

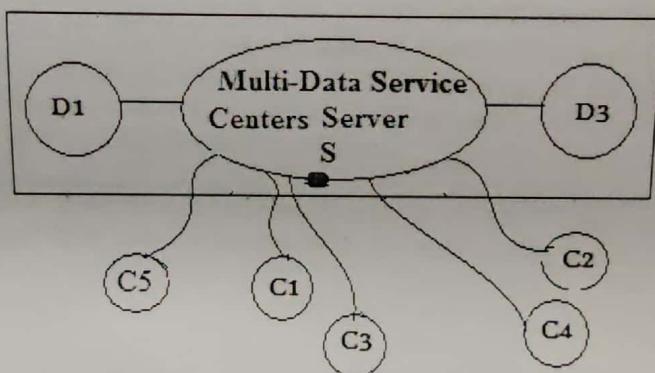
popen() , poll() - Assignments

1.	<p>Write a C/C++ program that uses the UNIX pipe and process control system calls (fork, exec, exit, pipe, wait and dup2) to connect a series of processes in a "pipeline", such that the standard output of the first process is connected to the standard input of the second process, the standard output of the second is connected to the standard input of the third, and so on.</p> <p>If your executable program for the above is upp.exe then the command line \$upp P1 P2 P3 P4</p> <p>should be executed as the standard output of P1 should go as standard input of P2 and the standard output of P2 should go as standard output of P3, and so on.</p> <p>You can write any simple logic programs for P1, P2, P3, P4.</p>
2.	<p>Process P1 has to facilitate (arrange) that the standard outputs (as and when available) of processes P2, P3, P4, and P5 should go as standard input of process P6. If there is no data from any of these processes (P2, P3, P4, P5), then, the standard output of process P1, if available, has to go as standard input of process P6. Write code for all Processes. (You should not use read(), write() and threads also.)</p>

FIFO - Assignments

1. **Multi-Data Service centers Server:** A Multi-Data Service centers Server S provides three Data service servers with executable files as D1.exe, D2.exe, and D3.exe. All the Clients first send request to well-known point of Multi-Data Service centers Server S. The Clients also inform server S, about the data service number they would like to use as numbers 1, 2, and 3. Depending on the data service number request from Client, server S arranges a separate corresponding Data service sever D_i (if it is not existing), and the Client receives the data of standard output of Data service server D_i as shown in figure below. If such D_i is already existing, then sever S will not create a new D_i, but it arranges that the Client receives the data of standard output of Data server D_i it has requested. Suppose at the moment three Clients C1, C3, C5 requested for D1 service and C2, C4 requested for D3 service, one D1 process and one D3 process along with main sever process S will be existing in the scenario as shown in figure below. In other words, only one data service server process will exist, regardless of the number of client requests for it.

Implement Multi-Data Service centers Server S, D1, D2, D3 data service servers and Client.



2. **ABC service provider:** S is a server process which supposes to offer a service s(), by listening to well-known point, but it does not offer the service on its own. There are three service provider server processes A, B, C in the same computer system. Process A is child of process S, whereas process B and process C are not children of S and A. (B, C are unrelated processes). All the four processes will be running (existing) before the arrival of first client request.

As soon as the first client request arrives for a service, the server process S informs the process A to start accepting and serving clients for the service. After process A accepts four clients, it stops accepting and also it sees that now, process B should start accepting and serving clients for the service. After process B accepts four clients, it also stops accepting and it sees that now, process C should start accepting and serving clients for the service. Soon after process C accepts four clients, it stops accepting and also it makes process S to know this. Now process S asks the user to continue or not. If the user enters 'Y', then process S again starts the offering of service starting from A. Otherwise his flow is stopped.

Implement all the different processes in this scenario and client process.
(Hint : You may have to use almost all the system calls you know so far)

FIFO - Assignments

1. **Chat Server:** Assume that a Chat Server listens to well-known point. When a first client wants to join in chat it is accepted. Afterwards, all the other client requests for joining in the chat. The Chat Server has to receive data from a client and has to send the same data to all the other clients who have joined in the chat. You can assume any special format for sending the data from client to server. Suppose five clients have joined in chat, then the Chat server should have six FIFOs. One well-known FIFO for reading data from all clients, and other private/individual five FIFOs to send data to clients. In other words, the clients will send the request for joining in the chat to well-known FIFO and also the clients will send chatting data to the well-known FIFO.

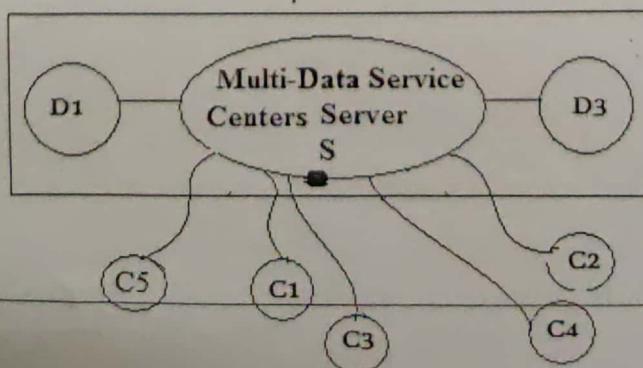
Implement Chat Server, and Client.

2. **Groups Chat Server:** Assume that a Chat Server opens five well-known FIFOs for various groups, i.e., G1, G2, G3, G4, G5. A client can join in any group Gi, and can chat as explained in above Assignment 1. A client receives all the chat messages of the group Gi, and it also can send chat messages to that group.

Implement Groups Chat Server, and Client.

3. **Multi-Data Service centers Server:** A Multi-Data Service centers Server S provides three Data service servers with executable files as D1.exe, D2.exe, and D3.exe. All the Clients first send request to well-known point of Multi-Data Service centers Server S. The Clients also inform server S, about the data service number they would like to use as numbers 1, 2, and 3. Depending on the data service number request from Client, server S arranges a separate corresponding Data service sever Di (if it is not existing), and the Client receives the data of standard output of Data service server Di as shown in figure below. If such Di is already existing, then sever S will not create a new Di, but it arranges that the Client receives the data of standard output of Data server Di it has requested. Suppose at the moment three Clients C1, C3, C5 requested for D1 service and C2, C4 requested for D3 service, one D1 process and one D3 process along with main sever process S will be existing in the scenario as shown in figure below. In other words, only one data service server process will exist, regardless of the number of client requests for it.

Implement Multi-Data Service centers Server S, D1, D2, D3 data service servers and Client.





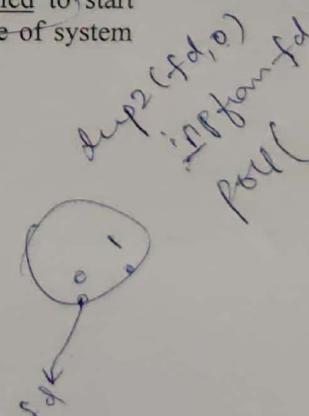
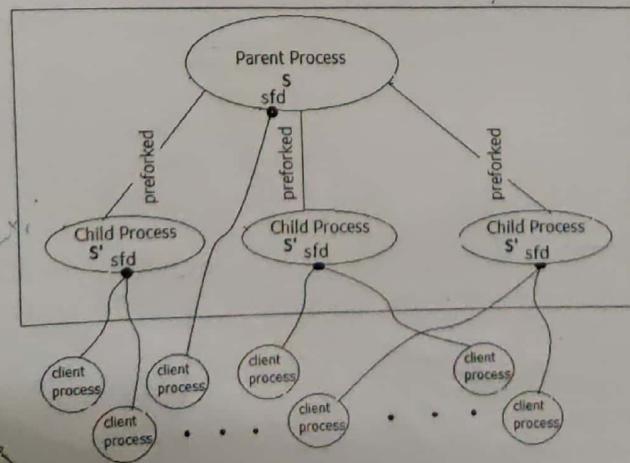
NATIONAL INSTITUTE OF TECHNOLOGY, WARANGAL
(An Institution of National Importance)
DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING
III B. Tech (Computer Science & Engineering) II Semester
Minor-I Test : CS352 : COMPUTER NETWORKS

Date: 31 - 01 - 2017

Time: One Hour

Max. Marks: 10

1. List the functions of Network Layer and Transport Layer along with the corresponding protocols of TCP/IP model. 1.5
2. How can you say that IP address is a hierarchical address? What is the total number of Class A networks, Class B networks and Class C networks of Internet? 1
3. S is a Super server process which supposes to offer four services (S₁, S₂, S₃, S₄) by listening to four socket fds. As soon as the first client connect request arrives for a service (say S₃), {in other words, as soon as the super server process S notices the first request for a service}, the super server process S creates that particular service server process (say S₃) by exec() the .exe file (S₃.exe). From then onwards, the particular service server process only accepts all the client requests for that service and serves them. Write pseudo-code (with proper sequence of system calls) for process S and also for any service server process S_i. 3
4. Process P₁ has to facilitate (arrange) that the standard outputs (as and when available) of processes P₂, P₃, P₄, and P₅ should go as standard input of process P₆. Write pseudo-code (with proper sequence of system calls) of process P₁ only. You should not use read(), write(), select() system calls and threads also. 2
5. **Preforked Server:** While the strategy of forking a child process by the main server for every client connects is simple to implement, there is a performance penalty to be paid. Creating a copy of a running process is expensive (in terms of time as well as resources), especially for large applications. As clients start connecting in large numbers, there can be a noticeable delay in launching the child process. One strategy to mitigate the startup costs for a process is to fork a number of processes into a "process pool" when the main server starts. This is called *preforking*. When a client requests for connect, the kernel chooses one of the children to handle the connection. Since the child is already running, there is no process creation delay. Assume the following scenario, where there is one parent server process S, and three child server processes are existing. Any Child Process can accept a maximum of five client connections. Once all the three clients accept the maximum number connections of clients, i.e. 15, then only the parent process is notified to start accepting client connections. Write pseudo-code (with proper sequence of system calls) of main server process S. 2.5





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DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING

MID SEMESTER EXAMINATIONS, Feb, 2017

III B. Tech (Computer Science & Engineering) II Semester

CS352 : COMPUTER NETWORKS

Date: 14 - 02 - 2017 Time: 10.00 AM - 12.00 PM Max. Marks: 30

N.B.: Answer ALL questions

All programs/functions/code segments are to be written in C/C++.

1. a) Compare and contrast Ethernet and Token Ring in a tabular form. Give the frame formats of 4.5
Ethernet and Token Ring data frames.
Why minimum frame length is maintained in Ethernet whereas it is not needed in Token
Ring? What is meant by ring maintenance and how is it done in Token ring?
- b) Given a message 101011, compute the CRC using the generator polynomial $X^3 + X^2 + 1$ 1.5
- 2.a) Give features of all the Sliding window protocols in a tabular form. 4
- b) Assume that n stations (numbered from 1 to n), equally distant are connected to an Ethernet. 2
The channel capacity is C bps and farthest propagation delay is T sec. What is the minimum
frame length for the station 'm'? (Assume, a station can have its own minimum frame length)
3. **uninetd:** uninetd super server is similar to inetd super server, but with some differences as 5
follows. First of all, it does not either fork() any child service server processes or create
individual service function threads, instead, it only servers the connected clients by calling the
service functions with appropriate arguments. The services can be connection-oriented or
connection-less. You can assume any number of services. Write code for uninetd super
server process and at least one connection-oriented service function it offers. No need of
writing #include statements and socket address initialization statements.
4. **Alternate Server:** A server process S provides a single service for multiple clients through 6
separate individual threads (i.e. not by forking) for each connected client. There also exists a
process called as Alternate Server (AS) in another computer system. (i.e. not in the computer
system where S is running). Whenever process S needs to do some maintenance work of its
own, it asks process AS to serve of all of its clients and informs about all the connected
clients to AS. Process S also informs to its connected clients about its busy in maintenance,
and tells them that they can get service from another server. But server S does not give the
address or details of the server AS to clients. And server S also tells the clients that it will
start servicing again at any time after it finishes its maintenance. It strictly instructs the clients
to get served by it only soon after it says ready for the service again. Now, a situation
(arrangement) can be made out that all the clients will be getting service from AS. As and
when a client notices the readiness of server S, it gets serviced only by S and stops getting
from AS. Write code for server processes A , AS and also for Client process.
No need of writing #include statements and socket address initialization statements.
5. **ABC service provider:** S is a super server process which supposes to offer four services (S₁, 7
S₂, S₃, S₄) by listening to four socket fds. There are three service provider server processes
A, B, C in the same computer system. Process A is child of process S, whereas process B and
process C are not children of S and A. (B, C are unrelated processes). All the four processes
will be running (existing) before the arrival of first client request.
As soon as the first client connect request arrives for a service (say S_i), *{in other words, as
soon as the super server process S notices the first request for a service}*, the super server
process S informs the process A to start accepting and serving clients for the service S_i. After
process A accepts seven clients, it stops accepting and also it sees that now, process B should
start accepting and serving clients for the same service S_i. After process B accepts seven
clients, it also stops accepting and it sees that now, process C should start accepting and
serving clients for the same service S_i. Soon after process C accepts seven clients, it stops
accepting and also it makes process S to know this. Now process S again starts the offering of
services other than the service S_i. This flow is continued until all the services got served.
Write pseudo-code (with proper sequence of system calls) for all the different processes in
this scenario. (Hint: Are you going to write pseudo-code for S,A,B,C or S,A,B or S,A or S
only ? The answer may not be in this list !) Of course, no need of writing code for client.



NATIONAL INSTITUTE OF TECHNOLOGY, WARANGAL

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DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING

III B. Tech (Computer Science & Engineering) II Semester

Minor-II Test : CS352 : COMPUTER NETWORKS

Date: 28 - 03 - 2017 Time: One Hour Max. Marks: 10

1. In an IP datagram, the MF bit is 0, the value of HLEN(Header length) is 8, the value of total length is 220, and the fragment offset value is 440.
 - i) number of the first byte in this datagram is : _____
 - ii) number of the last byte in this datagram is : _____
 - iii) the length of original packet is : _____
 - iv) Is this the last fragment, the first fragment, or a middle fragment? Support your answer.
2. An ISP is granted a block of addresses starting with 190.50.0.0 (65,536 addresses). The ISP needs to distribute these addresses to three groups of customers as follows:
 - a) The first group has 64 customers; each needs 256 addresses.
 - b) The second group has 128 customers; each needs 128 addresses.
 - c) The third group has 128 customers; each needs 64 addresses.Design the sub blocks, give masks, and find out how many addresses are still available after these allocations.
3. a) A, B, C are three processes in a Client computer system. All of them request a process D, in another computer system (say server computer system) to inform them about all the connection-oriented services available at that computer system. After getting reply, the process A connects to the first one-third of services, the process B connects to the second one-third of services, and process C connects to the last one-third of services list. Write pseudo-code segments (not full programs) for all different processes in this scenario.
b) Assume that among all those connection-oriented services, one service is as follows: a client process C, connects to the sever process S, and sends a message containing: an IP address (IP₅), a port number (4040), a file name (f1). That means the client process is requesting the server process to send contents of the specified file (f1 is in server computer system) to a process which is waiting at IP address(IP₅) and port number (4040).Now the server process makes arrangements and execs S2.exe without command line arguments.
S2.c code is as below.

```
main()
{ char buf[50];
  while !eof(stdin) {
    cin >> buf;
    cout << buf;
  }
}
```

Write pseudo-code segment (not full programs) for process S.
4. Process P1 has opened 5 files of 'A' type and 5 files of 'B' type and 5 files of 'C' type. At any point of time, if any one file of 'A' type and any one file of 'B' type and any one file of 'C' type are ready with input, then only, process P1 has to again choose one among these three ready file descriptors, and send that ready file descriptor, alternatively to the existing unrelated processes, P2 and P3, which are in the same computer system. Write sample pseudo code/code fragment for process P1 only.



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DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING
END SEMESTER EXAMINATIONS, April, 2018
III B.Tech(Computer Science &Engineering) II Semester
CS352 - COMPUTER NETWORKS

Date: 27 - 04 - 2018

Time: 9.30 AM – 12.30 PM

Max. Marks: 50

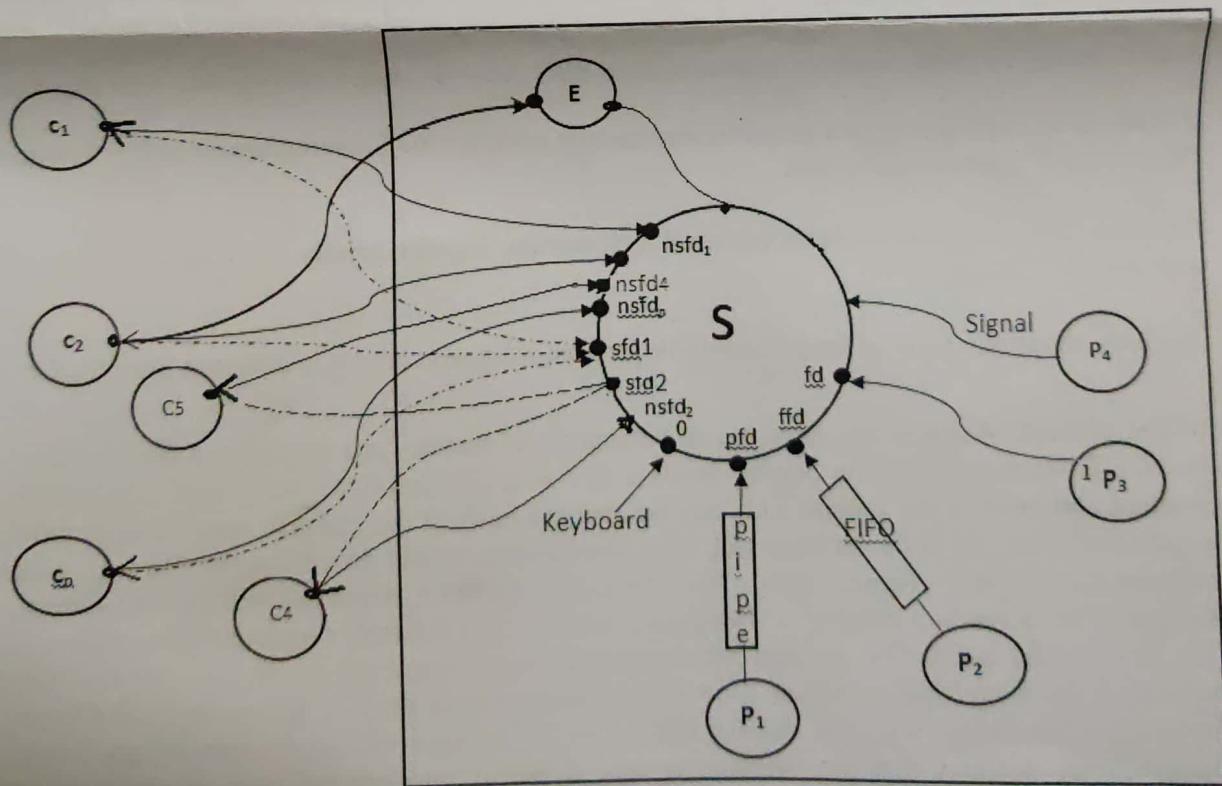
N.B.: Answer ALL questions

All programs/functions/code segments are to be written in C/C++.

1. Give the IPv4 (Internet Protocol) Header format. Explain the functionality of each field briefly. 7
What are the maximum sizes of IPv4 packet and fragmented Packet?
When IPv6 protocol is introduced, does the ARP protocol have to be changed? If so, are the changes conceptual or technical?
2. Which of the TCP header field indicates service number? 7
Why the total segment length field is not there in TCP header where as it is there in UDP?
Clarify with the help of UDP and TCP header formats along with connection management in TCP.
3. In many layered protocols, each layer has its own header. Surely it would be more efficient to have a single header at the front of each message with all the control in it than all these separate headers. Why is this not done? 7
Give the steps of Remote Procedure Call(RPC) and show how it fits into OSI reference model.
Also mention the steps involved in executing a RPC program with a reference to files involved.
- 4.a) Explain with appropriate port numbers and sample code for the implementation of File Transfer Protocol (FTP) server and client. 3
- b) Give the four scenarios of electronic mail architecture. Explain briefly about each module of a scenario. 3
- c) In which situations *iocnl* is used in network programming and how it is different from *fcntl*? 2
5. **NIT-Cricket:** Assume that there is one batsman, one bowler, one umpire and four fielders in the NIT-Cricket ground. The bowler sends a fd (i.e. a file descriptor represents a ball) to the batsman and notifies the umpire. (i.e. has bowled the ball). If the batsman doesn't reply within a specified time, he is declared as out, else, the batsman reads data from the file (fd), which contains two values – (speed, spin). Then he uses a function which takes these two numbers and generates a random number 'r' between 0 and 40. The batsman announces this number 'r'. (i.e. has hit the ball). The fielders are bearing(wearing) numbers as 10, 20, 30, 40. If the number 'r' is a multiple of either 4 or 6, the batsman gets runs as 4(boundary) or 6(sixer). Otherwise, the fielder with the number closest to 'r', informs the umpire that he got 'catch', then, umpire declares that the batsman is out. If the umpire has not been reported by any fielder, he announces the runs, as mentioned above. The fd (i.e. ball) is to be returned to the umpire and then to the bowler for next bowling. Assume that batsman, bowler and umpire are in one same system and fielders are in different systems.
Write essential code for all different processes of the above cricket scenario.
(As the batsman is from CSE, NITW, if he hits, it would be either a boundary(4) or a sixer(6), because he is playing single handed on his OWN !!!)

6. **NAT/PAT(Proxy):** In your hostel rooms, your systems will be having IP addresses as 192.168.0.x which have no global routing significance. But, still you are able to access the Internet. How is this possible? Write such a program which makes this possible.
And also, you have to include in the program, the feature of not allowing outside FTP connections to inside systems.
 (No need of explaining NAT/PAT(Proxy) and also no need of writing #include statements and socket address initialization statements).

7. A server process S gets input data from processes P1, P2, P3 and from keyboard (standard input). P1 is connected through pipe and P2 is connected through FIFO (named pipe) to S. Process P3 sends its standard output to S. The server S also listens for connection requests from connection-oriented clients on two socket file descriptor sfd1, sfd2 and it accepts any such requests. If S gets data from keyboard or P1 it sends the same data to all connected socket file descriptors (nsfds) of sfd1 and if S gets data from P2 or P3, it sends the same data to all connected socket file descriptors (nsfds) of sfd2. For sending data like this, the server process S must have to use/call only one send() system call. Process S should not use any loops for sending. If S gets a signal from process P4, then it handovers a next newly accepted client connection to a separate existing echo sever process E. (This accepted nsfd is after getting the signal from process P4). From then onwards that client will be served by E only.
 Write a program for the server process S only. The program should not use threads.
 (No need of writing programs for P1, P2, P3, P4, Echo Server, and client. No need of writing #include statements and socket address initialization statements).





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DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING
END SEMESTER EXAMINATIONS, April, 2017
III B.Tech(Computer Science &Engineering) II Semester
CS352 - COMPUTER NETWORKS

147256

Date: 24 - 04 - 2017

Time: 9.30 AM – 12.30 PM

Max. Marks: 50

N.B.: Answer ALL questions

All programs/functions/code segments are to be written in C/C++.

1. The following is a dump of a TCP header in hexadecimal form: (7.5)

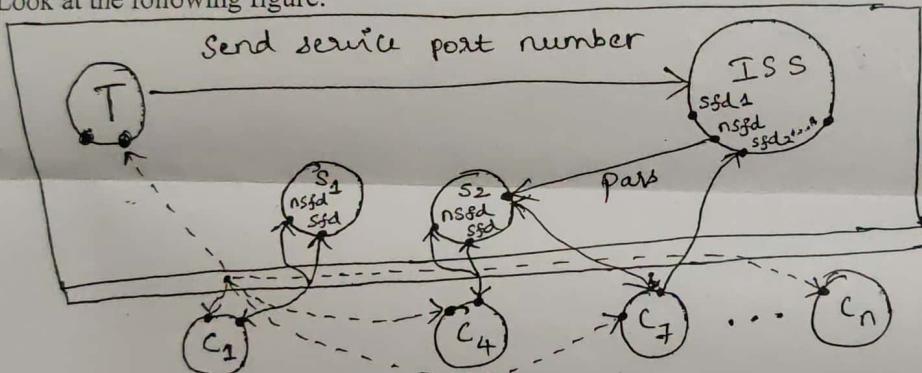
05320017 00000001 00000000 500207FF 00000000

Identify the values of each field of TCP header in the above and also mention its function.

Why it can be said that each byte of data gets acknowledged in TCP data transmission?

2. Write a sample example of RPC program. How many files are involved in Sun Remote Procedure Call (RPC) mechanism? Give the steps of executing a Sun RPC program. (7.5)
What is the need of Name Server?

3. Ingernerate (Svayambhu/ स्वयंभू, the self-existent) Super Server (ISS) : (9)
Look at the following figure.



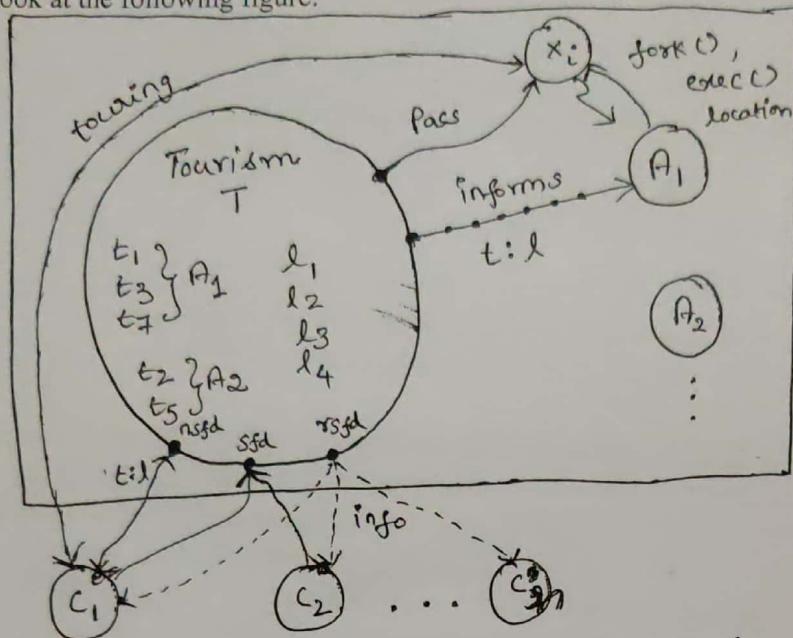
- a Service server process S_i can accept the first client and serves. After that it does not accept.
- A Tracer process T observes a Service server process S_i serving the first client. Then it sends that service port number to Ingernerate Super Server (ISS) so that ISS can start accepting the second client onwards for that service request.
- After receiving a service port number from T, the ISS only accepts service requests for any of the existing Service server processes and passes the accepted clients to the corresponding S_i .
- A client C_i can also get service port numbers from T, and can get connected for service.
- Wherever T observes a new service port number it informs that to all the clients that are served so far by that computer system.

Write required essential code for the processes ISS, T, S_i , C_i .

4. *Nitw-Tourism*

(7.5)

Look at the following figure.



T - Tourism Server

A - Agents

X - Taxi

C - Customers

$t_1, t_2, t_3, t_5, t_7 \rightarrow$ tourist places

$l_1, l_2, l_3, l_4 \rightarrow$ pick-up locations
for customers
[not IP & Port numbers]

- * C connects to T and requests for t_i, l_i .
- * T accepts C connection and looks for A who provides t_i .
- * T sends message to A_i for t_i, l_i .
- * A_i fork(), exec() a taxi x_i by giving details of l_i .
- * T pairs customer to x_i .
- * x_i now serves C_i.
- * All clients who used service of T, gets tour packages/offers information from T, time to time.
- * If any breakdown of vehicle occurs, x_i sends signal to A_i.

Write essential pseudocode segments for processes T, A, X.

5. What is meant by routing? Classify routing algorithms. Discuss at least three major routing algorithms/protocols. (7.5)

- 6.a) Explain IEEE 802.11 in detail with reference to its frame format. (4)

- b) Why congestion control is important in computer networks? What are the various ways/algorithms for it? (2)

- 7.a) What is the difference between fcntl() and ioctl() system calls? For what purposes they are used? Explain with examples. (2.5)

- b) List all the application layer protocols. Write notes on any two of them. (2.5)



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DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING
END SEMESTER EXAMINATIONS, May, 2019
III B.Tech(Computer Science &Engineering) II Semester
CS352 - COMPUTER NETWORKS

Date: 7 - 05 - 2019

Time: 9.00 AM – 12.00 PM

Max. Marks: 50

N.B.: Answer ALL questions

All programs/functions/code segments are to be written in C/C++.

1. An IPv4 datagram has arrived with the following information in the header (in hexadecimal): 8

45 00 00 54 00 03 58 50 20 06 00 00 7C 4E 03 02 B4 0E 0F 02

- i) How many bytes of options are there? ii) What is the size of the data?
iii) How much more time the packet can stay alive? iv) What is the higher layer protocol number?
v) What is the identification number of the packet?
vi) What are the addresses of the source and destination (in dotted decimal notation)?
vii) Is it the last fragment or not? Give the reason for your answer.
viii) When IPv6 protocol is introduced, does the RARP protocol have to be changed? If so, are the changes conceptual or technical?
ix) Why the total segment length field is not there in TCP header where as it is there in IP?

(Note: write answers only against each sub question in sequence, all at one place)

2. Why there should be a special compiler in Sun Remote Procedure Call (RPC) mechanism? 8

- ✓ How many files are involved in Sun RPC mechanism?
✓ Which of these should be written by the programmer and which will be generated?
✓ Also mention the steps involved in executing a RPC program with a reference to files involved.
✓ What are the limitations of RPC?

3. Write short notes on: (write answers for all sub questions at one place)

- a) File Transfer Protocol (FTP) 2.5
b) Domain Name Service (DNS) 2
c) Internet routing algorithms/methods/protocols 3.5
d) Tabularized comparison form of sliding window protocols 3

- ✓ **Firewall:** All traffic from inside to outside and outside to inside must pass through the firewall. 3
Only authorized traffic (defined by the local security policy table shown as below) will be allowed to pass. The table contents give the information of which types of Internet services can be accessed and which computer systems can be allowed to flow, inbound or outbound. Write sample code of implementation for such a firewall.

action	ourhost	port	theirhost	port
allow				
allow				
block				
...

5. **NitCodeChamp** : The specifications (problem statements) of fifty coding questions are stored 10 at NitCodeChamp online coding competition computer system. For each of the coding question Q_i , a standard coding solution $S_i.exe$ along with its test case(input file) T_i are also stored in the system. A registration process R , and a verification process V are running in the same NitCodeChamp computer system.

A participant, from his computer system gets connected to process R through a client process C_i . Then process R sends him a random question number i , and its specification Q_i , and also records C_i information. Next, process R conveys process V about C_i and the coding question number allotted to it. Process R makes sure that only one client process from an individual participant computer system can get connected to it.

Process C_i sends solution code over the connection. This solution code is received by process V . Now, process V executes this solution code with corresponding test case(input) T_i . These results(output) are compared with the results(output) obtained by execution of the standard coding solution $S_i.exe$ with test case(input) T_i by process V . If the two results(output) are same, then process V informs process R , that C_i has been selected, otherwise rejected. Now process R sends the final message of selection or rejection to C_i .

Write full code for process R , and process V .

(No need of writing #include statements and address initialization statements).

No need to use libpcap or Datalink access(SOCKET-PACKET) for this question).

6. **Nitnetd Super Server(Dynamic)**: Nitnetd Super Server is similar to inetd super server, but 10 with some differences as follows. The configuration file of this server looks as below:

Service Name	Protocol	Port Number	Internal/External	Limit	Service offered by
S1	TCP	1500	External	20	process
S2	TCP	2500	Internal	10	thread
S3	UDP	4000	Internal	---	function
S4	TCP	6000	External	---	process
15					

The implications of above table column titles are same as in inetd except those of Limit, Service offered by.

Limit: The Limit value shows the maximum number of clients connections, that the server can accept at any moment.

Service offered by: A service can be offered by a new process or by creating a thread or by calling a function.

The last line contains a number, which is the maximum number of latest contacted clients, that the Nitnetd Super Server has to maintain at any moment. Whenever new services are added (as it is dynamic configurable super server), then the Super Server has to inform about these new services to all the latest contacted clients computer systems. The last line of a configuration file will contain this number and it has to get updated accordingly. (i.e. at any moment, the Super Server has to maintain a maximum of that much number of latest contacted clients information).

S2 service receives a string as input and sends the length of the string.

Write full code for **Dynamic configurable Nitnetd Super Server program, and S2 service server function**.

(No need of writing #include statements and address initialization statements).



NATIONAL INSTITUTE OF TECHNOLOGY, WARANGAL
(An Institution of National Importance)
DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING
III B. Tech (Computer Science & Engineering) II Semester
Minor-II Test : CS352 : COMPUTER NETWORKS

Date: 10 - 04 - 2019 Time: One Hour Max. Marks: 10

Note: Answer all parts of a question at one place.

1. **NITW-CSE PASSPORT:** Assume that a process S in a server system is providing passport verification service as follows: client processes C₁, C₂, C₃,...C_i, which are running in the same computer system, contact the sever process S, and sends a message containing its name(Aabhaas Das), postal address address(eg, H-No : 10 -12- 45, Fathima Nagar, Warangal). Names will be different but postal address is same. A process called Verifier V, is also running in the same computer system of S. Now the server process S makes arrangements, so that process V can verify the details of a C_i. The process V has to send the same details (i.e. name, postal address) to client processes and should get a confirmed message from concerned C_i. Then it informs S about the result of verification. Depending on the result of verification, process S either can issue or deny passport to C_i. The process V and a process C_i should have to use only one descriptor. (Hint: no need of signals or any IPC) 5.5

First write clear steps, then write the pseudo-code for all processes in this scenario.

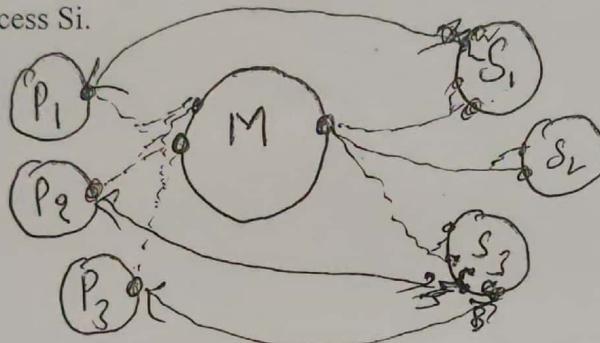
2. Which of the TCP header field indicates service number? Why the total segment length field is not there in TCP header where as it is there in UDP? 1.5
3. Which type of LANs is used for connecting real-time systems and why? 1.5
4. Which of the socket system calls can't be called on Unix domain sockets and why? 1.5



1. Assume that there are three different types of processes as shown in diagram below. All of the processes are in different computer systems. A process P_i wishes to get served by a process S_i . But none of process P_i knows the IP address of a S_i . That's why a process P_i gets connected to M , a mediator, and sends only a single message consisting of the service server number 1, 2, 3 that it wishes to get served by. Process M never sends any message to any P_i but it facilitates a situation that there will be a direct communication between a P_i and S_i . The process M knows the IP addresses of all S_i . And further S_i serves each P_i using a separate service function thread. A process P_i must use only one file descriptor(sfd). Process M must use only three sfds. You are required to minimize the number of sfds in a process S_i as far as possible. You are not allowed to use a bind(), just before a connect() system call. No dup()s as well.

4.5

First write clear steps. Then write pseudo-code for Mediator(M) , a process P_i and a Service server process S_i .



2. Consider a Chat Server that uses only the Inter Process Communication(IPC) of 3.5 Message Queue. You have to use only one message queue and you are not allowed to use fork(), threads, poll(), select() and BSD sockets. All the processes involved in chat are in the same computer system.

You can have your own assumptions for message formats.

First write clear steps, then write the pseudo-code for Chat Server process and a client process.

3. An ISP(Internet Service Provider) is granted a block of addresses starting with 150.30.0.0 (65,536 addresses). The ISP needs to distribute these addresses to three groups of customers as follows:

- a) The first group has 64 customers; each needs 256 addresses.
- b) The second group has 128 customers; each needs 128 addresses.
- c) The third group has 128 customers; each needs 64 addresses.

2

Design the sub blocks, give starting and ending address of each group and give subnet masks.