



Distributed Systems

Answer all Questions

Question One

A- Give true or false

1. As far as size (number of processors) is concerned, multicomputer with distributed memory are more scalable than shared-memory multiprocessors.
2. A program is executed on one processor and on the multiprocessor system. The total number of operations performed by n-processors in the multiprocessor system is greater than the number of operations performed by one processor.
3. Maximum efficiency for n-processor system is n.
4. A distributed system is one in which the components of an information system are distributed across multiple locations and computer networks.
5. A client/server system is a solution in which the presentation, presentation logic, application logic, data manipulation and data layers are distributed between client PCs and one or more servers.

B- 4D hypercube and number each node starting from 0000 to 1111

(ii) 2-D mesh with total of 16 processors

(iii) 2-D mesh with wraparound (which is also called torus) with total of 9 processors

C- Give the main differences between SDN networks and traditional network?

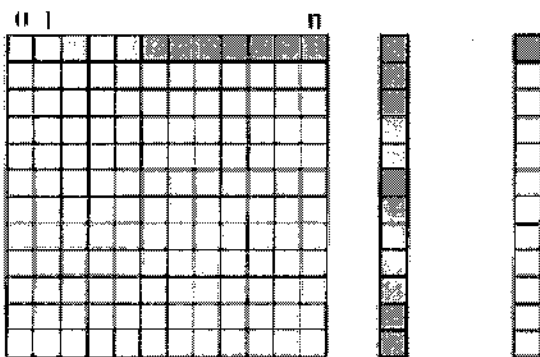
Question Two

1- What is middleware? How does it contribute to transparency (single system image) in distributed systems?

2- Consider the multiplication of a dense $n \times n$ matrix A with a vector b to yield another vector y . The i -th element $y[i]$ of the product vector is the dot-product of the i -th row of A with the input vector b i.e

$$y[i] = \sum_{j=1}^n A[i, j] \cdot b[j]$$

A b y



Study this problem then show how you can decompose this problem into tasks to be ready to execute in parallel.

3- Draw schematic diagram that gives the virtual Machine life cycle?

4- Give the Properties and Characteristics of cloud computing?

Question Three

1- Draw two examples of dynamic inter connection?

2- Explain the basic concept of SAN storage network?

3-Assume the following distributed database of suppliers and parts of a car fabrication company which consists of the following tables:

- Supplier table with attributes (Supplier number and city) contains of 10000 records at site A
 - Parts table with attributes (Part number, color) contains 100000 records at site B
 - Supplier-parts table with attributes (supplier number and part number) contains of 1000000 records at site A
- Also assume the data rate is 50000 bits per second , access delay= 0.1 second, Number of red parts is 10, Number of red shipments by London suppliers=100 000 and every record is stored in 25 byte long .
- If a user wants to execute the following query “Get supplier numbers for London suppliers of red parts”
Give 3 possible communication scenarios and calculate the communication time for each scenario.

Question Four

Choose the correct answer

1. What is stored in virtual machine log file?
 - a. Information of virtual machine’s activities
 - b. Virtual machine’s RAM contents
 - c. Virtual machine BIOS information
 - d. Information of virtual machine’s configuration
2. Which parameter determines the maximum amount of resource that a virtual machine can consume?
 - a. Share
 - b. Limit
 - c. Reservation
 - d. Priority
3. Which technology enables a physical CPU to appear as two or more logical CPUs?
 - a. Hyper-threading
 - b. Multi-core
 - c. Load balancing
 - d. Ballooning
4. Which optimization technique is used to detect identical pages in the memory?
 - a. Transparent page sharing
 - b. Memory ballooning
 - c. Memory swapping
 - d. Cache flushing
5. Which is the primary function of hypervisor?
 - a. Allows multiple operating systems to run concurrently on a physical machine
 - b. Allows multiple operating systems to run concurrently on a virtual machine
 - c. Allows multiple file systems to run concurrently on a virtual machine
 - d. Allows authorization to virtual machine resources to users
6. Which method enables a virtual machine to directly access a LUN on a storage array?
 - a. File system locking
 - b. Virtual machine clustering
 - c. Raw device mapping
 - d. Virtual storage mapping
7. What are the three major building blocks for automated storage tiering?
 - a. RAID type, storage type, policies
 - b. Storage type, storage group, policies
 - c. Storage group, RAID group, storage type
 - d. Storage group, RAID group, group policy
8. What is used to create secondary cache in cache tiering mechanism?
 - a. DRAM
 - b. FC drive
 - c. Solid state drive

- d. SATA drive
9. When is thin LUN preferred over traditional LUN?
 - a. Performance is predominant
 - b. Security is more important
 - c. Storage space efficiency is paramount
 - d. High availability is predominant
 10. What defines the minimum amount of physical storage allocated at a time to a thin LUN from a thin Pool?
 - a. Thin LUN extent
 - b. Thin LUN capacity
 - c. Thin LUN factor
 - d. Thin LUN set size
 11. Which is a benefit of network virtualization?
 - a. Enhanced storm control
 - b. Increased resource acquisition
 - c. Improved manageability
 - d. Better policy control
 12. Which network parameter sets maximum data transfer rate across a virtual machine port group without queuing or dropping frames?
 - a. Burst size
 - b. Peak bandwidth
 - c. Share
 - d. Limit
 13. As an organization leverages more resources from Cloud service providers, which expense of the organization would be expected to grow larger?
 - a. Power and energy
 - b. Management
 - c. Infrastructure
 - d. Operational
 14. Which technique allows traffic from multiple VLANs to traverse over a single network connection?
 - a. NIC Teaming
 - b. Multipathing
 - c. Port group
 - d. Trunking
 15. What is enabled by using NIC teaming?
 - a. Balance traffic across physical servers
 - b. Allocate bandwidth to traffic based on priority
 - c. Failover to another available physical NIC in the event of a physical NIC failure
 - d. Transfer data to a LUN on a FC storage system using multiple network links
 16. What best describes the "metered service" characteristic of Cloud computing?
 - a. Consumers are billed based on resource usage.
 - b. Services are provisioned based on their demand
 - c. Metering services are created when required from the resource pools.
 - d. Metering services can scale up and down based on resource usage.
 17. Which correctly describes N_Port ID Virtualization technology?
 - a. Single physical FC HBA port functions as multiple virtual N_ports
 - b. Single physical FC HBA port functions as multiple virtual E_ports
 - c. Single virtual FC HBA port functions as multiple physical N_ports
 - d. Single virtual FC HBA port functions as multiple physical E_ports
 18. What correctly describes application virtualization?

- a. Encapsulates operating system resources and the application
 - b. Increases application and CPU utilization
 - c. Provides interoperability between different application versions
 - d. Breaks dependencies between application interface and processing logic
19. What is true about application encapsulation?
- a. Requires a locally installed agent on the client machine
 - b. Requires a built-in agent at the remote server
 - c. Does not rely on software installation or underlying OS
 - d. Requires a locally installed agent on the client machine and a built-in agent
20. What is true about application streaming?
- a. Requires no agent at client machine
 - b. Requires a locally installed agent on the client machine and a built-in agent on the application
 - c. Requires a locally installed agent on the client machine
 - d. All the data is delivered to the client after application starts

Question Five

- 1-What are the main types distributed systems architectures models?
- 2- Compare host based virtualization and para virtualization.
 - 3- Classify the distributed systems according to
 - Memory distribution?
 - Processes and Granularity
 - Connection topology?
- 3- Explain three applications of IOT

Question six

1. Write one page of your term paper (Digital transformation or Block chain) showing the basic concepts, algorithms and techniques.

With my best wishes Dr. Hatem 2021