

# Lecture 1

## Database Systems

Instructor: M.Imran Khalil

[Imrankhalil3@gmail.com](mailto:Imrankhalil3@gmail.com)

Resource: [Imrankhalil3.wordpress.com](http://Imrankhalil3.wordpress.com)

©University of Sargodha Canal Campus Lahore



## Today's Lecture

- ▶ Course Outline and objective of this course
- ▶ Introduction to Database
- ▶ File based approach
- ▶ Draw backs to File based approach

©University of Sargodha Canal Campus Lahore



## Course outline

- ▶ Introduction to Database Management
- ▶ Database System Architecture
- ▶ Database Models
- ▶ Entity Relationship Model
- ▶ Entity Relationship Diagrams and Extended Entity Relationship Diagrams
- ▶ Relational Data Model
- ▶ Functional Dependencies
- ▶ Normalization

©University of Sargodha Canal Campus Lahore



## Course outline cont...

- ▶ Relational Algebra
- ▶ Structured Query Language
- ▶ Transaction Management
- ▶ Concurrency Control
- ▶ Recovery Techniques
- ▶ Query Optimization Techniques

©University of Sargodha Canal Campus Lahore





▶ **Recommended Text Book(s)**

An Introduction to Database Systems by C. J. Date

▶ **Additional Text Book(s)**

1. Database Management Systems by Catherine Ricardo

2. Database System Concepts by Silberschatz

3. Database Systems - Design, Implementation and Management by Carlos Coronel, et al.

©University of Sargodha Canal Campus Lahore

## RDBMS

▶ **Microsoft SQL SERVER 2012**

©University of Sargodha Canal Campus Lahore

## Database Management System (DBMS)

- ▶ Database
  - ▶ The collection of data, usually referred to as the **database**
- ▶ DBMS contains information about a particular enterprise
  - ▶ Collection of interrelated data
  - ▶ Set of programs to access the data
  - ▶ An environment that is both *convenient* and *efficient* to use
- ▶ Database Applications:
  - ▶ Banking: transactions
  - ▶ Airlines: reservations, schedules
  - ▶ Universities: registration, grades
  - ▶ Sales: customers, products, purchases
  - ▶ Online retailers: order tracking, customized recommendations
  - ▶ Manufacturing: production, inventory, orders, supply chain
  - ▶ Human resources: employee records, salaries, tax deductions
- ▶ Databases can be very large.
- ▶ Databases touch all aspects of our lives

©University of Sargodha Canal Campus Lahore



## University Database Example

- ▶ Application program examples
  - ▶ Add new students, instructors, and courses
  - ▶ Register students for courses, and generate class rosters
  - ▶ Assign grades to students, compute grade point averages (GPA) and generate transcripts
- ▶ In the early days, database applications were built directly on top of file systems

©University of Sargodha Canal Campus Lahore





## Drawbacks of using file systems to store data

- ▶ Data redundancy and inconsistency
  - ▶ Multiple file formats, duplication of information in different files
- ▶ Difficulty in accessing data
  - ▶ Need to write a new program to carry out each new task
- ▶ Data isolation – multiple files and formats
- ▶ Integrity problems
  - ▶ Integrity constraints (e.g., account balance > 0) become “buried” in program code rather than being stated explicitly
  - ▶ Hard to add new constraints or change existing ones

©University of Sargodha Canal Campus Lahore



## Drawbacks of using file systems to store data (Cont.)

- ▶ Atomicity of updates
  - ▶ Failures may leave database in an inconsistent state with partial updates carried out
  - ▶ Example: Transfer of funds from one account to another should either complete or not happen at all
- ▶ Concurrent access by multiple users
  - ▶ Concurrent access needed for performance
  - ▶ Uncontrolled concurrent accesses can lead to inconsistencies
    - ▶ Example: Two people reading a balance (say 100) and updating it by withdrawing money (say 50 each) at the same time
- ▶ Security problems
  - ▶ Hard to provide user access to some, but not all, data

**Database systems offer solutions to all the above problems**

©University of Sargodha Canal Campus Lahore

# End of Lecture

©University of Sargodha Canal Campus Lahore

