EECS 489 - WN 23

Discussion 6

Assignment-2

Assignment 2 is out. Due date: **02/24 2023, 11:59 PM**

Much harder than A-1. (~1,000 loc)

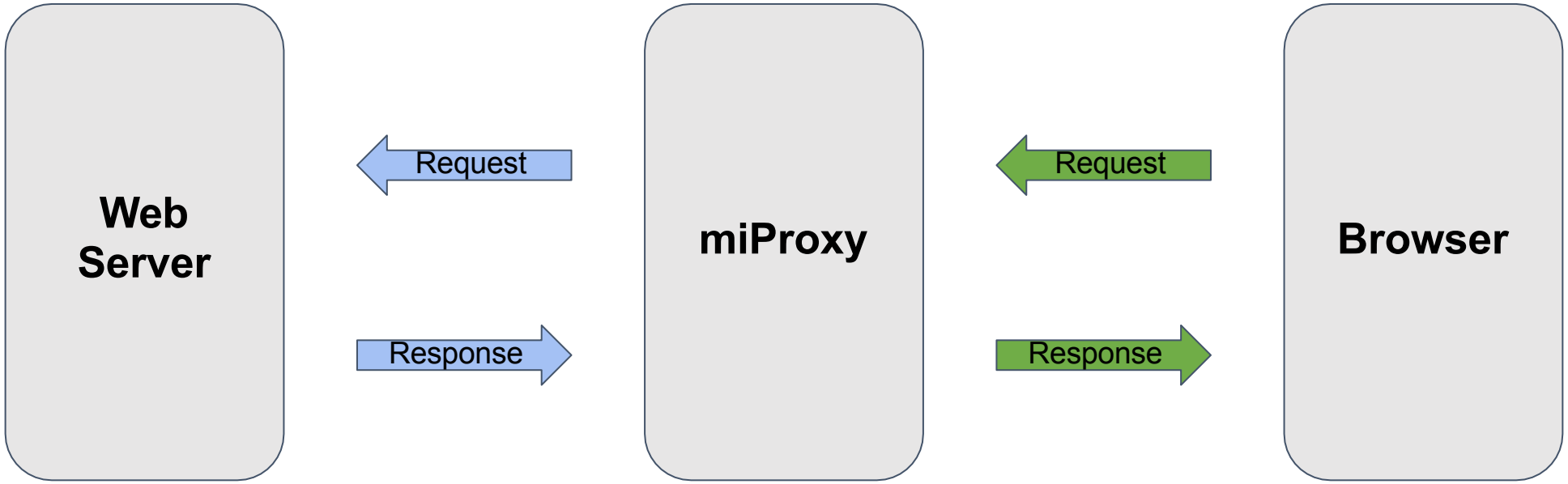
START EARLY!

Hosted in GitHub under https://github.com/eecs489

Please make sure you are in the correct GitHub team and have access to your repo.

The Autograder is available now.

Assignment-2 Overview

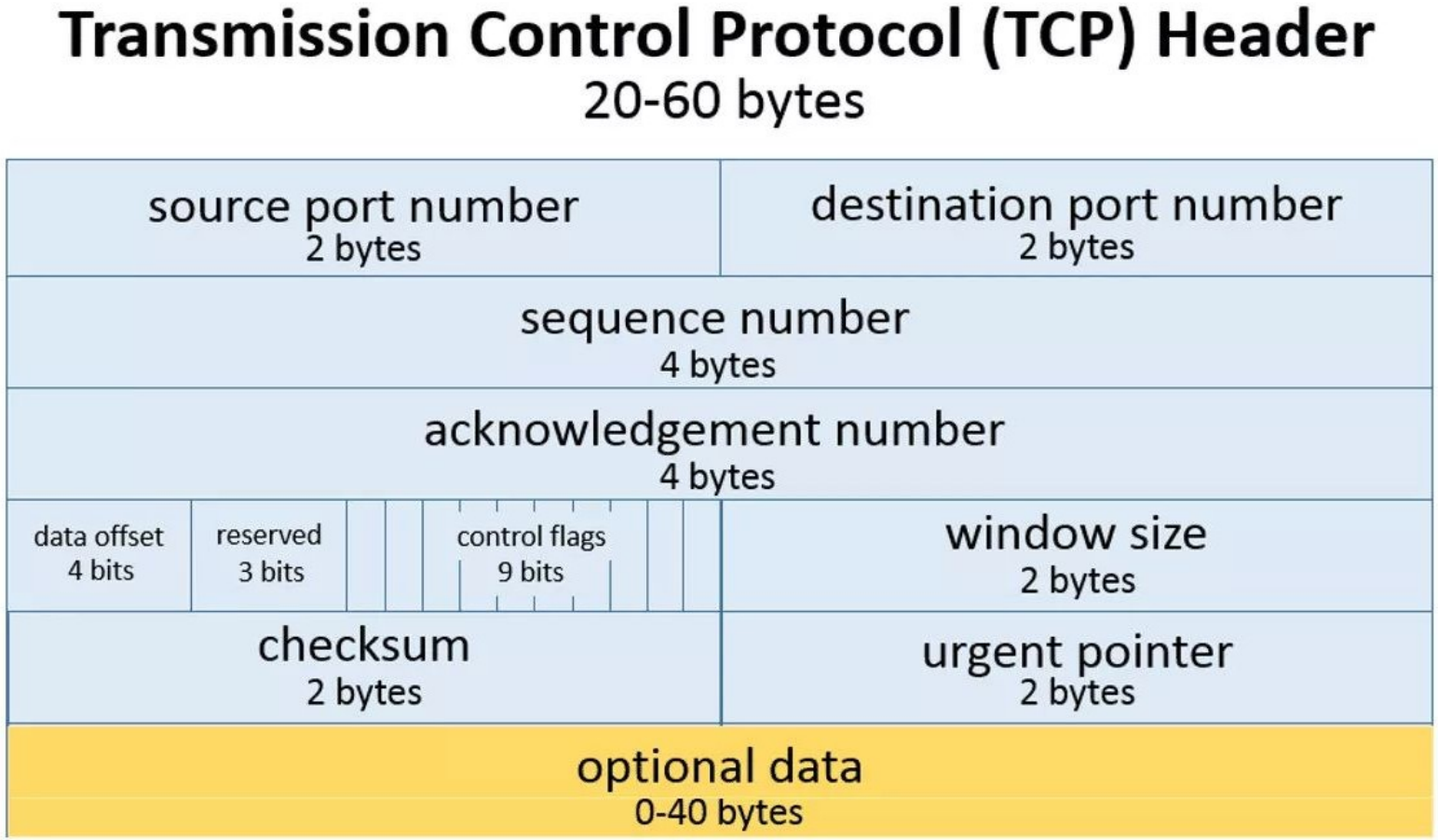


- The proxy only forwards messages between the browser and the web server
- Doesn’t care what are forwarded
  - Don’t make any assumption on what are forwarded

Assignment-2 Overview

A quick demo

TCP: Transmission Control Protocol



Q1 TCP File Transfer 1

Consider transferring an enormous file of **L** bytes from host A to host B.
What is the maximum value of **L** such that we don't run out of TCP sequence numbers?

- *Note:TCP sequence number is 4 bytes in the header*

Given **L** = 2^32 bytes, find how long it takes to transmit the file Assume:

- MSS (max segment size) = 1460 Bytes
- MTU (max transmission unit) = 1500 Bytes
- 128 Mbps link from A to B
- Ignore flow and congestion control, assume A sends as fast as possible contiguously.

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(2^32 / 1460 * 1500) / (128 *10^6 / 8) = 276 s
amount of data / bandwidth

Q2 TCP Segment Metadata

Host A (sender) and B (receiver) are communicating over a TCP connection.
Assume the following events happen in order:

- B has received the first 127 bytes of the flow from A, this consumes seq num 0-126
- A then sends two segments, S1 (80 bytes of data), S2 (40 bytes of data)
- S1 has sequence num 127, source port 30302, destination port 80
- B sends ACK1 and ACK2 to A when it receives the first / second segment respectively

Assume S1 and S2 arrive in order

Q: For S2, what are the sequence num, source port and destination port?

Q: For ACK1, what are the ack num, source port and destination port?

Now assume S1 and S2 come out of order

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Seq num: 207, Source port: 30302, Destination port: 80

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Ack num: 207, Source port: 80, Destination port: 30302

Now assume S1 and S2 come out of order

Q: For ACK1, what are the ack num, source port and destination port?

Ack num: 127, Source port: 80, Destination port: 30302

Q3 TCP CWND

Consider sending a large file over a lossless TCP connection Assume:

- TCP uses AIMD for congestion control with slow start
- ssthres = 16 MSS
- Approximately constant RTT
- CWND starts at 1 MSS

Q: How long does it take for CWND to increase from 1 MSS to 20 MSS?

Q: What is the average throughput (in terms of MSS and RTT) of the above process?

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Q: How long does it take for CWND to increase from 1 MSS to 20 MSS?

CWND: 1 2 4 8 16 17 18 19 20; 8 RTT

Q: What is the average throughput (in terms of MSS and RTT) of the above process?

(1+2+4+8+16+17+18+19) / 8 = 85 MSS / 8 RTT

Thanks

Have a good one!