

INTRODUCTION TO DATABASE MANAGEMENT SYSTEM

Data

- Data - raw facts/details
- Entity: a thing of significance about which information needs to be known.
- Attributes :The characteristics that describe or qualify an entity are called its attributes

Data Continued:

In case of a student, the basic entity is the student. Entity attributes (information recorded about that entity) may include:

- First and last name
- Home address
- Current address
- Date of birth
- Course opted
- Grade point average etc...

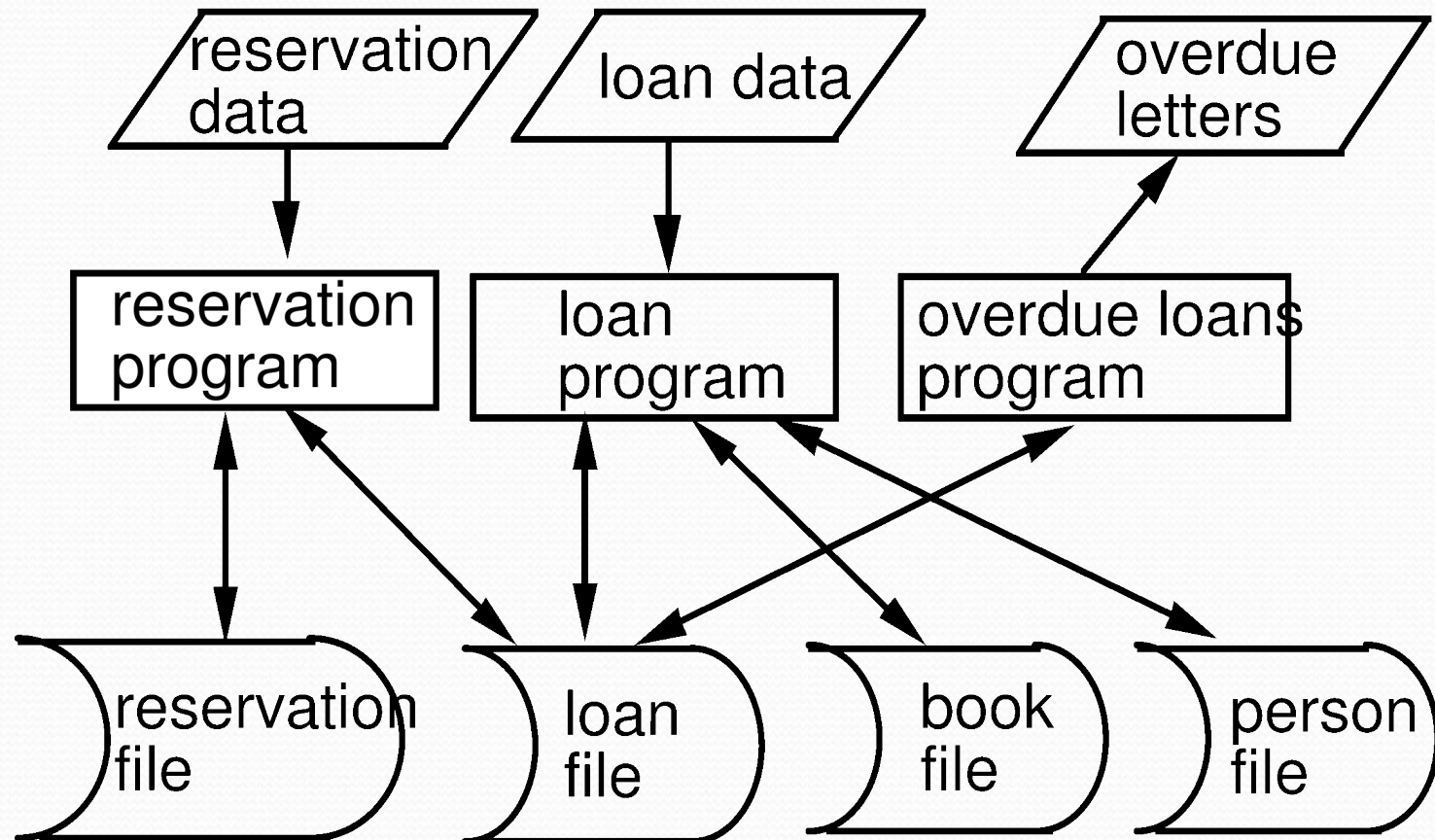
Data Continued:

- Field: A field consists of a group of characters.
- Record : All the details related to an entity is combined to form a record.
- File : A collection of related records
- Example: For a student, Admission file, Fee detail file, exam detail file etc...
- Database: Collection of logically related records & files.

Traditional Approach

- Applications developed in an ad-hoc and opportunistic manner
- Data files developed for individual applications

Files Dedicated to Application Programs



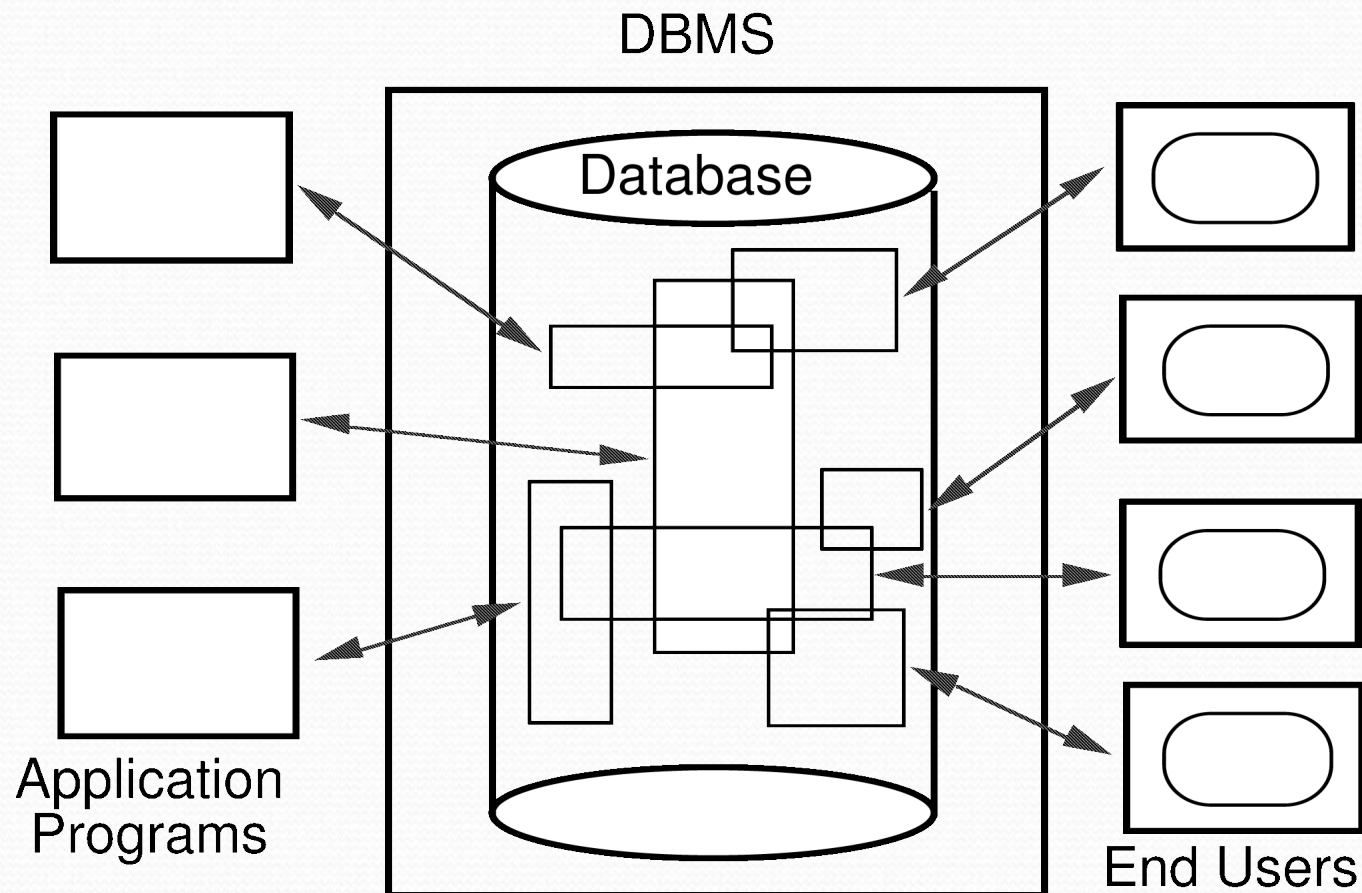
Database

- What is a database?
- A database is an organized collection of related files and records designed to meet the needs of an organization.

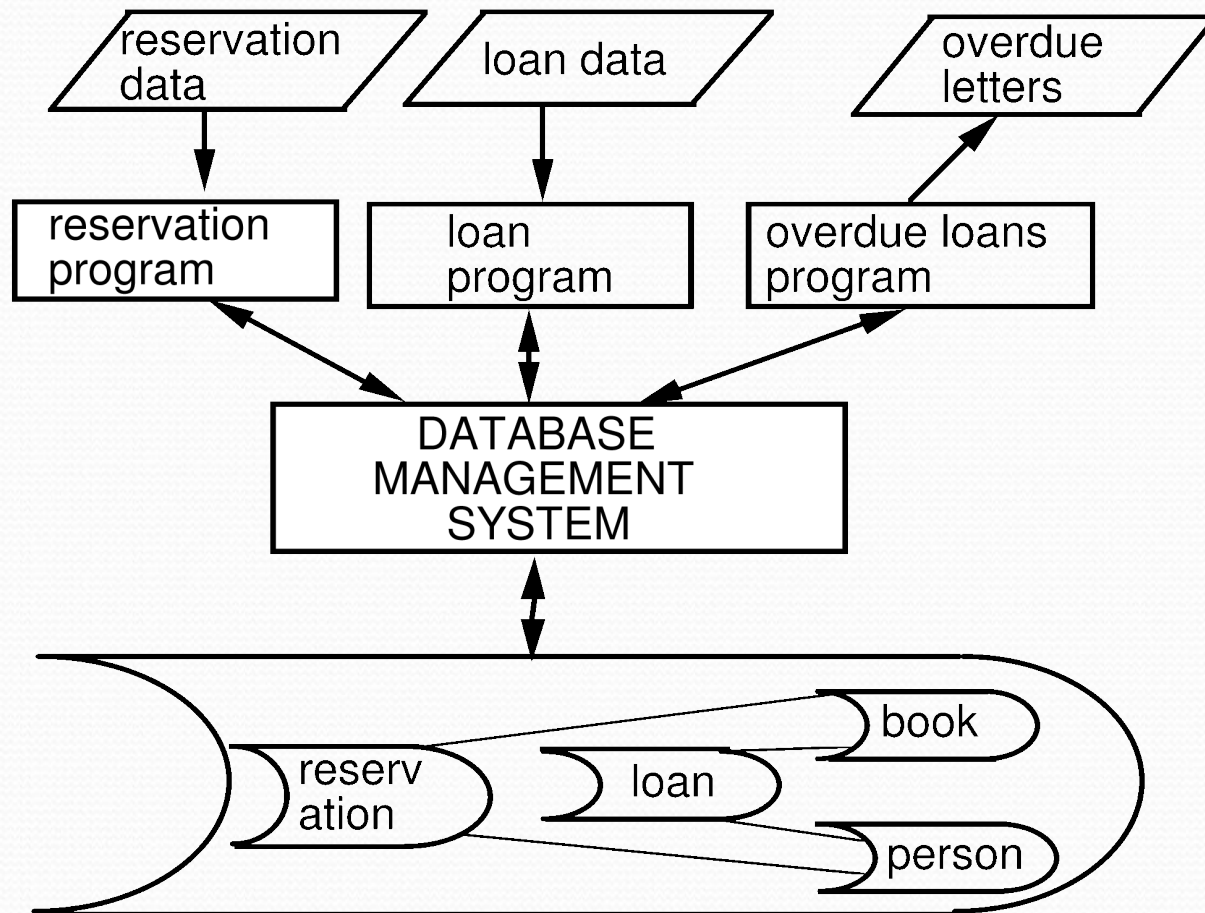
Database System Components

- Data
- Hardware
- Software
- Users

Interacting with a Database Application



Data Sharing in a Database Environment



DBMS

The **Database Management System (DBMS)** software that enables users to define, create and maintain the database and provides flexible management of the data.

Why We Need DBMS

- There is an information explosion in today's society
- Need to have right information at the right time to make accurate decisions

Using DBMS

- Centralization of information management
- Data shared by different groups of users and application programs
- Provision of multiple interfaces
- Advanced facilities for backup and recovery

DBMS Advantages

- Controlled redundancy
- Data Consistency/Integrity
- Sharing of data
- Enforcement of security
- Enforcement of development and maintenance standards
- Data independence

DBMS Disadvantages

- Centralized Database
- More Disk Space
- Operationality of the system
- Security Risk

DBMS-Users

- There are a number of users who can access or retrieve data on demand using the applications and interfaces provided by the DBMS.

Each type of user needs different software capabilities:

- DDL- The application programmers interact with the database by accessing the data from programs written in high-level languages
- DML- The end users are the people who sit at workstations and interact directly with the system.
- DCL- The database administrator (DBA) is the person or group in charge of implementing the database system within the organization.

The Entity Relationship Model

The ER model is a graphic representation to concisely present the data requirements of an application in a way that is easy to understand

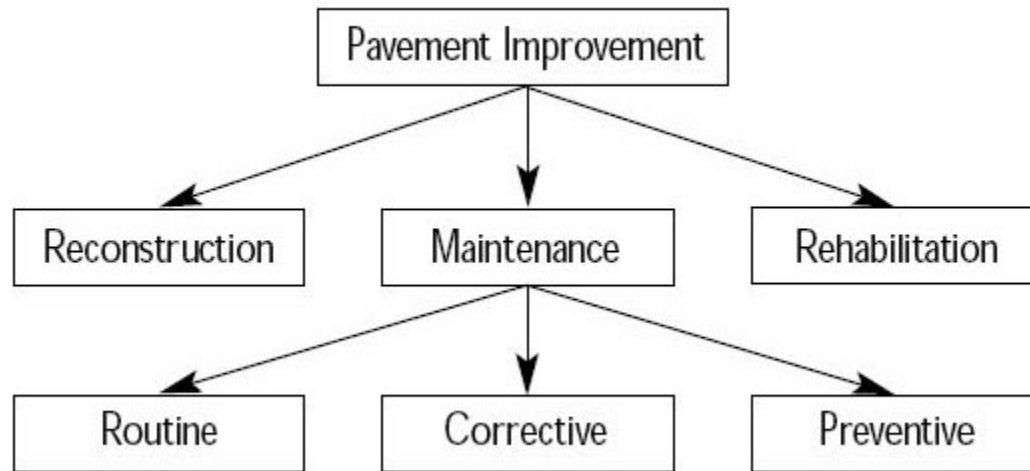
Today ER model is a standard for the design methodologies of software systems

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.

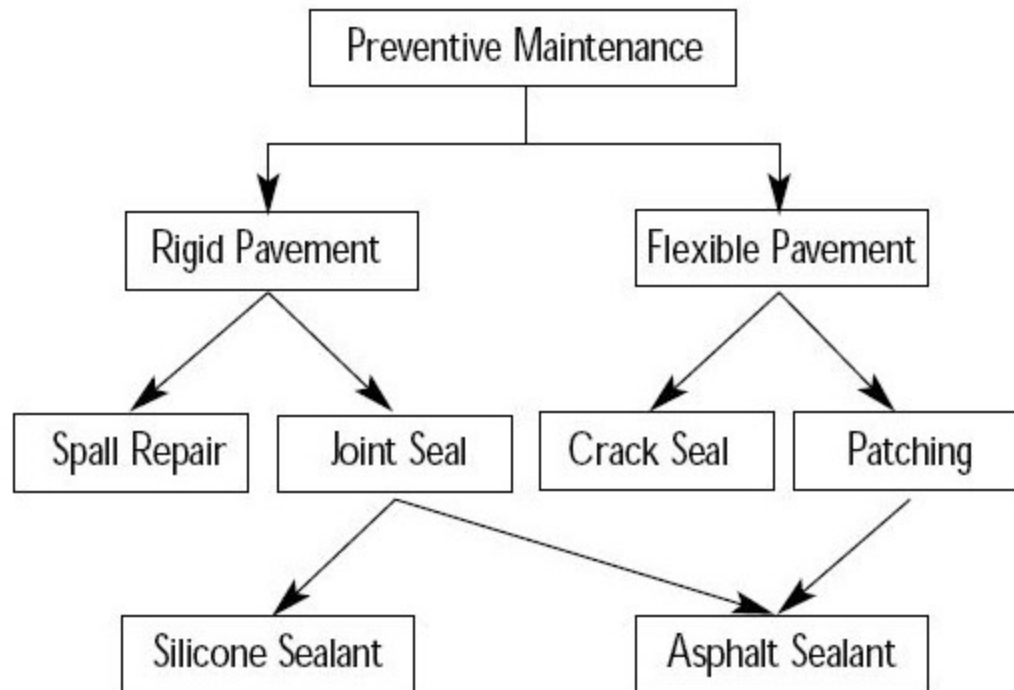
Data Models

- Hierarchical Model



Data Models

- Network Model



Data Models

- Relational Model

Activity Code	Activity Name
23	Patching
24	Overlay
25	Crack Sealing

Key = 24

Activity Code	Date	Route No.
24	01/12/01	I-95
24	02/08/01	I-66

Date	Activity Code	Route No.
01/12/01	24	I-95
01/15/01	23	I-495
02/08/01	24	I-66

Data Models

- The Relational Database Model:
 - Relational database model, 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 System(RDBMS)

How do I design a database?

„ **Logical design**

TMDetermine and define fields, tables, keys, and data integrity

„ **Physical implementation**

TMCreating tables, establishing key fields, and table relationships

„ **Application development**

TMDetermine end-user tasks

Data Abstraction

- The major purpose of a database system is to provide users with an **abstract view** of the system. The system hides certain details of how data is stored and created and maintained
 - Complexity should be hidden from database users.
- 1. Physical level:-** The lowest level of abstraction that describes how the data is actually stored.

Data Abstraction

- 2. **Logical Level**:-The next level of abstraction that describes the relationships among data.
- 3. **View level**:-Highest level of abstraction that describes *part* of the database for a particular group of users
 - Can be many different views of a database.

Data Abstraction

