Subject: Santa Monica College CS75 Network Protocols course
From: MORGAN_DAVID@smc.edu
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Dear enrolled CS75 student,

Here is information, further to my email to enrolled students two weeks ago (link below), about the upcoming Santa Monica College CS75 Network Protocols course. I have been working on shaping it and would like to give you an idea of the shape. I have material to work with from the last time a taught the course, in 2014. From that starting point I am synthesizing older material with new.

Network protocols as a subject is immense. Over 3000 protocols are supported by the Wireshark protocol analyzer, the main tool for studying network traffic at low level. And 9167 is the highest consecutive document number seen today under the "Recent RFCs" heading at rfc-editor.org, the design incubator site from which protocols are formalized and born. How many of these can be covered in a single class? How about in a 2-credit, calendar-compressed class like CS75? If the question is "what shall we omit" the answer from this perspective is "almost everything." OK, then how *will* we spend our time? Broadly, I have four things in mind.

First, there are limelight protocols that get all the attention because they get all the usage. At each layer in the OSI protocol model I can name the single most commonly used technology encountered and employed by us as endpoint computer users. They are:

application - http
transport - tcp
network - ipv4
datalink - ethernet
physical - twisted pair

A grasp of the model tells you that these are not sacrosanct. Any one or more of these should be wholesale replaceable. You should be able to abandon and eliminate any one of them if there is a replacement that can occupy the same space, without touching any of the others. And everything should then still just work. I want us to prove it. So at each layer I want to eliminate its limelight protocol, putting something else in its place. I need some other technologies to volunteer as replacements. These have offered their services:

application - tftp
transport - sctp
network - ipv6
datalink - ppp
physical - serial cable

At different depths, we will spend some time on each of these to show that they work. We will not go into the full possible depth on any of them, but enough to see them operate in place of the counterparts that overshadow them in our day-to-day experience. Just to prove that point.

Second, tcp is important enough that it deserves some individual attention. I want to look at it in some depth beyond what is covered in my CS70 (or other) basic networking course. There, we covered the 3-way handshake and byte numbering of a stream reflected in tcp's sequence and acknowledgement numbers. We didn't cover traffic control very much. I would like to look at that.

Third, protocols don't usually sit still forever. And how they evolve is interesting. As a case study, I want to take a retrospective look at http's evolution in recent years.

Fourth, we'll look at several other particular technologies as we have time. Tunneling, bridging, tls, dhcp, and icmp are on that short list.

Again, we can't cover everything and won't. But as a network enthusiast I look at this course as a playground. It's recess. There is a lot to play with.

In the textbook, you can be reading the substantial chapters 13 and 15 on the subject of the transport layer. The former covers general concepts and the latter their implementation by tcp in particular. You should have the textbook in hand before class starts, perhaps already. If possible, you should have VirtualBox installed, plus the virtual machine that I distribute imported into it. I don't want to spend any more of our limited time than necessary on that once class starts. Those are things I specified in my email message to enrolled students two weeks ago:

http://classpage.dmorgan.us/cs75-welcome-message1.pdf

First though please have a merry Christmas and happy new year, and then we can get to work.

David Morgan