MT1 Revision

Question 1: MCQs

Α.

The user and kernel modes define

a. client mode of operation (**b.** dual-mode of operation) **c.** symmetric mode of operation d. non symmetric mode of operation 2. implies that a computer is simultaneously running two or more instructions at the same time

a. Client

b. Multi-tasking

c. multicore

d. multi-processors

3. Storage systems can be organized in a hierarchy according to

a. Speed, size, volatility

b. Speed, cost, size

c. Volatility, cost, technology

d. Cost, size, usage

4. specifies the address of next instruction to execute

a. Loop

b. Timer

c. Program counter

d. Instruction register

Α.

5. Setting up a timer to avoid infinite loop is done at

a. user level

(b. kernel level

c. application level

d. hardware level

6. OS determines the status of a device using

a. devices status table

b. Interrupt

c. register

d. CPU

7. The four components of a computer system are

a. H/W, OS, applications programs and networkc. H/W, system calls, application programs and users

b. H/W, OS, application programs and users **d.** H/W, OS, application programs and I/O

8. Program that initializes all system aspects, from CPU registers to device controller and memory is called

a. software

b. application program

c. middleware

d. bootstrap

Α.

9. Multiplexing the CPU among many process is a way of achieving

a. concurrency	b. efficiency	c. speed	d. volatility			
10. When an interrupt occurs, is used to get address of interrupt service routine						
a. memory	b. hardware	(c. interrupt vector	d. operating system			
11. Operating systems provide an environment for:						

a. execution of programs by providing services to users only
b. execution of programs by providing services to users and programs
b. execution of programs by providing services to programs only
c. execution of programs by providing services to users and programs
d. none of the given

12. Almost all operating systems have a User interface (UI) that may be:

a. command-line interface

b. graphics user interface

c. batch

d. all of the given

Β.

13. Operating system services that provide functions that are helpful to the user include:

a. I/O operations**b.** Inter-process communications**c.** Error handling**d.** all of the given

14. A method used to pass parameters to the OS:

a. pass them in registers **b.** store them in a memory block **c.** push them onto the stack (**d.** all o

(**d.** all of the given

15. In the design and implementation of an operating system:

a. mechanisms and policies are not considered as different conceptsc. mechanisms determine how to do, policies decide what to do

b. mechanisms and policies have the same conceptsd. none of the given

16. The processor can transit from kernel mode to user mode, if

a. user executes a privileged instruction (**b.** I/O is completed

c. user executes a trap instruction **d.** none of the given

Β.

17. is an operating system function that controls the order and time in which programs are run.

a. File Management

b. Job Scheduling

c. Task Management

d. I/O Management

18. is an operating system function that manages the placement of programs and data in memory

a. Task Management

b. Device Management

c. Job Management

d. Memory Management

19. is used to allow execution of processes not completely in memory

a. Bootstrap program

b. Main memory

c. Virtual memory

d. Dual mode

20. Bootstrap program is stored in

a. magnetic disks

(**b.** read only memory

c. random access memory **d.** tape drivers

Β.

21. is an operating system function that controls the order and time in which programs are run.

a. File Management

b. Job Scheduling

c. Task Management

d. I/O Management

22. The routine determines the nature of the interrupt and performs whatever actions are needed

a. interrupt handler**b.** device controller**c.** program handler**d.** interrupt signal

23. is a program that assists in maintaining a computer's magnetic disks to ensure optimal performance

a. File Compression

b. Storage Management

c. File Management

d. Mass Storage Management

24. is a program that accepts requests for action from OS and causes a device to execute the requests

a. Utility

(**b.** Driver

c. Taskbar

d. Icon

Β.

25. The mode bit is added to the hardware of the computer to indicate:

a. the mode of processing: CPU processing or I/O processingc. the mode of disk controller: reading mode or writing mode

26. A program counter is used to:

a. count the number of executed instructions so farc. Specify the location of the next instruction to be executed)

b. the mode of operation: kernel mode or user moded. specify the location of the next instruction to be executed

b. count the total number of instructions in a program

d. Count the number of instructions the CPU will execute for a program within the current time slice

27. In a multiprocessor environment, making sure that the local cache of each CPU maintains the same value of a datum is called:

(a. Cache coherency

b. cache redundancy`

c. cache poisoning

d. cache replacement policy

Β.

29. A database server provided by a cloud service provider is an example of:

a. Software as a Service

b. Platform as a Service

c. Server as a Service

d. Infrastructure as a Service

30. Initial program that runs at the startup of computer and initializes all aspects of the system is called:

a. Firmware

b. Bootsware

c. Software

d. Interrupt vector

31. The program that handles interrupt is called:

a. Interrupt vector

b. Interrupt service routine

c. Interrupt supervisor

d. Interrupt service provider

32. Handheld computers are optimized for

a. Design and cost

b. Software and hardware

c. Usability and battery life **d.** Speed and size

Β.

33. Examples of APIs include:

a. Win32 API for Windows	b. POSIX API for POSIX-based systems	c. Java API for the JVM	d. All of the given			
34. Why would a programmer use APIs rather than invoke actual system calls?						
a. Portability	b. avoiding low level details	(c. a and b	d. none of the given			
35. operating-system services are functions that are helpful to the user such as:						
a. Load a program into memorc. File manipulation for the run	y and run that program b. P uning program d. a	b. Process I/O operations for the running programd. all of the given				
36. Processes may exchange information, on the same computer or between computers over a network, via:						
a. shared memory only	b. message passing only	(c. a and b)	d. none of the given			

Β.

37. In microkernel communication takes place between user modules using:

a. Bus

b. Shared memory

c. Message passing

d. System call

38. Which system structure the different OS modules are loadable on need basis into the kernel?

a. Microkernel system

b. Monolithic system

c. Layered System

d. Modular system

39. In a modular operating system, which of the statements is true?

a. All components can be loadable as needed within the kernel**c.** All components run in user mode

b. All components communicate through the kernel message passingd. Each component uses functions and services provided only by lower-level layers

Question 2: T/F

- 1. CLI or command interpreter allows direct command entry
- 2. Application Programming Interface is a programming interface to the services provided by the OS
- 3. Many modern operating systems implement loadable kernel modules
- 4. Internal structure of different operating systems are same



Β.

1. Which of the following instructions should be privileged?

- Set value of timer
- Read the clock
- Clear memory
- Switch from user to kernel mode

Β.

1. What abstracts the hardware? Why? Give an example of such abstraction.

Hardware can be abstracted by virtualization into several different execution environments
To:

- create the illusion that each separate environment is running on its own private computer
- \circ and allow operating systems to run as applications within other operating systems.
- Ex. A virtual machine is created on a Mac OS host and run MS Windows OS guest.

Β.

1. What is the difference between: mono-programming and multiprogramming.

- In a monoprogram machine a single job occupies the system from start until end.
 - \circ $\,$ In such a case CPU sits idle when there is a need of user action.
- A multiprogram machine increases CPU utilization by organizing jobs
 - \circ so that CPU always has something to execute.

Β.

1. What are the three main purposes of an operating system?

- To provide an <u>environment</u> for a computer user <u>to execute programs</u> on computer hardware in a convenient and efficient manner.
- Resource allocator. To allocate the resources of the computer as needed to solve the problem given. The allocation process should be as fair and efficient as possible.
 - As <u>a control program</u> it serves two major functions: (1) supervision of the execution of user programs to prevent errors and improper use of the computer, and (2) management of the operation and control of I/O devices.

- 1. What is the main feature of a microkernel?
 - makes extending the operating system easier
 - When the kernel does have to be modified, the changes tend to be fewer, because the microkernel is a smaller kernel.

- 1. What are the advantages of using loadable kernel modules?
 - Uses object-oriented approach
 - Each core component is separate
 - Each talks to the others over known interfaces
 - Each is loadable as needed within the kernel
 - More flexible than a layered system, because any module can call any other module
 - to provide core services, while other services are implemented dynamically, as the kernel is running
 - linking services dynamically is preferable to adding new features directly to the kernel
 - does not require recompiling the kernel every time a change was made

- 1. What is the function of SYSGEN utility?
- SYSGEN process combines information concerning the specific configuration of the hardware system with OS general-purpose code to produce an operating system customized for a particular environment
 - Used to build system-specific compiled kernel or system-tuned.

Β.

1. What are the two modes of inter-process communication? What are the strengths and weaknesses of the two approaches?



- 1. How does caching help in improving the performance of a computer?
 - □ In caching information in use copied from slower to faster storage temporarily
 - When we need a particular piece of information:
 - we first check whether it is in the cache
 - if it is, we use the information directly from the cache which is faster memory



Β.



1. Two common computing models are: client-server computing model and peer-to-peer computing model. What is the difference between these models?

In the client-server model, the clients request services and only the server can provide a service.

□ In peer-to-peer model, each node can request or provide services.

Β.

1. What is an advantage of peer-to-peer model over client-server model?

□ No single point of failure or bottleneck



Β.

1. In a peer-to-peer model, there are two general ways to determine what services are available, explain these two ways?

• Centralized service lookup:

in this way, when a node joins a P2P network, it registers its service with a centralized lookup service on the network which can then be consulted by nodes requesting service.

Ch01

P043

Discovery protocol:

A node requesting a service broadcasts a request to all nodes in the network. A node that provides the service can then respond to such request.

Β.

1. What are the differences between a trap and an interrupt? What is the use of each function?

- An interrupt is a hardware-generated signal that changes the flow within the system
 - An interrupt can be used to signal the completion of I/O so that the CPU doesn't have to spend cycles polling the device.
- A trap is a software generated interrupt
 - \circ A trap can be used to catch arithmetic errors or to call system routines.



Β.

1. What is the difference between symmetric and asymmetric multiprocessor systems?

- In asymmetric system, one machine is in hot-standby mode while the other is running the applications.
 - The hot-standby host machine does nothing but monitor the active server.
 - \circ If that server fails, the hot-standby host becomes the active server.
- □ In symmetric clustering, two or more hosts are running applications and are monitoring each other.
 - This structure is obviously more efficient, as it uses all of the available hardware.
 - However, it does require that more than one application be available to run.



Β.

1. Why is DMA preferred method of accessing fast devices like disk? Explain.

- DMA: Direct Memory Access, allows the device controller to transfer an entire block of data directly to or from the device and main memory at close to memory speeds for high speed devices.
 - data is transferred directly to memory without CPU intervention
 - only one interrupt is generated per block, rather than the one interrupt per byte.



Β.

1. What is dual-mode? Why is it used?

- A means of protection to ensure proper execution of operating system.
 - <u>Kernel mode</u> allows some privileged instructions to run.
 - this protection is achieved by marking some instructions as privileged and not allowing them to execute in <u>User mode</u>

Ch01

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Β.

1. What is the main advantage of multiprogramming?

Multiprogramming makes efficient use of the CPU
by overlapping the demands for the CPU and its I/O devices from various users.
It attempts to increase CPU utilization by always having something for the CPU to execute.



Β.

1. What are the main differences between operating systems for mainframe computers and PCs?

- The design goals of operating systems for these machines are quite different:
 - PCs ease of use is the main focus.
 - As for the mainframes, resource use is maximized.



Β.

1. What are the main types of system calls?

- Process control
- **G** File management
- Device management
- □ Information maintenance
- Communications
- Protection



Β.

1. List the advantages of microkernel system structure:

- Easier to extend a microkernel
- Easier to port the operating system to new architectures
- □ More reliable (less code is running in kernel mode)
- □ More secure



Β.

1. List the disadvantages of microkernel system structure:

Performance overhead of user space to kernel space communication,
because all communication between user space module should go through the messaging system of the kernel.



Β.

1. Explain the difference between a system call and a system program

System calls refer to operating system service and are executed in kernel mode.

System programs are user side programs that provide a convenient environment for program development and execution.

Ch01

P006 Ch02

P062

They call system calls to execute.

Β.

1. Below is the traditional UNIX System Structure with a list of its layers' contents.

You are asked to recognize the name and content of each layer, using its corresponding sequential number in the table of names, then put it on the structure in Figure 1.

(1) The users

(2) Shell and commands, Compilers and Interpreters, System libraries

(3) System-call interface to the kernel

- (4) Signal terminal handling, Character I/O system, Terminal drivers
- (5) File system, Swapping block I/O system, Disk and tape drivers
- (6) CPU scheduling, Page replacement, Demand paging, Virtual memory
- (7) Kernel interface to the hardware
- (8) Terminal controllers, Terminals
- (9) Device controllers, Disks and tapes
- (10) Memory controllers, Physical memory

	(1)			
	(2)			
(3)				
(4)	(5)	(6)		
(7)				
(8)	(9)	(10)		

