

Hands-on Lab: Keys and Constraints in MySQL using phpMyAdmin



Estimated time needed: 20 minutes

Introduction

In this lab, you will learn how to add keys to create relationships between the tables and use constraints to enforce rules on the data entry in the MySQL database service using the phpMyAdmin graphical user interface (GUI) tool.

Software used in this lab

In this lab, you will use [MySQL](#). MySQL is a relational database management system (RDBMS) designed to store, manipulate, and retrieve data efficiently.

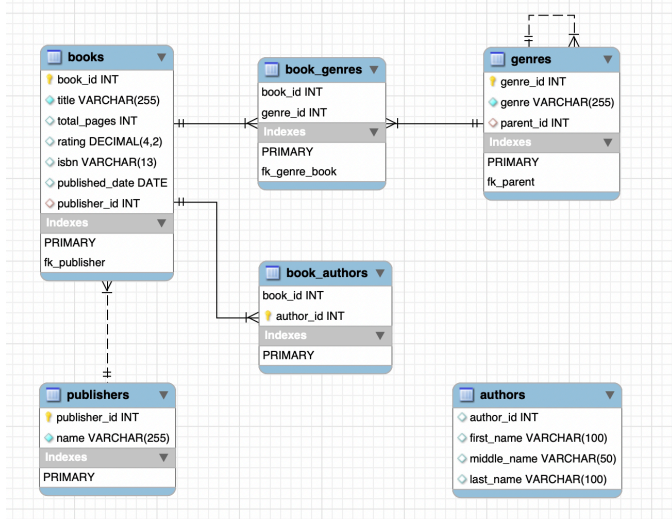


To complete this lab, you will utilize the MySQL relational database service available as part of IBM Skills Network Labs' (SN Labs) Cloud IDE. SN Labs is a virtual lab environment used in this course.

Database used in this lab

For this lab, you will use the eBooks database.

The following entity relationship diagram (ERD) shows the current status of the schema of the eBooks database used in this lab:



Objectives

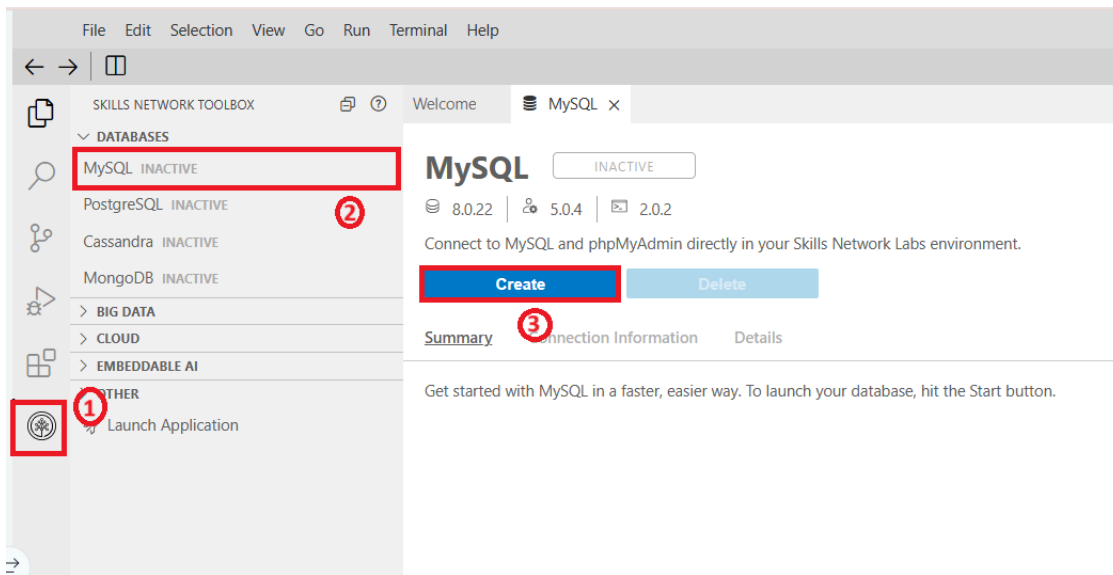
After completing this lab, you will be able to use the MySQL phpMyAdmin to:

- Create primary and foreign keys
- Add constraints to data columns

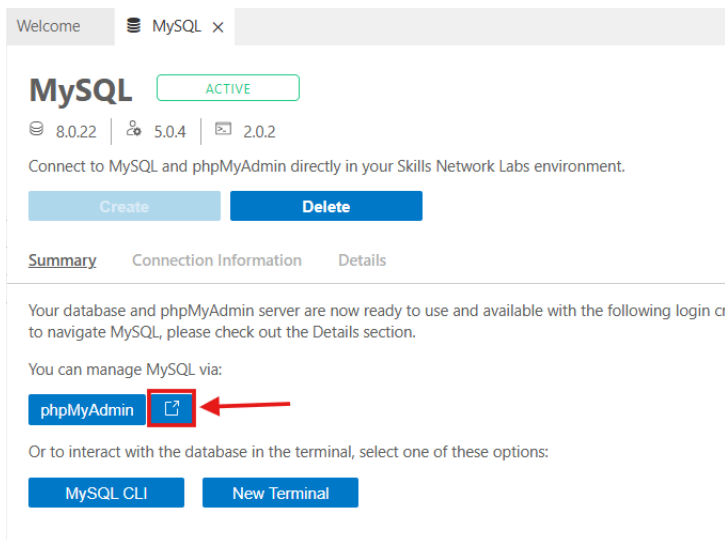
Exercise

In this exercise, you will learn how to add keys to create relationships between the tables. You will use constraints to enforce rules on the data entry in the MySQL database service using the phpMyAdmin graphical user interface (GUI) tool.

1. Click the Skills Network extension button on the left side of the window.
2. Open the DATABASES menu and click MySQL.
3. Click Create. MySQL may take a few moments to start.



4. Open the phpMyAdmin tool in a new tab in your browser.



5. You will see the phpMyAdmin GUI tool.

The screenshot displays the phpMyAdmin web interface. The browser's address bar shows the URL `sandipsahajo-8080.theiadocker-27.proxy.cognitiveclass.ai`. The interface includes a sidebar on the left with a tree view of databases: `New`, `information_schema`, `mysql`, `performance_schema`, `sakila`, and `sys`. The main content area features a top navigation bar with `Server: mysql:3306` and tabs for `Databases`, `SQL`, `Status`, and `User accounts`. The `General settings` section shows the `Server connection collation` set to `utf8mb4_unicode_ci`, with a `More settings` link. The `Appearance settings` section shows the `Language` set to `English` and the `Theme` set to `pmahomme`.

6. Download the **eBooks** MySQL dump file (containing the eBooks database table, definitions, and data) to your local computer storage.

- [eBooks_mysql_dump.sql](#)

7. Go to the **Import** tab. Click **Choose File** and load the `eBooks_mysql_dump.sql` file. Next, uncheck **Enable foreign key checks** and select SQL as the **Format**. Then click **Go**.

← Server: mysql:3306

DatabasesSQLStatusUser accountsExportImportSet

1

Importing into the current server

File to import:

File may be compressed (gzip, bzip2, zip) or uncompressed.
A compressed file's name must end in **[format].[compression]**. Example: **.sql.zip**

Browse your computer:

2 Choose File

 eBooks_mysql_dump.sql (Max: 2,048KiB)

You may also drag and drop a file on any page.

Character set of the file:

utf-8 ▼

Partial import:

☒ Allow the interruption of an import in case the script detects it is close to the PHP timeout limit. *(This mig*

Skip this number of queries (for SQL) starting from the first one:

0

Other options:

☐ Enable foreign key checks

 3

Format:

SQL ▼

 4

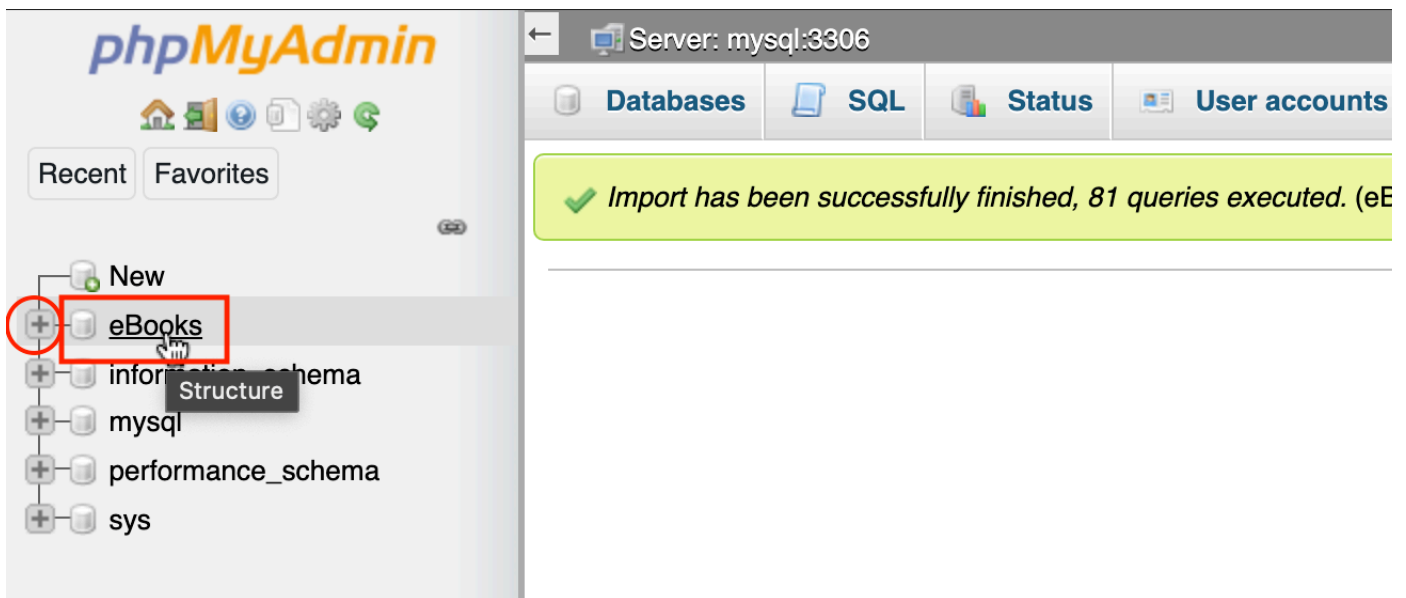
Format-specific options:

SQL compatibility mode:

NONE ▼

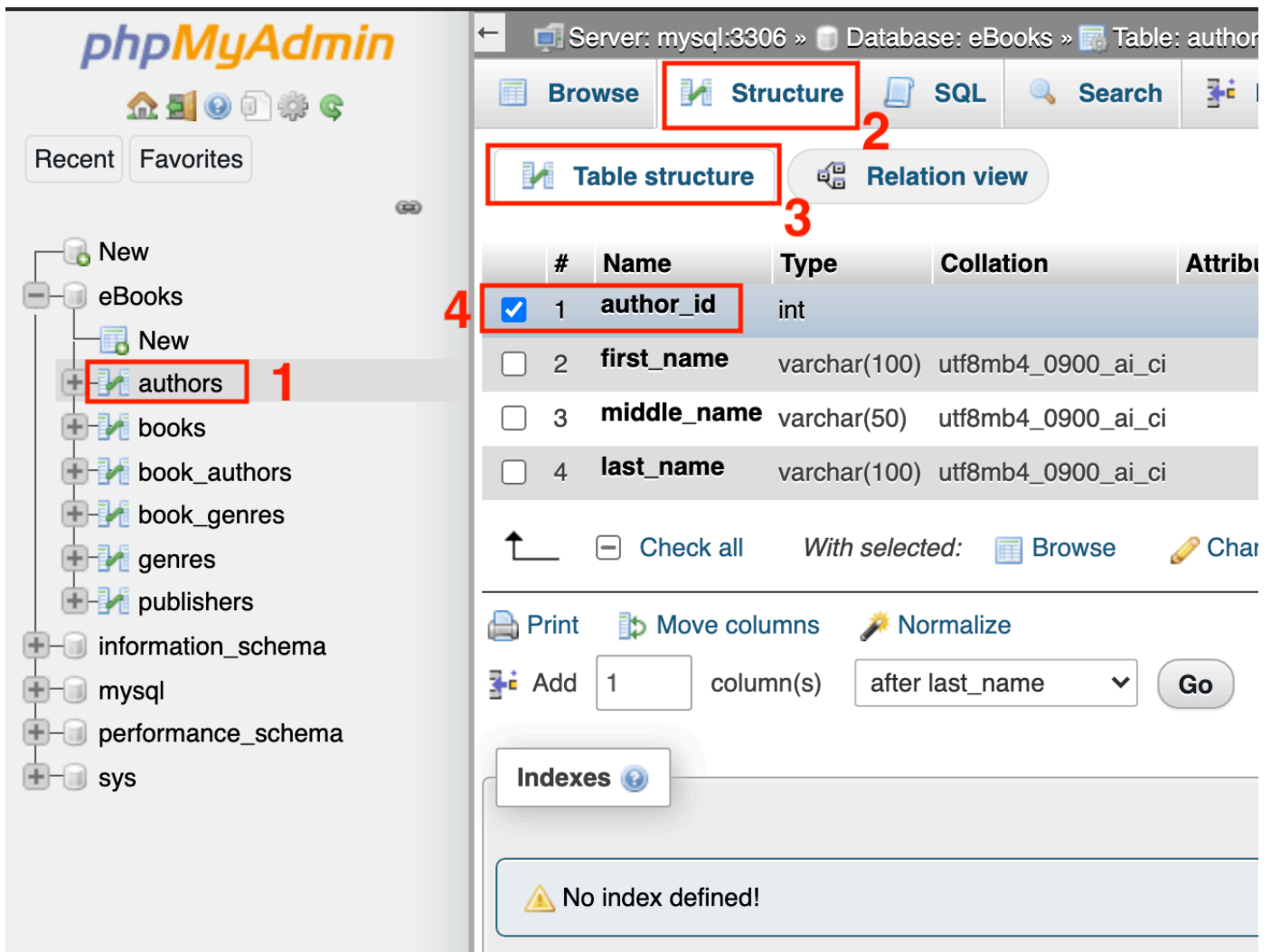
☒ Do not use `AUTO_INCREMENT` for zero values

8. The system will notify you that the import has successfully finished. Select the database **eBooks** to expand the image (if necessary, click the + icon beside **eBooks**). You will see the list of tables from the eBooks database.



9. **Primary Keys:** Creating a primary key on a table automatically creates an index on the key. You will create a primary key for the **author** table to identify every row in the table uniquely. You will set the **author_id** column of the **author** table as a primary key.

- In the tree view, click the **authors** table.
- Switch to the **Structure** tab and make sure you are inside the **Table structure** subtab.
- Check the **author_id** column.
- Click the **Primary** option.



10. **Auto-increment:** You will set the auto-increment feature for the primary key of the **author** table.

- In the tree view, click the **authors** table. Switch to the **Structure** tab and make sure you are inside the **Table structure** subtab.
- Check the **author_id** column.
- Click the **Change** option.
- Check **A_I** option (A_I = Auto_Increment).
- Click **Save**.

phpMyAdmin

Recent Favorites

- New
- eBooks
 - New
 - authors
 - books
 - book_authors
 - book_genres
 - genres
 - publishers
- information_schema
- mysql
- performance_schema
- sys

Server: mysql:3306 » Database: eBooks » Table: author

Browse Structure SQL Search

Table structure Relation view

#	Name	Type	Collation	Attrib
<input checked="" type="checkbox"/> 1	author_id	int		
<input type="checkbox"/> 2	first_name	varchar(100)	utf8mb4_0900_ai_ci	
<input type="checkbox"/> 3	middle_name	varchar(50)	utf8mb4_0900_ai_ci	
<input type="checkbox"/> 4	last_name	varchar(100)	utf8mb4_0900_ai_ci	

Check all With selected: Browse Char

Print Move columns Normalize

Add 1 column(s) after last_name Go

Indexes

Action	Keyname	Type	Unique	Packed	Column
Edit Drop	PRIMARY	BTREE	Yes	No	author_id

Server: mysql:3306 » Database: eBooks » Table: authors

Browse Structure SQL Search Insert Export Import

Name	Type	Length/Values	Default	Collat
author_id	INT		None	

Structure

11. **Null constraints:** You will restrict the **first_name** column of the **authors** table from having a NULL value.

- In the tree view, click the **authors** table. Switch to the **Structure** tab and make sure you are inside the **Table structure** subtab.
- Check the **first_name** column.
- Click the **Change** option.
- Uncheck the **Null** option.
- Click **Save**.

phpMyAdmin

Recent Favorites

- New
- eBooks
 - New
 - authors
 - books
 - book_authors
 - book_genres
 - genres
 - publishers
- information_schema
- mysql
- performance_schema
- sys

Server: mysql:3306 » Database: eBooks » Table: author

Browse Structure SQL Search

Table structure Relation view

#	Name	Type	Collation	Attrib
<input type="checkbox"/> 1	author_id	int		
<input checked="" type="checkbox"/> 2	first_name	varchar(100)	utf8mb4_0900_ai_ci	
<input type="checkbox"/> 3	middle_name	varchar(50)	utf8mb4_0900_ai_ci	
<input type="checkbox"/> 4	last_name	varchar(100)	utf8mb4_0900_ai_ci	

Check all With selected: Browse Char

Print Move columns Normalize

Add 1 column(s) after last_name Go

Indexes

Action	Keyname	Type	Unique	Packed	Column
Edit Drop	PRIMARY	BTREE	Yes	No	author_id

Server: mysql:3306 » Database: eBooks » Table: authors

Browse Structure SQL Search Insert Export Import

Name	Type	Length/Values	Default	Collat
first_name	VARCHAR	100	None	utf8

Structure

12. **Foreign keys:** You will create a foreign key for the **book_authors** table by setting its **author_id** column as a foreign key to establish a relationship between the **book_authors** and **authors** tables.

- In the tree view, click the **book_authors** table. Switch to the **Structure** tab and make sure you are inside the **Relation view** subtab.
- If necessary, click **Add constraint** to create a new foreign key constraint placeholder.
- Fill in the placeholders as shown in the following image.
- Click **Save**.

phpMyAdmin

Recent Favorites

- New
- eBooks
 - New
 - authors
 - books
 - book_authors**
 - book_genres
 - genres
 - publishers
- information_schema
- mysql
- performance_schema
- sys

Server: mysql:3306 » Database: eBooks » Table: book_authors

Browse **Structure** SQL Search

Table structure **Relation view**

#	Name	Type	Collation	Attributes	Null	Default
1	book_id	int			No	None
2	author_id	int			No	None

☐ Check all With selected: Browse Char

Print Move columns Normalize

Add 1 column(s) after author_id Go

Indexes

Action	Keyname	Type	Unique	Packed	Column
Edit Drop	PRIMARY	BTREE	Yes	No	book_id author_id

phpMyAdmin

Recent Favorites

- New
- eBooks
 - New
 - authors
 - books
 - book_authors
 - book_genres
 - genres
 - publishers
- information_schema
- mysql
- performance_schema
- sys

Server: mysql:3306 » Database: eBooks » Table: book_authors

Browse Structure SQL Search

Table structure Relation view

Foreign key constraints

Actions	Constraint properties
Drop	fk_book ON DELETE CASCADE
	fk_author ON DELETE CASCADE

+ Add constraint

Your SQL query has been executed successfully.

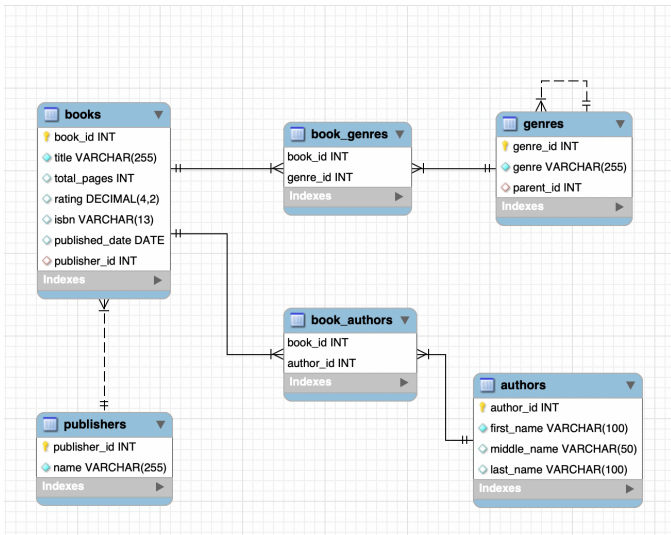
```
ALTER TABLE `book_authors` ADD CONSTRAINT `fk_author` FOREIGN KEY (`author_id`) REFERENCES `authors`
```

CASCADE means that when rows are deleted or updated in the parent table, the corresponding rows in the child table will also be deleted or updated.

RESTRICT means that rows cannot be deleted or updated in the parent table if there are corresponding rows in the child table.

13. After creating/adding all the above necessary primary keys, foreign keys, and constraints, the schema of the complete eBooks database will look like the following ERD diagram:

Note: You don't need to generate any ERD diagram like below for this lab. By comparing the earlier eBooks schema ERD (shown in the section "Database Used in this Lab") and this complete eBooks schema ERD, just try to understand how all the operations you did above made the eBooks database complete.



Congratulations! You have completed this lab, and you are ready for the next topic.

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Other Contributor(s)

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