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CPSC457_ASSIGNMENT 3

Part 1: Variant of Dining Philosophers with Waiter

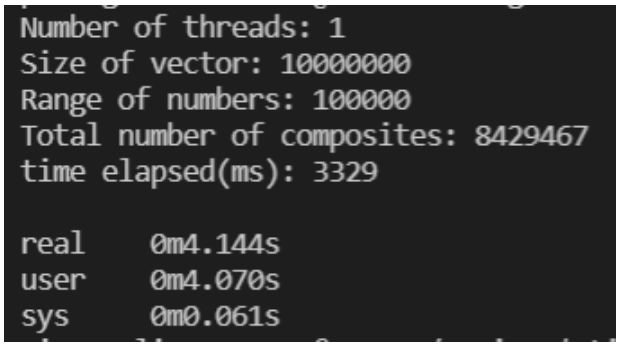
The averages' times that philosophers spent waiting to eat after becoming hungry:
(n = number of chopsticks)

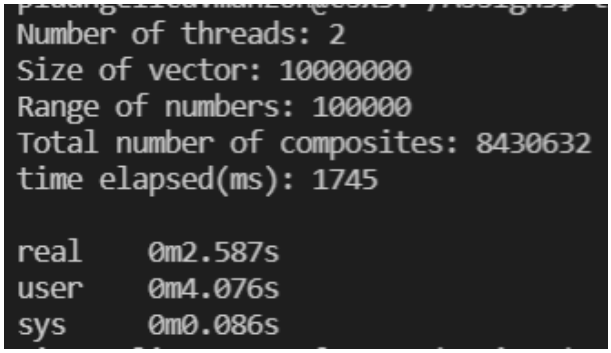
	n = 5	n = 6	n = 7	n = 8	n = 9	n = 10
Run 1	3.26683s	0.533403s	0.866677s	0.333349s	0.066697s	2.25051e-05s
Run 2	4.13351s	0.733391s	0.732956s	0.133394s	0.26668s	1.62941e-05s
Run 3	3.93343s	1.13329s	0.800031s	0.133456s	0.266701s	1.99469e-05s
Run 4	3.46686s	0.666681s	0.60008s	0.133356s	0.066706s	2.09152e-05s
Run 5	3.46680s	1.19996s	0.733474s	0.200011s	0.066700s	2.26147e-05s
Average:	**3.65349s**	**0.853345s**	**0.746643s**	**0.186713s**	**0.146697s**	**2.04552e-05s**

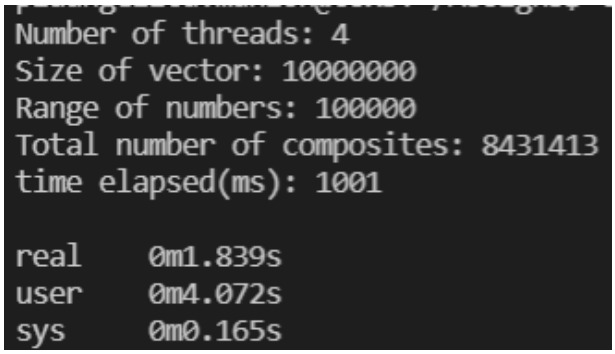
The output average time matches our expected value. We expect n = 5 to have the longest average time since it has the least chopsticks available. For n = 7, we expect it to be a little bit smaller than n = 6 since there is waiting time involved when there is only one chopstick available but since the left chopstick is already assigned to a philosopher, this should offset the waiting time.. This is the same case when n = 9. For n = 10, we expect to have 0s waiting time since there are enough chopsticks for each philosopher. Our results show that the average time is very small which is very close to zero.

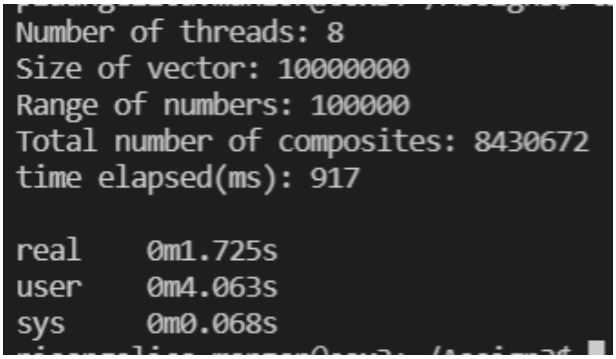
Part 2: Composite Numbers & Mutli-threading

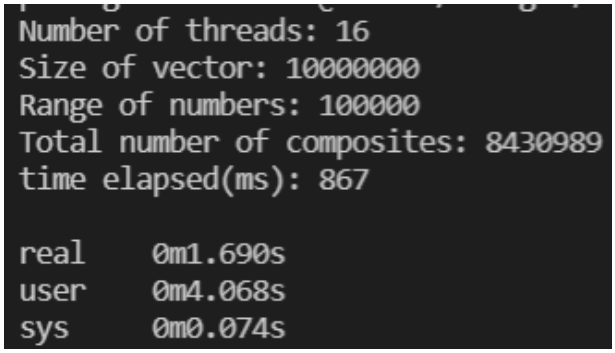
- *Time elapsed is the time from when we created the thread up to the time when the thread exits the thread function*











	Run time (Real Time) (s)	**Run Time (Elapsed Time) (s)**
Thread = 1	4.144	3.329
Thread = 2	2.587	1.745
Thread = 4	1.839	1.001
Thread = 8	1.725	0.917
Thread = 16	1.690	0.867

With an increasing number of threads, we expect the computation time to be shorter since we're dividing the work equally among each thread. This is more evident if we have a very large array size (input size). From our output above, we can see that with one thread, it takes about four seconds to process the data. With 16 threads, it decreases about four times compared to when we only have one thread.