upgrading Version
#-----------------------------------------------------

#-----------------------------------------------------
#-- Still Under Testing
#-----------------------------------------------------
#numpy>=1.24.2                          # Figure: numpy

#-----------------------------------------------------
#-- NOT Workable
#-----------------------------------------------------
#sphinxcontrib.jsdemo==0.1.4    # ExecCode: Need replace add_js_file()
#jupyter-sphinx==0.4.0          # ExecCode: Need gcc compiler
#sphinxcontrib.slide==1.0.0     # Slide: Slideshare
#hieroglyph==2.1.0              # Slide: make slides
#matplotlib>=3.7.1              # Plot: Need Python >= v3.8
#manim==0.17.2                  # Diagram: scipy, numpy need gcc
#sphinx_diagrams==0.4.0         # Diagram: Need GKE access
#sphinx-tabs>=3.4.1                     # Tabs: Conflict w/ sphinx-material
```