Project #2 – OpenMP: Functional Decomposition

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1. What your own-choice quantity was and how it fits into the simulation.

   My choice of quantity was a count of pest-control hunters. If there are more than 5 rabbits in a given month, the hunter cap increases by 1 (below 5 rabbits, the cap is 0). When there are more than two active hunters in a given month, one rabbit population decreases for the next month. When there are more hunters than the hunter capacity, 2 hunters decrease in the following month.

2. A table showing values for temperature, precipitation, number of rabbits, height of the rye grass, and your own-choice quantity as a function of month number.

Year	Month	Precipitation	Temperature	Grass Height	Rabbit Count	Hunter Count
2023	0	14	60	24	4	0
2023	1	16.17	51.85	29.82	7	0
2023	2	16.92	46.96	26.17	10	1
2023	3	15.58	67.87	26.68	13	2
2023	4	15.52	84.14	13.74	16	3
2023	5	12.04	76	0	14	4
2023	6	9.94	80.5	0	12	5
2023	7	9.35	70.85	0	10	6
2023	8	9.28	60.73	5.92	8	4
2023	9	7.17	51.82	4.34	6	2
2023	10	10.61	55.14	12.42	5	0
2023	11	12.25	33.71	7.44	8	0
2024	0	14.89	35.78	0	7	1
2024	1	14.29	54.82	8.29	6	2
2024	2	17.58	64.39	16.79	9	0
2024	3	17.51	72.37	11.62	12	1
2024	4	15.01	81.4	0	11	2
2024	5	11.27	88.78	0	10	3
2024	6	12.54	70.89	0	8	4
2024	7	9.57	74.32	0	6	2
2024	8	9.75	57.89	9.97	5	0
2024	9	8.65	56.21	17.99	8	0
2024	10	9.69	48.23	14.15	11	1
2024	11	11.45	50.35	10.53	14	2
2025	0	14.03	36.04	0	13	3
2025	1	16.69	50.82	0	11	4
2025	2	16.92	62.82	5.96	9	5
2025	3	15.78	66.39	9.83	7	3

2025	4	14.61	77.71	3.7	9	1
2025	5	12.57	88.26	0	8	2
2025	6	12.88	73.84	0	7	3
2025	7	8.18	73.75	0	5	1
2025	8	7.45	56.68	6.67	4	0
2025	9	7.84	56.74	14.98	7	0
2025	10	8.51	55.28	19.82	10	1
2025	11	10.58	40.7	10.24	13	2
2026	0	11.08	40.94	0	12	3
2026	1	15.57	49.38	0	10	4
2026	2	16.17	57.63	8.04	8	5
2026	3	16.28	64.54	15.49	10	3
2026	4	15.6	73.36	8.76	12	4
2026	5	13.47	75	0	10	5
2026	6	10.73	87.92	0	8	5
2026	7	9.3	81.56	0	6	3
2026	8	8.09	72.41	0	4	1
2026	9	7.38	48.71	0	3	0
2026	10	11.12	51.75	6.32	2	0
2026	11	11.74	38.85	4.54	5	0
2027	0	13.9	34.59	0	4	0
2027	1	1441	44.29	0	3	0
2027	2	17.42	54.96	10.81	2	0
2027	3	14.81	66.22	22.3	5	0
2027	4	13.76	74.97	19.43	8	0
2027	5	14.05	84.98	11.47	11	1
2027	6	11.98	83.7	0.54	11	2
2027	7	10.21	66.26	1.24	10	3
2027	8	9.08	68.04	0	8	4
2027	9	7.7	54.06	1.45	6	2
2027	10	8.95	46.4	0	5	0
2027	11	9.44	46.13	0	4	0
2028	0	11.33	49.96	2.8	3	0
2028	1	13.74	47.23	3.71	2	0
2028	2	15.39	55.5	17.73	5	0
2028	3	14.89	69.39	20.95	8	0
2028	4	15.09	79.34	13.42	11	1
2028	5	14.71	83.38	2.51	14	2
2028	6	12.38	87.5	0	13	3
2028	7	11.15	66.2	0	11	4
2028	8	7.36	57.83	1.29	9	5
2028	9	8.8	55.22	4.42	7	3
2028	10	8.55	44.94	0	5	1
2028	11	12.4	44.97	0	4	0

3. A graph showing temperature, precipitation, number of rabbits, height of the rye grass, and your own-choice quantity as a function of month number. Note: if you change the units to °C and centimeters, the quantities might fit better on the same set of axes.

Conversion to metric was not performed as the original graph was clear enough.
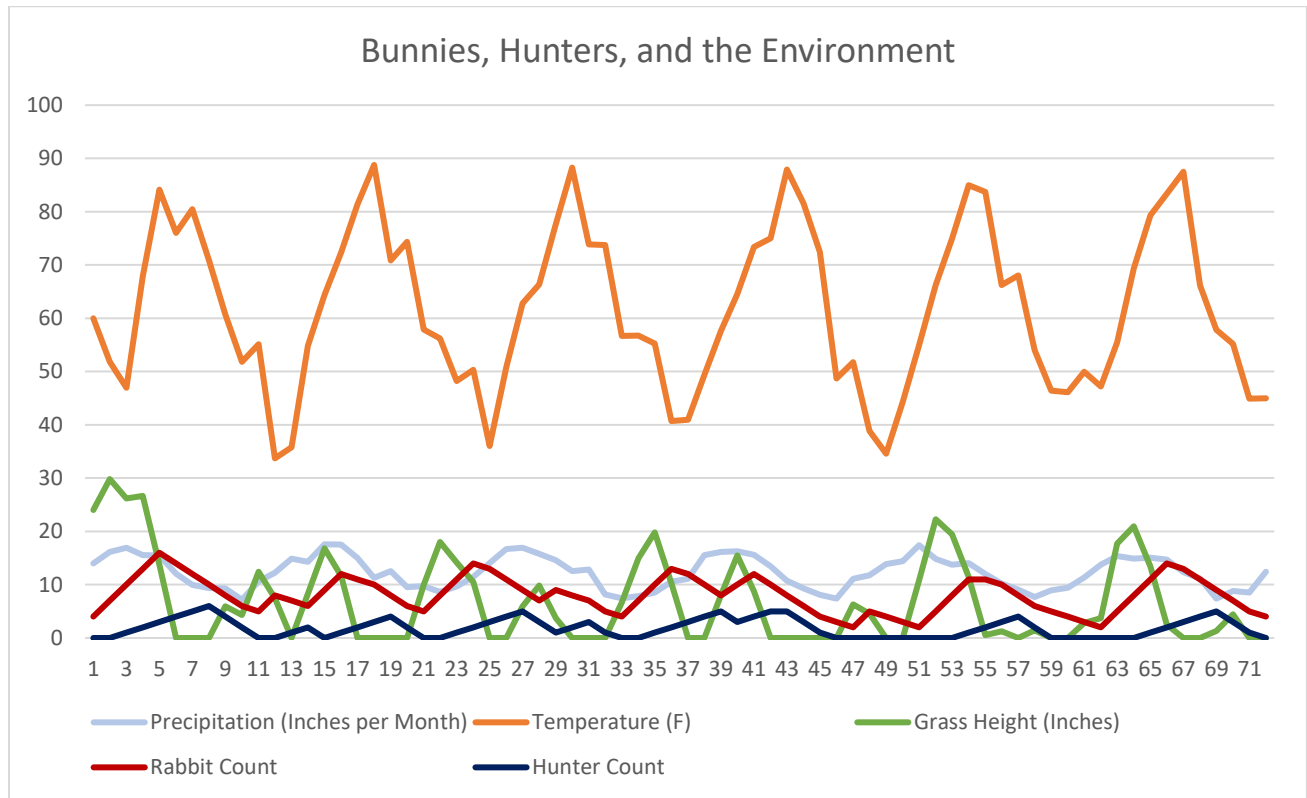
4. A commentary about the patterns in the graph and why they turned out that way. What evidence in the curves proves that your own quantity is actually affecting the simulation correctly?

More precipitation and higher temperatures during summer will cause the grass to grow. This will cause the rabbit population to increase. After a certain threshold (5 rabbits), one hunter will be recruited to check the rabbit population. Once there are 3 or more hunters active, the rabbit population decreases by 1. When there are more hunters than the current hunter cap (rabbit count – 5), 2 hunters are dismissed.

It is clear that the hunter population is affecting the rabbit population in the simulation (and vice versa). A spike in the rabbit population always leads to a spike in hunter population in the next few months. This, combined with the changing environment, decreases rabbit population. A general pattern can be observed where when the hunter population peaks, one can expect the local minimum of the rabbit population in a couple of months. Then the hunters are dismissed and as the seasons grow more favorable to fauna, the rabbit population increases again. This pattern repeats throughout the simulation.