COP5615 – Fall 2019
PROJECT - 1

1. Group Members

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Steps to run:

1. Unzip the file and navigate inside the folder
2. Open Terminal (with elixir installed)
3. For running: mix run proj1.exs 100000 200000

2. Number of Worker Actors Created

Each Worker(Actors) were given 10 subproblems for ranges from 100000 to 200000, therefore number of simulataenous actors created were

Dataset_range = (200000 - 100000), Number of actors = Dataset_range/10 = **10000**.

i.e. (upper range - lower range) / 10.

This value of subproblems and number of actors changes for different inputs but the number of subproblems maximum attained without lagging = 10

We tried giving smaller values like **10 actors**(to reduce the communication cost) and 10000 subproblems but the result obtained in smaller number of subproblems were better than larger ones.

3. Size of Work Unit for each Worker Actor

Size of worker unit was tested for different ranges from n = 2 to n = 12, and from the results obtained for **n= 10**, the number of subproblems assigned for a single request of a worker was optimal. But for larger instance, the number of subproblems can be increased.

Value of n(number of subproblems)	CPU time/Real time ratio
2	3.37
3	3.76 (discarded due to small number of subproblem distribution)
4	3.34
5	3.35
6	3.35
7	3.38
8	3.34
9	3.39
10	3.43
11	3.42
12	3.39

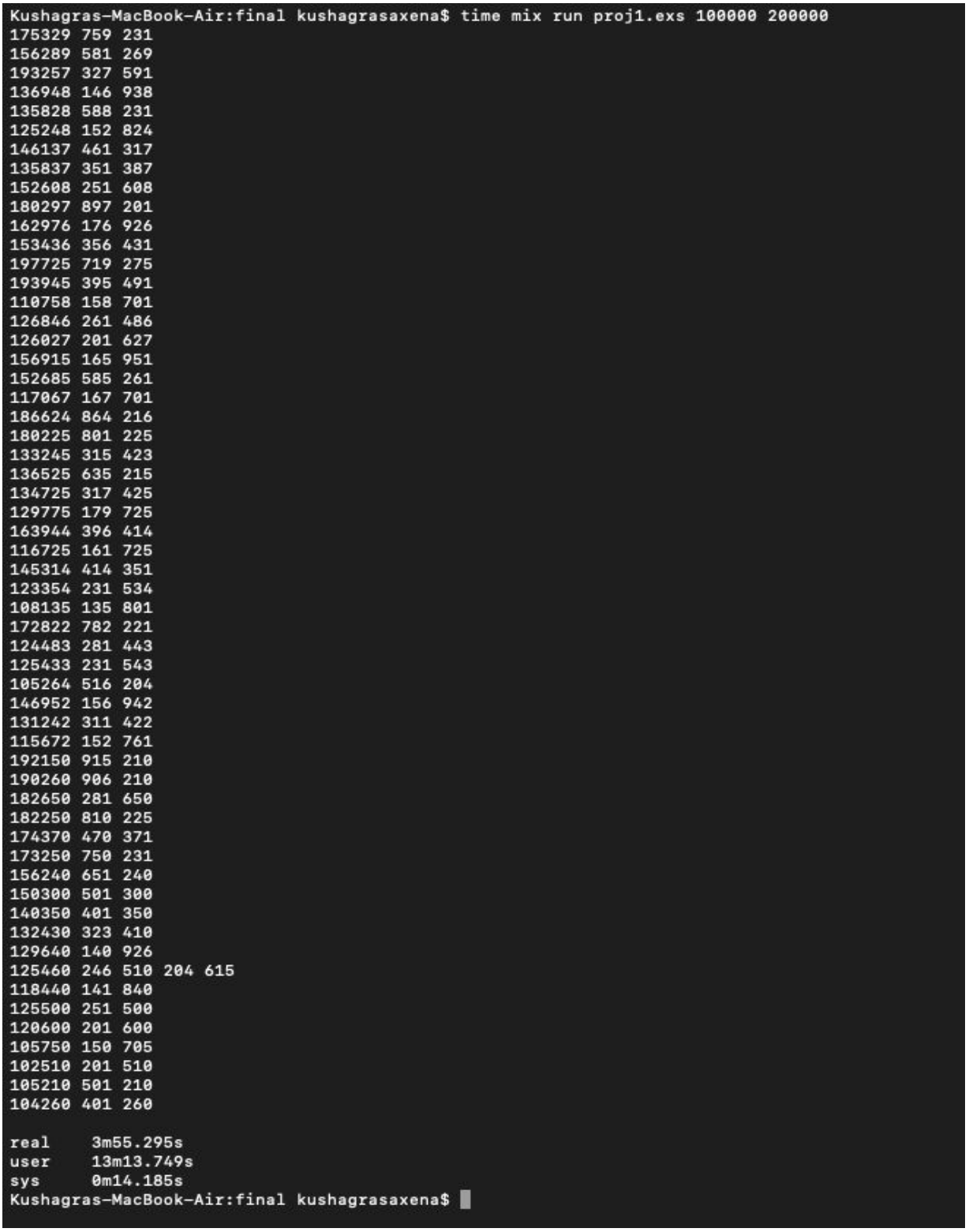
4. Result for: time mix run proj1.exs 100000 200000

Output:

175329 759 231
156289 581 269
193257 327 591
136948 146 938
135828 588 231
125248 152 824
146137 461 317
135837 351 387
152608 251 608
180297 897 201
162976 176 926
153436 356 431
197725 719 275
193945 395 491
110758 158 701
126846 261 486
126027 201 627
156915 165 951
152685 585 261
117067 167 701
186624 864 216
180225 801 225
133245 315 423
136525 635 215
134725 317 425
129775 179 725
163944 396 414
116725 161 725
145314 414 351
123354 231 534
108135 135 801
172822 782 221
124483 281 443
125433 231 543
105264 516 204
146952 156 942
131242 311 422
115672 152 761
192150 915 210
190260 906 210
182650 281 650
182250 810 225
174370 470 371
173250 750 231
156240 651 240
150300 501 300
140350 401 350
132430 323 410
129640 140 926

125460 246 510 204 615
118440 141 840
125500 251 500
120600 201 600
105750 150 705
102510 201 510
105210 501 210
104260 401 260

Screenshot:



5. Running time for : time mix run proj1.exs 100000 200000

Output:

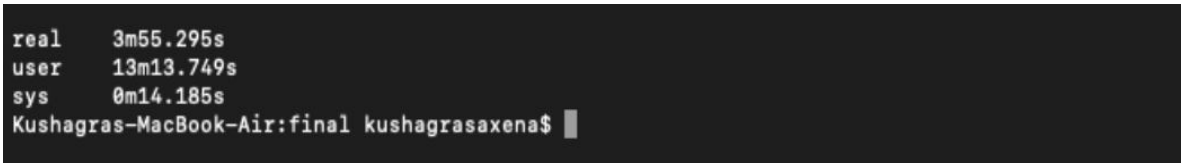
real	3m55.295s
user	13m13.749s
sys	0m14.185s

CPU Time: user time + system time =13min 27.934s

CPU Time / Real Time = 807.934/235.295

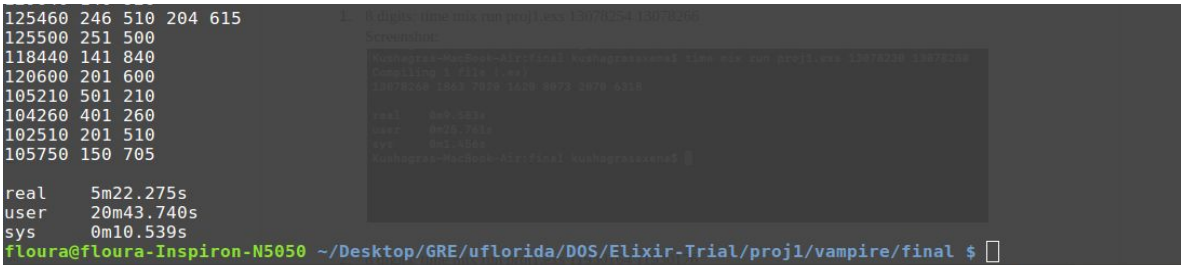
Laptop 1: Ratio: 3.43 > 1 (4 cores)

Screenshot:



Laptop 2: Ratio: 3.89 > 1 (4 cores)

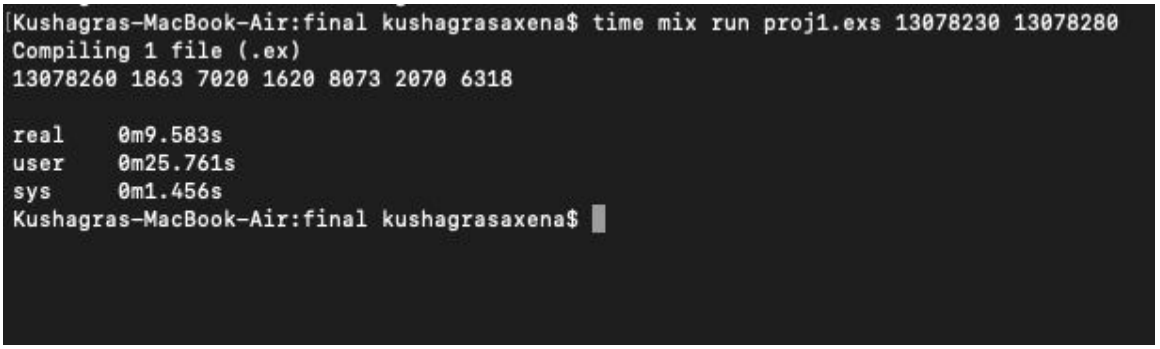
Screenshot:



6. Largest Problem Solved: 10 digits (ran only for smaller range)

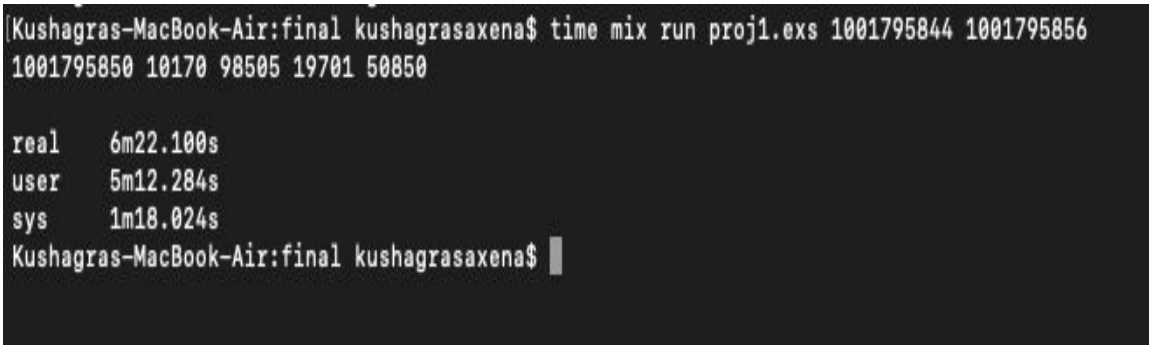
1. 8 digits: time mix run proj1.exs 13078254 13078266

   Screenshot:



2. 10 digits: time mix run proj1.exs 1001795844 1001795856

   Screenshot:



3. 8 digits: time mix run proj1.exs 11930164 11930176
   Screenshot:

```
[Kushagras-MacBook-Air:final kushagrasaxena$ time mix run proj1.exs 11930164 11930176
11930170 1310 9107 1301 9170

real    0m3.102s
user    0m3.303s
sys     0m0.319s
Kushagras-MacBook-Air:final kushagrasaxena$
```

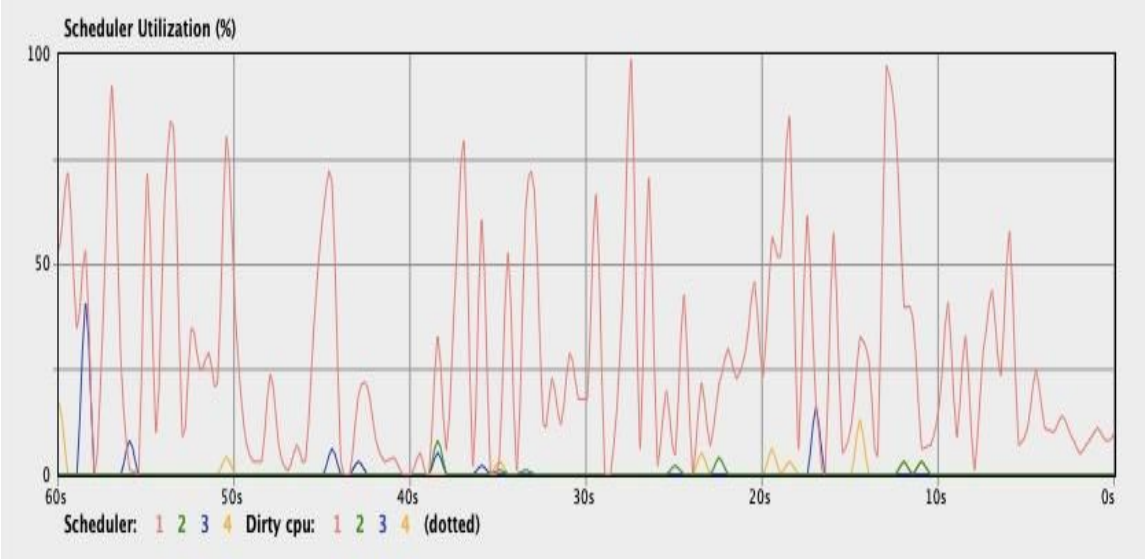
4. 8 digits: time mix run proj1.exs 61360774 61360786
   Screenshot:

```
[Kushagras-MacBook-Air:final kushagrasaxena$ time mix run proj1.exs 61360774 61360786
61360780 7613 8060 7130 8606

real    0m3.504s
user    0m3.358s
sys     0m0.384s
Kushagras-MacBook-Air:final kushagrasaxena$
```

7. CPU Utilization Chart

Screenshot: Run - 1



Screenshot: Run - 2