# CSE 4701 — Project 1, Part 1

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#### Generating the Database Schema

The following SQL commands were used to generate the 'Book\_Loan\_DB' database schema.

```
CREATE TABLE Book (
             Book_id VARCHAR(2) NOT NULL,
03
             Title VARCHAR (255) NOT NULL,
04
             Publisher_name VARCHAR (255) NOT NULL,
05
            PRIMARY KEY (Book_id)
07
       CREATE TABLE Book_Authors (
            Book_id VARCHAR(2) NOT NULL,
09
             Author_name VARCHAR (255) NOT NULL,
            PRIMARY KEY (Book_id, Author_name),
FOREIGN KEY (Book_id) REFERENCES Book(Book_id)
11
13
14
       CREATE TABLE Publisher (
15
16
             Name VARCHAR (255) NOT NULL,
17
             `Address` VARCHAR (255) NOT NULL,
            Phone VARCHAR(14) NOT NULL,
PRIMARY KEY ('Name', 'Address')
18
19
20
21
22
23
       CREATE TABLE Book_Copies (
Book_id VARCHAR(2) NOT NULL,
24
            Branch_id VARCHAR(3) NOT NULL,
25
            {\tt No\_of\_copies\ INT\ NOT\ NULL}\,,
26
            PRIMARY KEY (Book_id),
FOREIGN KEY (Book_id) REFERENCES Book(Book_id)
27
28
       );
29
       CREATE TABLE Library_Branch (
Branch_id VARCHAR(3) NOT NULL,
30
31
            Branch_name VARCHAR(255) NOT NULL, 
 `Address` VARCHAR(255) NOT NULL,
32
33
            PRIMARY KEY (Branch_id)
34
35
       );
36
37
       CREATE TABLE Borrower (
            Card_no VARCHAR(2) NOT NULL,
`Name` VARCHAR(255) NOT NULL
38
39
40
             `Address` VARCHAR (255) NOT NULL,
41
            Phone VARCHAR (14) NOT NULL,
42
            PRIMARY KEY (Card_no)
43
44
45
       CREATE TABLE Book_Loans (
46
            Book_id VARCHAR(2) NOT NULL,
47
            Branch_id VARCHAR(3) NOT NULL,
            Card_no VARCHAR(2) NOT NULL,
48
49
            Date_out DATE NOT NULL,
50
            Due_date DATE NOT NULL,
            PRIMARY KEY (Book_id, Branch_id, Card_no),
FOREIGN KEY (Book_id) REFERENCES Book(Book_id),
51
53
             FOREIGN KEY (Branch_id) REFERENCES Library_Branch(Branch_id),
54
            FOREIGN KEY (Card_no) REFERENCES Borrower(Card_no)
55
```

#### Populating the Database

The following SQL commands were used to populate the 'Book Loan DB' database.

```
INSERT INTO Book (Book_id, Title, Publisher_name) VALUES ('B1', 'The Lost Tribe', 'Picador');
INSERT INTO Book (Book_id, Title, Publisher_name) VALUES ('B2', 'It', 'Simon & Schuster');
INSERT INTO Book (Book_id, Title, Publisher_name) VALUES ('B3', 'Event Horizon', 'Tom Doherty
02
                04
         INSERT INTO Book_Authors (Book_id, Author_name) VALUES ('B1', 'Mark Lee');
INSERT INTO Book_Authors (Book_id, Author_name) VALUES ('B2', 'Stephen King');
INSERT INTO Book_Authors (Book_id, Author_name) VALUES ('B3', 'Steven McDonald');
05
06
07
08
        INSERT INTO Publisher ('Name', 'Address', Phone) VALUES ('Picador', '4300 Turkey Pen Road', '
               INSERT INTO Publisher ('Name', 'Address', Phone) VALUES ('Simon & Schuster', '4096 Emerson Road'
              \hookrightarrow , '(421) 540-1675');
        INSERT INTO Publisher ('Name', 'Address', Phone) VALUES ('Tom Doherty Assoc Llc', '4321 Walnut 

Hill Drive', '(345) 623-0356');
11 |
12
         INSERT INTO Book_Copies (Book_id, Branch_id, No_of_copies) VALUES ('B1', 'BR1', 15); INSERT INTO Book_Copies (Book_id, Branch_id, No_of_copies) VALUES ('B2', 'BR2', 10); INSERT INTO Book_Copies (Book_id, Branch_id, No_of_copies) VALUES ('B3', 'BR3', 20);
13
14
15
16
17 I
        INSERT INTO Library_Branch (Branch_id, Branch_name, `Address`) VALUES ('BR1', 'Sharpstown', '9
               → Bow Ridge Street Sharpstown');
18 | INSERT INTO Library_Branch (Branch_id, Branch_name, `Address`) VALUES ('BR2', 'Beloit', '3 West
              \hookrightarrow Rd. Beloit');
        INSERT INTO Library_Branch (Branch_id, Branch_name, `Address`) VALUES ('BR3', 'Drive Lake
19 I
               \hookrightarrow Charles', '824 Rock Maple Drive Lake Charles');
20
21 | INSERT INTO Borrower (Card_no, `Name`, `Address`, Phone) VALUES ('C1', 'John Smith', '731

Fondren, Houston, TX', '(206) 342-8631');
22 | INSERT INTO Borrower (Card_no, `Name`, `Address`, Phone) VALUES ('C2', 'Franklin Wong', '638
               \hookrightarrow Voss, Houston, TX', '(717) 550-1675');
       INSERT INTO Borrower (Card_no, `Name`, `Address`, Phone) VALUES ('C3', 'Alicia Zelaya', '3321 

→ Castle, Spring, TX', '(248) 762-0356');
23 |
24 |
       INSERT INTO Book_Loans (Book_id, Branch_id, Card_no, Date_out, Due_date) VALUES ('B1', 'BR1', '
25 I
               \hookrightarrow C1', '2023-01-05', '2023-02-05');
26 | INSERT INTO Book_Loans (Book_id, Branch_id, Card_no, Date_out, Due_date) VALUES ('B2', 'BR2', '
               \hookrightarrow C2', '2022-12-06', '2023-01-06');
        INSERT INTO Book_Loans (Book_id, Branch_id, Card_no, Date_out, Due_date) VALUES ('B3', 'BR3', '
               \hookrightarrow \ \texttt{C2', '2023-01-29', '2023-03-01');}
```

## Verifying Table Constraints

Below is the TABLE\_CONSTRAINTS system table located in the 'information\_schema' database. This table contains information about the constraints on tables in the database.

You can see below that the 'Book\_Loan\_DB' table schema contains constraints for all of the foreign keys defined in the various tables in the database. In this way, we can verify that the foreign keys are defined correctly.

		ormation_schema.TABLE_ 		+	+
CONSTRAINT_CATALOG	CONSTRAINT_SCHEMA	CONSTRAINT_NAME	TABLE_SCHEMA	TABLE_NAME	CONSTRAINT_TYPE
def	sys	PRIMARY	l sys	sys_config	PRIMARY KEY
def	Book_Loan_DB	PRIMARY	Book_Loan_DB		PRIMARY KEY
def	Book_Loan_DB	PRIMARY	Book_Loan_DB	Library_Branch	PRIMARY KEY
def	Book_Loan_DB	PRIMARY	Book_Loan_DB	Borrower	PRIMARY KEY
def	Book_Loan_DB	PRIMARY	Book_Loan_DB	Book_Authors	PRIMARY KEY
def	Book_Loan_DB	Book_Authors_ibfk_1	Book_Loan_DB	Book_Authors	FOREIGN KEY
def	Book_Loan_DB	PRIMARY	Book_Loan_DB	Publisher	PRIMARY KEY
def	Book_Loan_DB	PRIMARY	Book_Loan_DB	Book_Loans	PRIMARY KEY
def	Book_Loan_DB	Book_Loans_ibfk_1	Book_Loan_DB	Book_Loans	FOREIGN KEY
def	Book_Loan_DB	Book_Loans_ibfk_2	Book_Loan_DB	Book_Loans	FOREIGN KEY
def	Book_Loan_DB	Book_Loans_ibfk_3	Book_Loan_DB	Book_Loans	FOREIGN KEY
def	Book_Loan_DB	PRIMARY	Book_Loan_DB	Book_Copies	PRIMARY KEY
def	Book_Loan_DB	Book_Copies_ibfk_1	Book_Loan_DB	Book_Copies	FOREIGN KEY
def	mysql	PRIMARY	mysql	time_zone	PRIMARY KEY
def	mysql	PRIMARY	mysql	time_zone_transition	PRIMARY KEY
def	mysql	PRIMARY	mysql	time_zone_name	PRIMARY KEY
def	mysql	PRIMARY	mysql	help_category	I PRIMARY KEY
def	mysql	name	mysql	help_category	I UNIOUE
def	mysql	PRIMARY	mysql	proc	PRIMARY KEY
def	mysql	PRIMARY	mysql	proxies_priv	PRIMARY KEY
def	mysql	PRIMARY	mysql	func	PRIMARY KEY
def	mysql	PRIMARY	mysql	help_topic	PRIMARY KEY
def	mysql	name	mysql	help_topic	UNIQUE
def	mysql	PRIMARY	mysql	procs_priv	PRIMARY KEY
def I	mysql	PRIMARY	mysql	tables_priv	PRIMARY KEY
def	mysql	PRIMARY	mysql	help_relation	PRIMARY KEY
def I	mysql	PRIMARY	mysql	plugin	PRIMARY KEY
def	mysql	PRIMARY	mysql	help_keyword	PRIMARY KEY
def I	mysql	name	mysql	help_keyword	UNIQUE
def	mysql	PRIMARY	mysql	event	PRIMARY KEY
def	mysql	PRIMARY	mysql	global_priv	PRIMARY KEY
def	mysql	Priv	mysql	global_priv   global_priv	CHECK
def	mysql	PRIMARY	mysql	innodb_table_stats	PRIMARY KEY
def	mysql	Host	mysql	roles_mapping	UNIQUE
def		PRIMARY		transaction_registry	PRIMARY KEY
def I	mysql	commit_id	mysql	transaction_registry	UNIQUE
	mysql		mysql		
def	mysql	PRIMARY PRIMARY	mysql	innodb_index_stats	PRIMARY KEY   PRIMARY KEY
def	mysql		mysql	time_zone_leap_second	
def	mysql	PRIMARY	mysql	index_stats	PRIMARY KEY
def	mysql	PRIMARY	mysql	gtid_slave_pos	PRIMARY KEY
def	mysql	PRIMARY	mysql	column_stats	PRIMARY KEY
def	mysql	PRIMARY	mysql	table_stats	PRIMARY KEY
def	mysql	PRIMARY	mysql	l db	PRIMARY KEY
def	mysql	PRIMARY	mysql	time_zone_transition_type	PRIMARY KEY
def   def	mysql mysql	PRIMARY	mysql	columns_priv	PRIMARY KEY
		PRIMARY	mysql	servers	PRIMARY KEY

### Verifying Table Schemas

Below, you can see the individual table schemas from the database. In them, you can see which columns are primary keys, which columns are foreign keys, and each column's datatype.

Figure 1: Book Schema

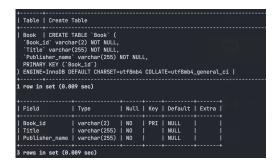


Figure 3: Book\_Copies Schema

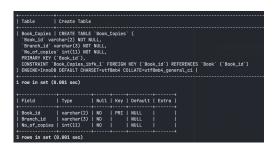


Figure 2: Book\_Authors Schema

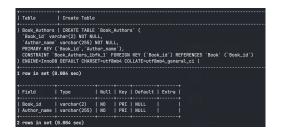


Figure 4: Book\_Loans Schema

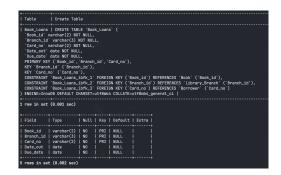


Figure 5: Borrower Schema

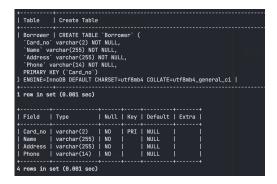


Figure 6: Library\_Branch Schema

Figure 7: Publisher Schema

#### Verifying Database Contents

MariaDB [	[Book_Loan_DB]> SELECT * FROM	Book;
Book_id	d   Title   Publishe	r_name
B1	The Lost Tribe   Picador	Training – Assign Ind
B2   B3	It	Schuster   rty Assoc Llc
3 rows in	+ n set (0.003 sec)	nigration begins at 5

Figure 8: Book Values

MariaDB [Book_Loan_DB]> SELECT * FROM Book_Copies;				
Book_id   Branch_id   No_of_copies				
+				
B1				
B2				
B3				
+, Jessica				
3 rows in set (0.003 sec)				

Figure 10: Book\_Copies Values

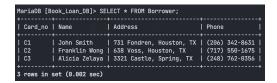


Figure 12: Borrower Values



Figure 9: Book\_Authors Values

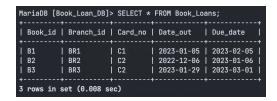


Figure 11: Book\_Loans Values

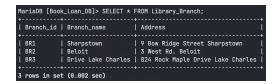


Figure 13: Library\_Branch Values

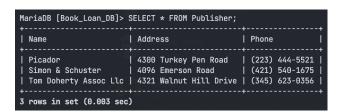


Figure 14: Publisher Values