

# 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.

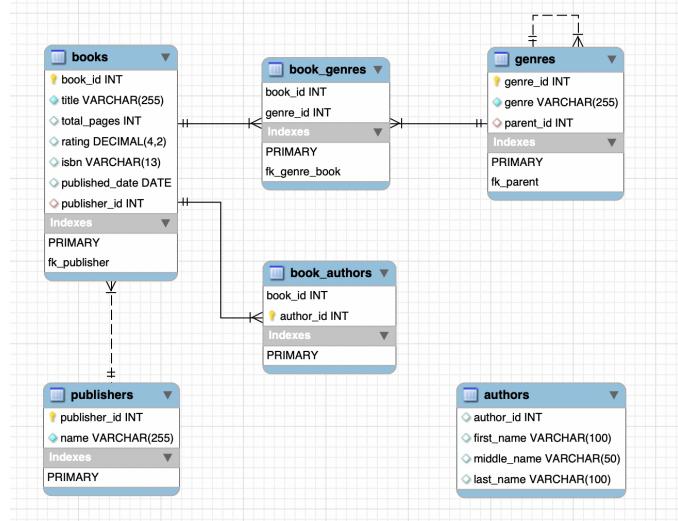


To complete this lab, you will utilize the MySQL relational database service available as part of IBM Skills Network Labs' (SN Labs) Cloud IDE. SN Labs is a virtual lab environment used in this course.

## 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

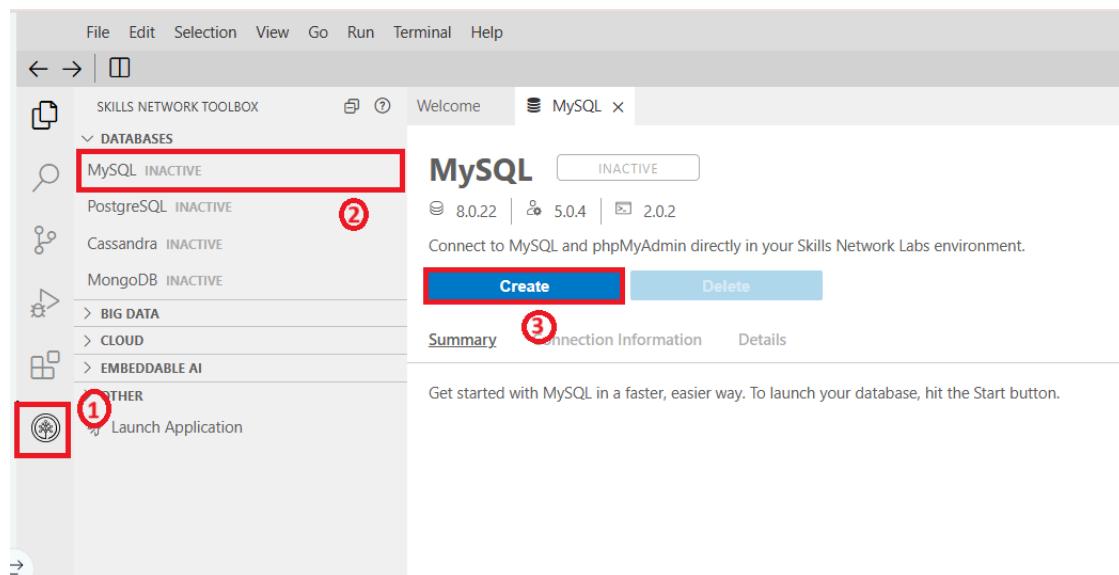
After completing this lab, you will be able to use the MySQL phpMyAdmin to:

- 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.

This screenshot shows the MySQL summary page. At the top, it says 'MySQL ACTIVE'. Below that are connection details: '8.0.22 | 5.0.4 | 2.0.2'. A note says 'Connect to MySQL and phpMyAdmin directly in your Skills Network Labs environment.' There are 'Create' and 'Delete' buttons. The 'Summary' tab is active. A red box highlights the 'phpMyAdmin' link, which is preceded by a blue square icon with a white square inside. An arrow points from the text above to this link. Below the link, it says 'Or to interact with the database in the terminal, select one of these options: MySQL CLI | New Terminal'.

5. You will see the phpMyAdmin GUI tool.

The screenshot shows the phpMyAdmin interface. On the left, there's a sidebar with a tree view of databases: New, information\_schema, mysql, performance\_schema, sakila, and sys. At the top, the URL is sandipsahajo-8080.theiadocker-27.proxy.cognitiveclass.ai. The main area has tabs for Databases, SQL, Status, and User accounts. The 'Databases' tab is selected. Below it, there are two sections: 'General settings' and 'Appearance settings'. In 'General settings', the server connection collation is set to utf8mb4\_unicode\_ci. In 'Appearance settings', the language is English and the theme is 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

Databases SQL Status User accounts Export Import Set

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**

2 Browse your computer: **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 might break imports that take a long time.)

Skip this number of queries (for SQL) starting from the first one: **0**

**Other options:**

Enable foreign key checks 3

**Format:**

4 SQL

**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.

The screenshot shows the phpMyAdmin interface with the title bar "Server: mysql:3306". Below it are tabs for "Databases", "SQL", "Status", and "User accounts". A green message box at the top right says "Import has been successfully finished, 81 queries executed. (eE)". On the left, there's a tree view of databases: "New", "eBooks" (highlighted with a red box), "information\_schema", "mysql", "performance\_schema", and "sys".

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.

The screenshot shows the phpMyAdmin interface with the title bar "Server: mysql:3306 » Database: eBooks » Table: author". Below it are tabs for "Browse", "Structure" (highlighted with a red box), "SQL", "Search", and "Relation view". The "Table structure" subtab is selected. A red box highlights the "author\_id" column in the list of columns. The table structure is as follows:

#	Name	Type	Collation	Attributes
<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	

Below the table, there are buttons for "Print", "Move columns", "Normalize", "Add", "Indexes", and a warning message "No index defined!".

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 the **A\_I** option (**A\_I = Auto\_Increment**).
- Click **Save**.

**phpMyAdmin**

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

Recent Favorites

New eBooks New authors books book\_authors book\_genres genres publishers information\_schema mysql performance\_schema sys

**Table structure**

#	Name	Type	Collation	Attribu
<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 Change

Print Move columns Normalize

Add 1 column(s) after last\_name Go

**Indexes**

Action	Keyname	Type	Unique	Packed	Column	
<input type="button" value="Edit"/>	<input type="button" value="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**

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

Recent Favorites

New eBooks New authors books book\_authors book\_genres genres publishers information\_schema mysql performance\_schema sys

**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](#) [Character](#)

[Print](#) [Move columns](#) [Normalize](#)

[Add](#) 1 column(s) after last\_name [Go](#)

**Indexes**

Action	Keyname	Type	Unique	Packed	Column	
<a href="#">Edit</a>	<a href="#">Drop</a>	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

Server: mysql:3306 » Database: eBooks » Table: book\_

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

New eBooks New authors books book\_authors book\_genres genres publishers information\_schema mysql performance\_schema sys

**phpMyAdmin**

Recent Favorites

Server: mysql:3306 » Database: eBooks » Table: book\_

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.

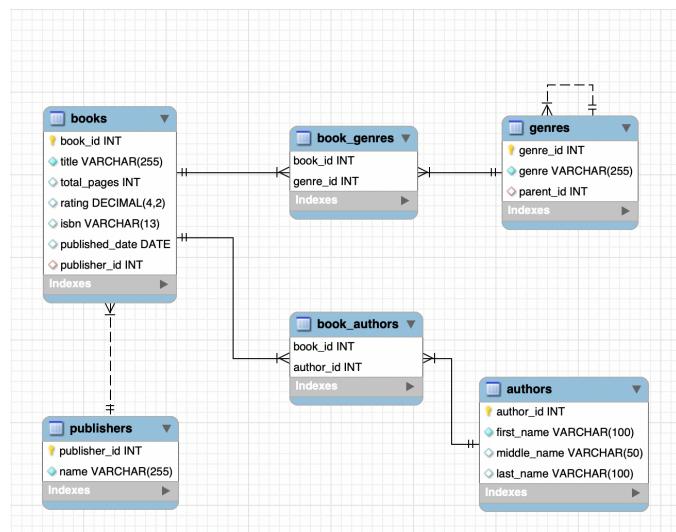
```
ALTER TABLE `book_authors` ADD CONSTRAINT `fk_author` FOREIGN KEY (`author_id`) REFERENCES `authors`
```

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.

Author: [Sandip Saha Joy](#)



# Skills Network

## Other Contributor(s)

- Kathy An

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