Technical

1. Who invented Compact Disc?

Ans : James T Russel

2. Which day is celebrated as world Computer Literacy Day?

Ans : December 2

3. Who invented Java?

Ans : James A Gosling

4. Longhorn was the code name of ?

Ans : Windows Vista

5. Who is known as the Human Computer of India?

Ans : Shakunthala Devi

6. What is mean by Liveware?

Ans : People who work with the computer

7. Which computer engineer got Nobel Prize for literature in 2003?

Ans : J.M. Coetzee

8. 'Weaving The Web' was written by.....

Ans : Tim Burners Lee

9. What is Beta Test?

Ans : Trial test of a computer or software before the commercial launch

10. 'Do no evil' is tag line of ......

Ans : Google

11. First Indian cinema released through internet is .....

Ans : Vivah

12. Rediff.com was founded by.....

Ans : Ajith Balakrishnan and Manish Agarwal

13. What is the extension of PDF?

Ans : Portable document format

14. Mows is a type of mouse for .... people

Ans : Physically handicapped people

15. Expand RDBMS?

Ans : Relational Data Base Management System

16. Difference engine was developed by.....

Ans : Charles Babbage

17. Orkut.com is now owned by ......

Ans : Google

18. World's first microprocessor is .....

Ans : Intel 4004

19. What is SQL?

Ans : Structured Query Language

20. What is the expansion of COBOL?

Ans : Common Business Oriented Language

21. What is the expansion of SMS?

Ans : Short Message Service

22. Which IT company's nickname is ' The Big Blue ' ?

Ans : IBM

23. What is the full form of   IEEE?

Ans : Institute of Electric and Electronic Engineers

24. Who developed COBOL?

Ans : Grace Murry Hopper

25. Email was developed by......

Ans : Raymond Samuel Tomlinson (Ray Tomlinson)

26. Green dam is ......

Ans : Web Filter

27. What is the expanded form of CMOS ?

Ans : Complementary Metal Oxide Semoconductor

28. Who is Netizen ?

Ans : Net Citizen (Citizen who uses internet)

29. What is Scareware?

Ans : Fake antivirus softwares

30. When was the first smart phone launched?

Ans : 1992 (IBM Simon)

31.   Solar power generates electricity from what source?

Ans : The Sun

32. Did the Apple iPhone first become available in 2005, 2006 or 2007?

Ans :   2007

33. What is the Earth's primary source of energy?

Ans :   The Sun

34. IBM is a well known computer and information technology company, what does IBM stand for?

Ans :   International Business Machines

35.   Along with whom did Bill Gates found Microsoft?

Ans :   Paul Allen

36. What science fiction writer wrote the three laws of robotics?

Ans :   Isaac Asimov

37. True or false? In computing, keyboards are used as input devices.

Ans :   True

38 . What does the abbreviation WWW stand for?

Ans :   World Wide Web

39. Nano, Shuffle, Classic and Touch are variations of what?

Ans :   The Apple iPod

40. True or false? DNA is an abbreviation for 'Deoxyribonucleic acid'.

Ans :   True

41.   Did the original Sony Playstation use CDs or cartridges to play games?

Ans :   CDs

42. In terms of computing, what does ROM stand for?

Ans :   Read Only Memory

43. True or false? Atomic bombs work by atomic fission.

Ans :   True

44. The technologically advanced humanoid robot ASIMO is made by which car company?

Ans :   Honda

45. Firefox, Opera, Chrome, Safari and Explorer are types of what?

Ans :   Web browsers

46. Is the wavelength of infrared light too long or short to be seen by humans?

Ans :   Long

47. The Hubble Space Telescope is named after which American astronomer?

Ans :   Edwin Hubble

48. Which Penguin is the mascot of Linux Operating system?

Ans :   TUX

49.   i pad is manufactured by

Ans :   Apple

50. Which IT company got name from Sanfrancisco?

Ans : CISCO

51. "Connecting people" is the tagline of ....

Ans : Nokia

52. What is IMEI?

Ans : International Mobile Equipment Identity.

53. What is e-zine?

Ans : Electronic Magazines.

54. What is the expansion of ASCII?

Ans : American Standard Code for Information Interchange.

55. Who developed first portable computer?

Ans : Adam Osborne

56. What is NIC?

Ans : Network Interface Card

57. Whose motto is "wisdom of mass principle?

Ans : Wikipedia

58. Who is the father of computer ethics?

Ans : Norbetweiner

59. Which Indian state implemented 'Cyber Grameen' ?

Ans : Andhra Pradesh

60. GPS was developed by?

Ans : US Army

61. What is Blue Brain project?

Ans : Cloning of human brain.

62. Which famous web site was found by Jeffry Bezos?

Ans : Amazon.com

63. What is three finger salutes?

Ans :   Pressing Ctrl + Alt + Del

64. In which year Microsoft Office was launched?

Ans :   1989

65. Who invented Compact Disc?

Ans :   James T Russel

66. Which day is celebrated as world Computer Literacy Day?

Ans :   December 2

67. Who is known as the Human Computer of India?

Ans :   Shakunthala Devi

68. Which computer engineer got Nobel Prize for literature in 2003?

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74. Email was developed by....

Ans :   Raymond Samuel Tomlinson (Ray Tomlinson)

75. When was the first smart phone launched?

Ans :   1992 (IBM Simon)

76. TFTP stands for?

Ans :   Trivial File Transfer Protocol (TFTP)

SQL Server

What is RDBMS?

Relational Data Base Management Systems (RDBMS) are database management systems that maintain data records and indices in tables. Relationships may be created and maintained across and among the data and tables. In a relational database, relationships between data items are expressed by means of tables. Interdependencies among these tables are expressed by data values rather than by pointers. This allows a high degree of data independence. An RDBMS has the capability to recombine the data items from different files, providing powerful tools for data usage.

What are the properties of the Relational tables?

Relational tables have six properties:

Values are atomic.

Column values are of the same kind.

Each row is unique.

The sequence of columns is insignificant.

The sequence of rows is insignificant.

Each column must have a unique name.

What is Normalization?

Database normalization is a data design and organization process applied to data structures based on rules that help building relational databases. In relational database design, the process of organizing data to minimize redundancy is called normalization. Normalization usually involves dividing a database into two or more tables and defining relationships between the tables. The objective is to isolate data so that additions, deletions, and modifications of a field can be made in just one table and then propagated through the rest of the database via the defined relationships.

What is De-normalization?

De-normalization is the process of attempting to optimize the performance of a database by adding redundant data. It is sometimes necessary because current DBMSs implement the relational model poorly. A true relational DBMS would allow for a fully normalized database at the logical level, while

providing physical storage of data that is tuned for high performance. De-normalization is a technique to move from higher to lower normal forms of database modeling in order to speed up database access.

What are different normalization forms?

1NF: Eliminate Repeating Groups Make a separate table for each set of related attributes, and give each table a primary key. Each field contains at most one value from its attribute domain.

2NF: Eliminate Redundant Data If an attribute depends on only part of a multi-valued key, remove it to a separate table.

3NF: Eliminate Columns Not Dependent On Key If attributes do not contribute to a description of the key, remove them to a separate table. All attributes must be directly dependent on the primary key.

BCNF: Boyce-Codd Normal Form If there are non-trivial dependencies between candidate key attributes, separate them out into distinct tables.

4NF: Isolate Independent Multiple Relationships No table may contain two or more 1:n or n:m relationships that are not directly related.

5NF: Isolate Semantically Related Multiple Relationships There may be practical constrains on information that justify separating logically related many-to-many relationships.

ONF: Optimal Normal Form A model limited to only simple (elemental) facts, as expressed in Object Role Model notation.

DKNF: Domain-Key Normal Form A model free from all modification anomalies is said to be in DKNF.

Remember, these normalization guidelines are cumulative. For a database to be in 3NF, it must first fulfill all the criteria of a 2NF and 1NF database.

What is Stored Procedure?

A stored procedure is a named group of SQL statements that have been previously created and stored in the server database. Stored procedures accept input parameters so that a single procedure can be used over the network by several clients using different input data. And when the procedure is modified, all clients automatically get the new version. Stored procedures reduce network traffic and improve performance. Stored procedures can be used to help ensure the integrity of the database.

e.g. sp_helpdb, sp_renamedb, sp_depends etc.

What is Trigger?

A trigger is a SQL procedure that initiates an action when an event (INSERT, DELETE or UPDATE) occurs. Triggers are stored in and managed by the DBMS. Triggers are used to maintain the referential

integrity of data by changing the data in a systematic fashion. A trigger cannot be called or executed; DBMS automatically fires the trigger as a result of a data modification to the associated table. Triggers can be viewed as similar to stored procedures in that both consist of procedural logic that is stored at the database level. Stored procedures, however, are not event-drive and are not attached to a specific table as triggers are. Stored procedures are explicitly executed by invoking a CALL to the procedure while triggers are implicitly executed. In addition, triggers can also execute stored procedures.

What is Nested Trigger?

A trigger can also contain INSERT, UPDATE and DELETE logic within itself, so when the trigger is fired because of data modification it can also cause another data modification, thereby firing another trigger. A trigger that contains data modification logic within itself is called a nested trigger.

What is View?

A simple view can be thought of as a subset of a table. It can be used for retrieving data, as well as updating or deleting rows. Rows updated or deleted in the view are updated or deleted in the table the view was created with. It should also be noted that as data in the original table changes, so does data in the view, as views are the way to look at part of the original table. The results of using a view are not permanently stored in the database. The data accessed through a view is actually constructed using standard T-SQL select command and can come from one to many different base tables or even other views.

What is Index?

An index is a physical structure containing pointers to the data. Indices are created in an existing table to locate rows more quickly and efficiently. It is possible to create an index on one or more columns of a table, and each index is given a name. The users cannot see the indexes; they are just used to speed up queries. Effective indexes are one of the best ways to improve performance in a database application. A table scan happens when there is no index available to help a query. In a table scan SQL Server examines every row in the table to satisfy the query results. Table scans are sometimes unavoidable, but on large tables, scans have a terrific impact on performance.

What is a Linked Server?

Linked Servers is a concept in SQL Server by which we can add other SQL Server to a Group and query both the SQL Server dbs using T-SQL Statements. With a linked server, you can create very clean, easy to follow, SQL statements that allow remote data to be retrieved, joined and combined with local data. Stored Procedure sp_addlinkedserver, sp_addlinkedsrvlogin will be used add new Linked Server.

What is Cursor?

Cursor is a database object used by applications to manipulate data in a set on a row-by- row basis, instead of the typical SQL commands that operate on all the rows in the set at one time.

In order to work with a cursor we need to perform some steps in the following order:

Declare cursor

Open cursor

Fetch row from the cursor

Process fetched row

Close cursor

Deallocate cursor

What is Collation?

Collation refers to a set of rules that determine how data is sorted and compared. Character data is sorted using rules that define the correct character sequence, with options for specifying case sensitivity, accent marks, kana character types and character width.

What is Difference between Function and Stored Procedure?

UDF can be used in the SQL statements anywhere in the WHERE/HAVING/SELECT section where as Stored procedures cannot be. UDFs that return tables can be treated as another rowset. This can be used in JOINs with other tables. Inline UDF's can be thought of as views that take parameters and can be used in JOINs and other Rowset operations.

What is sub-query? Explain properties of sub-query?

Sub-queries are often referred to as sub-selects, as they allow a SELECT statement to be executed arbitrarily within the body of another SQL statement. A sub-query is executed by enclosing it in a set of parentheses. Sub-queries are generally used to return a single row as an atomic value, though they may be used to compare values against multiple rows with the IN keyword.

A subquery is a SELECT statement that is nested within another T-SQL statement. A subquery SELECT statement if executed independently of the T-SQL statement, in which it is nested, will return a resultset. Meaning a subquery SELECT statement can standalone and is not depended on the statement in which it is nested. A subquery SELECT statement can return any number of values, and can be found in, the column list of a SELECT statement, a FROM, GROUP BY, HAVING, and/or ORDER BY clauses of a T-SQL statement. A Subquery can also be used as a parameter to a function call. Basically a subquery can be used anywhere an expression can be used.

What are different Types of Join?

Cross Join A cross join that does not have a WHERE clause produces the Cartesian product of the tables involved in the join. The size of a Cartesian product result set is the number of rows in the first table

multiplied by the number of rows in the second table. The common example is when company wants to combine each product with a pricing table to analyze each product at each price.

Inner Join A join that displays only the rows that have a match in both joined tables is known as inner Join. This is the default type of join in the Query and View Designer.

Outer Join A join that includes rows even if they do not have related rows in the joined table is an Outer Join. You can create three different outer join to specify the unmatched rows to be included:

Left Outer Join: In Left Outer Join all rows in the first-named table i.e. "left" table, which appears leftmost in the JOIN clause are included. Unmatched rows in the right table do not appear.

Right Outer Join: In Right Outer Join all rows in the second-named table i.e. "right" table, which appears rightmost in the JOIN clause are included. Unmatched rows in the left table are not included.

Full Outer Join: In Full Outer Join all rows in all joined tables are included, whether they are matched or not.

Self Join This is a particular case when one table joins to itself, with one or two aliases to avoid confusion. A self join can be of any type, as long as the joined tables are the same. A self join is rather unique in that it involves a relationship with only one table. The common example is when company has a hierarchal reporting structure whereby one member of staff reports to another. Self Join can be Outer Join or Inner Join.

What are primary keys and foreign keys?

Primary keys are the unique identifiers for each row. They must contain unique values and cannot be null. Due to their importance in relational databases, Primary keys are the most fundamental of all keys and constraints. A table can have only one Primary key. Foreign keys are both a method of ensuring data integrity and a manifestation of the relationship between tables.

What is User Defined Functions? What kind of User-Defined Functions can be created?

User-Defined Functions allow defining its own T-SQL functions that can accept 0 or more parameters and return a single scalar data value or a table data type.

Different Kinds of User-Defined Functions created are:

Scalar User-Defined Function A Scalar user-defined function returns one of the scalar data types. Text, ntext, image and timestamp data types are not supported. These are the type of user-defined functions that most developers are used to in other programming languages. You pass in 0 to many parameters and you get a return value.

Inline Table-Value User-Defined Function An Inline Table-Value user-defined function returns a table data type and is an exceptional alternative to a view as the user-defined function can pass

parameters into a T-SQL select command and in essence provide us with a parameterized, non-updateable view of the underlying tables.

Multi-statement Table-Value User-Defined Function A Multi-Statement Table-Value user-defined function returns a table and is also an exceptional alternative to a view as the function can support multiple T-SQL statements to build the final result where the view is limited to a single SELECT statement. Also, the ability to pass parameters into a TSQL select command or a group of them gives us the capability to in essence create a parameterized, non-updateable view of the data in the underlying tables. Within the create function command you must define the table structure that is being returned. After creating this type of user-defined function, It can be used in the FROM clause of a T-SQL command unlike the behavior found when using a stored procedure which can also return record sets.

What is Identity?

Identity (or AutoNumber) is a column that automatically generates numeric values. A start and increment value can be set, but most DBA leave these at 1. A GUID column also generates numbers; the value of this cannot be controlled. Identity/GUID columns do not need to be indexed.

What is DataWarehousing?

Subject-oriented, meaning that the data in the database is organized so that all the data elements relating to the same real-world event or object are linked together;

Time-variant, meaning that the changes to the data in the database are tracked and recorded so that reports can be produced showing changes over time;

Non-volatile, meaning that data in the database is never over-written or deleted, once committed, the data is static, read-only, but retained for future reporting.

Integrated, meaning that the database contains data from most or all of an organization's operational applications, and that this data is made consistent.

UNIX

How are devices represented in UNIX?

All devices are represented by files called special files that are located in /dev directory. Thus, device files and other files are named and accessed in the same way. A 'regular file' is just an ordinary data file in the disk. A 'block special file' represents a device with characteristics similar to a disk (data transfer in terms of blocks). A 'character special file' represents a device with characteristics similar to a keyboard (data transfer is by stream of bits in sequential order).

What is 'inode'?

All UNIX files have its description stored in a structure called 'inode'. The inode contains info about the file-size, its location, time of last access, time of last modification, permission and so on. Directories are

also represented as files and have an associated inode. In addition to descriptions about the file, the inode contains pointers to the data blocks of the file. If the file is large, inode has indirect pointer to a block of pointers to additional data blocks (this further aggregates for larger files). A block is typically 8k.

Inode consists of the following fields:

File owner identifier

File type

File access permissions

File access times

Number of links

File size

Location of the file data

Brief about the directory representation in UNIX.

A Unix directory is a file containing a correspondence between filenames and inodes. A directory is a special file that the kernel maintains. Only kernel modifies directories, but processes can read directories. The contents of a directory are a list of filename and inode number pairs. When new directories are created, kernel makes two entries named '.' (refers to the directory itself) and '..' (refers to parent directory). System call for creating directory is mkdir (pathname, mode).

What are the Unix system calls for I/O?

open(pathname,flag,mode) - open file

creat(pathname,mode) - create file

close(filedes) - close an open file

read(filedes,buffer,bytes) - read data from an open file

write(filedes,buffer,bytes) - write data to an open file

lseek(filedes,offset,from) - position an open file

dup(filedes) - duplicate an existing file descriptor

dup2(oldfd,newfd) - duplicate to a desired file descriptor

fcntl(filedes,cmd,arg) - change properties of an open file

ioctl(filedes,request,arg) - change the behaviour of an open file

The difference between fcntl anf ioctl is that the former is intended for any open file, while the latter is for device-specific operations.

How do you change File Access Permissions?

Every file has following attributes:

owner's user ID (16 bit integer)

owner's group ID (16 bit integer)

File access mode word

(r w x) - (r w x) - (r w x)

(user permission) - (group permission) - (others permission)

To change the access mode, we use chmod(filename,mode).

Example 1:

To change mode of myfile to 'rw-rw-r--' (ie. read, write permission for user - read,write permission for group - only read permission for others) we give the args as:

chmod(myfile,0664) .

Each operation is represented by discrete values

'r' is 4

'w' is 2

'x' is 1

Therefore, for 'rw' the value is 6(4+2).

Example 2:

To change mode of myfile to 'rwxr--r--' we give the args as:

chmod(myfile,0744).

What are links and symbolic links in UNIX file system?

A link is a second name (not a file) for a file. Links can be used to assign more than one name to a file, but cannot be used to assign a directory more than one name or link filenames on different computers.

Symbolic link 'is' a file that only contains the name of another file.Operation on the symbolic link is directed to the file pointed by the it.Both the limitations of links are eliminated in symbolic links.

Commands for linking files are:

Link "ln filename1 filename2"

Symbolic link "ln -s filename1 filename2"

What is a FIFO?

FIFO are otherwise called as 'named pipes'. FIFO (first-in-first-out) is a special file which is said to be data transient. Once data is read from named pipe, it cannot be read again. Also, data can be read only in the order written. It is used in interprocess communication where a process writes to one end of the pipe (producer) and the other reads from the other end (consumer).

How do you create special files like named pipes and device files?

The system call mknod creates special files in the following sequence.

kernel assigns new inode,

sets the file type to indicate that the file is a pipe, directory or special file,

If it is a device file, it makes the other entries like major, minor device numbers.

For example:

If the device is a disk, major device number refers to the disk controller and minor device number is the disk.

Discuss the mount and unmount system calls.

The privileged mount system call is used to attach a file system to a directory of another file system; the unmount system call detaches a file system. When you mount another file system on to your directory, you are essentially splicing one directory tree onto a branch in another directory tree. The first argument to mount call is the mount point, that is , a directory in the current file naming system. The second argument is the file system to mount to that point. When you insert a cdrom to your unix system's drive, the file system in the cdrom automatically mounts to "/dev/cdrom" in your system.

How does the inode map to data block of a file?

Inode has 13 block addresses. The first 10 are direct block addresses of the first 10 data blocks in the file. The 11th address points to a one-level index block. The 12th address points to a two-level (double in-direction) index block. The 13th address points to a three-level(triple in-direction)index block.

This provides a very large maximum file size with efficient access to large files, but also small files are accessed directly in one disk read.

What is a shell?

A shell is an interactive user interface to an operating system services that allows an user to enter commands as character strings or through a graphical user interface. The shell converts them to system calls to the OS or forks off a process to execute the command. System call results and other information from the OS are presented to the user through an interactive interface. Commonly used shells are sh,csh,ks etc.

Define Network?

A network is a set of devices connected by physical media links. A network is recursively is a connection of two or more nodes by a physical link or two or more networks connected by one or more nodes.

What is a Link?

At the lowest level, a network can consist of two or more computers directly connected by some physical medium such as coaxial cable or optical fiber. Such a physical medium is called as Link.

What is a node?

A network can consist of two or more computers directly connected by some physical medium such as coaxial cable or optical fiber. Such a physical medium is called as Links and the computer it connects is called as Nodes.

What is a gateway or Router?

A node that is connected to two or more networks is commonly called as router or Gateway. It generally forwards message from one network to another.

What is point-point link?

If the physical links are limited to a pair of nodes it is said to be point-point link.

What is Multiple Access?

If the physical links are shared by more than two nodes, it is said to be Multiple Access.

What are the advantages of Distributed Processing?

a. Security/Encapsulation

b. Distributed database

c. Faster Problem solving

d. Security through redundancy

e. Collaborative Processing

What are the criteria necessary for an effective and efficient network?

a. Performance

It can be measured in many ways, including transmit time and response time. b. Reliability

It is measured by frequency of failure, the time it takes a link to recover from a failure, and the network's robustness.

c. Security

Security issues includes protecting data from unauthorized access and virues.

Name the factors that affect the performance of the network?

a. Number of Users

b. Type of transmission medium

c. Hardware

d. Software

Name the factors that affect the reliability of the network?

a. Frequency of failure

b. Recovery time of a network after a failure

Name the factors that affect the security of the network?

a. Unauthorized Access

b. Viruses

What is Protocol?

A protocol is a set of rules that govern all aspects of information communication.

What are the key elements of protocols?

The key elements of protocols are

a. Syntax

It refers to the structure or format of the data, that is the order in which they are presented.

b. Semantics

It refers to the meaning of each section of bits.

c. Timing

Timing refers to two characteristics: When data should be sent and how fast they can be sent.

What are the key design issues of a computer Network?

a. Connectivity

b. Cost-effective Resource Sharing

c. Support for common Services

d. Performance

Define Bandwidth and Latency?

Network performance is measured in Bandwidth (throughput) and Latency (Delay). Bandwidth of a network is given by the number of bits that can be transmitted over the network in a certain period of time. Latency corresponds to how long it t5akes a message to travel from one end off a network to the other. It is strictly measured in terms of time.

Define Routing?

The process of determining systematically hoe to forward messages toward the destination nodes based on its address is called routing.

What is a peer-peer process?

The processes on each machine that communicate at a given layer are called peer-peer process.

When a switch is said to be congested?

It is possible that a switch receives packets faster than the shared link can accommodate and stores in its memory, for an extended period of time, then the switch will eventually run out of buffer space, and some packets will have to be dropped and in this state is said to congested state.

What is semantic gap?

Defining a useful channel involves both understanding the applications requirements and recognizing the limitations of the underlying technology. The gap between what applications expects and what the underlying technology can provide is called semantic gap.

What is Round Trip Time?

The duration of time it takes to send a message from one end of a network to the other and back, is called RTT.

Define the terms Unicasting, Multiccasting and Broadcasting?

If the message is sent from a source to a single destination node, it is called Unicasting.

If the message is sent to some subset of other nodes, it is called Multicasting.

If the message is sent to all the m nodes in the network it is called Broadcasting.

What is Multiplexing?

Multiplexing is the set of techniques that allows the simultaneous transmission of multiple signals across a single data link.

Name the categories of Multiplexing?

a. Frequency Division Multiplexing (FDM)

b. Time Division Multiplexing (TDM)

    i. Synchronous TDM

    ii. ASynchronous TDM Or Statistical TDM.

c. Wave Division Multiplexing (WDM)

What is FDM?

FDM is an analog technique that can be applied when the bandwidth of a link is greater than the combined bandwidths of the signals to be transmitted.

What is WDM?

WDM is conceptually the same as FDM, except that the multiplexing and demultiplexing involve light signals transmitted through fiber optics channel.

What is TDM?

TDM is a digital process that can be applied when the data rate capacity of the transmission medium is greater than the data rate required by the sending and receiving devices.

What is Synchronous TDM?

In STDM, the multiplexer allocates exactly the same time slot to each device at all times, whether or not a device has anything to transmit.

List the layers of OSI

a. Physical Layer

b. Data Link Layer

c. Network Layer

d. Transport Layer

e. Session Layer

f. Presentation Layer

g. Application Layer

Which layers are network support layers?

a. Physical Layer

b. Data link Layer and

c. Network Layers

Which layers are user support layers?

a. Session Layer

b. Presentation Layer and

c. Application Layer

Which layer links the network support layers and user support layers?

The Transport layer links the network support layers and user support layers.

What are the concerns of the Physical Layer?

Physical layer coordinates the functions required to transmit a bit stream over a physical medium.

a. Physical characteristics of interfaces and media

b. Representation of bits

c. Data rate

d. Synchronization of bits

e. Line configuration

f. Physical topology

g. Transmission mode

What are the responsibilities of Data Link Layer?

The Data Link Layer transforms the physical layer, a raw transmission facility, to a reliable link and is responsible for node-node delivery.

a. Framing

b. Physical Addressing

c. Flow Control

d. Error Control

e. Access Control

What are the responsibilities of Network Layer?

The Network Layer is responsible for the source-to-destination delivery of packet possibly across multiple networks (links).

a. Logical Addressing

b. Routing

What are the responsibilities of Transport Layer?

The Transport Layer is responsible for source-to-destination delivery of the entire message.

a. Service-point Addressing

b. Segmentation and reassembly

c. Connection Control

d. Flow Control

e. Error Control

What are the responsibilities of Session Layer?

The Session layer is the network dialog Controller. It establishes, maintains and synchronizes the interaction between the communicating systems.

a. Dialog control

b. Synchronization

What are the responsibilities of Presentation Layer?

The Presentation layer is concerned with the syntax and semantics of the information exchanged between two systems.

a. Translation

b. Encryption

c. Compression

What are the responsibilities of Application Layer?

The Application Layer enables the user, whether human or software, to access the network. It provides user interfaces and support for services such as e-mail, shared database management and other types of distributed information services.

a. Network virtual Terminal

b. File transfer, access and Management (FTAM)

c. Mail services

d. Directory Services

What are the two classes of hardware building blocks?

Nodes and Links.

What are the different link types used to build a computer network?

a. Cables

b. Leased Lines

c. Last-Mile Links

d. Wireless Links

What are the categories of Transmission media?

a. Guided Media

  i. Twisted - Pair cable

    1. Shielded TP

    2. Unshielded TP

  ii. Coaxial Cable

  iii. Fiber-optic cable

b. Unguided Media

    i. Terrestrial microwave

    ii. Satellite Communication

What are the types of errors?

a. Single-Bit error

    In a single-bit error, only one bit in the data unit has changed

b. Burst Error

    A Burst error means that two or more bits in the data have changed.

    What is Error Detection? What are its methods?

    Data can be corrupted during transmission. For reliable communication errors must be deducted and Corrected. Error Detection uses the concept of redundancy, which means adding extra bits for detecting errors at the destination. The common Error Detection methods are

        a. Vertical Redundancy Check (VRC)

        b. Longitudinal Redundancy Check (VRC)

        c. Cyclic Redundancy Check (VRC)

        d. Checksum

    What is Redundancy?

    The concept of including extra information in the transmission solely for the purpose of comparison. This technique is called redundancy.

    What is VRC?

    It is the most common and least expensive mechanism for Error Detection. In VRC, a parity bit is added to every data unit so that the total number of 1s becomes even for even parity. It can detect all single-bit errors. It can detect burst errors only if the total number of errors in each data unit is odd.

    What is LRC?

    In LRC, a block of bits is divided into rows and a redundant row of bits is added to the whole block. It can detect burst errors. If two bits in one data unit are damaged and bits in exactly the same positions in another data unit are also damaged, the LRC checker will not detect an error. In LRC a redundant data unit follows n data units.

    What is CRC?

CRC, is the most powerful of the redundancy checking techniques, is based on binary division.

What is Checksum?

Checksum is used by the higher layer protocols (TCP/IP) for error detection

List the steps involved in creating the checksum.

a. Divide the data into sections

b. Add the sections together using 1's complement arithmetic

c. Take the complement of the final sum, this is the checksum.

What are the Data link protocols?

Data link protocols are sets of specifications used to implement the data link layer. The categories of Data Link protocols are 1. Asynchronous Protocols

2. Synchronous Protocols

a. Character Oriented Protocols

b. Bit Oriented protocols

Compare Error Detection and Error Correction:

The correction of errors is more difficult than the detection. In error detection, checks only any error has occurred. In error correction, the exact number of bits that are corrupted and location in the message are known. The number of the errors and the size of the message are important factors.

What is Forward Error Correction?

Forward error correction is the process in which the receiver tries to guess the message by using redundant bits.

Define Retransmission?

Retransmission is a technique in which the receiver detects the occurrence of an error and asks the sender to resend the message. Resending is repeated until a message arrives that the receiver believes is error-freed.

What are Data Words?

In block coding, we divide our message into blocks, each of k bits, called datawords. The block coding process is one-to-one. The same dataword is always encoded as the same codeword.

What are Code Words?

"r" redundant bits are added to each block to make the length n = k + r. The resulting n-bit blocks are called codewords. 2n - 2k codewords that are not used. These codewords are invalid or illegal.

What is a Linear Block Code?

A linear block code is a code in which the exclusive OR (addition modulo-2) of two valid codewords creates another valid codeword.

What are Cyclic Codes?

Cyclic codes are special linear block codes with one extra property. In a cyclic code, if a codeword is cyclically shifted (rotated), the result is another codeword.

Define Encoder?

A device or program that uses predefined algorithms to encode, or compress audio or video data for storage or transmission use. A circuit that is used to convert between digital video and analog video.

Define Decoder?

A device or program that translates encoded data into its original format (e.g. it decodes the data). The term is often used in reference to MPEG-2 video and sound data, which must be decoded before it is output.

What is Framing?

Framing in the data link layer separates a message from one source to a destination, or from other messages to other destinations, by adding a sender address and a destination address. The destination address defines where the packet has to go and the sender address helps the recipient acknowledge the receipt.

What is Fixed Size Framing?

In fixed-size framing, there is no need for defining the boundaries of the frames. The size itself can be used as a delimiter.

Define Character Stuffing?

In byte stuffing (or character stuffing), a special byte is added to the data section of the frame when there is a character with the same pattern as the flag. The data section is stuffed with an extra byte. This byte is usually called the escape character (ESC), which has a predefined bit pattern. Whenever the receiver encounters the ESC character, it removes it from the data section and treats the next character as data, not a delimiting flag.

What is Bit Stuffing?

Bit stuffing is the process of adding one extra 0 whenever five consecutive Is follow a 0 in the data, so that the receiver does not mistake the pattern 0111110 for a flag.

What is Flow Control?

Flow control refers to a set of procedures used to restrict the amount of data that the sender can send before waiting for acknowledgment.

What is Error Control ?

Error control is both error detection and error correction. It allows the receiver to inform the sender of any frames lost or damaged in transmission and coordinates the retransmission of those frames by the sender. In the data link layer, the term error control refers primarily to methods of error detection and retransmission.

What Automatic Repeat Request (ARQ)?

Error control is both error detection and error correction. It allows the receiver to inform the sender of any frames lost or damaged in transmission and coordinates the retransmission of those frames by the sender. In the data link layer, the term error control refers primarily to methods of error detection and retransmission. Error control in the data link layer is often implemented simply: Any time an error is detected in an exchange, specified frames are retransmitted. This process is called automatic repeat request (ARQ).

Operating Systems

Explain the concept of Reentrancy?

It is a useful, memory-saving technique for multiprogrammed timesharing systems. A Reentrant Procedure is one in which multiple users can share a single copy of a program during the same period. Reentrancy has 2 key aspects: The program code cannot modify itself, and the local data for each user process must be stored separately. Thus, the permanent part is the code, and the temporary part is the pointer back to the calling program and local variables used by that program. Each execution instance is called activation. It executes the code in the permanent part, but has its own copy of local variables/parameters. The temporary part associated with each activation is the activation record. Generally, the activation record is kept on the stack.

Note: A reentrant procedure can be interrupted and called by an interrupting program, and still execute correctly on returning to the procedure.

Explain Belady's Anomaly?

Also called FIFO anomaly. Usually, on increasing the number of frames allocated to a process virtual memory, the process execution is faster, because fewer page faults occur. Sometimes, the reverse happens, i.e., the execution time increases even when more frames are allocated to the process. This is Belady's Anomaly. This is true for certain page reference patterns.

What is a binary semaphore? What is its use?

A binary semaphore is one, which takes only 0 and 1 as values. They are used to implement mutual exclusion and synchronize concurrent processes.

What is thrashing?

It is a phenomenon in virtual memory schemes when the processor spends most of its time swapping pages, rather than executing instructions. This is due to an inordinate number of page faults.

List the Coffman's conditions that lead to a deadlock.

Mutual Exclusion: Only one process may use a critical resource at a time.

Hold & Wait: A process may be allocated some resources while waiting for others.

No Pre-emption: No resource can be forcible removed from a process holding it.

Circular Wait: A closed chain of processes exist such that each process holds at least one resource needed by another process in the chain.

What are short, long and medium-term scheduling?

Long term scheduler determines which programs are admitted to the system for processing. It controls the degree of multiprogramming. Once admitted, a job becomes a process.

Medium term scheduling is part of the swapping function. This relates to processes that are in a blocked or suspended state. They are swapped out of real-memory until they are ready to execute. The swapping-in decision is based on memory-management criteria.

Short term scheduler, also know as a dispatcher executes most frequently, and makes the finest-grained decision of which process should execute next. This scheduler is invoked whenever an event occurs. It may lead to interruption of one process by preemption.

What are turnaround time and response time?

Turnaround time is the interval between the submission of a job and its completion. Response time is the interval between submission of a request, and the first response to that request.

What are the typical elements of a process image?

User data: Modifiable part of user space. May include program data, user stack area, and programs that may be modified.

User program: The instructions to be executed.

System Stack: Each process has one or more LIFO stacks associated with it. Used to store parameters and calling addresses for procedure and system calls.

Process control Block (PCB): Info needed by the OS to control processes.

What is the Translation Lookaside Buffer (TLB)?

In a cached system, the base addresses of the last few referenced pages is maintained in registers called the TLB that aids in faster lookup. TLB contains those page-table entries that have been most recently used. Normally, each virtual memory reference causes 2 physical memory accesses- one to fetch appropriate page-table entry, and one to fetch the desired data. Using TLB in-between, this is reduced to just one physical memory access in cases of TLB-hit.

What is the resident set and working set of a process?

Resident set is that portion of the process image that is actually in real-memory at a particular instant. Working set is that subset of resident set that is actually needed for execution. (Relate this to the variable-window size method for swapping techniques.)

When is a system in safe state?

The set of dispatchable processes is in a safe state if there exists at least one temporal order in which all processes can be run to completion without resulting in a deadlock.

What is cycle stealing?

We encounter cycle stealing in the context of Direct Memory Access (DMA). Either the DMA controller can use the data bus when the CPU does not need it, or it may force the CPU to temporarily suspend operation. The latter technique is called cycle stealing. Note that cycle stealing can be done only at specific break points in an instruction cycle.

What is meant by arm-stickiness?

If one or a few processes have a high access rate to data on one track of a storage disk, then they may monopolize the device by repeated requests to that track. This generally happens with most common device scheduling algorithms (LIFO, SSTF, C-SCAN, etc). High-density multisurface disks are more likely to be affected by this than low density ones.

What are the stipulations of C2 level security?

C2 level security provides for:

Discretionary Access Control

Identification and Authentication

Auditing

Resource reuse

What is busy waiting?

The repeated execution of a loop of code while waiting for an event to occur is called busy-waiting. The CPU is not engaged in any real productive activity during this period, and the process does not progress toward completion.

Explain the popular multiprocessor thread-scheduling strategies.

Load Sharing: Processes are not assigned to a particular processor. A global queue of threads is maintained. Each processor, when idle, selects a thread from this queue. Note that load balancing refers to a scheme where work is allocated to processors on a more permanent basis.

Gang Scheduling: A set of related threads is scheduled to run on a set of processors at the same time, on a 1-to-1 basis. Closely related threads / processes may be scheduled this way to reduce synchronization blocking, and minimize process switching. Group scheduling predated this strategy.

Dedicated processor assignment: Provides implicit scheduling defined by assignment of threads to processors. For the duration of program execution, each program is allocated a set of processors equal in number to the number of threads in the program. Processors are chosen from the available pool.

Dynamic scheduling: The number of thread in a program can be altered during the course of execution.

When does the condition 'rendezvous' arise?

In message passing, it is the condition in which, both, the sender and receiver are blocked until the message is delivered.

What is a trap and trapdoor?

Trapdoor is a secret undocumented entry point into a program used to grant access without normal methods of access authentication. A trap is a software interrupt, usually the result of an error condition.

What are local and global page replacements?

Local replacement means that an incoming page is brought in only to the relevant process address space. Global replacement policy allows any page frame from any process to be replaced. The latter is applicable to variable partitions model only.

Define latency, transfer and seek time with respect to disk I/O.

Seek time is the time required to move the disk arm to the required track. Rotational delay or latency is the time it takes for the beginning of the required sector to reach the head. Sum of seek time (if any) and latency is the access time. Time taken to actually transfer a span of data is transfer time.

Describe the Buddy system of memory allocation.

Free memory is maintained in linked lists, each of equal sized blocks. Any such block is of size 2^k. When some memory is required by a process, the block size of next higher order is chosen, and broken into two. Note that the two such pieces differ in address only in their kth bit. Such pieces are called buddies. When any used block is freed, the OS checks to see if its buddy is also free. If so, it is rejoined, and put into the original free-block linked-list.

What is time-stamping?

It is a technique proposed by Lamport, used to order events in a distributed system without the use of clocks. This scheme is intended to order events consisting of the transmission of messages. Each system 'i' in the network maintains a counter C_i. Every time a system transmits a message, it increments its counter by 1 and attaches the time-stamp T_i to the message. When a message is received, the receiving system 'j' sets its counter C_j to 1 more than the maximum of its current value and the incoming time-stamp T_i. At each site, the ordering of messages is determined by the following rules: For messages x from site i and y from site j, x precedes y if one of the following conditions holds....(a) if $T_i < T_j$ or (b) if $T_i = T_j$ and $i < j$.

How are the wait/signal operations for monitor different from those for semaphores?

If a process in a monitor signal and no task is waiting on the condition variable, the signal is lost. So this allows easier program design. Whereas in semaphores, every operation affects the value of the semaphore, so the wait and signal operations should be perfectly balanced in the program.

In the context of memory management, what are placement and replacement algorithms?

Placement algorithms determine where in available real-memory to load a program. Common methods are first-fit, next-fit, best-fit. Replacement algorithms are used when memory is full, and one process (or part of a process) needs to be swapped out to accommodate a new program. The replacement algorithm determines which are the partitions to be swapped out.

In loading programs into memory, what is the difference between load-time dynamic linking and run-time dynamic linking?

For load-time dynamic linking: Load module to be loaded is read into memory. Any reference to a target external module causes that module to be loaded and the references are updated to a relative address from the start base address of the application module.

With run-time dynamic loading: Some of the linking is postponed until actual reference during execution. Then the correct module is loaded and linked.

What are demand-paging and pre-paging?

With demand paging, a page is brought into memory only when a location on that page is actually referenced during execution. With pre-paging, pages other than the one demanded by a page fault are brought in. The selection of such pages is done based on common access patterns, especially for secondary memory devices.

Paging a memory management function, while multiprogramming a processor management function, are the two interdependent?

Yes.

What is page cannibalizing?

Page swapping or page replacements are called page cannibalizing.

What has triggered the need for multitasking in PCs?

Increased speed and memory capacity of microprocessors together with the support fir virtual memory and

Growth of client server computing

What are the four layers that Windows NT have in order to achieve independence?

Hardware abstraction layer

Kernel

Subsystems

System Services.

What is SMP?

To achieve maximum efficiency and reliability a mode of operation known as symmetric multiprocessing is used. In essence, with SMP any process or threads can be assigned to any processor.

What are the key object oriented concepts used by Windows NT?

Encapsulation, Object class and instance.

Is Windows NT a full blown object oriented operating system? Give reasons.

No Windows NT is not so, because its not implemented in object oriented language and the data structures reside within one executive component and are not represented as objects and it does not support object oriented capabilities.

What is a drawback of MVT?

It does not have the features like

ability to support multiple processors

virtual storage

source level debugging

What is process spawning?

When the OS at the explicit request of another process creates a process, this action is called process spawning.

How many jobs can be run concurrently on MVT?

15 jobs.

List out some reasons for process termination.

Normal completion

Time limit exceeded

Memory unavailable

Bounds violation

Protection error

Arithmetic error

Time overrun

I/O failure

Invalid instruction

Privileged instruction

Data misuse

Operator or OS intervention

Parent termination.

What are the reasons for process suspension?

swapping

interactive user request

timing

parent process request

What is process migration?

It is the transfer of sufficient amount of the state of process from one machine to the target machine.

What is mutant?

In Windows NT a mutant provides kernel mode or user mode mutual exclusion with the notion of ownership.

What is an idle thread?

The special thread a dispatcher will execute when no ready thread is found.

What is FtDisk?

It is a fault tolerance disk driver for Windows NT.

What are the possible threads a thread can have?

Ready

Standby

Running

Waiting

Transition

Terminated

What are rings in Windows NT?

Windows NT uses protection mechanism called rings provides by the process to implement separation between the user mode and kernel mode.

What is Executive in Windows NT?

In Windows NT, executive refers to the operating system code that runs in kernel mode.

What are the sub-components of I/O manager in Windows NT?

Network redirector/ Server

Cache manager.

File systems

Network driver

Device driver

What are DDks? Name an operating system that includes this feature.

DDks are device driver kits, which are equivalent to SDKs for writing device drivers. Windows NT includes DDks.

What level of security does Windows NT meets?

C2 level security.