

CHAPTER-1

BUSINESS PROCESSMANAGEMENT AND IT

Q.1 Define Business Process Re-engineering. Explain it with suitable example.

Answer

- Business Process Reengineering (BPR) is defined as the fundamental rethinking and radical redesign of processes to achieve dramatic improvement, in critical, contemporary measures of performance such as cost, quality, service and speed.
- It involves changes in structures and in processes within the business environment. The entire technological, human, and organizational dimensions may be changed in BPR.
- Information Technology plays a major role in BPR as it provides office automation; allows the business to be conducted in different locations; and provides flexibility in manufacturing, permits quicker delivery to customers and supports rapid and paperless transactions.
- In general, it allows an efficient and effective change in the manner in which work is performed. Business Process Re-engineering is also known as Business Process Redesign, Business Transformation, or Business Process Change Management.

An example of BPR application

- If a bank customer enters into the bank determined to apply for a loan, apply for an ATM card and open a savings account, most probably s/he must visit three different desks in order to be serviced. When BPR is applied to an organization, the customer communicates with only one person, called "case manager", for all three inquiries.
- Under BPR, while the loan application team processes the loan application, the case manager "triggers" the account team to open a savings account and the ATM team to supply the customer with an ATM card. The customer leaves the bank having a response for his loan application, a new savings account and an ATM card, and all these without having to move around the desks for signatures and documents. All the customer's requests were satisfied at the same time in parallel motion.

Q.2 Discuss Six Sigma, BPM Life Cycle and Total Quality Management (TQM).

Answer

A. Six Sigma —

- Six Sigma employs quality management and statistical analysis of process outputs by identifying and removing the causes of defects (errors) and minimizing variability in manufacturing and business processes.
- Each Six Sigma project carried out within an organization follows a defined sequence of steps and has quantified value targets, for example: reduce process cycle time, reduce pollution, reduce costs, increase customer satisfaction, and increase profits.

It follows a life-cycle having phases: Define, Measure, Analyze, Improve and Control (or DMAIC) which are described as follows.

- I. **Define:** Customers are identified and their requirements are gathered. Measurements that are critical to customer satisfaction [Critical to Quality, (CTQ)] are identified for further project improvement
- II. **Measure :** Process output Measures that are attributes of CTQs are determined and variables that affect these output measures are identified. Data on current process are gathered and current baseline performance for process output measures are established.



Variances of output measures are graphed and process sigma are calculated.

- III. **Analyze** : Using statistical methods and graphical displays, possible causes of process output variations are identified. These possible causes are analyzed statistically to determine root cause of variation.
- IV. **Improve**: Solution alternatives are generated to fix the root cause. The most appropriate solution is identified using solution prioritization matrix and validated using pilot testing. Cost and benefit analysis is performed to validate the financial benefit of the solution. Implementation plan is drafted and executed.
- V. **Control**: Process is standardized and documented. Before and after analysis is performed on the new process to validate expected results, monitoring system is implemented to ensure process is performing as designed. Project is evaluated and lessons learned are shared with others.

B. **BPM Life Cycle (BPM-L) -**

- Business Process Management-Life cycle establishes a sustainable process management capability that empowers organizations to embrace and manage process changes successfully.
- Because it incorporates both human resources and technology—culture, roles and responsibilities, as well as data content, applications and infrastructure—the approach enables fully informed decision-making right across an organization.
- Phases are Analysis, Design, Implementation, Run & Monitor and Optimize.
 - i. **Analysis phase** : This involves analysis of the current environment and current processes, identification of needs and definition of requirements.
 - ii. **Design phase** : This involves evaluation of potential solutions to meet the identified needs, business process designing and business process modeling.
 - iii. **Implementation phase** : This involves project preparation, blue printing, realization, final preparation, go live and support.
 - iv. **Run and Monitor phase**: This involves business process execution or deployment and business process monitoring.
 - v. **Optimize**: Iterate for continuous improvement.

C. **Total Quality Management (TQM)**

TQM is a management mechanism designed to improve a product or process by engaging every stakeholder and all members of an organization as well as the customers and aims at improving the quality of the products produced and the process utilized. TQM ultimately aims at complete customer satisfaction through ongoing improvements.

Q.3. **Classify each of the following items as belonging in the revenue, expenditure, human resources/ payroll, production, or financing cycle.**

- | | |
|----------------------------|--|
| (a) Purchase raw materials | (b) Decide how many units to make next month |
| (c) Pay for raw materials, | (d) Disburse payroll checks to factory workers |

Hire a new assistant controller

Update the allowance for uncollectible accounts

Establish a '10,000 credit limit for customer XYZ Company

Answer

- | | |
|-----------------------|-------------------------------|
| (a) Expenditure Cycle | (b) Production Cycle |
| (c) Expenditure Cycle | (d) Payroll Cycle |
| (e) Payroll Cycle | (f) Financial Reporting Cycle |
| (g) Revenue Cycle | |

Q.4 Explain different types of relationships in Entity-Relationship Model with suitable examples.

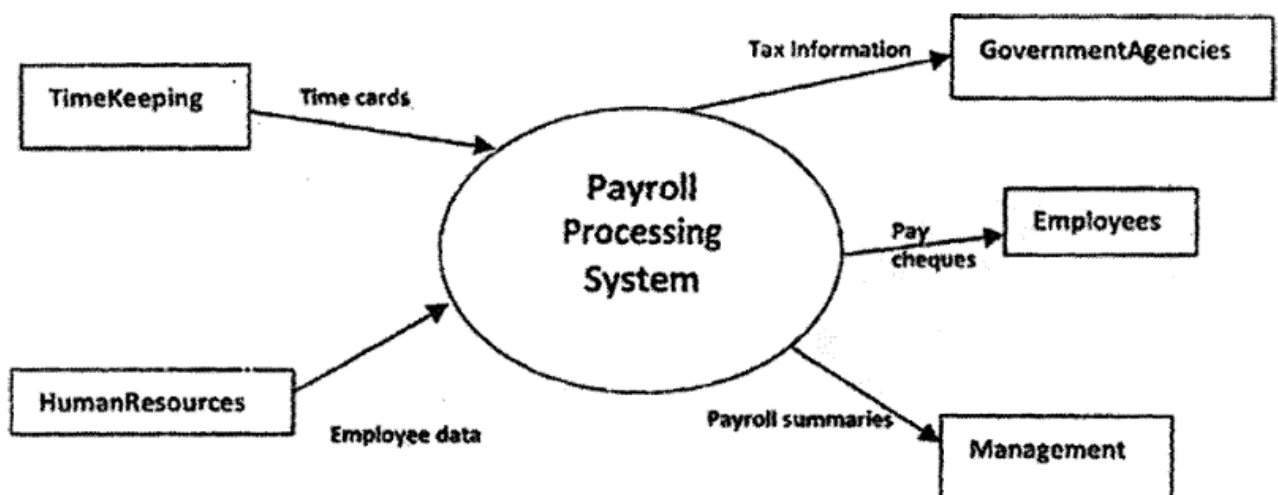
Answer

Relationship : It is defined as an association between two or more entities.

Types of Relationships in E-R Model are as follows:

- (1) **One-to-One relationship (1:1)** — A One-to-One relationship is shown on the diagram by a line connecting the two entities.
- (2) **One-to-Many relationships (1:N)** —
 - A One-to-Many relationship is shown on the diagram by a line connecting the two entities with a "crow's foot" symbol denoting the 'many' end of the relationship.
 - A class is formed by a group of at least one student. Each student is allocated to one and only one class.
- (3) **Many-to-One relationships (M:1)** —
 It is the reverse of One-to-Many relationship.
 When three administrators in a small town report to one minister.
- (4) **Many-to-Many relationships (M:N)**—
 - A Many-to-Many relationship is shown on the diagram by a line connecting the two entities with 'crow's foot' symbols at both ends.
 - A student may apply for more than one scholarship. Each scholarship may receive some applications from student, or none.

Q.5 Draw a Context Level Diagram for Payroll Processing System that interacts with the following five agents: Government Agencies; Employees; Management; Time Keeping and Human Resources-



- The DFD shown in the figure displays the inputs and outputs of the payroll processing application as well as the data sources and destinations external to the application.
- Thus this context diagram uses rectangles to identify Timekeeping and Human Resources as external entities, despite the fact that these departments are internal to the company.

- This is because those entities are external to the Payroll Processing System under study.

Q.6 Differentiate between Flowchart and Data Flow Diagram.

Answer

| | |
|--|--|
| <ul style="list-style-type: none"> • Flow chart presents steps to complete a process. • Flow chart does not have any input from or output to an external source. • The timing and sequence of the process is aptly shown by a flowchart. • Flow chart shows how to make a system function. • Flow chart is used in designing a process. • Types of Flow charts — System, Data, Document and Program. | <ul style="list-style-type: none"> • Data Flow Diagram presents the flow of data. • DFD describes the path of data from an external source to internal source or vice versa. • Whether processing of data is taking place in a particular order or several processes are taking place simultaneously is described by a DFD. • DFD defines the functionality of a system. • DFD is used to describe the path of data that will complete the process. • Types of DFD — Physical data flow and Logical data flow. |
|--|--|

Q.7 Discuss benefits and limitations of Flowchart.

Answer

The benefits of flowcharts are elucidated below:

- **Quicker grasp of relationships** —Before any application can be solved, it must be understood, the relationship between various elements of the application must be identified. The programmer can chart a lengthy procedure more easily with the help of a flowchart than by describing it by means of written notes.
- **Effective Analysis** —The flowchart becomes a blue print of a system that can be broken down into detailed parts for study. Problems may be identified and new approaches may be suggested by flowcharts.
- **Communication** —Flowcharts aid in communicating the facts of a business problem to those whose skills are needed for arriving at the solution.
- **Documentation** —Flowcharts serve as a good documentation which aid greatly in future program conversions. In the event of staff changes, they serve as training function by helping new employees in understanding the existing programs.
- **Efficient coding** —Flowcharts act as a guide during the system analysis and program preparation phase. Instructions coded in a programming language may be checked against the flowchart to ensure that no steps are omitted.
- **Orderly check out of problem** —Flowcharts serve as an important tool during program debugging. They help in detecting, locating and removing mistakes.
- **Efficient program maintenance** —The maintenance of operating programs is facilitated by flowcharts. The charts help the programmer to concentrate attention on that part of the information flow which is to be modified.



The limitations of flowcharts are given below:

- **Complex logic** —Flowchart becomes complex and clumsy where the problem logic is complex. The essentials of what is done can easily be lost in the technical details of how it is done.
- **Modification** — If modifications to a flowchart are required, it may require complete re- drawing.
- **Reproduction** —Reproduction of flowcharts is often a problem because the symbols used in flowcharts cannot be typed.
- **Link between conditions and actions** —Sometimes it becomes difficult to establish the linkage between various conditions and the actions to be taken there upon for a particular condition
- **Standardization** —Program flowcharts, although easy to follow, are not such a natural way of expressing procedures as writing in English, nor are they easily translated into Programming language.

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CHAPTER-2

INFORMATION SYSTEMS AND IT FUNDAMENTALS

Q.1 Define the following :

- | | |
|--------------------------------|-----------------------------|
| (a) Multiprocessing | (b) Hardware Virtualization |
| (c) Cloud Computing | (d) Groupware |
| (e) Computer Bus | (f) Memory Controller |
| (g) Direct Memory Access (DMA) | |

Answer

- (a) **Multiprocessing:** Multiprocessing is the use of two or more Central Processing Units (CPUs) within a single computer system to allocate tasks between them.
- (b) **Hardware Virtualization:** Hardware Virtualization or Platform Virtualization refers to the creation of a virtual machine that acts like a real computer with an operating system. Software executed on these virtual machines is separated from the underlying hardware resources.
- (c) **Cloud Computing:** Cloud computing is the use of various services, such as software development platforms, servers, storage, and software, over the Internet, often referred to as the "cloud."
- (d) **Groupware :** Groupware also known as Team-ware, Collaboration Software is software that allows collective and collaborative working of teams from different geographical locations on an online and real-time basis.
- (e) **Computer Bus:** Computer Bus is a communication system that transfers data between components inside a computer, or between computers that covers all related hardware components (wire, optical fiber, etc.) and software, including communication protocol.
- (f) **Memory Controller:** Memory Controller is a digital circuit which manages the flow of data going to and from the main memory and can be a separate chip or integrated into another chip.
- (g) **Direct Memory Access (DMA):** Direct Memory Access (DMA) is a feature of modern computers that allows certain hardware subsystems within the computer to access system memory independently of the Central Processing Unit (CPU).

Q.2 Write short notes on the following:

- | | |
|--|------------------------|
| (a) Bluetooth | (b) Wi-Fi |
| (c) Tablet | (d) Smartphone |
| (e) Touchpad | (f) Notebook |
| (g) Cache Memory | (h) Virtual Memory |
| (i) Instruction Set Architecture (ISA) | (j) Micro Architecture |

- (a) **Bluetooth:** Bluetooth is a wireless technology standard for exchanging data over short distances up to 50 meters (164 feet) from fixed and mobile devices, creating personal Area Networks (PANs) with high levels of security. Bluetooth is like a very low-power, short-range radio signal which is secure from the moment they're sent, so unlike any other wireless network we don't have to worry about turning on security. Few devices that utilize Bluetooth technology are Keyboards and mice, Printers, mobile phones and headsets, PDAs (Personal Digital Assistants), Desktop and laptop computers, Digital cameras, and Remotes. Through the use of a mobile phone with Bluetooth enabled; we can send pictures, videos, exchange business cards and also transfer files to our PC. Both data and voice transmissions can be sent and received through the use of short range networks.

**(b) Wi-Fi:**

- Wi-Fi is a popular wireless networking technology that uses radio waves to provide wireless high-speed Internet and network connections.
- Wi-Fi networks have limited range. A typical wireless access point might have a range of 32 meters (120 ft.).
- Wi-Fi can be less secure than wired connections because an intruder does not need a physical connection.
- Wi-Fi networks use radio technologies called 802.11 to provide secure, reliable, fast wireless connectivity.
- A Wi-Fi network can be used to connect electronic devices to each other, to the Internet, and to wired networks (which use Ethernet technology).
- Wi-Fi networks work well for small businesses providing connectivity between mobile salespeople, floor staff and behind-the-scenes finance and accounting departments.

(c) Tablet :

- A Tablet computer or simply tablet is a one piece general-purpose computer contained in a single panel.
- Its distinguishing characteristic is the use of a touch screen as the input device. Tablet PCs have extreme portability, easy to use interfaces and the wide range of ways they can be used. Some features of Tablets are as follows:
 - **Input Method:** Tablets rely solely on a touch interface on the screen for all input.
 - **Size:** Tablets have the size roughly of a small pad of paper and a weight that is less than one Kg.
 - **Battery Life:** Tablets are designed for efficiency because of the low power requirements of their hardware components. Tablets can achieve all day usage.
 - **Storage Capacity:** Most tablets come with configurations that allow between 16 and 64 gigabytes of storage.
 - **Performance:** Most tablet PCs are based on extremely low powered processors more suited for tasks like email, web browsing, playing video or audio.
 - **Software:** The two major tablet platforms are Android and iOS amongst plenty of applications that are available;
 - **Wireless:** Because tablets by design are mobile computers; most of them have Wi- Fi, blue tooth and mobile connectivity.

(d) Smartphone:

- A Smartphone is a mobile phone built on a mobile operating system with more advanced computing capability connectivity than a feature phone.
- This handheld device integrates mobile phone capabilities with the more common features of a handheld computer or PDA. Smartphone allows users to store information, e-mail and install programs, along with using a mobile phone in one device.
- Modern Smartphone also include high-resolution touch screens and web browsers that display standard web pages as well as mobile-optimized sites.
- High-speed data access is provided by Wi-Fi and mobile broadband.

(e) Touchpad:

- A Touchpad is a pointing device featuring a tactile sensor, a specialized surface that can translate the motion and position of a user's fingers to a relative position on screen.



- Touchpad is a common feature of laptop computers, can also be found on Personal Digital Assistants (PDAs) and some portable media players.
- (f) **Notebook:**
- Notebook is an extremely lightweight personal computer that typically weigh less than Kg and are small enough to fit easily in a briefcase.
 - Notebook computers use flat-panel technologies to produce a lightweight and non-bulky display screen. Modern notebook computers are almost equivalent to personal computers having the same CPUs, memory capacity and disk drives.
- (g) **Cache Memory :**
- Cache Memory (pronounced as cash) is a smaller, faster memory which stores copies of the data from the most frequently used main memory locations so that Processor/Registers can access it more rapidly than main memory.
 - It is the property of locality of reference, which allows improving substantially the effective memory access time in a computer system.
- (h) **Virtual Memory :**
- Virtual Memory is an imaginary memory area supported by some operating systems (for example, Windows) in conjunction with the hardware.
 - If a computer lacks the Random Access Memory (RAM) needed to run a program or operation, Windows uses virtual memory to compensate. Virtual memory combines computer's RAM with temporary space on the hard disk. When RAM runs low, virtual memory moves data from RAM to a space called a paging file. Moving data to and from the paging file frees up RAM to complete its work. Thus, Virtual memory is an allocation of hard disk space to help RAM.
- (i) **Instruction Set Architecture (ISA) :**
- It is the abstract model of a computing system that is seen by a machine language programmer, including the instruction set, memory address modes, processor registers, and address and data formats.
 - Instruction Set Architecture (ISA) is related to the programming of a computer —that is, how the computer understands, what each element in its basic language means, what instructions are to be carried out and in what order, etc.
 - The ISA basically deals with what the chip does.
- (j) **Micro architecture:**
- It, also known as Computer organization, is a lower level detailed description of the system that is sufficient for completely describing the operation of all parts of the computing system, and how they are inter-connected and inter-operate in order to implement the ISA.
 - The Micro architecture can be seen as how the ISA does and what it does.
 - It is the term used to describe the resources and methods used to achieve architecture specification.
 - The term typically includes the way in which these resources are organized as well as the design techniques used in the processor to reach the target cost and performance goals. The micro architecture essentially forms a specification for the logical implementation.

Q.3 What are the three critical pillars of Business Process Automation (BPA)?

Answer

Business Process Automation rests on the following three critical pillars:



- **Integration** : BPA allows applications and operating systems not only to read data that the systems produce, but also to pass data between the component applications of the business process and to modify the data as necessary.
- **Orchestration** : The process of orchestration enables the ability to bring tasks that exist across multiple computers and different business departments or branches under one umbrella that is the business process itself.
- **Automation**: Orchestration and integration unite with automation to deliver the capability to provide a rule-based process of automatic execution that can span multiple systems and enable a more effective, nimble and efficient business process.

Q.4 Discuss some of the benefits of using Business Process Automation.

Answer

Some benefits of using Business Process Automation include:

- **Reducing the Impact of Human Error** : BPA removes human participation in the process, which is the source of many errors.
- **Transforming Data into Information** : BPA can, apart from collecting and storing data also analyze data and make it available in a form that is useful for decision-making.
- **Improving performance and process effectiveness**: In many cases, tasks that must be done manually are the bottleneck in the process. Automating those manual tasks speeds up the effective throughput of the application.
- **Making users more efficient and effective**: People can focus their energies on the tasks they do best, allowing the computers to handle those that machines are best suited for.
- **Making the business more responsive**: Business can easily automate new applications and processes as they are introduced.
- **Improving Collaboration and Information Sharing**: Business processes designed through a collaborative interface mean Information Technology can integrate its processes with the business-side logic that drives day-to-day operations.

Q.5 Discuss different types of servers based on the services they provide.

Answer

There are different types of servers based on the nature of service they provide. Some of them are given as follows:

- **File server**: This is a computer and storage device dedicated to storing files. Any user on the network can store files on the server.
- **Print server**: This is a computer that manages one or more printers:
- **Network server**: This is a computer that manages network traffic.
- **Database server**: This is a computer system that processes database queries.
- **Application Server**: This is a program that handles all application operations between users and an enterprise's backend business applications or databases.
- **Web Server**: Web server is a computer that delivers (serves up) web pages. Every web server has an IP address and possibly a domain name. For example, if we enter the URL <http://www.icai.org> in our browser, this sends a request to the Web server whose domain name is www.icai.org. The server then fetches the named home page and sends it to our browser. Any computer can be turned into a Web server by installing server software and connecting the machine to the Internet.
- **Mail Server**: Mail server moves and stores mail over corporate networks.


Q.6 What are the different types of clouds in a Cloud computing environment?
Answer

The cloud computing environment can consist of multiple types of clouds based on their deployment and usage — Public, Private, Community and Hybrid.

- i. **Public Clouds :** The public cloud is made available to the general public or a large industry group. They are administrated by third parties or vendors over the Internet, and services are offered on pay-per-use basis. It is widely used in the development, deployment and management of enterprise applications, at affordable costs; and allows organizations to deliver highly scalable and reliable applications rapidly and at more affordable costs.
- ii. **Private/Internal Clouds:** This cloud computing environment resides within the boundaries of an organization and is used exclusively for the organization's benefits. They are built primarily by IT* departments within enterprises who seek to optimize utilization of infrastructure resources within the enterprise by provisioning the infrastructure with applications using the concepts of grid and virtualization. The Private Cloud enables an enterprise to manage the infrastructure and have more control.
- iii. **Community Clouds:** This is the sharing of computing infrastructure in between organizations of the same community. For example, all Government organizations within India may share computing infrastructure on the cloud to manage data. The risk is that data may be stored with the data of competitors.
- iv. **Hybrid Clouds :** It is a composition of two or more clouds (Private, Community or Public) and is maintained by both internal and external providers. Though they maintain their unique identity, they are bound together by standardized data and application portability. With a hybrid cloud, organizations might run non-core applications in a public cloud, while maintaining core applications and sensitive data in-house in a private cloud.

Q.7 Discuss Cloud Computing architecture.
Answer

- Cloud Computing architecture refers to the components and subcomponents that typically consist of a front end platform (fat client, thin client, mobile device), back end platform (servers, storage), a cloud based delivery, and a network (Internet, Intranet, Intercloud).
 - Cloud architecture typically involves multiple cloud components communicating with each other over a tight or loose coupling of cloud resources, services, middleware, and software components.
 - A cloud computing architecture consists of two parts - Front End and a Back End that connect to each other through a network, usually the Internet. The front end is the side the computer user or client, sees. The back end is the "cloud" section of the system.
- i. **Front End:** The front end of the cloud computing system comprises of the client's devices (or it may be a computer network) and some applications are needed for accessing the cloud computing system. All the cloud computing systems do not give the same interface to users. For example - Web services like electronic mail programs use some existing web browsers such as Firefox, Microsoft's Internet Explorer or Apple's Safari. Other types of systems have some unique applications which provide network access to its clients.
 - ii. **Back End:** Back end refers to some physical peripherals. In cloud computing, the back end is cloud itself which may encompass various computer machines, data storage systems and servers. Groups of these clouds make a whole cloud computing system. Theoretically, a cloud computing system can include practically any type of web application program such as video games to



7 applications for data processing, software development and entertainment residing on its individual dedicated server for services. There are some set of rules, generally called as Protocols which are followed by this server and it uses a special type of software termed as Middleware that allow computer that are connected on networks to communicate with each other. If any cloud computing service provider has many customers, then there's likely to be very high demand for huge storage space. Many companies that are service providers need hundreds of storage devices.

Q.8 Discuss Service models of Cloud Computing.

Answer

Service Models of Cloud Computing are as follows:

- **Infrastructure as a Service (IaaS):** It is the foundation of cloud services that provides clients with access to server hardware, storage, bandwidth and other fundamental computing resources. The service is typically paid for on a usage basis and may also include dynamic scaling so that if the customer needs more resources than expected, s/he can get them on the fly (probably to a given limit). It provides access to shared resources on need basis, without revealing details like location and hardware to clients.
- **Software as a Service (SaaS) :** It includes a complete software offering on the cloud. Users can access a software application hosted by the cloud vendor on pay-per-use basis. SaaS is a model of software deployment where an application is hosted as a service provided to customers across the Internet by removing the need to install and run an application on a user's own computer. SaaS can alleviate the burden of software maintenance and support but users relinquish control over software versions and requirements.
- **Platform as a Service (PaaS):** It provides clients with access to the basic operating software and optional services to develop and use software applications (e.g. database access and payment service) without the need to buy and manage the underlying computing infrastructure. For example, Google App Engine allows clients to run their web applications (i.e. software that can be accessed using a web browser such as Internet Explorer over the internet) on Google's infrastructure.
- **Network as a Service (NaaS):** It is a category of cloud services where the capability provided to the cloud service user is to use network/transport connecting services. NaaS involves optimization of resource allocation by considering network and computing resources as a whole. Some of the examples are: Virtual Private Network, Mobile Network Virtualization etc.
- **Communication as a Service (CaaS):** CaaS is an outsourced enterprise communication solution that can be leased from a single vendor. The CaaS vendor is responsible for all hardware and software management and offers guaranteed Quality of Service (QoS). It allows businesses to selectively deploy communication devices and modes on a pay-as-you-go, as-needed basis. This approach eliminates the large capital investments. Examples are: Voice over IP (VOIP), Instant Messaging (IM), Collaboration and Videoconferencing application using fixed and mobile devices.

Q.9 What is Mobile Computing? Discuss its components.

Answer

- **Mobile Computing:**
- Mobile Computing is the use of portable computing devices (such as laptop and netbook computers) in conjunction with mobile communication technologies to enable users to access the Internet and data on their home or work computers from anywhere in the world.



- Mobile computing is enabled by use of mobile devices (portable and hand held computing devices) such as PDA, laptops, mobile phones, MPplayers, digital cameras, tablet PC and Palmtops on a wireless network.
- Mobile computing involves Mobile Communication, Mobile Hardware and Mobile Software; which are discussed as follows:
 - (a) Mobile Communication:**
 - Mobile Communication refers to the infrastructure put in place to ensure that seamless and reliable communication goes on.
 - These would include devices such as Protocols, Services, Bandwidth and Portals necessary to facilitate and support the stated services. The data format is also defined at this stage.
 - The signals are carried over the air to intended devices that are capable of receiving and sending ' similar kind of signals. It will incorporate all aspects of wireless communication.
 - (b) Mobile Hardware:** Mobile Hardware includes mobile devices or device components that receive or access the service of mobility. They would range from Portable laptops, Smart phones, Tablet PC's to Personal Digital Assistants. These devices will have receptors that are capable of sensing and receiving signals. These devices are configured to operate in full- duplex, whereby they are capable of sending and receiving signals at the same time.
 - (c) Mobile Software:** Mobile Software is the actual program that runs on the mobile hardware. It deals with the characteristics and requirements of mobile applications. This is the engine of that mobile device. In other terms, it is the operating system of that appliance. It is the essential component that makes the mobile device operates.

Q.10. What is a Database Model? Discuss its various types.

Answer

A Database Model is a type of data model that determines the logical structure of a database and fundamentally determines in which manner data can be stored, organized and manipulated. Some prominent database models are as follows:

Hierarchical Database Model :

- In a hierarchical database model, records are logically organized into a hierarchy of relationships.
- A hierarchically structured database is arranged logically in an inverted tree pattern. All records in hierarchy are called-nodes.
- The top parent record in the hierarchy is called the root record.
- Records that "own" other records are called parent records. Each node is related to the others in a parent-child relationship. Each parent record may have one or more child records, but no child record may have more than one parent record. Thus, the hierarchical data structure implements one-to-one and one-to-many relationships. (Refer the fig.)

Network Database Model:

- The network model is a variation on the hierarchical model such that it is built on the concept of multiple branches (lower-level structures) emanating from one or more nodes (higher-level structures) and that branch may be connected to multiple nodes.
- The network model is able to represent redundancy in data more efficiently than in the hierarchical model.
- The network model also permits a record to be a member of more than one set at one time that allows the network model to implement the many-to-one and the many-to-many relationship types.

**Relational Database Model:**

- A relational database allows the definition of data and their structures, storage and retrieval operations and integrity constraints that can be organized in a table structure.
- A table is a collection of records and each record in a table contains the same fields.
- Three key terms are used extensively in relational database models: Relations, Attributes and Domains. A relation is a table with columns and rows.
- The named columns of the relation are called attributes, and the domain is the set of values the attributes are allowed to take.
- A relational database contains multiple tables, with at least similar value occurring in two different records (belonging to the same table or to different tables) that implies a relationship among those two records.
- Tables can also have a designated single attribute or a set of attributes that can act as a “key” which can be used to uniquely identify each record in the table. A key that can be used to uniquely identify a row in a table is called a Primary key.
- Any column can be a key, or multiple columns can be grouped together into a Compound key.

Object Oriented Data Base Model (OODBMS):

- It is based on the concept that the world can be modeled in terms of objects and their interactions.
- An Object-oriented database provides a mechanism to store complex data such as images, audio and video, etc.
- An OODBMS helps programmers make objects created in a programming language behave as a database object.
- Object-oriented programming is based on a series of working objects.
- Each object is an independently functioning application or program, assigned with a specific task or role to perform.
- An OODBMS is a relational database designed to manage all of these independent programs, using the data produced to quickly respond to requests for information by a larger application.

Q.11 What is an Operating System? Discuss various activities it performs.**Answer**

- An Operating System (OS) is a set of computer programs that manages computer hardware resources and acts as an interface with computer applications programs.
- The operating system is a vital component of the system software in a computer system.
- Application programs usually require an operating system to function that provides a convenient environment to users for executing their programs.
- Computer hardware with operating system can thus be viewed as an extended machine which is more powerful and easy to use. Some prominent Operating systems used nowadays are Windows 7, Windows 8, Linux, UNIX, etc.

A variety of activities are executed by Operating systems which include:

Performing hardware functions;

- Application programs to perform tasks have to obtain input from keyboards, retrieve data from disk & display output on monitors.
- Achieving all this is facilitated by operating system that acts as an intermediary between the application program and the hardware.

User Interfaces:

- An important function of any operating system is to provide user interface.



- DOS has a Command based User Interface (UI) i.e. text commands were given to computer to execute any command, whereas Windows has Graphic User Interface (GUI) which uses icons & menus.

Hardware Independence:

- Every computer could have different specifications and configurations of hardware.
- Operating system provides Application Program Interfaces (API) which can be used by application developers to create application software, thus obviating the need to understand the inner workings of OS and hardware. Thus, OS gives us hardware independence.

Memory Management:

- Memory Management features of Operating System control how memory is accessed and maximizes available memory & storage,
- Operating systems also provides Virtual Memory by carving an area of hard disk to supplement the functional memory capacity of RAM

Task Management :

- Task Management feature of Operating system helps in allocating resources to make optimum utilization of resources.
- This facilitates a user to work with more than one application at a time i.e. multitasking and also allows more than one user to use the system i.e. timesharing.

Networking Capability:

Operating systems can provide systems with features & capabilities to help connect computer networks. Like Linux & Windows 8 give us an excellent capability to connect to internet.

Logical Access Security:

Operating systems provide logical security by establishing a procedure for identification & authentication using a User ID and Password. It can log the user access thereby providing security control.

File Management:

The Operating System keeps a track of where each file is stored and who can access it, based on which it provides the file retrieval.

Q.12 What is CPU? What are the three functional units of a Central Processing Unit (CPU)?**Answer**

- The Central Processing Unit (CPU or microprocessor) is the actual hardware that interprets and executes the program (software) instructions and coordinates how all the other hardware devices work together.
- The CPU is built on a small flake of silicon and can contain the equivalent of several million transistors.
- We can think of transistors as switches which could be "ON" or "OFF" i.e., taking a value of 1 or 0.
- The processor or CPU is like the brain of the computer. The main function of CPU is to execute programs stored in memory.
- It consists of three functional units:

Control Unit (CU): CU controls the flow of data and instruction to and from memory, interprets the instruction and controls which tasks to execute and when.

Arithmetic and Logical Unit (ALU) : Performs arithmetic operations such as addition, subtraction, multiplication, and logical comparison of numbers: Equal to, Greater than, Less than, etc.

Registers: These are high speed memory units within CPU for storing small amount of data (mostly 32 or 64 bits). Registers could be:

Accumulators : They can keep running totals of arithmetic values.



Address Registers : They can store memory addresses which tell the CPU as to where in the memory an instruction is located.

Storage Registers : They can temporarily store data that is being sent to or coming from the system memory.

Miscellaneous : These are used for several functions for general purpose.

Q-13 Discuss Information System Life Cycle.

Answer

Information System Life Cycle is commonly referred as Software/System Development Life Cycle (SDLC) which is a methodology used to describe the process of building information systems. SDLC framework provides a sequence of activities for system designers and developers to follow. It consists of a set of steps or phases in which each phase of the SDLC uses the results of the previous one. Various phases for developing an Information System are given as follows:

Phase 1: System Investigation :

This phase examines that 'What is the problem and is it worth solving'? A feasibility study is done under the dimensions — Technical, Economical, Legal, Operational etc.

Phase 2: System Analysis :

This phase examines that 'What must the Information System do to solve the problem'? System analyst would be gathering details about the current system and will involve interviewing staff; examining current business; sending out questionnaires and observation of current procedures. The Systems Analyst will examine data and information flows in the enterprise using data flow diagrams; establish what the proposed system will actually do (not how it will do it); analyze costs and benefits; outline system implementation options. (For example: in-house or using consultants); consider possible hardware configurations; and make recommendations.

Phase 3: System Designing:

This phase examines that 'How will the Information System do what it must do to obtain the solution to the problem'? This phase specifies the technical aspects of a proposed system in terms of Hardware platform; Software; Outputs; Inputs; User interface; Modular design; Test plan; Conversion plan and Documentation.

Phase 4: System Implementation:

This phase examines that 'How will the solution be put into effect'? This phase involves coding and testing of the system; acquisition of hardware and software; and either installation of the new system or conversion of the old system to the new one.

Phase 5: System Maintenance and Review:

This phase evaluates results of solution and modifies the system to meet the changing needs. Post implementation review would be done to address Programming amendments; Adjustment of clerical procedures; Modification of Reports, and Request for new programs.

Q.14 Differentiate between the following:

1. Random Access Memory and Read Only Memory
2. Hierarchical Database Model and Network Database Model
3. Complex Instruction Set Computer (CISC) and Reduced Instruction Set Computer (RISC)

Answer

The differences between Random Access Memory (RAM) and Read Only Memory (ROM) are given below:

| Random Access Memory (RAM) | Read Only Memory (ROM) |
|----------------------------|------------------------|
|----------------------------|------------------------|



| | |
|---|---|
| RAM is a volatile memory and when the computer is turned off, RAM loses its data. When the computer is turned on again, operating system and other files are once again loaded into RAM usually from the hard disk. | Unlike RAM, ROM is non-volatile. The contents of ROM remain even after the computer is switched off. |
| This is Read Write memory wherein information can be read as well as modified. | Originally, the ROM used to be read- only; however, the new versions of ROM allow limited rewriting making it possible to upgrade firmware such as the BIOS by using installation software. |
| The differences between Hierarchical Database Model and Network Database Model are given below: | |
| Hierarchical Database Model | Network Database Model |
| The hierarchical model permits a record to be a member of only one set at one time. | Unlike the hierarchical mode, the network model permits a record to be a member of more than one set at one time |
| The hierarchical data structure implements one-to-one and one-to-many relationships. | The network model allows us to represent one-to-one, one-to-many and many-to-many relationships. |
| Each parent record may have one or more child records, records, but no child record may have more than one parent record. | Each parent record may have one or more child and even a child record may have more than one parent record. |
| The hierarchical model does not represent redundancy in data efficiently. | The network model is able to represent redundancy data more efficiently than in the hierarchical model. |
| The hierarchical data structures require specific entrance points to find records in a hierarchy. | The network data structures can be entered and traversed more flexibly. |

Complex Instruction Set Computer (CISC):

- If the Control Unit contains a number of micro-electronic circuitry to generate a set of control signals and each micro-circuitry is activated by a micro-code, this design approach is called CISC design. Examples of CISC processors are: Intel 386,486, Pentium, Pentium Pro, Pentium II, Pentium processors etc.
- CISC chips have a large, variable length and complex instructions and generally make use of complex addressing modes. Different machine programs can be executed on CISC machine. Since CISC processors possess so many processing features, the job of machine language programmers becomes easier.
- But at the same time, they are complex as well as expensive to produce. Now-a-days, most of the personal computers use CISC processors.

Reduced Instruction Set Computer (RISC):

- To execute each instruction, if there is separate electronic circuitry in the control unit, which produces all the necessary signals, this approach of the design of the control section of the processor is called RISC design.
- It is also called hard-wired approach. Examples of RISC processors: IBM RS6000, MC88100 processors etc. RISC processors use a small and limited number of instructions and mostly use hardwired control unit.



- These consume less power and are having high performance. RISC processors use simple addressing modes and RISC instruction is of uniform fixed length. Since RISC processors have a small instruction set, they place extra demand on programmers who must consider how to implement complex computations by combining simple instructions.
- However, RISC processors are faster, less complex and less expensive than CISC processors because of their simpler design.

-X-X-X-



CHAPTER-3

TELECOMMUNICATION AND NETWORKS

Q.1 Define the following terms as briefly :

- | | |
|----------------------------------|-----------------------------|
| (a) Network Interface Card (NIC) | (b) MODEM |
| (c) Multiplexer | (d) Internetwork Processors |
| (e) Switch | (f) Router |
| (g) Hub | (h) Bridge |
| (i) Repeater | (j) Gateway |
| (k) Server | (l) Protocol |

Answer

- (a) **Network Interface Card (NIC)** —Network Interface Card (NIC) is a computer hardware component that connects a computer to a computer network. It has additional memory for buffering incoming and outgoing data packets, thus improving the network throughput.
- (b) **MODEM** - A MODEM is a device that converts a digital computer signal into an analog telephone signal (i.e. it modulates the signal) and converts an analog telephone signal into a digital computer signal (i.e. it demodulates the signal) in a data communication system.
- (c) **Multiplexer** —A multiplexer is a communication processor that allows a single communication channel to carry simultaneous data transmissions from many terminals. A multiplexer merges the transmission of several terminals at one end of a communication channel while a similar unit separates the individual transmissions at the receiving end.
- (d) **Internetwork Processors** —Telecommunication networks are interconnected by special- purpose communication processors called internetwork processors such as switches, routers, hubs, bridges, repeaters and gateways.
- (e) **Switch**— Switch is a communication processor that makes connections between telecommunication circuits in a network so that a telecommunication message can reach its intended destination.
- (f) **Router** —Router is a communication processor that interconnects networks based on different rules or protocols, so that a telecommunication message can be routed to its destination.
- (g) **Hub**— Hub is a port-switching communication processor. This allows for the sharing of the network resources such as servers, LAN workstations, printers, etc.
- (h) **Bridge** —Bridge is a communication processor that connects number of Local Area Networks (LAN). It magnifies the data transmission signal while passing data from one LAN to another.
- (i) **Repeater**— Repeater is a communication processor that boosts or amplifies the signal before passing it to the next section of cable in a network,
- (j) **Gateway**— Gateway is a communication processor that connects networks and use different communication architectures.
- (k) **Server**— A server is one or more multi-user processors with shared memory providing computing, connectivity and the database services and the interfaces relevant to the business need.
- (l) **Protocol** —A protocol is the formal set of rules for communicating, including rules for timing of message exchanges, the type of electrical connection used by the communications devices, error detection techniques, means of gaining access to communications channels, and so on.

Q.2 Differentiate between the following:

- (a) **Guided Media and Unguided Media**



- (b) Client Server Network and Peer-to-Peer Network
- (c) Serial Transmission and Parallel Transmission
- (d) Synchronous Transmission and Asynchronous Transmission

Answer

a. The differences between Guided Media and Unguided Media are given below:

| Guided Media | Unguided Media |
|---|---|
| Guided Media are those media that provide a conduit from one device to another. | Unguided Transmission Media consists of a means for the data signals to travel but nothing to guide them along a specific path. |
| Guided Transmission Media uses a "cabling" system that guides the data signals along a specific path. | It passes through a vacuum; it is independent of a physical pathway. |
| Example — Coaxial Cable, Twisted Pair, Fiber Optic Cable. | Example — Infrared Waves, Micro Waves, Radio Waves etc. |

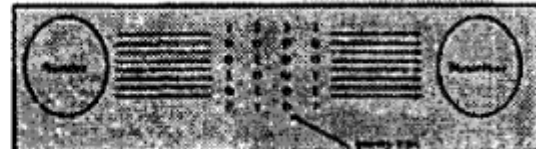
b. The differences between Client Server Network and Peer-to-Peer Network are given below :

| Client Server Network | Peer-to Peer Network |
|--|--|
| A client computer typically communicates only with servers, not with other clients, | Every computer is equal and can communicate with any other computer on the network to which it has been granted access rights. |
| A central server handles all security and file transactions. | Each machine shares its own resources and handles its own security. |
| It is more expensive as it requires a central file server, server software and client licenses | It is relatively less expensive as it does not require a dedicated machine, server software or special client licenses. |
| More secure. | Lesser secure as the network control is handed to the end-users. |
| Backup is centralized on the server; managed by network administrator. Backup by device and media only required at server. | Backup is decentralized; managed by users. Backup devices and media are required at each workstation. |
| The performance is relatively high as the server is dedicated and does not handle other tasks. | The performance is relatively low. |
| In case of failure of server, the whole network fails. | No single point of failure in the network. |
| C/S model relies on the power and stability of a single computer i.e. Server. | P2P gives each workstation equivalent capabilities and relies heavily on the power and bandwidth of each individual computer. |
| Example - Email, network printing, and the World Wide Web. | Example - Napster, Gnutella, Freenet, Bit Torrent and Skype. |

c. The differences between Serial Transmission and Parallel Transmission are given below:

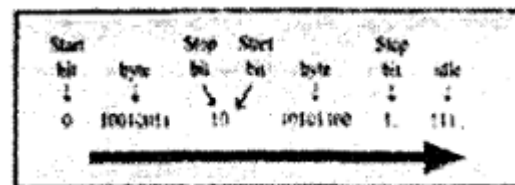
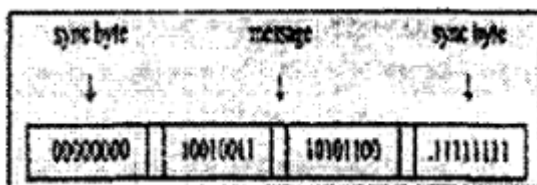
| Serial Transmission | Parallel Transmission |
|--|--|
| In this, the data bits are transmitted serially one after another. | In this, the data bits are transmitted simultaneously. |

| | |
|---|---|
| Data is transmitted over a single wire and is thus relatively slower, | Data is transmitted over eight different wires and is thus relatively faster. |
| It is a cheaper mode of transferring data. | It is relatively expensive mode of transferring data. |
| It is useful for long distance | Not practical for long distance data transmissions communications. |



d. The differences between Synchronous Transmission and Asynchronous Transmission are given below:

| Synchronous Transmission | Asynchronous Transmission |
|---|---|
| Allows characters to be sent down the line without Start-Stop bits. | Each data word is accompanied with start and stop bits. |
| Transmission is faster as in absence of Start and Stop bits, many data words can be transmitted per second. | Extra Start and Stop bits slow down the transmission process relatively. |
| The synchronous device is more expensive to build as it must be smart enough to differentiate between the actual data and the special synchronous characters. | It is relatively cheaper. |
| Chances of data loss are relatively higher. | More reliable as the start and stop bits ensure that the sender and the receiver remain in step with one another. |
| It is more efficient. | It is relatively less efficient. |



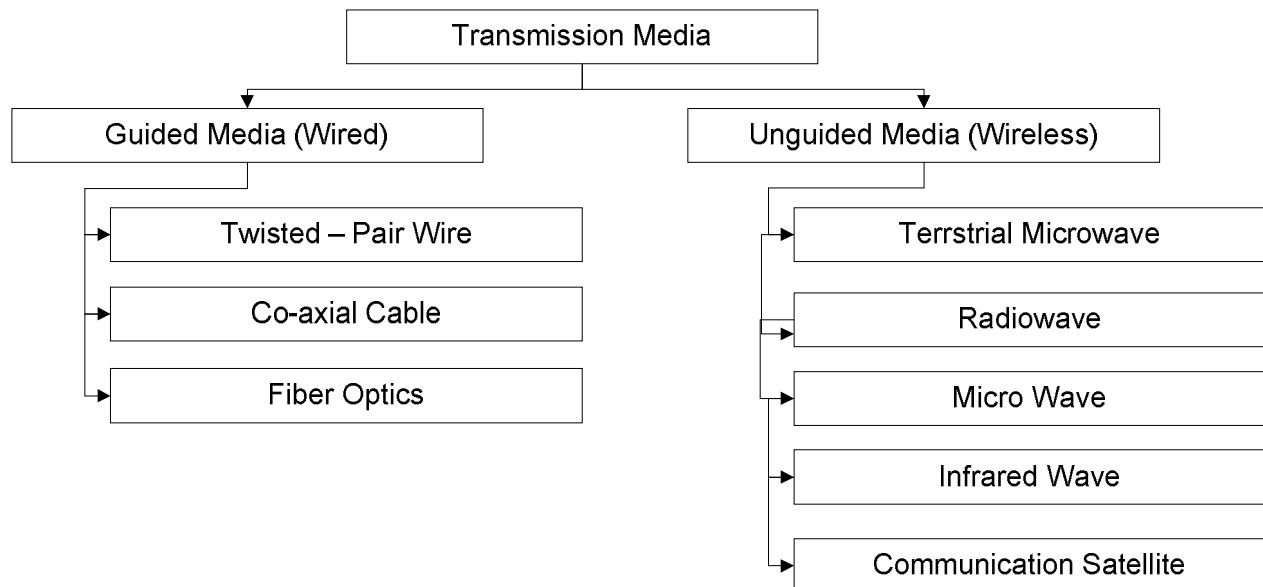
Q.3. Discuss Transmission Media in detail.

Answer

Transmission Media connects the message source with the message receiver by means of Guided or Unguided Media.

- Guided Media/Bound Media:** Guided Transmission Media uses a "cabling" system that guides the data signals along a specific path. Some of the common examples of guided media are Twisted Pair, Coaxial cable and Fiber optics.
- Twisted-Pair Wire:** Twisted-pair is ordinary telephone wire, consisting of copper wire twisted into pairs. It is the most widely used media for telecommunications and is used for both voice and data transmissions. It is used extensively in home and office telephone systems and many LANs and WANs.

3. **Coaxial Cable:** This telecommunication media consists of copper or aluminum wire wrapped with \$ spacers to insulate and protect it. Coaxial cables can carry a large volume of data and allows high-speed data transmission used in high-service metropolitan areas for cable TV systems, and for short- distance connection of computers and peripheral devices. It is used extensively in office buildings and other work sites for local area networks.
4. **Fiber Optics:** This media consists of one or more hair-thin filaments of glass fiber wrapped in a protective jacket. Signals are converted to light form and fired by laser in bursts. Optical fibers can carry digital as well as analog signals and provides increased speed and greater carrying capacity than coaxial cable and twisted-pair lines.



Unguided Media/Unbound Media :

Unguided Transmission Media consists of a means for the data signals to travel but nothing to guide them along a specific path. The data signals are not bound to a cabling media. Some of the common examples of unguided media are Terrestrial Microwave, Radio Waves, Micro Waves, Infrared Waves and Communication Satellites.

1. **Terrestrial Microwave:** Terrestrial microwave media uses the atmosphere as the medium through which to transmit signals and is used extensively for high-volume as well as long-distance communication of both data and voice in the form of electromagnetic waves.
2. **Radio Waves:** Radio waves are an invisible form of electromagnetic radiation that varies in wavelength from around a millimeter to 100,000 km, making it one of the widest ranges in the electromagnetic spectrum. Radio waves are most commonly used transmission media in the wireless Local Area Networks.
3. **Micro Waves:** Microwaves are radio waves with wavelengths ranging from as long as one meter to as short as one millimeter or equivalently, with frequencies between 300 MHz (0.3GHz) and 300 GHz. These are used for communication, radar systems, radio astronomy, navigation and spectroscopy.
4. **Infrared Waves:** Infrared light is used in industrial, scientific, and medical applications. Night-vision devices using infrared illumination allow people or animals to be observed without the observer being detected.
5. **Communication Satellites:** Communication satellites use the atmosphere (microwave radio waves) as the medium through which to transmit signals. A satellite is some solar- powered



electronic device that receives, amplifies, and retransmits signals; the satellite acts as a relay station between satellite transmissions stations on the ground (earth stations). They are used extensively for high- volume as well as long-distance communication of both data and voice.

Q.4 How can Client Computers be classified?

Answer

Client Computers can be classified as Fat Client, Thin Client or Hybrid Client.

Fat / Thick Client:

- A Fat Client or Thick Client is a client that performs the bulk of any data processing operations itself, and does not necessarily rely on the server.
- Thick clients do not rely on a central processing server because the processing is done locally on the user system, and the server is accessed primarily for storage purposes. For that reason, thick clients often are not well-suited for public environments.
- To maintain a thick client, IT needs to maintain all systems for software deployment and upgrades, rather than just maintaining the applications on the server. For example — Personal Computer.

Thin Client:

- A Thin Client use the resources of the host computer. A thin client generally only presents processed data provided by an application server, which performs the bulk of any required data processing.
- A thin client machine is going to communicate with a central processing server, meaning there is little hardware and software installed on the user's machine. A device using web application (such as Office Web Apps) is a thin client.

Hybrid Client:

- A Hybrid Client is a mixture of the above two client models.
- Similar to a fat client, it processes locally, but relies on the server for storing persistent data.
- This approach offers features from both the fat client (multimedia support, high performance) and the thin client (high manageability, flexibility). Hybrid clients are well suited for video gaming.

Q.5 Discuss some of the characteristics and issues of Client Server (C/S) architecture.

Answer

Some of the prominent characteristics of C/S architecture are as follows:

- Service:** C/S provides a clean separation of function based on the idea of service. The server process is a provider of services and the client is a consumer of service
- Shared Resources:** A server can service many clients at the same time and regulate their access to the shared resources.
- Transparency of Location:** C/S software usually masks the location of the server from the clients by redirecting the service calls when needed.
- Mix-and-Match:** The ideal C/S software is independent of hardware or Operating System software platforms.
- Scalability:** In a C/S environment, client workstations can either be added or removed and also the server load can be distributed across multiple servers.
- Integrity:** The server code and server data is centrally managed, which results in cheaper maintenance and the guarding of shared data integrity. At the same time, the clients remain personal and independent.

Issues in Client/Server Network

- When the server goes down or crashes, all the computers connected to it become unavailable to use.



- Simultaneous access to data and services by the user takes little more time for server to process the task.

Q.6 Discuss advantages and disadvantages of following:

- | | |
|---------------------------|-----------------------------|
| (a) Peer-to-Peer Network | (b) Single Tier Systems |
| (c) Two Tier Systems | (d) Three Tier Systems |
| (e) Centralized Computing | (f) Decentralized Computing |
| (g) Star Topology | (h) Ring Topology |
| (l) Bus Topology | (i) Mesh Topology |

Answer

(a) Peer-to-Peer Network

Advantages: Following are the major advantages of Peer-to-Peer networks:

- Peer-to-Peer Networks are easy and simple to set up and only require a Hub or a Switch to connect all the computers together.
- It is very simple and cost effective.
- If one computer fails to work, all other computers connected to it continue to work.

Disadvantages: The major disadvantages of peer-to-peer networks are as below:

- There can be a problem in accessing files if computers are not connected properly.
- It does not support connections with too many computers as the performance gets degraded in case of high network size.
- The data security is very poor in this architecture.

(b) Single Tier Systems

Advantages: A single-tier system requires only one stand-alone computer. It also requires only one installation of proprietary software which makes it the most cost-effective system available.

Disadvantages: It can be used by only one user at a time. A single tier system is impractical for an organization which requires two or more users to interact with the organizational data stores at the same time.

(c) Two Tier Systems

The advantages of Two-Tier systems are as follows:

- The system performance is higher because business logic and database are physically close.
- Since processing is shared between the client and server; more users could interact with system.
- By having simple structure, it is easy to setup and maintain entire system smoothly.

The disadvantages of Two-Tier systems are as follows:

- Performance deteriorates if number of users increases.
- There is restricted flexibility and choice of DBMS since data language used in server is proprietary to each vendor.

(d) Three Tier Systems

The advantages of Three-Tier systems:

- **Clear separation of user-interface-control** and data presentation from application-logic: Through this separation, more clients are able to have access to a wide variety of Server applications. The two main advantages for client-applications are quicker development through the reuse of pre-built business-logic components and a shorter test phase.
- **Dynamic load balancing:** If bottlenecks in terms of performance occur, the server process can be moved to other servers at runtime.



- **Change management:** It is easy and faster to exchange a component on the server than to furnish numerous PC5 with new program versions.

The **disadvantages** of Three-Tier systems are as below:

- It creates an increased need for network traffic management, server load balancing, and fault tolerance.
- Current tools are relatively immature and are more complex.
- Maintenance tools are currently inadequate for maintaining server libraries.

(e) Centralized Computing

Advantages are as follows:

- Ease of management — There are relatively few computers to manage;
- Enhanced security — The physical and logical securing of the computing environment can be more easily managed since there is only one location and a few computers;
- Ease of control — The introduction of change can be managed closely since there is only one location and a few computers;
- Reduced cost of ownership — Fewer computing elements to manage and therefore few people needed to manage them;
- Multiple types of workload — All of the work associated with the business runs at the central computing location.

Disadvantages are as follows:

- The central computer performs the computing functions and controls the remote terminals. In case of failure of central computer, the entire system will go down.
- Central computing relies heavily on the quality of administration and resources provided to its users. Empowerment of the central computer should be adequate by all means, else the usage suffers greatly.

(f) Decentralized Computing

Advantages are as follows:

- A decentralized system utilizes the potential of desktop systems to maximize the potential performance of the business applications.

Disadvantages are as follows:

- All computers have to be updated individually with new software, unlike a centralized computer system.

(g) Star Topolgy

Advantages are as follows:

- Several users can use the central unit at the same time.
- It is easy to add new nodes and remove existing nodes.
- A node failure does not bring down the entire network.
- It is easier to diagnose network problems through a central hub.

Disadvantages are as follows:

- The whole network is affected if the main unit “goes down,” and all communications stop. If it fails, there is no backup processing and communications capability and the local computers will be cut off from the corporate headquarters and from each other.
- Cost of cabling the central system and the points of the star network together are very high.

(h) Ring Topology

Advantages are as follows:



- Ring networks neither require a central computer to control activity nor does it need a file server.
- Each computer connected to the network can communicate directly with the other computers in the network by using the common communication channel, and each computer does its own independent applications processing.
- The ring network is not as susceptible to breakdowns as the star network, because when one computer in the ring fails, it does not necessarily affect the processing or communications capabilities of the other computers in the ring.
- Ring networks offer high performance for a small number of workstations or for larger networks where each station has a similar workload.
- Ring networks can span longer distances than other types of networks.
- Ring networks are easily extendable.

Disadvantages are as follows:

- Relatively expensive and difficult to install.
- Failure of one computer on the network can affect the whole network.
- It is difficult to troubleshoot a ring network.
- Adding or removing computers can disrupt the network.

(i) Bus Topology**Advantages are as follows :**

- There is no host computer or file server which makes bus network reliable as well as easy to use and understand.
- If one of the microcomputers fails, it will not affect the entire network.
- Requires the least amount of cable to connect the computers together and therefore is less expensive than other cabling arrangements.
- Is easy to extend. Two cables can be easily joined with a connector, making a longer cable for more computers to join the network.
- A repeater can also be used to extend a bus configuration.

Disadvantages are as follows:

- Heavy network traffic can slow a bus considerably since any computer can transmit at any time.
- Each connection between two cables weakens the electrical signal.
- The bus configuration can be difficult to troubleshoot. A cable break or malfunctioning computer can be difficult to find and can cause the whole network to stop functioning.

(j) Mesh Topology**Advantages are as follows:**

- Yields the greatest amount of redundancy in the event that if one of the nodes fails, the network traffic can be redirected to another node.
- Network problems are easier to diagnose.

Disadvantages are as follows:

- Installation and maintenance cost is very high as more cable is required in Mesh Topology.

Q.7. Discuss the common Switching techniques used in computer networking.**Answer**

The common switching techniques used in computer networking are — Circuit switching, Packet Switching and Message Switching.



- **Circuit Switching:** When two nodes communicate with each other over a dedicated communication path, it is called Circuit Switching. An important property of circuit switching is the need to set up an end-to-end path before any data can be sent which can either be permanent or temporary. Applications which use circuit switching may have to go through three phases: Establish a circuit, Transfer of data and Disconnect the circuit. The bandwidth is reserved all the way from sender to receiver and all the data packets follow the same path, thus, ensuring the sequence of data packets are in order.
- **Packet Switching:** The entire message is broken down into smaller transmission units called packets. The switching information is added in the header of each packet and transmitted independently. It is easier for intermediate networking devices to store smaller size packets and they do not take much resources either on carrier path or in the switches' internal memory. In packet switched network, first packet of a multi-packet message may be forwarded before the second one has fully arrived, thus reducing delay and improving throughput. Since, there is no fixed path, different packets can follow different path and thus they may reach to destination out of order.
- **Message Switching/ Store-and-Forward:** In message switching, no physical path is established between sender and receiver in advance. The whole message is treated as a data unit and is transferred in its entirety which contains the entire data being delivered from the source to destination node. A switch working on message switching first receives the whole message and buffers it until there are resources available to transfer it to the next hop. If the next hop is not having enough resource to accommodate large size message, the message is stored and switch waits. E-mail and voice mail are examples of message switching systems.

Q.8 Explain the OSI Model of communication in detail.

Answer

OSI Model — The International Standards Organization (ISO) developed a seven-layer Open Systems Interconnection (OSI) model to serve as a standard model for network architectures. Seven layers of OSI include the following:

- **Layer 7 or Application Layer:** This layer is closest to the end user and interacts with software applications and provides user services by file transfer, file sharing, etc. At this layer, communication partners are identified; quality of service is identified; user authentication and privacy are considered; any constraints on data syntax are identified; and database concurrency and deadlock situation controls are undertaken.
- **Layer 6 or Presentation Layer:** Also referred as Syntax Layer, this layer is usually a part of an operating system that converts incoming and outgoing data from one presentation format to another (for example, from a text stream into a popup window with the newly arrived text). It further controls onscreen display of data, transforms data to a standard application interface, encryption and data compression.
- **Layer 5 or Session Layer:** This layer sets up, coordinates, and terminates conversations; exchanges and dialogs between the applications at each end. It deals with session and connection coordination and provides for full-duplex, half-duplex, or simplex operation, and establishes check pointing, adjournment, termination, and restart procedures.
- **Layer 4 or Transport Layer:** This layer ensures reliable and transparent transfer of data between user processes; assembles and disassembles message packets and provides error recovery and flow control. Multiplexing and encryption are undertaken at this layer level.

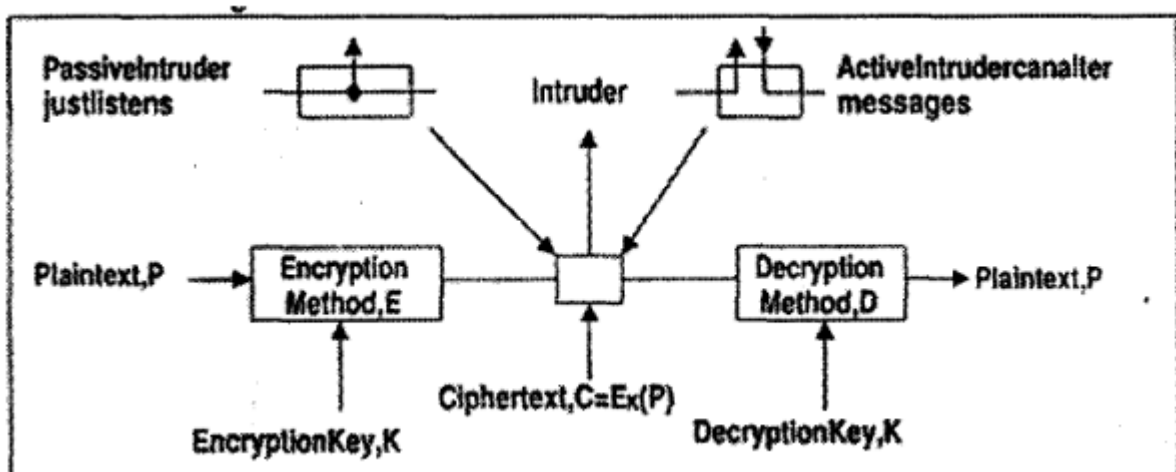
- **Layer or Network Layer:** The Network Layer provides the functional and procedural means of transferring variable length data sequences from a source to a destination via one or more networks, while maintaining the quality of service requested by the Transport Layer. The Network Layer makes a choice of the physical route of transmission; creates a virtual circuit for upper layers to make them independent of data transmission and switching; establishes, maintains, terminates connections between the nodes and ensure proper routing of data.
- **Layer 2 or Data Link Layer:** The Data Link Layer responds to service requests from the Network Layer and issues service requests to the Physical Layer. This layer transfers data between adjacent network nodes in a WAN or between nodes on the same LAN segment. This layer also specifies channel access control method and ensures reliable transfer of data through the transmission medium. It provides the functional and procedural means to transfer data between network entities and detects and possibly corrects errors that may occur in the Physical Layer.
- **Layer 1 or Physical Layer :** The Physical Layer is a hardware layer which specifies mechanical features as well as electromagnetic features of the connection between the devices and the transmission. Establishment and termination of a connection to a communications medium; participation in the process whereby the communication resources are effectively shared among multiple users; and modulation or conversion between the representation of digital data in user equipment and the corresponding signals transmitted over a communications channel are the major tasks of this layer.

Q.9. Discuss Encryption Model, in computer network.

Answer

In Cryptography, encryption is the process of encoding messages (or information) in such a way that eavesdroppers or hackers cannot read it, but only authorized parties can. The Encryption Model defines the encryption of plain text into cipher text and decryption of cipher text into plain text.

- Plain text is the message that is to be encrypted. It is transformed by a function that is parameterized by a key.
- Cipher Text is the output of the encryption process that is transmitted often by a messenger or radio.



Encryption Model — The intruder may hear and accurately copies down the complete cipher text. However, unlike the intended recipient, he does not know what the decryption key is and so cannot decrypt the cipher text easily. Sometimes the intruder can not only listen to the communication channel (passive intruder) but can also record messages and play them back later, inject his own messages, or modify legitimate messages before they get to the receiver (active intruder). The art of breaking ciphers



is known as Cryptanalysis, and the art of devising them (Cryptography) are collectively known as Cryptology.

**Q.10. Discuss in brief, some of the popular Network Security Protocols.****Answer**

Some of the popular network security protocols include Secure Shell (SSH), Secure File Transfer Protocol(SFTP), Hyper Text Transfer Protocol Secure (HTTPS) and Secure Socket Layer (SSL) etc.

- **SSH** — Secure Shell is a program to log into another computer over a network, to execute commands in a remote machine, and to move files from one machine to another. It provides strong authentication and secure communications over insecure channels. SSH protects a network from attacks such as IP spoofing, IP source routing, and DNS spoofing. An attacker cannot play back the traffic or hijack the connection when encryption is enabled. During ssh login; the entire login session including transmission of password is encrypted; therefore it is almost impossible for an outsider to collect passwords.
- **SFTP** — The SSH File Transfer Protocol (also known as Secure FTP and SFTP) is a computing network protocol for accessing and managing files on remote file systems. Unlike standard File Transfer Protocol(FTP), SFTP encrypts commands and data both, preventing passwords and sensitive information from being transmitted in the clear over a network.
- **HTTPS** — Hyper Text Transfer Protocol Secure (HTTPS) is a communication protocol for secure communication over a computer network with especially wide deployment on the Internet. The security of HTTPS uses long term public and secret keys to exchange a short term session key to encrypt the data flow between client and server.
- **SSL** — It is a protocol that provides a secure channel between two machines operating over the Internet or an internal network. It is typically used when a web browser needs to securely connect to a web server over the inherently insecure Internet. In practice, SSL is used to secure online credit card transactions system logins and any sensitive information exchanged online; to secure the connection between an email client such as Microsoft Outlook and an email server such as Microsoft Exchange, to secure intranet based traffic such as internal networks, file sharing, extranets, and database connections etc.

Q.11 Discuss FCAPS model of network management.**Answer**

FCAPS is the ISO Telecommunications Management Network model and framework for network management. It is an acronym for Fault, Configuration, Accounting, Performance and Security.

- **Fault Management** — A fault is an event that has a negative significance. The goal of fault management is to recognize, isolate, correct and log faults that occur in the network. Most fault management systems poll the managed objects for error conditions and present this information to the network manager. Fault management identifies and isolates network issues; proposes problem resolution; and subsequently logs the issues and associated resolutions.
- **Configuration Management** — Monitors network and system configuration information so that the impact on network operations (hardware and software elements) can be tracked and managed. Network changes, additions, and deletions need to be coordinated with the network management personnel.
- **Accounting Management** — Accounting management is concerned with tracking network utilization information, such that individual users, departments, or business units can be appropriately billed or charged for accounting purposes. For non-billed networks, accounting refers to administration whose primary goal is to administer the set of authorized users by establishing users, passwords, and



permissions and to administer the operations of the equipment such as by performing software backup and synchronization.

- **Performance Management** — Measures and makes network performance data available so that performance can be maintained and acceptable thresholds. It enables the manager to prepare the network for the future, as well as to determine the efficiency of the current network. The network performance addresses the throughput, network response times, packet loss rates, link utilization, percentage utilization, error rates and so forth.
- **Security Management** — Controls access to network resources as established by organizational security guidelines. Most network management systems address security regarding network hardware such as someone logging into a router. Security management functions include managing network authentication, authorization, and auditing, such that both internal and external users only have access to appropriate network resources, configuration and management of networkfirewalls, intrusion detection systems, and security policies (such as access lists).

Q.12 Discuss strategic capabilities of Internet along with their business applications.

Answer

The strategic capabilities of Internet include the following:

- **Overcome geographic barriers:** Capture information about business transactions from remote locations. This provides better customer service by reducing delay in filling orders and improves cash flow by speeding up the billing of customers. For example - Use the Internet and Extranet to transmit customer orders from travelling salespeople to a corporate data center for order processing and inventory control.
- **Overcometime barriers:** Provide information to remote locations immediately after it is requested. Credit inquiries can be made and answered in seconds. For example - Credit authorization at the point of sale using online PUS networks.
- **Overcome cost barriers:** Reduce the cost of more traditional means of communication. This reduces expensive business trips; allows customers, suppliers, and employees to collaborate, thus improving the quality of decisions reached. For example - Desktop video conferencing between a company and its business partners using the Internet, Intra net and Extranet.
- **Overcome structural barriers:** Support linkages for competitive advantage. Fast, convenient services lock in customers and suppliers. For example - Business-to-business electronic commerce websites for transactions with suppliers and customers using the Internet and Extra net.

Q.13. What do you understand by the term ‘e-Commerce’? Discuss its benefits and risks involved.

Answer

- E-Commerce is the process of doing business electronically. It refers to the use of technology to enhance the processing of commercial transactions between a company, its customers and its business partners. It involves the automation of a variety of business-to-business and business-to-consumer transactions through reliable and secure connections.

Benefits of e-Commerce Application and Implementation are as follows:

- Reduction in costs to buyers from increased competition in procurement as more suppliers are able to compete in an electronically open marketplace.
- Reduction in errors, time and overhead costs in information processing by eliminating requirements for re-entering data.
- Reduction in costs to suppliers by electronically accessing on-line databases of bid opportunities, on-line abilities to submit bids, and on-line review of rewards.



- Reduction in time to complete business transactions, particularly from delivery to payment.
- Creation of new markets through the ability to easily and cheaply reach potential customers.
- Easier entry into new markets especially geographically remote markets for enterprises regardless of size and location.
- Better quality of goods as specifications are standardized and competition is increased and improved variety of goods through expanded markets and the ability to produce customized goods.
- Faster time to market as business processes are linked, thus enabling seamless processing and eliminating time delays.
- Optimization of resource selection as businesses form cooperative teams to increase the chances of economic successes, and to provide the customer products and capabilities more exactly meeting the requirements.
- Reduction in inventories and risk of obsolete inventories as the demand for goods and services is electronically linked through just-in-time inventory and integrated manufacturing techniques.
- Reduction in overhead costs through uniformity, automation, and large-scale integration of management processes.
- Reduction in use of ecologically damaging materials through electronic coordination of activities and the movement of information rather than physical objects.
- Reduction in advertising costs.

Risks involved in e-Commerce are as follows:

- **Problem of anonymity:** There is need to identify and authenticate users in the virtual global market where anyone can sell to or buy from anyone, anything from anywhere.
- **Repudiation of contract:** There is possibility that the electronic transaction in the form of contract, sale order or purchase by the trading partner or customer may be denied.
- **Lack of authenticity of transactions:** The electronic documents that are produced in the course of an e-Commerce transaction may not be authentic and reliable.
- **Data Loss, Theft or Duplication:** The data transmitted over the Internet may be lost, duplicated, tampered with or replayed.
- **Attack from hackers:** Web servers used for e-Commerce may be vulnerable to hackers.
- **Denial of Service:** Service to customers may be denied due to non-availability of system as it may be affected by viruses, e-mail bombs and floods.
- **Non-recognition of electronic transactions:** e-Commerce transactions as electronic records and digital signatures may not be recognized as evidence in courts of law.
- **Lack of audit trails:** Audit trails in e-Commerce system may be lacking and the logs may be incomplete, too voluminous or easily tampered with.
- **Problem of piracy:** Intellectual property may not be adequately protected when such property is transacted through e-Commerce.

Q.14 What are the different types of e-Commerce?

Answer

The general classes of e-Commerce applications are as follows:

- **Business-to-Business (B2B) e-Commerce :** B2B refers to the exchange of services, information and/ or products from one business to another. B2B electronic commerce typically takes the form of automated processes between trading partners and is performed in much higher volumes than Business-to-Consumer (B2C) applications. B2B can also encompass marketing activities between businesses and not just the final transactions that result from marketing.



- **Business-to-Consumer (B2C) e-Commerce** : It is defined as the exchange of services, information and/or products from a business to a consumer, as opposed to between one business and another. This model saves time and money by doing business electronically but customers must be provided with safe and secure as well as easy-to- use and convenient options when it comes to paying for merchandise. This minimizes internal costs created by inefficient and ineffective supply chains and creates reduces end prices for the customers.
- **Consumer-to-Business (C2B) e-Commerce:** In C2B e-Commerce model, consumers directly contact with business vendors by posting their project work online so that the needy companies review it and contact the consumer directly with bid. The consumer reviews all the bids and selects the company for further processing. Some examples are guru.com, rentacoder.com, getacoder.com, freelancer.com.
- **Consumer-to-Consumer (C2C) e-Commerce** : C2C e-Commerce is an Internet- facilitated form of commerce that provides a virtual environment in which consumers can sell to one another through a third-party intermediary.
- **Business-to-Government (B2G) e-Commerce** : B2G e-Commerce, also known as e- Government, refers to the use of information and communication technologies to build and strengthen relationships between government and employees, citizens, businesses, non-profit organizations, and other government agencies.
- **Business-to-Employee (B2E) e-Commerce** : B2E e-Commerce, from an intra- organizational perspective provides the means for a business to offer online products and services to its employees.

Q.15 Differentiate between Host Based & Network Intrusion Detection System.

Answer

Differences between Host Based Intrusion Detection System and Network Based Intrusion Detection System are as follows:

| | Host Based Intrusion Detection System | Network Based Intrusion Detection System |
|---------------------|---|---|
| Deterrence | Strong deterrence for insiders — | Strong deterrence for Outsiders |
| Detection | Strong insider detection, weak outsider detection | Strong outsider detection, weak insider detection |
| Attack Anticipation | Good at trending and detecting spacious behavior patterns | None |
| Damage Assessment | Excellent for determining extent of compromise | Very weak damage isassessment capabilities |
| Response | Weak real-time response, good for longterm attacks | Strong response against outsider attack |
| Scope | Narrow in scope, monitors Specific activities | Broad in scope |
| Dependency | Host dependent | Host independent. |

Q.16 Write short note on Internet, Intranet and Extranet.

Answer

- **Internet:** The Internet is the massive global system that connects computer networks around the world together. Millions of private, public, academic, business and government networks worldwide connect with each other over the internet to share massive amounts of information, resources and services. The Internet uses the standard Internet protocol suite (TCP/IP) to allow us to connect to



each other. It has numerous information resources and services, such as the web pages of the World Wide Web (WWW), games, videos, images, e-mail, social networking, etc. The Internet carries information from all streams; traditional, such as newspaper, book and other print publishing; and modern such as blogging and web feeds. It also enables new forms of human interactions through, instant messaging, e-mail, Internet forums, and social networking.

- **Intranet:** Intranet is an internal network used by companies to connect their computers on a network. Intranet is accessible only by the organization's members, employees, or others with authorization. A firewall surrounds an Intranet that fends off unauthorized access. The Intranet is based on TCP/IP protocol and is inaccessible from the outside. An Intranet resides behind a firewall and is accessible only to people who are members of the same company or organization. Intranet is mainly used by corporations as it is a secure network and is much less expensive to build and manage than private networks based on proprietary protocols. Only the members of the corporation with authorized access may log on and access the network and the data on the network. Like all networks, the Intranet is mainly used to share data, information, resources, company programs, software applications, as well as facilitate communication between people or work groups within the company. Intranet improves the data sharing capability and overall knowledge base of the company's employees.
- **Extranet:** Extranet is basically an internal network that can be accessed externally. The extranet can be thought as an extension of the company's intranet. People from outside the company can have a limited access to the company's internal network for business or education related purposes. The access may be granted to the organization's partners, vendors, suppliers, current and potential customers, etc. Extranet refers to an Intranet that is partially accessible to authorized outsiders. An Extranet provides various levels of accessibility to outsiders having a valid username and password. The Extra net requires security and privacy, so that the information on the network is not wrongly accessed or misused by external parties. In order to protect the network, the extranets can incorporate firewall server management, the issuance and use of digital certificates or similar means of user authentication, encryption of messages, and the use of virtual private networks (VPNs) that tunnel through the public network.

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CHAPTER-4

BUSINESS INFORMATION SYSTEM

Q.1 Differentiate between the following:

- (a) Data and Information
- (b) Role-based Access Control (RBAC) and Rules-based Access Control (RAC)
- (c) Explicit Knowledge and Tacit Knowledge
- (d) Information and Knowledge

Answer

(a) The differences between Data and Information are as follows:

| Data | Information |
|---|--|
| Data is raw and unorganized fact that needs to be processed. | When data is processed, organized, structured or presented in a given context so as to make it useful, it is called Information. |
| Data in itself is meaningless and is the lowest level of knowledge. | Information is the second level of knowledge. |
| Observations and recordings are done to obtain data. | Analysis of data is done to obtain information. |

(b) Role-based Access Control (RBAC): RBAC largely eliminates discretion when providing access to objects. Instead, administrators or automated systems place subjects into roles. Subjects receive only the rights and permissions assigned to those roles. RBAC uses a centrally administered set of controls to determine how subjects and objects interact. When an employee changes jobs, all previous access is removed, and the rights and permissions of the new role are assigned. RBAC enforces static constraints based on a user's role. It is the best system for an organization that has high turnover.

Rules-based Access Control (RAC):

RAC takes into account the data affected, the identity attempting to perform a task, and other triggers

governed by business rules. RAC uses specific rules that indicate what can and cannot happen between a subject and an object. A manager, for example, has the ability to approve his/her employees' hours worked. However, when s/he attempts to approve his/her own hours, a rule built

into the application compares the employee record and the user, sees they are the same, and temporarily removes approval privilege. It is not necessarily identity based.

(c) Explicit knowledge:

Explicit knowledge is that knowledge which can be formalized easily and as a consequence is easily available across the organization. Explicit knowledge is articulated, and represented as spoken words, written material and compiled data. This type of knowledge is codified, easy to document, transfer and reproduce. For example - Online tutorials, Policy and procedural manuals.

Tacit knowledge

Tacit knowledge, on the other hand, resides in a few often-in just one person and hasn't been captured by the organization or made available to others. Tacit knowledge is unarticulated and represented as intuition, perspective, beliefs, and values that individuals form based on their



experiences, It is personal, experimental and context- specific. It is difficult to document and communicate the tacit knowledge. For example - hand-on skills, special know-how, employee’s experiences.

(d) Differences between Information and Knowledge are given as follows:

| Information | Knowledge |
|--|---|
| Information is piecemeal, fragmented and particular. | Knowledge is structured, coherent, and often universal. |
| Information is timely, transitory, and may even be short-lived | Knowledge is of enduring significance |
| Information is a flow of messages. | Knowledge is a stock, largely resulting from the flow, in the sense that the “input” of information may affect the stock of knowledge by adding to it, restructuring it, or changing it in any way. |
| Information is acquired by being told. | Knowledge can be acquired by thinking. Thus, new knowledge can be acquired without new information being received. |

Q.2 Define the following:

- (a) Business Information System
- (b) Business Process
- (c) Knowledge Management
- (d) extensible Business Reporting Language (XBRL)
- (e) Online Analytical Processing (OLAP)

Answer

- (a) **Business Information System:** Business Information Systems may be defined as system integrating business functions and information modules for establishing effective communication channels which are useful for making timely and accurate decisions and in turn contribute to organizational productivity and competitiveness.
- (b) **Business Process:** A Business Process is a collection of related, structured activities or tasks that produce a specific service or product (serve a particular goal) for a specific organization.
- (c) **Knowledge Management:** Knowledge Management encompasses both the content and the process of creating the content. It refers both to what is known and how it came to be known.
- (d) **Extensible Business Reporting Language (XBRL):** XBRL is freely available international standards-based business reporting language developed by accountants for financial reporting.
- (e) **Online Analytical Processing (OLAP):** OLAP is a multi-dimensional analytical tool typically used in data mining, that gathers and process vast amounts of information into useful packets.

Q.3. What is an Information System? Discuss its components in detail.

Answer

Information System

- An Information System (IS) is a combination of people, hardware, software, communication devices, network and data resources that processes (can be storing, retrieving, transforming information) data and information for a specific purpose. The system needs inputs from user (key in instructions and commands, typing, scanning) which will then be processed (calculating, reporting) using technology

devices such as computers, and produce output (printing reports, displaying results) that will be sent to another user or other system via a network and a feedback method that controls the operation.

- In general, any specific Information System aims to support operations, management and decision-making.

Components of Information System

- The main aim and purpose of each Information System is to convert the data into information which is useful and meaningful. This process consists of four basic concepts:
- People, hardware, software, and data are four basic resources of information systems;
- Human resources consist of end users and IT specialists; hardware resources involve machines and media; software resources consist of programs and procedures; and data resources include data and knowledge base; and network resources include communications media and networks.
- A process is used to convert data into information for end users;
- Information processes consist of input, processing, output, storage, and control processes.
- All components of information systems are mutually connected and cannot exist individually. The output could be in terms of printouts, reports, graphics; Input can be data, information and instructions; Processing may involve calculations, programming and storing; Controls could be related to decision-making and the feedback.

Q.4. Discuss Transaction Processing System (TPS).

Answer

Transaction Processing System (TPS) may be defined as a type of information system that collects, stores, modifies and retrieves the day-to-day data transactions of an enterprise. Archetypal examples of such systems would be used in an Airline Reservation Systems, Railway reservation by IRCT, Banking Systems, or the Accounting System of roughly any outsized company. These are designed to process transactions virtually instantly to ensure that customer data is available to the processes that require it. Most of the Transaction Processing Systems include one or additional of the following attributes:

- **Access Control-TPS:** Most Transaction Processing Systems come with access control to put a ceiling on users to only those allowed to accomplish so. Access Control ensures that people who are not authorized to use the system are not permissible to influence or transform the transaction process.
- **Equivalence-TPS:** Transactions are processed in the similar format every time to ensure that full effectiveness is achieved. The TPS Interfaces are designed to get hold of identical data for each transaction, despite the consequences of the source.
- **High Volume Rapid Processing-TPS:** TPS is designed to process transactions in an immediate to make confident that the transaction data is available to other users or processes that entail it. The instantaneous processing of transactions is noteworthy to the success of certain industry such as banking.
- **Trustworthiness-TPS:** A TPS system is designed to be robust and trustworthy. The system is capable to process transactions very rapidly, yet at the same time, conduct several checks to make certain that the data integrity is preserved.

Q.5. Discuss Office Automation Systems (OAS) in brief.

Answer

- Office Automation System (OAS) is an amalgamation of hardware, software, and other resources used to smooth the progress of communication and augment efficiency. Office automation refers to the use of computer and software to digitally generate, collect, store, manipulates, and relay office information needed for accomplishing basic tasks and goals.



- In addition to capturing handwritten notes, it comprises of exchange of information; management of administrative documents; handling of numerical data; and meeting, planning and management of work schedules. Office Automation System takes into consideration the computer applications and other problem solving tool along with a database to transform input into output.
- Office Automation is a widespread appearance that includes an all-embracing variety of applications of computer, communication and information technologies in office surroundings.

Q.6. Discuss Knowledge Management System (KMS).**Answer**

- Knowledge Management Systems (KMS) refers to any kind of IT system that stores and retrieves knowledge, improves collaboration, locates knowledge sources, mines repositories for hidden knowledge, captures and uses knowledge, or in some other way enhances the knowledge management process.
- KMS treats the knowledge component of any organization's activities as an explicit concern reflected in strategy, policy, and practice at all levels of the organization.
- **Two broad categories of knowledge exist — Explicit and Tacit.**
- **Explicit Knowledge** is formalized, articulated and written whereas Tacit Knowledge resides in a few often-in-just one person and has not been captured by the organization.
- Knowledge base is a special kind of database for knowledge management. It is an information repository that provides a means for information to be collected, organized, shared, searched and utilized. It can be either machine-readable or intended for human use.
- A Knowledge Discovery in databases system is a value-added intranet with facilities to search and identify captured knowledge, or identify experts who have the knowledge. The system will also help us establish contact with the expert and have a dialogue with them. It will then capture and make available the transcripts of such discussions, whether they be on chat, e-mail or discussion forums.

Q.7. Discuss Management Information System (MIS).**Answer**

- **Management Information System (MIS)** refers to the data, equipment and computer programs that are used to develop information for managerial use. It is an integrated system which provides accurate, timely and meaningful data for management planning, analysis and control to optimize the growth of the organization. Management Information Systems provide decision-makers with preselected types of information. MIS is generally in the form of computer-generated reports and usually generated from data obtained from transaction processing systems.
- **Airline reservations** (seat, booking, payment, schedules, boarding list, special needs, etc.), Bank operations (deposit, transfer, withdrawal) electronically with a distinguish payment gateways, Integration of department with the help of contemporary software's like ERP, and Logistics management application to streamline the transportation system etc. are some of the examples of MIS.

Q.8. Discuss Decision Support Systems (DSS). Discuss its components in detail.**Answer**

- A Decision Support System (DSS) is a computer-based information system that supports business or organizational decision-making activities. DSSs serve the management, operations and planning levels of an organization (usually mid and higher management) and help to make decisions, which may be rapidly changing and not easily specified in advance. DSS can be either fully computerized, human or a combination of both.



- A properly designed DSS may be defined as an interactive software-based system intended to help decision makers compile useful information from raw data, documents, personal knowledge, and/or business models to identify and solve problems and make decisions.
- DSS are there to facilitate a manager in making operational decisions, but the ultimate burden of responsibility lies with the manager. Managers can sometimes be over-optimistic in their expectations of a DSS and develop a unrealistic reliance on the system.

DSS has four basic components^

- **The user:** The user is usually a manager with an unstructured or semi-structured problem to solve and maybe at management - level of an organization.
- **One or more databases:** Databases contain both routine and non-routine data from both internal and external sources.
- **Planning languages:** Planning languages can either be general-purpose or special- purpose allowing users to perform routine tasks and specific tasks respectively.
- **Model Base:** Model base is the brain of the DSS as it performs data manipulations and computations with the data provided to it by the user and the database. The planning language in DSS allows the user to maintain a dialogue with the model base.

Q.9 What do you understand by the term “Executive Information System (EIS)”. Discuss its components in detail.

Answer

- An Executive Information System (EIS) is the nature of Information System used by executives to access and administer the data they entail to make informed business decisions.
- The EIS in itself is not an instrument, but rather, an infrastructure within a company- It may be defined as just not as a piece of hardware or software, but an infrastructure that supplies to a firm’s executives the up-to-the-minute operational data, gathered and sifted from various databases.
- EIS links data from various sources both internal and external to provide the amount and kind of information executives find useful.
- These systems are designed for top management; easy to use; present information in condensed view; access organization’s databases and data external to the organization.
- The typical information mix presented to the executive may include financial information, work in process, inventory figures, sales figures, market trends, industry statistics, and market price of the firm’s shares.

Components of an EIS are as follows:

| Component | Description |
|-------------------|---|
| Hardware | Includes Input data-entry devices, CPU, Data Storage files and Output Devices. |
| Software | Includes Text base software, Database, and Graphic types such as time series charts, scatter diagrams, maps, motion graphics, sequence charts, and comparison-oriented graphs (i.e., bar charts) Model base. |
| User Interface | Includes hardware (physical) and software (logical) components by which people (users) interact with a machine. Several types of interfaces can be available to the EIS structure, such as scheduled reports, questions/answers, menu driven, command language, natural language, and input/output. |
| Telecommunication | Involves transmitting data from one place to another in a reliable |



| |
|-------------------|
| networked system. |
|-------------------|

Q.10. Discuss Customer Relationship Management (CRM).
Answer

- Customer Relationship Management (CRM) may be defined as a business process in which client relationships; customer loyalty and brand value are built through marketing strategies and activities.
- CRM allows businesses to develop long-term relationships with established and new customers while helping modernize corporate performance.
- CRM incorporates commercial and client-specific strategies via employee training, marketing planning, relationship building and advertising.
- The main objective is to retain as much loyal customers as one can. To accomplish with CRM, companies need to match products and campaigns to prospect elegantly the customer life cycle.
- CRM encompasses the function and responsibilities of those employees who directly work with customers.
- CRM establishes the benefits of generating customer loyalty, raising a market intelligence enterprise, and an integrated relationship.
- Preserving existing customers and providing enhanced services to accomplish the loyalty is expressed -as CRM. CRM applications smoothen the progress to capture, consolidate, analysis, and enterprise-wide dissemination of data from existing and potential customers.
- CRM can be considered as an amalgamation of people, process and systems rather than just IT application.

Q.11 What is Supply Chain Management (SCM)? Discuss its components.
Answer

- **Supply Chain Management (SCM)** is a chain that starts with customers and ends with customers. Supply Chain Management may be defined as the process of planning, implementing and controlling the operations of the supply chain with the purpose of satisfying the customer's requirement as efficiently as possible.
- Supply Chain spans all movement and storage of raw materials, work-in-process, inventory and finished goods from the point of origin to the point of consumption.

Components of SCM: The main elements of a supply chain are as follows:

- **Procurement/Purchasing** —It begins with the purchasing of parts, components, or services. Procurement must ensure that the right items are delivered in the exact quantities at the correct location on the specified time schedule at minimal cost. The key issue in procurement is how one goes about selecting and maintaining a supplier, which can be approached from two directions. The first concentrates on how a firm might evaluate a potential supplier whereas the second is how a firm evaluates those businesses that are already suppliers to an operation.
- **Operations** —The second major element of SCM is Operations. Having received raw materials, parts, components, assemblies, or services from suppliers, the firm must transform them and produce the products or the services that meet the needs of its consumers. It must conduct this transformation in an efficient and effective manner for the benefit of SCM system
- **Distribution** —The third element of the SCM system is distribution. Distribution involves several activities - transportation (logistics) of goods across the entire supply chain, warehousing, and CRM
- **Integration** - The last element of SCM is the need for integration. It is critical that all participants in the service chain recognize the entirety of the service chain. The impact of the failure to adopt a



system-wide perspective - that is, examining the totality of the chain can significantly increase costs and destroy value.

Q.12. What is HRMS? Discuss its key modules.

Answer

A Human Resource Management System (HRMS) is a software application that coalesce many human resources functions together with benefits like administration, payroll, recruiting and training, performance analysis and assessment into one parcel.

Key Modules of HRMS are as follows:

- **Workforce Management:** Integrated across the strategic Human Capital Management (HCM) solution; Workforce Management provides powerful tools to effectively manage labour rules, ensure compliance, and control labour costs and expenses.
- **Time and Attendance Management:** The time and attendance module gathers standardized time and work related efforts. The most advanced modules provide broad flexibility in data collection methods, labor distribution capabilities and data analysis features. Cost analysis and efficiency metrics are the primary functions.
- **Payroll Management:** This module of the system is designed to automate manual payroll functions and facilitate salary, deductions, calculations etc.; eliminates errors and free up HR staff for more productive tasks. Data is generally fed from the human resources and time keeping modules to calculate automatic deposit and manual cheque writing capabilities. This module can encompass all employee-related transactions as well as integrate with existing financial management systems.
- **Training Management:** Training programs can be entered with future dates which allow managers to track progress of employees through these programs, examine the results of courses taken and reschedule specific courses when needed. The module tracks the trainer or training organization; costs associated with training schedules, tracks training locations, required supplies and equipment and registered attendees.
- **Compensation Management:** Compensation Management is more than just the means to attract and retain talented employees. In today's competitive labor market, organizations need to fully leverage their human capital to sustain a competitive position. This requires integrating employee processes, information and programs with organizational processes and strategies to achieve optimal organizational results.
- **Recruitment Management:** This module helps in hiring the right people with the right target skills. This module includes processes for managing open positions/requisitions, applicant screening, assessments, selection and hiring, correspondence, reporting and cost analysis.
- **Personnel Management:** The personnel management module comprises of HR master- data, personnel administration, recruitment and salary administration.
- **Organizational Management:** Organizational Management module includes organizational structure, staffing schedules and job description.
- **Employee Self Service (ESS):** The Employee Self Service module allows employees to query HR related data and perform some Human Resource transactions over the system. For example - Employees may query their attendance record from the system without asking the information from HR personnel.
- **Analytics:** The Analytics module enables organizations to extend the value of an HRMS implementation by extracting HR related data for use with other business intelligence platforms. For



example, organizations combine HR metrics with other business data to identify trends and anomalies in head count in order to better predict the impact of employee turnover on future output.

Q.13. Discuss Core Banking System (CBS).**Answer**

- Core Banking System (CBS) may be defined as the set of basic software components that manage the services provided by a bank to its customers through its branches (branch network). The absolute bank's branches access applications from centralized data centers. All transactions budge through core systems, which, at an absolute minimum, must remain running and responsive during businesshours.
- Increasingly, these systems are running 24x7to support Internet banking, global operations, and real time transactions via ATM, Internet, phone, and debit card.
- The various elements of core banking include making and servicing loans; opening new accounts; processing cash deposits and withdrawals; processing payments and cheque; calculating interest; Customer Relationship Management (CRM) activities; managing customer accounts; establishing criteria for minimum balances, interest rates, number of withdrawals allowed and so on; establishing interest rates; and maintaining records for all the bank's transactions.
- Normal core banking functions include deposit accounts, loans, mortgages and payments. Banks make these services available across multiple channels like ATMs, Internet banking, and branches. Examples of major core banking products include Infosys' Finacle, Nucleus FinnOne and Oracle's Flexcube application (from their acquisition of Indian IT vendor i-flex).

Q.14. What do you understand by Accounting Information System (AIS)? Also discuss its key elements.**Answer**

- Accounting Information System (AIS) is defined as a system of collection, storage and processing of financial and accounting data that is used by decision makers.
- An AIS is generally a computer-based method for tracking accounting activity in conjunction with information technology resources. The resulting statistical reports can be used internally by management or externally by other interested parties including investors, creditors and tax authorities. Accounting information system takes into consideration different aspects, which are composed of smaller subsystems, which help an organization in achieving its goal.
- The different sub components in AIS include Budgeting and Planning, Expenses Management, RevenueManagement, Cash and Treasury Management, Accounting software, Electronic Banking, Activity-based Management, Payroll etc.
- The key elements that compose the typical Accounting Information System are as follows:
 - (a) **People** : AIS helps various system users that include accountants, consultants, business analysts, managers, chief financial officers and auditors etc. from different departments within a company to work together. With well-designed AIS, everyone within an organization who is authorized to do so can access the same system and get the same information. AIS also simplify getting information to people outside of the organization when necessary.
 - (b) **Procedure and Instructions**: These include both manual and automated methods for collecting, storing, retrieving and processing data.
 - (c) **Data**: It refers to the information pertinent to the organization's business practices that may include sales orders, customer billing statements, sales analysis reports, purchase requisitions, vendor invoices, check registers, general ledger, inventory data, payroll information, timekeeping, tax information etc. This data can then be used to prepare accounting statements



and reports such as accounts receivable aging, depreciation/amortization schedules, trial balance, profit and loss, and so on.

- (d) **Software:** These are the computer programs that provide quality, reliability and security to the company's financial data that may be stored, retrieved, processed and analyzed. Managers rely on the information it outputs to make decisions for the company, and they need high-quality information to make sound decisions. Information Technology Infrastructure: This include hardware such as personal computers, servers, printers, surge protectors, routers, storage media, and possibly a backup power supply used to operate the system. The hardware selected for AIS must be compatible with the intended software.
- (e) **Internal Controls:** These are the security measures such as passwords or as complex as biometric identification to protect sensitive data against unauthorized computer access and to limit access to authorized users. Internal controls also protect against computer viruses, hackers and other internal and external threats to network security.

Q.15. Write a short note on Artificial Intelligence.

Answer

- Artificial Intelligence (AI) is the vicinity of computer science focusing on creating machines that can fit into place on behaviors that humans regard as intelligent. It is a research field that studies how to comprehend the intelligent human behaviors on a computer. The decisive objective of AI is to make a computer that can discover, sketch, and crack problems in parallel.
- The subject of artificial intelligence spans a wide horizon dealing with various kinds of knowledge representation schemes, different techniques of intelligent search, various methods for resolving uncertainty of data and knowledge, different schemes for automated machine learning and many others. Expert systems, Pattern Recognition, Natural language processing, and many others are some of the various purposes on which AI may be applied.

Q.16. What are the possible ways to make payments electronically?

Answer

Major types of Electronic Payments are as follows:

- **Credit Cards:** In a credit card transaction, the steps involved are authorization, batching, clearing and funding. The consumer presents preliminary proof of his ability to pay by presenting his credit card number to the merchant. The merchant can verify this with the bank, and create a purchase slip for the consumer to endorse. The merchant then uses this purchase slip to collect funds from the bank, and, on the next billing cycle, the consumer receives a statement from the bank with a record of the transaction.
- **Electronic Cheque:** Credit card payments are popular for commerce on the Internet. However, FSTC and Cyber Cash are two systems that let consumers use electronic cheques to pay Web merchants directly. Financial Services Technology Corporation (FSTC) is a consortium of banks and clearing houses that has designed an electronic cheque that is initiated electronically, and uses a digital signature for signing and endorsing. By CyberCash, electronic cheque functions as a message to the sender's bank to transfer funds, and, like a paper cheque, the message is given initially to the receiver who, in turn, endorses the cheque and presents it to the bank to obtain funds.
- **Smart Cards:** Smart cards are any pocket sized card with embedded integrated circuits. Smart cards can provide identification authentications, data storage and application processing. Smart cards may serve as a credit or ATM cards, Fuel cards, mobile phone SIMs, access-control cards, public transport



or public phone payment cards etc. on the card. Contact cards, Contactless cards and Combi/Hybrid Cards are the three types of Smart Cards.

- **Electronic Purses:** Electronic Purse Card is very similar to a pre-paid card. Bank issues a stored value card to its customer, the customer can then transfer value from his/her account to the card at an ATM, a personal computer, or a specially equipped telephone. While making purchases, customers pass their cards through a vendor's Point of Sale terminal. Validation is done through a Personal Identification Number (PIN Number). Once the transaction is complete, funds are deducted directly from the cards and transferred to the vendor's terminal. When the value on a card is spent, consumers can load additional funds from their accounts to the card.

Q.17. What is an Expert System? Discuss its key components.

Answer

An Expert System (ES) is a computerized information system that allows non-experts to make decisions comparable to those of an expert. The aim of the expert system is to have a team of seasoned specialists holding industry-wide experience who further spread across implementations like in Defense, Government, Finance, Telecom, and Engineering sectors.

Components of an Expert System are as follows:

- **Knowledge Base:** This includes the data, knowledge, relationships, rules of thumb (heuristics), and decision trees used by experts to solve a particular problem. A knowledge base is the computer equivalent of all the knowledge and insight that an expert or group of experts develop through years of experience in their field. The knowledge base of expert system encloses both realistic and heuristic knowledge. Realistic knowledge is that knowledge of the job domain that is extensively shared, characteristically found in textbooks or journals whereas heuristic knowledge is the fewer rigorous, extra empirical, supplementary judgmental knowledge of performance.
- **Database of Facts:** This holds the user's input about the current problem. The user may begin by entering as much as they know about the problem or the inference engine may prompt for details or ask whether certain conditions exist. Gradually a database of facts is built up which the inference engine uses to come to a decision. The quality and quantity of data gained from the user influences the reliability of the decision.
- **Inference Engine:** This program contains the logic and reasoning mechanisms that simulate the expert logic process and deliver advice. It uses data obtained from both the knowledge base and the user to make associations and inferences, form its conclusions, and recommend a course of action.
- **Explanation facility:** This facility provides the user with an explanation of the logic the Expert System used to arrive at its conclusion.
- **User Interface:** This program allows the user to design, create, update, use and communicate with the expert system.

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CHAPTER-5

BUSINESS PROCESS AUTOMATION THROUGH APPLICATION SOFTWARE

Q.1. What are the objectives of Business Process Automation (BPA)?

Answer

The success of any business process automation shall only be achieved when BPA ensures:

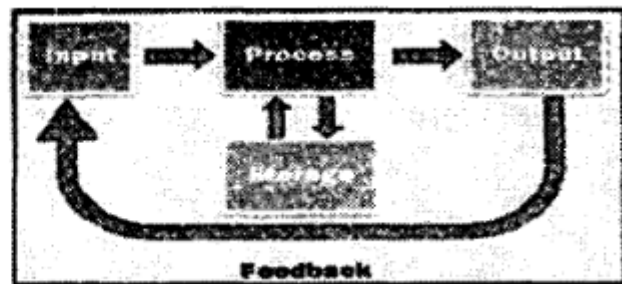
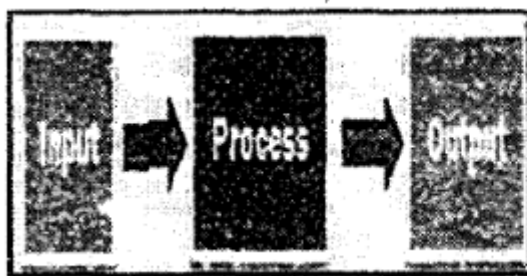
- **Confidentiality:** To ensure that data is only available to persons who have right to see the same;
- **Integrity:** To ensure that no un-authorized amendments can be made in the data;
- **Availability:** To ensure that data is available when asked for; and
- **Timeliness:** To ensure that data is made available in at the right time.

To ensure that all the above parameters are met, BPA needs to have appropriate internal controls put in place.

Q.2. Differentiate between Manual Information Processing Cycle and Computerized information Processing Cycle.

Answer

| Manual Information Processing Cycle | Computerized Information Processing. Cycle |
|--|---|
| Systems where the level of manual intervention is of very high. For example- Evaluation of exam papers, teaching and operations in operation theatres. | Systems where computers are used at every stage transaction processing and human intervention is minimal. |
| Include following components: | Include following components: |
| Input: Put details in register. | Input: Entering data into the computer; |
| Process: Summarize the information; and | Process: Performing operations on the data; |
| Output: Present information to management in the form of reports. | Storage: Saving data, programs, or output for future use; and And |
| | Output: Presenting the results. |



Q.3. What are the major control objectives in Business Process Automation (BPA)?

Answer

Control is defined as policies, procedures, practices and organization structure that are designed to provide reasonable assurance that business objectives are achieved and undesired events are prevented or detected and corrected. Major control objectives are given as follows:

- **Authorization** — ensures that all transactions are approved by responsible personnel in accordance with their specific or general authority before the transaction is recorded.



- **Completeness** — ensures that no valid transactions have been omitted from accounting records.
- **Accuracy** — ensures that all valid transactions are accurate, consistent with the originating transaction data, and information is recorded in a timely manner.
- **Validity** — ensures that all recorded transactions fairly represent the economic events that actually occurred, are lawful in nature, and have been executed in accordance with management's general authorization.
- **Segregation of Duties** — ensures that duties are assigned to individual in a manner that ensures that no one individual can control both the recording function and the procedures relative to processing a transaction.
- **Physical Safeguards and security-** Ensures that access to physical assets and information systems are controlled and properly restricted to authorized personnel
- **Error Handling-** ensures that errors detected at any stage of processing receiving prompts corrective actions and are reported to the appropriate level of management.

Q.4. What are the characteristics of Cloud Computing?

Answer

The following is a list of some of the characteristics of a cloud-computing environment:

Elasticity and Scalability: Cloud computing gives us the ability to expand and reduce resources according to the specific service requirement. For example, we may need a large number of server resources for the duration of a specific task. We can then release these server resources after we complete our task. Pay-per-Use: We pay for cloud services only when we use them, either for the short term or for a longer duration.

On-demand: Because we invoke cloud services only when we need them, they are not permanent parts of the IT infrastructure. With cloud services, there is no need to have dedicated resources waiting to be used, as is the case with internal services.

Resiliency: The resiliency of a cloud service offering can completely isolate the failure of server and storage resources from cloud users. Work is migrated to a different physical resource in the cloud with or without user awareness and intervention.

Multi Tenancy: Public cloud service providers often can host the cloud services for multiple users within the same infrastructure. Server and storage isolation may be physical or virtual depending upon the specific user requirements.

Workload Movement: This characteristic is related to resiliency and cost considerations. Cloud-computing providers can migrate work loads across servers both inside the data center and across data centers (even in a different geographic area).

Q.5. Discuss advantages and disadvantages of Cloud Computing.

Answer

Advantages of Cloud Computing: It is a cost efficient method to use, maintain and upgrade with almost unlimited storage. It provides an easy access to information and is usually competent enough to handle recovery of information. In the cloud, software integration occurs automatically and the entire system can be fully functional in a matter of a few minutes.

Disadvantages of Cloud Computing: This technology is always prone to outages and other technical issues and surrendering all the company's sensitive information to a third-party cloud service provider makes the company vulnerable to external hack attacks and threats.

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RTP-I**SECTION A- INFORMATION TECHNOLOGY****1. Define the following terms briefly:**

- (a) Cache Memory
- (b) Six Sigma
- (c) Virtual Memory
- (d) Firewall
- (e) Multiplexer
- (f) .Operating System
- (g) Business Information System
- (h) Process (from a business perspective)
- (i) Expert System
- (j) Identification Cards

2. Differentiate between the following:

- (a) Client-Server Network and Peer-to-Peer Network
- (b) Ring Network and Star Network
- (c) Asynchronous and Synchronous Data Transmission
- (d) Data Store and Data Flow in Data Flow Diagrams
- (e) Manual Information Processing Cycle and Computerized Information Processing Cycle
- (f) Tacit Knowledge and Explicit Knowledge
- (g) Hardware Encryption and Software Encryption
- (h) Information and Knowledge
- (i) Complex Instruction Set Computer (CISC) and Reduced Instruction Set Computer(RISC)
- (j) Infrastructure as a Service (IaaS) and Software as a Service (SaaS)

3. Write short note on the following:

- (a) Bluetooth
- (b) TCP/IP
- (c) Decision Table
- (d) Mesh Topology
- (e) Artificial Intelligence
- (f) Mobile Commerce
- (g) Grid Computing
- (h) SmartPhone
- (i) Micro Architecture
- (j) Value Chain Automation

Accounts BPM

4. Discuss the different cycles of an Account Business Process Management.

Controls in BPA

5. Define Controls and discuss their objectives and importance in Business Process Automation.

Internetwork Processors

6. What do you understand by Internetwork Processors? Discuss some of them, in brief.

Information Systems

7. What do you understand by the term "Information System"? Discuss its components.



Business Intelligence

8. Discuss Business Intelligence and its tools.

Business Process Automation

9. Discuss the steps involved in implementing Business Process Automation.

Information System Life Cycle

10. Discuss Information System Life Cycle in detail.

Database Management System

11. What do you understand by the term Database Management System? Discuss its advantages and disadvantages.

Telecommunication Media

12. What is Transmission Media? Discuss its various types.

Network Threats

13. Define Threat. What are various threats to a computer network's security?

Cloud Computing

14. Define Cloud Computing. What are the different types of clouds in a Cloud Computing Environment?

Mapping Systems

15. Draw an E-R Diagram based on the following facts:

- (a) A bank records information about its customers and their accounts. A specific account can have many owners (customers), and a specific customer can own and have only one account at most. Information about customers includes their social security number, phone number, name and address. Information about accounts includes account number, type, and balance. Further, every customer can

(b) Analyze the completeness of the following reduced decision table:

| | Table X | R1 | R2 | R3 | R4 | R5 |
|----|----------------|-----------|-----------|-----------|-----------|-----------|
| C1 | Condition A | Y | N | N | N | N |
| C2 | Condition B | Y | Y | N | N | N |
| C3 | Condition C | - | N | - | Y | N |
| C4 | Condition D | - | - | N | N | |
| A1 | Action 1 | X | X | X | | |
| A2 | Action 2 | | X | | | X |

(c) An electric supply company charges the following rates for its domestic consumers:

| No. of units consumed | Charges/perunit(Rs.) |
|--------------------------------|-----------------------------|
| For the first 200 units | 1.60 |
| For the next 300 units | 2.10 |
| Over 500 units | 3.90 |

Surcharge @ 20% of the bill is to be added to the charges.

Draw a Flow chart for the above, which will read the consumer number and the number of units consumed and print out the total charges with the consumer number and the units consumed.

RTP-II

SECTION-A: INFORMATION TECHNOLOGY

1. Define the following terms briefly:

- (a) Mobile Hardware



- (b) Total Quality Management (TQM)
- (c) Primary Memory
- (d) Intrusion Detection System (IDS)
- (e) Switch
- (f) Computer Network
- (g) Information System
- (h) Knowledge-Level Systems
- (i) Cryptography
- (j) Segregation of Duties.

1. Differentiate between the following:

- (a) Public Data Network and Private Data Network
- (b) Parallel Data Transmission and Serial Data Transmission
- (c) Thick Client; and Thin Client
- (d) Software as a Service (SaaS) and Platform as a Service (PaaS) in Cloud Computing
- (e) Hardware Resources and Software Resources
- (f) Broadcast Networks and Switched Networks
- (g) Consumer-to-Business (C2B) e-Commerce and Consumer-to-Consumer (C2C) e-Commerce
- (h) Strategic-Level Systems and Operational-Level Systems
- (i) Private Cloud and Hybrid Cloud in Cloud Computing
- (j) Role-based Access Control (RBAC) and Rules-based Access Control (RAC)

2. Write short note on the following:

- (a) TouchPad
- (b) Protocols
- (c) Data Flow Diagram
- (d) Star Network
- (e) Business Intelligence
- (f) Intranet
- (g) Network Virtualization
- (h) Flowchart
- (i) Instruction Set Architecture
- (j) Business Process Automation (BPA)

Business Process Management Life Cycle

3. Discuss different phases of Business Process Management (BPM) Life Cycle.

Input Controls in BPA

4. Discuss Input Controls and their categories in Business Process Automation.

OSI Model

5. Discuss OSI model in detail.

Supply Chain Management

6. Discuss Supply Chain Management (SCM) and its components.

Business Process Automation

7. What are the benefits of pursuing Business Process Automation (BPA)?

Operating System

8. Discuss Operating System and various activities performed by it?

Executive Information Systems



9. Discuss Executive Information System (EIS) and its components.

Relational Database Model

10. Discuss Relational Database Model.

Switched Networks

11. Discuss various switching techniques in telecommunication networks.

Network Vulnerabilities

12. Define Vulnerability in a Network. What are the factors responsible for the occurrence of Vulnerabilities?

Cloud Computing

13. Discuss advantages and disadvantages of Cloud Computing

Mapping Systems

14. Discuss different types of relationships in an E-R Diagram.
15. Discuss advantages and limitations of using Data Flow Diagram.
16. Discuss Decision Table in brief.

**TEST PAPER 1 (NOV.14)****SECTION A- INFORMATION TECHNOLOGY**

1. Answer all the following questions in brief:
 - (a) Differentiate between flow chart and data flow diagram.
 - (b) What is Bluetooth? Name any two devices that utilize Bluetooth technology.
 - (c) Define Virtual Private Networks (VPN).
 - (d) What is the difference between electronic cheque and paper cheque?
 - (e) What are the objectives of Business Process Automation?
2.
 - (a) What are the various key factors to be considered in implementing Business Process Management (BPM) in an enterprise?
 - (b) What are the major reasons for failure of Business Process Management Systems?
3.
 - (a) What is cloud computing? Describe any three types of clouds in cloud computing environment.
 - (b) What is mobile computing? What are the three major concerns related to mobile computing?
4.
 - (a) What is bus topology? List its two advantages and disadvantages.
 - (b) What do you mean by threat and vulnerability? Explain any three facts responsible for occurrence of vulnerabilities in the software.
5.
 - (a) Briefly explain the two main approaches to establish access controls in Software Systems.
 - (b) Explain the different components of Decision Support Systems.
6.
 - (a) List out different types of delivery channels through which information is delivered to the user.
 - (b) Briefly explain Grid Computing. What are possible reasons of using grid computing?
7. Write short notes on any four of the following:
 - (a) Hardware Virtualization
 - (b) Total Quality Management(TQM)
 - (c) HTTPS
 - (d) extensible Business Reporting Language
 - (e) Software as a service(SaaS)

**TEST PAPER 2(MAY-15)****SECTION A- INFORMATION TECHNOLOGY**

1. Answer all the following question in brief:
 - (a) What are the key benefits of Business Process Automation (BPA)?
 - (b) How extranets are used by Business Organization?
 - (c) Name the various phases of System Development Life Cycle (SDLC) in the logically correct order.
 - (d) Briefly explain three tiers in architecture.
 - (e) What are the components of the Computerized Information Processing Cycle?
2. ABC Limited is a software development company which appointed 50 software engineers in August 2014 at a monthly salary of Rs.30,000. All these engineers shall be entitled for an increment in their monthly salary after six month .The increment on present monthly salary shall be based on their performance to be evaluated on a 100 marks scale as per details given below:
 - Performance Marks < 70 then increment shall be 10% of present salary.
 - 70<performance marks <80, then increment shall be 20%of present salary
 - Performance -Marks >80, then increment shall be 20% of present salary.Draw a Flow —Chart to enable to print the details like name of the engineer, Performance marks, monthly increment amount and revised monthly salary for each of these 50 engineers.
3.
 - (a) Describe the following service models of cloud computing.
 - i. Network as a service(NaaS)
 - ii. Platform as a service (PaaS)
 - (b) What is server? Briefly explain any four types of servers based on the nature of service they provide What is server ?Briefly explain any four types of servers based on the nature of service they provide.
4.
 - (a) Which network topology can be used in case of Military Installations with a very small number of nodes and why it should be used? List advantages and disadvantages of such network topology.
 - (b) What is Accounting Information System (AIS)? Briefly describe the key component of AIS.
5.
 - (a) Difference between Explicit Knowledge and Tacit Knowledge.
 - (b) Explain the pre-requisites of ACID Test for any Transaction Processing System.(TPS)
6.
 - (a) Discuss any four key characteristics of Cloud computing.
 - (b) What are the major process control, which should be enforced through front end application system, to have consistency in the control process
7. Write short note on any four of the following:
 - (a) Radical Redesign
 - (b) Android
 - (c) Peer —to-Peer Networks(P2P)
 - (d) Electronic Purses
 - (e) Network Virtualization

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