NAPIER UNIVERSITY

SCHOOL OF COMPUTING

FIRST DIET (SEMESTER ONE) EXAMINATION

SESSION 2001-2002

MODULE: CO32010

NETWORK OPERATING SYSTEMS

DATE: **DURATION: 2 HOURS**

START TIME:

EXAMINER(S)

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QUESTION PAPER DATA

Number of pages - 6
Number of questions - 5
Number of sections - ONE

INSTRUCTION TO CANDIDATES

Complete any three of the questions from five.

1 (a) Define and explain the two major problems with distance-vector routing protocols, and the methods that can be used to overcome these problems. **(**10**)**

(b) How do interior routing protocols differ from exterior routing protocols? What advantage(s) do exterior routing protocols have over interior routing protocols? (8)

(c) Describe the four conditions which must occur for deadlock to occur, and give a practical example of this. (7)

Total Marks [25]

2 For the running configuration of a router given in Figure Q2:

(a) Show the programming steps to set the login password for a telnet session. (3)
(b) Determine the number of subnets that can connect to the network which connects to the `Ethernet0` connection, and also the number of hosts that can connect on each subnet. (8)
(c) Explain the ACL restrictions placed on the `Ethernet0` port. (5)
(d) Design an ACL for the `Ethernet0` port which blocks access to an FTP server (174.10.20.10) for all the addresses for the hosts from 180.70.1.128 to 180.70.1.254, but allows access for all the other hosts. (7)
(e) Explain the problems that an incorrectly set subnet mask on one of the ports would cause for the network. (2)

Total Marks [25]

Line no.	Router program
1	`version 12.0`
2	`service timestamps debug uptime`
3	`service timestamps log uptime`
4	`no service password-encryption`
5	`!`
6	`hostname my-router`
7	`!`
8	`enable secret 5 $1$op7P$LCHOURx5hc4Mns741ORvl/`
9	`!`
10	`ip subnet-zero`
11	`!`
12	`interface Ethernet0`
13	` ip address 180.2.1.130 255.255.255.192`
14	` ip access-group 104 in`
15	`!`
16	`interface Serial0`
17	` ip address 180.70.1.2 255.255.255.0`
18	` ip access-group 102 in`
19	` encapsulation ppp`
20	`!`
21	`router igrp 111`
22	` network 180.2.0.0`
23	` network 180.70.0.0`
24	`!`
26	`access-list 100 deny   ip host 180.2.1.134 host 180.70.1.1`
27	`access-list 100 permit ip any any`
28	`access-list 101 deny   tcp 180.2.1.128 0.0.0.63 host 180.70.1.1 eq www`
29	`access-list 101 permit ip any any`
30	`access-list 102 deny   tcp 180.2.1.128 0.0.0.63 180.70.1.0 0.0.0.255 eq www`
31	`access-list 102 permit ip any any`
32	`access-list 103 deny   ip 180.70.1.0 0.0.0.255 180.2.1.128 0.0.0.63`
33	`access-list 103 permit ip any any`
34	`access-list 104 deny   tcp 180.2.1.0 0.0.0.254 host 180.70.1.1 eq telnet`
35	`access-list 104 permit ip any any`
36	`!`
37	`line con 0`
38	` transport input none`
39	`line aux 0`
40	`line vty 0 4`
41	`!`

Figure Q2: Router program

3 (a) Figure Q3.1 shows the result of running the command `ps -ef` on the Unix system `mars`.

(i) By examining the process list determine whether this system is a network file system *client* or *server*, or both. (3)

(ii) List the processes from the list which are critical to the operation of the network file system and describe the main function of each one. (5)

(b) Describe the sequence of client/server operations required to carry out a remote procedure call, for example writing data to a remotely mounted network file system. (6)

(c) Figure Q3.2 shows an outline directory structure for three networked Unix systems (`mercury`, `venus` and `mars`) each is both NFS server and client. It is desired that any one of three users (`anne`, `bob` or `colin`) should be able to login to any of the three systems and see their own files using the same pathname. In other words the perceived location of each users' files is not dependent on the machine they are using. Detail the configuration actions required to achieve this. (11)

Total Marks [25]

Line no.	UNIX processes
1	`mars:~ > ps -ef`
2	`     UID   PID  PPID  C    STIME TTY      TIME CMD`
3	`    root     0     0  0   Oct 15 ?        0:01 sched`
4	`    root     1     0  0   Oct 15 ?        0:15 /etc/init -`
5	`    root     2     0  0   Oct 15 ?        0:00 pageout`
6	`    root     3     0  0   Oct 15 ?        5:54 fsflush`
7	`    root   205     1  0   Oct 15 ?        0:00 /usr/lib/utmpd`
8	`    root   107     1  0   Oct 15 ?        0:07 /usr/sbin/in.routed -q`
9	`    root   246     1  0   Oct 15 ?        0:00 /usr/lib/saf/sac -t 300`
10	`    root    49     1  0   Oct 15 ?       0:00 /usr/lib/devfsadm/devfseventd`
11	`    root    51     1  0   Oct 15 ?       0:00 /usr/lib/devfsadm/devfsadmd`
12	`    root   113     1  0   Oct 15 ?        0:00 /usr/sbin/rpcbind`
13	`    root   173     1  0   Oct 15 ?        0:02 /usr/sbin/syslogd`
14	`    root   115     1  0   Oct 15 ?        0:01 /usr/sbin/keyserv`
15	`    root   200     1  0   Oct 15 ?        0:00 /usr/lib/power/powerd`
16	`    root   162     1  0   Oct 15 ?       9:35 /usr/lib/autofs/automountd`
17	`    root   209     1  0   Oct 15 ?        0:01 /usr/sbin/vold`
18	`    root   156     1  0   Oct 15 ?        0:03 /usr/sbin/inetd -s -t`
19	`    root   151     1  0   Oct 15 ?        0:00 /usr/lib/nfs/lockd`
20	`    root   192     1  0   Oct 15 ?        0:17 /usr/sbin/nscd`
21	`  daemon   150     1  0   Oct 15 ?        0:00 /usr/lib/nfs/statd`
22	`    root   249   246  0   Oct 15 ?        0:00 /usr/lib/saf/ttymon`
23	`    root   239     1  0   Oct 15 ?       0:00 /usr/dt/bin/dtlogin -daemon`
24	`    root   250   230  0   Oct 15 ?        1:57 mibiisa -r`
26	`    root   377   156  0   Oct 15 ?        0:00 in.telnetd`
27	`    root 13040 13014  1 14:07:56 pts/0    0:00 ps -ef`
28	`    root  1710   156  0   Oct 16 ?        0:00 in.telnetd`
29	`    root 13006   156  0 14:03:25 ?        0:00 in.telnetd`
30	`    root 25389   156  0   Oct 16 ?        0:00 in.telnetd`
31	`    root 26096   156  0   Oct 16 ?        0:00 in.telnetd`
32	`    root  3212   156  0   Oct 16 ?        0:01 sadmind`
33	`    jim  13014 13006  0 14:03:35 pts/0    0:00 -tcsh`

Figure Q3.1: UNIX processes

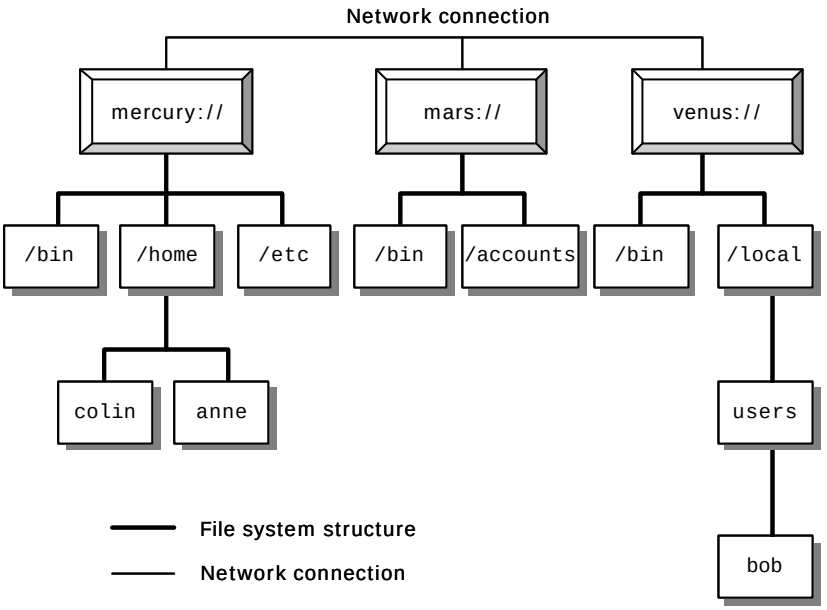

Figure Q3.2: UNIX processes

4 (a) Describe the role and benefits of the NIS (network information service). (8)

(b) Prior to the transmission of a message across a network, explain why it can be beneficial to encrypt it using:

(i) The sender's private key (5).
(ii) The recipient's public key (5).

(c) Using the RSA private key pair *E,n* (5,21) show how the trivial encrypted message 16 can be decrypted back into is original value. (7)

Total Marks [25]

5 (a) Explain the operation of NFS, and reasons for its architecture. How does NFS allow different data representations to be represented, and how does the client run processes on the server. (10)

(b) Outline a major weakness of the Windows NT domain structure that is overcome in NDS and NFS. (5)

(c) An operating system is currently running four processes (A-D), which each require a specified amount of memory of memory to complete. The total amount of memory on the system is 100 MB, and the total current requirements for the processes are:

Process A requires 70 MB of memory.
Process B requires 50 MB of memory.
Process C requires 40 MB of memory.
Process D requires 20 MB of memory.

The current allocation is:

Process	**Current allocation**
A	50 MB
B	20 MB
C	10 MB
D	10 MB

Show how deadlock could occur in this case, and how the Banker's algorithm could overcome this. What is the major drawback of the Banker's algorithm? (10)

Total Marks [25]