



Chapter 6

Case Studies of Relational Database Analysis and Design

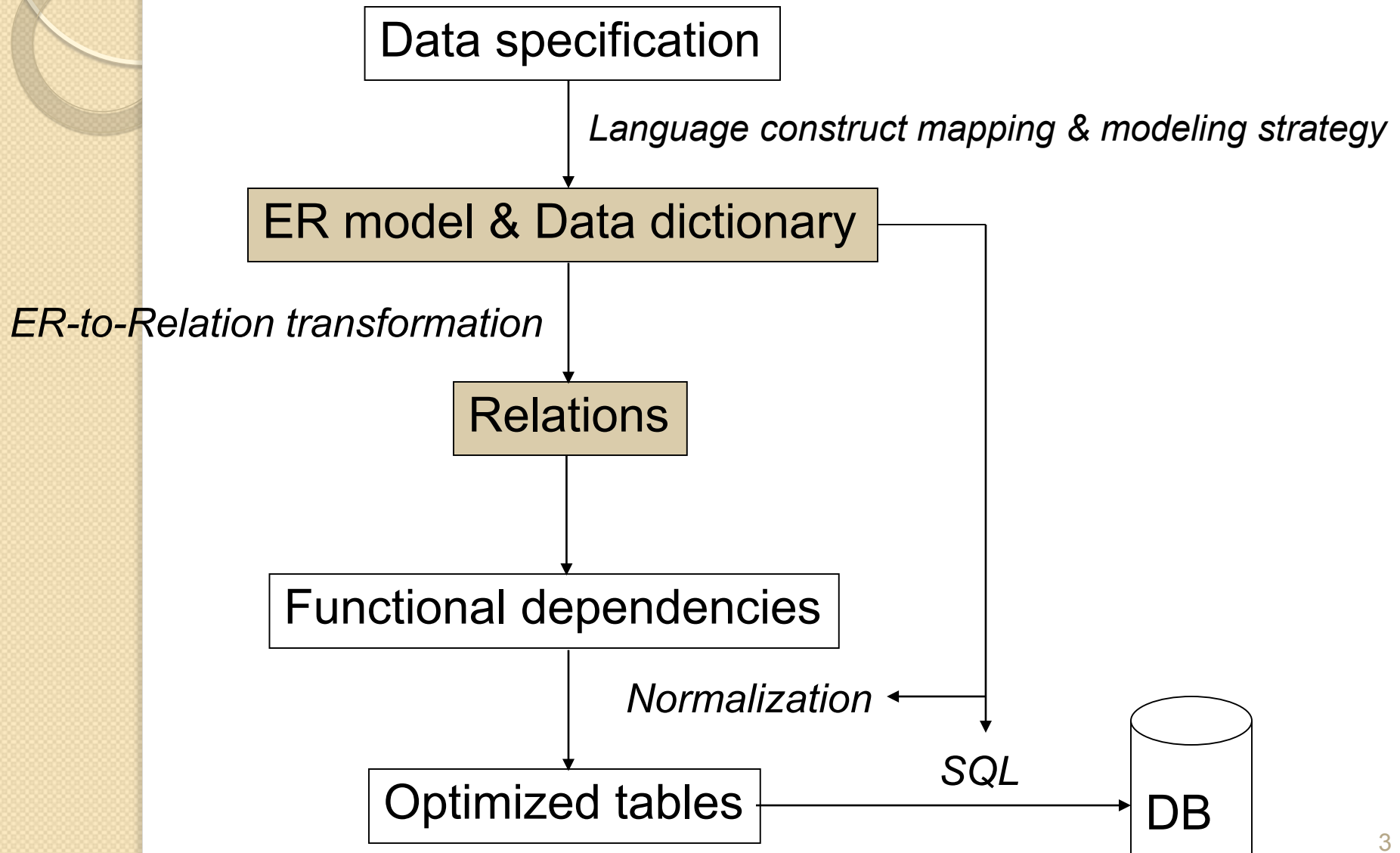
กรณีศึกษาการวิเคราะห์และออกแบบฐานข้อมูลเชิงสัมพันธ์

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A Big Picture of RDB Development



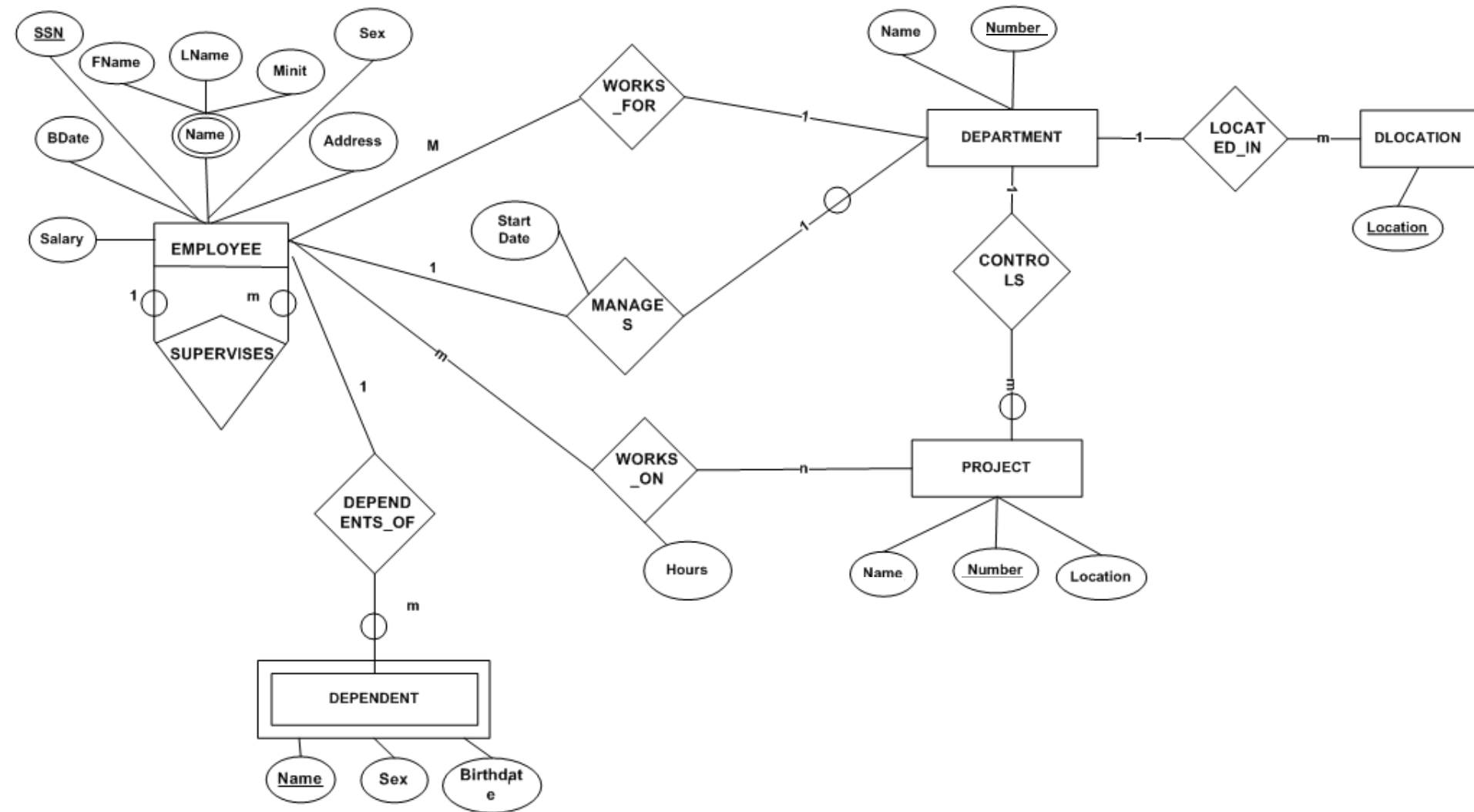
Text to ER Primitive Mapping

- Heuristic rules for mapping data requirements to ER primitive constructs:
 - Noun → Entity
 - Verb or Preposition → Relationship
 - Adjective → Attribute of Entity
 - Adverb → Attribute of Relationship

Case Study 1: Company HR

- Given the following data requirements for COMPANY database. Create its conceptual schema step-by-step as in modeling concepts of the ER model. The COMPANY database keeps track of a company's employees, departments, and projects. The database designers stated the following description of the “miniworld”– the part of the company to be represented in the database.
 1. The company is organized into departments. Each department has a name, a number, and an employee who manages the department. We keep track of the start date when that employee started managing the department. A department may have several locations.
 2. A department controls a number of projects, each of which has a name, a number, and a single location.
 3. We store each employee's name, social security number, address, salary, sex, and birth date. An employee is assigned to one department but may work on several projects, which are not necessarily controlled by the same department. We keep track of the number of hours per week that an employee works on each project. We also keep track of the direct supervisor of each employee.
 4. We want to keep track of the dependents of each employee for insurance purposes. We keep each dependent's name, sex, birth date, and relationship to the employee.

Case Study 1: ER model



Case Study 1: Relations

- Solution

- EMPLOYEE(SSN, Fname, Minit, Lname, Bdate, Address, Sex, Salary,
Super_SSN, Dnumber)
- DEPARTMENT(Dnumber, Dname, SSN, Start_date)
- DEPT_LOCATIONS(Dlocation, Dnumber)
- PROJECT(Pnumber, Pname, Plocation, Dnumber)
- WORKS_ON(SSN, Pnumber, Hours)
- DEPENDENT(SSN, Dependent_name, Dsex, Bdate)

Case Study 2: Conference

The organizer of an international conference on religions would like to keep information on the conference. Two reports are given. The first report contains information on particular religions. The second one states which speaker speaks on which topics. Furthermore, the organizer would like to use religion codes and text codes instead of names. You are asked to design 5NF relational database schemata for this conference.

<i>RELIGION_NAME</i>	<i>TEACHER</i>	<i>ADHERENT(Millions)</i>	<i>TEXTS</i>
Christianity	Christ	400	Old Testament
			New Testament
Budhism	Budha	300	Sutra
Muslim	Mahamed	400	Koran
Hinduism	Khrisna	350	Upanishad
			Pakavat kita
<i>SPEAKER</i>	<i>TOPIC</i>	<i>NO. SESSIONS</i>	<i>TEXT READ</i>
John	Christianity	2	Pakavat kita
	Hinduism	1	Koran
			Old Testament
Peter	Budhism	2	Koran
Chandra	Budhism	3	Old Testament
	Christianity	1	New Testament
			Sutra



Case Study 2: ER model

(write down your answer below)



Case Study 2: Relations

(write down your answer below)

Case Study 3: Library

- The school library would like to have a relational database system and you are asked to design relational database schemata.

The library would like to keep records for books and magazines. For each book, the book name, the author name(s), the publisher, the year published, the call number (e.g., QA 76.3...) and a serial registration number are recorded.

For each magazine, the magazine name, the publisher, the volume number, the month and the year issued and the magazine category (e.g., sports, computer, fashion, etc.) are recorded.

The library would also like to automate the borrowing system. They would like to record students' id#, name, address, class and a home phone number. They also keep borrowing records which inform them which students borrow which library items.

Design 5NF relational database schemata for this library using the ER conceptual schema model.



Case Study 3: ER model

(write down your answer below)



Case study 3: Relations

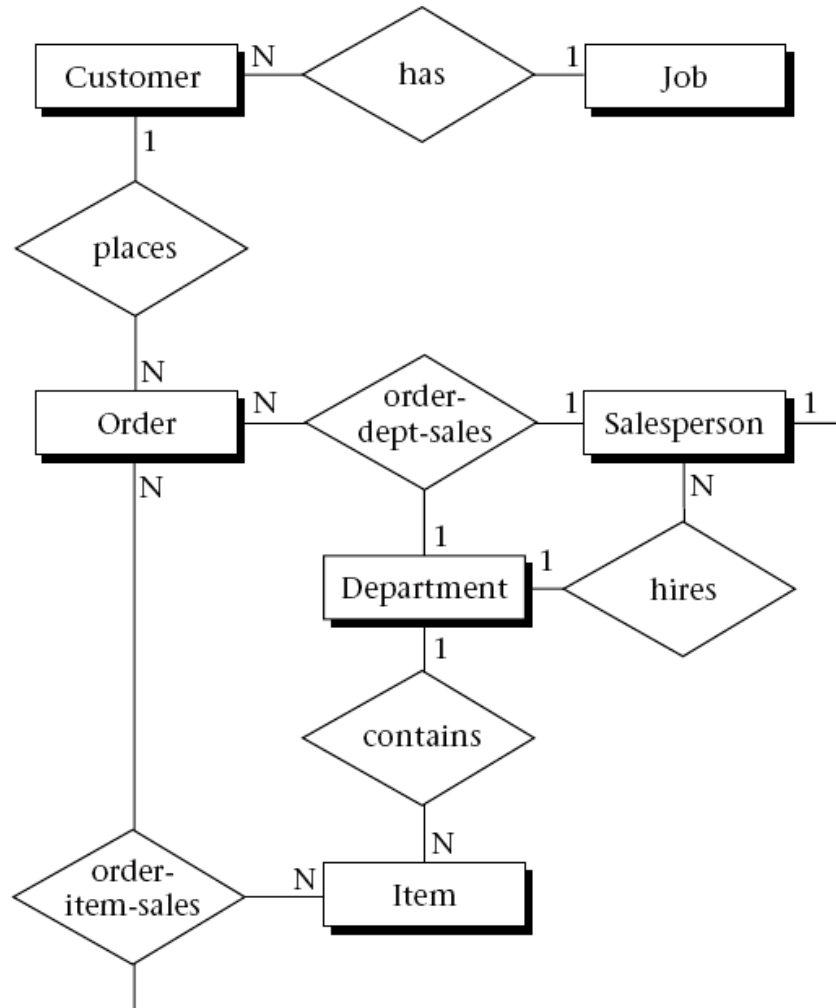
(write down your answer below)

Case study 4: Company Sales

- Each customer has one job_title, but different customers may have the same job-title.
- Each customer may place many orders, but only one customer may place a particular order.
- Each department has many salespeople, but each salesperson must work in only one department.
- Each department has many items for sale, but each item is sold in only one department. (Item means item type, like IBM PC).
- For each order, items ordered in different departments must involve different salespeople, but all items ordered within one department must be handled by exactly one salesperson. In other words, for each order, each item has exactly one salesperson; and for each order, each department has exactly one salesperson.

Case Study 4: ER model

- Partial solution (*what are missing?*)





Case Study 4: Relations

(write down your answer below)

Exercise

- Practice ER modeling (and normalization) through the four case studies given in this chapter.