Debre Berhan University | College of computing |Department of Computer Science
Course Title: Data Communication and Computer Networks |Course Code: CoSc2032 |
Lec.: 2hrs. | lab: 3 hrs. | Tut: 2hrs.| Academic year: 2022/23 | Year: 2nd |Program: Regular

Course description

This course will explore the various types of data communication systems, networks and them applications. Concepts & terminologies like computer networks, layered architecture (OSI & TCP/IP), network hardware, network software, standardization, network medium, and IP addressing will be explored. The practical aspect will deal with building small to medium level networks including Cabling, Configuring TCP/IP, Peer to Peer Networking, Sharing resources, Client Server Networking.

Course objectives components

➢ By the end of this course, students will be able to:

➢ Understand the concepts and principles of data communications and computer networks

➢ Understand data transmission and transmission media

➢ Understand Protocols and various networking

➢ Understand TCP/IP & OSI Reference Model ➢ Understand LAN and WAN technologies ➢ Understand and implement IP addressing.

➢ Build small to medium level Computer networks ➢ Understand subnets

Chapter 1: Data Communication and Computer Networking Basics (5 hours)

1.1 Data Communication
1.1.1 Definition of Data Communication
1.1.2 Communication Basics
1.1.3 Data Representation techniques
1.2 Computer Network
1.2.1 Network Definition
1.2.2 Network Applications
1.2.3 Network Types
1.2.3.1 Geographical Area
1.2.3.1.1 PAN
1.2.3.1.2 LAN
1.3 Transmission Media
1.3.1 Guided
1.3.1.1 Twisted Pair Cable
1.3.1.2 Coaxial Cable

1.1.4 Digital Data Transmission formats
1.1.5 Transmission Impairments
1.1.6 Modes of Data transmission
1.1.7 Elements of Data Communication
1.2.3.1.3 MAN
1.2.3.1.4 WAN
1.2.3.2 Architecture
1.2.3.2.1 Peer-to-Peer
1.2.3.2.2 Client/server
1.2.4 Network Components
1.2.4.1 Hardware Components
1.3.1.3 Fiber Optics/Optical Fiber Cable
1.3.2 Unguided
1.3.2.1 Wireless LAN
1.3.2.2 Radio Communication

1.1.8 Protocols and standards
1.1.9 Circuit switching and Packet switching,
1.2.4.2 Software Components
1.2.5 Network Topology
1.2.5.1 Physical
1.2.5.2 Logical
1.2.6 Network Models
1.2.6.1 OSI Reference Model
1.2.6.2 TCP/IP Protocol Suite
1.3.2.3 Microwave Communication
1.3.2.4 Infrared Communication
1.3.2.5 Wi-Fi
1.3.2.6 Bluetooth Technology
1.3.2.7 Satellite communication

Chapter 2: Application, Session and Presentation Layers (5 hours)

2.1. Application Layer Introduction
2.2. Client-Server Model
2.3. Application Protocols
2.4. Network Services
2.5. Session Layer
2.6. Presentation Layer

Chapter 3: Transport Layer (6 hours)

3.1. Segmentation
3.2. Addressing
3.3. Multiplexing and DE-multiplexing
3.4. Connectionless /Connection-Oriented
3.5. Unreliable/Reliable
3.6. Protocols in Transport Layer
3.6.1. UDP
3.6.2. TCP
3.6.2.1. Flow control
3.6.2.2. Error Control
3.6.2.3. Congestion control
3.6.2.4. TCP Variants

Chapter 4: Network Layer Addressing and Routing (8 hours)

4.6.1. Types of Messages
4.6.2. Message Format
4.1.1. Error Reporting and Query
4.7.3. Message Format
4.7.4. IGMP Operation
4.7.5. Encapsulation
4.1.5. Unicasting, Multicasting and Broadcasting
4.9. IPv6

Layer and Physical Layer (8 hours)

Assessment methods

➢ Assignments/quizzes 15%

➢ Lab Assessments 15%

➢ Mid semester examination 20%

➢ Final examination 50% **Textbooks:**

1. Data Communications and Networking, 5th Edition, Behrouz A. Forouzan **Reference**
books:

1. Andrew S. Tanenbaum, David J. Wetherall, Computer Networks (5th Edition), Pearson; 2010.

2. William Stallings, Data and Computer Communications, 10th Edition, Pearson, 2014 **Laboratory Outline**

Week 1: Designing cables

1.1. Crossover cable   1.2. Straight-through cable   1.3. Rollover cable

Week 2: Creating Peer to Peer network

2.1. Building a Switched based network 2.2. Sharing Files and Printers b/n   2.3. Sharing Files between Windows OSs
                                        Windows OSs

Week 3: Study of IPv4 Address

3.1. Classification of IP Addresses

3.2. Subnetting   3.3. Super netting   3.4. NIC addressing

Week 4: Study of Basic Network Configuration commands

4.1. ping   4.4. netstat   4.7. ftp

4.2. tracert/traceroute   4.5. telnet   4.8. nslookup

4.3. ifconfig/ipconfig   4.6. ssh   4.9. pathping

Week 5: Configuring a Switch

Week 6: Configuring a VLAN

Week 7: Configuring a Router

Week 8: Configuring NAT

Week 9: Configuring Routing Information Protocol (RIPv2)

Week 10: Configuring Interior Gateway Protocol (IGRP)

Week 11: Configuring Open Shortest Path First (OSPF)

Week 12: Configuring Enhanced Interior Gateway Routing Protocol (EIGRP)

Week 13: Configuring Border Gateway Protocol (BGP)

Week 14: Configuring Intermediate System-to-Intermediate System (IS-IS)