Lab Session

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Outline

- VM setup (Demo)
- Preview on Lecture 2
  - OSI 5-layer model
  - Packet-switching and Circuit-switching network
- Q&A

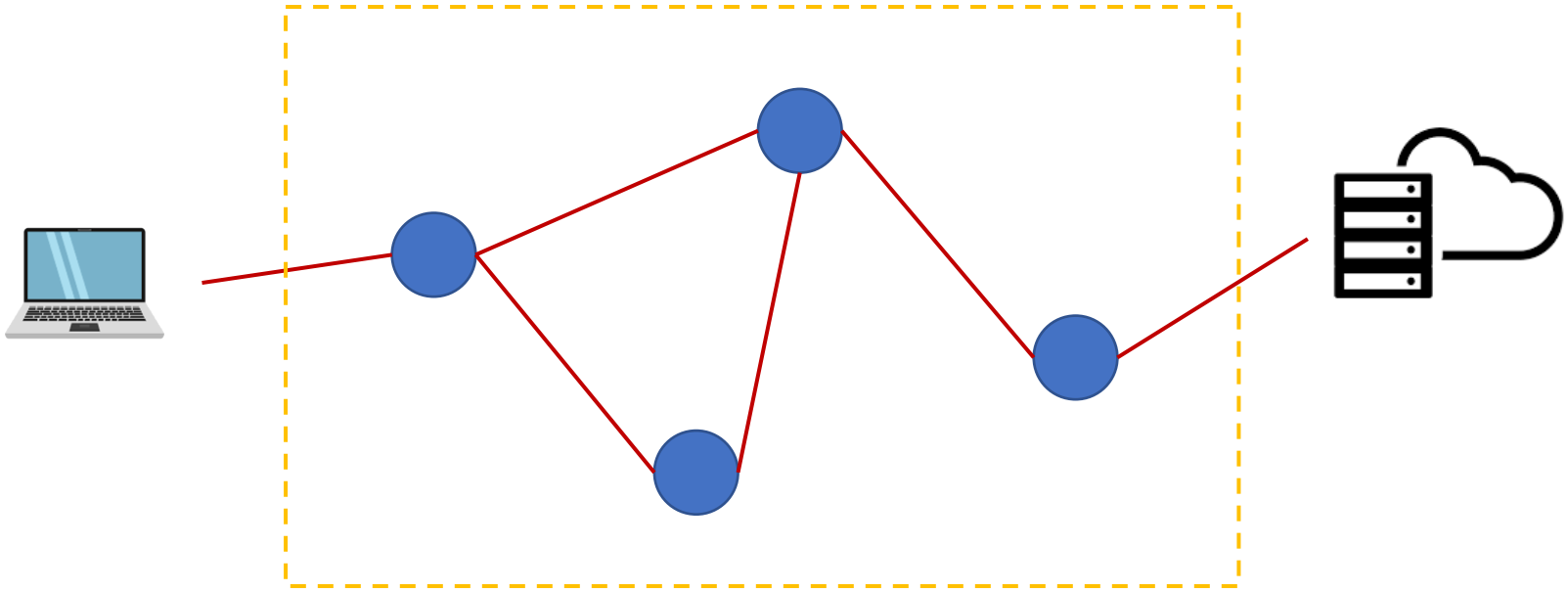
VM setup

- Dependencies
  - Vagrant
    - a tool managing virtual machine environment
    - instructions of various platforms (e.g., MacOS, Linux, Windows)
  - Virtualbox
    - a general-purpose full virtualizer
  - Git
    - https://docs.google.com/document/d/1vMlON-Ie4fkI4h50rWhFXLFtZCAfrwqn44Jz6HEIWew/edit?usp=sharing
- Base image
  - https://github.com/CSCI-UA0480-009/base-image
  - go to cloned folder and vagrant up

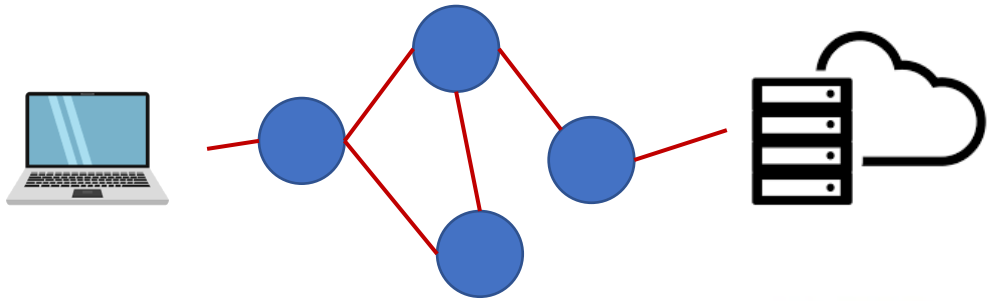
Troubleshooting

- no "--clipboard-mode" option
  - edit ~/.vagrant.d/boxes/peru-VAGRANTSLASH-ubuntu-18.04-desktop-amd64/20200901.01/virtualbox/Vagrantfile
  - change "--clipboard-mode" to "--clipboard”
- other issue
  - Google it and post your solutions on piazza!

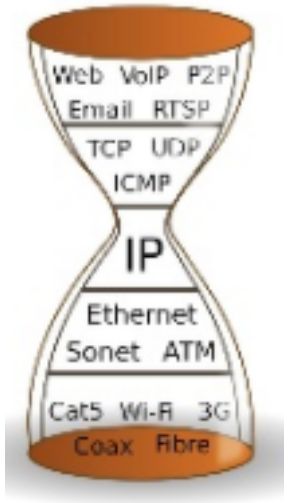
An example



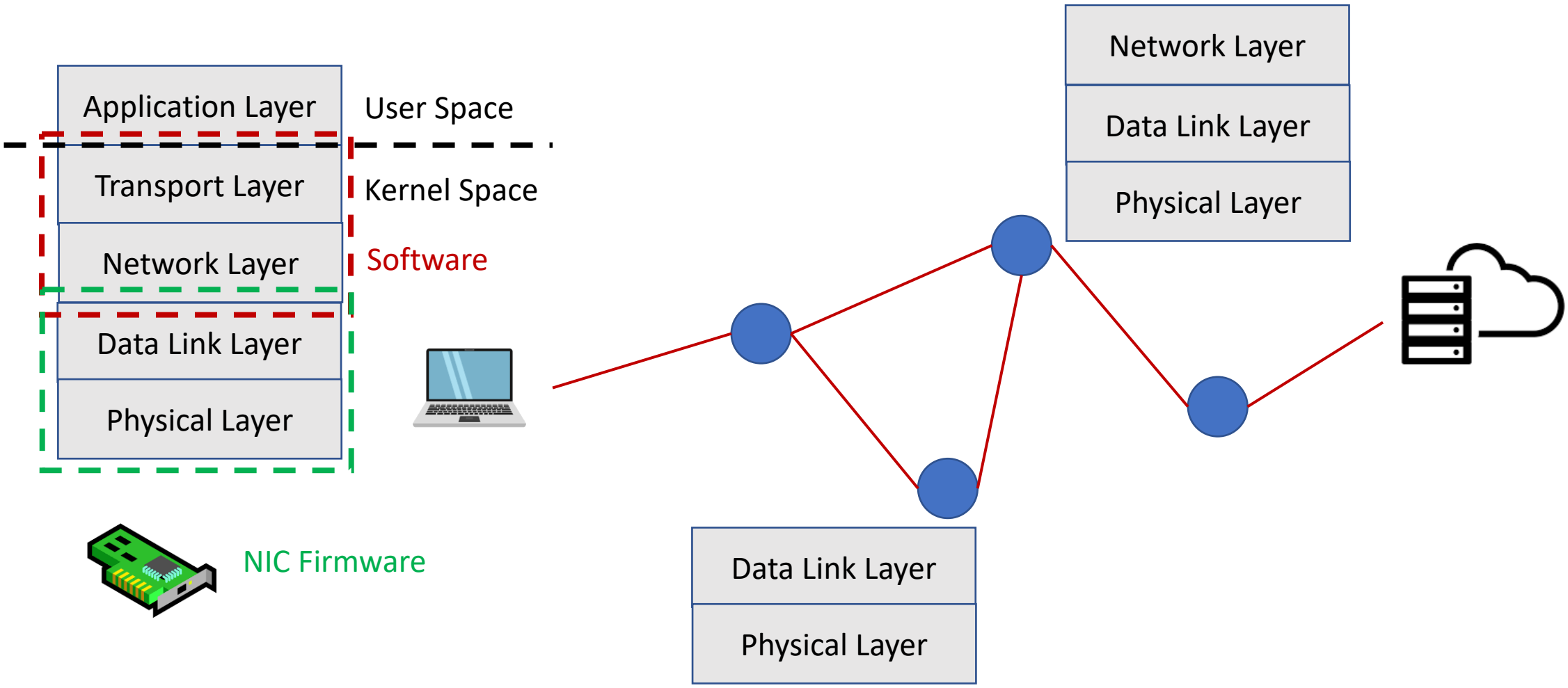
OSI 5-layer model



- Application Layer
  - Exchange data (e.g., Zoom, Google, etc.)
- Transport Layer
  - Determines the rate you can send your packets (TCP, UDP, etc.)
- Network Layer
  - Determines which path your packets will go (IP, etc.)
- Data Link Layer
  - Prepares frames for packet transmission (e.g., error detection code)
- Physical Layer
  - Coverts frames to hardware medium form (e.g., optical, electronical signals)



Where are these layers

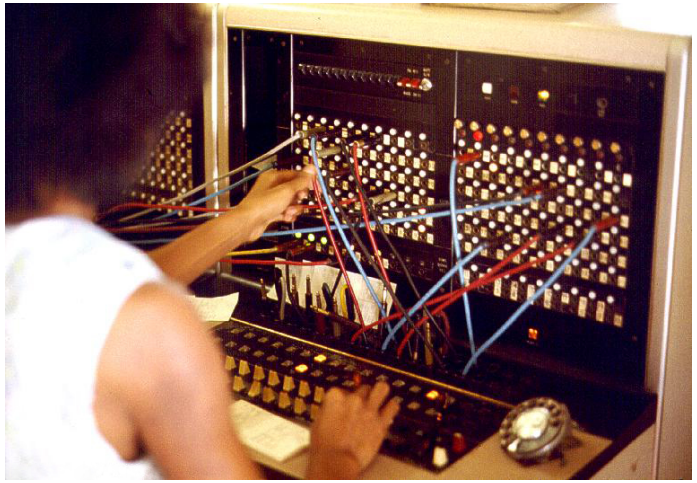


Performance Metrics (from network aspect)

- Throughput
  - e.g., transmission rate, etc.
- Latency
  - e.g., round-trip time (RTT), etc.
- Multiplexing(?)
  - e.g., how many users you can support, etc.
- Resiliency
  - e.g., what will you do if link (or node) fails, etc.
- etc.

Circuit-switching Network

- Widely used in early telephone network
- Main features
  - Setup connection before sending data
  - Exclusive possession



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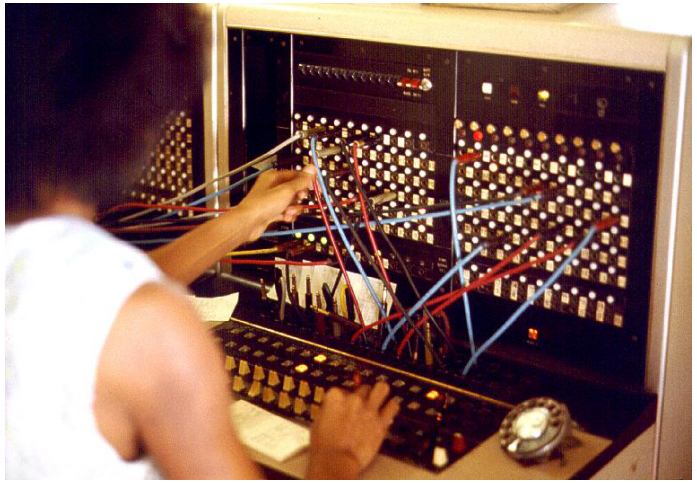
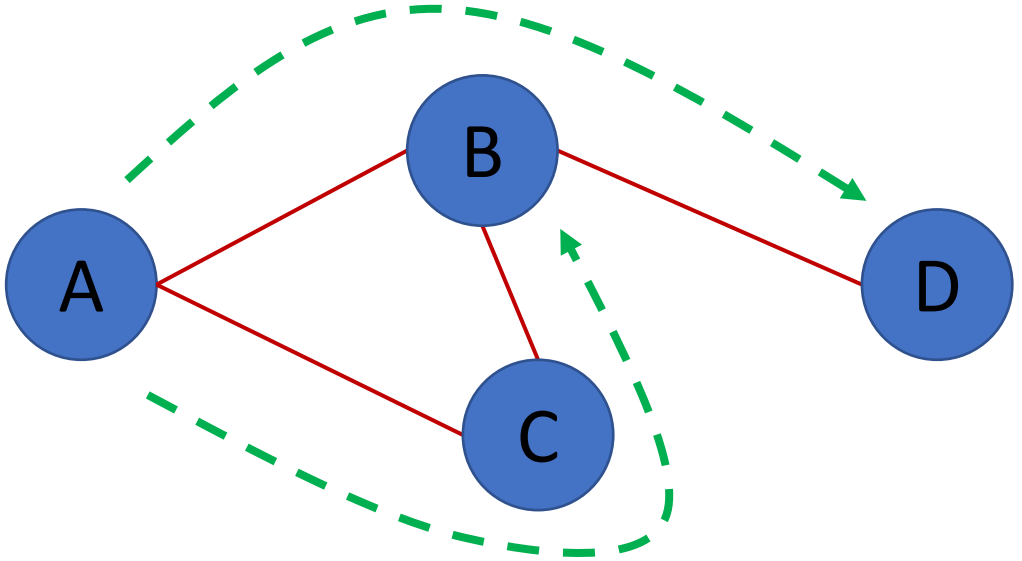


- Example
  - A to D connection
  - A to B connection



Packet-switching Network

- Dominate today's internet
- Main features
  - data are divided into small chunks called packets
  - routing information encapsuled into packet headers
  - intermediate nodes store FIB (forwarding information base)

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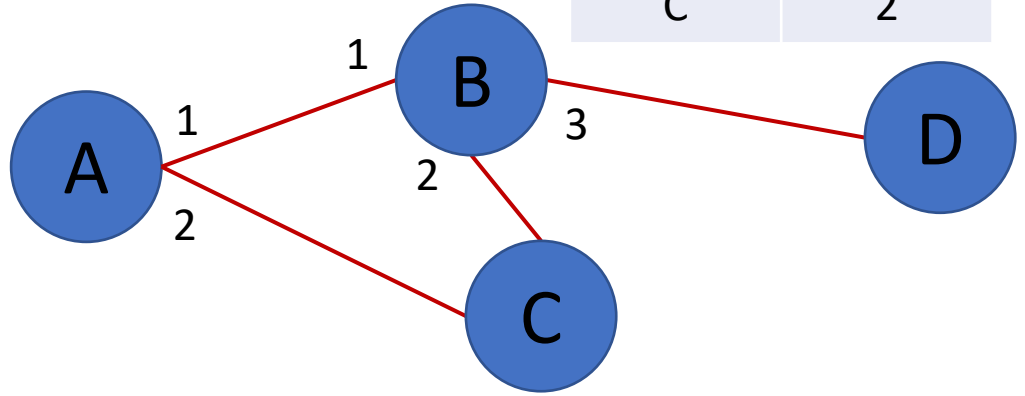
Dest.	Port
D	3
C	2



Dest.	Port
D	1
C	2

Take-home questions (will covered in lecture)

- Why do we have these two types of networks?
  - about goals and non-goals of early internet design

- Which type of network is better?
  - performance?
  - etc.