

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.

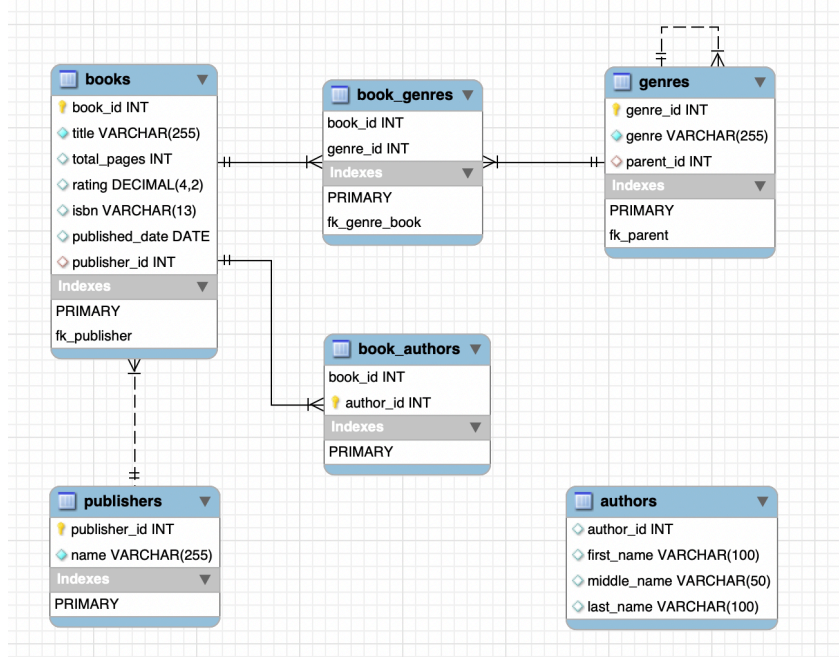


To complete this lab, you will utilize the MySQL relational database service available as part of IBM Skills Network Labs' (SN Labs) Cloud IDE. SN Labs is a virtual lab environment used in this course.

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.

File Edit Selection View Go Run Terminal Help

SKILLS NETWORK TOOLBOX

MySQL INACTIVE

PostgreSQL INACTIVE

Cassandra INACTIVE

MongoDB INACTIVE

BIG DATA

CLOUD

EMBEDDABLE AI

OTHER

Launch Application

MySQL INACTIVE

8.0.22 | 5.0.4 | 2.0.2

Connect to MySQL and phpMyAdmin directly in your Skills Network Labs environment.

Create Delete

Summary Connection Information Details

Get started with MySQL in a faster, easier way. To launch your database, hit the Start button.

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

Welcome MySQL x

MySQL ACTIVE

8.0.22 | 5.0.4 | 2.0.2

Connect to MySQL and phpMyAdmin directly in your Skills Network Labs environment.

Create Delete

Summary Connection Information Details

Your database and phpMyAdmin server are now ready to use and available with the following login cr to navigate MySQL, please check out the Details section.

You can manage MySQL via:

phpMyAdmin

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 displays the phpMyAdmin web interface. The top navigation bar includes a back arrow, a forward arrow, a refresh icon, a home icon, and a lock icon. The address bar shows the URL: `sandipsahajo-8080.theiadocker-27.proxy.cognitive`. The main header features the phpMyAdmin logo and a set of icons for home, server status, help, search, settings, and a green circular icon. Below the header, there are two tabs: 'Recent' and 'Favorites'. The left sidebar shows a tree view of databases: 'New' (with a green plus icon), 'information_schema', 'mysql', 'performance_schema', 'sakila', and 'sys'. The right pane is divided into two sections: 'General settings' and 'Appearance settings'. The 'General settings' section shows 'Server connection collation' set to 'utf8r' with a 'More settings' link. The 'Appearance settings' section shows 'Language' set to 'English' and 'Theme' set to 'pmahomme' with a dropdown arrow.

phpMyAdmin

Recent Favorites

New
+ information_schema
+ mysql
+ performance_schema
+ sakila
+ sys

Server: mysql:3306

Databases SQL Status

General settings

Server connection collation: utf8r
[More settings](#)

Appearance settings

Language English
Theme: 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

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

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

Other options:

☐ Enable foreign key checks **3**

Format:

4

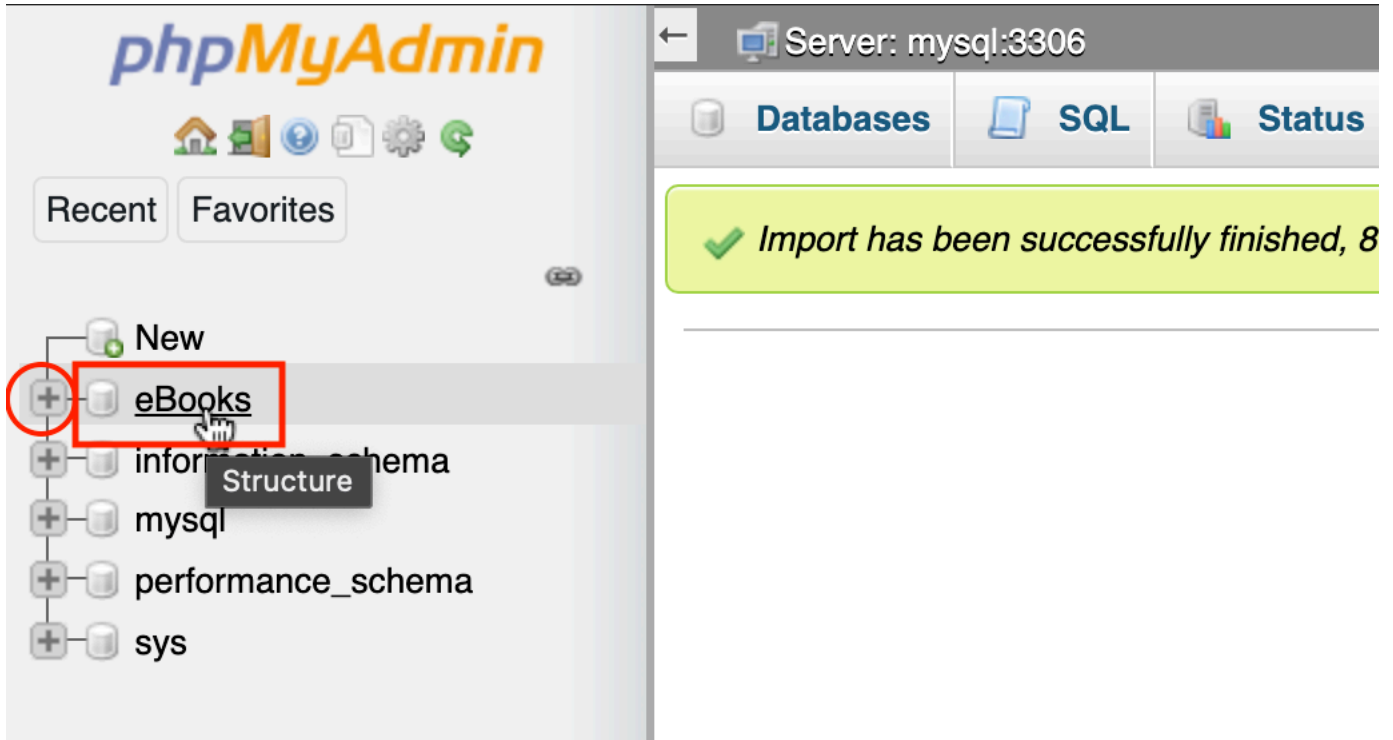
Format-specific options:

SQL compatibility mode:



☒ 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.

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 right pane shows the 'Table structure' sub-tab, displaying a table with 4 columns: 'author_id' (int), 'first_name' (varchar(100) utf8m), 'middle_name' (varchar(50) utf8m), and 'last_name' (varchar(100) utf8m). The 'author_id' column is selected with a checkbox. Below the table structure, there are buttons for 'Print', 'Move columns', 'Normalize', and 'Add'. The 'Add' button is set to '1 column(s)' and 'after last_n'. At the bottom, there is a section for 'Indexes' with 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 **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	Colla
<input checked="" type="checkbox"/> 1	author_id	int	
<input type="checkbox"/> 2	first_name	varchar(100)	utf8m
<input type="checkbox"/> 3	middle_name	varchar(50)	utf8m
<input type="checkbox"/> 4	last_name	varchar(100)	utf8m

Check all With selected:

Print Move columns Normalize

Add 1 column(s) after last_n

Indexes

Action	Keyname	Type	Uniq
Edit Drop	PRIMARY	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

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

Browse Structure SQL

Table structure Relation view

#	Name	Type	Colla
<input type="checkbox"/> 1	author_id	int	
<input checked="" type="checkbox"/> 2	first_name	varchar(100)	utf8m
<input type="checkbox"/> 3	middle_name	varchar(50)	utf8m
<input type="checkbox"/> 4	last_name	varchar(100)	utf8m

Check all With selected:

Print Move columns Normalize

Add 1 column(s) after last_n

Indexes ?

Action	Keyname	Type	Uniq
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 ?

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**.

The screenshot shows the phpMyAdmin interface. On the left, the database tree view shows the 'eBooks' database selected, with the 'book_authors' table highlighted. On the right, the 'Structure' tab is active, and the 'Relation view' subtab is selected. The table structure is displayed as follows:

#	Name	Type	Collation	A
1	book_id	int		
2	author_id	int		

Below the table structure, there are options to 'Check all' and 'With selected:'. There are also buttons for 'Print', 'Move columns', and 'Normalize'. At the bottom, the 'Indexes' section shows a primary index on the 'book_id' column, with a 'Drop' button and the index type 'BTREE'.

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

Foreign key constraints

Actions	Constraint properties
Drop	fk_book ON D
	fk_author ON D

+ Add constraint

Your SQL query has been executed successfully.

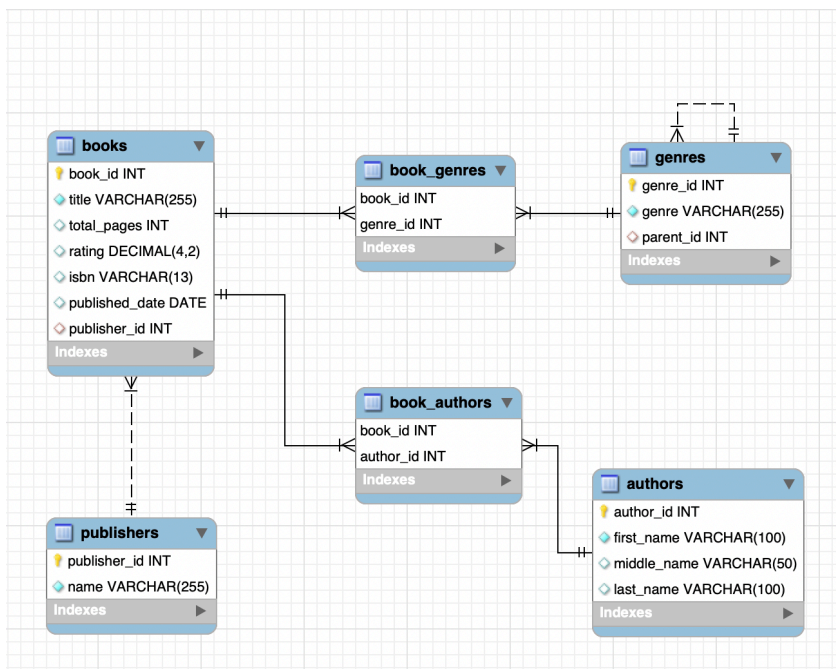
```
ALTER TABLE `book_authors` ADD CONSTRAINT `fk_author` FOREIGN KEY (`author_id`)
```

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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