

# 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.

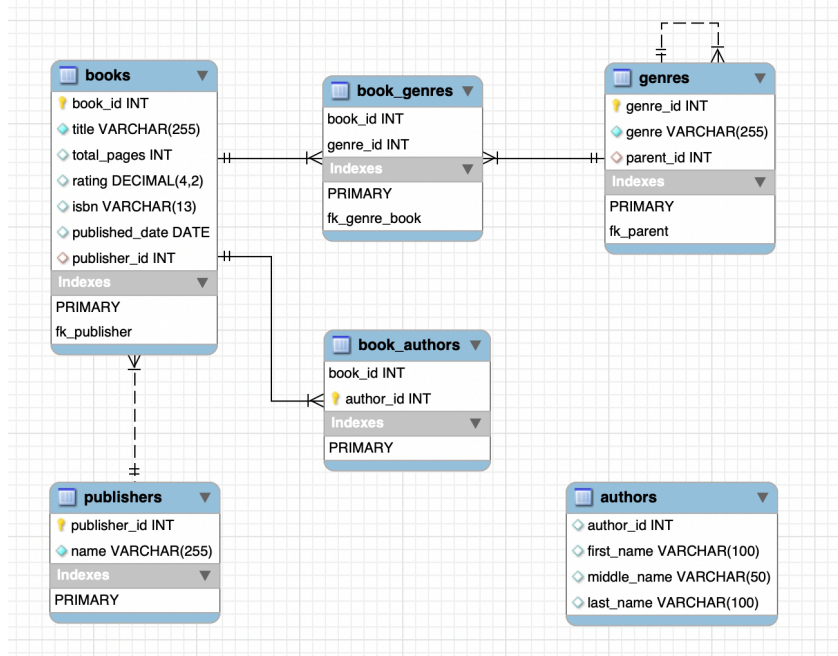


To complete this lab, you will utilize the MySQL relational database service available as part of IBM Skills Network Labs' (SN Labs) Cloud IDE. SN Labs is a virtual lab environment used in this course.

## 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. First, download the **eBooks** MySQL dump file (containing the eBooks database table, definitions, and data) to your local computer storage.
  - [eBooks\\_mysql\\_dump.sql](#)
2. Go to **Terminal > New Terminal** to open a terminal from the side-by-side launched Cloud IDE.

 Skills Network Labs

Instructions

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◀ Step 6 of 7 ▶

  
IBM Developer  
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3. Start the MySQL service session in the Cloud IDE using the following command in the terminal. Find your MySQL service session password in the following image from the highlighted terminal location. Note your MySQL service session password because you may need to use it later in the lab.

```
1. 1
1. start_mysql
```

Copied!

```
theia@theiadocker-sandipsahajo:/home/project$ start_mysql
Starting your MySQL database....
This process can take up to a minute.

MySQL database started, waiting for all services to be ready....

Your MySQL database is now ready to use and available with username:

You can access your MySQL database via:
  • The browser at: https://sandipsahajo-8080.theiadocker-27.proxy.co
  • CommandLine: mysql --host=127.0.0.1 --port=3306 --user=root --pas
theia@theiadocker-sandipsahajo:/home/project$
```

4. Copy your phpMyAdmin weblink from the highlighted location of the terminal shown in the following image and paste it to a new tab of your web browser.

```
theia@theiadocker-sandipsahajo:/home/project$ start_mysql
Starting your MySQL database....
This process can take up to a minute.

MySQL database started, waiting for all services to be ready....

Your MySQL database is now ready to use and available with username:

You can access your MySQL database via:
  • The browser at: https://sandipsahajo-8080.theiadocker-27.proxy.co
  • CommandLine: mysql --host=127.0.0.1 --port=3306 --user=root --pas
theia@theiadocker-sandipsahajo:/home/project$
```

5. You will see the phpMyAdmin GUI tool.

← → ↻ 🏠 🔒 sandipsahajo-8080.theiadocker-27.proxy.cognitivecla

# phpMyAdmin

🏠 📁 ? 📄 ⚙️ 💰

Recent Favorites

- New
- + information\_schema
- + mysql
- + performance\_schema
- + sakila
- + sys

← Server: mysql:3306

Databases SQL Status

## General settings

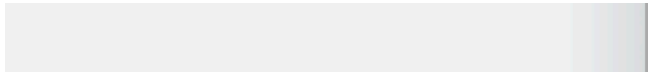
☰ Server connection collation: ⓘ utf8mb4

🔑 [More settings](#)

## Appearance settings


🗣️ Language ⓘ English


🎨 Theme: pmahomme ▼





6. 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**



# 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:

## Partial import:

☒ Allow the interruption of an import in case the script detects it is close to the PHP tin

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

## Other options:

☐ Enable foreign key checks **3**

## Format:

**4**

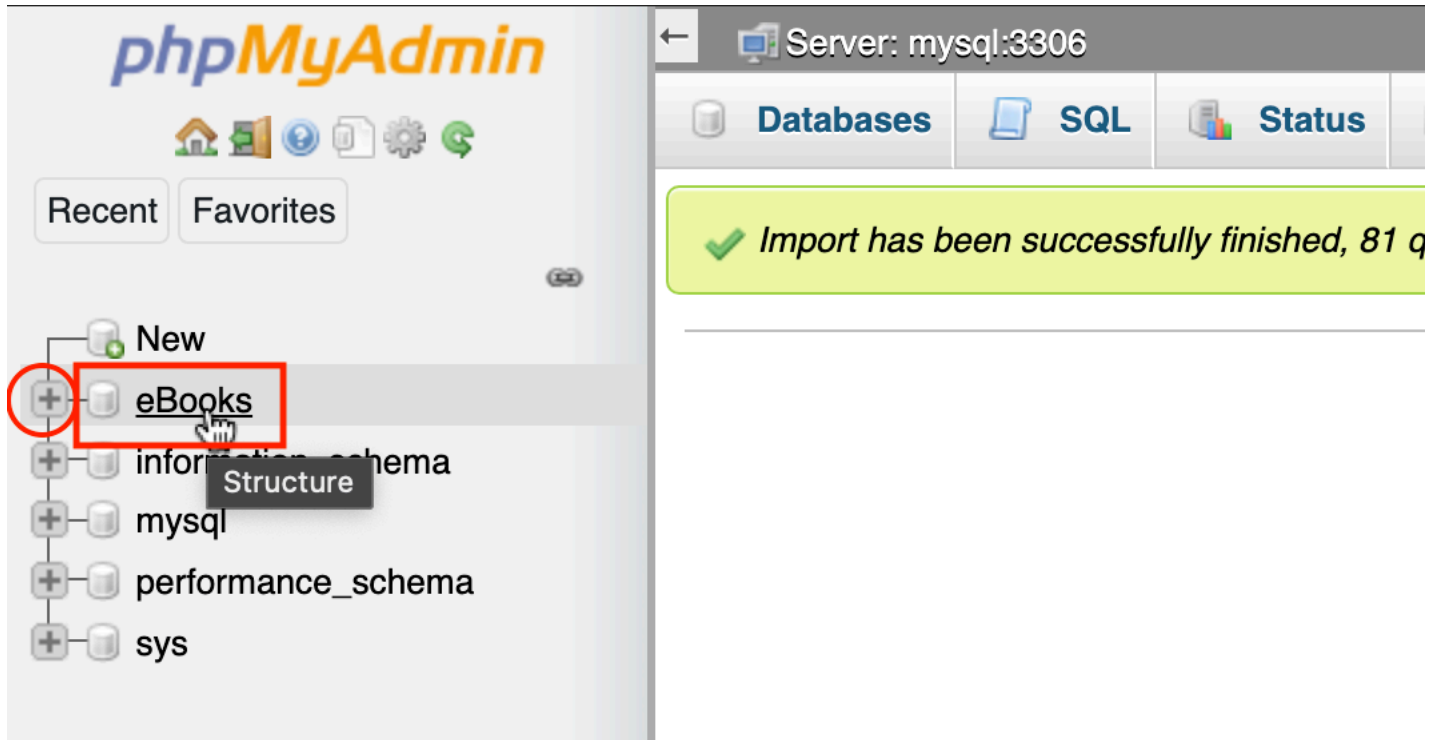
## Format-specific options:

SQL compatibility mode:

NOI

☒ Do not use `AUTO_INCREMENT` for zero values

7. 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.



8. **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 for a database named 'eBooks'. The left sidebar shows a tree view of databases and tables. The 'authors' table is selected under the 'eBooks' database. The main panel shows the 'Structure' tab, which contains a subtab for 'Table structure'. The table structure is displayed as a table with columns: #, Name, Type, and Collation. The 'author\_id' column is selected with a checkbox. Below the table structure, there are options to 'Check all', 'With selected:', 'Print', 'Move columns', and 'Normalize'. At the bottom, there is a section for 'Indexes' which shows 'No index defined!'.

#	Name	Type	Collation
<input checked="" type="checkbox"/> 1	author_id	int	
<input type="checkbox"/> 2	first_name	varchar(100)	utf8mb4
<input type="checkbox"/> 3	middle_name	varchar(50)	utf8mb4
<input type="checkbox"/> 4	last_name	varchar(100)	utf8mb4

9. **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

Browse Structure SQL

Table structure Relation view

#	Name	Type	Collation
<input checked="" type="checkbox"/>	1 <b>author_id</b>	int	
<input type="checkbox"/>	2 <b>first_name</b>	varchar(100)	utf8mb4
<input type="checkbox"/>	3 <b>middle_name</b>	varchar(50)	utf8mb4
<input type="checkbox"/>	4 <b>last_name</b>	varchar(100)	utf8mb4

Check all With selected:

Print Move columns Normalize

Add 1 column(s) after last\_name

**Indexes**

Action	Keyname	Type	Unique
Edit  Drop	<b>PRIMARY</b>	BTREE	Yes

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

Browse

Structure

SQL

Search

Insert

Export

Name	Type ?	Length/Values ?	Default ?
author_id	INT ▼		None

Structure ?

10. **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

Browse Structure SQL

Table structure Relation view

	#	Name	Type	Collation
<input type="checkbox"/>	1	author_id	int	
<input checked="" type="checkbox"/>	2	first_name	varchar(100)	utf8mb4
<input type="checkbox"/>	3	middle_name	varchar(50)	utf8mb4
<input type="checkbox"/>	4	last_name	varchar(100)	utf8mb4

↑ ☐ Check all With selected:

Print Move columns Normalize

Add  column(s)

Indexes

Action	Keyname	Type	Unique
Edit  Drop	PRIMARY	BTREE	Yes

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

Browse

Structure

SQL

Search

Insert

Export

Name	Type	Length/Values	Default
first_name	VARCHAR	100	None

Structure

11. **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

Server: mysql:3306 » Database: eBooks

Browse **Structure** SQL

Table structure **Relation view**

#	Name	Type	Collation	Attri
1	<b>book_id</b> 🔑	int		
2	<b>author_id</b> 🔑	int		

Check all With selected:

Print Move columns Normalize

Add 1 column(s) after author\_id

**Indexes** ⓘ

Action	Keyname	Type	Unique
Edit	Drop	<b>PRIMARY</b>	BTREE Yes

phpMyAdmin

Recent Favorites

New eBooks

authors books book\_authors book\_genres genres publishers

information\_schema mysql performance\_schema sys

Server: mysql:3306 » Database: eBooks

Browse Structure SQL

Table structure Relation view

Foreign key constraints

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

+ Add constraint

Your SQL query has been executed successfully.

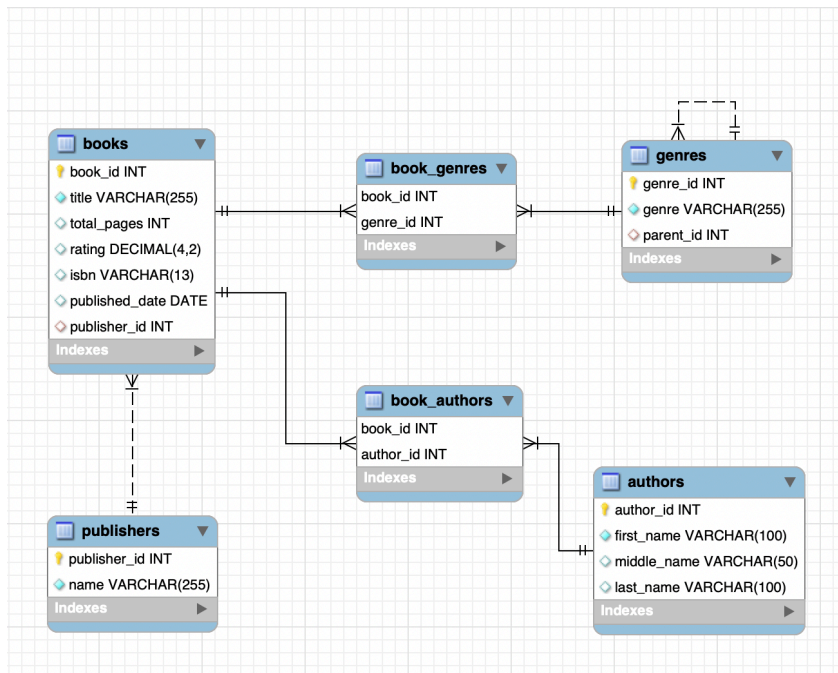
```
ALTER TABLE `book_authors` ADD CONSTRAINT `fk_author` FOREIGN KEY (`author_id`) REFERENCES `authors` (`id`) ON DELETE CASCADE ON UPDATE CASCADE;
```

**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.

12. 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](#)



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