

# INTRODUCTION TO **SQL**

Jasmin Ludolf

# Goals

- 1 Understand databases and their structure
- 2 Extract information from databases using SQL

# Structured Query Language (SQL)

Access



# Structured Query Language (SQL)

Organize

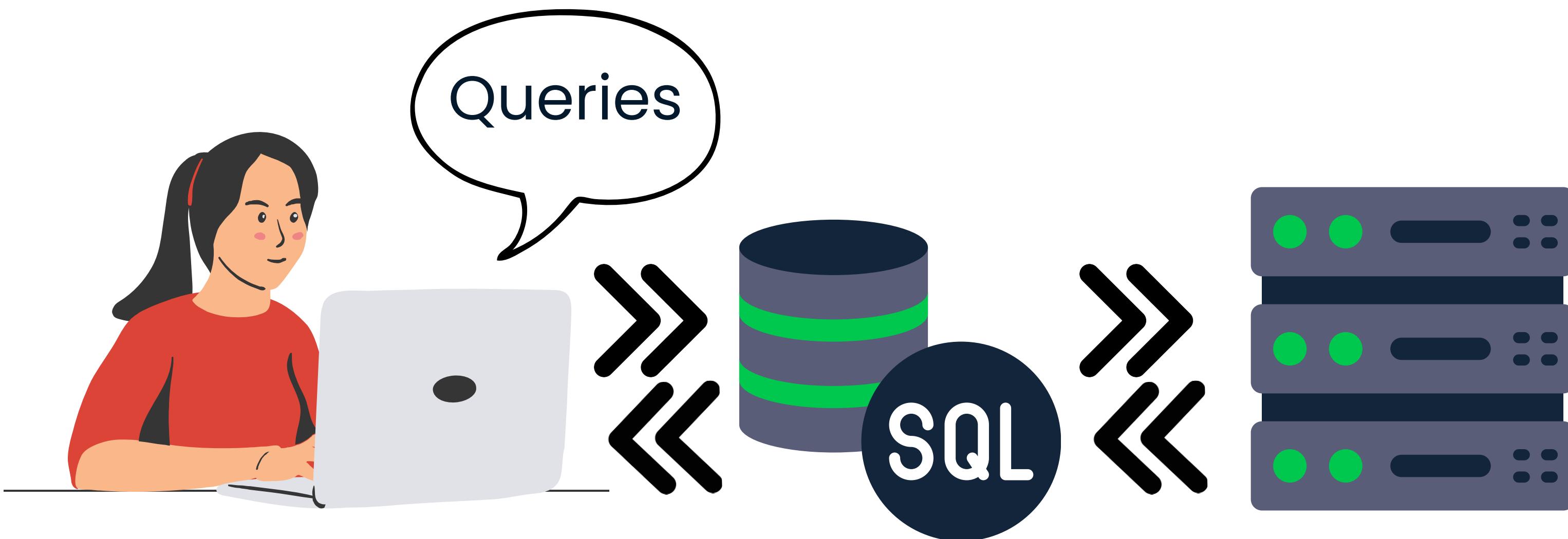


# Structured Query Language (SQL)

Analyze



# Structured Query Language (SQL)





# Database

## checkouts

id	start_date	due_date	card_num	book_id
23359	2024-05-11	2024-05-25	54378	547
23360	2024-05-12	2024-05-26	94722	156
23361	2024-05-12	2024-05-26	45783	912
23362	2024-05-13	2024-05-27	90123	838

## books

id	title	author	genre	pub_year
838	Being Mortal	Atul Gawande	Non-Fiction	2015
912	Educated	Tara Westover	Non-Fiction	2018
547	Segment of One	Michael Grigsby	Fiction	2022
156	Where the Wild Things Are	Maurice Sendak	Childrens	1963

## patrons

card_num	name	member_year	total_fine
54378	Izzy	2012	9.86
94722	Maham	2020	0
45783	Jasmin	2022	2.05
90123	James	1989	0



Powerful



Secure

## patrons

card_num	name	member_year	total_fine
54378	Izzy	2012	9.86
94722	Maham	2020	0
45783	Jasmin	2022	2.05
90123	James	1989	0

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54378	Izzy	2012	9.86
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45783	Jasmin	2022	2.05
90123	James	1989	0

## patrons

rows →

columns

card_num	name	member_year	total_fine
54378	Izzy	2012	9.86
94722	Maham	2020	0
45783	Jasmin	2022	2.05
90123	James	1989	0

Rows contain individual data

patrons

rows →

columns

card_num	name	member_year	total_fine
54378	Izzy	2012	9.86
94722	Maham	2020	0
45783	Jasmin	2022	2.05
90123	James	1989	0

Columns describe specific data

patrons

rows →

columns

card_num	name	member_year	total_fine
54378	Izzy	2012	9.86
94722	Maham	2020	0
45783	Jasmin	2022	2.05
90123	James	1989	0

Row for each patron

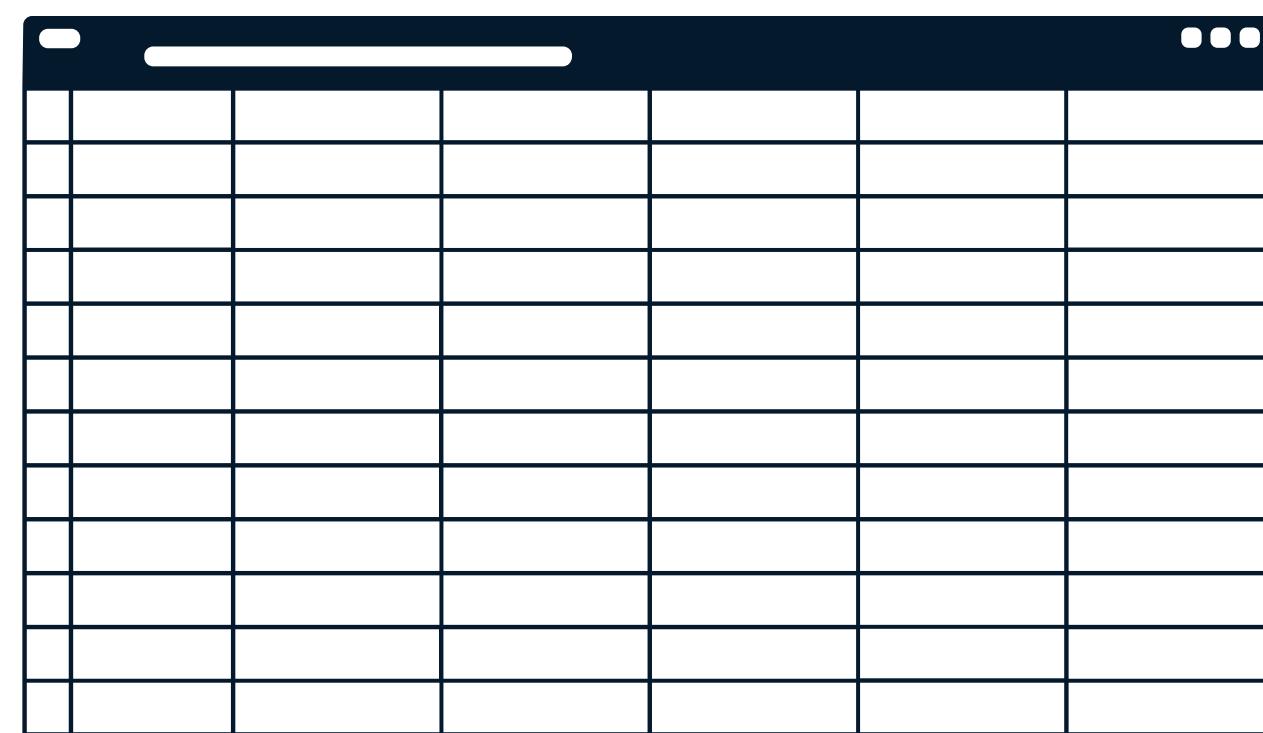
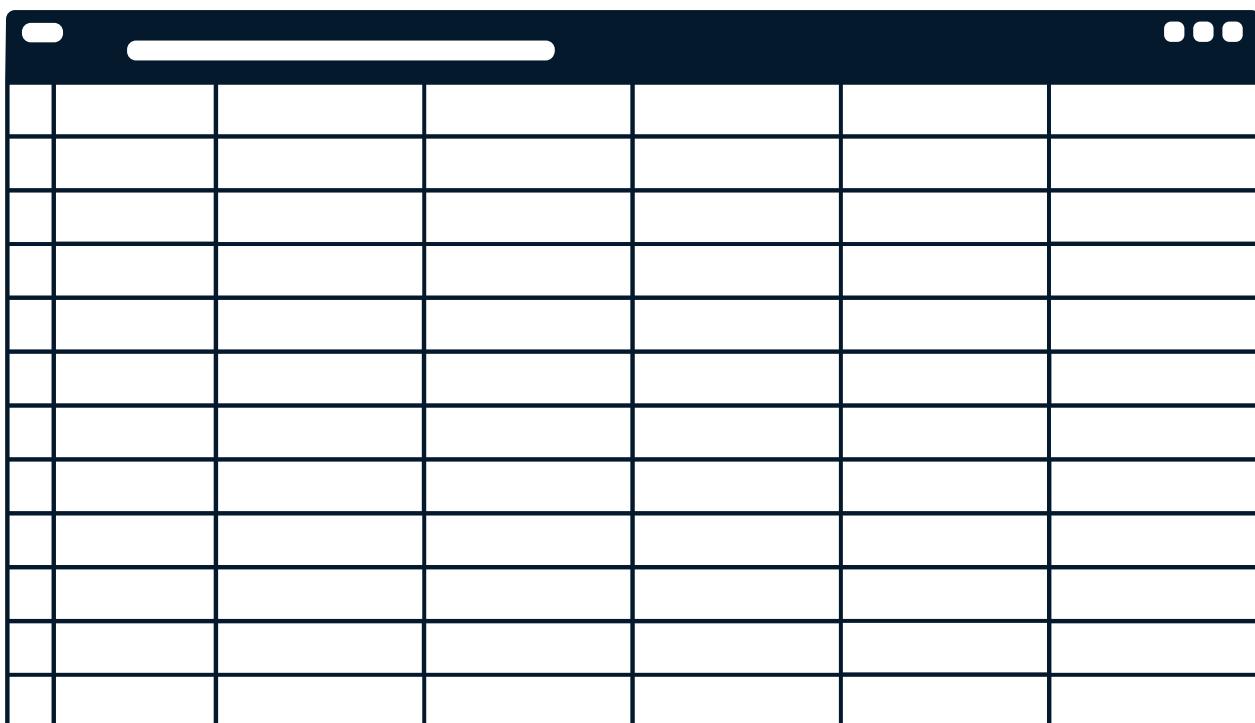
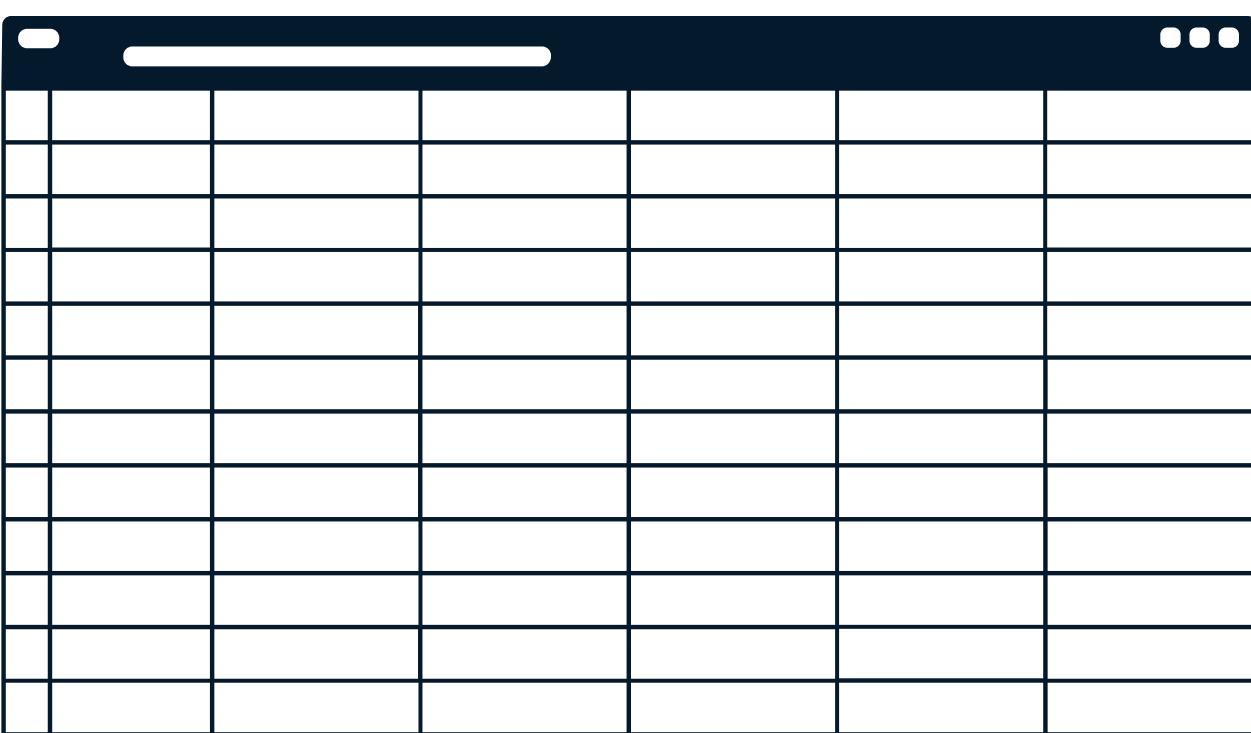
patrons

rows →

columns

card_num	name	member_year	total_fine
54378	Izzy	2012	9.86
94722	Maham	2020	0
45783	Jasmin	2022	2.05
90123	James	1989	0

Column for the year each patron joined



## checkouts

id	start_date	due_date	card_num	book_id
23359	2024-05-11	2024-05-25	54378	547
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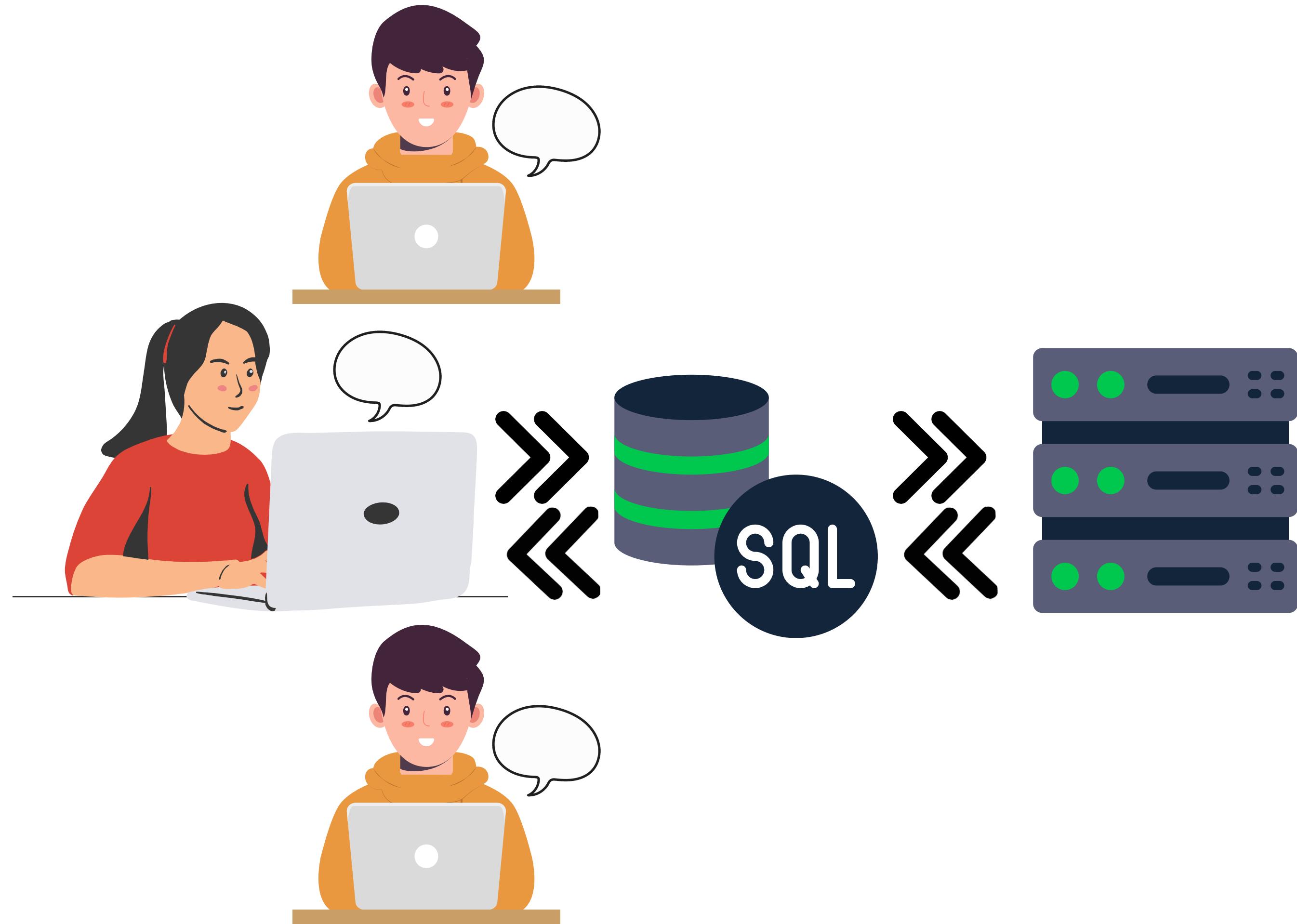
books

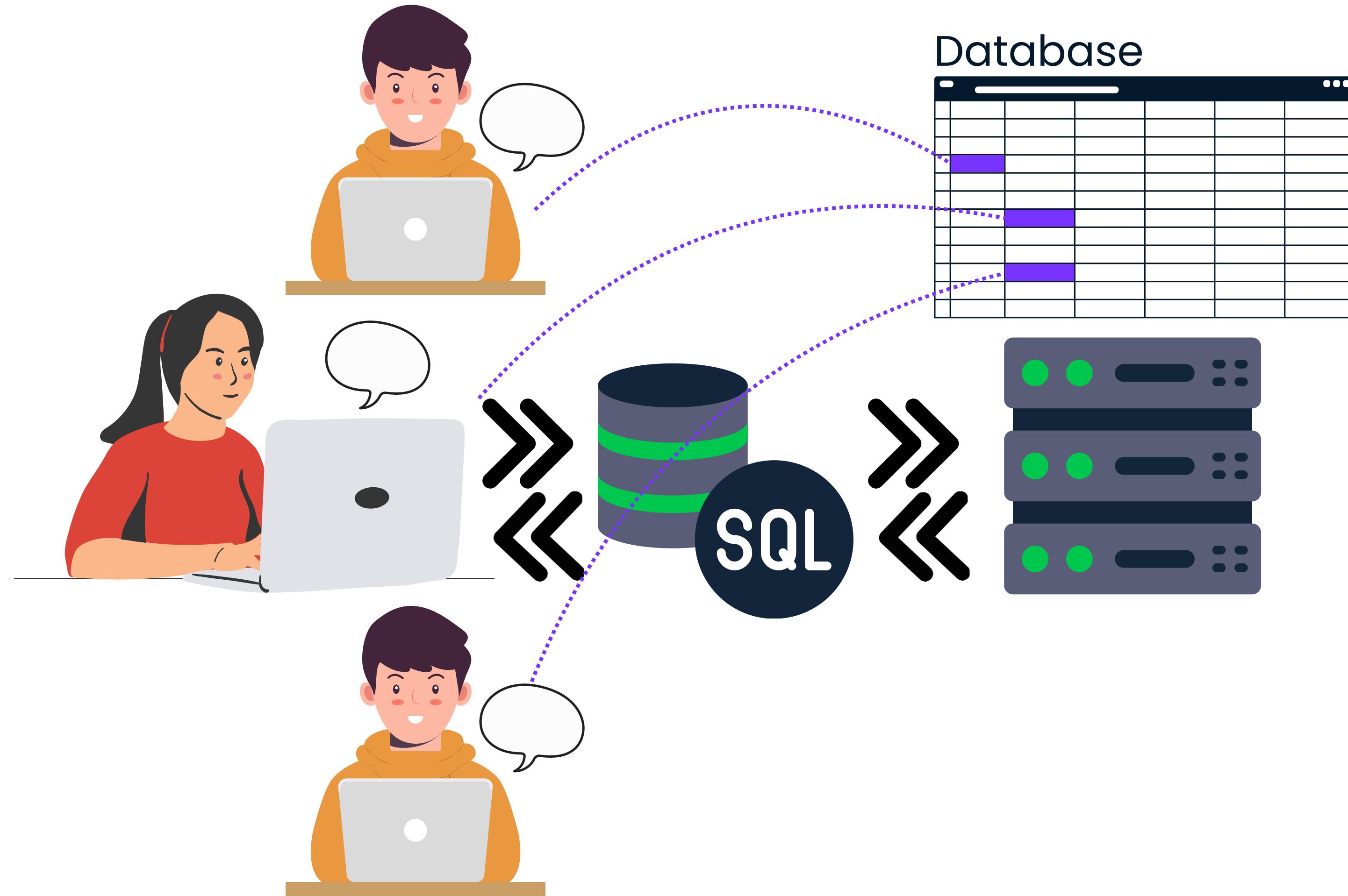
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912	Educated	Tara Westover	Non-Fiction	2018
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patrons

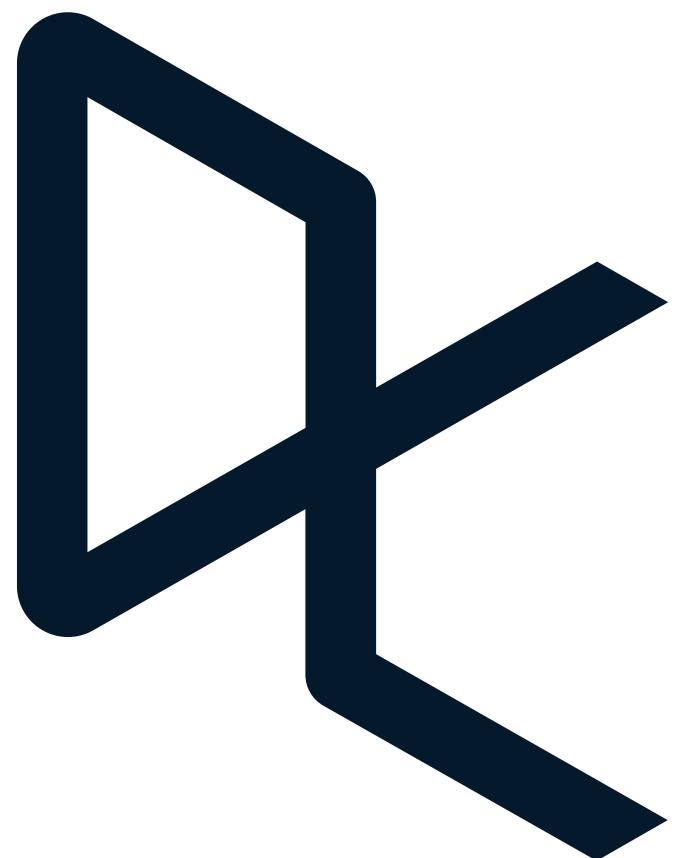
card_num	name	member_year	total_fine
54378	Izzy	2012	9.86
94722	Maham	2020	0
45783	Jasmin	2022	2.05
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# LET'S PRACTICE!



# **TABLES**

## **INTRODUCTION TO SQL**

Jasmin Ludolf

# Table naming

- Clear
- Refer to the data

# Table naming

- Clear
- Refer to the data

inventory  
products  
books

# Table naming

- Clear
- Refer to the data
- Lowercase
- Underscores



inventory  
products  
books



Patrons  
Library patrons  
PATRONS

# Table naming

- Clear
- Refer to the data
- Lowercase
- Underscores



inventory  
products  
books



Patron  
Library patrons  
PATRONS

# patrons

rows →

columns ↓

card_num	name	member_year	total_fine
54378	Izzy	2012	9.86
94722	Maham	2020	0
45783	Jasmin	2022	2.05
90123	James	1989	0

## patrons

records →

fields

card_num	name	member_year	total_fine
54378	Izzy	2012	9.86
94722	Maham	2020	0
45783	Jasmin	2022	2.05
90123	James	1989	0



## patrons

	card_num	name	member_year	total_fine
1	54378	Izzy	2012	9.86
2	94722	Maham	2020	0
3	45783	Jasmin	2022	2.05
4	90123	James	1989	0



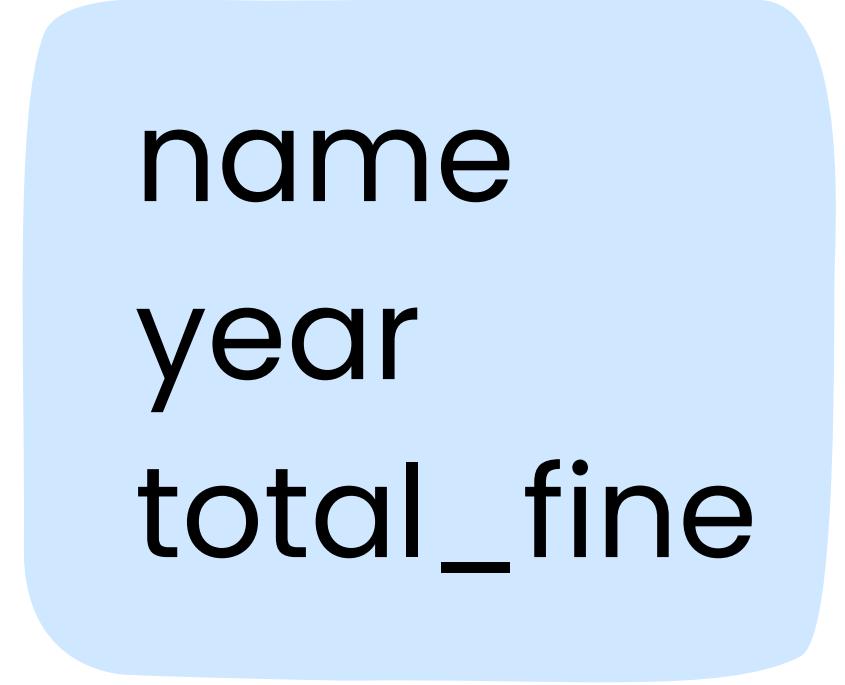
patrons



card_num	name	member_year	total_fine
54378	Izzy	2012	9.86
94722	Maham	2020	0
45783	Jasmin	2022	2.05
90123	James	1989	0

# Field naming

- Lowercase
- Use underscores



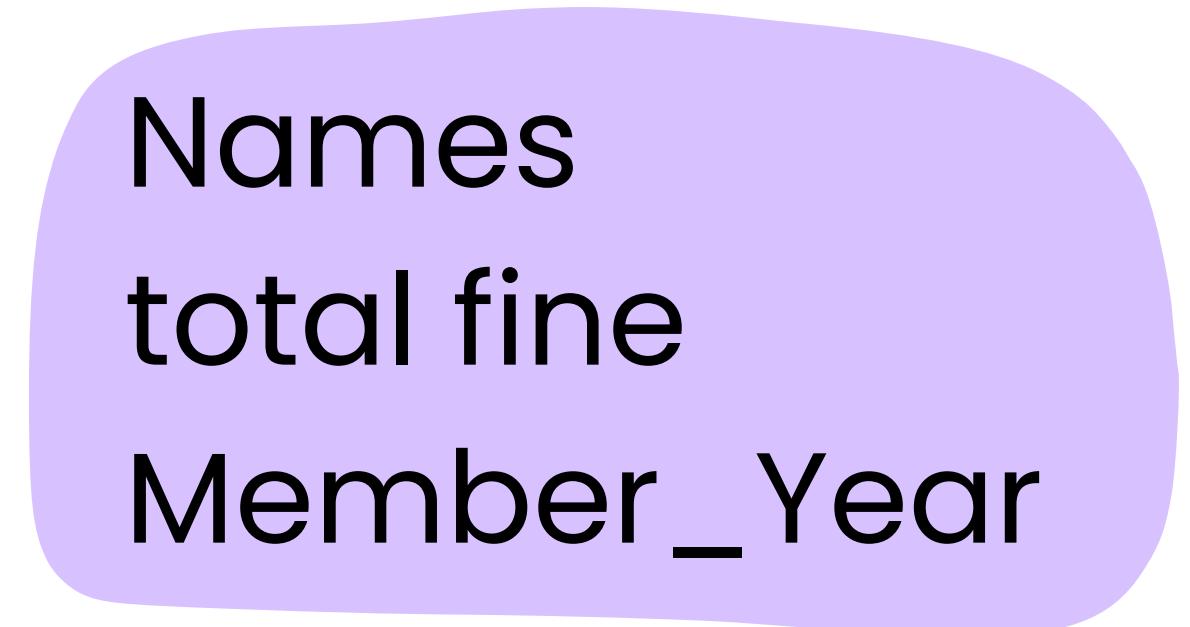
name  
year  
total\_fine

# Field naming

- Lowercase
- Use underscores
- Singular



name  
year  
total\_fine



Names  
total fine  
Member\_Year

# Field naming

- Lowercase
- Use underscores
- Singular
- Different to the table  
and other fields



name  
year  
total\_fine

A light blue rounded rectangular box contains the text "name", "year", and "total\_fine". A large green checkmark is drawn through the box.

Name  
total  
Member\_Year

A light purple rounded rectangular box contains the text "Name", "total", and "Member\_Year". A large red X is drawn through the box.

# Unique identifier (key)

patrons

card_num	name	member_year	total_fine
54378	Izzy	2012	9.86
94722	Maham	2020	0
45783	Jasmin	2022	2.05
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# Unique identifier (key)

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45783	Jasmin	2022	2.05
90123	James	1989	0

## checkouts

<b>id</b>	<b>start_date</b>	<b>due_date</b>	<b>card_num</b>	<b>book_id</b>
23359	2024-05-11	2024-05-25	54378	547
23360	2024-05-12	2024-05-26	54378	156
23361	2024-05-12	2024-05-26	45783	912
23362	2024-05-13	2024-05-27	90123	838

## patrons

<b>card_num</b>	<b>name</b>	<b>member_year</b>	<b>total_fine</b>
54378	Izzy	2012	9.86
94722	Maham	2020	0
45783	Jasmin	2022	2.05
90123	James	1989	0

## patron\_checkouts

card_num	name	member_year	total_fine	checkout_id	start_date	due_date	book_id
54378	Izzy	2012	9.86	23359	2024-05-11	2024-05-25	547
54378	Izzy	2012	9.86	23360	2024-05-11	2024-05-26	156
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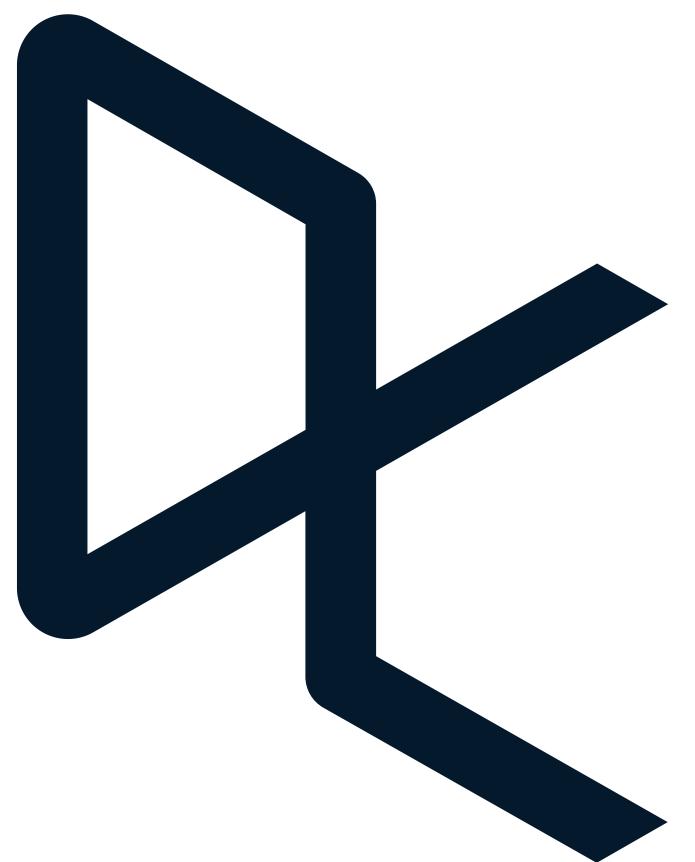
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90123	James	1989	0

# TIME TO PRACTICE!



# **DATA TYPES**

## **INTRODUCTION TO SQL**

Jasmin Ludolf

### checkouts

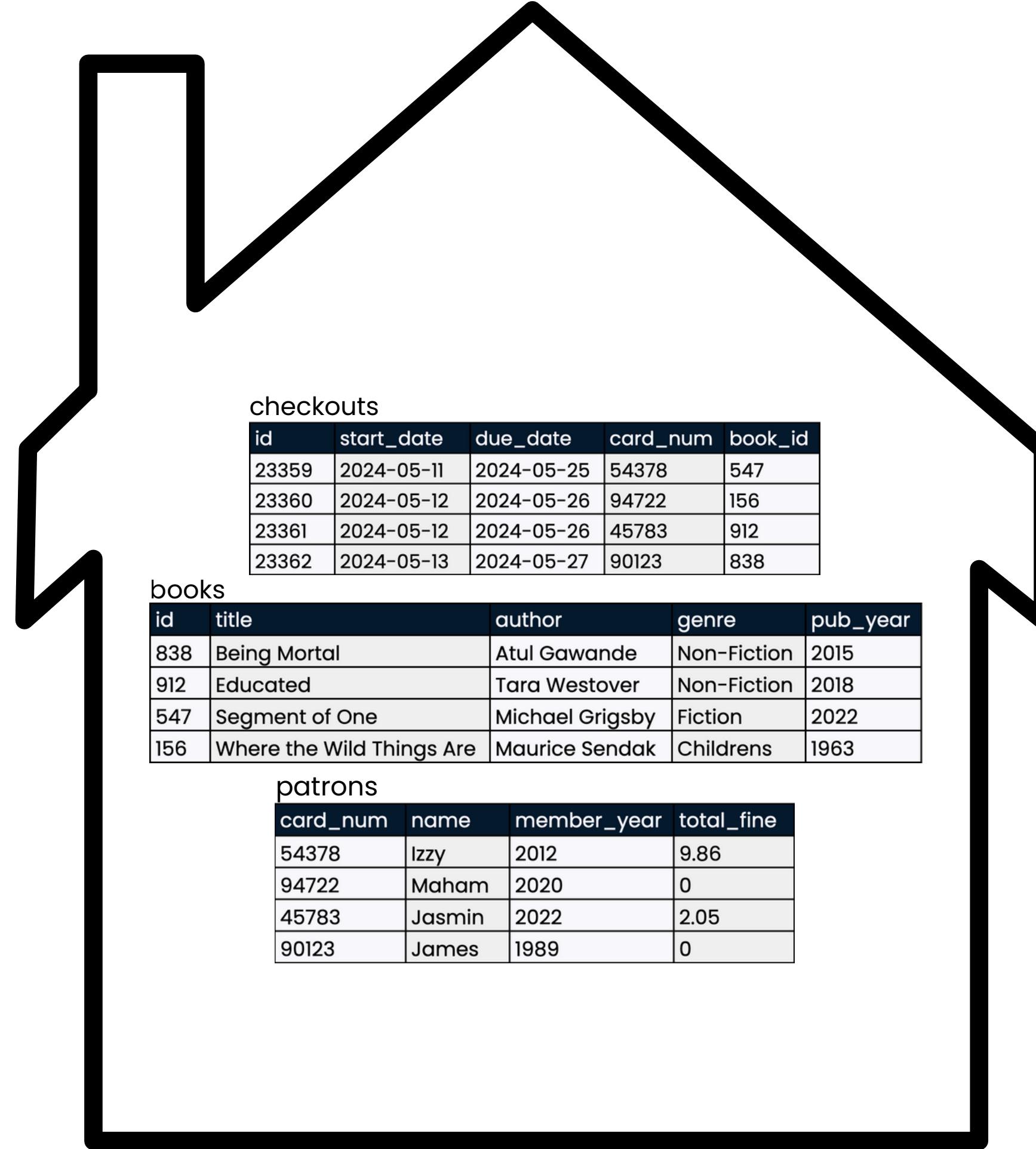
id	start_date	due_date	card_num	book_id
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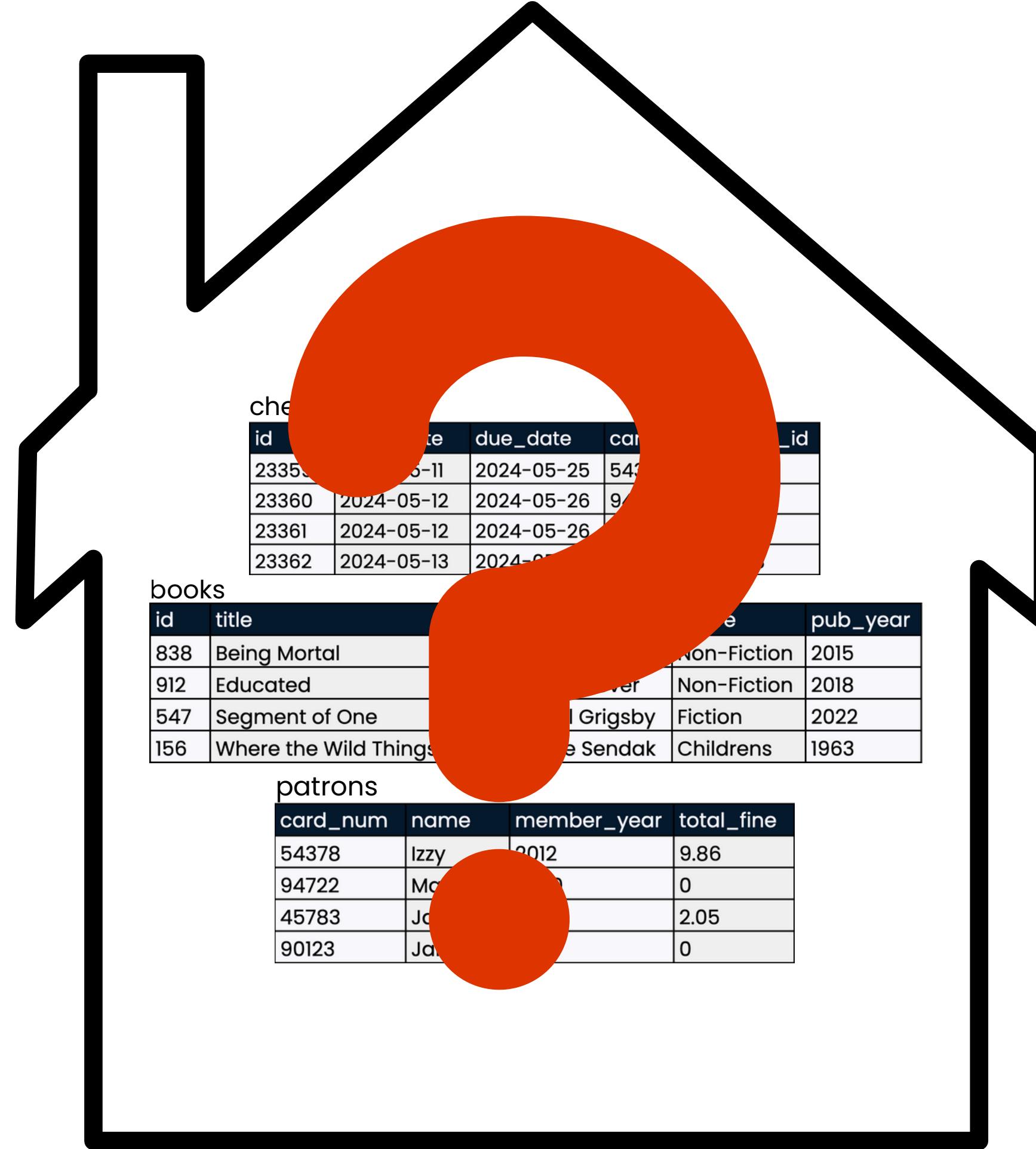
### books

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### patrons

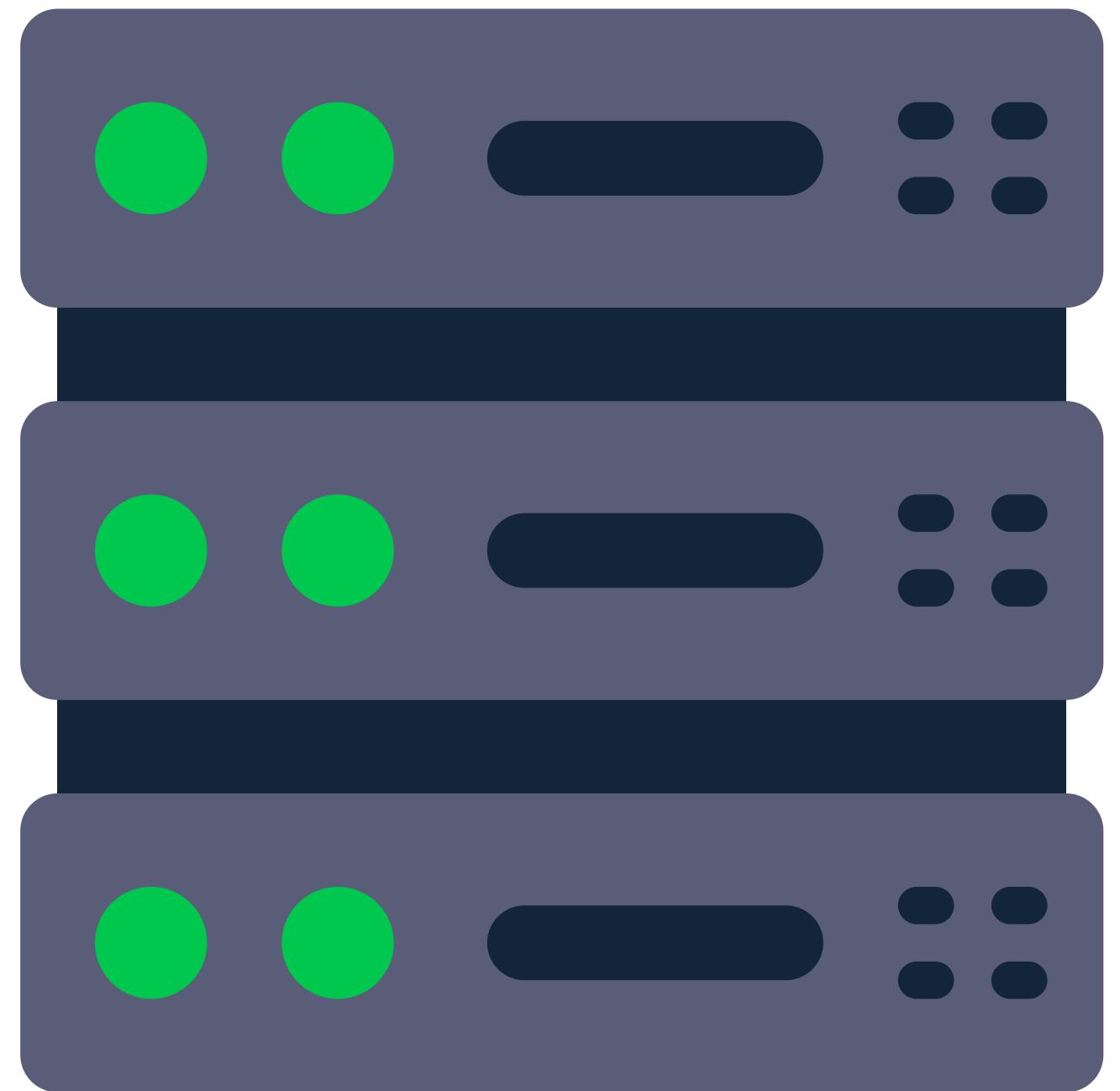
card_num	name	member_year	total_fine
54378	Izzy	2012	9.86
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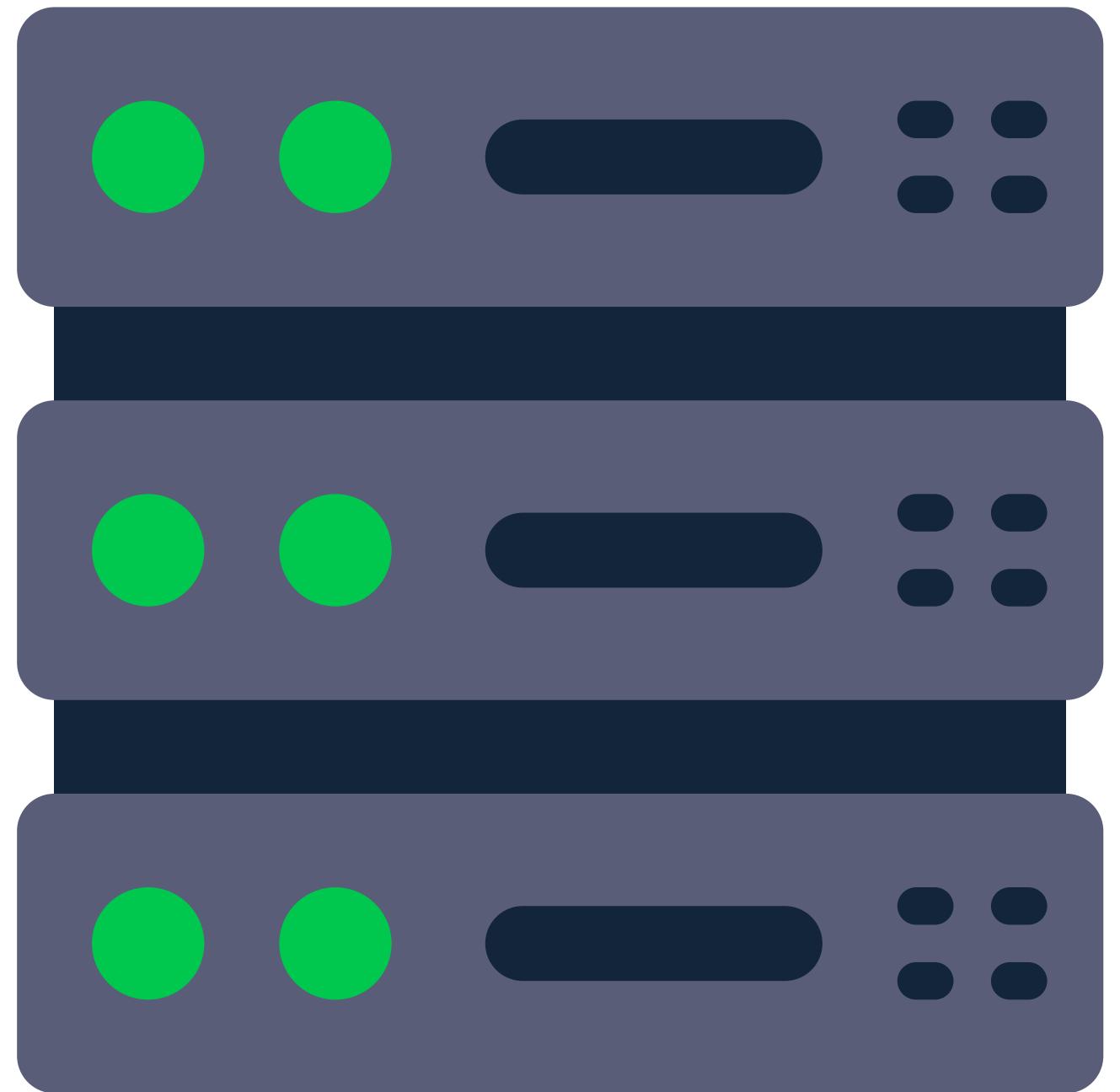




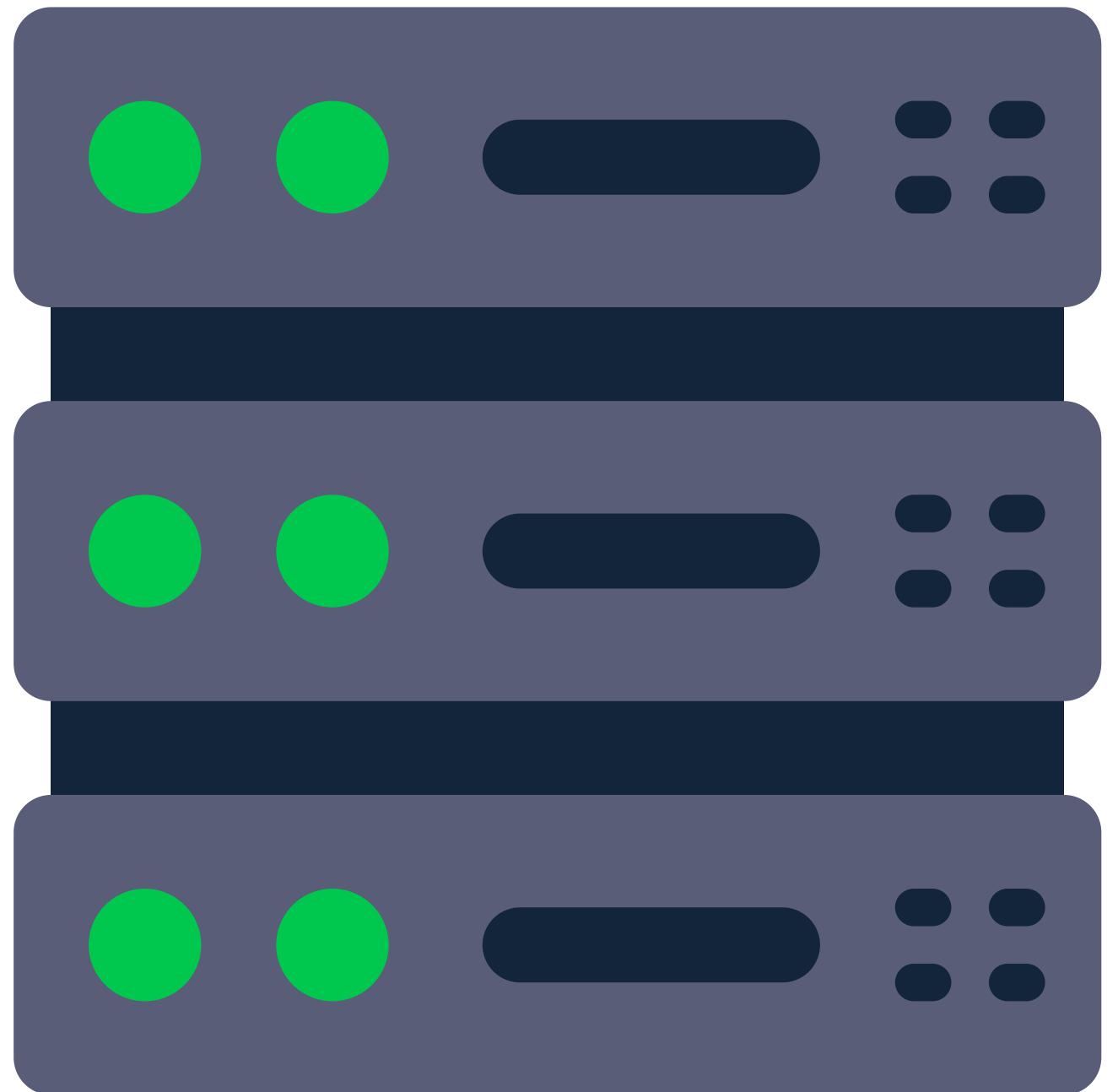




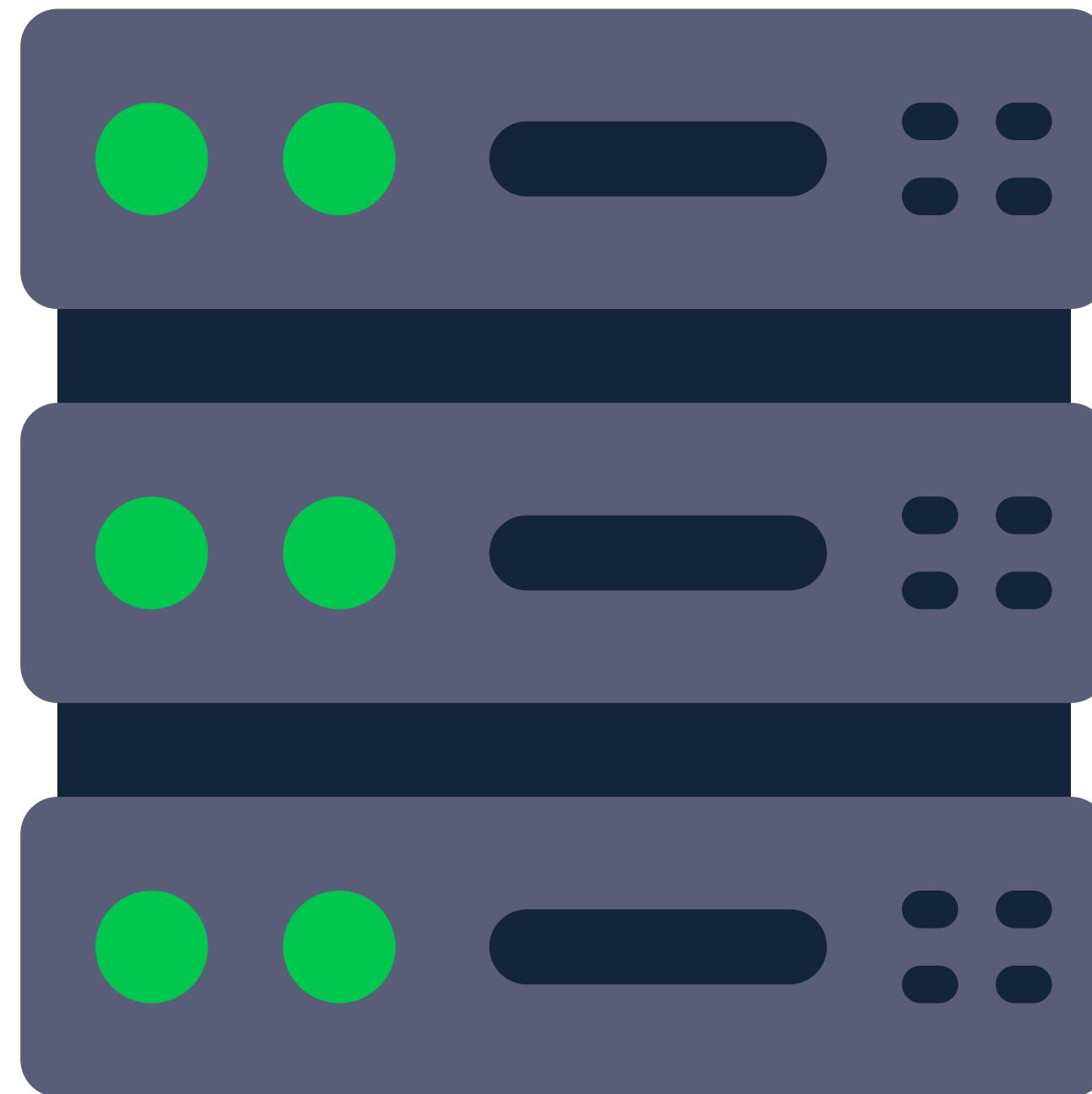
Powerful computers



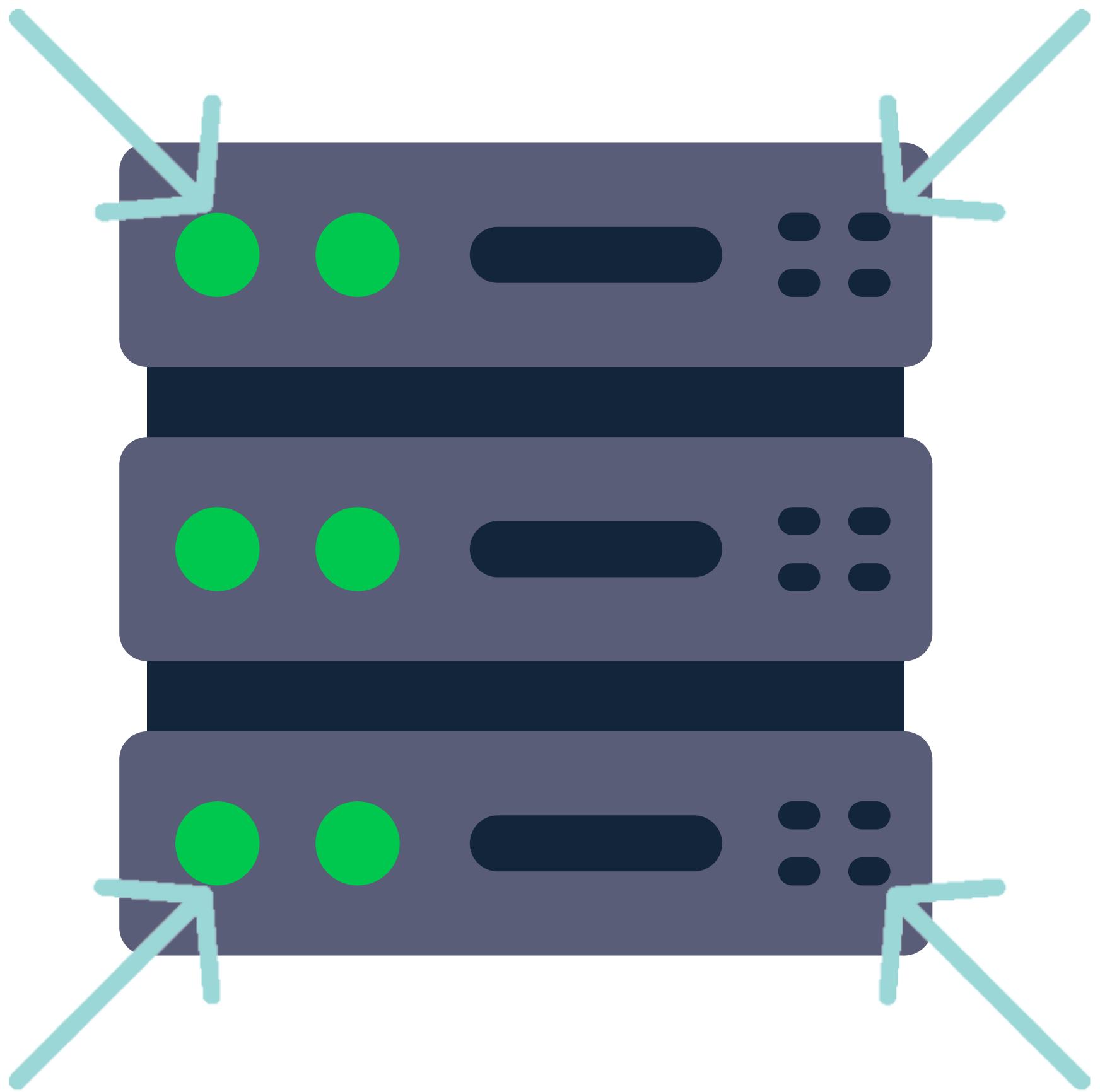
Store information



Perform services via  
network requests



Data access



card_num	name	member_year	total_fine
54378	Izzy	2012	9.86
94722	Maham	2020	0
45783	Jasmin	2022	2.05
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54378	Izzy	2012	9.86
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45783	Jasmin	2022	2.05
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Number

Text

Number

Number

card_num	name	member_year	total_fine
54378	Izzy	2012	9.86
94722	Maham	2020	0
45783	Jasmin	2022	2.05
90123	James	1989	0

$$2 \times 2 = 4$$

$$\text{Izzy} \times \text{Maham} = ?$$

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54378	Izzy	2012	9.86
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45783	Jasmin	2022	2.05
90123	James	1989	0

$2 \times 2 = 4$  

Izzy x Maham = ? 

# Strings

card_num	name	member_year	total_fine
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↓  
Text

# Strings

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54378	Izzy	2012	9.86
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↓  
String

# Strings

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54378	Izzy	2012	9.86
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String: James

# Strings

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VARCHAR

# Integers

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Whole numbers

# Integers

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INT

# FLOATS

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Fractional numbers

# FLOATS

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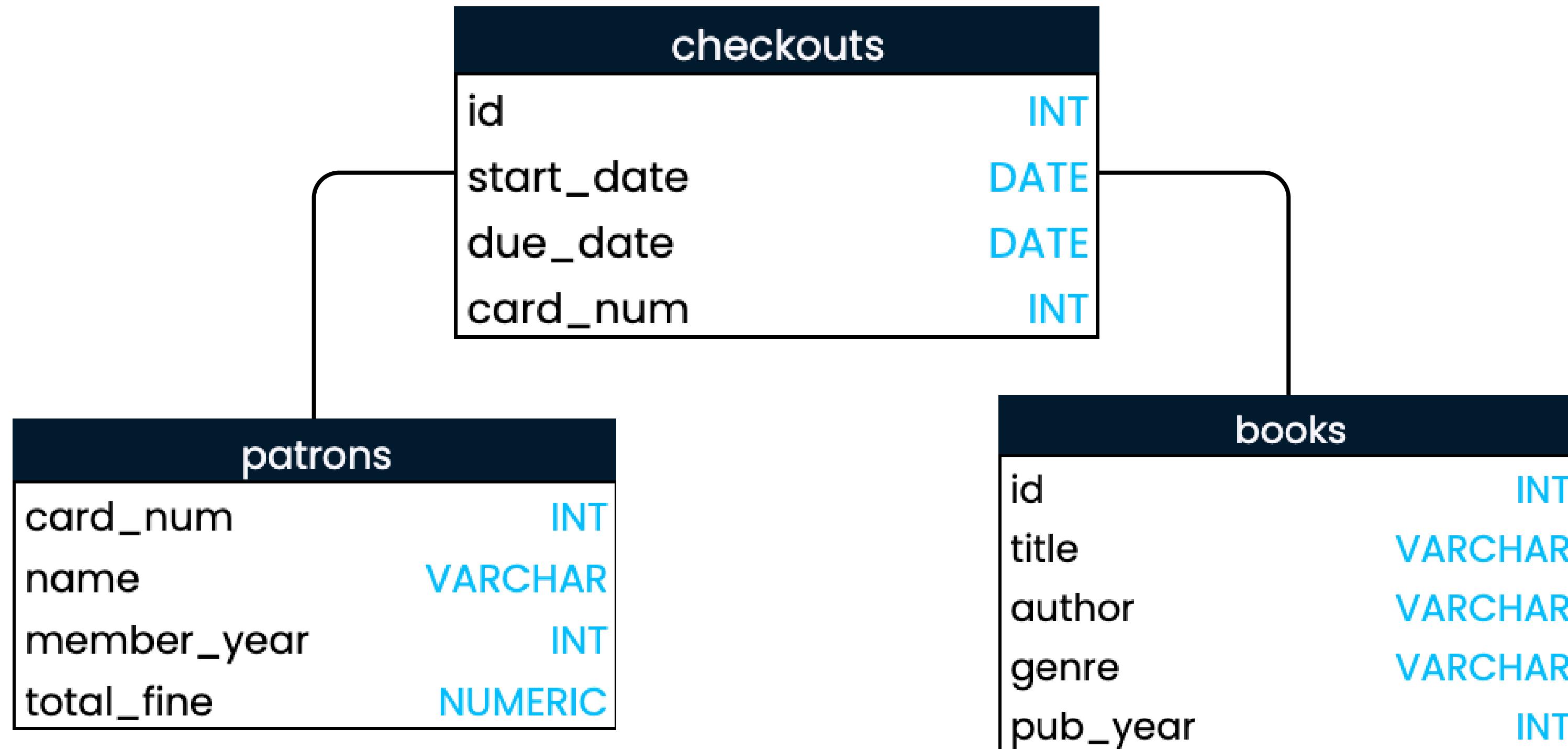
FLOATS

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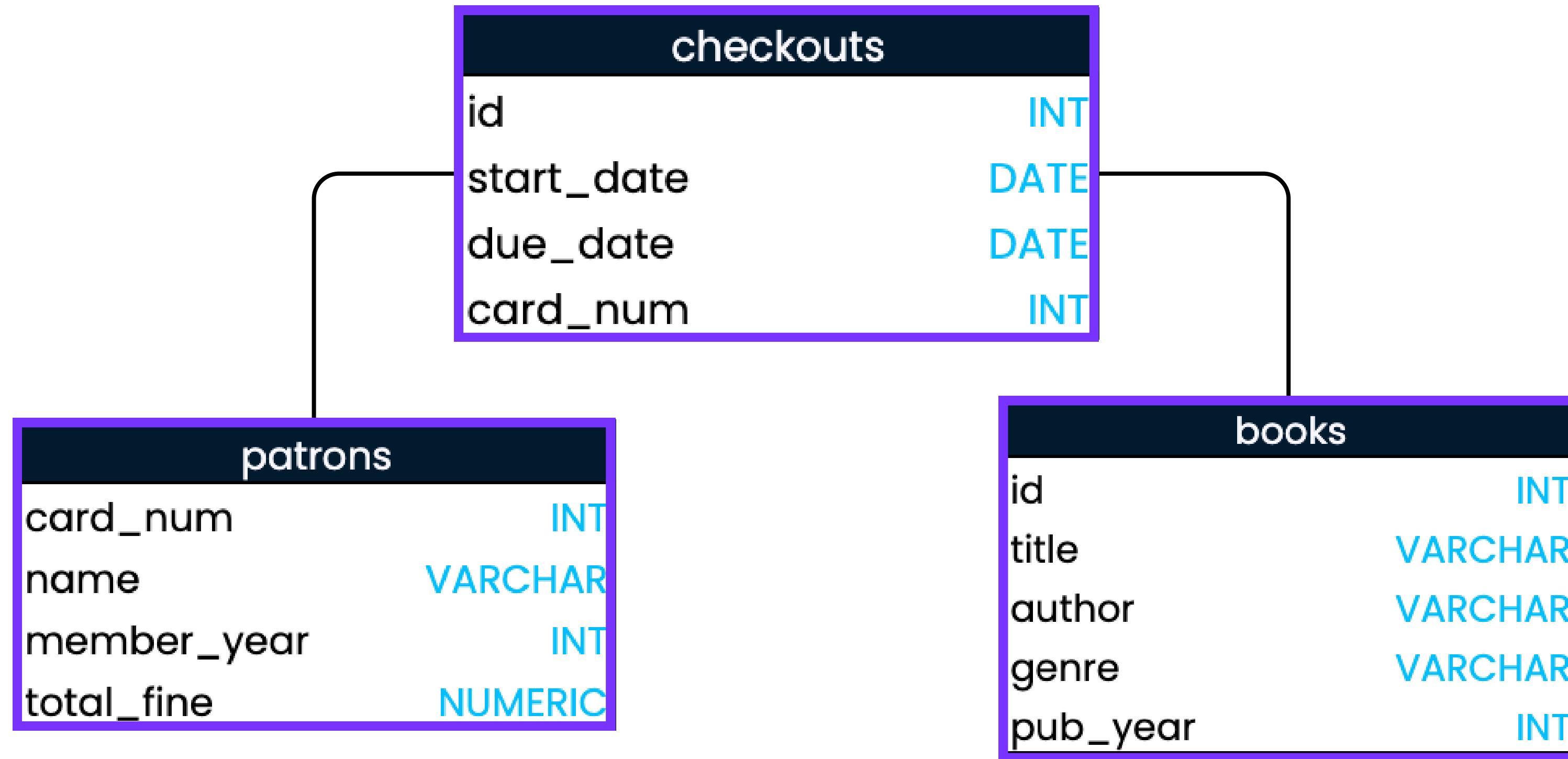
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NUMERIC

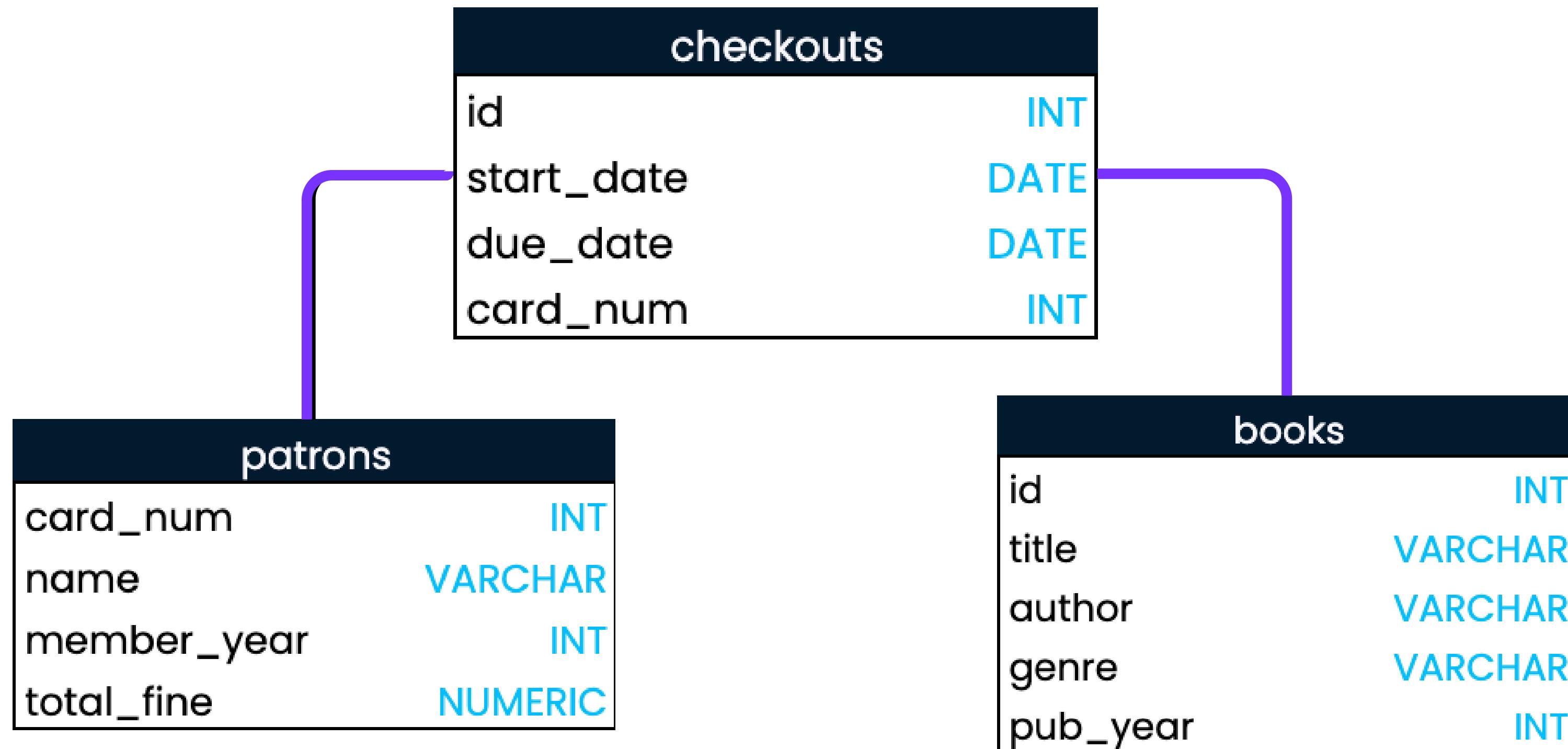
# Schema



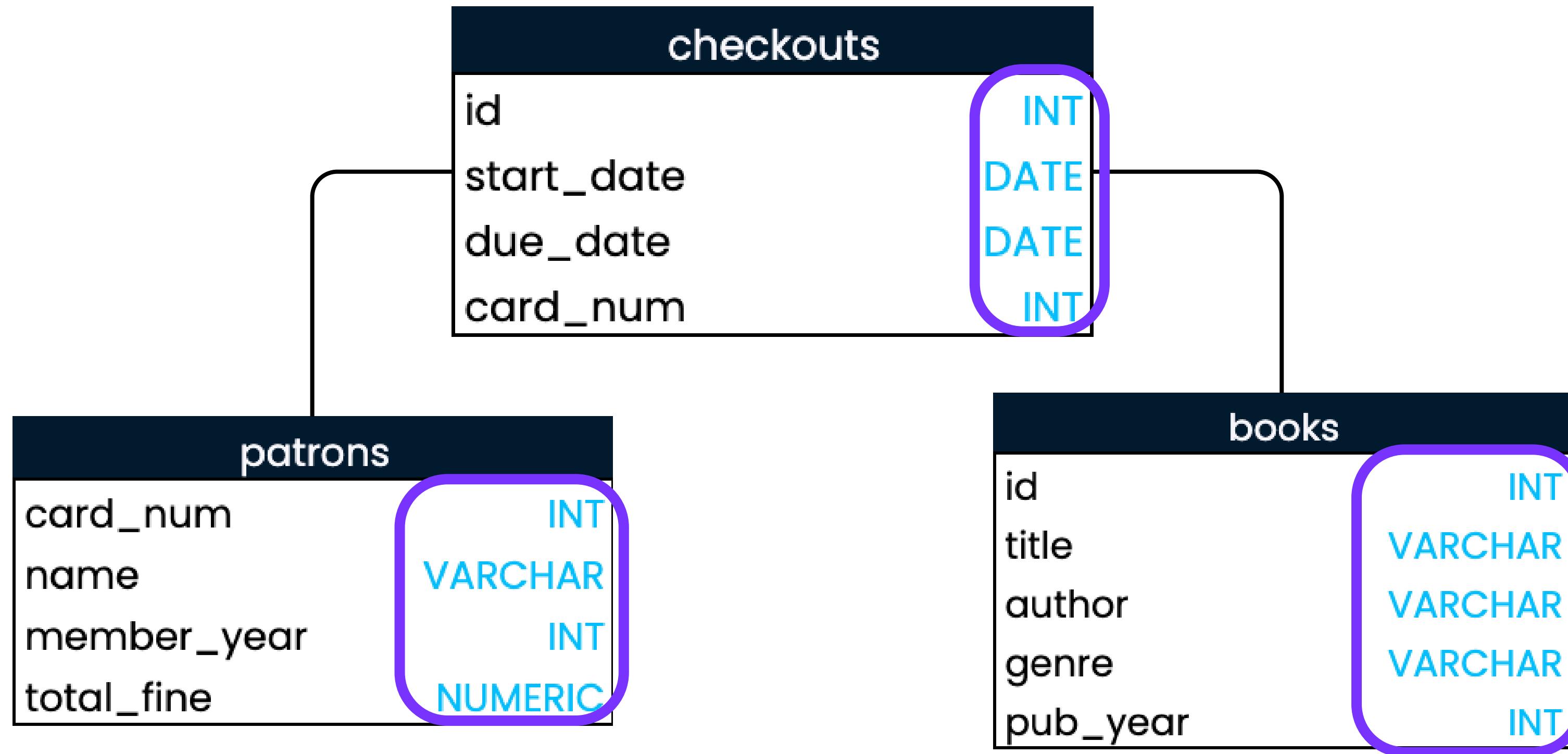
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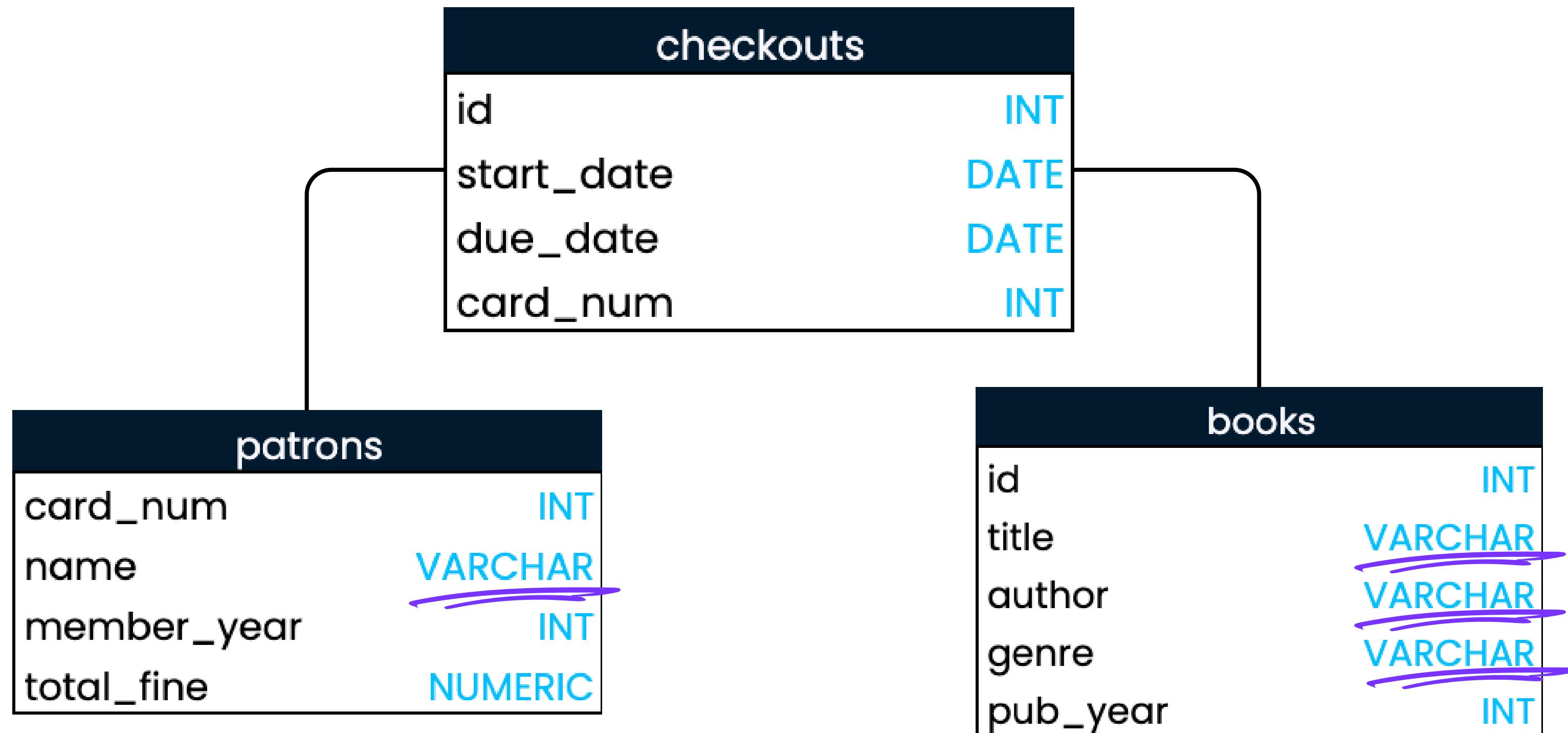
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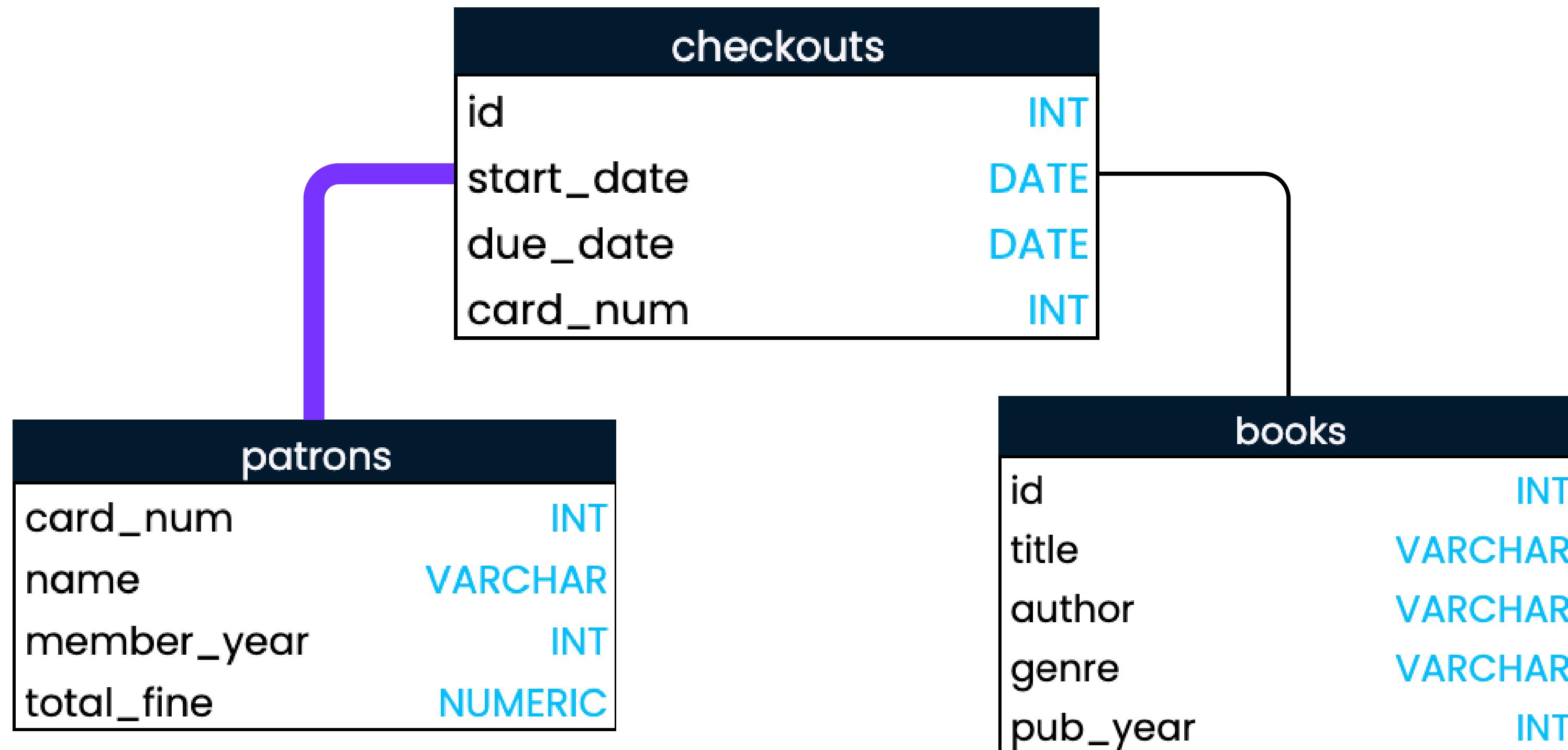
# Schema



# Schema



# Schema



# LET'S PRACTICE!

