EECS 489 Discussion 7

Announcement

- Assignment 3 is due in ~2 weeks
- (Online) Autograder coming soon
- Midterm grades (almost) out

Plans

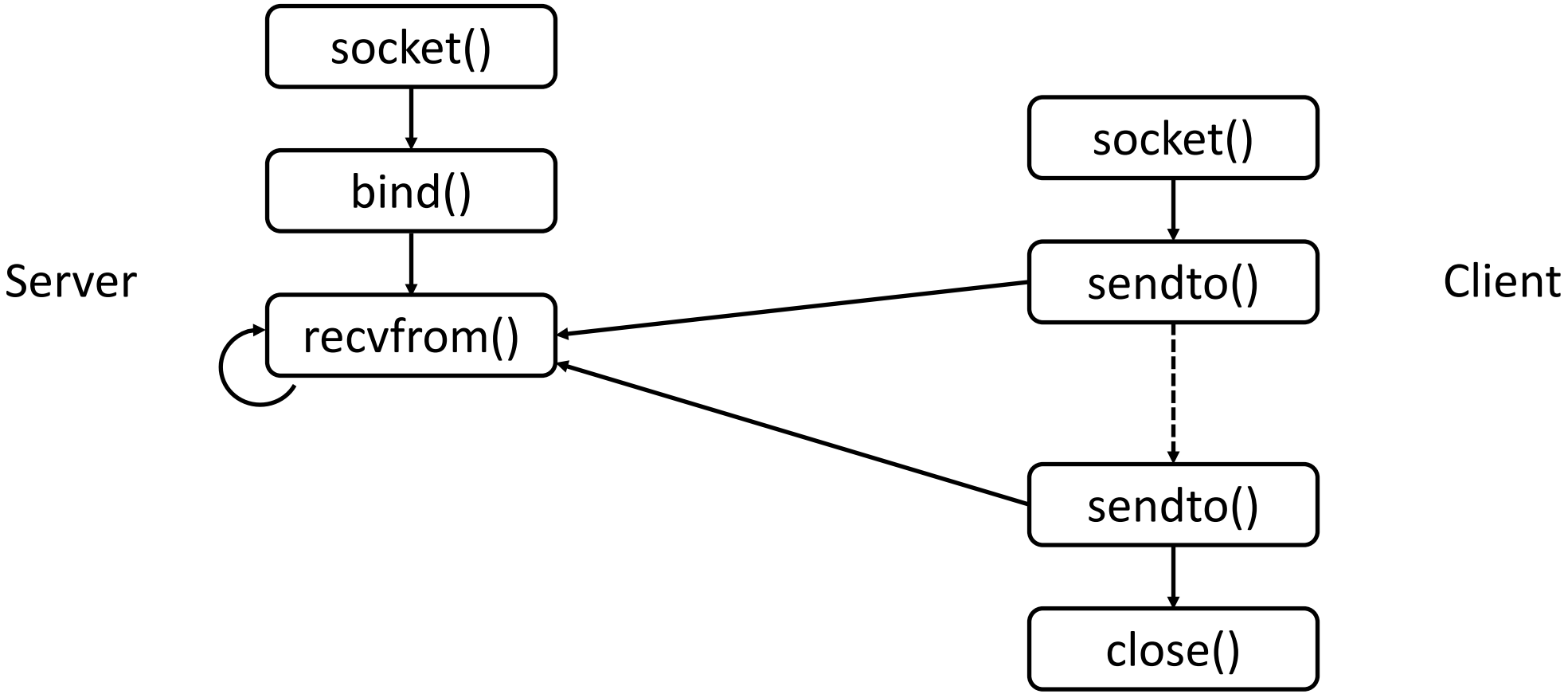
- UDP basics
- UDP socket program
- Problem set

UDP: Basics

User Datagram Protocol: *best-effort* delivery of message

- **Connectionless**: no handshaking before data transfer -> *support multicast*
- **Unreliable**: no reliability guarantee -> *fast*
- **Stateless**: no connection states such as send/recv buffering, congestion-control parameters, and sequence numbers. -> *scalable*

UDP: Example 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 a socket.

```
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)

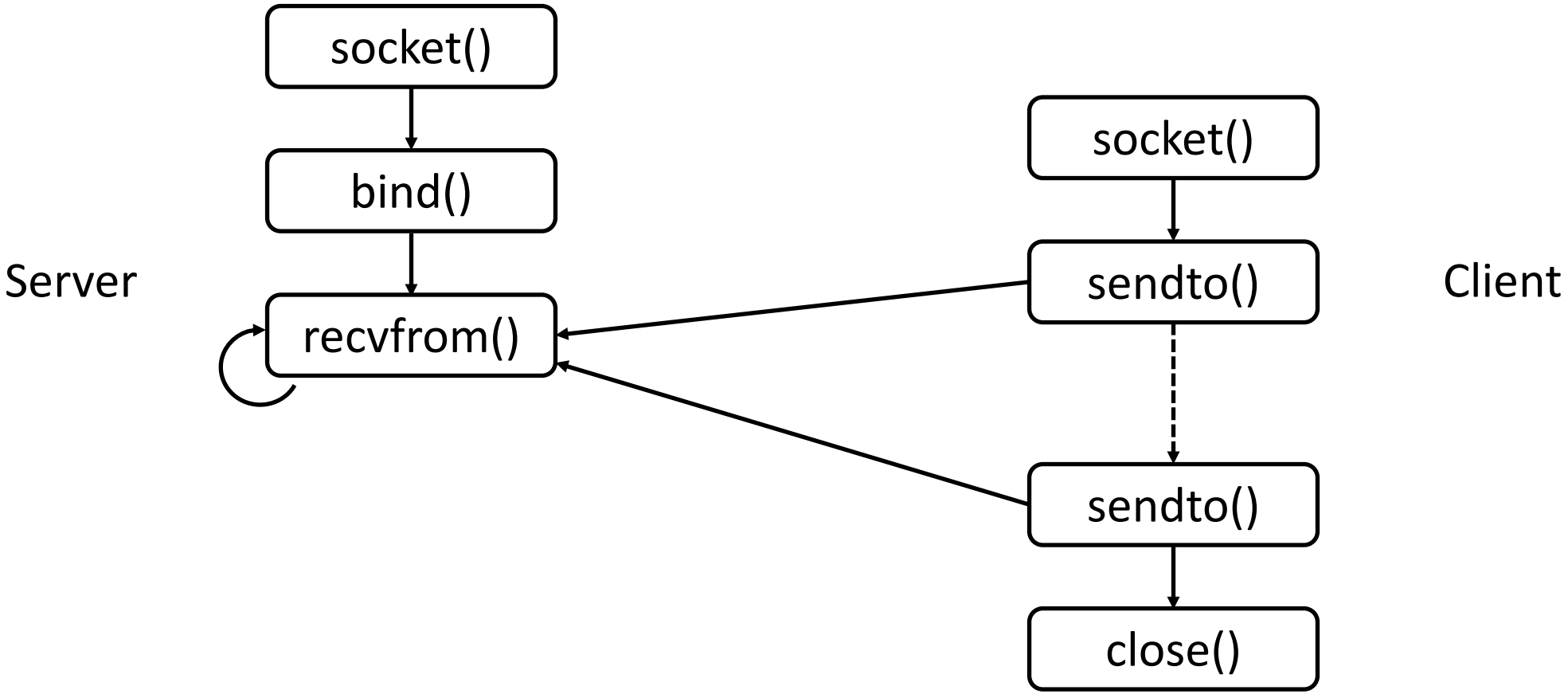
UDP: recvfrom()

Recv 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)

UDP: Example Flow



UDP: A quick demo…

Q1 forwarding table

Consider a datagram network using 32-bit host addresses. Suppose a router has 4 links, numbered 0 through 3, and packets are to be forwarded to the link interfaces 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 have 5 entries, uses longest prefix matching, and forwards packets to the correct link interfaces.

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 host addresses. Suppose a router uses longest prefix matching and has the following table:

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

Complete the forwarding table by providing the correct address range for each link interface.

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)