

Cork Institute of Technology
Bachelor of Science in Computing in Information Technology
Support - Award

(KITSU_7_Y3)(KITSE_7_Y3)

Autumn 2008

Computer System Administration

(Time: 3 Hours)

Instructions
Answer FIVE questions.
At least one question must be from Section A.
All questions are worth equal marks.

Examiners: Mr. G. McSweeney
Mr. J. Greenslade
Mr. J. Walsh

Section A

Q1.

- (a) **Flynn's Taxonomy** is based on dividing information into two types. What are they? **(2 Marks)**
- (b) Write down the **four** classifications of **Flynn's Taxonomy**. **(4 Marks)**
- (c) **UMA** and **NUMA** are classes of what type of machine? **(2 Marks)**
- (d) What does the acronym **CC-UMA** mean? **(2 Marks)**
- (e) What distinguishes a **CC-UMA** machine? **(2 Marks)**
- (f) Write down a formula to express **Amdahl's Law**. **(2 Marks)**
- (g) Write down a formula to calculate **efficiency** in a parallel programming environment. **(2 Marks)**
- (h) If a problem consists of thirty operations and ten of these can be done in parallel – calculate the **speedup** and **efficiency** values if there are five processors available. Assume all operations take one time unit. **(4 Marks)**

Q2.

- (a) Explain the terms **internal fragmentation** and **external fragmentation**. (4 Marks)
- (b) List three ways a disk manager might keep track of **free space**. (3 Marks)
- (c) Write down the names of two **disk caching algorithms**. (2 Marks)
- (d) In the Linux Virtual Server, the active router redirects services to support load balancing. Write down the specific items it distributes. (4 Marks)
- (e) What does the acronym **SAN** mean? (1 Mark)
- (f) Explain what is meant by a cluster? (2 Marks)
- (g) Describe **RAID Level 1**. (2 Marks)
- (h) Write down the main advantage of deploying **RAID Level 1**. (2 Marks)

Section B

Q3.

- (a) The following is part of the output of a long file listing (**ls -li**).

```
720971 -rwxr--r-- 1 bill groupX 144 Oct 3 12:47 newProg
```

Explain the significance of the items **720971**, **1** and **144**. _____ (3 Marks) |

- (b) What is the purpose of the environmental variables **PS1** and **PS2**? ____ (2 Marks) |

- (c) Write down another example of an **environmental** variable (apart from **PS1** and **PS2**). (1 Mark)

- (d) In Linux, what are the differences between a **hard** link and a **soft** link? |
-(3 Marks)

- (e) Consider the following entry from a **passwd** file:

```
smith:x:1001:100:john smith:home/smith:/bin/bash
```

```
smith:x:1001:100:john smith:home/smith:/bin/bash
```

What is the significance of the values **1001** and **100**? (2 Marks)

- (f) In which directory would you normally expect to find the **passwd** file? (1 Mark)

- (g) Describe how a user's password is **authenticated** in a Linux environment? (2 Marks)

- (h) Why are Linux passwords regarded as being secure? (2 Marks)

- (i) Explain the terms **redirection** and **pipng**. (2 Marks)

- (j) Write down an **example** of redirection and piping. (2 Marks)

Q4.

- (a) Distinguish between **primary**, **extended** and **logical** partitions. (3 Marks)
- (b) Why might **partitioning** a disk enhance security? (2 Marks)
- (c) Why might partitioning a disk make **backing** up a system easier? (2 Marks)
- (d) Apart from backup and security, suggest **two** reasons why creating partitions is a good idea. (2 Marks)
- (e) Name the most common Linux **filesystem**. (1 Mark)
- (f) Name a popular commercial **partitioning tool**. (1 Mark)
- (g) In a Linux partition, what is the purpose of the **superblock**? (4 Marks)
- (h) What does **mounting** a filesystem mean? (1 Mark)
- (i) In a typical Linux system, what type of files are stored in the following directories?

/root
/sbin
/media
/bin

(4 Marks)

Q5.

- (a) Apart from encrypting passwords, write down another application of **one-way** encryption algorithms. (2 Marks)
- (b) Describe **two** other types of encryption algorithms (apart from one-way) and give an appropriate example of each. (6 Marks)
- (c) What type of encryption does the **ssh** protocol use? (2 Marks)
- (d) How might a root user grant certain root **privileges** to ordinary users? (1 Mark)
- (e) A Linux system has three users **bill**, **mike** and **kate**. How might an administrator enable bill & mike to run a compiler program and enable mike & kate to run a browser program. kate should not be able to run the compiler and bill should not be able to run the browser. (3 Marks)
- (f) What is a **Trojan Horse**? (2 Marks)
- (g) Write a simple shell script which backs up the contents of a user's home directory (including subdirectories) and stores it on a media mounted at /media/usb. (4 Marks)

Q6.

- (a) With reference to disk quotas, what is meant by a **hard limit**, **soft limit** and **grace period**? **(3 Marks)**
- (b) What are the steps required to enable disk quotas? **(4 Marks)**
- (c) Apart from buying an additional or a larger disk, suggest **three** ways an administrator might solve storage shortage. **(3 Marks)**
- (d) With reference to fault isolation, before **pinging** a remote IP address (to confirm it is reachable) what should an administrator first try? **(2 Marks)**
- (e) In Linux, how would an administrator immediately **kill** a process that's causing a bottleneck in a system? **(2 Marks)**
- (f) What is unique about the **init** process? **(1 Mark)**
- (g) What does the following **cron** job do?
*15 16 * * * cp /etc/passwd /root/tmpFile* **(4 Marks)**
- (h) Apart from cron, name **another** Linux scheduling utility. **(1 Mark)**

Q7.

- (a) What is **GRUB** and what is its purpose? (3 Marks)
- (b) What is meant by a run-level? (2 Marks)
- (c) What is the usual default run-level and why? (2 Marks)
- (d) When might an administrator boot to a single user mode? (2 Marks)
- (e) In SUSE Linux, the **inittab** file contains the following line, what is its purpose?
`si::sysinit:/etc/init.d/boot` (2 Marks)
- (f) What is a daemon? (1 Mark)
- (g) Why is it important to know what daemons are running on your machine? (2 Marks)
- (h) What is purpose of the CUPS service? (2 Marks)
- (i) How would you test if the **apache** web server is running on your local machine? (2 Marks)
- (j) What is the purpose of the **Network File System** (NFS)? (2 Marks)