

Parallel Programming CS - 575
Project 2 - Functional Decomposition
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1. What your own-choice quantity was and how it fits into the simulation.

In this simulation, the user-defined quantity is the number of vampires, represented as NowNumVampires. This quantity fits into the simulation as another factor affecting the rabbit population. The Vampire() function simulates the growth and decline of the vampire population based on the number of rabbits available to them as a food source. If there are 10 or more rabbits, the vampire population increases by 2. If the number of rabbits is between 5 and 8 (inclusive), the vampire population decreases by 1. If there are fewer than 5 rabbits, the vampire population decreases by 2. The number of vampires is not allowed to drop below 1.

The vampire population influences the rabbit population, which in turn affects the rye grass height, as rabbits consume the rye grass.

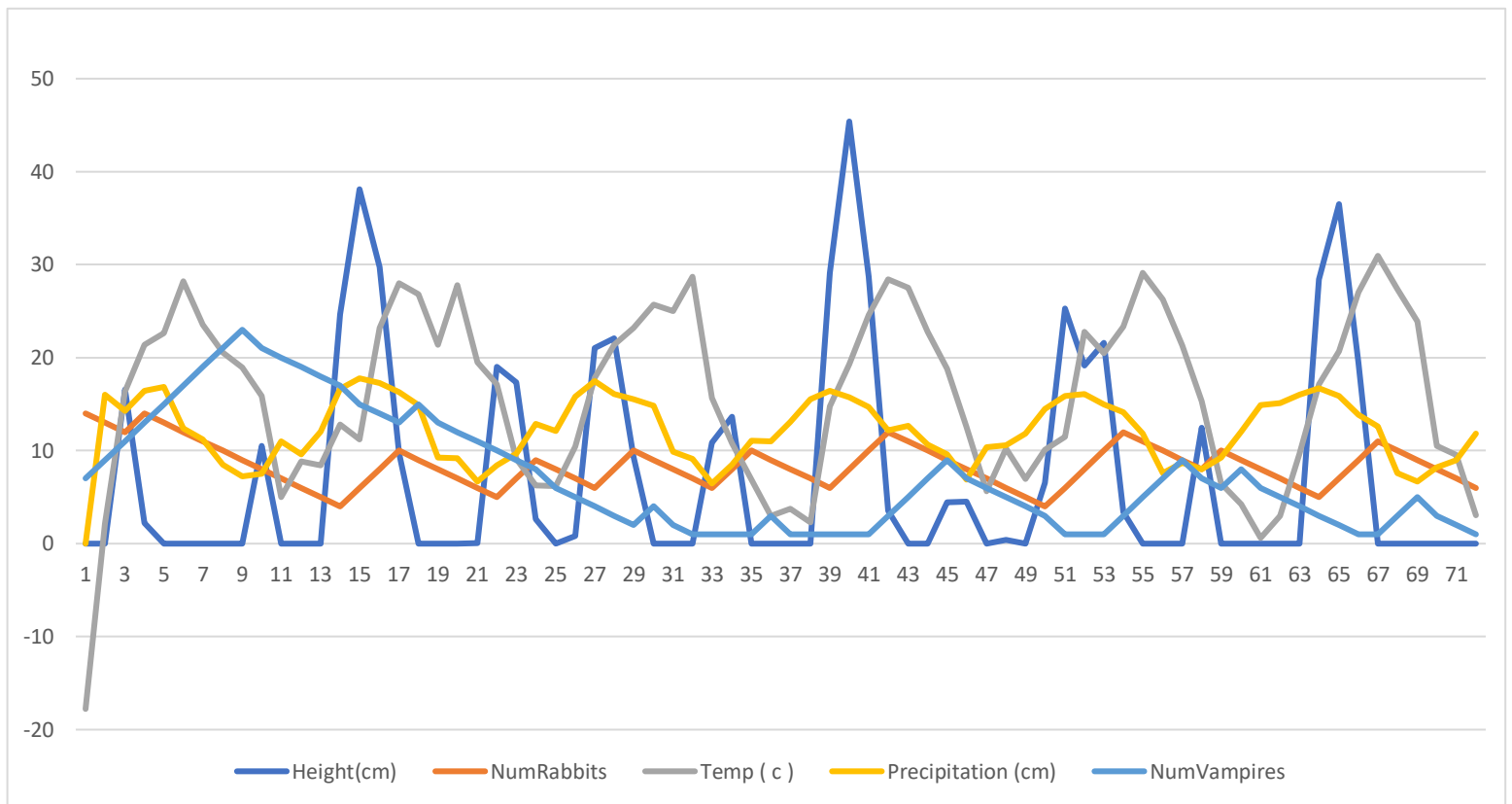
2. A table showing values for temperature, precipitation, number of rabbits, height of the rye grass, and your own-choice quantity as a function of month number.

Month	Height(cm)	NumRabbits	Temp (c)	Precipitation (cm)	NumVampires
1	0	14	-17.777778	0	7
2	0	13	2.148497	16.026506	9
3	16.583964	12	16.397667	14.291388	11
4	2.209642	14	21.35846	16.402004	13
5	0	13	22.610686	16.827499	15
6	0	12	28.200658	12.372535	17
7	0	11	23.521368	11.200785	19
8	0	10	20.562464	8.513231	21
9	0	9	18.917999	7.247656	23
10	10.496222	8	15.850343	7.535973	21
11	0	7	5.018692	11.028694	20
12	0	6	8.812353	9.5697	19
1	0	5	8.40399	12.054556	18
2	24.63345	4	12.837986	16.621578	17
3	38.105998	6	11.172121	17.777853	15
4	29.73523	8	23.196695	17.303108	14
5	9.735835	10	27.99483	16.280487	13
6	0	9	26.792861	14.928303	15
7	0	8	21.39164	9.279138	13
8	0	7	27.789052	9.208113	12
9	0.019909	6	19.533619	6.67898	11
10	18.982058	5	17.161681	8.414058	10

11	17.331658	7	9.134191	9.646575	9
12	2.618578	9	6.267505	12.89803	8
1	0	8	6.171754	12.106541	6
2	0.844142	7	10.456376	15.820302	5
3	21.019967	6	17.856522	17.46314	4
4	22.091743	8	21.359982	16.10734	3
5	9.290618	10	23.186467	15.542768	2
6	0	9	25.686073	14.822672	4
7	0	8	25.000593	9.868217	2
8	0	7	28.731969	9.093007	1
9	10.874511	6	15.67844	6.436296	1
10	13.627053	8	10.784416	8.51919	1
11	0	10	6.88591	11.055586	1
12	0	9	2.98819	10.968691	3
1	0	8	3.754489	13.086539	1
2	0	7	2.258369	15.533373	1
3	29.109086	6	14.743777	16.424051	1
4	45.394991	8	19.269604	15.73655	1
5	28.73282	10	24.559182	14.671627	1
6	3.55923	12	28.441374	12.170717	3
7	0	11	27.488467	12.684449	5
8	0	10	22.767245	10.655357	7
9	4.47495	9	18.774626	9.582606	9
10	4.504793	8	12.538552	6.91277	7
11	0	7	5.601565	10.349813	6
12	0.377284	6	10.246879	10.598145	5
1	0	5	6.973883	11.816935	4
2	6.555835	4	10.091203	14.514373	3
3	25.260389	6	11.512994	15.89186	1
4	19.133098	8	22.74626	16.072304	1
5	21.607218	10	20.498127	14.994671	1
6	3.411139	12	23.31941	14.167958	3
7	0	11	29.109374	11.840194	5
8	0	10	26.238064	7.595488	7
9	0	9	21.311429	8.708315	9
10	12.438969	8	15.300034	7.983962	7
11	0	10	6.485575	9.280266	6
12	0	9	4.216826	12.055237	8
1	0	8	0.598109	14.890915	6

2	0	7	2.965082	15.103669	5
3	0	6	9.659044	15.998169	4
4	28.411226	5	17.111717	16.705622	3
5	36.508644	7	20.702159	15.867394	2
6	19.449067	9	27.016144	13.847913	1
7	0	11	30.950809	12.601297	1
8	0	10	27.350464	7.582217	3
9	0	9	23.914354	6.667309	5
10	0	8	10.535956	8.215044	3
11	0	7	9.536482	8.988993	2
12	0	6	3.084573	11.822667	1

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.
cm = inches * 2.54 °C = (5./9.)*(°F-32)



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 affecting the simulation correctly?

From the graph we can see the below patterns :

Height of rye grass: The height of the rye grass fluctuates throughout the months. It shows that it increases during some months and then drop to a very low value, indicating that the grass is being consumed by the rabbits or other factors like temperature and precipitation are affecting its growth.

Number of rabbits: The number of rabbits also fluctuates, but it generally follows a pattern of increasing when there is enough rye grass available and then decreasing when there is not enough food or when the number of vampires increases.

Number of vampires: The number of vampires generally increases when the number of rabbits is high, indicating that they are feeding on rabbits. When the number of rabbits decreases, the number of vampires also decreases.

The evidence in the curves proves the (vampires) is affecting the simulation correctly can be seen in the relationship between the number of rabbits and the number of vampires. When there are more rabbits, the number of vampires increases as they have a sufficient food source. When the number of rabbits decreases, the number of vampires also decreases, indicating that the simulation is taking into account the effect of vampires preying on rabbits.

Therefore overall the simulation appears to be working correctly, taking into account all these factors and their interdependencies.