

1. Difference between router and switch and Broadcast domain - done

<https://www.geeksforgeeks.org/collision-domain-and-broadcast-domain-in-computer-network/>

See book chapter 15 - forouzan

2. DHCP DORA process - done

<https://www.geeksforgeeks.org/dynamic-host-configuration-protocol-dhcp/>

<https://vinitpandey.com/2015/06/17/dora-process-of-dhcp/>

Nice explanation

<https://www.netmanias.com/en/?m=view&id=techdocs&tag=77&no=5998>

<https://www.netmanias.com/en/?m=view&id=techdocs&tag=77&no=5999>

<https://www.netmanias.com/en/?m=view&id=techdocs&no=6000&xtag=dhcp-network-protocol&xref=understanding-dhcp-relay-agents>

3. DNS - done

<https://www.cloudflare.com/learning/dns/what-is-dns/>

See ch 25 of book

<https://howdns.works/ep1/>

4. TCP/UDP and why ? - done

See ch 23 of book

5. Subnetting - done

See ravula notes

6. MSS / MTU - done

<https://www.geeksforgeeks.org/what-is-mtumaximum-transmission-unit/>

<https://www.cloudflare.com/learning/network-layer/what-is-mtu/>

<https://www.cloudflare.com/learning/network-layer/what-is-mss/>

7. Complete flow when you trigger amazon.com - done

<https://medium.com/@maneesha.wijesinghe1/what-happens-when-you-type-an-url-in-the-browser-and-press-enter-bb0aa2449c1a>

https://developer.mozilla.org/en-US/docs/Web/HTTP/Basics_of_HTTP/MIME_types

https://www.nginx.com/resources/glossary/load-balancing/?_cf_chl_captcha_tk__=9fec74ba09102702abb578bb1cbeab4b78b609ee-1604975188-0-Afaa3X57euY7q5WdcE4jhrrfTgUAcQFWFBa4D5aru3XXYeeMmQ9BxkaN2d4lfl_-mQb-AoFNkzLzpM-LRlc0ONka7ekZk614ALDoTtL0DRw-vUcxIH_FXObiDMgkXbuZ8zoJKBfNC_GsGhkgTkhkOlepR8y0KsBgECqNT10il3Eil88_Jz3gXuZuxleapeaM3vvdKaVIDeZlF9TxrT_U76kTTWyFk5_NbYTqzklUtp1g4_mDkP-wfA0V8WHwl2BsCdNnXYA6fHNdkpIPQTVn79JLCegisAR7Va30wmPLiVQRUd4mLK70bzxYFcS8u0sQeMvn6W3QQqtXAhjXC74BbmXTh0S8oPiMjRsUA-R0IDsZg7ls7wizvsAi2YNJ_X_S2NNjwJDywnNunZefZ6hgLb3j4scG77Jh2v02oCMEgu1hxjWxnRoLrXCTc569Qo52fdPIViva8BhoLfh787uRtMLqvCQipwKz2YgDJjA96K6HLRhAylj4DKEu6n8q7jqhjl0RLOtDnXBkH18_AJc5Q7w2xZdn7Yo9RMGnK503C2711b1d0Dm4l9xVXFxS7sFzGVms8y--x4SiAiPHfVi_9Bs

<https://www.cloudflare.com/learning/serverless/glossary/what-is-chrome-v8/>

<https://developers.google.com/web/fundamentals/performance/critical-rendering-path/constructing-the-object-model>

<https://developers.google.com/web/fundamentals/performance/critical-rendering-path/render-tree-construction>

8. OSI model - done

See book ch 2

9. TCP and SSL handshake - done

SSL handshake covered in http module in OS
For SSL see chapter 32

10. Flow / error control - done

ch 11

11. What is a firewall, why do you need it ? - done

<https://www.compuquip.com/blog/the-different-types-of-firewall-architectures>

Ch 32

Operating Systems

1. OS boot process - done

<https://neosmart.net/wiki/mbr-boot-process/> - windows

Turned on - BIOS - MBR - Active partition - Boot loader

the traditional BIOS-MBR method

BIOS - POST - ADD ON ROM - MBR - Partition boot sector - bootloader

BIOS: basic input output system. Interacts with the hardware. Interface through which the operating system interacts with the hardware. Resides on motherboard on EEPROM.

POST process: Power on self test. BIOS tests all the hardwares and our CPU has access to all the hardwares. Errors like keyboard not found etc are shown at this step.

Add on ROM: some program requires user intervention for some configuration. Bios transfer control of cpu to some software routine stored in video or RAID controller. Then the user can do the task like changing display settings etc. After the work is done, transfer is given back to the bios.

At this step bios will show us an option to press any key. We can press any key to configure the booting process. BIOS is also responsible for identifying the hard disk and USB.

After this BIOS will transfer control of Computer to some other code store in the boot drive. Boot drive can be USB or a hard disk. That boot drive is called an MBR. BIOS will load the first 512 bytes of MBR and cpu starts executing them.

MBR contains a partition table. Partition table contains information about all the partitions and where they are stored. MBR also contains a bootstrap code which is a very very small code. It is called a stage 1 bootloader. It's responsibility is to call some other code. Where does it have to find the code ? that depends on the operating systems. But in windows it searches for an active partition in the partition table. And it will load the first 512 bytes of that partition.

Partition contains jmp (first 3 bytes), file system, then bootstrap code. We will reach bootstrap code after executing the jmp statement and it will also send us to some other code. (in the next sector in the partition),

Then comes the second stage bootloader. It looks up a file in the partition itself (a normal file) and asks the CPU to execute its contents. There is no restriction on this file. This file can be large.

Now the actual process begins, which operating system to load, where to load it from etc.

Boot configuration files, which contains information about the operating systems. Hard coding is not done.

For windows bootloader is BOOTMGR , the list of os is read from the BCD file in BOOT directory.

For linux, bootloader is GRUB and the list of os is read from grub.cfg file.

The boot process:

Load basic file system drivers

Load and read configuration files

Load and run supporting modules

Display operating system menu

Load the selected OS

2. Memory management, memory pages, buffer and caches, basic commands - done

Ravula notes

<https://www.geeksforgeeks.org/difference-between-buffering-and-caching-in-os/>

Buffers :

Buffers contains the metadata of the files/data which resides under the page cache.

Example: When there is a request of any data which is present in the page cache, first the kernel checks the data in the buffers which contain the metadata which points to the actual files/data contained in the page caches. Once from the metadata the actual block address of the file is known, it is picked up by the kernel for processing.

https://www.tutorialspoint.com/computer_fundamentals/computer_memory.htm

<https://www.enterprisestorageforum.com/storage-hardware/types-of-computer-memory.html>

<https://www.geeksforgeeks.org/cache-memory-in-computer-organization/>

3. System date/time management, network time protocol

4. Managing users and groups

5. File permissions
6. Managing software installation, uninstallation, upgrade etc.
7. Managing system services and background processes
8. **Remote management of a system, SSH, RDP etc. - done**

<https://cloudflare.com/learning/access-management/what-is-the-remote-desktop-protocol/>

https://medium.com/@Magical_Mudit/understanding-ssh-workflow-66a0e8d4bf65

9. **Network protocols FTP, HTTP (web servers) and SMTP (mail server) - done**

<https://howhttps.works/why-do-we-need-https/>

In ch 26, ch 27

10. System automation, cron, batch jobs, window startup tasks

<https://ostechnix.com/a-beginners-guide-to-cron-jobs/>

<https://kb.iu.edu/d/afrx#:~:text=A%20batch%20job%20is%20a,execution%20as%20a%20single%20unit.>

Troubleshooting

1. System performance, CPU, DISK, memory and network
2. System login issues
3. System booting issues
4. System logs

In linux, logs are created in /var/ folder.

5. Network connectivity issues

Troubleshoot a slow website

Server side issues:

Check ping - calculate round trip time.

Check time to first byte - time taken to send http request and receiving the first byte from the server. It must be less than a second. If it is greater than 1 sec, then server is the issue.

Network issue:

Open a website on a different network. If it works fine then network is the issue.

Use Tracert command

Personal experience: not able to load a part of the website, basically not able to play video on it on chrome, changed the browser it worked. Then i tried in chrome incognito, still not working. Worked after reinstalling chrome.

Personal experience: not able to access any website using chrome. Chrome says aww snap something is wrong. I checked this error on google documentation. I tried reinstalling chrome etc but didn't work. Finally I found the issue. My antivirus browser protection was causing the issue. I switched it off and the site started loading.

Troubleshoot slow internet

Check the speed.

Reboot the router.

Check dns server.

Maybe some updates are happening in the computer which is making things slow.

Clear cookies, cache.

Update browser

Check for malware.

Troubleshoot no internet

Restart your device.

Make sure dns is working

Check for malwares and viruses.

Turn off antivirus.

Reboot router.

Connected, but not able to browser internet

Ip address conflict

Check if other devices are able to connect or not.

Update network driver.

Troubleshooting a slow pc

Uninstall unused programs.

Delete temporary files.

Get more ram

Disable unnecessary startup tasks

Upgrade hard disk

Use dust cleaner
Check task manager
Run a virus scan
Restart computer
Update drivers

Troubleshooting 100% cpu utilization

Reboot
Check task manager and end process
Update drivers
Scan for malware
Too many background process - startup tasks
Antivirus is the culprit

Troubleshooting BSOD

No space in hard disk
Device driver incompatible with the os is installed
Incompatible version of bios was installed
Antivirus software or viruses may block system files or delete important registry keys.
An error occurred in the work of backup software.
It can also happen as a result of a Windows update.

Restart in safe mode
Update drivers
Find damaged system files Damaged or rewritten system files may cause the error. The command **sfc** finds damaged Windows system files and replaces them.
Check for error in disk where os is installed
Disable unnecessary programs
Virus
Update everything

Troubleshooting PC keeps booting

Open in safe mode
Uninstall latest updates
Check recently installed apps
Hardware issues
Malware issues

Troubleshooting FTP file transfer is slow

Check network.
Check resources
Check other services - video conferencing, streaming etc.
Traffic in the local network.
For testing, use publicly available ftp servers.
Distance between client and server affects the speed
Server is shared with too many users and has limited speeds.
Maybe ftp server is restricting upload and download speed.
Ftp client has restricted speed.
Check vpn
Check ports 20 and 21.
Try compressing files and then sending it.

<https://www.web24.com.au/tutorials/active-passive-modes-ftp#:~:text=Active%20and%20passive%20modes%20in%20FTP%20are%20the%20two%20connection,usually%20on%20separate%20TCP%20connections.>

Active mode

the server initiates data transfer connections back to the client. Active FTP may fail in cases where the client is behind a firewall and protected from many to one NAT(masquerading). This is because the firewall will not know which of the many servers behind it should receive the return connection.
Active mode is more secure for the server as it does not require unsecured ports to be open at the server end, because it is the server that initiates the data connection to the client. the client initiates the data transfer connections to the server.

Troubleshooting server issues

Ensure sufficient resources are there.
Enable cache
Check the list of processes running on the server and the resource consumption.
Block unwanted ip address.
Check if cron jobs are consuming too much resources.
Try performing a reboot.
Check server logs

Troubleshooting heating problem

Use a dust cleaner, dust blocks airflow.
Check if the fan is working or not.

Check virus.

Too much cpu consumption.

Troubleshooting slow download

Virus infection

Poor internet connection

Too many programs running

Too many files downloaded at once.

Shared internet connection.

Extra things :

1. NAT - done

In Ch 19

2. ICMP IGMP - done

In Ch 21

3. Linux files - <https://www.geeksforgeeks.org/linux-file-hierarchy-structure/>

4. Linux basic - tutorialspoint