Scalability Report

In the following an assessment of the scalability of the `respy` function `_full_solution` is provided. Input data for the function was generated by two simulated models within `respy`: `kw_94_one` and `kw_97_basic`. Data on wages, nonpecuniaries, continuation values, optimization parameters (time preference parameter δ and ambiguity parameter η) is available for periods 1, 8, 18, 28, 38 (and 48 for the `kw_97_basic` model).

Listing 1: function `_full_solution`

```
@parallelize_across_dense_dimensions
def _full_solution(
        wages, nonpecs, continuation_values, period_draws_emax_risk, optim_paras
):

        period_expected_value_functions = calculate_expected_value_functions(
                wages,
                nonpecs,
                continuation_values,
                period_draws_emax_risk,
                optim_paras["delta"],
                optim_paras["eta"],
        )

return period_expected_value_functions
```

The function `_full_solution` is fully guvectorized through `calculate_expected_value_functions`. Hence for any scalability analysis it is necessary to set the following environment variables (Listing 2) **before** importing `_full_solution`, and in particular before importing any `numba` and `numpy`-related libraries.

This holds true for any intended change of the environment variables. To test the computation time with respect to different number of maximal threads it is necessary to re-load the module. The environment variables will be stores and applied whenever `numba` and `numpy`-related libraries are imported. Otherwise changes will not come into place. This can be implemented with a caller module.

Listing 2: Environment settings - number of used threads

```
update_ = dict.fromkeys(
                [
                "NUMBA_NUM_THREADS",
                "MKL_NUM_THREADS",
                "OMP_NUM_THREADS",
                "OPENBLAS_NUM_THREADS",
                "NUMEXPR_NUM_THREADS",
                ],
        num_threads,
)
```

Results

Results were produced on a 2.6 GHz Quad-Core Intel Core i7 (with virtually 8 cores). Noteworthy, each physical core of the i7 performs hyper-threading. Hence, four i7 physical cores translate to eight virtual cores. With the command `$ sysctl hw.physicalcpu hw.logicalcpu` it is possible to check the number of physical vs. virtual cores available to the local machine. For purpose of comparability, the timing analysis was conducted with 100 iterations of the function call.

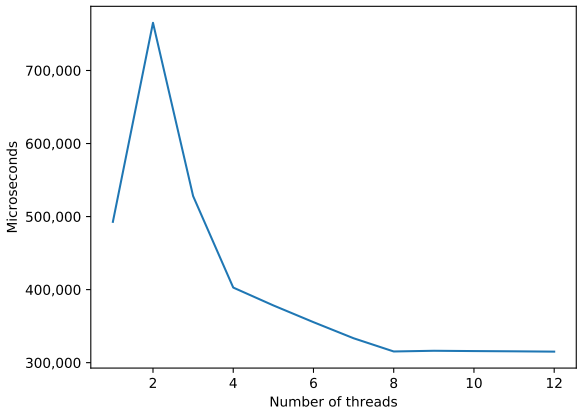
Results for `kw_94_one` are illustrated in Figure 1 and indicate that the computing time decreases with the number of maximum involved threads. After the last maximum number of cores are utilized (eight) there is no possible gain in computational time. If more cores would be available the computational time could be reduced.

Comparison between Subfigure 1(a) and Subfigure 1(b) uncovers another instance: Depending on the structure of the input data the physical cores reach their limit at some point. Setting up new virtual memory leads to overhead costs and consequently to an increase in computational time.

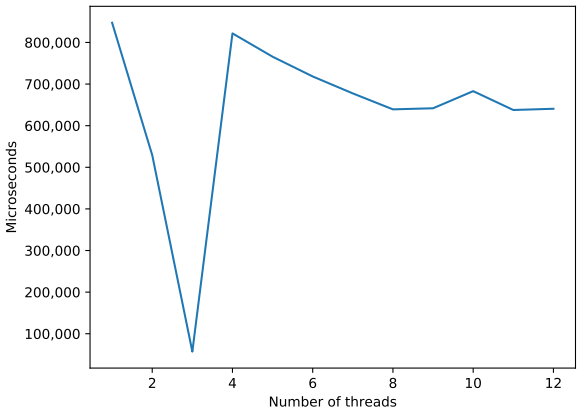
For the larger model `kw_97_basic` two data sets were generated, labeled one and two. Results are illustrated in Figure 2. Computation time decreases until the fourth core (last physical core) is reached. For more than four core virtual memory has to be created, which causes additional overhead costs and so increases computation time. Once the costs incurred computation time again reduces and stays constants after the eighth virtual core was exploited. There is no discernible difference between the two datasets.

CPU Monitoring

To gain a deeper understanding of the kernel usage CPU monitoring of the local machine may be beneficial. In the following pages the results are presented. The function `_full_solution` was monitored with sample input data of the `kw_94_one` period 38. The CPU monitoring indicates the core usage under hyper-threading. Any CPU usage in the range $[x \cdot 100\%, (x \cdot 100 + 99)\%]$ shows that x cores are utilized. The number of total threads (not only for the computation) is shown in `Python3.7`. With each page the maximum number of utilizable cores is increased. Need to redo the graphs with a clearer performance picture. Some flaws because of unnecessary processes in current implementation.

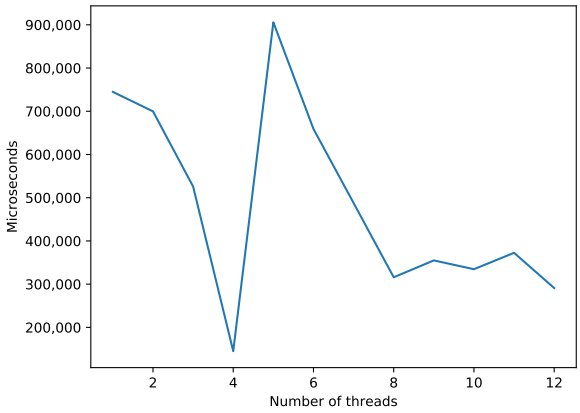


(a) 100 Iterations_`full_solution`: period 28.

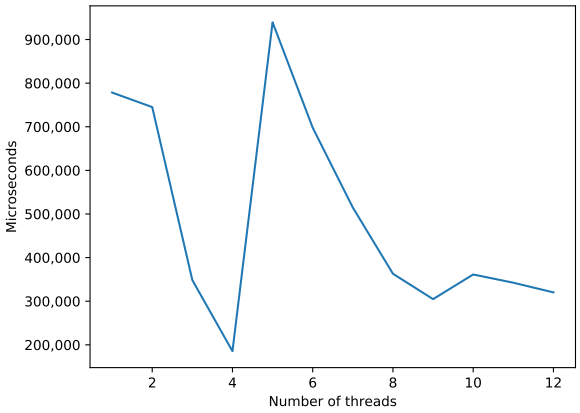


(b) 100 Iterations _`full_solution`: period 38.

Figure 1: Illustration of computation time vs. maximum available threads for `kw_94_one`.

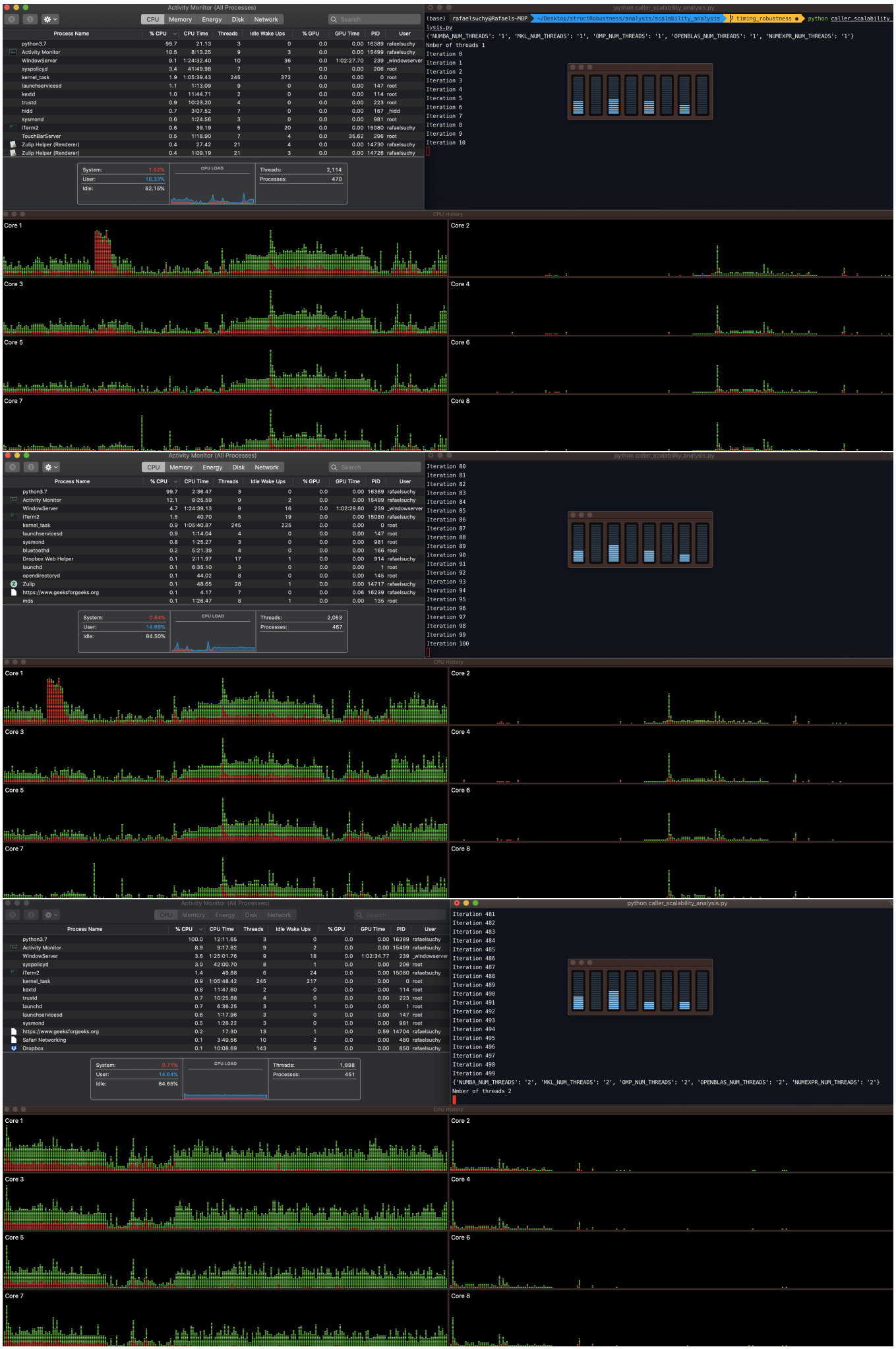


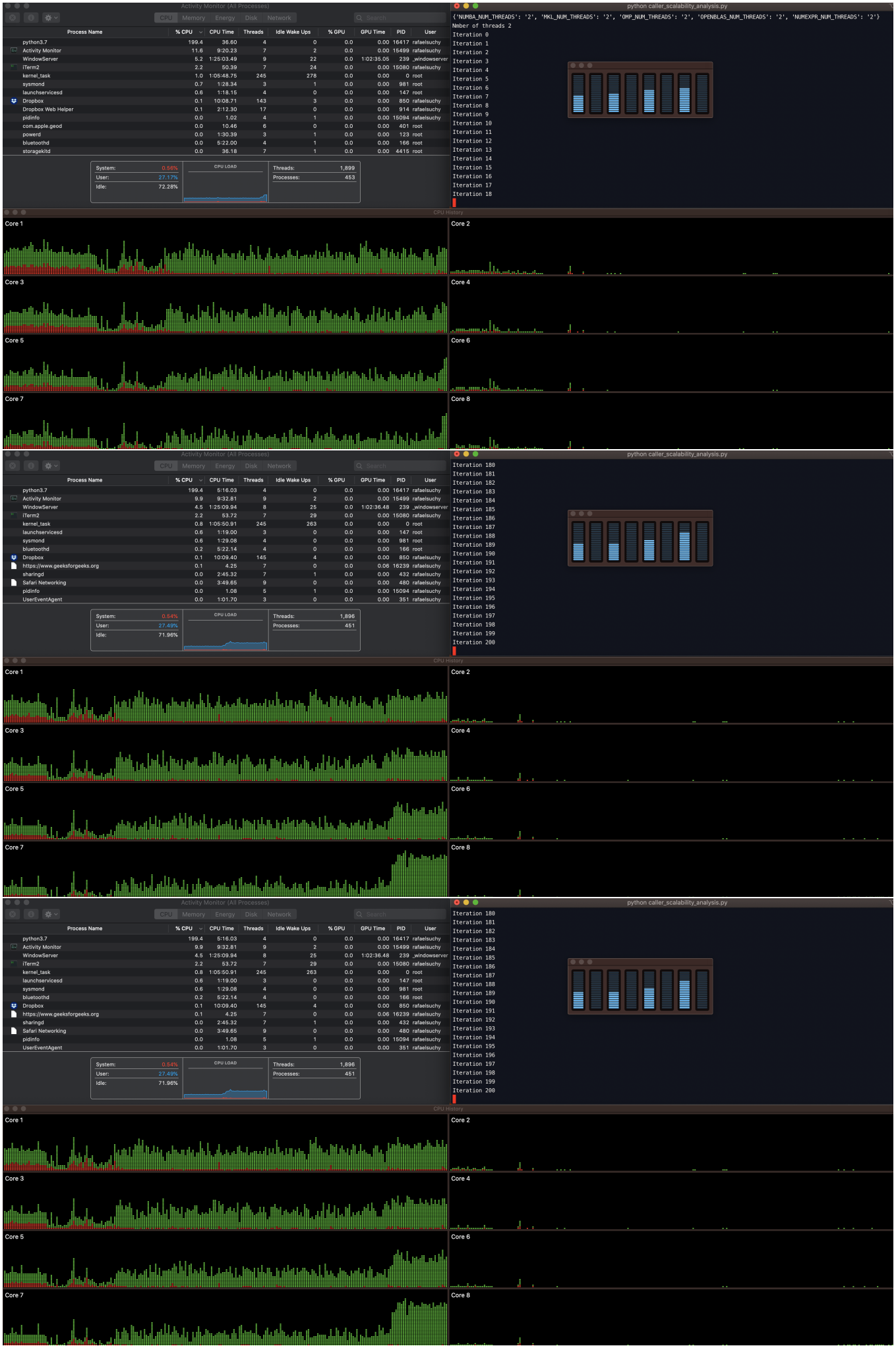
(a) 100 Iterations _`full_solution`: period 38 (one).

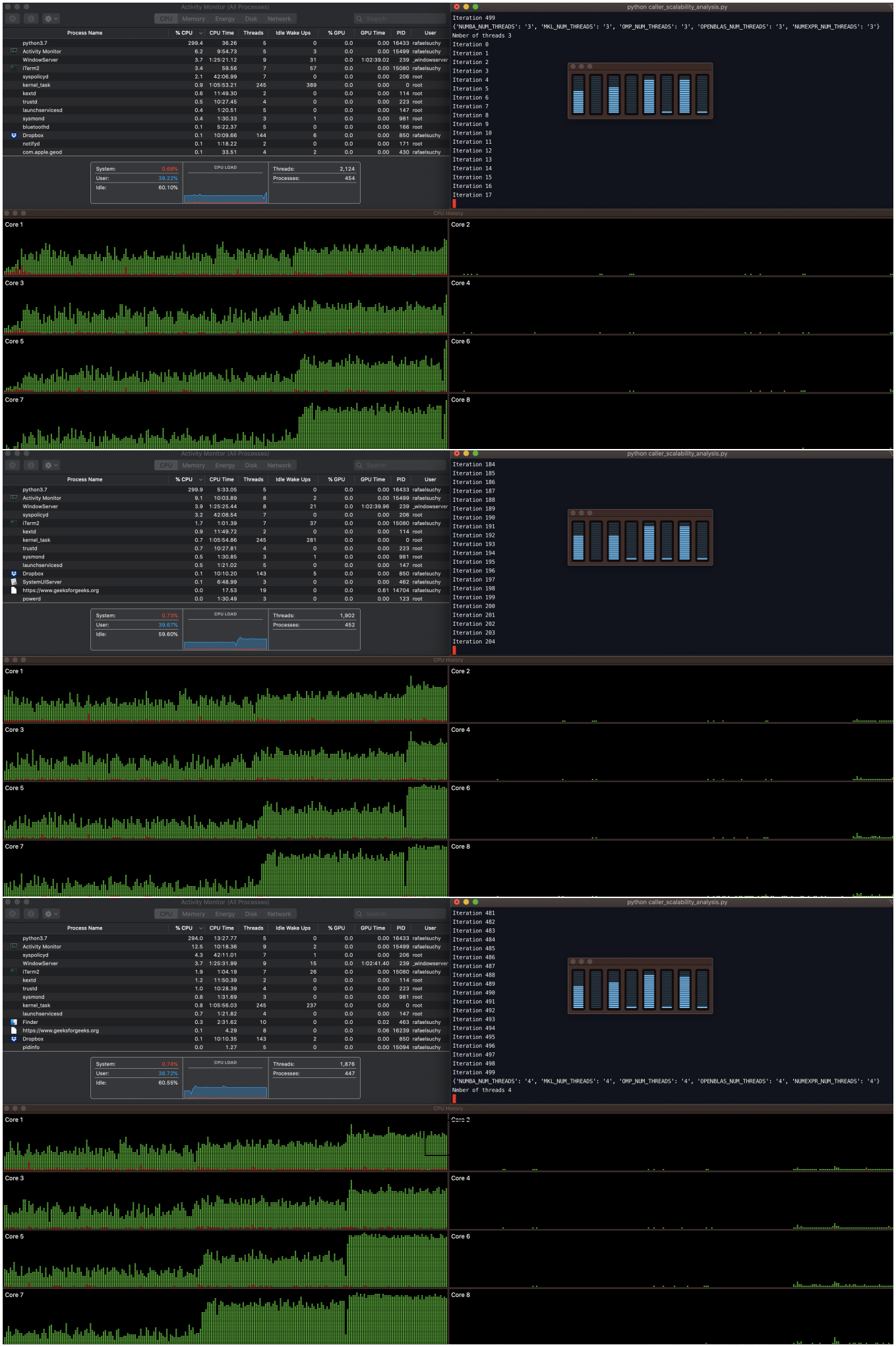


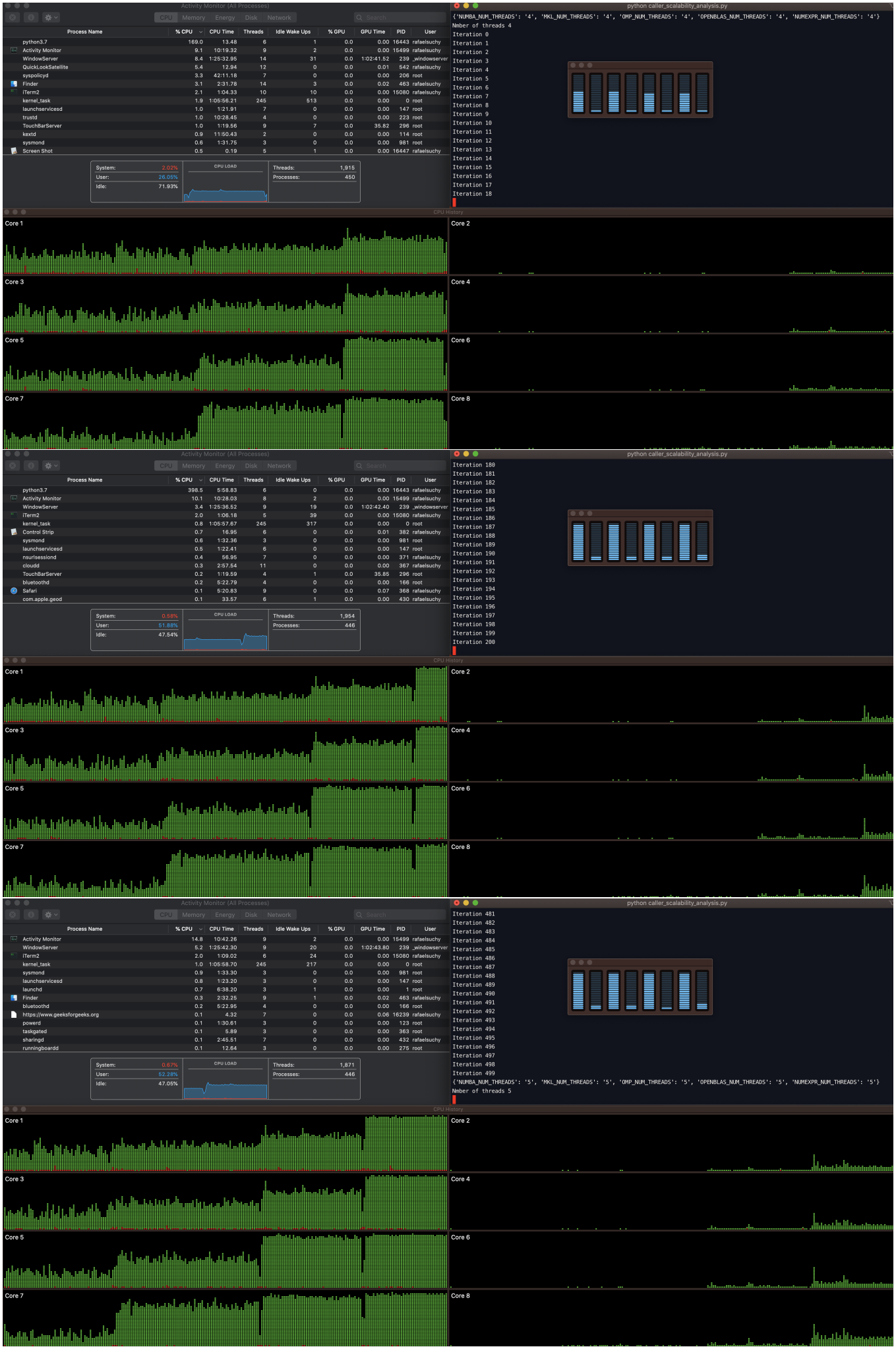
(b) 100 Iterations _`full_solution`: period 38 (two).

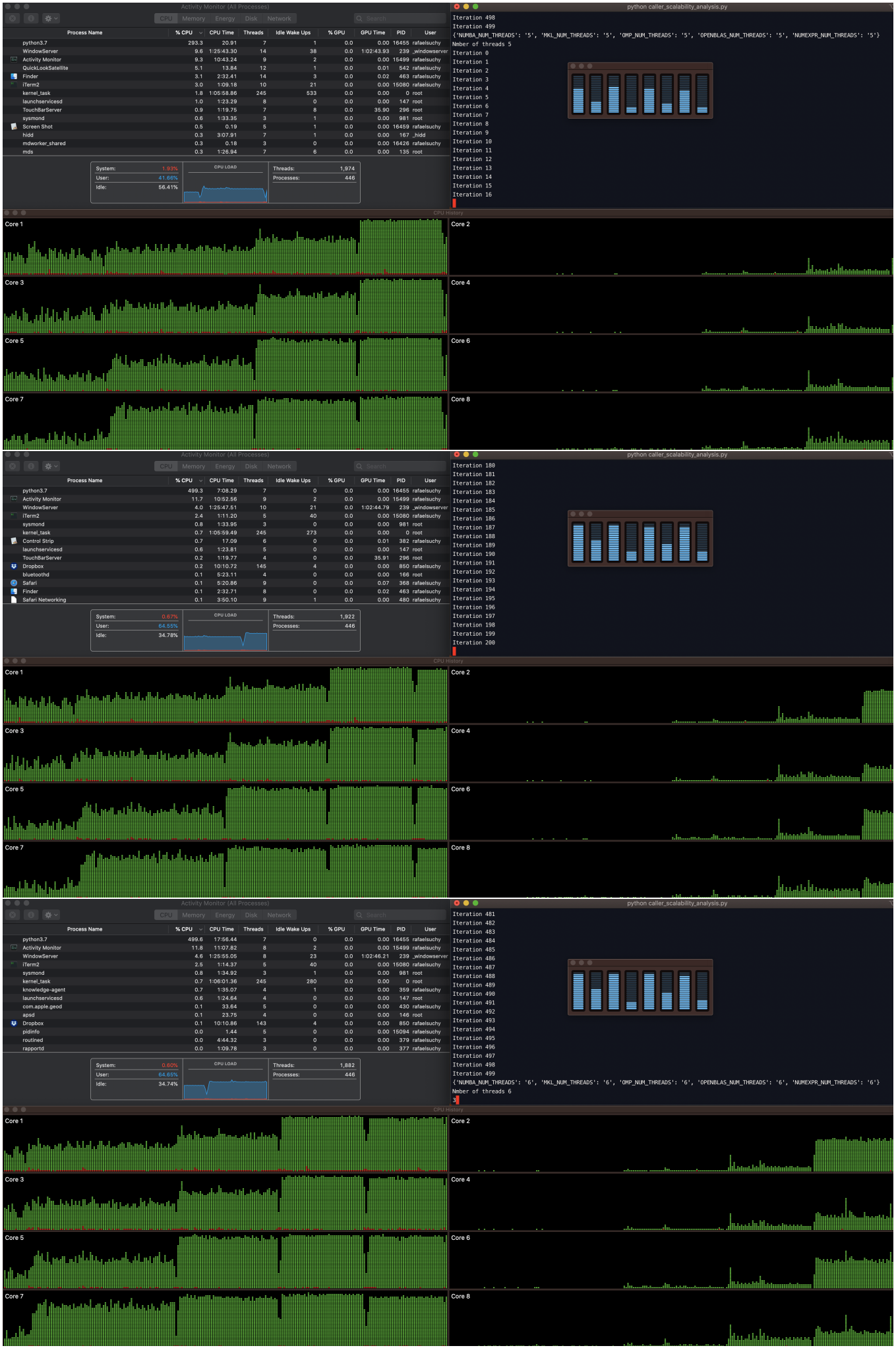
Figure 2: Illustration of computation time vs. maximum available threads for `kw_97_basic`.

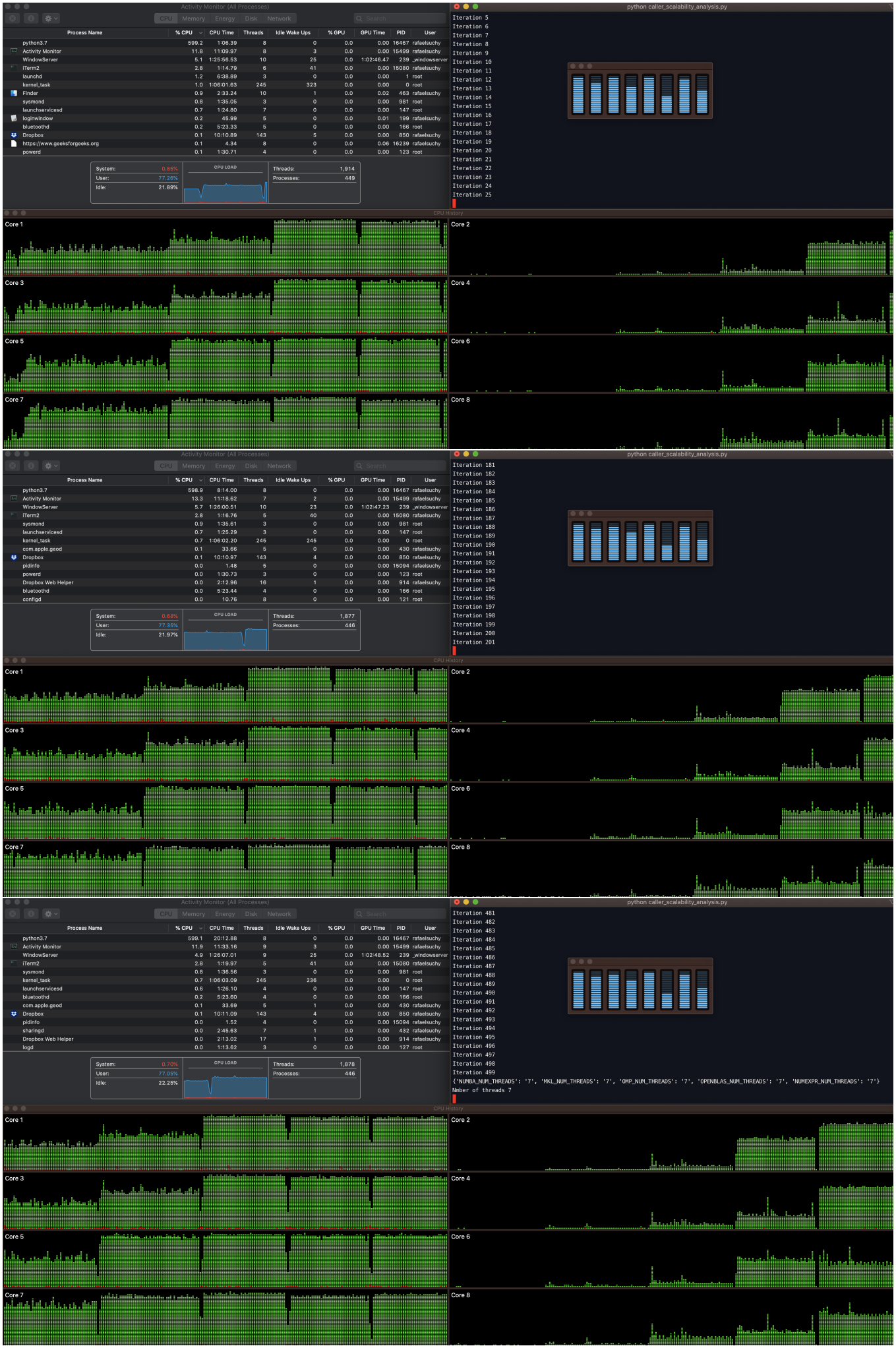

Activity Monitor (All Processes)
CPU Memory Energy Disk Network
Search
Process Name % CPU CPU Time Threads Idle Wake Ups % GPU GPU Time PID User
python3.7 99.7 21.13 3 0 0.0 0.00 16389 rafaelsuchy
Activity Monitor 10.5 8:13.25 9 3 0.0 0.00 15499 rafaelsuchy
WindowServer 9.1 1:24:32.40 10 36 0.0 1:02:27.70 239 _windowserver
syspolicyd 3.4 41:49.98 7 1 0.0 0.00 206 root
kernel_task 1.9 1:05:39.43 245 372 0.0 0.00 0 root
launchservicesd 1.1 1:13.09 9 0 0.0 0.00 147 root
kextd 1.0 11:44.71 2 0 0.0 0.00 114 root
trustd 0.9 10:23.20 4 0 0.0 0.00 223 root
hidd 0.7 3:07.52 7 0 0.0 0.00 167 _hidd
sysmond 0.6 1:24.56 3 0 0.0 0.00 981 root
iTerm2 0.6 39.19 5 20 0.0 0.00 15080 rafaelsuchy
TouchBarServer 0.5 1:18.90 7 4 0.0 35.62 296 root
Zulip Helper (Renderer) 0.4 27.42 21 4 0.0 0.00 14730 rafaelsuchy
Zulip Helper (Renderer) 0.4 1:09.19 21 3 0.0 0.00 14726 rafaelsuchy
System: 1.62%
User: 16.33%
Idle: 82.15%
CPU LOAD
Threads: 2,114
Processes: 470
python caller_scalability_analysis.py
(base) rafaelsuchy@Rafaels-MBP ~/Desktop/structRobustness/analysis/scalability_analysis timing_robustness python caller_scalability_analysis.py
{'NUMBA_NUM_THREADS': '1', 'MKL_NUM_THREADS': '1', 'OMP_NUM_THREADS': '1', 'OPENBLAS_NUM_THREADS': '1', 'NUMEXPR_NUM_THREADS': '1'}
Nmber of threads 1
Iteration 0
Iteration 1
Iteration 2
Iteration 3
Iteration 4
Iteration 5
Iteration 6
Iteration 7
Iteration 8
Iteration 9
Iteration 10
CPU History
Core 1
Core 2
Core 3
Core 4
Core 5
Core 6
Core 7
Core 8
Activity Monitor (All Processes)
CPU Memory Energy Disk Network
Search
Process Name % CPU CPU Time Threads Idle Wake Ups % GPU GPU Time PID User
python3.7 99.7 2:36.47 3 0 0.0 0.00 16389 rafaelsuchy
Activity Monitor 12.1 8:25.59 9 2 0.0 0.00 15499 rafaelsuchy
WindowServer 4.7 1:24:39.13 8 16 0.0 1:02:29.60 239 _windowserver
iTerm2 1.5 40.70 5 19 0.0 0.00 15080 rafaelsuchy
kernel_task 0.9 1:05:40.87 245 225 0.0 0.00 0 root
launchservicesd 0.9 1:14.04 4 0 0.0 0.00 147 root
sysmond 0.8 1:25.27 3 0 0.0 0.00 981 root
bluetoothd 0.2 5:21.39 4 0 0.0 0.00 166 root
Dropbox Web Helper 0.1 2:11.97 17 1 0.0 0.00 914 rafaelsuchy
launchd 0.1 6:35.10 3 0 0.0 0.00 1 root
opendirectoryd 0.1 44.02 8 0 0.0 0.00 145 root
Zulip 0.1 48.65 28 1 0.0 0.00 14717 rafaelsuchy
https://www.geeksforgeeks.org 0.1 4.17 7 0 0.0 0.06 16239 rafaelsuchy
mds 0.1 1:26.47 8 1 0.0 0.00 135 root
System: 0.84%
User: 14.66%
Idle: 84.50%
CPU LOAD
Threads: 2,053
Processes: 467
python caller_scalability_analysis.py
Iteration 80
Iteration 81
Iteration 82
Iteration 83
Iteration 84
Iteration 85
Iteration 86
Iteration 87
Iteration 88
Iteration 89
Iteration 90
Iteration 91
Iteration 92
Iteration 93
Iteration 94
Iteration 95
Iteration 96
Iteration 97
Iteration 98
Iteration 99
Iteration 100
CPU History
Core 1
Core 2
Core 3
Core 4
Core 5
Core 6
Core 7
Core 8
Activity Monitor (All Processes)
CPU Memory Energy Disk Network
Search
Process Name % CPU CPU Time Threads Idle Wake Ups % GPU GPU Time PID User
python3.7 100.0 12:11.65 3 0 0.0 0.00 16389 rafaelsuchy
Activity Monitor 8.9 9:17.92 9 2 0.0 0.00 15499 rafaelsuchy
WindowServer 3.6 1:25:01.76 9 18 0.0 1:02:34.77 239 _windowserver
syspolicyd 3.0 42:00.70 8 1 0.0 0.00 206 root
iTerm2 1.4 49.88 6 24 0.0 0.00 15080 rafaelsuchy
kernel_task 0.9 1:05:48.42 245 217 0.0 0.00 0 root
kextd 0.8 11:47.60 2 0 0.0 0.00 114 root
trustd 0.7 10:25.88 4 0 0.0 0.00 223 root
launchd 0.7 6:36.25 3 1 0.0 0.00 1 root
launchservicesd 0.6 1:17.96 3 0 0.0 0.00 147 root
sysmond 0.5 1:28.22 3 0 0.0 0.00 981 root
https://www.geeksforgeeks.org 0.2 17.30 13 1 0.0 0.59 14704 rafaelsuchy
Safari Networking 0.1 3:49.56 10 2 0.0 0.00 480 rafaelsuchy
Dropbox 0.1 10:08.69 143 9 0.0 0.00 850 rafaelsuchy
System: 0.71%
User: 14.64%
Idle: 84.65%
CPU LOAD
Threads: 1,898
Processes: 451
python caller_scalability_analysis.py
Iteration 481
Iteration 482
Iteration 483
Iteration 484
Iteration 485
Iteration 486
Iteration 487
Iteration 488
Iteration 489
Iteration 490
Iteration 491
Iteration 492
Iteration 493
Iteration 494
Iteration 495
Iteration 496
Iteration 497
Iteration 498
Iteration 499
{'NUMBA_NUM_THREADS': '2', 'MKL_NUM_THREADS': '2', 'OMP_NUM_THREADS': '2', 'OPENBLAS_NUM_THREADS': '2', 'NUMEXPR_NUM_THREADS': '2'}
Nmber of threads 2
CPU History
Core 1
Core 2
Core 3
Core 4
Core 5
Core 6
Core 7
Core 8

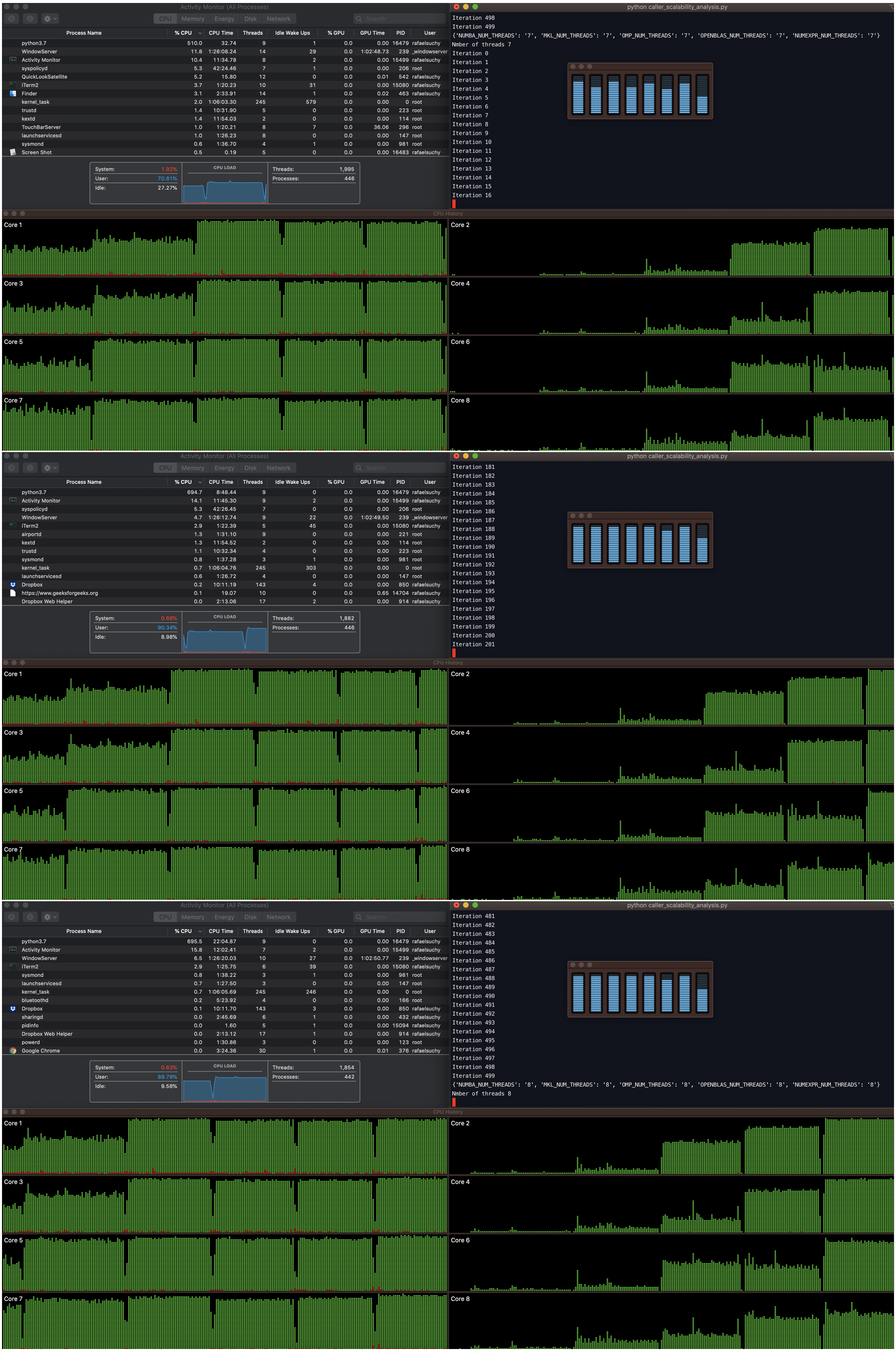

Activity Monitor (All Processes)
CPU Memory Energy Disk Network
Search
Process Name % CPU CPU Time Threads Idle Wake Ups % GPU GPU Time PID User
python3.7 199.4 36.60 4 0 0.0 0.00 16417 rafaelsuchy
Activity Monitor 11.6 9:20.23 7 2 0.0 0.00 15499 rafaelsuchy
WindowServer 5.2 1:25:03.49 9 22 0.0 1:02:35.05 239 _windowserver
iTerm2 2.2 50.39 7 24 0.0 0.00 15080 rafaelsuchy
kernel_task 1.0 1:05:48.75 245 278 0.0 0.00 0 root
sysmond 0.7 1:28.34 3 1 0.0 0.00 981 root
launchservicesd 0.6 1:18.15 4 0 0.0 0.00 147 root
Dropbox 0.1 10:08.71 143 3 0.0 0.00 850 rafaelsuchy
Dropbox Web Helper 0.1 2:12.30 17 0 0.0 0.00 914 rafaelsuchy
pidinfo 0.0 1.02 4 1 0.0 0.00 15094 rafaelsuchy
com.apple.geod 0.0 10.46 6 0 0.0 0.00 401 root
powerd 0.0 1:30.39 3 1 0.0 0.00 123 root
bluetoothd 0.0 5:22.00 4 1 0.0 0.00 166 root
storagekitd 0.0 36.18 7 1 0.0 0.00 4415 root
System: 0.56%
User: 27.17%
Idle: 72.28%
CPU LOAD
Threads: 1,899
Processes: 453
python caller_scalability_analysis.py
{'NUMBA_NUM_THREADS': '2', 'MKL_NUM_THREADS': '2', 'OMP_NUM_THREADS': '2', 'OPENBLAS_NUM_THREADS': '2', 'NUMEXPR_NUM_THREADS': '2'}
Nmber of threads 2
Iteration 0
Iteration 1
Iteration 2
Iteration 3
Iteration 4
Iteration 5
Iteration 6
Iteration 7
Iteration 8
Iteration 9
Iteration 10
Iteration 11
Iteration 12
Iteration 13
Iteration 14
Iteration 15
Iteration 16
Iteration 17
Iteration 18
CPU History
Core 1
Core 2
Core 3
Core 4
Core 5
Core 6
Core 7
Core 8
Activity Monitor (All Processes)
CPU Memory Energy Disk Network
Search
Process Name % CPU CPU Time Threads Idle Wake Ups % GPU GPU Time PID User
python3.7 199.4 5:16.03 4 0 0.0 0.00 16417 rafaelsuchy
Activity Monitor 9.9 9:32.81 9 2 0.0 0.00 15499 rafaelsuchy
WindowServer 4.5 1:25:09.94 8 25 0.0 1:02:36.48 239 _windowserver
iTerm2 2.2 53.72 7 29 0.0 0.00 15080 rafaelsuchy
kernel_task 0.8 1:05:50.91 245 263 0.0 0.00 0 root
launchservicesd 0.6 1:19.00 3 0 0.0 0.00 147 root
sysmond 0.6 1:29.08 4 0 0.0 0.00 981 root
bluetoothd 0.2 5:22.14 4 0 0.0 0.00 166 root
Dropbox 0.1 10:09.40 145 4 0.0 0.00 850 rafaelsuchy
https://www.geeksforgeeks.org 0.1 4.25 7 0 0.0 0.06 16239 rafaelsuchy
sharingd 0.0 2:45.32 7 1 0.0 0.00 432 rafaelsuchy
Safari Networking 0.0 3:49.65 9 0 0.0 0.00 480 rafaelsuchy
pidinfo 0.0 1.08 5 1 0.0 0.00 15094 rafaelsuchy
UserEventAgent 0.0 1:01.70 3 0 0.0 0.00 351 rafaelsuchy
System: 0.64%
User: 27.49%
Idle: 71.96%
CPU LOAD
Threads: 1,896
Processes: 451
python caller_scalability_analysis.py
Iteration 180
Iteration 181
Iteration 182
Iteration 183
Iteration 184
Iteration 185
Iteration 186
Iteration 187
Iteration 188
Iteration 189
Iteration 190
Iteration 191
Iteration 192
Iteration 193
Iteration 194
Iteration 195
Iteration 196
Iteration 197
Iteration 198
Iteration 199
Iteration 200
CPU History
Core 1
Core 2
Core 3
Core 4
Core 5
Core 6
Core 7
Core 8
Activity Monitor (All Processes)
CPU Memory Energy Disk Network
Search
Process Name % CPU CPU Time Threads Idle Wake Ups % GPU GPU Time PID User
python3.7 199.4 5:16.03 4 0 0.0 0.00 16417 rafaelsuchy
Activity Monitor 9.9 9:32.81 9 2 0.0 0.00 15499 rafaelsuchy
WindowServer 4.5 1:25:09.94 8 25 0.0 1:02:36.48 239 _windowserver
iTerm2 2.2 53.72 7 29 0.0 0.00 15080 rafaelsuchy
kernel_task 0.8 1:05:50.91 245 263 0.0 0.00 0 root
launchservicesd 0.6 1:19.00 3 0 0.0 0.00 147 root
sysmond 0.6 1:29.08 4 0 0.0 0.00 981 root
bluetoothd 0.2 5:22.14 4 0 0.0 0.00 166 root
Dropbox 0.1 10:09.40 145 4 0.0 0.00 850 rafaelsuchy
https://www.geeksforgeeks.org 0.1 4.25 7 0 0.0 0.06 16239 rafaelsuchy
sharingd 0.0 2:45.32 7 1 0.0 0.00 432 rafaelsuchy
Safari Networking 0.0 3:49.65 9 0 0.0 0.00 480 rafaelsuchy
pidinfo 0.0 1.08 5 1 0.0 0.00 15094 rafaelsuchy
UserEventAgent 0.0 1:01.70 3 0 0.0 0.00 351 rafaelsuchy
System: 0.64%
User: 27.49%
Idle: 71.96%
CPU LOAD
Threads: 1,896
Processes: 451
python caller_scalability_analysis.py
Iteration 180
Iteration 181
Iteration 182
Iteration 183
Iteration 184
Iteration 185
Iteration 186
Iteration 187
Iteration 188
Iteration 189
Iteration 190
Iteration 191
Iteration 192
Iteration 193
Iteration 194
Iteration 195
Iteration 196
Iteration 197
Iteration 198
Iteration 199
Iteration 200
CPU History
Core 1
Core 2
Core 3
Core 4
Core 5
Core 6
Core 7
Core 8

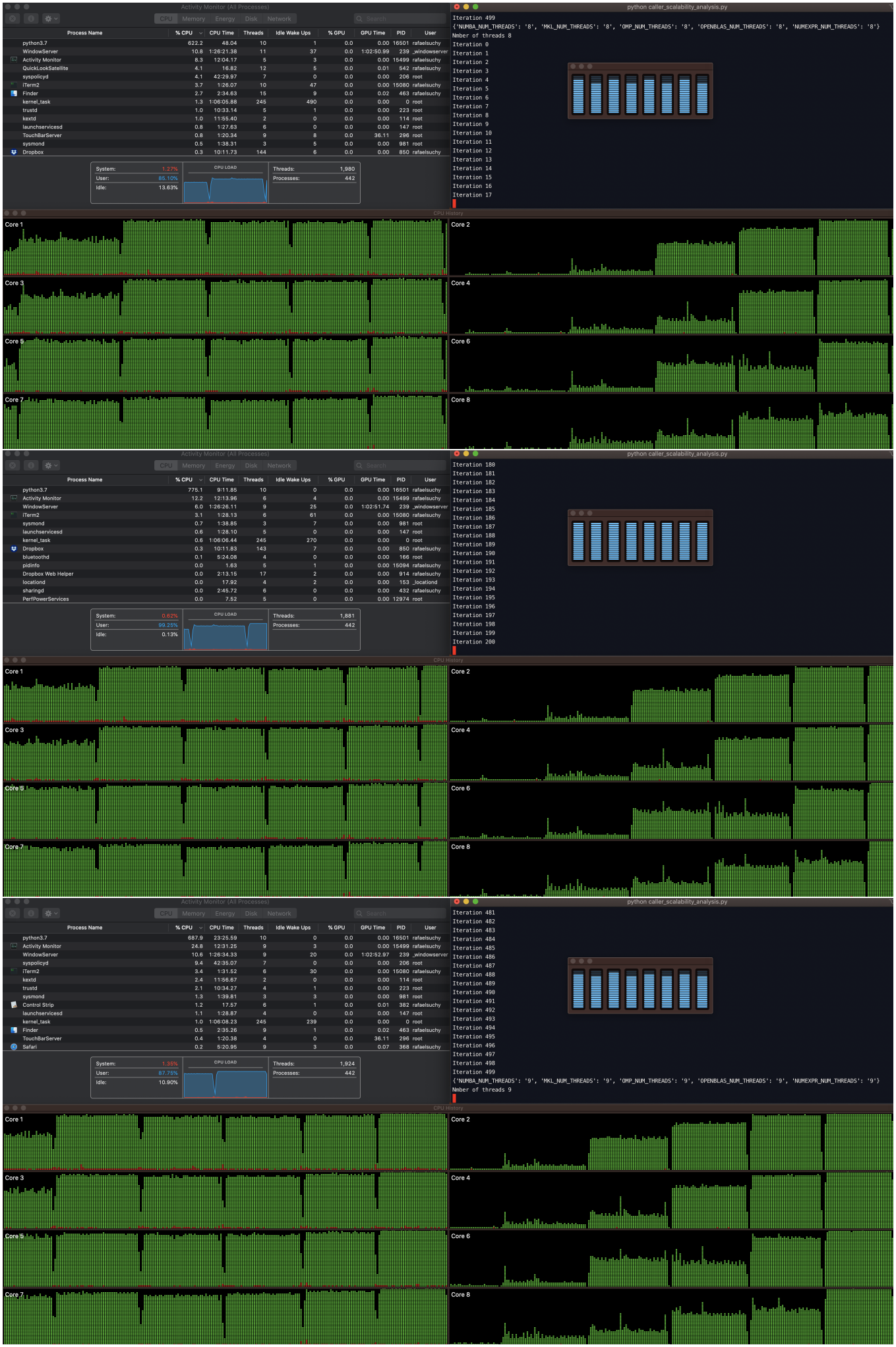

Activity Monitor (All Processes)
CPU Memory Energy Disk Network
Search
Process Name % CPU CPU Time Threads Idle Wake Ups % GPU GPU Time PID User
python3.7 299.4 36.26 5 0 0.0 0.00 16433 rafaelsuchy
Activity Monitor 6.2 9:54.73 5 3 0.0 0.00 15499 rafaelsuchy
WindowServer 3.7 1:25:21.12 9 31 0.0 1:02:39.02 239 _windowserver
iTerm2 3.4 59.56 7 57 0.0 0.00 15080 rafaelsuchy
syspolicyd 2.1 42:06.99 7 0 0.0 0.00 206 root
kernel_task 0.9 1:05:53.21 245 389 0.0 0.00 0 root
kextd 0.6 11:49.30 2 0 0.0 0.00 114 root
trustd 0.5 10:27.45 4 0 0.0 0.00 223 root
launchservicesd 0.4 1:20.51 5 0 0.0 0.00 147 root
sysmond 0.4 1:30.33 3 1 0.0 0.00 981 root
bluetoothd 0.1 5:22.37 5 0 0.0 0.00 166 root
Dropbox 0.1 10:09.66 144 6 0.0 0.00 850 rafaelsuchy
notifyd 0.1 1:18.22 2 0 0.0 0.00 171 root
com.apple.geod 0.1 33.51 4 2 0.0 0.00 430 rafaelsuchy
System: 0.68%
User: 39.22%
Idle: 60.10%
CPU LOAD
Threads: 2,124
Processes: 454
python caller_scalability_analysis.py
Iteration 499
{'NUMBA_NUM_THREADS': '3', 'MKL_NUM_THREADS': '3', 'OMP_NUM_THREADS': '3', 'OPENBLAS_NUM_THREADS': '3', 'NUMEXPR_NUM_THREADS': '3'}
Nmber of threads 3
Iteration 0
Iteration 1
Iteration 2
Iteration 3
Iteration 4
Iteration 5
Iteration 6
Iteration 7
Iteration 8
Iteration 9
Iteration 10
Iteration 11
Iteration 12
Iteration 13
Iteration 14
Iteration 15
Iteration 16
Iteration 17
CPU History
Core 1
Core 2
Core 3
Core 4
Core 5
Core 6
Core 7
Core 8
Activity Monitor (All Processes)
CPU Memory Energy Disk Network
Search
Process Name % CPU CPU Time Threads Idle Wake Ups % GPU GPU Time PID User
python3.7 299.9 5:33.05 5 0 0.0 0.00 16433 rafaelsuchy
Activity Monitor 9.1 10:03.89 8 2 0.0 0.00 15499 rafaelsuchy
WindowServer 3.9 1:25:25.44 8 21 0.0 1:02:39.96 239 _windowserver
syspolicyd 3.2 42:08.54 7 0 0.0 0.00 206 root
iTerm2 1.7 1:01.39 7 37 0.0 0.00 15080 rafaelsuchy
kextd 0.9 11:49.72 2 0 0.0 0.00 114 root
kernel_task 0.7 1:05:54.86 245 281 0.0 0.00 0 root
trustd 0.7 10:27.81 4 0 0.0 0.00 223 root
sysmond 0.5 1:30.85 3 1 0.0 0.00 981 root
launchservicesd 0.5 1:21.02 5 0 0.0 0.00 147 root
Dropbox 0.1 10:10.20 143 5 0.0 0.00 850 rafaelsuchy
SystemUIServer 0.1 6:48.99 3 0 0.0 0.00 462 rafaelsuchy
https://www.geeksforgeeks.org 0.0 17.53 19 0 0.0 0.61 14704 rafaelsuchy
powerd 0.0 1:30.49 3 0 0.0 0.00 123 root
System: 0.73%
User: 39.67%
Idle: 59.60%
CPU LOAD
Threads: 1,902
Processes: 452
python caller_scalability_analysis.py
Iteration 184
Iteration 185
Iteration 186
Iteration 187
Iteration 188
Iteration 189
Iteration 190
Iteration 191
Iteration 192
Iteration 193
Iteration 194
Iteration 195
Iteration 196
Iteration 197
Iteration 198
Iteration 199
Iteration 200
Iteration 201
Iteration 202
Iteration 203
Iteration 204
CPU History
Core 1
Core 2
Core 3
Core 4
Core 5
Core 6
Core 7
Core 8
Activity Monitor (All Processes)
CPU Memory Energy Disk Network
Search
Process Name % CPU CPU Time Threads Idle Wake Ups % GPU GPU Time PID User
python3.7 294.0 13:27.77 5 0 0.0 0.00 16433 rafaelsuchy
Activity Monitor 12.5 10:18.36 9 2 0.0 0.00 15499 rafaelsuchy
syspolicyd 4.3 42:11.01 7 1 0.0 0.00 206 root
WindowServer 3.7 1:25:31.99 9 15 0.0 1:02:41.40 239 _windowserver
iTerm2 1.9 1:04.19 7 26 0.0 0.00 15080 rafaelsuchy
kextd 1.2 11:50.39 2 0 0.0 0.00 114 root
trustd 1.0 10:28.39 4 0 0.0 0.00 223 root
sysmond 0.8 1:31.69 3 0 0.0 0.00 981 root
kernel_task 0.8 1:05:56.03 245 237 0.0 0.00 0 root
launchservicesd 0.7 1:21.82 4 0 0.0 0.00 147 root
Finder 0.3 2:31.62 10 0 0.0 0.02 463 rafaelsuchy
https://www.geeksforgeeks.org 0.1 4.29 8 0 0.0 0.06 16239 rafaelsuchy
Dropbox 0.1 10:10.35 143 2 0.0 0.00 850 rafaelsuchy
pidinfo 0.0 1.27 5 0 0.0 0.00 15094 rafaelsuchy
System: 0.74%
User: 38.72%
Idle: 60.55%
CPU LOAD
Threads: 1,876
Processes: 447
python caller_scalability_analysis.py
Iteration 481
Iteration 482
Iteration 483
Iteration 484
Iteration 485
Iteration 486
Iteration 487
Iteration 488
Iteration 489
Iteration 490
Iteration 491
Iteration 492
Iteration 493
Iteration 494
Iteration 495
Iteration 496
Iteration 497
Iteration 498
Iteration 499
{'NUMBA_NUM_THREADS': '4', 'MKL_NUM_THREADS': '4', 'OMP_NUM_THREADS': '4', 'OPENBLAS_NUM_THREADS': '4', 'NUMEXPR_NUM_THREADS': '4'}
Nmber of threads 4
CPU History
Core 1
Core 2
Core 3
Core 4
Core 5
Core 6
Core 7
Core 8

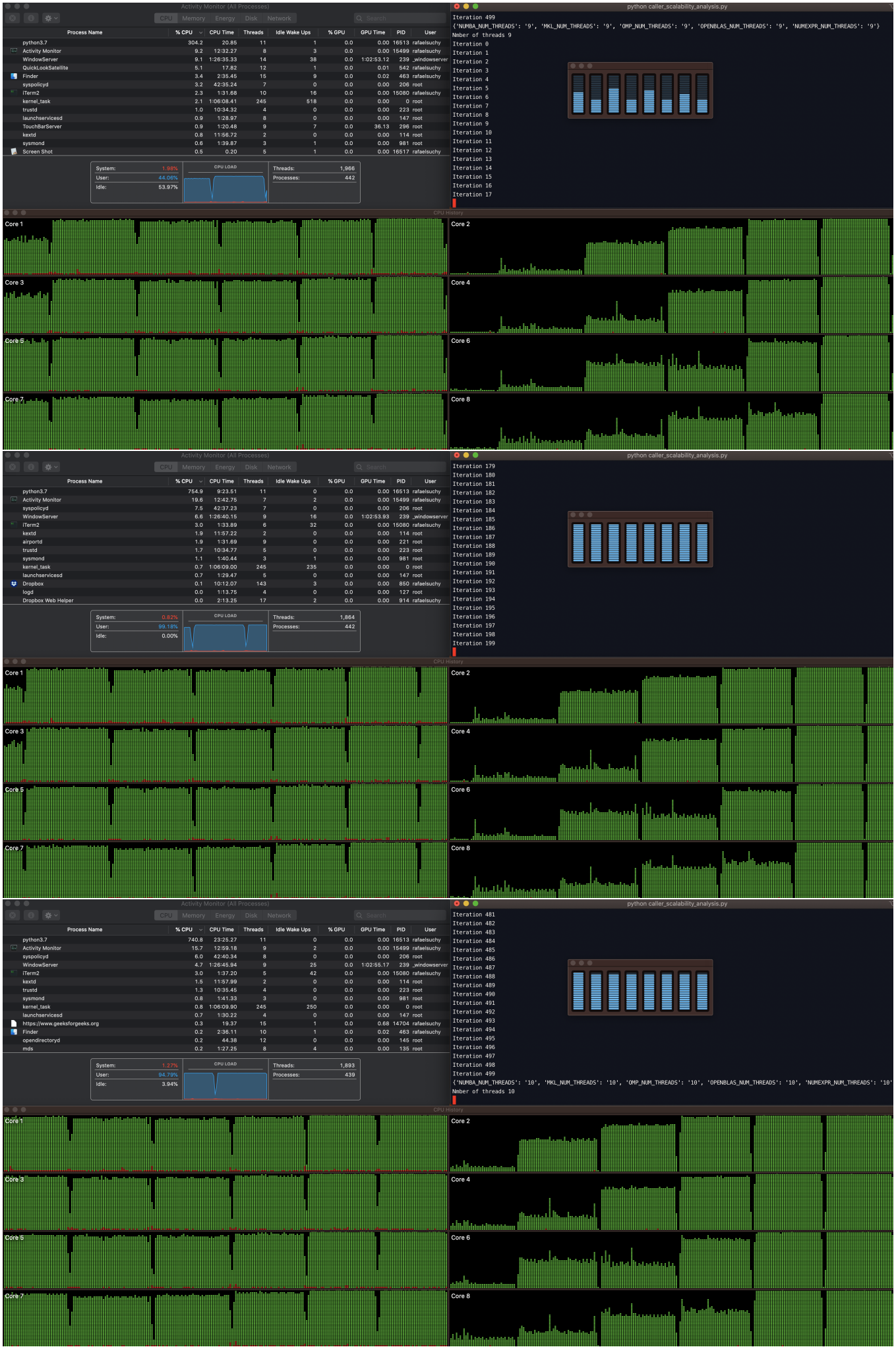

Activity Monitor (All Processes)
CPU Memory Energy Disk Network
Search
Process Name % CPU CPU Time Threads Idle Wake Ups % GPU GPU Time PID User
python3.7 169.0 13.48 6 1 0.0 0.00 16443 rafaelsuchy
Activity Monitor 9.1 10:19.32 9 2 0.0 0.00 15499 rafaelsuchy
WindowServer 8.4 1:25:32.95 14 31 0.0 1:02:41.52 239 _windowserver
QuickLookSatellite 5.4 12.94 12 0 0.0 0.01 542 rafaelsuchy
syspolicyd 3.3 42:11.18 7 0 0.0 0.00 206 root
Finder 3.1 2:31.78 14 3 0.0 0.02 463 rafaelsuchy
iTerm2 2.1 1:04.33 10 10 0.0 0.00 15080 rafaelsuchy
kernel_task 1.9 1:05:56.21 245 513 0.0 0.00 0 root
launchservicesd 1.0 1:21.91 7 0 0.0 0.00 147 root
trustd 1.0 10:28.45 4 0 0.0 0.00 223 root
TouchBarServer 1.0 1:19.56 9 7 0.0 35.82 296 root
kextd 0.9 11:50.43 2 0 0.0 0.00 114 root
sysmond 0.6 1:31.75 3 0 0.0 0.00 981 root
Screen Shot 0.5 0.19 5 1 0.0 0.00 16447 rafaelsuchy
System: 2.02%
User: 26.05%
Idle: 71.93%
CPU LOAD
Threads: 1,915
Processes: 450
python caller_scalability_analysis.py
{'NUMBA_NUM_THREADS': '4', 'MKL_NUM_THREADS': '4', 'OMP_NUM_THREADS': '4', 'OPENBLAS_NUM_THREADS': '4', 'NUMEXPR_NUM_THREADS': '4'}
Nmber of threads 4
Iteration 0
Iteration 1
Iteration 2
Iteration 3
Iteration 4
Iteration 5
Iteration 6
Iteration 7
Iteration 8
Iteration 9
Iteration 10
Iteration 11
Iteration 12
Iteration 13
Iteration 14
Iteration 15
Iteration 16
Iteration 17
Iteration 18
CPU History
Core 1
Core 2
Core 3
Core 4
Core 5
Core 6
Core 7
Core 8
Activity Monitor (All Processes)
CPU Memory Energy Disk Network
Search
Process Name % CPU CPU Time Threads Idle Wake Ups % GPU GPU Time PID User
python3.7 398.5 5:58.83 6 0 0.0 0.00 16443 rafaelsuchy
Activity Monitor 10.1 10:28.03 8 2 0.0 0.00 15499 rafaelsuchy
WindowServer 3.4 1:25:36.52 9 19 0.0 1:02:42.40 239 _windowserver
iTerm2 2.0 1:06.18 5 39 0.0 0.00 15080 rafaelsuchy
kernel_task 0.8 1:05:57.67 245 317 0.0 0.00 0 root
Control Strip 0.7 16.95 6 0 0.0 0.01 382 rafaelsuchy
sysmond 0.6 1:32.36 3 0 0.0 0.00 981 root
launchservicesd 0.5 1:22.41 6 0 0.0 0.00 147 root
nsurlsessiond 0.4 56.95 7 0 0.0 0.00 371 rafaelsuchy
cloudd 0.3 2:57.54 11 0 0.0 0.00 367 rafaelsuchy
TouchBarServer 0.2 1:19.59 4 1 0.0 35.85 296 root
bluetoothd 0.2 5:22.79 4 0 0.0 0.00 166 root
Safari 0.1 5:20.83 9 0 0.0 0.07 368 rafaelsuchy
com.apple.geod 0.1 33.57 6 1 0.0 0.00 430 rafaelsuchy
System: 0.58%
User: 51.88%
Idle: 47.54%
CPU LOAD
Threads: 1,954
Processes: 446
python caller_scalability_analysis.py
Iteration 180
Iteration 181
Iteration 182
Iteration 183
Iteration 184
Iteration 185
Iteration 186
Iteration 187
Iteration 188
Iteration 189
Iteration 190
Iteration 191
Iteration 192
Iteration 193
Iteration 194
Iteration 195
Iteration 196
Iteration 197
Iteration 198
Iteration 199
Iteration 200
CPU History
Core 1
Core 2
Core 3
Core 4
Core 5
Core 6
Core 7
Core 8
Activity Monitor (All Processes)
CPU Memory Energy Disk Network
Search
Process Name % CPU CPU Time Threads Idle Wake Ups % GPU GPU Time PID User
Activity Monitor 14.8 10:42.26 9 2 0.0 0.00 15499 rafaelsuchy
WindowServer 5.2 1:25:42.30 9 20 0.0 1:02:43.80 239 _windowserver
iTerm2 2.0 1:09.02 6 24 0.0 0.00 15080 rafaelsuchy
kernel_task 1.0 1:05:58.70 245 217 0.0 0.00 0 root
sysmond 0.9 1:33.30 3 0 0.0 0.00 981 root
launchservicesd 0.8 1:23.20 3 0 0.0 0.00 147 root
launchd 0.7 6:38.20 3 1 0.0 0.00 1 root
Finder 0.3 2:32.25 9 1 0.0 0.02 463 rafaelsuchy
bluetoothd 0.2 5:22.95 4 0 0.0 0.00 166 root
https://www.geeksforgeeks.org 0.1 4.32 7 0 0.0 0.06 16239 rafaelsuchy
powerd 0.1 1:30.61 3 0 0.0 0.00 123 root
taskgated 0.1 5.89 3 0 0.0 0.00 363 root
sharingd 0.1 2:45.51 7 0 0.0 0.00 432 rafaelsuchy
runningboardd 0.1 12.64 3 0 0.0 0.00 275 root
System: 0.67%
User: 52.28%
Idle: 47.05%
CPU LOAD
Threads: 1,871
Processes: 446
python caller_scalability_analysis.py
Iteration 481
Iteration 482
Iteration 483
Iteration 484
Iteration 485
Iteration 486
Iteration 487
Iteration 488
Iteration 489
Iteration 490
Iteration 491
Iteration 492
Iteration 493
Iteration 494
Iteration 495
Iteration 496
Iteration 497
Iteration 498
Iteration 499
{'NUMBA_NUM_THREADS': '5', 'MKL_NUM_THREADS': '5', 'OMP_NUM_THREADS': '5', 'OPENBLAS_NUM_THREADS': '5', 'NUMEXPR_NUM_THREADS': '5'}
Nmber of threads 5
CPU History
Core 1
Core 2
Core 3
Core 4
Core 5
Core 6
Core 7
Core 8

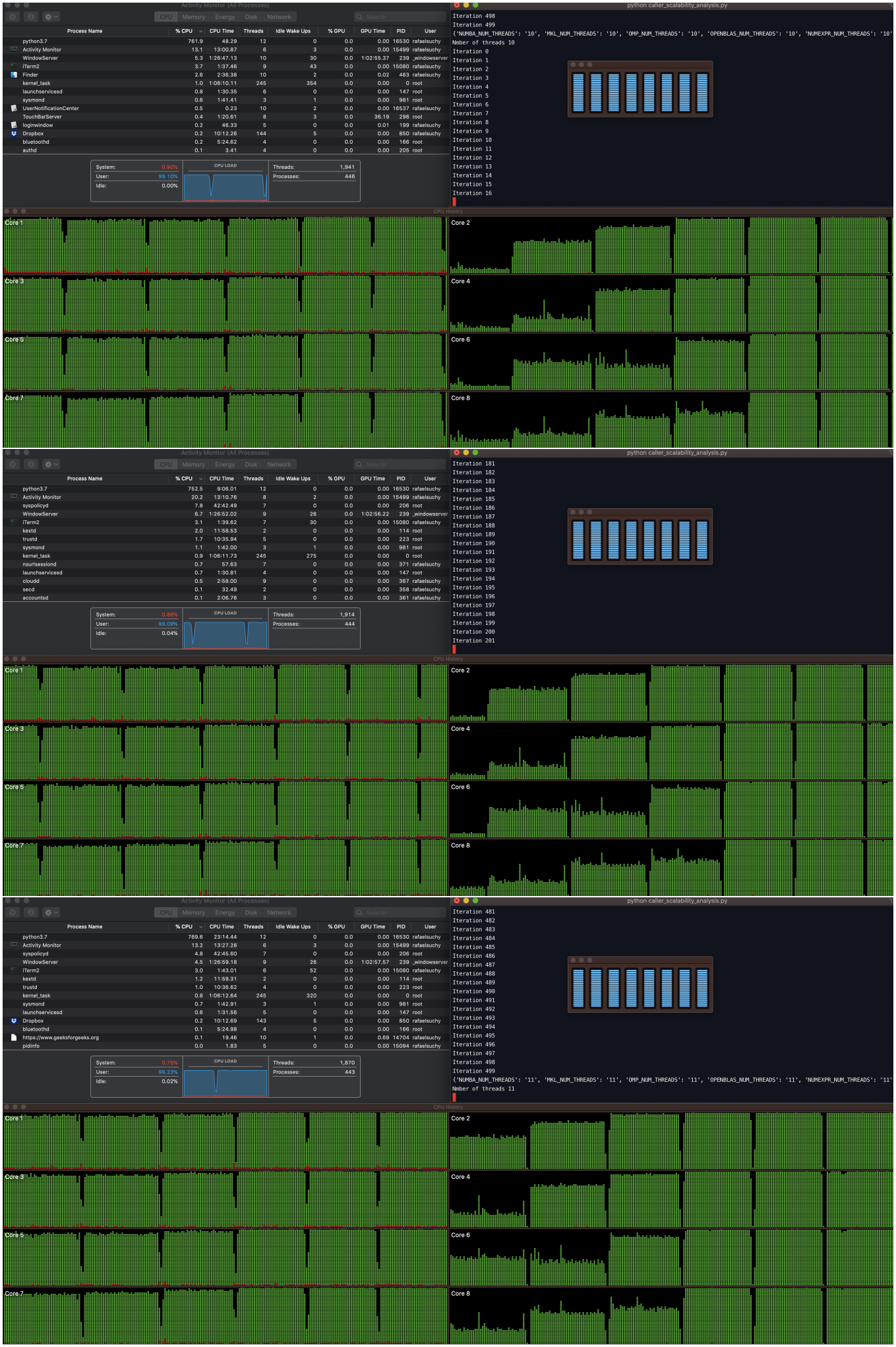

Activity Monitor (All Processes)
CPU Memory Energy Disk Network
Search
Process Name % CPU CPU Time Threads Idle Wake Ups % GPU GPU Time PID User
python3.7 293.3 20.91 7 1 0.0 0.00 16455 rafaelsuchy
WindowServer 9.6 1:25:43.30 14 38 0.0 1:02:43.93 239 _windowserver
Activity Monitor 9.3 10:43.24 9 2 0.0 0.00 15499 rafaelsuchy
QuickLookSatellite 5.1 13.84 12 1 0.0 0.01 542 rafaelsuchy
Finder 3.1 2:32.41 14 3 0.0 0.02 463 rafaelsuchy
iTerm2 3.0 1:09.18 10 21 0.0 0.00 15080 rafaelsuchy
kernel_task 1.8 1:05:58.86 245 533 0.0 0.00 0 root
launchservicesd 1.0 1:23.29 8 0 0.0 0.00 147 root
TouchBarServer 0.9 1:19.75 7 8 0.0 35.90 296 root
sysmond 0.6 1:33.35 3 1 0.0 0.00 981 root
Screen Shot 0.5 0.19 5 1 0.0 0.00 16459 rafaelsuchy
hidd 0.3 3:07.91 7 1 0.0 0.00 167 _hidd
mdworker_shared 0.3 0.18 3 0 0.0 0.00 16426 rafaelsuchy
mds 0.3 1:26.94 7 6 0.0 0.00 135 root
System: 1.93%
User: 41.66%
Idle: 56.41%
CPU LOAD
Threads: 1,974
Processes: 446
python caller_scalability_analysis.py
Iteration 498
Iteration 499
{'NUMBA_NUM_THREADS': '5', 'MKL_NUM_THREADS': '5', 'OMP_NUM_THREADS': '5', 'OPENBLAS_NUM_THREADS': '5', 'NUMEXPR_NUM_THREADS': '5'}
Nmber of threads 5
Iteration 0
Iteration 1
Iteration 2
Iteration 3
Iteration 4
Iteration 5
Iteration 6
Iteration 7
Iteration 8
Iteration 9
Iteration 10
Iteration 11
Iteration 12
Iteration 13
Iteration 14
Iteration 15
Iteration 16
CPU History
Core 1
Core 2
Core 3
Core 4
Core 5
Core 6
Core 7
Core 8
Activity Monitor (All Processes)
CPU Memory Energy Disk Network
Search
Process Name % CPU CPU Time Threads Idle Wake Ups % GPU GPU Time PID User
python3.7 499.3 7:08.29 7 0 0.0 0.00 16455 rafaelsuchy
Activity Monitor 11.7 10:52.56 9 2 0.0 0.00 15499 rafaelsuchy
WindowServer 4.0 1:25:47.51 10 21 0.0 1:02:44.79 239 _windowserver
iTerm2 2.4 1:11.20 5 40 0.0 0.00 15080 rafaelsuchy
sysmond 0.8 1:33.95 3 0 0.0 0.00 981 root
kernel_task 0.7 1:05:59.49 245 273 0.0 0.00 0 root
Control Strip 0.7 17.09 6 0 0.0 0.01 382 rafaelsuchy
launchservicesd 0.6 1:23.81 5 0 0.0 0.00 147 root
TouchBarServer 0.2 1:19.77 4 0 0.0 35.91 296 root
Dropbox 0.2 10:10.72 145 4 0.0 0.00 850 rafaelsuchy
bluetoothd 0.1 5:23.11 4 0 0.0 0.00 166 root
Safari 0.1 5:20.86 9 0 0.0 0.07 368 rafaelsuchy
Finder 0.1 2:32.71 8 0 0.0 0.02 463 rafaelsuchy
Safari Networking 0.1 3:50.10 9 1 0.0 0.00 480 rafaelsuchy
System: 0.67%
User: 64.55%
Idle: 34.78%
CPU LOAD
Threads: 1,922
Processes: 446
python caller_scalability_analysis.py
Iteration 180
Iteration 181
Iteration 182
Iteration 183
Iteration 184
Iteration 185
Iteration 186
Iteration 187
Iteration 188
Iteration 189
Iteration 190
Iteration 191
Iteration 192
Iteration 193
Iteration 194
Iteration 195
Iteration 196
Iteration 197
Iteration 198
Iteration 199
Iteration 200
CPU History
Core 1
Core 2
Core 3
Core 4
Core 5
Core 6
Core 7
Core 8
Activity Monitor (All Processes)
CPU Memory Energy Disk Network
Search
Process Name % CPU CPU Time Threads Idle Wake Ups % GPU GPU Time PID User
python3.7 499.6 17:56.44 7 0 0.0 0.00 16455 rafaelsuchy
Activity Monitor 11.8 11:07.82 8 2 0.0 0.00 15499 rafaelsuchy
WindowServer 4.6 1:25:55.05 8 23 0.0 1:02:46.21 239 _windowserver
iTerm2 2.5 1:14.37 5 40 0.0 0.00 15080 rafaelsuchy
sysmond 0.8 1:34.92 3 1 0.0 0.00 981 root
kernel_task 0.7 1:06:01.36 245 280 0.0 0.00 0 root
knowledge-agent 0.7 1:35.07 4 1 0.0 0.00 359 rafaelsuchy
launchservicesd 0.6 1:24.64 4 0 0.0 0.00 147 root
com.apple.geod 0.1 33.64 5 0 0.0 0.00 430 rafaelsuchy
apsd 0.1 23.75 4 0 0.0 0.00 146 root
Dropbox 0.1 10:10.86 143 4 0.0 0.00 850 rafaelsuchy
pidinfo 0.0 1.44 5 0 0.0 0.00 15094 rafaelsuchy
routined 0.0 4:44.32 3 0 0.0 0.00 379 rafaelsuchy
rapportd 0.0 1:09.78 3 0 0.0 0.00 377 rafaelsuchy
System: 0.60%
User: 64.65%
Idle: 34.74%
CPU LOAD
Threads: 1,882
Processes: 446
python caller_scalability_analysis.py
Iteration 481
Iteration 482
Iteration 483
Iteration 484
Iteration 485
Iteration 486
Iteration 487
Iteration 488
Iteration 489
Iteration 490
Iteration 491
Iteration 492
Iteration 493
Iteration 494
Iteration 495
Iteration 496
Iteration 497
Iteration 498
Iteration 499
{'NUMBA_NUM_THREADS': '6', 'MKL_NUM_THREADS': '6', 'OMP_NUM_THREADS': '6', 'OPENBLAS_NUM_THREADS': '6', 'NUMEXPR_NUM_THREADS': '6'}
Nmber of threads 6
3
CPU History
Core 1
Core 2
Core 3
Core 4
Core 5
Core 6
Core 7
Core 8

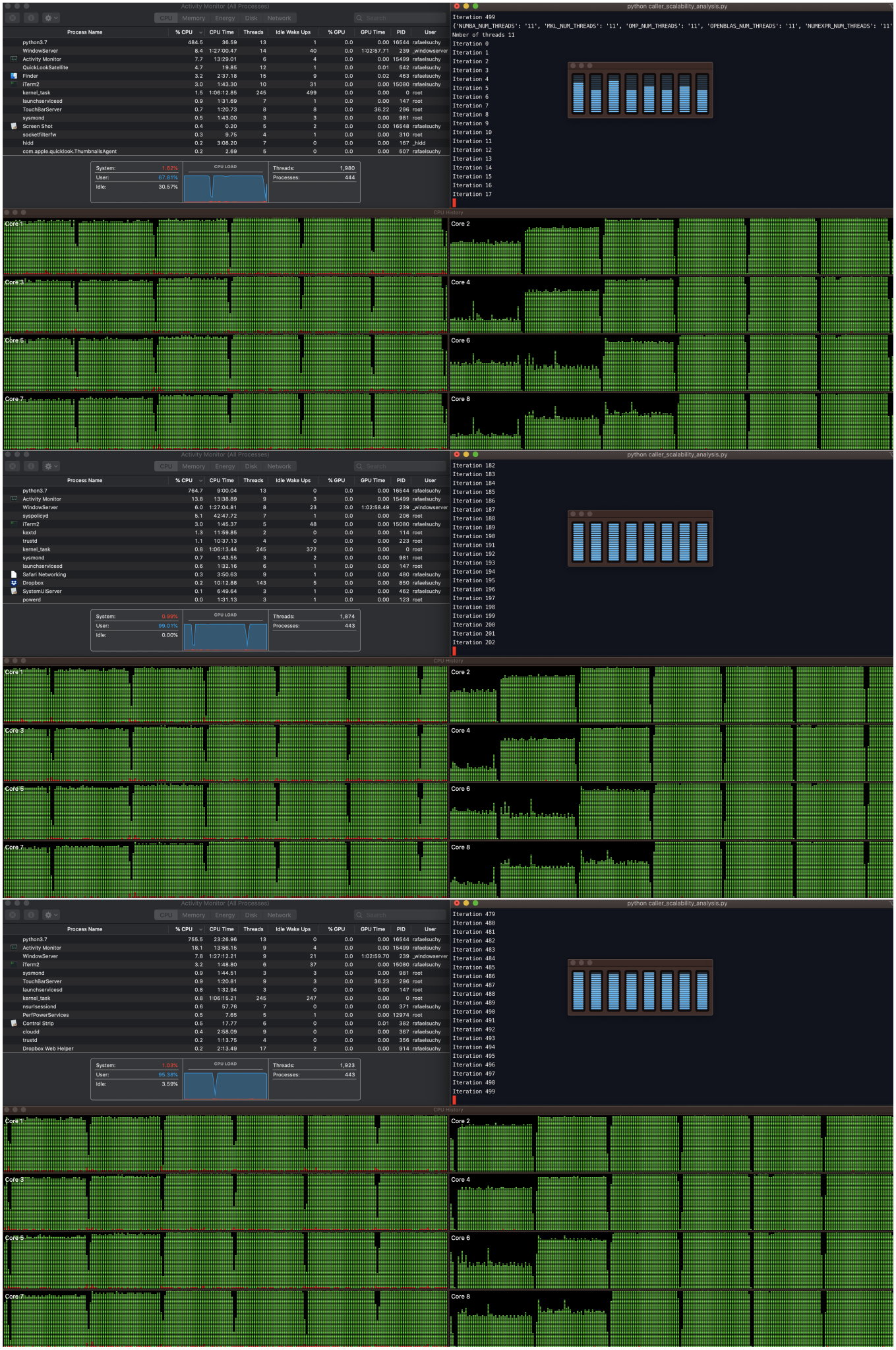

Activity Monitor (All Processes)
CPU Memory Energy Disk Network
Search
Process Name % CPU CPU Time Threads Idle Wake Ups % GPU GPU Time PID User
python3.7 599.2 1:06.39 8 0 0.0 0.00 16467 rafaelsuchy
Activity Monitor 11.8 11:09.97 8 3 0.0 0.00 15499 rafaelsuchy
WindowServer 5.1 1:25:56.53 10 25 0.0 1:02:46.47 239 _windowserver
iTerm2 2.8 1:14.79 6 41 0.0 0.00 15080 rafaelsuchy
launchd 1.2 6:38.89 3 0 0.0 0.00 1 root
kernel_task 1.0 1:06:01.63 245 323 0.0 0.00 0 root
Finder 0.9 2:33.24 10 1 0.0 0.02 463 rafaelsuchy
sysmond 0.8 1:35.05 3 0 0.0 0.00 981 root
launchservicesd 0.7 1:24.80 7 0 0.0 0.00 147 root
loginwindow 0.2 45.99 5 0 0.0 0.01 199 rafaelsuchy
bluetoothd 0.2 5:23.33 5 0 0.0 0.00 166 root
Dropbox 0.1 10:10.89 143 5 0.0 0.00 850 rafaelsuchy
https://www.geeksforgeeks.org 0.1 4.34 8 0 0.0 0.06 16239 rafaelsuchy
powerd 0.1 1:30.71 4 0 0.0 0.00 123 root
System: 0.85%
User: 77.26%
Idle: 21.89%
CPU LOAD
Threads: 1,914
Processes: 449
CPU History
Core 1
Core 2
Core 3
Core 4
Core 5
Core 6
Core 7
Core 8
python caller_scalability_analysis.py
Iteration 5
Iteration 6
Iteration 7
Iteration 8
Iteration 9
Iteration 10
Iteration 11
Iteration 12
Iteration 13
Iteration 14
Iteration 15
Iteration 16
Iteration 17
Iteration 18
Iteration 19
Iteration 20
Iteration 21
Iteration 22
Iteration 23
Iteration 24
Iteration 25
Activity Monitor (All Processes)
CPU Memory Energy Disk Network
Search
Process Name % CPU CPU Time Threads Idle Wake Ups % GPU GPU Time PID User
python3.7 598.9 8:14.00 8 0 0.0 0.00 16467 rafaelsuchy
Activity Monitor 13.3 11:18.62 7 2 0.0 0.00 15499 rafaelsuchy
WindowServer 5.7 1:26:00.51 10 23 0.0 1:02:47.23 239 _windowserver
iTerm2 2.8 1:16.76 5 40 0.0 0.00 15080 rafaelsuchy
sysmond 0.9 1:35.61 3 0 0.0 0.00 981 root
launchservicesd 0.7 1:25.29 3 0 0.0 0.00 147 root
kernel_task 0.7 1:06:02.20 245 245 0.0 0.00 0 root
com.apple.geod 0.1 33.66 5 0 0.0 0.00 430 rafaelsuchy
Dropbox 0.1 10:10.97 143 4 0.0 0.00 850 rafaelsuchy
pidinfo 0.0 1.48 5 0 0.0 0.00 15094 rafaelsuchy
powerd 0.0 1:30.73 3 0 0.0 0.00 123 root
Dropbox Web Helper 0.0 2:12.96 16 1 0.0 0.00 914 rafaelsuchy
bluetoothd 0.0 5:23.44 4 0 0.0 0.00 166 root
configd 0.0 10.76 8 0 0.0 0.00 121 root
System: 0.68%
User: 77.35%
Idle: 21.97%
CPU LOAD
Threads: 1,877
Processes: 446
CPU History
Core 1
Core 2
Core 3
Core 4
Core 5
Core 6
Core 7
Core 8
python caller_scalability_analysis.py
Iteration 181
Iteration 182
Iteration 183
Iteration 184
Iteration 185
Iteration 186
Iteration 187
Iteration 188
Iteration 189
Iteration 190
Iteration 191
Iteration 192
Iteration 193
Iteration 194
Iteration 195
Iteration 196
Iteration 197
Iteration 198
Iteration 199
Iteration 200
Iteration 201
Activity Monitor (All Processes)
CPU Memory Energy Disk Network
Search
Process Name % CPU CPU Time Threads Idle Wake Ups % GPU GPU Time PID User
python3.7 599.1 20:12.88 8 0 0.0 0.00 16467 rafaelsuchy
Activity Monitor 11.9 11:33.16 9 3 0.0 0.00 15499 rafaelsuchy
WindowServer 4.9 1:26:07.01 9 25 0.0 1:02:48.52 239 _windowserver
iTerm2 2.8 1:19.97 5 41 0.0 0.00 15080 rafaelsuchy
sysmond 0.8 1:36.56 3 0 0.0 0.00 981 root
kernel_task 0.7 1:06:03.09 245 236 0.0 0.00 0 root
launchservicesd 0.6 1:26.10 4 0 0.0 0.00 147 root
bluetoothd 0.2 5:23.60 4 0 0.0 0.00 166 root
com.apple.geod 0.1 33.69 5 1 0.0 0.00 430 rafaelsuchy
Dropbox 0.1 10:11.09 143 4 0.0 0.00 850 rafaelsuchy
pidinfo 0.0 1.52 4 0 0.0 0.00 15094 rafaelsuchy
sharingd 0.0 2:45.63 7 1 0.0 0.00 432 rafaelsuchy
Dropbox Web Helper 0.0 2:13.02 17 1 0.0 0.00 914 rafaelsuchy
logd 0.0 1:13.62 3 0 0.0 0.00 127 root
System: 0.70%
User: 77.05%
Idle: 22.25%
CPU LOAD
Threads: 1,878
Processes: 446
CPU History
Core 1
Core 2
Core 3
Core 4
Core 5
Core 6
Core 7
Core 8
python caller_scalability_analysis.py
Iteration 481
Iteration 482
Iteration 483
Iteration 484
Iteration 485
Iteration 486
Iteration 487
Iteration 488
Iteration 489
Iteration 490
Iteration 491
Iteration 492
Iteration 493
Iteration 494
Iteration 495
Iteration 496
Iteration 497
Iteration 498
Iteration 499
{'NUMBA_NUM_THREADS': '7', 'MKL_NUM_THREADS': '7', 'OMP_NUM_THREADS': '7', 'OPENBLAS_NUM_THREADS': '7', 'NUMEXPR_NUM_THREADS': '7'}
Nmber of threads 7


Activity Monitor (All Processes)
python caller_scalability_analysis.py
Iteration 498
Iteration 499
{'NUMBA_NUM_THREADS': '7', 'MKL_NUM_THREADS': '7', 'OMP_NUM_THREADS': '7', 'OPENBLAS_NUM_THREADS': '7', 'NUMEXPR_NUM_THREADS': '7'}
Nmber of threads 7
CPU LOAD
CPU History
Core 1
Core 2
Core 3
Core 4
Core 5
Core 6
Core 7
Core 8
{'NUMBA_NUM_THREADS': '8', 'MKL_NUM_THREADS': '8', 'OMP_NUM_THREADS': '8', 'OPENBLAS_NUM_THREADS': '8', 'NUMEXPR_NUM_THREADS': '8'}
Nmber of threads 8


Activity Monitor (All Processes)
CPU Memory Energy Disk Network
Search
Process Name % CPU CPU Time Threads Idle Wake Ups % GPU GPU Time PID User
python3.7 622.2 48.04 10 1 0.0 0.00 16501 rafaelsuchy
WindowServer 10.8 1:26:21.38 11 37 0.0 1:02:50.99 239 _windowserver
Activity Monitor 8.3 12:04.17 5 3 0.0 0.00 15499 rafaelsuchy
QuickLookSatellite 4.1 16.82 12 5 0.0 0.01 542 rafaelsuchy
syspolicyd 4.1 42:29.97 7 0 0.0 0.00 206 root
iTerm2 3.7 1:26.07 10 47 0.0 0.00 15080 rafaelsuchy
Finder 2.7 2:34.63 15 9 0.0 0.02 463 rafaelsuchy
kernel_task 1.3 1:06:05.88 245 490 0.0 0.00 0 root
trustd 1.0 10:33.14 5 1 0.0 0.00 223 root
kextd 1.0 11:55.40 2 0 0.0 0.00 114 root
launchservicesd 0.8 1:27.63 6 0 0.0 0.00 147 root
TouchBarServer 0.8 1:20.34 9 8 0.0 36.11 296 root
sysmond 0.5 1:38.31 3 5 0.0 0.00 981 root
Dropbox 0.3 10:11.73 144 6 0.0 0.00 850 rafaelsuchy
System: 1.27%
User: 86.10%
Idle: 13.63%
CPU LOAD
Threads: 1,980
Processes: 442
python caller_scalability_analysis.py
Iteration 499
{'NUMBA_NUM_THREADS': '8', 'MKL_NUM_THREADS': '8', 'OMP_NUM_THREADS': '8', 'OPENBLAS_NUM_THREADS': '8', 'NUMEXPR_NUM_THREADS': '8'}
Nmber of threads 8
Iteration 0
Iteration 1
Iteration 2
Iteration 3
Iteration 4
Iteration 5
Iteration 6
Iteration 7
Iteration 8
Iteration 9
Iteration 10
Iteration 11
Iteration 12
Iteration 13
Iteration 14
Iteration 15
Iteration 16
Iteration 17
CPU History
Core 1
Core 2
Core 3
Core 4
Core 5
Core 6
Core 7
Core 8
Activity Monitor (All Processes)
CPU Memory Energy Disk Network
Search
Process Name % CPU CPU Time Threads Idle Wake Ups % GPU GPU Time PID User
python3.7 775.1 9:11.85 10 0 0.0 0.00 16501 rafaelsuchy
Activity Monitor 12.2 12:13.96 6 4 0.0 0.00 15499 rafaelsuchy
WindowServer 6.0 1:26:26.11 9 25 0.0 1:02:51.74 239 _windowserver
iTerm2 3.1 1:28.13 6 61 0.0 0.00 15080 rafaelsuchy
sysmond 0.7 1:38.85 3 7 0.0 0.00 981 root
launchservicesd 0.6 1:28.10 5 0 0.0 0.00 147 root
kernel_task 0.6 1:06:06.44 245 270 0.0 0.00 0 root
Dropbox 0.3 10:11.83 143 7 0.0 0.00 850 rafaelsuchy
bluetoothd 0.1 5:24.08 4 0 0.0 0.00 166 root
pidinfo 0.0 1.63 5 1 0.0 0.00 15094 rafaelsuchy
Dropbox Web Helper 0.0 2:13.15 17 2 0.0 0.00 914 rafaelsuchy
locationd 0.0 17.92 4 2 0.0 0.00 153 _locationd
sharingd 0.0 2:45.72 6 0 0.0 0.00 432 rafaelsuchy
PerfPowerServices 0.0 7.52 5 0 0.0 0.00 12974 root
System: 0.62%
User: 99.25%
Idle: 0.13%
CPU LOAD
Threads: 1,881
Processes: 442
python caller_scalability_analysis.py
Iteration 180
Iteration 181
Iteration 182
Iteration 183
Iteration 184
Iteration 185
Iteration 186
Iteration 187
Iteration 188
Iteration 189
Iteration 190
Iteration 191
Iteration 192
Iteration 193
Iteration 194
Iteration 195
Iteration 196
Iteration 197
Iteration 198
Iteration 199
Iteration 200
CPU History
Core 1
Core 2
Core 3
Core 4
Core 5
Core 6
Core 7
Core 8
Activity Monitor (All Processes)
CPU Memory Energy Disk Network
Search
Process Name % CPU CPU Time Threads Idle Wake Ups % GPU GPU Time PID User
python3.7 687.9 23:25.59 10 0 0.0 0.00 16501 rafaelsuchy
Activity Monitor 24.8 12:31.25 9 3 0.0 0.00 15499 rafaelsuchy
WindowServer 10.6 1:26:34.33 9 20 0.0 1:02:52.97 239 _windowserver
syspolicyd 9.4 42:35.07 7 0 0.0 0.00 206 root
iTerm2 3.4 1:31.52 6 30 0.0 0.00 15080 rafaelsuchy
kextd 2.4 11:56.67 2 0 0.0 0.00 114 root
trustd 2.1 10:34.27 4 1 0.0 0.00 223 root
sysmond 1.3 1:39.81 3 3 0.0 0.00 981 root
Control Strip 1.2 17.57 6 1 0.0 0.01 382 rafaelsuchy
launchservicesd 1.1 1:28.87 4 0 0.0 0.00 147 root
kernel_task 1.0 1:06:08.23 245 239 0.0 0.00 0 root
Finder 0.5 2:35.26 9 1 0.0 0.02 463 rafaelsuchy
TouchBarServer 0.4 1:20.38 4 0 0.0 36.11 296 root
Safari 0.2 5:20.95 9 3 0.0 0.07 368 rafaelsuchy
System: 1.35%
User: 87.75%
Idle: 10.90%
CPU LOAD
Threads: 1,924
Processes: 442
python caller_scalability_analysis.py
Iteration 481
Iteration 482
Iteration 483
Iteration 484
Iteration 485
Iteration 486
Iteration 487
Iteration 488
Iteration 489
Iteration 490
Iteration 491
Iteration 492
Iteration 493
Iteration 494
Iteration 495
Iteration 496
Iteration 497
Iteration 498
Iteration 499
{'NUMBA_NUM_THREADS': '9', 'MKL_NUM_THREADS': '9', 'OMP_NUM_THREADS': '9', 'OPENBLAS_NUM_THREADS': '9', 'NUMEXPR_NUM_THREADS': '9'}
Nmber of threads 9
CPU History
Core 1
Core 2
Core 3
Core 4
Core 5
Core 6
Core 7
Core 8


Activity Monitor (All Processes)
CPU Memory Energy Disk Network
Search
Process Name % CPU CPU Time Threads Idle Wake Ups % GPU GPU Time PID User
python3.7 304.2 20.85 11 1 0.0 0.00 16513 rafaelsuchy
Activity Monitor 9.2 12:32.27 8 3 0.0 0.00 15499 rafaelsuchy
WindowServer 9.1 1:26:35.33 14 38 0.0 1:02:53.12 239 _windowserver
QuickLookSatellite 5.1 17.82 12 1 0.0 0.01 542 rafaelsuchy
Finder 3.4 2:35.45 15 9 0.0 0.02 463 rafaelsuchy
syspolicyd 3.2 42:35.24 7 0 0.0 0.00 206 root
iTerm2 2.3 1:31.68 10 16 0.0 0.00 15080 rafaelsuchy
kernel_task 2.1 1:06:08.41 245 518 0.0 0.00 0 root
trustd 1.0 10:34.32 4 0 0.0 0.00 223 root
launchservicesd 0.9 1:28.97 8 0 0.0 0.00 147 root
TouchBarServer 0.9 1:20.48 9 7 0.0 36.13 296 root
kextd 0.8 11:56.72 2 0 0.0 0.00 114 root
sysmond 0.6 1:39.87 3 1 0.0 0.00 981 root
Screen Shot 0.5 0.20 5 1 0.0 0.00 16517 rafaelsuchy
System: 1.98%
User: 44.06%
Idle: 53.97%
CPU LOAD
Threads: 1,966
Processes: 442
python caller_scalability_analysis.py
Iteration 499
{'NUMBA_NUM_THREADS': '9', 'MKL_NUM_THREADS': '9', 'OMP_NUM_THREADS': '9', 'OPENBLAS_NUM_THREADS': '9', 'NUMEXPR_NUM_THREADS': '9'}
Nmber of threads 9
Iteration 0
Iteration 1
Iteration 2
Iteration 3
Iteration 4
Iteration 5
Iteration 6
Iteration 7
Iteration 8
Iteration 9
Iteration 10
Iteration 11
Iteration 12
Iteration 13
Iteration 14
Iteration 15
Iteration 16
Iteration 17
CPU History
Core 1
Core 2
Core 3
Core 4
Core 5
Core 6
Core 7
Core 8
Activity Monitor (All Processes)
CPU Memory Energy Disk Network
Search
Process Name % CPU CPU Time Threads Idle Wake Ups % GPU GPU Time PID User
python3.7 764.9 9:23.51 11 0 0.0 0.00 16513 rafaelsuchy
Activity Monitor 19.6 12:42.75 7 2 0.0 0.00 15499 rafaelsuchy
syspolicyd 7.5 42:37.23 7 0 0.0 0.00 206 root
WindowServer 6.6 1:26:40.15 9 16 0.0 1:02:53.93 239 _windowserver
iTerm2 3.0 1:33.89 6 32 0.0 0.00 15080 rafaelsuchy
kextd 1.9 11:57.22 2 0 0.0 0.00 114 root
airportd 1.9 1:31.69 9 0 0.0 0.00 221 root
trustd 1.7 10:34.77 5 0 0.0 0.00 223 root
sysmond 1.1 1:40.44 3 1 0.0 0.00 981 root
kernel_task 0.7 1:06:09.00 245 235 0.0 0.00 0 root
launchservicesd 0.7 1:29.47 5 0 0.0 0.00 147 root
Dropbox 0.1 10:12.07 143 3 0.0 0.00 850 rafaelsuchy
logd 0.0 1:13.75 4 0 0.0 0.00 127 root
Dropbox Web Helper 0.0 2:13.25 17 2 0.0 0.00 914 rafaelsuchy
System: 0.82%
User: 99.18%
Idle: 0.00%
CPU LOAD
Threads: 1,864
Processes: 442
python caller_scalability_analysis.py
Iteration 179
Iteration 180
Iteration 181
Iteration 182
Iteration 183
Iteration 184
Iteration 185
Iteration 186
Iteration 187
Iteration 188
Iteration 189
Iteration 190
Iteration 191
Iteration 192
Iteration 193
Iteration 194
Iteration 195
Iteration 196
Iteration 197
Iteration 198
Iteration 199
CPU History
Core 1
Core 2
Core 3
Core 4
Core 5
Core 6
Core 7
Core 8
Activity Monitor (All Processes)
CPU Memory Energy Disk Network
Search
Process Name % CPU CPU Time Threads Idle Wake Ups % GPU GPU Time PID User
python3.7 740.8 23:25.27 11 0 0.0 0.00 16513 rafaelsuchy
Activity Monitor 15.7 12:59.18 9 2 0.0 0.00 15499 rafaelsuchy
syspolicyd 6.0 42:40.34 8 0 0.0 0.00 206 root
WindowServer 4.7 1:26:45.94 9 25 0.0 1:02:55.17 239 _windowserver
iTerm2 3.0 1:37.20 5 42 0.0 0.00 15080 rafaelsuchy
kextd 1.5 11:57.99 2 0 0.0 0.00 114 root
trustd 1.3 10:35.45 4 0 0.0 0.00 223 root
sysmond 0.8 1:41.33 3 0 0.0 0.00 981 root
kernel_task 0.8 1:06:09.90 245 250 0.0 0.00 0 root
launchservicesd 0.7 1:30.22 4 0 0.0 0.00 147 root
https://www.geeksforgeeks.org 0.3 19.37 15 1 0.0 0.68 14704 rafaelsuchy
Finder 0.2 2:36.11 10 1 0.0 0.02 463 rafaelsuchy
opendirectoryd 0.2 44.38 12 0 0.0 0.00 145 root
mds 0.2 1:27.25 8 4 0.0 0.00 135 root
System: 1.27%
User: 94.79%
Idle: 3.94%
CPU LOAD
Threads: 1,893
Processes: 439
python caller_scalability_analysis.py
Iteration 481
Iteration 482
Iteration 483
Iteration 484
Iteration 485
Iteration 486
Iteration 487
Iteration 488
Iteration 489
Iteration 490
Iteration 491
Iteration 492
Iteration 493
Iteration 494
Iteration 495
Iteration 496
Iteration 497
Iteration 498
Iteration 499
{'NUMBA_NUM_THREADS': '10', 'MKL_NUM_THREADS': '10', 'OMP_NUM_THREADS': '10', 'OPENBLAS_NUM_THREADS': '10', 'NUMEXPR_NUM_THREADS': '10'}
Nmber of threads 10
CPU History
Core 1
Core 2
Core 3
Core 4
Core 5
Core 6
Core 7
Core 8


Activity Monitor (All Processes)
CPU Memory Energy Disk Network
Search
Process Name % CPU CPU Time Threads Idle Wake Ups % GPU GPU Time PID User
python3.7 761.9 48.29 12 0 0.0 0.00 16530 rafaelsuchy
Activity Monitor 13.1 13:00.87 6 3 0.0 0.00 15499 rafaelsuchy
WindowServer 5.3 1:26:47.13 10 30 0.0 1:02:55.37 239 _windowserver
iTerm2 3.7 1:37.46 9 43 0.0 0.00 15080 rafaelsuchy
Finder 2.6 2:36.38 10 2 0.0 0.02 463 rafaelsuchy
kernel_task 1.0 1:06:10.11 245 354 0.0 0.00 0 root
launchservicesd 0.8 1:30.35 6 0 0.0 0.00 147 root
sysmond 0.6 1:41.41 3 1 0.0 0.00 981 root
UserNotificationCenter 0.5 0.23 10 2 0.0 0.00 16537 rafaelsuchy
TouchBarServer 0.4 1:20.61 8 3 0.0 36.19 296 root
loginwindow 0.2 46.33 5 0 0.0 0.01 199 rafaelsuchy
Dropbox 0.2 10:12.26 144 5 0.0 0.00 850 rafaelsuchy
bluetoothd 0.2 5:24.62 4 0 0.0 0.00 166 root
authd 0.1 3.41 4 0 0.0 0.00 205 root
System: 0.90%
User: 99.10%
Idle: 0.00%
CPU LOAD
Threads: 1,941
Processes: 446
python caller_scalability_analysis.py
Iteration 498
Iteration 499
{'NUMBA_NUM_THREADS': '10', 'MKL_NUM_THREADS': '10', 'OMP_NUM_THREADS': '10', 'OPENBLAS_NUM_THREADS': '10', 'NUMEXPR_NUM_THREADS': '10'
Nmber of threads 10
Iteration 0
Iteration 1
Iteration 2
Iteration 3
Iteration 4
Iteration 5
Iteration 6
Iteration 7
Iteration 8
Iteration 9
Iteration 10
Iteration 11
Iteration 12
Iteration 13
Iteration 14
Iteration 15
Iteration 16
CPU History
Core 1
Core 2
Core 3
Core 4
Core 5
Core 6
Core 7
Core 8
Activity Monitor (All Processes)
CPU Memory Energy Disk Network
Search
Process Name % CPU CPU Time Threads Idle Wake Ups % GPU GPU Time PID User
python3.7 752.5 9:06.01 12 0 0.0 0.00 16530 rafaelsuchy
Activity Monitor 20.2 13:10.76 8 2 0.0 0.00 15499 rafaelsuchy
syspolicyd 7.8 42:42.49 7 0 0.0 0.00 206 root
WindowServer 6.7 1:26:52.02 9 26 0.0 1:02:56.22 239 _windowserver
iTerm2 3.1 1:39.62 7 30 0.0 0.00 15080 rafaelsuchy
kextd 2.0 11:58.53 2 0 0.0 0.00 114 root
trustd 1.7 10:35.94 5 0 0.0 0.00 223 root
sysmond 1.1 1:42.00 3 1 0.0 0.00 981 root
kernel_task 0.9 1:06:11.73 245 275 0.0 0.00 0 root
nsurlsessiond 0.7 57.63 7 0 0.0 0.00 371 rafaelsuchy
launchservicesd 0.7 1:30.81 4 0 0.0 0.00 147 root
cloudd 0.5 2:58.00 9 0 0.0 0.00 367 rafaelsuchy
secd 0.1 32.49 2 0 0.0 0.00 358 rafaelsuchy
accountsd 0.1 2:06.76 3 0 0.0 0.00 361 rafaelsuchy
System: 0.88%
User: 99.09%
Idle: 0.04%
CPU LOAD
Threads: 1,914
Processes: 444
python caller_scalability_analysis.py
Iteration 181
Iteration 182
Iteration 183
Iteration 184
Iteration 185
Iteration 186
Iteration 187
Iteration 188
Iteration 189
Iteration 190
Iteration 191
Iteration 192
Iteration 193
Iteration 194
Iteration 195
Iteration 196
Iteration 197
Iteration 198
Iteration 199
Iteration 200
Iteration 201
CPU History
Core 1
Core 2
Core 3
Core 4
Core 5
Core 6
Core 7
Core 8
Activity Monitor (All Processes)
CPU Memory Energy Disk Network
Search
Process Name % CPU CPU Time Threads Idle Wake Ups % GPU GPU Time PID User
python3.7 769.6 23:14.44 12 0 0.0 0.00 16530 rafaelsuchy
Activity Monitor 13.2 13:27.28 6 3 0.0 0.00 15499 rafaelsuchy
syspolicyd 4.8 42:45.60 7 0 0.0 0.00 206 root
WindowServer 4.5 1:26:59.18 9 26 0.0 1:02:57.57 239 _windowserver
iTerm2 3.0 1:43.01 6 52 0.0 0.00 15080 rafaelsuchy
kextd 1.2 11:59.31 2 0 0.0 0.00 114 root
trustd 1.0 10:36.62 4 0 0.0 0.00 223 root
kernel_task 0.8 1:06:12.64 245 320 0.0 0.00 0 root
sysmond 0.7 1:42.91 3 1 0.0 0.00 981 root
launchservicesd 0.6 1:31.56 5 0 0.0 0.00 147 root
Dropbox 0.2 10:12.69 143 5 0.0 0.00 850 rafaelsuchy
bluetoothd 0.1 5:24.98 4 0 0.0 0.00 166 root
https://www.geeksforgeeks.org 0.1 19.46 10 1 0.0 0.69 14704 rafaelsuchy
pidinfo 0.0 1.83 5 0 0.0 0.00 15094 rafaelsuchy
System: 0.75%
User: 99.23%
Idle: 0.02%
CPU LOAD
Threads: 1,870
Processes: 443
python caller_scalability_analysis.py
Iteration 481
Iteration 482
Iteration 483
Iteration 484
Iteration 485
Iteration 486
Iteration 487
Iteration 488
Iteration 489
Iteration 490
Iteration 491
Iteration 492
Iteration 493
Iteration 494
Iteration 495
Iteration 496
Iteration 497
Iteration 498
Iteration 499
{'NUMBA_NUM_THREADS': '11', 'MKL_NUM_THREADS': '11', 'OMP_NUM_THREADS': '11', 'OPENBLAS_NUM_THREADS': '11', 'NUMEXPR_NUM_THREADS': '11'
Nmber of threads 11
CPU History
Core 1
Core 2
Core 3
Core 4
Core 5
Core 6
Core 7
Core 8


Activity Monitor (All Processes)
CPU Memory Energy Disk Network
Search
Process Name % CPU CPU Time Threads Idle Wake Ups % GPU GPU Time PID User
python3.7 484.5 36:59 13 1 0.0 0.00 16544 rafaelsuchy
WindowServer 8.4 1:27:00.47 14 40 0.0 1:02:57.71 239 _windowserver
Activity Monitor 7.7 13:29.01 6 4 0.0 0.00 15499 rafaelsuchy
QuickLookSatellite 4.7 19.85 12 1 0.0 0.01 542 rafaelsuchy
Finder 3.2 2:37.18 15 9 0.0 0.02 463 rafaelsuchy
iTerm2 3.0 1:43.30 10 31 0.0 0.00 15080 rafaelsuchy
kernel_task 1.5 1:06:12.85 245 499 0.0 0.00 0 root
launchservicesd 0.9 1:31.69 7 1 0.0 0.00 147 root
TouchBarServer 0.7 1:20.73 8 8 0.0 36.22 296 root
sysmond 0.5 1:43.00 3 3 0.0 0.00 981 root
Screen Shot 0.4 0.20 5 2 0.0 0.00 16548 rafaelsuchy
socketfilterfw 0.3 9.75 4 1 0.0 0.00 310 root
hidd 0.2 3:08.20 7 0 0.0 0.00 167 _hidd
com.apple.quicklook.ThumbnailsAgent 0.2 2.69 5 0 0.0 0.00 507 rafaelsuchy
System: 1.62%
User: 67.81%
Idle: 30.57%
CPU LOAD
Threads: 1,980
Processes: 444
python caller_scalability_analysis.py
Iteration 499
{'NUMBA_NUM_THREADS': '11', 'MKL_NUM_THREADS': '11', 'OMP_NUM_THREADS': '11', 'OPENBLAS_NUM_THREADS': '11', 'NUMEXPR_NUM_THREADS': '11'
Nmber of threads 11
Iteration 0
Iteration 1
Iteration 2
Iteration 3
Iteration 4
Iteration 5
Iteration 6
Iteration 7
Iteration 8
Iteration 9
Iteration 10
Iteration 11
Iteration 12
Iteration 13
Iteration 14
Iteration 15
Iteration 16
Iteration 17
CPU History
Core 1
Core 2
Core 3
Core 4
Core 5
Core 6
Core 7
Core 8
Activity Monitor (All Processes)
CPU Memory Energy Disk Network
Search
Process Name % CPU CPU Time Threads Idle Wake Ups % GPU GPU Time PID User
python3.7 764.7 9:00.04 13 0 0.0 0.00 16544 rafaelsuchy
Activity Monitor 13.8 13:38.89 9 3 0.0 0.00 15499 rafaelsuchy
WindowServer 6.0 1:27:04.81 8 23 0.0 1:02:58.49 239 _windowserver
syspolicyd 5.1 42:47.72 7 1 0.0 0.00 206 root
iTerm2 3.0 1:45.37 5 48 0.0 0.00 15080 rafaelsuchy
kextd 1.3 11:59.85 2 0 0.0 0.00 114 root
trustd 1.1 10:37.13 4 0 0.0 0.00 223 root
kernel_task 0.8 1:06:13.44 245 372 0.0 0.00 0 root
sysmond 0.7 1:43.55 3 2 0.0 0.00 981 root
launchservicesd 0.6 1:32.16 6 1 0.0 0.00 147 root
Safari Networking 0.3 3:50.63 9 1 0.0 0.00 480 rafaelsuchy
Dropbox 0.2 10:12.88 143 5 0.0 0.00 850 rafaelsuchy
SystemUIServer 0.1 6:49.64 3 1 0.0 0.00 462 rafaelsuchy
powerd 0.0 1:31.13 3 1 0.0 0.00 123 root
System: 0.99%
User: 99.01%
Idle: 0.00%
CPU LOAD
Threads: 1,874
Processes: 443
python caller_scalability_analysis.py
Iteration 182
Iteration 183
Iteration 184
Iteration 185
Iteration 186
Iteration 187
Iteration 188
Iteration 189
Iteration 190
Iteration 191
Iteration 192
Iteration 193
Iteration 194
Iteration 195
Iteration 196
Iteration 197
Iteration 198
Iteration 199
Iteration 200
Iteration 201
Iteration 202
CPU History
Core 1
Core 2
Core 3
Core 4
Core 5
Core 6
Core 7
Core 8
Activity Monitor (All Processes)
CPU Memory Energy Disk Network
Search
Process Name % CPU CPU Time Threads Idle Wake Ups % GPU GPU Time PID User
python3.7 755.5 23:26.96 13 0 0.0 0.00 16544 rafaelsuchy
Activity Monitor 18.1 13:56.15 9 4 0.0 0.00 15499 rafaelsuchy
WindowServer 7.8 1:27:12.21 9 21 0.0 1:02:59.70 239 _windowserver
iTerm2 3.2 1:48.80 6 37 0.0 0.00 15080 rafaelsuchy
sysmond 0.9 1:44.51 3 3 0.0 0.00 981 root
TouchBarServer 0.9 1:20.81 9 3 0.0 36.23 296 root
launchservicesd 0.8 1:32.94 3 0 0.0 0.00 147 root
kernel_task 0.8 1:06:15.21 245 247 0.0 0.00 0 root
nsurlsessiond 0.6 57.76 7 0 0.0 0.00 371 rafaelsuchy
PerfPowerServices 0.5 7.65 5 1 0.0 0.00 12974 root
Control Strip 0.5 17.77 6 0 0.0 0.01 382 rafaelsuchy
cloudd 0.4 2:58.09 9 0 0.0 0.00 367 rafaelsuchy
trustd 0.2 1:13.75 4 0 0.0 0.00 356 rafaelsuchy
Dropbox Web Helper 0.2 2:13.49 17 2 0.0 0.00 914 rafaelsuchy
System: 1.03%
User: 95.38%
Idle: 3.59%
CPU LOAD
Threads: 1,923
Processes: 443
python caller_scalability_analysis.py
Iteration 479
Iteration 480
Iteration 481
Iteration 482
Iteration 483
Iteration 484
Iteration 485
Iteration 486
Iteration 487
Iteration 488
Iteration 489
Iteration 490
Iteration 491
Iteration 492
Iteration 493
Iteration 494
Iteration 495
Iteration 496
Iteration 497
Iteration 498
Iteration 499
CPU History
Core 1
Core 2
Core 3
Core 4
Core 5
Core 6
Core 7
Core 8