CS50060: Advanced Computer Networks

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Lecture 0

Who am I?

- Brief BIO
  - Professor in the CSE Dept
  - Research Interests
    - Converged Cloud Radio Access Networks (4G/5G/Wi-Fi)
    - Softwarization and Cloudification of Networks (SDN/NFV)
    - Mobile Edge Computing enabled Vehicle-to-Anything (V2X) for autonomous navigation
    - Network Security and Cyber Forensics using Cloud Computing, Big Data, and AI/ML
  - Teaching Interests
    - Computer Networks
    - Operating Systems
    - Wireless Networks
    - Network Security

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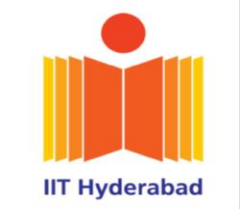
Some Queries

- What is a computer network?
- How is a computer network different from other types of networks?
- What is a computer network architecture?
- How to measure goodness of a computer network?
- How to build a scalable network that will support diverse applications?
- How to build a network that is always available and reliable?

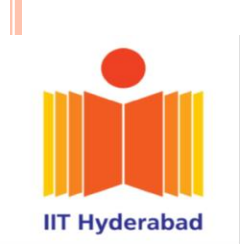
Objectives of the course

- A solid foundation of networking concepts and principles with emphasis on the Internet
- Spending a day in the life of a webpage request☺
- To learn how to monitor and analyze network traffic and protocols
- Hands-on approach to learning



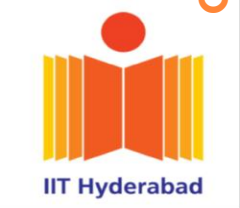
Prerequisites

- Proficiency in C/C++/Python
- Familiarity with Linux environment



Syllabus

- Basics of Computer Networks & the Internet
  - Layered Architecture and Protocols
  - Network Performance
- Application layer (Web, Email, DNS, P2P, CDN)
  - Socket Programming
- Transport layer principles & protocols
  - TCP/UDP
  - Congestion control in TCP
- Network layer: Data plane
  - IPv4/IPv6/DHCP/NAT
  - Forwarding in SDN
- Network layer: Control plane
  - OSPF/RIP/BGP/ICMP
  - SDN Controller
- Link layer and LANs
  - MAC Protocols
  - Ethernet/VLANs/ARP/Wi-Fi



Reference Books/Material

- Computer Networking: A Top-Down Approach **by James F. Kurose and Keith W. Ross**, 8th Edition, 2020, Addison Wesley (Pearson Education)
  - https://gaia.cs.umass.edu/kurose_ross/index.php
- Computer Networks: A Systems Approach by **Larry L. Peterson and Bruce Davie**, 6th Edition, 2019.
  - https://book.systemsapproach.org/index.html
- TCP/IP Illustrated Vol. 1: The Protocols, 2nd Edition by **Kevin Fall and W. Richard Steven**, 2011, Addison-Wesley (Pearson Education)
  - https://www.oreilly.com/library/view/tcpip-illustrated-volume/9780132808200/
- Google Classroom page → articles, videos, news, etc

Tools/Simulators

- Wireshark: http://www.wireshark.org/
- NS-3: https://www.nsnam.org/
- Mininet: http://mininet.org/

Administration

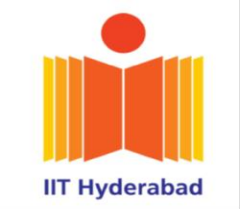
- Course management through Google Classroom
  - Register for CS50060 at https://classroom.google.com/c/NTIzMjEwNDEyOTM3?cjc=amgyxhw **code: amgyxhw**
  - Slides, Assignments, URLs, News, Reading material, discussions posted here
- Teaching Slot:
  - F slot: TUE @ 11 AM, WED @ 2:30 PM and FRI @ 10 AM
  - Office hours: Immediately following each lecture or by email appointment
- Teaching Assistants (TAs)
  - ??

Tentative Grading Policy

- Theory: 50%
  - Tutorials/Quizzes (10%)
  - Mid-term (15%)
  - Final exam (25%)
- Assignments: 50%
  - GC Queries/attendance
  - Programming Assignments
  - Wireshark Assignments

Assignments: Group Policy

- 1-2 students per group!
- Deliverables for wireshark asg
  - Legible report (NO copy-paste from other sources)
- Deliverables for programming assignments
  - Design document/report, README, Code files, test files in a tar ball on GC



Collaboration and Seeking help

- Communicate with Group members
  - Divide and Conquer
  - Pose queries on GC discussion forum to seek help (not solutions) from other teams, TAs
  - Document each member's work → Assignment report

- Engage with TAs
  - Discuss the problems being faced
  - Explain your methodology adapted for the project
  - Explain each member's responsibilities

Academic Honor Code

- Submitted work should be your own
- Acceptable collaboration:
  - Clarify problem, syntax doubts, debugging strategy
- Dishonesty has no place in any community
  - May NOT be in possession of some other Group's project
  - May NOT copy code from another group or Internet!
  - May NOT copy in lab and term exams
  - May NOT do your share of assignment work
- Penalty
  - If found guilty of copying assignments (high similarity in submitted assignments), both copy-er and copy-ee will get 0 Marks
  - Serious cases like stealing others work/cheating in lab and term exams → FR Grade

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https://cse.iith.ac.in/academics/plagiarism-policy.html

Welcome!