Programming Assignment #4:
TCP connection

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POSTECH CSE
Department of Computer
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Master Timetable

Regular schedules indicated by color. Regular due is at 23:59 of the last day of the same color.
Late submissions are accepted until 24 hours grace period after the regular due (at **20% penalty**)

Allocated Days & Relative Score Weights

Source: "**Sponge**" in Stanford CS144 'Introduction to Computer Networking' by Prof. Keith Winstein
- We will provide our own materials with proper localization. While you are free to refer to the original CS144 materials, our materials will precede in case of discrepancy.
- Complexity would vary with assignment; LoC per assignment may be between 25 and 150 lines.
- Per-assignment weights and days are differently allocated, reflecting the varying complexity.
- After each assignment, within 7 days, the best submission will be chosen and disclosed to the class.
  The author of the best submission is rewarded with +10% extra score on top of what she/he earned from that assignment.

No.	Theme	Days allocated (regular + late)	Relative weights allocated
0	Warmup	9 + 1	7
1	Byte streams	7 + 1	9
2	TCP receiver	10 + 1	14
3	TCP sender	12 + 1	18
4	TCP connection	19 + 1 (including mid-term week)	18
5	Network interface	12 + 1	14
6	IP router	10 + 1	11
7	Putting altogether	7 + 1	9

Building upon best code

- As announced on Day 1, it is allowed to build your assignment #N
  on top of whole or part of the best code for assignment #$(N-k)$, $k \geq 1$

- If you used any part of best codes, **include the following in your writeup (assnX.md):** *"For this assignment, I used part or whole of the best codes of assignment #i, #j, ..., #k."* (i.e., every best code number that you used)
  - Caution: See the whole dependency chain of your current code base.
    - You should specify all the past best submissions that currently exist in any part of your code base.
  - If you want to eliminate your dependency on best code #$(N-k)$, you can re-work on your assignment #$(N-k)$ and have your successive assignments based on it.

Your current Assn # N
Your own Assn # $(N-1)$
⋮
Best code # $(N-k)$

- Not specifying the use of best codes that exist in any part of your current code base will have our **automatic similarity checker trigger a cheating alert**. Please prevent such risks.

- To respect students who complete their submissions only on their own efforts, submissions that use any of previous best code #$(N-k)$ will have their top score **capped at 90%**. This policy will take effect from Assignment #2.

- When we select the best code in future assignments, our priority will be those without using others' best code.
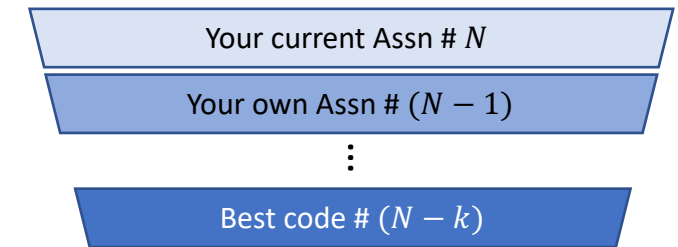
Where to Submit

At PLMS: **Week 10 (04/22, 04/24)**

- Chapter 4. Network Layer: Data Plane
- Chapter 5. Network Layer: Control Plane

📄 [Assignment] #4. TCP connection 2024-04-08 00:00:00 ~ 2024-04-26 23:59:00

For assignment description and resources, please refer to:

- Attached slides
- Our assignment webpage: https://tomahawk.postech.ac.kr/csed353/
  - For off-campus access including the dormitory, you need to turn on POSTECH VPN: https://vpn.postech.ac.kr/

Assignment Materials

CSED353: Computer Network

VM setup instructions
Note. M1 mac users, please pay special attention.

Before yo 🙂

- Check here for virtual machine setup instructions.
- Check here for Assignment FAQs.

✏️ **Programming Assignments**

Topic	Due date	Materials
Assignment #0: Networking Warmup	2023-03-03 23:59	</> Code 📄 Docs
Assignment #1: Stitching substrings into a byte stream	2023-03-12 23:59	</> Code 📄 Docs
Assignment #2: TCP receiver	2023-03-24 23:59	</> Code 📄 Docs
Assignment #3: TCP sender	2023-04-07 23:59	</> Code 📄 Docs
Assignment #4: TCP connection	2023-04-28 23:59	</> Code 📄 Docs

GitHub repo

API docs

Assignment description

https://tomahawk.postech.ac.kr/csed353/

For off-campus access (including dormitory), get POSTECH VPN first: https://vpn.postech.ac.kr/

In addition, please visit regularly PLMS → Announcement bulletin for important updates about assignments.

"You've reached the summit."

CS353: Computer Networks

Attribution: This series of programming assignments, including codebase and documentation, is adopted from 'Sponge' of Stanford CS144 Introduction to Computer Networking by Prof. Keith Winstein https://cs144.github.io/.

Assignment Checkpoint 4: the summit (TCP in full)

Due: April 26, 2022. 23:59
**Late deadline:** April 27, 2022. 23:59 (20% penalty)

1. Overview

**You have reached the summit.**

In Assignment 0, you implemented the abstraction of a *flow-controlled byte stream* (ByteStream). In Assignment 1, 2, and 3, you implemented the tools that translate—*in both directions*—between that abstraction and the one the Internet provides: unreliable datagrams.

[Review] Programming Assignment #3: TCP sender
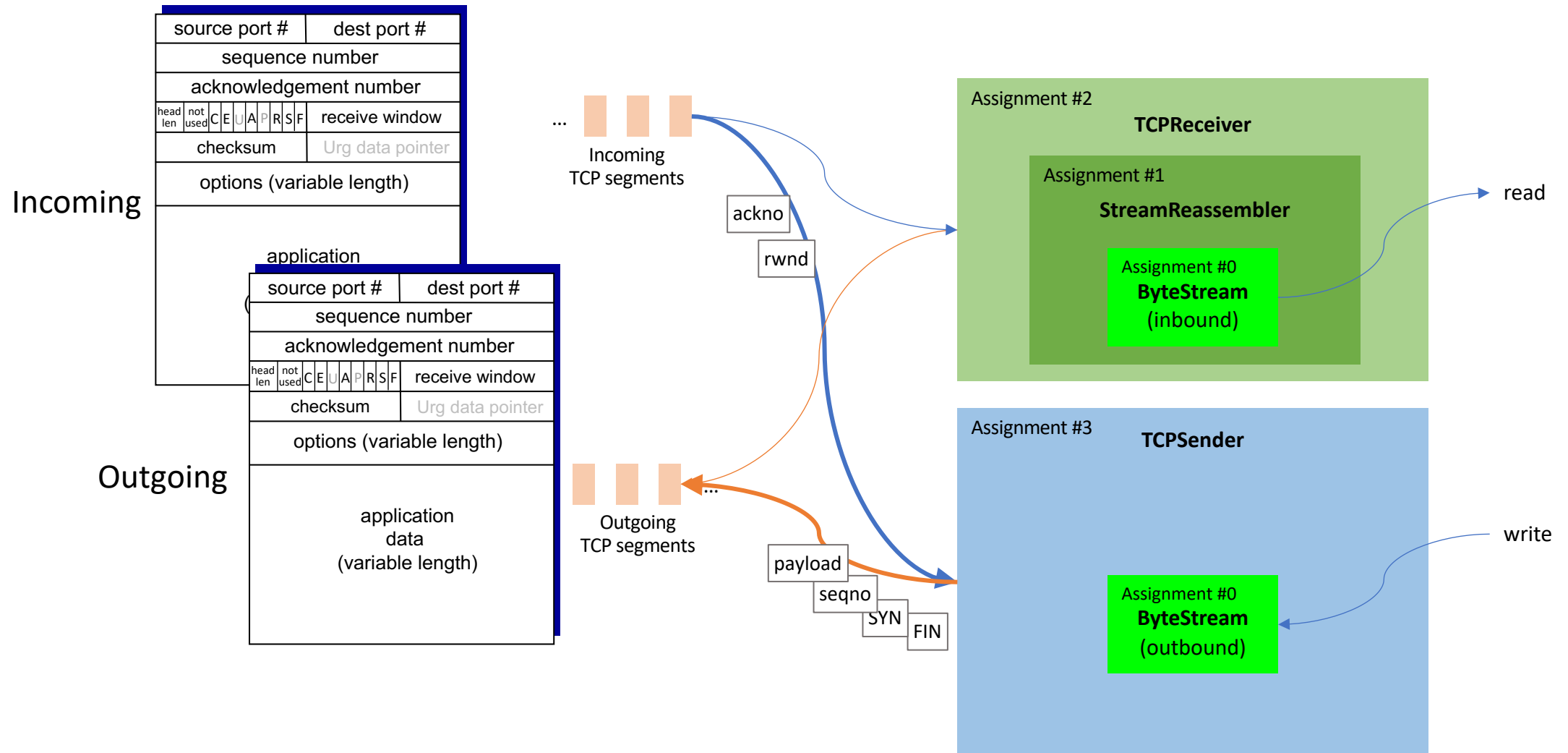
Programming Assignment #4: TCP connection
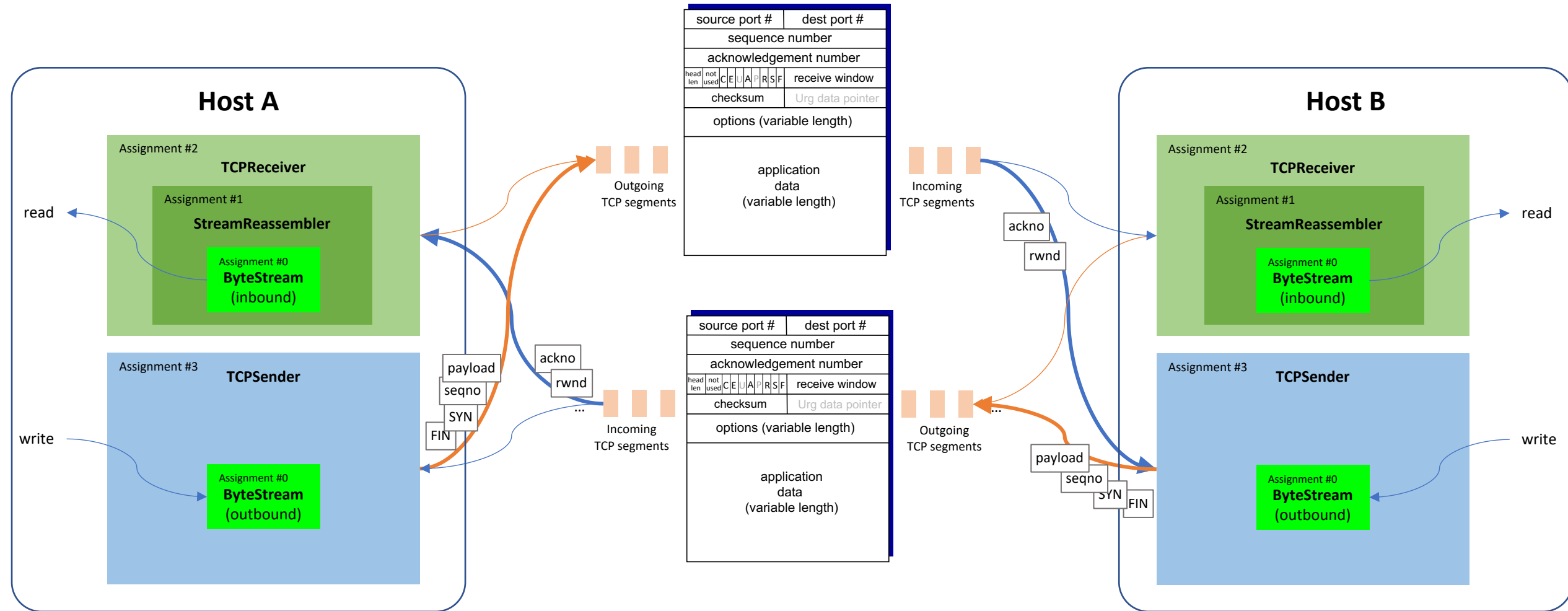
Programming Assignment #4: TCP connection

| source port #	dest port #
sequence number	
acknowledgement number	
head len / not used / C E U A P R S F	receive window
checksum	Urg data pointer
options (variable length)	
application data (variable length)	

RST

Where?
e.g., MAX_RETX_ATTEMPTS

keep-alive

tick() is your only method to access to the passage of time.
Use of any system calls or library functions will get penalty.

Read page 7 & 8 very carefully!
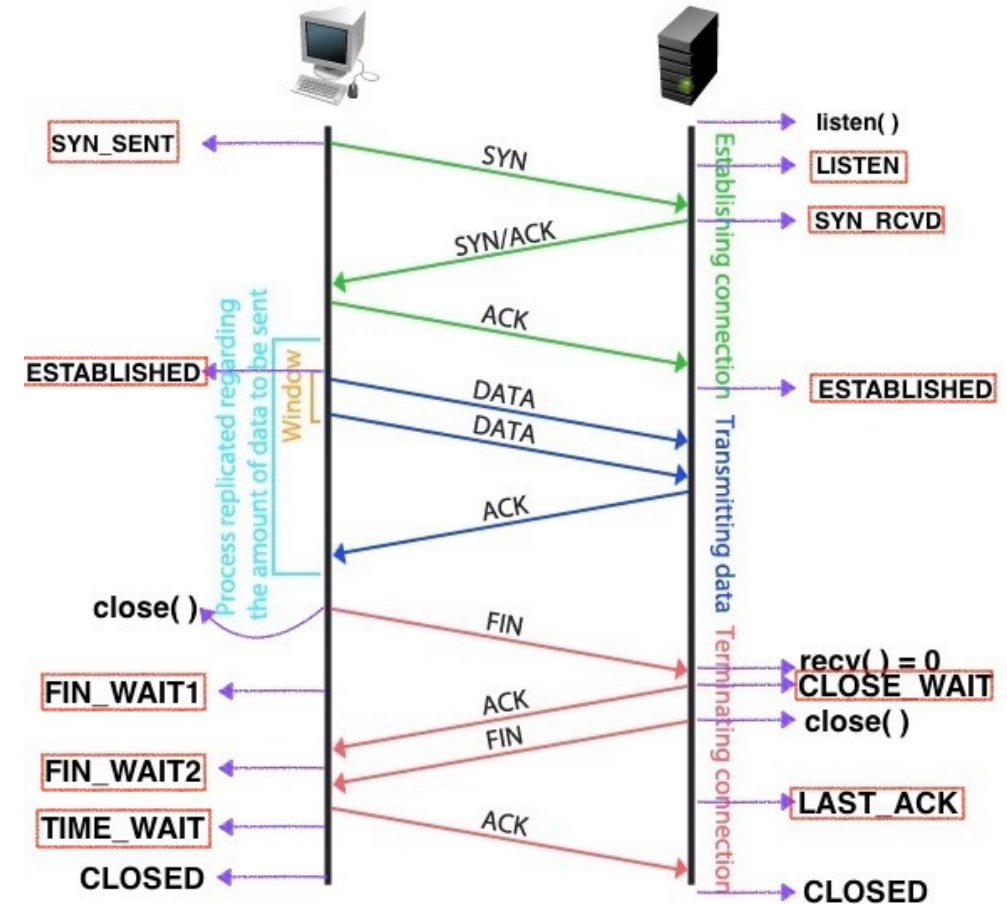
Programming Assignment #4: TCP connection

- To Dos
  - Standard automated tests: `make check_lab4`
  - Performance benchmark: `./apps/tcp_benchmark`
  - webget revisited: `make check_webget`

- For easy debugging
  - Run two instances (a server and a client) and inspect what happens using Wireshark

- **Regular due**   : Apr. 26, 23:59
- **Late due**   : Apr. 27, 23:59 (20% penalty)
- **18% weight** out of the whole programming assignments
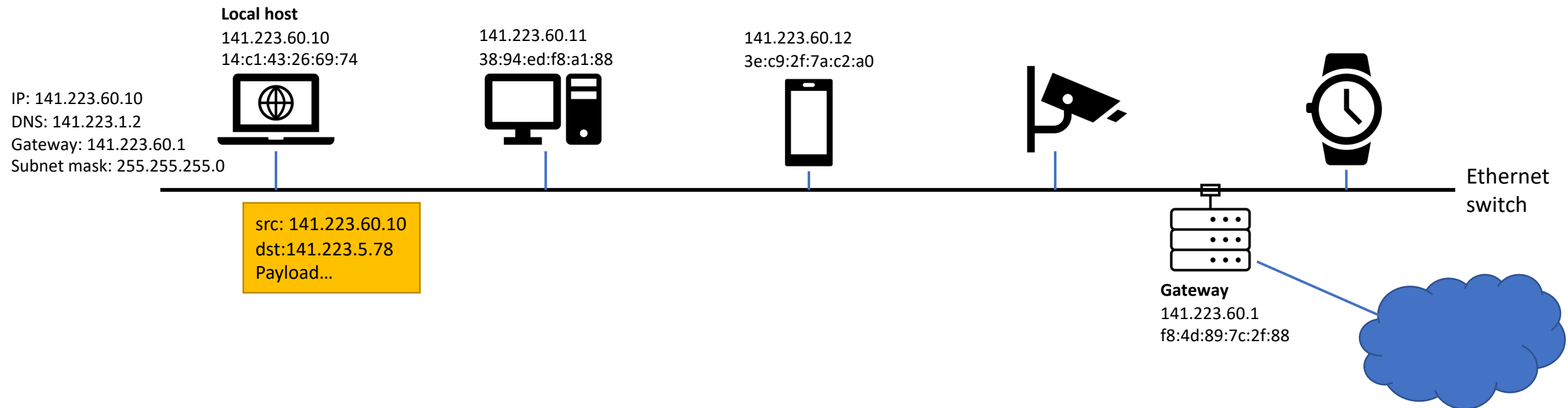- **Naming convention**: <your_student_id>.git (e.g., 20209876.git)

Local host's routing table
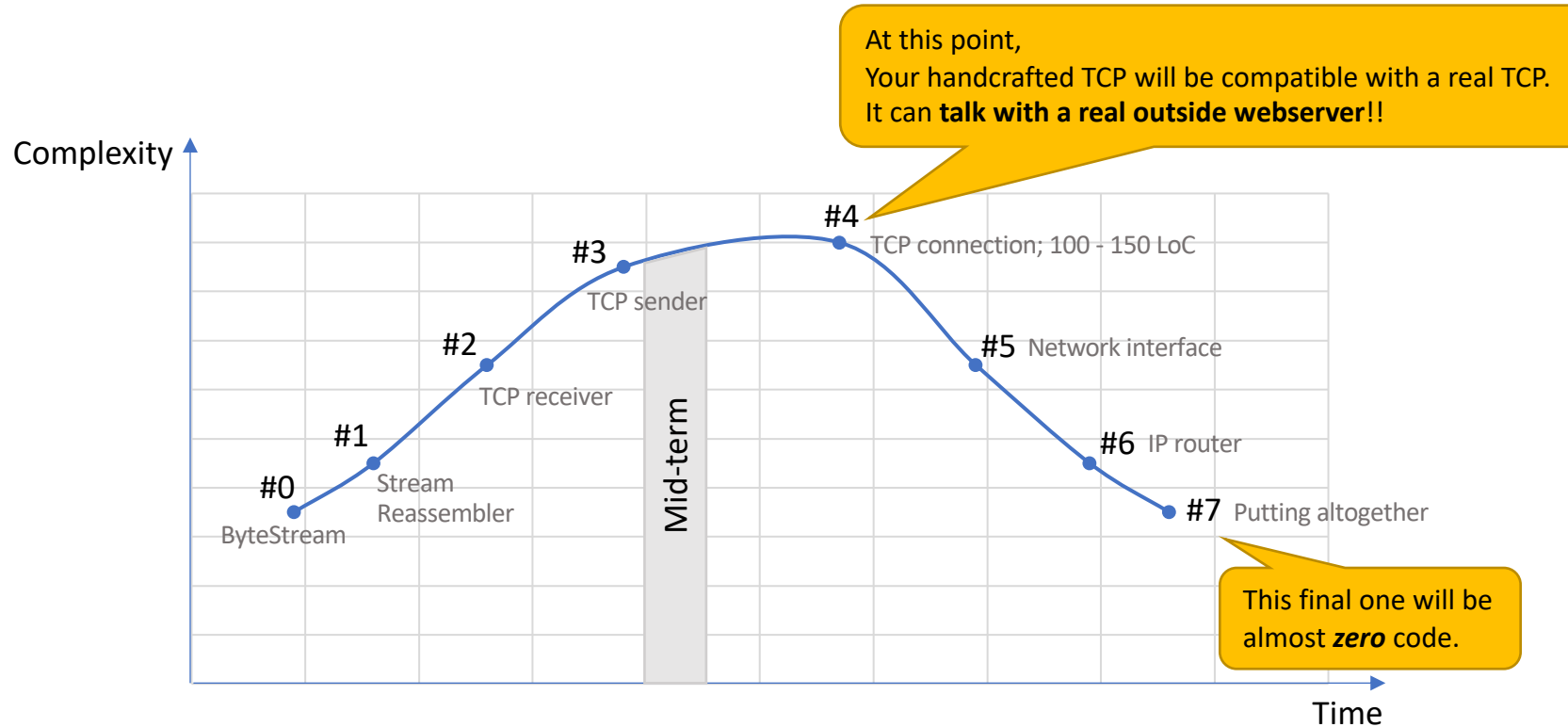
Destination	Gateway
141.223.60.11	38:94:ed:f8:a1:88
141.223.60.12	3e:c9:2f:7a:c2:a0
default	141.223.60.1
141.223.60.1	F8:4d:89:7c:2f:88

How to know the mapping at the first place??

Local host
141.223.60.10
14:c1:43:26:69:74

141.223.60.11
38:94:ed:f8:a1:88

141.223.60.12
3e:c9:2f:7a:c2:a0

IP: 141.223.60.10
DNS: 141.223.1.2
Gateway: 141.223.60.1
Subnet mask: 255.255.255.0

src: 141.223.60.10
dst:141.223.5.78
Payload...

Ethernet switch

Gateway
141.223.60.1
f8:4d:89:7c:2f:88

Heads-up on what's coming

Please start working on your assignment <mark>*early*</mark>

- You may find troubles in setting up your environment.

- You may find some differences between your output and the assignment PDF.
  - Partly our mistakes that a known discrepancy was not fixed already.

- You are welcome to post questions, as long as you are not asking us to solve or debug your assignment directly.

- However, it takes time for us to provide responses, typically $\leqq$ 24 hours.
  - If many of you do your assignment close to the deadlines, many questions will be poured in a short period of time.
  - Due to the peak load, our responses may get delayed.
  - In the worst case, you may not have your answer before the deadline. Still, the due won't be extended.