

LE04: 06/03/2020

Master in Informatics and Computing Engineering
Database and Web Applications Laboratory
Instance: 2019/2020

Lecture #4 :: 06/03/2020

Goals

By the end of this class, the student should be able to:

- Obtain the Conceptual Model.
- Obtain the Relational Schema from the Conceptual Model.
- Validate the Relational Schema using the database normalization.

Content

1. Conceptual (data) modelling (A4)
2. Structure modelling using UML
 - Class diagrams
 - Classes
 - Attributes
 - Aggregation relationship
 - Composition relationship
 - Generalization relationship
 - Dependency relationship
 - Class-association
3. Relational schema (A5)
 - Relation schemas
 - Attributes, domains
 - Primary keys, foreign keys and other integrity rules.
4. Mapping UML in relations (and objects in tuples)
 - Relational Paradigm vs. Object-oriented Paradigm
 - Object identification with primary keys
 - Mapping rules
 - Mapping associations and generalizations
5. Introduction to schema refinement
 - Problems caused by redundancy
 - Functional dependencies
6. Normal forms (recap)
 - Boyce-Codd Normal Form (BCNF)
 - Third Normal form

- 7. Decomposition of relations
 - Lossless-join decomposition
 - Dependency-preserving decomposition
- 8. Relational Schema refinement

Bibliography

- Scott Ambler, *The Object Primer*, Cambridge University Press, 3rd Edition, 2004 (section 8.4, 8.5 and 12.3)
- Alberto Rodrigues da Silva, Carlos Videira, *UML — Metodologias e Ferramentas CASE*, 2ª Edição, Centro Atlântico Editora, Maio 2005 (capítulos 6 e 10)
- R. Ramakrishnan, J. Gehrke. *Database Management Systems*. McGRAW-Hill International Editions, 3rd Edition, 2003, ISBN=0-07-246563-8 (Chapter 19)

Materials

- Illustrations presented in class: [Conceptual Modeling](#), [Mapping to Relational](#), [Schema validation](#)
- J. Correia Lopes, Sérgio Nunes. [Database Specification \(EBD\) \(A4-A6\)](#), February 2020
- Scott W. Ambler. [Agile Modeling: UML 2 Class Diagrams](#), Ambysoft, last accessed in February 2020

Summary

- Conceptual Data Model. Database specification. Relational Schema. Relational Schema validation.¹⁾

— *LBAW, 2019/20*

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¹⁾

Modelo Conceptual de Dados. Especificação de Base de Dados. Esquema Relacional. Validação do Esquema Relacional

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