SUMMARY

FIRST HALF:

- Pursued Interface Study :
    - RS-232 :
        - RS-232 is a serial communication standard used for transmitting data between computers and other serial devices such as printers, modems, and industrial controls.
        - It formally defines signals connecting between a DTE (data terminal equipment) such as a computer terminal, and a DCE (data circuit-terminating equipment or data communication equipment), such as a modem.
        - Compared with later interfaces such as RS-422, RS-485 and Ethernet, RS-232 has lower transmission speed, shorter maximum cable length, larger voltage swing, larger standard connectors, no multipoint capability and limited multi drop capability.
        - In modern personal computers, USB has displaced RS-232 from most of its peripheral interface roles.
        - RS-232 ports are also commonly used to communicate to headless systems such as servers, where no monitor or keyboard is installed, during boot when the operating system is not running yet and therefore no network connection is possible.
        - A computer with an RS-232 serial port can communicate with the serial port of an embedded system

(such as a router) as an alternative to monitoring over Ethernet.

- In RS-232, user data is sent as a time-series of bits. Both synchronous and asynchronous transmissions are supported by the standard.

- Each data or control circuit only operates in one direction, that is, signalling from a DTE to the attached DCE or the reverse, because transmit data and receive data are separate circuits, the interface can operate in a full duplex manner, supporting concurrent data flow in both directions.

- The standard does not define character framing within the data stream or character encoding.

- Features:
  - Simple to implement: RS-232 is a simple and well-established standard.
  - Low cost: RS-232 is relatively low cost compared to other serial communication standards.
  - High reliability: RS-232 has been widely used for many years, making it a reliable standard.

- Limitations:
  - Short distances: RS-232 is limited to short distances (up to 50 feet) for reliable data transfer.
  - Low data rates: RS-232 has low data transfer speeds (up to 20 kbps).
  - Limited number of devices: RS-232 can support only up to 2 devices.

- Applications:
  - Modems

- Personal computers
- POS systems
- Medical devices
- Industrial control systems.

- RS-485:
  - RS-485, also known as TIA-485(-A) or EIA-485
  - RS-485 is a serial communication standard that allows multiple devices to be connected over long distances (up to 4,000 feet) and communicate with one another.
  - Electrical signalling is balanced, and multipoint systems are supported.
  - RS-485 supports inexpensive local networks and multi drop communications links, using the same differential signalling over twisted pair as RS-422.
  - It is generally accepted that RS-485 can be used with data rates up to 10 Mbit/s or, at lower speeds, distances up to 1,200 m (4,000 ft). As a rule of thumb, the speed in bit/s multiplied by the length in metres should not exceed 10^8.
  - Features:
    - Multi-point communication: Supports communication between multiple devices.
    - Long distances: Can transmit data over long distances up to 4,000 feet.

- High data rates: Can transfer data at speeds up to 10 Mbps.
- High reliability: Features such as differential signalling and multi-drop capability make it more reliable than other serial communication standards.
- Cost-effective: RS-485 is relatively low cost compared to other serial communication standards.

- Applications:
  - Industrial automation
  - Building automation
  - Power control
  - Medical devices
  - Instrumentation systems.

- DDR3/DDR4

  - DDR3/DDR4 are types of computer memory (RAM) used in personal computers and servers

  - DDR3:
    - Released in 2007
    - Transfer rate: 800-1600 MT/s (Mega Transfers per second)
    - Voltage: 1.5V
    - Maximum memory size: 16GB per module
    - Bandwidth: 12.8 GB/s

- DDR4:
  - Released in 2014
  - Transfer rate: 2133-4266 MT/s
  - Voltage: 1.2V
  - Maximum memory size: 128GB per module
  - Bandwidth: 25.6 GB/s

- Benefits of DDR4 over DDR3:
  - Increased speed: DDR4 is faster than DDR3.
  - Increased memory capacity: DDR4 can support larger amounts of memory.
  - Increased energy efficiency: DDR4 uses less power than DDR3, making it more energy efficient.

- Both DDR3 and DDR4 are widely used in modern computers and servers for their high performance and reliability.

SECOND HALF :

- Troubleshooting of Multiple Client Server program in Python