COMP9334 Capacity Planning
Assignment 1, Session 1, 2016

March 11, 2016

Instructions

(1) There is one (1) question in this assignment. Answer all parts of the question.

(2) The total mark for this assignment is 5 marks.

(3) In answering the questions, it is important for you to show us your intermediate steps and tell us what arguments you have made to obtain the results. You need to note that both the intermediate steps and the arguments carry marks. Please note that we are **not** just interested in whether you can get the final numerical answer right, but we are **more** interested to find out whether you understand the subject matter. We do that by looking at your intermediate steps and the arguments that you have made to obtain the answer. Thus, if you can show us the perfect intermediate steps and the in-between arguments but get the numerical values wrong for some reason, we will still award you marks for having understood the subject matter.

If you use a computer program to perform any part of your work, you are also required to submit the program.

(4) The submission deadline is 11:59pm Monday 4 April 2016. Late submissions up to 3 days late will be accepted. Late submission will cap the maximum mark that you receive.

(5) Submit your work via *give* command. We will only accept Acrobat pdf file with the name **assign1.pdf**. Log onto a CSE machine and make sure you're in the same directory as your work, then do the following:

(a) When you're ready to submit, at the bash prompt type 9334

(b) Next, type: give cs9334 assign1 assign1.pdf (You should receive a message stating the result of your submission).

Note that you can submit as many times as you wish before the deadline. A later submission will over-write the earlier one(s).

Question 1 (5 marks)

Figure 1 shows a computer system consisting of a dispatcher and 2 servers (Servers 1 and 2). The dispatcher consists of a CPU which will be referred to as CPU-Dispatcher. Each server consists of a CPU and a disk. We will refer to the CPU and disk of Server i (i = 1, 2) as CPU-i and Disk-i. The computer system is used by a group of n interactive users.

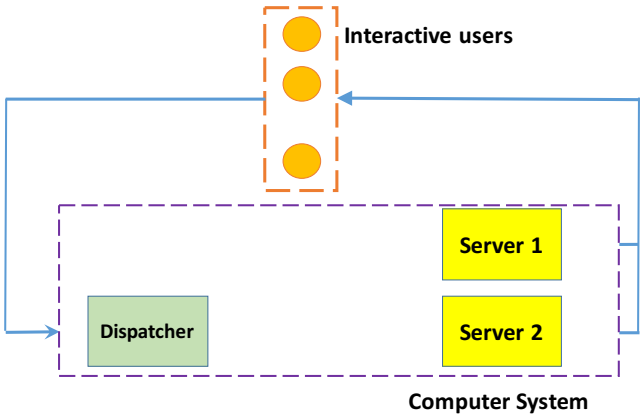

Figure 1: An interactive computer system with a dispatcher and two servers.

The system was monitored for 10 minutes and the following measurements were taken:

Number of completed jobs	145
Number of CPU-Dispatcher accesses	149
Number of CPU-1 accesses	321
Number of CPU-2 accesses	550
Number of Disk-1 accesses	1210
Number of Disk-2 accesses	1250
CPU-Dispatcher busy time	113 seconds
CPU-1 busy time	127 seconds
CPU-2 busy time	297 seconds
Disk-1 busy time	116 seconds
Disk-2 busy time	286 seconds
Think time	10 seconds

(a) Determine the service demand at CPU-1.

(b) Determine the service time per visit at Disk-2.

(c) Assuming that a job served by the computer system can use any of three CPUs and any of

two disks in the computer system a number of times, use bottleneck analysis to determine the asymptotic bound on the system throughput when there are $n = 5$ interactive users.

(d) Using your results in Part (c), compute the minimum possible response time when there are $n = 5$ interactive users.

Note: The mark distributions for Parts (a), (b), (c) and (d) are, respectively, 1, 1, 2 and 1.

$---$ End of assignment $---$