

Advanced Topics in Databases

Exercise 10

1. Semi-Structure for a Structured Query Language 9 (2 + 2 + 1 + 1 + 3) Points

SQL is the de-facto industry standard for the lingua franca of (relational) database systems. In its last 45 years of existence, SQL evolved heavily. By the latest standard SQL:2016, support for JSON data was added to the language.

- (a) Consider the groups of new functionality in SQL: validation, construction, querying functionality and the SQL/JSON Path Language. For each group, sketch roughly its purpose in your own word.
- (b) Recap the concepts of strict and lax mode in SQL/JSON Path Language. Explain the purpose of both modes, and their differences. Afterwards, provide one example query strings that only differs in their mode, and roughly explain how the mode affects the query evaluation.
- (c) Recap the concepts of context variable and named variables in the SQL/JSON Path Language. Explain the purpose of both concepts with your own words, and provide an example each.
- (d) State the evaluation semantics of the following
 - i. Member access
 - ii. Element access
 - iii. Filter expressions
- (e) Explain the SQL/JSON Path Language item functions `type()` and `keyvalue()` in your own words!
- (f) Assume you the following two facts in a database
 - F1 Jane is a woman but her age is not known (null).
 - F2 Joe is a man but his age is not known (null).

Recap the semantics for equality comparison of unknown (null) values in SQL/JSON Path Language and SQL. Now, it is asked whether Jane and Joe have the same age. What is the answer to this query in SQL/JSON Path Language and what is the answer in SQL? Give an explanation!

- A1 Jane and Joe have the same age.
- A2 Jane and Joe doesn't have the same age.
- A3 It is not known whether Jane and Joe have the same age.

2. Hands on Evaluation in SQL/JSON Path Language 3 (3) Points

The SQL/JSON Path Language is a dedicated language built into SQL. This new language comes with its own semantics that slightly differ from the host language SQL, e.g., equality comparison results for Unknown (Null).

Recap the example of property access that does not exist for all array entries (given in the lecture). Evaluate the following SQL/JSON Path Language query step by step. For each step, show intermediate results and give a comment explaining this step. Is the filter expression required for this query?

```
lax $.authors[*] ? (exists (@.org)).org
```

Finally, explain the differences to the queries

```
strict $.authors[*] ? (exists (@.org)).org
```

and

```
lax $.authors[*].org
```

Good Luck!