



**ECE PARIS**  
ÉCOLE D'INGÉNIEURS

Prénom : .....  
NOM : .....  
Promotion : .....  
Groupe : .....

**ING 4**  
**Système d'Exploitation**  
**Devoir surveillé**

**Int.**

15 décembre 2017  
10:15 - 11:45  
**Durée : 01:30**

Sujet proposé par : KHOURY Christian  
Calculatrice autorisée : NON  
Documents autorisés : NON  
Ordinateur autorisé : NON

**Les étudiants devront répondre sur la grille de réponse jointe au sujet. Il est impératif de noter le n° étudiant, en haut, à droite de celle-ci.**

**RAPPEL :**

- ✦ NOM et Prénom de l'élève doivent être portés sur toutes les copies rendues.
- ✦ Les copies doivent être numérotées.
- ✦ Tous les appareils électroniques (téléphones portables, PDA, ordinateurs, montre connectée, etc.) doivent être éteints et rangés.
- ✦ **Toute erreur constatée sur le sujet doit être signalée sur la copie. Le correcteur en tiendra compte lors de la correction du devoir.**
- ✦ Il est interdit de communiquer.
- ✦ Toute fraude, ou tentative de fraude, qu'elle soit passive ou active, fera l'objet d'un rapport de la part du surveillant et sera sanctionnée par la note zéro, assortie d'une convocation devant le Conseil de discipline. Aucune contestation ne sera possible. Tous les documents et supports utilisés frauduleusement, devront être remis au surveillant.
- ✦ Les élèves ne sont pas autorisés à quitter la salle où se déroule l'épreuve moins de 45 minutes après le début de l'épreuve. Au-delà de ces 45 premières minutes, toute sortie est définitive (sauf dans le cas d'une épreuve durant plus de deux heures).



# Operating Systems Exam

Documents forbidden

- Only one correct answer per question

1. In the process lifecycle, whenever a process is created, it enters
  - a. the RUNNING state
  - b. the BLOCKED state
  - c. the MOVING state
  - ☒ d. the READY state
2. In the process lifecycle, the transition from the READY state to the RUNNING state indicates that :
  - a. a process has been preempted by another process
  - b. a process has blocked waiting for an event
  - c. a process is done waiting for an event
  - ☒ d. none of the above
3. In the process lifecycle, the transition from the RUNNING state to the BLOCKED state indicates that :
  - a. the OS has blocked it for some unknown reason
  - ☒ b. a very slow operation is taking place in the process
  - c. a very fast operation is taking place in the process
  - d. none of the above
4. In the process lifecycle, the transition from the RUNNING state to the READY state indicates that :
  - ☒ a. the scheduling algorithm is preemptive
  - b. the scheduling algorithm is non preemptive
  - c. the scheduling algorithm is Round Robin
  - d. none of the above
5. In the process lifecycle, the transition from the BLOCKED state to the READY state indicates that :
  - a. the OS has unblocked it for some unknown reason
  - b. a very slow operation is taking place in the process
  - c. a very fast operation is taking place in the process
  - ☒ d. time has elapsed

6. Which of the following is shared between all the threads in a process
- Register values
  - ☒ File descriptor table
  - Stack frames
  - None of the above
7. Which of the following is not included in an inode ?
- File size
  - ☒ File name
  - File modification date
  - None of the above

Given the following 4 tasks (Questions 8 to 13)

	Arrival Time	Exec Time	I/O
T1	2	4	None
T2	0	4	3/1
T3	1	4	3/1
T4	5	4	None

I/O figures (t1/t2) indicate that an I/O call is made at t1 after the start of the process and takes t2 time units to end.

8. Using a FCFS scheduling algorithm, the processes run in the following order :
- ☒ T2, T3, T1, T2, T4, T3
  - T2, T3, T1, T4
  - T2, T3, T2, T1, T4, T3
  - T3, T1, T2, T4, T2, T3

9. Using a FCFS scheduling algorithm, the turnaround time of T3 is
- ☒ a. 15
  - b. 14
  - c. 13
  - d. None of the above
10. Using a FCFS scheduling algorithm, the waiting time of T3 is
- a. 15
  - b. 14
  - c. 13
  - ☒ d. None of the above
11. Using a Round Robin with a quantum of 4, the processes run in the following order
- ☒ a. T2, T3, T1, T2, T4, T3
  - b. T2, T3, T1, T4
  - c. T2, T3, T2, T1, T4, T3
  - d. None of the above
12. Using a Round Robin with a quantum of 3, the processes run in the following order
- ~~a. T2, T3, T2, T1, T4, T3, T1, T4~~
  - ☒ b. T2, T3, T1, T2, T4, T3, T1, T4
  - c. T1, T2, T3, T4
  - d. T3, T2, T1, T4, T3, T1, T4
13. Using a Round Robin with a quantum of 3, the turnaround time of T3 is
- a. 11
  - b. 12
  - ☒ c. 13
  - d. None of the above
14. A context switch happens when
- a. a task is replaced by another one
  - b. a task moves from the READY state to the RUNNING state
  - c. a task moves from the RUNNING state to the Blocked state
  - ☒ d. all of the above

15. Synchronization is needed when

- a. data is shared and read concurrently by different tasks
- b. data is not shared and modified concurrently by different tasks
- ☒ c. data is shared and modified concurrently by different tasks
- d. none of the above

16. Given 3 tasks that increment concurrently a variable i initialized to 44. Possible outcome of these executions is

- a. 44, 45, 46, 47
- b. 46, 47
- ☒ c. 45, 46, 47
- d. None of the above

17. Given a semaphore initialized to 0, a shared variable i set to 65, and 5 tasks doing « Acquire(S) i++ Release(S) ». The final value of this variable upon completion of all tasks is

- ☒ a. 65
- b. 66
- c. 67
- d. 68

18. Given a semaphore initialized to 2, a shared variable i set to 65, and 4 tasks doing « Acquire(S) i++ Release(S) ». The final value can be

- a. 67, 69
- b. 66, 67
- ☒ c. 66, 67, 68, 69
- d. None of the above

Given a 1-level paging scheme with addresses over 16 bits and a page size of 256 Bytes.  
(Questions 19 – 25)

2 Bytes

19. The address can be written as (page number, offset). The number of bits used for the each part is

- a. (10, 7)
- b. (8, 7)
- ☒ c. (8, 8)
- d. None of the above

20. The number of entries in the page table is

- a. 64
- b. 128
- ☒ c. 256
- d. 512

21. The size of the page table is

- ☒ a. 512
- b. 1024
- c. 2048
- d. None of the above

Given the following page table (indices starting at 0)

0	1
1	4
2	2
3	8
4	255
5	9

pg  
offset  
030+ → 080+

(used notation : hexadecimal 0x3411 is equivalent to 0011 0100 0001 0001 in binary format)

22. The logical address 0x0001 (in hexadecimal) is physically stored in

- a. 0x1001
- ☒ b. 0x0101
- c. 0x0081
- d. None of the above

23. If the page size is 128 Bytes, the logical address 0x0001 would be physically in

- a. 0x1001
- b. 0x0101
- ☒ c. 0x0081
- d. None of the above

24. The logical address 0x0605 is physically stored in

- a. 0x0805
- b. 0x0905
- c. 0x0205
- ☒ d. None of the above

25. The logical address 0x0307 is physically stored in

- a. 0x0107
- b. 0x0407
- ☒ c. 0x0807
- d. 0x2008

Given a filesystem based on inodes with data block of 4 KBytes, indices (addresses) of blocks using 32 bits and containing 11 direct entries. (Questions 26 – 28)

26. How many entries are there in the simple indirection table ?

- a. 256
- b. 512
- c. 1024 ←
- d. Aucune réponse

27. What is the maximum size of a file using only the direct entries and the simple indirection ?

- a. 4 Moctets
- b. 4 Moctets et 40 octets
- ☒ c. 4 Goctets et 44 octets
- d. Aucune réponse

28. What is the maximum size of a file using only the direct entries and the double indirection ?

- a. 4 Moctets
- b. 4 Moctets et 40 octets
- c. 4 Goctets et 44 octets
- ☒ d. Aucune réponse