

# The University of Nottingham

SCHOOL OF COMPUTER SCIENCE

A LEVEL 4 MODULE, AUTUMN SEMESTER 2011-2012

## SYSTEM AND NETWORK ADMINISTRATION

Time allowed TWO hours

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*Candidates may complete the front cover of their answer book and sign their desk card but must NOT write anything else until the start of the examination period is announced*

### ***Answer question ONE and TWO other questions***

*Only silent, self contained calculators with a Single-Line Display are permitted in this examination.*

*Dictionaries are not allowed with one exception. Those whose first language is not English may use a standard translation dictionary to translate between that language and English provided that neither language is the subject of this examination. Subject specific translation dictionaries are not permitted.*

*No electronic devices capable of storing and retrieving text, including electronic dictionaries, may be used.*

***DO NOT turn your examination paper over until instructed to do so***

**ADDITIONAL MATERIAL:      NONE**

**INFORMATION FOR INVIGILATORS:      NONE**

**1. Compulsory Question [34 marks]**

- (a) Explain, giving an example, what a regular expression is. (2 marks)
- (b) How would you redirect stderr in UNIX? Give an example command to illustrate this. (3 marks)
- (c) Give an example UNIX command which uses both file redirection and piping. (2 marks)
- (d) State what the following UNIX commands do:
- i. `lpq -Pfred`
  - ii. `pwd`
  - iii. `du -k`
  - iv. `finger xyz10m`
  - v. `!!`
- (5 marks)
- (e) Give UNIX commands to do the following:
- i. Find out who is logged on to a UNIX machine;
  - ii. Move the file "myfile.txt" to a directory two levels above the current directory;
  - iii. List the files in the current directory, including their permissions;
  - iv. View the contents of the file myfile.txt;
  - v. Rename the file "myfile.txt" to "myfile2.txt".
- (5 marks)

QUESTION 1 CONTINUED ON NEXT PAGE

## QUESTION 1 CONTINUED

- (f) A user is currently logged on to his local file server. He executes the following commands, in the order listed, in his shell window. He receives responses from the shell, as shown to the right of each command:

<b>Command:</b>	<b>Response:</b>
pwd	/staff/fred
ls	Private                      Research      Teaching
ls ../..	bin    etc    staff   stud    usr
cd Teaching; ls	IHC    INC    ADM
mkdir Exams	<no response>

Draw a tree to illustrate the UNIX filestructure that can be inferred from these responses.  
(5 marks)

- (g) As a system administrator, you have purchased a new disk to install on a UNIX system. Briefly outline the stages that would be involved in creating a new file system on this disk.  
(4 marks)

- (h) The Network File System (NFS) is based on two main protocols, the MOUNT protocol and the NFS protocol. Explain the roles of these protocols and at what stage of the NFS operation they are used.  
(8 marks)

**2. Question on Management Policies [33 marks]**

- (a) You are employed as an IT manager by an organization with 300 employees. Write an essay describing the duties you would expect to be performing as part of your role. (15 marks)
- (b) Explain the difference between a policy and a procedure. Give an example of each to illustrate your answer. (4 marks)
- (c) What is the purpose of performing a risk assessment for an organisation? Specifically, what sort of things are assessed during a risk assessment? (3 marks)
- (d) Outline the steps you would take in order to perform a risk assessment for an organization. (5 marks)
- (e) What should a disaster recovery plan include? List the elements you would expect to find in a disaster recovery plan, with a brief explanation of each. (6 marks)

**3. Question on Managing Users (33 marks)**

- (a) Outline the steps you would take to create a new user account on UNIX. (5 marks)
- (b) This question is about the password file and the shadow password file on UNIX:
- i. Explain the difference between the password file and the shadow password file on UNIX; (2 marks)
  - ii. Where would you expect to find these files? (2 marks)
  - iii. Give three fields that are found in entries in the password file, with a brief description of the purpose of each. (6 marks)
  - iv. Give an example utility that uses the information in the password file. (3 marks)
- (c) Users are assigned to groups in Windows and UNIX. What is the reason for this? (2 marks)
- (d) Windows defines a number of standard groups. List two of them. (2 marks)
- (e) Explain why, in UNIX, the superuser's path should never include '.' (4 marks)
- (f) Outline the steps you would take as a system administrator to move a user's account files to a new disk. (5 marks)
- (g) What is the difference between a local account and a network account? (2 marks)

**4. Question on TCP/IP Networking (33 marks)**

- (a) Explain what is meant by the term RFC. What are RFCs used for?  
(4 marks)
- (b) Explain in detail the role of Network Address Translation and how it works.  
(8 marks)
- (c) Answer the following questions on DHCP:
- i. What is the role of DHCP?  
(2 marks)
  - ii. How does DHCP operate in order to provide its service to network hosts?  
(6 marks)
  - iii. Give two advantages of DHCP.  
(2 marks)
- (d) Describe a mechanism used by hosts on a network to map between IP addresses and hardware addresses.  
(6 marks)
- (e) What are ICMP redirects? What problems can they cause and what measure can be taken to avoid those problems?  
(5 marks)

5. **Question on Starting UNIX and the UNIX Kernel (33 marks)**

- (a) Explain the role of run levels in UNIX. (4 marks)
- (b) List three roles of the UNIX init process. (3 marks)
- (c) Explain the stages that a UNIX system goes through during startup, in terms of its hardware and software. (6 marks)
- (d) Examine the following screenshot of a console window on a UNIX server showing boot scripts:

```

root@marian - Konsole
Session Edit View Bookmarks Settings Help
marian ~$ /bin/ls /etc/rc3.d/[KS][0-9]*
/etc/rc3.d/S10ntp          /etc/rc3.d/S71ldap
/etc/rc3.d/S16boot.server /etc/rc3.d/S78nocol
/etc/rc3.d/S18smb        /etc/rc3.d/S80mysql.server
/etc/rc3.d/S25iscdhcp    /etc/rc3.d/S84appserv
/etc/rc3.d/S30rwho       /etc/rc3.d/S89gmond
/etc/rc3.d/S45www        /etc/rc3.d/S90beacon
/etc/rc3.d/S50frame      /etc/rc3.d/S95ypwatch
marian ~$

```

- i. In what order are these boot scripts run? Explain in your answer how you determined this. (3 marks)
- ii. What run level are these scripts associated with? Explain your answer. (2 marks)
- iii. Are these scripts for starting up services or stopping them? Explain how you determined this. (4 marks)
- iv. What is the boot script **/etc/rc3.d/S30rwho** responsible for? (2 marks)
- (e) Give three different methods of interprocess communication in UNIX, with a brief explanation of each. (3 marks)
- (f) Explain how processes communicate with the kernel in UNIX. Why do they use this mechanism? (4 marks)
- (g) How do peripherals communicate with the UNIX kernel? (2 marks)