CSCI-1680 - Computer Networks

Chen Avin (avin)

http://www.cs.brown.edu/courses/cs168

Based partly on lecture notes by David Mazières, Phil Levis, John Jannotti, Peterson & Davie, Rodrigo Fonseca

Overview

- **Goal: learn concepts underlying networks**
  - How do networks work? What can one do with them?
  - Gain a basic understanding of the Internet
  - Gain experience writing *protocols*
  - Tools to understand new protocols and applications

Cast

- **Instructor: Chen Avin (avin)**
- **HTA: Anubhav Malhotra (malhotra)**
- **UTA: Shu Zhang (szhang)**
- **UTA: Rui Zhou (ruizhou)**
- **How to reach us: Piazza**

Teaching & Expectation

- About me
- Academic Policy
- Teaching style & Expectation
- Please ask questions and start a discussion – in class and on-line

Prerequisites

- **CSCI-0320/CSCI-0360 (or equivalent).**
  - We assume basic OS concepts (kernel/user, threads/processes, I/O, scheduling)
- **Low-level programming or be willing to learn quickly**
  - threads, locking, explicit memory management, …
- **We allow any* language, but really *support* only C**
  - You will be bit twiddling and byte packing…

Administrivia

- **All assignments will be on the course page**
  http://www.cs.brown.edu/courses/cs168/f13
- **Text: Peterson and Davie, Computer Networks - A Systems Approach, 4th or 5th Editions**
- **You are responsible to check the web page!**
  - All announcements will be there
  - Textbook chapters corresponding to lectures: read them before class
  - Handouts, due dates, programming resources, *etc…*
  - *Subject to change* (reload before checking assignments)

Grading

- **"Written" component**
  - Exams: Midterm (15%) and Final (25%)
  - Homework: 3 written assignments (15%)
    - Short answer and design questions
- **4 Programming Projects (45%)**
  - Snowcast: streaming music server
  - IP, as an overlay, on top of UDP
  - TCP, on top of *your* IP
  - Final (TBD)
- **Must pass two components individually**

Networks

- **What is a network?**
  - System of lines/channels that interconnect
  - *E.g.*, railroad, highway, plumbing, postal, telephone, social, computer
  - Networks Science
- **Computer Network**
  - Moves information
  - Nodes: general-purpose computers (most nodes)
  - Links: wires, fiber optics, EM spectrum, composite…

Why are computer networks cooler?

- **Many nodes are general-purpose computers**
- **Very easy to innovate and develop new uses of the network: *you* can program the nodes**
- **Contrast with the ossified Telephone network:**
  - Can't program most phones
  - Intelligence in the network, control by parties vested in the *status quo*, …

What is the Internet?

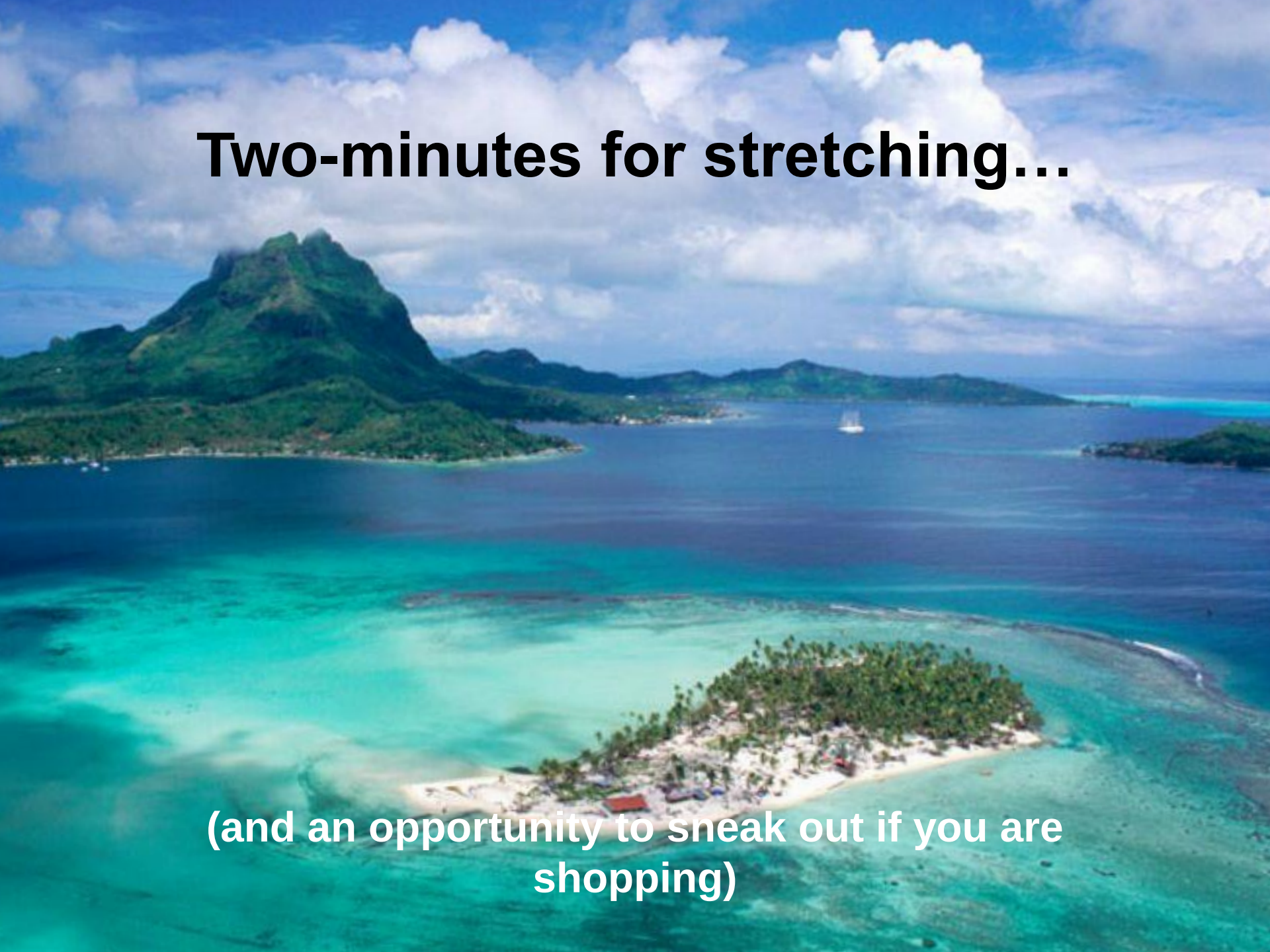
- A “nuts and bolts” view
- A service view

Why should you take this course?

- **Impact**
  - Social, economic, political, educational, …
  - How to win an election?
  - How could Egypt shut down the Internet internally?
  - How could Pakistan shut down Youtube *globally?*
- **Continuously changing and evolving**
  - Incredible complexity
  - Any fact you learn will be inevitably out of date
  - Learn general underlying *principles*
- **Learn to program the network**
- **Networks are cool!**

Roadmap

- **Assignments: learn by implementing**
  - Warm up: Snowcast, a networked music server
    - Get a feel for how applications use the network
- **Build knowledge from the ground up**
  - Link individual nodes
  - Local networks with multiple nodes
  - IP: Connect hosts across several networks
  - Transport: Connect processes on different hosts
  - Applications
- **A few cross-cutting issues**
  - Security, multimedia, overlay networks, P2P…


Two-minutes for stretching…
(and an opportunity to sneak out if you are shopping)

m.socrative.com

Enter Room number: 623612

In what year the Internet was “born”?

A.1957

B.1969

C.1977

D.1989

E.1995

m.socrative.com

Enter Room number:
623612

Short tour on Internet history

http://prezi.com/autk9m4qcl1o/?utm_campaign=share&utm_medium=copy

Coming Up

- **Snowcast: start TODAY!**
- **Saturday, 1-3pm: Super Help Session**
  - C, Sockets, Concurrency, Network Debugging
- **Next class:** Overview & Layering
- **Then…**
  - We start moving up the network stack, starting from how two computers can talk to each other.