

# Introduction to databases

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Based on Christopher Ré and Jennifer Widom slides

# Agenda

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What is a Database Management System?

Scope of this course

Key concepts

Key people

# Database Management Systems (DBMS)

Provides efficient, reliable, convenient, and safe multi-user storage of and access to massive amounts of persistent data.

## Massive

Terabytes of data

## Multi-user

Concurrency control

## Persistent

Data in databases outlive the programs that execute on that data

## Convenient

Physical data independence  
High-level query languages

## Safe

Possible failures: hardware, software, power, users  
Ensure the consistency of the data

## Efficient

Thousands of queries/updates per second

## Reliable

99,99999% up time

# Scope of this course

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Database applications may be programmed via “frameworks”

DBMS may run in conjunction with “middleware”

Data-intensive applications may not use DBMS at all

**We'll focus on the DBMS itself.**

# Key concepts

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## Data model

Description of how the data is structured

Examples: set of records, XML, graph

## Schema versus data

Analogy: types and variables in programming languages

## Data definition language (DDL)

Set up schema

## Data manipulation or query language (DML)

Querying and modifying

# Key people

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DBMS implementer

Builds system

Database designer

Establishes schema

Database application developer

Programs that operate on database

Database administrator

Loads data, keeps running smoothly

Whether you know it or not, you're using a database every day.

# History of databases

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Every hour, every day, digital databases quietly store, cross-reference, and return information on every aspect of our lives.

Discover the history of these powerful tools, including one man's struggle to convince his employer listen to his idea – the idea that led to a billion dollar industry.

Computer History Museum

<https://www.youtube.com/watch?v=KG-mqHoXOXY&t=5s>