

FISSEA 2007 20th Annual Conference

Networking & Information Security
Improving Online Learning Through Simulation



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Agenda



- About the University of Maryland University College
- Online learning environment obstacles
- Online Laboratory Implementation Framework (OLIF©)
- IT Guru/Simulation benefits
- Networking and security lab exercises overview
- Summary



About UMUC



- UMUC has more than 88,000 students worldwide, over 32,000 whom are Maryland residents offering programs tailored for working adults and other traditional students
- UMUC is a leader in Higher Education for Adults and Distance Education
- UMUC offers more than 600 courses and close to 100 undergraduate and graduate certificate and degree programs completely online via WebTycho
- UMUC educates the Military – 54,000 service members world wide at more than 130 locations

Reference: http://www.umuc.edu/ip/umucfacts_02.shtml



Obstacles in an Online Learning Environment



- Communication barriers
- Learner motivation
- Computer and technical problems
- Need for virtual labs



Online Laboratory Implementation Framework



- Decision Points
 - Make or buy
 - Cost
 - Course integration
 - Support
- SDLC Phases
 - Initiation
 - Analysis & Evaluation
 - Selection of Learning Technology
 - Design Integration
 - Implementation
 - Monitor & Adapt
- Perspectives
 - Instructional Designers
 - Management
 - Instructors
 - Students

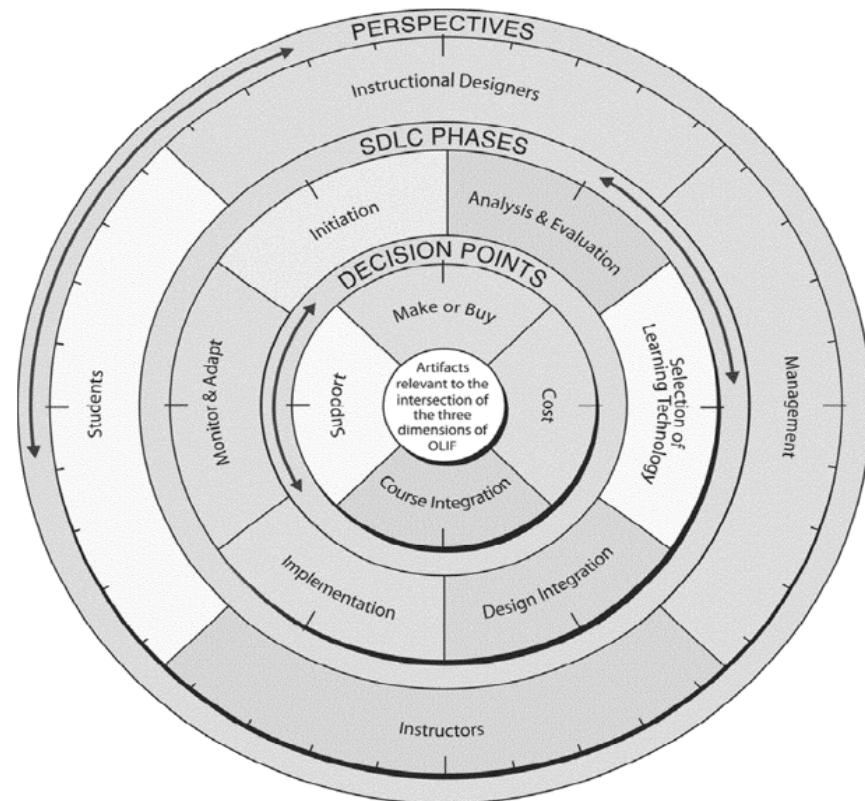


Figure 9 - Online Laboratory Implementation Concept



OPNET IT GURU/Simulation Benefits



- Provides a rich suite of widely used telecommunications devices used in networking and security.
- Affords ability to build computer models so students can study common networking and security exercises in a safe online lab environment.
- Uses models and scenarios so students can study the behavior of communications networks and security implications.
- Ease of use



OPNET Pilot – Cool Crusin



In phase one you will be learning to create a network from scratch.

Checklist for Phase 1

Create an OPNET directory

Place the nodes in OPNET

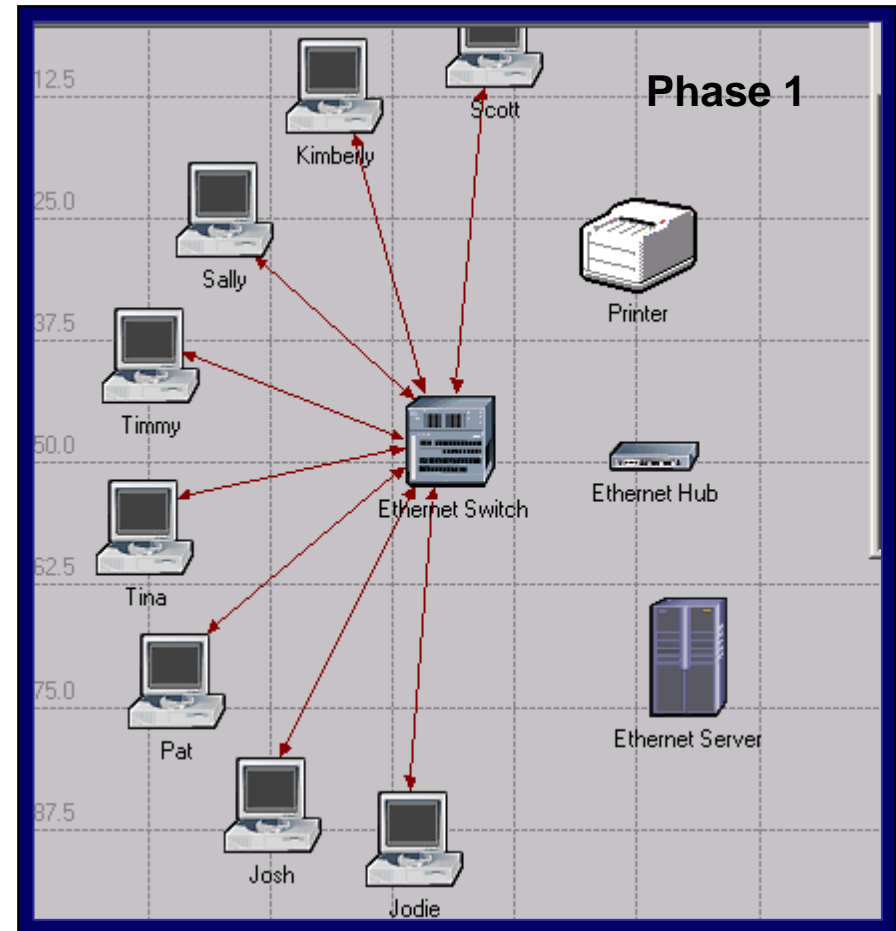
Name the nodes in OPNET

Link the nodes in OPNET

Verify the links in OPNET

Discuss as a team the questions for phase 1

Elect one team representative to post the answers in the WebTycho



Overview of Networking & Security Lab Exercises



- Overview of networking and security lab exercises
 - Undergraduate School
 - Baseline
 - Distributed Web Attack
 - Firewall to Stop a Distributed Web Attack
 - Denial of Service Attack
 - Using a Personal Firewall to Stop a Denial of Service Attack
 - Graduate School
 - Unauthorized Video Download
 - Proxy Server to Prevent Video Download
 - Unauthorized File Sharing
 - Packet Filtering to Stop File Sharing
 - Need OPNET 12.X version
 - Network Address Translation

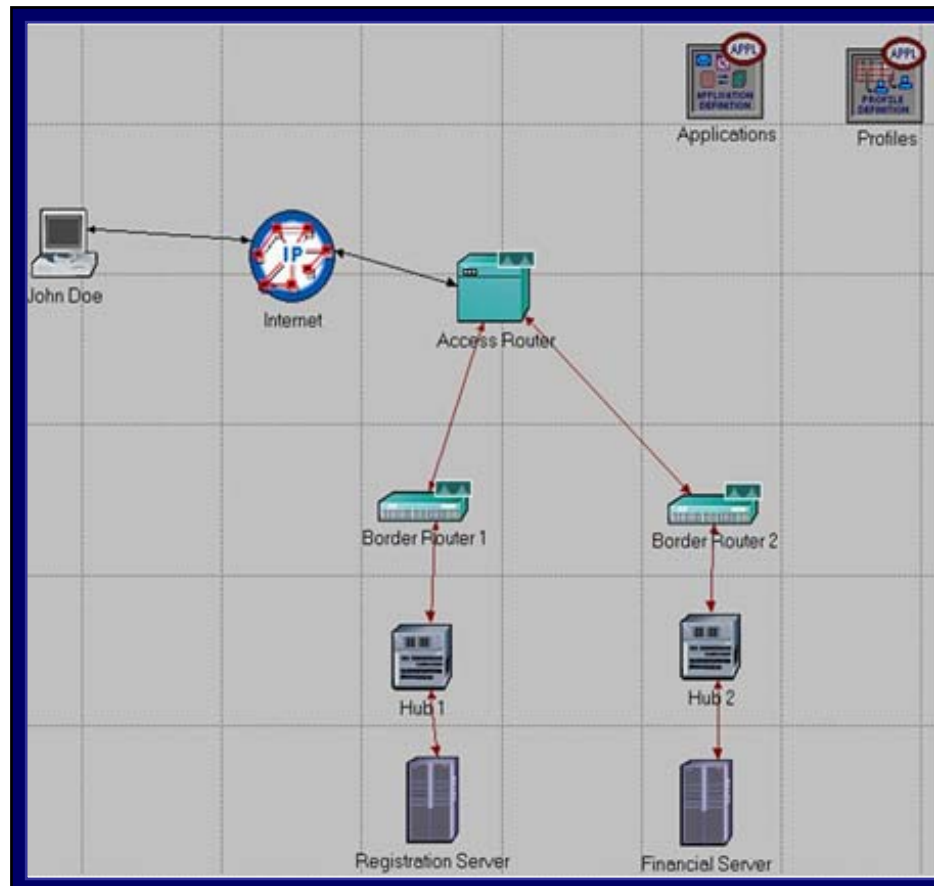


Review of Networking & Security Lab Exercises



Baseline

Reference scenario to compare the performance observed for future exercises.



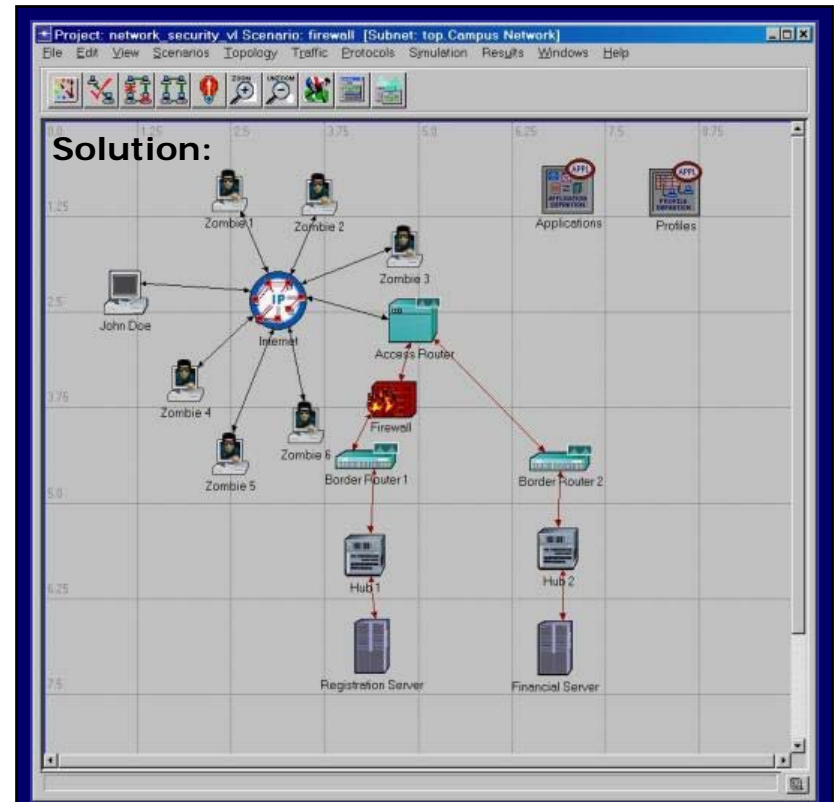
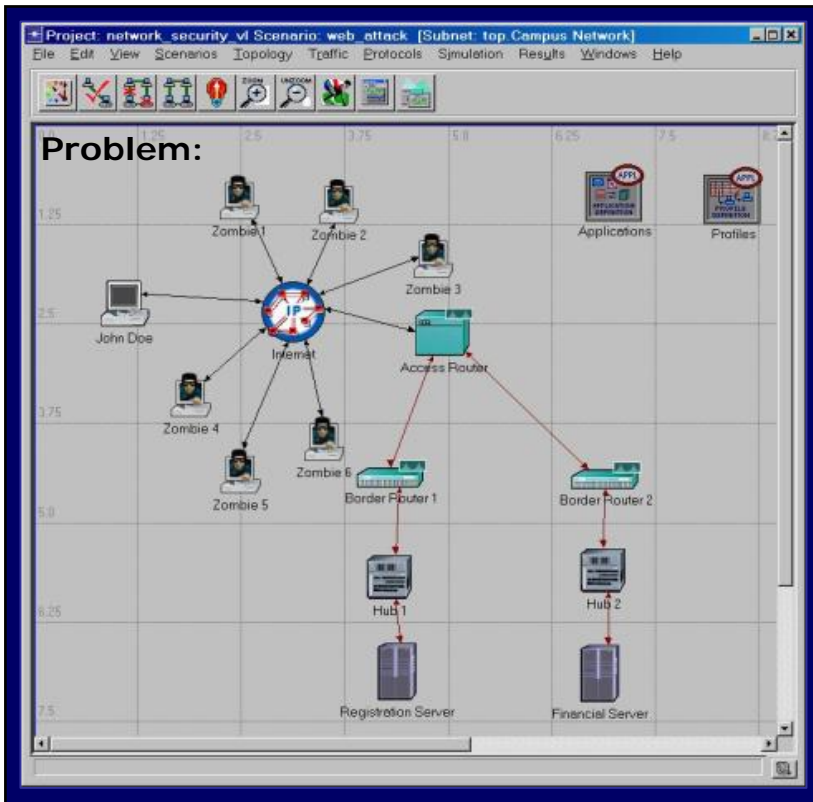
Review of Networking & Security Lab Exercises



Distributed Web Attack

Problem: Zombies overload the registration server CPU and memory resources.

Solution: Firewall blocks the zombie IP addresses (IP packets received from zombies' IP addresses are discarded.)



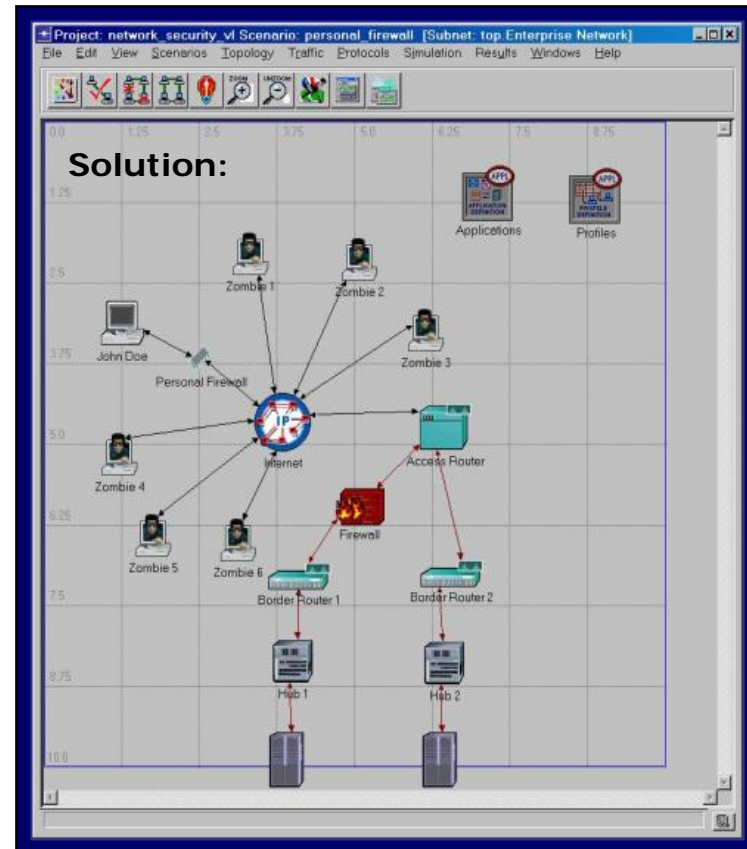
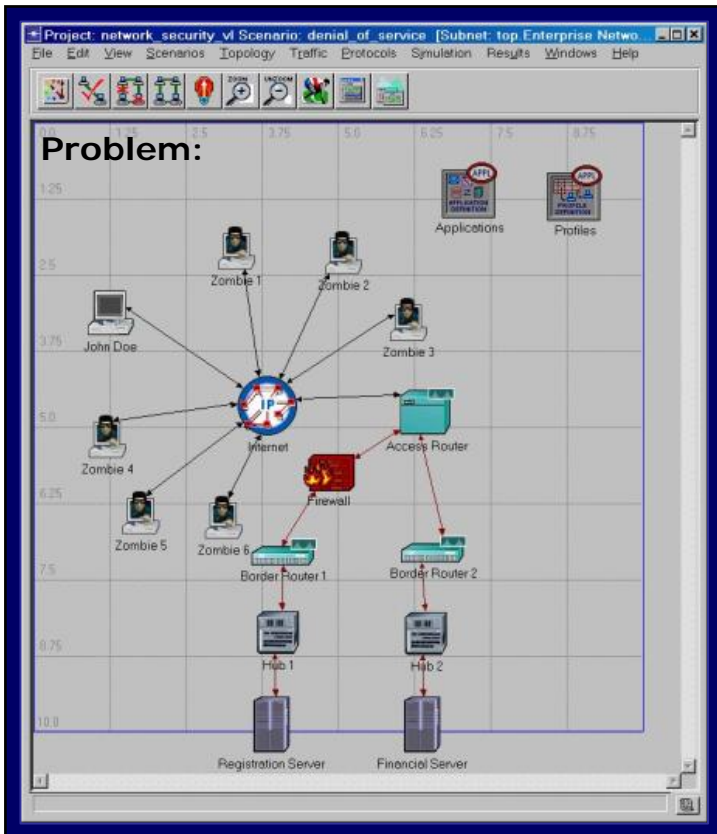
Review of Networking & Security Lab Exercises



Denial of Service

Problem: The hacker uses the Zombie herd to exploit an unprotected FTP port on John Doe's machine.

Solution: Personal firewall blocks packets addressed to the FTP port on John Doe's machine.



Course Integration



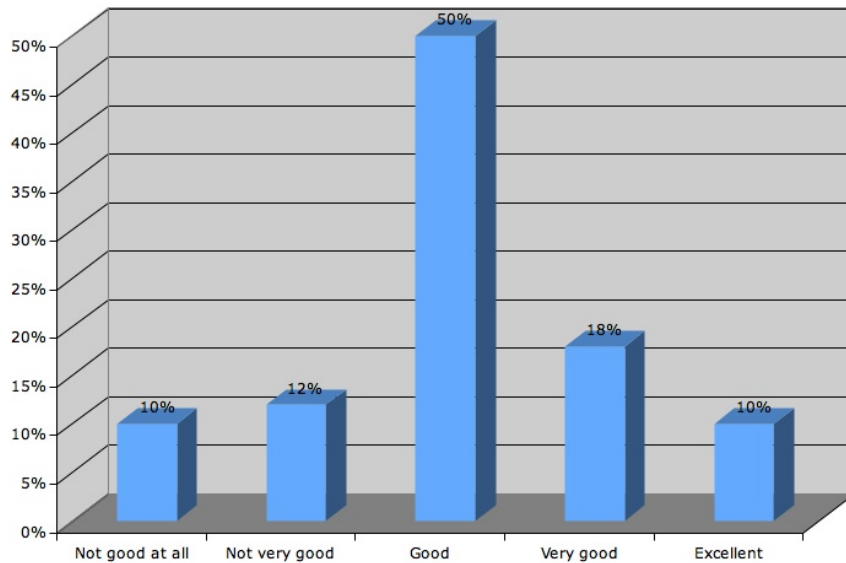
- Ensure that visualization supports the learning objectives
- Consider student learning curves
 - Undergraduate & Graduate
- Student motivation
- Flexible learning environment
- Focus on course content
- Step-by-step process
- Engage students as if they were in “live labs”



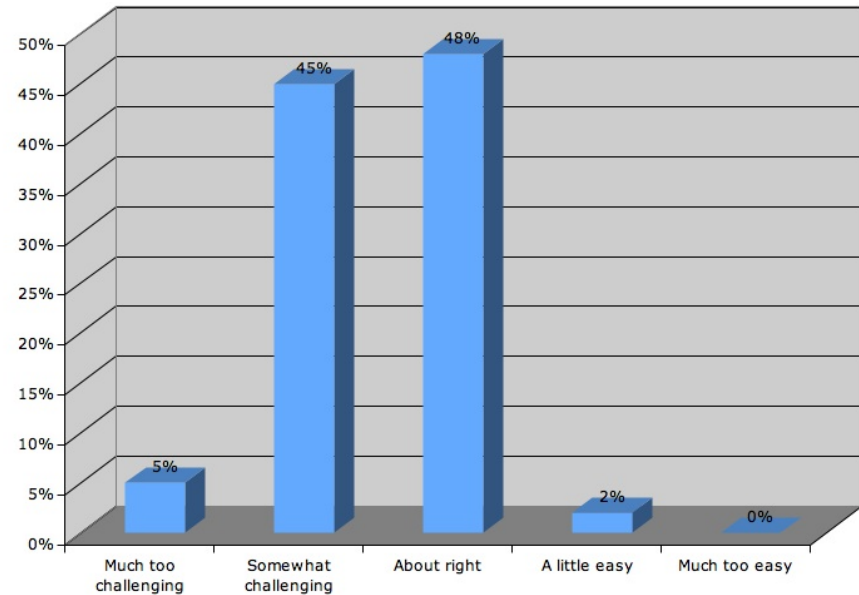
Results/Summary



I found the content covered in the OPNET assignment to enable me to attain mastery in networking was



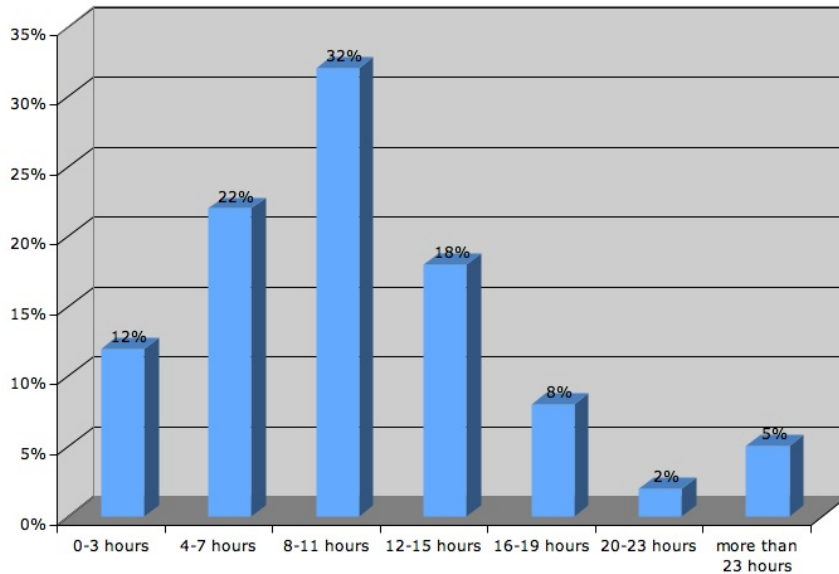
I found OPNET exercises and answers to be



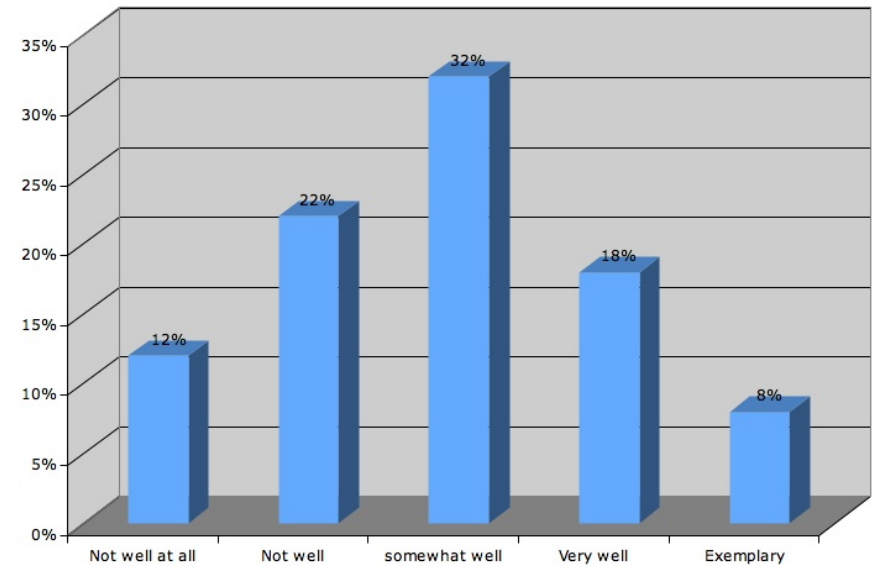
Results/Summary



Approximately how many hours did you spend on OPNET installation and assignments?



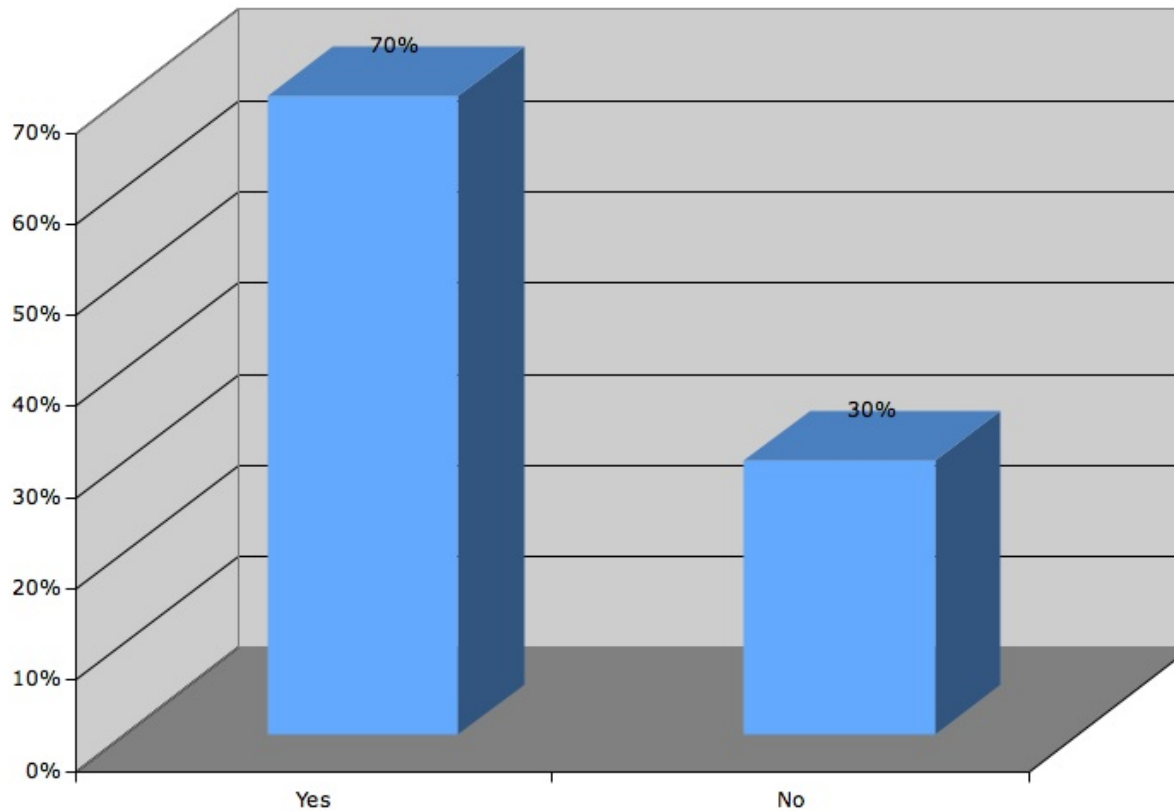
Did the OPNET assignment work well in terms of design of content (e.g., graphics, appropriate use of multimedia, links, white space, etc.)



Results/Summary



Did this course (with the use of simulation) meet your expectations?



Conclusion



- Student outcomes and success
 - What are the main networking concepts you learned from the OPNET projects?
 - "DOS Attack"
 - "The concept of network security"
 - "How easily a network can be attacked"
 - "Packet Filtering and routers"
 - "Setting up personal firewall"
 - "Server, workstation, router, and firewall iterations and functionalities."
 - "The main concepts I learned from the projects was the seriousness of web based attacks."
 - "The use of firewalls and an ACL."



Conclusion - Summary



- Student satisfaction (Student's comments)
 - "Before the class I had very little networking experience. I feel like I have a much better grasp now, though. "
 - "The simulation was very helpful in getting hands on knowledge of what we were learning."
 - "It helped drive the points home, by actually doing the stuff, not just reading about it."
 - "As this was my first online course with simulation software, I was very pleased with the course. I have heard people I work with speak of simulation software and how useful it was in learning things and I now have to agree with them. I feel it is extremely useful and informative."
 - "I understood what I wanted from the course and it met or exceeded my expectation."
 - "Perfect for working adults with limited time to schedule in actual lab time"
 - "Yes, it was essential as it allowed me to be able to visualize how networks work and how all the information we learned fit into the real world."



Conclusion - Continued



- Faculty ease of use
- Pros
 - It gives students a feel for networking and security concepts without the expense of real hardware and software
 - "It was useful because you could do what could never be done from home before"
 - "Since the simulations were necessary OPNET allowed me to experience them since I do not have access to a lab where the simulations could have been performed."
- Cons
 - It still not real – students can't make mistakes and see real consequences.
 - "It is right there. That is the good thing about simulations, you can duplicate, but the only catch is that this is a controlled simulation. You can stop and start in a simulated environment, you have no control in a production environment."
- Growing horizon for additional learning objects
- Questions?

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