

## Network Socket Programming in ANSI C (5 days)

Development environment : Windows XP with Visual Studio environment

### 1. An Intro to networking technologies

#### Introduction to Networking

- Computing Basics
- Networking Fundamentals
- Network Devices
- Network Topologies

#### Network Types

- Local-Area Networks
- Wide-Area Networks
- Other Types of Network

#### Network Media

- Network Media Types
- Cabling the LAN
- Cabling the WAN

#### TCP/IP

- TCP/IP Overview
- Transport Layer
- Establishing a TCP Connection
- TCP/IP Internet Layer Overview

#### IP Addressing and Routing

- IP Networking Addressing
- IP Subnetting and Calculation
- Routing Basics
- Routing Protocols

#### Labs/Exercise with IP address and routing

### 2 TCP/IP Protocol Services

- What is TCP/IP?
- Transport Services
  - Connection-less Services: UDP
  - Connection-oriented Services: TCP
  - Deciding on a Transport: UDP versus TCP
- Network services
  - IP Services
  - ICMP Services

- Support Protocols & Services
  - Domain Name Service (DNS)
  - Address Resolution Protocol (ARP)
  - Other Support Protocols

### **Labs/Exercises on TCP/IP, DNS and related commands**

## **3. Network Program Mechanics**

- Client-Server Model
  - Client & Server Association
- Network Program Sketch
- Open a Socket
  - `socket()`
- Name the Socket
- Associate with Another Socket
- Send and Receive Between Sockets
  - Sending Data on a "connected" Socket
  - Sending Data on an "unconnected" Socket
  - Receiving Data
  - Association as Socket Demultiplexer
- Close the Socket
- Client & Server Sketches
  - Connection-oriented (TCP) Network Applications
  - Connection-less (UDP) Network Applications

### **Labs/Exercises on Socket operations and related packet handling**

## **4. Operation Modes**

- What are Operation Modes?
  - Wait on Hold: Blocking
  - Call Again Later: Non-blocking
  - Request a Call Back: Asynchronous
- Blocking
  - Blocking Sockets
  - Blocking Functions
  - Blocking is Fake
  - Blocking Hook Functions
  - Canceling Blocking Operations
  - Timeouts on Blocking Operations
  - No Receive Minimum
  - Code Example
- Non-Blocking
  - How Do You Make a Socket Non-blocking?
  - Success and failure are not absolutes!
  - Polling Instead of Blocking
  - Explicit Yielding
  - Code Example
- Asynchronous
  - What Are the Asynchronous Functions?
- Performance Differences

- Platform Differences

**Labs/Exercises of packet handling Blocking, Non-Blocking, and asynchronous modes.**

**5. Advance Topics Client Server / BSD Socket**

- Client /Server model using Sockets
- BSD Berkeley Socket Data Structure
- Socket Setup and Communication
- Byte Ordering , Alignment, and Padding in Socket Programming
- Framing and Parsing in Socket Programming
- Any other left out topics and doubts

**Labs/Exercises related to advance topics**

**\* Outline is subject to slight modification and change.**