

# Introduction to Database Systems

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Ben Carterette

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Physical and logical organization of databases.  
Data retrieval languages, relational database  
languages, security and integrity, concurrency,  
distributed databases.

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## Database Systems

- The overview in 5 Ws (and one H):
  - **What** is a database? What is a database management system (DBMS)?
  - **Why** use databases? Why study them?
  - **Who** works with databases?
  - **How** does a DBMS work?
  - **Where and when** did databases originate?

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## What is a Database?

- A **database** is a collection of data
  - Usually large quantities of interrelated data
    - E.g. student records, faculty records, courses, classrooms, payrolls, ...
- A **database management system (DBMS)** is a software system designed to store and manage data

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## Why Use a DBMS?

“So a bunch of text files on disk can be a database. I’ll just process them with Python. Why do I need to learn about DBMS software?”

- Data too large to fit in memory; files too big for random access on disk
- Arbitrarily complex queries that must be answered quickly
- Many users accessing data concurrently
- Some users need different access permissions

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## Why Use a DBMS?

- Data independence
- Efficient access
- Integrity and security
- Access administration
- Concurrent access
- Application development time

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