

EECS 489 - WN 23

Discussion 1

A1 is out

- Course website <https://github.com/morleydragon/eecs489>
- Please register your github username ASAP. <https://forms.gle/a79fPrA7XpzaBH9P6>
- Due Fri., 27th Jan. 11:59:59 p.m.
 - 1 late day for A1 only
- Get yourself familiar with the basic socket programming
- START EARLY!
- Have fun : -)
- Sign up group for A2/3/4 <https://forms.gle/Mi3tsZzcNoWH1XPW7>

Plan

- Introduction to socket programming
- A Demo

Socket Programming: Intro

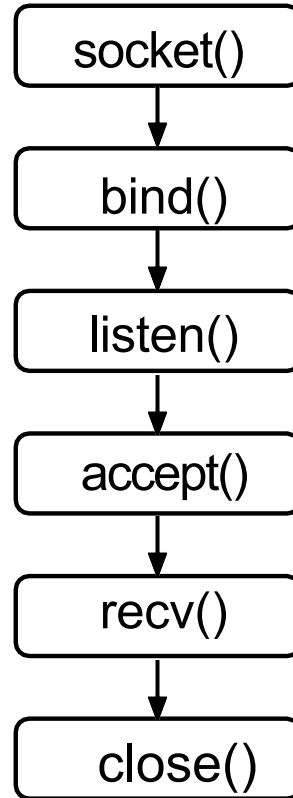
What is a socket?

- Communication endpoint at the end hosts.

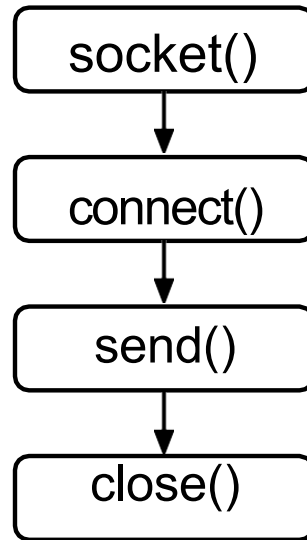
Why do we use a socket?

- It provides an application programming interface to exchange data between processes on the same or different machines.

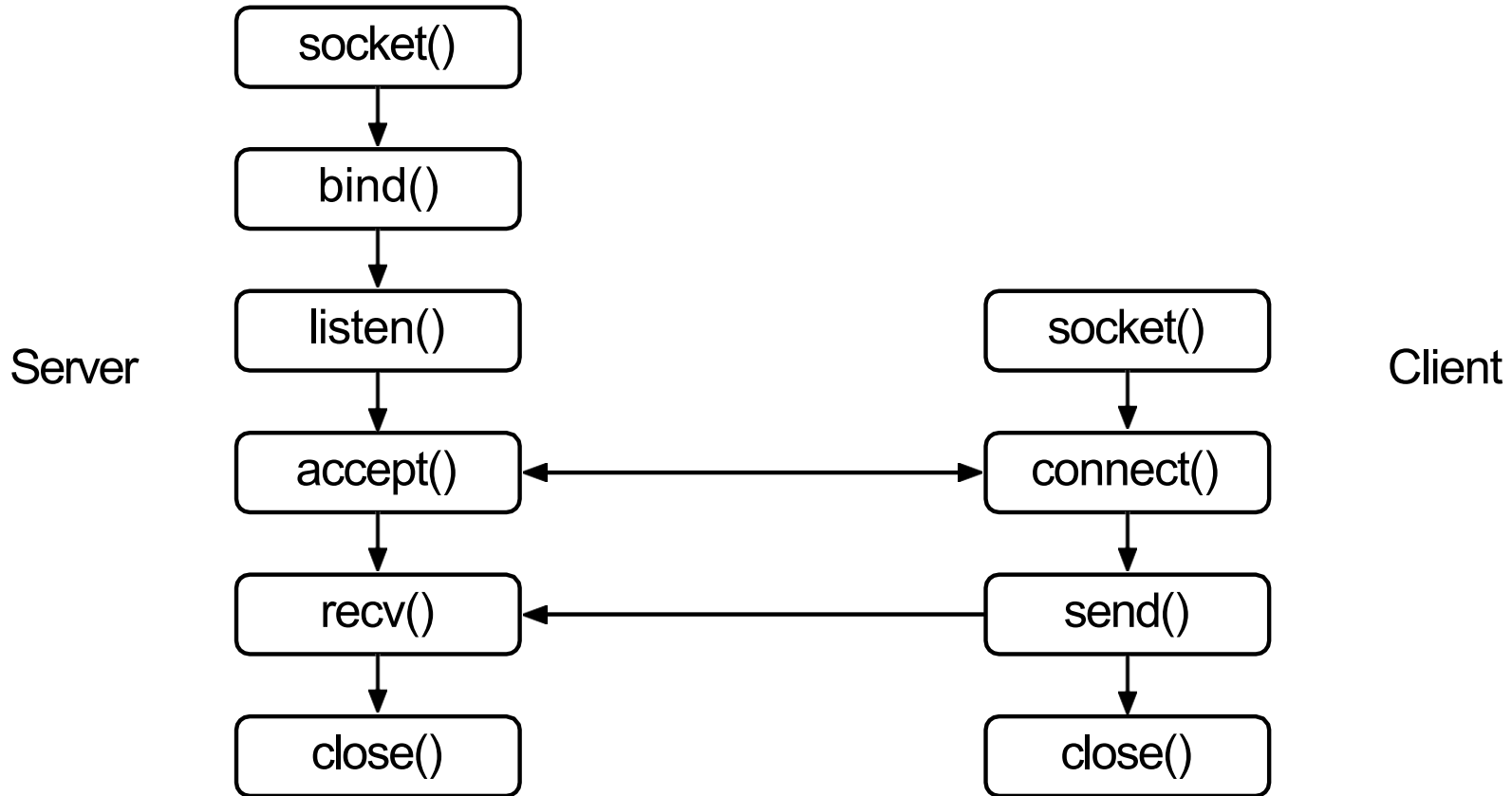
Socket Programming: Server Side



Socket Programming: Client Side



Socket Programming: Complete Flow



Socket Programming: socket()

Create a socket

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

```
sockfd = socket(AF_INET, SOCK_STREAM, IPPROTO_TCP);
```


Socket Programming: bind()

Bind an address to a socket

```
int bind(int sockfd, const struct sockaddr *addr,  
         socklen_t addrlen);
```

```
struct sockaddr_in addr; memset(&addr, 0, sizeof(addr));  
addr.sin_family = AF_INET;  
addr.sin_addr.s_addr = INADDR_ANY;  
addr.sin_port = htons(port);  
bind(sockfd, (struct sockaddr *) &addr, sizeof(addr));
```

Byte Order

Internet Convention: Big Endian

Host: machine-dependent

represent the two-byte hex: b34f

Big-Endian: b34f

Small-Endian: 4fb3

Function	Description
htons()	host to network short
htonl()	host to network long
ntohs()	network to host short
ntohl()	network to host long

Socket Programming: listen()

Listen for connections on a socket

```
int listen(int sockfd, int backlog);
```

```
listen(sockfd, 10);
```

Socket Programming: connect()

Initiate a connection on a socket

```
int connect(int sockfd, const struct sockaddr *addr,  
            socklen_t addrlen);
```

```
struct hostent *server = gethostbyname(hostname);  
struct sockaddr_in addr;  
memset(&addr, 0, sizeof(addr));  
addr.sin_family = AF_INET;  
addr.sin_addr.s_addr = *(unsigned long *) server->h_addr_list[0];  
addr.sin_port = htons(server_port);
```

Socket Programming: accept()

Accept a connection on a socket

```
int accept(int sockfd, struct sockaddr *addr, socklen_t *addrlen);
```

```
socklen_t addr_len = sizeof(addr);
```

```
int conn = accept(sockfd, (struct sockaddr *) &addr, &addr_len);
```

Socket Programming: send()

Send a message on a socket

```
ssize_t send(int sockfd, const void *buf, size_t len, int flags);
```

```
send(conn, buffer, MSG_SIZE, MSG_NOSIGNAL);
```

Socket Programming: recv()

Receive a message on a socket

```
ssize_t recv(int sockfd, void *buf, size_t len, int flags);
```

```
byte_recved = recv(conn, buffer, len, MSG_NOSIGNAL);
```

Socket Programming:A Demo

Socket Programming: Resources

- [Beej's Guide to Network Programming](#)
- [eeecs482/bgreeves-socket-example: Sockets example from discussion](#)
- man is always your good friend
 - man socket

Useful Libraries for A1

```
#include <arpa/inet.h>    // htons(), ntohs()
#include <netdb.h>        // gethostbyname(), struct hostent
#include <netinet/in.h>    // struct sockaddr_in
#include <stdio.h>         // perror(), fprintf()
#include <string.h>        // memcpy()
#include <sys/socket.h>     // getsockname()
#include <unistd.h>        // stderr
#include <time.h>          // time(&time_t)
```

Thanks

Have a good one!