

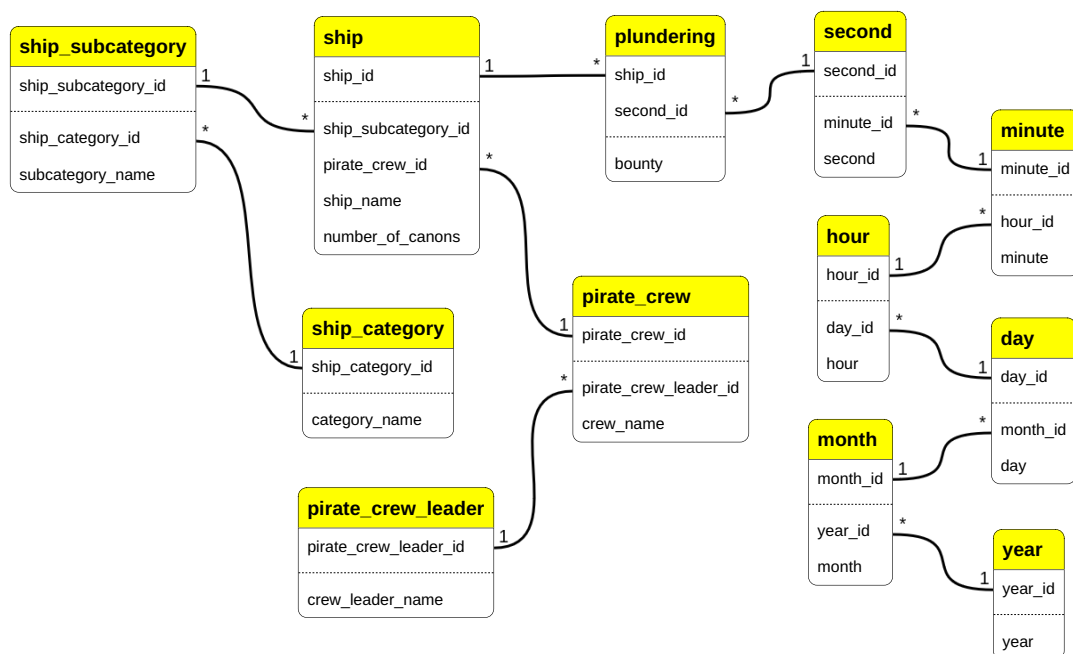
Relational Databases and Data Analysis

- Hand in your solution as PDF. The file must be named `solution-4.pdf`. Use `zipme.py` to create the archive to upload in ILIAS.

Exercise 1 *Multi-dimensional data model*

(1 + 1 + 2 + 2 + 1 + 1 Points)

A cutting-edge pirate crew wants to leverage relational databases to track their performance metrics in order to facilitate growth of their operational efficiency. They came up with the following schema.



- For each table of the schema above, identify whether it is a fact table or a dimension table. Briefly explain how to differentiate between dimension tables and fact tables.
- Is this a star schema, snowflake schema, galaxy schema or fact constellation schema? Briefly explain your reasoning!
- Convert the previous schema into a star schema. Indicate cardinalities with “*” and “1” for each edge and separate the primary key with a dashed line.
- Give two reasons for preferring the star schema over the snowflake schema and two reasons for preferring the snowflake schema over the star schema.
- Modify or extend the pirate’s schema to obtain an unmistakable galaxy schema. Briefly explain which aspect was important to make it so.
- Express the pirate’s schema as a multi-dimensional Entity/Relationship model. Currently, it only contains simple hierarchies. Introduce an additional dimension such that there is a parallel hierarchy and highlight it in the diagram. Be advised that the shape of the nodes and the direction of arrow heads are relevant.

Exercise 2 *Classification Hierarchies*

(2 Points)

Convert the following vertical classification hierarchy into a hybrid classification hierarchy like the one seen in the lecture.

| Dimension_ID | Parent_ID |
|------------------------|------------------------|
| 5801 S Ellis Ave | Chicago |
| Bavaria | Germany |
| Berlin | Berlin |
| Berlin | Germany |
| Chicago | Illinois |
| Christophstr. 1 | Düsseldorf |
| Cologne | North Rhine-Westphalia |
| Düsseldorfer Str. 1 | Cologne |
| Düsseldorf | North Rhine-Westphalia |
| Illinois | United States |
| Neuschwansteinstr. 20 | Schwangau |
| North Rhine-Westphalia | Germany |
| Platz der Republik 1 | Berlin |
| Schwangau | Bavaria |
| Universitätsstr. 1 | Düsseldorf |