

INFS1603 – Business Databases

ONE. DATABASE SYSTEMS

- **Data** are meaningful facts concerning things (people, places, events and concepts)
- **Information** is processed data and presented in a form for human interpretation
 - Processes can include organizing data to reveal patterns or making forecasts/inferences using statistic modeling
- **Databases** is a collection of data that exists over a long period of time – includes end user data & metadata, purpose is to keep track of things, managed through database management systems (DBMS)
- **Metadata** is data about data
- **Character** is the most basic element of data
- **Field** contains data (composed of characters)
- **Record** is a set of related fields
- **Database** collects related records
- **Data warehouse** stores data in a format optimized for decision support (historical & external data)

DBMS are programs managing the structure and controls access to the data stored in the database

- Serves as an intermediary between the user and the database
- Receives application requests and translates them into complex operations required to fulfil requests
- Enables data to be shared among multiple applications or users and integrates user's view in a single data repository

Advantages of DBMS

- Improved data sharing
- Improve data security
- Better data integration
- Minimized data inconsistency (when same data appears in different places)
- Improved data access (provides quick answers to ad hoc queries)
- Improved decision making (greater data quality, promoting accuracy, validity and timeliness of data)
- Increased end-user productivity (data availability → quick decisions)

TYPES OF DBMS

- **Single-user database** supports only one user at a time, runs on a personal computer – **desktop database**
- **Multiuser database** supports multiple users (usually fewer than 50) called a **workgroup database**
- If the database supports a whole organization (50+) it is called an **enterprise database**
- **Cloud database** is created and maintained using cloud data services, provided by third party vendors
- **General purpose** contains a wide variety of data used in multiple disciplines
- **Discipline-specific** contains data focused on a small set of disciplines
- **Operational** supports a company's day to day operations – known as online transaction processing (OLTP), transactional or production database
- **Online Analytical Processing (OLAP)** is a set of tools that work together to provide an advanced data analysis environment for retrieving, processing and modeling data from data warehouse
- **Business Intelligence** describes a comprehensive approach to capture and process data with the purpose of generating information to support business decision making
- **Unstructured data** exists in their original raw state whereas **structured** is formatting unstructured data
- **Extensible Markup Language (XML)** is a special language used to represent and manipulate data elements in a textual format
 - XML database supports storage and management of semi-structured XML data

EVOLUTION OF FILE SYSTEM DATA PROCESSING

1. **Manual File System:** Storing data on paper and placed in filing cabinets
2. **Computerised File Systems:** A data processing specialist was hired to create a computer-based system to track data and produce required reports, when people want data, they'd send requests for data to the specialist and the specialist created programs to retrieve the data from file and present a report
3. **Database Systems**

Problems with File System Data Processing

- Lengthy development times – requires extensive programming
- Difficulty of getting quick answers – need to write programs to produce simple reports
- Complex system administration – each file needs own management programs to add/modify data
- Lack of security & limited data sharing
- Extensive programming
- Third generation programming language (3GL) skills required
- Data redundancy, inconsistency & anomalies (modification, insertion & deletion)

DATA REDUNDANCY: Occurs when the same data is stored unnecessarily at different places. Can lead to:

- **Poor data security:** Increases chances for copying
- **Data inconsistency:** When different and conflicting versions of the same data appear in different places
- **Data entry errors**
- **Data anomalies:** Not all required changes in redundant data are made successfully
 - *Modification:* A change might occur in thousands of places
 - *Insertion:* Needing to add a new agent → Adding a dummy customer entry to reflect new addition
 - *Deletion:* Deleting one can delete more

INFS1603 – SQL

TWO: BASIC SQL STATEMENTS

Summary of Commands in Chapter 2:

COMMAND DESCRIPTION	BASIC SYNTAX STRUCTURE	EXAMPLE
Command to view all columns of a table	SELECT * FROM table name;	SELECT * FROM ZJLB_BOOKS
Command to view one column	SELECT column name FROM table name;	SELECT title FROM ZJLB_BOOKS
Command to view multiple columns of a table	SELECT column name, column name FROM table name	SELECT title, pubdate FROM ZJLB_BOOKS
Command to assign an alias to a column during display	SELECT column name AS alias FROM table name	SELECT title AS titles FROM ZJLB_BOOKS
Command to perform arithmetic operations during retrieval	SELECT arithmetic expression FROM table name	SELECT retail-cost FROM ZJLB_BOOKS
Command to eliminate duplication in output	SELECT DISTINCT column name FROM table name;	SELECT DISTINCT state FROM ZJLB_CUSTOMERS
Command to perform concatenation of column contents during display	SELECT column name column name FROM table name;	SELECT firstname lastname FROM ZJLB_CUSTOMERS
Command to view the structure of a table	DESCRIBE table name;	DESCRIBE ZJLB_BOOKS

- Choosing specific columns in a **SELECT** statement is called projection
- When specifying more than one column in **SELECT** clause, commas should separate columns
 - Oracle sequences columns in the display the same order the user sequences them
- If the column alias contains spaces or special symbols or if you don't want it to be all in capitals, there must be an enclosing of quotation marks (" ")
- **Multiplication:** *
- **Division:** /
- **Addition:** +
- **Subtraction:** -
 - Multiplication and division are solved first from left to right, use parentheses to override this
 - Book's profit margin: (retail-cost)/cost
 - Selecting profit:
 - SELECT title, retail-cost AS "PROFIT"
FROM ZJLB_BOOKS
- If no value is entered for a column in a row of data, the value is considered **NULL**
 - Absence of data
 - If any value in an arithmetic operation is NULL, the result is NULL

You can use functions to substitute a value such as 0 for a NULL value