

GE 103- Database Management

Course Introduction

DBMS

Database

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Data collection managed by a
specialized software called a
Database Management System (DBMS)

Why a whole course in Databases?

Banking, ticket reservations, customer records, sales records, product records, inventories, employee records, address books, demographic records, student records, course plans, schedules, surveys, test suites, research data, genome bank, medicinal records, time tables, news archives, sports results, e-commerce, user authentication systems, web forums, www.imdb.com, the world wide web, ...

Databases are everywhere!

Examples

- Banking
 - Drove the development of DBMS
- Industry
 - Inventories, personnel records, sales ...
 - Production Control
 - Test data
- Research
 - Sensor data (25GB/h for a car)
 - Geographical data
 - Laboratory information management systems
 - Biological data (e.g. genome data)

Why not a file system?

File systems are

- Structured
- Persistent
- Changable
- Digital

... but oh so inefficient!

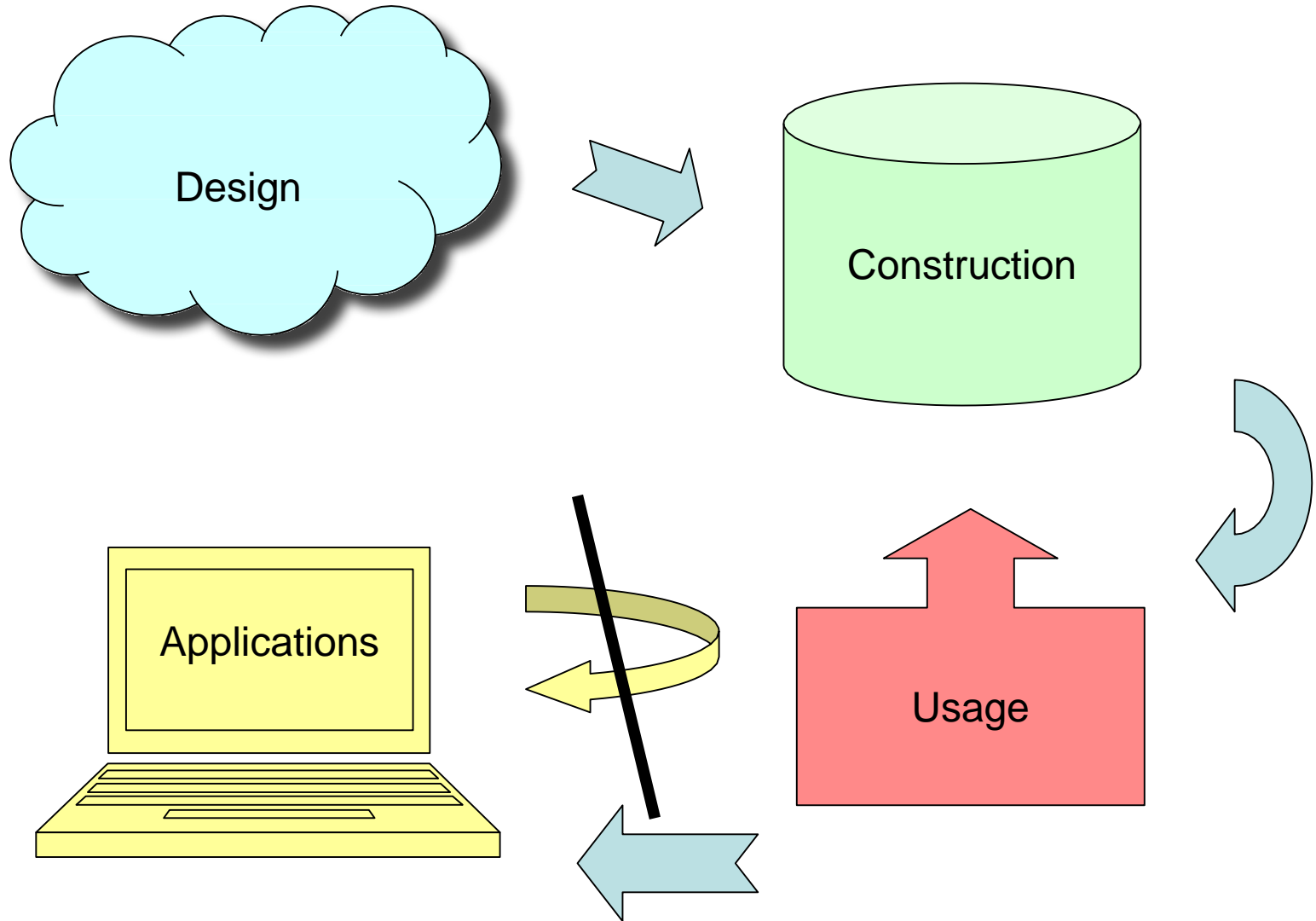
Modern DBMS

- Handle *persistent* data
- Give *efficient* access to huge amounts of data
- Give a *convenient* interface to users
- Guarantee *integrity* constraints
- Handle transactions and concurrency

Database Management Systems

- Hierarchical databases:
 - "Easy" to design if only one hierarchy
 - Efficient access
 - Low-level view of stored data
 - Hard to write queries
- Network databases:
 - "Easy" to design
 - Efficient access
 - Low-level view of stored data
 - Very hard to write queries

Course Objectives



Course Objectives – Design

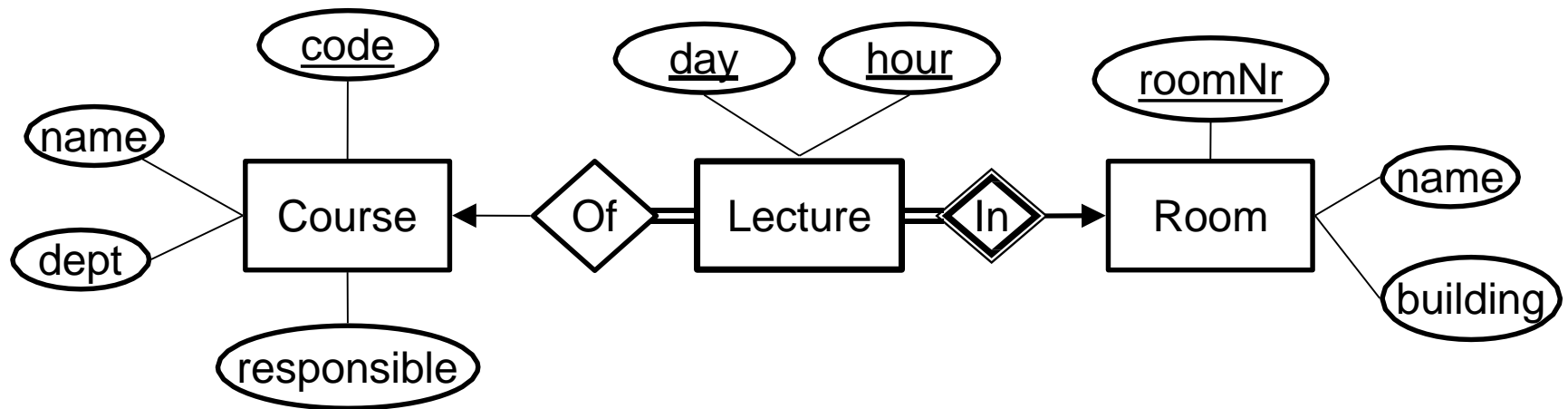
When the course is through, you should

- Given a domain, know how to design a database that correctly models the domain and its constraints

“We want a database that we can use for scheduling courses and lectures. This is how it’s supposed to work: ...”

Course Objectives – Design

- Entity-relationship (E-R) diagrams
- Functional Dependencies
- Normal Forms



Course Objectives – Construction

When the course is through, you should

- Given a database schema with related constraints, implement the database in a relational DBMS

```
Courses (code, name, dept, examiner)
```

```
Rooms (roomNr, name, building)
```

```
Lectures (roomNr, day, hour, course)
```

```
roomNr -> Rooms.roomNr
```

```
course -> Courses.code
```

Course Objectives – Construction

- SQL Data Definition Language (DDL)

```
CREATE TABLE Lectures (  
    lectureId INT PRIMARY KEY,  
    roomId REFERENCES Rooms(roomId) ,  
    day INT check (day BETWEEN 1 AND 7) ,  
    hour INT check (hour BETWEEN 0 AND 23) ,  
    course REFERENCES Courses(code) ,  
    UNIQUE (roomId, day, hour)  
);
```

Course Objectives – Usage

When the course is through, you should

- Know how to query a database for relevant data using SQL
- Know how to change the contents of a database using SQL

”Add a course ‘Databases’ with course code ‘TDA357’, given by ...”

”Give me all info about the course ‘TDA357’”

Course Objectives – Usage

- SQL Data Manipulation Language (DML)

```
INSERT INTO Courses VALUES  
( 'TDA357' , 'Databases' , 'CS' , Mickey' );
```

- Querying with SQL

```
SELECT * FROM Courses WHERE code = 'TDA357' ;
```

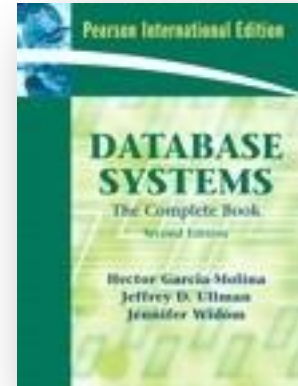
Course Objectives - Summary

You will learn how to

- **design** a database
- **construct** a database from a schema
- **use** a database through queries and updates
- use a database from an external **application**

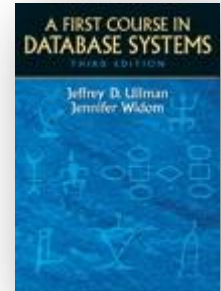
Course Book

"Database Systems:
The Complete Book, 2E",
by Hector Garcia-Molina,
Jeffrey D. Ullman,
and Jennifer Widom



Alternative versions

"First Course in Database Systems, A, 3/E" by Jeffrey D. Ullman and Jennifer Widom



"Database Systems: The Complete Book", by Hector Garcia-Molina, Jeffrey D. Ullman, and Jennifer Widom



Web Resources

-Website (Course Homepage)

http://aytugonan.cbu.edu.tr/GE103_index.html

- Slides of lectures
- Exercise sessions + solutions
- Lab assignment
- Extra information
- Sample exam questions and solutions

Teaching staff

- Lecturer/Course responsible:
 - Assoc. Prof. Dr. Aytuğ ONAN
 - (aytug.onan@ikcu.edu.tr)
 - (aytugonan@gmail.com)
- Course assistants:
 - Research Assistant Fatma Günseli
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Evaluation Criteria

- Quizzes	(2)	15%
- Term Project	(1)	15%
- Midterm Exam	(1)	30%
- Final Exam	(1)	40%