Programming Assignment #6:
IP Router

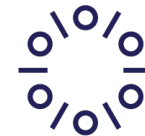**Inseok Hwang**   **Sungjae Cho**   **Jaewoong Jang**   **Mingyeol Kim**

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POSTECH CSE
Department of Computer
Science & Engineering

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, <u>our materials will precede in case of discrepancy</u>.
- Complexity would vary with assignment; <u>LoC per assignment may be between 25 and 150 lines</u>.
- Per-assignment weights and days are differently allocated, reflecting the varying complexity.
- After each assignment, within 7 days, <u>the best submission will be chosen and disclosed</u> to the class. The author of the best submission is <u>rewarded with +10% extra</u> 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.

- 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.

| Your current Assn # N |
| Your own Assn # $(N-1)$ |
| $\vdots$ |
| Best code # $(N-k)$ |
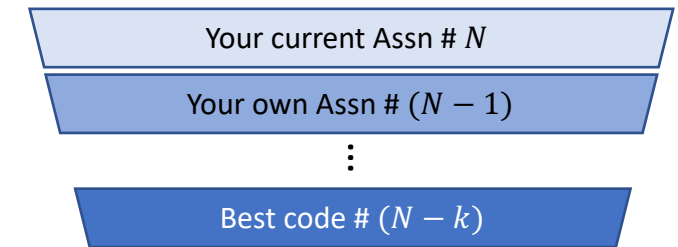
Where to Submit

At PLMS:

Week 14 (05/20, 05/22)

- Chapter 6. Link Layer and LANs
- Chapter 7 & 8 Digest. Wireless, Mobile Networks, and Security

[Assignment] #6. IP router   2024-05-13 00:00:00 ~ 2024-05-22 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

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

CSED353: Computer Network

Before you start 🙂

- 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
Assignment #5: Network Interface	2023-05-12 23:59	Code Docs

GitHub repo

Assignment description

API docs

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.

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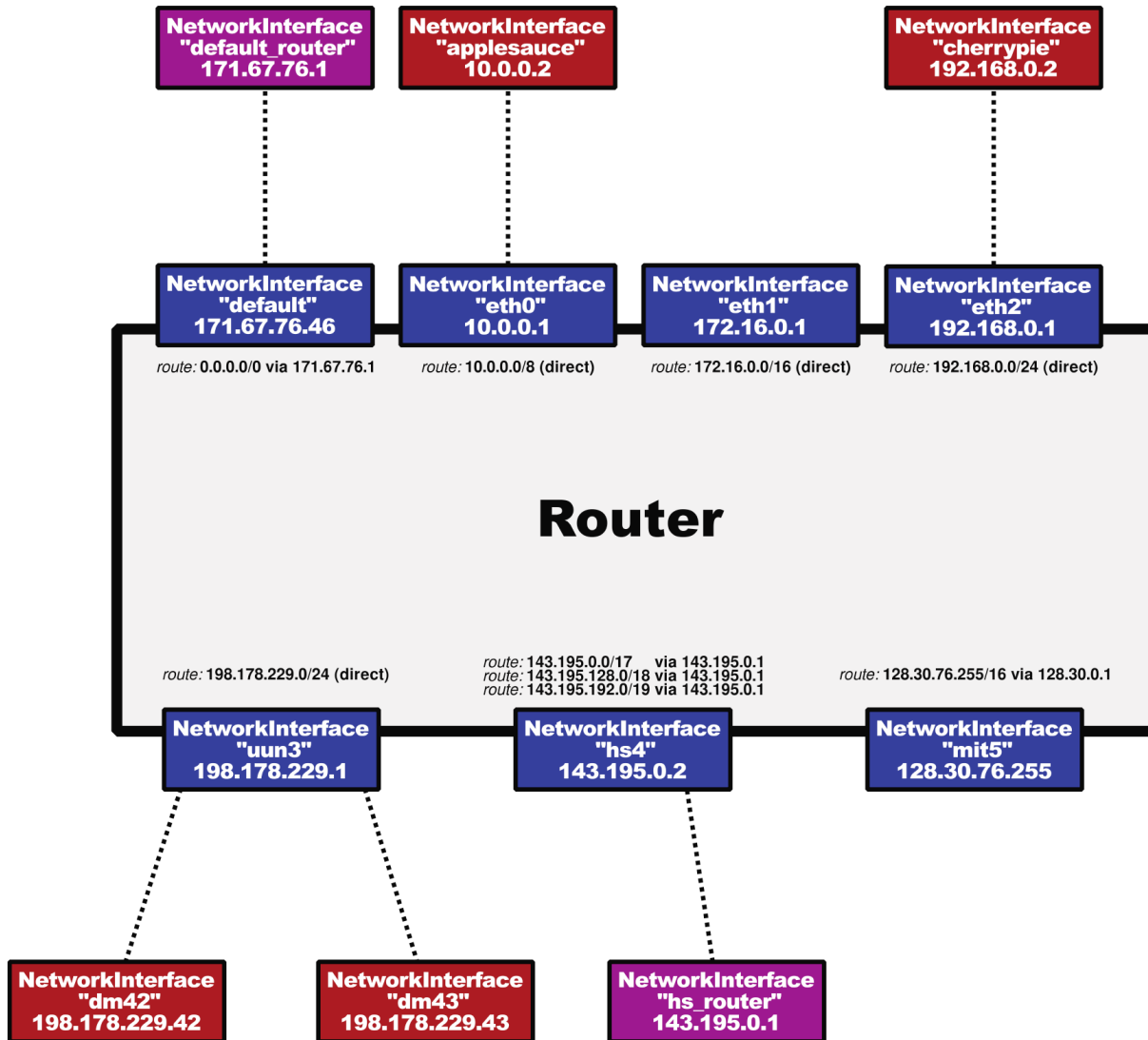
Destination	Gateway
141.223.60.11	38:94:ed:f8:a1:88
141.223.60.12	3e:c9:2f:7a:c2:a0
default	141.223.60.1
141.223.60.1	F8:4d:89:7c:2f:88

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
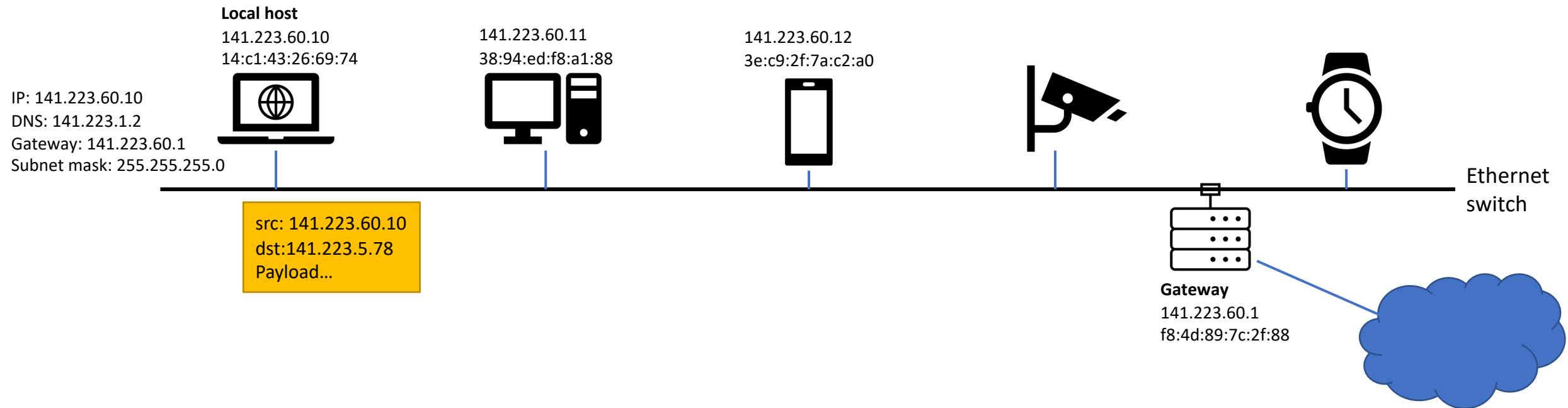
Programming Assignment #6: IP Router

- **Adding a new route**
  - Address prefix
  - Prefix length
  - Next hop IP address
  - Interface number
  - *Data structure for the routing table is up to you!*

- **Route a datagram**
  - Longest prefix match rule
  - Drop the datagram if no route matches or TTL expires
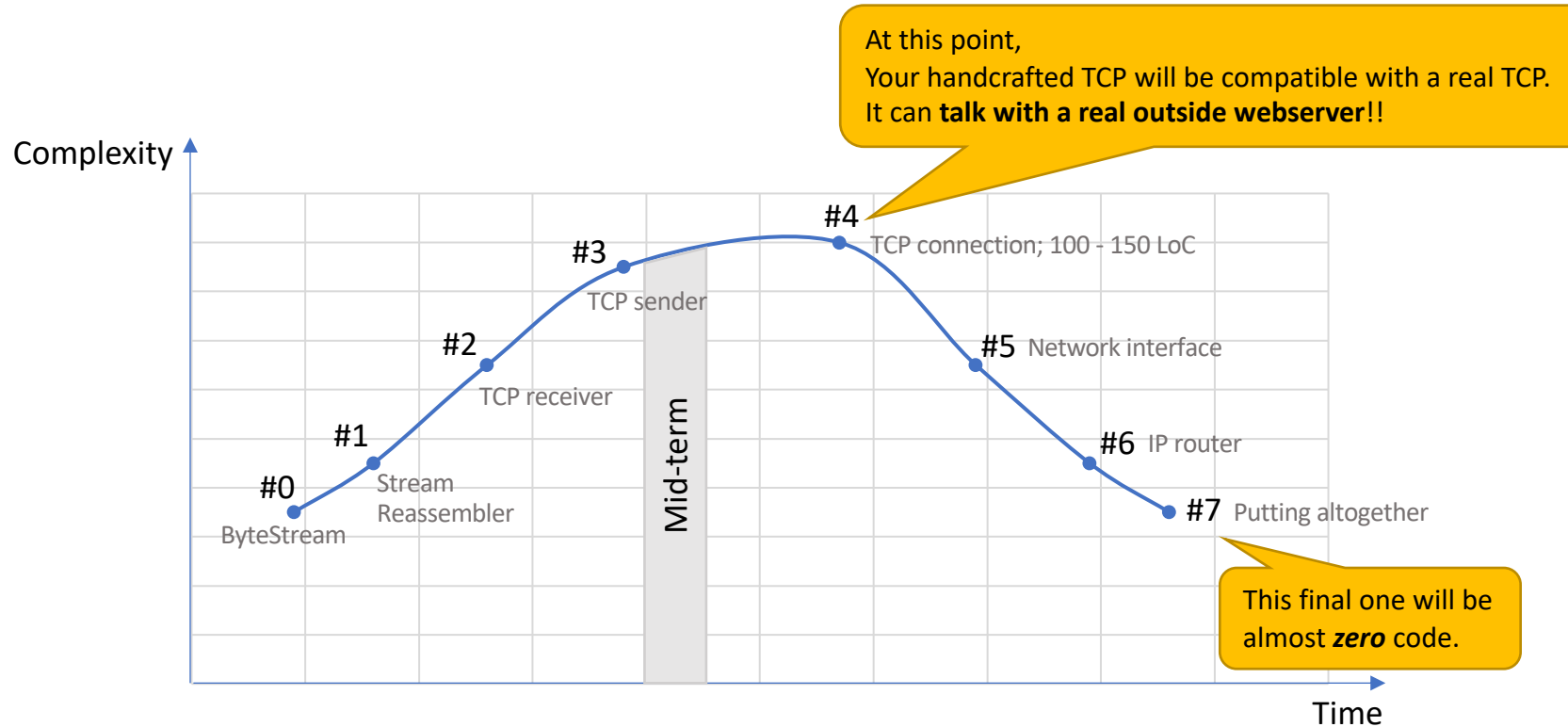 - *No need to implement ICMP*

Programming Assignment #6: IP Router

- To Dos
  - 2 tests: `make check_lab6`
  - 161 tests including previous: `make check`

  - **Regular due**   : May. 22, 23:59
  - **Late due**   : May. 23, 23:59 (20% penalty)
  - **11% weight** out of the whole programming assignments
  - **Naming convention**: <your_student_id>.git (e.g., 20209876.git)

Heads-up on what's coming

Complexity

#0
ByteStream

#1
Stream
Reassembler

#2
TCP receiver

#3
TCP sender

Mid-term

#4
TCP connection; 100 - 150 LoC

At this point,
Your handcrafted TCP will be compatible with a real TCP.
It can **talk with a real outside webserver**!!

#5 Network interface

#6 IP router

#7 Putting altogether

This final one will be
almost *zero* code.

Time

Please start working on your assignment *early*

- 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.