



INTRODUCTION TO COMPUTING

Assignment 3

Instructor: Drakhshan Bokhat

Total Marks: 10

Marks Obtained: _____

Roll No: _____

Mapping CLOs: CLO 3

Activity 04a Collisions: The Alphabet Game

A. This game is best played in groups of 4-7 people. Take a moment to establish your groups and introduce yourselves to each other.

B. In each group, your goal is to take turns saying the letters of the alphabet, in order from A to Z. Sounds easy, right? Here is the difficult part: there can be no collisions. In other words, if someone has just said the letter "C", and if two people simultaneously start to say the letter "D", your group has to start over again at the letter "A." If your group wants to have fun, you could all do something to signify that a collision has occurred, such as bumping elbows. When you get to "Z", do a group celebration.

C. Here are few more rules:

0. The game starts when any person in the group says "go."
1. There can be no pattern in the order of who says a letter.
2. You cannot use any physical gestures to message the group regarding who is going to speak next.
3. There can be no talking, or pre-planning, about how your team will accomplish this task.

D. Play this once with your group. Then if you have time, have two (or more) groups start at the same time and compete against each other to finish first. As another variation, mix up the groups after one successful turn.

E. Answer the following questions after you have played this game many times:

1. Why do you think collisions occurred?
2. If you double the number of people in an group, do you think this would lead to more collisions or less collisions? Why?

3. If you were allowed to use physical gestures, what would you use?

4. Physical Gestures can be thought of a kind of Protocol. A Protocol is a set of rules for coordinating the transfer of information between different entities. Explain how physical gestures would help avoid collisions.

Activity 04b Acting out TCP/IP with packets and routers

The beauty of the Internet is that it is decentralized and redundant. Its information lies at the edges, not at the core. Data is broken up into packets, which are transmitted one at a time, through no predefined route.

You will need several small pieces of paper for this activity.

A. Depending on the size of your class, break up into different roles. A little more than half the class should be in the middle of the room, and the rest will form small groups (of size 2-3) around the edges of the room. People in the middle are called “Routers” and act independently. Each small group will be called a “Device”.

B. The routers are not allowed to move. Make sure they can spread out around the room so that they are within arms reach of each other. Also, make sure that at least one Router is within arms reach of each Device. There should be enough routers to allow for multiple paths between Devices.

C. The small groups that are acting as Devices need to be numbered. Decide as a class what number (IP address) each device will have.

D. Each Device will think of a different 4-7 letter word to send to each of the other Devices. Using several small pieces of paper. Each piece of paper is considered a Packet, and contains:

- one letter in the word
- the number of the sequence of this letter in the word (2 of 7)
- the destination group's IP address
- your group's IP address

E. Start exchanging packets by giving one packet at a time to a Router. Each router may only handle one packet at a time. They should pass the packet to another Router, to help it get to its destination. If a packet touches the ground, it is considered “dropped” and will be taken away by the instructor. The instructor may also randomly confiscate packets as they are being passed.

F. If a device is missing a packet, they should send a message via a packet to a device requesting a missing packet. Devices may only communicate with each other using packets.

When all the devices have their packets, stop the activity and discuss what caused problems in the transmission of packets from one device to another.

Activity 04c Imagining a human DDoS attack

A. Review: What is a Distributed Denial of Service attack? Write down an explanation that you would give to someone who uses the Internet but does not have a broad knowledge of how it works.

B. Thinking about the key elements of a DDoS attack, work in small groups to devise a human-scale DDoS attack. Your attack will not actually use computers, but will use unsuspecting humans acting as “bots” to disrupt some legitimate and important human service. Write down the key elements of your DDoS attack below.

C. Share out your explanations with the large group. Find one that could be acted out within your classroom. Act it out.

D. Finally, discuss some serious consequence of computerized DDoS attacks. What kind of computer-enabled services could be crippled by these attacks, and what kind of harmful effects could result?