SBAA3018-INFORMATION MANAGEMENT

COURSE OBJECTIVES

- To understand the importance of information in business.
- To know the technologies and methods used for effective decision making.
- To understand the security control system and ethics in IT.

UNIT 1 INTRODUCTION

Data, Information, Intelligence, Information Technology, Information System, evolution, types hierarchy, System development methodologies, Functional Information Systems, DSS, EIS, Information System.

UNIT 2 SYSTEM ANALYSIS AND DESIGN **9 Hrs.**

System flow chart, Decision table, Data flow Diagram (DFD), Entity Relationship (ER), Object Oriented Analysis and Design (OOAD), UML diagram.

UNIT 3 DATABASE MANAGEMENT SYSTEMS

DBMS - HDBMS, NDBMS, RDBMS, OODBMS, Query Processing,
Data Mart.

UNIT 4 SECURITY CONTROL AND REPORTING **9 Hrs.**

Security, Testing, Error detection, Controls, IS Vulnerability, Disaster Management, Computer Crimes, Securing the Web, Intranets and Wireless Networks, Software Audit, Ethics in IT, User Interface and reporting.

UNIT 5 NEW IT INITIATIVES

Role of information management in
Computing, Cloud computing, CMM.

COURSE OUTCOMES

On completion of the course, student will be able to

CO1 - Understand the importance of information in business.
CO2 - Gains knowledge on effective applications of information systems in business.
CO3 - Describe about the system analysis and design.
CO4 - Manage the database management system.
CO5 - Develop the security control to protect the system.
CO6 - Know the role of information management in e-business, ERP and business intelligence.

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SCHOOL OF MANAGEMENT STUDIES

UNIT – I – INFORMATION MANAGEMENT – SBAA3018

UNIT 1 INTRODUCTION

Data, Information, Intelligence, Information Technology, Information System, Evolution, Types based on functions and Hierarchy, System Development Methodologies, Functional Information Systems, DSS, EIS, KMS, GIS, International Information System.

Data:

Data are facts that are not currently being used for decision making purpose. **For example,** payroll records, data on accounts receivable, personnel data etc.

"Data refers to a collection of facts usually collected as the result of experience, observation or experiment, or processes within a computer system, or a set of premises."

Data may consist of numbers, words, or images, particularly as measurements or observations of a set of variables. Data is often viewed as a lowest level of abstraction from which information and knowledge are derived.

According to Ackoff, "Data are symbols that represent properties of objects, events and their environments. They are products of observation. To observe is to sense. The technology of sensing instrumentation is, of course, to be highly developed."

Information

It is data that has been given meaning by way of relational connection. This "meaning" can be useful, but does not have to be. In computer parlance, a relational database makes information from the data stored within it.

Information is derived from data and useful in solving problems. Information, therefore is a potential function of data.

Once the data have been sifted through and organized so as to be relevant to the context of the decision at hand, the data can be called information.

Important points regarding information

Organized form of data
Data with context
Data with relationships
Pies of knowledge that can be codified and stored
Physical representation of knowledge
Pooling of bits of knowledge
Communication or reception of knowledge
Action of informing

Characteristics of Information

1. Timeliness
2. Accuracy
3. Frequency
4. Relevant
6. Appropriateness
7. Conciseness
8. Understandability
9. Complete

5. Current
10. Economical

Difference between Data and Information

Data	Information
Facts, statistics used for reference or analysis	Knowledge derived from study, experience and statistics
Numbers, characters, symbols, images etc., which can be processed by a computer	Communication of intelligence derived from processed output of computer
Data must be interpreted, by a human or machine, to derive meaning	Information is any kind of knowledge that is exchangeable amongst people
Latin datum meaning 'that which is given'. Data plural, datum singular	Information is a scientific term and is generally used in plural senses
Data is unprocessed facts and figures	Processed data is called information which is meaningful

Intelligence:

The concept of 'intelligence' is relatively new, unknown a century ago, though it comes from older Latin roots

– *inter*= between, within + *legere* =to bring together, gather, pick out, choose, catch up, catch with the eye, read; *intellegere* = to see into, perceive, understand

Francis Galton revived the term in the late 19th century, arguing for its innateness

You can take your pick of definitions but most agree that intelligence has to do with the related capacities of:

i.) Learning from experience
ii.) Adapting to ones environment

Think of a person lacking either of these, and you pick out people who seem to lack intelligence

Note however that very few formal tests of intelligence really demand subjects to do either of these!

Aristotle stated that man differs from animals by intellect alone--there was no concept of individual differences--and intellect was noted by man's ability to speak. Therefore if an individual was unable to speak then s/he was no different than an animal.

It is where the collection and use of information come together. The transformation of information to intelligence requires the drawing of inferences as to how the information relates to the specific issue or decision. It is critical that the inferences are apparent (visible), understood, and shared by those who will eventually use the intelligence.

Intelligence is related to the possession and creation of knowledge and characterizes an adaptive behavior.

Intelligence is a way of manipulating information and knowledge to get certain things done, one of which is the acquiring of more information and knowledge

Knowledge

Knowledge is the facts, feelings or experiences known by a person or a group of people. It is considered to be present in ideas, judgment, root causes, relationships, perspectives and concepts. Knowledge is the result of learning and is stored in an individual brain or encoded in documents, product, facilities and concepts. It is gained from the certitude that comes from experience, a logical argument, or a preponderance of evidence. Knowledge knows what works and how it works.

Understanding

It is cognitive and analytical. It is the process by which I can take knowledge and synthesize new knowledge from the previously held knowledge. The difference between understanding and knowledge is the difference between "learning" and "memorizing". People who have understanding can undertake useful actions because they can synthesize new knowledge, or in some cases, at least new information, from what is previously known (and understood). That is, understanding can build upon currently held information, knowledge and understanding itself. In computer parlance, AI systems possess understanding in the sense that they are able to synthesize new knowledge from previously stored information and knowledge.

Wisdom

Wisdom is an extrapolative and non-deterministic, non-probabilistic process. It calls upon all the previous levels of consciousness, and specifically upon special types of human programming (moral, ethical codes, etc.). It beckons to give us understanding about which there has previously been no understanding, and in doing so, goes far beyond understanding itself. It is the essence of philosophical probing. Unlike the previous four levels, it asks questions to which there is no (easily-achievable) answer, and in some cases, to which there can be no humanly-known answers period. Wisdom is therefore, the process by which we also discern, or judge, between right and wrong, good and bad.

Relationship between Data, Information, Knowledge and Intelligence

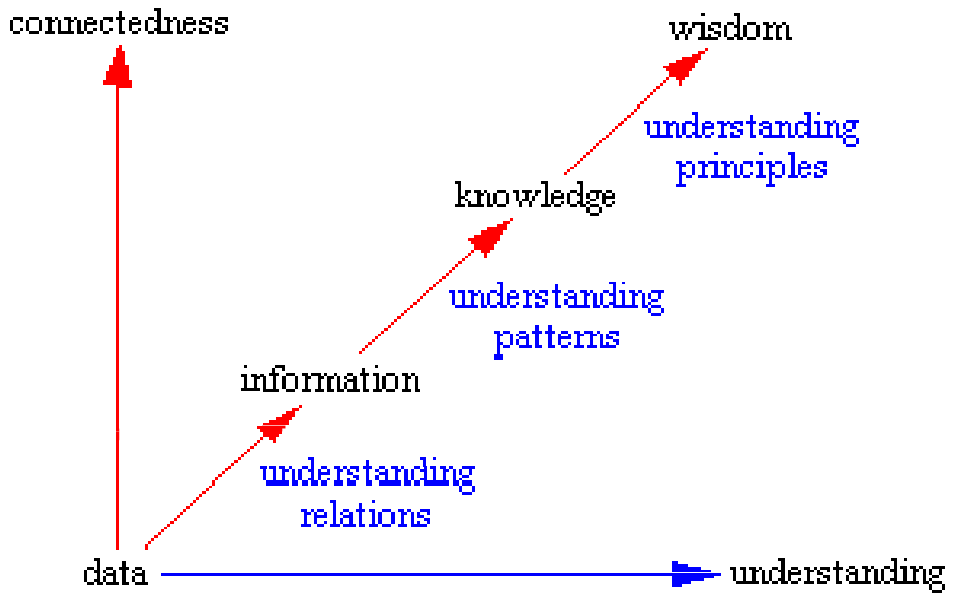

Fig.01

According to Russell Ackoff, a systems theorist and professor of organizational change, the content of the human mind can be classified into five categories:

1. **Data**: symbols
2. **Information**: data that are processed to be useful; provides answers to "who", "what", "where", and "when" questions
3. **Knowledge**: application of data and information; answers "how" questions
4. **Understanding**: appreciation of "why"
5. **Wisdom**: evaluated understanding.

Information Technology

Everyone is using Information Technology knowingly or unknowingly. It is growing rapidly. It covers many different and distinct fields like movies, wireless phones or internet. IT is used everywhere in any field.

User can use IT, for creating multimedia in Business or for creating different magazine or websites. It not only helps the organization or to the societies but it is finding helpful to the individual persons. In past days, everything is manual processing for mailing system; preparing reports were carried without electronic machine.

Definition: “IT enhances our local economy. It helps to solving social issue and to develop community relationship. Use of IT tools is equitable and affordable”.

Information technology is a system that process for required output. IT can be described as a set of elements connect together for retrieving, processing and

outputting data in the appropriate format for the purpose of common objective.

Information technology is a concept. It is not a hardware part or a device. It is a technology that helps to process information. The information system which is used to help to build information technology is called information system. Information system is a collection of hardware and software. It helps to perform different function.

Components of IT

- People
- Hardware
- Software
- Data
- Network

Advantages of IT

1. Globalization
2. Cost effectiveness
3. All time
4. Communication
5. Bridging cultural gap
6. Creation of new jobs

Disadvantages of IT

- Unemployment
- Privacy and safety issues
- Lack of job security
- Dominant culture
- Literary
- Backup
- Affect human relationship

Applications of IT

1. Education
   - Access to variety of learning resources
   - Any time learning
   - Collaborative learning
2. Business and Industry
   - Customer relations
   - Business operations
   - Industrial productivity
   - Business mobility
3. Entertainment
   - Games,
   - Music and videos,
   - Animated movies,
   - CDMA or GPRS etc.
4. Medicine
   - Magnetic resonance imaging (MRI)
   - Computerized axial tomography (CAT)
   - Robotic surgery etc.

Challenges of IT

- Challenge of globalization
- Challenge of insularity
- Challenge of privary
- Challenges of ethics

Information System (IS)

IS is a set of people, procedures and resources that collects, transforms, and disseminates information in an organization

"An information system (IS) can be any organized combination of people, hardware, software, communications networks, and data resources that stores and retrieves, transforms, and disseminate information in an organization".

Information systems are implemented within an organization for the purpose of improving the effectiveness and efficiency of that organization.

Evolution of Management Information System

Decade	Information Systems	Characteristic of Information systems
1951-60	Electronic Data processing	• Collecting, manipulating, storing of data • No scope for decision making
1961-70	Management Information System	• Pervasive in all level of the management decisions. • Solution for structured decisions.
1971-80	Decision Support System Expert System	• Analytical models for semi-structured decisions
1981 and above	Artificial Intelligence. Executive Information System.	• Solution for unstructured decision making through advanced graphics.
1985 and above	Knowledge Management System, End User Computing	• Intelligence workstation for knowledge work which involves thinking, processing information and formulating analyses recommendations and procedures.

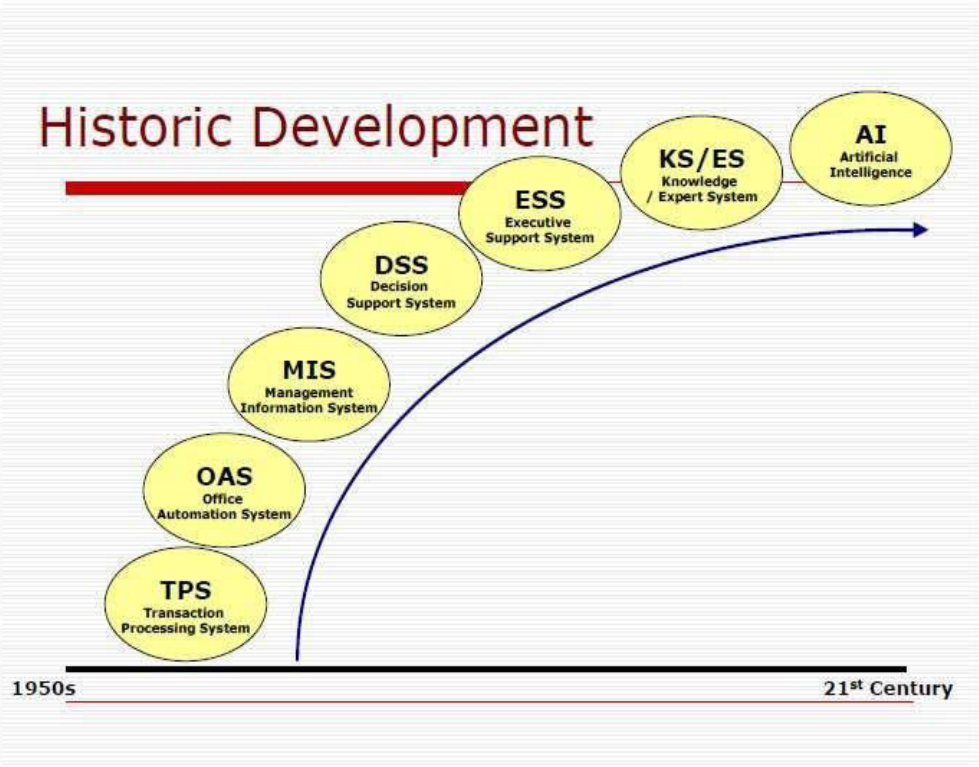

Fig.02

Types of Information Systems:

- Information system based on functions
- Information system based on management hierarchy

Information systems based on functions

- Manufacturing
- Accounting
- Finance
- Marketing
- Sales
- Human resource

Information systems based on functions

- Executive information systems
- Decision support systems
- Management information systems
- Transaction processing system

IS Activities

- Input
- Process
- Output
- Storage
- Control

Capabilities of information systems

- Provide fast and accurate transaction processing
- Provide large capacity, fast access storage
- Provide fast communication
- Reduce information overload
- Span boundaries
- Provide support for decision making
- Provide a competitive weapon

System Development Methodologies

A methodology is a system of methods, or a body of methods, rules and postulates used by a discipline. So, a systems methodology is a body of methods, rules and postulates used by a system practitioners to investigate, understand and address systems, their issues, problems, behaviors and contexts, and – where appropriate – to moderate, modify, or otherwise address and solve, resolve, or dissolve issues and problems.

Objectives of system methodology

- It shows how the system should be working
- It examines how various components work together to produce a particular outcome
- It shows the processes as part of a larger system
- It reveals data collection needs
- It can be helpful in monitoring performance

System Development:

Systems development has two major components:

- System Analysis and
- Systems Design

System Analysis: It is the process of gathering and interpreting facts, diagnosing problems, and using the information to recommend improvements to the system.

System Design: It is the process of planning a new business system or complement an existing system.

Analysis specifies "what" the system should do, that is it sets the objective and Design states "how" to accomplish this objective.

Systems Development Life Cycle (SDLC)

The Systems development life cycle is a sequence of events carried out by analysts, designers and users to develop and implement an information system. These activities are carried out in different stages.

Phases of SDLC:

1. Preliminary investigation / Feasibility Study
2. Determination of Systems requirements
3. Design of the system
4. Development of software
5. Systems testing
6. Systems implementation
7. Systems Maintenance

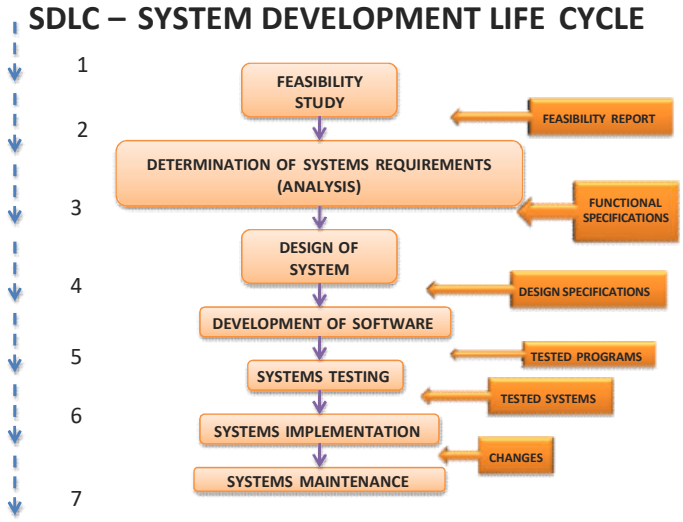

Fig.03

1. Preliminary Investigation

One must know what the problem is before it can be solved. An important outcome of the preliminary investigation is determining whether the system requested is feasible or not.

The major purposes of this study are:

- Identify the responsible users and develop an initial scope of the system
- Identify current deficiencies in the user's environment
- Determine objectives for the new system

- Determine whether it is feasible to automate the system and, if so, suggest some acceptable options

The three major areas to consider while determining the feasibility are:

a) Technical Feasibility: The analyst must find out whether current technical resources which are available in the organization is capable of handling the user's requirements. If not, then the analyst with the help of vendors should confirm whether the technology is available and capable of meeting the user's request.

b) Economic Feasibility:

- Management time
- Time spent by the systems analysis team
- Cost of doing the full systems study
- Estimated cost of hardware
- Estimated cost of software and / or software development

c) Operational Feasibility:

- Operational feasibility is dependent upon determining human resources for the project
- If the ultimate users are virtually wedded to the present system and they see no problem and if they are not involved in requesting for a new system, then resistance to its operation will be strong.
- Alternatively, if users themselves have expressed a need for an improved system, then they will put in all efforts to see that it becomes operational, and will eventually use it.

2. Determination of Requirements (Analysis)

This activity may be carried out in two phases:

a. Detailed Investigation:
   - What is being done by the current system?
   - How it is being done?
   - How frequently does it occur?
   - How bit is the volume of transactions or decisions?
   - How well is the task is being performed?
   - Does a problem exist? If so, How serious it is?

b. Analysis or Determination of System Requirement:
   - Inputs must be received by the system
   - Output must be produced by the system
   - Data to be retained
   - The procedures to get the output from the given input
   - Audit & control requirements
   - System Acceptance Criteria

3. Design of the System

The Design process should take care of the following:

- Identification of reports and outputs
- Scrutinize the data present on each report/output
- Sketch the form as expected to appear at the end of completion of the system
- Description of data to be input calculated/stored
- Individual data items and calculation procedures

4. Development of Software

In this stage, the actual coding/writing of the programs is done. In some firms, separate groups of programmers do the programming whereas other firms employ analyst-programmers who do analysis and design as well as code programs. Programmers are also responsible for documenting the program including comments that explain both how and why a certain procedure was coded in a specific way.

5. Systems Testing

- Once the programs are tested individually, then the system as a whole needs to be tested.
- During testing, the system is used experimentally to ensure that the software does not fail.
- Special test data is prepared as input for processing and the results are examined to locate unexpected results.
- In many organizations testing is performed by persons other than who wrote the original programs.
- Using persons who do not know how the programs were designed ensures more complete and reliable software

6. Systems Implementation

- In this stage, the systems analysts put the new software which has been tested into use.
- User personnel are trained and any files of data needed by the new system are constructed.
- In short, the new software is installed and then used.

7. Systems Maintenance

- Once installed, the software is often used for many years.
- However, both the organization and the users change.
- The environment may also change over a period of time.
- Therefore the software has to be maintained and changes will be made to the software, files or procedures to meet the user's requirements.

Strength of the SDLC

- Well tried and tested
- Provides a base guideline for systems development which can be modified to suit specific requirements
- Emphasis on project control, documentation, standards, and quality control.
- Useful for building large transaction processing systems and Management Information Systems
- Building complex systems which need rigorous and formal requirements analysis, and tight control of the system development process.

Limitations of the SDLC

- It is resource intensive
- It is inflexible and inhibits change
- Something that may no longer be appropriate
- Top down, approach discourages iteration
- Hard to visualize final system
- Not well suited to most of small desktop systems

- Does not encourage user participation
- Focus on technical aspects
- Costly and time consuming
- Inflexible to discourage change

System / Software Life Cycle Model:

Definition:

A (software/system) *lifecycle model* is a description of the sequence of activities carried out in a project, and the relative order of these activities.

It provides a fixed **generic framework** that can be tailored to a specific project.

Project specific ***parameters*** will include:

- Size, (person-years)
- Budget,
- Duration.

Project Plan = Lifecycle Model + Project Parameters

There are hundreds of different lifecycle models to choose from, e.g:

- ***Waterfall Model (Classical & Iterative),***
- ***Spiral Model***
- ***Evolutionary Model***
- ***Prototyping Model***

but many are minor variations on a smaller number of basic models.

By changing the lifecycle model, we can **improve** :

- ***Development speed (time to market)***
- ***Product quality***
- ***Project visibility***
- ***Administrative overhead***
- ***Risk exposure***
- ***Customer relations, etc.***

Normally, a lifecycle model covers the entire **lifetime of a product**. From ***birth of a commercial idea*** to ***final de-installation of last release*** i.e. The three main phases:

- ***design***,
- ***build***,
- ***maintain***

The Waterfall Model

- The waterfall model is the classic lifecycle model – it is widely known, understood and (commonly) used.
- Introduced by Royce 1970.

Classical Waterfall Model	Iterative Waterfall Model

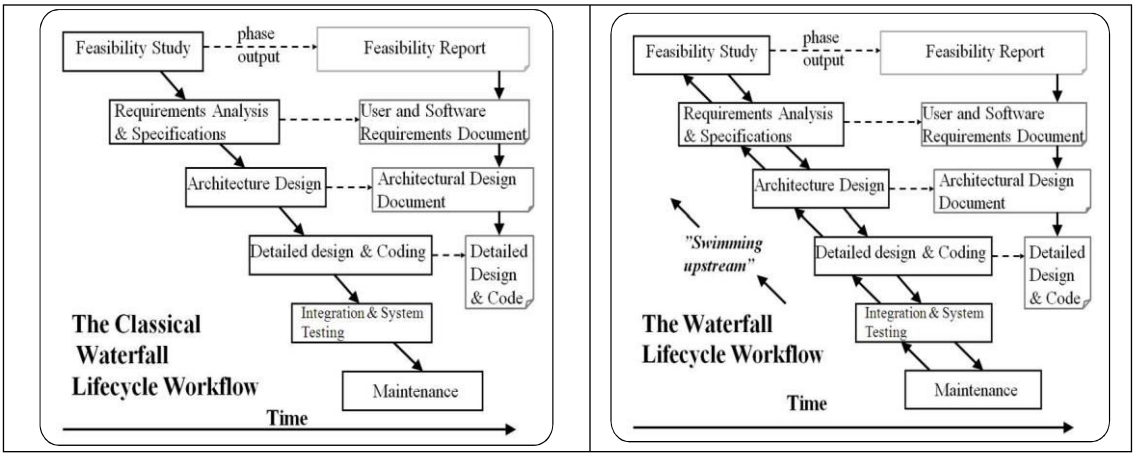

Fig.04

Advantages

1. Easy to understand and implement.
2. Widely used and known (in theory!)
3. Reinforces good habits: define-before- design, design-before-code
4. Identifies deliverables and milestones
5. Document driven, URD, SRD, … etc.
6. Works well on mature products and weak teams

Disadvantages

1. Idealised, doesn't match reality well.
2. Doesn't reflect iterative nature of exploratory development.
3. Unrealistic to expect accurate requirements so early in project
4. Software is delivered late in project, delays discovery of serious errors.
5. Difficult to integrate risk management
6. Difficult and expensive to make changes to documents, "swimming upstream".
7. Significant administrative overhead, costly for small teams and projects.

When to use Waterfall Model

- Requirements are very well known
- Product definition is stable
- Technology is understood
- New version of an existing product
- Porting an existing product to a new platform.

The Spiral Model

Since end-user requirements are hard to obtain/define, it is natural to develop software in an ***experimental*** way:
e.g.

1. Build some software
2. See if it meets customer requirements
3. If no go to 1 else stop.

This loop approach gives rise to structured **iterative lifecycle models.** In 1988 Boehm

developed the spiral model as an iterative model which includes ***riskanalysis*** and ***risk management***.

The Spiral Model

Each cycle follows a waterfall model by:

1. Determining objectives
2. Specifying constraints
3. Generating alternatives
4. Identifying risks
5. Resolving risks
6. Developing next-level product
7. Planning next cycle

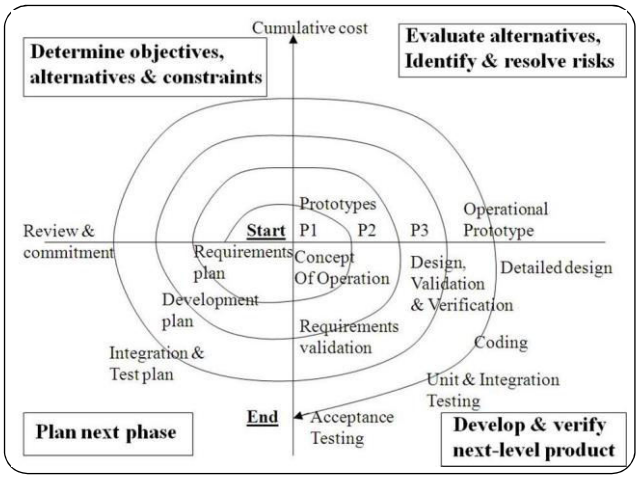

Fig.05

Spiral Model Strengths

- Provides early indication of insurmountable risks, without much cost
- Users see the system early because of rapid prototyping tools
- Critical high-risk functions are developed first
- The design does not have to be perfect
- Users can be closely tied to all lifecycle steps
- Early and frequent feedback from users
- Cumulative costs assessed frequently

Spiral Model Weaknesses

- Time spent for evaluating risks too large for small or low-risk projects
- Time spent planning, resetting objectives, doing risk analysis may be excessive
- The model is complex
- Risk assessment expertise is required
- Spiral may continue indefinitely
- Developers must be reassigned during non-development phase activities
- May be hard to define objective, verifiable milestones that indicate readiness to proceed through the next iteration

When to use Spiral Model:

- When creation of a prototype is appropriate
- When costs and risk evaluation is important
- For medium to high-risk projects
- Long-term project commitment unwise because of potential changes
- Users are unsure of their needs
- Requirements are complex
- New product line
- Significant changes are expected (research and exploration)

The Evolutionary Model

This model is also known as the successive versions model. In this model the system is first broken down into several modules or functional units that can be incrementally implemented or delivered. In this model, each successive version of the product is a functioning system capable of performing some more useful work.

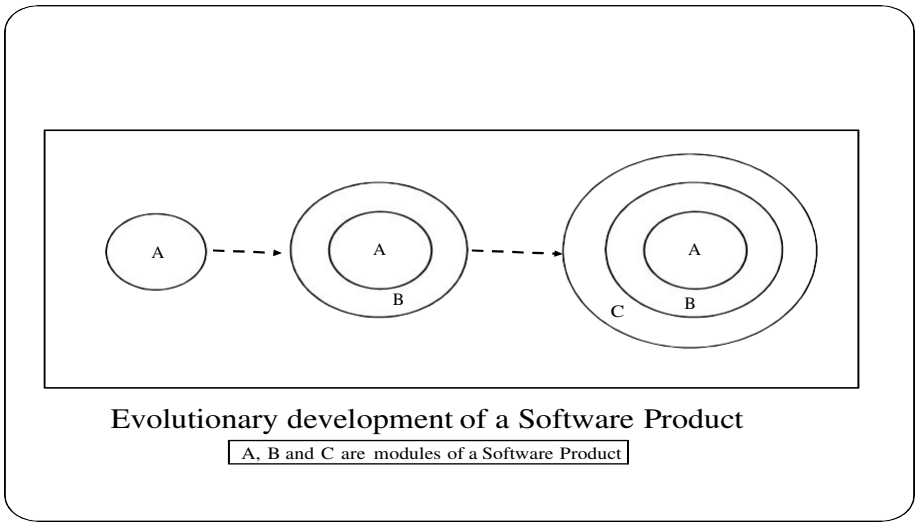

Fig.06

Advantages

- The user gets a chance to experiment with a partially developed system much before the fully developed version is released
- The evolutionary model facilitates to elicit the exact requirements of the user for incorporating into the fully developed system
- Also, the core modules get tested thoroughly, thereby reducing chances of errors in the final product.

Disadvantages

- For most practical problems, it is difficult to subdivide the problem into several functional units that can be incrementally implemented and delivered.
- Evolutionary model is useful only for very large problems were it is easier to identify modules for incremental implementation.

The Rapid Prototyping Model

Rapid prototyping emphasises requirements analysis and validation, also called: ***"customer oriented development"***

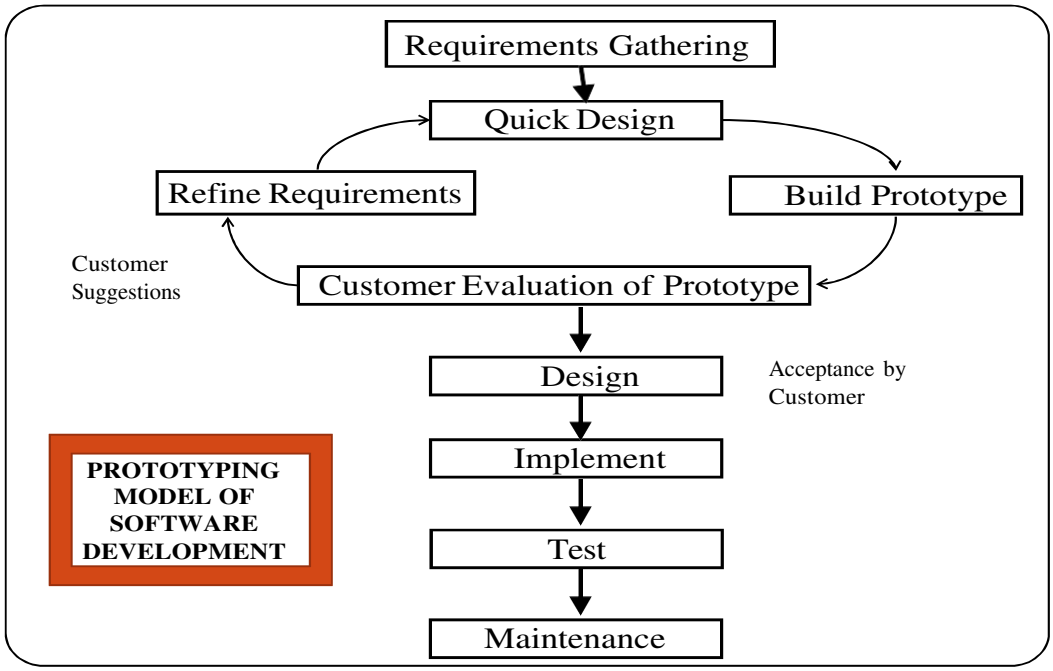

Fig.07

Advantages

1. Reduces risk of incorrect user requirements
2. Good where requirements are changing/uncommitted
3. Regular visible progress aids management
4. Supports early product marketing

Disadvantages

1. An unstable/badly implemented prototype often becomes the final product.
2. Requires extensive customer collaboration
3. Difficult to know how long project will last.
4. Easy to fall back into code-and-fix without proper requirements analysis, design, customer evaluation and feedback.

RAD Model:

RAD model is Rapid Application Development model. It is a type of incremental model. In RAD model the components or functions are developed in parallel as if they were mini projects. The development are time boxed and then assembled into a working prototype.

Different phases in RAD model

- Business modeling
- Data modeling
- Process modeling
- Application generation
- Testing and turnover

End User Development Model

End user development refers to the activity of building the information system

in terms of the user. Some types of information systems can be developed is called end-user with little or no formal assistances from technical specialists. This phenomenon is called end-user development. A series of software tools categorized as fourth generation languages makes this possible.

Categories of fourth generation language

- PC software tools
- Query language
- Report generator
- Graphics language
- Applications generator
- Application software package
- Very high level programming language

Outsourcing Model

Outsourcing is subcontracting a process, such as product design or manufacturing, to a third-party company. If a firm does not want to use its internal resources to build or operate information systems, it can outsource the work to an external organization that specializes in providing these services. Application service providers (ASPs) are one form of outsourcing.

Functional Information systems

A functional information system is a system that provides detailed information for a specific type of operations activity or related group of activities, as well as summarized information for management control of such activities.

The major functional systems of many organizations are

- Marketing information system
- Manufacturing information system
- HR information system
- Accounting information system
- Financial information system

Marketing Information system

MKIS is a computer based system that works in conjunction with other functional information systems to support the firm's management in solving problems that relate to marketing of the firms products.

Manufacturing information system

Manufacturing information system is a complete set of tools for managing the flow of manufacturing production data throughout the enterprise. This IS was designed to provide tools for both IT and operations personnel who would deliver services to anyone in the plant.

Human Resource Information System

HRIS refers to the systems and processes at the intersection between human resource management and information technology. It provides a method, by which an organization collects, maintains analyses and reports information on people and jobs.

Accounting information systems

AIS is the system of records a business keeps to maintain its accounting system. This includes the purchase, sales, and other financial processes of the business. The purpose of AIS is to accumulate data and provide decision makers (investors, creditors, and managers) with information to make decisions.

Financial Information System

The term FIS is used to describe the CBIS subsystem that provides information to persons and groups both inside and outside the firm concerning the firm's financial matters. Information is provided in the form of periodic reports, special reports, and results of mathematical simulation, electronic communications, and the advice of expert systems.

Decision Support System

DSS refers to a class of systems, which support the process of making decisions. The emphasis is on support rather than on automation of decision. Decision support systems allow the decision maker to retrieve data and test alternative solutions during the process of problem solving. DS is a specialized MIS designed to support an executives, skills at all stages of decision making i.e., problem identification, selecting relevant data, picking the approach to be used in decision making and evaluating the alternative courses of action.

Characteristics of DSS

- Provide rapid access to information
- Handle large amount of data from different sources
- Provide report and presentation flexibility
- Offer both textual and graphical orientation and Support drill-down analysis
- Perform complex, sophisticated analysis and comparisons using advanced software packages.

Activities of DSS

- What-if analysis
- Goal oriented
- Risk analysis
- Model building
- Graphical analysis

Components of DSS

- Data management sub system
- Model management sub system
- User interface sub system
- Knowledge based management sub system

Classification of DSS

- File drawer systems
- Data analysis systems
- Accounting models
- Representational models

- Optimization models
- Suggestion models

Advantages of DSS
- Improving personal efficiency
- Improving problem solving
- Facilitating communications
- Promoting learning or training
- Increasing organizational control

Disadvantages of DSS
- Limited storage capability
- Slow
- Limited information sharing
- Difficult
- Require extensive knowledge
- Translation problem
- Confliction

Executive Information Systems

Executive information systems are information systems that combine many of the features of management information systems and decision support systems. When they were first developed, their focus was on meeting the strategic information needs of top management. Thus, the first goal of executive information systems was to provide top executives with immediate and easy access to information about a firm's critical success factors (CSF), that is, key factors that are critical to accomplishing an organization's strategic objectives.

Features of EIS
- Drill-down capabilities
- Designed with managements CSF in mind
- Status access, trend analysis and exception reporting
- Personalized analysis
- Navigation of information
- Presents graphical tabular and textual information

Components of EIS
- Hardware
- Software
- Interface
- Telecommunication

Advantages of EIS
- Easy for upper level executives to use
- Ability to analyze trends
- Contribution to strategic control
- Ease access to existing information
- Instruments of change

- Better reporting system
- Improved mental model of the business for executives

Disadvantages of EIS
- Functions are limited, cannot perform complex calculations
- Hard to quantify benefits and to justify implementation of an EIS
- Difficult to keep current data
- May lead to less reliable and insecure data
- Small companies may encounter excessive costs for implementation

Knowledge Management System

Knowledge management is the process of identifying, collecting, preserving and transforming information into knowledge that is readily accessible in order to foster innovation and improve the performance of the organization. It is based on the assumption that the potential for sustained improvement exists in the knowledge derived frompeople, processes, designs and ideas within the organization. Knowledge management also implies the creation of a culture and structure that promotes information sharing and learning.

Features of KMS
- Purpose
- Context
- Processes
- Participants
- Instruments

Components of KMS
- Business process management
- Content management
- Web content management
- Knowledge applications management

Types of KMS
- Enterprise wide system
- Knowledge work system
- Intelligent techniques

Advantages of KMS
- Information sharing
- Elimination of redundancy of work
- Self learning

Disadvantages of KMS
- Justification of investment in knowledge management
- Obtaining senior management support
- Overcoming cultural hurdles to sharing
- Encouraging employees to use and share knowledge
- Confidentiality issues may limit ability to share knowledge
- Not a static system

Geographic Information Systems (GIS)

The work geographic in GIS carries two meanings

i. Earth: it implies that all data in the system are pertinent to earth's features and resources, including human activities based on or associated with these features and resources.
ii. Geographic space: it means that the commonality of both the data and the problems that the system are developed to solve is geography, i.e., location, distribution, pattern and relationship within a specific geographical reference framework.

GIS integrates hardware, software, and data for capturing, managing analyzing, and displaying all forms of geographically referenced informations.

Purposes of GIS

- To support decision making based on spatial data
- To support general research
- To collect, manipulate, and use spatial data in database management
- To produce standardized and customized cartographic production.

Capabilities of GIS

- Organization
- Queries
- Prediction
- Analysis
- Visualization
- Combination
- Basic notation

International Information Systems (GIS)

IIS are a general class of computer networks that operate in more than one nation-state. General IIS can be distinguished from more specific systems through their linkage to functionality, the sole limiting criteria being the providing of informational support to transactions that originate in one nation-state and terminate in another. The architecture of international systems is not fixed, but rather may be either centralized or decentralized on an international basis. In this type of information system, the important element is the existence of data crossing international borders in support of a transaction, typically trade and commerce data. However, the nature of the trade, once it is made, limits it within the national border of at least one host nation-state.

Major dimensions for IIS

- Global environment
- Corporate global strategies
- Structure of the organization
- Management and business process and
- Technology platform

Types of IIS

- Transnational Information systems
- Global information systems

- Collaborative or cooperative information systems

Components of IIS

- Data input (Internal and External environment input
- Operational components (system controls, DBMS, user interface systems)
- Data output (sales management, senior management output)

Global strategies and business organization

- Domestic exporter strategy
- Multinational strategy
- Franchisers
- Transnational strategy

Challenges of IIS

- Technological challenges
- Regulations and tariffs
- Differences in payment mechanisms
- Language differences
- Cultural differences
- Conflicting economic, and security interests
- Political challenges
- Different standards

QUESTION BANK – UNIT - 1

	PART – A	CO	Blooms Level
1	Define data with example.	CO1	L4
2	What is information? Give example.	CO1	L3
3	What is meant by intelligence?	CO1	L3
4	Explain the role of knowledge in organization.	CO1	L4
5	Differentiate data and information.	CO1	L4
6	Explain the advantages of IT.	CO1	L5
7	Explain GIS.	CO1	L4
8	Describe the functions of EIS	CO1	L5
9	What is DSS? What are its activities?	CO1	L3
10	What is Functional information system?	CO1	L3

	PART _B	CO	Blooms Level
1	Explain the evolution and roles of information system.	CO1	L4
2	Classify information system based on functions and hierarchy?	CO1	L6
3	Explain the major challenges of IS.	CO1	L5
4	What is system methodology? Explain the different types of system development methodologies.	CO1	L6
5	What is GIS? Explain its Capability?	CO1	L3
6	What is IIS? Explain the components of IIS.	CO1	L6
7	Explain the major challenges of Global Information system.	CO1	L4

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SCHOOL OF MANAGEMENT STUDIES

UNIT – II – INFORMATION MANAGEMENT – SBAA3018

UNIT 1 SYSTEM ANALYSIS AND DESIGN

Case tools – System Flow Chart, Decision Table, Data Flow Diagram (DFD), Entity Relationship (ER), Object Oriented Analysis and Design (OOAD), UML Diagram

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SYSTEM

A system is an orderly grouping of interdependent components linked together according to a plan to achieve a specific objective.

SYSTEM ANALYSIS

System Analysis: It is the process of gathering and interpreting facts, diagnosing problems, and using the information to recommend improvements to the system.

Analysis specifies "what" the system should do, that is it sets the objective and Design states "how" to accomplish this objective.

Reasons for initiating System Analysis

- Problem solving
- New requirement
- Implement a new idea or technology
- Broad Systems improvements

SYSTEM DESIGN

System Design: It is the process of planning a new business system or complement an existing system.

System design work begins after systems analysis is completed. System analysis lists users' requirements. Now it is the task of systems designer to identify data requirements and data sources. The system design may be divided into conceptual / logical design and physical design.

Logical design: The logical design of a system pertains to an abstract representation of the data flows, inputs and outputs of the system.

Physical design: The physical design relates to the actual input and output processes of the system.

CASE TOOLS (Computer Aided Software Engineering Tools)

With the increasing speed of changing market demands new products replace old ones much earlier than before, so the development of new products has to go faster. So, to speed up the software system building process, an introduced term in field of software engineering is CASE tools. It is a generic term used to denote automated support associated with the software development activities. CASE supports the development, verification, maintenance and evolution of processes and artifacts.

CASE tools are software programs th^{2}at are designed to assist human programmers with the complexity of the processes and the artifacts of software engineering. These

automated tools help in synthesis, analysis, modeling, documentation, coding etc.

Characteristics of CASE tools

- Standard methodology
- Flexibility
- Strong integration
- Integration with testing software
- Support for reverse engineering
- On-line help

Classes of CASE tools:

- Analysis, design and specification tools
- Data modeling tools
- Prototyping tools
- Coding tools
- Testing tools
- Implementation tools
- Upper CASE tools
- Lower CASE tools

Architecture of CASE environment

- A database (to store the information)
- An object Management system (to manage changes to the information)
- A tools control mechanism (to coordinate the use of CASE tools)
- A user interface (to provide consistent pathway between actions made by user and tools)

Advantages of CASE tools

- Easy revision of system descriptions and graphic representations
- Support of system prototyping through the capability to change specifications
- Some CASE tools have the capability to produce working source code for the application
- A CASE tool also provides maintenance support as a result of storage of system specification in a central information repository.

Disadvantages of CASE tools

- Absence of standard levels of methodology support
- Limited functions supported
- Conflicting use of diagrams
- Human tasks remain critical

SYSTEM FLOW CHART

A Flow chart is a pictorial representation of the sequence of operations in systems. Flowcharting is the most common method of describing procedures in a computer

based information system.

A flow chart is the plan to be followed when a program is written. It acts like a road map for a programmer and guides him/her in proceeding from the starting point to the final point in a logical manner.

Flow Chart Symbols:

Symbol	Name	Function
	Start/end	An oval represents a start or end point.
	Arrows	A line is a connector that shows relationships between the representative shapes.
	Input/Output	A parallelogram represents input or ouptut.
	Process	A rectangle represents a process.
	Decision	A diamond indicates a decision.

Fig.07

Rules for drawing flow chart

- First formulate the main line of logic, then incorporate the details
- Maintain a consistent level of detail for a given flowchart.
- Do not give every detail on the flowchart
- Words in the flowchart symbols should be common statements for easy understanding
- Be consistent in the use of names and variables in a flowchart
- Go from left to right and top to bottom while constructing a flowchart
- Keep the flowchart as simple as possible
- The crossing of flow lines should be avoided
- If a new page is needed for drawing a flowchart, it is recommended that the flowchart be broken at an input or out point
- Finally check whether the flowchart is logically correct and complete.

Advantages of flow charts

- Conveys better meaning
- Effective joining of a part of a system
- Efficient coding

Disadvantages of flow charts

- Takes more time to draw

- Difficult to make changes
- Non-standardization

Examples of Flow Charts:

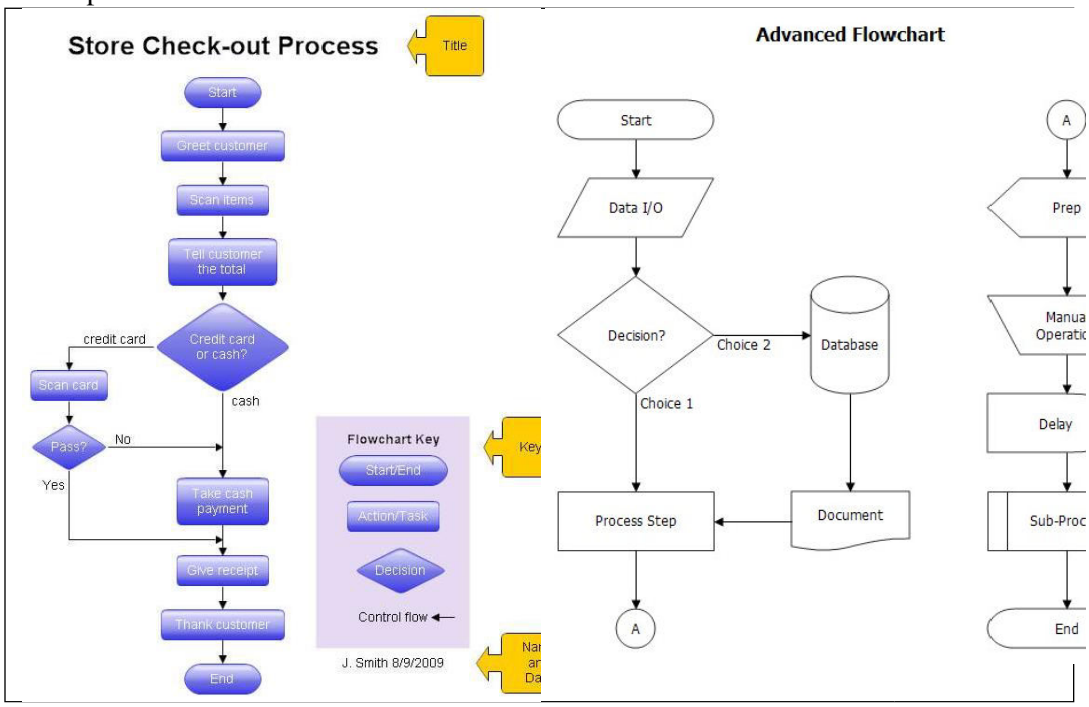

Fig.08

DECISION TABLE

Decision tables are a pr cise yet compact way to model complicated l gic. Decision table is a matrix representation of the logic of a decision, which specifies the possible conditions for the decision possible conditions for the decision and the resulting actions.

Decision tables are a convenient way to organize information in a systematic manner. A major drawback of a decision tree is the lack of information in its format to tell what other combinations of conditions to test. This is where the decision table is useful.

Creating Decision tables

- Name conditions and values that each condition can assume
- Name all possible actions that can occur
- List all possible rules
- Define actions for each rule
- Simplify decision table

Advantages of decision tables

- Decision rules are clearly structured
- Managers can be relieved from decision making
- Consistency in decision making

- Communication is easier between managers and analysts
- Documentation is easily prepared, changed, or updated,
- Easy to use
- Easier to draw or modify compared to flowcharts
- Facilitate more compact documentation

Disadvantages of decision tables

- Impose an additional burden
- Do not depict the flow
- Not easy to translate and
- Cannot list all the alternatives

The following are the **balanced decision table**.

Printer troubleshooter									
		Rules							
Conditions	Printer does not print	Y	Y	Y	Y	N	N	N	N
	A red light is flashing	Y	Y	N	N	Y	Y	N	N
	Printer is unrecognized	Y	N	Y	N	Y	N	Y	N
Actions	Check the power cable			X					
	Check the printer-computer cable	X		X					
	Ensure printer software is installed	X		X		X		X	
	Check/replace ink	X	X			X	X		
	Check for paper jam		X		X				

Fig.09

What to do today?								
	1	2	3	4	5	6	7	8
Is today a weekday?	y	y	y	y	n	n	n	n
Is today a holiday?	n	n	y	y	y	y	n	n
Is it raining?	y	n	y	n	y	n	y	n
Go to work	1	1						
Go on a picnic				1		1		1
Watch sports on TV			1		1		1	

Fig.10

DATA FLOW DIAGRAM

DFD are widely used graphic tools for describing the movement of data within or outside the system. These diagrams, popularly called as DFDs, quickly convey to both the software developers and users, how the current system is working and how the proposed system will work. The main advantage of DFD is that they are easily understood by the users and hence, users can suggest modification in the proposed system.

DFD provides no information about the timing or ordering of processes, or about whether processes will operate in sequence or in parallel. It is therefore quite different from a flow chart.

Meaning of Flow chart: A **diagram** consisting of a set of symbols such as rectangles or diamonds and connecting lines that shows step-by-step progression through a procedure, processor system

Components of DFD:

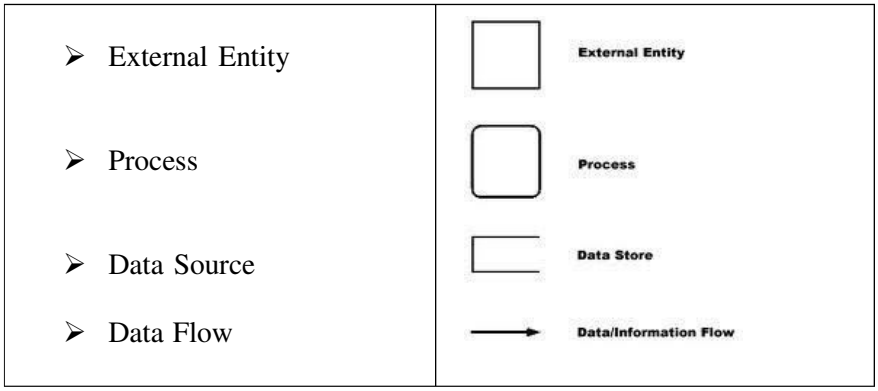

Fig.11

Rules for drawing a DFD:

- Sources cannot leak data directly to a data store
- A data store cannot pass the data directly to a destination
- A data flow out of a data store is read only.
- Data cannot flow directly from one data store to another
- Any process producing output by itself should be a source.
- Any process with only input should be a data destination.
- Each subsystem must be a process on the next higher level diagram.

Examples of DFDs

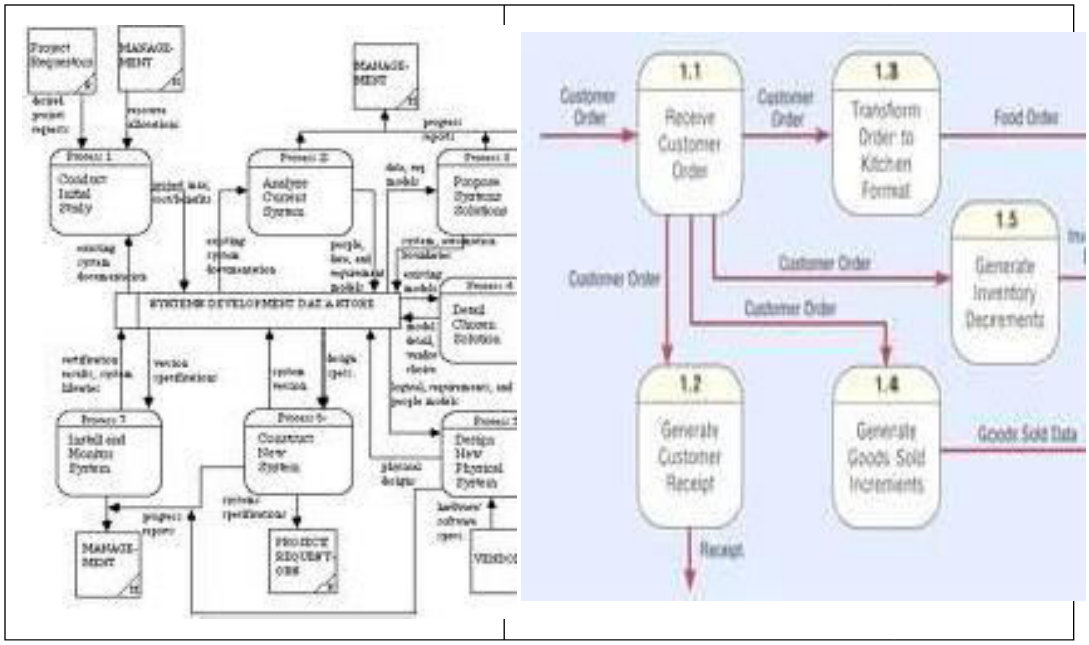

Fig.12

Advantages of DFD

- Early implementation
- Study independence
- Analysis
- Tool for communication
- Reduces costs

Disadvantages of DFD

- Imprecise
- Absence of control aspects
- Highly subjective

ERD - Entity Relationship Diagram

An entity-relationship (ER) diagram is a specialized graphic that illustrates the interrelationships between entities in a database. An E-R diagram expresses the overall logical structure of a database graphically.

The entity-relationship diagram (also known as an ERD) is a network model that describes the stored data layout of a system at a high level of abstraction.

It is quite different from the dataflow diagram, which models the functions performed by a system, and it is different from the state-transition diagram,, which models the time dependent behavior of a system

Objectives of ERD

- Straight forward relational representation
- Easy conversion of ER to other data model
- Graphical representation for better understanding

The components of an ERD:

- Entity / Object
- Attributes
- Relationships
  - One to One
  - One to Many
  - Many to Many
- Associative object type indicators
- Super type / subtype indicators

Examples of ER Diagram

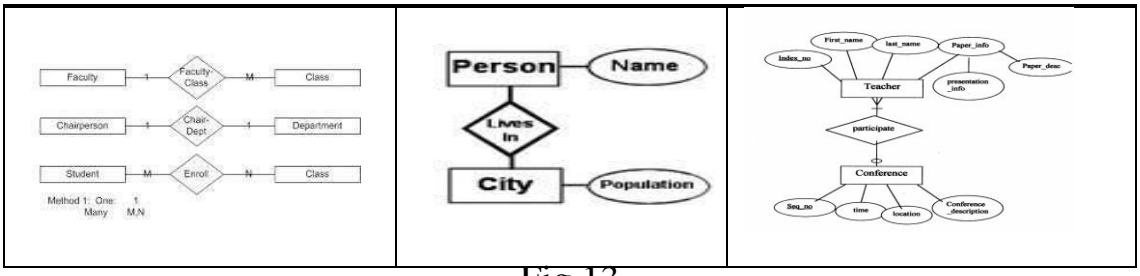

Fig.13

OBJECT ORIENTED ANALYSIS AND DESIGN (OOAD)

Object oriented design methodology focuses attention not on the function performed by the program but instead on the data that are to be manipulated by the program.

Object oriented technology is one of the latest approaches to software development and its shows much promise in solving the problems associated with building modern software systems.

In the object oriented design approach, the system is viewed as a collection of objects. The system states decentralized among the objects and each object manages its own state information.

Object oriented concepts (Six basic concepts)

- Class (it is a template for building objects. It is used as a blue print to create objects and it includes attributes and methods that are created objects all share.
- Object (a system is designed as a set of interacting objects and each represents a tangible real world entity)
- Information Hiding (Ability to protect some components of the object from external entities. This is realized by language keywords to enable a variable to be declared as a private to the owning class.)
- Inheritance (Ability for a class to extend or override functionality of another class)
- Interface (Ability to defer the implementation of a method)
- Polymorphism (Ability to replace an object with its sub objects)

Data and process modeling

Object oriented data modeling is based on what is called the "object oriented paradigm", which is not just a way of programming but most importantly, is a way of

thinking abstractly about a problem using real-world concepts, rather than implementation oriented concepts.

Object oriented data models achieve these requirements by providing appropriate mechanisms to represent the structure of application domains with a high degree of accuracy while also placing emphasis on operational abstractions

To represent the data and process modeling, the most common used language is UMS. UML stands for Unified Modeling Language.

UNIFIED MODELING LANGUAGE (UML)

Unified Modeling Language (UML) combines techniques from data modeling (entity relationship diagrams), business modeling (work flows),object modeling, and component modeling. It can be used with all processes, throughout the software development life cycle, and across different implementation technologies.
The Unified Modeling Language (UML) offers a standard way to visualize a system's architectural blueprints, including elements such as:

- activities
- actors
- business processes
- database schemas
- (logical) components
- programming language statements
- Reusable software components.

UML has synthesized the notations of the Booch method, the Object-modeling technique (OMT) and Object-oriented software engineering (OOSE) by fusing them into a single, common and widely usable modeling language. UML aims to be a standard modeling language which can model concurrent and distributed systems.

UML models may be automatically transformed to other representations (e.g. Java) by means of QVT-like transformation languages. UML is extensible, with two mechanisms for customization: profiles and stereotypes.

Software development methods

UML is not a development method by itself; however, it was designed to be compatible with the leading object-oriented software development methods of its time (for example OMT, Booch method, Objector). Since UML has evolved, some of these methods have been recast to take advantage of the new notations (for example OMT), and new methods have been created based on UML, such as IBM Rational Unified Process (RUP). Others include Abstraction Method and Dynamic Systems Development Method.

UML Diagram

A Diagram is the graphical presentation of a set of elements, most often rendered a a connected graph of verticers (things) and paths (relationships)

UML diagrams represent two different views of a system model:

- Static (or *structural*) view: emphasizes the static structure of the system using objects, attributes, operations and relationships. The structural view includes class diagrams and composite structure diagrams.
- Dynamic (or *behavioral*) view: emphasizes the dynamic behavior of the system by showing collaborations among objects and changes to the internal states of objects. This view includes sequence diagrams, activity diagrams and state machine diagrams.

UML models can be exchanged among UML tools by using the XML Metadata Interchange (XMI) interchange format.

STRUCTURE DIAGRAMS

Structure diagrams emphasize the things that must be present in the system being modeled. Since structure diagrams represent the structure, they are used extensively in documenting the software architecture of software systems.

- Class diagram: describes the structure of a system by showing the system's classes, their attributes, and the relationships among the classes.
- Component diagram: describes how a software system is split up into components and shows the dependencies among these components.
- Composite structure diagram: describes the internal structure of a class and the collaborations that this structure makes possible.
- Deployment diagram: describes the hardware used in system implementations and the execution environments and artifacts deployed on the hardware.
- Object diagram: shows a complete or partial view of the structure of an example modeled system at a specific time.
- Package diagram: describes how a system is split up into logical groupings by showing the dependencies among these groupings.
- Profile diagram: operates at the meta model level to show stereotypes as classes with the <<stereotype>> stereotype, and profiles as packages with the <<profile>> stereotype. The extension relation (solid line with closed, filled arrowhead) indicates what meta model element a given stereotype is extending.

BEHAVIOR DIAGRAMS

Behavior diagrams emphasize what must happen in the system being modeled. Since behavior diagrams illustrate the behavior of a system, they are used extensively to describe the functionality of software systems.

- Activity diagram: describes the business and operational step-by-step workflows of components in a system. An activity diagram shows the overall flow of control.
- UML state machine diagram: describes the states and state transitions of the system.
- Use Case Diagram: describes the functionality provided by a system in terms of actors, their goals represented as use cases, and any dependencies among those use cases.

INTERACTION DIAGRAMS

Interaction diagrams, a subset of behavior diagrams, emphasize the flow of control and data among the things in the system being modeled:

- **Communication diagram:** shows the interactions between objects or parts in terms of sequenced messages. They represent a combination of information taken from Class, Sequence, and Use Case Diagrams describing both the static structure and dynamic behavior of a system.
- **Interaction overview diagram:** provides an overview in which the nodes represent communication diagrams.
- **Sequence diagram:** shows how objects communicate with each other in terms of a sequence of messages. Also indicates the life spans of objects relative to those messages.
- **Timing diagrams:** a specific type of interaction diagram where the focus is on timing constraints.

UML Diagrams Overview:

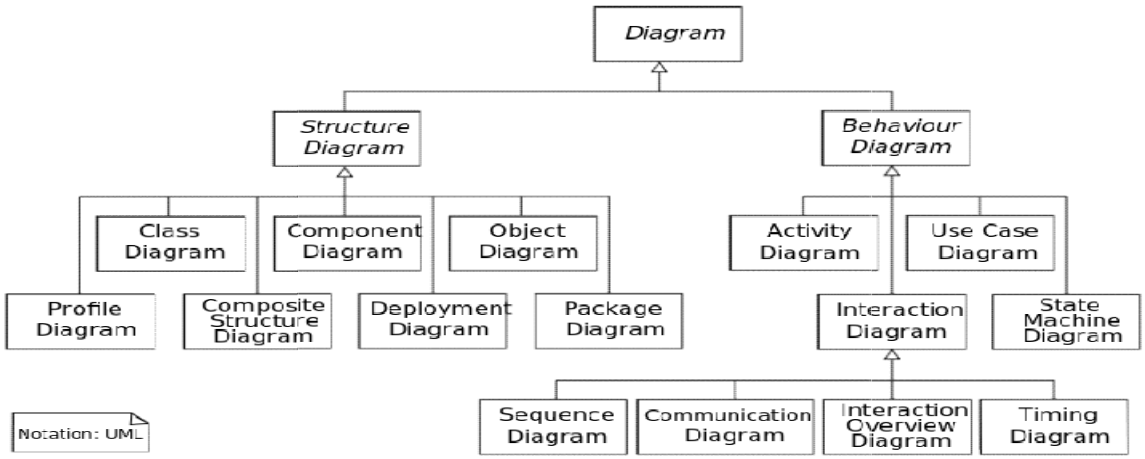

Fig.14

QUESTION BANK – UNIT – 2

	PART – A	CO	Blooms Level
1	What is system analysis.	CO2	L6
2	What is meant by system design?	CO2	L5
3	What are the main activities of system analysis?	CO2	L4
4	Explain the Logical and Physical system design.	CO2	L3
5	What is system spefication?	CO2	L4
6	What is system flow chart?	CO2	L4
7	What is decision table?	CO2	L5
8	What are DFD rules?	CO2	L5
9	What is a CASE tools?	CO2	L4
10	What is object oriented analysis and design?	CO2	L4

	PART – B	CO	Blooms Level
1	What are the main rules of drawing flow charts? Describe the flow charts for students' marks in exam	CO2	L5
2	What are the main parts of decision table? Explain the advantages of decision table.	CO2	L3
3	What is DFD? Explain the steps of developing DFD.	CO2	L6
4	What are the notations of ERD? Give example of ERD.	CO2	L6
5	What is UML? Explain the class diagram with example.	CO2	L4
6	Write short notes on the following with example. Object diagram, use case diagram, sequence diagram, activity diagram and component diagram.	CO2	L5

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SCHOOL OF MANAGEMENT STUDIES

UNIT – III– INFORMATION MANAGEMENT – SBAA3018

UNIT-3 DATABASE MANAGEMENT SYSTEMS
DBMS - HDBMS, NDBMS, RDBMS, OODBMS, Query Processing, SQL, Concurrency Management, Data warehousing and Data Mart.

DBMS- Data Base Management System
Database is collection of data which is related by some aspect. Data is collection of facts and figures which can be processed to produce information. Name of a student, age, class and her subjects can be counted as data for recording purposes.

Mostly data represents recordable facts. Data aids in producing information which is based on facts. For example, if we have data about marks obtained by all students, we can then conclude abouttoppers and average marks etc.

A database management system stores data, in such a way which is easier to retrieve, manipulate and helps to produce information.

Characteristics

Traditionally data was organized in file formats. DBMS was all new concepts then and all the research was done to make it to overcome all the deficiencies in traditional style of data management. Modern DBMS has the following characteristics:

- Real-world entity: Modern DBMS are more realistic and uses real world entities to design its architecture. It uses the behavior and attributes too. For example, a school database may use student as entity and their age as their attribute.

- Relation-based tables: DBMS allows entities and relations among them to form as tables. This eases the concept of data saving. A user can understand the architecture of database just by looking at table names etc.

- Isolation of data and application: A database system is entirely different than its data. Where database is said to active entity, data is said to be passive one on which the database works and organizes. DBMS also stores metadata which is data about data, to ease its own process.

- Less redundancy: DBMS follows rules of normalization, which splits a relation when any of its attributes is having redundancy in values. Following normalization, which itself is a mathematically rich and scientific process, make the entire database to contain as less redundancy as possible.

- Consistency: DBMS always enjoy the state on consistency where the

previous form of data storing applications like file processing does not guarantee this. Consistency is a state where every relation in database remains consistent. There exist methods and techniques, which can detect attempt of leaving database in inconsistent state.

- Query Language: DBMS is equipped with query language, which makes it more efficient to retrieve and manipulate data. A user can apply as many and different filtering options, as he or she wants. Traditionally it was not possible where file-processing system was used.

- ACID Properties: DBMS follows the concepts for ACID properties, which stands for Atomicity, Consistency, Isolation and Durability. These concepts are applied on transactions, which manipulate data in database. ACID properties maintains database in healthy state in multi-transactional environment and in case of failure.

- Multiuser and Concurrent Access: DBMS support multi-user environment and allows them to access and manipulate data in parallel. Though there are restrictions on transactions when they attempt to handle same data item, but users are always unaware of them.

- Multiple views: DBMS offers multiples views for different users. A user who is in sales department will have a different view of database than a person working in production department. This enables user to have a concentrate view of database according to their requirements.

- Security: Features like multiple views offers security at some extent where users are unable to access data of other users and departments. DBMS offers methods to impose constraints while entering data into database and retrieving data at later stage. DBMS offers many different levels of security features, which enables multiple users to have different view with different features. For example, a user in sales department cannot see data of purchase department is one thing, additionally how much data of sales department he can see, can also be managed. Because DBMS is not saved on disk as traditional file system it is very hard for a thief to breakthe code.

Users

DBMS is used by various users for various purposes. Some may involve in retrieving data and somemay involve in backing it up. Some of them are described as follows:

- Administrators: A bunch of users maintain the DBMS and are responsible for administrating the database. They are responsible to look after its usage and by whom it should be used. Theycreate users access

and apply limitation to maintain isolation and force security. Administrators also look after DBMS resources like system license, software application and tools required and other hardware related maintenance.

- Designer: This is the group of people who actually works on designing part of database. The actual database is started with requirement analysis followed by a good designing process. They people keep a close watch on what data should be kept and in what format. They identify and design the whole set of entities, relations, constraints and views.
- End Users: This group contains the persons who actually take advantage of database system. End users can be just viewers who pay attention to the logs or market rates or end users can be as sophisticated as business a analyst who takes the most of it.

DBMS - Architecture

The design of a Database Management System highly depends on its architecture. It can be centralized or decentralized or hierarchical. DBMS architecture can be seen as single tier or multi tier.n-tier architecture divides the whole system into related but independent n modules, which can be independently modified, altered, changed or replaced.

In 1-tier architecture, DBMS is the only entity where user directly sits on DBMS and uses it. Any changes done here will directly be done on DBMS itself. It does not provide handy tools for end users and preferably database designer and programmers use single tier architecture.

If the architecture of DBMS is 2-tier then must have some application, which uses the DBMS. Programmers use 2-tier architecture where they access DBMS by means of application. Here application tier is entirely independent of database in term of operation, design and programming.

3- tier architecture

Most widely used architecture is 3-tier architecture. 3-tier architecture separates it tier from each otheron basis of users. It is described as follows:

- Database (Data) Tier: At this tier, only database resides. Database along with its query processing languages sits in layer-3 of 3-tier architecture. It also contains all relations and theirconstraints.

- Application (Middle) Tier: At this tier the application server and program, which access database, resides. For a user this application tier

works as abstracted view of database. Users are unaware of any existence of database beyond application. For database-tier, application tieris the user of it. Database tier is not aware of any other user beyond application tier. This tier works as mediator between the two.

- User (Presentation) Tier: An end user sits on this tier. From a users aspect this tier is everything. He/she doesn't know about any existence or form of database beyond this layer. At this layer multiple views of database can be provided by the application. All views aregenerated by applications, which reside in application tier.

Multiple tier database architecture is highly modifiable as almost all its components are independent and can be changed independently.

DBMS - Data Models

Data model tells how the logical structure of a database is modeled. Data Models are fundamental entities to introduce abstraction in DBMS. Data models define how data is connected to each other and how it will be processed and stored inside the system.

The very first data model could be flat data-models where all the data used to be kept in same plane. Because earlier data models were not so scientific they were prone to introduce lots of duplication andupdate anomalies.

Entity-Relationship Model

Entity-Relationship model is based on the notion of real world entities and relationship among them. While formulating real-world scenario into database model, ER Model creates entity set, relationship set, general attributes and constraints. ER Model is best used for the conceptual design of database.

ER Model is based on:

- Entities and their attributes
- Relationships among entities
- Entity

  An entity in ER Model is real world entity, which has some properties called attributes. Every attribute is defined by its set of values, called domain.

  For example, in a school database, a student is considered as an entity. Student has various attributes like name, age and class etc.

- Relationship

  The logical association among entities is called relationship. Relationships are mapped with entities in various ways. Mapping cardinalities define the number of association between two entities.

  Mapping cardinalities:

  - one to one
  - one to many
  - many to one
  - many to many

Relational Model

The most popular data model in DBMS is Relational Model. It is more scientific model then others. This model is based on first-order predicate logic and defines table as an n-ary relation.

The main highlights of this model are:

- Data is stored in tables called relations.
- Relations can be normalized.
- In normalized relations, values saved are atomic values.
- Each row in relation contains unique value
- Each column in relation contains values from a same domain.

DBMS - Data Schemas

Database schema

Database schema skeleton structure of and it represents the logical view of entire database. It tells about how the data is organized and how relation among them is associated. It formulates all database constraints that would be put on data in relations, which resides in database.

A database schema defines its entities and the relationship among them. Database schema is a descriptive detail of the database, which can be depicted by means of schema diagrams. All these activities are done by database designer to help programmers in order to give some ease of understanding all aspect of database.

Database schema can be divided broadly in two categories:

- Physical Database Schema: This schema pertains to the actual storage of data and its form ofstorage like files, indices etc. It defines the how data will be stored in secondary storage etc.

- Logical Database Schema: This defines all logical constraints that need to be applied on datastored. It defines tables, views and integrity constraints etc.

Database Instance

It is important that we distinguish these two terms individually. Database schema is the skeleton of database. It is designed when database doesn't exist at all and very hard to do any changes once the database is operational. Database schema does not contain any data or information.

Database instances, is a state of operational database with data at any given time. This is a snapshot of database. Database instances tend to change with time. DBMS ensures that its every instance (state)
must be a valid state by keeping up to all validation, constraints and condition that database designers has imposed or it is expected from DBMS itself.

HDBMS Hierarchical Database Management System

A hierarchical database model is a data model in which the data is organized into a tree-like structure. The data is stored as records which are connected to one another through links. A record is a collection of fields, with each field containing only one value. The entity type of a record defines which fields the record contains.

Example of a hierarchical model

A record in the hierarchical database model corresponds to a row in the relational database model and an entity type corresponds to a table.

The hierarchical database model mandates that each child record has only one parent, whereas each parent record can have one or more child records. In order to retrieve data from a hierarchical database the whole tree needs to be traversed starting from the root node. This model is recognized as the first database model created by IBM in the 1960s.

The Hierarchical Data Model is a way of organizing a database with multiple one to many relationships. The structure is based on the rule that one parent can have many children but children are allowed only one parent. This structure

allows information to be repeated through the parent childrelations created by IBM and was implemented mainly in their Information Management System.

Advantages

The model allows easy addition and deletion of new information. Data at the top of the Hierarchy is very fast to access. It was very easy to work with the model because it worked well with linear type data storage such as tapes. The model relates very well to natural hierarchies such as assembly plants and employee organization in corporations. It relates well to anything that works through a one to many relationships. For example; there is a president with many managers below them, and those managers have many employees below them, but each employee has only one manager.

Disadvantages

This model has many issues that hold it back now that we require more sophisticated relationships. It requires data to be repetitively stored in many different entities. The database can be very slow when searching for information on the lower entities. We no longer use linear data storage mediums such as tapes so that advantage is null. Searching for data requires the DBMS to run through the entire model from top to bottom until the required information is found, making queries very slow. Can only model one to many relationships, many to many relationships are not supported. Clever manipulation of the model is required to make many to may relationships.

NDBMS-Network Database Management System

Network Database: A network databases are mainly used on large digital computers. It more connections can be made between different types of data, network databases are considered more efficiency It contains limitations must be considered when we have to use this kind of database. It is Similar to the hierarchical databases; network databases.

Network databases are similar to hierarchical databases by also having a hierarchical structure. A network database looks more like a cobweb or interconnected network of records.

In network databases, children are called members and parents are called occupier. The difference between each child or member can have more than one parent. The Approval of the network data model similar with the esteem of the hierarchical data model. Some data were more naturally modeledwith more than one parent per child. The network model authorized the modeling of many-to-many relationships in

The network model is very similar to the hierarchical model really. Actually

the hierarchical model is a subset of the network model. However, instead of using a single-parent tree hierarchy, the network model uses set theory to provide a tree-like hierarchy with the exception that child tables were allowed to have more than one parent. It supports many-to-many relationships.

RDBMS-Relational Database Management System

In relational databases, the relationship between data files is relational. Hierarchical and network databases require the user to pass a hierarchy in order to access needed data. These databases connect to the data in different files by using common data numbers or a key field. Data in relational databasesis stored in different access control tables, each having a key field that mainly identifies each row. In the relational databases are more reliable than either the hierarchical or network database structures. In relational databases, tables or files filled up with data are called relations designates a row or record, and columns are referred to as attributes or fields.

Relational databases work on each table has a key field that uniquely indicates each row, and that these key fields can be used to connect one table of data to another.

The relational database has two major reasons

1. Relational databases can be used with little or no training.
2. Database entries can be modified without specify the entire body.

Properties of Relational Tables

In the relational database we have to follow some properties which are given below.

- It's Values are Atomic
- In Each Row is alone.
- Column Values are of the same thing.
- Columns are undistinguished.
- Sequence of Rows is Insignificant.
- Each Column has a common Name.

OODBMS – Object oriented Database Management System

In this Model we have to discuss the functionality of the object oriented Programming .It takes more than storage of programming language objects. Object DBMS's increase the semantics of the C++ and Java .It provides full-featured database programming capability, while containing native language compatibility. It adds the database functionality to object programming languages. This approach is the analogical of the application and database development into a constant data model and language environment. Applications require less code, use

more natural data modeling, and code bases are easier to maintain. Object developers can write complete database applications with a decent amount of additional effort.

The object-oriented database derivation is the integrity of object-oriented programming language systems and consistent systems. The power of the object-oriented databases comes from the cyclical treatment of both consistent data, as found in databases, and transient data, as found in executing programs.

Object-oriented databases use small, recyclable separated of software called objects. The objects themselves are stored in the object-oriented database. Each object contains of two elements:

1. Piece of data (e.g., sound, video, text, or graphics).
2. Instructions or software programs called methods, for what to do with the data.

Disadvantage of Object-oriented databases

1. Object-oriented databases have these disadvantages.
2. Object-oriented database are more expensive to develop.
3. In the Most organizations are unwilling to abandon and convert from those databases.

The benefits to object-oriented databases are compelling. The ability to mix and match reusable objects provides incredible multimedia capability.

Query Processing

Upper levels of the data integration problem

How to construct mappings from sources to a single mediated schema

How queries posed over the mediated schema are reformulated over the sources

Basic Steps in Query Processing

1. Parsing and translation
2. Optimization
3. EvaluationParsing and translation

Translate the query into its internal form. This is then translated into relational algebra. Parser checks syntax, verifies relations.

Evaluation

The query-execution engine takes a query-evaluation plan, executes that plan, and returns the answers to the query.A relational algebra expression may have many equivalent expressions. Each relational algebra operation can be evaluated using one of several different algorithms. Correspondingly, a relational-algebra expression can be evaluated in many ways. Annotated expression specifying detailed evaluation strategy is called an evaluation-plan.

Query Optimization

Amongst all equivalent evaluation plans choose the one with lowest cost. Cost is estimated using statistical information from the database catalog.

SQL

SQL is Structured Query Language, which is a computer language for storing, manipulating and retrieving data stored in relational database.

SQL is the standard language for Relation Database System. All relational database management systems like MySQL, MS Access, and Oracle, Sybase, Informix, postgres and SQL Server use SQL asstandard database language.

Why SQL?

- Allows users to access data in relational database management systems.
- Allows users to describe the data.
- Allows users to define the data in database and manipulate that data.
- Allows to embed within other languages using SQL modules, libraries & pre-compilers.
- Allows users to create and drop databases and tables.
- Allows users to create view, stored procedure, functions in a database.
- Allows users to set permissions on tables, procedures, and views

History

- 1970 -- Dr. Edgar F. "Ted" Codd of IBM is known as the father of relational databases. Hedescribed a relational model for databases.
- 1974 -- Structured Query Language appeared.
- 1978 -- IBM worked to develop Codd's ideas and released a product named System/R.
- 1986 -- IBM developed the first prototype of relational database and standardized by ANSI.The first relational database was released by Relational Software and its later becoming Oracle.

SQL Process

When you are executing an SQL command for any RDBMS, the system determines the best way to carry out your request and SQL engine figures out how to interpret the task.

There are various components included in the process. These components are Query Dispatcher, Optimization Engines, Classic Query Engine and SQL Query Engine, etc. Classic query engine handles all non-SQL queries but SQL query engine won't handle logical files.

SQL Commands

The standard SQL commands to interact with relational databases are CREATE, SELECT, INSERT, UPDATE, DELETE and DROP. These commands can be classified into groups based on their nature.

DDL - Data Definition Language

Command	Description
CREATE	Creates a new table, a view of a table, or other object in database
ALTER	Modifies an existing database object, such as a table.
DROP	Deletes an entire table, a view of a table or other object in the database.

Fig.15

DML - Data Manipulation Language

Command	Description
SELECT	Retrieves certain records from one or more tables
INSERT	Creates a record
UPDATE	Modifies records
DELETE	Deletes records

Fig.16

DCL - Data Control Language

Command	Description
GRANT	Gives a privilege to user
REVOKE	Takes back privileges granted from user

Fig.17

Concurrency Management

In a multiprogramming environment where more than one transactions can be concurrently executed, there exists a need of protocols to control the concurrency of transaction to ensure atomicity and isolation properties of transactions.

Concurrency control protocols, which ensure serializability of transactions, are most desirable. Concurrency control protocols can be broadly divided into two categories:

- Lock based protocols
- Time stamp based protocols

Lock based protocols

Database systems, which are equipped with lock-based protocols, use mechanism by which any transaction cannot read or write data until it acquires appropriate lock on it first. Locks are of two kinds:

- Binary Locks: a lock on data item can be in two states; it is either locked or unlocked.

- Shared/exclusive: this type of locking mechanism differentiates lock based on their uses. If a lock is acquired on a data item to perform a write operation, it is exclusive lock. Because allowing more than one transactions to write on same data item would lead the database into an inconsistent state. Read locks are shared because no data value is being changed.

Types lock protocols

- Simplistic

  Simplistic lock based protocols allow transaction to obtain lock on every object before 'write' operation is performed. As soon as 'write' has been done, transactions may unlock the data item.

- Pre-claiming

  In this protocol, a transactions evaluations its operations and creates a list of data items on which it needs locks. Before starting the execution, transaction requests the system for alllocks it needs beforehand. If all the locks are granted, the transaction executes and releases all the locks when all its operations are over. Else if all the locks are not granted, the transaction rolls back and waits until all locks are granted.

- Two Phase Locking - 2PL

  This locking protocol is divides transaction execution phase into three parts. In the first part, when transaction starts executing, transaction seeks grant for locks it needs as it executes. Second part is where the transaction acquires all locks and no other lock is required. Transaction keeps executing its operation. As soon as the transaction releases its first lock, the third phase starts. In this phase a transaction cannot demand for any lock but only releases the acquired locks.

  Two phase locking has two phases, one is growing; where all locks are being acquired by transaction and second one is shrinking, where locks held by the transaction are being released.To claim an exclusive (write) lock, a transaction must first acquire a shared (read)lock and then upgrade it to exclusive lock.

- Strict Two Phase Locking

  The first phase of Strict-2PL is same as 2PL. After acquiring all locks in the first phase, transaction continues to execute normally. But in contrast to 2PL, Strict-2PL does not release lock as soon as it is no more required, but it holds all locks until commit state arrive. Strict- 2PL releases all locks at once at commit point. Time stamp based protocols

The most commonly used concurrency protocol is time-stamp based protocol. This protocol uses either system time or logical counter to be used as a time-stamp. Lock based protocols manage the order between conflicting pairs among transaction at the time of execution whereas time-stamp based protocols start working as soon as transaction is created.

Every transaction has a time-stamp associated with it and the ordering is determined by the age of the transaction. A transaction created at 0002 clock time would be older than all other transaction, which come after it. For example, any transaction 'y' entering the system at 0004 is two seconds younger and priority may be given to the older one.

In addition, every data item is given the latest read and write-timestamp. This lets the system know, when last read was and write operation made on the data item.

Time-stamp ordering protocol

The timestamp-ordering protocol ensures serializability among transaction in their conflicting read and writes operations. This is the responsibility of the protocol system that the conflicting pair of tasks should be executed according to the timestamp values of the transactions.

- Time-stamp of Transaction Ti is denoted as TS (T_i).
- Read time-stamp of data-item X is denoted by R-timestamp(X).
- Write time-stamp of data-item X is denoted by W-timestamp(X).

Timestamp ordering protocol works as follows:

- If a transaction Ti issues read(X) operation:
  - If TS(Ti) < W-timestamp(X)
    - Operation rejected.
  - If TS(Ti) >= W-timestamp(X)
    - Operation executed.
  - All data-item Timestamps updated.
- If a transaction Ti issues write(X) operation:
  - If TS(Ti) < R-timestamp(X)
    - Operation rejected.
    - If TS(Ti) < W-timestamp(X)
    - Operation rejected and Ti rolled back.
  - Otherwise, operation executed.

Data warehouse

- Data warehouse is data management and data analysis
- Goal: is to integrate enterprise wide corporate data into a single reository from which users caneasily run queries

Benefits

- The major benefit of data warehousing are high returns on investment.
- Increased productivity of corporate decision-makers

Problems

- Underestimation of resources for data loading
- Hidden problems with source systems
- Required data not captured
- Increased end-user demands
- Data homogenization
- High demand for resources
- Data ownership
- High maintenance
- Long-duration projects
- Complexity of integration

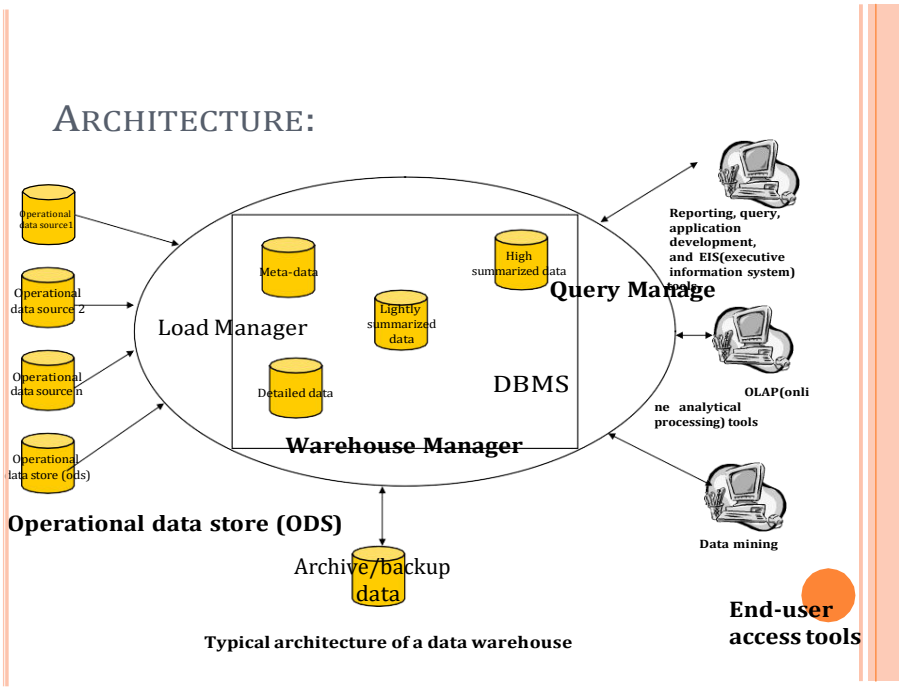

Fig.18

Main components

- Operational data sources□for the DW is supplied from mainframe operational data held in first generation hierarchical and network databases, departmental data held in proprietary file systems, private data held on workstaions and private serves and external systems such as the Internet, commercially available DB, or DB assoicated with and organization‘s suppliers or customers.
- Operational datastore(ODS)□is a repository of current and integrated operational data used for analysis. It is often structured and supplied with data in the same way as the data warehouse, but may in fact simply act as a staging area for data to be moved into the warehouse.
- query manager□also called backend component, it performs all the operations associated with the management of user queries. The operations performed by this component include directing queries to the appropriate tables and scheduling the execution of queries
- end-user access tools□can be categorized into five main groups: data reporting and query tools, application development tools, executive information system (EIS) tools, online analytical processing (OLAP) tools, and data mining tools.

Data flow

- Inflow- The processes associated with the extraction, cleansing, and loading of the data fromthe source systems into the data warehouse.
- upflow- The process associated with adding value to the data in the warehouse throughsummarizing, packaging , packaging, and distribution of the data.
- downflow- The processes associated with archiving and backing-up of data in the warehouse.

Tools and Technologies

The critical steps in the construction of a data warehouse:

- Extraction
- Cleansing
- Transformation

after the critical steps, loading the results into target system can be carried out either by separateproducts, or by a single, categories:

- code generators
- database data replication tools
- dynamic transformation engines

For the various types of meta-data and the day-to-day operations of the data warehouse, theadministration and management tools must be capable of supporting those tasks:

- Monitoring data loading from multiple sources
- Data quality and integrity checks
- Managing and updating meta-data
- Monitoring database performance to ensure efficient query response times and resourceutilization
- Auditing data warehouse usage to provide user chargeback information
- Replicating, subsetting, and distributing data
- Maintaining effient data storage management
- Purging data;
- Archiving and backing-up data
- Implementing recovery following failure

Data Mart

A data mart is a simple form of a data warehouse that is focused on a single subject (or functional area), such as sales, finance or marketing. Data marts are often built and controlled by a single department within an organization. Given their single-subject focus, data marts usually draw data from only a few sources. The sources could be internal operational systems, a central data warehouse, or external data.[1]

Dependent and Independent Data Marts

There are two basic types of data marts: dependent and independent. The categorization is based primarily on the data source that feeds the data mart. Dependent data marts draw data from a central data warehouse that has already been created. Independent data marts, in contrast, are standalone systems built by drawing data directly from operational or external sources of data, or both.

The main difference between independent and dependent data marts is how you populate the data mart; that is, how you get data out of the sources and into the data mart. This step, called the Extraction-Transformation-and Loading (ETL) process, involves moving data from operational systems, filtering it, and loading it into the data mart.With dependent data marts, this process is somewhat simplified because formatted and summarized (clean) data has already been loaded into the central data warehouse. The ETL process for dependent data marts is mostly a process of identifying the right subset of data relevant to the chosen data mart subject and moving a copy of it, perhaps in a summarized form.

With independent data marts, however, you must deal with all aspects of the

ETL process, much as you do with a central data warehouse. The number of sources is likely to be fewer and the amount of data associated with the data mart is less than the warehouse, given your focus on a single subject.The motivations behind the creation of these two types of data marts are also typically different. Dependent data marts are usually built to achieve improved performance and availability, better control, and lower telecommunication costs resulting from local access of data relevant to a specific department. The creation of independent data marts is often driven by the need to have a solution within a shorter time.

Steps in Implementing a Data Mart

Simply stated, the major steps in implementing a data mart are to design the schema, construct the physical storage, populate the data mart with data from source systems, access it to make informed decisions, and manage it over time.

- Designing
- Constructing
- Populating
- Accessing
- Managing

1. Designing

The design step is first in the data mart process. This step covers all of the tasks from initiating the request for a data mart through gathering information about the requirements, and developing the logical and physical design of the data mart. The design step involves the following tasks:

- Gathering the business and technical requirements
- Identifying data sources
- Selecting the appropriate subset of data
- Designing the logical and physical structure of the data mart

2. Constructing

This step includes creating the physical database and the logical structures associated with the data mart to provide fast and efficient access to the data. This step involves the following tasks:

- Creating the physical database and storage structures, such as tablespaces, associated with thedata mart
- Creating the schema objects, such as tables and indexes defined in the design step
- Determining how best to set up the tables and the access structures

3. Populating

The populating step covers all of the tasks related to getting the data from the source, cleaning it up, modifying it to the right format and level of detail, and moving it into the data mart. More formally stated, the populating step involves the following tasks:

- Mapping data sources to target data structures
- Extracting data
- Cleansing and transforming the data
- Loading data into the data mart
- Creating and storing metadata

4. Accessing

The accessing step involves putting the data to use: querying the data, analyzing it, creating reports, charts, and graphs, and publishing these. Typically, the end user uses a graphical front-end tool to submit queries to the database and display the results of the queries. The accessing step requires that you perform the following tasks:

- Set up an intermediate layer for the front-end tool to use. This layer, the metalayer, translates database structures and object names into business terms, so that the end user can interact with the data mart using terms that relate to the business function.
- Maintain and manage these business interfaces.
- Set up and manage database structures, like summarized tables, that help queries submitted through the front-end tool execute quickly and efficiently.

5. Managing

This step involves managing the data mart over its lifetime. In this step, you perform management tasks such as the following:

- Providing secure access to the data
- Managing the growth of the data
- Optimizing the system for better performance
- Ensuring the availability of data even with system failures

Data Mart issues

- Data mart functionality□the capabilities of data marts have increased with the growth in their popularity
- Data mart size□the performance deteriorates as data marts grow in size, so need to reduce the size of data marts to gain improvements in performance
- Data mart load performance□two critical components: end-user

response time and data loading performance to increment DB updating so that only cells affected by the change are updated and not the entire MDDB structure.

QUESTION BANK – UNIT – 3

	PART – A	CO	Blooms Level
1	What is an Entity?	CO3	L5
2	What is an Attribute?	CO3	L3
3	What Is Entity Relationship Model?	CO3	L5
4	Define DBMS.	CO3	L6
5	What are the advantages of database system?	CO3	L4
6	What are the objectives of DBMS?	CO3	L6
7	Define data model.	CO3	L6
8	What is ER diagram?	CO3	L4
9	What is relational data model?	CO3	L5
10	What is a Primary Key?	CO3	L5

	PART – B	CO	Blooms Level
1	What is Database Management system? Write advantages and disadvantages.	CO3	L6
2	Explain about HDBMS.	CO3	L5
3	Write notes on NDBMS model.	CO3	L6
4	Explain the process of query processing	CO3	L6
5	Discuss about concurrency management	CO3	L3
6	Evaluate D Mart model of data warehousing	CO3	L5

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SCHOOL OF MANAGEMENT STUDIES

UNIT – IV – INFORMATION MANAGEMENT – SBAA3018

UNIT 4 – SECURITY, CONTROL AND REPORTING

Security, Testing, Error Detection, Controls, IS Vulnerability, Disaster Management, Computer Crimes, Securing the Web, Intranets and Wireless Networks, Software Audit, Ethics in IT, User Interface and Reporting.

INFORMATION SECURITY

Why break IT system security?

- Revenge
- Money
- Notoriety
- The challenge of doing IT

All computer systems and communications channels face security threats that can compromise systems, the services provided by the systems and/or the data stored on or transmitted between systems. The most common threats are:

- Denial of Service
- Interception
- Manipulation
- Masquerading
- Repudiation

Challenges of IS security: There are three types of threats to IS security in an organization:

1. Internal Threats
   - Misuse and abuse of critical and sensitive computing assets
   - Damage or disruption of critical servers because of inappropriate access levels
   - Loss of productivity
   - Sabotage/vandalism (delete / corrupt)
2. External Threats
   - Hacking
   - Virus attacks
   - Corporate espionage (spies)
3. Natural Threats
   - Due to Natural disasters (Earthquake)
   - System Failures
   - Tornadoes

Security tools and defensive strategies to check the threats to IS

- Firewalls, Encryption
- Denial of Service defenses, Virus defenses
- E-mail Monitoring, Security Codes
- Backup files
- Security Monitors
- Biometric security
- Disaster recovery plans
- Fault tolerant system

SECURITY TESTING

Security testing is a process to determine that an information system protects data and maintains functionality as intended.

Primary reason: To identify potential vulnerabilities and subsequently repair them.

- The number of reported vulnerabilities is growing daily.
- The number of computer per person in many organization is continuously rise.
- Increasing demands on competent and experienced system administrators.
- It is imperative that organizations routinely best system for vulnerabilities and misconfiguration,

Vulnerability:

Vulnerability is a bug or misconfiguration or special sets of circumstances that could result in an exploitation of that vulnerability. Vulnerability could be exploited directly by an attacker through automated attack such as Distributed Denial of Service attacks / Viruses.

Security testing results can be used in following ways:

1. As a reference point for corrective action
2. To address identified vulnerabilities.
3. As a bench mark for tracing an organizations progress in meeting security requirements
4. To assess the implementation status of system security requirements
5. To conduct cost benefit analysis for improvements to system security and
6. To enhance other life cycle activities, such as risk assessment and performance improvement efforts.

Security testing Techniques:

1. Network scanning
2. Vulnerability scanning
3. Password cracking
4. Log review
5. Integrity checkers
6. Virus detection
7. War dialing
8. War driving
9. Penetration testing

ERROR DETECTION:

Software errors are inescapable and they are easily permeable into programs. Errors free software delivery is twofold. The first is to prevent the introduction of errors and the second is to detect the errors or bugs hidden in the codes.

The moment errors are detected instant action must be taken to seek them out, and destroy them. Prevention of bugs creeping into programs is far better than eliminating them. Software developers are supposed to have already spent approximately 80 percent of development costs on identifying and correcting defects.

Classes of Error Detection Techniques

1. Static Analysis
    - Code Walk through
    - Code Inspection
2. Dynamic Analysis
3. Formal Analysis

Phases of Error Detection

- Requirements
- Design
- Implementation
- Test
- Installation and checkout
- Operation and maintenance

CONTROL:

The combination of manual and automated measures that safeguard information system and ensure that they perform according to management standards is termed controls.

Controls are defense mechanisms that are designed to protect all the components of an information system specially, data, software, hardware and networks.

General controls: it will apply to all computerized applications and consist of a combination of hardware, software and manual procedures that create an overall control environment,

- Physical controls: Computers, Data centers, Software, Manuals and Networks
- Access controls: Restriction for authorized and unauthorized
- Biometric controls: Fingerprint, Blood vessels, Retina of eye, Voice, Signature, Facial Thermography
- Data security control
- Administrative control
- Communication control

Application controls:

- Input control
- Processing control
- Output control

IS VULNERABILITY

It is a bug or weakness which allows an attackers to reduce a system's information assurance (accidentally triggered / Intentionally exploited)

- Hardware failure
- Software failure
- Personnel actions
- Theft of data
- Sabotage / Malicious damage
- Computer Viruses

- Fire, Earthquake, floods
- User errors
- Programme changes
- Telecommunication problems

Examples of vulnerability

- Weak passwords
- Software bugs
- Computer viruses
- Script code injuction

DISASTER MANAGEMENT

'Disaster management can be defined as the organization and management of resources and responsibilities for dealing with all humanitarian aspects of emergencies, in particular preparedness, response and recovery in order to lessen the impact of disasters.

Types of disasters

There is no country that is immune from disaster, though vulnerability to disaster varies. There are four main types of disaster.

- **Natural disasters.** These disasters include floods, hurricanes, earthquakes and volcano eruptions that can have immediate impacts on human health, as well as secondary impacts causing further death and suffering from floods causing landslides, earthquakes resulting in fires, tsunamis causing widespread flooding and typhoons sinking ferries
- **Environmental emergencies.** These emergencies include technological or industrial accidents, usually involving hazardous material, and occur where these materials are produced, used or transported. Large forest fires are generally included in this definition because they tend to be caused by humans.
- **Complex emergencies.** These emergencies involve a break-down of authority, looting and attacks on strategic installations. Complex emergencies include conflict situations and war.
- **Pandemic emergencies.** These emergencies involve a sudden onset of a contagious disease that affects health but also disrupts services and businesses, bringing economic and social costs.

Any disaster can interrupt essential services, such as the provision of health care, electricity, water, sewage/garbage removal, transportation and communications. The interruption can seriously affect the health, social and economic networks of local communities and countries. Disasters have a major and long-lasting impact on people long after the immediate effect has been mitigated. Poorly planned relief activities can have a significant negative impact not only on the disaster victims but also on donors and relief agencies. So it is important that physical therapists join established programmes rather than attempting individual efforts.

Local, regional, national and (where necessary) international organizations are all involved in mounting a humanitarian response to disasters. Each will have a prepared

disaster management plan. These plans cover prevention, preparedness, relief and recovery.

Disaster prevention

These are activities designed to provide permanent protection from disasters. Not all disasters, particularly natural disasters, can be prevented, but the risk of loss of life and injury can be mitigated with good evacuation plans, environmental planning and design standards.

Disaster preparedness

These activities are designed to minimize loss of life and damage – for example by removing people and property from a threatened location and by facilitating timely and effective rescue, relief and rehabilitation. Preparedness is the main way of reducing the impact of disasters. Community-based preparedness and management should be a high priority in physical therapy practice management.

Disaster relief

This is a coordinated multi-agency response to reduce the impact of a disaster and its long-term results. Relief activities include rescue, relocation, providing food and water, preventing disease and disability, repairing vital services such as telecommunications and transport, providing temporary shelter and emergency health care.

Disaster recovery

Once emergency needs have been met and the initial crisis is over, the people affected and the communities that support them are still vulnerable. Recovery activities include rebuilding infrastructure, health care and rehabilitation. These should blend with development activities, such as building human resources for health and developing policies and practices to avoid similar situations in future.

Disaster management is linked with sustainable development, particularly in relation to vulnerable people such as those with disabilities, elderly people, children and other marginalized groups.

COMPUTER CRIMES

"Any violations of criminal law that involve knowledge of computer technology for their perpetration, investigation or prosecution".

Types of computer crimes:

- Spam - unauthorized sending of bulk SMS
- Fraud
- Obscene or offensive content
- Harassment
- Drug trafficking
- Cyber terrorism

CYBER CRIME:

"unlawful acts wherein the computer is either a tool or target or both"

Reasons for cyber crime:

- Capacity to store data in comparatively small space
- Ease to access
- Complex (millions of codes)
- Negligence (connected with human conduct)
- Loss of evidence

Mode of committing cyber crime:

- Unauthorised access (Hacking)
- Theft of Information (Electronic form)
- E-mail bombing (mail crash)
- Dada diddling (altering raw data)
- Denial of service attack
- Logic bombs
- Pornography
- Forgery
- IPR violation
- Banking (credit card items)

SECURING THE WEB:

- Once the business connected to internet it is your responsibility to protect your business data and information against unwanted intruders.
- Sensitive information such as customer details, pricing lists and personal records can all be stolen, corrupted or even destroyed unless protected properly
- Gain competitive edge to reach worldwide audience
- Low cost
- Customer information such as credit card numbers, and financial data

Internet security:

"It involves the protection of a computer's internet account and files from intrusion of an unknown users."

The internet security professionals should be in fluent in major four aspects:

1. Penetration testing
2. Intrusion detection
3. Incidence response
4. Legal / Audit compliance

Security Policy in securing the web:

Website take steps to make certain that the organisation has an adequate security policy in place. The security policy should address the following areas.

Step 1: Securing, installing and configuring the underlying operating system of the Web Server,
Step 2: Securing, installing and configuring the Web Server software.
Step 3: Employing approximate network protection mechanisms. (e.g. Firewall, Packet filtering router,& Proxy)

Step 4: Maintaining the secure configuration through application of appropriate patches and upgrades, security testing, Monitoring logs & Backup of data and operating system.
Step 5: Using publicizing and protecting information and data in a careful systematic manner.
Step 6: Application updating and log reviews.
Step 7: Conducting initial and periodic vulnerability scans of each public Web Servers (Firewall routers).

SECURING THE INTRANET / EXTRANET

Intranet is an internal information system based on Internet Technology, Web services, and HTTP communication protocols and HTML publishing.

Tangible Benefits of Intranet / Extranet	**Intangible benefits of Intranet / Extranet**
➢ Inexpensive to implement ➢ Easy to use, just point & click ➢ Saves time & Money ➢ Better Information faster ➢ Scalable & flexible ➢ Connects across platforms ➢ Puts users in control of data	➢ Improved decision making ➢ Empowered users ➢ Build culture of sharing & collaborating ➢ Facilitates organizational learning ➢ Breaks down bureaucracy ➢ Improved quality of work life ➢ Improved productivity

Risks involved in Intranet / Extranet:

- The network administrator should make sure that proper security permissions are assigned to the folders, so that users will access information properly.
- All shared folders should be hidden to prevent any user from being tempted to scan through the folders.
- Server that is hosting the web page should have latest security service packs installed.
- Any information is posted, the confidentiality of such information should be investigated, the password page should be assigned
- The network administrator should ensure that proper security permissions are in place.

Business applications to Intranet:

Human Resource, Sales & Marketing, Information System, Executive / Corporate, Customer Service & Finance

SECURING WIRELESS NETWORK:

- Wireless – WiFi – (Wireless Fidelity) helps you to connect to the internet without relying on wires.
- House, office, airport has wireless connection, you can access the network from anywhere within that wireless area
- Wireless rely on radio waves
- Transmitter known as wireless access point/gateway provides hotspot that transmits the connectivity over radio waves.

Steps to secure Wireless Network:

- Change the System ID (SSID / ESSID – Service Set Identifier / Extended Service Set Identifier)
- Disable identifier broadcasting
- Enable Encryption
- Restrict unnecessary traffic
- Change the default administrator password
- Patch and protect your PC

SOFTWARE AUDIT

"Software audit is a regular investigation of the software installed on all computers in an organisation to ensure that it is authorized / licensed."

- 95% of IT security risk from software
- It is imperative that organizations assess / measure / manage their own software risk

Need for Software Audit:

- To identify critical security issues before they are exploited by malicious attackers.
- To reduce the vulnerabilities of software
- To locate the most problematic crashes of application
- To restore compromised network
- To conduct software vulnerability assessment
- To harden and improve the security of an application.

Types of auditors and audits:

- Internal Auditor – Internal Audit
- External Auditor – External Audit

Software audit review:

"An independent examination of software product, software process, or set of software processes to assess the compliance with specifications, criteria and contractual agreements".

ETHICS IN INFORMATION TECHNOLOGY:

Ethics is a moral code and set of rules which establishes boundaries of generally accepted behaviour.

Morality in social conventions about right / wrong.

Ethics is a set of belief about right and wrong behaviour Ethical behaviour conforms to generally accept social norms.

Ethics in IT

- E-mail and Internet access monitoring
- Peer to Peer networks violation of copyright
- Unsolicited e-Mail
- Hackers and identify theft
- Plagiarism
- Cookies & spyware

Ethical relationship between IT professionals and employers:

- Software piracy
- Enabling others be tempted to violate laws
- Trade Secret
- Whistle blowing

Ethical relationship between IT professionals and Clients

- Hardware, software services at certain cost and within time frame
- Provides compensation
- Access to key contacts
- Contractual terms
- Own products and services recommended
- Unable to provide full or accurate status

Ethical relationship between IT professionals and suppliers

- Good relationship
- Fair dealing to avoid unreasonable demand
- Bribery (monetary or non-monetary)

Ethical relationship between IT professionals and other professionals

- Inappropriate sharing of corporate information

Ethical relationship between IT professionals and IT Users

- Understand users needs and capabilities
- Deliver products and services meets those needs
- Establish an environment that supports ethical behaviour by users.

Ethical relationship between IT professionals and Society

- Actions of IT professionals can affect society

USER INTERFACE

An interface is the common boundary between the user and the computer system application – the point where the computer and the individual interact.

It is a part of the system that allows users to input data, to command the operations and to receive outputs from the system. Therefore, user interfaces include documents, data entry screens, reports (printed or screen display) and user system dialog.

The User interface essentially addresses three different communication and interaction needs of the system

- Between one software component and another
- Between a software component and other information users or other non-human objects such as devices, utilities and systems
- Between the user and the computer.

Purpose of Interface

- It tells the system what actions to take
- Facilitates use of system
- Avoid user errors

Types of Interfaces

1. Natural language interface
2. Question answer interfaces
3. Menu driven interface
    - Pull down and cascading menus
    - Tear off and popup menu
    - Toolbar and iconic menu
    - Hypertext and hyperlink menus
4. Form fill interface
5. Command language interface
6. Graphical user interfaces
    - Direct manipulation
    - Indirect manipulation

REPORTING

Reporting is a fundamental part of the larger movement towards improved business intelligence and knowledge management. Often implementation involves extract, transform, and load (ETL) procedures in coordination with a data warehouse and then using one or more reporting tools. While reports can be distributed in print form or via email, they are typically accessed via a corporate intranet.

Business reporting or enterprise reporting is "the public reporting of operating and financial data by a business enterprise," or "the regular provision of information to decision-makers within an organization to support them in their work."

With the dramatic expansion of information technology, and the desire for increased competitiveness in corporations, there has been an increase in the use of computing power to produce unified reports which join different views of the enterprise in one place. This reporting process involves querying data sources with different logical models to produce a human readable report—for example, a computer user has to query the Human Resources databases and the Capital Improvements databases to show how efficiently space is being used across an entire corporation.

TYPES OF REPORTS:

Reports can be classified on the basis of purpose, source, frequency, target audience, length, subject dealt, function performed and intention.

1. Source: Source refers to the person/persons who initiated the report. Voluntary reports are prepared on own initiative and they require more detail. The background of the subject should be more carefully planned. The authorized reports are those which are prepared as a response to a request made.
2. Frequency: Routine or periodic reports are submitted on a recurring basis which may be weekly, monthly, daily etc. Some routine reports may be prepared in preprinted computerized form. Due to the routine nature of report, it requires only less introduction then the special reports. Special reports are nonrecurring in nature and they present the results of specific, one time studies or investigations.
3. Length: A short report differs from a long report in scope, research and duration. A long report examines the problem in detail and requires more extensive time and effort in preparation. On the contrary a short report may discuss only a module of a problem. A summary is a short report which gives a concise overview of a situation. It highlights the important details but does not include background material, examples or specific details. A short report is suitable when the problem is well defined, is of limited scope and has a simple methodology. It normally runs to five pages.
4. Intent: An informal report focuses on the facts and explains or educates the readers. Analytical report is designed to solve a problem by convincing readers that the conclusions and recommendations reached are justified based on the data collected, analysis and interpretation. Information provided plays a supporting role in convincing the reader.
5. Function: The reports may be classified as informative and interpretative on the basis of function performed. Informative reports present facts pertinent to the issue or situation. Common types of informational reports include those for monitoring and controlling operations, statements of policies and procedures, compliance reports and progress reports. It may take the form of an operating or a periodic report. Operating reports provide managers with detailed information regarding all activities like sales, inventory, costs etc., Periodic reports which describe the activities in a department during a particular period.
6. Subject dealt: The reports may be categorized as problem determining, fact finding, performance report, technical report etc. The problem determining report focuses on underlying a problem or to ascertain whether a problem actually exists. Technical reports are concerned with presenting data on a specialized subject with or without comments.
7. Legal reports: Reports may be prepared to meet the government regulations. For eg., A compliance report explains what a company is doing to conform to the government regulations. It may be prepared on annual basis like the income tax returns, annual share holders report etc. Interim compliance reports can also be prepared to monitor and control the licenses granted by the government.

QUESTION BANK – UNIT – 4

	PART – A	CO	Blooms Level
1	What is meant by security?	CO4	L4
2	What are controls?	CO4	L5
3	What is firewall?	CO4	L5
4	What is access controls?	CO4	L6
5	Explain digital signature.	CO4	L5
6	What is computer crime?	CO4	L4
7	What is meant by hacking?	CO4	L5
8	What is authorization and authentication?	CO4	L4
9	What are the objectives of information testing.	CO4	L4
10	What is software design?	CO4	L3

	PART – B	CO	Blooms Level
1	Explain different types of firewall.	CO4	L5
2	What is vulnerability? Explain the different cause of vulnerability.	CO4	L6
3	Explain the different forms of computer crime.	CO4	L5
4	What is virus? Compare and contrast between virus and work.	CO4	L5
5	What is ethics? Explain the business and technology ethics.	CO4	L3
6	Define reporting. Explain different types of reports.	CO4	L6
7	What is user interface? Explain the different types of interfaces.	CO4	L5

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SCHOOL OF MANAGEMENT STUDIES

UNIT – V – INFORMATION MANAGEMENT – SBAA3018

UNIT 5 – NEW IT INITIATIVES

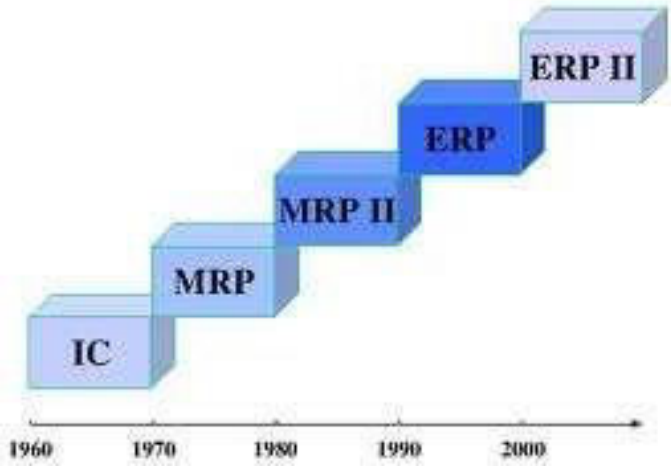
Role of Information management in ERP, e-Business, e-Governance, Data Mining, Business Intelligence, Pervasive Computing, Cloud Computing, CMM

ENTERPRISES RESOURCE PLANNING (ERP)

- ERP is a package software solution that addresses the enterprise needs of an organization by tightly integrating the various functions of an organization using a process view of the organization.
- ERP is an integrated enterprise wide information system solution that integrates across functions, management hierarchies and locations.
- ERP software applications to improve the performance of organizations resource planning, management control and operational control.

Fig.19

Evolution of ERP



ERP II **Fig.20**

ERP II is regarded as the "next generation" of ERP and offers several advantages over

traditional ERP systems. ERP systems have historically been mostly limited to finance and administration primarily serving logistics, supply chain and warehousing functions.

Uses of ERP:

- Ideal for manufacturing industry
- All functions for planning and managing core business
- Designed to automate many of the basic process
- Eliminating complex
- A mirror image of business process

Critical factors for successful implementation

- It needs high level of sponsor commitment
- It needs strong process orientation in terms of time
- It needs dedicated project team from the user
- It needs strong support for changes to occur
- It needs quick decision making processes and
- It needs empowered team

Role of Information Management in ERP:

From the overall business standpoint, an ERP system achieves a number of important objectives, including maximizing throughput of information, minimizing response time to customers and suppliers, pushing decision making down to the lowest appropriate level, and providing timely information to decision makers. Most important, an ERP system integrates information throughout the supply chain. From a business standpoint, this means cost reduction, inventory reduction and improved operating performance. The information management benefits are shown below:

Basis	Before ERP	With ERP
Cycle Time	Costly bottlenecks	Time and cost reduction of business process
Transactions processing	Multiple transactions use multiple data files	Faster transactions, using common data.
Financial Management	Increased cost of excess inventory, cost of overdue accounts receivable	Improves operational performance
Business processes	Proliferation of fragmented processes with duplication of effort	Re-engineering around a business model that conforms to best practices
Productivity	Lack of responsiveness to customers	Improvements in customer service
SCM	Lack of integration	Linkages with suppliers & customers
e-Business	Web-based interfaces	Integrated systems
Information	Lack of information for effective monitoring and control	Allows cross functional access to the data for planning and control
Communication	Lack of effective communications with customers and suppliers	Facilitates organizational communication with customers and suppliers

USINESS:

- The conduct of automated business transactions by means of electronic communications networks end to end.
- Utilization of information and communication technologies in support of all the activities of business.

One can simply describe e-business by three simple points:

- Automated
- Business process
- Network

ommerce:

"any form of business transaction in which the parties interact electronically rather than by physical exchanges or direct physical contact"

Differences between e-commerce and e-business:

- E-commerce is the subset of e-business. The later one is a very broad concept while the former one is just a small part of it.
- Those activities which essentially involve monetary transactions of termed as e-commerce. However, e-business is a much broader term.
- To sell online is e-commerce but to bring and retain customers and educate them is e-business.
- E-commerce has also been defined as a process covering outward processes that touch customers, suppliers and external partners while e-business covers internal processes such as production, inventory management, product development, risk management, finance etc.

The major categories of e-business solutions

- Business to Business
- Business to Consumer
- Consumer to Business
- Business to Government
- Government to Business
- Peer to Peer
- Business to Employee
- M-Commerce

E-GOVERNANCE:

e-Governance refers to the delivery of national or local government information and services via the internet or other digital means to citizens or businesses or other governmental agencies.

overnance is the use of information technology to provide citizen and organizations with more convenient access to government information and services and to provide delivery of public services to citizen, business partners, and those working in the public sector.

Government harness information to technologies such as Wide Area Network, Internet, WWW and mobile computing reach out to citizens, business and other arms of the government to:

- Improve delivery of services to citizens, businesses and employees
- Engage citizens in the process of governance through interaction
- Empower citizens through access to knowledge and information and
- Make the working of the government more efficient and effective

Delivery models and activities of e-Governance:

- Government to Citizen (G2C)
- Government to Business (G2B)
- Government to Government (G2G)
- Government to Employees (G2E)

Within the above interaction domains, four kinds of activities take place:

- Pushing information over the internet, e.g. regulatory services, general holidays, public hearing schedules, issue briefs, notifications, etc.
- Two-way communications between the agency and the citizen. In this model, user can engage in dialogue with agencies and post problems, comments, or requests to the agency.
- Conducting transactions, e.g. lodging tax returns, applying for services and grants
- Governance e.g. online polling, voting, and campaigning

Non Internet e-Governance:

While e-governance is often thought of as online government or internet based government, Many non-internet electronic governance technologies can be used in this context. Some non-internet forms include telephone, fax, SMS, MMS, wireless networks and services, Bluetooth, tracking systems, biometric identification, road traffic management and regulatory enforcement, identity cards, smart cards and other near field communication applications, polling station technology, TV and radio-based delivery of government services, e-mail, online community facilities, newsgroups and electronic mailing lists, online chats, and instant messaging technologies.

Potential benefits and risks of e-Governance:

Benefits:

- Convenient and cost effective for business
- More transparency and accountability
- Can be used to attract industrial and commercial investment
- Democratization
- Speed and convenience to citizens

Risks:

- Hyper surveillance (Close contact) – No privacy
- Cost (Very huge amount need to government to implement the system)
- Inaccessibility (Remote area / illiterate)
- False sense of transparency (maintained and updated by government, so there may be chance for false information)

DATA WAREHOUSING

Data warehousing is a collection of methods, techniques, and tools used to support knowledge workers – senior managers, directors, managers, and analysts – to conduct data analyses that help with performing decision making processes and improving information resources.

Benefits of Data warehousing:

- Has a subject area orientation
- Integrates data from multiple, diverse sources
- Allows for analysis of data over time
- Adds ad hoc reporting and enquiry
- Provides analysis capabilities to decision makers
- Allows for a continuous planning process
- Converts corporate data into strategic information
- Data warehouses facilitate decision support system such as trend reports

Disadvantages of data ware housing:

- Data warehouses are not the optimal environment for unstructured data
- Because data must be extracted, transformed and loaded into the warehouse
- Over their life, data warehouses can have high costs
- Maintenance costs are high

DATA MINING

- Data mining can be defined as the process of getting hidden information from the piles of databases for analysis purposes.
- Data mining is also known as knowledge discovery in databases (KDD). It is the extraction of data from large databases for some specialized work.
- Data mining tools predict future trends and behaviours, allowing businesses to make proactive, knowledge driven decisions.

Scope of Data Mining:

- Automated prediction of trends and behaviors
- Automated discovery of previously unknown patterns

How does data mining work?

- Classes
- Clusters
- Associations
- Sequential patterns

Data mining consists of five major elements:

- Extract, transform, and load transaction data onto the data warehouse system
- Store and manage the data in a multidimensional database system
- Provide data access to business analysts and information technology professionals
- Analyze the data by application software
- Present the data in a useful format, such as a graph or table

Data mining process:

- Problem definition
- Data exploration
- Data preparation
- Modeling
- Evaluation
- Deployment

BUSINESS INTELLIGENCE:

Business intelligence (BI) is a business management term which refers to applications and technologies which are used to gather, provide access to, and analyze data and information about their company operations.

Business intelligence systems can help companies have a more comprehensive knowledge of the factors affecting their business, such as

- Metrics on sales,
- Production
- Internal operations and
- Help the companies to make better business decisions.

The five key stages of BI

- Data sourcing
- Data analysis
- Situation awareness
- Risk assessment
- Decision support

Potential industry application areas of Business Intelligence:

- Retail / Marketing
- Banking
- Insurance and Health care
- Transportation
- Finance

PERVASIVE COMPUTING:

Pervasive computing is the study of a computing technology that pervades the users' environment by making use of seamless connectivity of multiple independent information devices embedded in the environment of the users.

Pervasive computing is a branch of computing that allows computing elements to pervade user's environment to help user(s) preferably without being intrusive. It involves elements of computing, sensing, communication networking, services. It demonstrates its ubiquitous nature by being freely available at times, almost invisible / transparent to the user(s) and has hardware, firmware, software (OS, Applications etc. includes services.

Pervasive computing is done by:

- Making use of multiple independent information devices (fixed or mobile, homogeneous or heterogeneous)
- Interconnecting these devices seamlessly through wireless or wired computer communication networks.
- Providing a class of computing / sensory / communication services to a class of users, preferably transparently and can provide personalized services while ensuring a fair degree of privacy / non-intrusiveness.
- Pervasive computing is also called ubiquitous computing or invisible computing.

Unlike traditional desktop computers and existing networks, the new devices will have the following characteristics:

- Many will have small, inexpensive processors with limited memory and little or no persistent storage.
- They will connect to other computing elements without the direct intervention of users.
- Often, they will be connected by wireless networks.
- They will change rapidly, sometimes by being mobile, sometimes by going on and offline at widely varying rates.
- Over time, they will be replaced far more rapidly than is now common.
- They will be used as a source of information, often sending that information into the center of the network to which they are attached.

Nature of pervasive computing:

- Ubiquitous computing (ever present / everywhere)
- Ambient computing (computing is embedded in everyday objects)
- Disappearing computing (engaged in mobile interaction sessions)

Advantages of pervasive computing:

We increasingly rely on the electronic creation, storage, and transmittal of personal, financial, and other confidential information, and demand the highest security for all these transactions and require complete access to time-sensitive data, regardless of physical location. We expect device – personal digital assistants, mobile phones, office PCs and home entertainment systems – to access that information and work together in one seamless, integrated system. Pervasive computing gives us the tools to manage information quickly, efficiently, and effortlessly.

It aims to enable people to accomplish an increasing number of personal and professional transactions using a new class of intelligent and portable appliances or 'smart devices' embedded with microprocessors that allow users to plug into intelligent networks and gain direct, simple, and secure access to both relevant information and services. It gives people convenient access to relevant information stored on powerful networks, allowing them to easily take action anywhere, anytime.

Pervasive computing simplifies life by combining open standards-based applications with everyday activities. It removes the complexity of new technologies, enables us to be more efficient in our work and leaves us more leisure time and thus pervasive computing is fast becoming a part of everyday life.

Pervasive computing provides an attractive vision for the future of computing. Well, we no longer will be sitting down in front of a PC to get access to information. In this wireless world we will have instant access to the information and services that

we will want to access with devices, such as smart phones, set top boxes, embedded intelligence in your automobile and others, all linked to the network, allowing us to connect anytime, anywhere seamlessly, and very importantly, transparently.

CLOUD COMPUTING

Cloud computing is a type of computing that relies on sharing computing resources rather than having local servers or personal devices to handle applications.

In cloud computing, the word cloud is used as a metaphor for "the internet", so the phrase cloud computing means "a type of internet based computing", where different services such as servers, storage and applications – are delivered to an organization's computers and devices through the internet

Characteristics of cloud computing

- On-demand self-service
- Broad network access
- Resource pooling
- Rapid elasticity
- Measured service

Components of cloud computing

- Clients
- Data centre
- Distributed servers

Cloud computing models

- Software as a service
- Platform as a service
- Infrastructure as a service

Types of cloud computing

- Public cloud
- Private cloud
- Hybrid cloud

Advantages of cloud computing

- Reduced cost
- Increased storage
- Flexibility

Disadvantages of cloud computing

- Data protection
- Data recovery and availability
- Management capabilities
- Regulatory and compliance restrictions

CAPABILITY MATURITY MODEL

MM comes from the field of software development; it is used as a general model to aid in improving organizational business process in diverse areas. Such as software engineering, system engineering, project management, software maintenance, risk management, system acquisition, information technology, services, and human capital management. The CMM has been used extensively worldwide in government, commerce, industry and software development organizations.

What is CMM?

CMM is a model of process maturity for software development – an evolutionary model of the progress of a company's abilities to develop software.

Advantages of using CMM:

- CMM describes an evolutionary improvement path from an ad hoc immature process to a mature, disciplined process.
- CMM covers practices for planning, engineering, and managing software development and maintenance.
- CMM establishes a yardstick against which it is possible to judge, in a repeatable way, the maturity of an organization's software process,
- CMM can also be used by an organization to plan improvements to its software process.
- CMM also reflects the needs of individuals performing software process, software process assessments, or software capability evaluations, is documented and is publicly available.
- In any software development company there are standards for processes of development, testing, and software application, and rules for appearance of final program code, components, interfaces, etc.

Levels of CMM:

- Initial level (Disciplined process),
- Repeatable level (standard, consistent process)
- Defined level (predictable process),
- Managed level (Continuously improving process)
- Optimizing level (anticipates possible errors and defects and decrease the costs of software development)

QUESTION BANK – UNIT - 5

	PART – A	CO	Blooms Level
1	Explain the uses of ERP.	CO6	L4
2	What is e-Business.	CO6	L6
3	What is data mining?	CO5	L4
4	Explain data warehouse.	CO6	L4
5	Explain the non-internet e-governance.	CO5	L3
6	Define business intelligence.	CO5	L4
7	What is pervasive computing	CO5	L5
8	List out the advantages of data mining.	CO5	L5
9	Bring out the benefits of e-governance.	CO6	L5
10	What is cloud computing?	CO5	L4

	PART – B	CO	Blooms Level
1	Explain the role of information management in ERP.	CO6	L5
2	Explain the different types of e-business?	CO6	L5
3	Explain the components of data mining?	CO5	L6
4	What is pervasive computing? Explain its advantages.	CO5	L6
5	Explain CMM and its different levels.	CO6	L4
6	Explain different types cloud computing. What are the benefits and demerits of cloud computing?	CO5	L5

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1. Kenneth C. Laudon & Jane Price Laudon, Management Information Systems - Managing the digital firm, PHI Learning, Pearson Education, 14th Edition, 2016.
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