TCP/IP, Implementation interconnexion, administration

Hands-on course of 4 days - 28h
Ref.: INR - Price 2025: 2 610 (excl. taxes)

This course will provide you with the relevant knowledge you need to successfully implement a TCP/IP network. It presents in a progressive manner what you need to know and to do to implement a TCP/IP network. You will configure a workstation and servers and set up some basic TCP/IP services.

TEACHING METHODS

Active learning based on examples, demonstrations, experience-sharing, real cases, and an evaluation of what was learned from the training.

Discussions, experience-sharing, demonstrations, tutorials, and real cases.

THE PROGRAMME

last updated: 06/2024

1) Introduction to TCP/IP
- Basic notions. TCP/IP architecture. Networking standards.
- Services and protocol. Communication mechanisms.
- Connection-oriented versus datagram communication.
- Client-server model.
- RFCs. What is IETF?

2) IP protocols
- Using the physical networks. From Ethernet to SDH/SONET.
- Network addresses.
- Address classes.
- What a netmask is. How to use it.
- Routing principles. Routing tables. Static versus dynamic routing.
- Subnetting. What for. How to implement them.
- ICMP protocol. How to use it.
- The ping and tracert commands. How to use them.
- DHCP protocol. How to implement it.
Hands-on work : Setting up a basic IP network with Ethernet and Windows or Linux workstations. Using ICMP, observing traffic. Setting up DHCP servers and clients. Setting up a DHCP relay.

3) Transport layer : TCP and UDP
- Application addresses: Transport port numbers.
- TCP: Connection-oriented transport protocol. When to use it.
- Setting up a connection. Numbering scheme, acknowledgement and retransmission, Flow control.
- UDP: Connectionless transport protocol. When to use it.
- The socket interface. Network application design principles.
Hands-on work : Observing TCP-based transfers and UDP-based transfers.

4) Interconnecting IP networks

- Routers. Functions implemented on a router. Translation addresses and/or port numbers (NAT, PAT).
- Comparing routers with switches.
- Routing. Dynamic versus static routing. Interior Gateway Protocols (IGP: RIP-distance vector routing, OSPF-link state ro
- IP switching. How to make IP routing faster: from proprietary tag switching techniques to MPLS.

Hands-on work : Designing and implementing several IP subnetworks. Choosing netmasks, setting up routers. Using RIP and OSPF.

5) TCP/IP applications

- Domain Name System. Design principles. How to set up and test a DNS server.
- File Transfer Protocol. How it works. Security aspects.
- Another file transfer protocol: Trivial File Transfer Protocol. How it uses UDP.
- WWW HTTP and related techniques.
- Mail related protocols: Pop, Imap, Smtp. How to avoid Spam.
- Remote access protocols: Telnet, rlogin, ssh. What is SSL.
- Sharing resources: NFS, SMB and other protocols.
- Multimedia applications.

Hands-on work : Observing FTP transfers from a command-line client or a browser. Comparison with TFTP transfer. Using Telnet and HTTP.

6) TCP/IP network management

- What is a network management system: manager and agents.
- Using SNMP (SNMP V1, V2c, V3. SMI. MIBs).
- Analysis tools.

Hands-on work : Monitoring traffics. Basic SNMP use.

7) Towards IPv6

- Why to get ready for IPV6.
- Adresses and adressing structure.
- Statically versus dynamically assigned adresses. Using DHCPv6.
- IPv6 migration : using dual stacks, tunnels.

Hands-on work : Setting up the IPv6 stack on a Windows workstation. Assigning static adresses. Observing Iv6 packets.

8) TCP/IP security

- What is IPSec.
- Building VPNs.
- Firewall, proxy-servers, NAT and PAT.

DATES

REMOTE CLASS
2025 : 21 oct.