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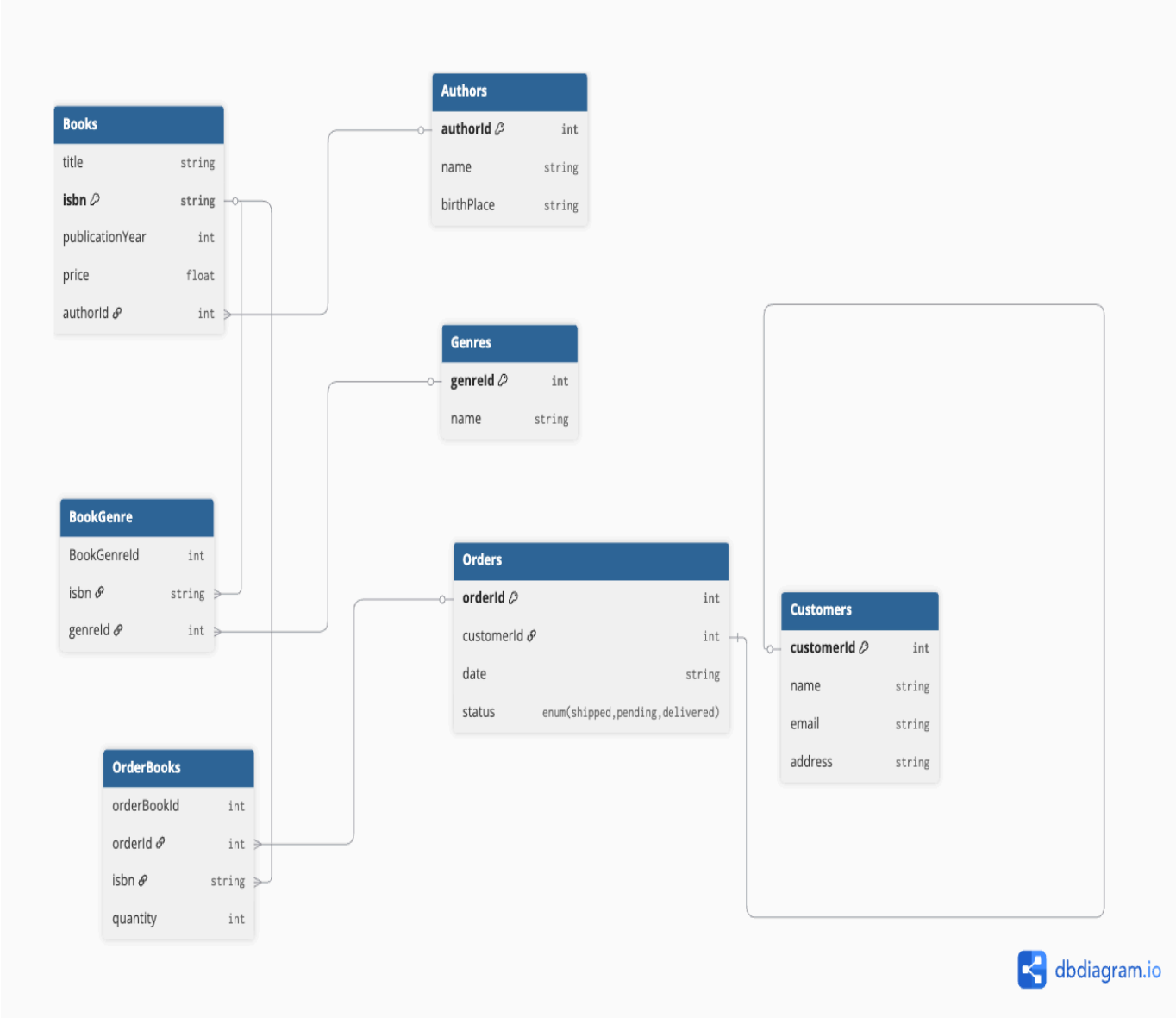
QAP1 Database

Schema diagram showing tables and their relationships



NOTE:

- Primary Key is indicated with a key-like icon and bold text e.g; isbn in Books table
- Foreign Key is indicated with a link-like icon e.g; authorId in Books table

Normalization

Description of how each table meets 1NF, 2NF and 3NF

Books

- **1NF**: Each column and row are unique.
- **2NF**: All columns depend on “isbn” as Primary Key. No partial dependency.
- **3NF**: No transitive dependency. Each book belongs to multiple genre is defined in its own table “BookGenre” and authorId links the 1:1 relationship of Book and Author. Title, publicationYear, price are attributes of books only. authorId is a foreign key

Authors

- **INF**: Each column and row are unique.
- **2NF**: No partial dependency. All columns depend on “authorId” as Primary key.
- **3NF**: No transitive dependency. Name and birthplace are attributes of author only.

Genres

- **INF**: Each row and column is unique.
- **2NF**: It has a primary key ‘genreId’. No partial dependencies.
- **3NF**: No transitive dependencies. Attribute name belongs to genre table.

BookGenre (Juncture Table for M:M between Books and Genres)

- **1NF:** Each column row is unique.
- **2NF:** All non-key attributes depend on the primary key “`BookGenreId`”. No partial dependencies.
- **3NF:** No transitive dependencies. The table only stores the relationship between books and genres.

Customers

- **INF**: Each row and column is unique.
- **2NF**: It has a primary key ‘customerId’. No partial dependencies.
- **3NF**: No transitive dependencies. All non- key attributes(“name”, “email”, “address") belongs to customers table.

Orders

- **INF**: Each row and column is unique.
- **2NF**: No partial dependencies.
- **3NF**: No transitive dependencies. All non- key attributes(“date”, “status”) belongs to orders table. “customerId” is a foreign key which points to customers table.

OrderBook

- **INF**: Each row and column is unique.
- **2NF**: All non-key attributes depend fully on the primary key orderBookId. No partial dependencies.
- **3NF**: No transitive dependencies. orderId and isbn are foreign keys linking to Orders and Books, and quantity describes only the number of copies of a specific book in a specific order.

Relationship

1. **Books and Authors**: Books and Authors have a *one to one* relationship because each book has a single author. It is referenced in the Book table with authorId(“Authors.authorId”).
2. **Books and Genres**: Books and Genres have *many to many* relationship because each book can belong to many genres and each genre can contain many books. Hence, it has a junction table to better fit into 3NF.

   Table BookGenre

BookGenreId	int	
isbn (Foreign Key)	string	Ref: > Books.isbn
genreId (Foreign key)	int	Ref: > Genres.genreId

3. **Orders and Books**: Orders and Books have a *many to many* relationship because an order can contain multiple books and a book may appear in multiple orders. The quantity is the number of copies of the book in the order. They both have a juncture table named “OrderBooks”

   Table OrderBooks

orderBookId	int	
orderId(Foreign Key)	int	Ref: > Orders.orderId
isbn(Foreign Key)	string	Ref: > Book.isbn
quantity	int	

4. **Customers and Orders**: Customers and Orders have a *one to many* relationship because s customer can place many orders and each order is placed by a single customer. The customerId is a foreign key in Orders table that references the customer who placed the order.

Benefits of using a database

A bookstore would use a database to reduce data redundancy by storing information (e.g., authors, customers) once and linking it across records, ensuring accuracy and consistency. It improves efficiency by enabling fast searches, easy tracking of inventory, and quick access to customer and order details. Databases also scale as the store grows, supporting large volumes of data and multiple users. They provide strong data integrity and security through validation rules and access controls, while offering backup and recovery options to protect against data loss. In addition, concurrency support allows many staff members to work at once without issues. Advanced features such as sales reports, low-stock alerts, and personalized recommendations further enhance operations and customer experience.