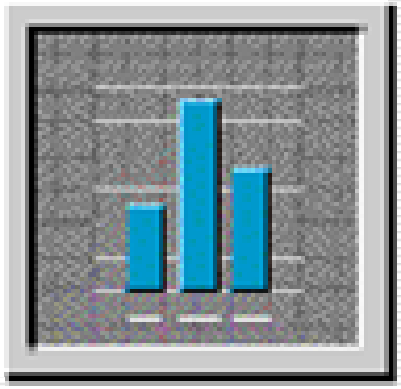
MIS Concepts & Design



by

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MIS Concepts

Information is Critical

The information we have

is not what we want,

The information we want

is not the information we need,

The information we need

is not available.

Information is a Resource

- It is scarce
- It has a cost
- It has alternative uses
- There is an opportunity cost factor involved if one does not process information

Why need Information?

To ensure effective and efficient decision - making leading to prosperity of the Organisation.

What is MIS?

Short for *Management Information System* –

MIS refers broadly to a computer-based system that provides managers with the tools for organizing, evaluating and efficiently running their departments.

What is MIS?

Right Information

To the right person

At the right place

At the right time

In the right form

At the right cost

Management Information System

The three sub-components

Management, Information and System

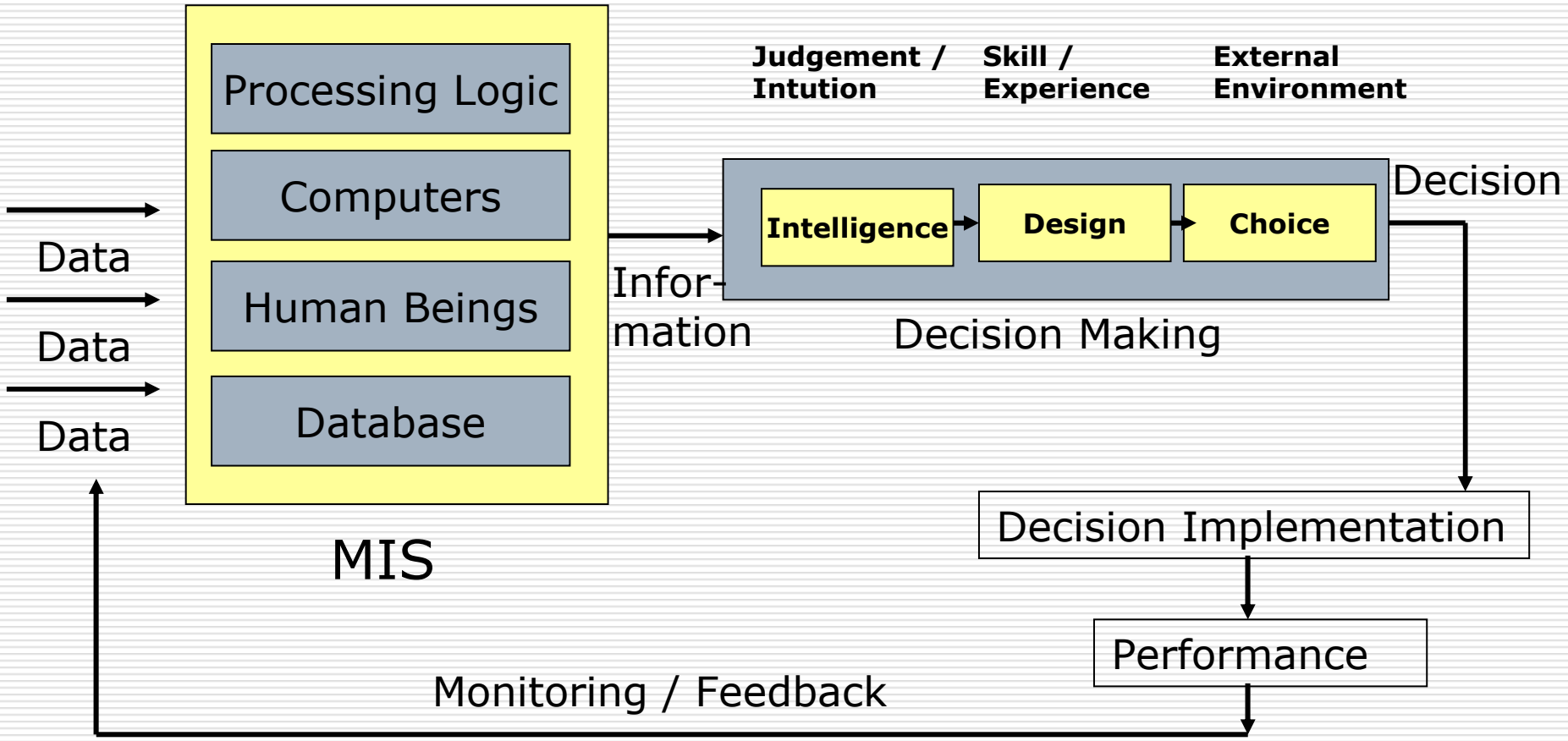
- together bring out the focus clearly & effectively.

System **emphasizing a fair degree of integration and a holistic view;**

Information **stressing on processed data in the context in which it is used by end users;**

Management **focusing on the ultimate use of such information systems for managerial decision making.**

The Concept of MIS



Why MIS? It's Role

Increased Business & Management Complexities

Increased Business Complexities

- Technological Revolution
- Research & Development
- Explosion of Information

Increased Management Complexities

- Management Science Technologies
- Decision-making
- Onset of Computers

Functional Uses of MIS

Enhance :

- Quality of our operations
- Quality of our services

We achieve :

- Efficiency
- Transparency
- Speedy Decision making

Strategic Uses of MIS

- Precise development of strategies, planning, forecasting and monitoring
- Problem solving
- Decision-making
- Separate work from location

Historic Development

The concept of MIS has changed substantially over the years.

In the 50's and 60's, the management saw the potential of computers to process large amounts of data speedily and accurately.

The departments that were involved with such activities were known as Electronic Data Processing (EDP) departments. The focus of EDP was Record Keeping e.g. accounting data – Payroll data.

Historic Development

In the 70's, there was a discernible shift from data to information. The focus was not on data but on the analysis of Organisation data.

There was a shift in the philosophy.

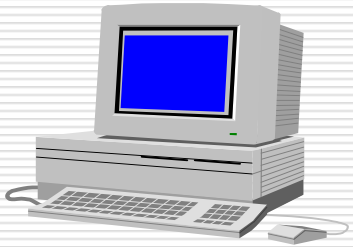
Such a concept came to be widely known as 'Management Information System'.

right information in right time to right people

Historic Development

In the 70's the top management relied on the staff of EDP & MIS to supply the necessary information.

The 80's saw the Personal Computer (PC) revolution.



The Personal Computer & the desk-top metaphor changed the picture completely.

The biggest pay-off for such direct use was the "what-if" analysis capability.

This led to the emerge of Decision Support Systems (DSS).

Historic Development

The information and decision hungry managers of 80's saw a huge potential in the expert systems as a result of spectacular growth in the Artificial Intelligence area.

Combined with DSS philosophy the expert systems could supply a superior class of managerial information support, known as Knowledge Based Systems (KBS).

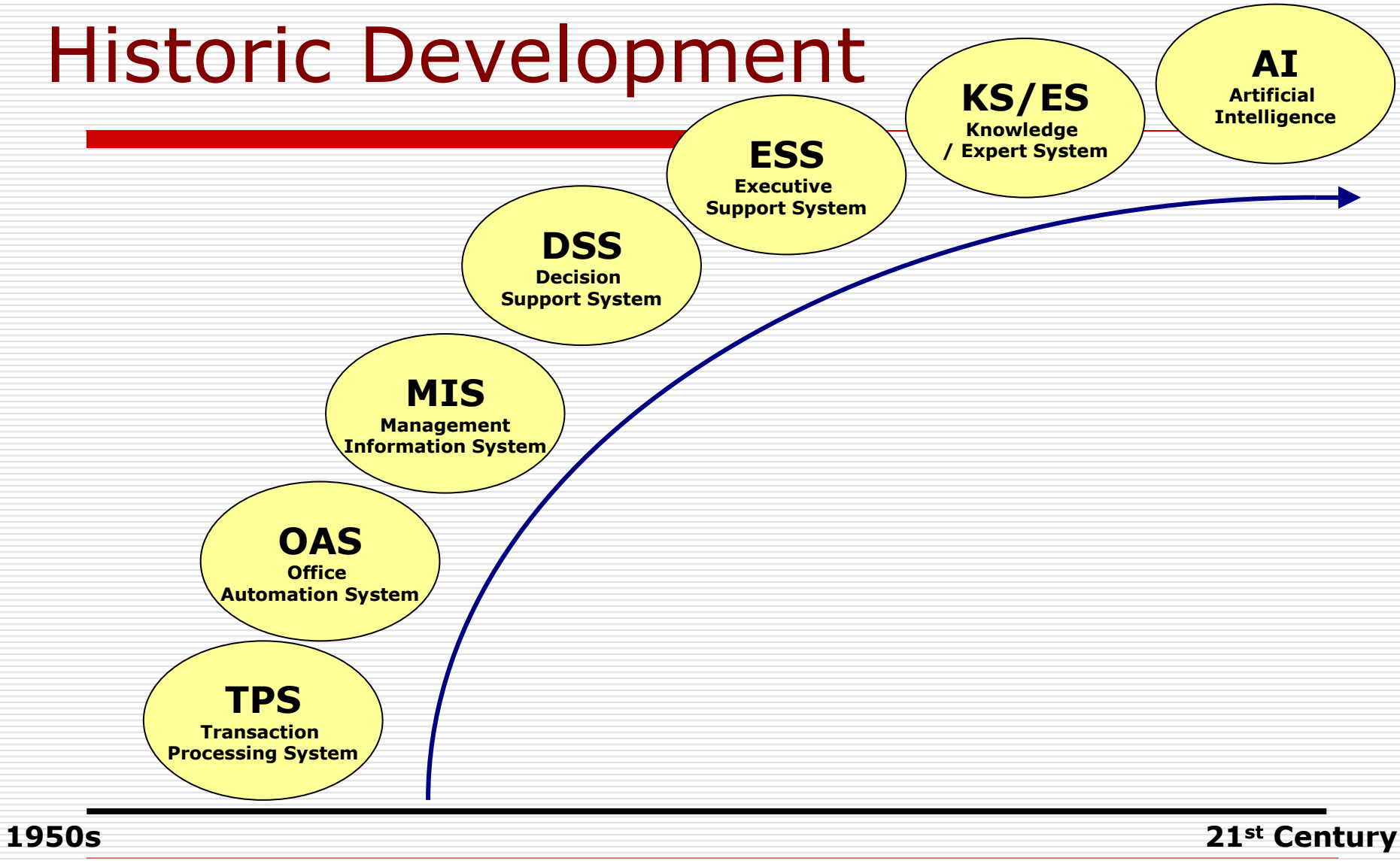
Historic Development

The EDP targeted the operational level of management.

The MIS/DSS/KBS target the middle management.

Attempts were made to provide information to top management as well, known as Executive Information System (EIS).

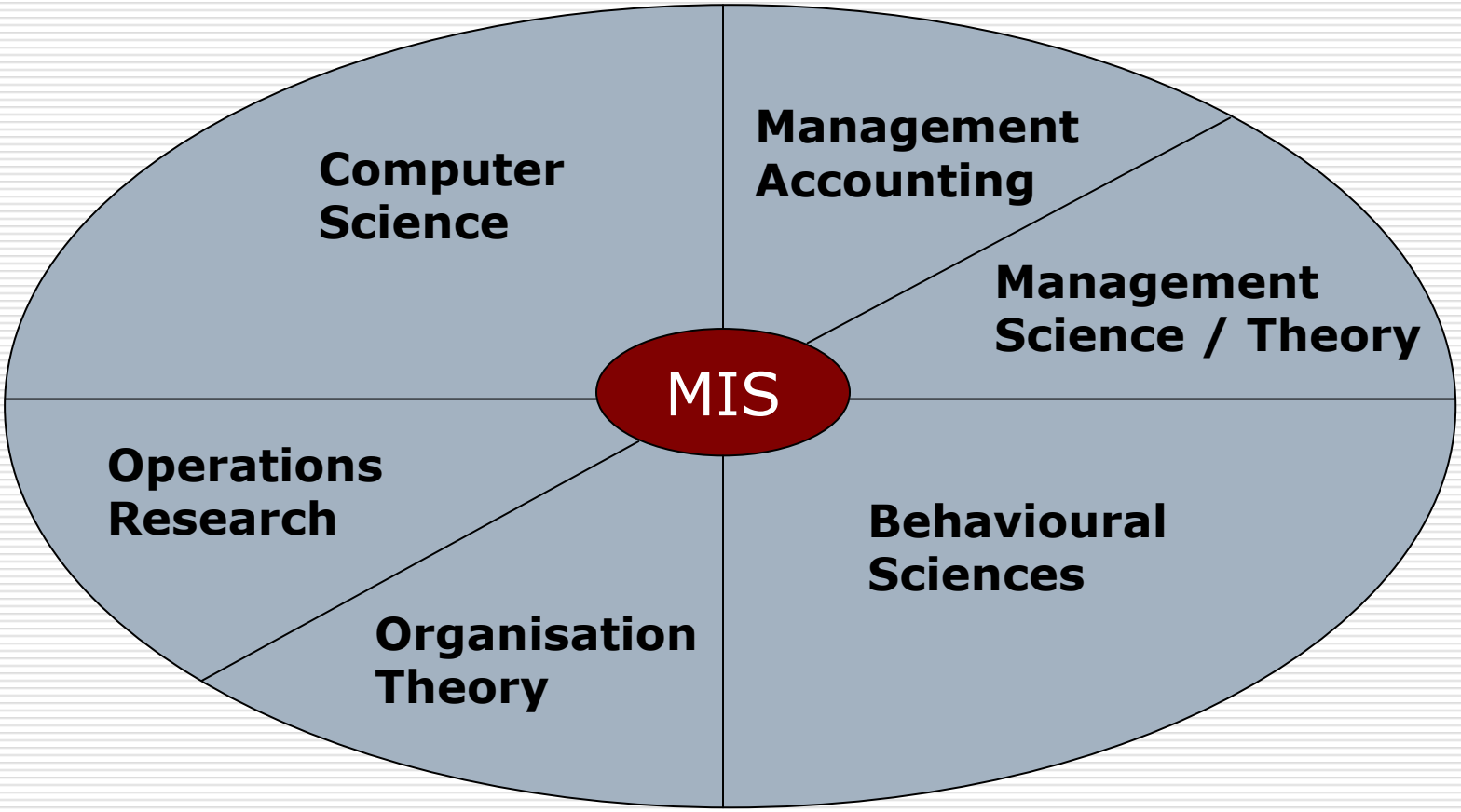
Historic Development



Historic Development

- EDP - Focus on Data
- OAS - Focus on Communication
- MIS - Focus on Information
- DSS - Focus on Decision Support
- EIS - Focus on Decision Support for Top Management
- ES - Focus on Consultation
- AI - Focus on self-learning / thinking systems

Characteristics of MIS



A multi-disciplinary Subject

Typical MIS Systems

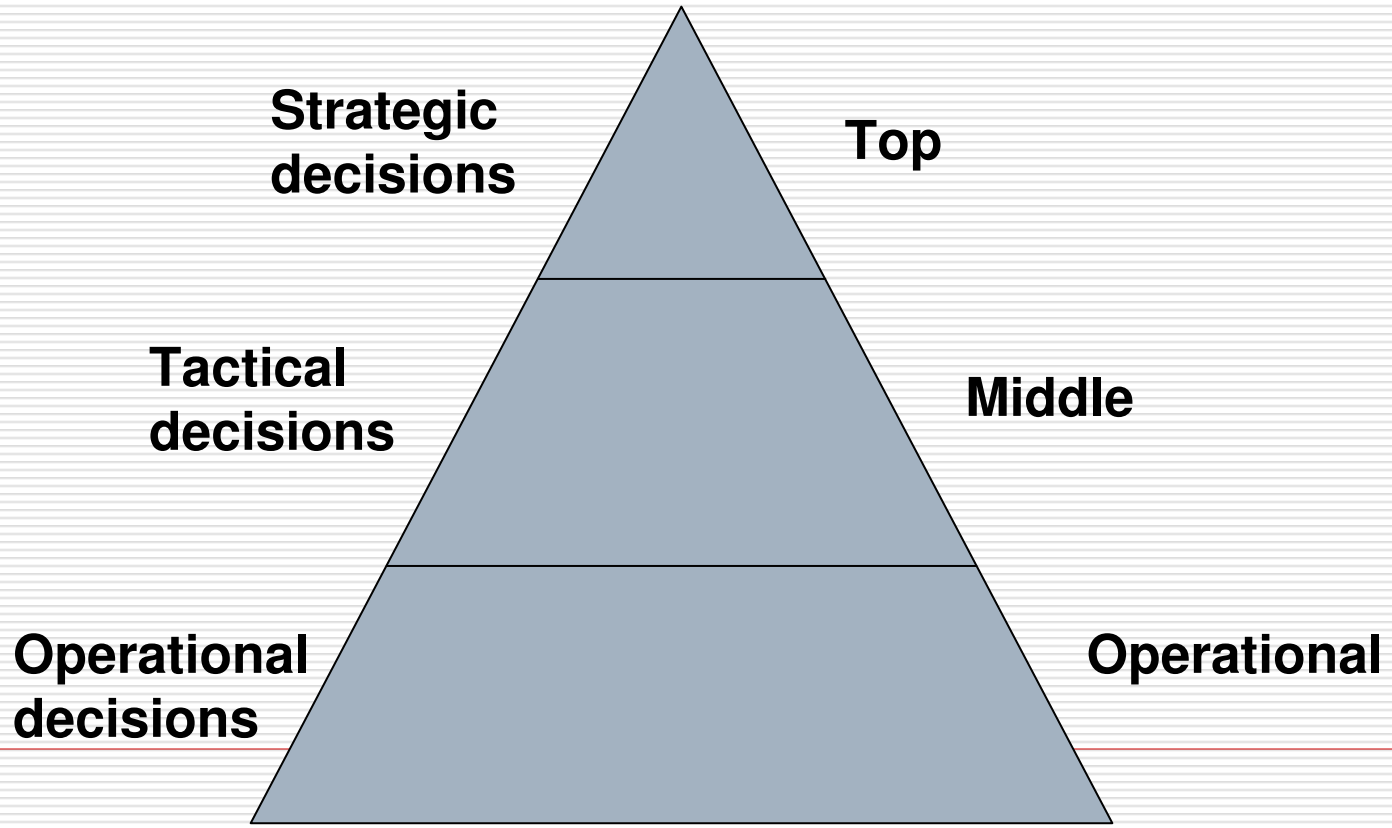
Classification through functional disciplines

	Production	**Finance**	**Personnel**	**Marketing**
Strategic	New Plant Location	Alternative Financing	Welfare Policy	Competitor Survey
Tactical	Production Bottleneck	Variance Analysis	Performance Appraisal	Advertising
Operational	Daily Scheduling	Payroll	Leave Records	Sales Analysis

Organisation System & MIS

Organisational Systems & MIS

Classification of Management



Organisational Systems & MIS

right information in right time at right level

Operational Level – *accuracy* & *timeliness* of information collection and dissemination is important

Tactical & Strategic Level – *relevance* is the watch-word

Efficiency at Operational level

Effectiveness at tactical & strategic level

Organisational Systems & MIS

Mapping organisational level and structure

into the design of any

MIS

is very important for its

successful implementation.

The Technology Component

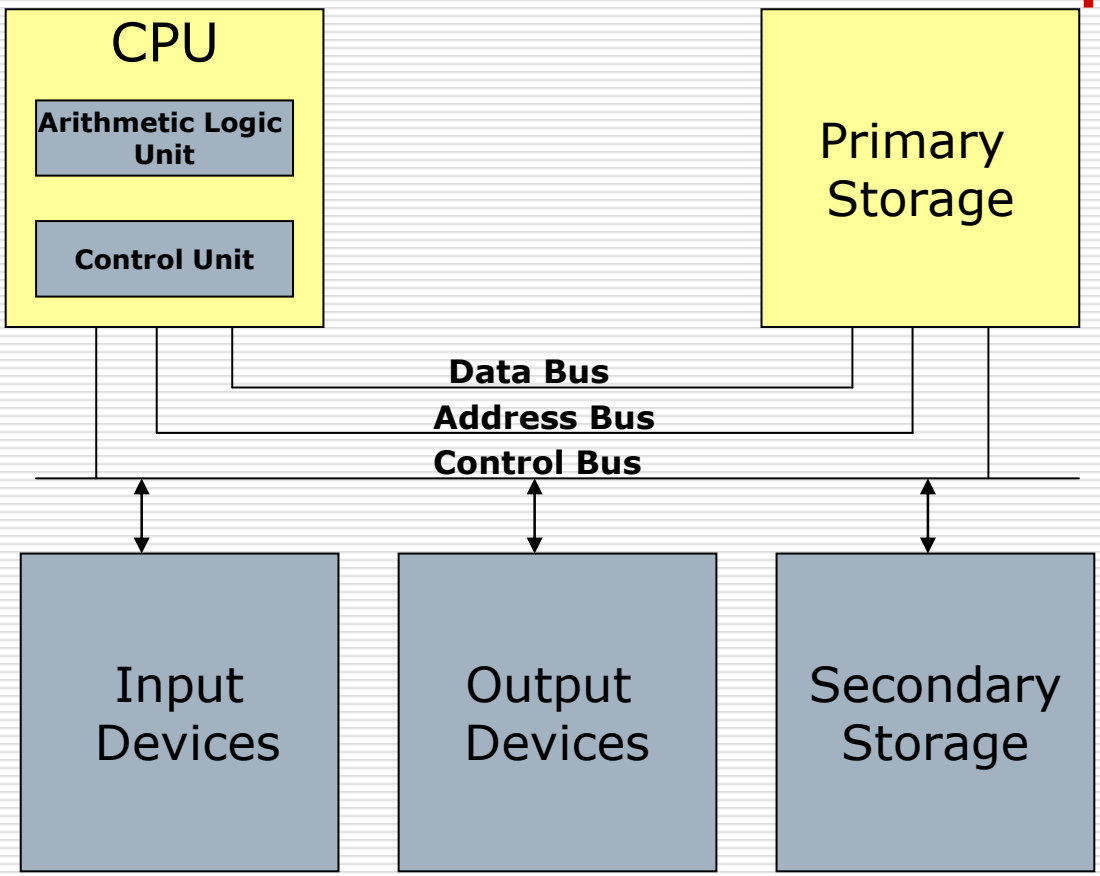
The Technology Component

Information Technology (IT) has changed the way organisations function and carry out their activites.

Computers have fundamentally changed MIS from an abstract concept to concrete system that provide efficiency and transparency in the Oraganisation.

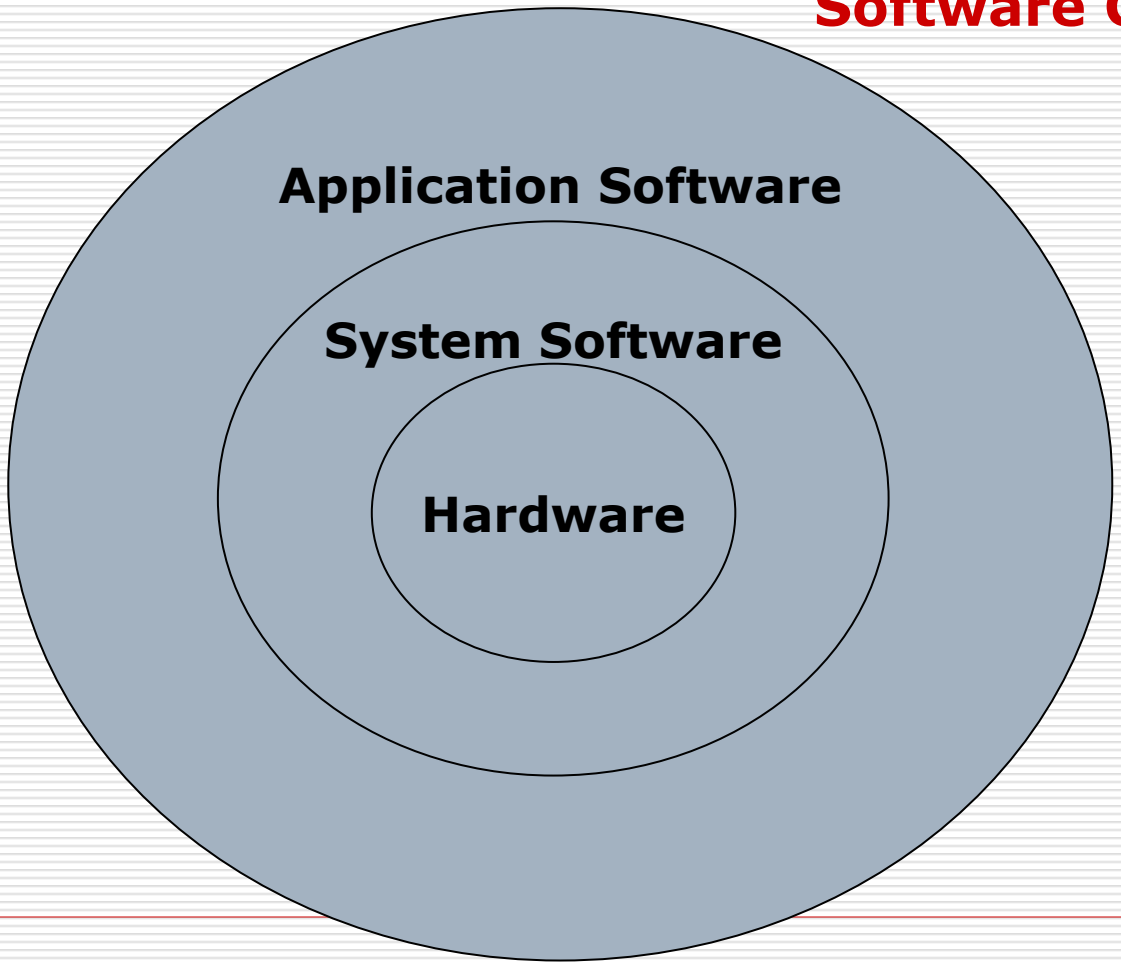
The Technology Component

Computer Hardware



The Technology Component

Software Categories



The Technology Component

Data Communication

Data Communication consists of

- Data Processing & Transactions
  - Transaction is a fundamental organisational function
- Data Transmission
  - Transmission : Media, networks and paths
  - Processing :Getting/delivering the right message to the right receiver
  - Control : Routing messages, structure maintenance.

Database Technology

Database Technology

At the heart of the Information Systems of an Organisation is the central repository of Organisation Data.

Databases

- Data - raw facts/details

- DATABASE- A shared collection of logically related data. Models real-world *enterprise.*

  Entities

  - students, courses, instructors

  Relationships

  - Suman is currently taking MB101
  - Vijay is currently taking MB102
  - Abhishek is currently taking MB103 but took MB101 last semester

Databases

- ***Database Management System (DBMS)*:**
  large software package designed to store and manage databases

Databases are everywhere: Your wallet is full of DB *records*

- Driver's license
- Credit cards
- Gym membership
- Individual checks
- Rs. 500 notes (w/serial numbers)
- Maybe even photos (ids on back)

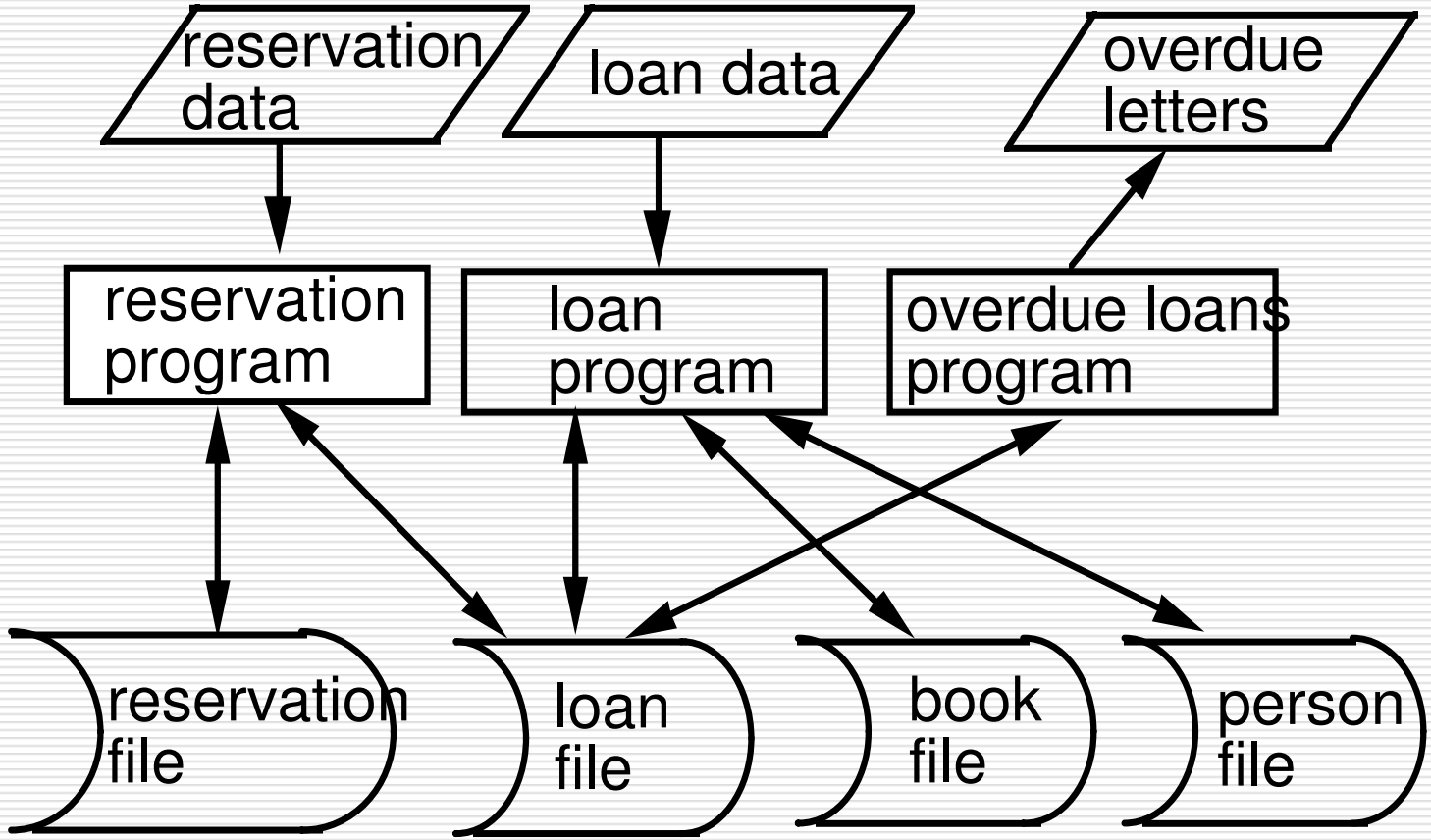
Why We Need DBMS?

- There is an information explosion in today's society
  - Need to keep accurate records
- Advantages of using a DBMS fall into three main categories:
  - Proper maintenance of the data
  - Providing access to the data
  - Maintaining security of the data

Traditional Approach

- Applications developed in an ad-hoc and opportunistic manner
- Data requirements for applications derived independently
- Data files developed for individual applications
- Application programs are data dependent

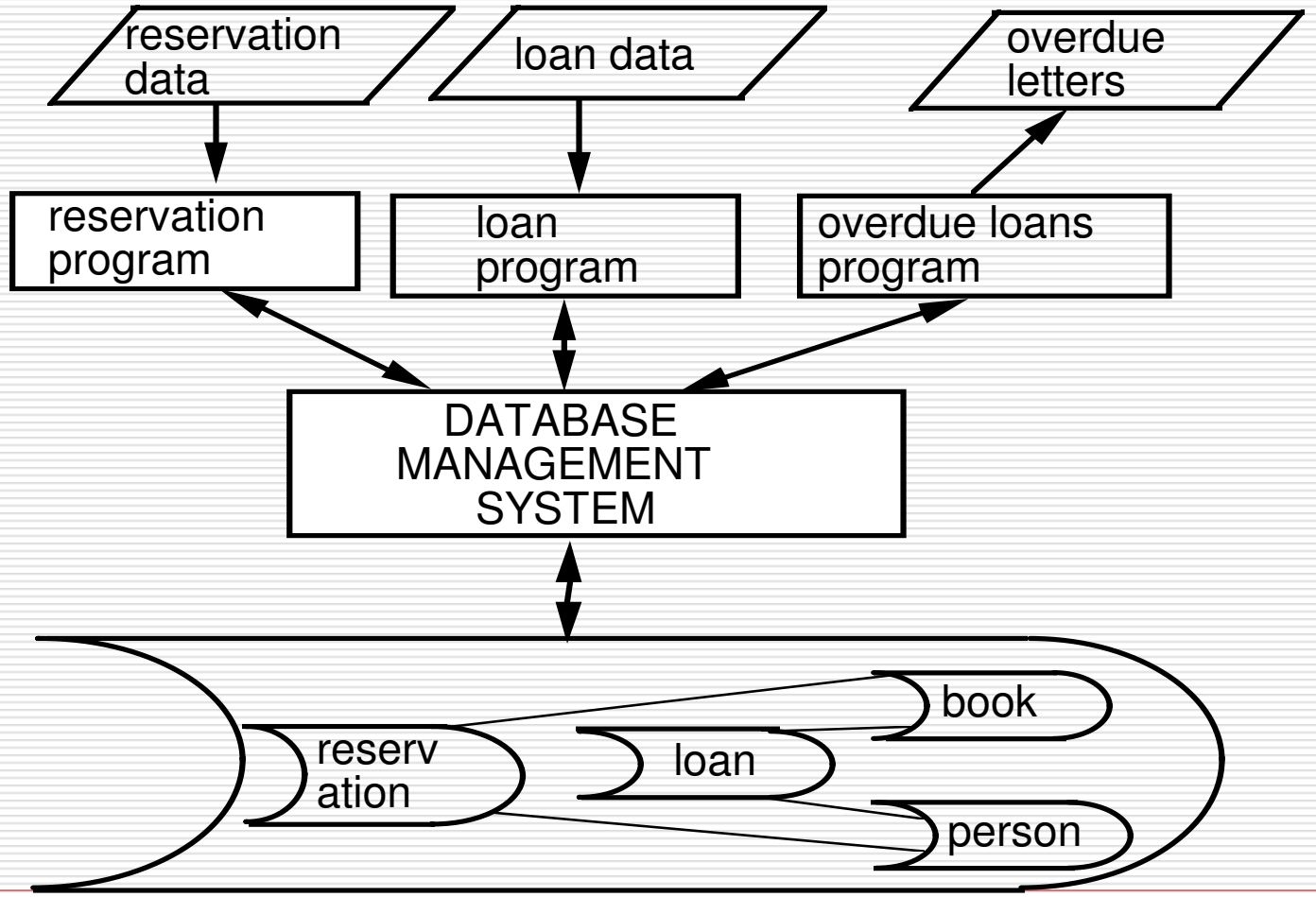
Files Dedicated to Application Programs



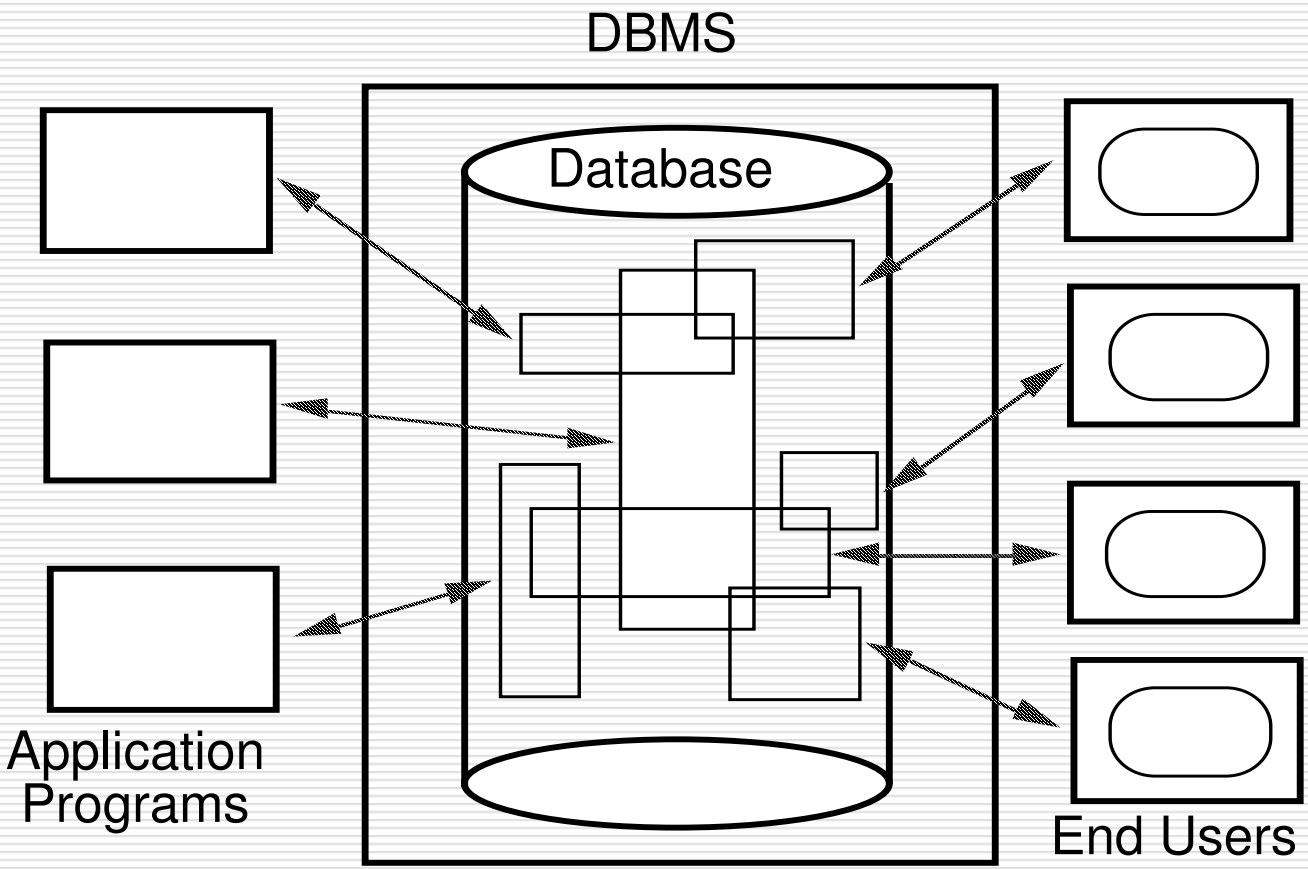
Database Approach

- Centralization of information management
- Data shared by different groups of users and application programs
- Integrity constraint handling
- Advanced facilities for backup and recovery

Data Sharing in a Database Environment



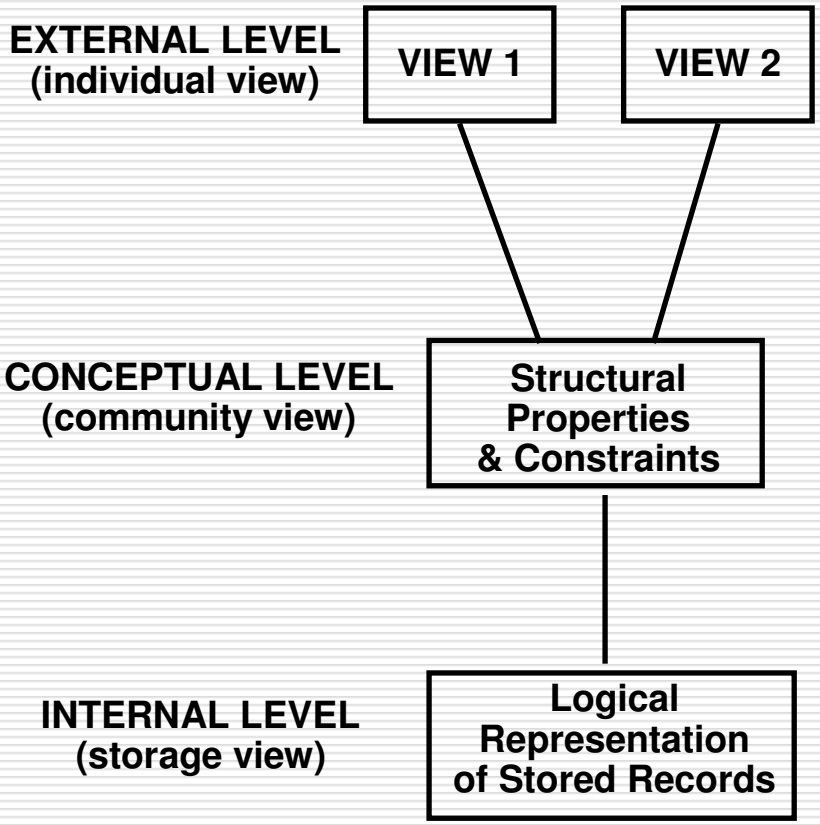
Interacting with a Database



Advantages

- Sharing of data
- Enforcement of security
- Enforcement of development and maintenance standards
- Reduction of redundancy
- Avoidance of inconsistency across files
- Maintenance of integrity
- Data independence

3-levels Architecture



Complete DBMS

- Hardware
- Software
  - Utilities
- Data
- Users
- Procedures

Hardware

- The actual computer system used for keeping and accessing the database.
- Large organization usually has a network with a central server and many client programs running on desktops.
- Smaller organizations may have the DBMS and its clients reside in a single computer.

Software

- The actual DBMS.
  - Allows the users to communicate with the database.
  - Controls access
  - Includes utilities
    - Report writers
    - Application development tools
  - Examples of DBMS software
    - Microsoft SQL Server
    - Oracle Corporation Personal Oracle™
    - IBM DB2™

Data

- The database should contain all the data needed by the organization.
- Emphasis is on the relevant data pertaining to one or more objects or entities.
  - Entity: a thing of significance about which information needs to be known.
- The characteristics that describe or qualify an entity are called attributes of the entity.

Data continued…

- For each attribute, the set of possible values that the attribute can take is called the domain of the attribute.
  - The domain of the date of birth would be all the dates that might be reasonable in the student body.
    - No date in the 1700s would be expected.
  - Undergraduate class levels would probably be restricted to
    - Part I
    - Part II
    - Part III
    - No other values would be allowed.

Users

- Each type of user needs different software capabilities:
  - The database administrator (DBA) is the person or group in charge of implementing the database system within the organization.
  - The end users are the people who sit at workstations and interact directly with the system.
  - The application programmers interact with the database by accessing the data from programs written in high-level languages such as Visual Basic etc.

Procedures

- An integral part of any system is the set of procedures that control the behavior of the system.
  - The actual practices the users follow to obtain, enter, maintain, and retrieve the data.
    - For example, in a payroll system, how are the hours worked received by the clerk and entered into the system?
    - Exactly when are monthly reports generated and to whom are they sent?

Data Models

- Models generally allow people to conceptualize an abstract idea more easily
  - Model airplanes
  - Model homes
- A data model is a way of explaining the logical layout of the data and the relationship of various parts to each other and the whole.
  - Different data models have been used throughout the years.

Classification of DBMS

1. Classical DBMS

- **Hierarchical**
- **Network**
- **Relational**

2. New Directions

- **Extended Relational**
- **Object-Oriented**
- **Distributed**

Data Models continued…

- The Relational Database Model:
  - Relational database management systems, where all data are kept in tables or relations.
  - More flexible & easy to use.
  - Almost any item of data can be accessed more quickly than the other models.
  - Retrieval time is reduced so that interactive access becomes more feasible.
- This is what is referred to as Relational Database Management Systems (RDBMS)

Object Oriented Database - OODBMS

- Handle big and complex data that relational databases could not.
- Joining of object-oriented programming with database technology, which provides an integrated application development system.

Object Oriented Database - OODBMS

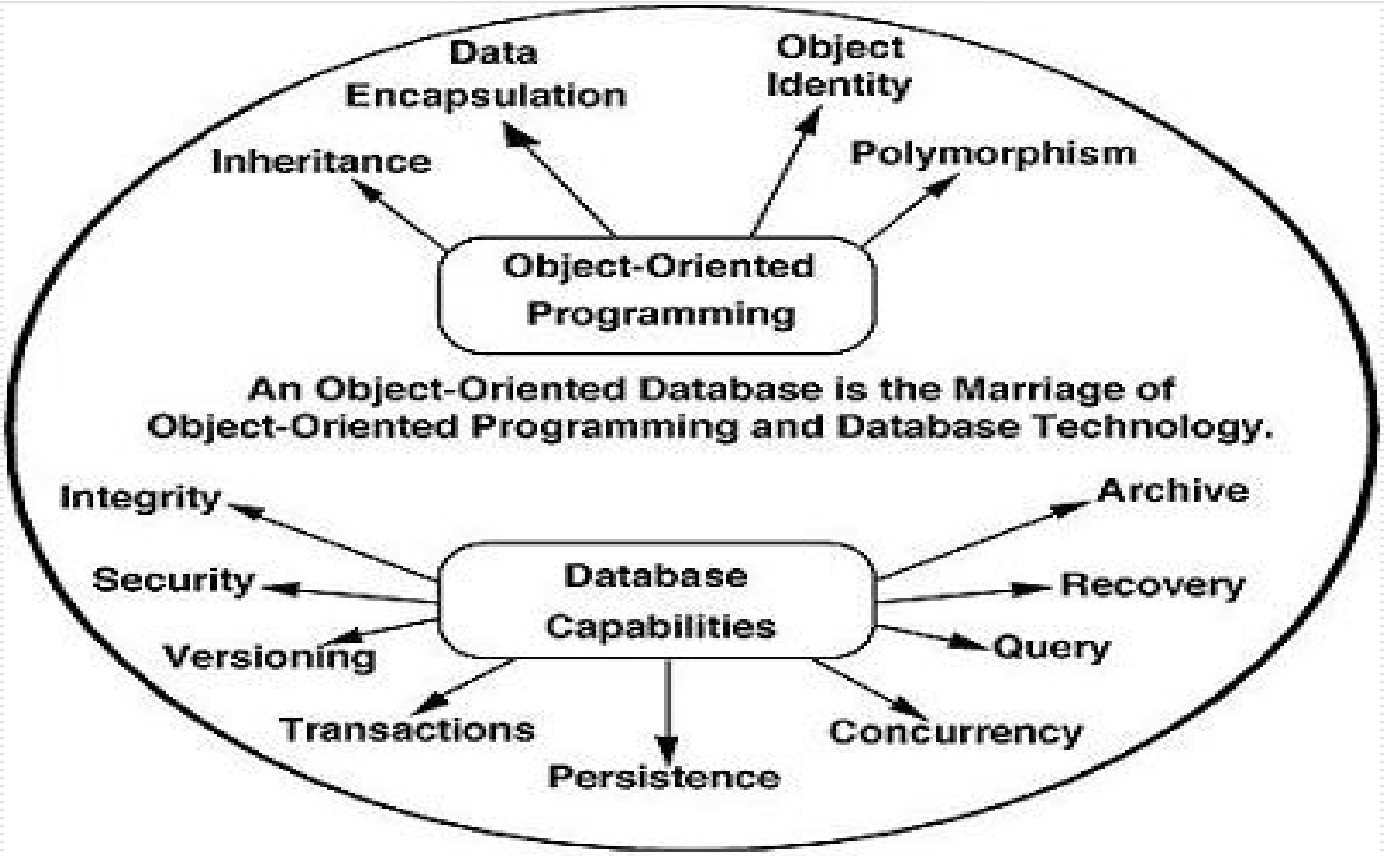


Figure 1. Makeup of an Object-Oriented Database

Object Relational - ORDBMS

- RDBMS extended to include Object Oriented concepts and structures.
- Handle new types of data such as audio, video, and image files that relational databases were not equipped to handle.
- Advantages of ORDBMS
  - it allows organizations to continue using their existing systems, without having to make major changes.
  - it allows users and programmers to start using object-oriented systems in parallel.

ACID properties

- ACID properties are an important concept for databases. The acronym stands for Atomicity, Consistency, Isolation, and Durability.
- A single logical operation on the data is called a transaction.
- Example : transfer of funds from one account to another.
- The ACID properties guarantee that such transactions are processed reliably.

ACID properties

- Atomicity guarantees that one account won't be debited if the other is not credited as well.
- Consistency a transaction can't break the rules, or *integrity constraints*, of the database. If an integrity constraint states that all accounts must have a positive balance, then any transaction violating this rule will be aborted.
- Isolation This means that no operation outside the transaction can ever see the data in an intermediate state;
- Durability refers to the guarantee that once the user has been notified of success, the transaction will persist, and not be undone.

MIS Design

MIS Design

The Concept of 'Systems' is of pivotal importance in MIS

What is a System?

Systems are created to solve problems.

Systems approach is an organized way of dealing with a problem.

Defining a System

- A collection of components that work together to realize some objective forms a system

- Three Major Components

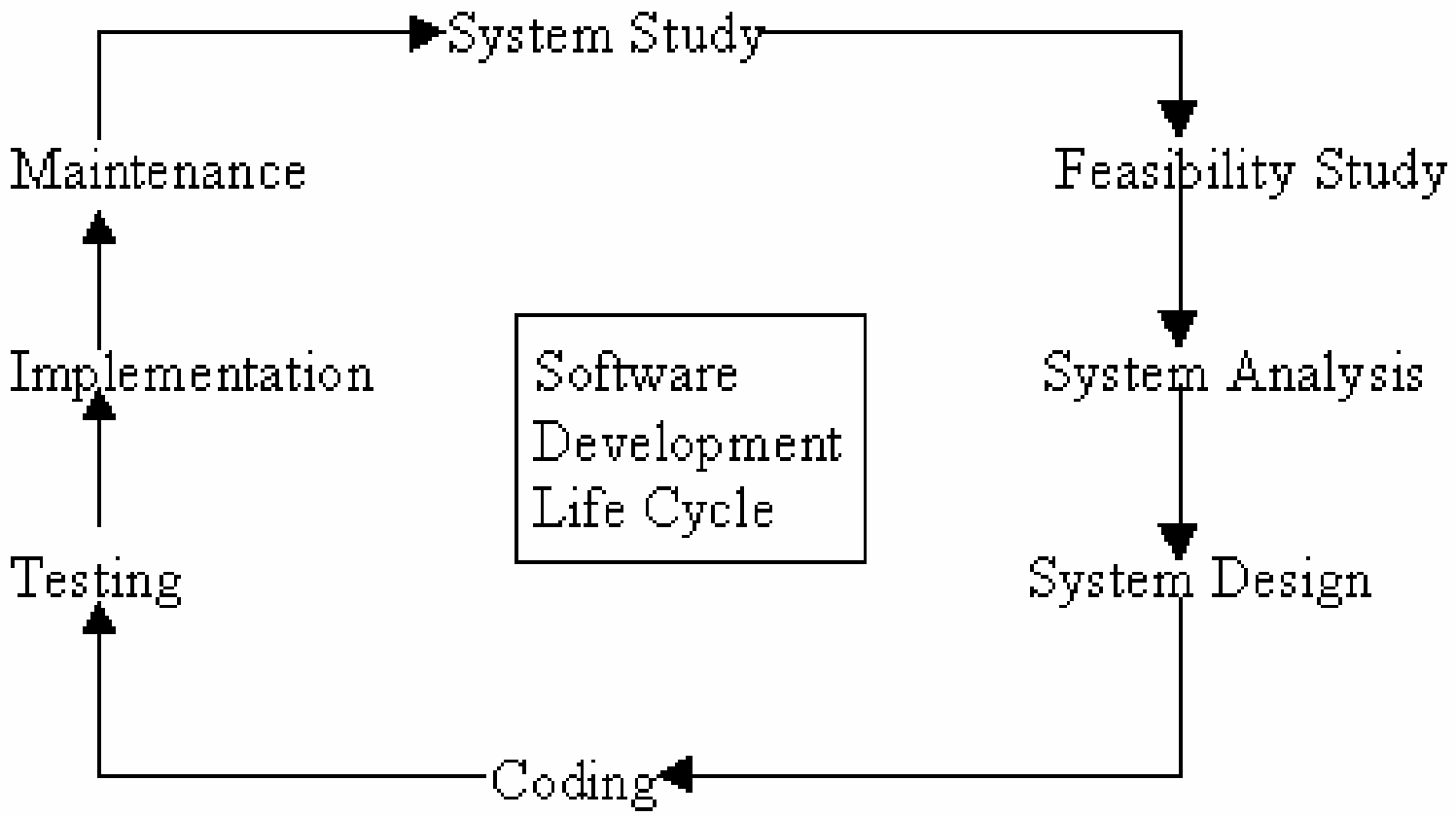
Fox Example

- Human body - a complete natural system.
- National systems - political system, economic system, educational system

System Life Cycle

- Organisational process of developing and maintaining systems.
- Helps to establish a system project plan.

Phases of SDLC



System Study

- problem identification and project initiation
- background analysis
- inference or findings

Feasibility Study

- Workability,
- Meeting user's requirements,
- Effective use of resources
- Cost effectiveness.

System Analysis

- Specification of the new system
- Functional hierarchy
- Identify Data items

System Design

- preliminary or general design
- Structure or detailed design

Tools and techniques used for designing:

Flowchart
Data flow diagram (DFDs)
Data dictionary
Structured English
Decision table
Decision tree

Coding

- Coding the new system into computer programming language.
- Defined procedures transformed into control specifications
- Programming phase - computer instructions.

Testing

A test run of the system

- Unit testing
- System testing
- Black box testing
- White box testing

Implementation

- theory is turned into practice
- Parallel run
- Pilot run
- User training

Maintenance

The review of the system is done for:

- knowing the required changes or the additional requirements
- studying the performance

If a major change to a system is needed, a new project is set up to carry out the change. The new project will then proceed through all the above life cycle phases.

Software Quality

Information System & Quality

ATMs

Computerised Railway Bookings

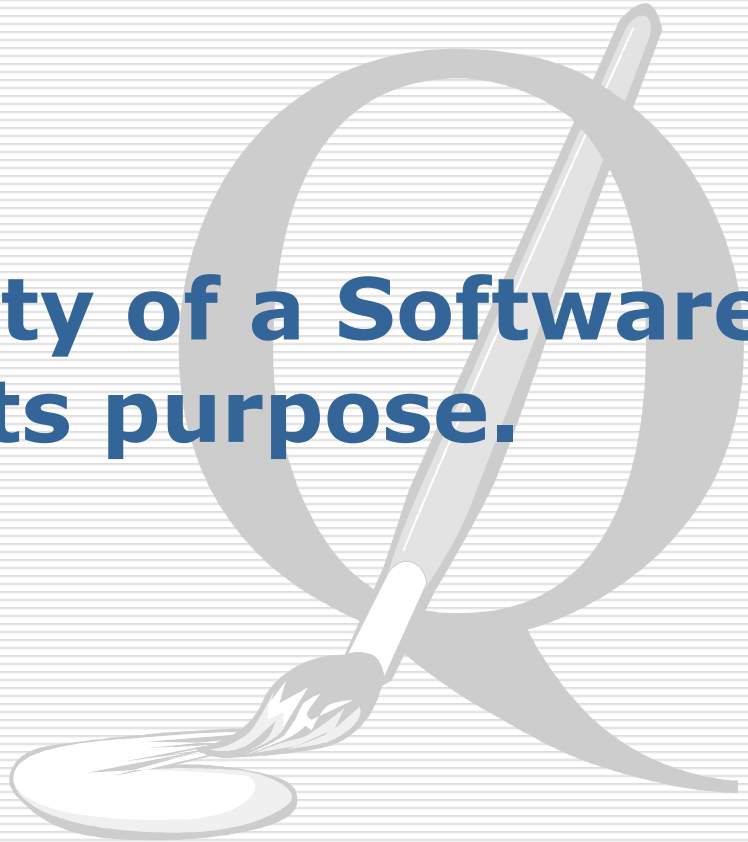
Telephone Network

We do not expect them to fail!

Quality

"Quality indicates the degree of excellence of a product or service"

What is Software Quality?



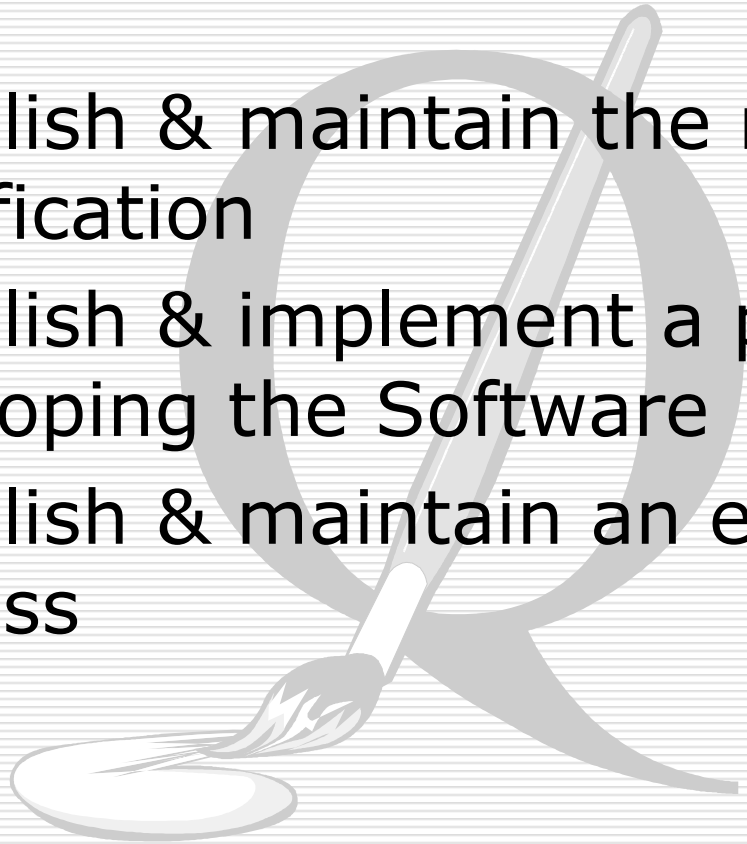
Ability of a Software to be fit for its purpose.

Quality Factors

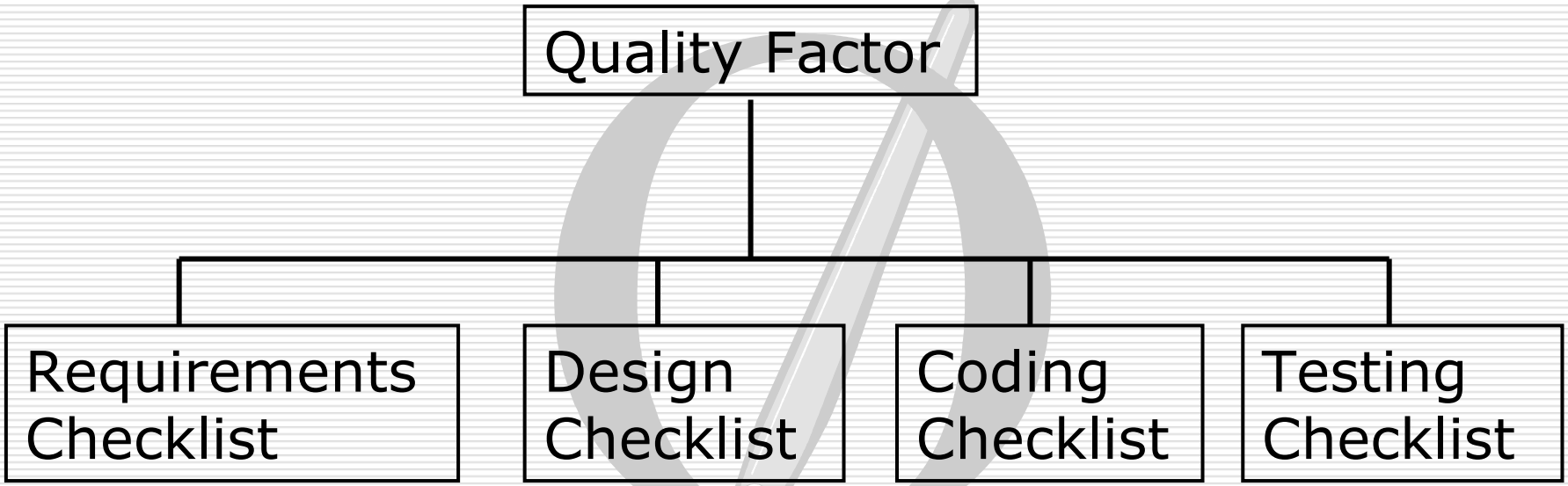
- Reliability
- Correctness
- Maintainability
- Security
- Reusability
- Portability
- User-friendliness

Management Role in Software Quality Assurance

- Establish & maintain the requirement specification
- Establish & implement a process for developing the Software
- Establish & maintain an evaluation process



Quality Model



Quality Factor throughout the Software Life Cycle

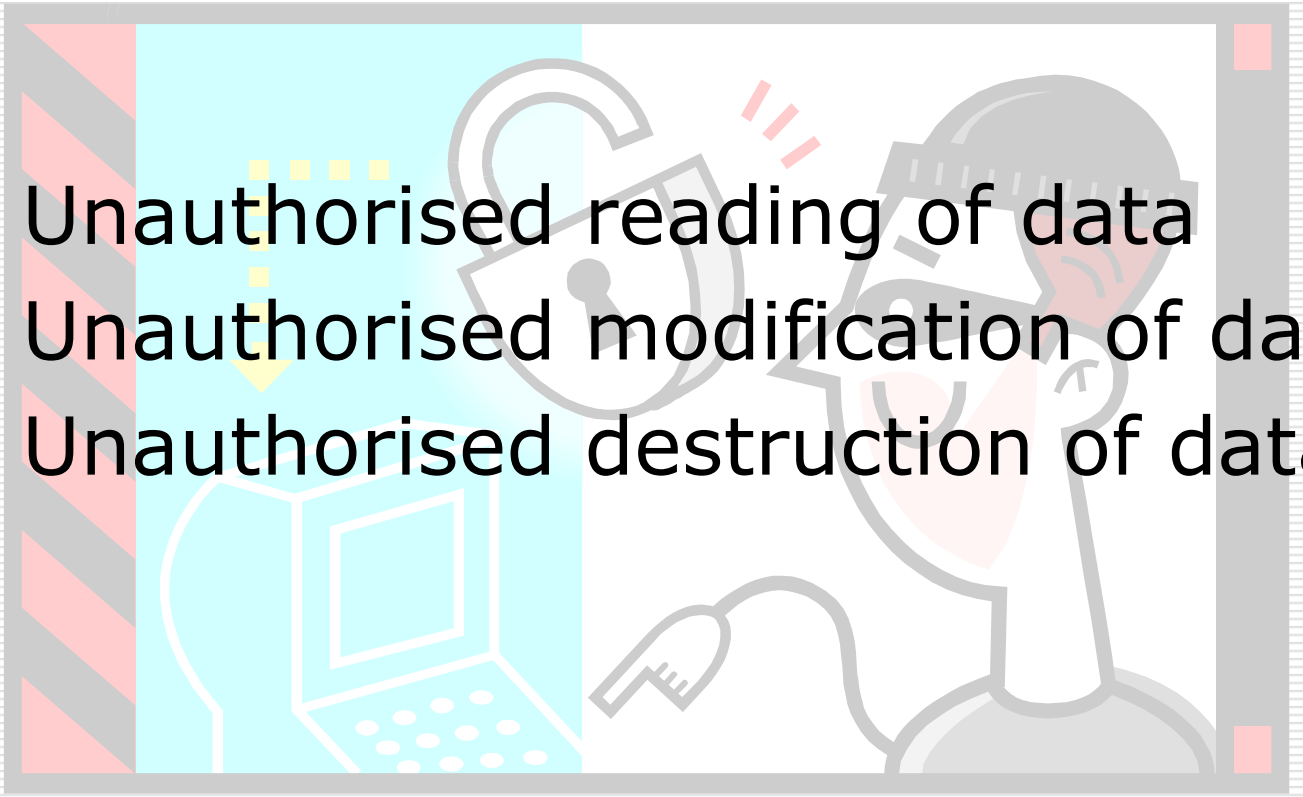
Information Security

Information Security & Control

I.T and Computers have bought ‘Information Age’

The spread of Internet & relative ease of access made easier ‘Information Breach’

Information Breach

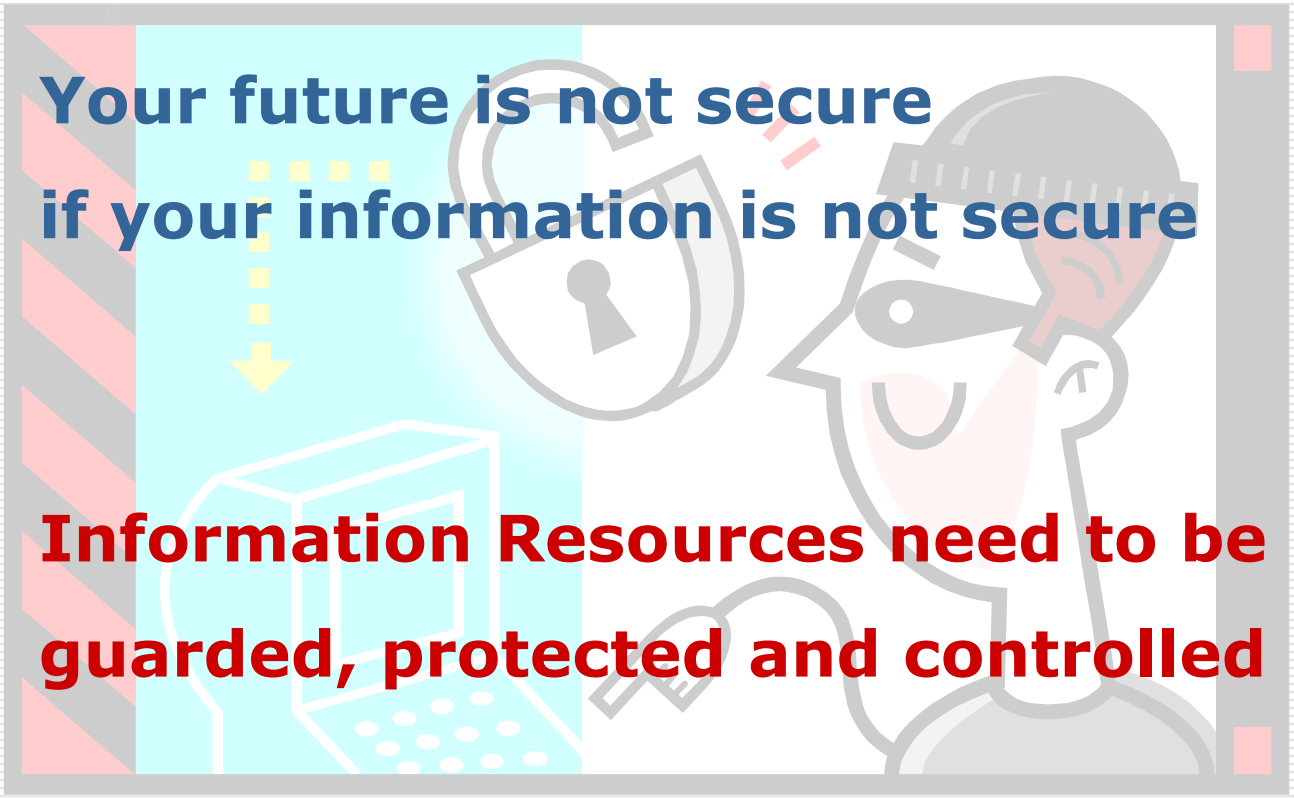


- Unauthorised reading of data
- Unauthorised modification of data
- Unauthorised destruction of data

Why break I.T. System Security?

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

Information Security

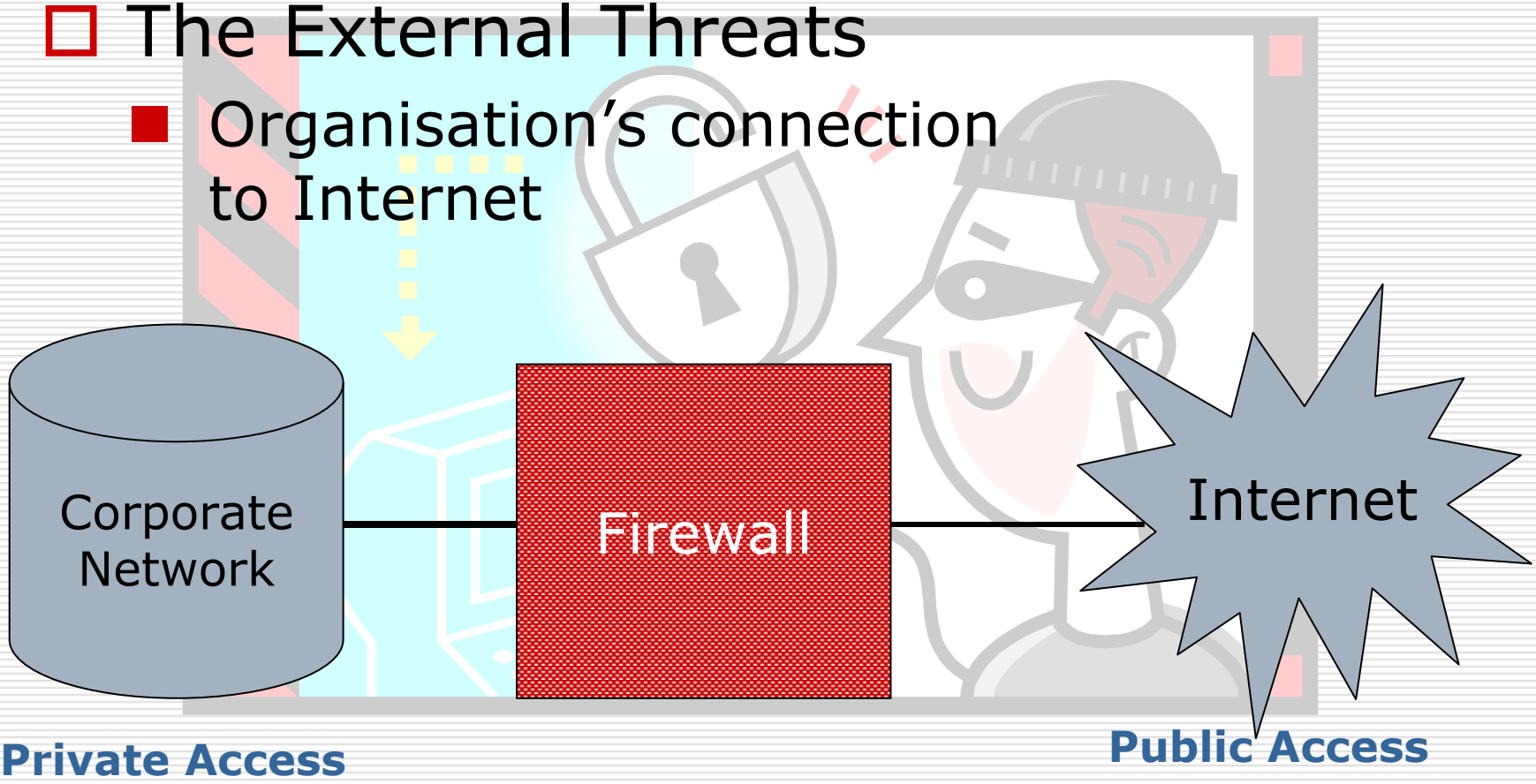


Security Threats

- The External Threats
- The Internal Threats

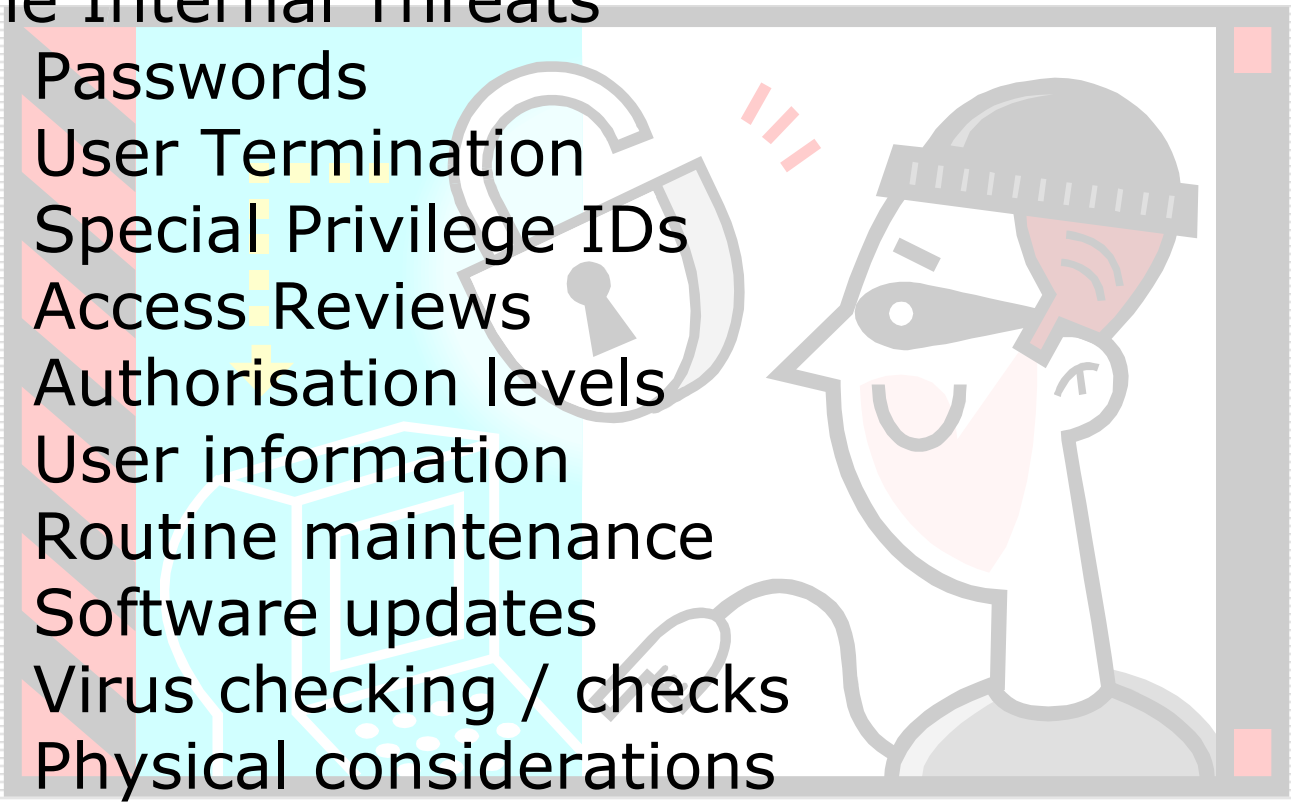
Security Threats

- The External Threats
  - Organisation's connection to Internet



Security Threats

- The Internal Threats
  - Passwords
  - User Termination
  - Special Privilege IDs
  - Access Reviews
  - Authorisation levels
  - User information
  - Routine maintenance
  - Software updates
  - Virus checking / checks
  - Physical considerations
  - Audit Trails



The Greatest Security Threats Come from within

We may never be able to eliminate all the security risks

But we can make it very very hard for them to do so.

Implement short term. Plan long-term.

Thanks