

Project Egress

New Mexico
Supercomputing Challenge
Final Report
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Team 83
Mesa Middle School
Las Cruces, NM

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Executive Summary

Our project is about wanting to prove that most schools have unsafe, time-wise, in that entire school population has to meet in one place, however by putting different safe areas around the school, it would be safer for the staff and students' to get to the safe areas. The "safe areas" would be closer than they are now, but still far away enough from the building that it's not a safety hazard. We used NetLogo to program an example of how our school (Mesa Middle School) would act in case of a fire drill if they were to choose what the program believed to be the fastest way. Once discussing the dangers of our own school's fire routes to our principle's, we learned that there's many things that account for a "safe" fire route –such as distance, and that it should take an average of 3 minutes to get *everyone* to the one designated safety area. We tested our fire routes, and learned a few things that might surprise our principles and staff, as well as anyone uneducated in fire routes. We also learned that they had been misinformed in a few things too, such as what was required in, but have yet to speak to them, or anyone. So we decided to present the data in a more organized way.



Most schools don't realize that there's a fault in their systems and one of those systems being school fire routes/drills. One of our teachers stated that it seemed odd that everyone had to gather up in on big (orderly) blob during a supposed fire, and that in case of a real fire, more traffic than there is during drills would bound to happen. We chose that as problem, wanting to know more about the

topic. The first step, we decided, was to talk to whoever had the biggest say on what happens around our campus, our principle, Gabe Jacquez. When asked about our fire drills, he said, "It is required for everyone to group up together, that way it's easier to take into account who is and isn't there," Interesting, we thought, and we asked more questions, and gave suggestions. We were told that it takes around 3 minutes to get everyone on campus to the bus parking lot, our "safe zone", and 5 more to see who is present, who's missing, and where they could possibly be. That's around 8 minutes in total to do the necessary things in a fire drill, and that's without any accidents that could happen, or obstacles that could appear in case of a fire.

Deciding that instead of taking their word for it, we tested it ourselves. Sadly, we couldn't time and observe an actual fire drill, but what we could do was time how long the average is for everyone in a certain building (six in total). Above is a picture of our school, and the most common route each building has, which we walked and timed the amount of time it took to get there, without traffic.

Building	Time	Time in Seconds
1	2 minutes and 14 seconds	134 seconds
2	3 minutes and 45 seconds	225 seconds
3	5 minutes and 35 seconds	335 seconds
4	3 minutes and 34 seconds	214 seconds
5	2 minutes and 18 seconds	138 seconds
6	1 minutes and 24 seconds	84 seconds

Average Time: 2 minutes and 14 seconds (134 seconds)

Total Time for Everyone's Arrival: Around 5 ½ minutes

In the table above, you can see the average time it takes for everyone in the building to get to the safe zone in our school, using the routes we have now, and as you can see, the buildings closer to the “safe zone”, and with a simple route, you have an acceptable time for building 6, around a minute and a half. Building 1 and 5, also close to the safe zone, takes around 2 minutes and a third, which is still good time, but with traffic, the seconds could go up. As you can see, buildings with a more complex route, such as buildings 2 and 3, you have longer routes, and with a longer route, you’ll take longer to get to your designated area. Contrary to our principle’s belief, it doesn’t take three minutes to get everyone to the parking lot, it takes almost twice the amount *without* traffic, something he wouldn’t have even guessed. So yes, our teacher was right, it does take a few minutes too long to get everyone to the parking lot. Upon doing more research and talking to a fireman and the LCPS Director of Safety and Security we learned that it actually isn’t a requirement to have everyone grouped up in one area, and that if we wanted to, we could have different designated areas, and as shown in the picture, we have plenty of space for it too, and other schools most likely do as well. However, with the idea that different routes and more appropriate locations, you’d have to prove it, and to prove it, we decided to program it. By using the path finding algorithm, we programmed NetLogo to find its own path to what we choose to be our designated area using a

similar mapping of our school, and then doing the same as with the area we have now, comparing the two, and repeat for each building with the time length of the route being more than 2 ½ minutes, or 150 seconds, or until we find a new, better, and safer route. Our results proved that there are in fact better routes than the ones we have now, not very surprising really.

Acknowledgements & Citations:

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[https://www.osha.gov/OshDoc/data General Facts/emergency-exit-routes-factsheet.pdf](https://www.osha.gov/OshDoc/data%20General%20Facts/emergency-exit-routes-factsheet.pdf)

<http://www.iccsafe.org/safety/Documents/MeansofEgressBroch.pdf>

Program –NetLogo