# BSc. (Honours) Degree in 

 Computer Science
# BSc. (Honours) Degree in Computer Science (International) 

Year 1

SUMMER EXAMINATIONS 2015-2016

OPERATING Systems 1 [CMPU1022]
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MONDAY $18^{\text {TH }}$ MAY 2016 17:00PM-19:00PM.
Two (2) Hours

Answer Any THREE (3) Questions out of FOUR (4).
Note: Question (1) One carries 40 Marks, All Other Questions Carry 30 Marks.

1. (a) Explain what is meant by the Fetch-Decode-Execute cycle.
2. (b) Briefly describe what is meant by the term von Neuman Architecture.
3. (c) The Little-Man Computer provides an analogy for the execution of a computer program, explain what each of the following represent in the analogy to a real computer:
(i) The Pigeon-holes
(ii) The In-Tray
(iii) The Program Counter
(iv) The Calculator
(v) The Out-Tray
4. (d) The Little Man model uses a single-digit op-code and a 2 -digit memory addressing and has the following instructions defined where the address portion is shown as xx .

| OpCode | Instruction | Description |
| :--- | :--- | :--- |
| 1 xx | ADD | Add the value of a given memory location to <br> calculator |
| 2 xx | SUBTRACT | Subtract the value of a given memory location to <br> calculator |
| 3 xx | STORE | Copy the value from the calculator into a given <br> memory location |
| 5 xx | LOAD | Copy the value from a given memory location into <br> the calculator |
| 6 xx | BRANCH | Unconditional branch. Set the Program Counter to <br> value xx |
| 7 xx | BRANCH IF <br> ZERO | Conditional branch. If the accumulator is zero, <br> branch to xx |
| 8 xx | BRANCH IF <br> POSITIVE | Conditional branch. If the accumulator is positive, <br> branch to xx |
| 901 | INPUT | Get the value from the IN-TRAY and put it into the <br> calculator |
| 902 | OUTPUT | Put the value in the calculator into the OUT-TRAY |
| 000 | HALT | Take a break |

Write a program using these codes to take two numbers which are contained in the IN-TRAY and display the sum (+) of those numbers in the OUT-TRAY. Comment every instruction.
2. (a) Explain what the following DOS commands do:
(i) dir
(2 Marks)
(ii) path
(iii) help
(iv) echo
(v) tree
2. (b) Explain what the following Linux/Bash commands do:
(i) cat
(ii) clear
(iii) pwd
(iv) ls
(v) man
(2 Marks)

Question Two is continued overleaf $\rightarrow$
2. (c) Write a DOS Batch script to automatically recursively backup files from a specified directory (and all its sub-directories), to a newly create directory called BackupFolder (with the same sub-directories). Finally list all the files recursively in the new BackupFolder.
(3 Marks)
Suggest a name that you would give to the file with the instructions in it?

What would you type in to the command prompt to execute it?
2. (d) Write a Bash/Linux script to automatically recursively backup files from a specified directory (and all its sub-directories), to a newly create directory called BackupFolder (with the same sub-directories). Finally list all the files recursively in the new BackupFolder.

Suggest a name that you would give to the file with the instructions in it?

What would you type in to the command prompt to execute it?
3. (a) Explain the following data structures, including in each explanation a diagram:
(i) A Queue
(ii) A Stack
(2 Marks)
(iii) A Heap
(iii) A Heap
3. (b) Explain the purpose of the Job Scheduler.
3. (c) What are the five (5) statuses a process can have, and what transitions are permissible between states. Illustrate your answer with a diagram, and an explanation of each state.
3. (d) What are the fields in the Process Control Block (PCB)? Provide an explanation for each field.
4. (a) What is Deadlock? Discuss four (4) types of deadlock.
(5 Marks)
4. (b) What does the File Manager do?
4. (c) Discuss the following physical file storage allocation schemas:
(i) Contiguous Storage
(5 Marks)
(ii) Non-contiguous Storage
(iii) Indexed Storage
4. (d) What is an Access Control Matrix? Include an example in your answer.

