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UNIVERSITI TUN HUSSEIN ONN MALAYSIA

**FINAL EXAMINATION
SEMESTER I
SESSION 2022/2023**

COURSE NAME : FUNDAMENTALS OF OPERATING SYSTEM

COURSE CODE : DAT 10303

PROGRAMME CODE : DAT

EXAMINATION DATE : FEBRUARY 2023

DURATION : 2 HOURS 30 MINUTES

INSTRUCTIONS :

1. ANSWER ALL QUESTIONS
2. THIS FINAL EXAMINATION IS CONDUCTED VIA **CLOSED BOOK**.
3. STUDENTS ARE **PROHIBITED** TO CONSULT THEIR OWN MATERIAL OR ANY EXTERNAL RESOURCES DURING THE EXAMINATION CONDUCTED VIA CLOSED BOOK

THIS QUESTION PAPER CONSISTS OF **FIFTEEN (15)** PAGES

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TERBUKA

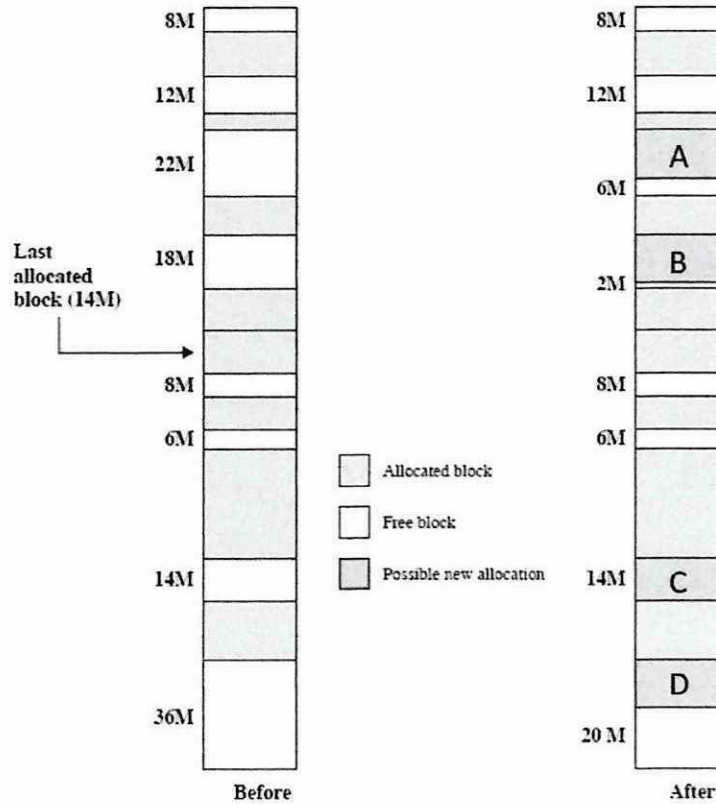
SECTION A (40 MARKS)

Choose the best answer.

Q1 Internal fragmentation problem will occur with _____.

- A fixed partitioning.
- B buddy system.
- C round robin scheduling
- D virtual memory.

Q2



Above figure is an example of memory configuration after several placement and swapping-out operations. The last allocated block shown was 14M. If a 16-Mbyte allocation request comes in, where would the process be allocated in the memory, using the **Next-Fit** memory allocation algorithm?

- A A
- B B
- C C
- D D

Q3 What is the command to change test2 file permission to where the owner of the file is allowed to read/write/execute, people from the same group as the owner are allowed to read the file only and the general public are only allowed to execute the file, as per shown in the sample figure shown?

```

                                     from
A  ----- 1 diana nasrin 53 Oct 25 20:34 test2
                                     to
B  -rwxr---x 1 diana nasrin 53 Oct 25 20:34 test2
    
```

- A chmod test2 714
- B chmod test2 741
- C chmod 741 test2
- D chmod 714 test2

Q4 Based on the figure shown, which file that could not be access at all by user from the same group?

```

-rw-rw-r-- 1 zaki accounting 53 Oct 25 20:34 test1
-rwxr---x 1 diana nasrin 53 Oct 25 20:34 test2
-rw---rwx 1 daniyal research 53 Oct 25 20:34 test3
    
```

- A test1
- B test2
- C test3
- D None of the above.

Q5 Which of the statement below is FALSE about memory hierarchy?

- A Greater capacity, slower access speed.
- B Greater capacity, smaller cost per bit.
- C Greater capacity, faster access speed.
- D Faster access time, greater cost per bit.

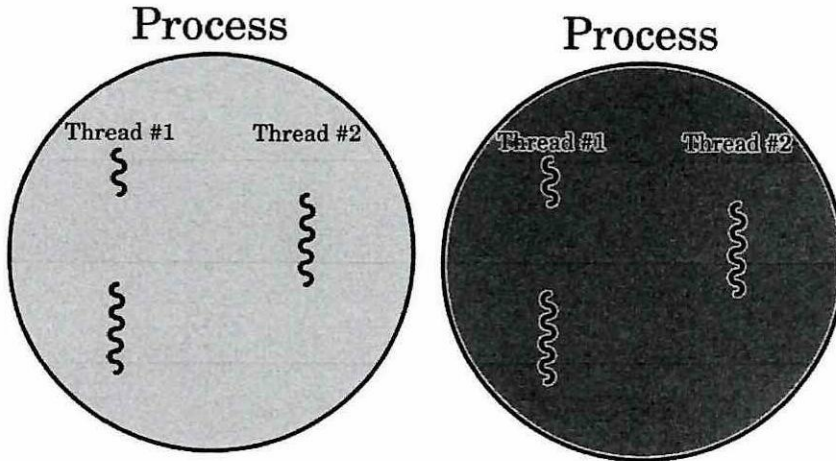
Q6 File system provides the resource abstractions typically associated with _____ .

- A virtual memory
- B primary storage
- C main memory
- D secondary storage

- Q7** What is the disadvantage of First-Fit allocation algorithm?
- A Remaining unused memory areas left after allocation become waste if request is too small.
 - B It searches as little as possible.
 - C It finishes after finding the first suitable free partition.
 - D It allocates the first free partition or hole large enough which can accommodate the process.
- Q8** The disadvantage of this algorithm is that it is often become inefficient in terms of memory utilization. As all requests must be rounded up to a power of 2, a 35KB process is allocated to 64KB, thus wasting extra 29KB causing internal fragmentation.
- What is the memory allocation algorithm that would describe the above statement?
- A First-Fit.
 - B Next-Fit.
 - C Best-Fit.
 - D Buddy system.
- Q9** _____ memory allocation algorithm begins as first fit to find a free partition. When called next time it starts searching from where it left off, not from the beginning.
- A First-Fit.
 - B Next-Fit.
 - C Best-Fit.
 - D Buddy system.
- Q10** Which statement is TRUE about process and memory?
- A All memory references within a process are logical addresses that are dynamically translated into virtual addresses at run time.
 - B A process may be broken up into a number of pieces (pages or segments) and these pieces need to be contiguously located in main memory during execution.
 - C In an execution of a process, operating system brings into main memory a few pieces of the program.
 - D A process may be swapped in and out of main memory occupying different regions of main memory at different times during the course of execution.
- Q11** Choose the statement that is TRUE about segmentation memory management schemes.
- A Process is divided into the variable size segments and loaded to the logical memory address space.
 - B The logical address space is the collection of same size segments.
 - C It causes internal fragmentation.
 - D Each segment has its name but not its length.

- Q12** These are the events that will occur once the OS decides to create a new process EXCEPT.
- A Initializes process control block.
 - B Generate an interrupt alert to the OS.
 - C Sets up appropriate linkages.
 - D Creates or expand other data structures.

Q13



Describe the conclusion that could be drawn from the above figure of two different processes on the relationships between thread and process.

- A A process is an executing instance of an application and a thread is a path of execution outside a process.
 - B Threads within the same process share the same address space, whereas different processes do not.
 - C A thread of execution is the smallest sequence of programmed instructions that can be managed independently by scheduler and each thread belongs to more than one process.
 - D A process can have multiple threads, all executing at different time.
- Q14** Which of these statements is NOT the reason of why operating system needs to evolve?
- A Offering of new services.
 - B Fixes of its design and methodology.
 - C Multi-programmed Batch Systems.
 - D New types of hardware.

Q15

Name	Status	25%	75%	1%	0%	0%	GPU engine	Power usage	Power usage L...
Apps (8)									
Windows Explorer		0.1%	46.3 MB	0 MB/s	0 Mbps	0%		Very low	Very low
Task Manager		0.4%	27.1 MB	0 MB/s	0 Mbps	0%		Very low	Very low
Paint		0%	29.1 MB	0 MB/s	0 Mbps	0%		Very low	Very low
Microsoft Word		0%	123.3 MB	0 MB/s	0 Mbps	0%		Very low	Very low
Microsoft PowerPoint (2)		0%	148.2 MB	0 MB/s	0 Mbps	0%		Very low	Very low
Microsoft Excel		0%	46.8 MB	0 MB/s	0 Mbps	0%		Very low	Very low
Internet Explorer		0%	22.0 MB	0 MB/s	0 Mbps	0%		Very low	Very low
Google Chrome (28)		0.1%	1,402.2 MB	0.1 MB/s	0.1 Mbps	0%	GPU 0 - 3D	Very low	Very low
Background processes (113)									
Zoom Sharing Service (32 bit)		0%	0.1 MB	0 MB/s	0 Mbps	0%		Very low	Very low
YourPhone (2)		0%	0.6 MB	0 MB/s	0 Mbps	0%		Very low	Very low

Based on the above windows Task Manager, what is the process that utilize more processor time than other processes?

- A Windows Explorer.
- B Google Chrome.
- C Task Manager.
- D Microsoft Powerpoint.

Q16 Which of these statements is TRUE about I/O modules in computer basic elements?

- A It transfers data from external devices to processor and memory, and vice versa.
- B It contains external buffers.
- C It contains internal buffers for data exchange.
- D It moves data between the computer and the internal environment.

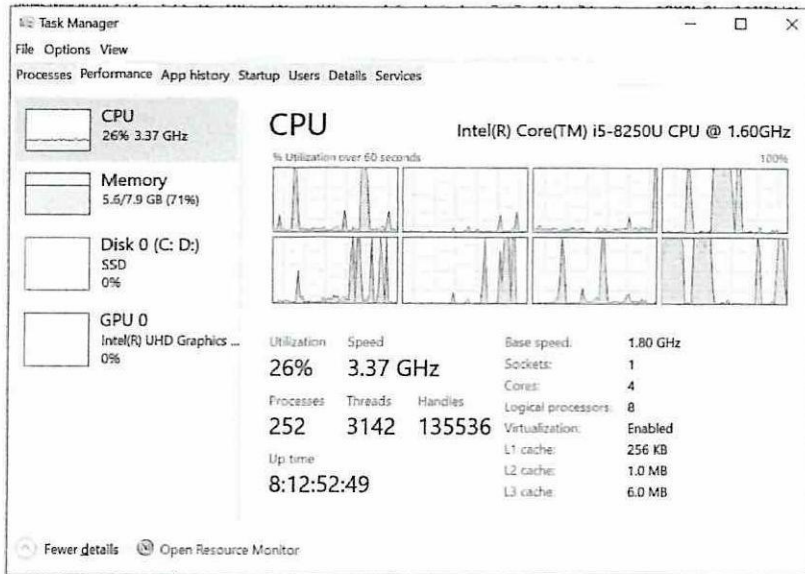
Q17 Which of these statements is FALSE about Basic Instruction Cycle?

- A Instruction execution may involve several operations and depends on the nature of the instruction.
- B The processing required for a single instruction is called an instruction cycle.
- C It consists of two steps which are referred to as the not-running stage and the running stage.
- D Program execution halts only if the processor is turned off or some sort of unrecoverable error occurs.

Q18 Which of these statements is FALSE about Interrupts?

- A Virtually all computers provide a mechanism by which other modules (I/O, memory) may interrupt the normal sequencing of the processor.
- B Interrupts are provided primarily as a way to improve processor utilization.
- C Interrupts are provided because most I/O devices are faster than the processor.
- D Interrupts are provided because processor must pause to wait for device.

Q19



Based on the above windows Task Manager, what is the percentage of CPU utilization for this computer?

- A 252
- B 5.6
- C 3.37
- D 26

Q20 Which of these statements is TRUE about I/O modules in computer basic elements?

- A It transfers data from external devices to processor and memory, and vice versa.
- B It contains external buffers.
- C It contains internal buffers for data exchange.
- D It moves data between the computer and the internal environment.

Q21 Determine which of these statements is NOT an objective of operating system.

- A An operating system makes a computer more convenient to use.
- B An operating system allows the computer system resources to be used in an efficient manner.
- C An operating system should be constructed in such a way as to permit the effective development, testing, and introduction of new system functions permissible without interfering with its service.
- D An operating system should manage computer hardware and its external environment.

Q22 What are the UNIX commands that will find all lines in the file *final_exam.txt* that contain the string "lulus" but do not contain the string "meniru" and display the output of the search to the computer screen?

- A `cat final_exam.txt | grep "lulus" | grep -v "meniru"`
- B `cat > final_exam.txt | grep "lulus" | grep -v "meniru"`
- C `cat >> final_exam.txt | grep "lulus" | grep -v "meniru"`
- D `cat | final_exam.txt | grep "lulus" | grep -v "meniru"`

Q23 The output from programs is usually written to the screen, while their input usually comes from the keyboard (if no file arguments are given). What is the UNIX command to display the input "Peperiksaan Akhir" that user keyin from the keyboard to the computer screen?

- A `cat Peperiksaan Akhir`
- B `echo Peperiksaan Akhir`
- C `echo Peperiksaan Akhir > screen`
- D `cat Peperiksaan Akhir > screen`

Q24 What is the UNIX command example if we want to append the output of the echo command to a file?

- A `echo nama_pelajar < gagal_DAT10303`
- B `echo nama_pelajar > gagal_DAT10303`
- C `echo nama_pelajar >> gagal_DAT10303`
- D `echo >> gagal_DAT10303`

Q25 What will the UNIX command `chmod 600 private.txt` do?

- A sets the permissions on file *private.txt* to `r-----`
- B sets the permissions on file *private.txt* to `-w-----`
- C sets the permissions on file *private.txt* to `r-x-----`
- D sets the permissions on file *private.txt* to `rw-----`

Q26

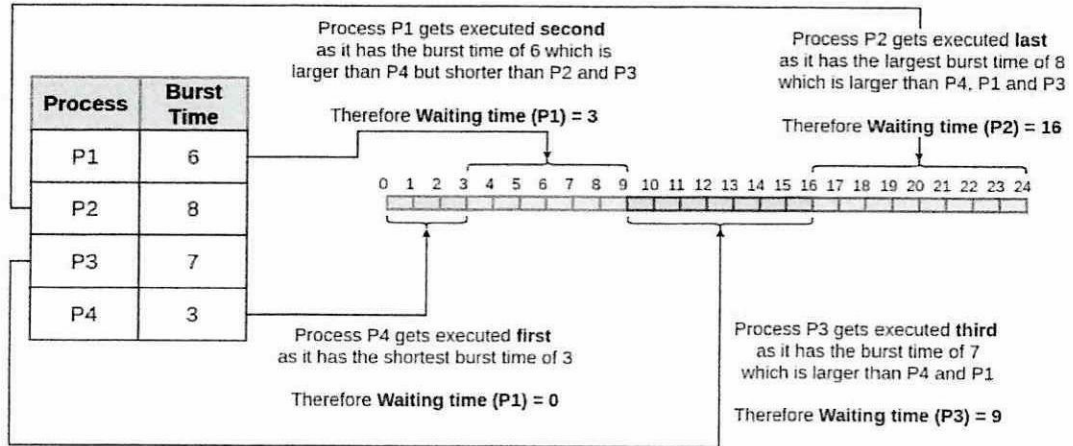
```
/usr/bin/mkdir
```

What is the UNIX command that will produce the above figure on the screen, where it will show the user where an application program or system utility is stored on disk?

- `locate mkdir`
- `which mkdir`
- `find mkdir`
- `info mkdir`

- Q27** Every file or directory on a UNIX system has three types of permissions, describing what operations can be performed on it by various categories of users. The three categories of user by sequence are _____ .
- A user/owner, group and others.
 - B owner, others and group.
 - C owner, user and others.
 - D user, owner and general public.
- Q28** File and directory permissions can only be modified by their owners, or by the superuser (root), by using the _____ system utility UNIX command.
- A chgrp
 - B chown
 - C sudo
 - D chmod
- Q29** What is the function of **pwd** UNIX command?
- A Change the user account passwords.
 - B Reports information on current running processes, outputting to standard output.
 - C Displays the full absolute path to your current location in the filesystem.
 - D Print your current working directory a file.
- Q30** This scheduling algorithm is similar to the First in First out queue in data structure, where the data element which is added to the queue first, is the one who leaves the queue first. What is this scheduling algorithm called?
- A First Come First Serve.
 - B Shortest Job First.
 - C First in Last Out.
 - D Longest Job First.
- Q31** Which is NOT the disadvantages of the First Come First Serve scheduling algorithm?
- A Its algorithm is not complex as it just puts the process requests in a queue and executes it one by one.
 - B Eventually, every process will get to run.
 - C If a process is started, the CPU will execute the process until it ends.
 - D It is simple and easy to implement.

Q32



The diagram above would best describe which CPU scheduling algorithm?

- A Round Robin.
- B First Come First Serve.
- C Shortest Job First.
- D First In Last Out.

Q33 Which is NOT the description for Round Robin Scheduling algorithm?

- A A round-robin scheduler generally employs time-sharing, giving each job a time slot or quantum.
- B While performing a round-robin scheduling, a particular time quantum is allotted to different jobs.
- C Each process gets a chance to reschedule after a particular quantum time in this scheduling.
- D It sorts all the process according to the arrival time.

Q34 Why does fixed partitioning suffer from internal fragmentation?

- A Because the memory "holes" left between two partitions may be too small for another process to use.
- B Because all the small holes are being combined into one larger hole.
- C Because compaction is used,
- D Because some processes may use less memory than the fixed partition size.

Q35

Request 70	A	128	256	512
Request 35	A	B	64	256
Request 80	A	B	64	C
Return A	128	B	64	C
Request 60	128	B	D	C
Return B	128	64	D	C
Return D	256	C	128	512
Return C	1024			

State the memory management technique that would best describe the above diagram.

- A Fixed partitioning.
- B Buddy system.
- C Round robin scheduling
- DD ynamic partitioning.

Q36

Process	Duration	Order	Arrival Time
P1	3	1	0
P2	4	2	0
P3	3	3	0

Suppose time quantum is 1 unit.

P1	P2	P3	P1	P2	P3	P1	P2	P3	P2
0 10									

P1 waiting time : 4

The average waiting time(AWT) : $(4+6+6)/3=5.33$

P2 waiting time: 6

P3 waiting time: 6

The diagram above would best describe which CPU scheduling algorithm?

- A Round Robin.
- B First Come First Serve.
- C Shortest Job First.
- D First In First Out.

Q37

PROCESS	BURST TIME
P1	21
P2	3
P3	6
P4	2



The above data is for an example of First Come First Serve scheduling algorithm, which shows 4 processes and its burst time. Supposed that the processes arrived in the order of P₁, P₂, P₃ and P₄. What is the waiting time for P₁?

- A 30
- B 24
- C 21
- D 0

Q38

PROCESS	BURST TIME
P1	21
P2	3
P3	6
P4	2



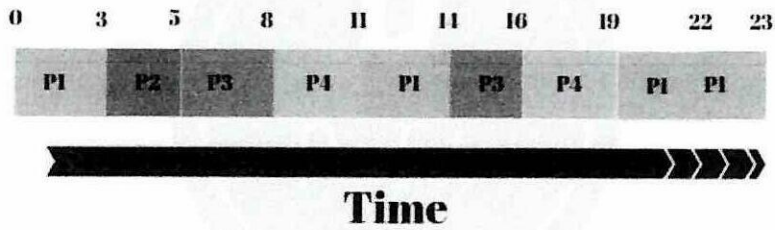
Calculate the average process waiting time for the above data if it uses the Shortest Job First scheduling algorithm.

- A 8
- B 4.5
- C 2.75
- D 2.25

Q39 Which is FALSE about the First-Fit memory allocation algorithm?

- A Scans from memory last placement location.
- B Simplest technique.
- C Fastest.
- D Finds the first big enough block from the beginning of memory.

Q40



Process	Burst Time
P1	10
P2	2
P3	5
P4	6

The figure above is the order in which the CPU processes the process are (Gantt Chart) using the Round Robin scheduling algorithm and the data of the burst time of the 4 processes. Determine the time quantum use for this algorithm.

- A 1
- B 2
- C 3
- D 4

SECTION B (20 MARKS)**State TRUE or FALSE**

- Q41** Files management comes from the general idea that “any problems in computer science can be solved by adding indirection”.
- Q42** Memory needs to be allocated efficiently to pack as many processes into memory as possible.
- Q43** In the First Come First Serve (FCFS) scheduling algorithm, the process which arrives first, will be executed last.
- Q44** Records is a collection of related fields.
- Q45** Virtually all computers provide a mechanism by which other modules (I/O, memory) may interrupt the normal sequencing of the processor.
- Q46** Files is a collection of related data where relationships exist among the elements.
- Q47** Database consists of one or more files.
- Q48** Records is a basic element of data and contains a single value.
- Q49** File management systems provides services to users and applications in the use of files.
- Q50** Threads reside inside the process and each thread belongs to exactly one process.
- Q51** A directory system should support several operations including searching, creating, and listing of files as well as listing and updating directories.
- Q52** Virtual memory takes program addresses and maps them to RAM address.
- Q53** In virtual memory Physical Addresses (PA) is what the hardware uses to talk to the RAM where the address space is determined by how much RAM is installed.
- Q54** In most memory management schemes; the kernel occupies some fixed portion of main memory and the rest is shared by multiple processes.
- Q55** The programmer knows where the program will be placed in memory when it is executed, whether it may be swapped to disk and return to main memory at a different location (relocated).
- Q56** A thread of execution is the smallest sequence of programmed instructions that cannot be managed independently by scheduler.
- Q57** In dynamic partitioning, partitions are of variable length and number.
- Q58** Fixed partitioning will cause internal fragmentation.
- Q59** Thread is a lightweight process.

Q60 Program execution consists of repeating the process of instruction fetch and instruction execution.

SECTION C (40 MARKS)

Q61 (a) Describe **THREE (3)** common problems of memory, you should expand your answer based on your own words.

(9 marks)

(b) Describe virtual memory.

(4 marks)

(c) Illustrate the Five State Process Model.

(7 marks)

Q62 (a) Explain **FIVE (5)** services provided by an operating system.

(10 marks)

(b) Illustrate the layers and views of a computer system.

(7 marks)

(c) Elaborate **THREE (3)** factors that pushes the evolution of an operating system over time.

(3 marks)

- END OF QUESTIONS -