Exercise: Entity Relationship Model for Exam Planning

Your Task

You are all familiar with the examinations at the end of the semester. As you might have guessed, before the examinations can take place, a lot of planning and organization must have happened in the background. Let's assist our student office and create an information model of their problem domain! As *one example*, think about all the rooms that need to be booked.

Follow the proposed steps from table 1 in Song & Froehlich's paper (Song & Froehlich 1995, p. 33, see below) and apply the suggested rules to build an Entity-Relationship Model (ERM).

Table 1. Database design using the ER model.

1. Understand the problem. Analyze user requirements.
   - What things do we need to keep data about?
   - What things are essential to the organization?
   - What things do we talk about in the organization?
   - What queries and reports do we need?
   - What are *important* people, places, physical things, organizations, events and abstract concepts in the organization?
2. Create ER diagrams.
   a) Identify entity types. Assign nouns for entity names.
   b) Identify relationship types among (between) entity types. Use meaningful verbs for relationship names, if possible. Otherwise, use abbreviations from each participating entity names.
   c) Draw an ER diagram without attributes.
   d) Identify relationship types.
      1) Mapping cardinality (1:1, 1:N, N:1, N:M)
      2) Total or partial
   e) Assign attributes to entity types and relationship types. Usually, an attribute comes from an adjective, an adverb, or a noun.
   f) Decide the primary key for entity types. Choose a single attribute for entity type. If not possible, create a single attribute for the key.
   g) Decide the primary key of relationship types.
      1) If 1:1, then key of either side entity type.
      2) If 1:N, then key of N-side entity type.
      3) If N:M, then concatenate keys of two entity types.
      4) If ternary, then concatenate keys of participating entity types, depending on cardinalities.
   h) Create Data Dictionaries.
      1) A schema table
      2) One table for each object type. Assign a domain type for each attribute. Explain the meaning of attributes, if not intuitive.
      3) Explain the meaning of each relationship in detail.

References

Il-Yeol Song and K. Froehlich, "Entity-relationship modeling," in IEEE Potentials, vol. 13, no. 5,
pp. 29-34, Dec. 1994-Jan. 1995, doi: 10.1109/45.464652.