



University of Central Punjab

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FACULTY OF INFORMATION TECHNOLOGY

Computer Communication and Networks (CCN)

Lab Mid Term Exam – Spring 2022

Paper Duration: 90 minutes

Total Marks: (10+30=40)

Name: _____ Reg No: _____ Sec: _____

INSTRUCTIONS:

- Write your Name, Registration No and Section in the provided space.
- You are required to submit **Questions** on portal (doc and c files).
- 100% deduction in case of **compilation error**.
- 50% deduction in case of run time error (**segmentation fault**).

Question 1: MCQs:

(10 Marks)

1. A client creates socket (AF_INET, SOCK_DGRAM, 0). What type of socket is this?
 - a. IPv4, TCP
 - b. IPv4, UDP
 - c. IPv6, TCP
 - d. IPv6, UDP
2. When receiving data from network, the host needs to call the following function:
 - a. bind ()
 - b. htonl ()
 - c. htons ()
 - d. ntohl ()
3. A UDP server gets client port number information from the following:
 - a. 3-way handshake
 - b. (struct sockaddr*) &clientaddr
 - c. (struct sockaddr*) &buffer
 - d. client information must be well known
4. What do the port numbers in a TCP connection specify?
 - a. Specify the communication processes on the two end systems
 - b. Specify the complete socket address
 - c. Specify the address family
 - d. All of the above
5. TCP provides a byte stream data delivery service.
 - a. True
 - b. False

6. When `accept()` is called, it creates a new file descriptor used to listen to new connection requests.
 - a. True
 - b. False
7. When `fork()` is called, it always returns the value of `pid > 0`.
 - a. True
 - b. False
8. Which socket API call in UDP Server uses client socket address structure to get client socket address information.
 - a. `socket()`
 - b. `bind()`
 - c. `recvfrom()`
 - d. `accept()`
9. File descriptors are normally negative integers that kernel uses to identify the files being accessed by a particular process.
 - a. True
 - b. False
10. Routines that deal with synchronizations are called thread creation.
 - a. True
 - b. False

Question 2:

(30 Marks)

You are required to develop a TCP client/server program, where client sends an encrypted message to the server. Assume that encryption scheme involved is already known between the client and the server. The server would then decrypt the message using the decryption scheme, and return the decrypted message back to the client. The detailed functionality required is explained below.

ASCII table for lower and uppercase characters:

Alphabet	A	B	C	D	E	F	G	H	I
ASCII Code	65	66	67	68	69	70	71	72	73
Alphabet	J	K	L	M	N	O	P	Q	R
ASCII Code	74	75	76	77	78	79	80	81	82
Alphabet	S	T	U	V	W	X	Y	Z	
ASCII Code	83	84	85	86	87	88	89	90	
Alphabet	a	b	c	d	e	f	g	h	i
ASCII Code	97	98	99	100	101	102	103	104	105
Alphabet	j	k	l	m	n	o	p	q	r
ASCII Code	106	107	108	109	110	111	112	113	114
Alphabet	s	t	u	v	w	x	y	z	
ASCII Code	115	116	117	118	119	120	121	122	

Requirements for the Client are as follows:

1. Create Message “Hello World 2022”
2. **Encryption Scheme:**
 - i. Add 2 in each lowercase character of the message
 - ii. Multiply each uppercase character of the message with 2
 - iii. Add 3 in each numeric character of the message
3. Send the encrypted data to server for decryption

Requirements for the Server are as follows:

1. Receive data from client
2. **Decryption Scheme:**
 - i. Subtract 2 from each lowercase letter of the message
 - ii. Divide each uppercase character of the message with 2
 - iii. Subtract 3 from each numeric character of the message
3. Send back the decrypted data to client
 - i. If decryption is successful, send message “Decryption successful”, along with the decrypted message back to the client.
 - ii. If decryption is unsuccessful, send message “Unable to Decrypt”.
 - iii. Server will show the received message on the terminal, whether decryption was successful or not.

Sample to explain encryption and decryption process:

Message created	Encryption Scheme				Encryption Output
Ali1	A	l	i	1	
	(A*2)	(l+2)	(i+2)	(1+3)	Cnk4

Data received at server	Decryption Scheme				Decryption Output
Cnk4	C	n	k	4	
	(C/2)	(n-2)	(k-2)	(4-3)	Ali1