

UNIVERSITY OF BOLTON

CREATIVE TECHNOLOGIES

COMPUTING WITH WEBSITE DEVELOPMENT

SEMESTER ONE EXAMINATIONS 2018/2019

UNIX

MODULE NO: CPU5003

Date: Wednesday 16th January 2019 Time: 10:00 – 12:00

INSTRUCTIONS TO CANDIDATES:

There are **SIX** questions.

Answer **ANY FOUR** questions.

All questions carry equal marks.

Question 1

- 1a. Below is an example of the Unix df command showing the space available on various file systems.

```
[adami@localhost home]$ df
```

Filesystem	1K-blocks	Used	Available	Use%	Mounted on
/dev/mapper/centos-root	30385668	3874168	26511500	13%	/
devtmpfs	924680	0	924680	0%	/dev
tmpfs	941400	0	941400	0%	/dev/shm
tmpfs	941400	9252	932148	1%	/run
tmpfs	941400	0	941400	0%	/sys/fs/cgroup
/dev/sda1	1038336	197056	841280	19%	/boot
tmpfs	188284	12	188272	1%	/run/user/1001

Show how this output can be modified using a Bash script to display the information as an HTML table.

(16 marks)

```
[adami@localhost ~]$ ifconfig enp0s3
enp0s3: flags=4163<UP,BROADCAST,RUNNING,MULTICAST> mtu 1500
inet 10.0.2.15 netmask 255.255.255.0 broadcast 10.0.2.255
inet6 fe80::b957:7ad6:28e:e41a prefixlen 64 scopeid 0x20<link>
ether 08:00:27:2f:ba:01 txqueuelen 1000 (Ethernet)
RX packets 164254 bytes 176632591 (168.4 MiB)
RX errors 0 dropped 0 overruns 0 frame 0
TX packets 50391 bytes 6957032 (6.6 MiB)
TX errors 0 dropped 0 overruns 0 carrier 0 collisions 0
```

- 1b. The above image shows the output of the ifconfig command showing Ethernet interface settings on a Linux system. Show how you can use single line unix command to extract the following information from the output:

- i. The IPv6 address (fe90::b957:7ad6:28e:e41a in the above text)
- ii. The broadcast address (10.0.2.225 above)
- iii. The number of received (RX) packets (164254 above)

(9 marks)

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Question 2

- 2a. Compare and contrast three different forms of loop that can be used in a bash script. You should give detailed examples of the three different loop structures you have identified and explain how each is best used. Use sample code to illustrate your answers.

(15 marks)

- 2b. Explain how the test condition e.g. [*some condition*] can be used to evaluate string variables, numerical tests and file based tests. Give examples of each kind of test using either an if statement or a loop.

(10 marks)

Question 3

This question deals with using bash to process HTML form data, each part of the question looks at a different step of the process.

- 3a. Explain the two different mechanisms used by a web browser to pass form variables to a server using either the HTTP GET or HTTP POST methods.

(5 marks)

- 3b. Describe with the aid of some sample code how the collection of form variables can be retrieved in a Bash script for both HTTP GET and POST methods.

(5 marks)

- 3c. Using example code where necessary show how the individual HTML form variables can be separated into bash shell variables with corresponding values.

(5 marks)

- 3d. HTTP encodes any punctuation characters in form variables before they are sent to the server. Explain why this is necessary. Once more with the aid of example code, explain how these encoded characters can be decoded in a Bash script to restore their original values.

(10 marks)

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Question 4

4a. Examine the following output:

```
[ai1@webserver]$ ls -l
total 8
-rwxr-xr-- 1 ai1 staff 2877 Jan 15 13:37 start-up.sh
[ai1@webserver]$
```

The user 'ai1' would like to change the permissions on start-up.sh so that other members of the staff group can read the file but not execute it. No other permissions should be changed. Show two different ways to achieve this.

(4 marks)

4b. Examine the following output and provide an explanation of the permissions listed and explain who has permission to do what.

```
[ai1@webserver]$ ls -l
total 8
-rwxr-x--- 1 ai1 staff 2877 Jan 10 10:31 unlock
drwxr-xr-- 1 ai1 staff 245 Jan 11 15:43 scripts
[ai1@webserver]$
```

(11 marks)

4c. Explain what the 'sticky bit' is used for in terms of file permissions. How can you set the sticky bit and how can you see whether it is set?

(4 marks)

4d. Why might you use the setuid permission for a script or executable file? Explain how you would set this permission and explain why this might represent a serious security problem.

(6 marks)

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Question 5

- 5a. Consider this statement: *“Using threads rather than processes to handle HTTP requests give a performance boost to a web server.”*

To what extent do you agree with the above statement? Give reasons for your answer and clearly explain the difference between processes and threads.

(15 marks)

- 5b. *“All users are idiots, or out to get you”* is a favourite quote of your lecturer. In the context of a web server running Bash CGI scripts identify threats and vulnerabilities which justify the quote.

(10 marks)

Question 6

- 6a. What is meant by the pipe symbol (|) in the Bash environment. Give examples of ways this is useful.

(5 marks)

- 6b. Explain the different meaning of the three different types of quotes that can be used in a Bash script as shown in the following examples:

```
value="1232  
ex1="$value"  
ex2=' $value'  
ex3=`ls`
```

What would be the values of ex1, ex2 and ex3 in this instance?

(10 marks)

- 6c. What is the difference between an absolute path and a relative path when specifying the path to a file or directory?

(5 marks)

- 6d. Assuming you have an executable file called script.sh with the correct permissions in your current directory, why would you type ./script.sh to run that file?

(5 marks)

END OF QUESTIONS