

Enterprise Performance Architecture  
CA2  
Worth 25%  
Upload by: 15th Dec 2017 @5PM  
Late Penalty: 2%per day

November 21, 2017

**Plagiarism will not be tolerated. Students may be selected to discuss their submission with me.**

**Any student who wishes to skip Part 1 can request the data file from me.  
You will then be marked out of 60**

**This CA is to be completed on a single core Linux virtual machine.**

In this assignment you are required to apply lab practice and lecture knowledge to analyze the throughput, utilization, service demand and response time of a single CPU as the number of concurrent users increases  $1 \leq N \leq 50$ . This assignment is in 2 parts (worth 40% and 60% respectively):

# 1 Running the load test, collecting the data (40 marks)

## 1.1 Preparation

Download, compile and run the file `loadtest.C` following the instructions at the top of the file (`loadtest` is a synthetic load generation program to stress CPU and IO on a single core machine). This file produces an output file called `synthetic.dat` which contains an entry for each transaction completed

## 1.2 Running the load test

In this section you are going to develop one bash script called `runtest.sh` which you must upload as part of your answer.

1. Each time you run the load test use a different parameter in the range  $1 \leq N \leq 50$
2. At the end of each load test run you need to capture the results in the format shown in Section 1.3
3. You will need a Linux bash `for` loop for this stage:

```
for i in {1..50}
do
# do something here
done
```

4. While the load test is running you are going to collect CPU utilization using the `mpstat` command (JSON output) which we have seen in the labs
5. It is up to you to decide how long each load test should run for but not more than 10 seconds is acceptable. <sup>1</sup>

## 1.3 Collecting the results

Your `runtest.sh` script needs to gather the data into the following format:

C0	N	idle
23	1	73.16
40	2	61.41
54	3	57.32
...		

(this is example data) and into a file called `results.dat`

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<sup>1</sup>Please note that exceeding 50+ may crash your VM

## 1.4 Output from this section

There are two assessment components from this part of the CA:

1. your bash script `runtest.sh` **which must be comprehensively commented**.  
Your bash script should use only the Linux commands covered in our labs to date.  
**(25 marks)** .
2. your results file `results.dat` **(15 marks)**

## 2 Plotting results and Discussion (60 marks)

Write an R script (or use Excel/Tableau etc) to load the results data and plot 4 graphs as follows:

1.  $U_i$  vs  $N$
2.  $D_i$  vs  $N$
3.  $X_0$  vs  $N$
4.  $R$  vs  $N$

Formulae for calculating these metrics are contained in the lecture notes.

### 2.1 Write up

Write a report discussing each plot's characteristics and trends - commenting on *why* the trends have arisen. Be sure to discuss the Operating System you tested this on, and the CPU, memory and disk configurations. This section should contain not less than 750 words.

### 2.2 Output from this section

There is one assessment component from this part of the CA: your answer document which includes plots and discussion **(60 marks)** . **Your answer document must include an appendix A that contains your bash script.** Failure to include this will result in marks lost.

## 3 In summary: checklist of components to upload

Upload the following files inside one zip:

Component	Marks
your bash script <code>runtest.sh</code>	25
your results file <code>results.dat</code>	15
your <b>PDF</b> answer document with 4 plots and discussion containing not less than 750 words. <b>Your answer document must include an appendix A that contains your bash script.</b> Failure to include this will result in marks lost.	60