

A woman with dark hair tied back, wearing a purple short-sleeved top, is standing in a library aisle. She is holding an open book and looking directly at the camera. The background shows rows of bookshelves filled with books, slightly out of focus.

## SQL: Aggregate and Nested Queries

Students at the National University of Ngendipura (NUN) buy books for their studies. They also lend and borrow books to and from other students. Your company, Apasaja Private Limited, is commissioned by NUN Students Association (NUNStA) to implement an online book exchange system that records information about students, books that they own and books that they lend and borrow.

The database records the name, faculty, and department of each student. Each student is identified in the system by her email. The database also records the date at which the student joined the university (year attribute).

The database records the title, authors, publisher, year and edition and the ISBN-10 and ISBN-13 for each book. The International Standard Book Number, ISBN-10 or -13, is an industry standard for the unique identification of books. It is possible that the database records books that are not owned by any students (because the owners of a copy graduated or because the book was advised by a lecturer for a course but not yet purchased by any student.)

The database records the date at which a book copy is borrowed and the date at which it is returned. We refer to this information as a loan record.

For auditing purposes the database records information about the books, the copies and the owners of the copies as long as the owners are students or as there are loan records concerning the copies. For auditing purposes the database records information about graduated students as long as there are loan records concerning books that they owned.

**This tutorial uses the schema and data for the database created in “SQL: Creating and Populating Tables” including all the updates done during the tutorial.**

### Questions

*Not all questions will be discussed during tutorial. You are expected to attempt them before coming to the tutorial. You may be randomly called to present your answer during tutorial. You are encouraged to discuss them on Canvas Discussion.*

**1. Aggregate Queries.**

- (a) How many loans involve an owner and a borrower from the same department?
- (b) For each faculty, print the number of loans that involve an owner and a borrower from this faculty?
- (c) What are the average and the standard deviation [3] of the duration of a loan in days?

**2. Nested Queries.**

- (a) Print the titles of the different books that have never been borrowed. Use a nested query.
- (b) Print the name of the different students who own a copy of a book that they have never lent to anybody.
- (c) For each department, print the names of the students who lent the most.
- (d) Print the emails and the names of the different students who borrowed all the books authored by Adam Smith.

**References**

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