It will tell you which part of the code took how long to run

```
import  cProfile
```

Syntax: cProfile.run(statement, filename=none, sorts=1)

```
cProfile.run("20+10")
```

```
         3 function calls in 0.000 seconds

   Ordered by: standard name

   ncalls  tottime  percall  cumtime  percall filename:lineno(function)
        1    0.000    0.000    0.000    0.000 <string>:1(<module>)
        1    0.000    0.000    0.000    0.000 {built-in method builtins.exec}
        1    0.000    0.000    0.000    0.000 {method 'disable' of '_lsprof.Profiler' objects}
```

```
import  cProfile
import  re
cProfile.run('re.compile("foo|bar")')
```

```
         6 function calls in 0.000 seconds

   Ordered by: standard name

   ncalls  tottime  percall  cumtime  percall filename:lineno(function)
        1    0.000    0.000    0.000    0.000 <string>:1(<module>)
        1    0.000    0.000    0.000    0.000 re.py:234(compile)
        1    0.000    0.000    0.000    0.000 re.py:273(_compile)
        1    0.000    0.000    0.000    0.000 {built-in method builtins.exec}
        1    0.000    0.000    0.000    0.000 {built-in method builtins.isinstance}
        1    0.000    0.000    0.000    0.000 {method 'disable' of '_lsprof.Profiler' objects}
```

Profiling a function that calls other functions

```
#  Code  contaiing  multiple  functions
def  create_array():
    arr  =  []
    for  i  in  range(0,  40000):
        arr.append(i)

def  print_statement():
    print("  Array  created  sussessfully")

def  main():
    create_array()


if  __name__  ==  "__main__":
    cProfile.run("main()")
```

```
         40005 function calls in 0.010 seconds

   Ordered by: standard name

   ncalls  tottime  percall  cumtime  percall filename:lineno(function)
        1    0.000    0.000    0.010    0.010 <ipython-input-51-060f8711cef7>:10(main)
        1    0.006    0.006    0.010    0.010 <ipython-input-51-060f8711cef7>:2(create_array)
        1    0.000    0.000    0.010    0.010 <string>:1(<module>)
        1    0.000    0.000    0.010    0.010 {built-in method builtins.exec}
    40000    0.003    0.000    0.003    0.000 {method 'append' of 'list' objects}
        1    0.000    0.000    0.000    0.000 {method 'disable' of '_lsprof.Profiler' objects}
```

The pstats module can be used to manipulate the results collected by the profiler object.

Sort the outputs by ncalls

```
if  __name__  ==  "__main__":
    import  cProfile,  pstats
```

```
profiler = cProfile.Profile()
profiler.enable()
main()
profiler.disable()
stats = pstats.Stats(profiler).sort_stats("ncalls")
stats.print_stats()
```

```
         40003 function calls in 0.009 seconds

   Ordered by: call count

   ncalls  tottime  percall  cumtime  percall filename:lineno(function)
    40000    0.003    0.000    0.003    0.000 {method 'append' of 'list' objects}
        1    0.006    0.006    0.009    0.009 <ipython-input-51-060f8711cef7>:2(create_array)
        1    0.000    0.000    0.009    0.009 <ipython-input-51-060f8711cef7>:10(main)
        1    0.000    0.000    0.000    0.000 {method 'disable' of '_lsprof.Profiler' objects}
```

You can also sort it by the cumulative time

```
if __name__ == "__main__":
    import cProfile, pstats
    profiler = cProfile.Profile()
    profiler.enable()
    main()
    profiler.disable()
    stats = pstats.Stats(profiler).sort_stats("cumtime")
    stats.print_stats()
```

```
         40003 function calls in 0.010 seconds

   Ordered by: cumulative time

   ncalls  tottime  percall  cumtime  percall filename:lineno(function)
        1    0.000    0.000    0.010    0.010 <ipython-input-51-060f8711cef7>:10(main)
        1    0.007    0.007    0.010    0.010 <ipython-input-51-060f8711cef7>:2(create_array)
    40000    0.003    0.000    0.003    0.000 {method 'append' of 'list' objects}
        1    0.000    0.000    0.000    0.000 {method 'disable' of '_lsprof.Profiler' objects}
```

Then, How can we store the data?

```
# Export profiler output to file
stats = pstats.Stats(profiler)
stats.dump_stats("/content/export-data")
```

Visualize profiling results via terminal

1. Gprof2dot

```
!pip install gprof2dot
```

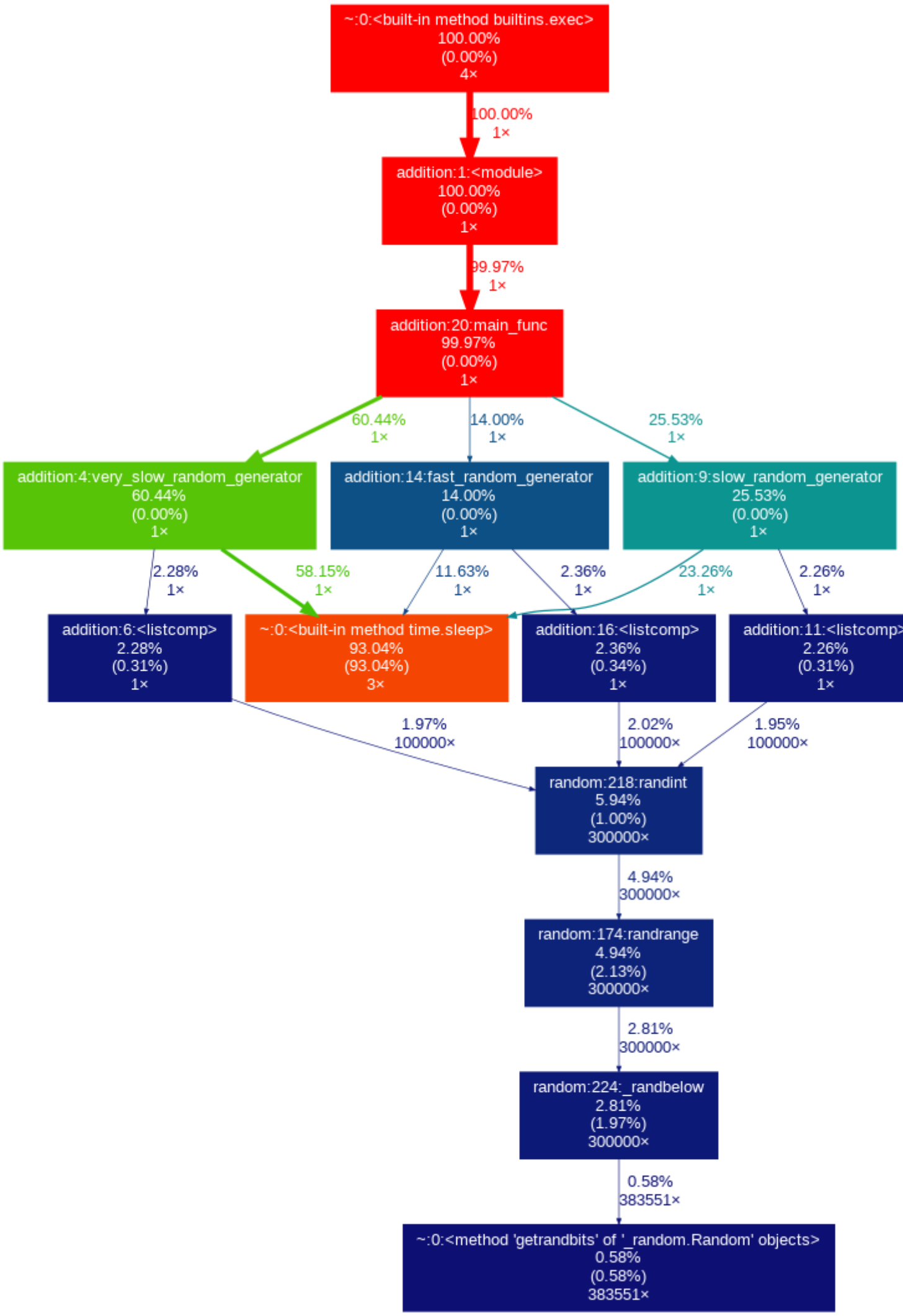
```
Collecting gprof2dot
  Downloading gprof2dot-2021.2.21.tar.gz (31 kB)
Building wheels for collected packages: gprof2dot
  Building wheel for gprof2dot (setup.py) ... done
  Created wheel for gprof2dot: filename=gprof2dot-2021.2.21-py3-none-any.whl size=27762 sha256=5d8f2dd8fbf68d5a51dc515693542f748f1e9d5c76e1
  Stored in directory: /root/.cache/pip/wheels/70/ff/20/2eafd73841d3a2cb7a920cecd29cb5edbe460037ac17c1ae96
Successfully built gprof2dot
Installing collected packages: gprof2dot
Successfully installed gprof2dot-2021.2.21
```

```
!python -m cProfile -o output.pstats addition.py
```

```
50.42928
50.53446
50.51801
```

```
!gprof2dot -f pstats output.pstats | dot -Tpng -o output.png
```

```
from IPython.display import Image
Image(filename='output.png')
```



2.Snakeviz

```
!pip  install  snakeviz
```

```
Collecting snakeviz
  Downloading snakeviz-2.1.0-py2.py3-none-any.whl (282 kB)
     |████████████████████████████████| 282 kB 29.3 MB/s
Requirement already satisfied: tornado>=2.0 in /usr/local/lib/python3.7/dist-packages (from snakeviz) (5.1.1)
Installing collected packages: snakeviz
Successfully installed snakeviz-2.1.0
```

```
!snakeviz  output.pstats
```

```
Port 8080 in use, trying another.
snakeviz web server started on 127.0.0.1:8081; enter Ctrl-C to exit
http://127.0.0.1:8081/snakeviz/%2Fcontent%2Foutput.pstats
snakeviz: error: no web browser found: could not locate runnable browser

usage: snakeviz [-h] [-v] [-H ADDR] [-p PORT] [-b BROWSER_PATH] [-s] filename
```

```
Start SnakeViz to view a Python profile.

positional arguments:
  filename              Python profile to view

optional arguments:
  -h, --help            show this help message and exit
  -v, --version         show program's version number and exit
  -H ADDR, --hostname ADDR
                        hostname to bind to (default: 127.0.0.1)
  -p PORT, --port PORT  port to bind to; if this port is already in use a free
                        port will be selected automatically (default: 8080)
  -b BROWSER_PATH, --browser BROWSER_PATH
                        name of webbrowser to launch as described in the
                        documentation of Python's webbrowser module:
                        https://docs.python.org/3/library/webbrowser.html
  -s, --server          start SnakeViz in server-only mode--no attempt will be
                        made to open a browser
```

SnakeViz

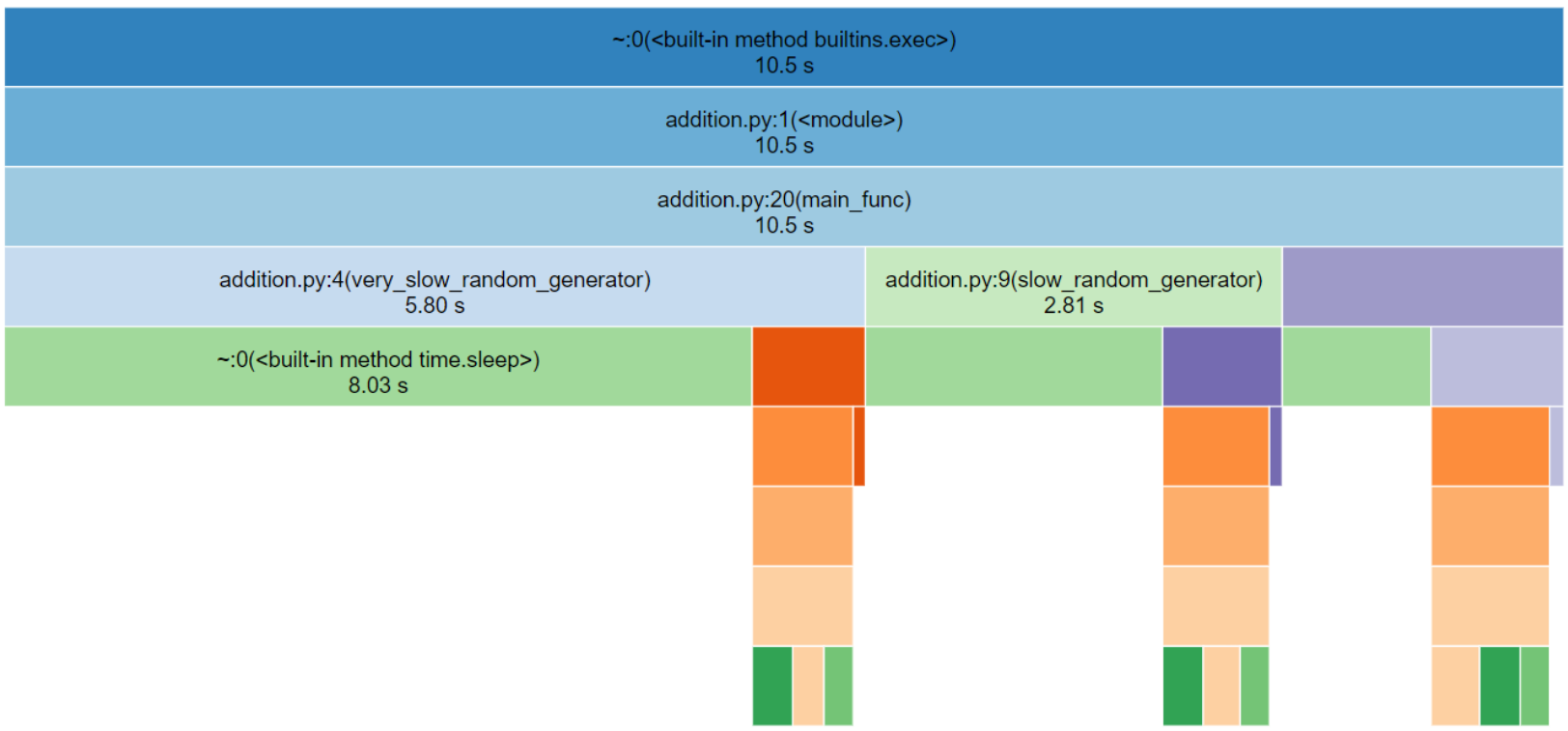
Reset Root

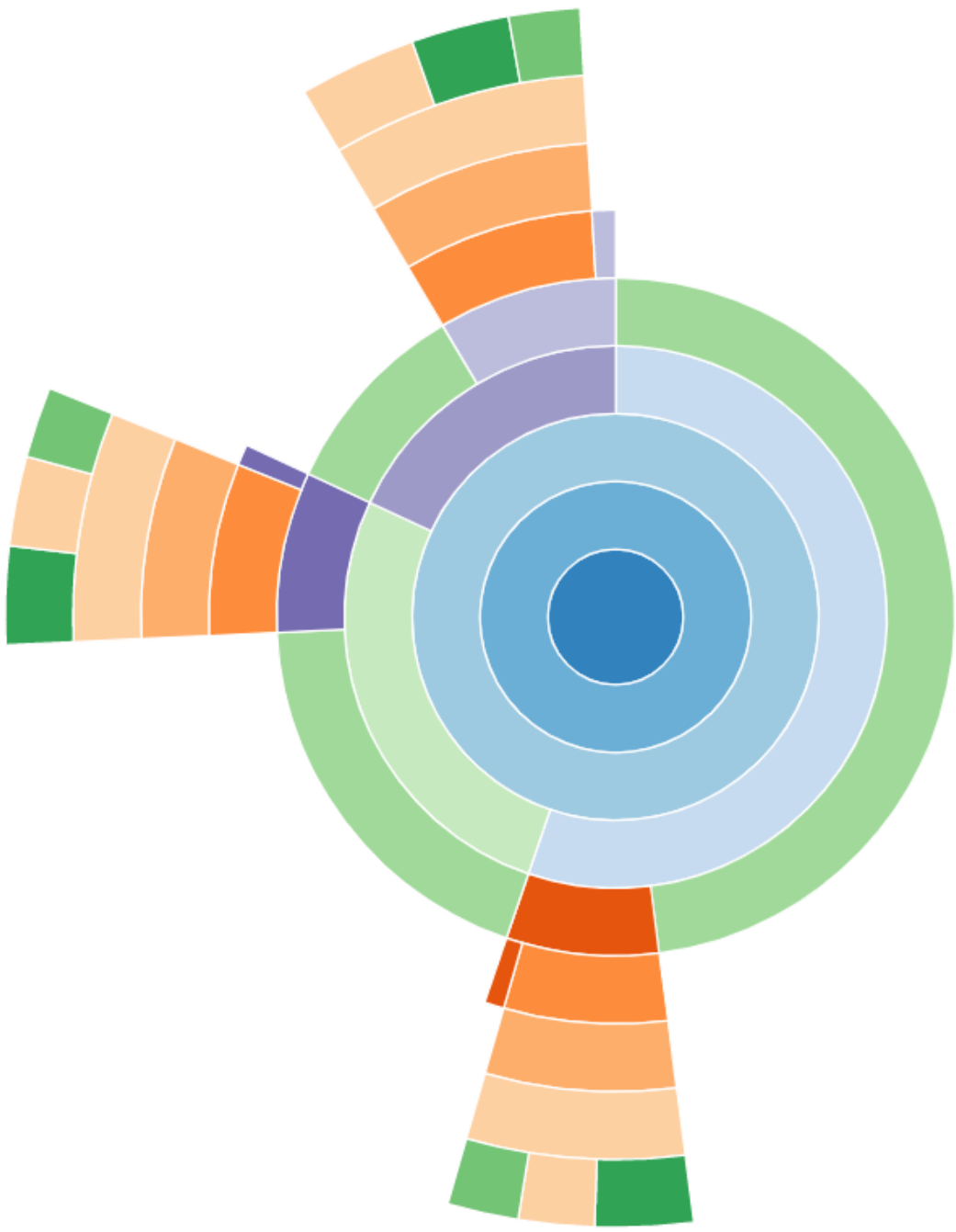
Reset Zoom

Style: Icicle

Depth: 10

Cutoff: 1 / 1000



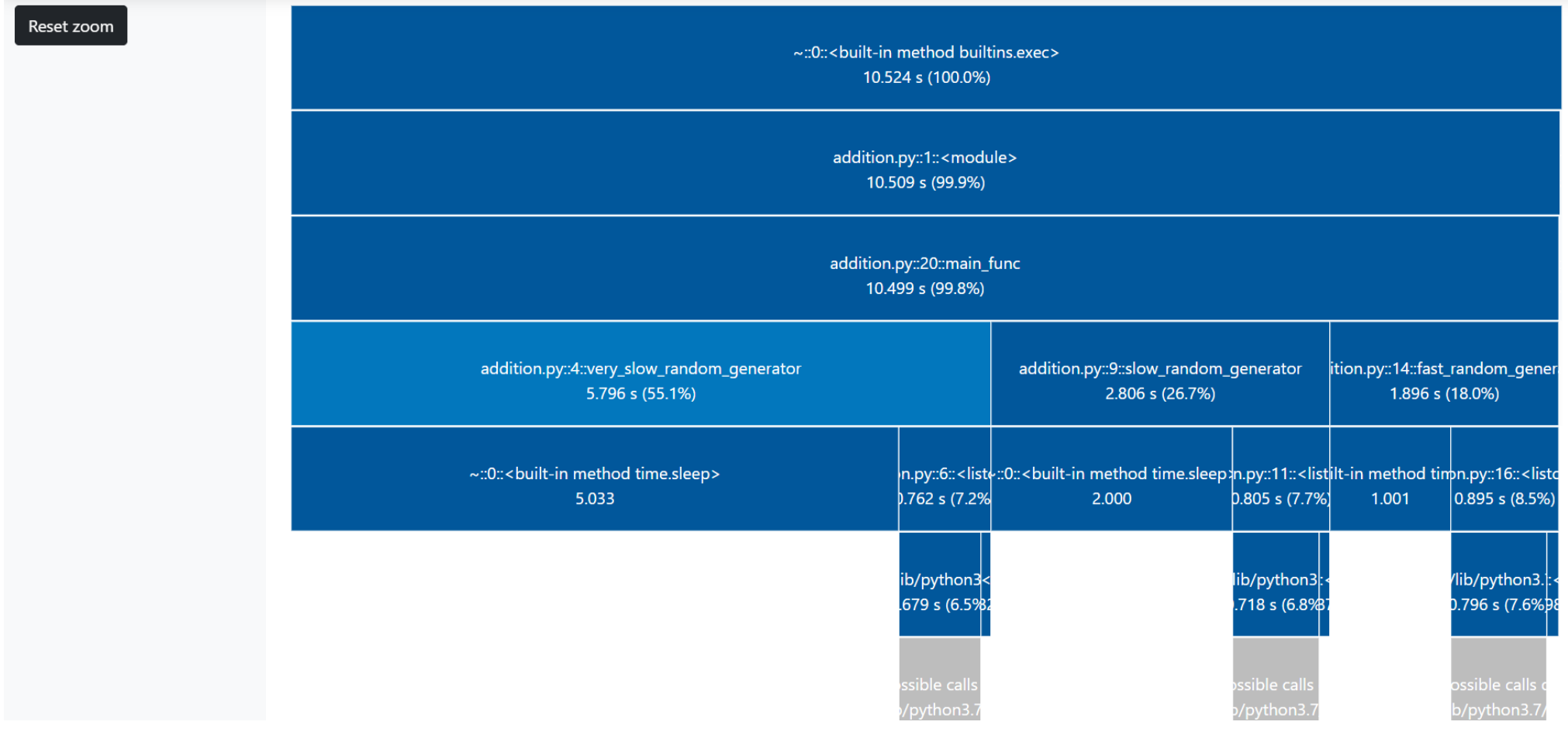


3.Tuna

```
1   !pip  install  tuna
```

```
Collecting tuna
  Downloading tuna-0.5.8-py3-none-any.whl (147 kB)
     |████████████████████████████████████████| 147 kB 27.0 MB/s
Requirement already satisfied: importlib-metadata in /usr/local/lib/python3.7/dist-packages (from tuna) (4.6.4)
Requirement already satisfied: typing-extensions>=3.6.4 in /usr/local/lib/python3.7/dist-packages (from importlib-metadata->tuna) (3.7.4.3)
Requirement already satisfied: zipp>=0.5 in /usr/local/lib/python3.7/dist-packages (from importlib-metadata->tuna) (3.5.0)
Installing collected packages: tuna
Successfully installed tuna-0.5.8
```

```
1   !tuna  output.pstats
```



Export as PDF

```
!apt-get install texlive texlive-xetex texlive-latex-extra pandoc
!pip install pypandoc
```

```
from google.colab import drive
drive.mount('/content/drive')
```

```
Mounted at /content/drive
```

```
!cp drive/My\ Drive/Colab\ Notebooks/ProfilingPythonCode.ipynb ./
```

```
!jupyter nbconvert --to PDF "ProfilingPythonCode.ipynb"
```

✓ 8 秒 完成时间：上午12:49