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Computer Science

— Engineering Web and Data-intensive Systems - Winter Term 2024/25 —

Assignment 4.

From: Jan 13th, 2025 To: Jan 28th, 2025

Notes on the sumbission

Please store your solution in the OLAT group folder. We have already created a `solutions` folder for you.

Create a sub-folder for each assignment according to the scheme `solutions/assignmentNN`.

Put all solution files into that subfolder. We prefer PDF documents. You shall also add other files contributing to the solution, for example Astah models, database scripts (in later assignments).

Serious Advice

If you repeat the EWADIS course, we *strongly recommend* to redo the assignments from scratch. It is not very useful to copy solutions from the last semester, even if you think you have a perfect solution or a reference solution that we provided.

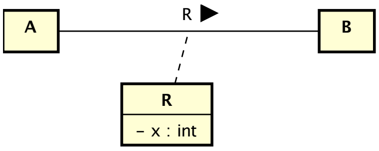
The intent of the assignments is to actively practice, not to present a perfect solution!

1 Graph Databases: Schema and Query

a) This exercise is based on **TSS (Time Sheet System)** example that was given in the first assignment. The .Asta file can be found in the OLAT downloads folder.

Please convert the provided object oriented schema in the .Asta file into a graph schema. You have to decide on relation directions and relation names, and also on how to deal with the generalization.

Model the graph schema as a UML class diagram! Use classes for node types, and associations with name and direction for the relation types. Remember that relations (edges) in graphs can have attributes. If you want to use this feature, relation attributes can be depicted by an association class:



b) You are asked to solve the task practically with Neo4J. You **MUST** generate test data (Cypher CREATE statements) so that there are multiple contracts with timesheets, WorkReports etc. You also should deliver the following…

- An Astah file with the graph schema.
- A Cypher file with the test data.
- At least one Cypher file per query.

Finally, the syntax of all the deliverables **MUST** be correct and properly run.

c) **Query Task 1:** The supervisor and secretary can view the details of a student assistant such as the *contract status*.

At the end of every year, the system provides an overview of the most recent assistant contracts that have been created.

The overview of the contracts should account for the following conditions…

- The *Contracts* have started on the 01.01.2024 and/or afterwards.
- The *Contracts* are still running.
- The *Assistant* had at least 5 days of vacation in 2024.
- The *Working Hours per Week* are at least 5 hours.

Given your graph schema, sketch a Cypher query that can be used to show the overview explained above. You can assume that the every employee has a unique ID and therefore it (the ID) can be used as an entry point for the query.

d) **Query Task 2:** You are asked to query the assistants who fulfil the following conditions…

- Have at least one *Time Sheet Entry*.
- Their *Timesheet* is signed by both the *supervisor* and *assistant*.
- The *Contracts* are still running.
- The *Vacation Hours* are more than one hour.

Given your graph schema, sketch a Cypher query that can be used to show the overview explained above. You can assume that the every employee has a unique ID and therefore it (the ID) can be used as an entry point for the query.