Softirqs
Tasklets
Workqueues

Simple Timer

Formatting tips:-
* different font, background for code & commands
* Suitable font size
* Headings vs content
* Few Screenshots
* Few code snippets

Socket Programming, Networking Concepts

Inter Host Communication -- Networking

Some basics
* Types of networks - LAN, WAN, MAN, PAN, BAN
* Topologies - Star, Ring, Mesh

Network Model:-
* OSI Model : 7 layers
* TCP/IP Model : 4/5 layers

LAN - Gateway

Routers, Switches

OSI Layer Model	TCP/IP Layer Model
Application Layer	Application Layer
Presentation Layer	
Session Layer	
Transport Layer	Transport Layer
Network Layer	IP Layer
Data Link Layer	Link layer
Physical layer	Physical layer

App level protocols:- HTTP, FTP, IMAP, POP, SMTP and many more
Physical:- Ethernet, Radio channel(WLAN), CANBus, Bluetooth Radio

IEEE 802.3
IEEE 802.11
IEEE 802.15.4 -- PAN

Link layer -- node to node / host to host / hop to hop
-- integrity checks
-- Physical address : MAC address (unique for each network card)

Ethernet / WLAN adapters
Network Interface Card (NIC) -- Typically PCI based
Ethernet port for cable

USB-Ethernet, USB-Wifi, Serial-Ethernet

MAC addr - 48 bit address - 6 pairs of hex digits, separated by colon

AA:BB:CC:DD:EE:FF

ifconfig -- check the MAC addr of your network interface

IP Address ==> IPv4, IPv6
==> Logical address

IPv4 ==> a.b.c.d (a,b,c,d are in range of 0-255)

Loopback addr ==> 127.0.0.1

Local addresses ==> 192.168.x.x
172.x.y.z
10.x.y.z

ARP, RARP protocols (Address Resolution Protocol)
-- binding between logical IP address
and physical MAC address

Link layer -- between two nodes directly
IP Layer -- identify the host (machine, node) with multiple hops
-- host/node/machine specific
Transport layer -- multiplexing/demutiplexing among multiple applications
App Layer -- Final processing

Transport layer -- multiplexing/demutiplexing

IP Address and port number, e.g. 192.168.0.15:8080

Some utils:- (Try your self)

- ping
- ifconfig
- nl

- netstat
- route

TCP, UDP Socket Programming -- Transport Layer

Transport Layer:-

* Responsible for end to end communication
* Multiplexing & Demultiplexing of data from various applications
* Reliability
    * Acknowledgement
    * Timeout, Retransmission
    * Integrity check (checksum), flow control
* Congestion Control
* Data Encapsulation - header + payload (segments/datagrams)

TCP Layer:-

* Transmission Control Protocol
* Connection Oriented Protocol
* Stream of data
* Checksum for header + data

* Sequencing of segments, Reordering
* ACK, Timeout, Retransmission
* Deduplication
* Flow control

Internals(TODO):-

- TCP Header
- Connection Establishment (3 way handshake)
- Data Transmission
- Connection Termination

Hands-on:-

* Simple TCP Client & Server
* Simple UDP Sender & Receiver
* Concurrent server a) using fork b) using threads

Socket APIs (system calls):-

- socket
- bind
- listen
- accept
- send/recv (write/read)
- close, shutdown

Sock prog:-

- beej's guide
- soft prayog

socket:-

logical concepts (socket / port)
Combination of IP Address and Port no

endpoint for 2-way communication

TODO:-

std protocols and port no.s for them

HTTP - 80
FTP - 21
Telnet - 23
SSH - 22
HTTPs - 443

Little endian (host), Big endian (network)
Conversion APIs:- htons, ntohs, inet_addr, inet_aton, inet_ntoa

Activity:- TCP & UDP Client Server examples

16 bit port number

port range : 0 to 65535

Reserved : 0-1023 (typically
requires admin access)
1024 - 41951 :
registered ports
IANA Recommendations

41952 - 65535
dynamic ports