

INTRODUCTION TO SQL

Jasmin Ludolf

Goals

- ➊ Understand databases and their structure
- ➋ Extract information from databases using SQL

Structured Query Language (SQL)

Access



Structured Query Language (SQL)

Organize

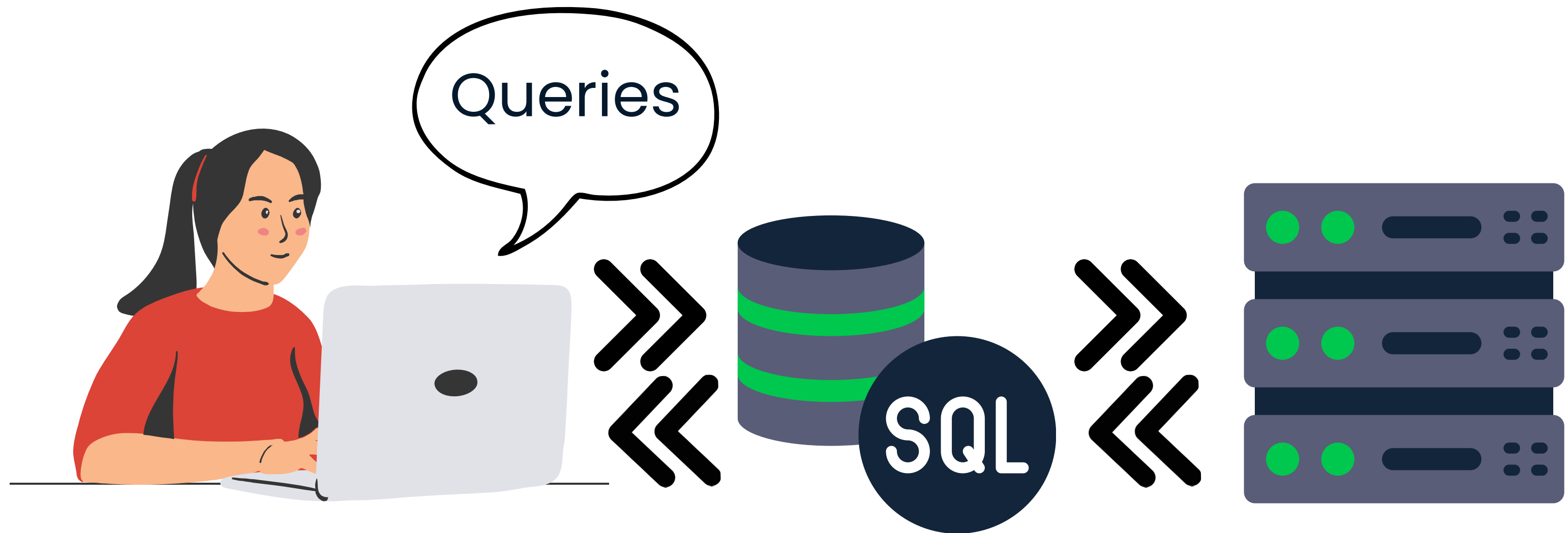


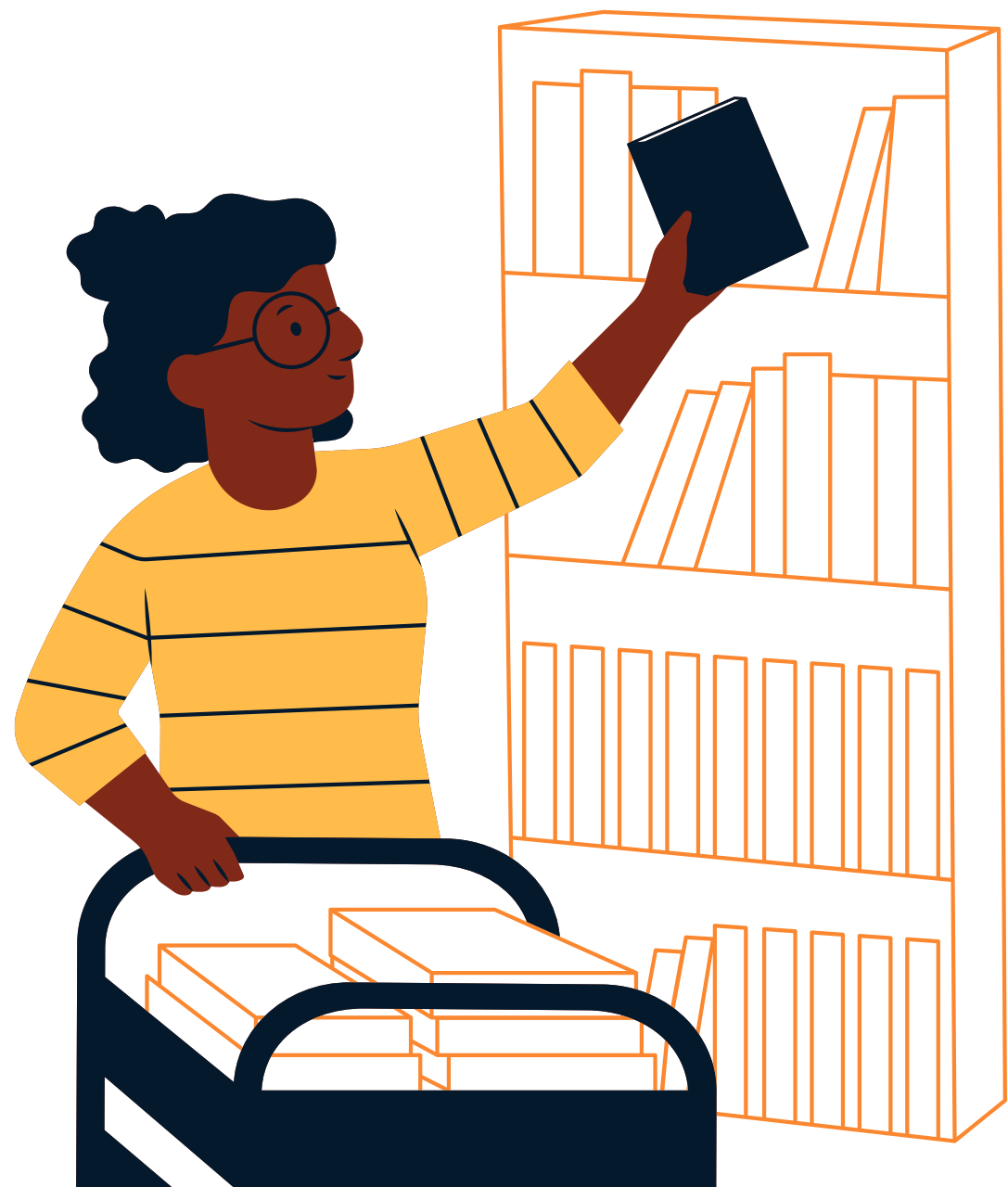
Structured Query Language (SQL)

Analyze



Structured Query Language (SQL)





Database

[illegible]

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

patrons

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patrons

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90123	James	1989	0

patrons

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patrons

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54378	Izzy	2012	9.86
94722	Maham	2020	0
45783	Jasmin	2022	2.05
90123	James	1989	0

patrons

columns



rows →

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

columns



rows →

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

columns



rows →

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

columns



rows →

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
23360	2024-05-12	2024-05-26	94722	156
23361	2024-05-12	2024-05-26	45783	912
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books

id	title	author	genre	pub_year
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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

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checkouts

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23362	2024-05-13	2024-05-27	90123	838

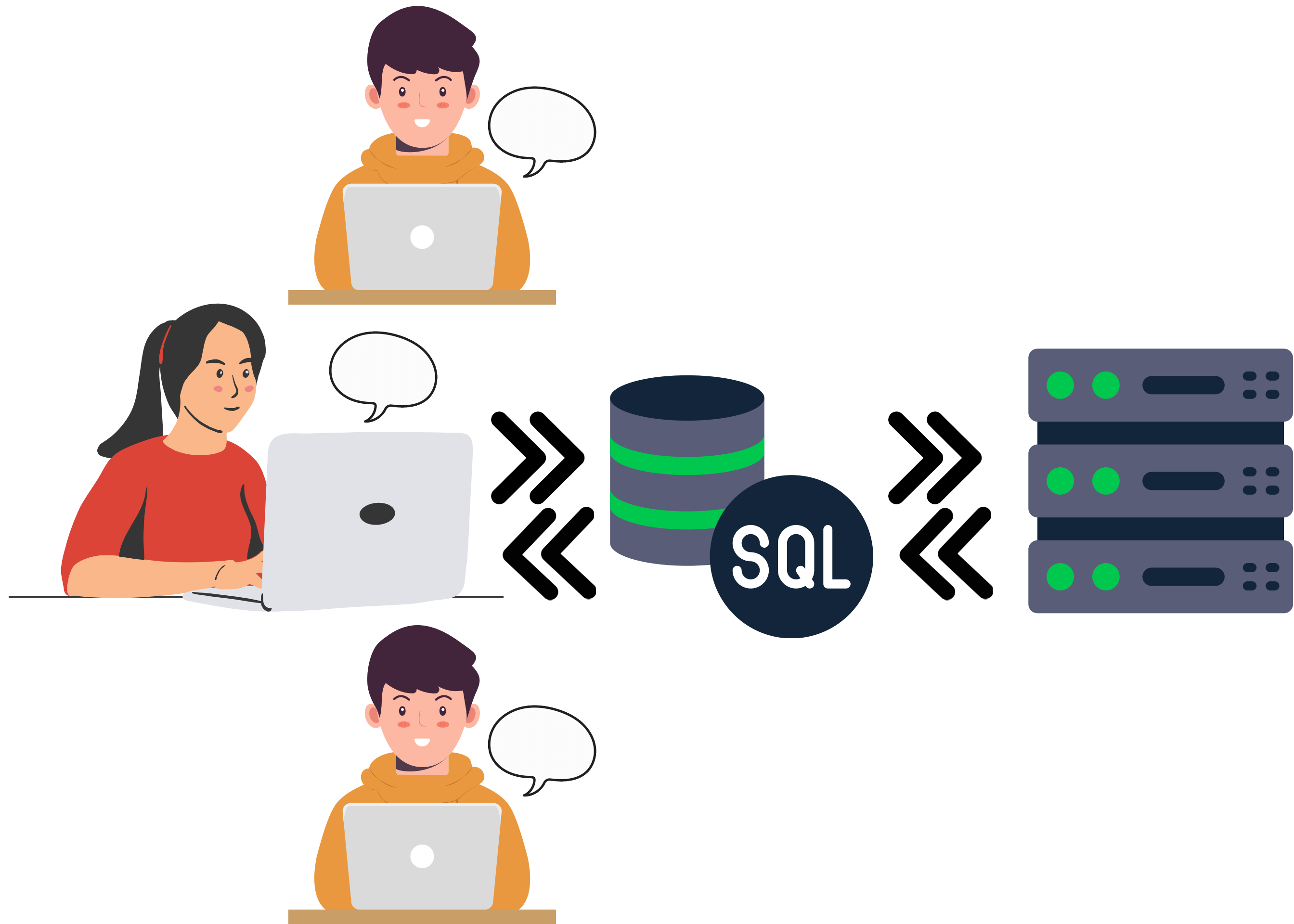
books

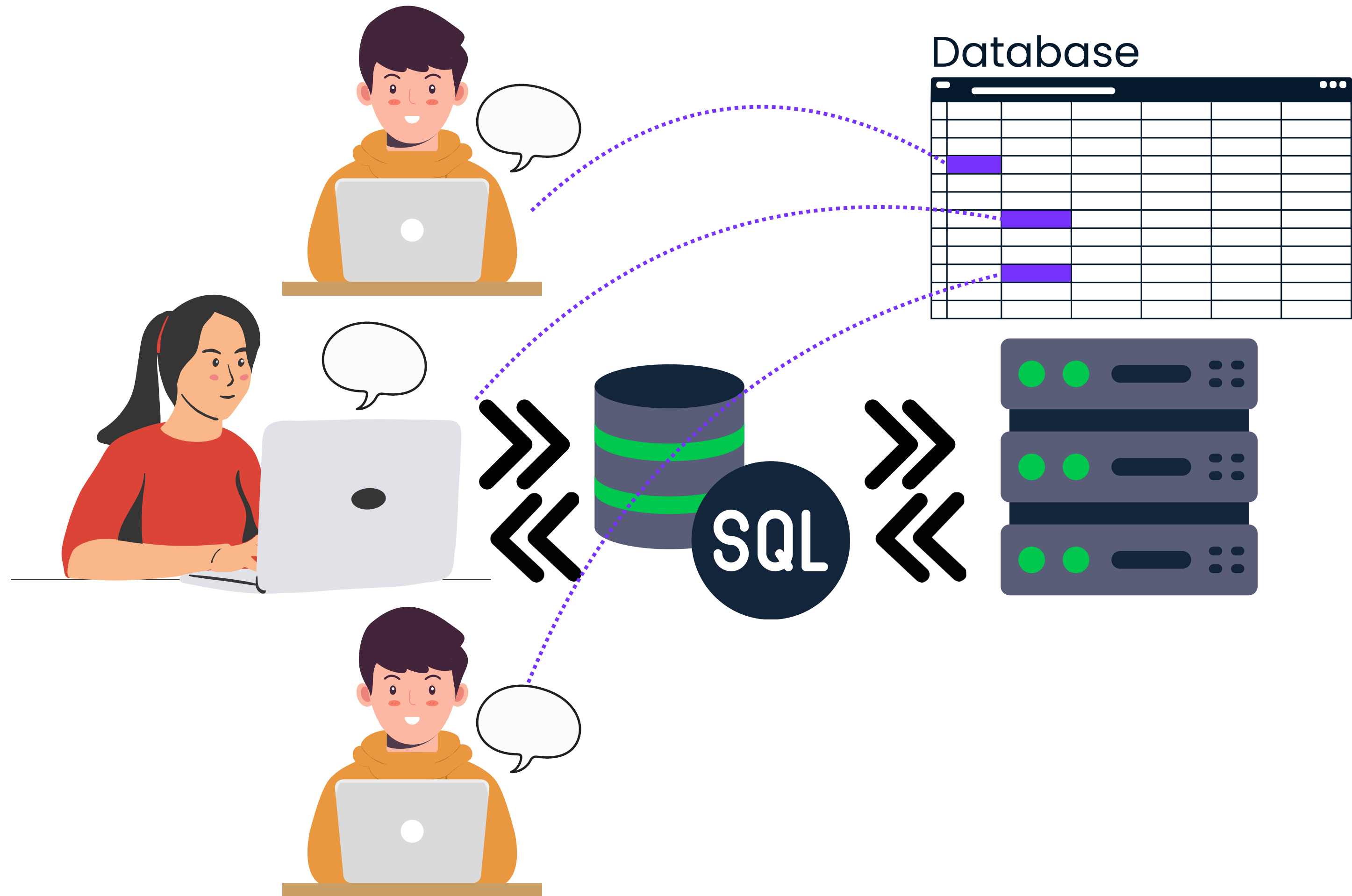
id	title	author	genre	pub_year
838	Being Mortal	Atul Gawande	Non-Fiction	2015
912	Educated	Tara Westover	Non-Fiction	2018
547	Segment of One	Michael Grigsby	Fiction	2022
156	Where the Wild Things Are	Maurice Sendak	Childrens	1963

patrons

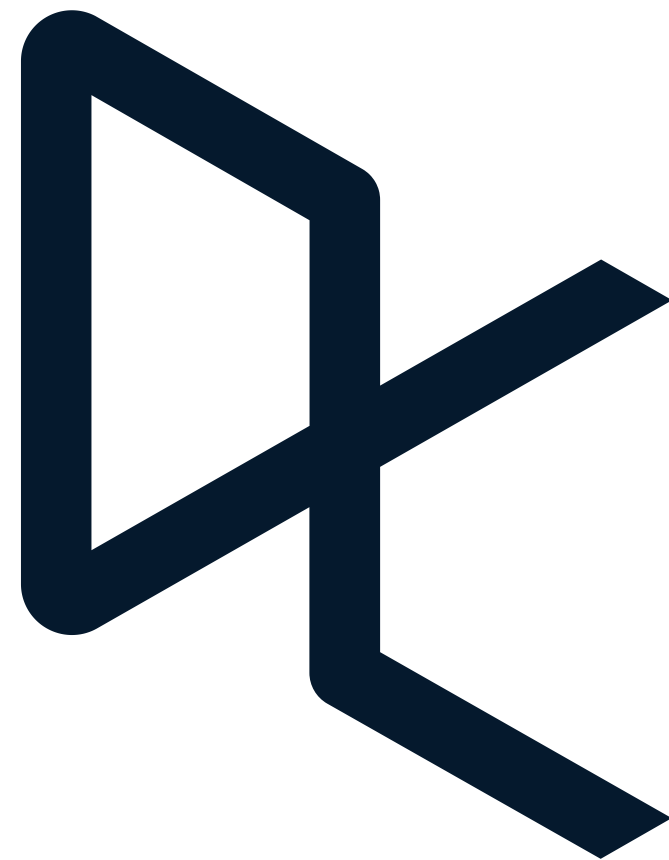
card_num	name	member_year	total_fine
54378	Izzy	2012	9.86
94722	Maham	2020	0
45783	Jasmin	2022	2.05
90123	James	1989	0







LET'S PRACTICE!



TABLES

INTRODUCTION TO SQL

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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

A green checkmark is drawn over the text, indicating that this naming convention is correct.

Patrons
Library patrons
PATRONS

A red X is drawn over the text, indicating that this naming convention is incorrect.

patrons

columns



rows



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

fields
↓

records →

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



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

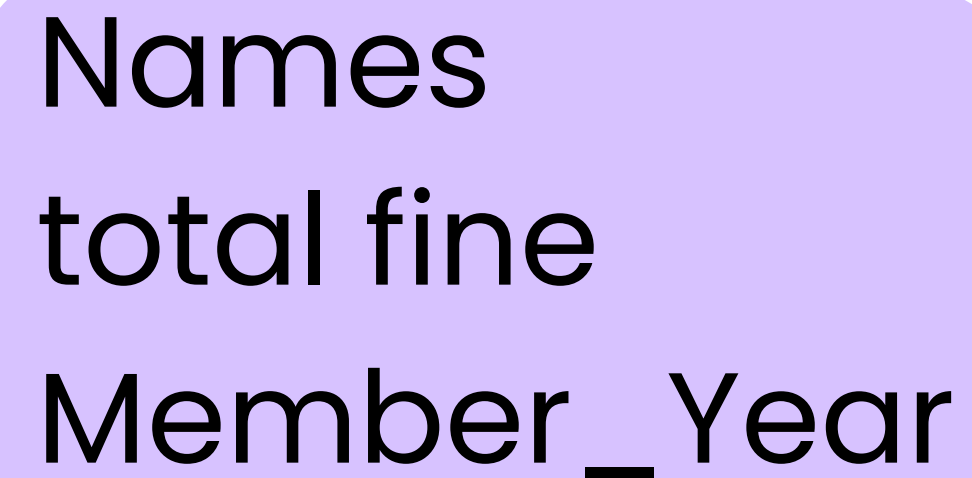
```
name  
year  
total_fine
```

Field naming

- Lowercase
- Use underscores
- Singular



name
year
total_fine



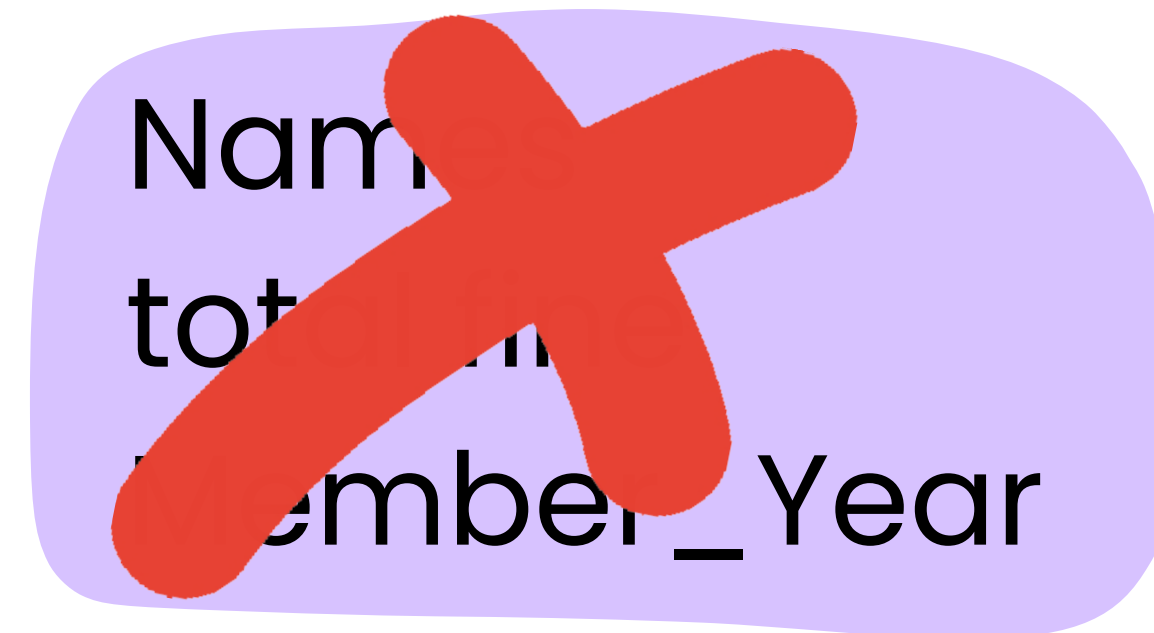
Names
total fine
Member_Year

Field naming

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



name
year
total_fine



Name
total
member_Year

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
90123	James	1989	0

Unique identifier (key)

patrons

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patrons

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54378	Izzy	2012	9.86
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checkouts

id	start_date	due_date	card_num	book_id
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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
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
94722	Maham	2020	0				
45783	Jasmin	2022	2.05	23361	2024-05-12	2024-05-26	912
90123	James	1989	0	23362	2024-05-13	2024-05-27	838

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
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90123	James	1989	0	23362	2024-05-13	2024-05-27	838

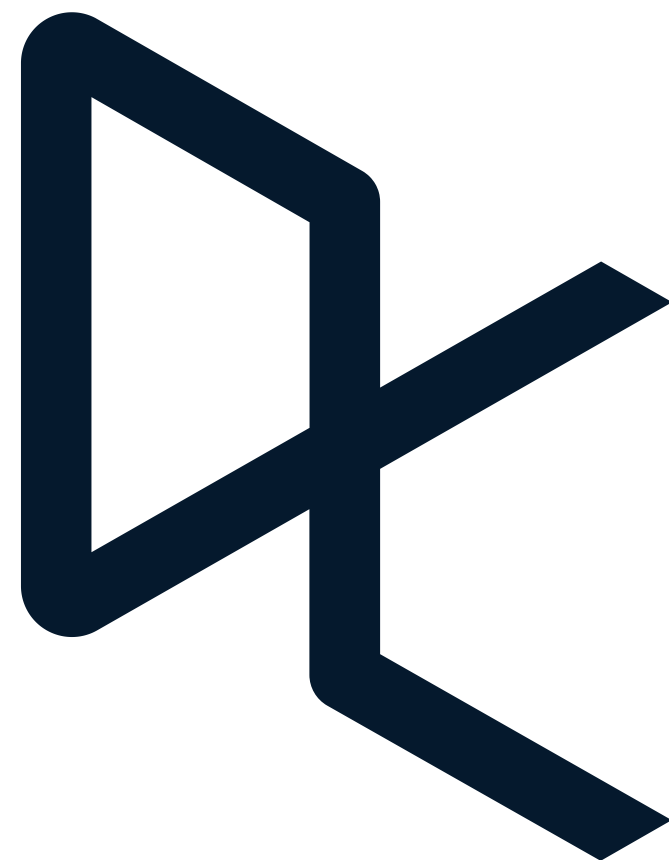
checkouts

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

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54378	Izzy	2012	9.86
94722	Maham	2020	0
45783	Jasmin	2022	2.05
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TIME TO PRACTICE!



DATA TYPES

INTRODUCTION TO SQL

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checkouts

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patrons

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54378	Izzy	2012	9.86
94722	Maham	2020	0
45783	Jasmin	2022	2.05
90123	James	1989	0

checkouts

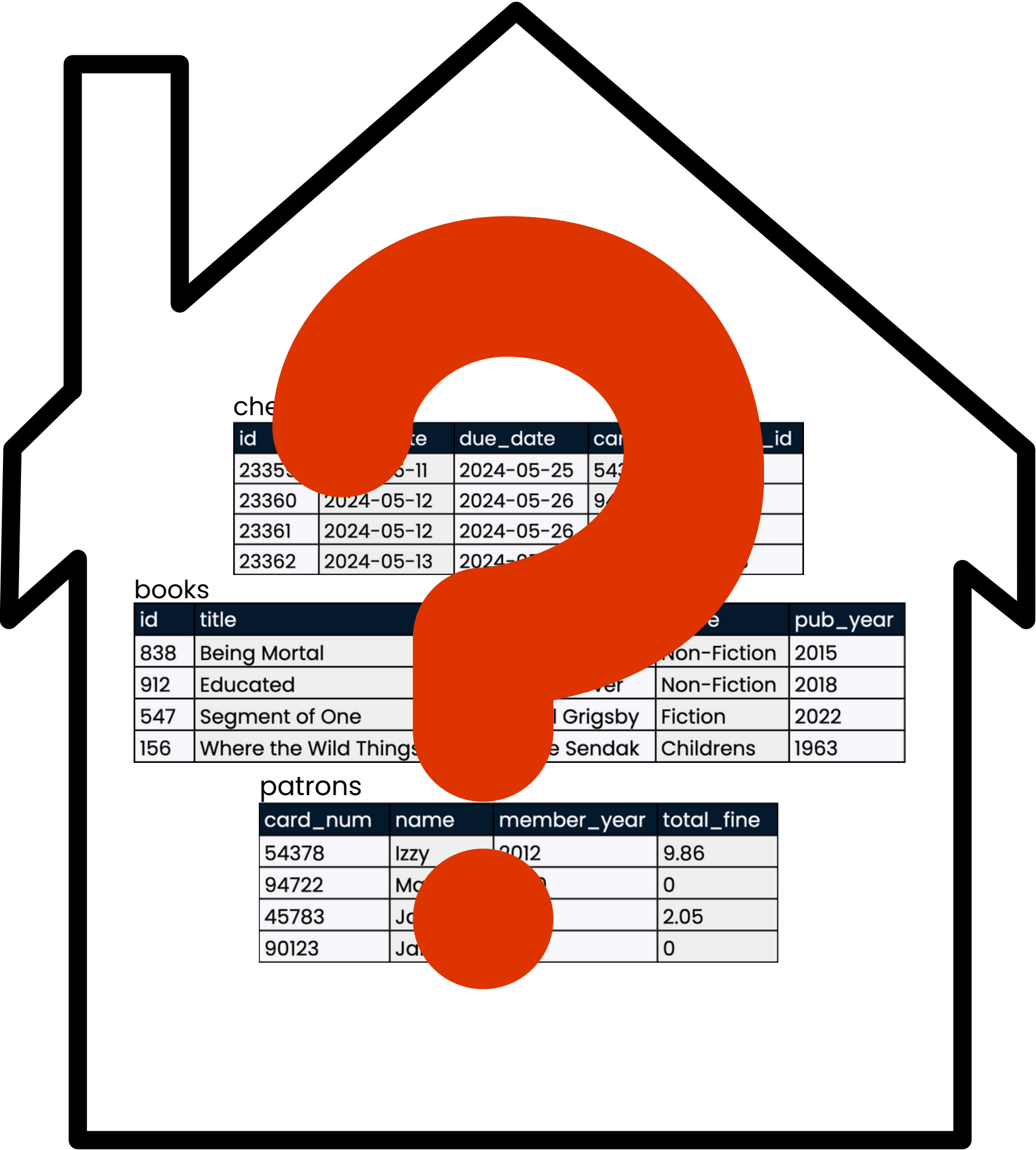
id	start_date	due_date	card_num	book_id
23359	2024-05-11	2024-05-25	54378	547
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94722	Maham	2020	0
45783	Jasmin	2022	2.05
90123	James	1989	0



checked_out

id	due_date	card_id
23355	2024-05-11	54378
23360	2024-05-12	94722
23361	2024-05-12	45783
23362	2024-05-13	90123

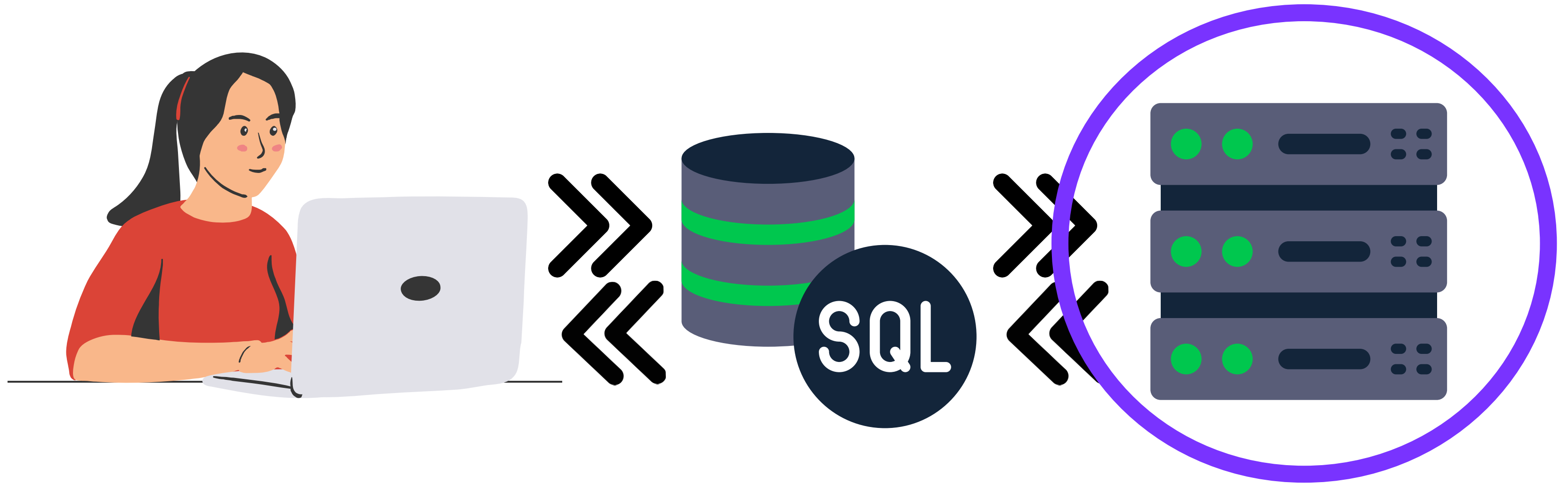
books

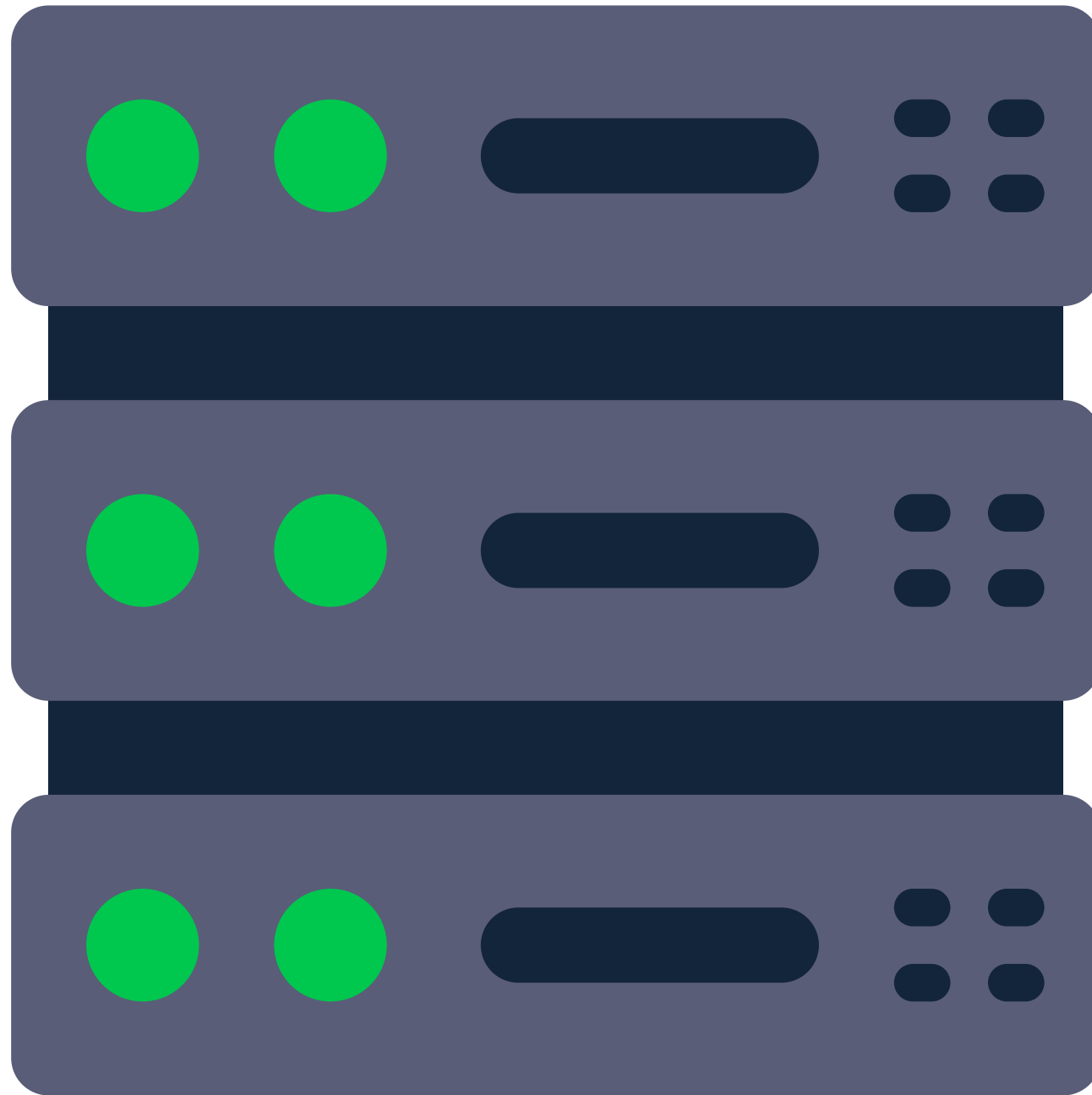
id	title	genre	pub_year
838	Being Mortal	Non-Fiction	2015
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patrons

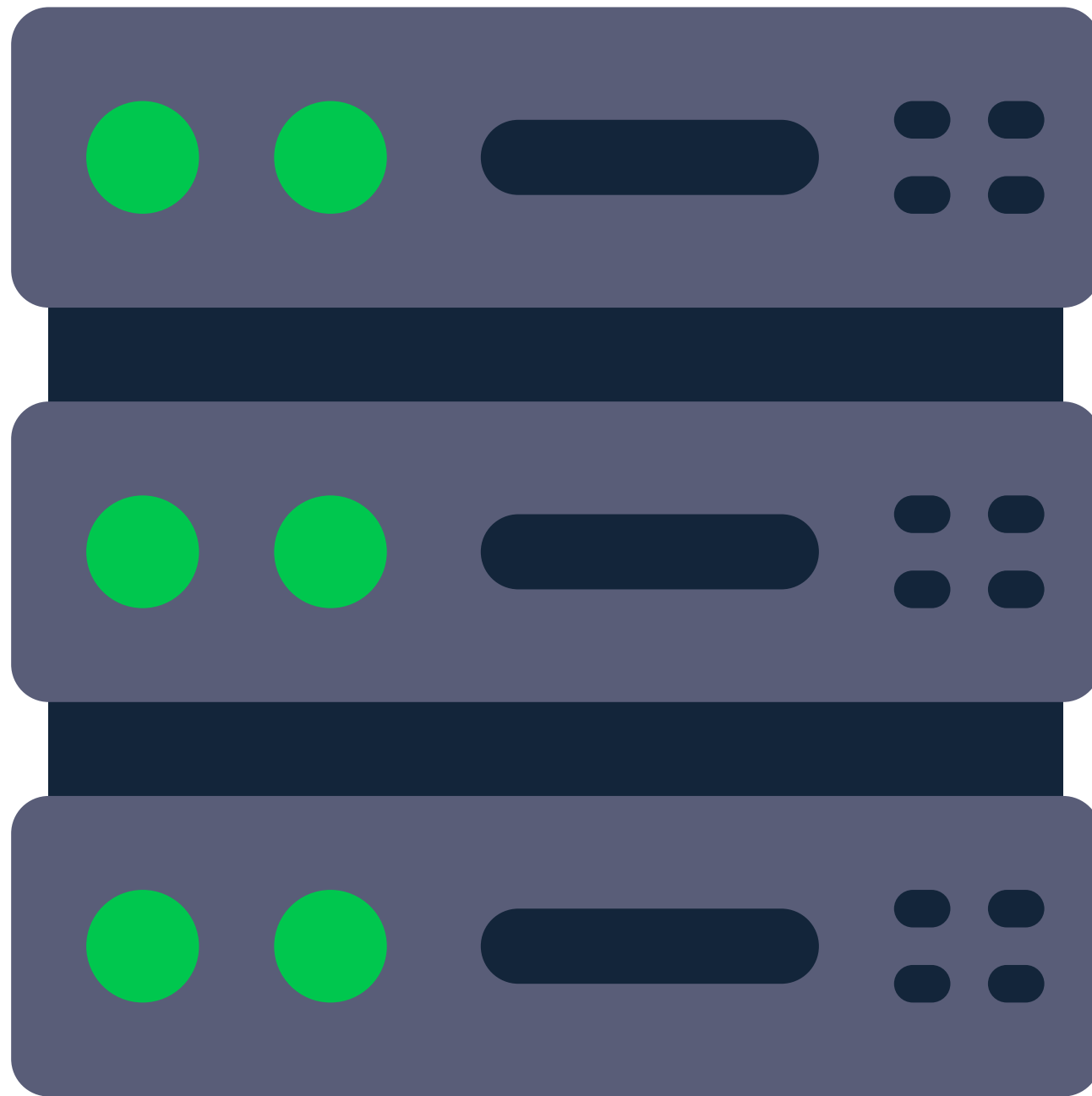
card_num	name	member_year	total_fine
54378	Izzy	2012	9.86
94722	Mo		0
45783	Jo		2.05
90123	Ja		0







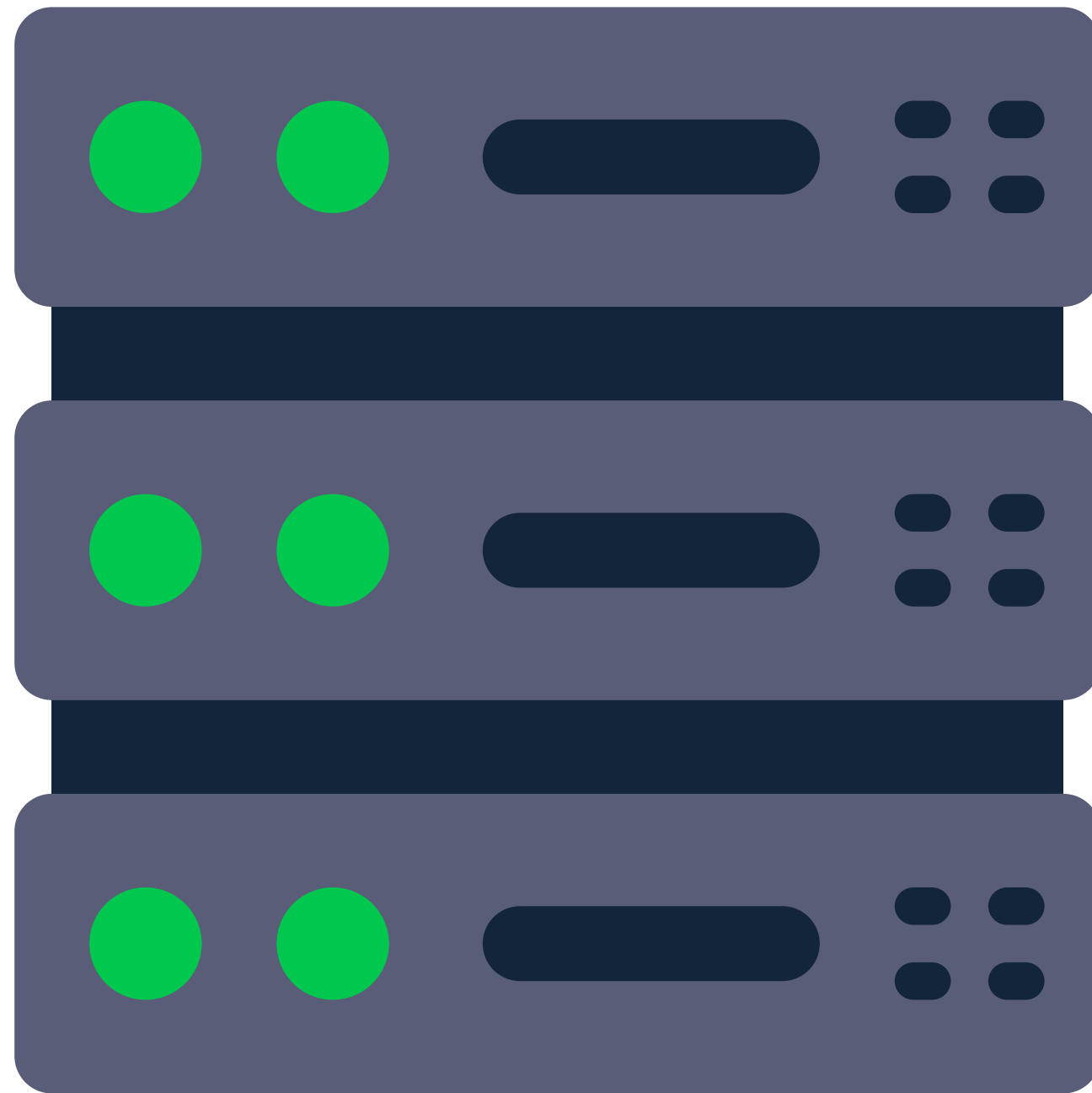
Powerful computers



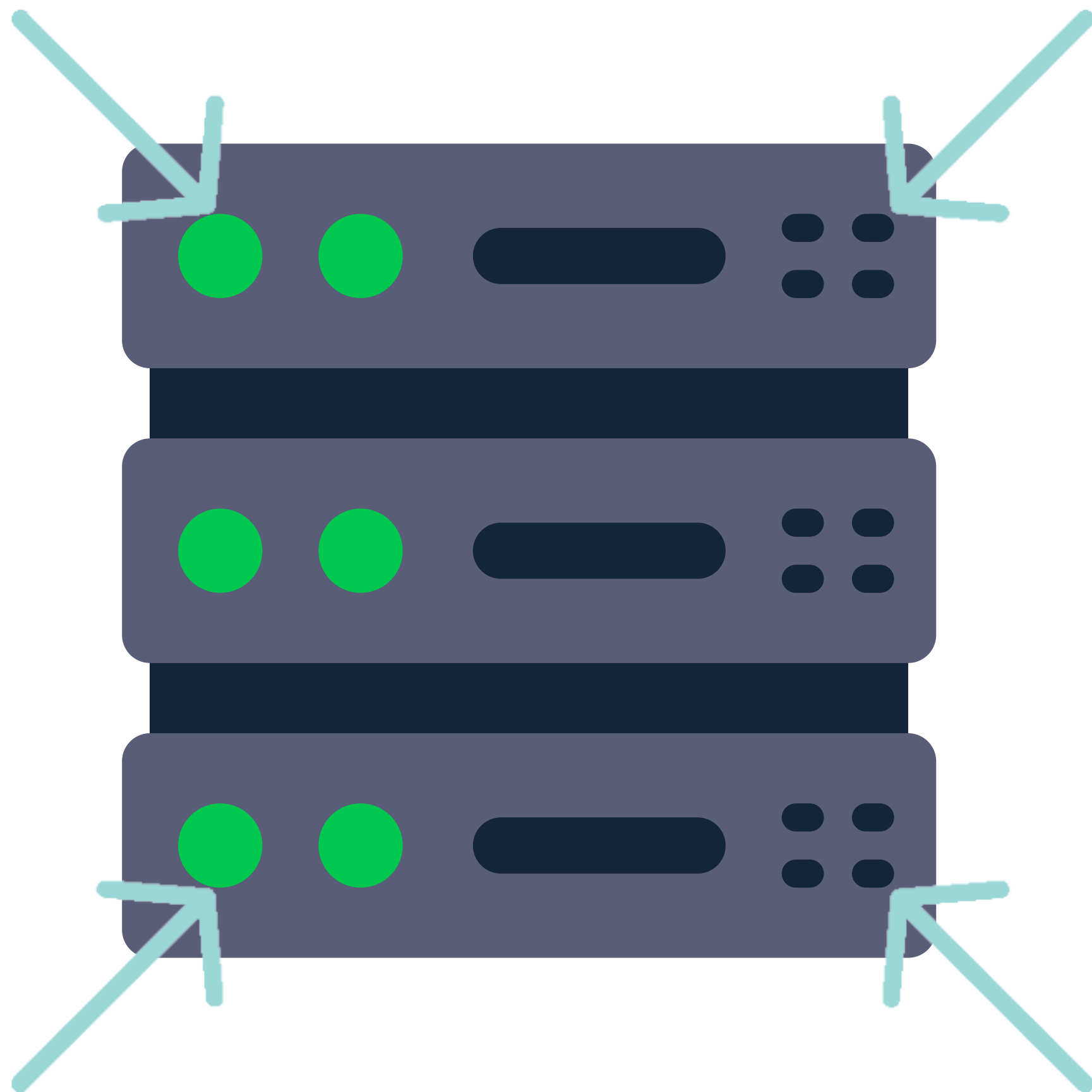
Store information



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
94722	Maham	2020	0
45783	Jasmin	2022	2.05
90123	James	1989	0

↓
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

$$2 \times 2 = 4$$

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

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

$2 \times 2 = 4$ ☒

Izzy x Maham = ? ☐

Strings

card_num	name	member_year	total_fine
54378	Izzy	2012	9.86
94722	Maham	2020	0
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90123	James	1989	0

↓
Text

Strings

card_num	name	member_year	total_fine
54378	Izzy	2012	9.86
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↓
String

Strings

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54378	Izzy	2012	9.86
94722	Maham	2020	0
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90123	James	1989	0

↓
String: James

Strings

card_num	name	member_year	total_fine
54378	Izzy	2012	9.86
94722	Maham	2020	0
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VARCHAR

Integers

card_num	name	member_year	total_fine
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Whole numbers

Integers

card_num	name	member_year	total_fine
54378	Izzy	2012	9.86
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INT

Floats

card_num	name	member_year	total_fine
54378	Izzy	2012	9.86
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45783	Jasmin	2022	2.05
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Fractional numbers

Floats

card_num	name	member_year	total_fine
54378	Izzy	2012	9.86
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Floats

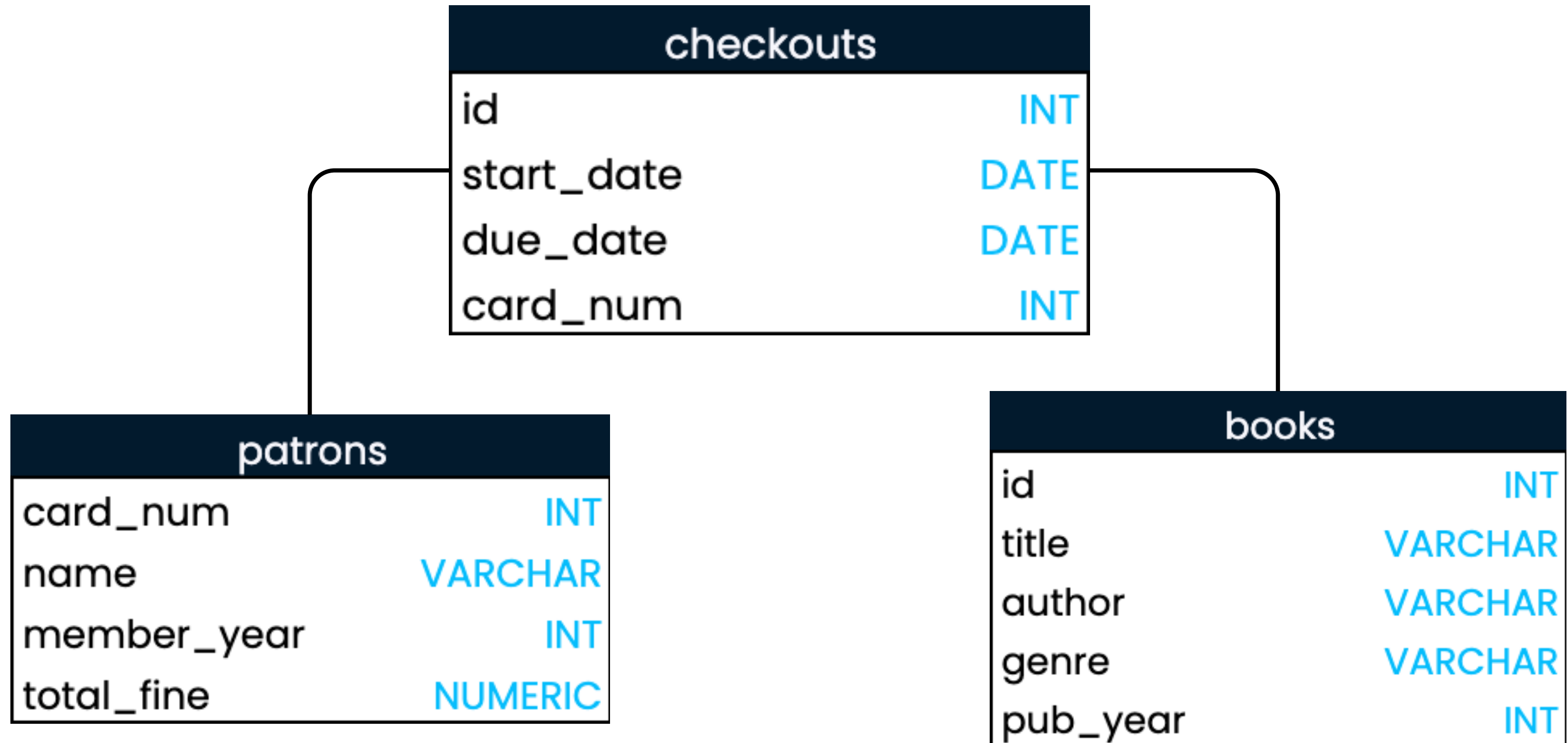
Floats

card_num	name	member_year	total_fine
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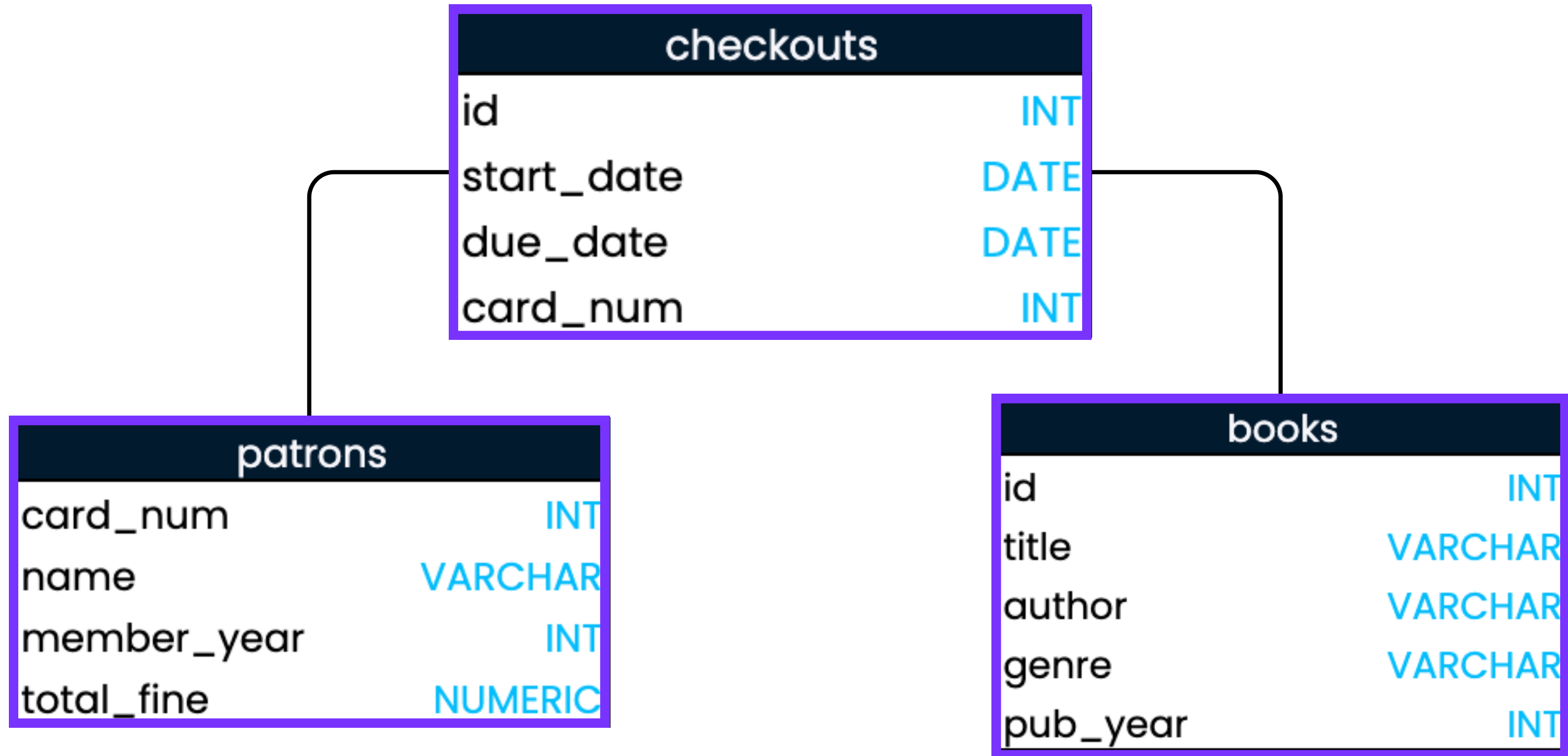


NUMERIC

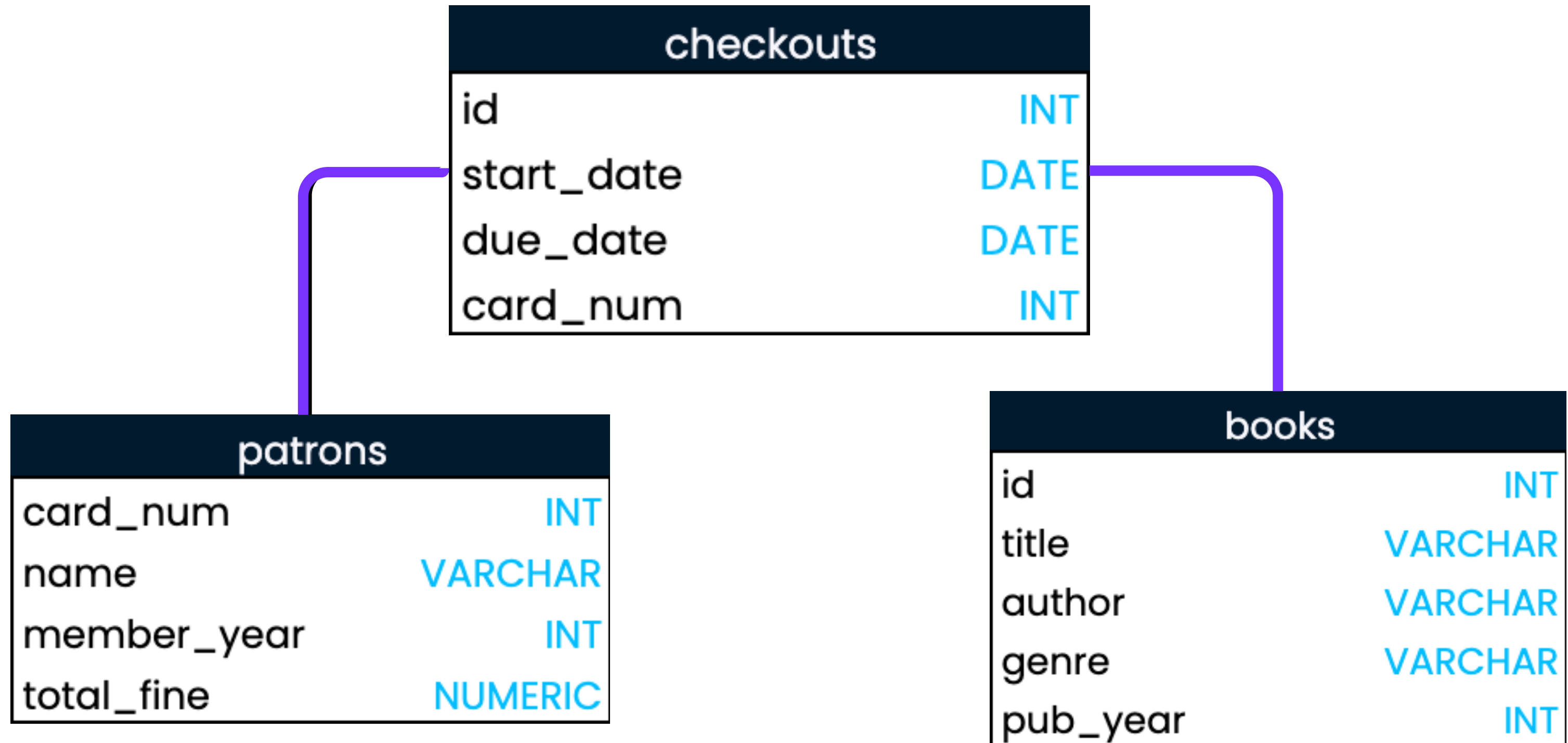
Schema



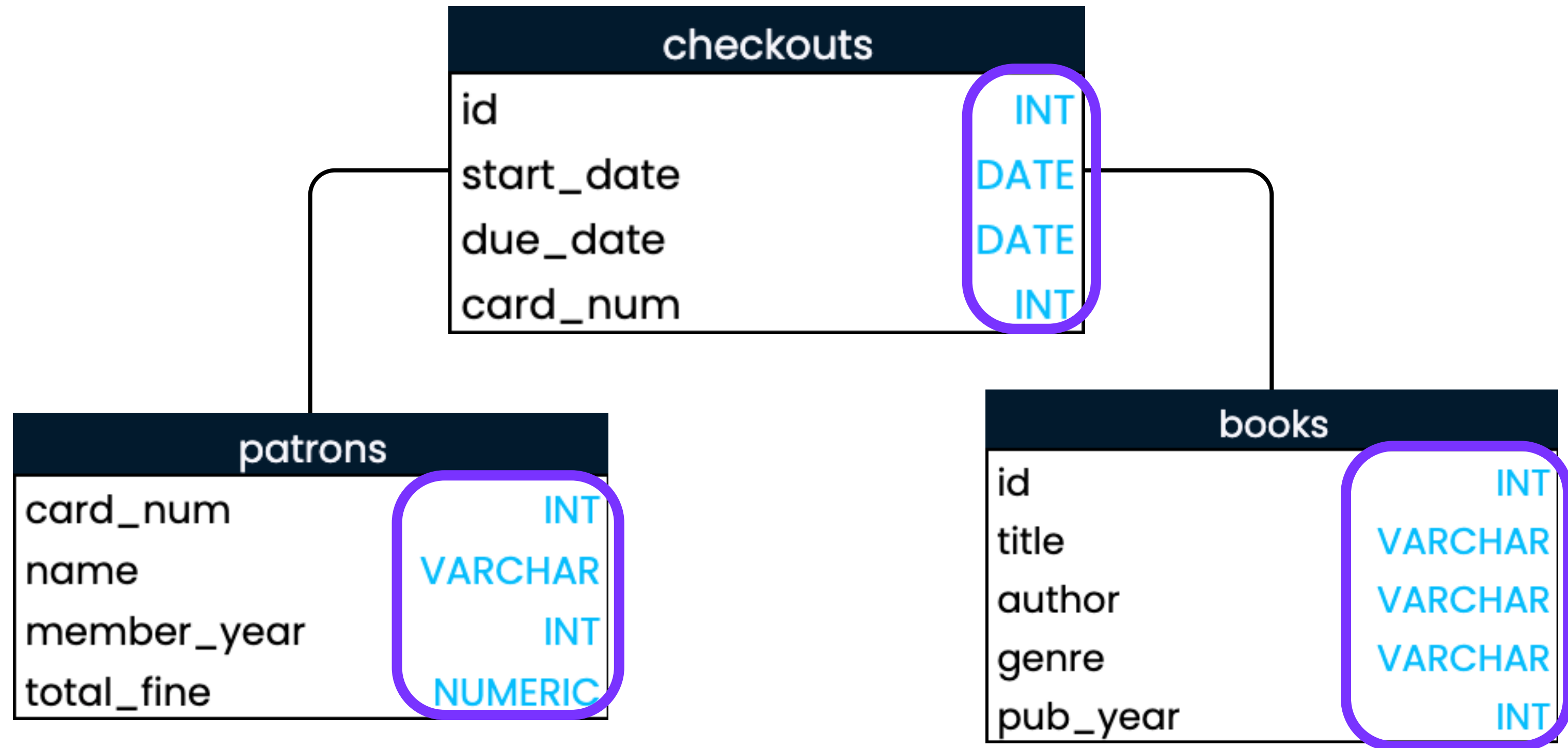
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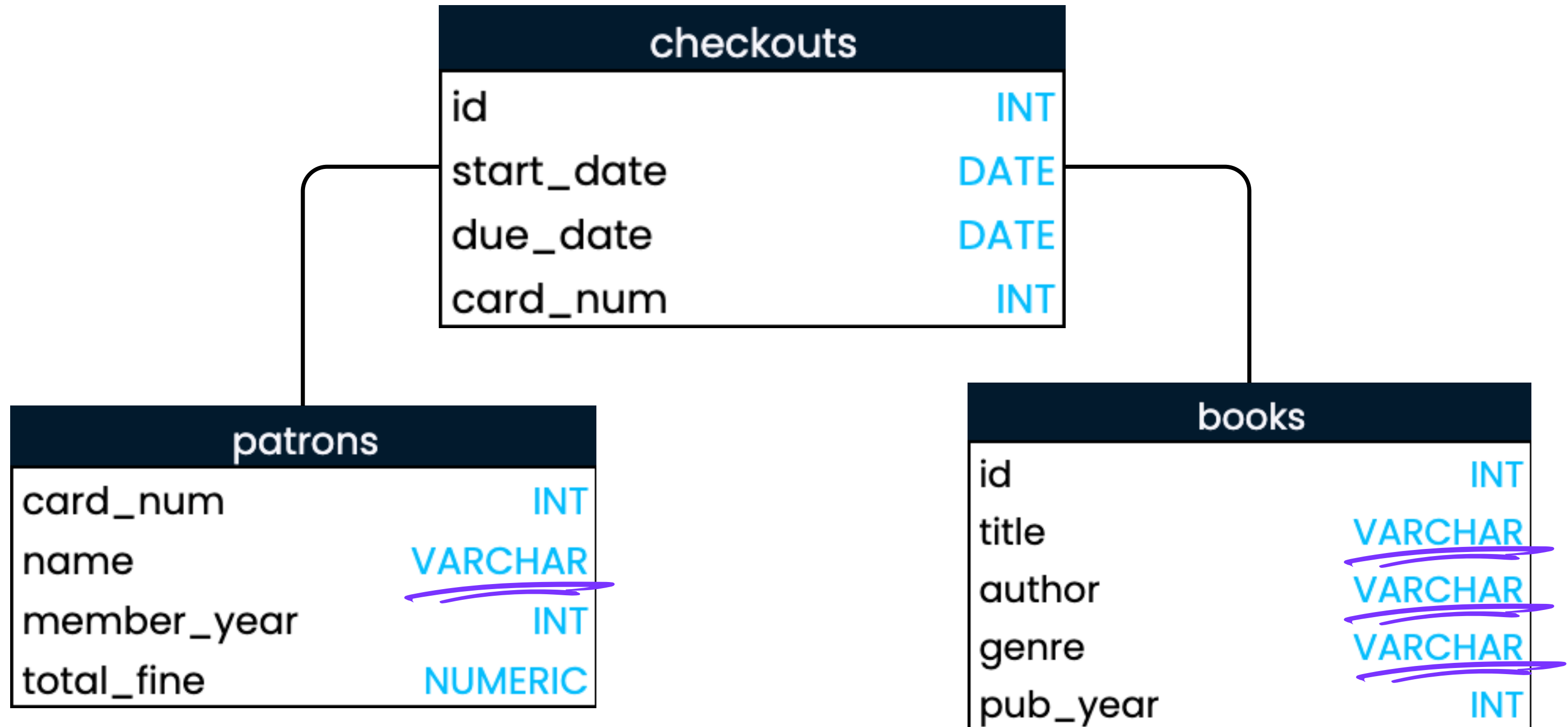
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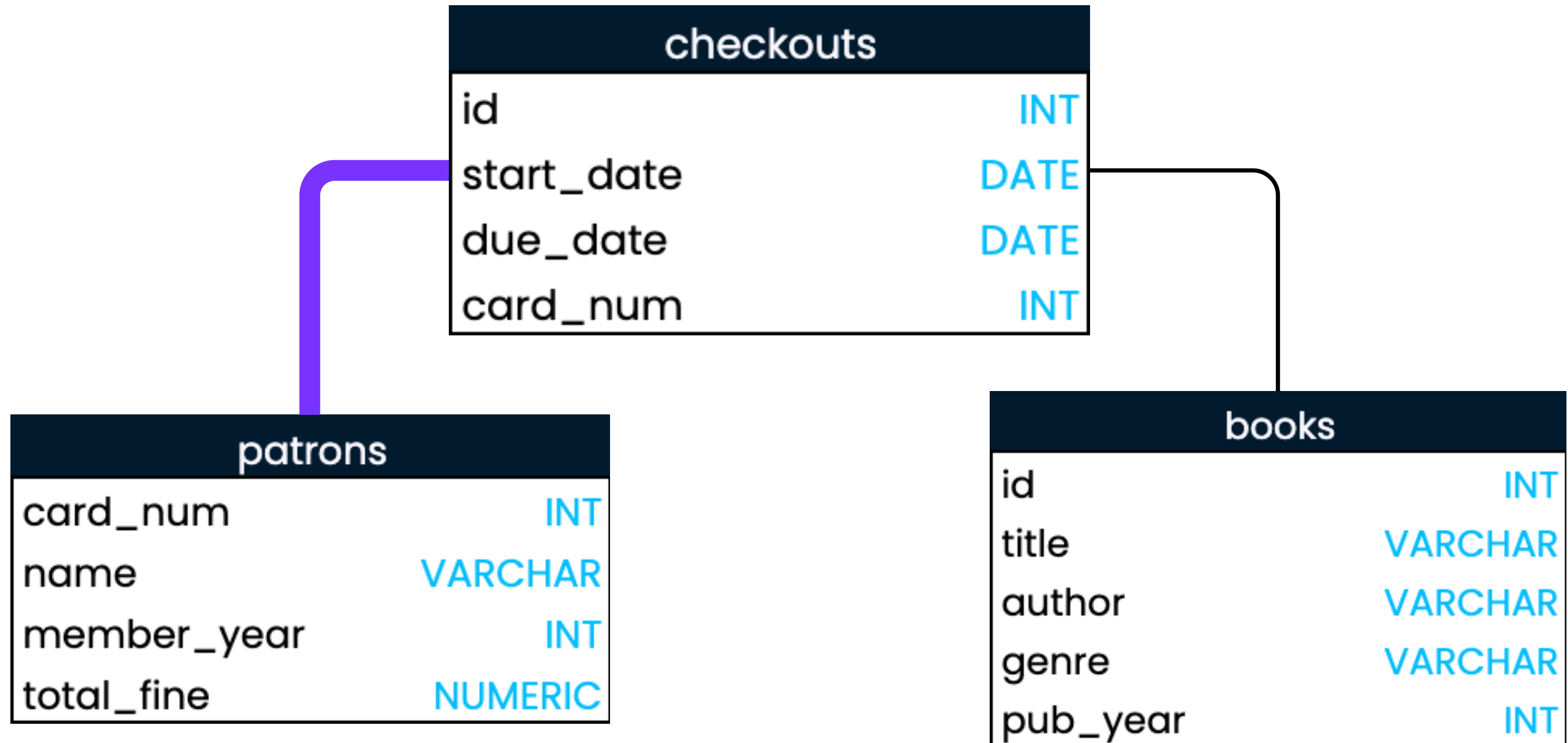
Schema



Schema



Schema



LET'S PRACTICE!

