Name, first name:	Enrollment number:	Study program:

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Mock exam
Database System Concepts for Non-Computer Scientists
Winter 2017/18, February 7th, 2018

Important notes for the exam:

- Processing time 40 minutes; you can gain maximal 40 points; to pass you have to gain at least 50% of the points (20 points)

- Your answers may be in English and /or German

- Papers

    o Please do only use the delivered papers.

    o Inscribe the first paper with your name, enrollment number, study program; every further paper with your name.

    o Please do check the completeness of your papers. The exam comprises

        ▪ 6 pages (including this front page)

        ▪ 4 assignments

- If you realize that your papers are not complete, please tell us immediately!

Assignments

- Please do not use pencils, and no red or green pens.
- This is a closed book exam.

- Please provide us with an ID card and a student card.

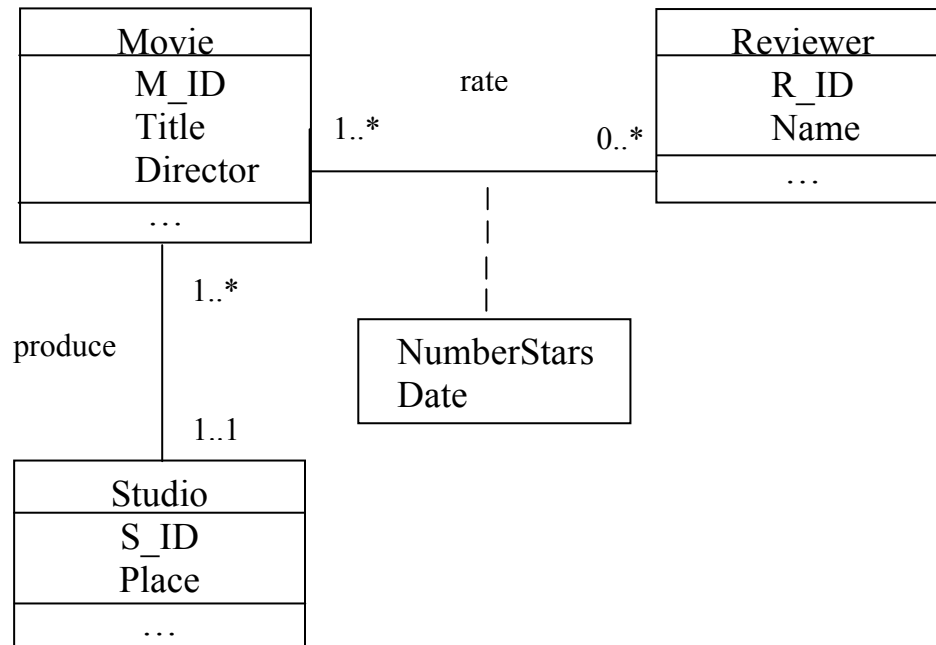- Please sign this cover sheet.

Good luck!

Signature student: _____

Name, first name:

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Assignment 1 (UML-Modeling, Relational Schema) 8 Points

Given the following excerpt of a UML model (in the notation of our lecture) for movies. A reviewer can rate the same movie on different days.

a) Transform the UML schema into a relational schema **with refinement** in giving the table structures (see below). Mark the primary keys by underlining, indicate which attributes must not be NULL, and describe the foreign key constraints – everything that can be derived from the schema above. If possible no constraints from the schema should be lost.
Example form of the table structures and constraints:
T1(<u>A, B</u>, C), T2(<u>A</u>, B), T1.A, T1.B, T2.A, T2.B NOT NULL, T1.C references T2.A

b) Which information from the schema above cannot be described in the DDL?

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Assignment 2 (SQL-Queries) 12 Points

Formulate SQL queries for the university schema, see supplementary sheet:
a) Average weekly hours of the lectures of Professor Russel

b) Which output is given with the query below on that data of the university schema which is
given on the supplementary sheet? Please give attribute names and values in form of a ta-
ble.

    SELECT name, s.studnr, COUNT(a.studnr) AS Quantity
    FROM students s LEFT OUTER JOIN attend a
    ON s.studnr = a.studnr
    WHERE s.studnr = 24002 OR s.studnr = 28106
    GROUP BY name, s.studnr

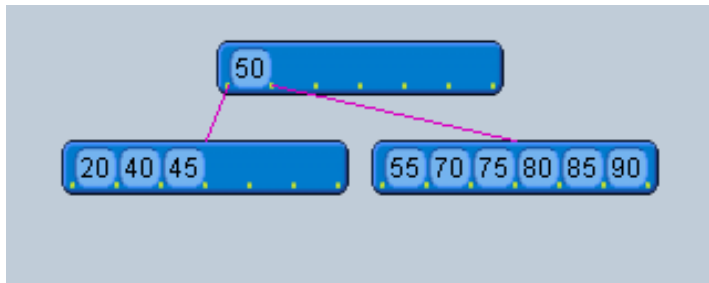c) Names of all professors who give at least 2 lectures

d) Which assistants share the same boss? Give the pairs of those assistants. Take care that an
assistant with him-/herself as a pair is not in the output.

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Assignment 3 (B-Trees) 8 Points

Given the following B-Tree:

a) What is the degree of this B-Tree?

b) Insert 77 into the B-Tree above. Depict the resulting B-Tree completely.
   Use the algorithm discussed in the lecture.

c) Name one advantage and two disadvantages of hashing as an index structure for disk access.

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Assignment 4 (Miscellaneous) 12 Points

a) What is a weak entity in E/R-modeling? Depict a **typical** example.

b) What does the ‚A' in the acronym ACID for transaction properties stand for?

A_____

Give a **short** explanation.

c) **Shortly** describe the anomaly *Dirty Read*.

d) Give one example each for logical and physical optimization in query execution.

e) Can an index be defined over several attributes?

yes ☐   no ☐

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f) What does the acronyms below stand for?

OLTP:

OLAP:

For which classes of applications (OLTP or OLAP) storing relations in column stores is advantageous?

g) What means ‚on delete cascade' with foreign key constraints?