

CPE 464 - Sockets Worksheet
Due: Thursday January 26, 2011 in Lecture

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This worksheet is due on **Thursday January 26th** at the beginning of **lecture**.

What are Unix Sockets?

A means of exchanging data between processes, either on the same machine or in different hosts on a network.

What is the C language command to create a **TCP** socket in the internet domain?

`socket(AF_INET, SOCK_STREAM, 0)`

What is the C language command to create a **UDP** socket in the internet domain?

`socket(AF_INET, SOCK_DGRAM, 0)`

What **four** functions may be used to send (two sending functions) and receive data (two receiving functions) over stream based sockets?

send

sendto

recv

recvfrom

Two questions on the listen function:

- What does the listen() function do?

Sets a socket to passive mode to accept() connection requests

- What does the second parameter to the listen() do and why would we set it to a value greater than one?

The backlog parameter defines the maximum number of connection requests listen() can handle at once. May return an error if backlog is too small.

Regarding the bind function:

- What does the bind function do?

Attaches an address to a socket

- What are the three pieces of information needed to bind (name) a socket?

The socket file descriptor, the address, and the length of the address struct

- What are well known port numbers?

80 - http

666 - DOOM

cat /etc/services

- What is the purpose of providing a port number of zero (0) to the bind function?

- What are the port numbers for the following services:

- o Web traffic (http): 80

- o FTP Control: 21

- o Telnet: 23

- o Domain Name Server (DNS): 5353

- o Internet Message Access Protocol (IMAP): 143

- What does the select() function do?

Block until a socket is ready for either reading or writing, given a duration of time.

- Using the man command what are the **include** files needed in order to use the socket() function call:

sys/types.h, sys/socket.h

- Using the man command what are the **libraries** that must be linked to in order to use the listen() function call:

libc4

- Why do you use sendto and recvfrom function calls when using UDP (versus the send(...)/recv(..) calls)?

UDP sockets created with socket(...SOCK_DGRAM...) have unspecified local and remote addresses. Only sendto() and recvfrom() have arguments that specify them. send() and recv() assume the address is NULL and its length is 0.

- Why does transmitting using STREAM sockets require creating multiple sockets while DATAGRAM sockets only require one socket?

There are a number of function calls that must be made in order to utilize sockets for communications. List the functions in the order which are needed to setup and execute communications client-server connection using Stream Sockets (make sure it is clear which socket you are working with on the server):

Functions on the Sender:

sk = socket(...)
connect(sk, ...)
send(sk, ...)
recv(sk, ...)
close(sk)

Functions on the Receiver:

s1 = socket(...), bind(sk)
listen(s1), s2 = accept()
recv(s2, ...)
send(s2, ...)
close(s2)

close(s1)

List the functions in the order which are needed to setup and execute communications using DATAGRAM Sockets:

Functions on the Sender:

sk = socket()
sendto(sk, ...)
recvfrom(sk, ...)
close(sk, ...)

Functions on the Receiver:

s1 = socket(), bind(s1, ...)
recvfrom(s1, ...)
sendto(s1, ...)
close(s1)