



CSCA0102

IT and Business Applications

Chapter 9

Managing Data Resources

Managing Data Resources

- An information system provides users with timely, accurate, and relevant information.
- The information is stored in computer files.
- When files are properly arranged and maintained, users can easily access and retrieve the information when they need.
- If the files are not properly managed, they can lead to chaos in information processing.
- Even if the hardware and software are excellent, the information system can be very inefficient because of poor file management.

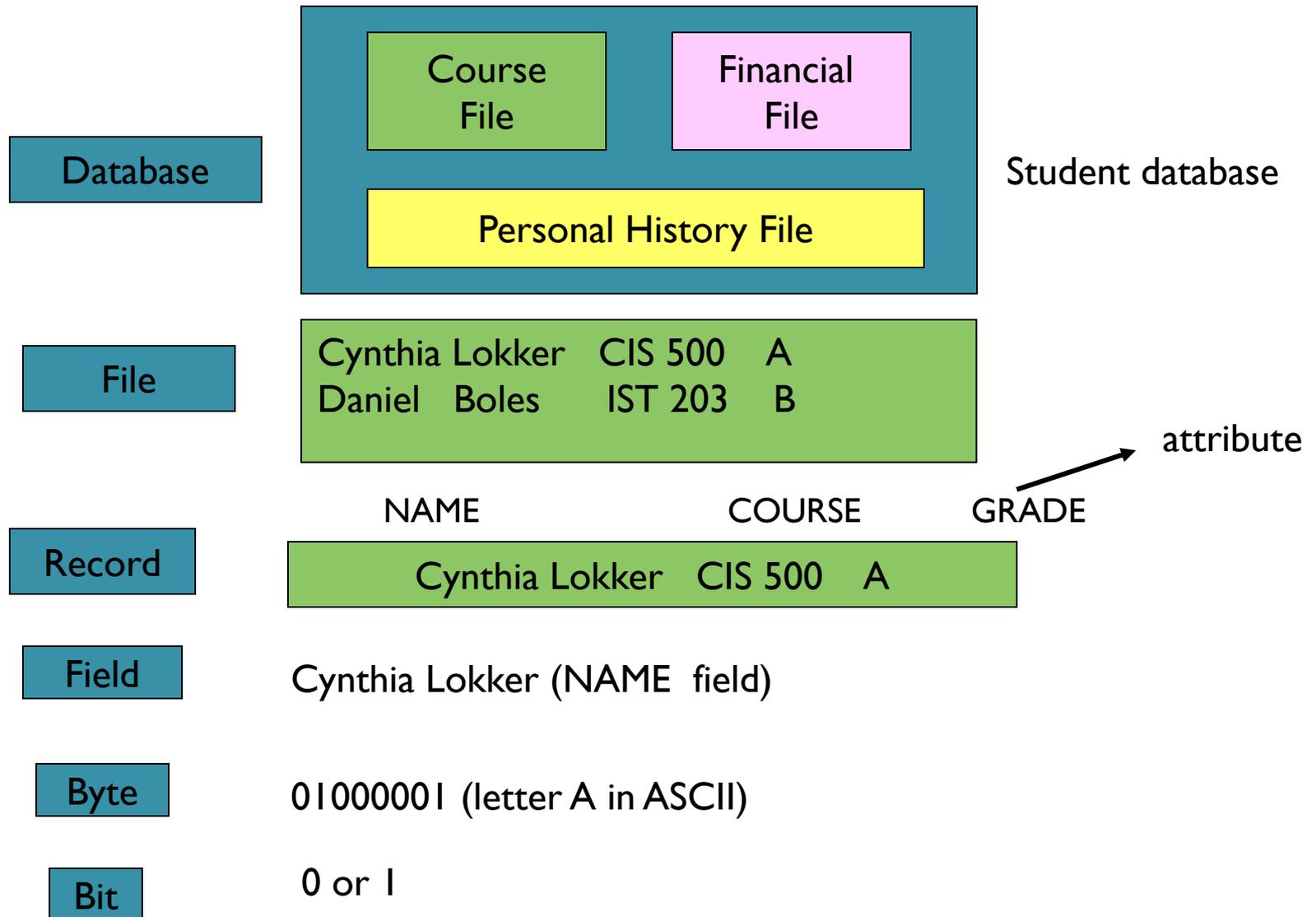
File Organisations Terms and Concepts

- A computer system organizes data in a hierarchy that starts with the bit.
- Bit represents 0 or 1.
- 8 bits are grouped to form a byte. Each byte represents one character, number, or symbol.
- Bytes can be grouped to form a field. It can represent a person's name or age.
- Related fields can be grouped to form a record. Related fields can be student's name, course taken and the grade.
- Related records can be grouped to form a file.
- Related files can be grouped to form a database

The Data Hierarchy

- Database: Group of related files
- File: Group of records of same type
- Record: Group of related fields
- Field: Group of words or a complete number

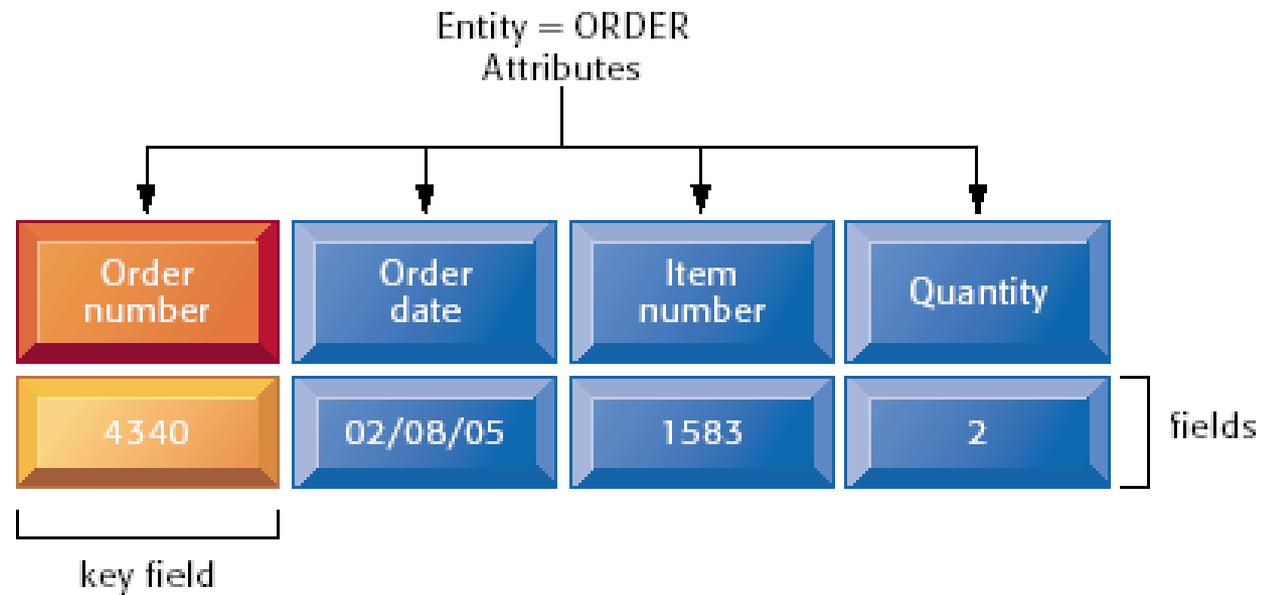
The Data Hierarchy



The Data Hierarchy

- Entity: Person, place, thing, event about which information is maintained
- Attribute: Description of a particular entity
- Key field: Identifier field used to retrieve, update, sort a record

The Data Hierarchy



Accessing Records from Computer Files

- Computer stores files on secondary storage devices.
- Records can be arranged in several ways on storage media.
- How individual record scan be accessed or retrieved depends on how they are arranged on storage media.
- There are mainly two ways to organize records: **sequentially** or **randomly**.

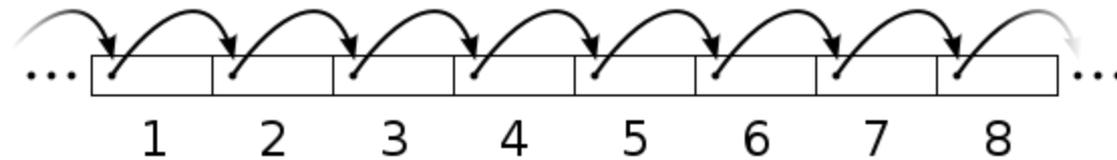
Accessing Records from Computer Files

- In sequential file organization, data records must be retrieved in the same physical sequence in which they are stored.
- In direct or random file organization, data records can be accessed in any sequence as users desire, without regard to actual physical order on the storage media.
- Sequential file organization is the only file organization that can be used on magnetic tape. Example: Payroll
- Direct or random file organization is utilized with magnetic disk.

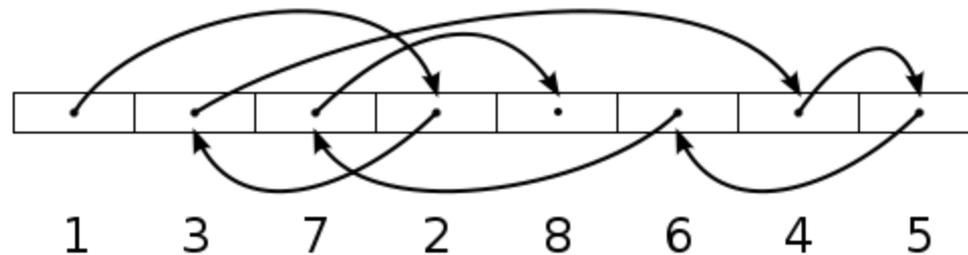
Most computer applications utilize this method.

Accessing Records from Computer Files

Sequential access



Random access



Problems of the Traditional File Environment

- **Data redundancy**: Data redundancy is the presence of duplicate data in multiple data files
- **Program data dependence**: Program data dependence is the tight relationship between data stored in files and the specific programs required to update and maintain those files.
- **Lack of flexibility**: lack of flexibility is a traditional file system can deliver routine scheduled reports after extensive programming efforts but it can not deliver ad hoc reports or respond to unanticipated information requirement in a timely fashion.
- **Poor security**: Because there is little control or management of data, access to information may be out of control.

Database Management System

- A database management system (DBMS) is a special software that permits an organization to centralize data, manage it efficiently, and provide access to the stored data by application programs.

Component of DBMS

- The data definition language (DDL)
- The data manipulation language (DML)
- The data dictionary

Component of DBMS

- The **data definition language** which is the formal language used by programmer to specify the content and structure of the database.
- Example:
 - Create
 - Drop
 - Alter

Component of DBMS

- The **data manipulation language**, which is used to manipulate the data in database.
- It contains commands that permit end-users and programming specialists to extract data from the database to satisfy information requests and develop applications.
- Examples:
 - Select
 - Insert
 - Update
 - Delete

Component of DBMS

- A data dictionary is a file or a set of files that contains a database's metadata.
- The data dictionary contains records about other objects in the database, such as data ownership, data relationships to other objects, and other data.

Component of DBMS

NAME: AMT-PAY-BASE
FOCUS NAME: BASEPAY
PC NAME: SALARY

DESCRIPTION: EMPLOYEE'S ANNUAL SALARY

SIZE: 9 BYTES
TYPE: N (NUMERIC)
DATE CHANGED: 01/01/04
OWNERSHIP: COMPENSATION
UPDATE SECURITY: SITE PERSONNEL
ACCESS SECURITY: MANAGER, COMPENSATION PLANNING AND RESEARCH
MANAGER, JOB EVALUATION SYSTEMS
MANAGER, HUMAN RESOURCES PLANNING
MANAGER, SITE EQUAL OPPORTUNITY AFFAIRS
MANAGER, SITE BENEFITS
MANAGER, CLAIMS PAYING SYSTEMS
MANAGER, QUALIFIED PLANS
MANAGER, SITE EMPLOYMENT/EEO
BUSINESS FUNCTIONS USED BY: COMPENSATION
HR PLANNING
EMPLOYMENT
INSURANCE
PENSION
401K

PROGRAMS USING: PI01000
PI02000
PI03000
PI04000
PI05000

REPORTS USING: REPORT 124 (SALARY INCREASE TRACKING REPORT)
REPORT 448 (GROUP INSURANCE AUDIT REPORT)
REPORT 452 (SALARY REVIEW LISTING)
PENSION REFERENCE LISTING

Advantages of DBMS

- Complexity of the information system environment can be reduced.
- Data redundancy and inconsistency can be reduced.
- Data confusion can be eliminated.
- Program-data dependency can be reduced.
- Program development and maintenance costs can be reduced.
- Flexibility of IS can be enhanced.
- Access and availability of information system can be increased.

Advantages of DBMS

- Complexity of the information system environment can be reduced.
- Data redundancy and inconsistency can be reduced.
- Data confusion can be eliminated.
- Program-data dependency can be reduced.
- Program development and maintenance costs can be reduced.
- Flexibility of Information System can be enhanced.
- Access and availability of information system can be increased.

Database Models

- Hierarchical database
- Network data
- Relational database
- Object Oriented database

Database Models

Hierarchical database model

- The hierarchical database model stores data logically in a vertical hierarchy resembling a tree-like structure.
- An upper record is connected logically to a lower record in a parent-child relationship.
- A parent segment can have more than one child but a child can only have one parent.
- This model is good for treating one-to-many relationships.
- They can store large numbers of segments and process efficiently, but they can only deliver information if a request follows the linkages of the hierarchy.

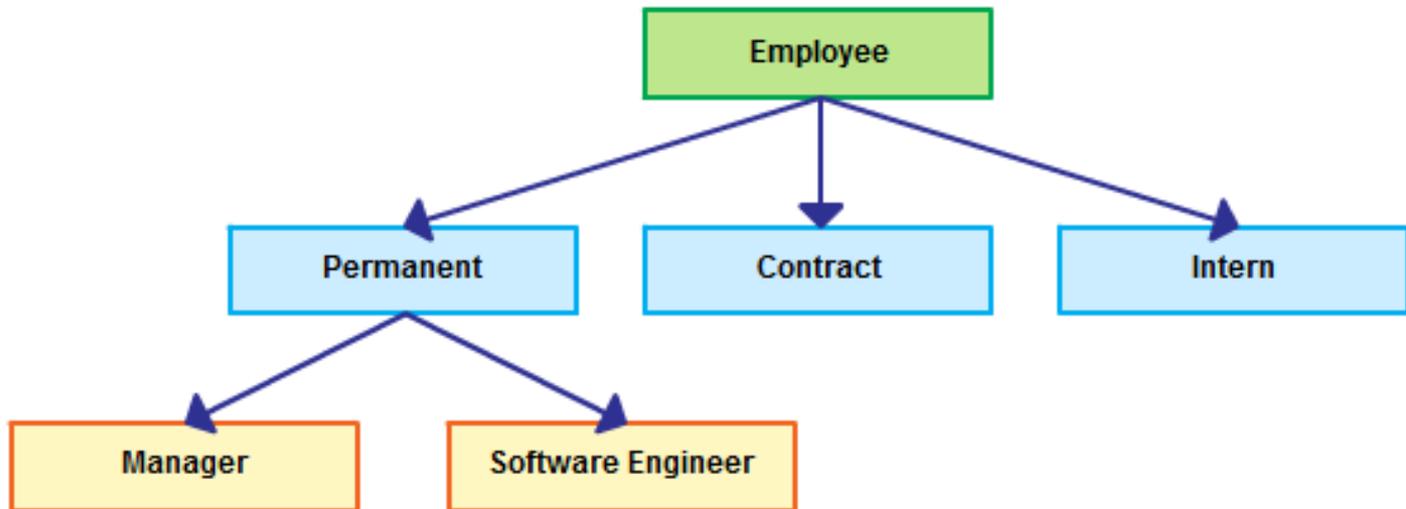
Database Models

Hierarchical database model

- Advantages: They are good for high volume rapid response systems, such as airline reservation systems.
- Disadvantages: Their low user-friendliness, inflexibility, and complexity of programming .

Database Models

Hierarchical database model



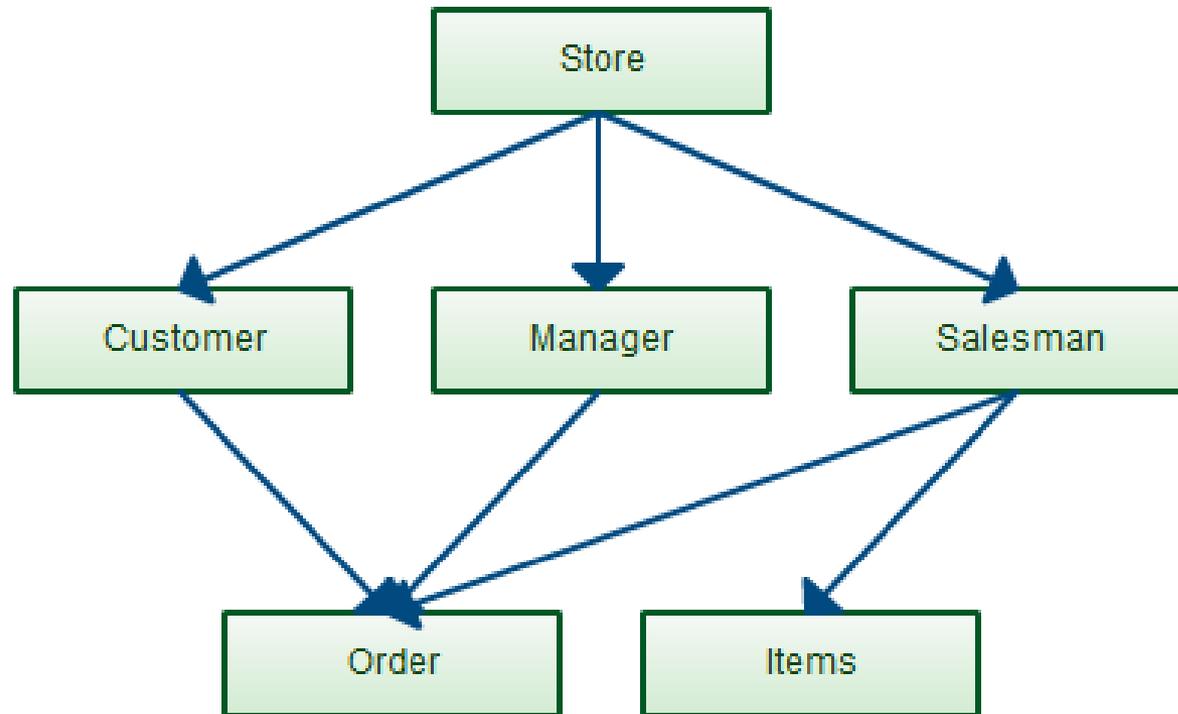
Database Models

Network database model

- The network model stores data logically in a structure that permits many-to-many relationships.
- Through extensive use of pointers, child segment can have more than one parent.
- Network DBMS reduce redundancy and they process information efficiently.
- However, they are inflexible and very complex to maintain and program.

Database Models

Network database model



Database Models

Relational database model

- The relational model overcomes many of the limitations of the previous models.
- Data are organized into two-dimensional tables, each of which can be considered a file.
- The relational model can relate any piece of information in one file to any piece in another file as long as the two tables share a common data element.
- For this reason, they are very flexible.

Database Models

Relational database model

- Access paths to data are not predefined, so that they can easily respond to ad-hoc queries with less programming.
- The main problem with RDBMS is poor processing efficiency. Response time can be very slow if large number of accesses are required to select, join, and extract data from tables.

Database Models

Relational database 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

Database Models

Distributed database model

- A distributed database is partitioned, or distributed among more than one physical locations.
- Parts of the database are stored in one location and other parts are stored and maintained in other locations.
- One main central database can be partitioned into multiple local databases.
- These databases can be updated locally and later justified with the central database.
- Alternately, the central database can be duplicated at various remote locations.
- Another possibility is to maintain a central index and have complete records stored at local levels

Database Models

Distributed database model

