CS 332-Computer Networks-Spring 2004

Professor

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Office hours: MTWR 2:30 - 3:30pm, or by appointment.

Course Description

This course is intended as a general introduction to the principles of computer networking. No previous knowledge of the topic is assumed. Topics will be arranged roughly around the ISO seven layer reference model for networks, which specifies the type of services that should be available at various levels of network interconnection.

The course will begin by discussing some of the underlying issues in establishing communication between two computers. At the lowest end of the spectrum, we will talk about issues related to the physical connections between computers. From the basics, we will move on to consider international standards for protocols at various levels of the ISO reference model such as Ethernet, TCP/IP, et cetera. These standards span a wide variety of transmission media, network layouts, and access techniques. We will also spend time discussing some of the applications that are being built upon these various types of networks and the implications that such applications have for computer science and for society as a whole.

Information about this course is available on-line at:

http://www.mathcs.richmond.edu/~lbarnett/cs332/

Prerequisites

CS 301 - Computer Organization, or instructor’s permission

Readings


Additional readings from the technical literature and other sources are on reserve at Boatwright library.

You will also want a reference on the ANSI C programming language. There are a great many similarities between C++ and C, but it is best to have a book specific to C. The definitive reference is Kernighan & Ritchie (ISBN 0131103628). It is a slender volume, somewhat terse (like the language), but it is complete. Though published in 1988, it contains everything you need to know about the core C language (there’s a reason it is still in print after 15 years). A bit more verbose, but also useful, is Steve Oualline’s book (ISBN 1565923065), but if you have the C++ version, there is a great deal of repetition between the two.

**Attendance**

Each unexcused absence will result in a 1 point reduction in your final average.

**Help**

There will be several programming assignments during the semester. Seeking help from classmates on syntactic questions relating to programming languages or on questions about other software to be used in the assignments is acceptable. It is natural to look at other programmers’ code, as much actual programming work is collaborative in nature, but the bottom line is that you should never use a solution without completely understanding how it works. Therefore, while looking at someone else’s code would not be an honor violation, using someone else’s code in your own program would be.

**Grading Policy**

<table>
<thead>
<tr>
<th>Percentage</th>
<th>Component</th>
<th>Dates</th>
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<tbody>
<tr>
<td>35%</td>
<td>Homework/Labs/Projects</td>
<td></td>
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<tr>
<td>40%</td>
<td>Tests (2)</td>
<td>Test 1: Wed., Feb. 18</td>
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<td></td>
<td>Test 2: Wed., March 21</td>
</tr>
<tr>
<td>25%</td>
<td>Final Exam</td>
<td>Mon. May 3, 9:00am - 12:00 noon</td>
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I expect assignments to be turned in on time. Assignments not received by the stated due date will receive a grade of 0. With homework and projects making up 35% of the grade, missing any assignment will have a significant impact on your final grade.

**Course Outline**

The following is a tentative (and rather ambitious) list of topics to be covered this semester. I will be focusing on commonly used algorithms and techniques and protocol standards which are in common use rather than on specific implementations of these protocols. So, you are unlikely to hear much about Novell Netware or Microsoft Network
in class (though there may be a few case studies to illustrate some of the things we talk about). However, the material presented here should give you a good foundation for understanding the workings and design of any particular networking package you are confronted with.

**Introduction** -- an overview of Computer Networking

**Transmission Media**
- Copper, Optical Fiber, Wireless transmission

**Networking Basics**
- Circuit Switching
- Packet Switching
- Point to point transmission techniques
- Shared medium transmission techniques
  - Carrier Sense Multiple Access
  - Permission (Token) based techniques

**Network programming techniques**

**Local Area Networks (LANs)**
- IEEE 802.3: Ethernet

**Wireless Communication**
- IEEE 802.11 networking

**Internetworking**
- The IP protocol
- Internet routing
- Bridges
- Routers

**End-to-end issues**
- The TCP and UDP protocols
- Congestion control

**Network Management**
- Internet: Simple Network Management Protocol (SNMP)
- ISO: Common Management Information Protocol (CMIP)

**Network Security**
- Typical network weaknesses
- Infamous intrusions

**Networking Applications**
- Electronic mail
- World Wide Web
- Video conferencing
- E-commerce