EECS 489 Discussion 7

Annoucements

- Assignment 3 is out
- Please compile/test inside the VM
  - macOS g++ can’t compile the example code

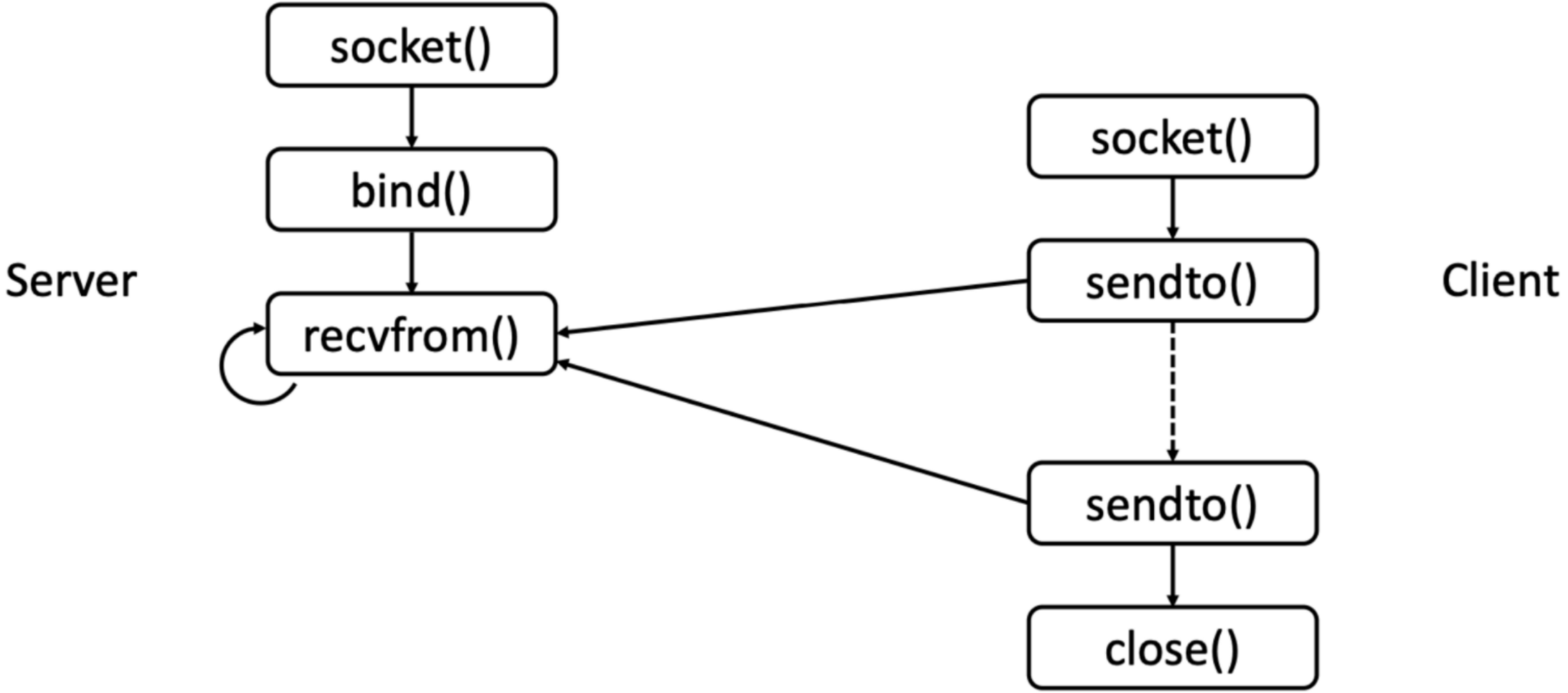
Agenda

- UDP intro
- UDP programming
- Problem sets

UDP Basics

- User Datagram Protocol: best effort delivery
  - Connectionless: no handshake; support multicasting
  - Unreliable: (**Fast**)
  - Stateless: no connection states such as send/recv buffering, congestion-control parameters, or seq numbers. (**Scalable**)

UDP: control flow



UDP: socket()

Create a UDP socket

```
int socket(int domain, int type, int protocol);
```

```
sockfd = socket(AF_INET, SOCK_DGRAM, IPPROTO_UDP);
```

UDP: sendto()

Send data to destination

```
ssize_t sendto(int sockfd, const void *buf, size_t len, int flags,
               const struct sockaddr *dest_addr, socklen_t addrlen);
```

```
socklen_t addr_len = sizeof(addr);
sendto(sd, buf, LEN , 0 , (struct sockaddr *) &addr, addr_len)
```

UDP: recvfrom()

Receive data from a socket

```
ssize_t recvfrom(int sockfd, void *buf, size_t len, int flags,
                 struct sockaddr *src_addr, socklen_t *addrlen);
```

```
socklen_t addr_len = sizeof(addr);
int len = recvfrom(sd, buf, LEN, 0, (struct sockaddr *) &addr, &addr_len)
```

Demo

Demo of UDP using nc/wireshark

Q1 Forwarding Table

Consider a datagram network using 32-bit addressing. Suppose a router has 4 links (0-3), and packets are to be forwarded as follows:

Destination Address Range	Link Interface
11100000 00000000 00000000 00000000 through 11100000 00111111 11111111 11111111	0
11100000 01000000 00000000 00000000 through 11100000 01000000 11111111 11111111	1
11100000 01000001 00000000 00000000 through 11100001 01111111 11111111 11111111	2
otherwise	3

Provide a forwarding table that has 5 entries using longest prefix matching.

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Provide a forwarding table that has 5 entries using longest prefix matching.

Q1 Forwarding Table

Destination Address Range	Link Interface
11100000 00 (/10)	0
11100000 01000000 (/16)	1
11100000 (/8)	2
11100001 0 (/9)	2
otherwise	3

Q2 Forwarding Table

Consider a datagram network using 8-bit addressing. Suppose a router using longest prefix matching has the following table:

Prefix Match	Link Interface
00	0
010	1
011	2
10	2
11	3

Complete the table by providing the correct address ranges for each link

Q2 Forwarding Table

Prefix Match	Link Interface	Range
00	0	0000 0000 to 0011 1111 (63)
010	1	0100 0000 (64) to 0101 1111 (95)
011	2	0110 0000 (96) to 0111 1111 (127)
10	2	1000 0000 (128) to 1011 1111 (191)
11	3	1100 0000 (192) to 1111 1111 (255)