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HELP Session 1
CS4514

CS4514

- We expect that you have had a programming course similar to 2005 before coming into this class.

- Programs will be done in C or C++

- We also expect that you will have had OS before coming into this class
  - Fork()
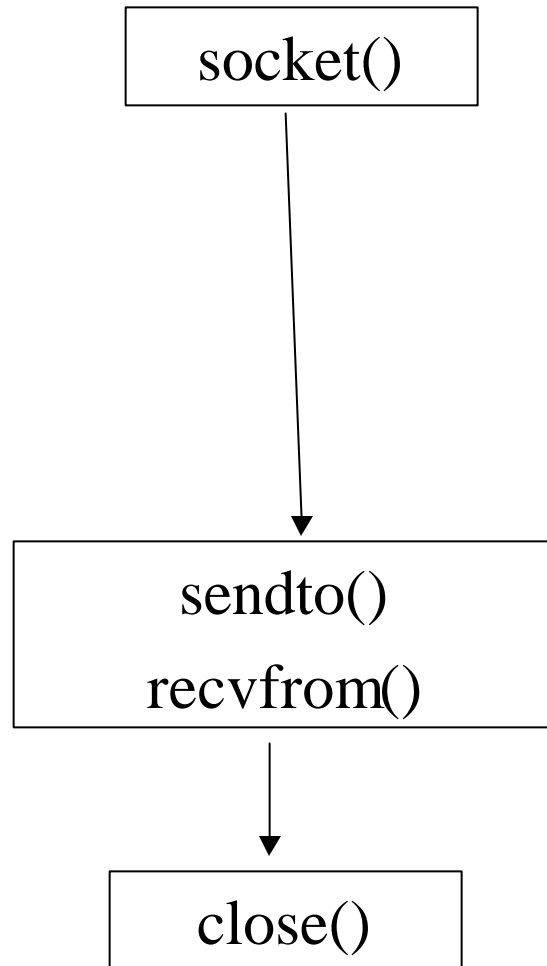 - Exec()
  - Malloc() or new

Programs

- Programs need to work on garden.wpi.edu
- This system is Digital Unix
- If you program on another platform you need to test the software on garden before turning in the assignment.
- Make sure you have the correct includes in your program
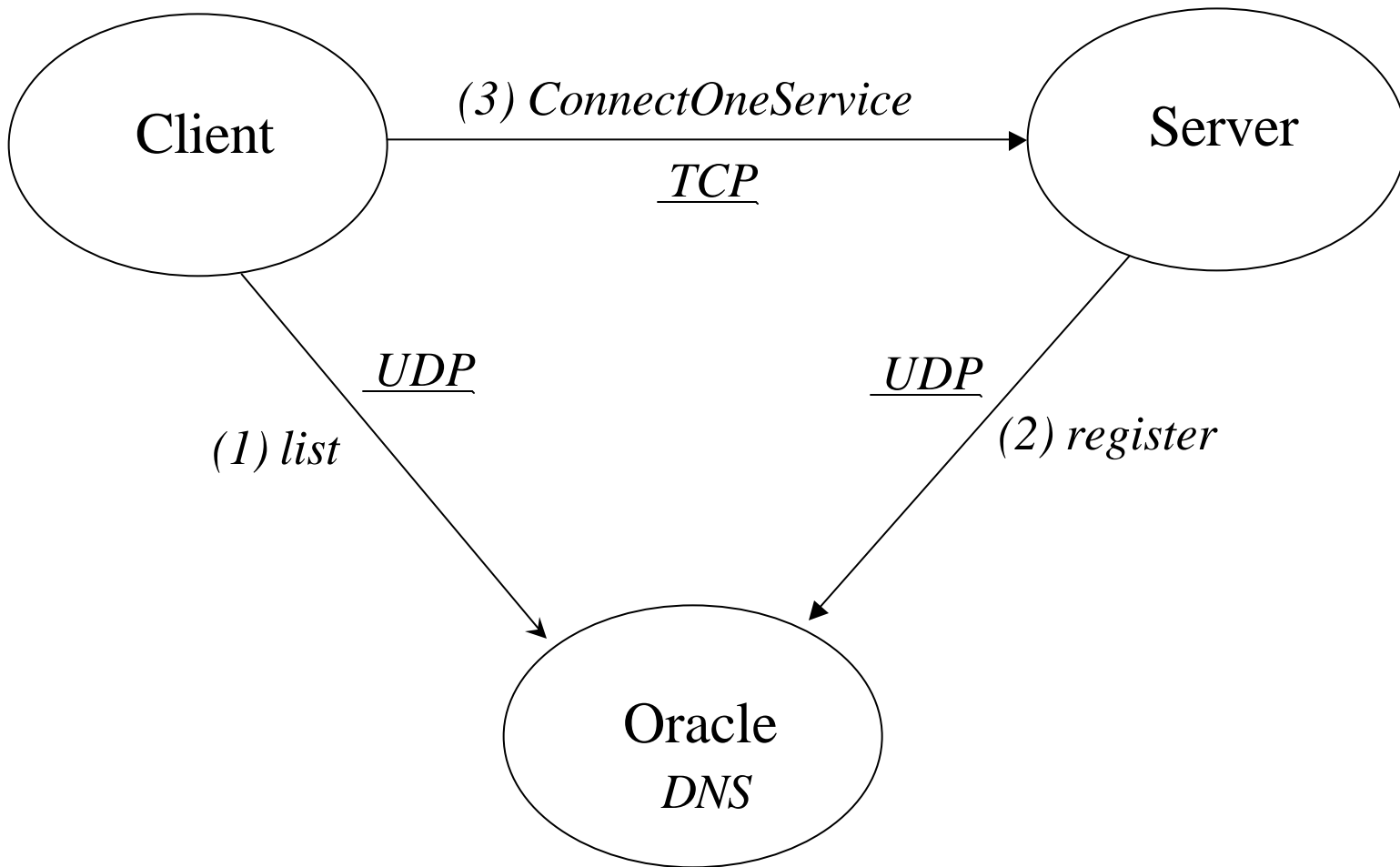
UDP Connection (Client)
P. 212 Stevens

socket()

sendto()

recvfrom()

close()

Example -- UDP Connection (Client)

```
 if ( (sd = socket( AF_INET, SOCK_DGRAM, 0 )) < 0 ) {
            perror( strerror(errno) );
            exit(-1);
 }
bzero(   (char*)&client, sizeof(client)  );
client.sin-family = AF-INET;
client.sin-port = htons(0);
client.sin-addr.s-addr = htonl( INADDR-ANY );
```
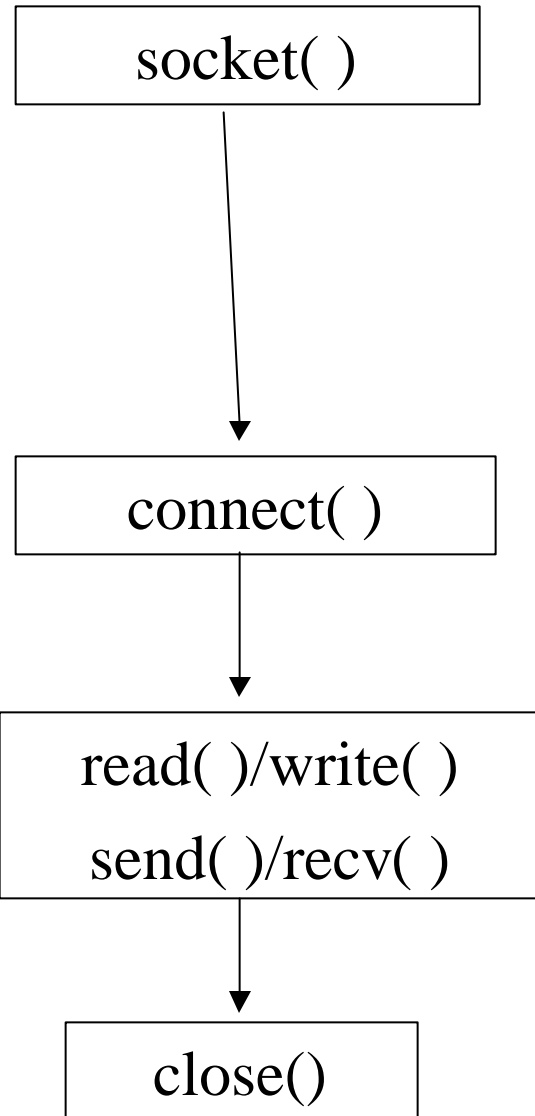
NOTE:

• *struct sockaddr_in client, server;*

• *struct hostent *hp;*

• *For more, see P78-79 of textbook.*

Example -- UDP Connection (Client) *Cont.*

```
bzero( (char*)&server, sizeof(server) );
server.sin-family = AF_INET;
server.sin-port = htons( SERVER-PORT );  // May not always need
If ( (hp = gethostbyname(SERVER-NAME)) == NULL) {
        perror( strerror(errno) );
        exit(-1);
}
bcopy( hp->addr, (char*)&server.sin-addr, hp->length);

  …

sendto( sd, sBuf, data-size, 0, (struct sockaddr*)&server, sizeof(server) );
…
recvfrom( sd, rBuf, MAXLEN, 0, (struct sockaddr*)&server, sizeof(server) );

…
close( sd );
```

TCP Connection (Client)
P. 86 Stevens

socket( )

connect( )

read( )/write( )

send( )/recv( )

close()

Example: TCP Connection (Client)

```
 if ( (sd = socket( AF_INET, SOCK_STREAM, 0 )) < 0 ) {
          perror( strerror(errno) );
          exit(-1);
 }
bzero(   (char*)&client, sizeof(client)  );
client.sin-family = AF-INET;
client.sin-port = htons(0);
client.sin-addr.s-addr = htonl( INADDR-ANY );
```

> *NOTE:*
>
> • *struct sockaddr_in client, server;*
>
> • *struct hostent *hp;*
>
> • *For more, see P74-75 of textbook.*

Example: TCP Connection (Client) *Cont.*

```
bzero( (char*)&server, sizeof(server) );
server.sin-family = AF_INET;
server.sin-port = htons( SERVER-PORT );
if ( (hp = gethostbyname( SERVER-NAME )) == NULL) {
        perror( strerror(errno) );
        exit(-1);
}
bcopy( hp->addr, (char*)&server.sin-addr, hp->length);
if ( connect( sd, (struct sockaddr*)&server, sizeof(server) ) < 0 ) {
        perror( strerror(errno) );
        exit(-1);
}
while (1) {
        …
        read/write()
}
close( sd );
```

Example TCP Connection (Server)
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```
socket()

bind()

listen()

accept()

close()
```
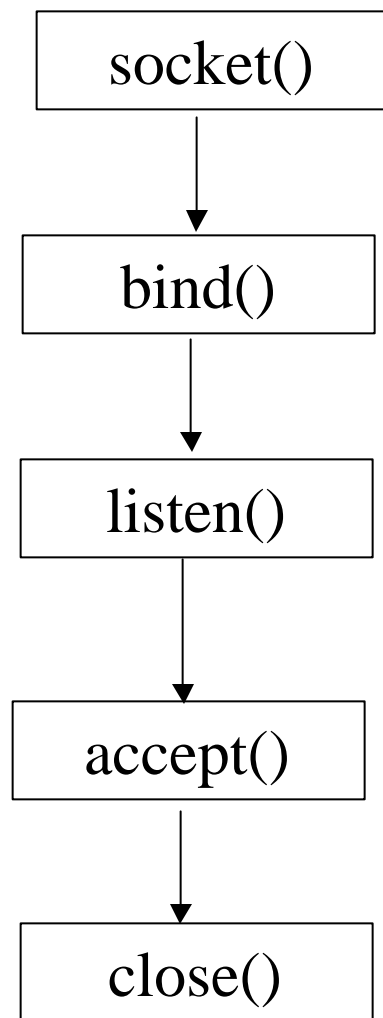
sd = **socket**(AF_INET, SOCK_STREAM, 0);

bzero((char*)&server, sizeof(server));

server.sin-family = AF-INET;

server.sin-port = **YOUR-SERVER-PORT**;

server.sin-addr.s-addr = htonl(INADDR-ANY);

bind(sd, (struct sockaddr*) &server, sizeof(server));

 listen(sd, backlog);

 while (1) {

     new-sd = **accept**(sd, (struct sockaddr *) &client, sizeof(client));

      read()/**write**();

      …

 }

 close(sd **);**

NOTE:

•struct sockaddr_in server;

•For more, see P73 of textbook.

Send/recv the om struct

- ssize_t recv(int sockfd, void *buff, size_t nbytes, int flags);
- ssize_t send(int sockfd, const void *buff, size_t nbytes, int flags);
- Usage:

  struct om sendMsg, recvMsg;

  … set the field's values in sendMsg first

  send(s, (void *)&sendMsg, lom, 0);

  recv(s, (void *)&recvMsg, lom, 0);

om struct

(struct om serv, newServ;)

•To Find a service info. in oracle:

       serv.ver = verCur;
       serv.cmd = cmdGet;
       serv.uid = ?;
       serv.sbServ = ?;

•Register a service:

       newServ.cmd = cmdPut;
       newServ.uid = ?;
       newServ.sbServ = ?;
       newServ.sbDesc = ?;
       newServ.sa = ?

•Clear a service:

       oldServ.ver = verCur;
       oldServ.cmd = cmdClr;
       odlServ.uid = ?;
       oldServ.sbServ = ?;

Some system calls – gethostbyname & getservbyname

- gethostbyname: mapping from host name to IP address

    struct hostent *gethostbyname(const char *hostname)

- Getservbyname: looks up a service given its name

    struct servent *getservbyname(const char *servname, const char *protoname)

    hostname = "garden.wpi.edu"

    servname = "netoracle"

Turnin your files

- Use

  /cs/bin/turnin submit cs4514 proj1 [all files]

- Files should include

  - source code which can be compiled without errors

  - a documentation file (include your compile command)

  - a result script showing the running result

  - Any custom include files that you used, including oracle.h if you have not used

  #include "/cs/cs4514/pub/lib/oracle.h"

UNIX Programming

- Some functions that you may need:
  - Fork
  - Bind
  - Sendto/send
  - Recvfrom/recv
  - Gethostbyname
  - Getservbyname
  - Strlen
  - Strtok

UNIX Programming (cont.)

- – Accept
- – Listen
- – Select

- There are a large number of system calls that you will use in your programs

- Use man pages for help on a particular command or function

UNIX debugging

- Compile program with –g flag
    - g++ -g –o program program.cc
    - gcc –g –o program program.c
- gdb program {core}
- Set args (command arguments)
- run
- where
- list
- step
- Break
- inspect
- help
- quit

UNIX debugging(cont.)

- Many more options use help to learn more
- This will be useful to find out where a program crashes or seg faults
- Can set breakpoints to stop at specific line or function
- Can set specific data values in program

HELP

- Bring printouts to office hours
- Email to TA list with questions
- You CAN email a specific TA, but do not expect immediate results, better to use alias.
- We do have a class mailing list that could be used as a last resort