

# Advanced Database Systems – Exercise Sheet 3

## SQL Queries

### Task 1

Write SQL queries to create the following relations:

- Manufacturer(Name, Address, Phone)
- Sensor(Id, Name, Type, MName → Manufacturer(Name))
- Warning(Id, Message)
- Observation(SId → Sensor(Id), Time, Value, Unit)
- BasedOn((OSId, OTime) → Observation(SId, Time), WId → Warning(Id))

Insert the following rows and values:

- Manufacturer:
  - ‘AeroSense GmbH’, ‘Lindwurmweg 87, 80337 München’, ‘+49 89 123456’
  - ‘Nordic Metrics AG’, ‘Fjordweg 12, 24103 Kiel’, ‘+49 431 98765’
  - ‘RheinTech SE’, ‘Rheinallee 5, 50678 Köln’, ‘+49 221 445566’
- Sensor:
  - 101, ‘AS-Temp-01’, ‘temperature’, ‘AeroSense GmbH’
  - 102, ‘NM-Hum-07’, ‘humidity’, ‘Nordic Metrics AG’
  - 103, ‘RT-Press-3’, ‘pressure’, ‘RheinTech SE’
- Warning:
  - 1, ‘Temperature exceeds threshold’
  - 2, ‘Humidity below safe range’
- Observation:
  - 101, ‘2025-11-01 08:30:00’, 26.4, ‘°C’
  - 101, ‘2025-11-01 09:00:00’, 31.1, ‘°C’
  - 102, ‘2025-11-01 08:30:00’, 35.0, ‘%’
  - 102, ‘2025-11-01 09:00:00’, 28.2, ‘%’
  - 103, ‘2025-11-01 08:30:00’, 1014.6, ‘hPa’
- BasedOn:
  - 101, ‘2025-11-01 09:00:00’, 1
  - 102, ‘2025-11-01 09:00:00’, 2

## Task 2

Given the following relations:

- Student(MatrNr, Name, Email)
- Subject(Id, Name)
- Course(Id, SbjId → Subject(Id), Credits)
- StudentCourse(StdMatrNr → Student(MatNr), CrsId → Course(Id), Grade)

Write SQL queries for their creation. Insert the following rows and values:

- Student:
  - 62001, 'Alexander Becker', 'alexander.becker@tu-ilmenau.de'
  - 62002, 'Ben Fischer', 'ben.fischer@tu-ilmenau.de'
  - 62003, 'Clara Neumann', 'clara.neumann@tu-ilmenau.de'
  - 62004, 'Diana Weber', 'diana.weber@tu-ilmenau.de'
- Subject:
  - 1, 'Databases'
  - 2, 'Algorithms'
  - 3, 'Machine Learning'
- Course:
  - 1, 1, 6 (Databases)
  - 2, 2, 5 (Algorithms)
  - 3, 3, 6 (Machine Learning)
- StudentCourse:
  - 62001, 1, 2.0
  - 62001, 2, 1.7
  - 62001, 3, 5.0
  - 62002, 1, 1.3
  - 62002, 2, 2.0
  - 62002, 3, NULL
  - 62003, 3, 1.0
  - 62003, 2, 2.3
  - 62004, 2, 4.0
  - 62004, 1, 2.7

Write the following SQL queries:

- (a) Get the email address of the student with the matriculation number 62002.

- (b) Get any email address that belongs to more than one student.
- (c) Get the list of grades of Clara Neumann.
- (d) Get the email address and grades of the student with matriculation number 62002.
- (e) Get the name, email address, and subjects taken by the student with matriculation number 62004, as well as his or her grade in each subject.
- (f) Get the cumulative grade of the student with matriculation number 62002 over all subjects that he or she did not fail.
- (g) Get the list of students with their cumulative grades over all passed subjects.
- (h) Get the names of all students who have very good cumulative grades and did not fail any subject.