LIBRARY MANAGEMENT SYSTEM USING PYTHON AND MySQL

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A J-Component Review 2 by:
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Introduction

With the rapid development of computer technology, the application of computer technology in all walks of life has been widely popular. The development of modern information technology has led to the progress of the library in the direction of automation, network, and digitization.

Due to the increase in the collection of library books and the increasing demand for information, the traditional manual management methods have many shortcomings, the main performance is that the efficiency of handling of borrowing books and returning books process is very low, obviously it cannot adapt to the current information society.

The Library Management System is an application for assisting a librarian in managing a book library. The system would provide basic set of features to add/update members, add/update books, and manage check in specifications for the systems based on the client’s statement of need.

Literature Survey

Author	Contribution	Research Gap
Amin (2003)	Provides information about various open source software for use in libraries like, software tools for automation, software tools for value added services, software tools for digital library initiatives, miscellaneous supporting tools.	Doesn’t mention the cost and resources required to develop and maintain the software.
Eby (2007)	Provides information on some of the available open source library management systems, digital library software, metasearch, link resolvers, federated search engines and OPAC software.	Doesn’t mention the limitations for development of the software.
Hoffman & Yang (2012)	Studies the current usage of next generation online public access catalogues and discovery tools in academic libraries in the USA and Canada. They also reports that use of discovery tool is increasing. The author also provides update on next generation catalogue and discovery tool usage in academic libraries of both countries.	

Literature Survey

Author	Contribution	Research Gap
Dartmouth College Library report (2013)	Describes shortcomings of the present generation of library management systems and suggests improvements and inclusion of features in next generation systems like discovery, personalization, Reuse, collection development, collection management, electronic resource management system integration.	
Yang (2013)	Describes advanced features of next generation library management systems such as interoperability, electronic resource management, role based login, and other features such as support for different record formats, integration with other system.	Doesn’t mention the vulnerabilities and security risks associated with the software.
Palmer & Choi (2014)	Assesses the state of open source software research in the library context by employing descriptive literature review. They found that most of the significant areas of research are digital repository software, OPAC and integrated library systems.	

Modules

- **Database**
  - book
  - users
  - day_to_day
  - author
  - category
  - publisher

- **User Interface (UI)**
  - Login page
  - Main UI
  - Themes
- **Python Modules**
  - Link to database
  - Link to GUI

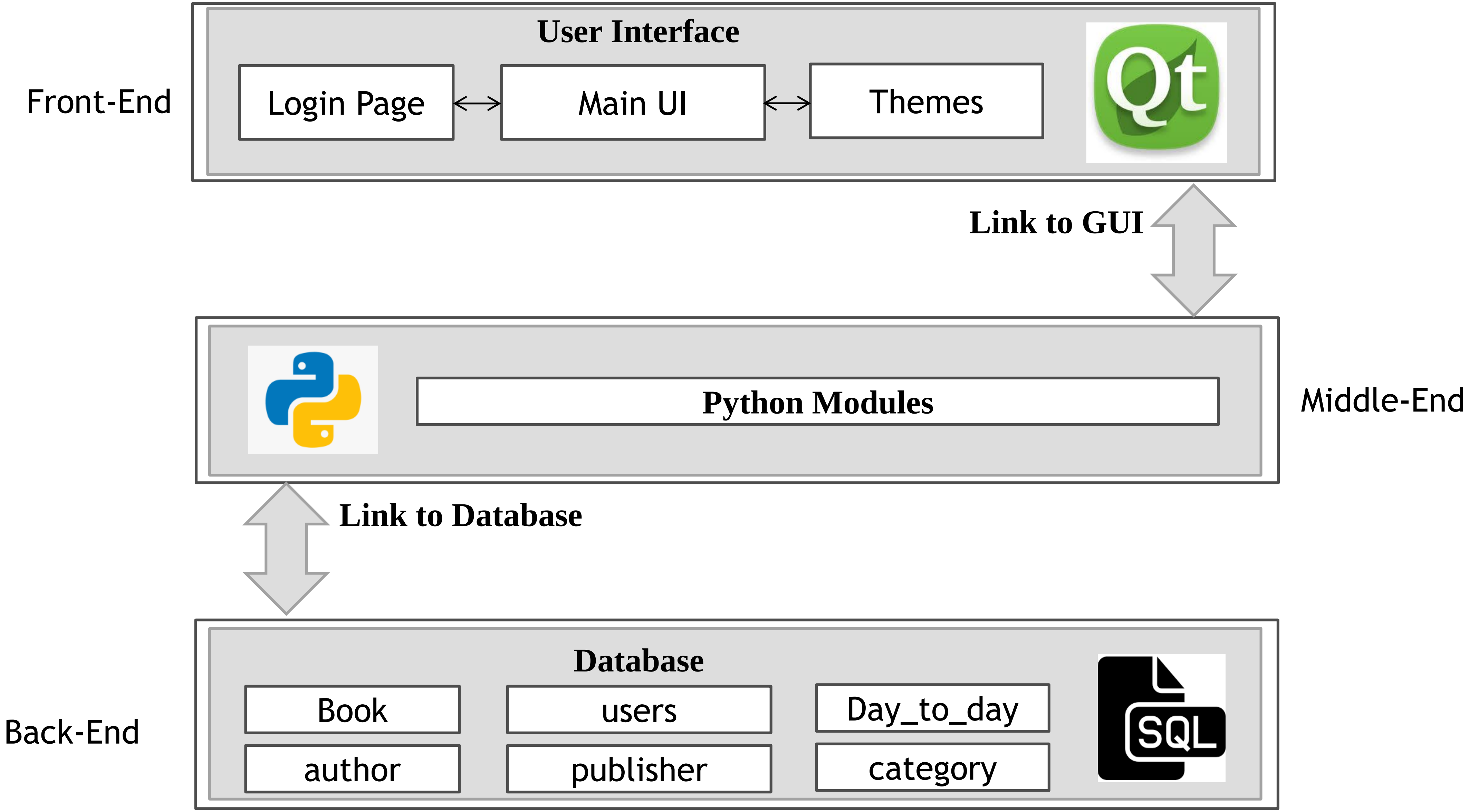


Diagram: *Architecture Diagram for the Library Management System*

Modules Introduction

- Databas
  - Contains the schemas and the data accessed and edited using the GUI.
  - Book: Schema that stores information about books in the library.
  - User: Schema that stores information about the users.
  - Day_to_day: Schema that stores information about the operations carried out by users such as retrieve, rent, withdraw.
  - Author: Schema that stores information about the authors of the books in library.
  - Category: Schema that stores information about the categories of the books in library.
  - Publisher: Schema that stores information about the publishers of the books in library.

Modules Introduction

- User Interface
  - The graphical view of the application for users to interact with.
  - Login Page: Prompts the users to login upon launching the application.
  - Main UI: Allows users to edit data in the database.
  - Themes: Allows users to toggle between themes for the UI.
- Python Modules:
  - The most important part of the application since it allows direct links between the Database and the User Interface.
  - Link to database: Allows modifying data in the database via python.
  - Link to GUI: Allows the user to access the database via the GUI.

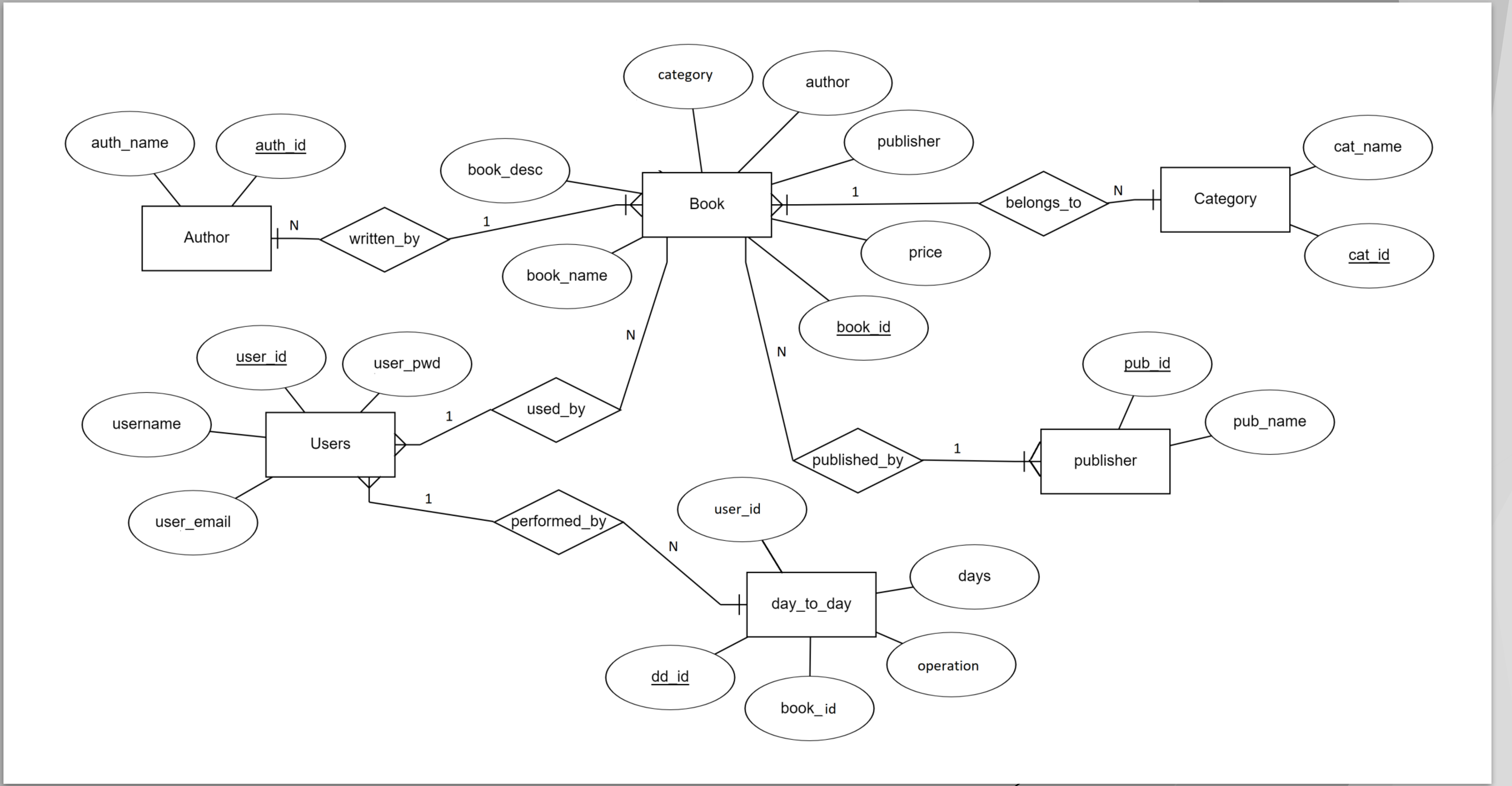
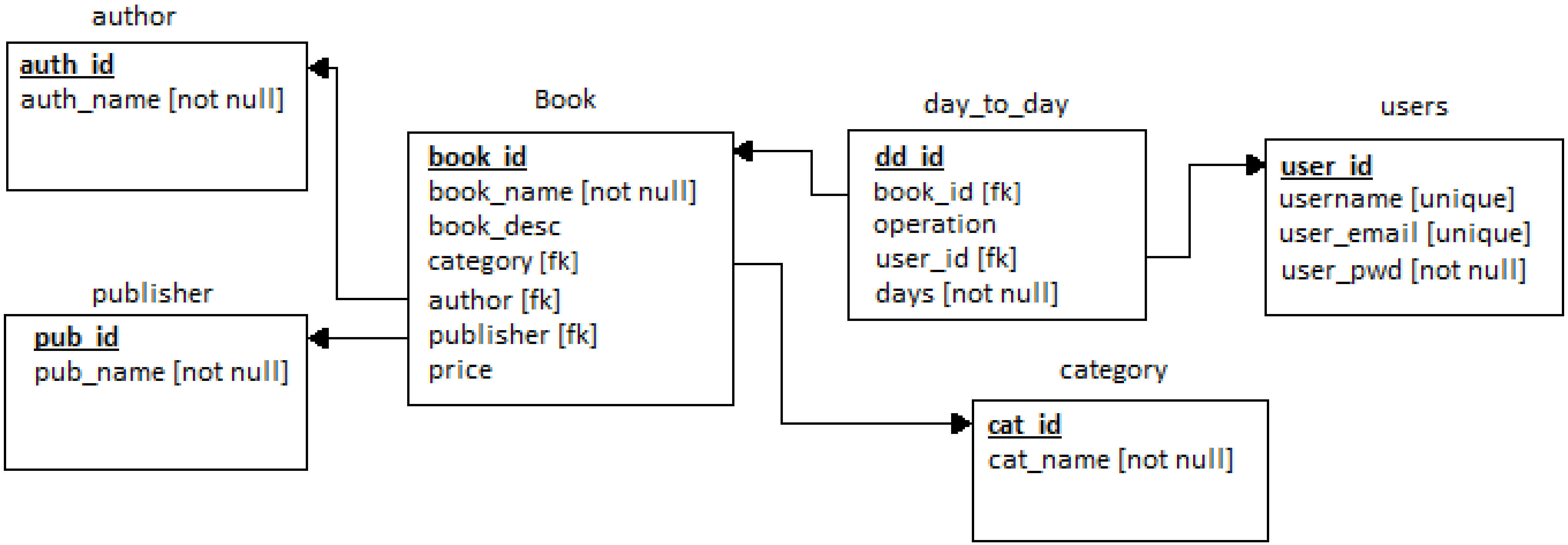


Diagram: *Entity-Relation Diagram*



author

auth_id
auth_name [not null]

publisher

pub_id
pub_name [not null]

Book

book_id
book_name [not null]
book_desc
category [fk]
author [fk]
publisher [fk]
price

day_to_day

dd_id
book_id [fk]
operation
user_id [fk]
days [not null]

users

user_id
username [unique]
user_email [unique]
user_pwd [not null]

category

cat_id
cat_name [not null]

Diagram: *Schema Diagram*

Normalized Tables

All Tables are in Boyce-Codd Normal Form (BCNF)

Table: *Book*

TABLE	ATTRIBUTE	DATATYPE	CONSTRAINT
Book	book_id	int	primary key
	book_name	varchar	not null
	book_desc	varchar	
	Category	varchar	foreign key category (cat_id)
	Author	varchar	foreign key author (auth_id)
	Publisher	varchar	foreign key pub(pub_id)
	Price	int	

Candidate Keys: {book_id, book_name, book_desc}

Table: *Users*

TABLE	ATTRIBUTE	DATATYPE	CONSTRAINT
Users	user_id	int	primary key
	username	varchar	Unique
	user_email	varchar	unique
	user_pwd	varchar	not null

Candidate Keys: {user_id, username, user_email}

Table: *day_to_day*

TABLE	ATTRIBUTE	DATATYPE	CONSTRAINT
day_to_day	dd_id	int	primary key
	Book_id	int	foreign key Book (book_id)
	operation	varchar	
	user_id	int	foreign key Users (user_id)
	days	int	not null

Candidate Keys: {dd_id}

Table: *category*

TABLE	ATTRIBUTE	DATATYPE	CONSTRAINT
Category	cat_id	varchar	primary key
	cat_name	varchar	not null

Candidate Keys: {cat_id, cat_name}

Table: *author*

TABLE	ATTRIBUTE	DATATYPE	CONSTRAINT
Author	auth_id	varchar	primary key
	auth_name	varchar	not null

Candidate Keys: {auth_id, auth_name}

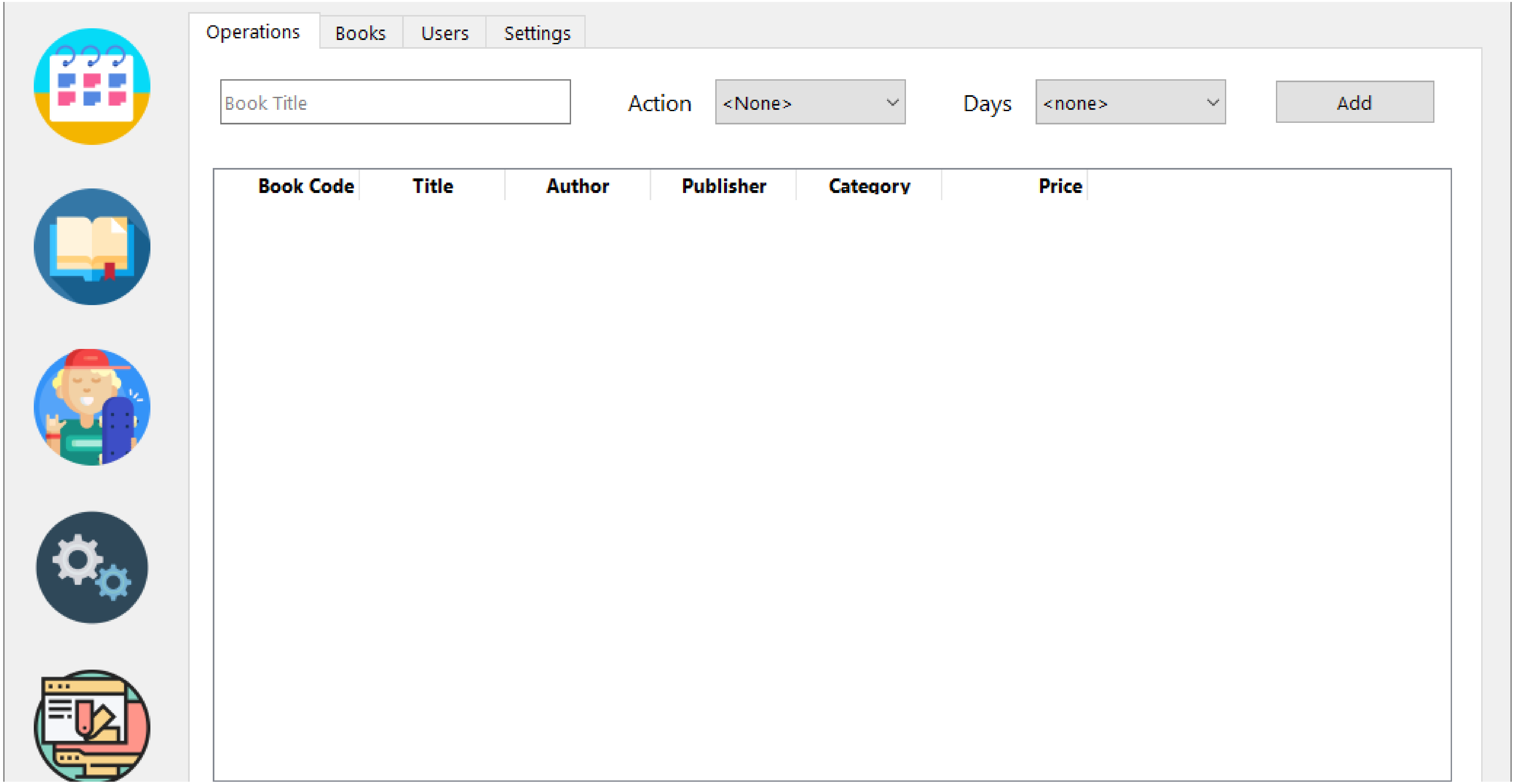
Table: *publisher*

TABLE	ATTRIBUTE	DATATYPE	CONSTRAINT
Publisher	pub_id	varchar	primary key
	pub_name	varchar	not null

Candidate Keys: {pub_id, pub_name}

User Interface

(Subject to change)



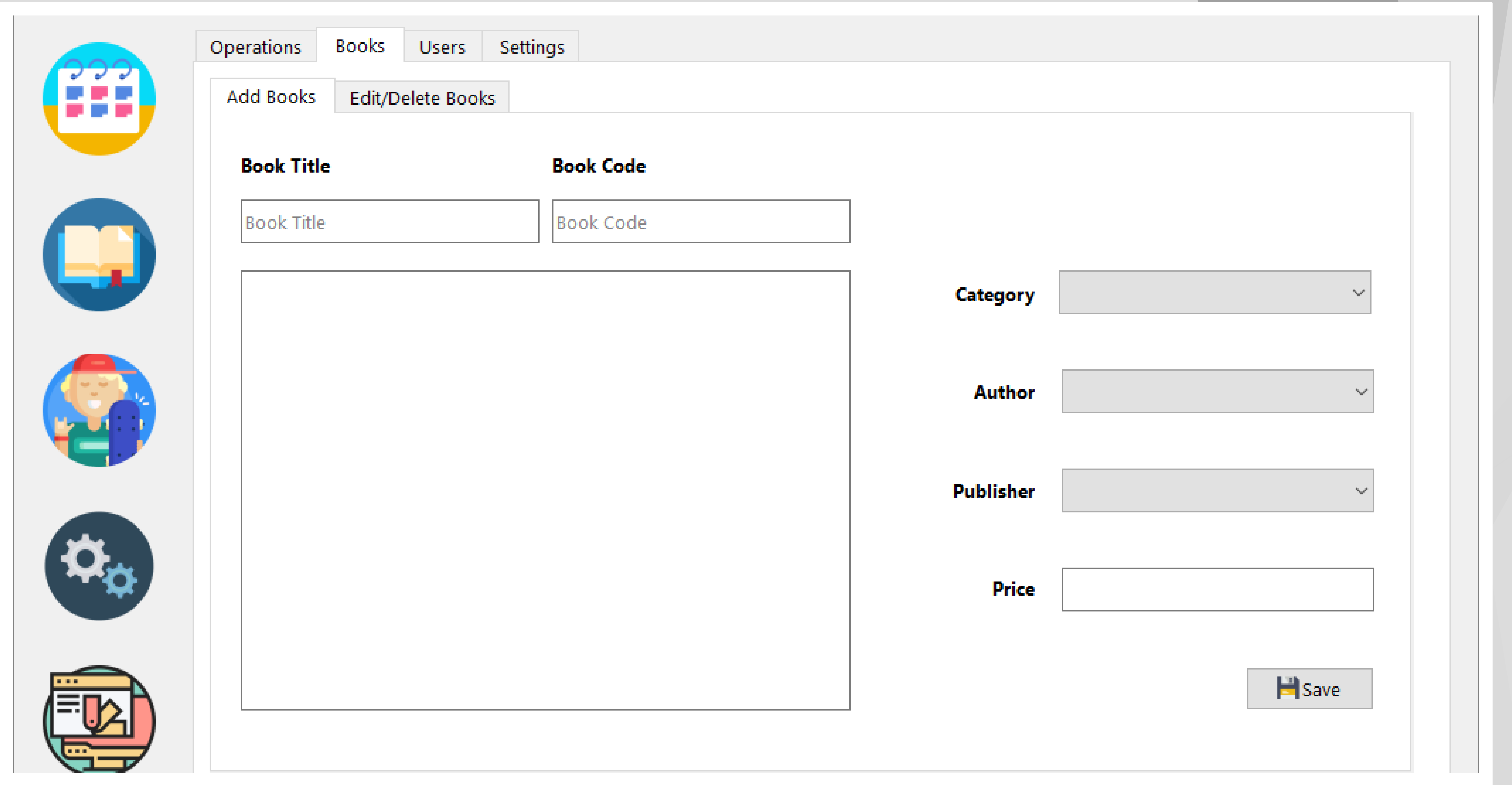
Book Title

Action <None>

Days <none>

Book Code	Title	Author	Publisher	Category	Price

Image: *Operations Tab*



Book Title: Book Title

Book Code: Book Code

Category

Author

Publisher

Price

Image: *Add Books Tab in the Books Tab*

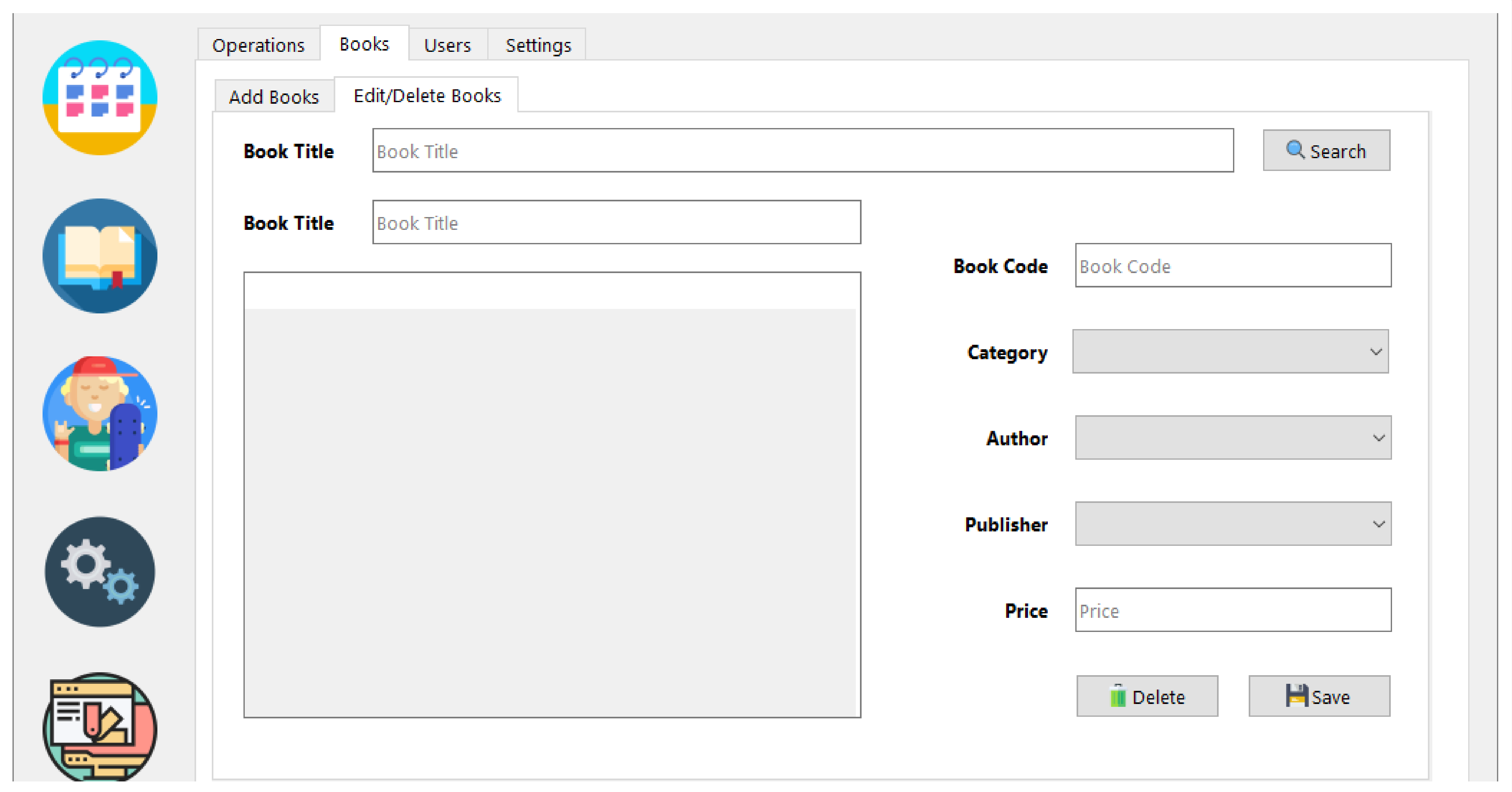


Image: *Edit/Delete Books Tab in the Books Tab*

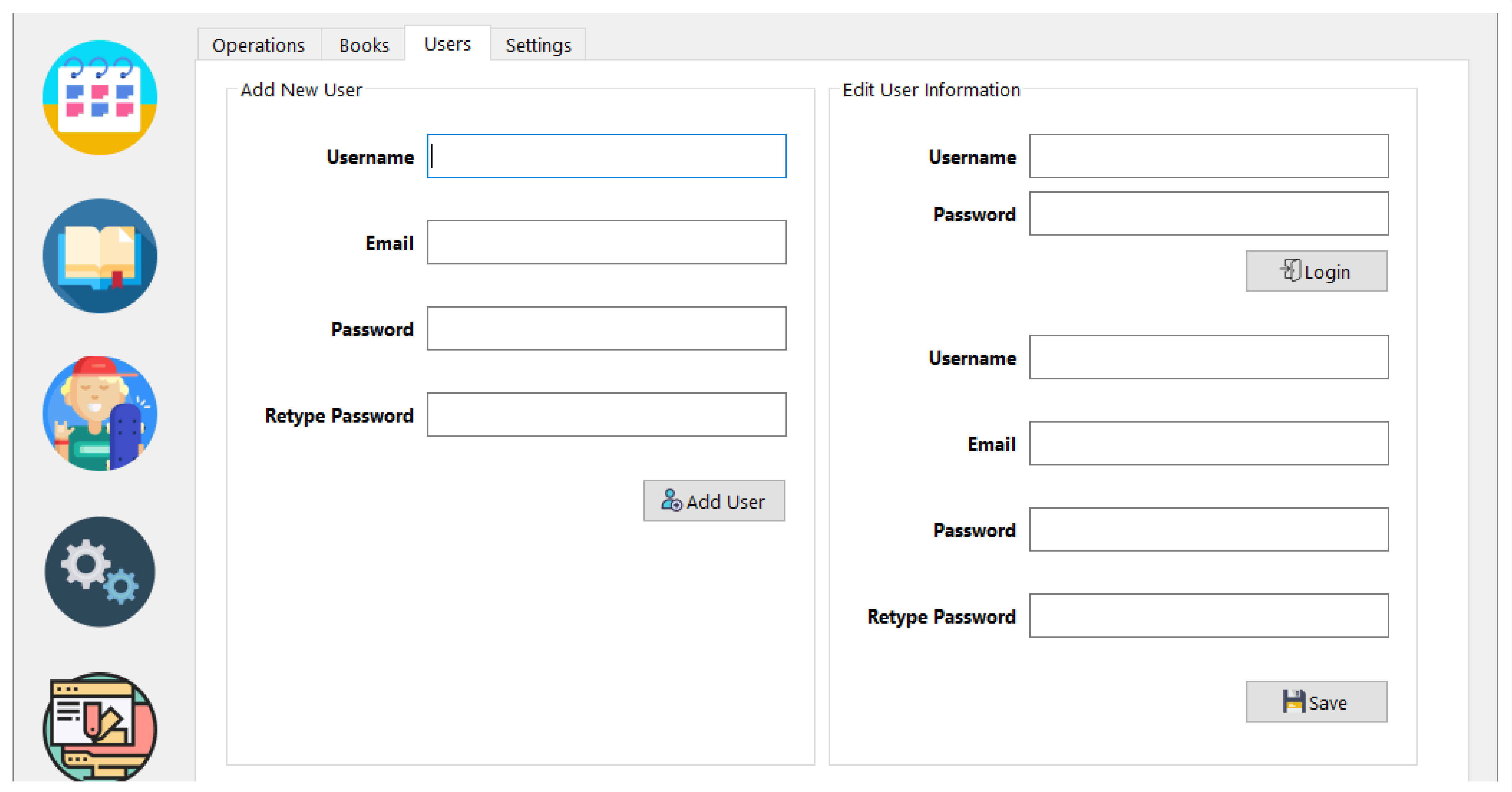
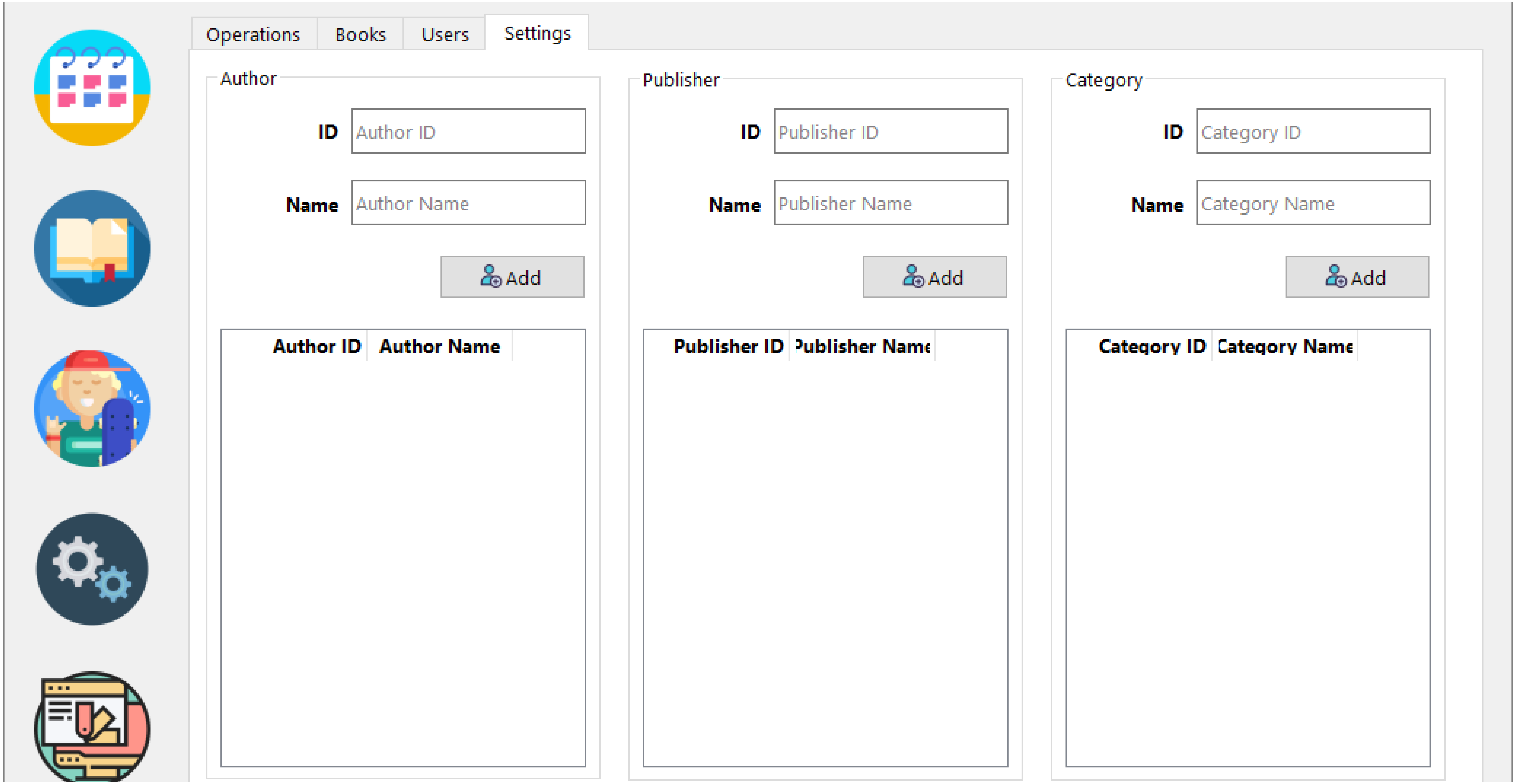


Image: *Users Tab with ‘Add New User’ and ‘Edit User Information’ groups*



Author

ID: Author ID

Name: Author Name

Add

Author ID	Author Name

Publisher

ID: Publisher ID

Name: Publisher Name

Add

Publisher ID	?ublisher Name

Category

ID: Category ID

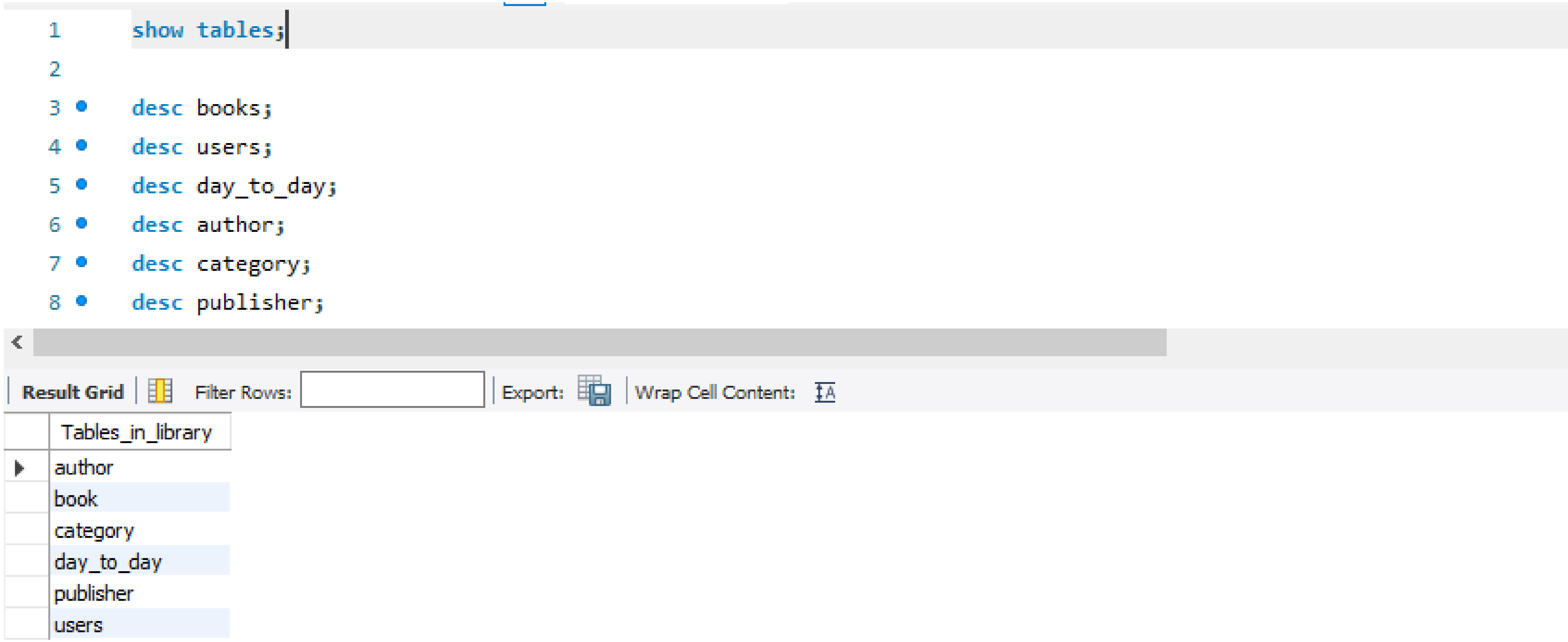
Name: Category Name

Add

Category ID	Category Name

Image: *Settings Tab*

Database Schemas

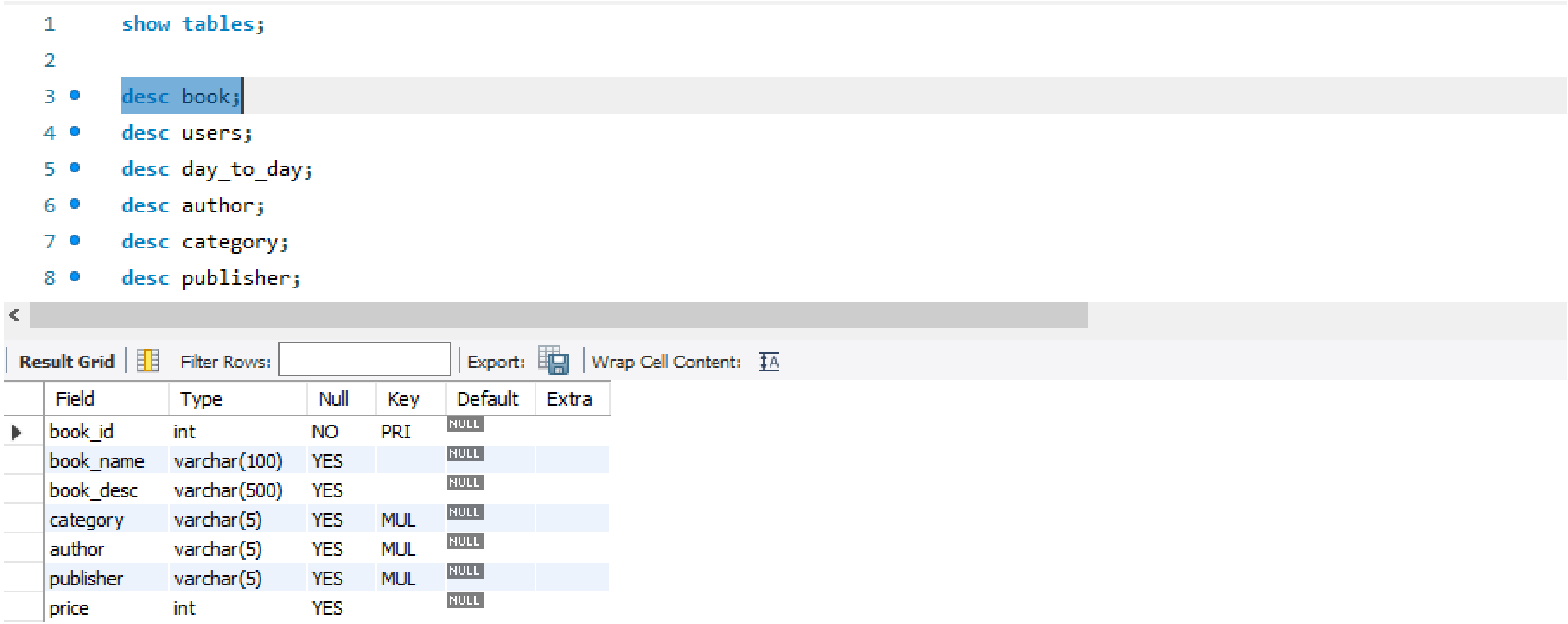


```
show tables;

desc books;
desc users;
desc day_to_day;
desc author;
desc category;
desc publisher;
```

Tables_in_library
author
book
category
day_to_day
publisher
users

Image: *Tables in the database*

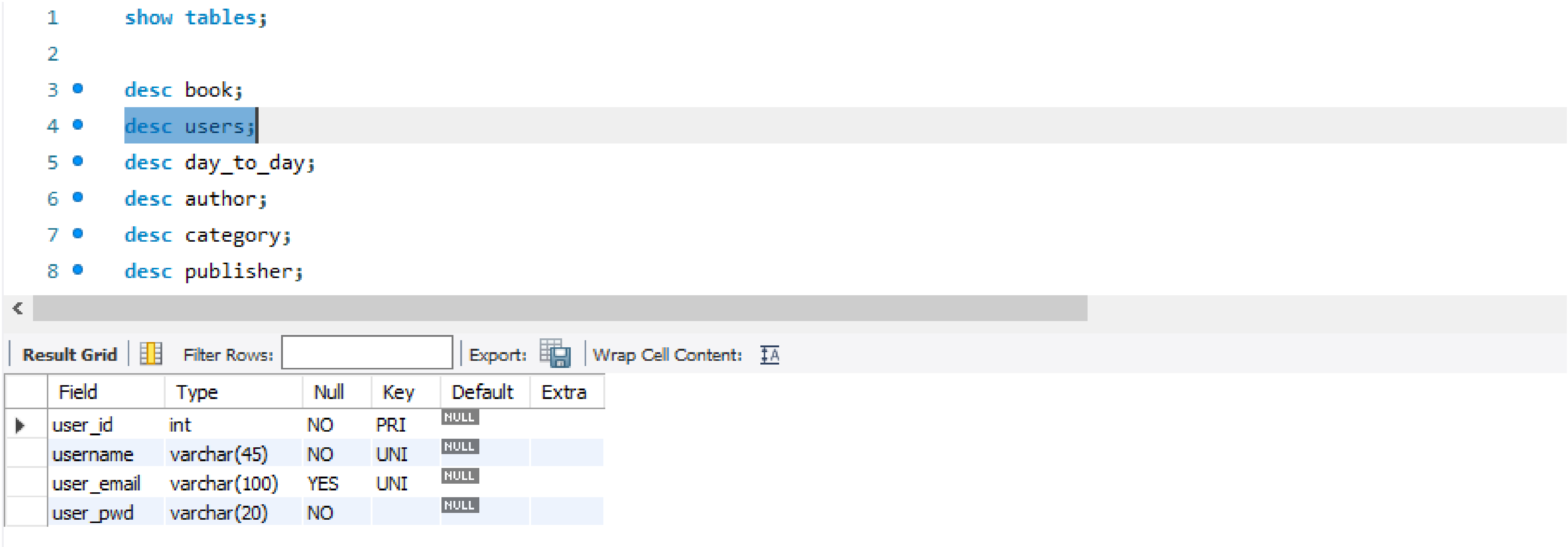


```
show tables;

desc book;
desc users;
desc day_to_day;
desc author;
desc category;
desc publisher;
```

Field	Type	Null	Key	Default	Extra
book_id	int	NO	PRI	NULL	
book_name	varchar(100)	YES		NULL	
book_desc	varchar(500)	YES		NULL	
category	varchar(5)	YES	MUL	NULL	
author	varchar(5)	YES	MUL	NULL	
publisher	varchar(5)	YES	MUL	NULL	
price	int	YES		NULL	

Image: *Schema for book table*

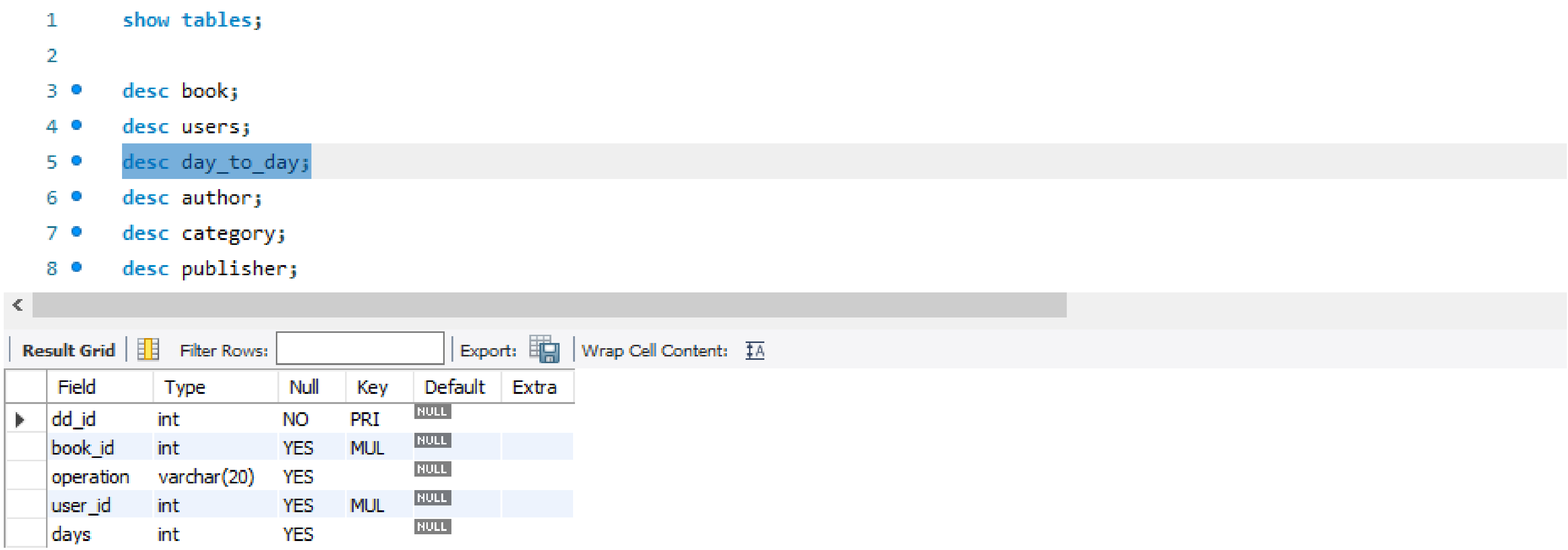


```sql
show tables;

desc book;
desc users;
desc day_to_day;
desc author;
desc category;
desc publisher;
```

Field	Type	Null	Key	Default	Extra
user_id	int	NO	PRI	NULL	
username	varchar(45)	NO	UNI	NULL	
user_email	varchar(100)	YES	UNI	NULL	
user_pwd	varchar(20)	NO		NULL	

Image: *Schema for Users table*

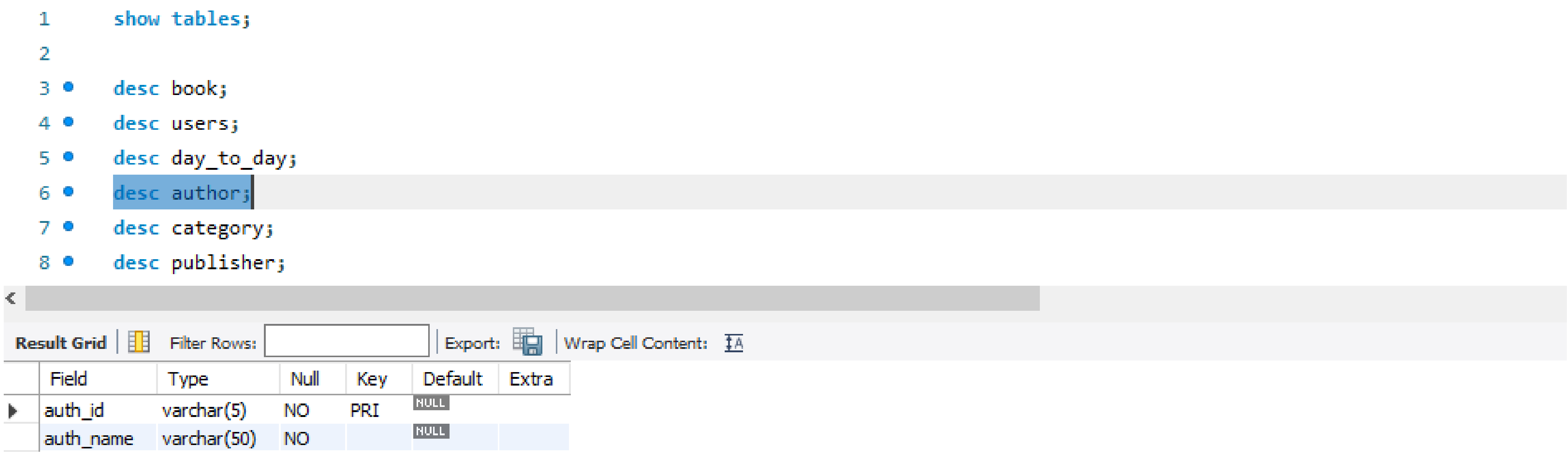


```
show tables;

desc book;
desc users;
desc day_to_day;
desc author;
desc category;
desc publisher;
```

Field	Type	Null	Key	Default	Extra
dd_id	int	NO	PRI	NULL	
book_id	int	YES	MUL	NULL	
operation	varchar(20)	YES		NULL	
user_id	int	YES	MUL	NULL	
days	int	YES		NULL	

Image: *Schema for day_to_day table*

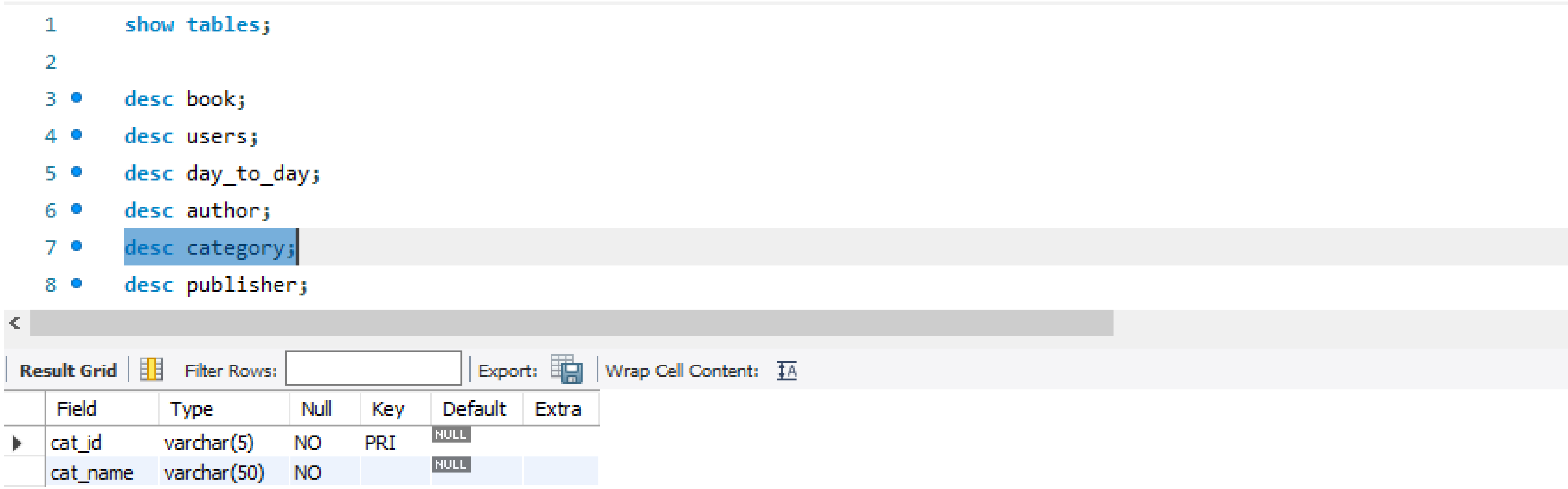


```
show tables;

desc book;
desc users;
desc day_to_day;
desc author;
desc category;
desc publisher;
```

Field	Type	Null	Key	Default	Extra
auth_id	varchar(5)	NO	PRI	NULL	
auth_name	varchar(50)	NO		NULL	

Image: *Schema for author table*

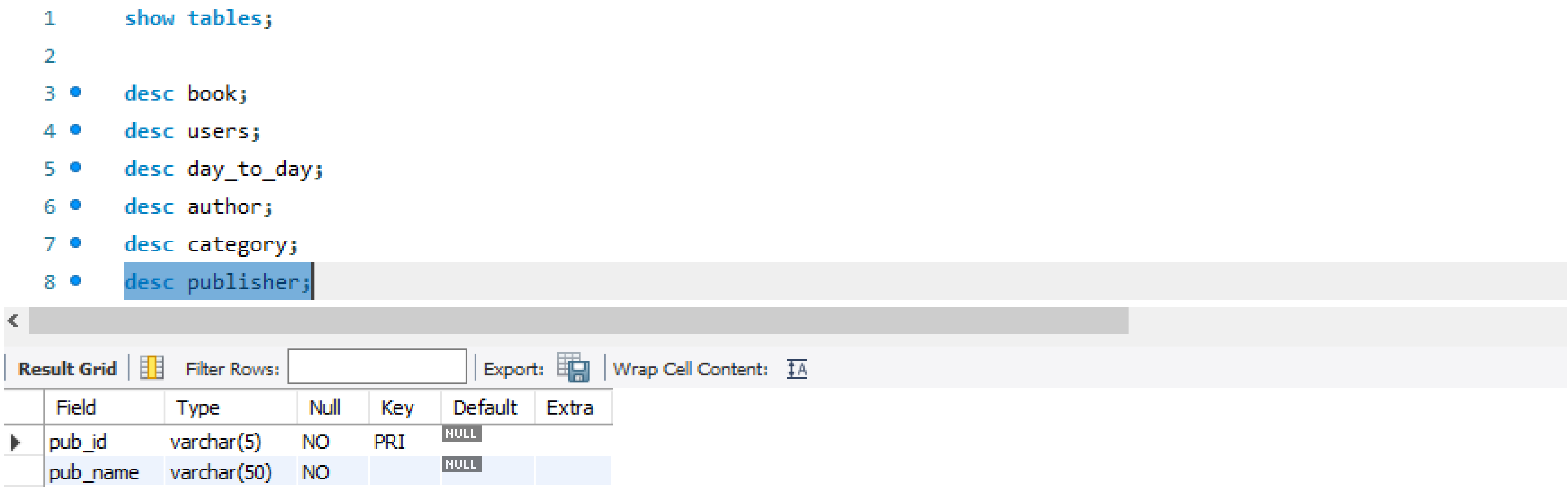


```
show tables;

desc book;
desc users;
desc day_to_day;
desc author;
desc category;
desc publisher;
```

Field	Type	Null	Key	Default	Extra
cat_id	varchar(5)	NO	PRI	NULL	
cat_name	varchar(50)	NO		NULL	

Image: *Schema for category table*



```
show tables;

desc book;
desc users;
desc day_to_day;
desc author;
desc category;
desc publisher;
```

Field	Type	Null	Key	Default	Extra
pub_id	varchar(5)	NO	PRI	NULL	
pub_name	varchar(50)	NO		NULL	

Image: *Schema for publisher table*