Lecture 1

Introduction to Database System

(Part 1)

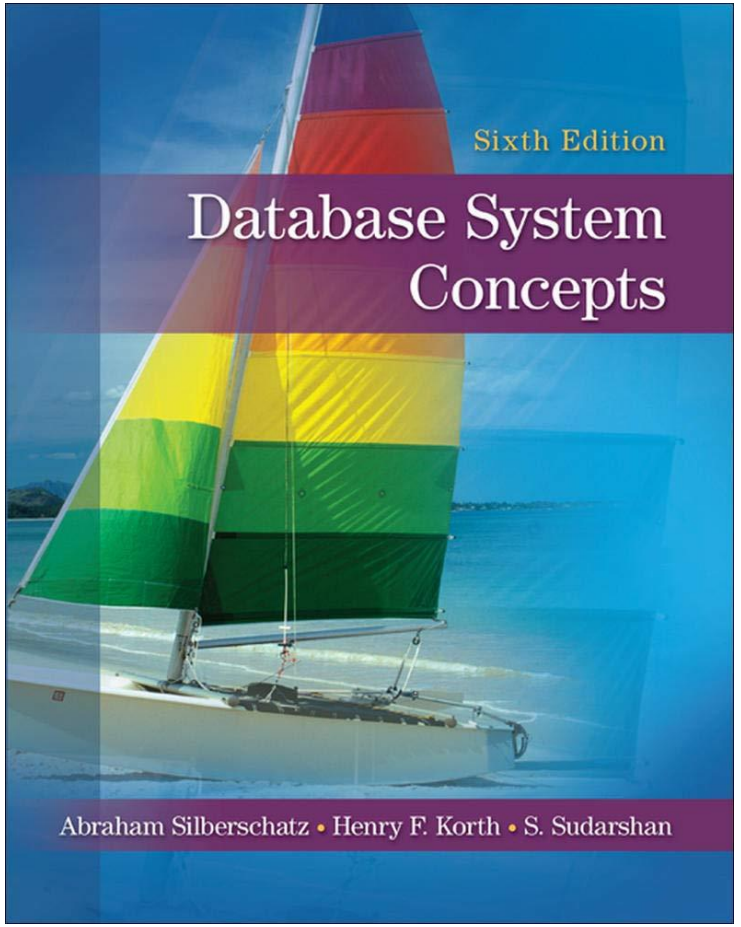
Introduction

- Course materials and updates will be posted in **Google Classroom**
- Online lectures will be delivered via **Google Meet**
- You are expected to attend the sessions **right on time**
- **Attendance:** Enter your name and student ID in the chat box

Introduction

- *Text Book(s):*
  1. **Database System Concepts (6th Edition)** by Silberschatz, Korth and Sudarshan
  2. **Fundamentals of Database Systems** by Elmasri & Navathe

- ***Recommended Online Reads*:**
  1. https://www.tutorialspoint.com/dbms/index.htm
  2. https://www.w3schools.com/sql/



Course Information

Course Title:	**Database System**
Course Code:	**CSE-3101**
Credit:	3.00
Contact Hours:	3 Hrs./Week
Total Marks:	100

Evaluation

Sl No.	Description	Marks distribution
1	Mid-term examinations	30
2	Assignments/Viva	10
3	Attendance	10
4	Final term examination	50
	Total	100

Evaluation (Lab)

Sl No.	Description	Marks distribution
1	Assignments (3-4)	50-80%
2	Viva/Quiz	10%
3	Attendance	10%
4	Final Evaluation	0-30%
	Total	100%

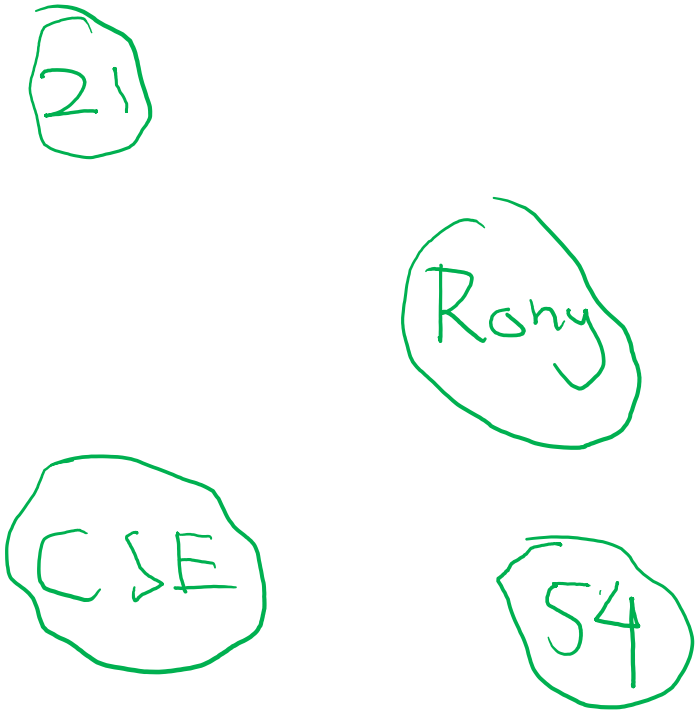
Why this course?

Introduction

- **Database system has various applications in real-life:**
  - ✓ **Banking:** all transactions
  - ✓ **Airlines:** reservation, schedules
  - ✓ **Universities:** registration, grades
  - ✓ **Sales:** customers, products, purchases
  - ✓ **Human resources:** Employee records, salaries, tax deductions

Introduction

- **Data**: Raw, isolated facts or figures (without context)
- **Information:** Processed, meaningful, useful data



Name	Dept.	Age	Batch
Rony	CSE	21	54

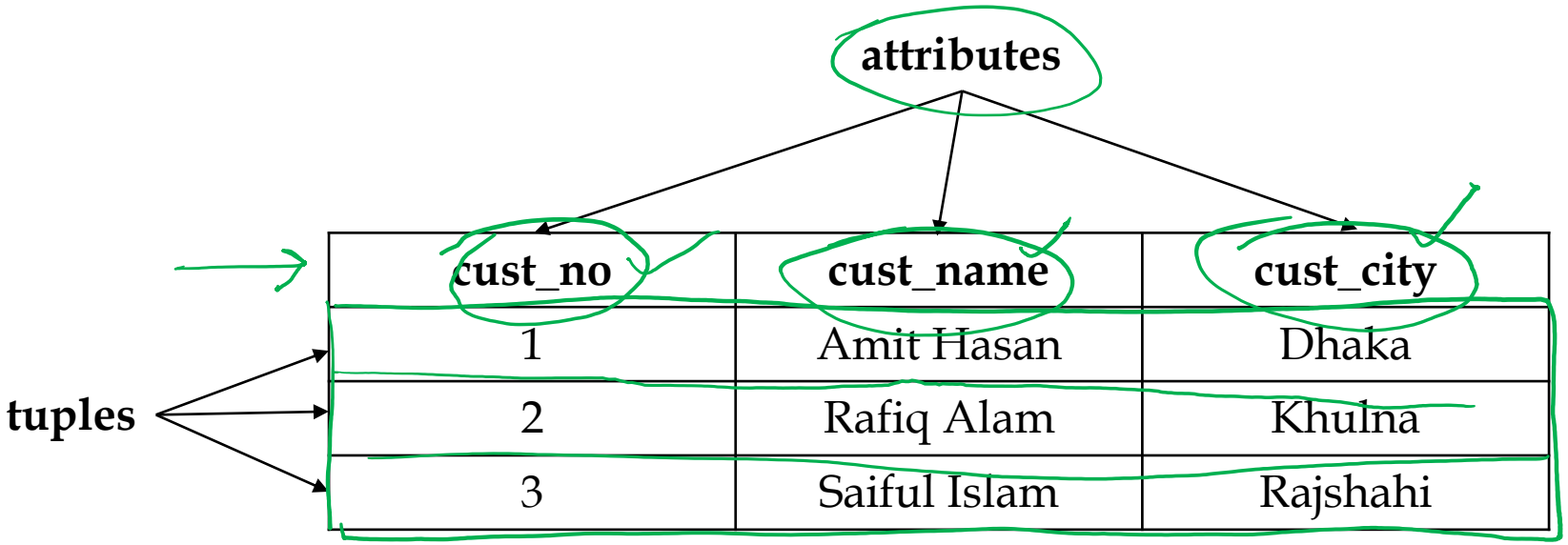
Introduction

- **Database:**
  - ✓ **Database is a collection of large, interrelated data.**
  - ✓ These data can be stored in the form of tables.
  - ✓ Example:
    - A Customer database may include attributes or fields such as cust_no, cust_name, and cust_city.

cust_no	cust_name	cust_city
1	Amit Hasan	Dhaka
2	Rafiq Alam	Khulna
3	Saiful Islam	Rajshahi

Introduction

- **Database:**
  - ✓ Each row in the table is called a **tuple** or **record**.
  - ✓ Each column in the table is called an **attribute** or **field**.



cust_no	cust_name	cust_city
1	Amit Hasan	Dhaka
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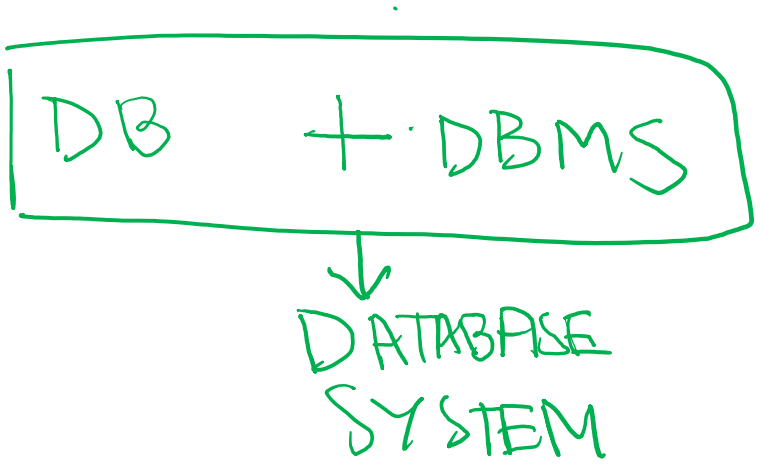
Introduction

- **Database Management System (DBMS):**
  - ✓ A software package designed to store and manage databases.
  - ✓ **The primary goal of a DBMS is to provide a way to store and retrieve database information that is both *convenient* and *efficient*.**



University Database Example

We will be using a university database as example.

- Data consists of information about:
  - Student
  - Instructor
  - Course
  - Dept.

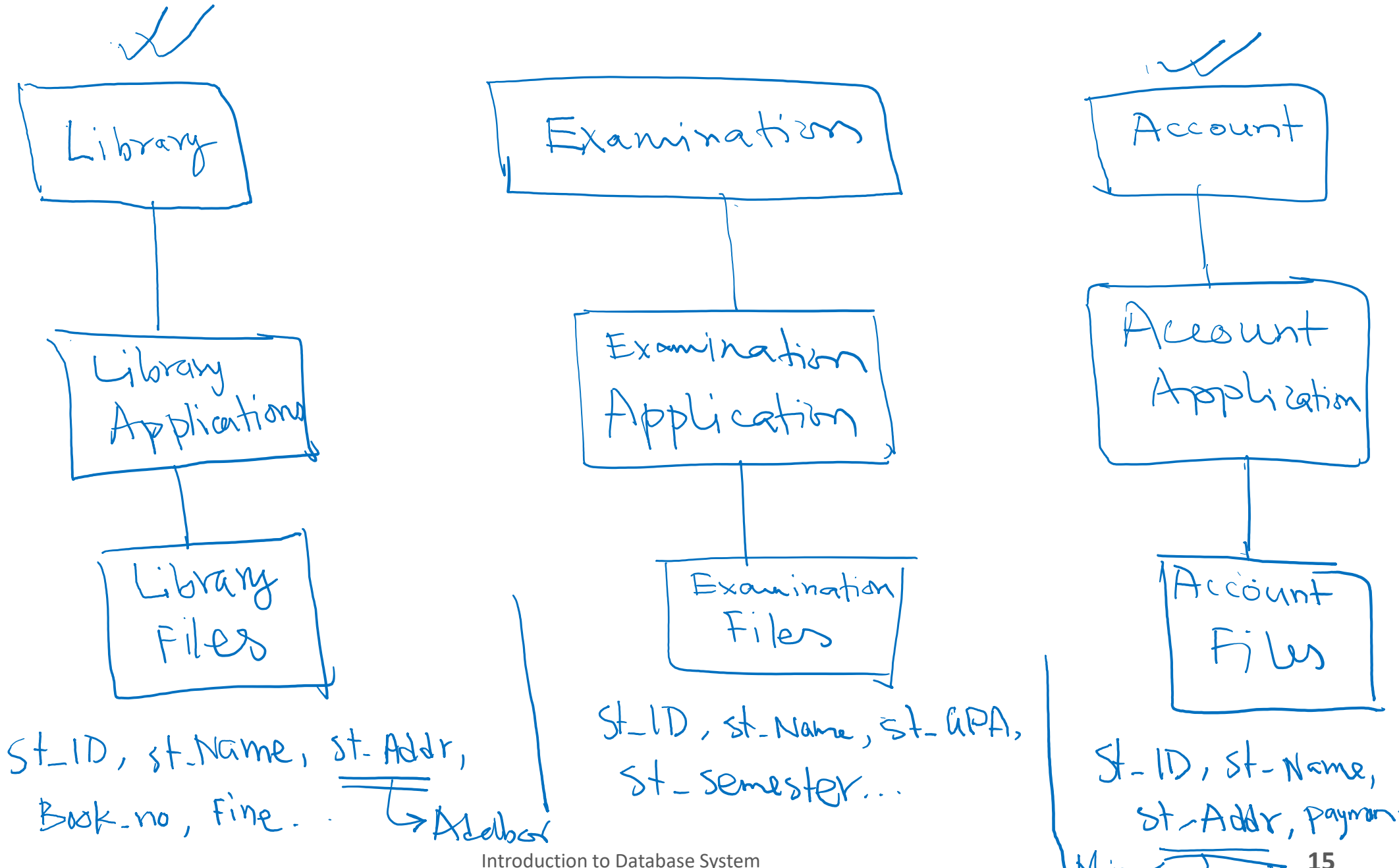
DB

- Application program examples:
  - Add new students, instructors, courses
  - Register students for courses and generate class roster
  - Assign grades, calculate GPA, generate transcripts

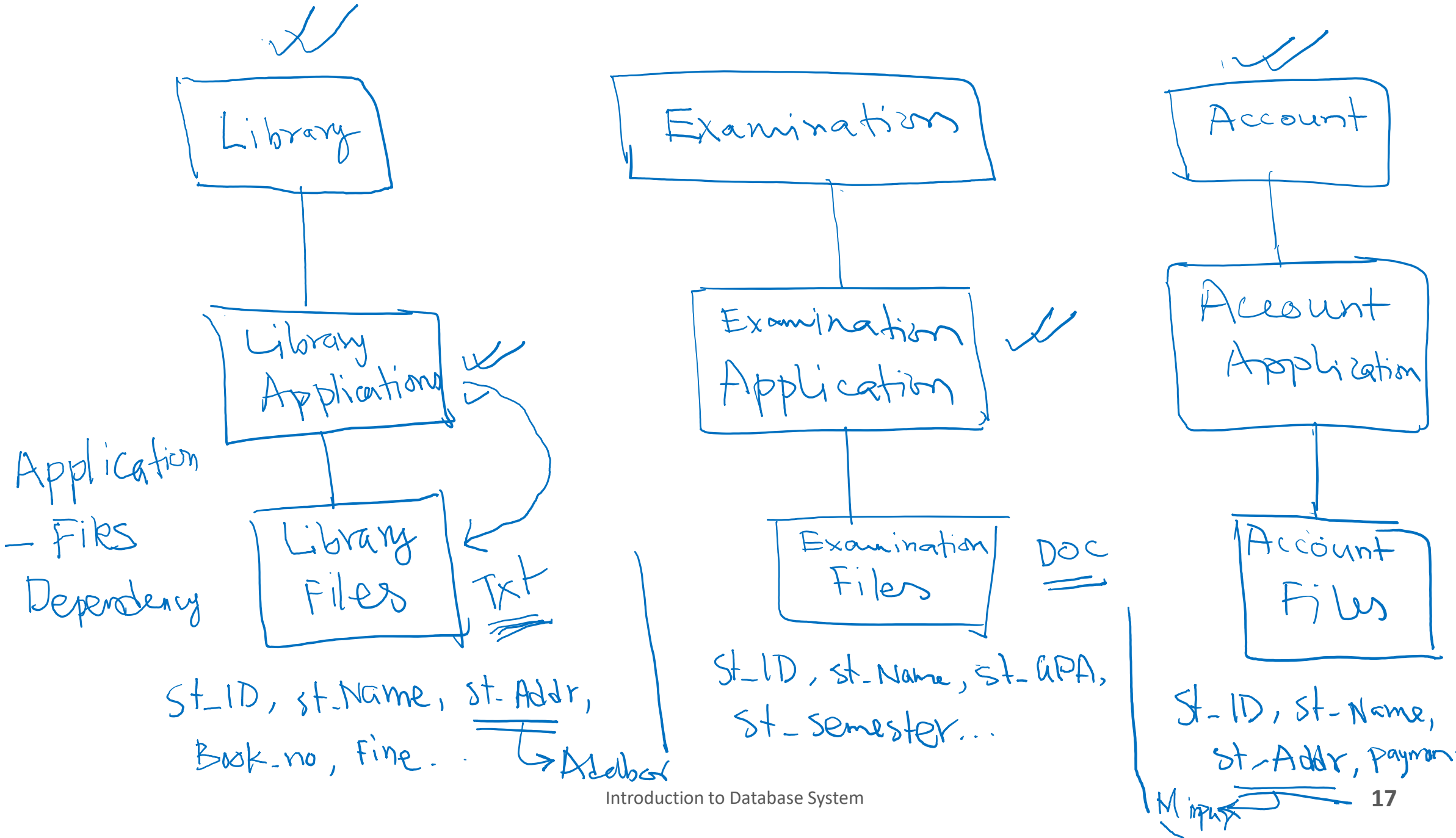
DBMS

A Bit of History

- Computers initially used of scientific/engineering purposes
- Commercial applications introduced **File Processing System**
- **File Processing System:** A collection of programs that perform services for the end-users such as generating reports


Library
Library Application
Library Files
St_ID, st_Name, st_Addr,
Book_no, Fine.
Examination
Examination Application
Examination Files
St_ID, st_Name, st_GPA,
st_semester...
Account
Account Application
Account Files
St_ID, St_Name,
st_Addr, payment_st.

Book_no, Book_Title, Author, Edition


Library
Library Application
Application - Files Dependency
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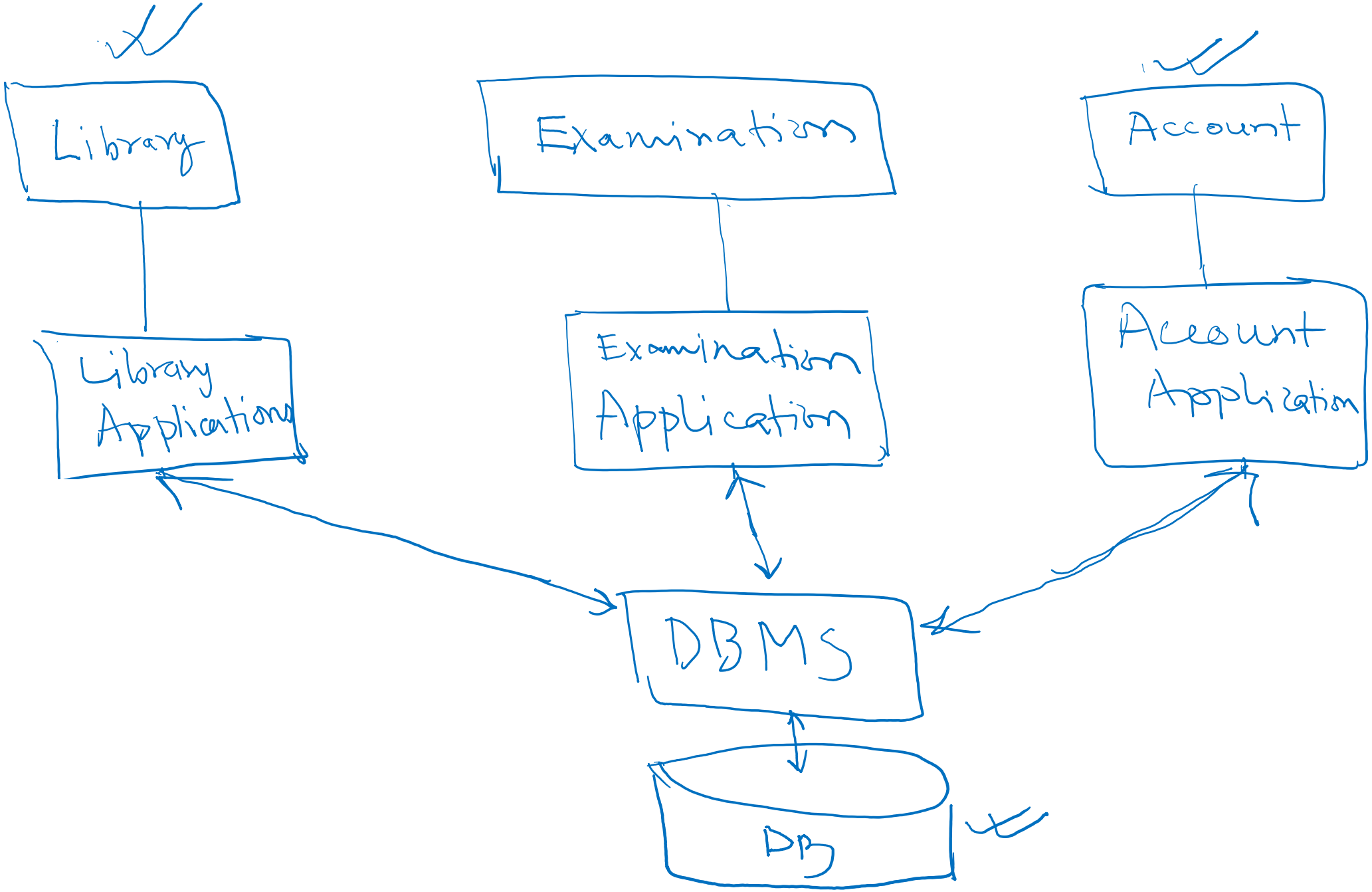
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Library Application
Examination Application
Account Application
DBMS
DB

File Processing System/Purpose of DB System

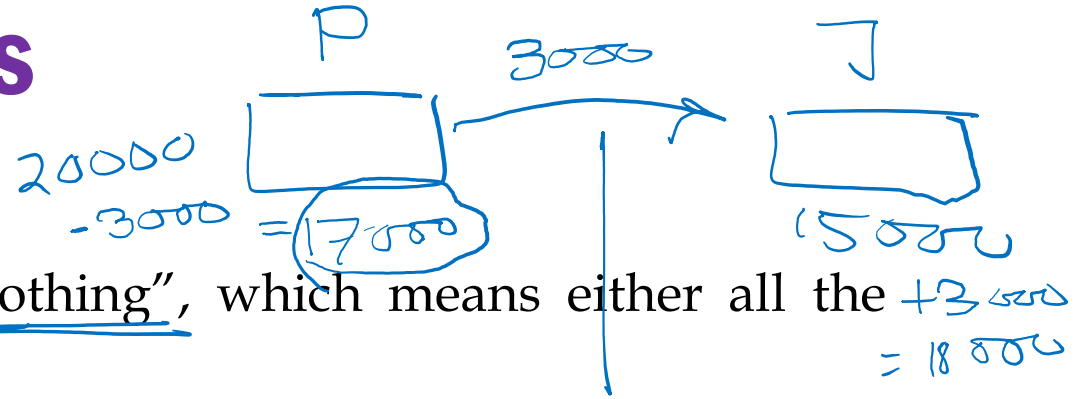
In the early days, database applications were built directly on top of **file systems**, which leads to:

1. **Data redundancy and inconsistency:**
   - Data redundancy refers to the duplication of data.
   - In file systems, the same information may be duplicated in several places (files).
   - This Data redundancy may also lead to data inconsistency.

2. **Data Isolation:**
   - Because data are scattered in various files, and files may be in different formats, writing new application programs to retrieve the appropriate data is difficult.

3. **Dependency on application programs:**
   - Changing files would lead to change in application programs.

Purpose of Database Systems



4. **Atomicity of Updates:**
   - Atomicity of a transaction refers to "All or nothing", which means either all the operations in a transaction executes or none.
   - Failures may leave database in an inconsistent state with partial updates carried out

5. **Data Security:**
   - Data should be secured from unauthorised access, for example a student in a college should not be able to see the payroll details of the teachers, such kind of security constraints are difficult to apply in file processing systems.

6. **Concurrent access by multiple users**
   - Concurrent access needed for performance
   - Uncontrolled concurrent accesses can lead to inconsistencies

Purpose of Database Systems

7. **Integrity Issues**
   - Integrity constraints (e.g., account balance > 0) are hard to add constraints or change in file-processing system

Related Readings

- Database System Concepts (6th Edition)
  - *Chapter 1*

- https://www.tutorialspoint.com/dbms/index.htm