



Vavuniya Campus of the University of Jaffna

First Examination in Information and Communication Technology - 2016

Second Semester - November/December 2017

ICT1233 Operating System

Answer Five Questions Only

Time Allowed: Three hours

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1. (a) Briefly explain three major functions of an Operating System. [15%]
(b) State clearly the significance of multiprogramming in an operating system. [15%]
(c) Describe any three problems in designing and developing an operating system. [20%]
(d) Give any three types of operating system with suitable example for each of the types. [20%]
(e) Describe any five advantages of a Distributed System. [15%]
(f) Describe what is meant by Virtual Machines. [15%]
 2. (a) Differentiate *Process* and *Threads* with respect to an operating system. [20%]
(b) State clearly why Process ID (PID) and User ID (UID) are important to a process. [10%]
(c) Give any three attributes of a process in an Operating System. [10%]
(d) Briefly describe the process memory with the aid of a diagram. [15%]

[To be continued...]

(e) Describe any three types of *system call* by providing example for each of the types.

[25%]

(f) Compare and contrast *monolithic kernel* with *microkernel*.

[20%]

3. (a) Briefly describe the seven states of a process model with the aid of a simple diagram.

[20%]

(b) Explain what is meant by "Critical Section" problem with regard to resource sharing in interprocess communication.

[10%]

(c) Differentiate *preemptive* and *non-preemptive* scheduling algorithms in process scheduling.

[15%]

(d) Consider the system that uses preemptive priority scheduling under the following process load given in Table 1 where a smaller priority number means a higher priority:

Table 1: Process Details

Process	P0	P1	P2	P3	P4	P5	P6
Burst Time	80	20	10	20	50	30	10
Priority	2	1	3	1	4	2	1
Arrival Time	0	0	10	30	95	100	150

i. Calculate the average turnaround time for the processes given above.

[20%]

ii. Calculate the average wait time for the above process

[20%]

iii. Give any two advantages of this scheduling technique.

[15%]

4. (a) Define the term "Process Deadlock" with respect to an operating system.

[10%]

(b) Briefly describe the necessary and sufficient conditions for a deadlock to occur.

[20%]

(c) Describe any three strategies to deal with deadlock.

[15%]

[To be continued...]

- (d) Find whether the allocation graph (Figure 1) given below has a deadlock. Justify your answer.

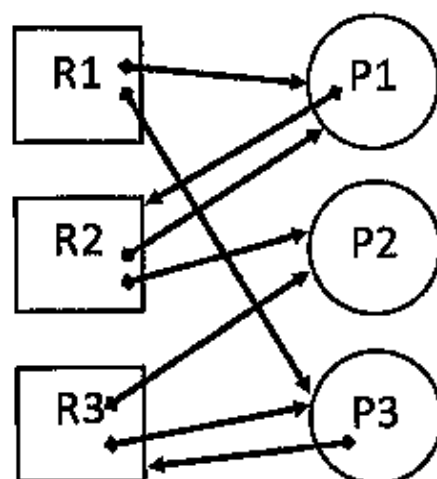


Figure 1: Resource Allocation Graph

- (e) Assume that there are five processes (P0, P1, P2, P3 and P4) and four types of resources (A, B, C and D). The available resources in A, B, C and D are 1, 5, 2 and 0 respectively. At time t_0 the system state is given below in Table 2:

Table 2: The System State

Details	Current Allocation				Maximum Demand			
	A	B	C	D	A	B	C	D
P0	0	1	1	0	0	2	1	0
P1	1	2	3	1	1	6	5	2
P2	1	3	6	5	2	3	6	6
P3	0	6	3	2	0	6	5	2
P4	0	0	1	4	0	6	5	6

- Create the need-matrix.
- Find whether the system is in a safe state. If yes, write the safe sequence.

5. (a) State clearly what is meant by *relocation and protection* in memory management.

[10%]

(b) Given memory partitions 100KB, 500KB, 300KB and 600KB (in order), explain how the first-fit, best-fit and worst-fit algorithms work to place the processes of 212KB, 417K, 112KB and 426KB (in order).

[20%]

(c) Indicate which algorithm in part (b) makes the most efficient use of memory in the above given scenario. Justify your answer.

[10%]

(d) Justify the need of Virtual Addressing in memory management.

[10%]

(e) Consider the logical address space of eight pages of 1024 bytes each, mapped to a physical memory of 32 frames. Find the number of bits for virtual address and the number of bits for physical address.

[20%]

(f) Consider the table given below:

Table 3: PageNo and PageFrameNo

PageNo	6	5	4	3	2	1	0
PageFrameNo	101101	011011	100001	011100	011101	100101	110011

Find the physical address of each of the virtual addresses given below using Table 3:

i. 0011,010010

ii. 0101,100101

iii. 0110,110101

[30%]

6. (a) Describe the four types of risk that can be faced by a computer.

[20%]

(b) Compare and contrast a good and bad passwords with suitable examples.

[20%]

(c) State the significant difference between *Worm* and *Trojan Horse*.

[15%]

(d) State what do you understand by a "File" in a computer.

[15%]

[To be continued...]

- (e) Compare and contrast *Unix file naming convention* and *Windows file naming convention*. [15%]
- (f) Consider the Figure 2 in MS-DOS convention given below:

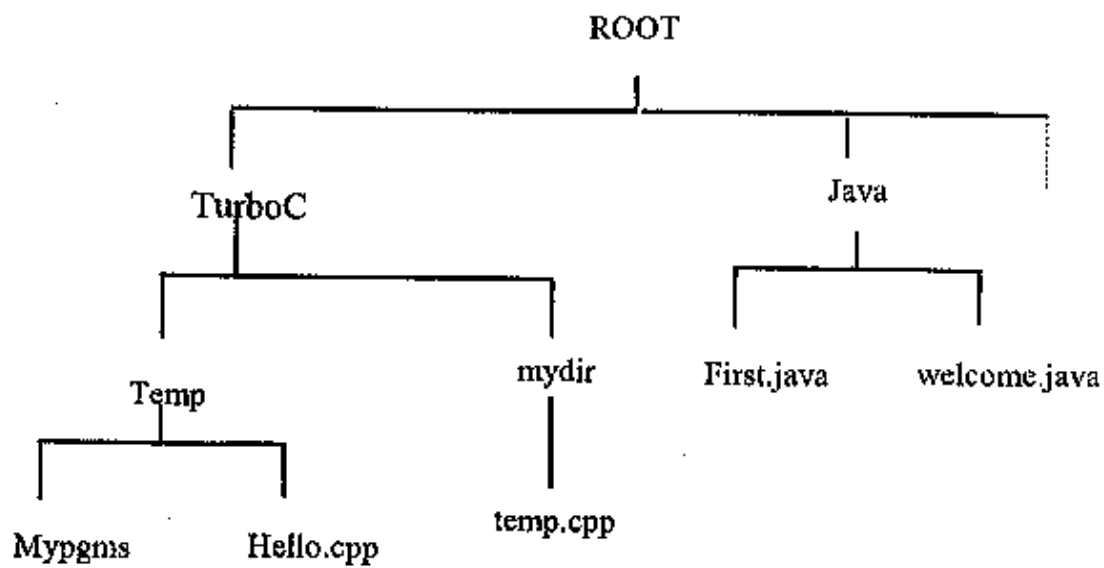


Figure 2: Multi Level Directory System

- If the current directory is "Temp" then find the relative path for the file "temp.cpp". [5%]
- If the current directory is "Myprogms" then find the relative path for the file "temp.cpp". [5%]
- Find the full path of the file "Hello.cpp". [5%]