```
/Library/Frameworks/Python.framework/Versions/3.4/bin/python3.4 "/Users/jkwanjooh/PycharmProjects/HPC Programming/runTime.py"


Assignment Two:
==============
Enter 1 to calculate the runtime for a Serial program:
Enter 2 to calculate the runtime for a Parallel program
Enter 3 to calculate the Speedup for a parallel program
Enter 4 to calculate the Efficiency of aParallel program
Enter 5 To view the Runtime for a serial program
Enter 6 To view the Runtime for a parallel program
Enter 7 To view the Speedup table(cores vs processors
Enter 8 to view the Efficiency table (cores vs processors)
 Enter 0 to exit the program
Please make a selection:  7

                                Speedup (n is the number of processes and p is the number of cores)
    |------------------------------------------------------------------------------------------------------------------------|
    |          1          2          4          8          16          32          64          128
------------------------------------------------------------------------------------------------------------------------|
10  |       1.0000       1.9608       3.7037       6.4516       9.7561       12.3077       13.2231       12.8514
------------------------------------------------------------------------------------------------------------------------|
20  |       1.0000       1.9900       3.9216       7.5472       13.7931       22.8571       32.6531       39.5062
------------------------------------------------------------------------------------------------------------------------|
30  |       1.0000       1.9956       3.9648       7.7922       14.9378       27.1698       44.8598       64.1425
------------------------------------------------------------------------------------------------------------------------|
40  |       1.0000       1.9975       3.9801       7.8818       15.3846       29.0909       51.6129       82.0513
------------------------------------------------------------------------------------------------------------------------|
50  |       1.0000       1.9984       3.9872       7.9239       15.6006       30.0752       55.4785       94.2285
------------------------------------------------------------------------------------------------------------------------|
60  |       1.0000       1.9989       3.9911       7.9470       15.7205       30.6383       57.8313       102.4911
------------------------------------------------------------------------------------------------------------------------|
70  |       1.0000       1.9992       3.9935       7.9610       15.7937       30.9881       59.3490       108.2126

```

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--------------------------------------------------------------------------------------------------------------------------------|
80  |      1.0000      1.9994      3.9950      7.9701      15.8416      31.2195      60.3774      112.2807
--------------------------------------------------------------------------------------------------------------------------------|
90  |      1.0000      1.9995      3.9961      7.9764      15.8746      31.3801      61.1033      115.2512
--------------------------------------------------------------------------------------------------------------------------------|
100 |      1.0000      1.9996      3.9968      7.9808      15.8983      31.4961      61.6333      117.4743
--------------------------------------------------------------------------------------------------------------------------------|
110 |      1.0000      1.9997      3.9974      7.9842      15.9158      31.5824      62.0314      119.1751
--------------------------------------------------------------------------------------------------------------------------------|
120 |      1.0000      1.9997      3.9978      7.9867      15.9292      31.6484      62.3377      120.5021
--------------------------------------------------------------------------------------------------------------------------------|
130 |      1.0000      1.9998      3.9981      7.9887      15.9396      31.6999      62.5781      121.5554
--------------------------------------------------------------------------------------------------------------------------------|
140 |      1.0000      1.9998      3.9984      7.9902      15.9479      31.7409      62.7702      122.4044
--------------------------------------------------------------------------------------------------------------------------------|
150 |      1.0000      1.9998      3.9986      7.9915      15.9546      31.7741      62.9261      123.0980
--------------------------------------------------------------------------------------------------------------------------------|
160 |      1.0000      1.9998      3.9988      7.9925      15.9601      31.8012      63.0542      123.6715
--------------------------------------------------------------------------------------------------------------------------------|
170 |      1.0000      1.9999      3.9989      7.9934      15.9646      31.8238      63.1608      124.1509
--------------------------------------------------------------------------------------------------------------------------------|
180 |      1.0000      1.9999      3.9990      7.9941      15.9685      31.8428      63.2504      124.5555
--------------------------------------------------------------------------------------------------------------------------------|
190 |      1.0000      1.9999      3.9991      7.9947      15.9717      31.8588
```

```
63.3264       124.9000

------------------------------------------------------------------------------------------------------------------------------|
200 |     1.0000     1.9999     3.9992     7.9952     15.9744     31.8725
     63.3914     125.1956

------------------------------------------------------------------------------------------------------------------------------|
210 |     1.0000     1.9999     3.9993     7.9956     15.9768     31.8843
     63.4475     125.4512

------------------------------------------------------------------------------------------------------------------------------|
220 |     1.0000     1.9999     3.9993     7.9960     15.9789     31.8946
     63.4962     125.6735

------------------------------------------------------------------------------------------------------------------------------|
230 |     1.0000     1.9999     3.9994     7.9964     15.9807     31.9035
     63.5388     125.8681

------------------------------------------------------------------------------------------------------------------------------|
240 |     1.0000     1.9999     3.9994     7.9967     15.9822     31.9114
     63.5762     126.0394

------------------------------------------------------------------------------------------------------------------------------|
250 |     1.0000     1.9999     3.9995     7.9969     15.9836     31.9183
     63.6092     126.1909

------------------------------------------------------------------------------------------------------------------------------|
260 |     1.0000     1.9999     3.9995     7.9972     15.9849     31.9244
     63.6385     126.3256

------------------------------------------------------------------------------------------------------------------------------|
270 |     1.0000     1.9999     3.9996     7.9974     15.9860     31.9299
     63.6646     126.4459

------------------------------------------------------------------------------------------------------------------------------|
280 |     1.0000     1.9999     3.9996     7.9976     15.9869     31.9348
     63.6881     126.5537

------------------------------------------------------------------------------------------------------------------------------|
290 |     1.0000     2.0000     3.9996     7.9977     15.9878     31.9392
     63.7091     126.6507

------------------------------------------------------------------------------------------------------------------------------|
300 |     1.0000     2.0000     3.9996     7.9979     15.9886     31.9432
     63.7281     126.7383

------------------------------------------------------------------------------------------------------------------------------|
```

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310 |       1.0000       2.0000       3.9997       7.9980       15.9894      31.9468
      63.7453      126.8176

-------------------------------------------------------------------------------------------------------------
-------------------------|
320 |       1.0000       2.0000       3.9997       7.9981       15.9900      31.9501
      63.7609      126.8897

-------------------------------------------------------------------------------------------------------------
-------------------------|


Assignment Two:
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Enter 5 To view the Runtime for a serial program
Enter 6 To view the Runtime for a parallel program
Enter 7 To view the Speedup table(cores vs processors
Enter 8 to view the Efficiency table (cores vs processors)
 Enter 0 to exit the program
Please make a selection:  8

                              Efficiency (n is the number of processes and p is the number of
cores)

   |-------------------------------------------------------------------------------------------------------
-----------------------|
   |          1          2          4          8          16         32         64
128

-------------------------------------------------------------------------------------------------------------
-------------------------|
10 |       1.0000       0.9804       0.9259       0.8065       0.6098       0.3846
0.2066       0.1004

-------------------------------------------------------------------------------------------------------------
-------------------------|
20 |       1.0000       0.9950       0.9804       0.9434       0.8621       0.7143
0.5102       0.3086

-------------------------------------------------------------------------------------------------------------
-------------------------|
30 |       1.0000       0.9978       0.9912       0.9740       0.9336       0.8491
0.7009       0.5011

-------------------------------------------------------------------------------------------------------------
-------------------------|
40 |       1.0000       0.9988       0.9950       0.9852       0.9615       0.9091
0.8065       0.6410

-------------------------------------------------------------------------------------------------------------
-------------------------|
50 |       1.0000       0.9992       0.9968       0.9905       0.9750       0.9398
0.8669       0.7362

-------------------------------------------------------------------------------------------------------------
```

```
113 -------------------------|
114 60 |      1.0000      0.9994      0.9978      0.9934      0.9825      0.9574
        0.9036      0.8007
115
    ------------------------------------------------------------------------------------------------------
    -------------------------|
116 70 |      1.0000      0.9996      0.9984      0.9951      0.9871      0.9684
        0.9273      0.8454
117
    ------------------------------------------------------------------------------------------------------
    -------------------------|
118 80 |      1.0000      0.9997      0.9988      0.9963      0.9901      0.9756
        0.9434      0.8772
119
    ------------------------------------------------------------------------------------------------------
    -------------------------|
120 90 |      1.0000      0.9998      0.9990      0.9970      0.9922      0.9806
        0.9547      0.9004
121
    ------------------------------------------------------------------------------------------------------
    -------------------------|
122 100|      1.0000      0.9998      0.9992      0.9976      0.9936      0.9843
        0.9630      0.9178
123
    ------------------------------------------------------------------------------------------------------
    -------------------------|
124 110|      1.0000      0.9998      0.9993      0.9980      0.9947      0.9869
        0.9692      0.9311
125
    ------------------------------------------------------------------------------------------------------
    -------------------------|
126 120|      1.0000      0.9999      0.9994      0.9983      0.9956      0.9890
        0.9740      0.9414
127
    ------------------------------------------------------------------------------------------------------
    -------------------------|
128 130|      1.0000      0.9999      0.9995      0.9986      0.9962      0.9906
        0.9778      0.9497
129
    ------------------------------------------------------------------------------------------------------
    -------------------------|
130 140|      1.0000      0.9999      0.9996      0.9988      0.9967      0.9919
        0.9808      0.9563
131
    ------------------------------------------------------------------------------------------------------
    -------------------------|
132 150|      1.0000      0.9999      0.9996      0.9989      0.9972      0.9929
        0.9832      0.9617
133
    ------------------------------------------------------------------------------------------------------
    -------------------------|
134 160|      1.0000      0.9999      0.9997      0.9991      0.9975      0.9938
        0.9852      0.9662
135
    ------------------------------------------------------------------------------------------------------
    -------------------------|
136 170|      1.0000      0.9999      0.9997      0.9992      0.9978      0.9945
        0.9869      0.9699
137
```

180	1.0000	0.9999	0.9998	0.9993	0.9980	0.9951	0.9883 0.9731
190	1.0000	0.9999	0.9998	0.9993	0.9982	0.9956	0.9895 0.9758
200	1.0000	1.0000	0.9998	0.9994	0.9984	0.9960	0.9905 0.9781
210	1.0000	1.0000	0.9998	0.9995	0.9986	0.9964	0.9914 0.9801
220	1.0000	1.0000	0.9998	0.9995	0.9987	0.9967	0.9921 0.9818
230	1.0000	1.0000	0.9998	0.9995	0.9988	0.9970	0.9928 0.9833
240	1.0000	1.0000	0.9999	0.9996	0.9989	0.9972	0.9934 0.9847
250	1.0000	1.0000	0.9999	0.9996	0.9990	0.9974	0.9939 0.9859
260	1.0000	1.0000	0.9999	0.9996	0.9991	0.9976	0.9944 0.9869
270	1.0000	1.0000	0.9999	0.9997	0.9991	0.9978	0.9948 0.9879
280	1.0000	1.0000	0.9999	0.9997	0.9992	0.9980	0.9951 0.9887
290	1.0000	1.0000	0.9999	0.9997	0.9992	0.9981	

```
160  0.9955        0.9895
161
     ---------------------------------------------------------------------------------------------------------
     -------------------------|
162  300 |         1.0000        1.0000        0.9999        0.9997        0.9993        0.9982
     0.9958        0.9901
163
     ---------------------------------------------------------------------------------------------------------
     -------------------------|
164  310 |         1.0000        1.0000        0.9999        0.9998        0.9993        0.9983
     0.9960        0.9908
165
     ---------------------------------------------------------------------------------------------------------
     -------------------------|
166  320 |         1.0000        1.0000        0.9999        0.9998        0.9994        0.9984
     0.9963        0.9913
167
     ---------------------------------------------------------------------------------------------------------
     -------------------------|
168
169
170  Assignment Two:
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181  Please make a selection:
```