# Tutorial: Creating and Populating Tables

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) and the date of her graduation (`graduate` attribute, which is `NULL` if the student has not graduated at the time of the database instance.).

The database records the title, authors, publisher, edition, 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.

The database records information about books, copies and owners as long as the owners are students. Loan records of books that have been returned are deleted at the end each semester. The database records information about graduated students as long as there are loan records concerning books that they owned or borrowed but did not return.

1. You are provided with the relational schema and with an instance of the database dated from the end of academic year 2021–2022 ($31^{st}$ July 2022). You are given the SQL data definition language code to create the schema and the SQL data manipulation language code to create a instance of the database.

   (a) Download the following files from Canvas "`Files > Cases > Book Exchange`".

   `NUNStASchema.sql`,

   `NUNStAStudent.sql`,

   `NUNStABook.sql`,

   `NUNStACopy.sql`,

   `NUNStALoan.sql`,

   and `NUNStAClean.sql`.

   (b) Read the SQL files. What are they doing?

   (c) Use the files to create and populate a database (they may need some "bug" fixing).

2. Insertion, deletion, and update.

   (a) Insert the following new book.

   ```
   INSERT INTO book VALUES (
   'An Introduction to Database Systems',
   ```

```
3  'paperback' ,
4  640 ,
5  'English' ,
6  'C. J. Date' ,
7  'Pearson',
8  '0321197844' ,
9  '978 -0321197849 ');
```

(b) Insert the same book with a different `ISBN13`, for instance
`'978-0201385908'`.  <span>duplicate key value violates unique constraint "book_isbn10_key"</span>

(c) Insert the same book with the original `ISBN13` but with a different `ISBN10`, for instance `'0201385902'`.

(d) Insert the following new student.

```
1  INSERT INTO student VALUES (
2  'TIKKI TAVI' ,
3  'tikki@gmail.com' ,
4  '2021 -08 -01 ',
5  'School of Computing ',
6  'CS ',
7  NULL );
```

(e) Insert the following new student.

```
1  INSERT INTO student (email, name, year, faculty, department)
2  VALUES (
3  'rikki@gmail.com ',
4  'RIKKI TAVI ',
5  '2021 -08 -01 ',
6  'School of Computing ',
7  'CS ');
```

(f) Change the name of the department 'CS' to 'Computer Science'.

```
1  UPDATE student
2  SET department = 'Computer Science '
3  WHERE department = 'CS ';
```

(g) Delete the students from the 'chemistry' department.  <span>Encounter error trying to delete as loan pri key</span>

(h) Delete the students from the 'Chemistry' department.  <span>references students email, cant delete unless on delete cascade borrower in schema?</span>

3. Integrity constraints (to be discussed in class.)

(a) Some constraints in PostgreSQL are `DEFERRABLE`. What does it mean?

(b) Insert the following copy of 'An Introduction to Database Systems' owned by Tikki.

```
1  INSERT INTO copy
2  VALUES (
3  'tikki@gmail.com ',
4  '978 -0321197849 ',
5  1);
```

What is the difference between the following two SQL programs?

```
1  BEGIN TRANSACTION ;
2  SET CONSTRAINTS ALL IMMEDIATE ;
3  DELETE FROM book
4  WHERE ISBN13 = '978 -0321197849 ' ;
5  DELETE FROM copy
6  WHERE book = '978 -0321197849 ' ;
7  END TRANSACTION ;
```

```
1  BEGIN TRANSACTION ;
2  SET CONSTRAINTS ALL DEFERRED ;
3  DELETE FROM book WHERE ISBN13 = '978 -0321197849 ' ;
4  DELETE FROM copy WHERE book = '978 -0321197849 ' ;
5  END TRANSACTION ;
```

4. Modifying the Schema (to be discussed in class.)

(a) Add a field `available` to the table `copy` that indicates whether the copy is currently borrowed, `'false'`, or is available, `true'`. Make the necessary changes. Is it needed?

(b) Argue that the table `student` should not contain both the fields `department` and `faculty`. Make the necessary changes.

# References

[1] W3schools online web tutorials. `www.w3schools.com`. Visited on 21 July 2022.

[2] S. Bressan and B. Catania. *Introduction to Database Systems*. McGraw-Hill Education, 2006.

[3] R. Elmasri and S. B. Navathe. *Fundamentals of Database Systems*. Pearson, 7th edition, 2015.

[4] H. Garcia-Molina, J.D. Ullman, and J. Widom. *Database Systems: The Complete Book*. Pearson international edition. Pearson Prentice Hall, 2009.

[5] R. Ramakrishnan and J. Gehrke. *Database Management Systems*. McGraw-Hill, 2002.