

CS 43: Computer Networks

01: Course Administration & Introduction

August 31, 2026



Slides adapted from Kurose & Ross, Kevin Webb, Vasanta Chaganti, Laurent Vanbever

Today



About your instructor



What is this course about?



Course Administration

- Structure & Grading
- Academic Honesty
- How does this class work?



Introduction [If time]

- What does it take to transmit a packet over the Internet?

Today



About your instructor



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Introduction [If time]

- What does it take to transmit a packet over the Internet?

Hi! I'm Prof. Ranysha Ware!

You can call me:

Professor Ware / Dr. Ware (she / they)

PhD in CS: **Carnegie Mellon University**

MS in CS: **UMass Amherst**

BS in CS: **SUNY New Paltz**

Thesis work: How to modernize congestion control
algorithm evaluations?



RANYSHA WARE AWARDED PRIZE FOR WORK ON INTERNET FAIRNESS

Friday, February 7, 2020 - by Virginia Alvino Young

Ranysha Ware, a Ph.D. student in Carnegie Mellon University's [Computer Science Department](#), has received a 2020 [Applied Networking Research Prize](#) (ANRP) from the [Internet Engineering Task Force](#). She is being recognized for her work on congestion control fairness.

Ware leads a research project on internet fairness that recently demonstrated how Google's new congestion control algorithm (CCA) [gives an unfair advantage](#) to its own traffic, and [proposed new guidelines](#) for developing future algorithms.

She is one of six recipients of the ANRP this year, and one of two who will present their work March 21-27 at the IETF 107 in Vancouver, British Columbia.

Ware earned her M.S. in computer science from the University of Massachusetts Amherst. She is a Facebook Emerging Scholar and two-time recipient of the National GEM Consortium Fellowship.



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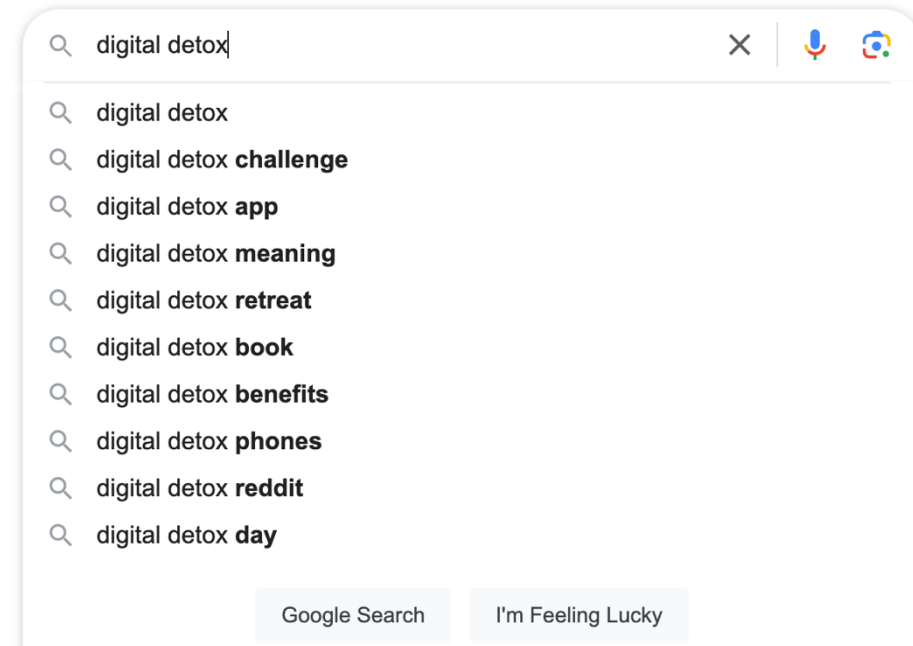
Introduction [If time]

- What does it take to transmit a packet over the Internet?

What is the Internet?

Why should you care?

When was the last time
you went 24 hours without
going online?

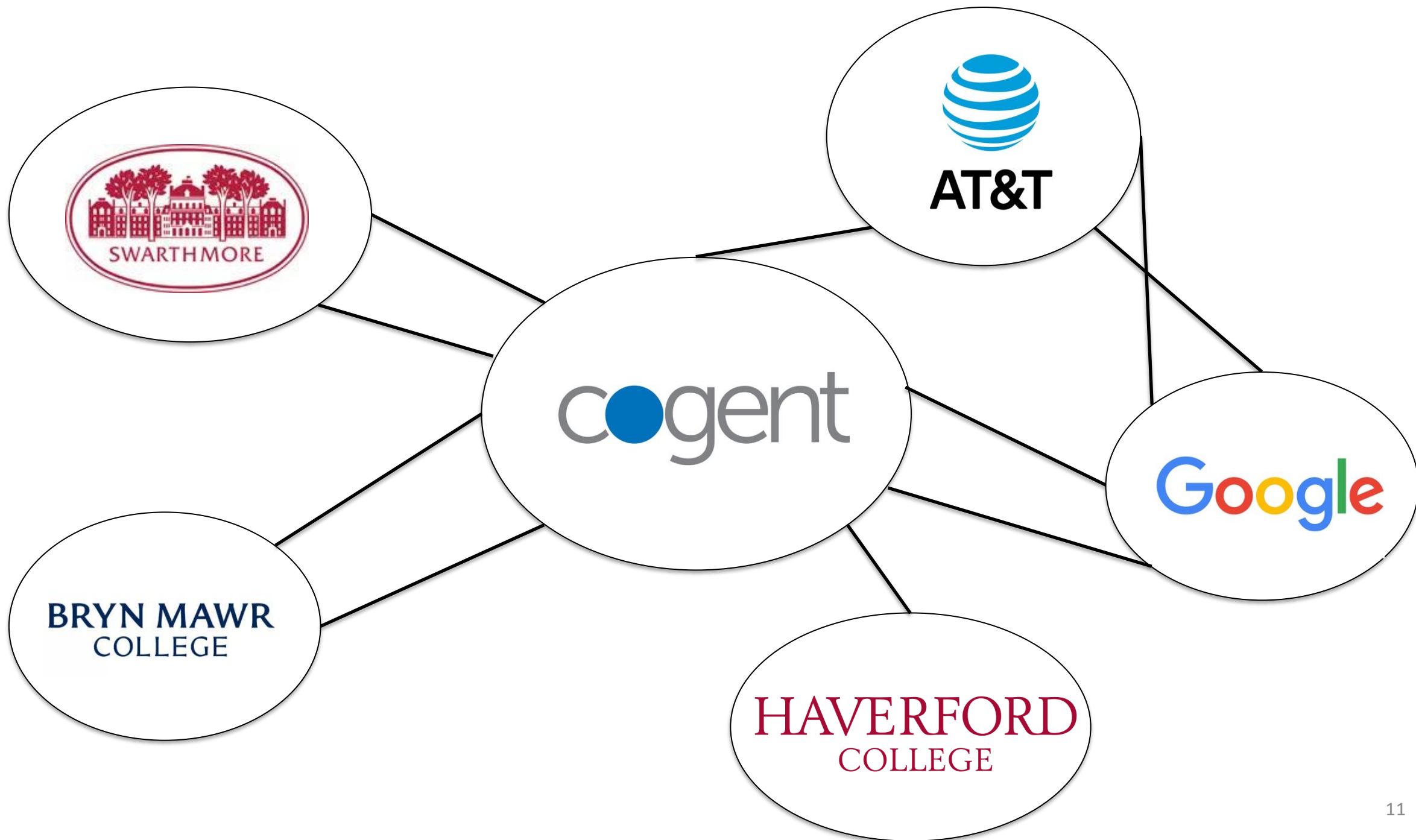


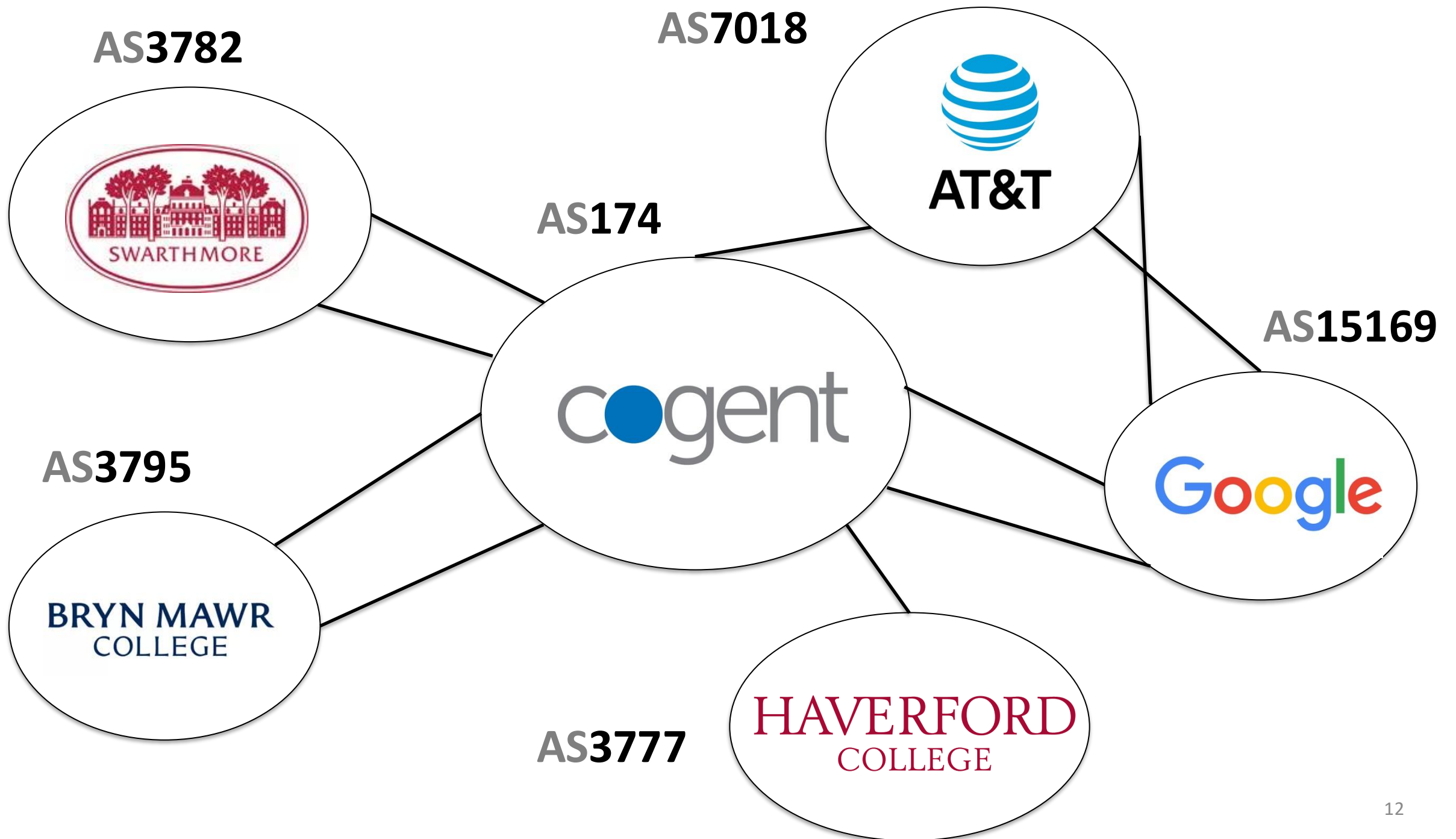
Internet

Internet



A network of *networks*







The Internet **“glues together” many networks.**
This is its most important and fundamental goal.





Doing so is hard when considering competing interests.
This leads to many tussles across business & technology.
Economic incentives often shape Internet paths.



The Internet is huge

The Internet is **huge**

~ 80,000

of interconnected networks
as of August 2026

~ 30 billion

estimated* # of connected devices
in 2023

~ 13 exabytes

estimated* daily global IP traffic
in 2022

**~ 82% of all
Internet traffic**

estimated* percentage of video traffic
in 2022

* Cisco Visual Networking Index

The Internet is **incredibly diverse**

what

it connects

The Internet is **incredibly diverse**

<i>what</i>	devices	phones, servers, sensors, pacemakers, ...
it connects	applications	web, video streaming, gaming, ...
	users	governments, operators, malicious, ...

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how

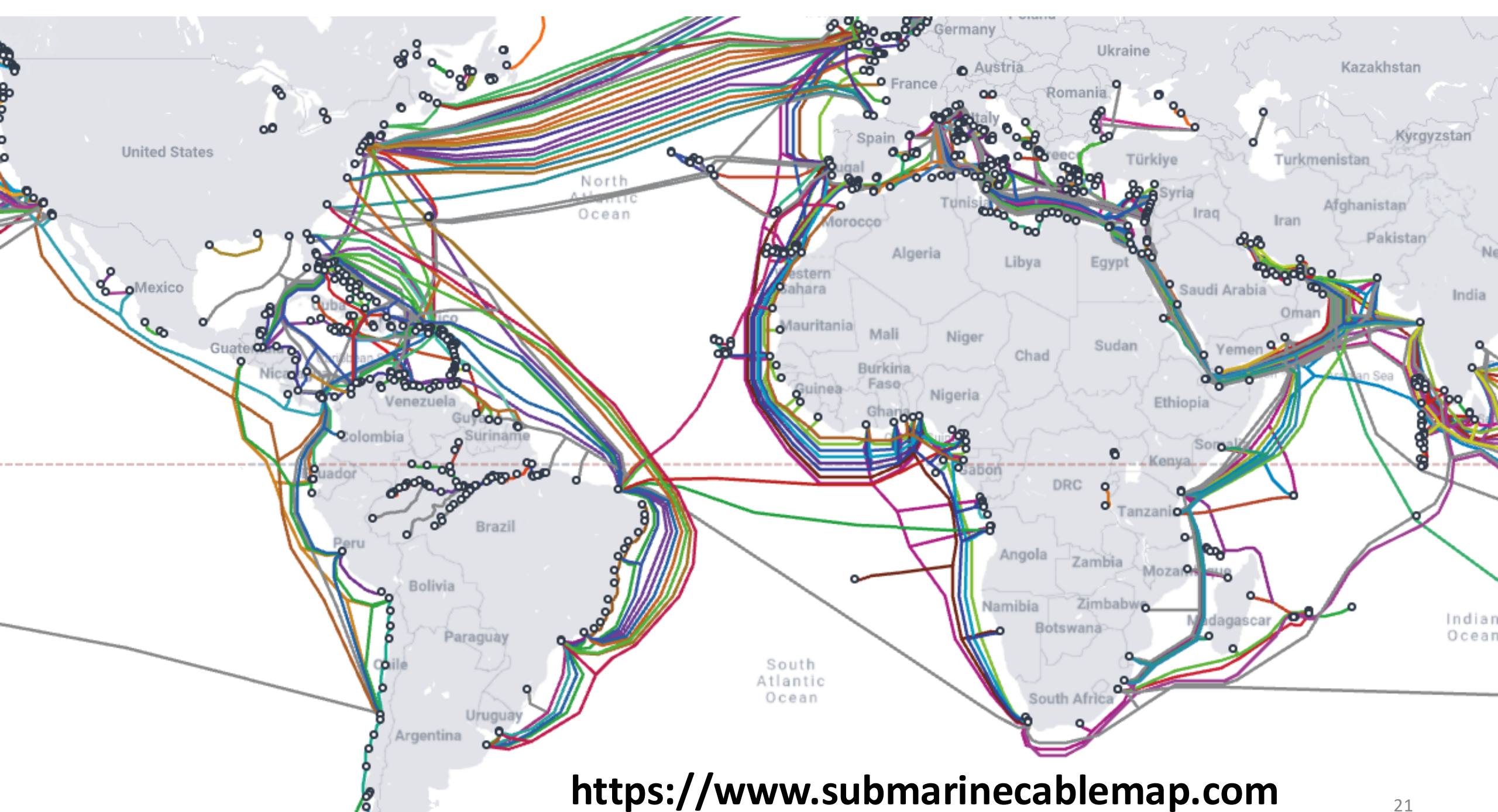
it connects

The Internet is **incredibly diverse**

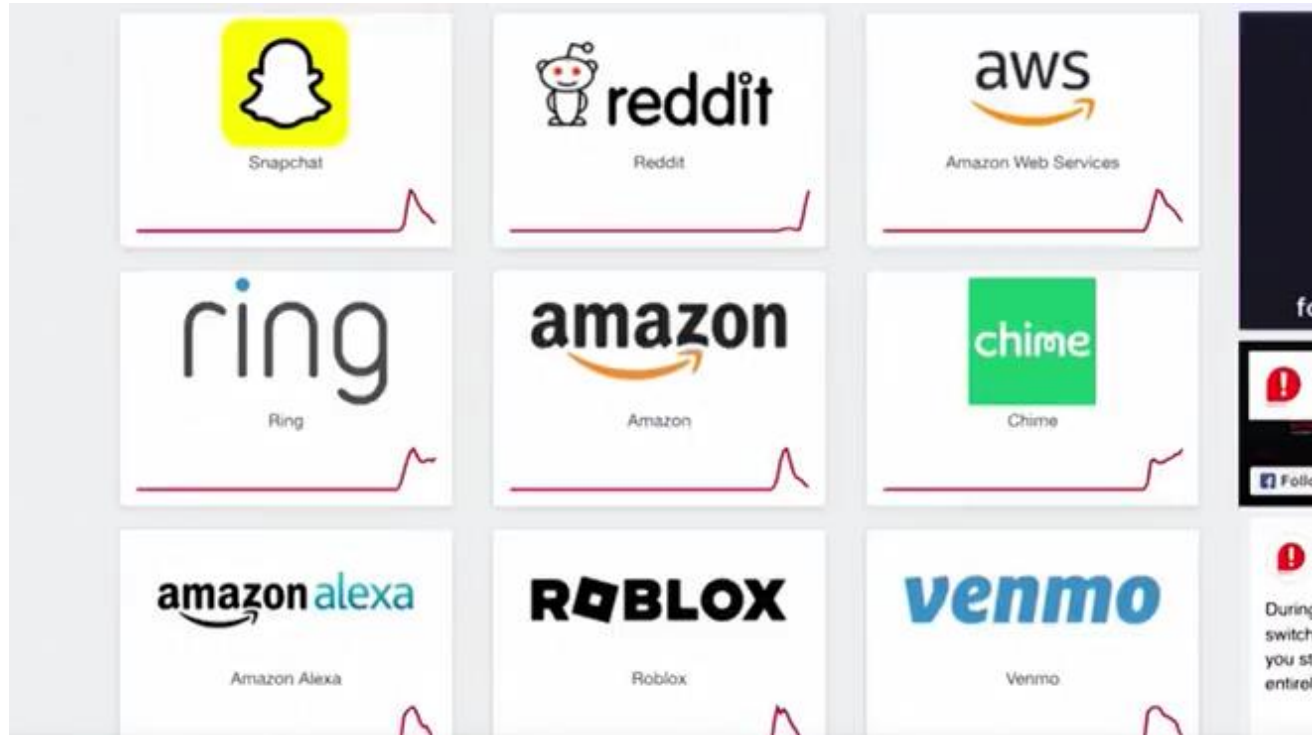
what	devices	phones, servers, sensors, pacemakers, ...
it connects	applications	web, video streaming, gaming, ...
	users	governments, operators, malicious, ...

how	technology	optical fiber, satellite, wireless, copper, ...
it connects		

	from	to	delta
latency	microseconds	seconds	10^6
bandwidth	kilobits/sec	terabits/sec	10^9
loss rate	0%	100%	



The Internet is **prone to failure**



Source: <http://downdetector.com>

Amazon Outage Forces Hundreds of Websites Offline for Hours

Amazon Web Services, a major provider of cloud services, cited a problem at its data center in Northern Virginia. The outage highlighted the fragility of global internet infrastructure.

Listen · 6:05 min [Share full article](#) [431](#)



The Amazon Web Services pavilion at a trade fair in Hanover, Germany, in March. Sean Gallup/Getty Images

By **Jenny Gross**
Reporting from London

Oct. 20, 2025

Source: NYTimes

The Internet is **always changing**

1970s

2020s

bandwidth

hosts

killer app

The Internet is **always changing**

	1970s	2020s
bandwidth	$O(10^4)$ bits/second	$O(10^{14})$
# hosts	$O(10^2)$	$O(10^{10})$
killer app	copy files	video

One cannot design for a fixed target!

	1970s	2020s	2030s
bandwidth	$O(10^4)$ bits/second	$O(10^{14})$	
# hosts	$O(10^2)$	$O(10^{10})$	
killer app	copy files	video	

To sum up
the Internet is ...

To sum up
the Internet is ...

A **network** of **networks**...
of enormous **scale** and **diversity**...
prone to **failures**...
in **perpetual evolution**...

After this class questions you'll be able to answer:

- How does typing a website name in a browser reach the right server anywhere in the world, in under a second?
- Why does a video call get choppy while a file download just gets slower?
- Why doesn't cutting an undersea cable break the Internet?
- How can a government shut down the Internet for an entire country?
- How does your laptop get a working connection the instant you plug in a cable, without you configuring anything?

Today



About your instructor



What is this course about?

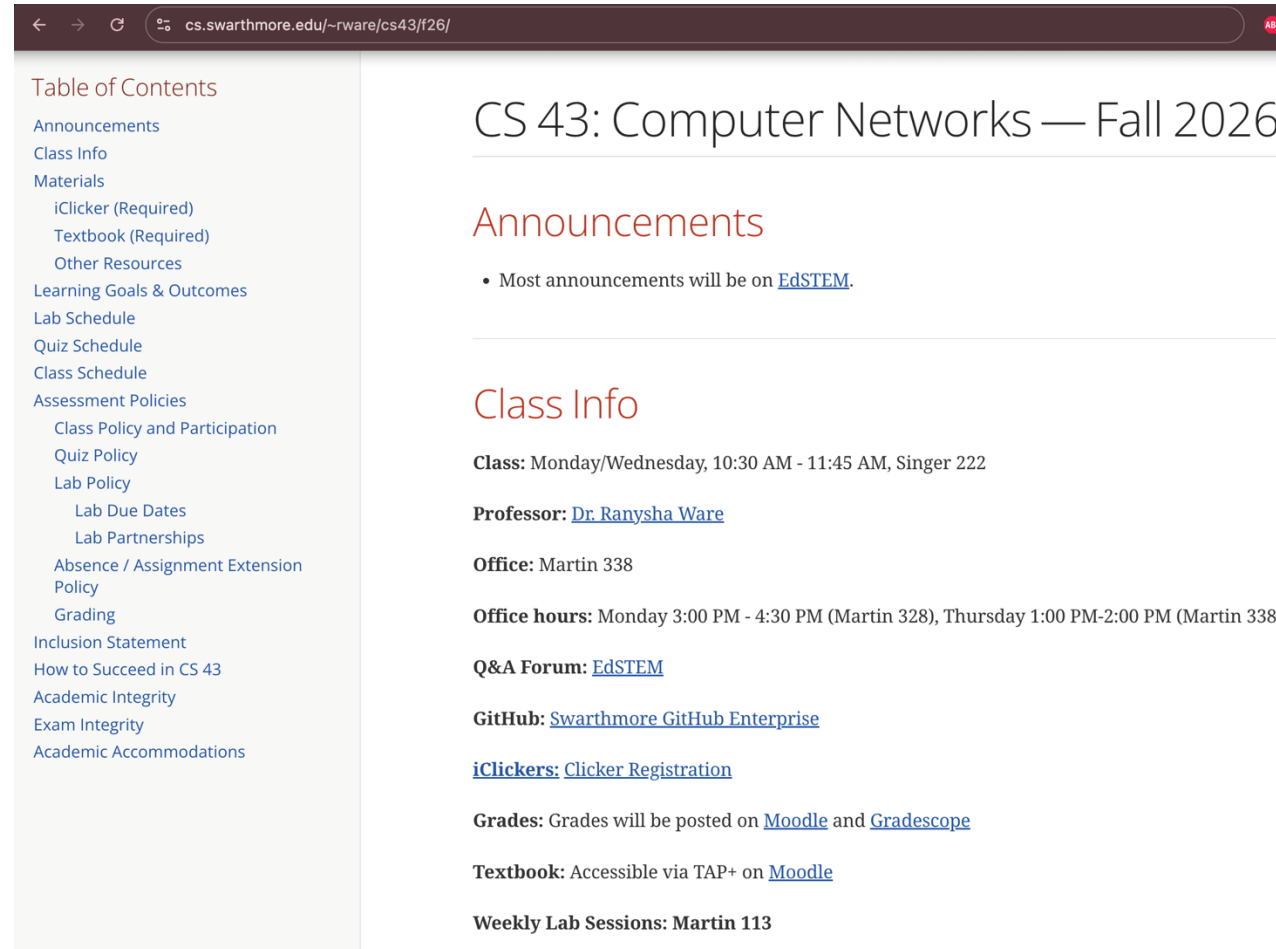
Course Administration

- Structure & Grading
- Academic Honesty
- How does this class work?

 Introduction [If time]

- What does it take to transmit a packet over the Internet?

Read the syllabus and complete the policy quiz!



The screenshot shows a web browser window with the address bar displaying `cs.swarthmore.edu/~rware/cs43/f26/`. The page has a left sidebar with a "Table of Contents" and a main content area. The sidebar lists various links: Announcements, Class Info, Materials (with sub-links for iClicker, Textbook, and Other Resources), Learning Goals & Outcomes, Lab Schedule, Quiz Schedule, Class Schedule, Assessment Policies (with sub-links for Class Policy and Participation, Quiz Policy, Lab Policy, Lab Due Dates, and Lab Partnerships), Absence / Assignment Extension Policy, Grading, Inclusion Statement, How to Succeed in CS 43, Academic Integrity, Exam Integrity, and Academic Accommodations. The main content area features the title "CS 43: Computer Networks — Fall 2026" and a section titled "Announcements" with a bullet point stating that most announcements will be on EdSTEM. Below this is a section titled "Class Info" containing details about the class schedule, professor (Dr. Ranysha Ware), office location (Martin 338), office hours, Q&A forum (EdSTEM), GitHub repository (Swarthmore GitHub Enterprise), iClickers (Clicker Registration), grades posting (Moodle and Gradescope), textbook access (Moodle), and weekly lab sessions (Martin 113).

Table of Contents

- Announcements
- Class Info
- Materials
 - iClicker (Required)
 - Textbook (Required)
 - Other Resources
- Learning Goals & Outcomes
- Lab Schedule
- Quiz Schedule
- Class Schedule
- Assessment Policies
 - Class Policy and Participation
 - Quiz Policy
 - Lab Policy
 - Lab Due Dates
 - Lab Partnerships
 - Absence / Assignment Extension Policy
 - Grading
- Inclusion Statement
- How to Succeed in CS 43
- Academic Integrity
- Exam Integrity
- Academic Accommodations

CS 43: Computer Networks — Fall 2026

Announcements

- Most announcements will be on [EdSTEM](#).

Class Info

Class: Monday/Wednesday, 10:30 AM - 11:45 AM, Singer 222

Professor: [Dr. Ranysha Ware](#)

Office: Martin 338

Office hours: Monday 3:00 PM - 4:30 PM (Martin 328), Thursday 1:00 PM-2:00 PM (Martin 338)

Q&A Forum: [EdSTEM](#)

GitHub: [Swarthmore GitHub Enterprise](#)

iClickers: [Clicker Registration](#)

Grades: Grades will be posted on [Moodle](#) and [Gradescope](#)

Textbook: Accessible via TAP+ on [Moodle](#)

Weekly Lab Sessions: Martin 113

<https://www.cs.swarthmore.edu/~rware/cs43/f26/>

Our Shared Values In This Class

Diversity, inclusion, and a mutual sense of belonging are all core values of this course. All participants in this course must be treated with respect by other members of the Swarthmore CS community. We must all strive, students and faculty both, to never make anyone feel unwelcome or unsafe in any way. Violations of these principles are viewed as unacceptable, and we take them very seriously. If you ever feel discriminated against or otherwise excluded, no matter how minor the offense, we encourage you to reach out to Prof. Ware or one of the College Deans

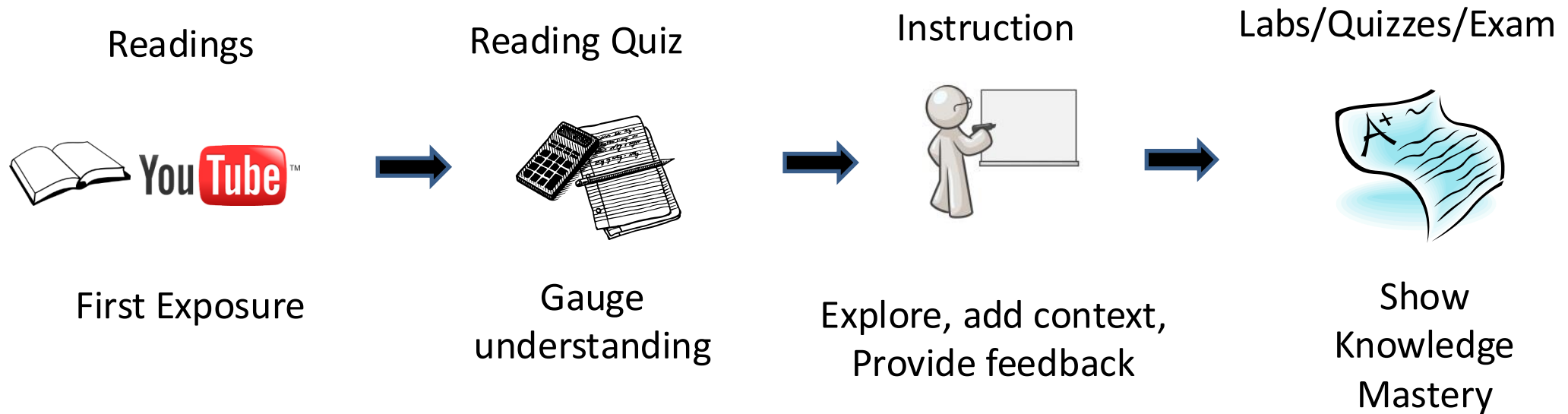
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How to Be A Good Classmate

- **Everyone** deserves to be — and participate — in class & lab
- We can **all** learn something from one another
- Come to class prepared (readings, assignments)
- Give others a chance to answer
- Avoid distracting others during class

Classes: Interactive Classes with Peer Instruction



- You do the “easy” part before class
- Class is reserved for interactive, customized experiences
- To learn, YOU must actively work with a problem and construct your own understanding of it

Peer Instruction: In-class discussions

- Based on readings for that day
- Short reading quiz with 1-3 high level questions
- Individually think about the questions (1 -2 minutes)
- Discuss: Analyze problems with your group
 - 5 – 10 minutes
 - Practice analyzing, talking about challenging concepts
 - Reach consensus
 - If you have questions, raise your hand and I'll come over
- Class-wide discussions Led by YOU (students) – tell us what you talked about in discussion that everyone should know!

Clickers!

Clicker Registration

<https://join.iclicker.com/DQLN>

If you don't register your clicker, I can't give you credit for participation!

Participation scores count from week 2



- Lets you vote on questions in real time.
- Like pub trivia, except the subject is always networking 😊

Locating your Clicker ID



Hexadecimal number:
numbers 0-9 and
letters A – F

ID is also visible when
you turn your clicker
on.

Resources: EdStem

- Edstem Q&A Forum: <https://edstem.org/us/courses/104164/discussion>
- All announcements will be on EdStem
- Use Edstem!
 - asking questions (not asked previously)
 - answering questions (you've worked through)
 - when in doubt (e.g., posting code)– leave a private message
 - Response within a day (except on the weekends)
- Email ***doesn't scale***: course related questions/comments edstem/office hours

What do I **expect from you**?

- Do the reading (and/or watching videos) and complete reading quizzes during class
- Show up to class and participate using iClickers and worksheets
- Take weekly quizzes about the week's content
 - Quizzes will cover everything from labs, reading, in class discussion
- Attend lab and do the lab assignments on time
- Take the final exam
- Do your own work, don't use AI tools to short circuit your learning
- Communication! Ask for help, attend OH, ask questions on Ed
- Read all course announcements on Ed
- Take care of yourself and be respectful of yourself and others

What can you **expect from me**?

- Respond to Ed posts within 24 hours (not on the weekends!)
- Office hours
 - Mondays 3pm-430pm in Martin 328
 - Thursdays 1pm-2pm in Martin 338
- Post slides on the course website before class
- Adhere to policies as outlined in the syllabus
- Post assignments and return graded assignments in a timely manner
- Treat you with kindness and respect
- Be receptive to constructive feedback

Course Grade Distribution

- 38% Lab assignments - 6 (6% each, Lab 4 is 8%)
- 30%. Quizzes - 12 (2.5% each, lowest dropped)
- 22% Final Exam
- 5% Reading Quizzes
- 5%. In-class polls, worksheets, and attendance

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I will drop your three lowest reading quizzes/no-shows.

How to succeed in an Upper Level Systems Class

- Reading comprehension!
- Pre-Reqs: 31 & 35 and ACTUALLY applying material you learnt from those classes
 - remember valgrind and gdb? they'll be your best friends ... again!
- Working through code, problem sets, and reading material like you would in the “real-world”
 - lab assignments are larger, more difficult, and not always directly related to that week's lectures
 - making sure you read and understand required readings/videos
 - try/brainstorm different approaches...
 - growth mindset

- Do not suffer in silence
- **Please reach out to:**
 - Me (Prof. Ware)
 - Your Academic Advisors
 - Student Deans
 - Counseling & Psychological Services



by KC Green

Why did you come Swarthmore?

It upholds academic honest to...

- Copy code from the textbook or man pages and add a comment in files saying where it came from.
- Discuss approaches to assignments with classmates, but not solutions
- Ask questions in lecture, even if the question is “I have no idea what’s going on”
- Ask for help from Prof. Ware when you are struggling – attend office hours or ask for a 1-on-1 meeting
- If you’re unsure whether something is allowed, ask
- Submit your own work, even when it is incomplete

It violates academic integrity to...

- Have anyone (or anything) look at your code who is not your lab partner or Prof. Ware
- Claiming code not written by you as your own work
- Use GenAI/LLMs on any course work (this includes chat/autocomplete features in IDEs like VSCode):
 - Put any course materials into GenAI tools
 - Put any of your code or other materials generated for this course into GenAI tools
- Copy answers from someone else's quiz or exam

You can learn from your mistakes
but actions have consequences...

It is CS department policy to **report all** suspected violations to the
College's Senior Associate Dean of Student Life:

According to the Faculty Handbook:



"It is the opinion of the faculty that for an intentional first offense failure in the course may be appropriate. Suspension for a semester or deprivation of the degree in that year may also be appropriate when warranted by the seriousness of the offense. For a second offense the penalty normally should be expulsion."

Administrative Questions?

- All of this info is on the class website
 - Please complete the policy quiz:
- Feel free to ask Q&A on the Edstem discussion board
- It's my second year here.
Would be great to get (constructive) feedback!

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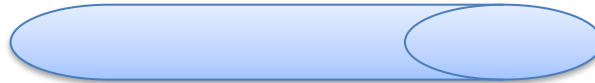
A “Simple” Task

Send information from one computer to another

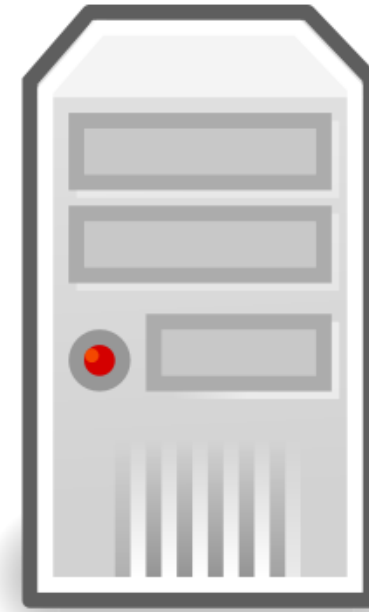
- hosts: endpoints of a network
- The plumbing is called a link.



Host
(PC)

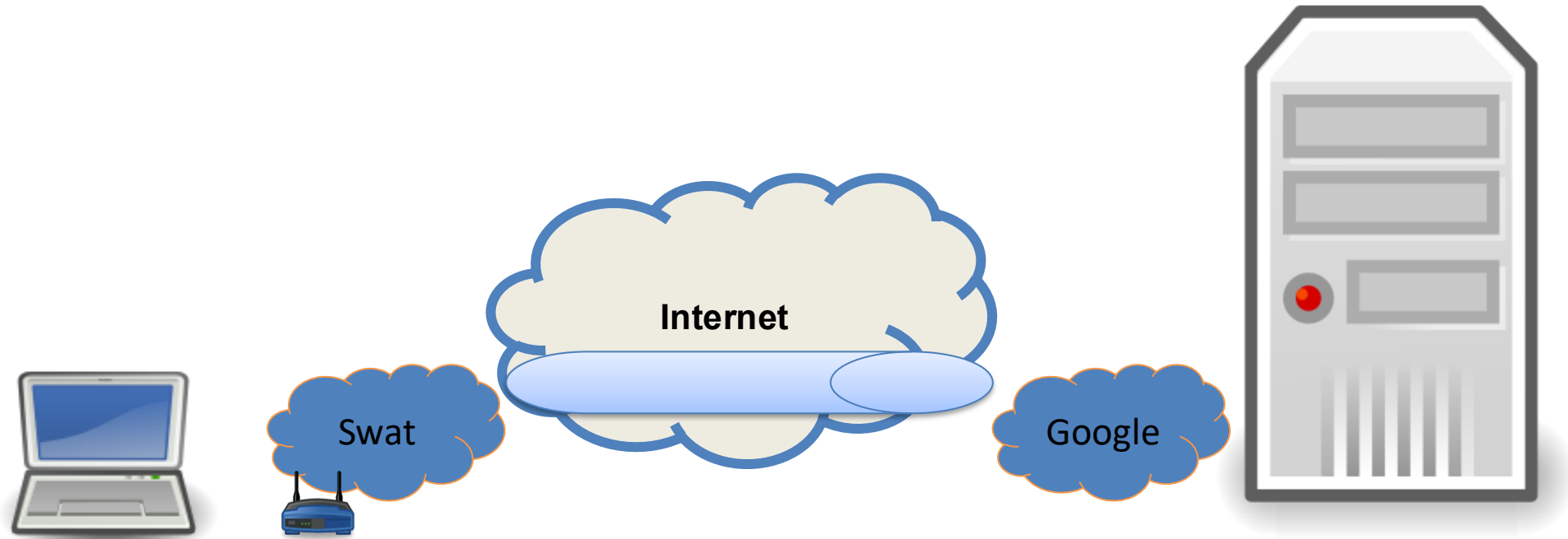


Link

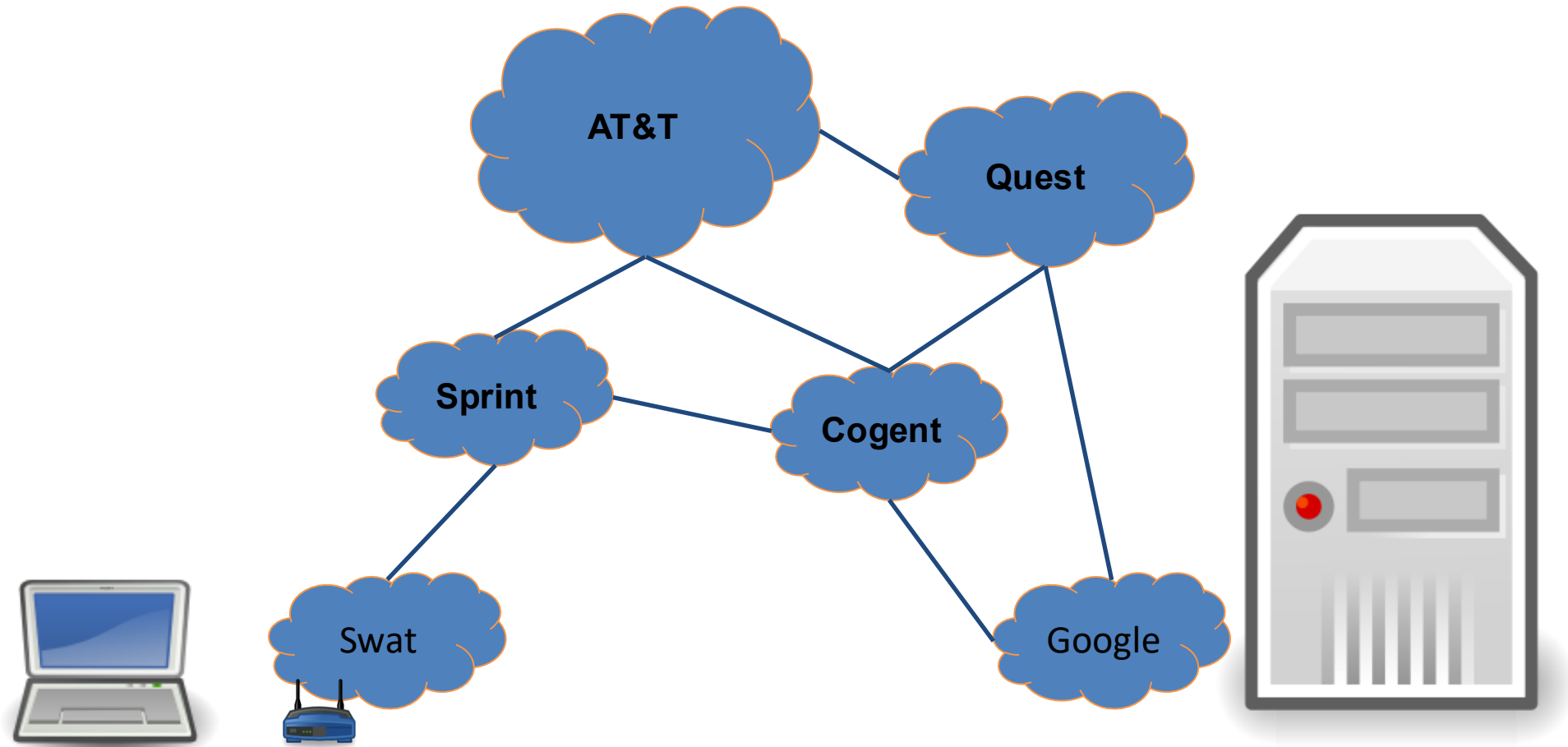


Host
(Server)

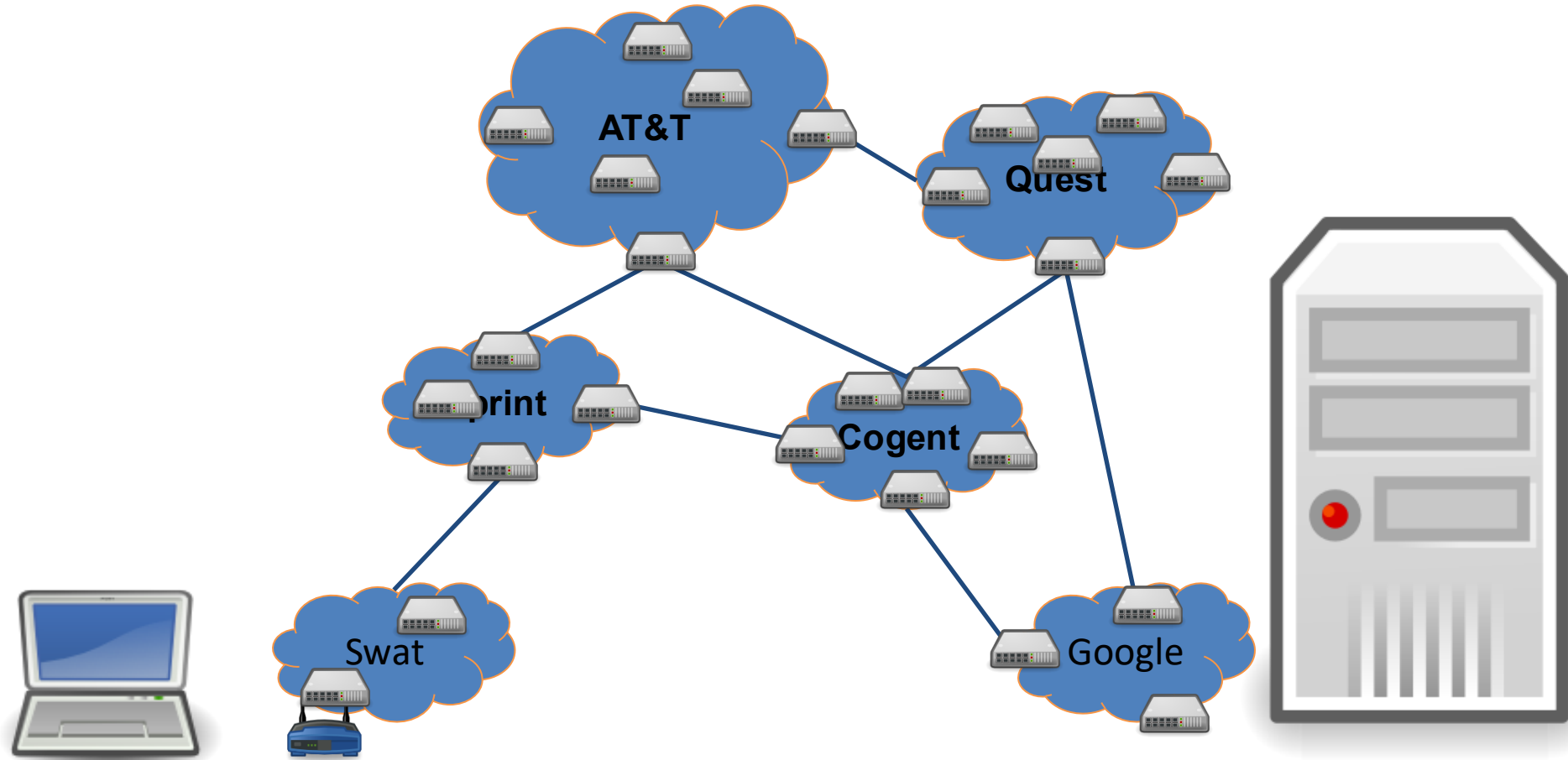
Not Really So Simple...



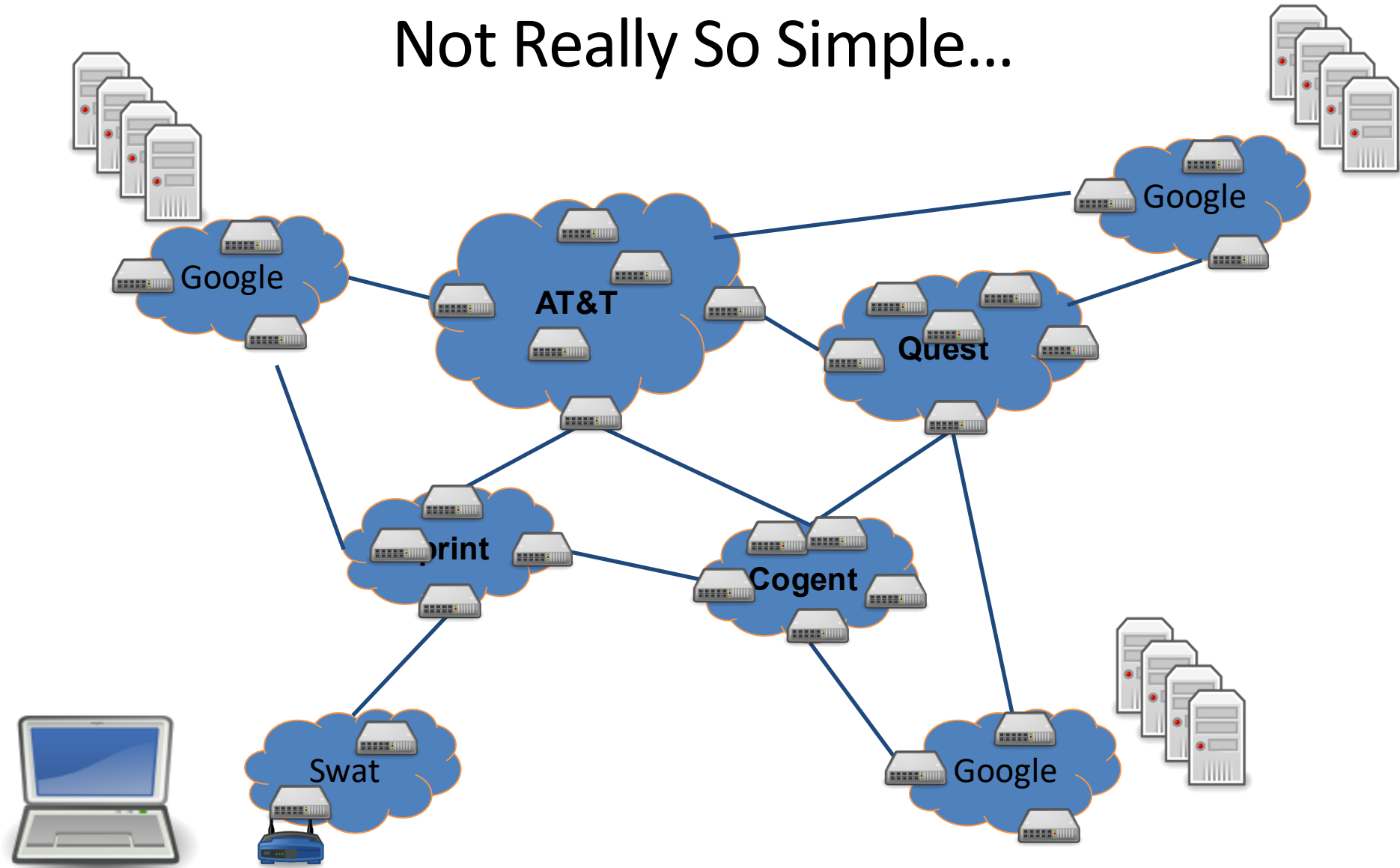
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Not Really So Simple...



Not Really So Simple...



Example Peer Instruction Question:

What of these are **required** to get your packet from your laptop to a Google server?

- A. Manage complexity and scale up
- B. Naming and addressing
- C. Moving data to a destination
- D. Reliability and fault tolerance
- E. Security and Privacy

Example Peer Instruction Question:

What of these are **required** to get your packet from your laptop to a Google server?

A. Manage complexity and scale up

B. Naming and addressing

C. Moving data to a destination

D. Reliability and fault tolerance

E. Security and Privacy

We need everything for modern reliable and secure communication, however, only B & C are strictly required for the network to function so your packet **can be delivered.**

TODO List

- Reading: Protocols and Layering
 - K&R Sections 1.1, 1.5
- iClicker registration: <https://join.iclicker.com/DQLN>
- Assignment 0: <https://forms.gle/TESwRPAwj1cANdJUA>
- Policy Quiz: <https://forms.gle/jDRDM4MexeY9sv4i9>
- Let me know if you need accommodations