

## **Activity 7**

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## Objective

Identify entities, attributes, primary keys, and relationships in a database model, determine their cardinalities (1:1, 1:N, N:M), and justify the meaning of minimum and maximum values through a complete and accurate E/R diagram.

## Description

The library of a high school wants to organize its information in a database to improve resource management.

Students are registered in the library, storing for each one a unique identifier, their name, the grade they are enrolled in, and their email address. For books, the ISBN (unique for each copy), title, author, and year of publication are stored. These books are grouped into categories such as “Novel,” “Science,” or “History,” for which an identifier and a name are kept. A single book may belong to one or several categories.

The library also manages loans. Each time a student requests a book, a loan is recorded with its own identifier, the loan date, and the return date. A loan is always associated with one student and one specific book.

In addition to loans, the library organizes cultural events such as reading clubs, talks, and workshops. For each event, an identifier, a name, and the event date are stored. Students can register for different events, and each event can have several participating students.

Finally, events are coordinated by librarians. For each librarian, an identifier, name, and phone number are stored. Each librarian can coordinate several events, although each event has a single coordinator.

**Tasks**

1. Identify the entities and their attributes (mark the primary key).

**Entities:**

STUDENT, BOOK, CATEGORY, LOAN, EVENT, LIBRARIAN.

**Attributes:**

STUDENT: #studentID, name, grade, email.

BOOK: #isbn, title, author, year\_publication.

CATEGORY: #categoriesID, novel, science, history.

LOAN: #loanID, loan\_date, return\_date.

EVENT: #eventID, event\_name, event\_date.

LIBRARIAN: #librarianID, librarian\_name, phone\_number.

2. Identify all relationships.

BOOK grouped CATEGORY.

BOOK belong CATEGORY.

STUDENT requests BOOK.

LOAN associated STUDENT.

STUDENT register EVENT.

EVENT coordinated LIBRARIAN.

3. Indicate the type of each relationship (1:1, 1:N, or N:M).

BOOK N:M CATEGORY.

BOOK 1:N CATEGORY.

STUDENT 1:1 BOOK.

LOAN 1:1 STUDENT.

STUDENT N:M EVENT.

EVENT N:M LIBRARIAN.

4. Establish the minimum and maximum cardinalities for each relationship.

BOOK (1,N) N:M (1,N) CATEGORY.

BOOK (1,1) 1:N (1,N) CATEGORY.

STUDENT (1,1) 1:1 (1,1) BOOK.

LOAN (1,N) 1:1 (1,1) STUDENT.

STUDENT (1,N) N:M (0,N) EVENT.

EVENT (1,N) N:M (1,N) LIBRARIAN.

5. Indicate whether each relationship is optional or mandatory according to its cardinality.

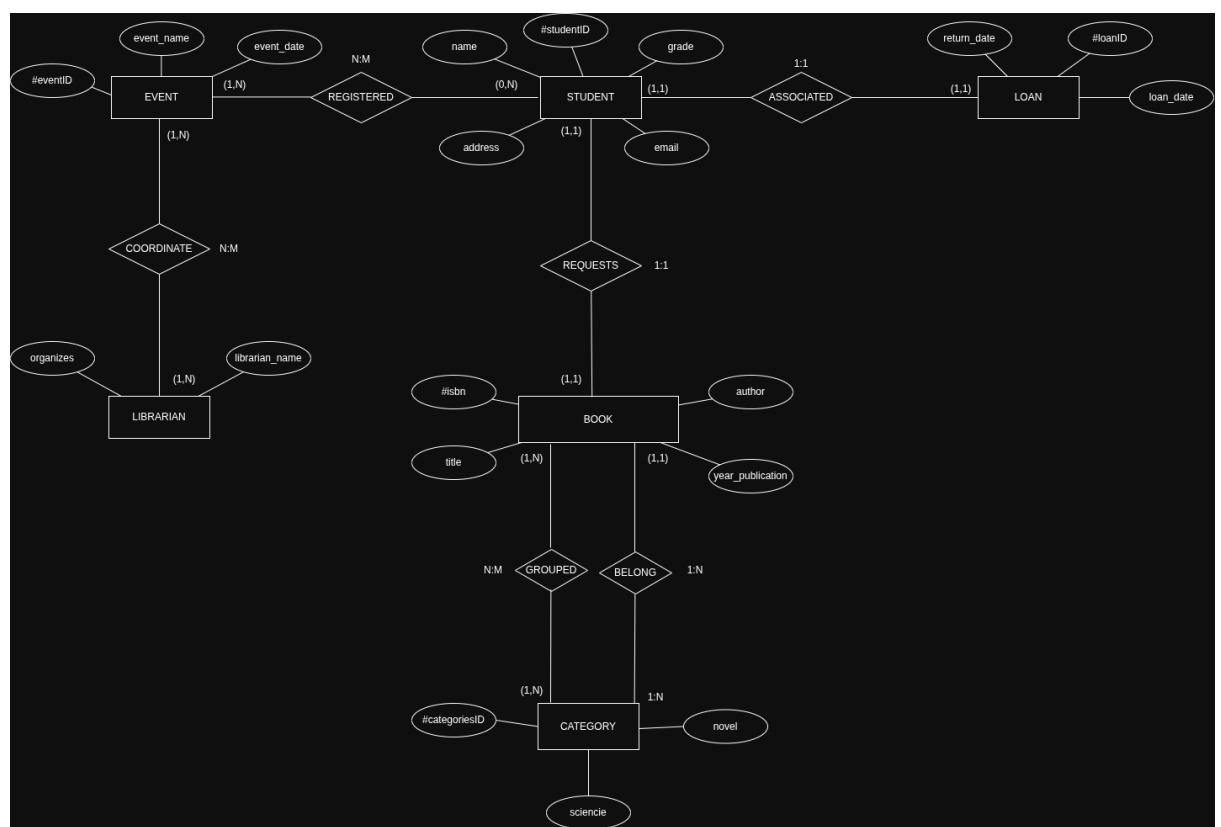
All the relationships and cardinalities are mandatory, because all have minimum cardinalities, in this case starting with 1.

6. For each relationship, complete a table like the following. You must justify separately the minimum and maximum cardinalities on each side of the relationship (two rows per relationship).

Relationship	Direction	Source entity	Target entity	Minimum	Maximum	Justification
grouped	$\text{BOOK} \rightarrow \text{CATEGORY}$	BOOK	CATEGORY	1	N	"These books are grouped into categories" 1 or more books and different categories.
belong	$\text{BOOK} \rightarrow \text{CATEGORY}$	BOOK	CATEGORY	0	N	"A simple book may belong to one or a several categories" can 0 book belong to 1 or N categories.
requests	$\text{STUDENT} \rightarrow \text{BOOK}$	STUDENT	BOOK	1	1	"Each time a student requests a book" 1 student and 1 book.
associated	$\text{LOAN} \rightarrow \text{STUDENT}$	LOAN	STUDENT	1	1	"The loan It's always associated with one student" 1 loan and 1 student.
register	$\text{STUDENT} \rightarrow \text{EVENT}$	STUDENT	EVENT	0	N	"Students can register for different

						events”  Students and events minim 1 and máxim N different.
coordinated	EVENT → LIBRARIA N	EVENT	LIBRARIAN	1	N	“Events are coordinated by librarians”  Min 1 Event and max N.

7. Draw the complete ERD including entities, attributes, primary keys, relationships, and cardinalities.



## Activity Submission

Export the document to PDF format and submit it through Google Classroom.