

Biohazard

New Mexico

Supercomputing Challenge

Final Report

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Team 58

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## Executive Summary

Our model of disease spreading is to show how it gradually grows from one person and evolves to cataclysmic portions and consumes the United States. The questions we asked were, “How long will it take to fully infect the United States?” “What effect does differing immune system strengths have?” “Will the infected people eventually be killed off because of this disease?” All these questions have been answered in certain variables; these variables were calculated and brought into our program in Starlogo. As our model virus, current like viruses in our day and age and combined them to make a super virus, to which the people would be exposed too.

## Statement Investigated

The investigated statement problem would be "How long would it take for a virus to spread and expose an entire population to its effects". We took many roads to find a solution, which would lead us to about two weeks at the most. For the first three, four days the people are carriers and start to feel sickness such as the Flu or a cold. By the time this happens the virus can be passed to other people just like many of the common viruses. By five to nine days the virus has spread and starts to break down cells in the body, with ten to fourteen days the person is totally immobile and passes away. The purpose of the realization of a person not surviving is to help better understand a virus actually works, because the virus attacks the nutrients and cells of the body. We also calculated speed by how fast a person gets to a different airport. Immune amount ways in percentages to mix them up. Number of people was brought forth by a amount of people in that city. Disease effects would worsen each day until death.

## Method Description

When we first started our project the whole team realized we were to make a graph simulating the United States. We drew out a replica of the United States onto the Starlogo program. In the United States we made semi square boxes, to represent the major cities. We used New York, Dallas, Washington D.C., Chicago, Los Angeles, and Orlando. Our program shows, these cities as all having airports. These airports provide the vectors for the virus to spread to different locations.

We have color-coded humans from healthy (green), a, these cities all have airports. As we all know airports have airplanes, which travel, all around the world to different locations. In the project at hand we are only going to focus the virus spreading in the United States. Carrier (yellow), or infected (red). Another color code was brought into play for those who are immune, which would be (blue). We researched different viruses and diseases on the internet to figure out how they affected our model population. Our research was brought into play for our Starlogo Program. We used different facts about these calamities to show how this virus would affect effected and spread throughout the United States. The facts we used came from prior world catastrophes and the present Avian Bird Flu.

## Results of Our Study

From our results we can tell you that if a virus such as this ever got out that it would infect the United States within a few months. We showed how people would travel within the U.S. and how that would infect other people causing a chain reaction. Also we explained how it could travel as if a common cold. With the Starlogo program our results were spectacular; we have a time recorder so we know how long the virus takes to control the United States. The changes from healthy to infect by color code worked out, so when an infected touched a healthy

person it would turn that person into either infected or immune based upon ratios. We have successfully proven our project meets our expected standards. We even figured out, “How many people go on airplanes each day?” and we also took consideration on holidays as well.

### Analyzing Our Results

If a virus such as one like this ever got out it would infect the U.S. population in a few months. Since it has effects like the common cold we would be oblivious to it until it brought suspicion by a few deaths. By then it would be too late to kill the source or find a cure before it could be contained. It would have already spread before we could have had enough warning to study or examine it. We came to the conclusion that the top government officials would be the first out of the country or the ones most protected. The people come second compared to them and we figured the economy would crash if America could not provide shipping or buy anything from the other countries.

We analyzed all our results starting with the simplest thing to make everything functional. Measurements were taken by trying to answer things we did not know and finally figured it out with assistance to use in the program.

### Products of our Work

Starlogo – We used this program to make our project fully functional, by allowing the use to draw out the United States. We also had to make buttons to allow us to make the program run. The control panel in Starlogo was used to put our input in, which allowed the buttons to work. We turned our turtles into color-coded humans by making shapes in the shape chooser.

### Our Achievement on This Project

Our greatest achievement was that we all got along and that we worked together to figure out the problem and find the solution. We heard everyone's ideas and gave our own ideas, and offered criticism when it was needed. We accepted everyone's idea about things without having a closed mind about it. We had are problems nut we always laughed afterwards and made jokes about it. We think this achievement of being able to comply with each other and being friends it on of the best ever.

### Acknowledgements

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