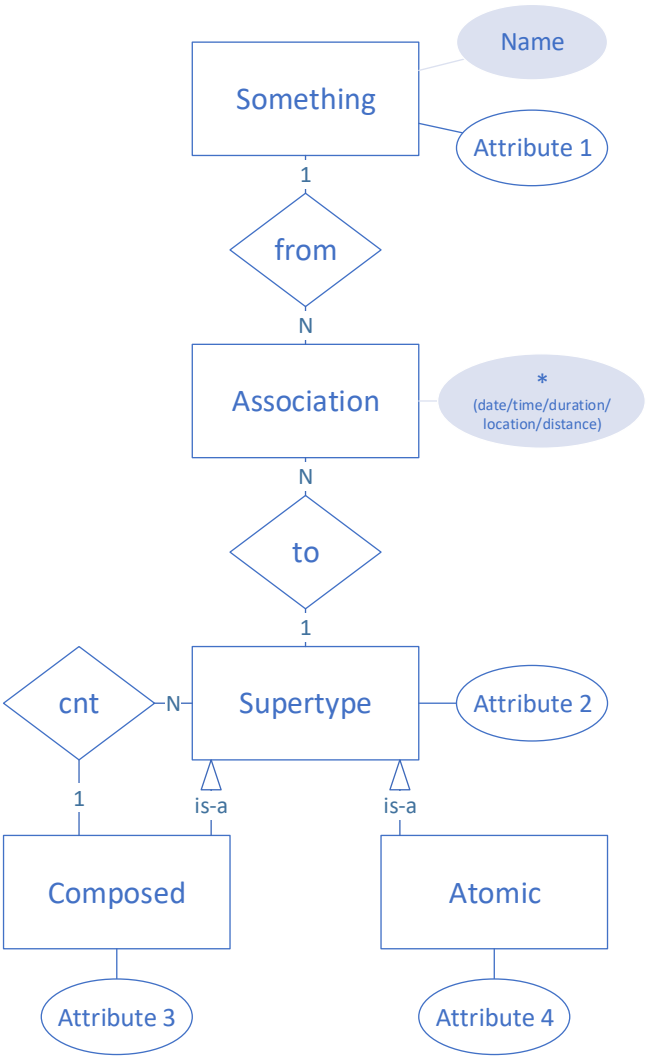
Project X

Task description for an individual project

This document describes your tasks for the project to be presented as part of the oral exam for the information management course (w.2InfoM).

Generic Conceptual Data Model

The following figure shows a generic conceptual data model using the entity relationship notation (ER). You have your own mapping of each generic entity type, attribute and relationship to the ones you should use as part of your individual project. This mapping was sent to you by email.



Work Packages

WP 1: Design

Draw your personalized conceptual data model by replacing the generic entity types **`Something`**, **`Association`**, **`Supertype`**, **`Composed`** and **`Atomic`** and relationships **`from`**, **`to`** and **`cnt`** with the ones you received in the email.
Find meaningful attribute names for the generic attributes **`Attribute 1`**, **`Attribute 2`**, **`Attribute 3`**, **`Attribute 4`** as well as the attribute marked with an **`*`** (asterisk). This attribute marked with an asterisk should be chosen such that it represents one of the following: date, time, date-time, duration, location, spatial distance.
Make sure you keep the relationship cardinality constraints (one to many) and the type hierarchy (inheritance).

Output: ER Diagram describing your personalized application domain including your own entity types, attributes and relationships.

WP 2: Implement

Implement the back-end component for an application following your personalized application domain.

- **Java Classes as JPA Entities**
  Make sure the Java classes follow the entity types as specified in your personalized application domain, including their names, attributes and relationships.
- **One Repository for each JPA Entity**
  In this step you may leave these repositories empty and do with the default queries.
- **One REST Controller for each JPA Entity**
  Implement two endpoints for each controller: one returning all instances and another one expecting a URL parameter containing an ID and returning the instance referenced by this ID. Both of these endpoints should be made available as GET methods.

Output: Code written by you specifying the classes and interfaces in the three packages of the Spring Boot project **`entities`**, **`repositories`** and **`controllers`**.

WP 3: Test Data **(Optional Alternative: see WP 0)**

Use Mockaroo (https://www.mockaroo.com/) to generate random (but meaningful) test data. Make sure you have (at least) 100 instances including attribute values for the three JPA Entities representing the entity types **`Something`**, **`Association`** and **`Supertype`**[1], and (at least) 100 "connections" for each relationship. Insert this test data into the database and make sure the data is returned by the REST API endpoints when you access them (e.g. using your browser or postman or equivalent).

Output: All SQL insert statements (as downloaded from Mockaroo) and the JSON data shown in your browser (or postman or equivalent)

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[1] Note that each instance of **`Supertype`** must also be an instance of either **`Composed`** or **`Atomic`**. While you may decide on how to distribute these instances, you need to make sure you end up having instances of both subtypes.

WP 4: A Query **(Optional Alternative: see WP 0)**

Specify a query that meets the following requirements.
(Note that we are referring to specific entity types, attributes and relationship in your personalized application domain by means of entity types, relationships and attributes as specified in the generic data model – you need to do the mapping to your personalized application domain!)

- It returns values of the **`Name`** attribute declared by **`Something`**.
- It returns the values of the **`Name`** attribute of **`Something`** instances connected to **`Association`** instances by means of the **`from`** relationship.
- The **`Association`** instances they are connected to have a given value for the attribute marked with an asterisk. This given value is an input to the query.

In the generic data model above, this query would be written as an SQL select statement as follows. The input value to the query is represented with an X

```
SELECT s.name
FROM something s, association a
WHERE s.id = a.from
AND a.asterisk = X
```

Implement this query in a repository interface and make it available with a new endpoint in your REST API. The input value to the query should be given as an URL argument and the endpoint HTTP-method should be GET.

Make sure your endpoint returns the expected result given the test data in your database (e.g. using your browser or postman or equivalent).

Output: The query as an SQL select statement (NOT JPQL) as well as the code you wrote to implement it (probably a native query in a repository and an endpoint implemented in a controller).

WP 5: XSLT **(Optional Alternative: see WP 0)**

In Workbench, execute a query that returns all instances of `Supertype`. Export the result in an XML format. Write an XSLT that transforms this XML into an HTML document where the instances are listed in a table. Make sure the table has one column for the attribute declared by `Supertype`.

Output: XML and XSLT

WP 0: Optional Alternatives and Extensions for Bonus Points

WP 3: Test Data

Find or generate test data other than using Mockaroo. For example, you may find a data set on Kaggle[2] that suits your application domain. Alternatively, you may find data available by means of accessing a REST API[3] or by reading in a file. In order to get bonus points, you need to have code for

a) accessing (e.g. from File, REST, Web, …) and
b) transforming (e.g. from CSV, JSON, XML, HTML, …)

the data.

Output: In addition to the output required for WP 3, show the data source as well as your code accessing and transforming the data

WP 4: Query

Extend and adapt your query with a **`Group By`** statement. You may further increase the complexity of your query by means of involving the entity types **`Composed`** and **`Atomic`**.

Output: The same output as required for WP 4.

WP 5: XSLT

Extend the SQL query in order to return all instances of one of the subtypes, including the subtype AND supertype attributes. Adapt your XSLT in order to render all attributes.

Front-End

Design and implement a front-end for your back-end. The front-end consists of HTML document(s) styled with CSS (e.g. Bootstrap) and including JavaScript code (e.g. svelte) interacting with your REST API. The front-end should support a user journey (sequence of actor-system interactions) outlining the core idea of your application (MVP).

Note: It is forbidden to have the same artefacts evaluated multiple times in the context of different courses. The front-end you develop as part of this optional extension must differ substantially from the one you do for the w.2WEng course.

Output: Front-End components including HTML, CSS and JavaScript

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[2] Data sets at Kaggle: https://www.kaggle.com/datasets

[3] For example, check out https://www.programmableweb.com/category/all/apis and https://www.google.com/publicdata/directory.

Presentation

As part of your exam, you must be prepared to present and discuss the following:

- WP 1: Your personalized application domain (show ERD figure)
- WP 2: Your code (in Eclipse or equivalent)
- WP 3: The SQL Insert statements (in a text editor or in Workbench or equivalent)
- WP 3: Show your test data as JSON data in your browser (or postman or equivalent)
- WP 4: The SQL select statement and its execution in Workbench (or equivalent) including the result
- WP 4: Show the result as JSON data in your browser (or postman or equivalent) when calling the endpoint
- WP 5: Show the XML and XSLT (in a text editor or equivalent) and the result of the transformation in a browser.
- WP 0 (Optional Alternatives): Show the output listed for each alternative you chose to do.

Evaluation

Each of the items in the list above (Section "Presentation") yields 2 Points if the expectations according to the work package descriptions are met. As part of the oral exam, we may ask questions in order to make sure you know and understand what you did.

For each item, points will be given as follows.

- 2 Points if everything is done according to the requirements, the outputs presented successfully, and you are able to answer questions.
- 1 Point if requirements are met partially only, the presentation of the outputs did not work (e.g. no working code) or if your answers to questions show you are not sure about what you did.
- 0 Point if item is missing or your answers to questions show a complete lack of understanding of what you did.

The amount of points you collect determines your grade. We may grant individual bonus points if your results are outstanding. However, you may not collect indefinite amounts of bonus points. Required artefacts that are missing cannot be replaced entirely by means of bonus points.