CPSC 441 -Assignment 4
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User Manual

To compile and run the code:

- Using Command Prompt, locate and go to the directory which the file is located.
- Use the command "gcc -Wall BozonSimulation.c" to compile and create an executable.
- Use the command "/a.exe" to run the code.

The terminal will then prompt the user to enter the number of bozons they want in the colony (M value). Once an integer is entered, please "enter". Then it will ask the user to enter the average sleep time of the colony (S value). Once any double value is entered, please "enter". Then it will ask the user to enter the average yodel time of the colony (Y value). Once any double value is entered, please "enter". The Terminal will then display:

- Average silent time percentage
- Average melodious time percentage
- Average screeching time percentage
- Total yodels attempted
- Percentage of perfect yodels

The testing was successful, as far as I could tell, and the values were matched to the test case given on the website, provided by Professor Williamson.

References:

- Adapted the code posted on D2L written by Reza Gholzadeh.

Simulation results:

Table 1: Where M = 5, S = 100.0, Y = 10.0

Silent time percentage	Melodious time percentage	Screech time percentage	Total attempted yodels	Perfect yodel percentage
62.01%	31.10%	6.88%	45361	48.74%

Table 2: Where S = 100.0 and Y = 10.0

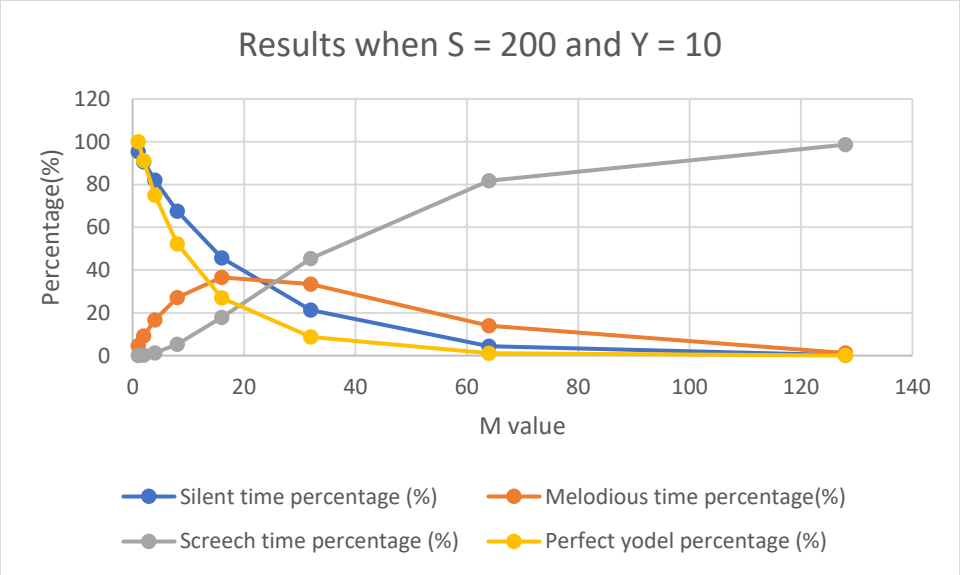
M value	Silent time percentage (%)	Melodious time percentage (%)	Screech time percentage (%)	Total attempted yodels	Perfect yodel percentage (%)
5	62.01	31.10	6.88	4536	48.74
8	46.66	37.35	15.99	72548	30.42
10	38.83	38.61	22.56	90231	22.47
12	32.11	38.01	29.88	108597	16.65
15	23.87	35.86	40.27	136058	11.04

The optimal value of M is 10, when S is 100 and Y is 10, as seen by the table above. It has a melodious time percentage of 38.61%.

Table 3: Where S = 200.0 and Y = 10.0

M value	Silent time percentage (%)	Melodious time percentage(%)	Screech time percentage (%)	Total attempted yodels	Perfect yodel percentage (%)
1	95.34	4.66	0.00	4683	99.98
2	90.64	9.16	0.20	9475	91.21
4	81.99	16.68	1.33	19218	75.05
8	67.60	27.14	5.25	38085	52.23
16	45.63	36.57	17.79	76265	26.97
32	21.26	33.40	45.34	151540	8.81
64	4.34	13.91	81.75	305400	1.11
128	0.18	1.20	98.62	610085	0.02

The highest value of the melodious state is when M is 16, as seen by the table above. It has a melodious time percentage of 36.57%.



Summary

From the results depicted in the graphs above, it is shown that having a consistent value of Y and S as the M varies will give a consistent pattern in the results. The silent time and perfect yodel percentage have an exponential decrease, as seen on the graph, as the number of bozons increases. This logically is reasonable as a greater number of bozons means that more can be yodelling at the same time, which decreases the silent time (because if even one bozon is yodelling, then the state is not silent). It also decreases the perfect yodel percentage because more bozons will have the potential of overlapping their yodelling, causing a screech, which also explains the exponential increase in the screech time percentage, as well as the increased number of attempted yodels. The melodious time percentage increases and decreases depending on how many bozons are in the colony. This is dependent on the sleep and yodel averages, but also due to the fact that having too great a number of bozons means more screeching; a colony of too little bozons and a high S can mean more of the bozons will be sleeping rather than yodelling. Finding a “sweet spot” for the optimal melodious state is done through testing or analyzing graphs of more test cases with varying M values.