The STEM Pipeline at Texas Tech

This material is based upon work supported by the National Science Foundation under Grant No. 727944, 742402, 745472,
1035096, and 0930257

West Texas Target Audience

- Rural
- Hispanic
- First generation
- Nervous about going to the big university
- Intimidated by university faculty

STEM Pipeline

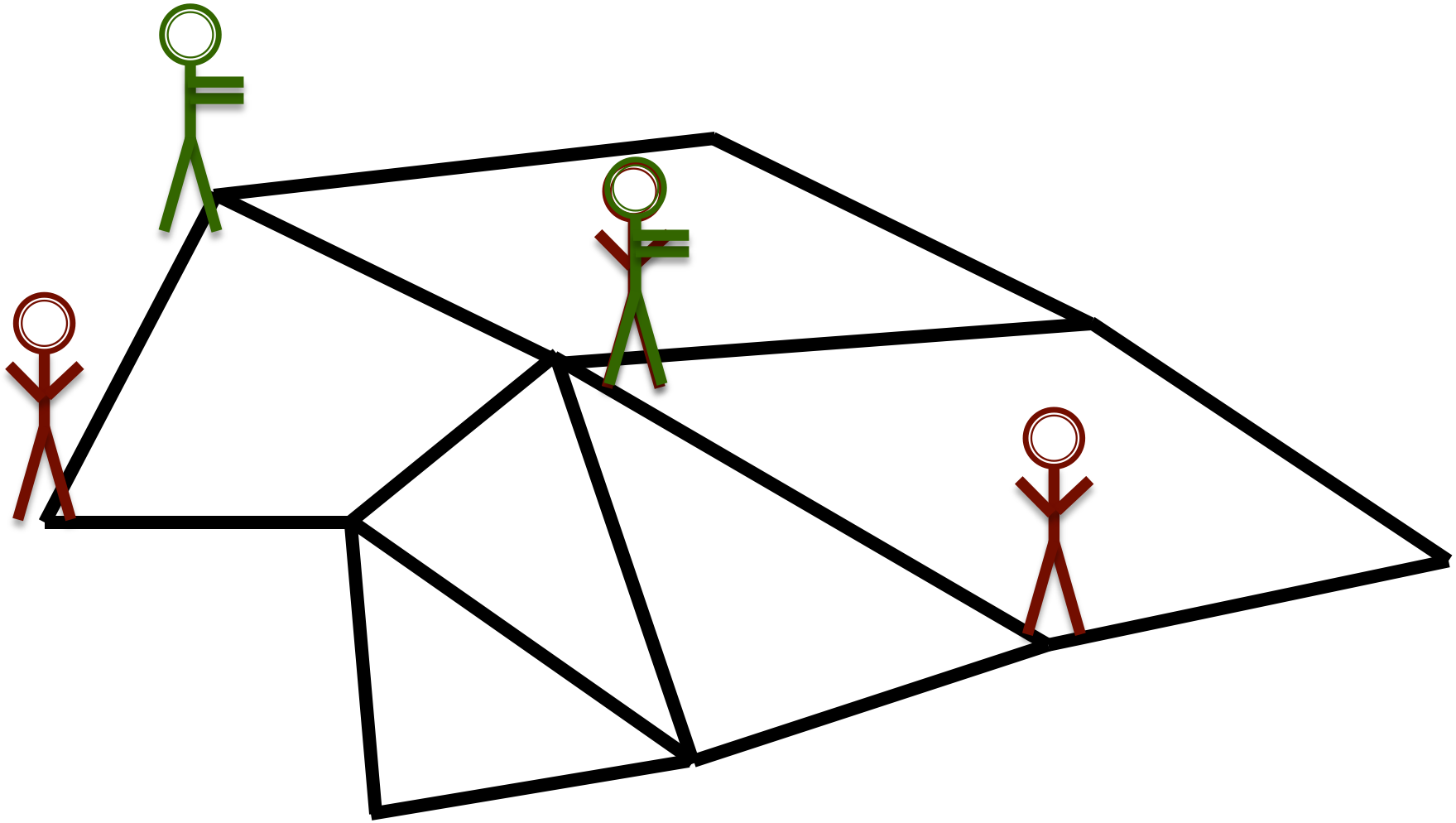
- School visits and district connections
  - Grad programs for teachers
  - Regional awards for teachers
  - LAZARUS
- TexPREP summer program for middle school
- SuMAC summer program for 9^{th},10^{th}, 11^{th} graders

STEM Pipeline

- PRISM summer camp for 12th graders and freshmen
- PRISM, S-STEM, and Noyce scholarships at Tech
- Mentoring support
- Early undergrad research

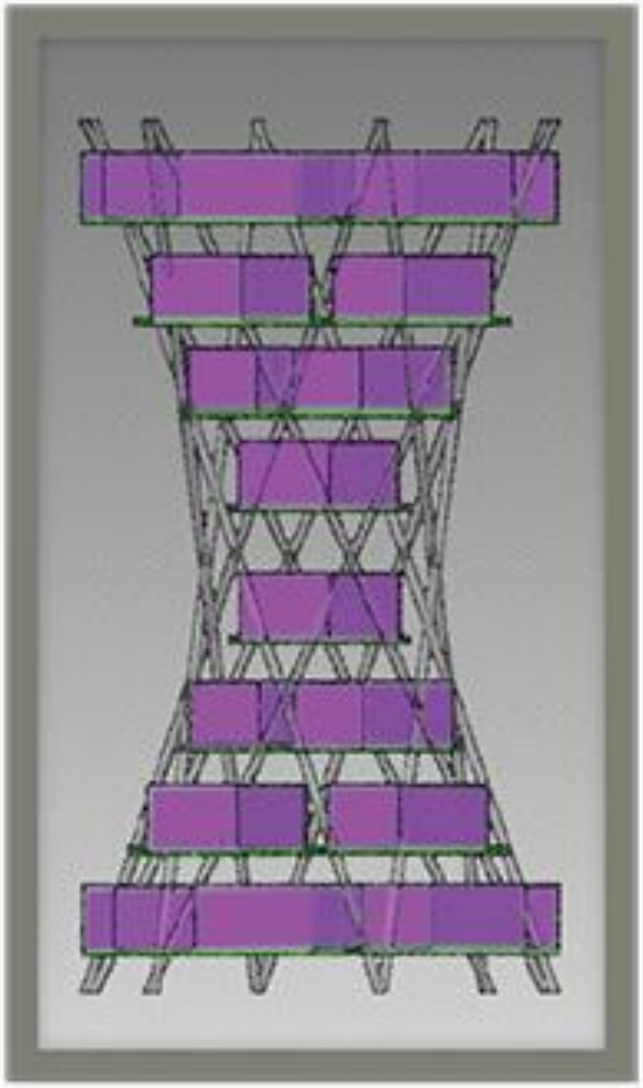
The Germ of an Idea

Zombie Virus

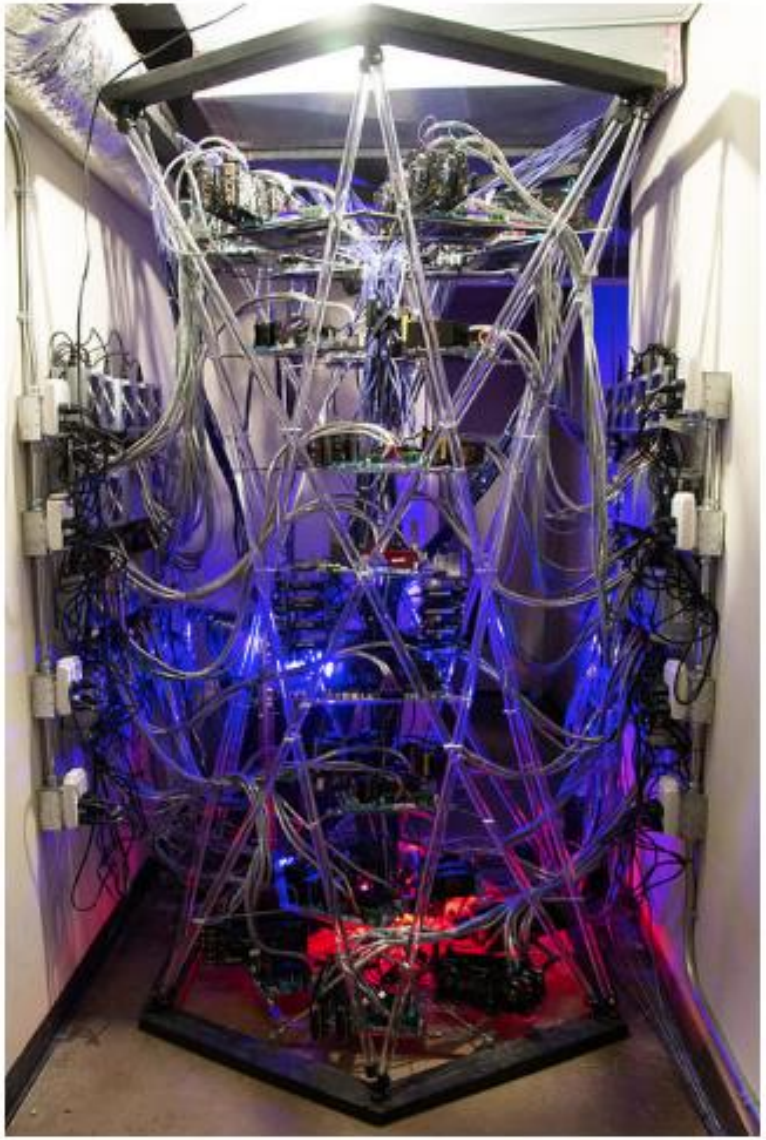


Lab for the
Analysis of
Zombie
Activity and
Research into
Undead
Simulations

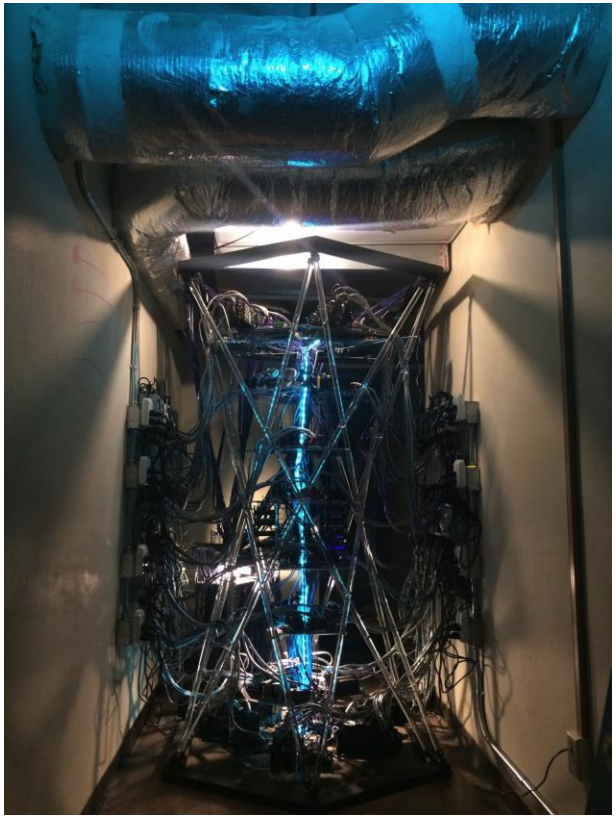
Designing A Supercomputer

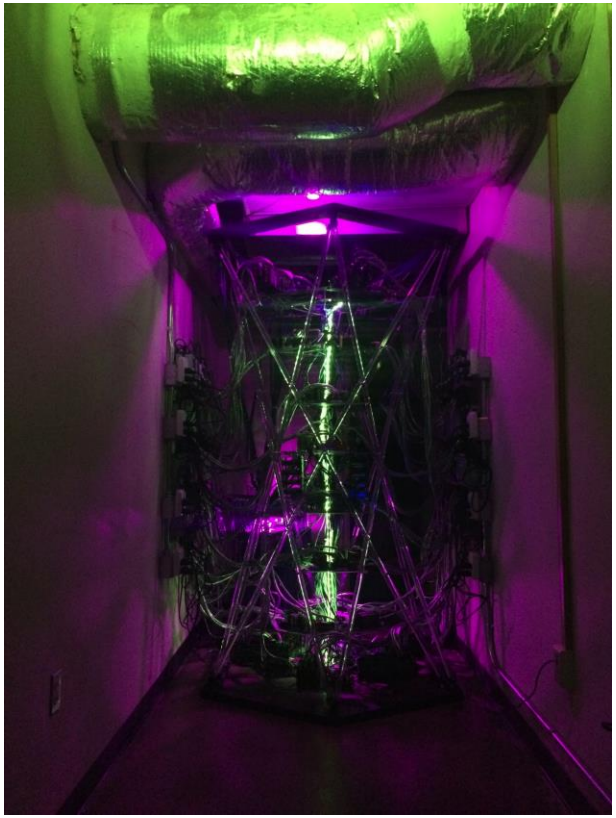


Building It

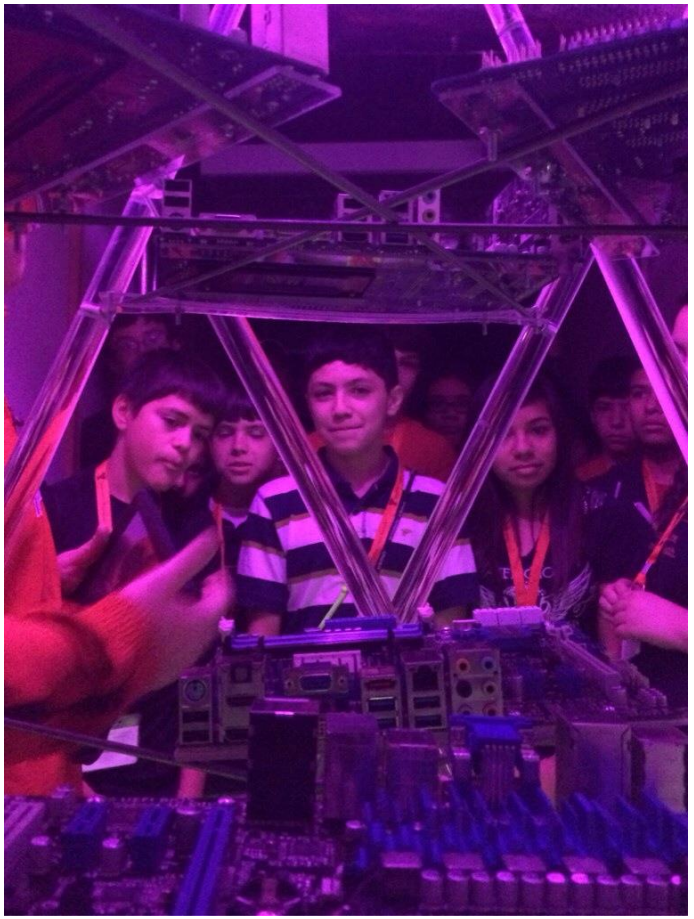


Making It Look Cool





Outreach



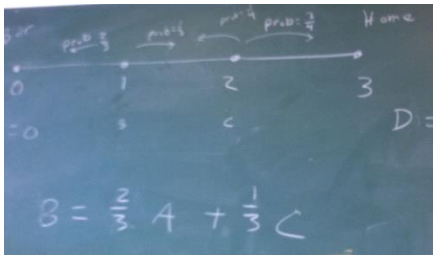
Going on a ZOMBIE Hunt!

Shane Burk, Colleen Adcox, Jason Tom, Donna Freeman, Stephanie Avance
Research Group with Dr. Brock Williams

INTRODUCTION

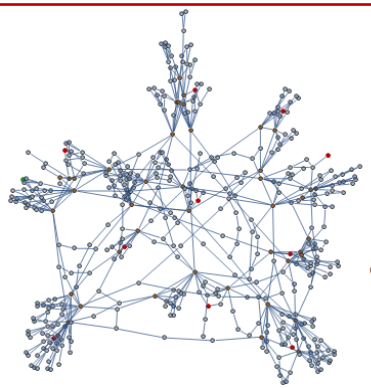
We applied probability models to study disease outbreaks. In particular, we investigated the zombie virus, the subject of a great deal of attention in popular culture.

We then applied these techniques to analyze the "pig" game we often play in our classrooms.



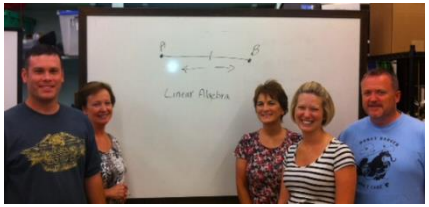
THE ZOMBIES

We examined stochastic processes which allowed us to analyze the zombie virus. We worked through the details of one dimensional random walks, and we then used what we learned to run computer simulations using code developed by TTU's John Calhoun.



Number of Streets	43
Number of Rooms	518
Number of Highway connections	158
Number of Buildings	114
Number of airports	0
Maxium Number of People	1677

Radius –13
Diameter –21
Grah Center –(304, 340, 419)



THE PIGS

These same ideas can be used to model the "pig" game we commonly play in middle school math classrooms. Two dice are rolled, and their values added together for the player's score. A player may withdraw from further rolls to keep their score, but if a double 1 is rolled, then both players receive 0 points. The largest score after 10 rounds wins.

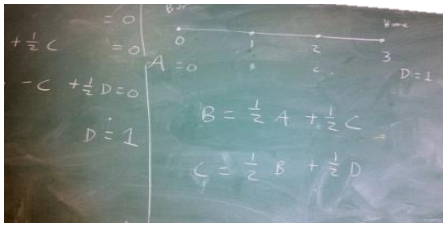
THANKS

We would like to thank the Greater Texas Foundation and Texas Tech University for the opportunity to participate in the $(MS)^2$ Program.

RESEARCH RESULTS

We found the expected score in a game of "pig" is 20. Thus a player should not stop rolling with a score less than 20.

In our zombie simulations, we were unable to find a strategy to consistently ensure human survival.



EFFECT ON OUR TEACHING

Our confidence has been boosted in our own abilities to work with more sophisticated mathematical ideas. This experience pushed us beyond what we teach in our classrooms. We can now show our students how math research is done outside of the walls of their classrooms.

Our students often ask the question, "when will I ever need what I am learning?" Through this experience we are far better equipped to answer that question.

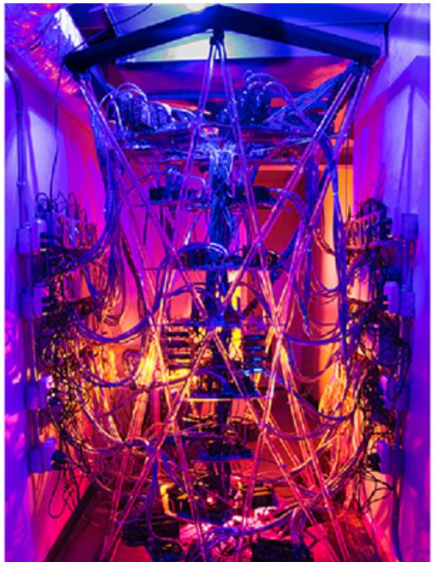
LAZARUS

Lab for the Analysis of Zombie Activity and Research into Undead Simulations

#lazaruslives

The Lab for the Analysis of Zombie Activity and Research into Undead Simulations (LAZARUS) was founded at Texas Tech University in 2014 as the result of the synergistic efforts of the Department of Mathematics & Statistics, the Science, Technology, Engineering, and Mathematics (STEM) Center for Outreach, Research & Education (STEM-CORE), and a number of independent initiatives funded by the National Science Foundation. The lab is designed to serve two purposes: (1) support research opportunities for undergraduate and graduate students, and (2) support K12 outreach efforts designed to increase awareness and interest in STEM academic and career pathways. While the lab hosts a number of resources designed to support these objectives, a supercomputer branded as the Schoenberg Cluster is featured as the lab's centerpiece.

SCHOENBERG



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TTU LAZARUS @lazarus_ttu 9 Jan

Off to Joint Math Meetings!
pic.twitter.com/a6EzgbOdIU

Expand

TTU LAZARUS @lazarus_ttu 15 Dec

Todays lesson- you cant boot linux 2.6 kernel

Tweet to @lazarus_ttu

SOCIAL MEDIA

www.lazarus.ttu.edu

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#lazaruslives

Summary

We've guided high school students into STEM fields by

1. Connecting students with university faculty to do science and math
2. Short on-campus summer research experiences
3. Research topics that grab students' attention

Partnerships for Pathways to STEM Workforce

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This event is funded by the National Science Foundation, grant #1312022. Any opinions, findings, and conclusions or recommendations expressed at this event or in these materials are those of the author(s) and do not necessarily reflect the views of the National Science Foundation