Workplace Studies of Collaboration & Assignment 1

Week 1

Summaries

- If you're not added to the blog, please send me your email address.
- Take a peek at your peers' summaries for this past week. You'll get a sense for effective summaries/synopses.

Project Stuff

- Next week Thursday: prepare three crazy ideas to present to class. [5~8 minutes each]
  - Novel system
  - An interesting research question
  - A study of a [system | context]
  - Or, an area…
- See “project details” from the course webpage for some ideas

Three things on deck for today…

- Discussion: “Is paper safer…”
- Assignment #1
- Some networking (enough for you to do the assignment)

Classics in CSCW Literature

- Collaborative Activity and Technological Design: Task Coordination in London Underground Control Rooms (Heath & Luff, 1991)
- Patterns of Contact and Communication in Scientific Research Collaboration (Kraut & Egido, 1988)
- **Is Paper Safer? The Role of Paper Flight Strips in Air Traffic Control (Mackay, 2000)**

Big Themes

- *Awareness*
  - *Monitoring and performance*
- Formal and informal contact / communication
- **Procedure vs. practice**
  - **Perspectives on design and systems**

Big Picture

- Study of activity in air traffic control towers
- Nice example of an ethnographic study
- Big message: difference between the practices vs. procedures
- Argument: new designs should be careful to consider the “invisible functions” of practices

Context

- Air traffic control: dangerous, high stress
- Surprisingly: they use these paper things
- Different perspectives on the role/function of paper strips: controllers vs. engineers vs. social scientists
- Practice vs. procedure: tension between safety and efficiency

Ethnography

- Careful description of their process: what they did, the context they studied, and how the data was analyzed
- Detailed video analysis of a few specific instances

Things I think were important

- Physicality of the strips: each strip represents a plane (spatial layout; handoff; physical "monitoring")
- Annotation of strips: quick (shorthand might be region/area-specific, though)
- Peripheral monitoring (like in London Underground); construction of information/ managing interruptions

Things that made me go hmm…

- Paper strips getting lost
- Paper strips being tossed around

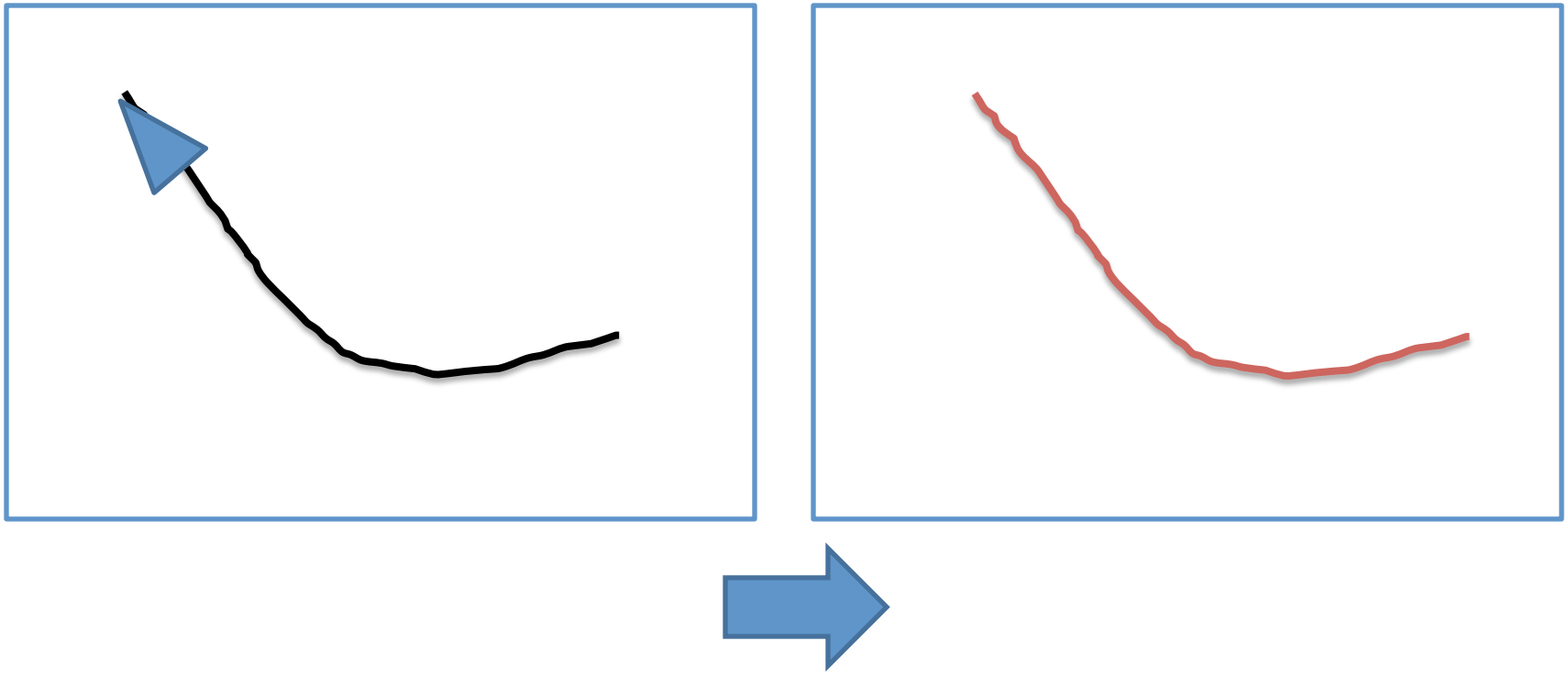
Thoughts / Discussion Points

- What are some requirements for computational tools for this kind of environment?
- What was the nature of the solution they proposed?
- What is your take on the nature of this solution?

- assignment #1

build a distributed whiteboard

goal: build a simple distributed application



- assignment #1

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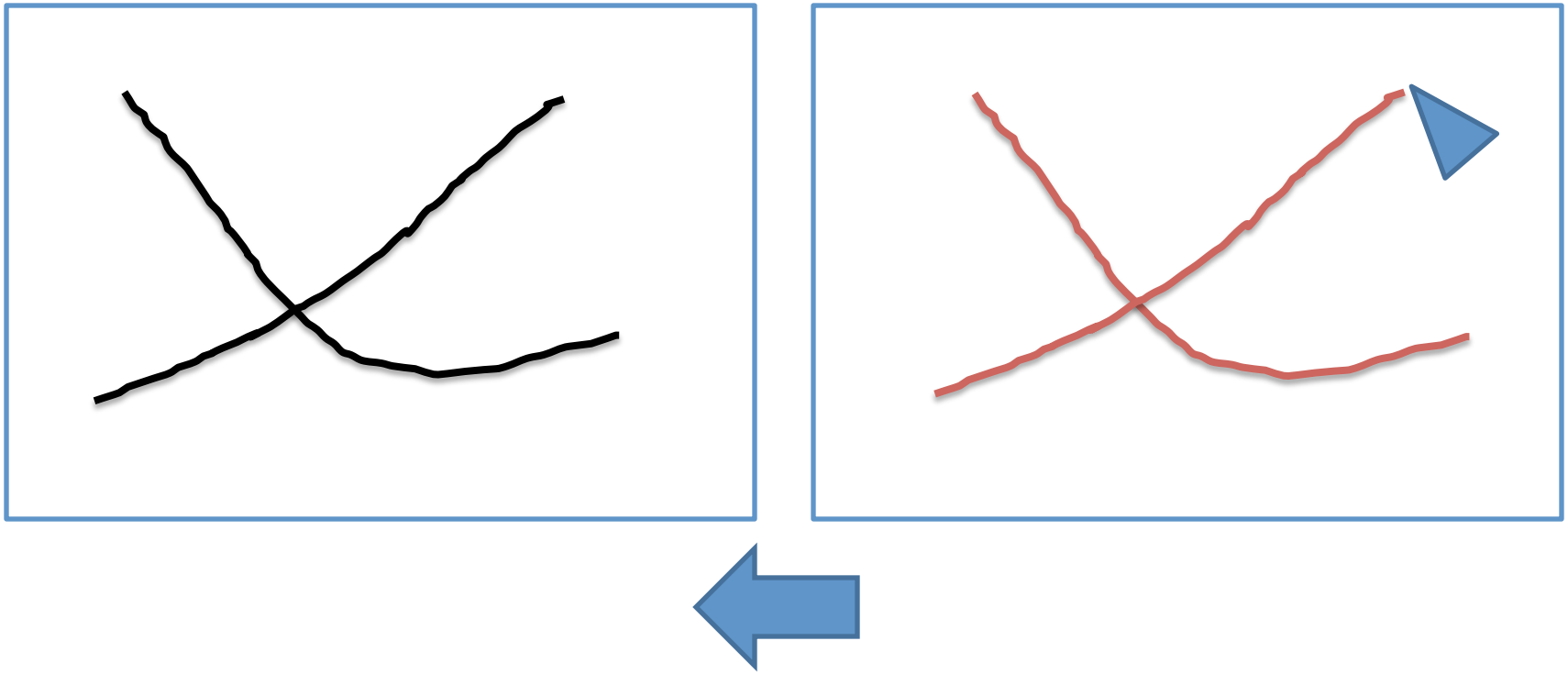


- assignment #1

constraints

language: whatever you like; suggestions: C#, processing, Java, or Python*

feel free to use networking toolkits. Suggestions: consider OSC (open sound control)

- assignment #1

fun bits

2.5% each!

see the assignment page

some examples:

- support telepointers
- support the late joiner
- support >2 clients

Networking, whiteboard style…

- Terminology: protocols, servers, clients, hosts, serialization
- Addressing and ports: IPs, loopback, DNS, NAT
- Distributed application topologies
  - Peer-to-peer
  - Centralized

on deck

*distributed application terminology

topologies

*networking 101

*based on: http://hcc2.cc.gatech.edu/documents/107_Edwards_week6.pdf

assumptions

you have seen some of this before

you kind of have a feel for most of this stuff

this is mostly refresher

* but I could be wrong; ask for clarification when needed

- terminology

protocol

rules that facilitate information exchange

"picard **to** riker"

"riker here"

...

"picard **out**"

(* or another radio protocol)

network applications communicate in very specific ways (certain messages, known formats)

- terminology

server

process that waits for incoming connections, and provides a service

restaurant waiter, for example

web server, Apple app store, video game server

instant messaging servers, file servers

- terminology

client

process that connects to servers, and uses the provided service

tink tink “apple juice, please!”

web browsers get web pages, and render them

email clients (outlook/thunderbird) connect to mail servers to get and send email

IM clients connect to servers to exchange messages and find out who’s online

- terminology

host

(n) a device connected to the network

(n) a device running the server

(v) run the server; *usage*: I will *host* the server

- terminology

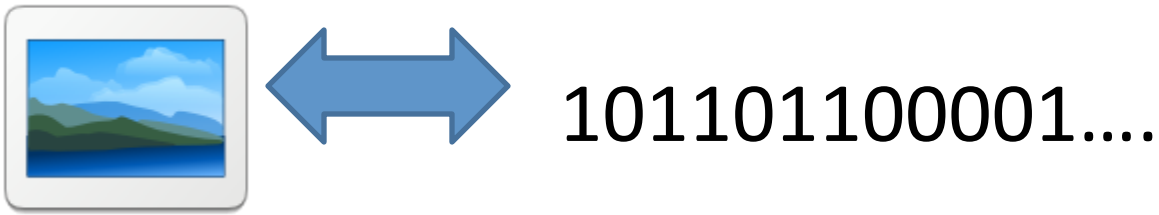
serialization

converting an object into a format that can be stored and resurrected later

make into a stream

pictures, MS Word documents

data structures/data objects



topologies

arrangement or distribution of application and communication logic

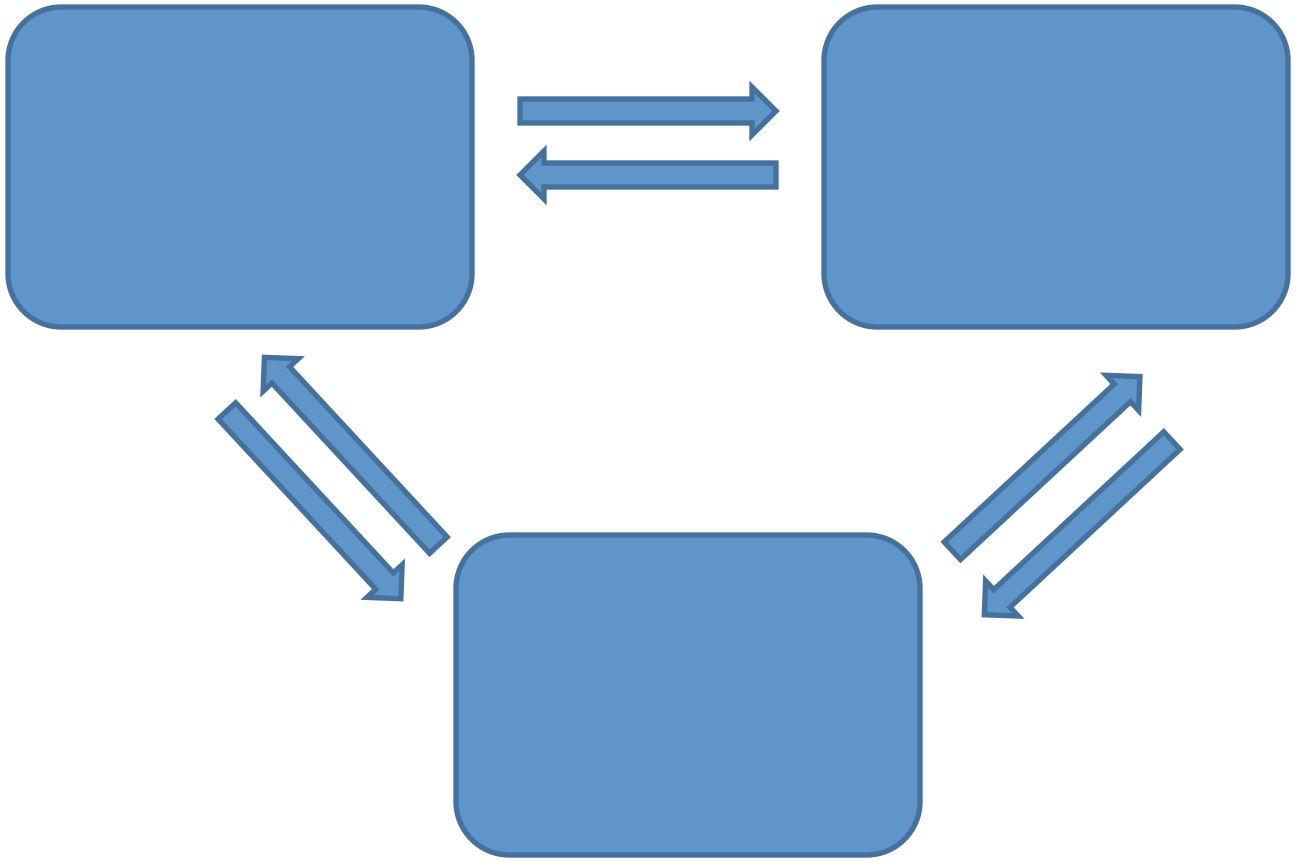
general questions this lays out:

- which parts talk to each other
- how you know who's around

- topologies

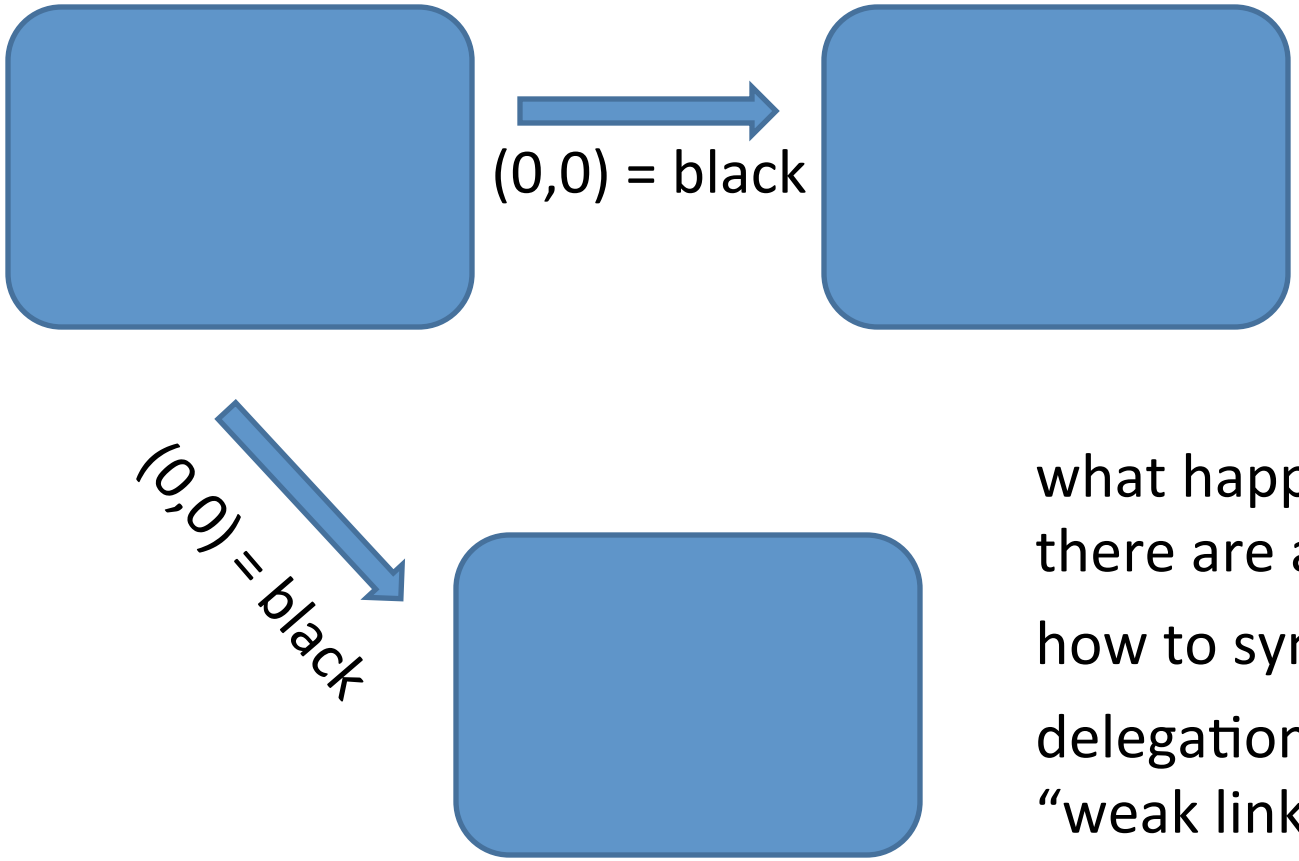
peer-to-peer

everyone tries to talk to one another



- topologies

peer-to-peer



what happens when there are a lot of peers?

how to synchronize?

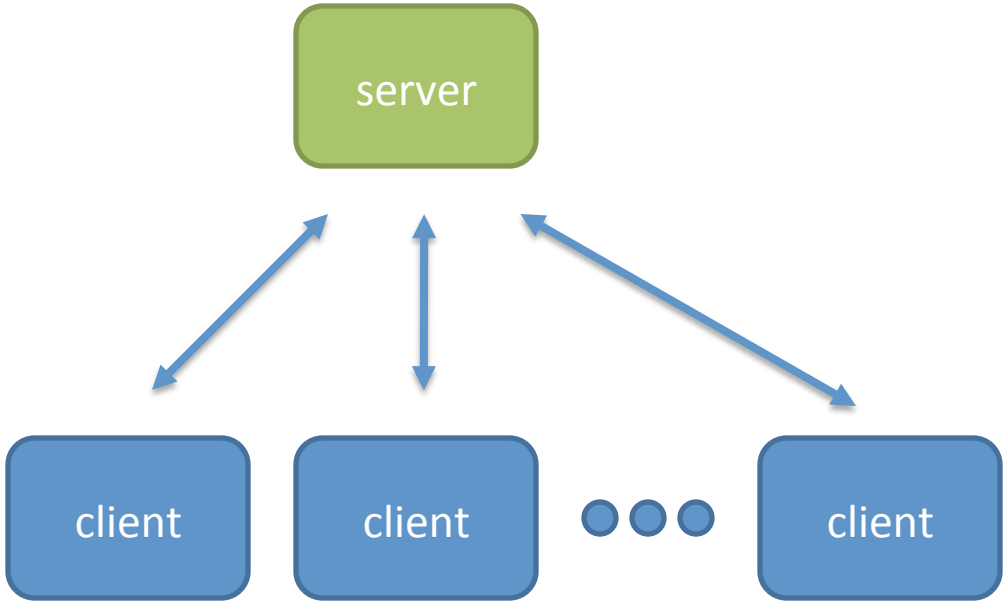
delegation leads to "weak link" scenarios

peer discovery?

- topologies

centralized

server responsible for communication between clients



- topologies

centralized

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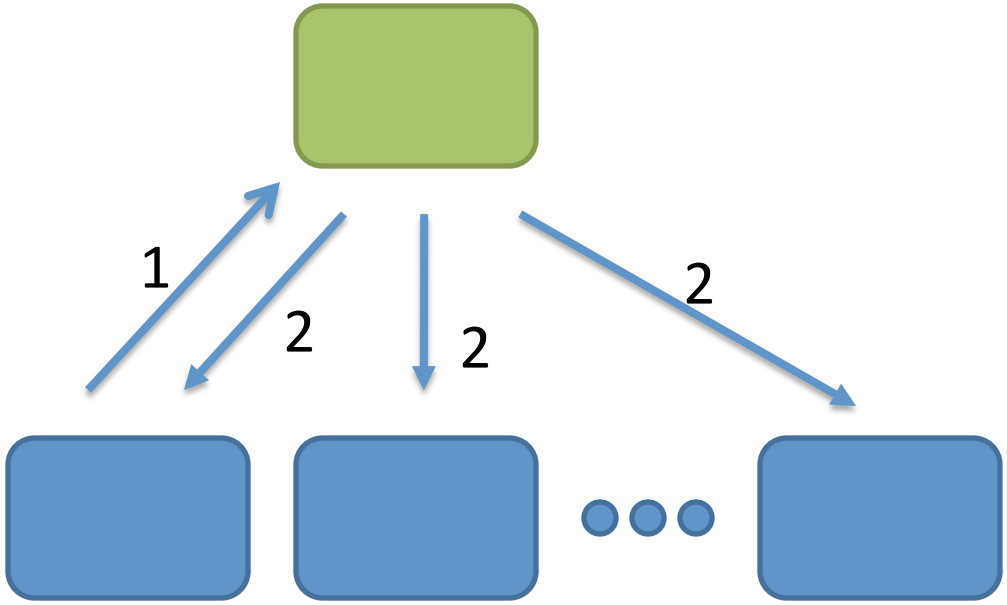

1. client sends message
2. server relays this, or another message to other clients

- topologies

all sorts of interesting hybrids

bittorrent, skype, gnutella …

mainly, the hybrids are in place to:

boostrapping (getting going)

overcome performance bottlenecks

or, structurally, they just make sense (different parts use different models—like skype)

networking 101

every host has an address

addresses are written in dotted quad notation e.g.
    192.168.1.23, 74.125.229.16

one special address refers to the “local” machine:
    127.0.0.1
    localhost

- networking 101

addressing

only a limited number of IP addresses

DHCP (dynamic host configuration protocol) is used to assign IP addresses from a shared pool (LAWN at GeorgiaTech)

IPs from DHCP expire

when debugging, you can use “localhost” to refer to the client and server on the same machine

- networking 101

private and public addresses

** not all IP addresses can be reached from a given machine **

because there are more devices than IPs, “local network adminstrators” use private or “non-routable” IP addresses

10.0.0.0 – 10.255.255.255
172.16.0.0. – 172.31.255.255
192.168.0.1 – 192.168.255.255.

(your home network is likely doing this)

- networking 101

network address translation

most home routers do this

Shaw gives me: 68.144.6.230

my router gives:

desktop: 192.168.1.115

Xbox: 192.168.1.110

laptop: 192.168.1.118

router performs Network Address Translation (NAT) so that when my desktop tries to connect to a website, it looks like it is coming from 68.144.6.230

- networking 101

why is this important?

servers running with private IP addresses cannot be reached from machines not on that network

➔generally, you will be unable to run a server at U of C, and connect to it from a client at home

- networking 101

naming

when you go to a web browser, you don't type in 64.223.161.104, you type in www.google.com

DNS (domain name service) makes this happen
- a big distributed database of all the machines on the Internet
- each organization manages its own little portion of it
- maps from host names to IP addresses

internet runs on IP addresses; names are for people*
- when you type www.google.com, the browser *resolves that name to an* IP address by talking to a DNS server
- if *name resolution can't be done (DNS is down; you're not connected to* the network), then browsing will fail

* "usability" ;-) … email boxes were supposed to be numbered

- networking 101

ports

ports let your machine run multiple servers at the same time

analogy: IP address=street address; ports=apartments

a port is a number [0-65,535] used to specify a certain mailbox in the apartment

- networking 101

ports (2)

most internet services run on well-known ports

e.g. web servers run on port 80, so when I type www.google.com, it resolves: 64.223.161.104; when you type it into a web browser, the browser connects to: 64.223.161.104, port 80

ports 0-1024 are “special” and reserved

- networking 101

why do you need to know this?

when you are writing an application, choose a high port number (e.g. 5000) [network toolkits might choose this for you]

only one program gets to use a port at a time

firewalls often block ports (e.g. to prevent you from connecting to instant messenger)

debugging:

"port already bound": another process is already using that port

"can't connect": you may have specified the wrong IP *or* port

Open Sound Control

- Music systems
- Message format
  - Address patterns
- Repeater servers / notification servers
- Clients that listen to “address patterns”