# Final Project Phase 4 Requirements

The intent of this phase is to complete Defense Daemon to the best of your team’s abilities. Since the missile defense system is sufficiently complicated, there is no clear delineation marking completion. Your final presentation must address the performance of your system in a quantified, objective way. Your group will have up to 20 minutes for their final presentation. The final presentation should cover the same attributes as earlier phases, but this must heavily focus on the results / performance. Imagine each team has built a missile defense system, and your quantified analysis will serve as the selling points to potential buyers (me) of this system. Whose system would I prefer to go with? Your results ought to speak for themselves – imagine you are trying to sell your solution!

1. To quantify performance, each team must conduct a series of identical tests and provide quantitative performance metrics and qualitative analysis on any shortcomings. Consider the following test parameters.

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Rot Per Sec (Deg) (Assume 60 fps) | Wedge Angle (Deg) | Scan Range (m) | Qty Inbound Red | Time of Red Arrival (sec) | Time to Lock (sec) | Successfully eliminated? |
| 1 | 20 | 50 | 1,2,3,4 | 1,2,3,4,5 |  |  |
| 1.2 | 25 | 100 |  |  |  |  |
| 1.4 | 30 | 200 |  |  |  |  |
| 1.6 | 35 | 300 |  |  |  |  |
| 1.8 | 40 | 400 |  |  |  |  |
| 2.0 | 45 | 500 |  |  |  |  |
|  | 50 | 600 |  |  |  |  |
|  | 55 | 700 |  |  |  |  |
|  | 60 | 800 |  |  |  |  |
|  |  | 900 |  |  |  |  |
|  |  | 1000 |  |  |  |  |

When an enemy missile is launched, assume they are launched 10 meters beyond the scan range. Since all missiles are launched from the same distance, we will vary the “Time of Red Arrival” to adjust each Red’s parabolic trajectory.

1. Considering the combinatorics above, testing each permutation would require automation. To test the 5 “Time of Red Arrival” scenarios, that would require at least 15 seconds. This would be multiplied by the number of inbound scenarios run, multiplied by the number of scan ranges, etc. The attributes listed in this paragraph would “require” about 11 minutes to complete. If the wedge angle and Rot Per Sec begin to vary, that 11 minutes will quickly grow to 44 minutes if 2 rotations and 2 wedge angles were tested against all previous possibilities.
2. You may alter the above parameters, with justification, to thoroughly quantify the performance of your system – take it to and then beyond, its breaking point.
3. Overall, how well does your system perform?
4. What are your system’s limitations?
5. What would your team advertise your system’s operational capabilities to be?
6. At which point does your system determine you have a sufficiently good “trajectory lock” to launch your defense missile?
7. How did you automate the testing or go about collecting your quantified results?

During your final demo, I want to see multiple simultaneous inbound red missiles approach. Your missile defense system must sense, track, launch, and strike these missiles down. Your team should create a “test mode” that enables us to watch (hands off the keyboard) the battle unfold over time. To show the efficacy of your system, you should augment the visualization with virtual indicators that determine when a red missile is, or is not, eliminated. For example, if a red missile is struck by a defensive missile at some location, a semi-transparent sphere placed at the defensive missile’s point of explosion should subsume the head of the inbound red missile’s flight path. The radius of the sphere should equal the defensive missile’s blast radius. Your imaginations are the only limiting factor in developing novel visualizations that characterize the behavior of your system (because it’s obviously not Software Engineering that is a LIMFAC ☺)…