



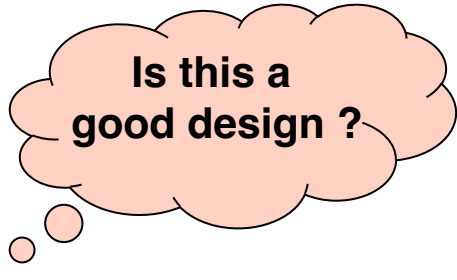
KOREA UNIVERSITY
DATABASE LAB

Lab

Chapter 7 - Relational Database Design (Normalization)

Exercise

- Let us assume the university in the textbook.



Is this a good design ?

- Suppose relation schema *in_dep* is defined as (*ID*, *name*, *salary*, *dept_name*, *building*, *budget*), and the current contents of *in_dep* are as follows.

| <i>ID</i> | <i>name</i> | <i>salary</i> | <i>dept_name</i> | <i>building</i> | <i>budget</i> |
|-----------|-------------|---------------|------------------|-----------------|---------------|
| 22222 | Einstein | 95000 | Physics | Watson | 70000 |
| 12121 | Wu | 90000 | Finance | Painter | 120000 |
| 32343 | El Said | 60000 | History | Painter | 50000 |
| 45565 | Katz | 75000 | Comp. Sci. | Taylor | 100000 |
| 98345 | Kim | 80000 | Elec. Eng. | Taylor | 85000 |
| 76766 | Crick | 72000 | Biology | Watson | 90000 |
| 10101 | Srinivasan | 65000 | Comp. Sci. | Taylor | 100000 |
| 58583 | Califieri | 62000 | History | Painter | 50000 |
| 83821 | Brandt | 92000 | Comp. Sci. | Taylor | 100000 |
| 15151 | Mozart | 40000 | Music | Packard | 80000 |
| 33456 | Gold | 87000 | Physics | Watson | 70000 |
| 76543 | Singh | 80000 | Finance | Painter | 120000 |

Figure 7.2 The *in_dep* relation.

Exercise

1. Based on the assumptions we have on the *University* example, find all (non-trivial) **functional dependencies** for schema *in_dep*.
2. Find **candidate keys** for schema *in_dep*.
3. Prove whether schema *in_dep* is in **1NF** or not.
4. Prove whether schema *in_dep* is in **3NF** or not.
5. Prove whether schema *in_dep* is in **BCNF** or not.
6. **Decompose** *in_dep* into BCNF forms.
7. Prove your decomposition (the above answer - #6) is **lossless**.
8. Display the contents of relation instances for the above decomposition (#7) based on Fig. 7.2 in the previous slide.
9. Show Fig. 7.2 can be reconstructed from the answer of #8.
10. Describe the final database schema (the answer of #6) using **SQL** statements; you must specify **PK** (primary key) and **FK** (foreign key) constraints appropriately.

Homework

- Complete the exercise.
- Submit your report on blackboard
 - 10:29:59, 2024/06/06
 - **Only PDF (or image) files** are accepted
 - **No late submission**



KOREA UNIVERSITY
DATABASE LAB

End of Lab