

```
nbody.py
326007606 function calls in 56.558 seconds

Ordered by: cumulative time

ncalls  tottime  percall  cuntime  percall  filename:lineno(function)
1      0.000    0.000   56.558   56.558 {built-in method builtins.exec}
1      0.000    0.000   56.558   56.558 nbody.py:1(<module>)
1      0.238    0.238   56.558   56.558 nbody.py:125(nbody)
2000000 12.970    0.000   56.319    0.000 nbody.py:67(advance)
20000000 15.238    0.000   39.451    0.000 nbody.py:54(update_vs)
120000000 11.496    0.000   24.212    0.000 nbody.py:47(compute_b)
120000000 12.716    0.000   12.716    0.000 nbody.py:51(compute_mag)
10000000 1.589    0.000    1.589    0.000 nbody.py:62(update_rs)
20002000 1.219    0.000    1.219    0.000 nbody.py:44(compute_deltas)
20002000 0.642    0.000    0.642    0.000 {method 'append' of 'list' objects}
14001401 0.449    0.000    0.449    0.000 {method 'keys' of 'dict' objects}
200     0.001    0.000    0.002    0.000 nbody.py:88(report_energy)
2000    0.000    0.000    0.000    0.000 nbody.py:85(compute_energy)
1      0.000    0.000    0.000    0.000 nbody.py:108(offset_momentum)
1      0.000    0.000    0.000    0.000 {method 'disable' of '_lsprof.Profiler' objects}
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```
nbody_1.py
116005606 function calls in 26.535 seconds

Ordered by: cumulative time

ncalls  tottime  percall  cuntime  percall  filename:lineno(function)
1      0.000    0.000   26.535   26.535 {built-in method builtins.exec}
1      0.000    0.000   26.535   26.535 nbody_1.py:1(<module>)
1      0.226    0.226   26.535   26.535 nbody_1.py:143(nbody)
2000000 17.393    0.000   26.307    0.000 nbody_1.py:80(advance)
40000000 3.701    0.000    7.976    0.000 nbody_1.py:54(compute_b)
40000000 4.274    0.000    4.274    0.000 nbody_1.py:59(compute_mag)
20002000 0.560    0.000    0.560    0.000 {method 'append' of 'list' objects}
14001401 0.379    0.000    0.379    0.000 {method 'keys' of 'dict' objects}
200     0.001    0.000    0.002    0.000 nbody_1.py:118(report_energy)
2000    0.000    0.000    0.000    0.000 nbody_1.py:114(compute_energy)
1      0.000    0.000    0.000    0.000 nbody_1.py:140(offset_momentum)
1      0.000    0.000    0.000    0.000 {method 'disable' of '_lsprof.Profiler' objects}
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```
nbody_2.py
314006406 function calls in 54.200 seconds

Ordered by: cumulative time

ncalls  tottime  percall  cuntime  percall  filename:lineno(function)
1      0.000    0.000   54.200   54.200 {built-in method builtins.exec}
1      0.000    0.000   54.200   54.200 nbody_2.py:1(<module>)
1      0.271    0.271   54.200   54.200 nbody_2.py:131(nbody)
2000000 11.345    0.000   53.927    0.000 nbody_2.py:78(advance)
20000000 15.102    0.000   39.136    0.000 nbody_2.py:63(update_vs)
120000000 11.357    0.000   24.034    0.000 nbody_2.py:54(compute_b)
120000000 12.677    0.000   12.677    0.000 nbody_2.py:59(compute_mag)
10000000 1.561    0.000    1.561    0.000 nbody_2.py:72(update_rs)
20002000 1.175    0.000    1.175    0.000 nbody_2.py:50(compute_deltas)
20002000 0.636    0.000    0.636    0.000 {method 'add' of 'set' objects}
2000201 0.074    0.000    0.074    0.000 {method 'keys' of 'dict' objects}
200     0.001    0.000    0.002    0.000 nbody_2.py:103(report_energy)
2000    0.000    0.000    0.000    0.000 nbody_2.py:99(compute_energy)
1      0.000    0.000    0.000    0.000 nbody_2.py:126(offset_momentum)
1      0.000    0.000    0.000    0.000 {method 'disable' of '_lsprof.Profiler' objects}
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```
nbody_3.py
326007606 function calls in 56.018 seconds

Ordered by: cumulative time

ncalls  tottime  percall  cuntime  percall  filename:lineno(function)
1      0.000    0.000   56.018   56.018 {built-in method builtins.exec}
1      0.000    0.000   56.018   56.018 nbody_3.py:1(<module>)
1      0.243    0.243   56.018   56.018 nbody_3.py:101(nbody)
2000000 12.780    0.000   55.773    0.000 nbody_3.py:34(advance)
20000000 15.183    0.000   39.104    0.000 nbody_3.py:19(update_vs)
120000000 11.179    0.000   23.921    0.000 nbody_3.py:10(compute_b)
120000000 12.743    0.000   12.743    0.000 nbody_3.py:15(compute_mag)
10000000 1.603    0.000    1.603    0.000 nbody_3.py:28(update_rs)
20002000 1.206    0.000    1.206    0.000 nbody_3.py:6(compute_deltas)
20002000 0.633    0.000    0.633    0.000 {method 'append' of 'list' objects}
14001401 0.447    0.000    0.447    0.000 {method 'keys' of 'dict' objects}
200     0.001    0.000    0.002    0.000 nbody_3.py:57(report_energy)
2000    0.000    0.000    0.000    0.000 nbody_3.py:53(compute_energy)
1      0.000    0.000    0.000    0.000 nbody_3.py:78(offset_momentum)
1      0.000    0.000    0.000    0.000 {method 'disable' of '_lsprof.Profiler' objects}
```

```
nbody_4.py
292004532 function calls in 47.937 seconds

Ordered by: cumulative time

ncalls  tottime  percall  cuntime  percall  filename:lineno(function)
1      0.000    0.000   47.937   47.937 {built-in method builtins.exec}
1      0.000    0.000   47.937   47.937 nbody_4.py:1(<module>)
1      0.000    0.000   47.937   47.937 nbody_4.py:136(nbody)
100     6.571    0.066   47.935    0.479 nbody_4.py:78(advance)
20000000 14.924    0.000   38.643    0.000 nbody_4.py:63(update_vs)
120000000 11.088    0.000   23.718    0.000 nbody_4.py:54(compute_b)
120000000 12.630    0.000   12.630    0.000 nbody_4.py:59(compute_mag)
10000000 1.545    0.000    1.545    0.000 nbody_4.py:72(update_rs)
20002000 1.121    0.000    1.121    0.000 nbody_4.py:50(compute_deltas)
2000207 0.056    0.000    0.056    0.000 {method 'keys' of 'dict' objects}
200     0.001    0.000    0.001    0.000 nbody_4.py:98(report_energy)
2000    0.000    0.000    0.000    0.000 nbody_4.py:94(compute_energy)
1      0.000    0.000    0.000    0.000 nbody_4.py:119(offset_momentum)
1      0.000    0.000    0.000    0.000 {method 'disable' of '_lsprof.Profiler' objects}
10     0.000    0.000    0.000    0.000 {method 'append' of 'list' objects}
10     0.000    0.000    0.000    0.000 {method 'add' of 'set' objects}
```

```
nbody_opt.py
82002532 function calls in 19.487 seconds

Ordered by: cumulative time

ncalls  tottime  percall  cuntime  percall  filename:lineno(function)
1      0.000    0.000   19.487   19.487 {built-in method builtins.exec}
1      0.000    0.000   19.487   19.487 nbody_opt.py:1(<module>)
1      0.000    0.000   19.487   19.487 nbody_opt.py:147(nbody)
100    11.676    0.117   19.486    0.195 nbody_opt.py:80(advance)
40000000 3.482    0.000    7.760    0.000 nbody_opt.py:54(compute_b)
40000000 4.278    0.000    4.278    0.000 nbody_opt.py:59(compute_mag)
2000207 0.050    0.000    0.050    0.000 {method 'keys' of 'dict' objects}
200     0.001    0.000    0.001    0.000 nbody_opt.py:110(report_energy)
2000    0.000    0.000    0.000    0.000 nbody_opt.py:107(compute_energy)
1      0.000    0.000    0.000    0.000 nbody_opt.py:130(offset_momentum)
1      0.000    0.000    0.000    0.000 {method 'disable' of '_lsprof.Profiler' objects}
10     0.000    0.000    0.000    0.000 {method 'add' of 'set' objects}
10     0.000    0.000    0.000    0.000 {method 'append' of 'list' objects}
```