IT 309: Client Server Computing

(Elective)

Credits: 3
Lecture Hours: 48

Course Objectives

This module aims to revisit and reinforce the knowledge in the networking system with special emphasis to Internet protocols, and client server based architecture. Laboratory work is essential in this course.

Course Description

Introduction to Client / Server, Client / Server Components, Networking and Communication, Transport Layer Protocols, Introduction to Operating System, Understanding Middleware , Client Server Database, Socket Programming in Java ,Performance Tuning and Optimization, and Securing a Client / Server System, and Distributed System Architecture

Course Details

Unit 1: Introduction to Client / Server **LH 4**

Introduction to Client / Server.
- 2-tier Architecture
- 3-tier Architecture

Benefits and Characteristics of Client / Server Architecture.

Client / Server Models
- Distributed Presentation
- Remote Presentation
- Distributed Logic
- Remote Data
- Distributed Data.
- Fat vs. Thin

Unit 2: Client / Server Components **LH 3**

Network Operating Systems for Client / Server.
- Examples of NOS (Explanation not required)
- Common Services of NOS.

Unit 3: Networking and Communication **LH 4**

Seven Layers Function of OSI Model
- Cables(Structure, Application)
- Guided(Twisted, Coaxial,Optical)

Unguided (Microwaves, Radiowaves, Bluetooth, Wimax)

Concepts of Logical and Physical Topologies.

Effect of Bandwidth on Client/Server.

Unit 4: Transport Layer Protocols **LH 5**

- Introduction to UDP (User Datagram Protocol)
  - Operation of UDP
  - Characteristics of UDP
  - Application of UDP
- Introduction to TCP (Transmission Control Protocol)
  - Operation of TCP.
  - Characteristics of TCP
  - TCP three-way handshake process.
  - Application of TCP
- Relationship between TCP & IP
  - Standard TCP / IP services
- Port numbers and socket address

Unit 5: Understanding Middleware **LH 5**

- The Database Connectivity Challenge
  - Data Source Differences, Approaches to Database Connectivity
- Basic view of Middle Ware
  - General Characteristics
- Introduction to Groupware.
- The main types of Middleware,
  - DCE (Distributed Computing Environment)
    - Components
    - Application
  - MOM (Message Oriented Middleware)
    - Working Mechanism
    - Application
  - Transaction processing Monitors
    - Working Mechanism (ACID)
    - Application
  - ODBC (Open Database Connectivity) & JDBC(Java Database Connectivity)
    - Components
    - Features and Application.

Unit 6: Client Server Database **LH 8**

1.1 Database System Architectures
1.2 Classic Client/Server Architecture
1.3 Setting ODBC/JDBC for connecting database in MSSQL Server, Oracle
1.4 Developing Three-Tier Client/Server Architecture
1.5 Open Database Connectivity

Unit 7: Socket Programming in Java **LH 9**

1.6 Creating Client and Server Sockets (UDP and TCP sockets)
1.7 Reading from and writing to a Socket
1.8 Writing the Server Side of a Socket

Unit 8: Performance Tuning and Optimization **LH 4**

Client Performance
- Hardware and Software.

Server Performance
- Hardware and Software.

Database Performance
- Index design
- Query design
- Database design

Network Performance
- Data rate
- Bandwidth
- Throughput
- Congesion

Unit 9: Securing a Client/Server System **LH 3**

The Challenges of Client / Server Security

Security for the Clients and Servers
- Physical security
- Software security
- Network security

Unit 10: Distributed System Architecture **LH 3**

Remote Procedure Call (RPC)

Object Management Architecture (OMA)

Distributed Resource Architecture
- Distributed data Architecture
- Distributed Server Architecture
- Distributed Computing Architecture

Project Work: Instructor should assign project work to each group of student demonstrating distributed client server architecture overview using the following tools:

Back End : My SQLl or oracle

Front End : VB.Net or Java

References

- Alex Berson, Client / Sever Architecture
- Neil Jonkins et al, "Client/Server Unleashed"
- Jeffrey D. Schank, Client-Server Applications and Architecture
- Robert Orfail, Dan Harkey, Cliet/Server Programming with Java and CORBA, First Edition, Wiley