Consumer Search and Resource Discovery

Unit-7 Solutions

7.1 Information Search and Retrieval

Q1. What are the challenges and problems that are encountered in Information search?

Answer : April/May-09, Set-1, Q7 M[16]

As volumes of data on the internet is growing exponentially, information searching is becoming more challenging. Being lost in the internet is not a serious problem now-a-days. To find the information of our interest in the cyberspace is a tricky ad complex job. The following are the various challenges that arises while searching information online.

- Information is being uploaded on the internet at a high rate. The electronic market is information intensive and dynamic i.e., things keep on changing. Therefore, consumers need to be updated with the latest trends and technologies to make their search extensive.
- Since, the turnover of information is rapid, traditional tools of information search are not sufficient for the consumers. Therefore, a challenge is to design and implement advance searching, filtering and data mining tools that maximize the search process of an individual in terms of time, cost and information needs. These advanced tools will enable consumers to manage loads of information and search in this information based on some attribute or criteria.
- Sometimes the search results gets overloaded often confusing the consumers. The users must be given small number of products as search result, these products should be the best alternatives available to suit the needs or preferences of the user.
- Consumers learn the environment slowly by knowing 'what is where'. Additionally, directories and catalogs may be provided to the consumers that facilitates them to navigate and browse the product information of their choice.
- Today, the focus is on the human technology interfaces, according to this feature, the information regarding preferences of a customer is taken and intelligent and useful information is provided to the consumer. But the challenge here is, how to represent this useful information on the screen. Developments are being made to use virtual reality for displaying such information to user.

Explain the utility of business information. In this context, explain Wide Area Information Service engine (WAIS).

April/May-09, Set-3, Q7 M[16]

Answer : April/May-09, Set-4, Q7 M[16]

Utility of Business Information

Business information is important for any organization. Using the right information at the right time can simplify the business process, reduce the cost and provide quality service to customers. The business information can be used for decision making. The business data is collected from customers and markets through survey and is analyzed for taking better organizational decisions.

Information is also useful in the internal working of organization. Usually, managers and employees need to gather information of their work status so that they could know whether they are behind the schedule. If so, they could take necessary actions to complete the work on time.

Since, internet is being used heavily in business and commerce, voluminous amount of business information is available online. The challenge is to find the information that we are looking for. In other words, it is very difficult to search our desired information from the bulky online content. The web information contains thousands of databases and it would take hours to days to navigate such vast information.

Therefore, we require automated tools that can search information on the internet. Wide Area Information Service (WAIS) is one such tool that searches contents of files on the internet.

Wide Area Information Service (WAIS)

For answer refer Unit-VII, Q9, Topic: Wide Area Information Service (WAIS).

Q3. Explain the probabilistic information retrieval models.

Answer : April/May-08, Set-1, Q7 M[16]

Information retrieval system plays an important role in e-commerce. Probabilistic Information Retrieval (PIR) model is one such model. Being one of the best match retrieval models, PIM is based on the principle of "probability ranking". According to this principle, a retrieval system must rank the texts based on the probability of relevance to an information query. To be clear, the system must assign a rank to each document using the probability of its appropriateness to the requested information. Probability of relevance of a text to a query can be obtained by using the statistical distribution of terms in relevant and irrelevant texts and in database. However, a ranking function like the popular Okapi BM25 and its versions like BM25F can be used to rank the texts.

Advantages

1. Since the documents in the database are placed in decreasing order of their probabilities, the efficiency of the search process increases.
2. User can concentrate on the first few replies, as the requested information is known to have higher probability relevance with these replies. Thus, helping a user to decide whether examining a particular document is required or not.
3. The ranking principle does not take into account the relevance between query and text and the relevance relationship between their representations.

Disadvantage

Although PIR is user-centric, it imposes responsibilities on the system engineers to implement the concept of probability to obtain relevance information.

Q4. What is consumer search? Explain the process of consumer search in online marketing.

Answer : April/May-08, Set-2, Q7 M[16]

Consumer Search Paradigm

For answer refer Unit-VII, Q8.

Browsing of information online is not an easy task because of the voluminous data available in the information space. Although the desired information is available online, consumers find it difficult to access because the information is hidden somewhere in the information space. The accessibility of this information can be augmented with the help of search and retrieval tools. These tools make use of the processing power of the computer for enhancing the decision making process while reducing the time and effort utilized for processing of superfluous information.

The decision making process related to an organization d an individual consumer can be augmented by developing lexible format for navigating, searching and retrieving ormation from an online database. By implementing this nat the customers can search their desired product at imal price. On the other hand, the organization searches he new developments, make advancements in services, ify new suppliers, provides new products/services etc. onsumers, searching for appropriate information in the nation space is becoming more and more complex due to pid changes in the information available. Therefore, the and retrieval processes must be designed so as to ize the customer's value in terms of money, time and ation requirements. Moreover, the information filtering mining tools which are responsible for managing the tion flow and evaluating the products based on their s must also be used.

Each and every individual customer has their own set of preferences but he/she certainly lacks the environmental knowledge (i.e., what and where). The use of directories and catalogs for organizing the information space will enable the customers to browse the information space and learn about different products/services in an organized manner.

Q5. What are the different types of information processing demands on consumers due to information change imposed by electronic markets? April/May-08, Set-3, Q7 M[16]

Answer :

The process of searching for desired information online can often be complicated due to certain reasons. Firstly, rapid changes takes place in the available information because of constantly changing electronic market environments. Thus, the online information gathered by consumer must be updated periodically and involve extensive search efforts.

The different types of information processing demands on consumers due to information change in electronic markets are,

(a) The search and retrieval processes must be designed in such a way that, they maximizes an individuals value interms of cost, time and information requirement.

(b) The rapid change in information makes it mandatory for the consumers to implement information filtering and data mining tools. Hence, the relevant information can be controlled and managed efficiently.

(c) The consumers must be capable of distinguishing their desired product/services from the massive information or services available online. They must also be capable of finding the best suitable alternative product/service that serves their requirement in case, the desired service is not available.

(d) The consumers must be familiar of their searched product/service and potential location. This knowledge can be obtained by making use of electronic directories and catalogs that also helps in determining the alternative products/services.

(e) The consumers must select an appropriate user interface that facilitates them in making decisions, interacting with online environments etc., the interface must also provide quick and easy access to the information.

Q6. What are the advantages and disadvantages of consumer search in online marketing research?

Answer : April/May-08, Set-4, Q7 M[16]

Advantages

1. It provides the user with a detailed information about the product/service instantly.

It allows the user to identify and then select the desired information from a massive database collection.

It provides the user with the heterogenous access to the databases irrespective of their original locations.

It provides downloading and organizing capability so that user can download the data and organize it according to his/her convenience.

Finding large number of answers to a single query is an easy tasks.

The query can be in a simple English language.

It is most inexpensive.

Disadvantages

1. Consumer search provides massive information content which occupies lot of disk space.
2. Only 10–20 percent of the information provided by the search will be relevant to query and the remaining information will be of no use to the user. This is because the search provides information from all the domains related to the query while, the user might be looking from a certain domain.
3. The information retrieved by the consumer search may not be reliable because there are some instances where, unauthorized users place the inconsistent information on the web.
4. The information retrieved via consumer search may not be viable after a period of time because the information will be continuously changing. Thus, the organized collection of this information will be feasible upto a certain time period.
5. Browsing often leads to navigation problems and disorientation of users because browsing of information mainly rely on the quality and relevancy of the organization.

Q7. Explain the different search and resource discovery paradigm.

Answer :

The three different search and resource discovery paradigms are.

(i) Information search and retrieval

(ii) Electronic directories and catalogs

(iii) Information filtering.

Information Search and Retrieval Paradigm

Information search and retrieval is a process of finding extracting information according to the specifications vided by a user. The main purpose of developing this cess is to support naive users in areas like electronic pping and home banking. The goals include the following.

1. To satisfy the customers upto the maximum extent.
2. To reduce the cost.

3. To fastly execute the requested query. Computer methods that are used to execute the query are.
   (a) Method for finding exact match based on keyword.
   (b) Method for finding nearest neighbours.

Information search and retrieval is used in areas like libraries where customers are concentrating on information seeking behaviour.

(ii) Electronic Directories and Catalogs

Directories and catalogs are used for the following tasks.

(a) Information organizing

(b) Information browsing.

(a) Information Organizing

Organizing refers to the way of organizing or arranging the information so as to make decisions for interrelating it. Organizing the information in a static way is useful for some people but causes harm to other people. Due to its static nature many people get used to that information and doesn't want it to be changed while some other people feel that because of its fixed characteristics it is very difficult to change the information, since it is created by some other people. The apprehension of organizing the information is very intuitive which means that what one finds easy may be difficult for others to browse depending on the requirement.

(b) Information Browsing

It is defined as an activity that is guided by human for analyzing the enterprise and identifying the details of resource space. Browsing relies on the organizational standard. There are two major problems that occur while performing browsing, they are navigation issues and disorientation issues of users. These problems can be solved by using system that supports different representations of similar information.

(iii) Information Filtering

The objective of information filtering is to provid access to relevant and variable information when a us requests for it. This information represents a small portion the total information base that can be accessed, whene required. Information filtering is a process of selecting o those information that matches the user's request. The purp of this process is to eliminate unnecessary data present i incoming stream. This process is not responsible performing any kind of search but its only objective is to out inconsistent data. It consist of data which is transr implicitly by different remote sources or by different alter sources like e-mail.

Software filters are used to provide access control. It ensures only the information that is appropriate to passed to the decision maker. The transmitted information helps them to behave in a more versatile way with respect to the changing organizational surroundings. There are two types of software filters. They are,

(a) Local filter
(b) Remote filter.

(a) Local Filters

Local filters are used for processing incoming stream of data.

(b) Remote Filters

They are software agents that perform their task on behalf of users. They help users to perform daily task, search and retrieve information, support decision-making. They work as a proxy for user that move around the database present on different networks.

Q8. Explain about information search and retrieval paradigm.

Answer :

Information Search and Retrieval Paradigm

Searching is a process of identifying/finding the required information from a massive amount of stored semistructured information. This is in contrast to the database application that deals with the structured format since it follow certain standards, syntaxes and make use of data type that have specific meaning. Examples of the structured includes, students database and email messages respectively.

There are two phases in which search process can be accomplished. They are,

(i) End-user retrieval phase
(ii) Publisher indexing phase.

End-user Retrieval Phase

The following steps must be followed in end-user ieval phase are,

1. A query is constructed by a user which specifies the search method to be used.
2. Query is then sent to server, that examines the query, process it and initiate the search process. The result is a table that contains a list of matching documents called hit-list. This tables finally degenerate hit-list is passed back to the users.

Users then select the pertinent document according to their requirements, scans it and print only the desired part of a document.

blisher Indexing Phase

s phase is responsible for,

Making an entry of a document in the database.

Creating and updating indexes and pointers that are useful while searching is performed.

These tasks are accomplished without human intervention. In order to avoid degradation in the efficiency or throughput of a system, this phase is normally performed during nonworking hours.

Retrieval and indexing phases are dependent on one another. Methods should be provided for loading search queries and scanning the matched document by user interface. The index created during indexing phase must be structured to quickly initiate the kind of searching process specified in the query.

Q9. What is the functionality of WAIS engine and explain how does it work?

OR

Write short notes on WAIS engine.

OR

What is search engine? Explain WAIS engine.

OR

Explain the functioning of Wide Area Information Service.

Answer :

Search Engine

Search engine is defined as a technique of finding data according to the user typed query without being concerned about its location. Search engines are replacing WAIS broadband search engines because of their highly developed and complex behaviour.

Topic is a search engine that is basically used in Lotus Notes, Adobe Acrobat applications. The searching done by employing Topic Search engine is done using both keywords and information. The result of this search is a hit-list arranged according to the preference assigned by the search engine.

Context-based searching is another search engine that searches the data according to keyword per context instead of searching each keyword per sentence, when a query is given. The result of this type of search are documents that have similar meaning but doesn't match word according to the query given.

Oracle context is another type of search engine which is used over internet. This search engine creates the summary by scanning through different documents.

Wide Area Information Service (WAIS)

WAIS is a flexible search engine that can searches the requested file by accessing the server that are remotely distributed across the network. Searching is done by using an indexing scheme that allows a user to find the document relevant to the specified query. This search engine returns only the address location of the requested file.

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WAIS is based on client/server model that is using ANSI standard for searching index databases on remote computers. It is used as a full-text search engine and is an internet system in which server keeps track of the directory of servers present at one location. When user enters a text that is to be searched from a selected database, all servers are then accessible by the clients. The result obtained provides description of each text which is meeting the search requirements.

Since WAIS system is stored based on peer-to-peer communication, a new server finds it easy to learn information from other servers and produce useful information. The main purpose of WAIS system is to support users in searching the required information over computer network. WAIS system is based on information retrieval model rather than on browse model.

The different components in WAIS systems are,

1. Client
2. Server
3. Indexer.

When a publisher wants to index a particular file list, indexer takes that list to produce many index files that include a directory containing all words present in the database. In order to publish, the index files that are generated, publisher execute WAIS system automatically with register option that distribute these files to various WAIS indexes present across the network. WAIS client is a user interface that sends the requested information either to local or to a remote server. The WAIS server is a program that processes client's request by executing the request on a system containing one or more information sources or databases.

The different problems that can be solved by WAIS system from user's, point-of-view are given below,

1. In order to find the required information, WAIS system allows its users to browse, scan and select information from the massive database.
2. Since index files may be available on different machines, WAIS provides heterogeneous method to access database.

In order to avoid users from getting overwhelmed, WAIS provide a variety of methods for downloading and organizing the fetched data.

ilization of WAIS

Many organization uses WAIS system to send rmation over the computer network. Since WWW allows ter versatality in the structure of distributed information, sage of WAIS services and the number of WAIS servers etting reduced.

Explain the different indexing methods used by search engine.

OR

Explain indexing methods and indexing packages available for Unix based workstation.

OR

What is a search engine? Discuss two indexing methods used by search engines.

Answer :

Search Engine

For answer refer Unit-VII, Q9, Topic: Search Engine.

Indexing Methods

There are two kinds of indexing methods used by search engines. They are,

1. File-level indexing
2. Word-level indexing.

1. File-level Indexing

In file-level indexing, when a word that is to be searched is entered, the search process is initiated to see by using all the files in which the indexed word appears at least once. File-level indexing doesn't maintain any additional information about the words location. The advantage of this method is that the disk space is utilized efficiently.

2. Word-level Indexing

This level of indexing is difficult because, it is highly developed and complex. This method stores the word location information because of which a lot of disk space is utilized. It allows the users to search the full phrases that are closely related with the indexed word. The disadvantage of this method is that it consumes large amount of storage space for storing additional information about the location. Compared to file-level indexing method, word-level indexing scheme is much slower because it has massive volume of information for performing the requested search.

Indexing Packages

There are three different categories of indexing packages that are available for Unix-based workstation. They are,

1. Client/server indexing package
2. Main frame based indexing package
3. Parallel processing indexing package.

1. Client/Server Indexing Package

In client/server model, the document database, text search and retrieval software are stored on a central server and complex data representations and user interface software programs are available present on the client system. The task of server is to make comparison between search item and the different text files present in the database. These text files can be divided into modules which are stored on different servers. If searching is done locally, then response time is fast. I information to be searched is not present on local server, the chain of servers can be used for obtaining the desire information. The searching on remote server is performed as background process while users are retrieving informati from their local servers. The drawback of this scheme is t whenever master file is modified, all the individual subinde should also be modified.

2. Mainframe Based Indexing Package

When compared to client/server method, mainframe based method is more costly and less versatile. The advantages of this approach are as follows.

1. Storage space is extensive
2. Instant and fast response time
3. Standardized data management and configuration control.

The functionalities of mainframe also include,

(a) Managing query
(b) Managing display format

3. Parallel Processing Indexing Package

This approach allows multiple processors to perform the search process concurrently. This is made possible by fragmenting the whole text file into different parts and assigning each individual part to different processor. Each processor perform the processing independent of the other, but the completion time of all processors is almost the same. The results obtained from different processors are combined and given to the desired user.

Q11. What are WWW robots, wanderers and spiders?

Answer :

Web Robots

Web Robots are also known as wanderers or spiders. These are the programs that browses several pages in world wide web automatically. It does this by recursively or continuously retrieving the linked pages. These web robots are generally used by search engine like Goggle to perform the following tasks.

1. For indexing the web content
2. Scanning the e-mail addresses
3. Creating a copy of visited pages for later processing
4. For validating HTML code
5. For providing up-to-date information to the users

As the demands of merchants are increasing rapidly, agent based resource discovery is becoming crucial or vital. The main purpose of this discovery program is that, it helps companies to find the business partners of their interest if centralized directory is not present. It does this by traversing the WWW recursively and to record the presence and absence of resources over it.

Working of Resource Discovery Paradigm

WWW is viewed as a graph by different software programmers. The program is initiated by traversing the hyperlink present in the set of nodes upto its specified depth, starting from the URL that have "." as suffix and "/" as ending table. This URL is actually passed as a parameter. In order to avoid revisiting of the same URL document leaves, associated with that URL are stored in different table. Because of this, only HTML part of WWW is traversed using breadth first search technique.

It is very difficult for performing comprehensive or full-scale searching over the internet because of the time limit and heterogenous nature. Because of these problems, it becomes essential to handle multiple searches simultaneously. This is possible when many software agents cooperate with each other to work in the distributed environment consisting of different networks and different protocol standards.

Many experiments are being conducted for the following purposes.

1. To control many software agents
2. To maintain consistency
3. To handle security and reliability issues
4. To reduce redundancy
5. To confirm sufficient coverage of information resources.

Q12. Explain the specific models of information retrieval.

OR

Compare the various search models of information retrieval.

Answer :

Models of Information Retrieval

There are three models that are used for retrieving information from the database in an efficient manner. They are,

1. Boolean information retrieval model
2. Vector space information retrieval model
3. Probabilistic information retrieval model.

1. Boolean Information Retrieval Model

In all the information retrieval systems, boolean model is a standard model based on the exact match criterion. Boolean refers to query specification which are found using word or phrases, which are combined using standard operators AND, OR, NOT. In every database file, these combinations of words exist, this model fetches those text files irrespective of their locations. The drawback of this model is that it doesn't give any preference or priority to the fetched document. The system is more effective if a query exactly matches with the retrieved document and on the other hand results in ineffectiveness if the result is not definite and accurate.

2. Vector Space Information Retrieval Model

Vector space model is developed to overcome the problems of boolean model. This model is based on the best-match criterion that treats text and queries as vectors that are present in multidimensional environment. It performs vecto comparison using cosine correlation similarity method.

According to this method, the query matches the tex when vector text is similar to vector query. The differenc between boolean model and vector space model is that, t later processes the query based on its dimensions that a calculated using statistical distribution method and the form processes the query based on exact match criteria.

Probabilistic Information Retrieval Model

4. This model is based on probability ranking criterion. According to this, criteria, every text present in the database is given some priority. It assumes that the affinity between the information requirement and text is ambiguous. There are different sources used to estimate the chances of relativity between text and a query.

Both vector space model and probabilistic model uses boolean queries.

7.2 E-Commerce Catalogues

Q13. What is electronic commerce catalogue? Explain the various types of catalogues.

April/May-09, Set-2, Q7 M[16]

OR

Define electronic commerce catalogs or directories. What are the different types of directories?

OR

What are electronic white and yellow pages? Explain.

Answer :

Electronic Commerce Catalogs or Directories

Directories helps in finding data or applications that is distributed across Wide Area Network (WAN). The main purpose of directories is to provide necessary information about the services, cost and standards that assist customers in making decision while purchasing any product or service. Directories are very crucial for organizing and leading e-commerce, for providing distributed information in the form of directory service which is opaque in the architecture of network. Services associated with directories provide enhanced value added capabilities independently and these services are accessed by multiple users.

There are two types of directories. Those are as follows,

1. Electronic white pages
2. Electronic yellow pages.

White pages are used for identifying potential customers or institutions.

Yellow pages focus on customers who had made a decision of purchasing product. Yellow pages act as an advertising medium of low profile. The difference between print-based yellow pages and electronic yellow pages is that, the later provides more enhanced services than the former. In electronic yellow pages, a directory is created that acts as an interface to various resources. These directories can even be accessible even from an e-commerce application, which includes a huge demand for these directories.

A directory is said to be effective,

1. If it is easily accessible by all network elements.
2. If it provides faster response time.
3. If the changes are reflected correctly in network architecture.

The most challenging factors while creating a directory are,

(i) It should be accessible by different kinds of networks both guided and unguided networks.

(ii) It should be able to make use of different kinds of interfaces such as set-top boxes, personal computers.

(iii) It should be able to make use of different kinds of access applications such as e-mail, dial-up and other applications such as home shopping and home banking.

Implementation Problems

The services provided by directories must be able to assign various objects to user-oriented names, which is problematic in homogeneous LAN surroundings when documents and resources are not steady and continuously changing. This becomes more complex in heterogenous WAN surroundings as synchronization is needed in different databases.

It is the task of directory to track all entities and their elements in distributed network applications.

Directories or catalogs acts as information database for storing entities present in the real world. The major use of directories is to search the telephone numbers and addresses of a particular person or an institution is . It is very necessary for directory to be organized in a sequential manner so that it is very easy to access the information. Directories are integrated with in the network operating system so as to store the information of network architecture and even combined with messaging service such as e-mail.

Q14. How online database is important for individual and organizational decision making?

Answer :

Aug./Sep.-08, Set-3, Q7 M[16]

Since, from the last few decades it has been observed that information is a key element to take several organizational decisions and for the success of their business. The organization wins the race, if it could successfully gather, analyze, understand and act upon information. The uncertainties in business can be resolved by thorough information analysis. The modern technology is looking forward to store all organizational information in online databases and uses it both for organizational and individual (end-user) decision making. Among these, the technologies are data warehousing, metadata repositories, Online Analytical Processing (OLAP), data-mining, Decision Support Systems (DSS) and Online Transaction Processing (OLTP) etc.

A data warehousing system is an online database where user's operational data, company's data etc., are stored. It consists of data repository to store data. Also several tools are available for accessing the stored data in a customized manner. The data warehousing system has several decision support algorithms that lets a manager or a customer to make better and faster decisions. These decision support tools or systems provide a summarized and consolidated data (which is more important than the detailed or individual record) for making all sort of management decisions. Consider a simple example, when we see a statistical figure like a bar-graph or a pie-chart we can understand the data better, faster and can take decision easily. Similarly, company's progress can be identified easily by converting its sales data into a bar graph.

In order to survive and succeed in today's highly competitive global environment, business organizations must make decisions quickly, correctly by using the available data. Online databases help in conducting the complete financial analysis of organization's data and thus enable them to make decisions based on the actual situations data rather than rough estimates. Earlier, Decision Support System (DSS) was used in work groups or as organization's teams. But, nowadays with the advent of internet the inter-organizational decision support system can be made possible, where several organizations can take common decisions based on their combined data.

DSS can help to save countless hours of manual work in analyzing the data. It also prevents an organization from making costly mistakes by doing assumptions on incomplete or incorrect data.

DSS can also help an individual in taking decisions. For example, the Australian government has uploaded their heritage data like natural, historic and indigenous values. It consists of a list of nearly 22,000 significant places. Any tourist can access this information and take decision about his tour based upon its desired characteristics like climatic conditions of the place, vegetation etc.

When several countries upload such information in online databases then an overall survey can be performed which helps in finding out many crucial things.

Another important applications of online databases is the online drug database, which can assist millions of doctors, researchers across the world to make clinical decisions regarding infectious disease therapies. The Clinical Decision Support System Tools (CDSTs) are helpful in selecting appropriate treatment for the patients. The use of various tools to access online database like Electronic Health Records (EHR) and electronic databases have shown positive influence on patients morbidity and mortality, cost management and formulary compliance and prevention of medication errors etc.

Online databases and DSS has a complimentary effect on e-commerce and online shopping environments. They can be used by many companies to know the demand for a particular product and hence they can take decisions related to its production, marketing, distribution and so on. Due to the growth of internet enabled business applications and interactive media like www, most consumers are doing online shopping or pre-purchase information search. The availability of interactive decision aids for consumers helps them to search their desired product and make purchase decisions. A unique characteristic of online shopping environment is that it allows a very-high degree of interactivity.

Q15. What do you mean by electronic white and yellow pages of directory business? Discuss the overview of directory business.

Answer :

Aug./Sep.-08, Set-4, Q7 M[16]

Electronic White and Yellow Pages

For answer refer Unit-VII, Q13, Topic: Electronic Commerce Catalogs or Directories.

Overview of Directory Business

The purpose of directory business is to provide information on any business to customers regarding its services, prices, quality etc.

- The first telephone directory was published in 1878. It was a single yellow page that listed customer names of the New Haven District Telephone company in alphabetical order.

  The list included the physicians, dentists, stores, factories, meat and fish markets, the local police, a publisher, a lawyer etc. In this case, the telephone subscriber simply gives a specific customer name to the telephone operator instead of dialing a number.

- Michigan State Telephone Company in Detroit published the first official yellow pages in 1906. But in 1983, the business of yellow pages telephone directory was affected by AT & T Bell labs thereby Bell undertook several directory publishers for publishing new books so that to compete with the needs of market place.

- The yellow pages directory industry was greatly attracted due to the following features.
  (a) It supplies to local advertisers.
  (b) Price-inelastic demand.
  (c) Semiannual (or) annual publishing cycle forcing the local advertisers to advertise till the publishing of next directory.
  (d) High return on investments.

- Electronic directory services was first introduced by France Telecom.
- Then, Electronic directory services of US were primarily focused on heavy spender (The business traveller).
- Bell Atlantic introduced a service "Info Travel" which helped the hotel guests in the following ways.
  (a) They can know about the travellers through the T.V and remote controls.
  (b) They can retrieve the information on participating advertisers through CD-interactive technology inserted upto the hotel rooms.
  (c) They can also request the maps.
  (d) They can be connected by telephone to the advertisers.
  (e) They can order the products from electronic catalogs.

The main objective of Info Travel was to replace the traditional directories.

The advertisers in Info Travel were mostly the local marketers rather than global advertisers.

The local marketers were divided into different categories likes services, things to see and do, eating places etc.

Q16. Explain the functions of electronic white pages.

OR

Explain white pages through X.500.

OR

Explain about white pages directory information tree.

Answer :

Electronic White Pages

The services provided by electronic white pages range from fixed table of e-mail addresses to directory assistance that is similar to telephone white pages. It provides enhanced services when compared to conventional telephone company.

The main purpose of using white pages is to reduce the redundancy or duplication in any organization that is spending huge amount of money in storing similar list of addresses, telephone numbers or other information at several sites.

Functions of White Pages

Functions of white pages are;

1. Searching
2. Retrieving.

1. Searching

Searching is defined as a process of finding people can be done by means of indices according to the informati provided. This search process returns a list of documents that matches the query. The main purpose of using index is to ma searching process quicker and easier.

2. Retrieving

Retrieving is a process of fetching auxiliary information related to a person's address, telephone number or SSI (Secure System Identification).

Approaches used for creating white pages directory are interpretability and conventional form of communicatio These approaches are strong enough to provide all the required functionality that is used for establishing directory servic associated with different technologies.

White Pages through X.500

One of the common implementation of white page service is X.500 that is used for tracking individual e-mail addresse on a WAN.

Features of X.500 are as follows,

1. Maintaining and updating decentralized part
2. Powerful searching capabilities
3. Single Global Name Service (GNS)
4. Information framework
5. Standardized directory.

1. Maintaining and Updating Decentralized Part

In order to instantaneously maintain and update every executing site, X.500 takes the responsibility of its local part in a directory.

2. Powerful Searching Capabilities

Arbitrarily sophisticated queries can be constructed by users using X.500 searching facilities.

3. Single Global Name Space (GNS)

A unique GNS is provided by X.500.

4. Information Framework

X.500 allows local extension by defining information structure is being used in a directory.

5. Standardized Directory

The directory application constructed by X.500 retrieves information in an organized way which requires distributed information services such as e-mail service and directory tools service.

Models required for constructing X.500 directory service are,

(a) Directory architecture model

(b) Information architecture model

(c) Security model.

The directory of X.500 consists of Directory System Agent (DSA) which is actually a collection of servers responsible for storing information according to the specifications of X.500 standard. In order to hold information about different entities and to provide its services to Directory User Agents (DUAs), DSAs must cooperate with each other. All DSA's together form a Directory Information Tree (DIT) that represents global directory. All information is stored in tree format i.e., in hierarchical structure with root at the highest level. Countries are represented as the children of root, organizations is represented as children of countries, individual organization units are represented as the children of organization.

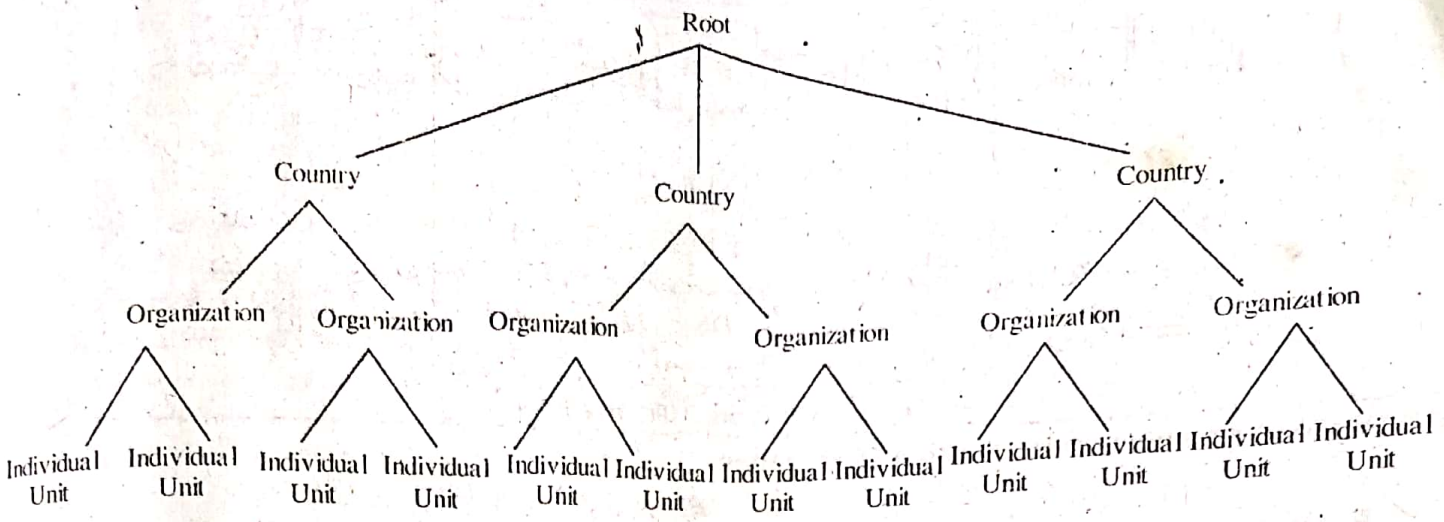

Figure: Directory Information Tree (DIT)

Individual DSA is responsible for maintaining only a portion of global directory. With the help of DIT, each DSA maintain the necessary information of other DSA. X.500 standard does not specify which DSA should maintain what portion of global directory. But, it must be ensured that information present on DSA is not present on several other DSAs.

Directory user agent acts as an interface through which a user, (who can either be a person or a program) can access the directory. These user agents sends the request to the DSA server which is nearer to them so that it becomes easy for a user to browse or retrieve information from directory information tree.

Interaction between different user agents is done by communicating with at least one DSA. It is not necessary that a DSA should be bounded to specific DSA. DSA is responsible for solving the DUAs request. It returns the corresponding information or communicate with other DSA, if it doesn't have required information. DUAs request is stored on local server which doesn't contain much important information. In order to retrieve the required information, server agents must communicate with each other. Following are the methods used when the required information is not present on local server agent.

(i) Chaining DSA

(ii) Referencing DSA

(iii) Multicasting DSA

(iv) Hybrids.

(i) **Chaining DSA**

Before returning the response or reply, request is transferred to a chain of directory service agents.

(ii) **Referencing DSA**

This method is responsible for identifying DSA that is more appropriate for solving user's request. If one DSA fails to satisfy the users request it sends a reference to another DSA.

(iii) **Multicasting DSA**

Multicasting is a method of transferring the same request to more than one DSAs.

(iv) **Hybrid**

In hybrid method, chaining, referral, multicasting can be merged depending on the user's request.

Problems Associated with X.500

1. X.500 is very sophisticated. Therefore, white page services that are simple must be defined to promote widespread implementation.
2. To ensure the reliability and uniformity of data a powerful central management must be available.
3. Conventional naming scheme must be distinguished and documented.

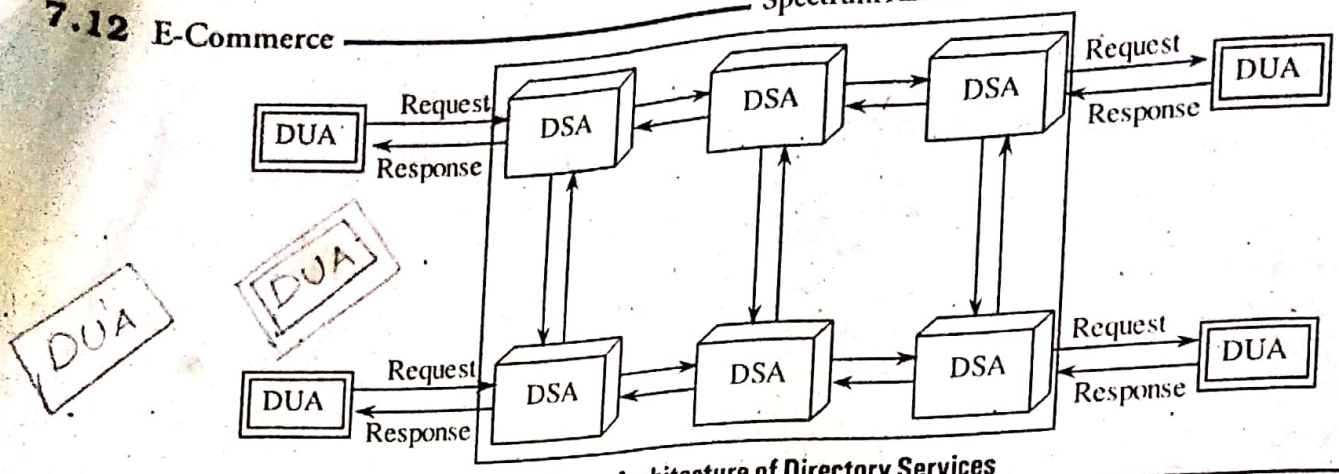

Figure: Architecture of Directory Services

Q17. Write short notes on electronic yellow pages.

OR

Explain about the various third-party directories.

OR

What are the categories into which third-party directories are classified? Briefly explain each one

Answer :

Electronic Yellow Pages

Print-based yellow pages are replaced by electronic. Yellow directory database which provide easy and instant access to information present in the directory. These database helps its user in finding organization that is not present in printed yellow pages.

Many publishers of various organizations are developing number of directories that are achievable and feasible Examples include a directory for storing college information, corporate information etc.

The different types of third-party directories are,

1. Basic yellow pages
2. Business directories.

   It is further divided into,

   (i) State business directory
   (ii) Manufacturer directory
   (iii) Big-business directory
   (iv) Metropolitan area business directory.
3. Credit reference directory
4. World Wide Web directory
5. Directories by SIC.

1. Basic Yellow Pages

Human-oriented goods and services listing can be used for organizing these type of directories.

2. Business Directories

Additional information about any organization, financial health etc., are provided in these business directories. There are different business directories that perform different experimentation task such as,

(i) State business directory
(ii) Manufacturers directory
(iii) Big-business directory
(iv) Metropolitan area business directory.

(i) **State Business Directory**

These directories are used for maintaining the information about the state according to its type and city. This is useful for those type of business that can perform their operations on the basis of demographic conditions.

(ii) **Manufacturer's Directory**

This directory is used for storing information about different manufacturers so that it is easy to search for a particular manufacturer if any product or service is to be sold.

(iii) **Big-business Directory**

This directory maintains information about such organizations that contain more than 100 employees. If search is to be made for this kind of company, this directory is useful.

(iv) **Metropolitan Area Business Directory**

This directory list the companies and different business contacts with necessary information that includes telephone number, address etc.

3. **Credit Reference Directory**

These directories stores data associated with the credit. These data is used for knowing whether a particular new customers or suppliers are qualified or not.

4. **World Wide Web Directory**

These directories maintain information about the servers that are distributed all around wide area network such as internet in the form of hyperlinks.

5. **Directories by SIC**

Standard Industrial Classification are those directories which are approved by government.

There are two categories of publishers of yellow page directories. Those are as follows.

(a) Utility related publishers

(b) Independent publishers.

OM SRI SAI RAM

(a) **Utility Related Publisher**

These publishers publish yellow pages directories for various telephone companies.

(b) **Independent Publisher**

These publishers publish yellow pages directories associated with a particular segment of market.

Q18. Explain interactive product catalogs.

Answer :

Interactive Product Catalogs

Now-a-days many organizations and business institutions are using online directories and catalogs for gaining competitive advantage. Some of the online directories are Yahoo and EINet Galaxy. The major use of these directories in any organization is to advertise their products or services. The objective of interactive catalogs is to allow any buyer to purchase any product from anywhere using virtual mall that are opened 24/7. After selecting the product from online virtual mall, customer interact with companies using different methods like e-mail, desktop video processing etc.

Directories are compiled by third-party agents that guides the customer in searching the catalogs present in the information database. Electronic yellow pages are necessary when e-commerce is employed in business. In yellow pages, data is organized in such a manner that it will help customers in finding the desired information quickly. They are not used for creating needs but are used for satisfying the needs i.e., they act as reactive medium.

Interactive catalogs are basically used in small-scaled businesses where scarce marketing support and sales staff are effectively utilized. For determining effective market segments, it is necessary for a business to gather information related to geographic domain and life-style of various customers. This vast information is combined to have a definite knowledge of different preferences that the customer have for a product.

The functions that are supported by interactive catalogs are,

1. Grouping of different goods/services
2. Coordinating the purchases
3. Functions of financial operations.

Interactive catalogs are very sophisticated to create, though it is very attractive and interesting. Complexity of managing and organizing large volumes of information can be made easier with the help of virtual reality, software agents that are responsible for arranging, sorting and modifying of information.

7.3 Information Filtering

Q19. Describe the information filtering. What type of data is involved in filtering systems? Aug./Sep.-08, Set-2, Q7 M[15]

OR

What is information filtering? Discuss mail and news filtering agents.

Answer :

Information Filtering

The objective of information filtering is to provide access to relevant and variable information when a user requests for it. This information represents a small portion of the entire information base that can be accessed whenever required. Information filtering is also known as content filtering. It is a process of selecting only that information that matches the user's request. Filtering describes different methods that are responsible for broadcasting information to customer when required. The purpose of this process is to eliminate unnecessary data present in the incoming stream. This process is not responsible for performing any kind of search but its only objective is to filter out inconsistent data. It consists of data which is transmitted implicitly by different remote sources or by different alternative sources like e-mail.

Features

1. Massive and abundant volume of data is present in filtering system.
2. Filtering system consist of incoming data stream that need to be broadcasted by different remote sources or directly by other local sources such as e-mail.
3. Filtering is a process of removing unwanted data from a stream of incoming data instead of searching the data in the given input stream.
4. Filtering is used for fetching required data from remote databases based on user's query. This system is used by system developers which are responsible for developing intelligent agents whose task is to search remote database to find the exact or best match for user's query.
5. Filtering is based on profile that represents user interest and which gives detailed information about a particular person or group of persons preferences. The most common use of user profile is in SDI (Selective Dissemination of Information) which is a service that reduces the crisis of information overload. It does this by informing every individual about the new documents to keep them aware of newer technologies developed in particular area of interest.
6. Traditional filtering system is associated with the textual data but not with the real-time data such as voice, video, graphics, images since each have different forms and structures that makes filtering process complicated.

There are two types of filters used in information filtering system. They are as follows,

(a) Intelligent filters

(b) Software filters

(i) Intelligent Filters

These filters are responsible for searching and retrieving information from large databases for finding the exact match for user's query.

(ii) Software Filters

Software filters are responsible for processing a document, understanding the information and allowing the users to have the following capabilities.

(a) Speed/scan reading

(b) Text summarization

(c) Abstract generation

(d) Information extraction

(a) **Speed/Scan Reading Capabilities**

Focuses on important segment of text enabling the reader to read it quickly.

(b) **Text Summarizing Capability**

Interprets the document and decreases the size of original document.

(c) **Abstract Generating Capability**

A new version of a document which considers all important issues is created whose size is very much larger than the size of original document.

(d) **Information Extraction Capability**

It is responsible for extracting particular informat on from textual repository by creating information retrieval agents.

Filtering Agents

There are two types of filtering agents used in information filtering system. They are as follows.

1. Mail filtering agents
2. News filtering agents.

1. Mail Filtering Agents

These agents allows the users to view details about the product in which they are interested in their e-mail inboxes, electronic forms or an on-line news service. The main task of mail agent is to retrieve necessary information at regular interval and keep the user abreast of new developments in their domains by sending the information using the personalized newspaper. Apple search software from Apple is an example of mail agent that creates personal agents that are responsible for searching the incoming messages present on the server. The users have the right to set the time interval of personal agents in order to browse information database and allows to select only those information modules that are required by users.

2. News Filtering Agents

When user's specifies the area in which they are interested, news agents sends them on-line. News alerts related to that domain through medium specified by users which may include e-mail, fax, Lotus Notes applications. The services of this filter is used by executives, who need to be kept abreast about the development in their particular areas of interest. It also allows users to create news clipping reports by selecting them from news service functions.

7.4 Consumer Data Interface, Emerging Tools

Q20. Explain various emerging tools that are available in e-commerce for consumer data interface.

Answer : Aug Sep 08, Set-1, Q7 M[16]

Most of the e-commerce applications need a complex interface between the users and the information resources, such applications make use of high-level interfaces in order to meet the customer's requirements and preferences. The efforts being made for developing an efficient and effective consumer data interfaces can be classified as follows.

1. Human Computer Interface (HCI)

Different emerging technologies provides an effective interaction between the humans and computers. In near future, voice-based machines that can recognize and reproduce speech signals, the GUI's that enable quick browsing of massive amount of data user sensitive interfaces that can customize and display the available information as per the user's understanding capabilities will be available. The interaction with the machines will be through touch, facial expressions and gestures.

2. Heterogeneous Database Interface

The access methods for databases comprising of multiformated data (i.e., multiple structure databases) will be developed. In the coming years, users will be capable of generating and broadcasting and query driven to the relevant database, thereby receiving the timely response with respect to that broadcasted query. Some examples of multiformated data include plain text, spread sheet, programs, video, etc.

3. User Centered Design Tools/Systems

Different methods and models that are capable of producing interactive tools and architecture centric software systems will be developed. The data driven capabilities and the knowledge based capabilities are combined to form highly effective and easily implemented interactive tools such as, document-oriented computing interface.

4. Virtual Reality and Telepresence

The virtual environment creating tools and methods will be developed in order to facilitate the real time human interaction with machines and communication devices. This interaction will be via sensors, effectors and other computational resources. For e-commerce applications, efforts are being made for creating shared virtual environments that can be accessed by multiple network users.

The development of URL (Uniform Resource Locator) facilitates the users in locating different types of information in internet. In other words, URL serves as a standard addressing mechanism for obtaining desired information from the massive volume of data stored in the cyber space. It also enables merging of data obtained from different parts of the internet. Now-a-days, in order to access the information the user must be capable of identifying or locating the desired information, he/she must also be capable of determining how that particular information is implemented and where can it be applied.

5. Virtual Reality and Consumer Experience

The development of real-time www based 3D environment is one of the significant achievements for web browsers. The next generation browsers make use of 3D enabled user interfaces for navigating the web for giving visual appearances to the grouping of documents and their relationships. Complex relationships within the document collection can also be visualized by merging the virtual reality with the servers. These servers are capable of classifying and merging of documents.

Consider an example of virtual air-ticket booking counter. Apart from booking the air-tickets the customers can virtually move inside the aeroplane to locate his/her seat, can sit on the seat to know the comfort level, can know in advance the extra benefits he/she might be provided with etc.

With virtual reality taking off, the users can virtually realize their dreams like meeting the top celebrities, travelling different countries, making their favorite actors dance, sing, talk, smile etc., for them. On the otherhand the companies are striving hard to set the attention of their potential customers with attractive websites.

6. Virtual Reality and Consumer Choice and Behavior

Virtual reality plays a significant role in internet advertising and marketing. In coming years, it will become the backbone for all internet advertisements. However, the users are still unaware of the distinct features that have been added to it in order to facilitate marketing strategies and consumer influencing factors. This unawareness is due to lack of communication between the developers and the marketing research teams.

The choice of the consumer is very important and research is being conducted on it since, 'convincing the customer's is the main motive of any organization. Moreover, the requirements vary from customers to customers i.e,, some customers may be technologically inexperienced while the others may be technologically independent. These technologically inexperienced customers may require timely guidance when they are working in e-commerce environments but the technologically experienced customers may find these guideline to be unnecessary. If customer preferences and requirements are known in advance then, e-commerce user interfaces will be designed and implemented accordingly. The outcome of the consumer choice research suggests two significant technological enhancements.

(i) Enhance the quality of the web pages so that they are more attractive to the customers. This can be done by improving the features of HTML (Hyper Text Markup Language) and VRML (Virtual Reality Modeling Language).

(ii) The choice information is encapsulated into the applets for integrating domain-specific customer characteristics. These applets enable the customization of the consumer's client browser environment.

VRML will be interpreted by the web browsers of future generations like Gopher VR.

7. Virtual Reality Modeling Language (VRML)

The 3D data can be integrated into the web using VRML. In other words, VRML is the current specification for integrating 3D images into the internet. The present version of VRML 1.0 was designed to satisfy the following three requirements. They are,

(i) Platform independence

(ii) Extensibility

(iii) Low-bandwidth access.

The 3D web pages created by using VRML does not require any special type of hardware or other peripherals instead, any standard 486 PC with windows as an operating system is capable of running those applications. However, the speed of the modem will be helpful.

Unit-8 Solutions

Multimedia

8.1 Key Multimedia Concepts

Q1. What are the recent advancements in multimedia technology? Explain the risks associated with them.

Answer : **Aug./Sep.-08, Set-3, Q8 M[16]**

Multimedia technologies comprise of certain important elements. They are,

1. Human Machine Interface (HMI)
2. Multimedia Database Management Systems (MMDMS).

1. Human Machine Interface (HMI)

The most significant development areas of human-machine interface involves,

(i) Central controllers

(ii) Touch screens

(iii) Head-up Displays (HUDs)

(iv) Touch sensitive and laser technologies.

(i) Central Controllers

A controller consisting of essential modules for the correct functioning of programmable controller is known as a "central controllers".

Central controllers consists of the following,

(a) Interface modules for programmers, expansion units, standard peripherals etc.

(b) Communications processors for operator communication and visualization

(c) RAM or EPROM memory modules for the program memory.

Some manufacturers of central controllers are Buckner/cops, calsense, motorola, rain bird, etc.

(ii) Touch Screens

It is an input device that detects the presence and location of a touch within the display area.

Advantage of Touch Screen

- Suitable for sensing passive objects such as a finger, hand or a stylus.

Disadvantage of Touch Screen

- Not feasible for sensing active objects like light pen.

The different types of touch screen technologies are,

(a) Resistive technology

(b) Capacitive technology

(c) Surface Acoustic Wave (SAW) technology etc.

(a) Resistive Technology

Resistive technology is the most affordable touch screen technology. This type of touch screen panel comprises of 800 layers. Out of these, two layers are of almost importance. They are,

- Two thin metallic electrically conductive layers.
- Two thin metallic electrically resistive layers.

The working of resistive touch screen panel is as follows.

Whenever, any object touches it, the layers are connected at a particular point. As a result, the resistive touch screen panel acts in a electrically similar way to two voltage dividers with connected outputs. This causes a change in electric current. The change is registered as a touch event and is transmitted to the controller for proper processing.

Advantage of Resistive Technology

- These panels does not get damaged by dust, sand or other outside elements.

Disadvantage of Resistive Technology

- Resistive touch screen panel offers a clarity of only 75%.

(b) Capacitive Technology

This type of panel is composed of indium tinoxide material. The material is used as a conductor of continuous electric current across a capacitive sensor. Thus, controlled field of electrons are exhibited by the sensor on both horizontal and vertical axes. This results in capacitance.

Advantages of Capacitive Technology

1. Capacitive touch screen panels offers more clarity than the resistive touch screen panels.
2. Capacitive technology is more flexible, as it can be used in different applications like POS (Point-of-Sale) system, industrial controls etc.

Disadvantage of Capacitive Technology

These type of panels can only sense the contact of a finger, but not of a pen stylus or a glared finger.

(c) **Surface Acoustic Wave (SAW) Technology**

Another touch screen technology is SAW technology. Ultrasonic waves are used for such touch screen panel. The working of SAW touch screen panel is almost similar to resistive touch screen panel. The only difference is that, in SAW touch panel when any object touches it, portion of ultrasonic wave is absorbed. Also, instead of electric current, ultrasonic wave is registered as a touch event.

(iii) **Head-up Displays (HUDs)**

A display in which the data is represented without requiring the user to look away from his or her normal view point is known as a HUD. These displays are called head-up, because information is viewed with their "heads up" (looking forward) and not looking down.

HUD are mostly used in applications like military aviation, automobiles, commercial aircraft etc.

Head-up displays can be categorized into two types.

(a) **Fixed HUDs**

In this type of head-up display, a display element moves with the orientation of the user's head attached to the airframe.

(b) **Helmet Manted Displays (HMDs)**

These displays are a kind of HUDs where a user should look through a display element held firmly by the airframe.

There are three components of head-up displays.

(a) Combiner

(b) Projector unit

(c) Video generation computer.

Combiner is a type of surface open which image is projected for proper viewing by the pilot. It is located directly in front of a pilot.

Projector unit places the image into combiner.

Video generation computer acts as an interface between the projector unit and the data to be displayed.

Problems/Risks in Using HUDs

Problems of head-up displays (HUDs) are exposed hen they are used in aircraft. In aircraft, HUDs have limited lds of view, generally less than 30°. Hence, as a result with h displays, pilot may not be able to view any virtual image perly. Similar type of problem is experienced when people head-up displays in automobiles as well.

Using video head-up display on aircraft can also lead oblems. Some of the problems are;

Poor display and transmission quality of video. Thus, video data can't be viewed or transmitted properly.

Without optimization, it is not passible for the pilot to use the controls of video HUD.

(iv) **Touch Sensitive Technologies**

These technologies include,

(a) Touch sensitive pad

(b) Touch sensitive tablet (touch tablet)

(a) **Touch Sensitive Pad**

Touch sensitive pad can be divided into two types,

- Mouse pad
- Bit pad

The working of a mouse pad is similar to that of a mouse where the relative pattern of a finger or a stylus is sensed by it using a touch sensitive pad.

The functionality of bit pad is based on absolute partitioning in which, if the pointer is moved from one corner of the pad to another, the cursor is jumped from one corner to another.

(b) **Touch Sensitive Tablet (Touch Tablet)**

A tablet which can sense what is being touched and where it is being touched is called a touch sensitive tablet or,

A flat surface which is mounted horizontally or nearly horizontally and senses the location of a finger pressing on it is known as a touch tablet.

Touch sensitive tablets posses certain features that make them unique from other devices. The features are,

(i) Touch tablets have a low profile and can be integrated into other disks and low-profile keyboards like key tronic touch pad.

(ii) Touch tablets are constructed in a simple manner with no moving parts. Due to this, these tablets operates in a reliable manner.

(iii) Touch tablets does not consists of mechanical intermediate devices like stylus or puck, because they are used in hostile environments like classrooms, public access terminals etc., where mechanical intermediate devices are more likely to get lost or damaged.

(iv) Touch sensitive tablets can be moulded into one-piece constructions. Hence, there is no possibility of cracks and grooves where dirt is most likely to get stored.

With such property, touch sensitive tablets are either used in clean environments like hospitals or unhygienic environments like factories.

Problems/Risks in using Touch-sensitive Technologies

Problems or risks associated with touch sensitive tablets and touch pards are as follows,

(i) Use of touch tablets can affect the fingers of the users especially if pressure sensitive tablet is implemented

(c) To use touch pads, finger motion should be precise. i.e., the finger should be placed in the exact position for touch pad to sense it. Due to this, some people do not prefer them.

(d) When using touch pads, no other additional features of it like "tap-to-click" can be accessed.

2. Multimedia Database Management System (MMDBMS)

Advancements in multimedia database management system includes,

(i) SQL/MM

(ii) MPEG-7

(iii) VDBMS (Video Database Management System).

(i) SQL/MM

SQL/MM stands for Structural Query Language/ Multimedia. It is a language used for multimedia applications. This type of language was introduced in the year 1991-1992 and was standardized in 2001 by ISO subcommittee SC32 working group. SQL/MM is defined by SQL 99.

Features of SQL/MM

- It supports object relational data model.
- It consists of different multimedia objects and their related methods.
- SQL/MM includes separate class libraries for each complex data type.

Object types supported by SQL/MM includes full text, spatial and image.

Images can be stored in different formates like GIF, TIFF, JPEG, JPG etc.

Image can be categorized into two types. They are,

(a) Still image

(b) Moving image.

(a) Still Image

These type of images are defined by using the following data type,

***SI-still* Image**

This data type provides methods for rotation, scaling, cropping of a still image.

Other data types in still image are,

***SI-positional* Color**

This data type gives positional information for a given color in a still image.

***SI-color* Histogram**

It shows quantities of different colors present in a still image.

***SI-texture* Type**

This still image data type contains information regarding the contrast of still image, coarseness of still image etc.

***SI-feature* List**

This data type contains information about all possible features of a still image.

(b) Moving Image

At present, AQL/MM does not support moving images. They are to be addressed in near future using certain SQL/MM standards.

However, there is a standard which is the most appropriate for moving image. The standard is MPEG.

(ii) MPEG-7

MPEG Stands for Motion Picture Experts Group. It is a standard used for multimedia data. MPEG consists of different versions.

(a) MPEG-2

(b) MPEG-4

(c) MPEG-7.

Out of these, MPEG-7 is currently the most complete description standard for multimedia data. One of the interesting features of MPEG-7 is that any audio/video material associated with multimedia data can be indexed or searched.

The main elements of MPEG-7 standard are,

1. Description tools
2. Description definition language
3. System tools.

1. Description Tools

MPEG-7 comprises of two types of description tool

(a) Descriptors

(b) Description schemes.

Descriptors provide quantitative measures of au and video. Descriptors are denoted by the letter D.

Description scheme is a description tool that cont information about the structure of descriptors and t relationships. It is denoted by the word DS.

2. Description Definition Language

This language provides syntax definitions fo above two description tools. It is also used to generat description schemes.

3. System Tools

These tools provide binary coded representat the following,

- Multiplexing of descriptions
- Synchronization of descriptions with c
- Efficient storage and transmission
- Protection and management of int property in MPEG-7 descriptions.

Advantages of MPEG-4 are properly utilized by Some of the advantages provided by MPEG-4 are,

- Object descriptions for the audio objects can be attached within a sce
- Audiovisual material can be enc MPEG-4 in terms of objects hav relationship in space and time.

(ii) To use touch pads, finger motion should be precise, i.e., the finger should be placed in the exact position for touch pad to sense it. Due to this, some people do not prefer them.

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2. Description definition language
3. System tools.

1. Description Tools

MPEG-7 comprises of two types of description tools,

(a) Descriptors

(b) Description schemes.

Descriptors provide quantitative measures of audio and video. Descriptors are denoted by the letter D.

Description scheme is a description tool that contains information about the structure of descriptors and their relationships. It is denoted by the word DS.

2. Description Definition Language

This language provides syntax definitions for the above two description tools. It is also used to generate new description schemes.

3. System Tools

These tools provide binary coded representation for the following,

- Multiplexing of descriptions
- Synchronization of descriptions with content
- Efficient storage and transmission
- Protection and management of intellectual property in MPEG-7 descriptions.

Advantages of MPEG-4 are properly utilized by MPEG-7. Some of the advantages provided by MPEG-4 are,

- Object descriptions for the audio and visua objects can be attached within a scene.
- Audiovisual material can be encoded usin MPEG-4 in terms of objects having certa relationship in space and time.

Descriptors and description scheme of MPEG-7 are used to gather some of the important information such as,

- Information about objects collection
- Information regarding low-level features in the content such as colors, textures etc.
- Structural information on content components that are spatial, temporal or both. Few examples of such components are scene cuts, motion tracking of a region etc.
- Information that shows how the content is browsed in an efficient manner using variations, summaries, spatial and frequency sub bands,
- Information that shows how user interacts with the content.

Problems or Risks of MPEG-7 Standard

(i) Inability to describe digital text or analog resources properly.
(ii) By using MPEG-7 scheme there is a possibility of duplicating the information.
(iii) Inability to provide proper textual description for certain components like a "table of contents" data element.

(iii) VDBMS (Video Database Management System)

Another advancement in multimedia database management system is video database management system.

Properties of Video Database Management System

(i) It supports continuous video streaming.
(ii) Storage of video and meta-data is possible in VDBMS.
(iii) Video database management system allows feature-based preprocessing for representation and indexing of video content.
(iv) VDBMS also supports buffer and storage management.
(v) Processing of video query is carried out in video database management system.

Working of video database management system is based on three types of layers. They are,

(a) User Interface and Application Layer (UIAL)
(b) Object Relational Database Management Layer (ORDBML)
(c) Object Storage System Layer (OSSL).

(a) User Interface and Application Layer (UIAL)

This is the first layer of video database management system. Activities carried out in this layer are as follows,

(i) Searching of content based query
(ii) Retrieval of content-based query
(iii) Real-time streaming of content-based query
(iv) Implementation of image and semantic processing using video processing tool-kit to partition video into relevant shots.
(v) Processing of shots with the help of tool-kit for extraction of key frames, MPEG-7 compatible low level features etc.
(vi) Storage of video data and its features along with the meta-data in the video database using video processing tool-kit.
(vii) By using video processing tool-kit, shot results are represented by key frames and ranked by performing similarity search.

(b) Object Relational Database Management Layer (ORDBML)

The second layer of VDBMS is object relational database management layer. In this layer, different tasks that are performed are,

(i) Managing, scheduling and serving of concurrent video streams by a real-time stream manager.
(ii) Integration of query and streaming engines for improvement in each management.
(iii) Implementation of similarity search on the basis of nearest neighbour query in the high dimensional space.
(iv) Extraction of video features and mapping of those features to a high dimensional point in space as well as to high dimensional key frame.

(c) **Object Storage System Layer (OSSL)**

This is the third layer of video database management system. In this layer,

(i) Large volumes of data are dealt with real-time requirements.

(ii) Real-time and non real-time video operations are performed.

Further elaboration of the three layers of video database management is explained diagrammatically as follows.

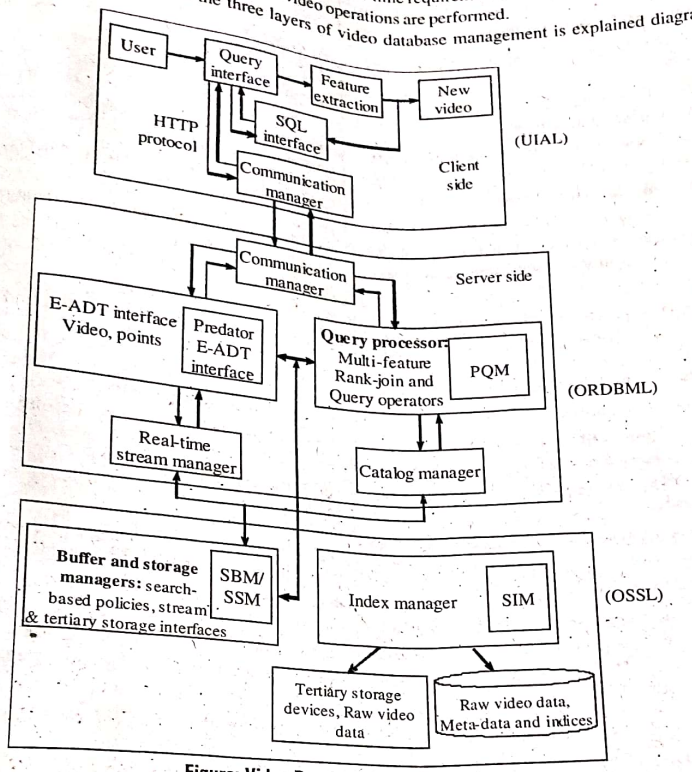

Figure: Video Database Management System

PQM – Predator Query Manager

SIM – Share Index Manager

SBM – Share Buffer Manager

SSM – Share Storage Manager.

From the above figure, it can be seen that user interface and application layer shows operations performed by communication manager on the client side.

On the other hand, object relational database management layer represents operations carried out by server side communication manager. Also functionalities of other managers (catalog and real-time stream manager) are also shown in the figure.

In the final layer, it can be observed how catalog and real-time stream manger combine together and perform operations with other managers.

Q2. Explain e-commerce solutions and database solutions that are available in industrial houses for business purposes.

Answer : April/May-08, Set-1, Q3 M[16]

E-commerce Solutions for Business Purposes

E-commerce solutions in industrial houses for business purposes are,

1. Inventory management
2. Supply chain management

For answer refer Unit-I, Q16. Topics: Inventory Management, Supply Chain Management.

Database Solutions for Business Purposes

Database solutions for business purposes are nothing but the databases supporting the e-commerce solutions. The most popular database solutions for business purposes are,

1. Oracle

Oracle RDBMS or simply Oracle database was produced and marketed in the year 1977 by the Oracle corporation. Most of the business organizations employ Oracle as their databases due to the following reasons.

(i) High level of security.

(ii) Various features like clusterware, Automatic Workload Repository (AWR), Oracle Managed Files (OMF), recovery manager etc., are available with Oracle.

However, small business organizations do not opt for oracle as it is highly expensive.

2. IBM's DB2 and Informix

DB2, also known as data server, is one of the RDBMS developed by IBM. It can run on any kind of system ranging from laptops to mainframes. IBM gave its first object-relational extension to DB2. Thus, making DB2 an object-SQL DBMS. It is much useful in business processes where each entity is a real time object. Its sophisticated version DB2 Data warehouse Enterprise Edition or DB2 DWE is designed for business intelligence implementations and mixed workloads like OLTP with data warehousing.

Informix is another RDBMS developed by IBM. In addition to supporting OLTP, Informix supports integrated solutions.

3. Microsoft SQL Server

It is a RDBMS developed by Microsoft. It uses T-SQL and MS-SQL as its primary query languages. It comes in many flavours, each with its own benefits. These versions provide OLTP, data warehousing and an enough support required for performing business operations. Moreover, this database is less expensive than other databases.

Q3. Explain the storage and transmission requirements for multimedia.

Answer : April/May-08, Set-2, Q3 M[16]

Storage and Transmission Requirements for Multimedia

Multimedia systems are the systems that are responsible for creating, storing, processing, retrieving, transmitting and displaying of multimedia objects. A multimedia object incorporates various characteristics that is, it can be a text-based object, audio object, video object, graphics, images or all the features in a single object. The storage and transmission requirements of multimedia objects are typically more compared to other objects. Various challenges are associated with the storage and retrieval of multimedia content because of its massive size and type of information content. Each component medium of the multimedia content is individually stored on its respective compatible device. For an instance, audio content of the multimedia object can be stored on a low speed device whereas, the video content (within the same multimedia object) must be stored on a high speed optical device. The retrieval of multimedia content is also a difficult task as it involves retrieving of all the components in a synchronized way. For example, the retrieving of audio and video components must be done such that both audio and video are synchronized with each other. Moreover, the retrieval must be quick enough because multimedia content is delay sensitive and cannot withstand much with delay jitters. The retrieval process further becomes complicated when the bandwidth of the existing storage devices is low.

Multimedia systems are used by different types of users. Therefore, it is important to have a good user interface that is capable of displaying a wide range of media. Moreover, the query language processing is also required to efficiently manage and control the multimedia display multimedia data needs real-time processing. So, storage servers must be efficiently designed such that, they are more responsive and augments the overall performance of the system. These storage servers must be capable enough to store and retrieve the data at high speed and in more quantity. Multimedia content like audio and video signals are of analog type and hence need a type conversion before being transmitted. The conversion of analog to digital signals can be done by making use of sampling and quantization techniques. The processing model is used for processing the visual information which focuses on the difference between computer generated images and real-time images, the man-made objects are presented by the geometrical models which are the abstract representation of processing model, these geometrical models performs necessary transformations on the abstract models, in order to generate realistic looking images. The real-time images are then transformed by the image processing model. The properties of the image such as pattern recognition, surface

recognition etc., are extracted and an abstract model of that image is generated by the image understanding and computer vision programs. In general, the three types of digital audio, are,

1. General audio
2. Music
3. Human speech (processed using speech processing program).

Even though, the cost of data storage has significantly reduced and computers have become more faster, the need for data compression still arises because, the use of sound and video have also increased along with the processing speed. There are two methods of data compression (i.e., lossless compression and lossy compression). The lossless method is commonly applied to the text while, the lossy method is typically applied to audio, video, speech and images. The text compression works by eliminating the redundancy present in the textual data. Two types of redundancies exists in text data are as follows,

- ❖ Statistical redundancy
- ❖ Knowledge redundancy.

Statistical redundancy is the redundancy of symbols and knowledge redundancy is the redundancy of common information about the encoder and the decoder.

The type of audio (general sound, music, speech) and the transmission channel utilized must be considered before performing audio compression.

1. General Audio

If it is a general audio then a large collection of bits is needed for its representation and hence, a larger bandwidth is needed for its transmission. Since, the sound signal is a time_varying constraints, all the neighbouring sample values are correlated, there is a slight difference between the values of previous and the present samples. Differential predictive coding and transform coding can be applied to obtain the difference signal thereby eliminating the inter-state redundancy.

2. Music

If the type of audio is a music then, MIDI representation is used for the compression. The MIDI representation encodes the names of playback devices and the manner in which they are played. The knowledge redundancy is also exploited by MIDI representation.

3. Human Speech

If the audio is a speech signal then, its compression is based on the speech decomposition into white noise (i.e., noise produced by human) and sine waves (i.e., the signals produced by voice cords), which are then coded by predictive encoder. The redundancy within an image can be eliminated using the image compression techniques (which mainly rely on encoding techniques). The prediction and transform encoding techniques can be applied in order to remove statistical redundancy which is, typically the correlation between the neighbouring pixels. It is better to encode the image using structural image models because they consider 3D properties of a scene and image is mainly a projection of 3D objects on the 2D plane. So, a high compression ratio is obtained. Multimedia networks are used for the transmission of multimedia bit-streams. Although these networks are noisy, they serves as a good interface/medium for multimedia bit streams. Even if there is a distortion in bitstream during transmission, it can be identified and resolved by using error-correcting codes.

Q4 Define multimedia and explain its key concepts.

Answer : April/May-09, Set-2, Q8 M[16]

Multimedia

Multimedia is defined as an integration of multiple media that not only includes plain text but also real-time data such as video, audio, graphics, sound, animation etc. Among different kinds of multimedia, "digital video" is gaining more popularity in creating e-commerce applications. The different applications of digital video include, video on demand, video conferencing.

The following are the steps that are required for capturing and displaying multimedia objects,

1. Capturing and generating image
2. Performing compression
3. Storing compressed data
4. Transmission of image
5. Processing and displaying image.

1. Capturing and Generating Image

Capturing of image is done by making use of a sensor such as television, camera or can be generated by using electronic devices such as computer or television.

2. Performing Compression

It is not possible to transfer the complete image through communication media, as it consists of large volume of data. The solution is to apply compression techniques that reduces the volume of data without affecting the quality of image.

3. Storing Compressed Data

Different secondary storage technologies such as CD-ROM or network storage servers are used for storing compressed data. The data is stored until it is ready for transmission.

4. Transmission of Image

Data that represents an image is transmitted in the form of data packets. Each packet consists of a header that

specifies source as well as destination address. Data in packets are in the form of bit streams that are transmitted through communication channel. However, transmission speed is dependent on the capability of the channel.

5. Processing and Displaying Image

After receiving the image in the form of packet, decapsulation is performed by removing the bits that were appended to ensure data integrity. Streams that represent video, audio, data are separated and data stream is stored until the image is ready for display. Decompression is performed so as to display the image on electronic devices like computer monitor, television etc.

Multimedia Data Compression Techniques

The main purpose of data compression is to decrease the volume of massive data and to eliminate the data redundancy, so that the information can be stored on the available storage space that ranges from minimum 2:1 and maximum 200 : 1. These ranges depend on the desired quality level and various compression/decompression techniques applied.

Methods used for performing data compression are,

1. Sector-oriented compression of a disk
2. Compression based on backup strategy
3. Compression based on graphics
4. Compression based on network speed.

1. Sector-oriented Compression of a Disk

This type of compression is opaque to end-users and is in-built in the operating system. Example of this form of compression is double space feature of MS-DOS 6.2.

2. Compression Based on Backup Strategy

The most common program that is used for compressing a file before storing them is PKZIP.

3. Compression Based on Graphics or Video

Since graphics contain large amount of data, different compression techniques or methods are used to reduce the volume of data and prevents it from over-whelming.

4. Compression Based on Network Speed

Various compression schemes that are used in modems and routers can be used to reduce the risk of data loss while transmitting them over low speed networks.

Different Types of Compression Techniques

Compression techniques can be classified into two types. They are,

1. Lossy compression
2. Lossless compression.

These two terms give information regarding the state of data block after completing either compression or decompression cycles.

1. Lossy Compression

In lossy compression, there is a mismatch betwe data received and data transmitted. In this type of compress technique loss of data occurs due to which accuracy a resolution is lost. It is basically performed while transmitti real-time data where loss in data accuracy and resolution c be adjustable. The advantage of this technique is that reduces large amount of disk space.

Two standards for lossy graphics compressi techniques are,

(i) **MPEG**
Motion Picture Expert Group (MPEG) is used f compressing moving pictures.

(ii) **JPEG**
Joint Photographic Expert Group (JPEG) is us for compressing graphic images.

2. Lossless Compression

In lossless compression technique, there is no mi match between transmitted and received data i.e., outpu which is compressed is same as the input. This type c compression is used while transmitting text and numeric dat because in this type of data accuracy is very important.

Q5. Write short notes on functioning of CD-ROM as a multimedia storage device.

Answer :

For answer refer Unit-VIII, Q7, Topic: Desktop-based (CD-ROM).

Q6. Explain about multimedia servers.

Answer :

Multimedia Servers

Multimedia server act as both hardware and software system whose main responsibility is to convert the rawfacts into useful information which is provided to users on demand. A multimedia server is also responsible for capturing, processing, managing and delivering audio/video, textual or graphical data. Server in e-commerce applications is responsible for managing, storing task, providing security, managing transaction, ensuring scalability. The difference between server and client applications is that client is responsible for managing user-interface issues while multimedia server deals with critical issues like speed, connectivity, security etc.

Multimedia server provides a range of platforms that are cheaper, fast and can easily handle new data types. These platforms provide scalability and has the capability for managing multiple concurrent transactions by using three different types of techniques like,

1. Multiprocessing
2. Multitasking
3. Multithreading

1. **Multiprocessing**

Multiprocessing refers to the ability of parallely executing multiple tasks (more than two tasks) on multiple processors i.e., it is the ability of utilizing more than one processor. These processors can either be tightly or loosely coupled. In tightly coupled processor system, common memory is shared by all the processors, whereas in loosely coupled processor system every individual processor has its own local memory.

The interaction between processor and memory is made possible with the help of memory bus. Each processor has its own main memory cache. Synchronization is needed to make sure that the data present in these caches is uniform.

The two types of multiprocessing techniques are,

(i) Symmetric multiprocessing

(ii) Asymmetric multiprocessing.

(i) **Symmetric Multiprocessing**

In this type of multiprocessing all the available processors are given equal preferences that is the task assigned to one processor can be completed by another processor. Application programs are fragmented into small units of task, processes and threads to be executed in a concurrent fashion on the available processors. Tasks are then assigned to the processors that are free by the network operating system or server operating system dynamically which means that a processor is never in an inactive state. Using symmetric multiprocessing, processors are utilized to maximum capability in order to achieve maximum efficiency.

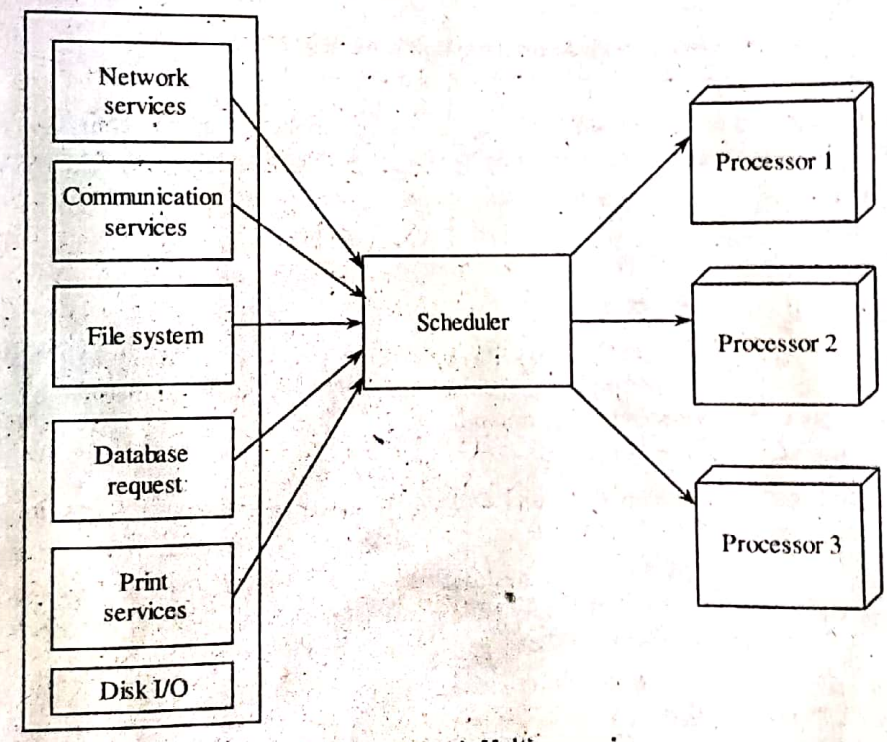

Figure (1): Symmetric Multiprocessing

(ii) **Asymmetric Multiprocessing (ASMP)**

In this type of multiprocessing each individual processor is assigned a particular task. Here, processors work independently relative to other processors. The drawback of ASMP is that tasks are randomly distributed across the available processors. Due to this, other processes have to wait until the execution of previous process is terminated. This restriction is because operating systems have the ability to be executed only a single processor at a time. ASMP, lacks scalability, but at the same time provides synchronization since only one process is executed at one time by an operating system.

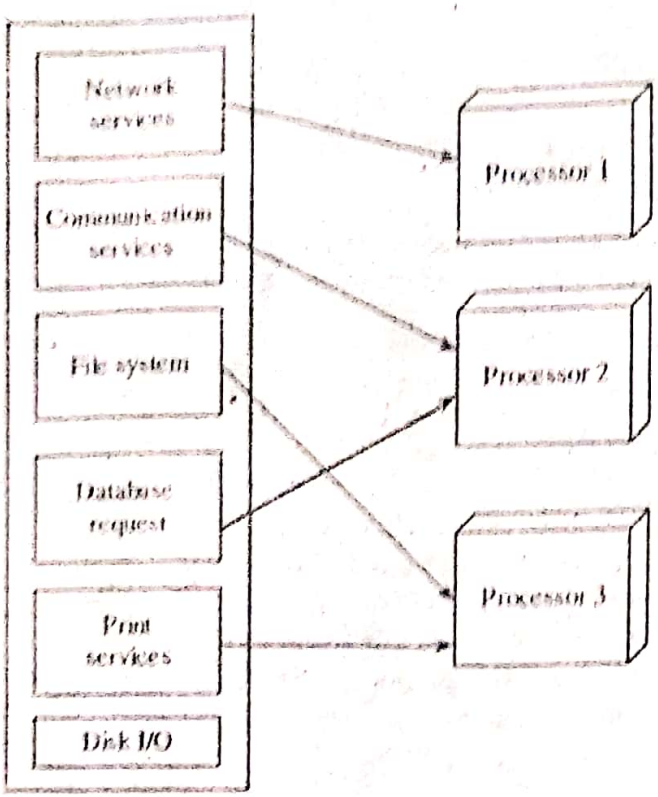

Figure (2): Asymmetric Multiprocessing (ASMP)

2. **Multitasking**

Multitasking is defined as a process wherein multiple tasks are executed by an operating system thereby creating a misconception that all programs are executed concurrently by simply switching control from one process to another.

The two types of multitasking techniques are,

(i) Preemptive multitasking

(ii) Non-preemptive multitasking

(i) **Preemptive Multitasking**

This type of multitasking is present in advanced server operating systems such as Windows NT. Preemptive is defined as a process of preempting the resource before the process is completely executed and distributing the processor's time between the available process with or without their permission.

(ii) **Non-preemptive Multitasking**

In this type of multitasking, it is not possible to preempt the resources until the process is terminated.

3. **Multithreading**

Multithreading is defined as a process of executing different programs within a single address space. In multithreading, threads of different processes may execute concurrently without using multiple processors. Threads belonging to the same process may be assigned to a different processor and can be executed simultaneously.

The difference between multitasking and multithreading is that in the former a process represents the smallest unit of execution, but in the latter a thread represents the smallest unit of execution.

Q7. Explain the different multimedia storage techniques.

Answer :

Multimedia Storage Techniques

Multimedia storage techniques can be categorized into two types. They are,

1. Network-based
2. Desktop-based

Network-based (Disk Arrays)

Disk array is a storage mechanism that stores large volume of data. It is basically important for firewall servers and other e-commerce servers. Storing capacity of small disk array is 1 to 9 GB and that of larger disk array is 50 to 5 TB. RAID technology is preferred for storing information on disks because of its greater capacity level, reliability level and high degree of availability which is achieved through fault tolerance. Level of fault tolerance is dependent on RAID level. There are many RAID levels in which RAID 0 through RAID 5 are commonly used. Apart from these, RAID 5 plus, 6 and 7 are also present. The degree of availability and efficiency is directly proportional to RAID level.

The advantage of using RAID technology is that is the capability of reconstructing data stored on a damaged single disk from the information present on the remaining disks.

Desktop-based (CD-ROM)

CD-ROM is another type of storage technology that is used in e-commerce application. Because of the large storage space capacity, CD-ROM has gained a lot of popularity and have therefore become a premier desktop storage technology. The capacity of audio CD is 530 Mb and that of data CD is 3.2 GB. Earlier it was only possible to read data from CD but there was no option to burn CD's. In order to perform read operation, a special drive called CD-ROM drive is needed. In today's world of technology apart from readable CD's, recordable CD's are also emerging that allows users to write and delete data.

Characteristics of CD-ROM Technology

1. CD-ROM have greater storage capacity when compared to other storage technologies.
2. CD-ROM's are less expensive since they are produced by well developed process.
3. CD-ROM acts as an electronic publishing, distribution and access medium.
4. The random access performance of CD's are far better than the floppies because of the presence of optical read head means and various encoding methods.

Methods that are used for recording data in CD is different from method used while storing analog data. In analog method, the read operation is performed using a mechanical device called "stylus" that is physically connected to the recording surface. But in CD technology, data is stored by converting the electromagnetic signals into bit or byte level which can be read by using lasers.

Steps that are Following while Recording Data

Step 1

Pits represents the shallow depressions and lands represents the space between indentations. Both pits and lands are present on a spiral surface of CD-ROM where pits are read by scattering light rays and lands are responsible for reflecting light. Information in binary format is encoded based on the length of pits and lands.

Step 2

Laser release a light beam, that is focused by using focusing coil.

Step 3

This light beam break through a plastic layer which acts as a protective layer and strikes the reflective aluminium layer present on the surface.

Step 4

When the beam of light strikes a land, it is reflected back to the detector and penetrate through a prism that deflects the light beam to light sensing diode.

Step 5

Then the light voltages are converted into electrical pulses that are compared with timing circuit to generate 1's and 0's.

8.2 Digital Video and Electronic Commerce

Q8. Explain various types of codecs. In this context explain various Moving Pictures Experts Group (MPEG). How MPEG different from JPEG.

April/May-15, Set-1, Q8 M[15]
Aug./Sep.-08, Set-1, Q8 M[15]

Answer :

For answer refer Unit-VIII, Q10.

Q9. Discuss the characteristics of digital video.

OR

What is digital video? Explain the characteristics of digital video in electronic commerce.

Answer :

Digital Video

Digital video is nothing but the representation of data in a binary format. These data bits represent a series of frames where an individual frame represents an image. In order to avoid flicker, the refresh rate should be equal to 50 frames per second. The important feature of digital video is the presence of synchronized sound track. Digital video acts as a core or important component in different electronic commerce applications.

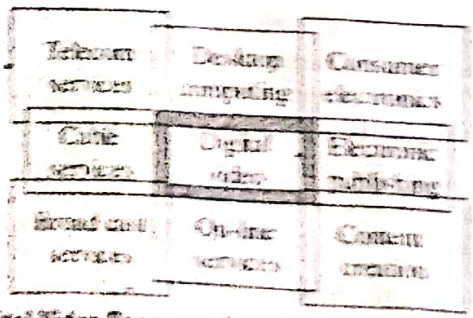

Figure: Digital Video Representing all the Important Components

Characteristics of Digital Video

The following are the characteristics that distinguishes digital video from analog video.

1. It is possible to edit, send and reproduce the digital signal without recognizing any reduction in the quality level of a picture.
2. It has the capability of adopting flexible and adaptive routing techniques using packet-switching scheme.
3. New applications are developed in consumer electronics, multimedia computers and commu-nication markets using digital video compression techniques.

The difference between textual data and audio/video data is that, audio/video data have constant rate outputs that requires time synchronization which is static without effecting the user's capability to retrieve and understand information, whereas in textual data time synchronization is not important while understanding text or image. Video/Audio data is also referred as continuous real-time data.

In order to generate continuous real-time data, it is essential that remote servers must be capable of supporting considerable data rate for generating accurate and correct audio and video outputs.

Network bandwidth limits the ability of conti-nuously transmitting 30 fps to single user. In order to deliver continuous data, 1.3 Mbps of dedicated transmission media is required to achieve compression ratio of 10 M bytes/min.

Q10. What is codec? Explain the different types of codecs.

Answer :

Codec

Codec is a technique that performs compression and decompression of either video or audio information for storing massive amount of data.

Codecs can be classified into two types. They are,

1. Hybrid codec
2. Software-based codec.

1. Hybrid Codec

Hybrid codec performs compression and decom-pression using a combination of specialized processors and softwares. By using complex algorithms, which requires a considerable amount of processing speed, better compression can be attained. This speed of processing acquired by special hardware boards perform decompression at the same speed and produces the same quality as that of VCR tape.

The drawback of hybrid codec is that it requires a dedicated hardware that is costly for processing and playing digital video. The two different types of hybrid codec standards are,

(i) JPEG

(ii) MPEG

(i) Joint Photographic Experts Group (JPEG)

JPEG is used for compressing stationary images using compression algorithm defined by Joint ISO/CCITT experts group. There are two methods in which JPEG can be utilized.

1. As a part of MPEG
2. Motion JPEG.

If any of the two methods are used, pictures are compressed as though they are motionless pictures. Since, the compression chip is cheaper, JPEG standard is commonly used for video sequences. With motion JPEG any frame can be easily accessed if it is in a digitized format.

The difference between JPEG and MPEG compression techniques is that, JPEG is fast and has the ability to capture images that can be displayed on full-screen with full data rate. If the compression ratio exceeds 20 : 1, then degradation in the quality of image becomes visible. Using JPEG it is possible to either compress full-color digital images or gray-scale digital images. It is not responsible for compressing black-and-white and moving images. JPEG is based on lossy compression technique which means that, data received is not similar to data transmitted.

An important property is JPEG compression technique is that, the level of lossiness can be changed by simply modifying the different parameters of compression.

JPEG is a complex compression technique, that performs compression in a step-wise manner as follows,

(a) Discrete Cosine Transformation

This transformation examines 8×8 pixel matrices.

(b) Quantization

This process edits the data and performs compression on pixels in a similar fashion as that of run length.

(c) In the last step, a variant of Huffman encoding technique is used for compressing the image.

(ii) Moving Pictures Experts Group (MPEG)

The goals of MPEG is to develop standards for compressing high-quality digital videos along with audio. There are two standards of MPEG that are defined by ISO group.

(a) MPEG-I

(b) MPEG-II.

MPEG-I is responsible for compressing video (while being transmitted) to CD's. MPEG-II is responsible for

compressing video in real-time environment. Both these open standards were developed by ISO/CCITT Moving Pictures Expert Group (MPEG).

There are two type of compression that are performed in video sequence.

- Intraframe
- Interframe.

Intraframe

Key frames are generated at regular intervals which are capable of providing reasonable and sensible checks on the compressed video output. It uses the data present within that frame for its compression.

Interframe

This compression technique generates frames that are compressed based on the delta frames.

(a) **MPEG-I**

MPEG-I is responsible for defining stream of bits for audio and video that has completed their compression cycle in order to efficiently utilize the available bandwidth at a data rate of 1.5 Mbps. This rate has its own significance as it is the rate of audio CD's that are not compressed. MPEG-I standard is divided into three subparts.

- Video
- Audio
- System.

System is the combination of both audio and video streams with accurate time synchronization between them.

MPEG-I video can be compressed by users if MPEG-I standard is implemented in business chips. C-cube micro-system is the leading producer of MPEG standards that are incorporated in most of the video boards. The main purpose of this standard is to process video at a resolution of 352 × 240 pixel at 30 fps called source input format which is a quarter of broadcast television resolution. The quality of digital video that underwent decompression cycle is calculated by considering,

- Number of colors that can be displayed
- Number of pixels per frame
- Number of frames per second.

(b) **MPEG-II**

MPEG-II is responsible for compressing video signals that are used for transmitting high quality video. MPEG-II employs a compression algorithm that can perform video processing at full resolution even if the data rate is very slow and by understanding the requirements of transmitter. It does this by supporting video sources that are weaved together, thereby increasing the performance and decreasing the manufacturing costs.

MPEG-II defines the stream of bits that are coded in order to generate digital and video that have high-quality entertainment level. It can be said that MPEG-II is an extension of MPEG-I standard. Difference between these two standards is that, MPEG-II supports video format that are weaved together and consists of many advanced features such as supporting high density television. MPEG-II utilizes the bandwidth with data rate of 2 to 15 Mbps that requires a resolution of broadcast television of 720 × 480 at 60 fps.

MPEG-II will become a core standard for compression of television is interactive and video on-demand is real.

2. Software-based Codec

There are two software based codecs. They are,

(i) Cinepak

(ii) Indeo.

Both these software codecs are grouped together to be used in video application software like QuickTime and Microsoft video for windows.

(i) Cinepak

Cinepak deals with compressing motion images and is most commonly used for distributing movies on secondary storage device such as CD-ROM's. Cinepak is irregular or unbalanced software based codec where compression is performed at low speed but playback is done quickly and efficiently. It is capable of playing 15 fps with 320 × 240 pixel resolution.

(ii) Indeo

Indeo is a regular or balanced software based codec that makes equal usage of both compression and decompression time. The most common application of indeo is video conferencing where real-time compression as well as decompression is needed.

Indeo faced obstacles related to performance and compression ratio between intraframe and interframe. These hurdles were overcome in the later versions of Indeo that provided enhanced performance and high speed data transfer rate.

Q11. List out the applications of digital video in e-commerce and explain each of them.

Answer :

Applications of Digital Video

The different applications of digital video that are defined based on the following commercial areas using digital video compression techniques are,

1. Consumer market
2. Communication market
3. Computer market.

1. Application of Digital Video of Consumer Market

(i) Video karaoke

(ii) Video games

(iii) Digital cameras

(iv) Digital video cassette recorders
(v) Digital television receiver.

(i) Video Karaoke

Video karaoke is a video editing software through which it is possible to view the karaoke clips along with the lyrics that are displayed on video. Video karaoke software is supported by windows 2000, Windows NT, Windows XP home/professional versions.

(ii) Video Games

Video game is nothing but a game that can interact with the users through an interface. The main purpose of this communication is to produce a feedback that can be viewed visually on raster scanned video devices.

(iii) Digital Cameras

It is a camera that capture pictures and stores them in a digitized format instead of recording the picture in an analog format. The major advantage of digital camera is that it is very easy, fast, less expensive to develop photos as there is no need for performing film processing.

(iv) Digital Video Cassette Recorders (DVCR)

DVCR is nothing but a digital VCR that is capable of protecting an image from being altered while performing search or processing an image.

(v) Digital Television Receivers

Digital television receiver receives and performs decompression of video signal that is compressed using MPEG-II compression standard to be displayed on television screen. Here, decompressing is performed by processing stream of bits that corresponds to different classes including discrete cosine transform coefficient and motion vector information.

2. Application of Digital Video in Communication Market

(i) Video-on-demand services
(ii) Video telephony
(iii) Direct Broadcast Satellite (DBS).

(i) Video-on-demand Services

Video-on-demand is entirely different from pay-per view service in which, the viewers make a choice of movie, they wish to see by specifying the time at which they want to see it. In video-on-demand, videos were delivered to customers using copper telephone wires without interrupting the normal telephone service. This service can reduce the trip to any video store only if the price of set top decoders is low.

ii) Video Telephony

Video telephony is a telephone which allows full-duplex, real-time audio-video communication between a group of end-users. This telephone requires high-resolution data along with the bandwidth that is larger when compared to audio data.

(iii) Direct Broadcast Satellite (DBS)

DBS refers to the satellite television that broadcasts signal directly to viewers's home through the use of their own earth station or downlinks. It broadcasts many number of television channels intended for home reception mounted on a small-dish antenna. Direct broadcast satellite is also referred to as direct-to-home signals.

3. Applications of Digital Video in Computer Market

(i) High color image editor.
(ii) Image databases.

Other applications such as add-on cards for Video CD playback, video-game playback, desktop video editing, multimedia presentation authoring and color scanners are present in computer market.

(i) High Color Image Editor

High color image editor is very fast image editor consisting different color management schemes. It is generally used to enhance the quality of image before printing it.

(ii) Image Databases

Some of the different types of image databases are,

(a) Vision and Autonomous System Center's Image Database

The VASC image database contains images that are shared with researchers present around the world.

(b) USC-SIPI Image Database

USC-SIPI image database is a collection of images in a digital format. This database is maintained so as to help researchers in processing and analyzing the images.

(c) Defence Image Database

This database holds numerous images that have been contributed by Army, Royal Navy.

8.3 Desktop Video Processing

Q12. Give an overview of the various desktop components needed for digital video processing and production.

OR

Briefly discuss about desktop video processing.

Answer :

Desktop Video Processing

The different components that are required for processing and production of digital video are,

1. Video capture hardware
2. Video playback accelerator boards
3. Editing software
4. Desktop video application software.

Other peripheral devices that are required for processing digital video are,

(i) Microphones
(ii) Speakers
(iii) Joysticks.

1. Hardware Used for Playback and Capturing Video

The basic requirement for capturing and processing digital video are,

- Large amount of disk space
- Significant speed of CPU processor
- Specialized hardware that performs digitizing and compressing of the incoming video signals.

Earlier it was very difficult to process video because of large volumes of data present in it. This problem is solved by using products of video playback that improved the capability of a system responsible for processing multimedia. The two video playback products are,

(a) Video ASIC (Application Specific Integrated Circuit)
(b) Broad level product.

2. Video Playback Accelerator Boards

The two types of accelerator boards are,

(i) Graphics accelerator board
(ii) Video accelerator board.

(i) Graphics Accelerator Board

This board deals with the movement of graphical data from display adapters like DRAM and VRAM to the monitor screen. Acceleration processor present in these adapters performs this task. The speed of moving graphic data can be increased by using on board 32 and 64-bit data path.

(ii) Video Accelerator Board

It deals with increasing the speed of playback and improving the quality of captured digital video. The important goal of video accelerator is to enhance playback concerned with motion-video. Specialized processors are available that are used for improving playback and quality of digital video. A video board is responsible for displaying full-screen motion video on computer monitor. Earlier, graphics and video data were processed using two different accelerator boards, but now both these boards are merged to provide better functionality.

3. Video Capture Hardware and Editing Software

(i) Video Capture Hardware

Video capture hardware board is responsible for,

(a) Converting incoming analog, video signals into digital form.
(b) Managing interpolation tasks while scaling images and while transmitting video analog signal to the monitor.

When video signals are converted into digital format, they are transmitted using internal connector to video compression board that is responsible for compressing massive data by applying various compression techniques.

(ii) Video Editing Software

The video editing software is responsible for,

(a) Cropping the image
(b) Scaling
(c) Converting from analog to digital format
(d) Adding special effects such as zooms, fade-ins etc. to both audio and video to give different appearances.

Advance video editing tools are being developed so as to fulfill the changing demand of professional manufacturers, business representatives etc. For developing these tools, a program that is powerful, easier to use, cheaper and affordable must be created. This program must support standard formats of digital audio and video. Pull down menus and windows compatibility are very important concepts that must be present in video-editing software packages. Using these editing tools even a naive user can easily understand the complex procedures.

Applications that can be used on different platforms are created by using video capture software. These applications are used for compressing and playing digital video. Cross platform application refers to the process of capturing, manipulating, compressing, translating digital files, so that they can be played on different platforms. Once the video is created, an end-user application must be constructed by choosing either QuickTime or video for Windows application software. In order to reduce the cost of duplication that arises when a developer creates the same application twice is to reuse existing application on multiple cross platforms.

4. Desktop Video Software

Digital video engine is the basic requirement for processing digital video. There are two different types of digital video engines. They are,

(i) Apple's QuickTime
(ii) Microsoft Video for Windows.

For Macintosh operating system, these engines are in-built, but for Windows operating system, they need to be installed explicitly. The advantage of these application software is that no specialized hardware is required to playback digital video.

(I) Apple's QuickTime Digital Video Engine

A QuickTime engine, developed by an Apple corporation actually refers to the collection of software

...is responsible for playing and processing moving video files with ".MOV" extension without using specialized hardware. ...This software has its own codec techniques that are used for compression and decompression. It was the first software engine ...that treated video as a standard data type. Using QuickTime it is very easy to perform operations like cut, copy, paste on video ...data. The advantage of QuickTime engine is that it is operable on both Macintosh and Windows operating system. There are ...various features that are incorporated in digital video using QuickTime. They are,

(a) Multiple video tracks
(b) Multiple sound tracks
(c) Support for synchronized text present in video.

(ii) Microsoft's Digital Video Engine

A video engine, developed by Microsoft, is a collection of software programs responsible for playing and processing moving video files with ".AVI" (Audio Video Interleaved) extension without using specialized hardware. This software has its own codec techniques that are used for compressing and decompressing digital video. The drawback of Microsoft video for windows is that it is operable only on Windows operating system but not on Mac operating system. This video engine consists of Microsoft program that is responsible for converting QuickTime file to video for window file.

9.4 Desktop Video Conferencing

Q13 Describe the connectionless vs connection oriented networks.

Answer : April/May-09, Set-4, Q8 M[16]

Connection oriented Communication	Connectionless Communication
1. In connection oriented communication, a connection must be established through the network before two computers can communicate.	1. Connection is not required in connectionless communication. It can be started at any time.
2. It is analogous to a telephone system.	2. It is analogous to the postal mail system.
3. Both the computers must be ready to exchange the data.	3. A computer can send data at any time on when the user requests it.
4. Messages are sent and received in order.	4. Messages may arrive at the receiver in any order.
5. It provides services such as reliable data transfer, flow control and congestion control.	5. It does not offer these services.
6. It is reliable i.e., it never loses data. The reliability is achieved through acknowledgments that are sent by the receiver on the receipt of each message to the sender.	6. It is unreliable. So there are no acknowledgments.
7. It is appropriate for file transfer applications.	7. It is appropriate for sending e-mail.
8. The acknowledgment introduces overhead and delays.	8. It has less initial overheads.
9. The internet connection oriented service is called TCP (Transmission Control Protocol).	9. The internet's connectionless service is called UDP (User Datagram Protocol).
10. It offers the following types of services, (i) Reliable message stream (ii) Reliable byte stream (iii) Unreliable connection	10. It offers the following types of services, (i) Unreliable datagram (ii) Acknowledged datagram (iii) Request reply
11. It has ability to inform communicating computers immediately when a connection fails. (Example: When hardware fails)	11. It goes unnoticed and unreported when a connection fails. In this system a computer can continue to send messages even after a failure.
12. The internet applications that use this service include Internet Mail, FTP and HTTP.	12. The multimedia applications that use this service include internet phone and video conferencing.

Q15. Explain the economics that are associated with desktop videoconferencing.

Answer : Aug./Sep.-08, Set-2, Q8 M[16]

Desktop Videoconferencing

Desktop videoconferencing has gained much popularity as an efficient communication tool due to the increased digital video capabilities of PCs. It enables an inexpensive and reliable communication between the traders irrespective of their physical locations. Initially, the video-conferencing involved an expensive room-sized equipment and a separate room was assigned for conferencing purpose.

All the persons who are involved in the conference must be present in that room. The room is equipped with large monitors displaying similar rooms at remote locations. For example, the corporate in one country can describe their newly introduced products and services by arranging a video conference so that their counterparts in other countries can actively take part in the discussion i.e., they can give the suggestions and feedback at the time of discussion itself.

With the introduction of desktop videoconferencing, the concept of room videoconferencing had fainted. It enables the user to sit comfortably at their respective desktop and the communication between different traders occur via PC terminals in a similar way as of telephonic conversation. The business users will be facilitated with the technologies like internetworking and compression techniques that enables them to work in a meeting environment while being at their individual locations. The computer screen of the user's desktop displays four or five small sized windows, one of these will be a shared space using which all the trading partners interact. A private workspace will also be available with each trader for taking down important points, analyzing the data later on, reading e-mails, etc. Apart from this, each individual trader has his/her respective mute controller so that he/she can switch it off/on as per his/her requirement.

Desktop videoconferencing has become an integral part of most of the business and personal communications because of the following three factors associated with it.

1. Cost
2. Standard
3. Compression.

1. Cost

The drastic fall in the cost of videoconferencing equipment has made it an optimal solution for the business and personal communications. Initially, during 1980's the cost of a room-sized computer system was somewhere around Rs. 2.5 to 3 crores but now it has reduced to Rs. 2.5 to 3 lakhs and just Rs. 25000 to 50,000 for a desktop system. Apart from the cost-fall in desktop videoconferencing equipments, the quality of video captured and processing of video has significantly improved. This makes videoconferencing an efficient and a cost-effective mechanism for video-based communications.

2. Standard

A videoconferencing standard that is compatible with different machines from different vendors is under development and very soon it will be available in the market. The world wide standard for videoconferencing is slowly coming into existence thereby, allowing communication between machines from different vendors.

3. Compression

The bandwidth of the communication channel has the major impact on data transmission (media files, text, etc). Video transmission over a communication channel requires more bandwidth when compared to ordinary text transmission. Hence, it will be better to compress the video before transmitting it. The overhead associated with videoconferencing can be significantly reduced by using the efficient and faster compression mechanisms available.

The videoconferencing is fastly moving towards desktop computers because of their enhanced processing power, improved video, audio and data compression mechanisms. Some newly introduced package that converts PC into videophones are also available within affordable range so, long distance video calls can be made via POTS lines in a cost-effective manner.

Q15. What are the benefits associated with desktop videoconferencing? State how do you overcome the limitations of it.

April/May-09, Set-1, Q8 M[16]

Answer : Aug./Sep.-08, Set-4, Q8 M[16]

Desktop Videoconferencing

Videoconferencing is the means by which people from different geographical locations hold an interactive communication. In other words, videoconferencing technique involves the usage of audio, video and text for creating a lively connection between people of different locations.

Benefits

The potential benefits offered by desktop video-conferencing are as follows,

1. It saves the time and cost of travelling different locations for meeting different people.
2. Well established communication between suppliers and customers and between company personnel.
3. It eliminates the pressure, stress and fatigue associated with travelling.
4. It reduces the product/project development time to a great extent by eliminating the need to carry out a manual business meeting where employees from all the branches must be present.

5. The meetings carried out by desktop videoconferencing often requires less time compared with manual meetings.
6. It facilitates the immediate contact between different people.
7. In urgent situations like earthquakes, calamities, attacks by terrorist etc., desktop videoconferencing plays a vital role by providing quick face to face interaction.
8. With desktop videoconferencing, the companies can grasp various opportunities within narrow time frames.
9. For decision makers, the desktop videoconferencing enables them to interact on a project with their colleagues so as to make quick, efficient and reliable decisions.
10. The desktop videoconferencing also enables the company personnel to exchange the text messages so that significant information is shared by all the employees and thereby increasing the productivity.

Limitations

Apart from the benefits offered by desktop videoconferencing these are some limitations associated with it.

1. For a Successful Videoconferencing, it is Mandatory to have a Good Sound Quality

The standard ISDN lines that are commonly used in telephone connection provides the following range of frequencies.

Low range = 3100 Hz

High range = 7000 Hz.

The videoconferencing standard (i.e., the ISO) needs the frequency range of 125 Hz to 12500 Hz which is audible to human ear.

At present, there are only two ways for obtaining a better sound and lip synchronization of video and audio, they are,

(i) Satellite transmission (broadband)

(ii) ATM cable (broadband)

Apart from utilizing perfect broadband sound and image, the following aspects must be considered.

(a) The performance of the interpreters will degrade if they consistently feel isolation from their audience.

(b) The working time for a videoconferencing should not exceed more than 3 hours per day because it requires the interpreters to continuously interpret between participants which are at different locations. In videoconferencing not all participants are present at the same site.

(c) Top-quality earphones which support full range of sound must be provided to the interpreters.

2. The Image Quality is also Essential for the Success of Videoconferencing

At present, both the sound and the image quality cannot be obtained at the same time, any one needs to be sacrificed for the other. The system is configured by a technical personnel for obtaining better sound quality which effects the image quality. The poor quality images cause eyestrains, increased fluctuations in images etc. An experienced, coordinating interpreter is needed that works with the video and sound technicians to successfully carry out a videoconference.

Although videoconferencing technology is growing rapidly, it still needs much more developments to meet the conditions for conference interpreters.

The limitations of videoconferencing will be the same for long-distance interpreting even if we obtain a perfect short distance videoconference technique because of the bandwidth requirements, synchronization of audio and video over such a long distance, cost of devices involved etc. In order to overcome these limitations the cost of devices should be reduced, improvements should be made to broadband speed, good quality audio and video devices are needed and so on.

Q16. Explain networks. Discuss in detail the Integrated Digital Networks (ISDN).

April/May-08, Set-3, Q8 M[16]

Answer : **April/May-08, Set-4, Q8 M[16]**

Networks

A network refers to a collection of interconnected PCs which can communicate with each other, share resources, information etc., it can be classified based on the scale (capability), connection method, functional relationship and topology used.

Classification Based on the Scale

Based on its scale, a network can be classified into the following categories,

1. Local Area Network (LAN)
2. Wide Area Network (WAN)
3. Metropolitan Area Network (MAN)
4. Personal Area Network (PAN)
5. Virtual Private Network (VPN)
6. Campus Area Network (CAN)
7. Global Area Network (GAN)

Classification Based on Connection Method

A network can also be classified based on the connection method (hardware and software technology) used.

1. Optical Fiber
2. Ethernet

3. Wireless LAN
4. Home PNA
5. Power line.

Classification Based on Functional Relationship

Based on the functional relationships between the network components, a network can be classified into the following categories.

1. Active networks
2. Client-server architecture
3. Peer-to-peer or work group architecture.

Classification Based on Network Topology

The networks based on their topologies can be classified as follows.

1. Bus network
2. Star network
3. Ring network
4. Mesh network
5. Star-bus network
6. Tree or hierarchical topology network.

Two or more computers when connected form a network and two or more networks when connected form an inter network. In general, the three types of inter-networks are,

1. Intranet
2. Extranet
3. Internet.

An intranet is a collection of networks that uses IP protocol and IP-based tools. It consists of one or more web servers for providing users with the organizational data.

An extranet is an inter-network within an organization which has atleast one connection to the external network.

The internet is a network of networks which does not have a specific boundaries. It comprises of different networks like LAN, MAN, WAN which are connected via bridges, routers, gateways, hubs, etc. It is connected to all the public, private, government, educational, networks.

In order to establish a network, different hardware components such as network interface cards, repeaters, hubs, bridges, switches, routers, etc.

ISDN (Integrated Services Digital Networks)

ISDN Architecture

Integrated Services Digital Network (ISDN) is a fully digital, circuit-switched telephone system. ISDN integrates voice and non-voice services together. The key idea behind ISDN is the use of a conceptual pipe called the digital bit pipe through which bits flow between the customer and the ISDN exchange. The pipe is bidirectional that is the bits can originate at the customer or at the ISDN exchange. Any device such as a digital telephone, a digital terminal, a digital facsimile machine can originate the bits.

The digital bit pipe uses time division multiplexing of the bit stream to support multiple independent channels. There are two standards developed for the bit pipe. For home users it defines a low bandwidth standard and for business users it defines a high bandwidth standard supporting multiple channels. Further if the bandwidth requirements of business users is more than provided by a single bit pipe then business users can have multiple bit pipes.

The ISDN system for a home or small business is shown in figure (1).

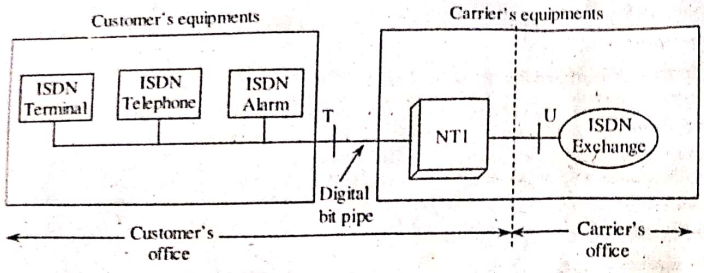

Figure (1)

As shown in figure (1) there is a network terminating device NT1 placed by the carriers at the customer's office and connected to the ISDN exchange using the twisted pair. The NT1 has a connector to which a bus cable can be connected. A bus cable can have upto eight ISDN devices such as terminals, telephones and so on.

The ISDN system for a large business is shown in figure (2).

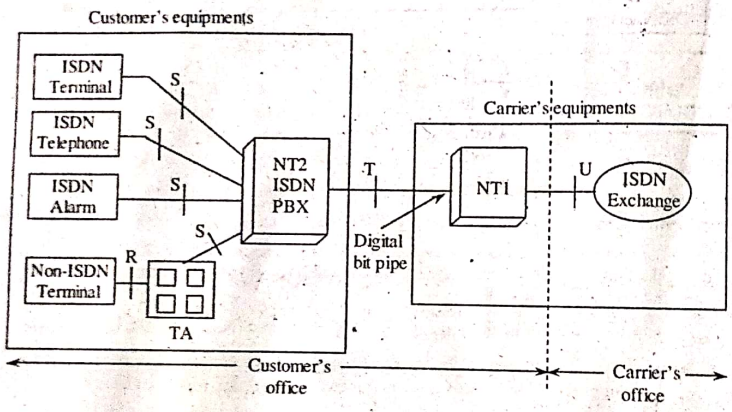

Figure (2)

In this system another device called a private branch exchange, PBX is connected to NT1. It can handle many conversations simultaneously. Both ISDN and non-ISDN devices can be connected to PBX thus it provides the real interface for terminals, telephones and other equipments.

ISDN Objectives

The main objectives of ISDN is to make the telephone system fully digital. The primary goal of ISDN is to integrate voice and non-voice services

The voice services provided by ISDN include,

1. Call transfer and call forward.
2. Display caller's information such as phone number, name, address and database record on telephones.
3. Multiple buttons on a telephone for setting up instant call to another telephone.
4. Automatic walk-up call service.

The non-voice services provided by ISDN include,

1. Connecting computers in the world as telephones are connected.
2. Provide telemetry services such as remote electricity meter reading, on-line medical, burglar and smoke alarms.
3. Provide teletext service such as composing, sending and receiving e-mails.
4. Access to a remote database for example, on-line telephone book, banking, reservations etc.

ISDN Reference Points

A reference point refers to an interface between two functional groupings (grouping of devices based on their functionalities). The functional groupings at the customer's office are of three types. They are,

1. Network Terminations (NT1 and NT2)
2. Terminal Equipment (TE1 and TE2)
3. Terminal Adapter (TA)

There are four reference points in ISDN connection.

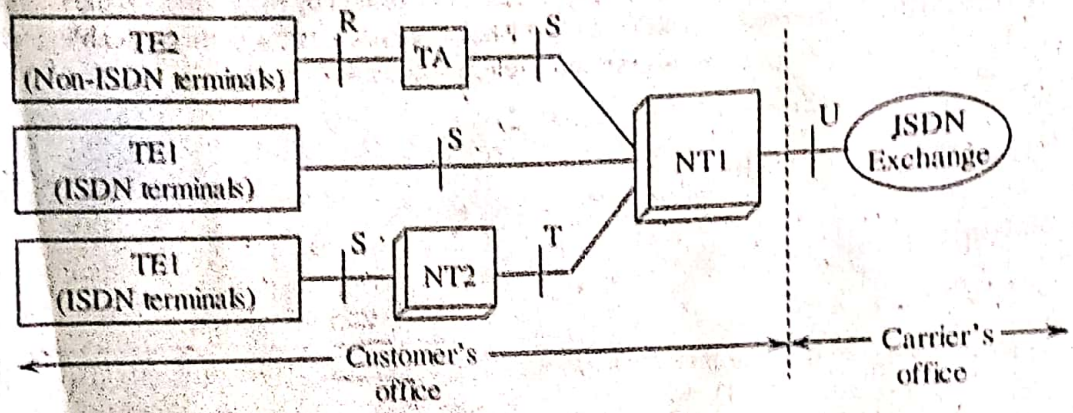

Figure (3): Reference Points in ISDN Connection

The *U* reference point defines the connection between ISDN exchange and NT1.

The *T* reference point defines the connection between network terminations, NT1 and NT2.

The *S* reference point defines the connection between NT2 and ISDN terminals.

The *R* reference point defines the connection between non-ISDN terminals and TA.

ISDN Channels

The ISDN digital bit pipe supports multiple independent channels by time division multiplexing.

The three ISDN digital channels are,

1. B-channel
2. D-channel
3. H-channel.

1. B-Channel

A B (Bearer)-channel carries digital information such as digitized voice, data or compressed video. The maximum data rate of B-channel is 64 kbps. If the desired transmission rate is 128 kbps then two B-channels can be combined. However, a single B-channel is used for data transmission destined to a single recipient only.

2. D-Channel

A D-channel carries controlling signals such as establishing a call, ringing and so on. So, B-channel carry the actual data, transmission. Traditionally a channel used to carry the actual data as well as controlling information is called as in-band signaling. ISDN uses out-band signalling that separates the two and dedicate a separate channel for control signals. Digital circuit-switched networks uses a protocol called Signaling System Number 7 (SS7) to provide out-band signaling.

A D-channel can carry actual data in cases where signalling is not required. For example, in alarm systems, teletext etc. The maximum transmission rate of D-channel is 16 kbps or 64 kbps.

H-Channel

H-channel provides higher bandwidth by combining multiple B and D-channels. Thus the data rates of H-channel are 384, 1536, or 1920 kbps. H-channel is used for applications requiring higher bandwidths for example videoconferencing, high-speed data/audio.

ISDN Interfaces

ISDN supports two interfaces,

1. Basic rate interface
2. Primary rate interface.

1. Basic Rate Interface

The Basic Rate Interface (BRI) is a large digital bit pipe consisting of two B channels and one D channel i.e., 2B + D. In BRI service 2 channels carries data and 1 channel carries signals. The bandwidth of each B channel is 64 kbps and that of D channel is 16 kbps. 48 kbps is required by the BRI service itself for operating overhead. Therefore, the total bandwidth required for BRI ISDN interface is $(2B \times 64) + (1D \times 16) + 48 = 192$ kbps.

Figure (4): Basic Rate Interface

A BRI channel is appropriate for a home or small business.

2. Primary Rate Interface

The data carrying capacity of the Primary Rate Interface (PRI) is much more than the BRI. It consists of 23B channels and 1D channel. The data rate of a D channel is 64 kbps instead of 16 kbps as in BRI. For operating overhead PRI service needs 8 kbps. Therefore, the total capacity of a PRI ISDN interface is,

$(23B \times 64) + (1D \times 64) + 8 = 1.544$ Mbps.

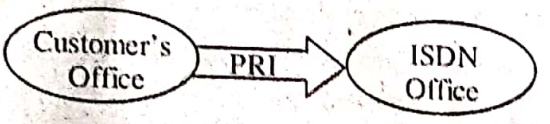

Figure (5): Primary Rate Interface

Q17. Explain the various types of desktop video conferencing system.

Answer :

Types of Desktop Video Conferencing

There are three ways by which desktop video conferencing is made possible. They are,

1. Using Plain Old Telephone line Solution (POTS).
2. Using Integrated Service Digital Network (ISDN).
3. Using Internet.

1. Utilizing POTS of Desktop Video Conferencing

POTS systems are more suitable for point-to-point (i.e., one-to-one) conferencing since no extra charges are imposed and no need to make special arrangement with the telephone company. One of the major loopholes of POTS system is that is doesn't provide enough speed to match with the speed of modem (28.8 kbps). To overcome this loophole, POTS can be appended with an external 28.8 kbps speed devices such as V.fast modem, video camera and two expansion boards. Out of the two expansion boards, the responsibility of one board is to capture and compress the outgoing video. The other expansion board represents communication board that is responsible for managing sound compression and decompression. Decompression of incoming video is performed using a software that is dependent on CPU's speed.

When every device is installed properly, the video conferencing software enables the user to transmit video, audio or data over telephone line in a smaller way as making a phone call. A keypad is present on the screen that is used for dialling numbers. POTS provide greater amount of flexibility in which a receiver after answering the phone call can continue with their usual work by switching between their systems.

POTS offer both application as well as screen sharing approaches that allow the local and remote users to view the document and manipulate the image if necessary over telephone. A utility called snap shot utility is used that allows a user to capture images quickly and then highlight certain areas.

It is also possible to perform zooming. To zoom out, codec such as VATP (Vector Adaptive Transform Processing) is used. Bandwidth is assigned dynamically by codec based on innovative information requirements.

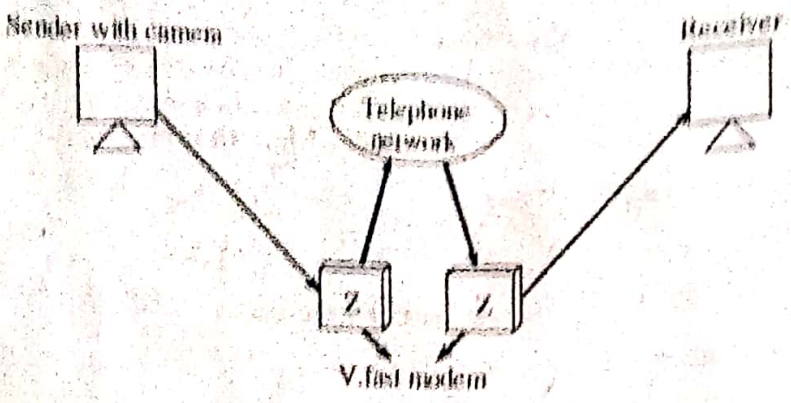

Figure (1): Utilizing POTS for One-to-one Desktop Video Conferencing

2. Utilizing ISDN for Desktop Video Conferencing

Integrated Service Digital Network (ISDN) provides bandwidth that is more than the bandwidth required by POTS. The drawback of ISDN is that whenever ISDN services are to be provided a dedicated hardware needs to be installed. ISDN is confined to organizations that are acknowledged about the barriers or hurdles arising while using ISDN services.

H.261 compression technology of video is preferred by ISDN network for performing compression and decompression. This technology is generally used for compressing real-time video information that is transmitted with 64 kbps of bandwidth. The quality of the transmitted image can be increased by increasing the bandwidth. H.261 supports graceful degradation that defines the system's behaviour through packet-switching technique.

Load and channel bandwidth are inversely proportional to each other. For example, what will be the performance of a video of load increases and bandwidth decreases. In order to provide solution to this query, H.261 sends rough information about the video and then changes the quality of channel depending on the bandwidth.

The drawback of H.261 transmission protocol is that it is computationally high powered and therefore requires dedicated hardware to function.

3. Utilizing Internet for Desktop Video Conferencing

The two programs of desktop video conferencing that are present on internet are,

(i) Cu-SeeMe

(ii) MBONE

(i) Cu-SeeME

Cu-SeeMe is a software developed for Macintosh and Windows operating system. This software provides support for real time multiparty video conferencing over internet. Usually Cu-SeeMe is used for providing one-to-one conference, however by using reflector, one-to-many, several-to-several conferencing is also possible. This type of conferencing depends on user's demand and also on hardware capabilities. Cu-SeeMe provides conferencing at lower cost. The specifications that are required for receiving video on Mac system are,

(a) Screen with a capability of displaying 16 gray colors.

(b) Internet connection.

(c) Mac TCP.

(d) Cu-SeeMe client application.

(e) Apple's QuickTime.

The specification that are required for sending video on Mac system are,

Specification to receive video + Camera with NTSC output + Video digitizer.

Apple's QuickTake and QuickCam are some of the examples of digital camera. Cu-SeeMe group of researchers prefer QuickCam to other digital camera because of its low cost and flexibility. QuickCam is designed for QuickTime video format. The specification of this format is a system version 7 or higher operating system and QuickTime with Version 2.0. Different rates of frames are used for recording video that ranges from 4 fps at 320 × 240 pixels to 30 fps at 80 × 60 pixels frame rate is affected by the speed of a computer. Cu-SeeMe is becoming popular and its ideas are mostly included while developing mercantile goods.

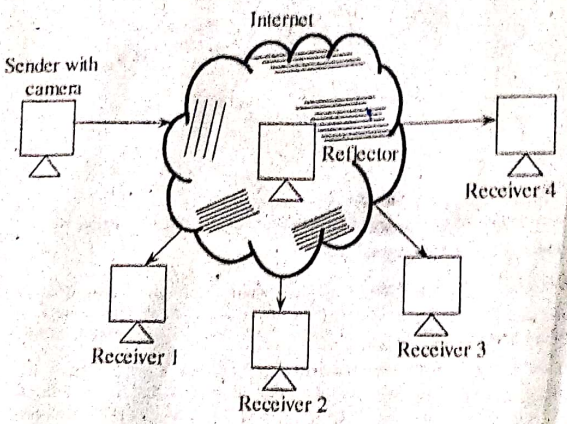

Figure (2): Utilizing CU-SeeMe Software for One-to-many Desktop Video Conferencing

(ii) Multicast-Back Bone (MBONE)

MBONE is created for understanding how broadcasting is made possible over internet. Multicast backbone represents a logical network that shares the transmission media. Multicasting is possible by using multicast routers. These routers support internet protocol multicasting. The drawback of MBONE is that it is very time consuming. It is basically created to understand the working of IP multicast extensions. MBONE helped researchers by developing softwares that are necessary for broadcasting audio and video.

One of the best applications of multicast is the packetized video where images are recursively converted into digital format and transmitted to the remote user after performing compression. If the volume of data is still large then IP multicast transmits only single video stream at a time over the communication channel.

The basic responsibility of MBONE is to append video to original audio signals. IETF was the first application that was broadcasted by using MBONE.

MBONE can be defined as a collection of islands which support IP multicasting. The connection between the islands are made using tunnels that represents point-to-point line configuration. Multicast routed software was developed that allowed UNIX workstation to behave as multicast routers. In between these routers, multicast IP packet is encapsulated as normal IP packet that specifies destination as mrouted machine.

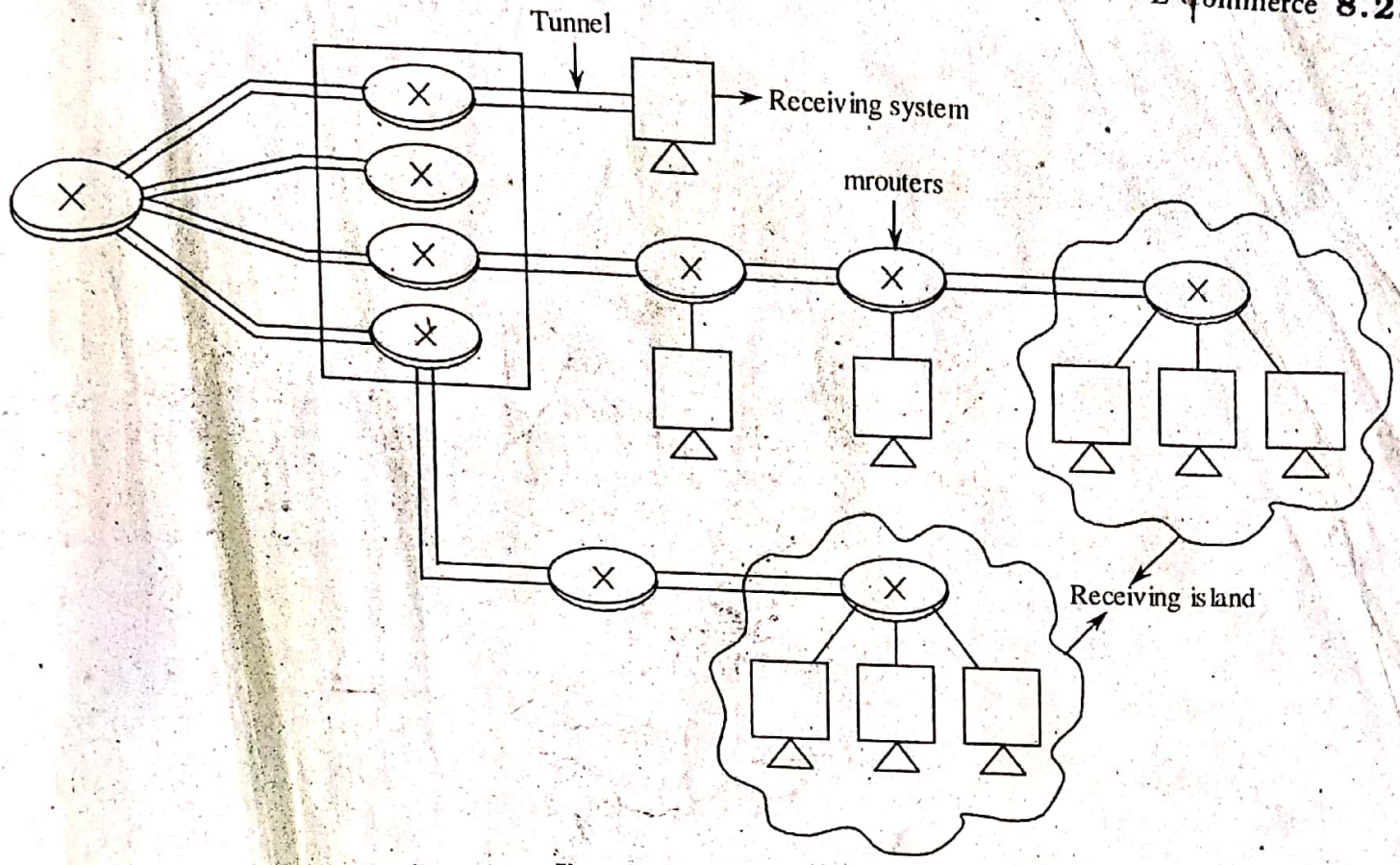

Figure (3): MBONE Configuration

Q18. Describe two types of video conferencing.

Answer :

For answer refer Unit-VIII, Q17, Topics: Utilizing POTS of Desktop Video Conferencing and Utilizing ISDN for Desktop Video Conferencing.

Q19. Explain data or document conferencing.

OR

Write short notes on Desktop video conferencing.

Answer :

Desktop Video Conferencing

Desktop video conferencing is becoming popular as a communication tool. The advantage of video conferencing is that it eliminates the expenses and difficulty of travelling for business users. Earlier video conferencing was performed by using expensive devices. In this type of conferencing, all workers are assembled in a room called conference room that consists of specialized equipment and a monitor that displays the same room. This room is viewed by every individual employee irrespective of their location that view the screen. However, this traditional conference model in being replaced by a new conference model in which employees have their own private work space that is used for writing notes, reading e-mails. Each worker uses his own desktop and interacts with other employees as they do in telephonic conversations.

Factors that make desktop video conferencing as a communication tool are,

1. Price or cost
2. Standard
3. Compression.

1. **Cost**

Desktop video conferencing drastically reduced the cost of devices that were used earlier.

2. **Standard**

A standard is being developed, that enables interoperable interaction between machines that are purchased different vendors.

3. ***Compression Techniques.***

They are used for reduce the volume of massive data present in video conferencing so as to make efficient utilizati bandwidth.

Data Conferencing

The two ways through which data conferencing is made possible are

(a) Screen sharing

(b) Application sharing.

(a) Screen Sharing

Data conferencing represents a form of screen sharing technology in which at least one window is shared by re users and also by local users.

Working of Whiteboard Model

Once connection is established between desktops a whiteboard screen is presented that is viewed as well as manipu by people that are participating in the session. Tools that are used in whiteboard software are drawing tools, painting t annotation tools. These tools are used for producing new ideas and allowing users to participate in the interactive discuss Compression is performed on bitmaps of whiteboard before transmitting it over communication channel.

Whiteboard can utilize the existing information by using cut and paste methods. However, data present in whiteb model are invariable that is, if modifications are made to collaborative window, these changes do not affect the source d

(b) Application Sharing

In application sharing, screen selected by a local user is accessed by remote users for viewing and modification. H source data is modified by local as well as remote users. There are different approaches that are used for enabling applica sharing. In one of the approaches, all drawing commands present on windows GDI (Graphical Data Interchange) screen captured and transmitted over telephone lines. When receiver receives these commands, they are executed in the back gr that are visible to both local and remote users. Bandwidth is efficiently utilized when drawing commands are transmitted ra than images or pictures.