Profiling nbody.py:
-0.16908926275527172
-0.1690524049239141
-0.16901474404530115
-0.16902307738080738
-0.1690798593916716
-0.1690837851340391
-0.1690461237029509
-0.16901416322876 73
-0.1690277860596755
-0.16908371256964286
-0.16908078067628346
-0.16904474158017624
-0.16901196403207439
-0.16903317301080864
-0.16908783999484456
-0.16908019793585344
-0.16904027123722912
-0.16900666759845165
-0.1690385994000913
-0.16909278202 63521
-0.16907709741618646
-0.1690318157474469
-0.16900365578743826
-0.16904872400310705
-0.16909656666618936
-0.16907120739400114
-0.16902491372614678
-0.1690054028562737
-0.1690615084418881
-0.16909732952330989
-0.16906445026914277
-0.16901977601924423
-0.1690087837330612
-0.16906942996092264
-0.1690936981250834
-0.16905776550855287
-0.16901607122935539
-0.16901202092861942
-0.1690769590988439
-0.16909176966916228
-0.1690540204053561 6
-0.16901235909925366
-0.16901736033369455
-0.1690847459685499
-0.16909035534676262
-0.16904838452880422
-0.16900663034076266
-0.16902335367423574
-0.16909124149510837
-0.1690861459859356
-0.16904015517545168
-0.16900291923555205
-0.16903287494400335
-0.16909558331070956

```
-0.16908055117120765
-0.16903390308620184
-0.16900274590721814
-0.16904459300211724
-0.16909854774651836
-0.16907499697399825
-0.16902883385621698
-0.16900287426063337
-0.16905344993896332
-0.16909778695827116
-0.1690688542355601
-0.16902288517135491
-0.1690034111639226
-0.16906323202819348
-0.16909793327535813
-0.16906372791458069
-0.16901758963658736
-0.16900762655227408
-0.16907413362652127
-0.1690966701276139
-0.16905715253841647
-0.16901176533650106
-0.16901316541886924
-0.16908223578125162
-0.1690918842838697
-0.1690491567289713
-0.1690084483625472
-0.16902057135969534
-0.16908716660200046
-0.16908658831414558
-0.16904412116934314
-0.16900740673825185
-0.16902932050670785
-0.16909180276278374
-0.16908292959405574
-0.16903991544261052
-0.16900522540601676
-0.16903656773659115
-0.16909410318888132
-0.169078466211733
-0.16903274720873912
-0.16900284987920383
-0.1690462807510843
-0.1690971767866576
-0.16907293588692712
-0.16902628585294033
        326007706 function calls in 51.278 seconds

   Ordered by: cumulative time

   ncalls  tottime  percall  cumtime  percall filename:lineno(function)
        1    0.000    0.000   51.278   51.278 {built-in method builtins.exec}
        1    0.000    0.000   51.278   51.278 nbody.py:1(<module>)
        1    0.288    0.288   51.278   51.278 nbody.py:125(nbody)
  2000000   11.972    0.000   50.987    0.000 nbody.py:67(advance)
```

```
 20000000  11.843   0.000  34.412   0.000 nbody.py:54(update_vs)
120000000  12.295   0.000  22.568   0.000 nbody.py:47(compute_b)
120000000  10.274   0.000  10.274   0.000 nbody.py:51(compute_mag)
 20002000   1.402   0.000   1.402   0.000 {method 'append' of 'list' objects}
 20002000   1.163   0.000   1.163   0.000 nbody.py:44(compute_deltas)
 10000000   1.029   0.000   1.029   0.000 nbody.py:62(update_rs)
 14001401   1.011   0.000   1.011   0.000 {method 'keys' of 'dict' objects}
      200   0.001   0.000   0.002   0.000 nbody.py:88(report_energy)
      100   0.001   0.000   0.001   0.000 {built-in method builtins.print}
     2000   0.000   0.000   0.000   0.000 nbody.py:85(compute_energy)
        1   0.000   0.000   0.000   0.000 {method 'disable' of '_lsprof.Profiler' objects}
        1   0.000   0.000   0.000   0.000 nbody.py:108(offset_momentum)
```

Profiling nbody_1.py:
-0.16908926275527172
-0.1690524049239141
-0.16901474404530115
-0.16902307738080738
-0.1690798593916716
-0.1690837851340391
-0.1690461237029509
-0.1690141632287673
-0.1690277860596755
-0.16908371256964286
-0.16908078067628346
-0.16904474158017624
-0.16901196403207439
-0.1690331730108064
-0.16908783999484456
-0.16908019793585344
-0.16904027123722912
-0.16900666759845165
-0.1690385994000913
-0.1690927820263521
-0.16907709741618646
-0.1690318157474469
-0.16900365578743826
-0.16904872400310705
-0.16909656666618936
-0.16907120739400114
-0.16902491372614678
-0.1690054028562737
-0.1690615084418881
-0.16909732952330989
-0.16906445026914277
-0.16901977601924423
-0.1690087837330612
-0.16906942996092264
-0.1690936981250834
-0.16905776550855287
-0.16901607122935539
-0.16901202092861942
-0.1690769590988439
-0.169091769 66916228

-0.16905402040535616
-0.16901235909925366
-0.16901736033369455
-0.1690847459685499
-0.16909035534676262
-0.16904838452880422
-0.16900663034076266
-0.16902335367423574
-0.16909124149510837
-0.16908618459859356
-0.16904015517545168
-0.16900291923555205
-0.16903287494400335
-0.16909558331070956
-0.16908055117120765
-0.16903390308620184
-0.16900274590721814
-0.16904459300211724
-0.16909854774651836
-0.16907499697399825
-0.16902883385621698
-0.16900287426063337
-0.16905344993896332
-0.16909778695827116
-0.1690688542355601
-0.16902288517135491
-0.1690034111639226
-0.16906323202819348
-0.16909793327535813
-0.16906372791458069
-0.16901758963658736
-0.16900762655227408
-0.16907413362652127
-0.1690966701276139
-0.16905715253841647
-0.16901176533650106
-0.16901316541886924
-0.16908223578125162
-0.1690918842838697
-0.1690491567289713
-0.1690084483625472
-0.16902057135969534
-0.16908716660200046
-0.16908658831414558
-0.16904412116934314
-0.16900740673825185
-0.16902932050670785
-0.16909180276278374
-0.16908292959405574
-0.16903991544261052
-0.16900522540601676
-0.16903656773659115
-0.16909410318888132
-0.1690784466211733
-0.16903274720873912

-0.16900284987920383
-0.1690462807510843
-0.1690971767866576
-0.16907293588692712
-0.16902628585294033
Elapsed time: 13.68013310432434 seconds
        36003709 function calls in 13.680 seconds

    Ordered by: cumulative time

    ncalls tottime percall cumtime percall filename:lineno(function)
         1   0.000   0.000   13.680   13.680 {built-in method builtins.exec}
         1   0.000   0.000   13.680   13.680 nbody_1.py:1(<module>)
         1   0.258   0.258   13.680   13.680 nbody_1.py:111(nbody)
   2000000   11.300   0.000   13.420   0.000 nbody_1.py:34(advance)
  20002000   1.275   0.000   1.275   0.000 {method 'append' of 'list' objects}
  14001401   0.846   0.000   0.846   0.000 {method 'keys' of 'dict' objects}
       200   0.001   0.000   0.001   0.000 nbody_1.py:71(report_energy)
       101   0.000   0.000   0.000   0.000 {built-in method builtins.print}
         1   0.000   0.000   0.000   0.000 {method 'disable' of '_lsprof.Profiler' objects}
         1   0.000   0.000   0.000   0.000 nbody_1.py:95(offset_momentum)
         2   0.000   0.000   0.000   0.000 {built-in method time.time}

Profiling nbody_2.py:
-0.16908926275527172
-0.1690524049239141
-0.16901474404530115
-0.16902307738080738
-0.1690798593916716
-0.1690837851340391
-0.1690461237029509
-0.1690141632287673
-0.1690277860596755
-0.16908371256964286
-0.16908078067628346
-0.16904474158017624
-0.16901196403207439
-0.16903317301080864
-0.16908783999484456
-0.16908019793585344
-0.1690402712372912
-0.16900666759845165
-0.1690385994000913
-0.1690927820263521
-0.16907709741618646
-0.1690318157474469
-0.16900365578743826
-0.16904872400310705
-0.16909656666618936
-0.1690712073940014
-0.16902491372614678
-0.1690054028562737
-0.16906150844188811

-0.16909732952330989
-0.16906445026914277
-0.16901977601924423
-0.16900878373306612
-0.16906942996092264
-0.1690936981250834
-0.16905776550855287
-0.16901607122935539
-0.16901202092861942
-0.1690769590988439
-0.16909176966916228
-0.16905402040535616
-0.16901235909925366
-0.16901736033369455
-0.16908474596854499
-0.16909035534676262
-0.16904838452880422
-0.16900663034076266
-0.16902335367423574
-0.16909124149510837
-0.16908618459859356
-0.16904015517545168
-0.16900291923555205
-0.16903287494400335
-0.16909558331070956
-0.16908055117120765
-0.16903390308620184
-0.16900274590721814
-0.16904459300211724
-0.16909854774651836
-0.16907499697399825
-0.16902883385621698
-0.16900287426063337
-0.16905344993896332
-0.16909778695827116
-0.1690688542355601
-0.16902288517135491
-0.1690034111639226
-0.16906323202819348
-0.16909793327535813
-0.16906372791458069
-0.16901758963658736
-0.16900762655227408
-0.16907413362652127
-0.1690966701276139
-0.16905715253841647
-0.16901176533650106
-0.16901316541886924
-0.16908223578125162
-0.1690918842838697
-0.16904915672897131
-0.1690084483625472
-0.16902057135969534
-0.16908716660200046
-0.16908658831414558

-0.16904412116934314
-0.16900740673825185
-0.16902932050670785
-0.16909180276278374
-0.16908292959405574
-0.16903991544261052
-0.16900522540601676
-0.16903656773659115
-0.16909410318888132
-0.169078466211733
-0.16903274720873912
-0.16900284987920383
-0.1690462807510843
-0.1690971767866576
-0.16907293588692712
-0.16902628585294033
Elapsed time: 12.621937990188599 seconds
        36003709 function calls in 12.622 seconds

   Ordered by: cumulative time

   ncalls tottime percall cumtime percall filename:lineno(function)
        1   0.000   0.000   12.622   12.622 {built-in method builtins.exec}
        1   0.000   0.000   12.622   12.622 nbody_2.py:1(<module>)
        1   0.278   0.278   12.622   12.622 nbody_2.py:105(nbody)
  2000000   10.221   0.000   12.342   0.000 nbody_2.py:32(advance)
 20002000   1.268   0.000   1.268   0.000 {method 'add' of 'set' objects}
 14001401   0.854   0.000   0.854   0.000 {method 'keys' of 'dict' objects}
      200   0.001   0.000   0.001   0.000 nbody_2.py:66(report_energy)
      101   0.000   0.000   0.000   0.000 {built-in method builtins.print}
        1   0.000   0.000   0.000   0.000 {method 'disable' of '_lsprof.Profiler' objects}
        1   0.000   0.000   0.000   0.000 nbody_2.py:89(offset_momentum)
        2   0.000   0.000   0.000   0.000 {built-in method time.time}

Profiling nbody_3.py:
-0.16908926275527172
-0.1690524049239141
-0.16901474404530115
-0.16902307738080738
-0.1690798593916716
-0.1690837851340391
-0.1690461237029509
-0.1690141632287673
-0.1690277860596755
-0.16908371256964286
-0.16908078067628346
-0.1690447415801724
-0.16901196403207439
-0.16903317301080864
-0.16908783999484456
-0.16908019793585344
-0.16904027123722912
-0.16900666759845165

-0.1690385994000913
-0.1690927820263521
-0.16907709741618646
-0.16903181574744469
-0.16900365578743826
-0.16904872400310705
-0.16909656666618936
-0.16907120739400114
-0.16902491372614678
-0.1690054028562737
-0.1690615084418881
-0.16909732952330989
-0.16906445026914277
-0.16901977601924423
-0.1690087837330612
-0.16906942996092264
-0.1690936981250834
-0.16905776550855287
-0.16901607122935539
-0.16901202092861942
-0.1690769590988439
-0.16909176966916228
-0.16905402040535616
-0.16901235909925366
-0.16901736033369455
-0.1690847459685499
-0.16909035534676262
-0.16904838452880422
-0.16900663034076266
-0.16902335367423574
-0.16909124149510837
-0.16908618459859356
-0.16904015517545168
-0.16900291923555205
-0.16903287494400335
-0.16909558331070956
-0.16908055117120765
-0.16903390308620184
-0.16900274590721814
-0.16904459300211724
-0.16909854774651836
-0.16907499697399825
-0.16902883385621698
-0.16900287426063337
-0.16905344993896332
-0.16909778695827116
-0.1690688542355601
-0.16902288517135491
-0.1690034111639226
-0.16906323202819348
-0.16909793327535813
-0.16906372791458069
-0.16901758963658736
-0.16900762655227408
-0.16907413362652127

-0.1690966701276139
-0.16905715253841647
-0.16901176533650106
-0.16901316541886924
-0.1690823357125162
-0.1690918842838697
-0.1690491567289713
-0.1690084483625472
-0.16902057135969534
-0.16908716660200046
-0.16908658831414558
-0.16904412116934314
-0.16900740673825185
-0.16902932050670785
-0.16909180276278374
-0.16908292959405574
-0.16903991544261052
-0.16900522540601676
-0.16903656773659115
-0.16909410318888132
-0.169078466211733
-0.16903274720873912
-0.16900284987920383
-0.1690462807510843
-0.1690971767866576
-0.16907293588692712
-0.16902628585294033
Elapsed time: 7.915003776550293 seconds
        4000510 function calls in 7.915 seconds

   Ordered by: cumulative time

   ncalls tottime percall cumtime percall filename:lineno(function)
        1   0.000   0.000   7.915   7.915 {built-in method builtins.exec}
        1   0.000   0.000   7.915   7.915 nbody_3.py:1(<module>)
        1   0.279   0.279   7.915   7.915 nbody_3.py:105(nbody)
  2000000   7.511   0.000   7.636   0.000 nbody_3.py:34(advance)
  2000201   0.125   0.000   0.125   0.000 {method 'keys' of 'dict' objects}
      200   0.001   0.000   0.001   0.000 nbody_3.py:67(report_energy)
      101   0.000   0.000   0.000   0.000 {built-in method builtins.print}
        1   0.000   0.000   0.000   0.000 {method 'disable' of '_lsprof.Profiler' objects}
        1   0.000   0.000   0.000   0.000 nbody_3.py:89(offset_momentum)
        1   0.000   0.000   0.000   0.000 nbody_3.py:13(initialize_bodies)
        2   0.000   0.000   0.000   0.000 {built-in method time.time}

Profiling nbody_4.py:
-0.16908926275527172
-0.1690524049239141
-0.16901474404530115
-0.16902307738080738
-0.1690798593916716
-0.1690837851340391
-0.1690461237029509

```
-0.16901416322287673
-0.1690277860596755
-0.16908371256964286
-0.16908078067628346
-0.16904474158017624
-0.16901196403207439
-0.16903317301080864
-0.16908783999484456
-0.16908019793585344
-0.16904027123722912
-0.16900666759845165
-0.1690385994000913
-0.1690927820263521
-0.16907709741618646
-0.1690318157474469
-0.16900365578743826
-0.16904872400310705
-0.16909656666618936
-0.16907120739400114
-0.16902491372614678
-0.16900054028562737
-0.1690615084418881
-0.16909732952330989
-0.16906445026914277
-0.16901977601924423
-0.1690087837330612
-0.16906942996092264
-0.1690936981250834
-0.16905776550855287
-0.16901607122935539
-0.16901202092861942
-0.1690769590988439
-0.16909176966916228
-0.16905402040535616
-0.16901235909925366
-0.16901736033369455
-0.1690847459685499
-0.16909035534676262
-0.16904838452880422
-0.16900663034076266
-0.16902335367423574
-0.16909124149510837
-0.16908618459859356
-0.16904015517545168
-0.16900291923555205
-0.16903287494400335
-0.16909558331070956
-0.16908055117120765
-0.16903390308620184
-0.16900274590721814
-0.16904459300211724
-0.16909854774651836
-0.16907499697399825
-0.16902883385621698
-0.16900287426063337
```

```
-0.16905344993896332
-0.16909778695827116
-0.1690688542355601
-0.16902288517135491
-0.169034111639226
-0.16906323202819348
-0.16909793327535813
-0.16906372791458069
-0.16901758963658736
-0.16900762655227408
-0.16907413362652127
-0.1690966701276139
-0.16905715253841647
-0.16901176533650106
-0.16901316541886924
-0.16908223578125162
-0.1690918842838697
-0.1690491567289713
-0.1690084483625472
-0.16902057135969534
-0.16908716660200046
-0.16908658831414558
-0.16904412116934314
-0.16900740673825185
-0.16902932050670785
-0.16909180276278374
-0.16908292959405574
-0.16903991544261052
-0.16900522540601676
-0.1690365677365115
-0.16909410318888132
-0.169078466211733
-0.16903274720873912
-0.16900284987920383
-0.1690462807510843
-0.1690971767866576
-0.16907293588692712
-0.16902628585294033
Elapsed time: 6.8310840129852295 seconds
        4000511 function calls in 6.831 seconds

   Ordered by: cumulative time

   ncalls  tottime  percall  cumtime  percall filename:lineno(function)
        1    0.000    0.000    6.831    6.831 {built-in method builtins.exec}
        1    0.000    0.000    6.831    6.831 nbody_4.py:1(<module>)
        1    0.230    0.230    6.831    6.831 nbody_4.py:97(nbody)
  2000000    6.474    0.000    6.600    0.000 nbody_4.py:36(advance)
  2000201    0.126    0.000    0.126    0.000 {method 'items' of 'dict' objects}
      200    0.000    0.000    0.000    0.000 nbody_4.py:64(report_energy)
      101    0.000    0.000    0.000    0.000 {built-in method builtins.print}
        1    0.000    0.000    0.000    0.000 {method 'disable' of '_lsprof.Profiler' objects}
        1    0.000    0.000    0.000    0.000 nbody_4.py:82(offset_momentum)
        1    0.000    0.000    0.000    0.000 nbody_4.py:15(initialize_bodies)
        2    0.000    0.000    0.000    0.000 {built-in method time.time}
```

```
     1    0.000   0.000   0.000   0.000 {method 'keys' of 'dict' objects}
```

Profiling nbody_opt.py:
-0.16908926275527172
-0.1690524049239141
-0.16901474404530115
-0.16902307738080738
-0.1690798593916716
-0.1690837851340391
-0.1690461237029509
-0.1690141632287673
-0.1690277860596755
-0.16908371256964286
-0.16908078067628346
-0.16904474158017624
-0.16901196403207439
-0.16903317301080864
-0.16908783999484456
-0.16908019793585344
-0.16904027123722912
-0.16900666759845165
-0.1690385994000913
-0.1690927820263521
-0.16907709741618646
-0.1690318157474469
-0.16900365578743826
-0.16904872400310705
-0.16909656666618936
-0.16907120739400114
-0.16902491372614678
-0.1690054028562737
-0.1690615084418881
-0.16909732952330989
-0.16906445026914277
-0.16901977601924423
-0.1690087837330612
-0.16906942996092264
-0.1690936981250834
-0.16905776550855287
-0.16901607122935539
-0.16901202092861942
-0.1690769590988439
-0.16909176966916228
-0.16905402040535616
-0.16901235909925366
-0.16901736033369455
-0.1690847459685499
-0.16909035534676262
-0.1690483452880422
-0.16900663034076266
-0.16902335367423574
-0.16909124149510837
-0.16908618459859356

-0.16904015517545168
-0.16900291923555205
-0.16903287494400335
-0.16909558331070956
-0.16908055117120765
-0.16903390308620184
-0.16900274590721814
-0.16904459300211724
-0.16909854774651836
-0.16907499697399825
-0.16902883385621698
-0.16900287426063337
-0.16905344993896332
-0.16909778695827116
-0.1690688542355601
-0.16902288517135491
-0.1690034111639226
-0.16906323202819348
-0.16909793327535813
-0.16906372791458069
-0.16901758963658736
-0.16900762655227408
-0.16907413362652127
-0.1690966701276139
-0.16905715253841647
-0.16901176533650106
-0.16901316541886924
-0.16908223578125162
-0.1690918842838697
-0.1690491567289713
-0.16900844836254724
-0.16902057135969534
-0.16908716660200046
-0.16908658831414558
-0.16904412116934314
-0.16900740673825185
-0.16902932050670785
-0.16909180276278374
-0.16908292959405574
-0.16903991544261052
-0.16900522540601676
-0.16903656773659115
-0.1690941031888132
-0.169078466211733
-0.16903274720873912
-0.16900284987920383
-0.1690462807510843
-0.1690971767866576
-0.16907293588692712
-0.16902628585294033
Elapsed time: 6.830500841140747 seconds
        4000511 function calls in 6.830 seconds

   Ordered by: cumulative time

```
 ncalls  tottime  percall  cumtime  percall filename:lineno(function)
      1    0.000    0.000    6.830    6.830 {built-in method builtins.exec}
      1    0.000    0.000    6.830    6.830 nbody_opt.py:1(<module>)
      1    0.239    0.239    6.830    6.830 nbody_opt.py:107(nbody)
2000000    6.466    0.000    6.591    0.000 nbody_opt.py:41(advance)
2000201    0.124    0.000    0.124    0.000 {method 'items' of 'dict' objects}
    200    0.000    0.000    0.000    0.000 nbody_opt.py:71(report_energy)
    101    0.000    0.000    0.000    0.000 {built-in method builtins.print}
      1    0.000    0.000    0.000    0.000 {method 'disable' of '_lsprof.Profiler' objects}
      1    0.000    0.000    0.000    0.000 nbody_opt.py:92(offset_momentum)
      1    0.000    0.000    0.000    0.000 nbody_opt.py:19(initialize_bodies)
      2    0.000    0.000    0.000    0.000 {built-in method time.time}
      1    0.000    0.000    0.000    0.000 {method 'keys' of 'dict' objects}
```