CZ3006/CSC302
NET-CENTRIC COMPUTING

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Objectives of this course

This course presents a broad coverage of the structure, implementation, and theoretical underpinnings of networking technologies and network-based applications.

Upon completion of this course, the student should be able to understand:

1. basic concepts, reference models, and protocols of modern computer networks, and
2. the World Wide Web technologies and applications.

Main contents of the course (Part I)

1. **Introduction to net-centric computing.** Background and history of networking and the Internet, network reference models and architectures, example networks, and network-based applications.
2. **The physical layer and data link layer.** Communication technology, packet and circuit switching, error control and flow control, sliding window protocols.
3. **The MAC Layer and Local Area Networks** . Multiple access protocols, CSMA/CD and Ethernet, wireless communication networks.
4. **The network layer and Internet IP protocols**. Network layer service and design issues, routing algorithms, congestion control, internetworking, Internet Protocol (IPv4 and IPv6), Internet control protocols.
5. **The transport layer and Internet TCP protocols**. Transport layer service v.s. protocols, connection establishment, use and release, Internet User Data Protocol (UDP) and Transmission Control Protocol (TCP).

Main contents of the course (Part II)

6. **Web architecture and protocols**. Background and fundamentals of Internet and World Wide Web, including web browsers, web servers, and information exchange protocols such as MIME, HTTP, etc..
7. **Web documentation technologies**. Web content and documentation technology and tools, including XML, HTML, and etc.
8. **Client application programming techniques**. Client side dynamic programming and event handling technologies, and how they can be integrated and interacted with web documentation tools.
9. **Server application programming techniques**. Server side programming principle and technologies, including basic scripting syntax, form data processing, file handling, as well as interaction with client side scripts.

Teaching resources:

Textbooks:

1. Part I:
   Tannenbaum, A. S. and Wetheral D. Computer Networks. Prentice Hall, 5th Edition. 2011.
   ISBN 013-978-0-13-255317-9

   http://www.computernetworks5e.org/
2. Part II:
   Sebesta, Robert W., Programming the World Wide Web, Addison Wesley, 6th Edition, 2010.
   ISBN: 013-9780132130813

Teaching and assessment methods

- A combination of two-hour lectures and one-hour tutorial per week will be used. In addition, four lab sessions are scheduled in four weeks (to be announced separately).

- There will be two programming assignments and a final exam:
  1. The two programming assignments (one for each part) will be worth 30% in total (15% each). They will provide students with experience of implementing and experimenting with network protocols and WWW applications.
  2. The final exam will be worth 70% and it will provide the necessary comprehensive assessment.

- It will be essential to attend lectures and tutorials to be able to do the programming assignments and to pass the final exam.