

Focal Points for written exam: Advanced Database Models – 2019

- Overall there are 100 points, distributed as described below. Grades are 1.0, 1.3, 1.7, 2.0 ... 4.0 (all counted as “passed”) and 5.0 (“failed”).
- Assignments of grades may be adjusted according to the overall results, but a score of 50 points or more definitely implies a grade of 4.0 or better (“passed”).
- The questions will be handed out on printed paper with enough space for the answers. Besides a pen no additional material is allowed. The usage of additional help (phones, computers, printouts, books, notes is counted as an attempt of fraud and the exam result will be “not passed”. Phones must be turned off.
- The questions only refer to content addressed in the lecture. Topics greyed out are not covered in the exam.
- Questions are typically regarding an explanation of introduced concepts. For specific topics marked below, there might be questions referring to a simple application example (A).

Basic Terms and Foundations (10 Points)

- Terms: Data(base) Model, Database Schema, Conceptual and Logical Models
- Differences of Relational theory and SQL
- Problems of RDBMS, Impedance Mismatch

Conceptual Models (15 Points)

- Advanced ER Constructs
 - Specialization with notation from Elmasri/Navathe (A)
 - Types of specialization (total/partial, disjoint/overlapping) (A)
- Mapping OO to Relational Model (solutions, disadvantages) (A)
- Basic Principles of UML

The NF² and eNF² Database Model (15 Points)

- NF²: term and basic principles
 - Nest and Unnest operations, Partitioned Normal Form (A)
- eNF²: differences to NF²
 - Type constructors and their properties
- NF² and eNF² in SQL: which type constructors, nested tables, unnesting operation (A)

Object-oriented and Object-relational Database (30 Points)

- Object-oriented concepts: type constructors and complex objects, object identity, specialization, encapsulation, polymorphism, types and classes, type and class hierarchies
- Object-oriented databases
 - Schema definition: language dependent or independent, pre- vs. postprocessors
 - Terms: persistent-capable classes, persistence independence, persistence orthogonality
 - Persistence concepts: named objects, persistence by reachability (A)
- Object-relational databases
 - Object Types and Object Tables (differences to relational tables)
 - Type and table hierarchies (A)
 - Object identity and references, scope of references (A)
 - Methods
 - Type systems of SQL:2003 and Oracle (A)
- Recursive queries (A)

Semi-structured Data and XML Database (10 Points)

- XML schema definitions
 - Terms: well-formed and valid XML documents (A)
 - DTDs (A)
 - XML Schema basic principles, concepts and notation
- XML query languages
 - XPath: basic principles, simple examples (A), structure of path steps
 - XQuery: basic principles. structure

Single-Choice /True-False-Questions (20 Points)

This section will contain 10 single-choice-questions (one of several alternatives should be marked as correct) and true-false-questions (a given statement should be marked as either true or false). A correct mark scores one point, an incorrect mark scores -1 points, no mark is 0 points. Accordingly, only mark answers where you are very certain about the correctness! In both sections (single-choice, true-false) the overall score cannot be less than 0.

The questions in this part of the exam will refer to all previously mentioned focal points.