The Concept of Relational Schemas: Primary Key

365 DataScience

Relational Schemas: Primary Key

Sales			
purchase_number	date_of_purchase	customer_id	item_code
1	9/3/2016	1	A_1
2	12/2/2016	2	C_1
3	4/15/2017	3	D_1
4	5/24/2017	1	B_2
5	5/25/2017	4	B_2
6	6/6/2017	2	B_1
7	6/10/2017	4	A_2
8	6/13/2017	3	C_1
9	7/20/2017	1	A_1
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365 DataScience

Relational Schemas: Primary Key

Customers				
customer_id	first_name	last_name	email_address	number_of_complaints
1	John	McKinley	john.mackinley@365careers.com	0
2	Elizabeth	McFarlane	e.mcfarlane@365careers.com	2
3	Kevin	Lawrence	kevin.lawrence@365careers.com	1
4	Catherine	Winnfield	c.winnfield@365careers.com	0

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9	7/20/2017	1	A_1
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Items					
item_code	item	unit_price_usd	company_id	company	headquarters_phone_number
A_1	Lamp	20	1	Company A	+1 (202) 555-0196
A_2	Desk	250	1	Company A	+1 (202) 555-0196
B_1	Lamp	30	2	Company B	+1 (202) 555-0152
B_2	Desk	350	2	Company B	+1 (202) 555-0152
C_1	Chair	150	3	Company C	+1 (229) 853-9913
D_1	Loudspeakers	400	4	Company D	+1 (618) 369-7392

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Companies

company	Headquarters_Phone_number	company_id
Company A	+1 (202) 555-0196	1
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Relational Schemas: Primary Key

- these tables have a tabular shape

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Relational Schemas: Primary Key

- these tables have a tabular form
- a relational schema can be applied to represent them

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sales per customer of our company

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the dates of a few purchases may coincide

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the ID of a customer may appear a few times

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there is a possibility to see the same item code a few times

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all the numbers in this column will be different

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Relational Schemas: Primary Key

`primary key`

a column (or a set of columns) whose value exists and is unique for every record in a table is called a **primary key**

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Relational Schemas: Primary Key

- Primary Key

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Relational Schemas: Primary Key

- **Primary Key**

  may be composed of a set of columns

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Relational Schemas: Primary Key

Primary Key

may be composed of a set of columns

e.g. “purchase_number” + “date_of_purchase”

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Relational Schemas: Primary Key

Primary Key

one-column primary key = all purchases will be recorded under a different number

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365 DataScience

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365 DataScience

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- cannot contain null values!

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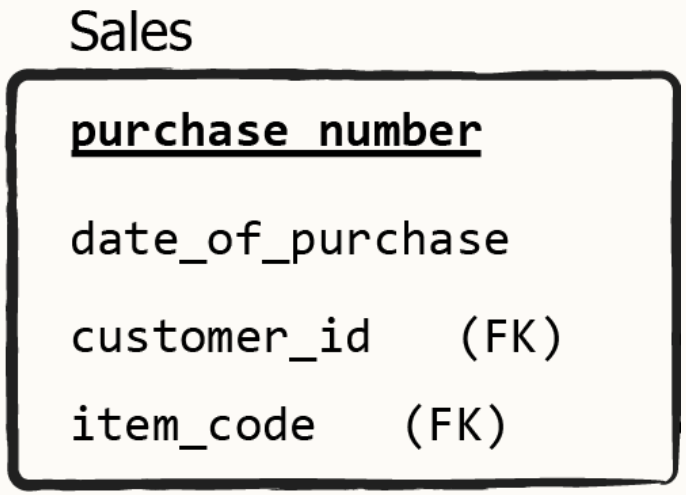
Relational Schemas: Primary Key



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Relational Schemas: Primary Key

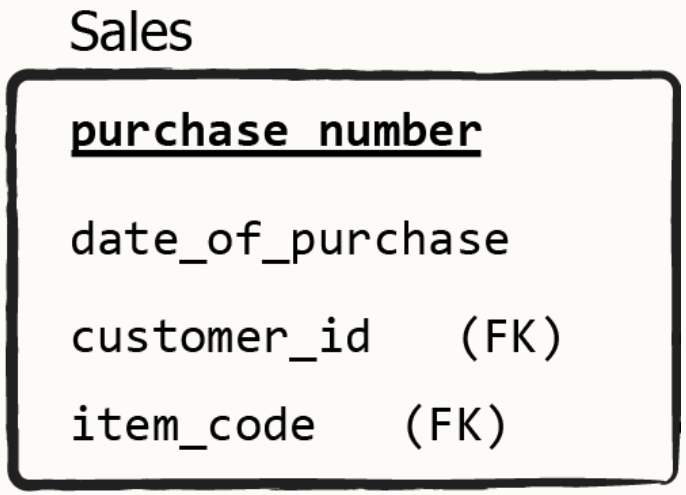

Table name: Sales
Primary key: purchase_number
Other fields: date_of_purchase, customer_id, item_code

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Relational Schemas: Primary Key

Sales

purchase_number
date_of_purchase
customer_id (FK)
item_code (FK)

=

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- cannot contain null values!
- not all tables you work with will have a primary key

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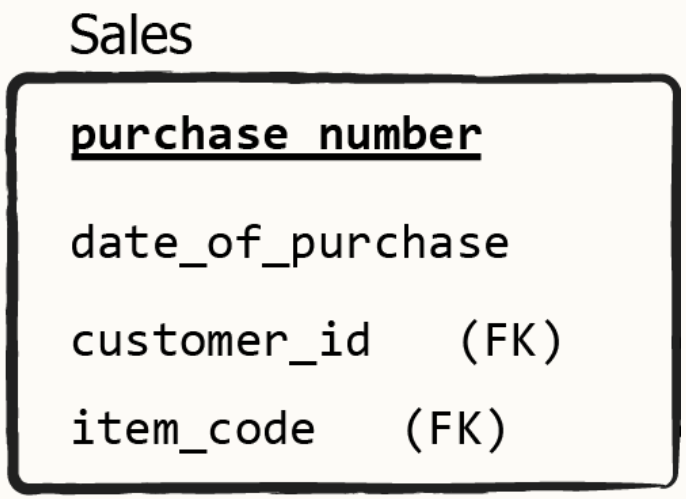
Relational Schemas: Primary Key

relational schema



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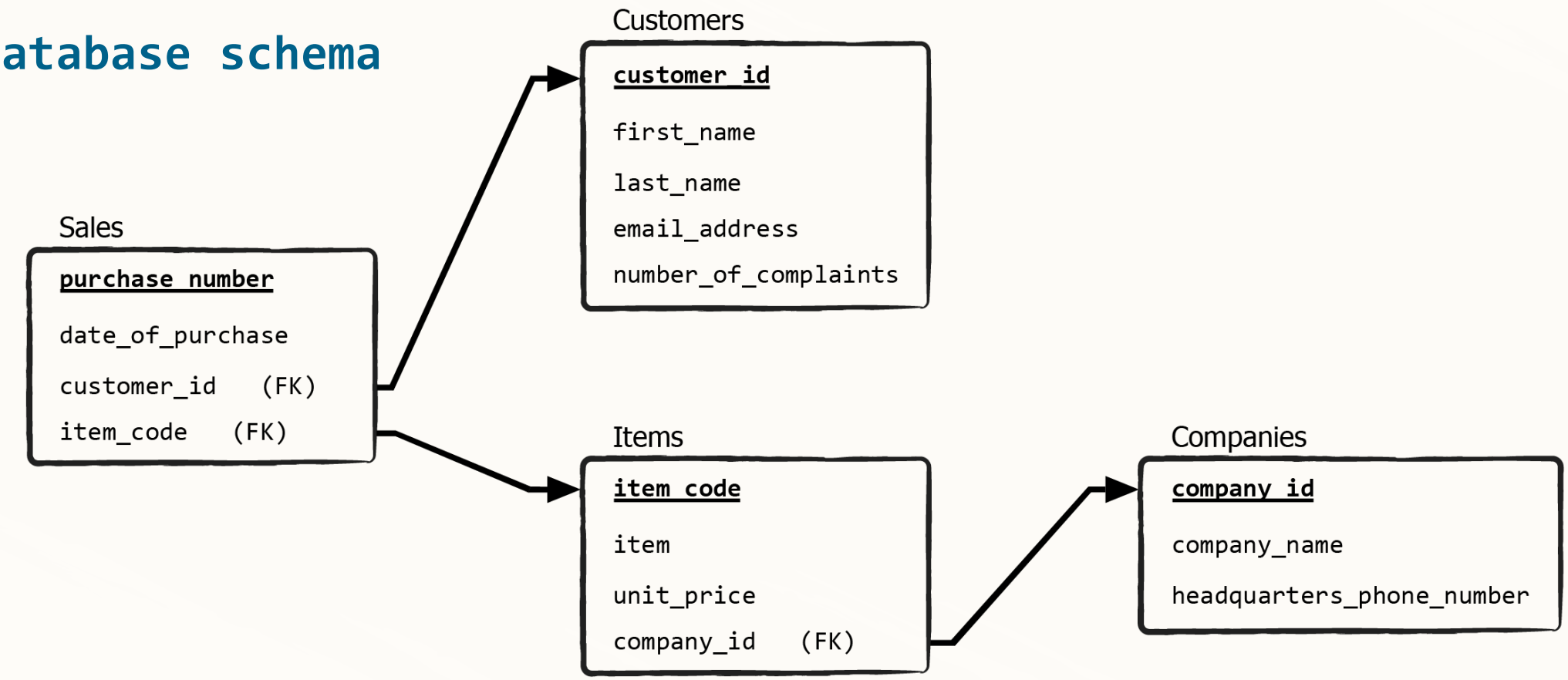
Relational Schemas: Primary Key

database schema



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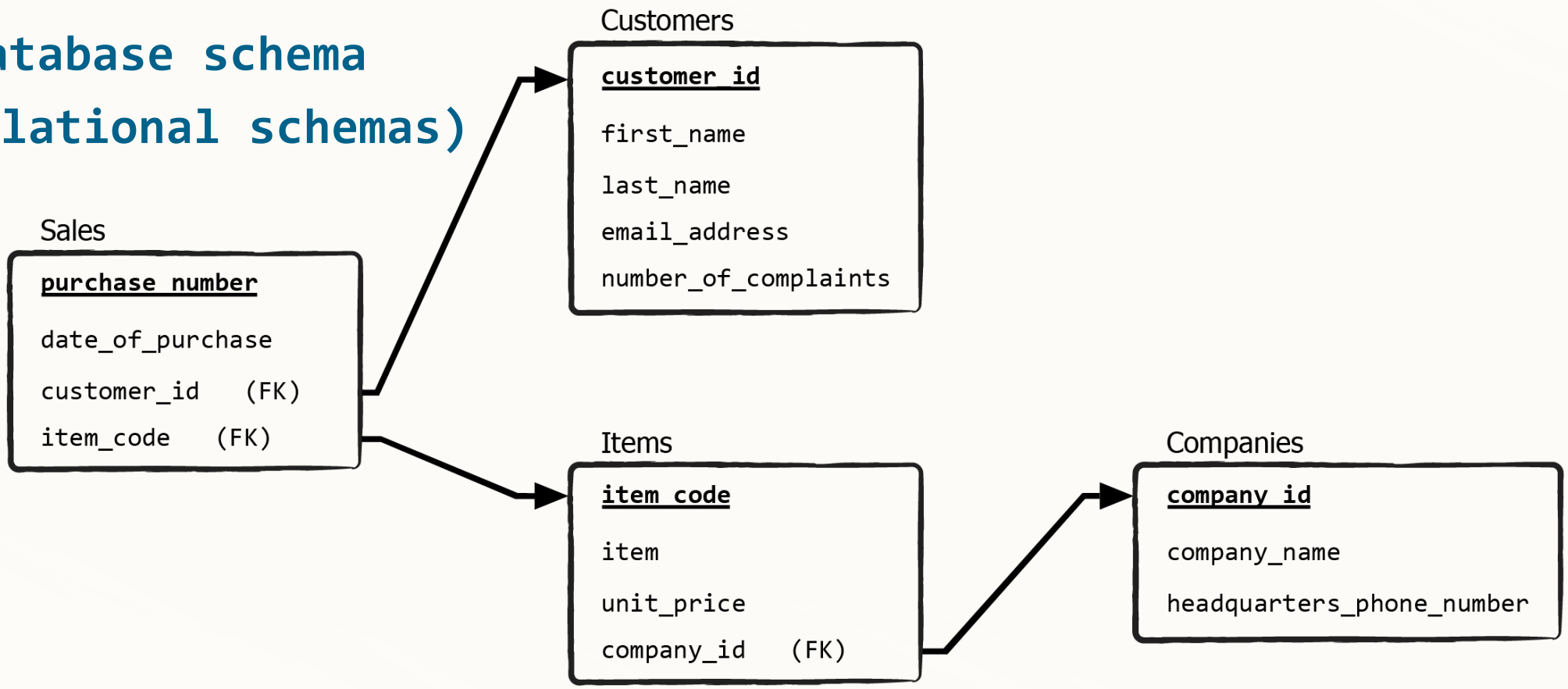
Relational Schemas: Primary Key

database schema
(relational schemas)



365 DataScience

The Concept of Relational Schemas: Foreign Key

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Sales			
purchase_number	date_of_purchase	customer_id	item_code
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2	12/2/2016	2	C_1
3	4/15/2017	3	D_1
4	5/24/2017	1	B_2
5	5/25/2017	4	B_2
6	6/6/2017	2	B_1
7	6/10/2017	4	A_2
8	6/13/2017	3	C_1
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365 DataScience

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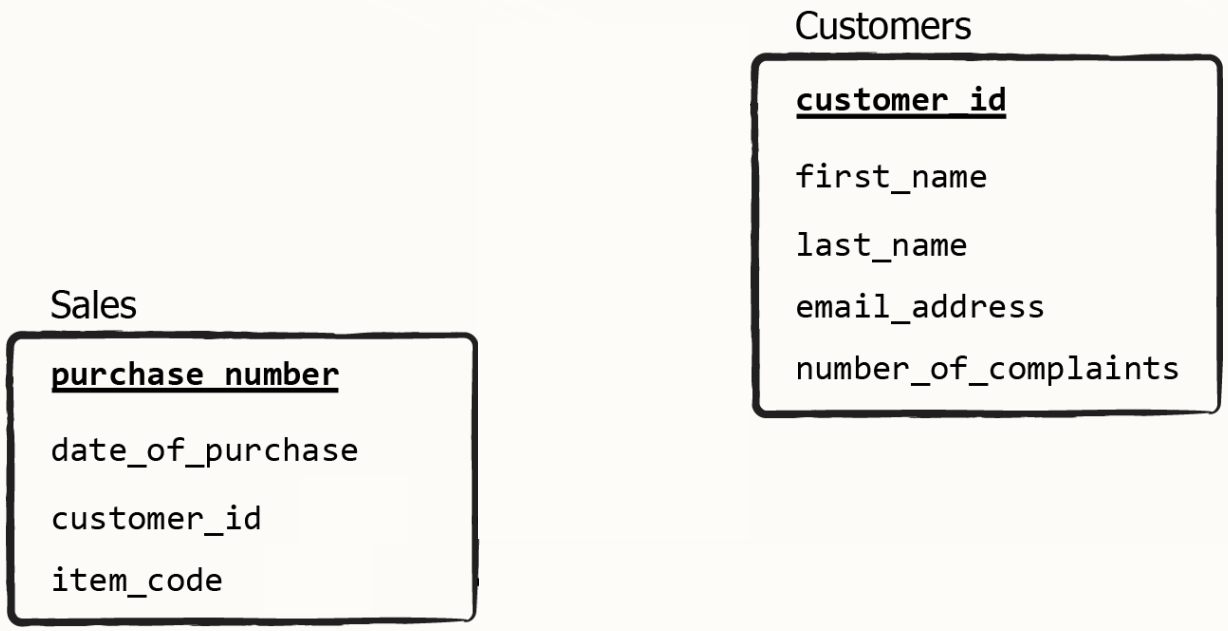
365 DataScience

Relational Schemas: Foreign Key

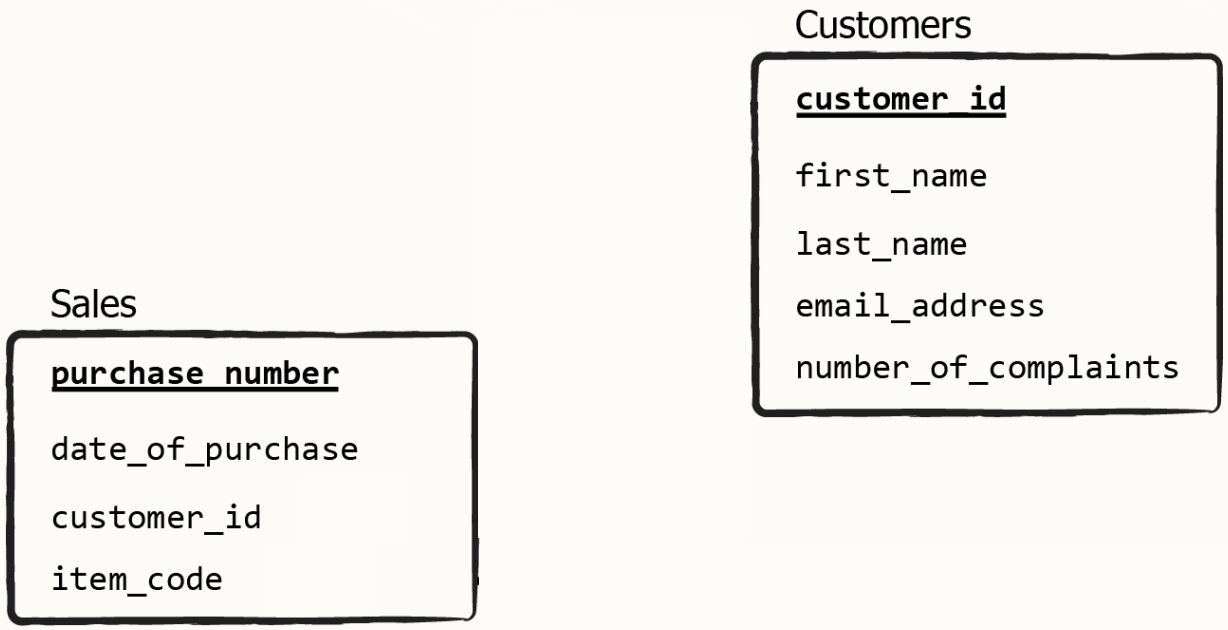
365 DataScience

Relational Schemas: Foreign Key



365 DataScience

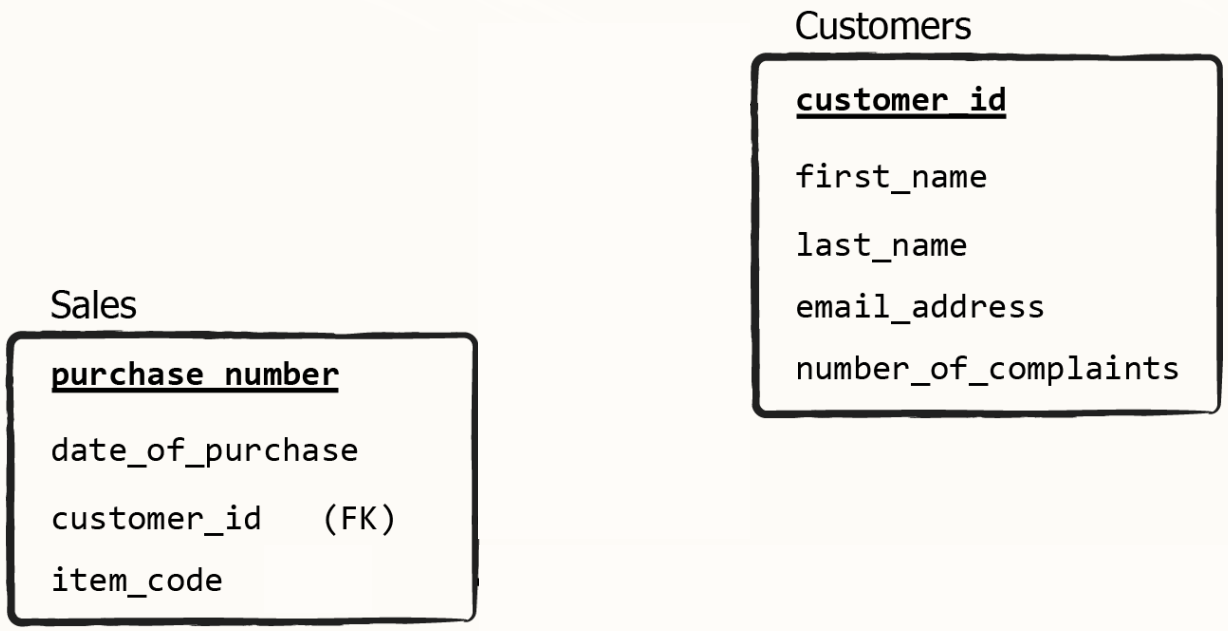
Relational Schemas: Foreign Key



always look for the foreign keys, as they show us where the relations are

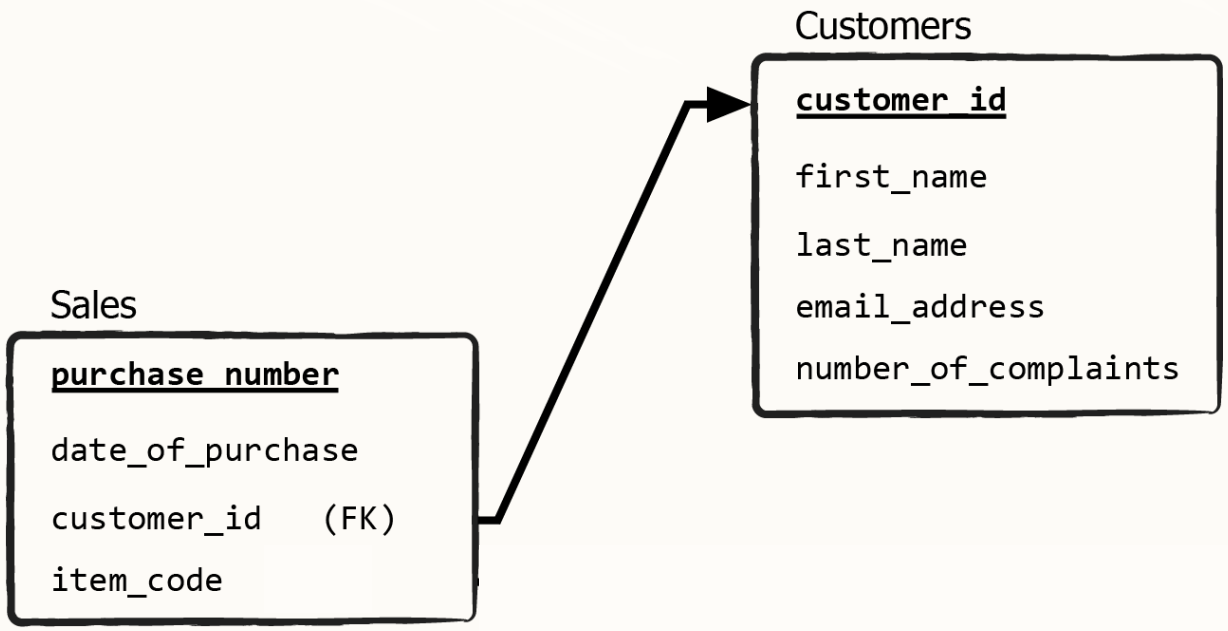
365 DataScience

Relational Schemas: Foreign Key



365 DataScience

Relational Schemas: Foreign Key



365 DataScience

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no repeating and missing values

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no repeating and missing values
(unique values only)

365 DataScience

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Items

item_code	item	unit_price_usd	company_id	company	headquarters_phone_number
A_1	Lamp	20	1	Company A	+1 (202) 555-0196
A_2	Desk	250	1	Company A	+1 (202) 555-0196
B_1	Lamp	30	2	Company B	+1 (202) 555-0152
B_2	Desk	350	2	Company B	+1 (202) 555-0152
C_1	Chair	150	3	Company C	+1 (229) 853-9913
D_1	Loudspeakers	400	4	Company D	+1 (618) 369-7392

365 DataScience

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365 DataScience

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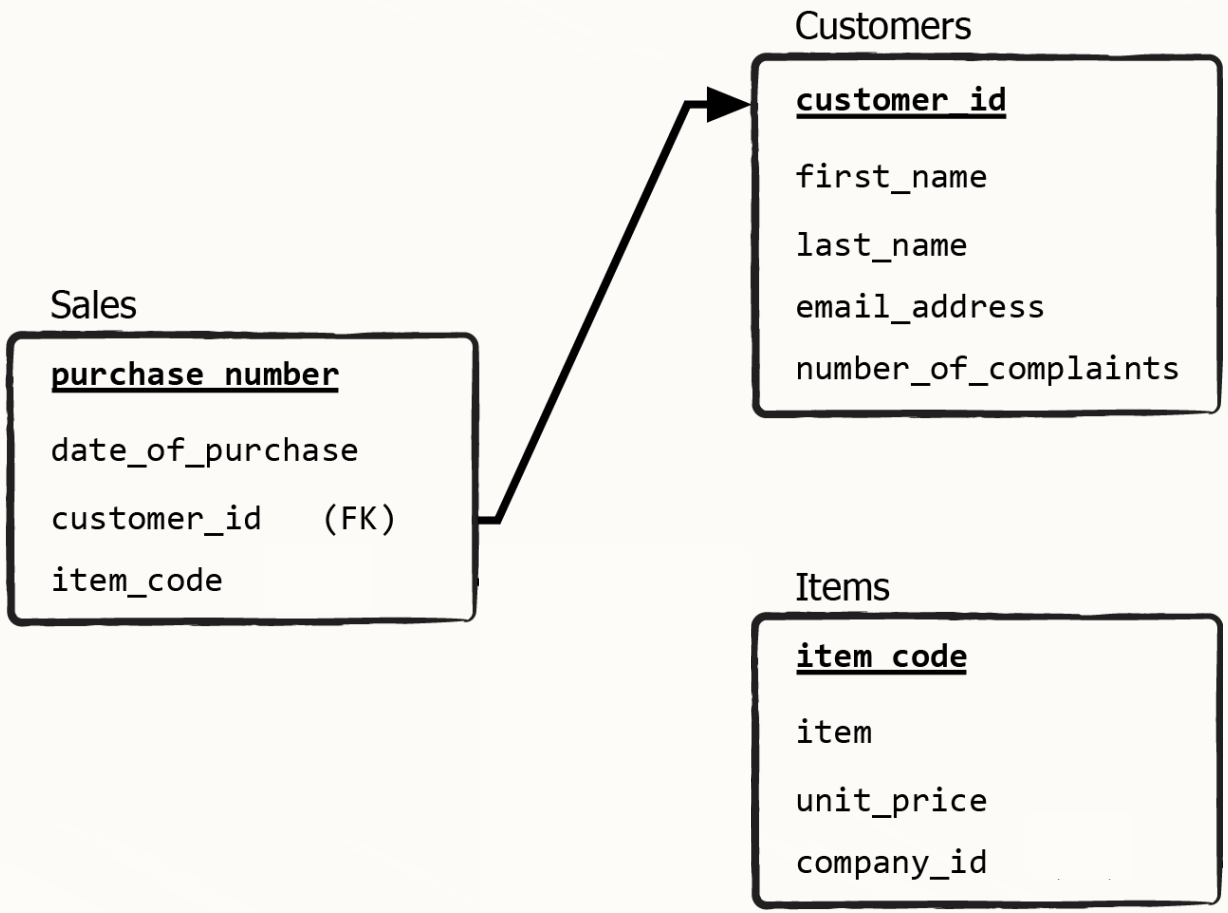

365 DataScience

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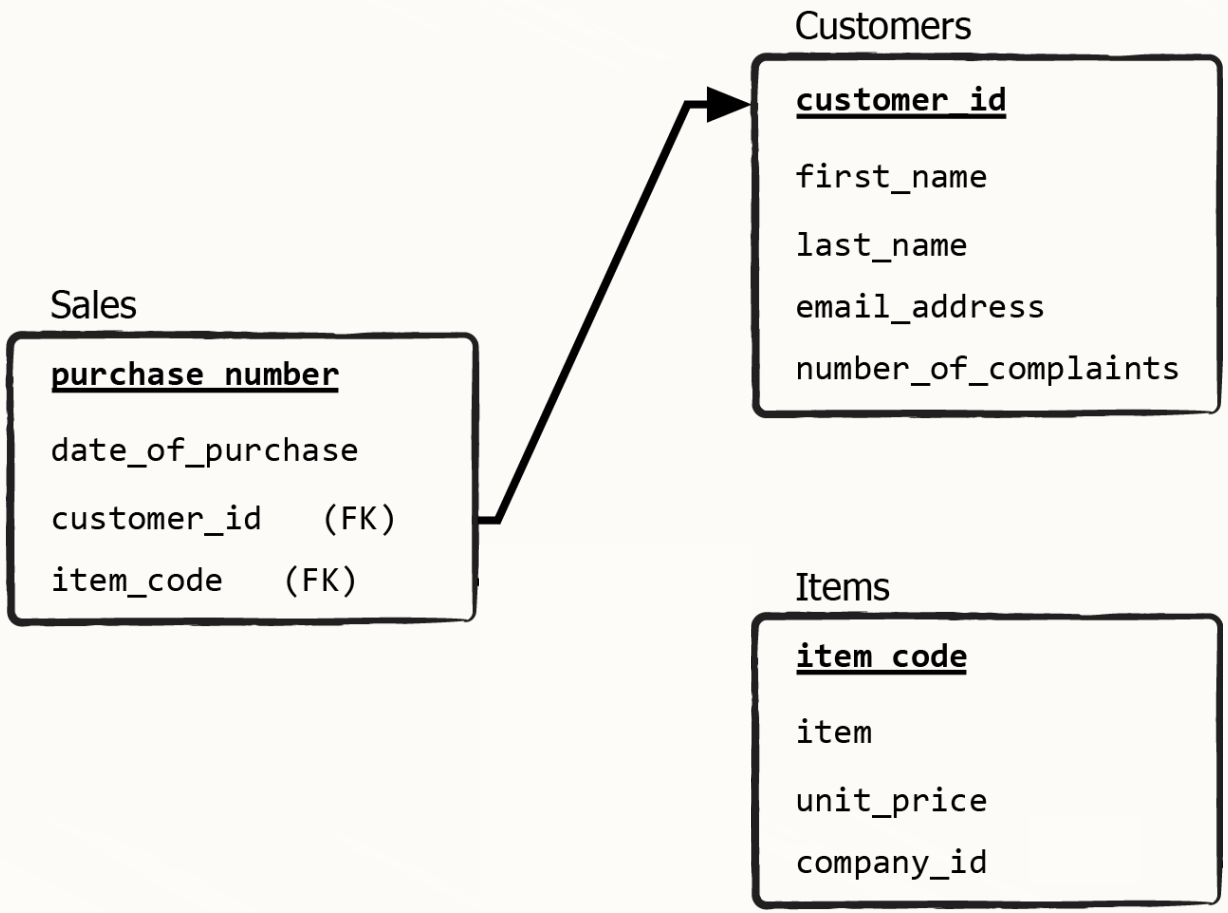

365 DataScience

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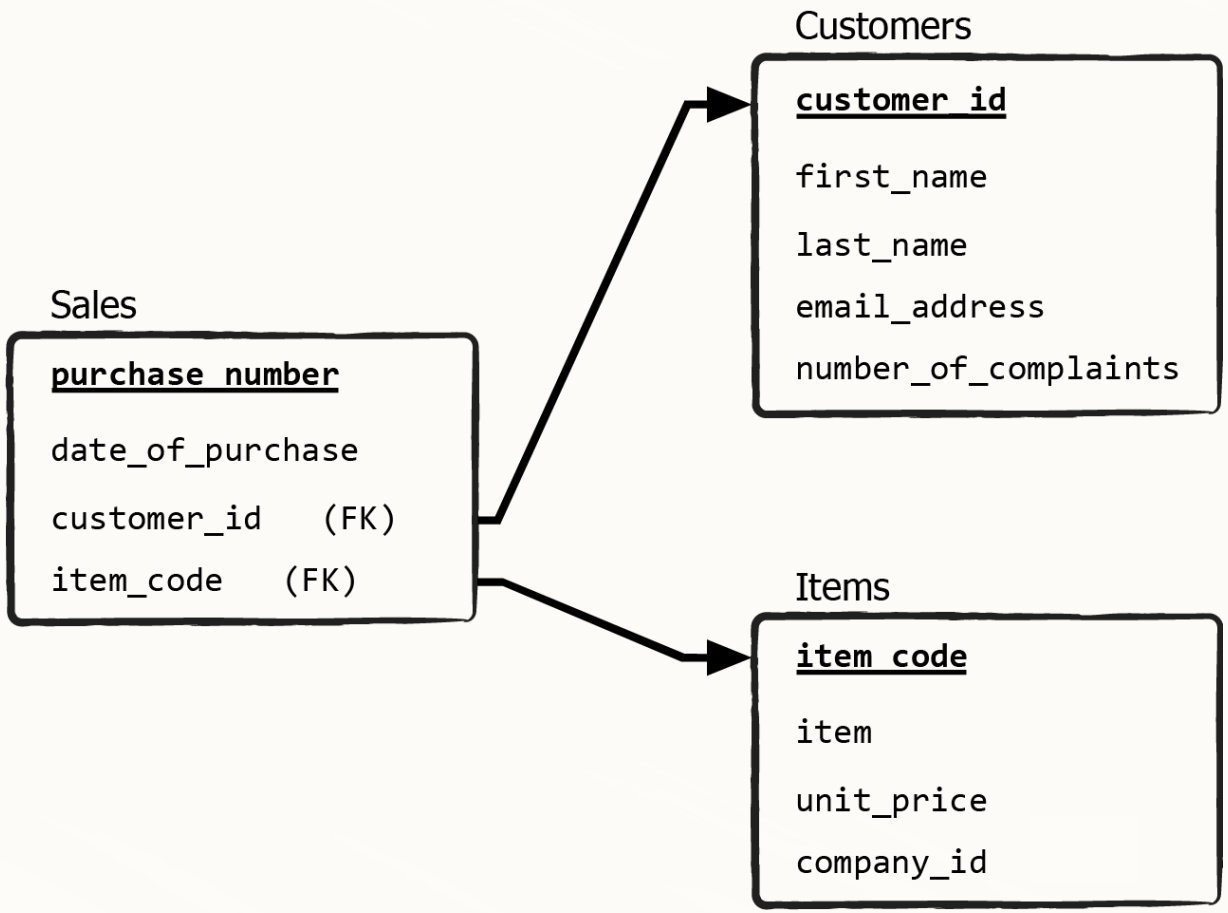


365 DataScience

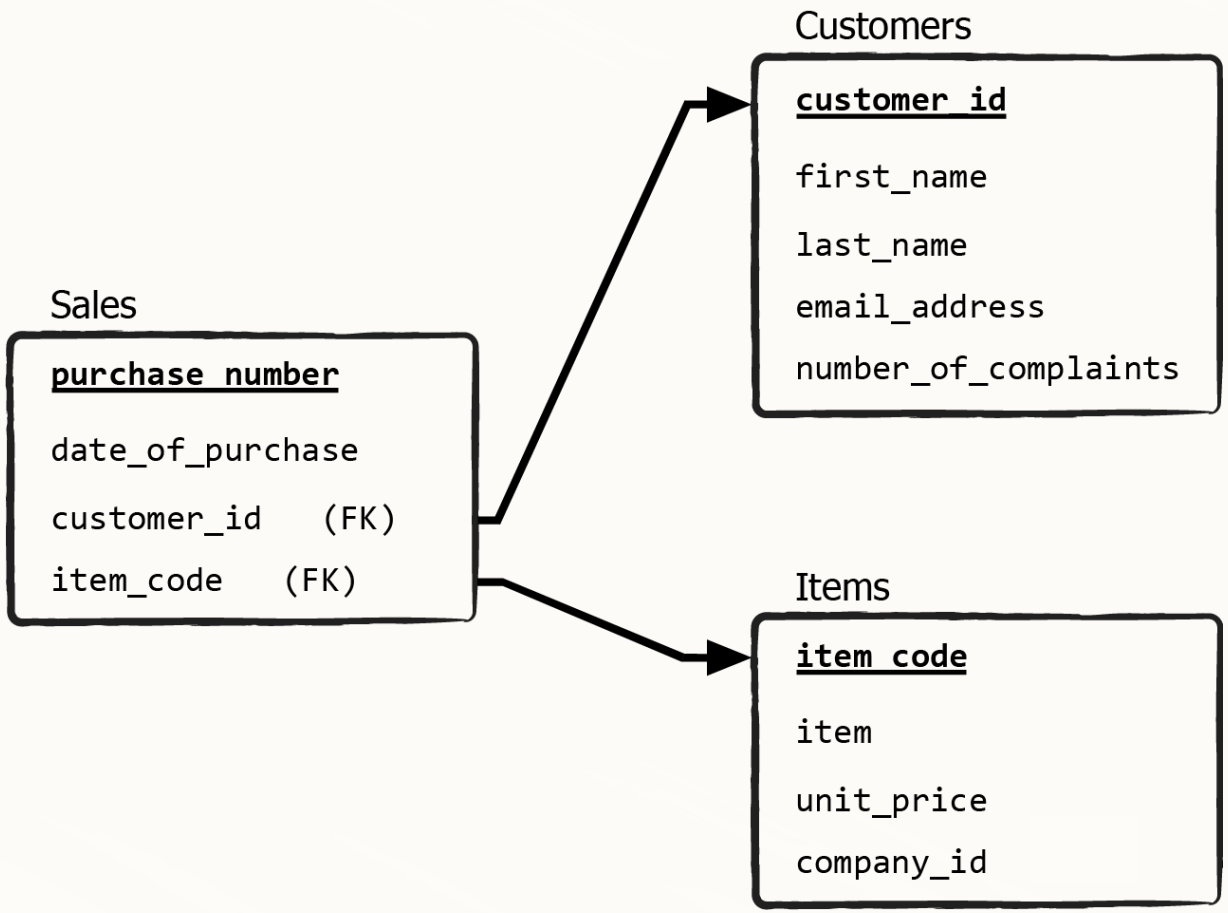
Relational Schemas: Foreign Key

foreign key

identifies the relationships between tables, not the tables themselves

365 DataScience

Relational Schemas: Foreign Key

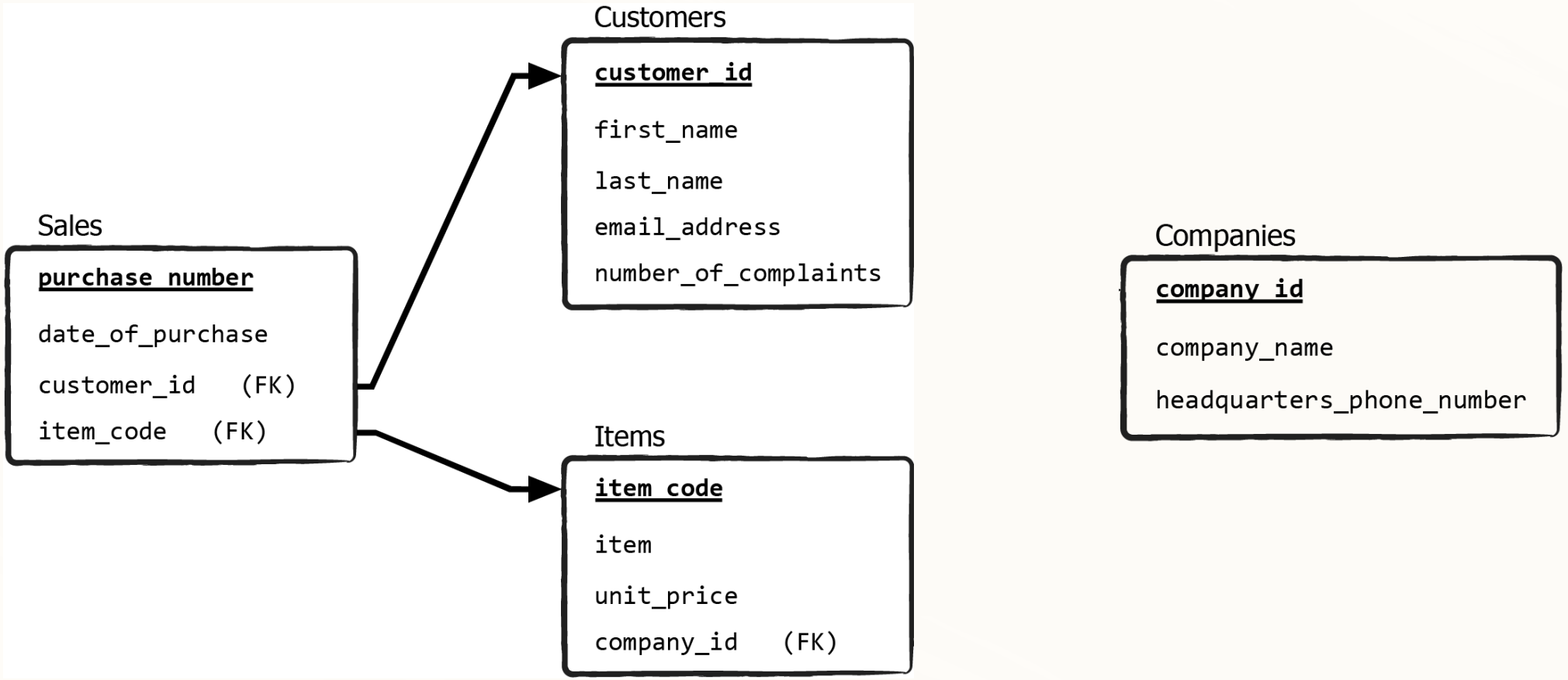


365 DataScience

The Concept of Relational Schemas: Unique Key & Null Values

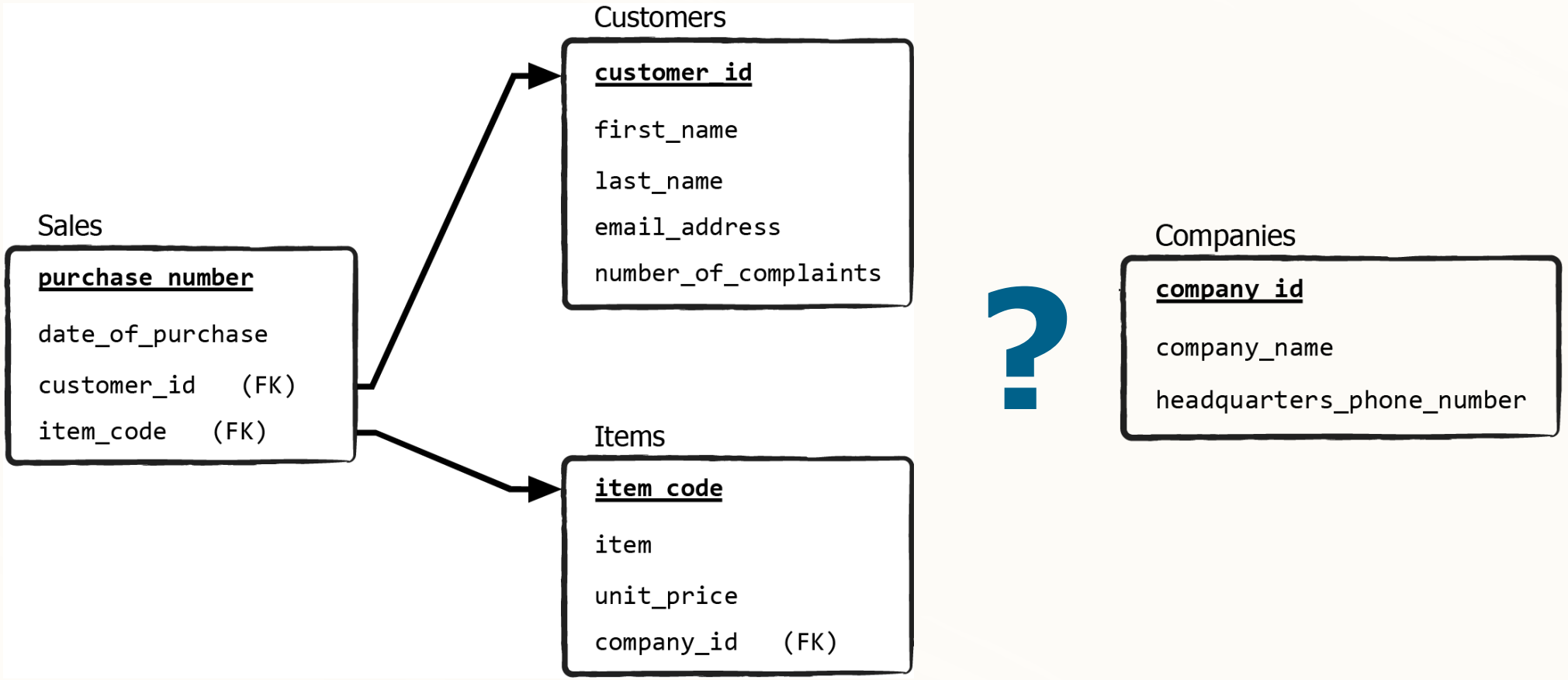
365 DataScience

Relational Schemas: Unique Key & Null Values



365 DataScience

Relational Schemas: Unique Key & Null Values



365 DataScience

Relational Schemas: Unique Key & Null Values

Companies		
company_id	headquarters_phone_number	company
1	+1 (202) 555-0196	Company A
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You can have two or more companies with the same name

365 DataScience

Relational Schemas: Unique Key & Null Values

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You *cannot* have two US numbers that are completely identical

365 DataScience

Relational Schemas: Unique Key & Null Values

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?

365 DataScience

Relational Schemas: Unique Key & Null Values

unique key

used whenever you would like to specify that you don’t want to see duplicate data in a given field

365 DataScience

Relational Schemas: Unique Key & Null Values

	primary key	unique key
NULL VALUES	no	yes

365 DataScience

Relational Schemas: Unique Key & Null Values

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3	+1 (229) 853-9913	Company C
4	+1 (618) 369-7392	Company D

365 DataScience

Relational Schemas: Unique Key & Null Values

	primary key	unique key
NULL VALUES	no	yes
NUMBER OF KEYS	1	0, 1, 2…

365 DataScience

Relational Schemas: Unique Key & Null Values

	primary key	unique key
NULL VALUES	no	yes
NUMBER OF KEYS	1	0, 1, 2…
APPLICATION TO MULTIPLE COLUMNS	yes	yes

365 DataScience

Relational Schemas: Unique Key & Null Values

Companies		
company_id	headquarters_phone_number	company
1	+1 (202) 555-0196	Company A
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365 DataScience

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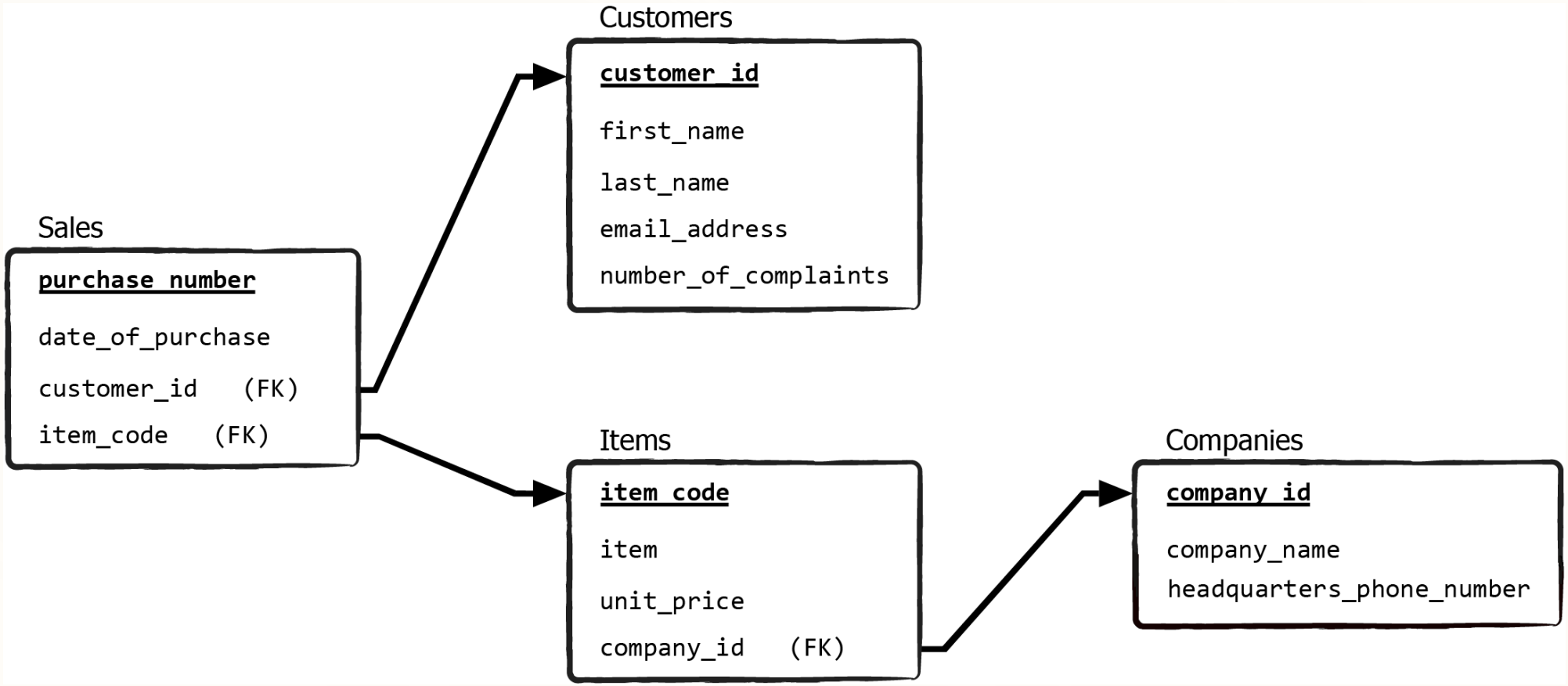

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The Concept of Relational Schemas: Relationships between Tables

365 DataScience

Relationships

- Relationships

365 DataScience

Relationships

Relationships

relationships tell you how much of the data from a foreign key field can be seen in the primary key column of the table the data is related to and vice versa

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Relationships

Sales			
purchase_number	date_of_purchase	customer_id	item_code
1	9/3/2016	1	A_1
2	12/2/2016	2	C_1
3	4/15/2017	3	D_1
4	5/24/2017	1	B_2
5	5/25/2017	4	B_2
6	6/6/2017	2	B_1
7	6/10/2017	4	A_2
8	6/13/2017	3	C_1
9	7/20/2017	1	A_1
10	8/11/2017	2	B_1

Customers				
customer_id	first_name	last_name	email_address	number_of_complaints
1	John	McKinley	john.mackinley@365careers.com	0
2	Elizabeth	McFarlane	e.mcfarlane@365careers.com	2
3	Kevin	Lawrence	kevin.lawrence@365careers.com	1
4	Catherine	Winnfield	c.winnfield@365careers.com	0

365 DataScience

Relationships

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365 DataScience

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unique values

365 DataScience

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repeated values

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365 DataScience

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unique values

one-to-many type of relationship

one value from the *customer_id* column under the "Customers" table can be found **many** times in the *customer_id* column in the "Sales" table.

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Relationships

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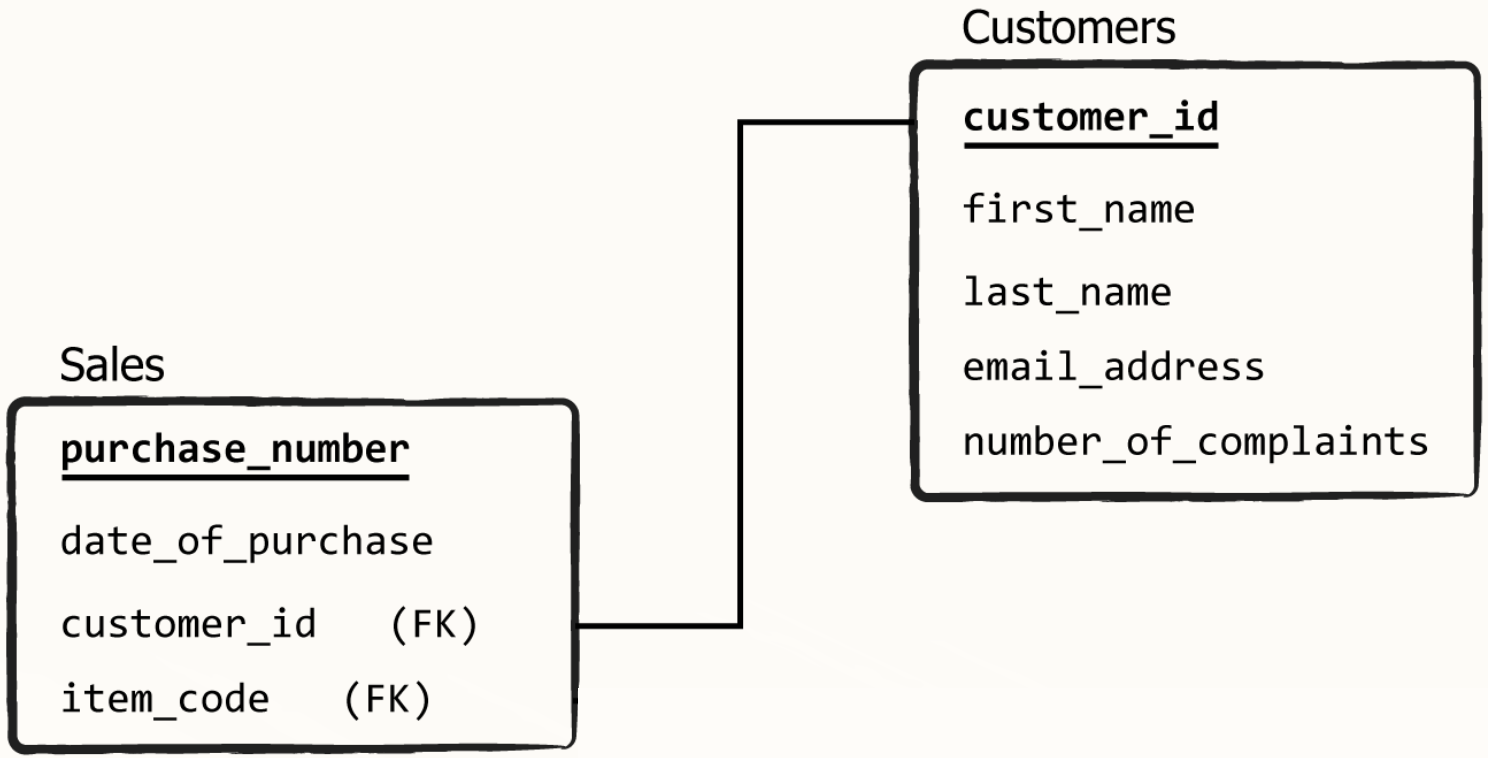
Relationships



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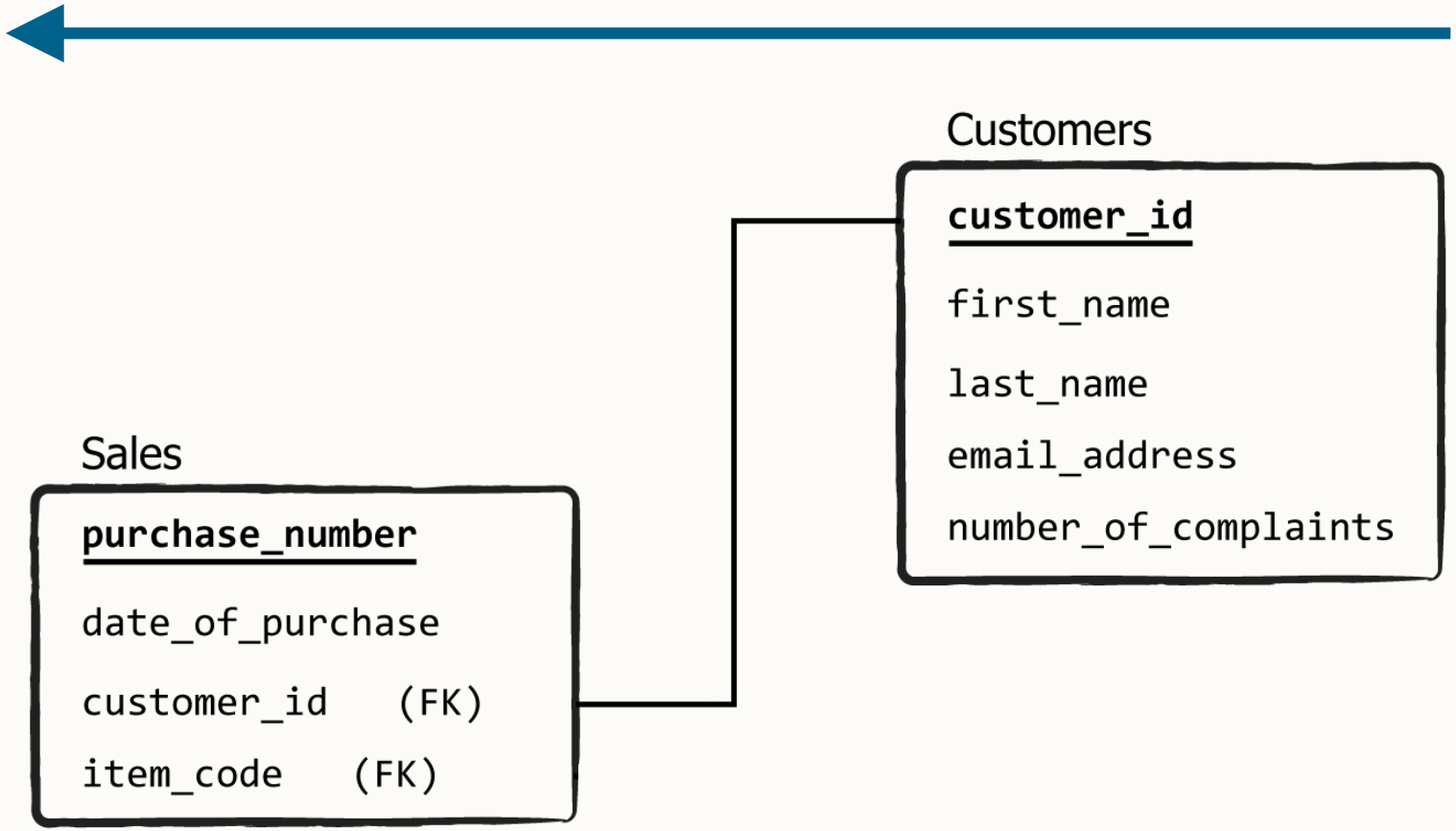
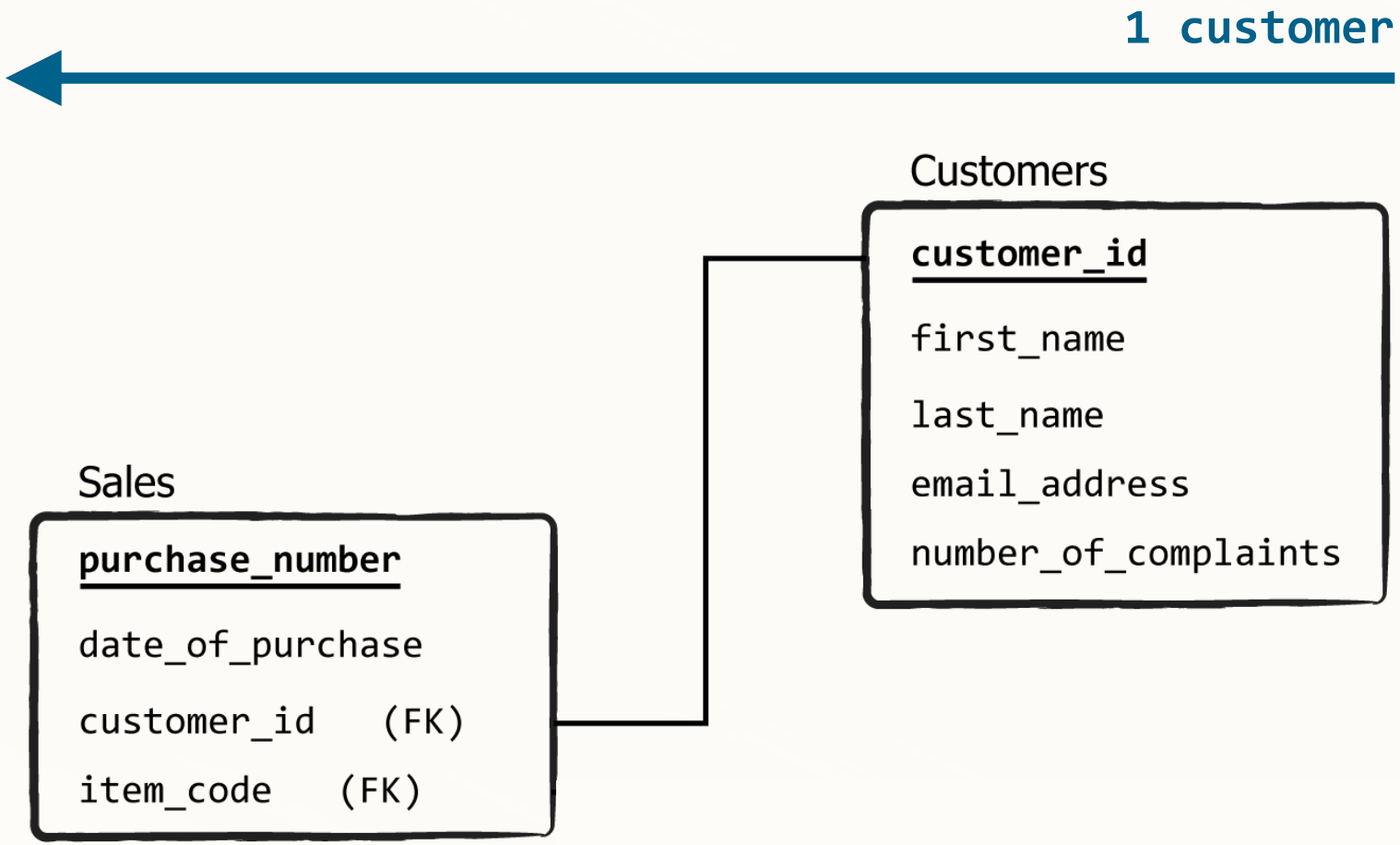
Relationships



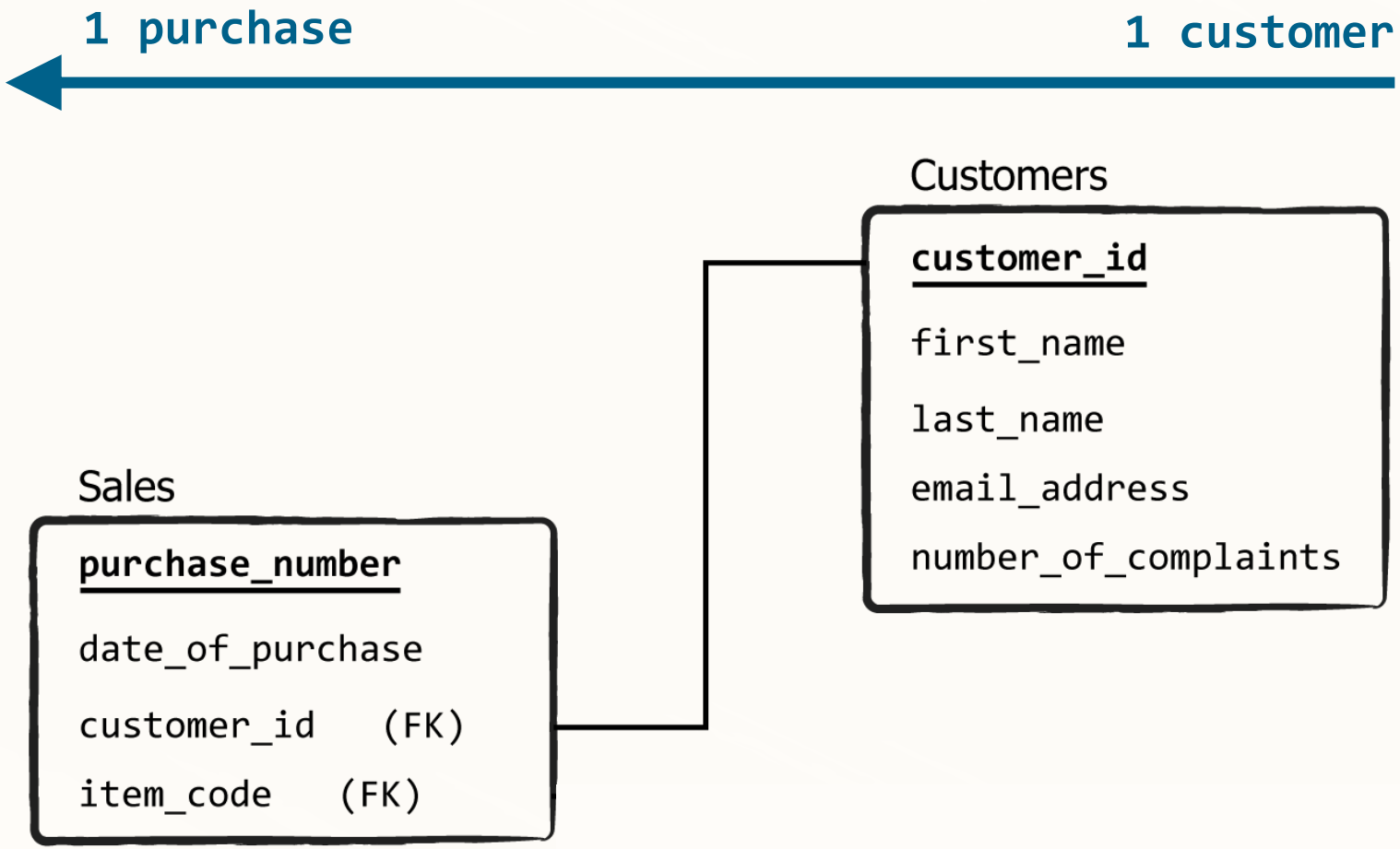
365 DataScience

Relationships



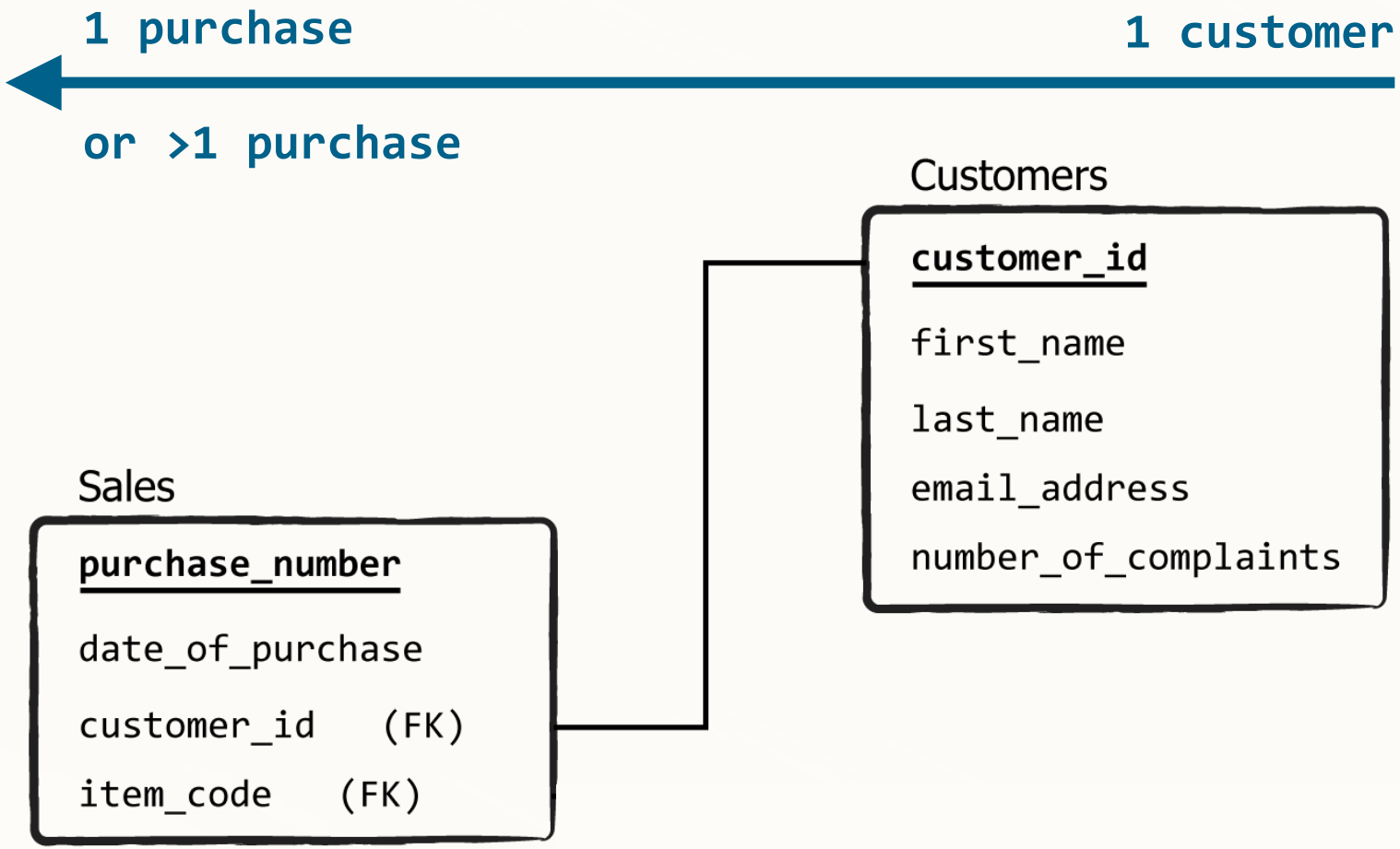
365 DataScience

Relationships



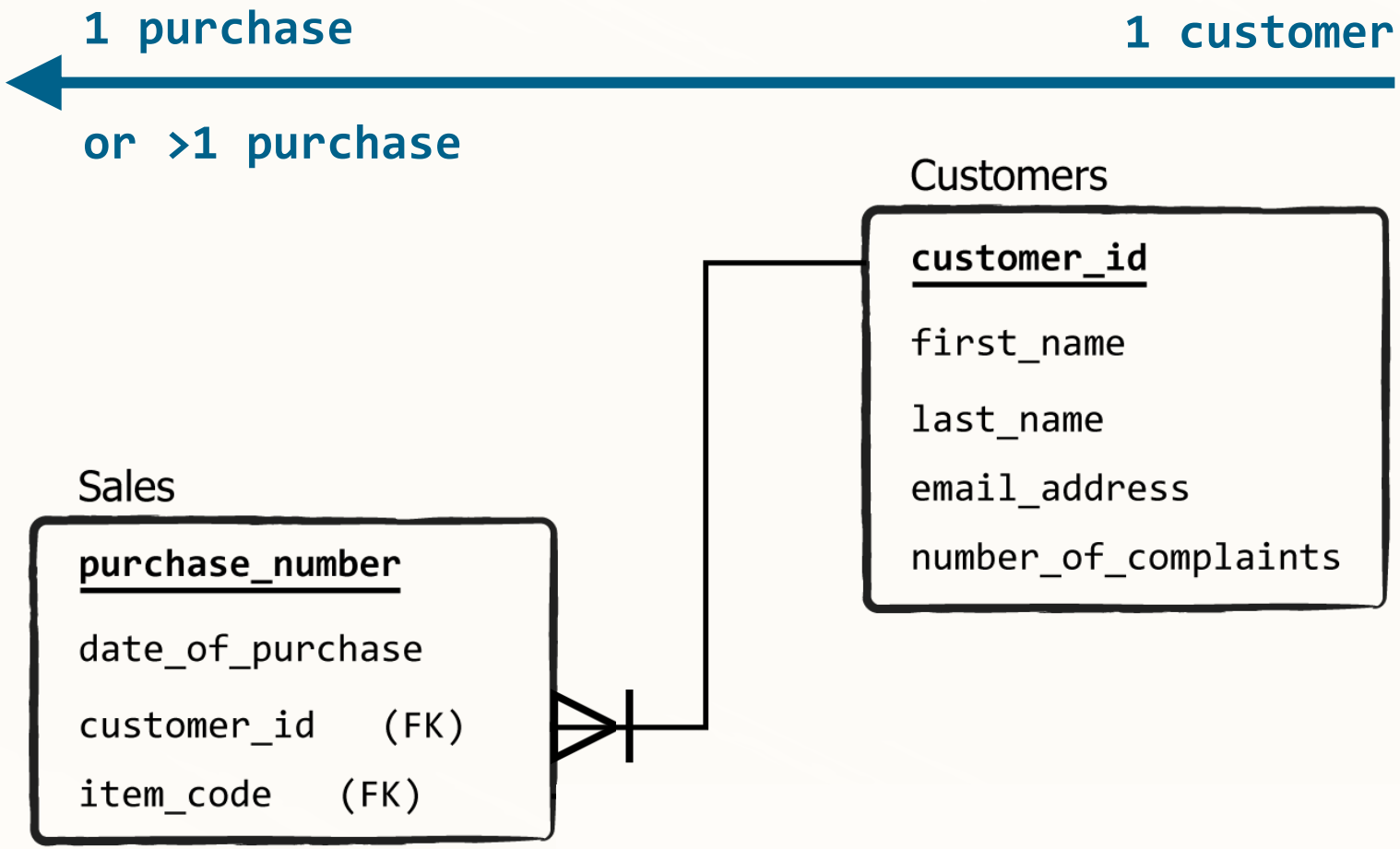
365 DataScience

Relationships



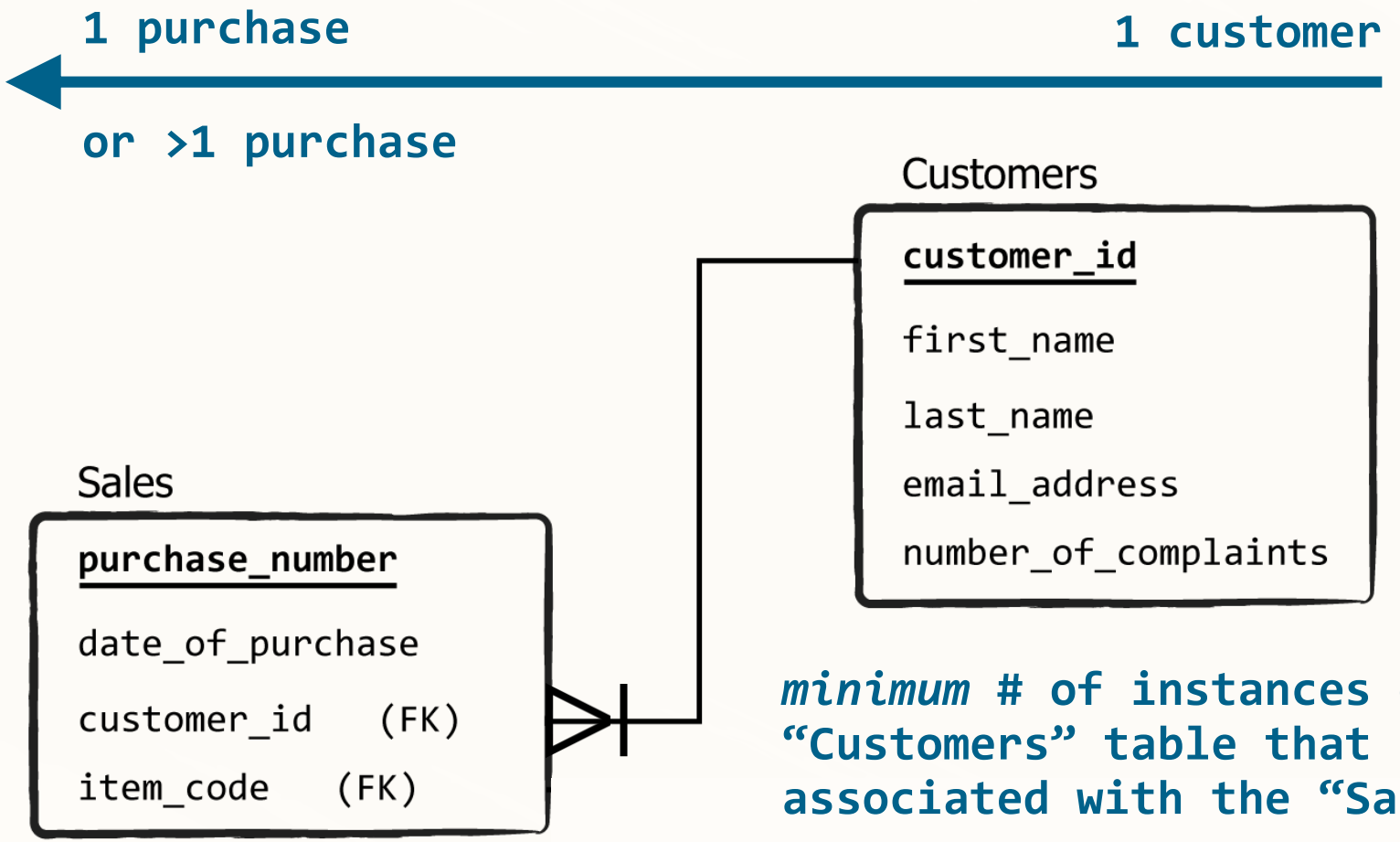
365 DataScience

Relationships



365 DataScience

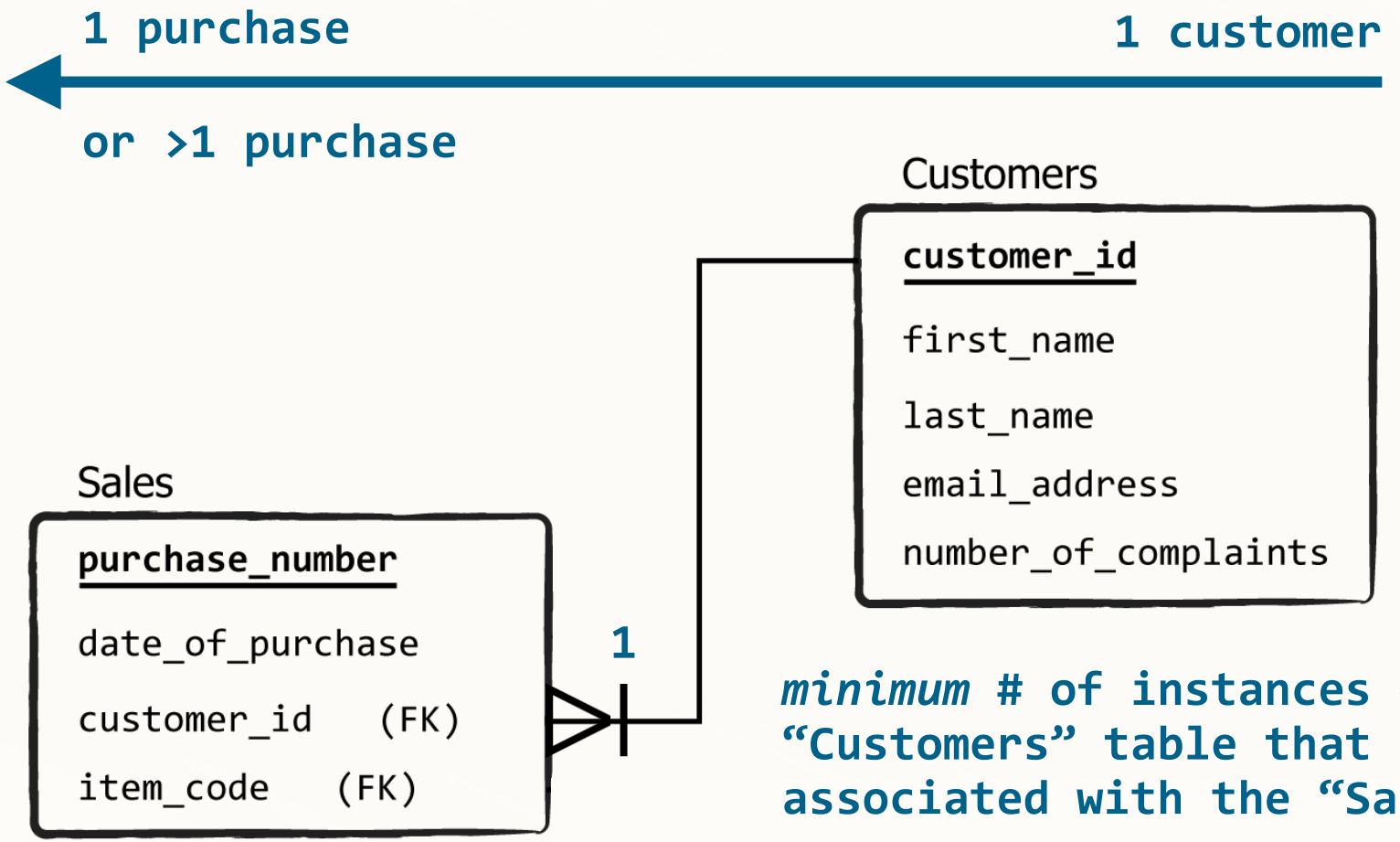
Relationships



minimum # of instances of the "Customers" table that *can be* associated with the "Sales" entity

365 DataScience

Relationships



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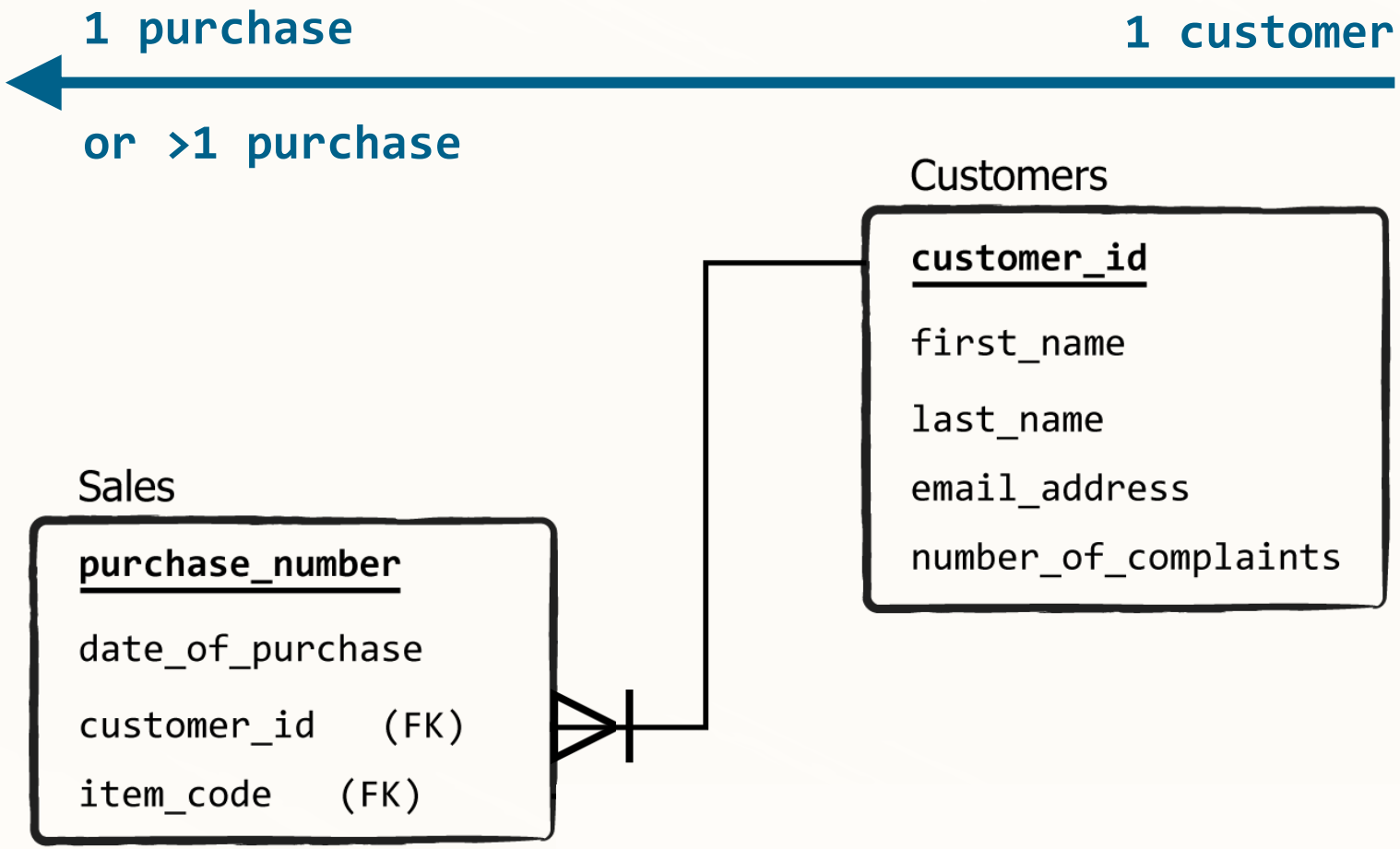
365 DataScience

Relationships



365 DataScience

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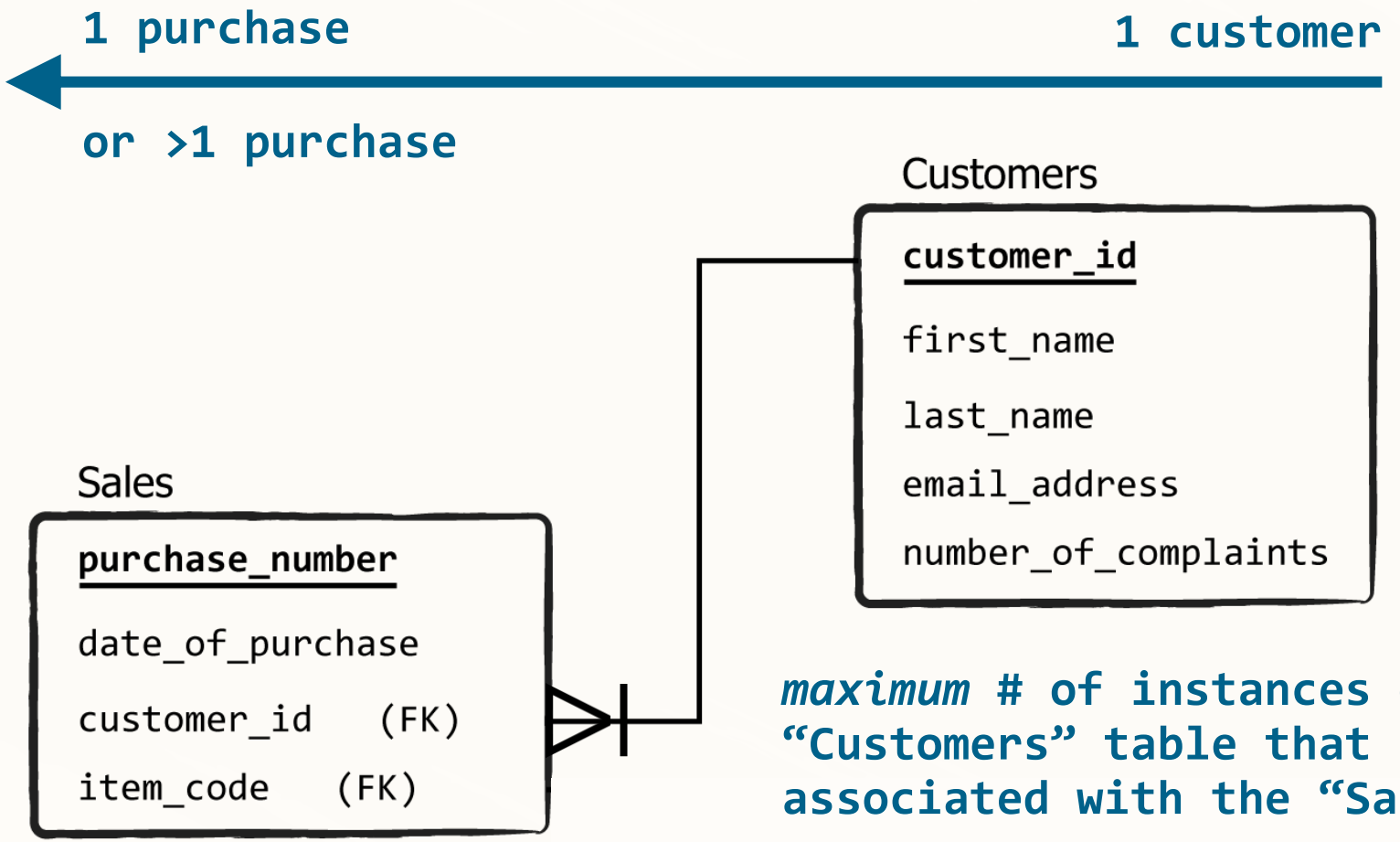

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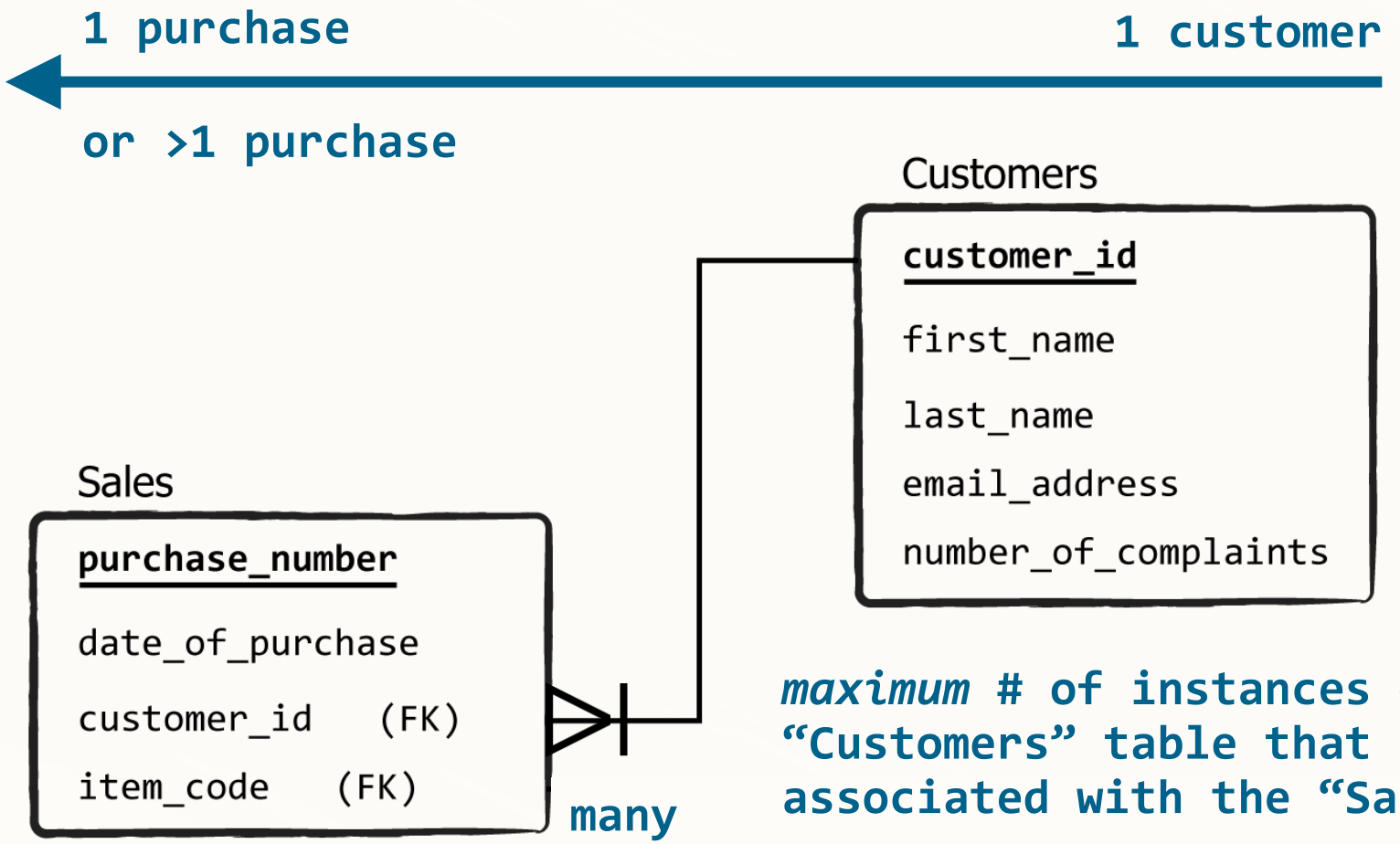
365 DataScience

Relationships



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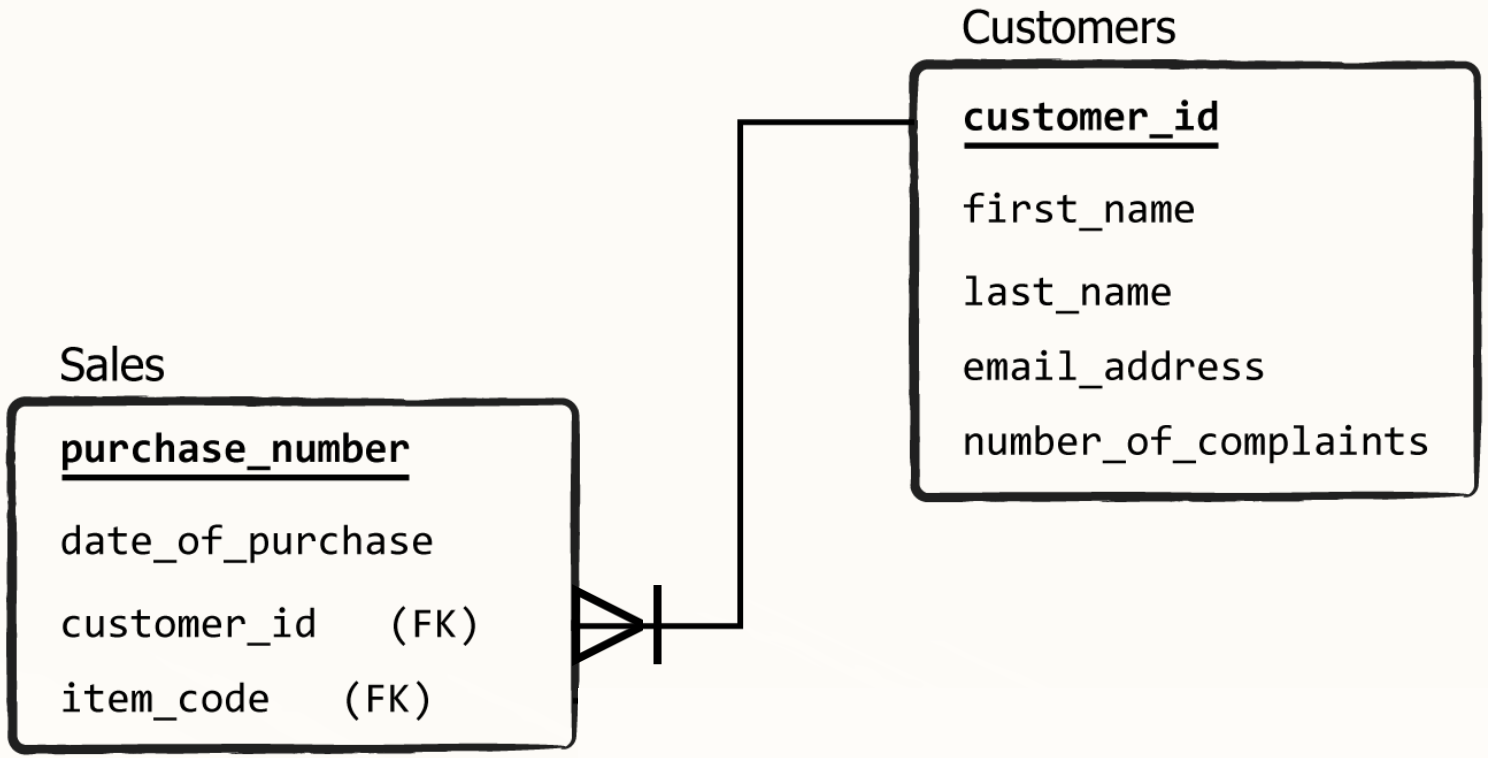
365 DataScience

Relationships



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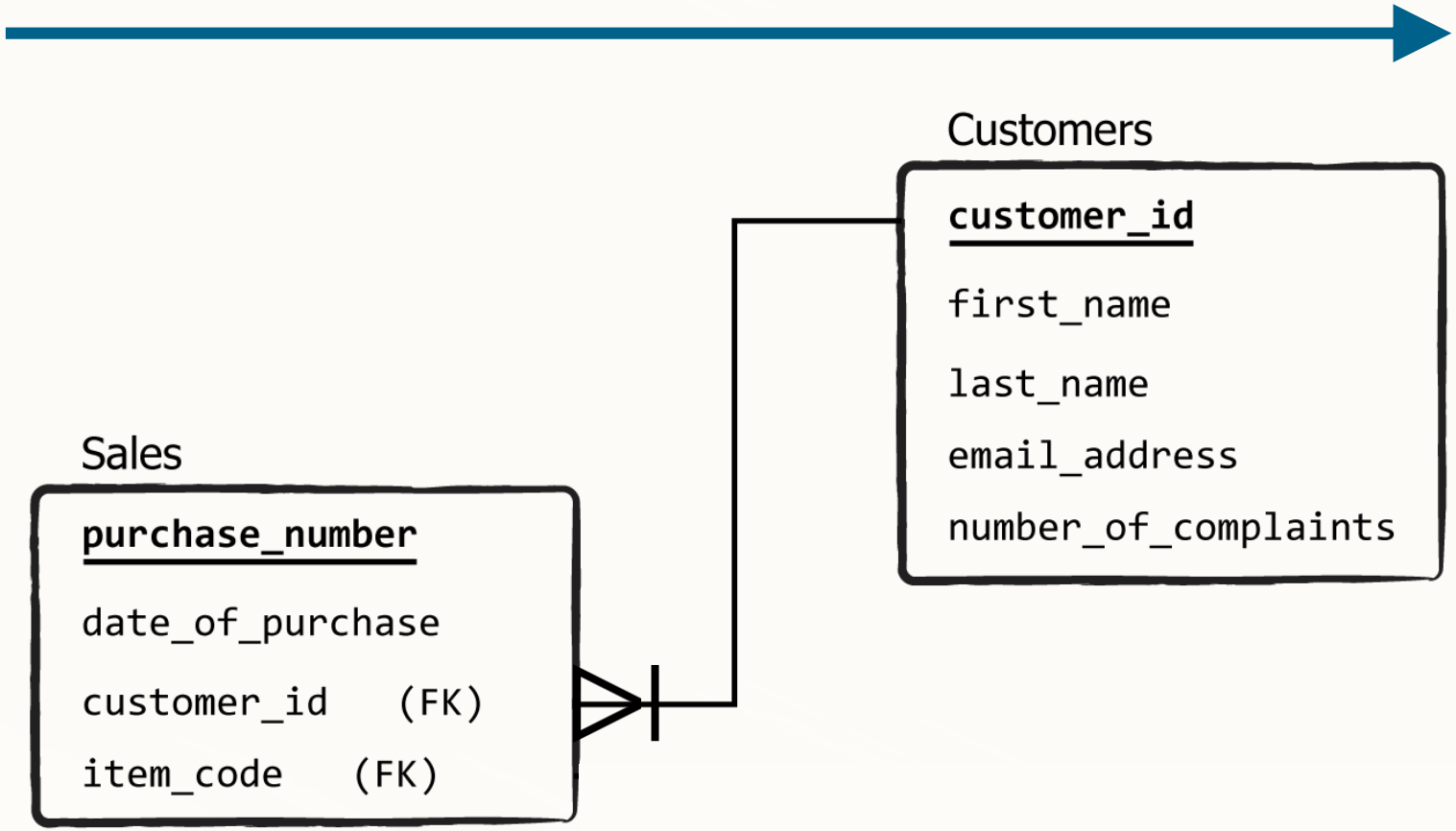
Relationships



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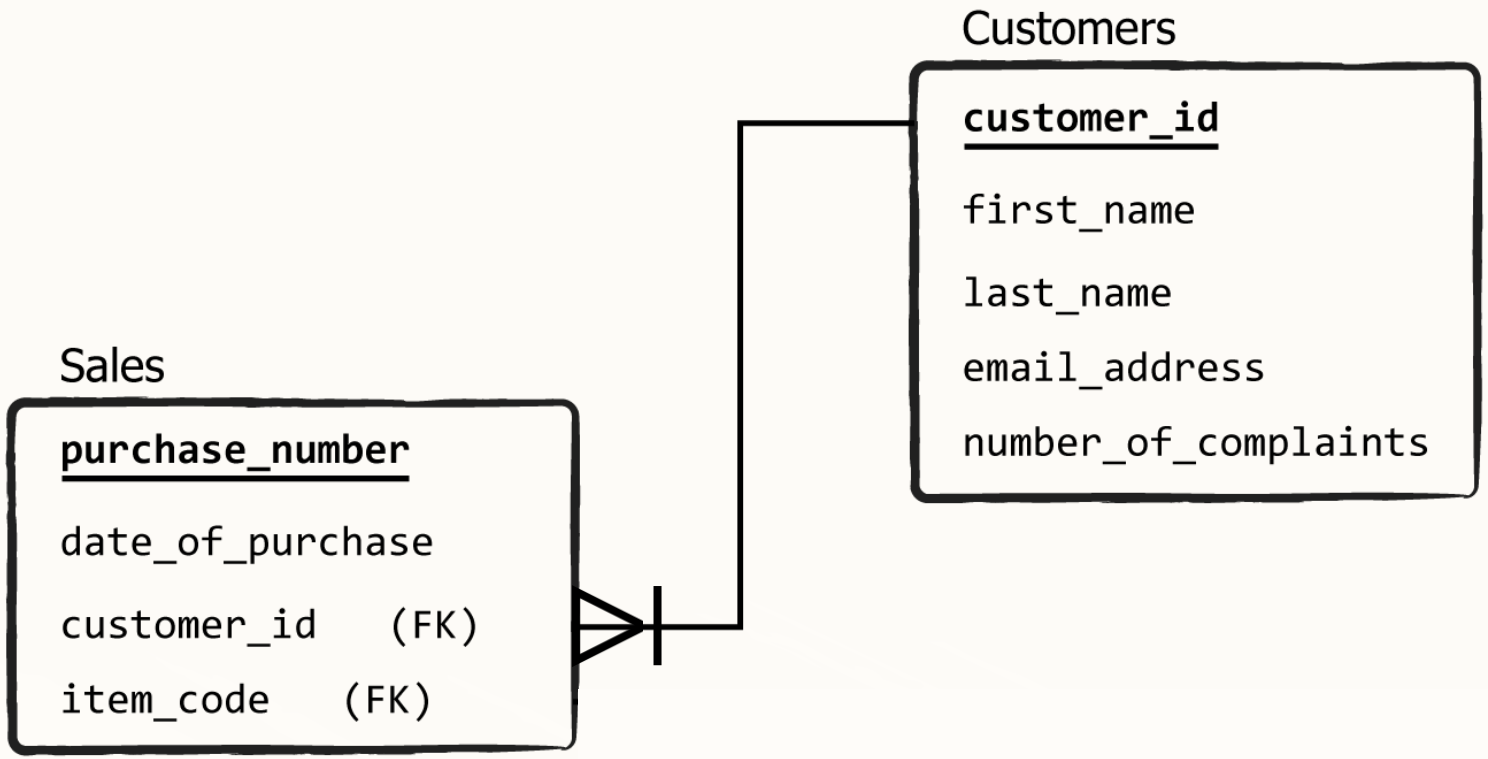
Relationships

1 purchase



365 DataScience

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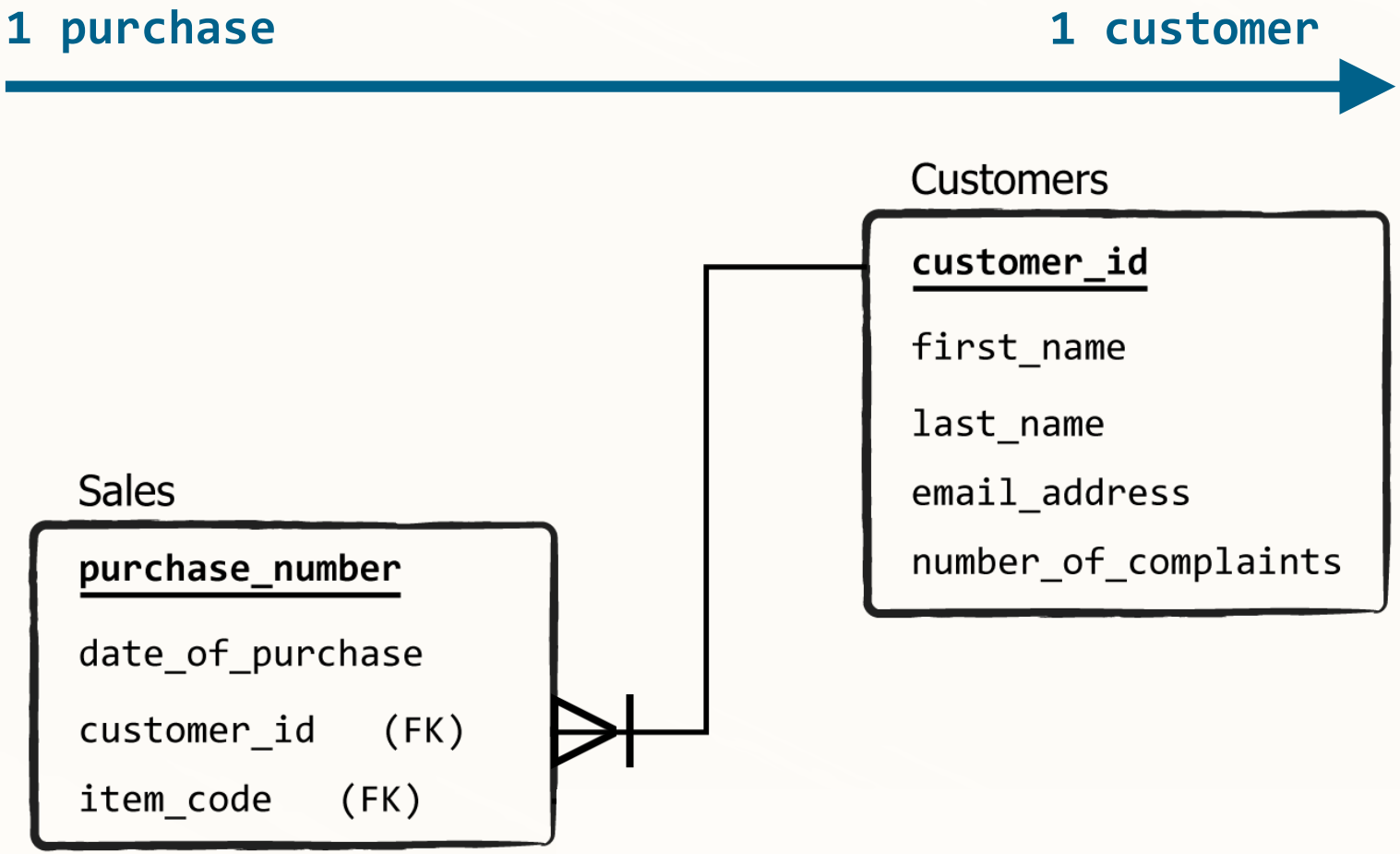

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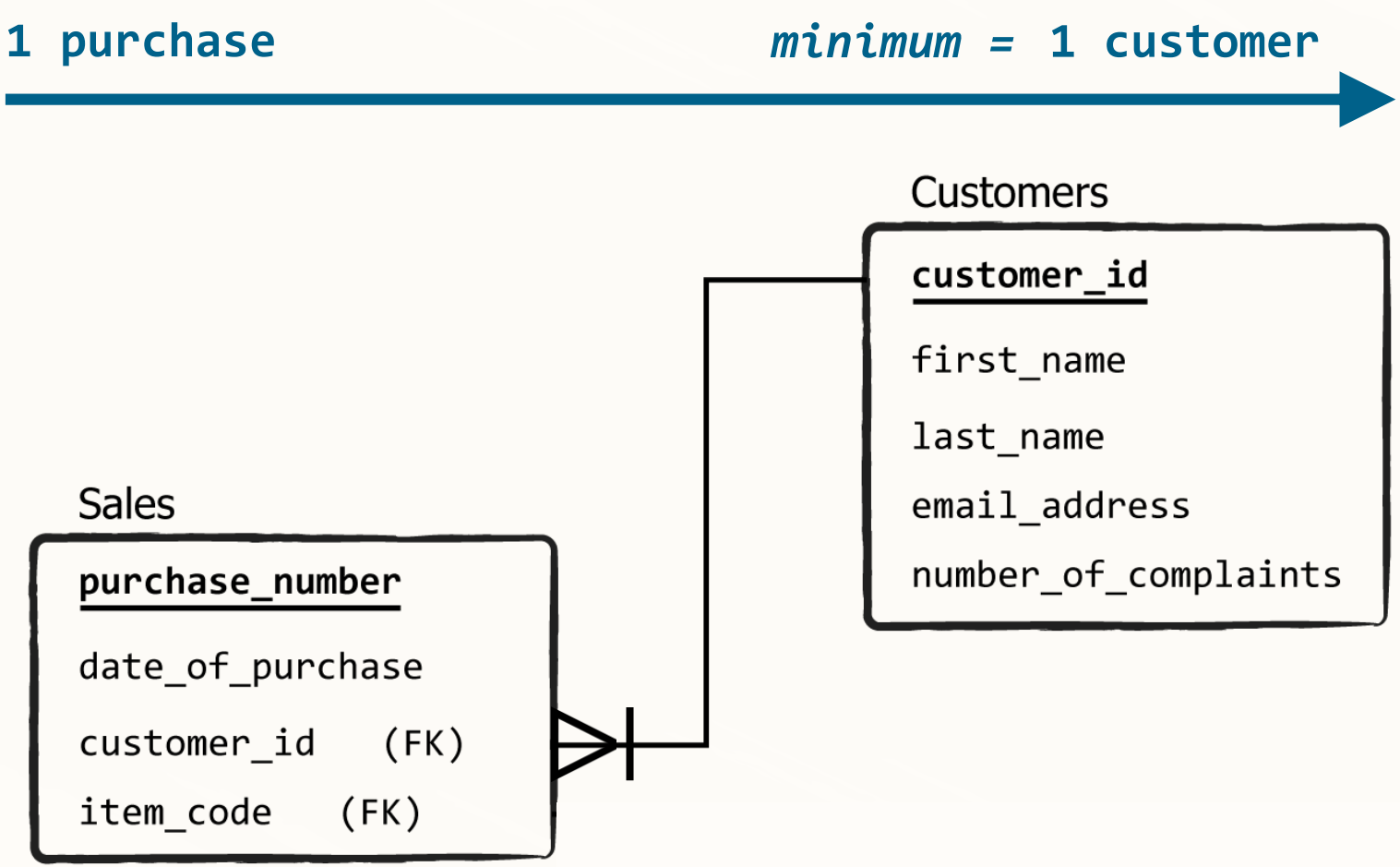

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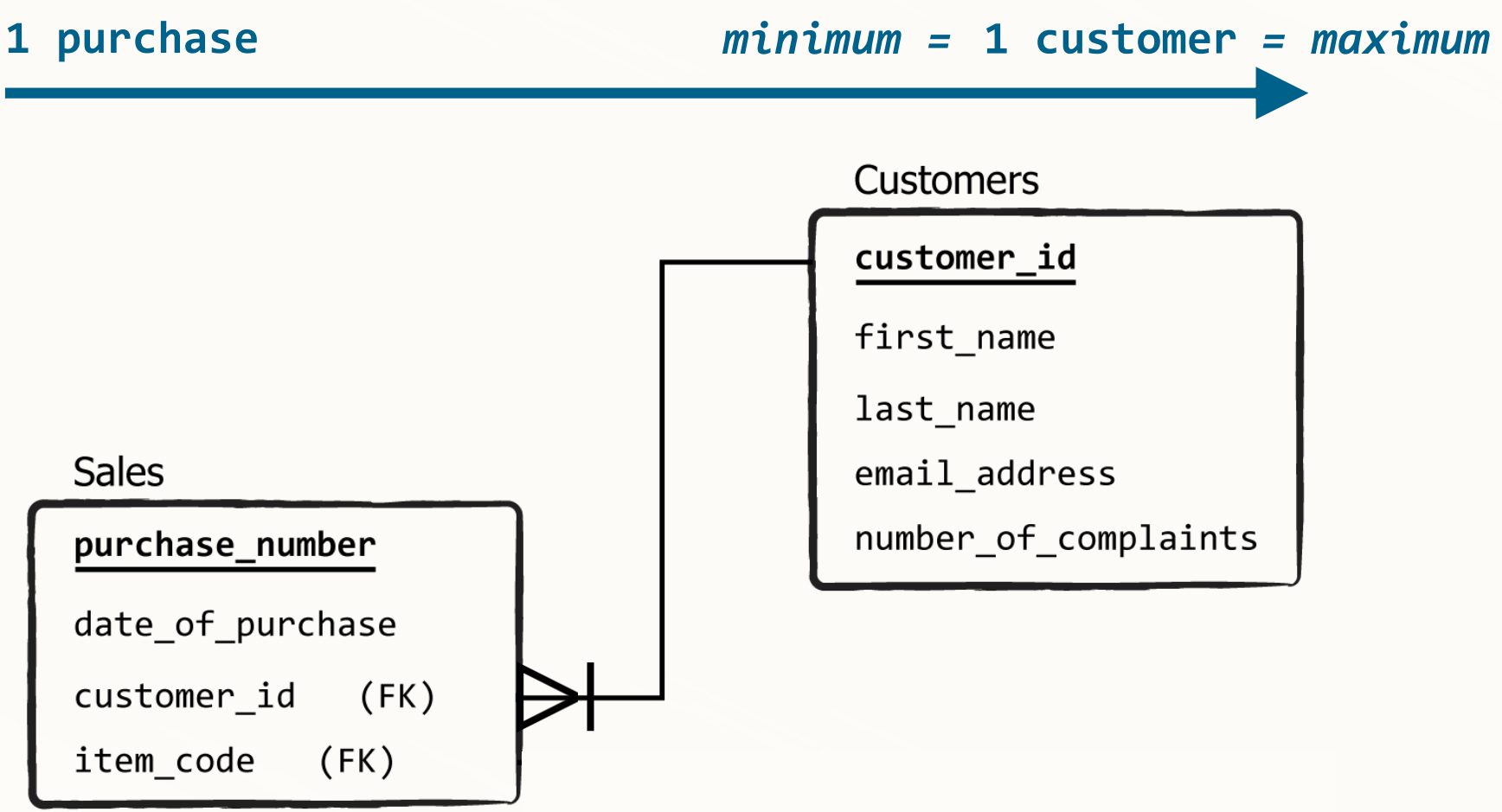

365 DataScience

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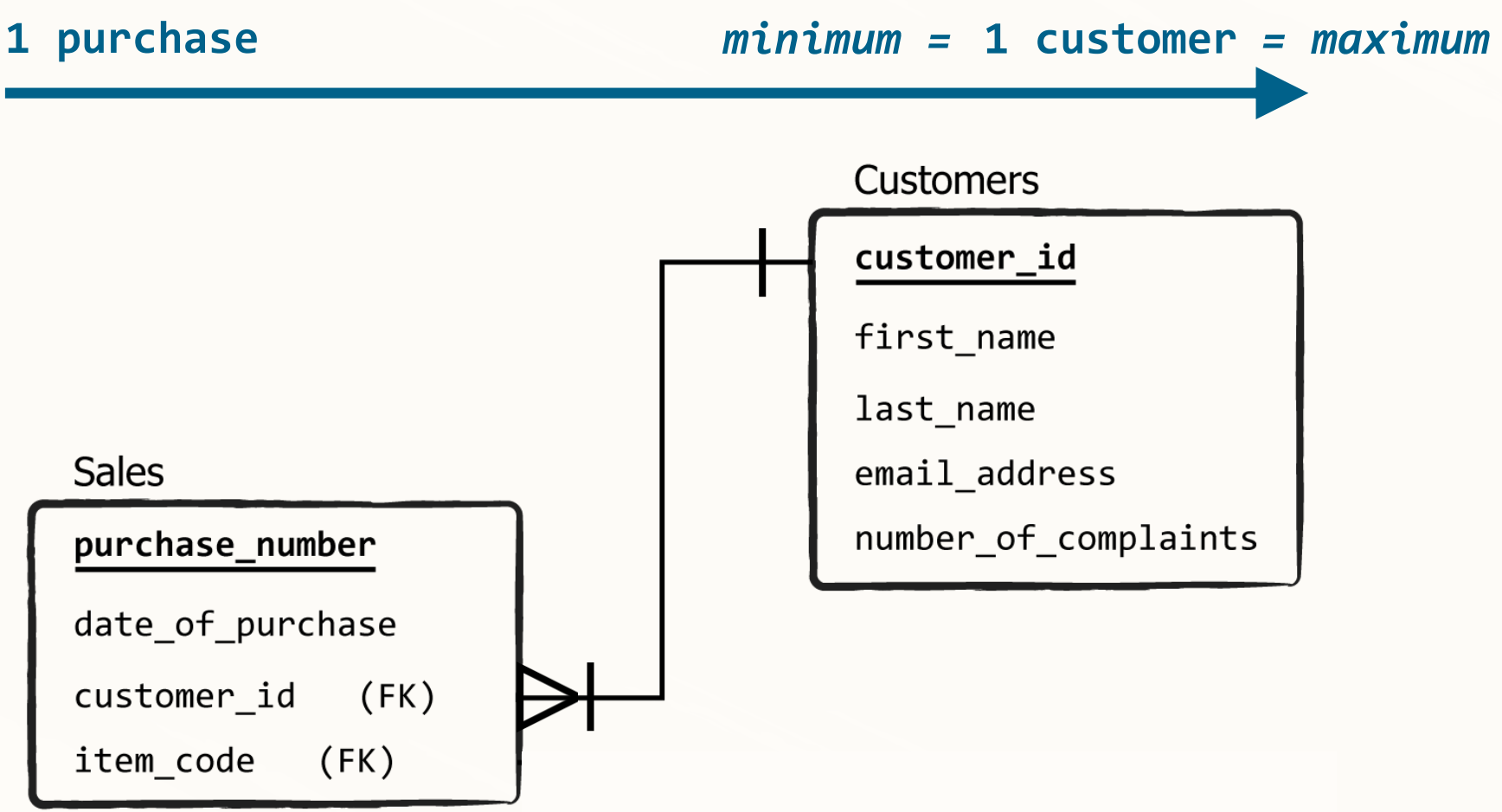

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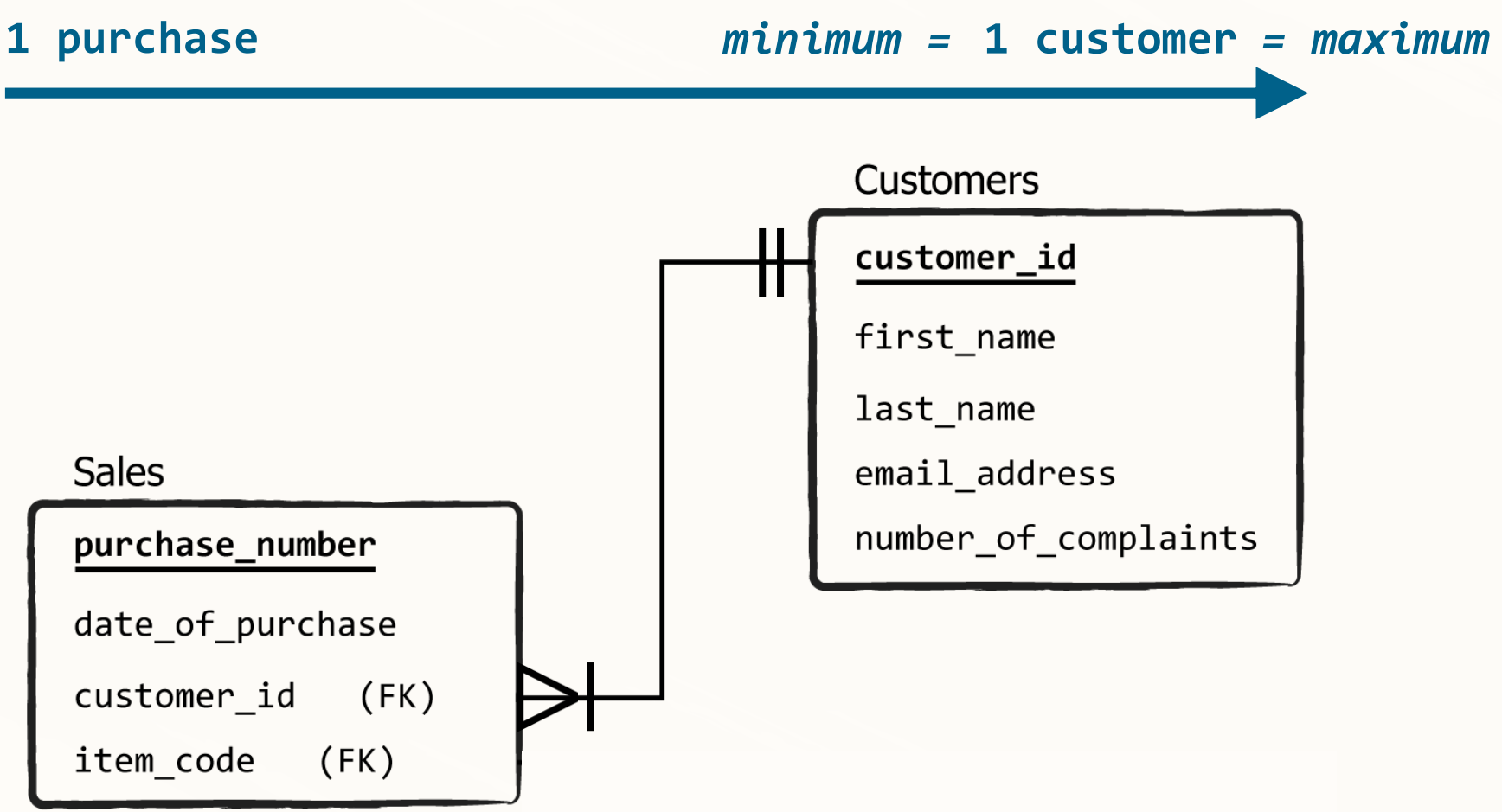

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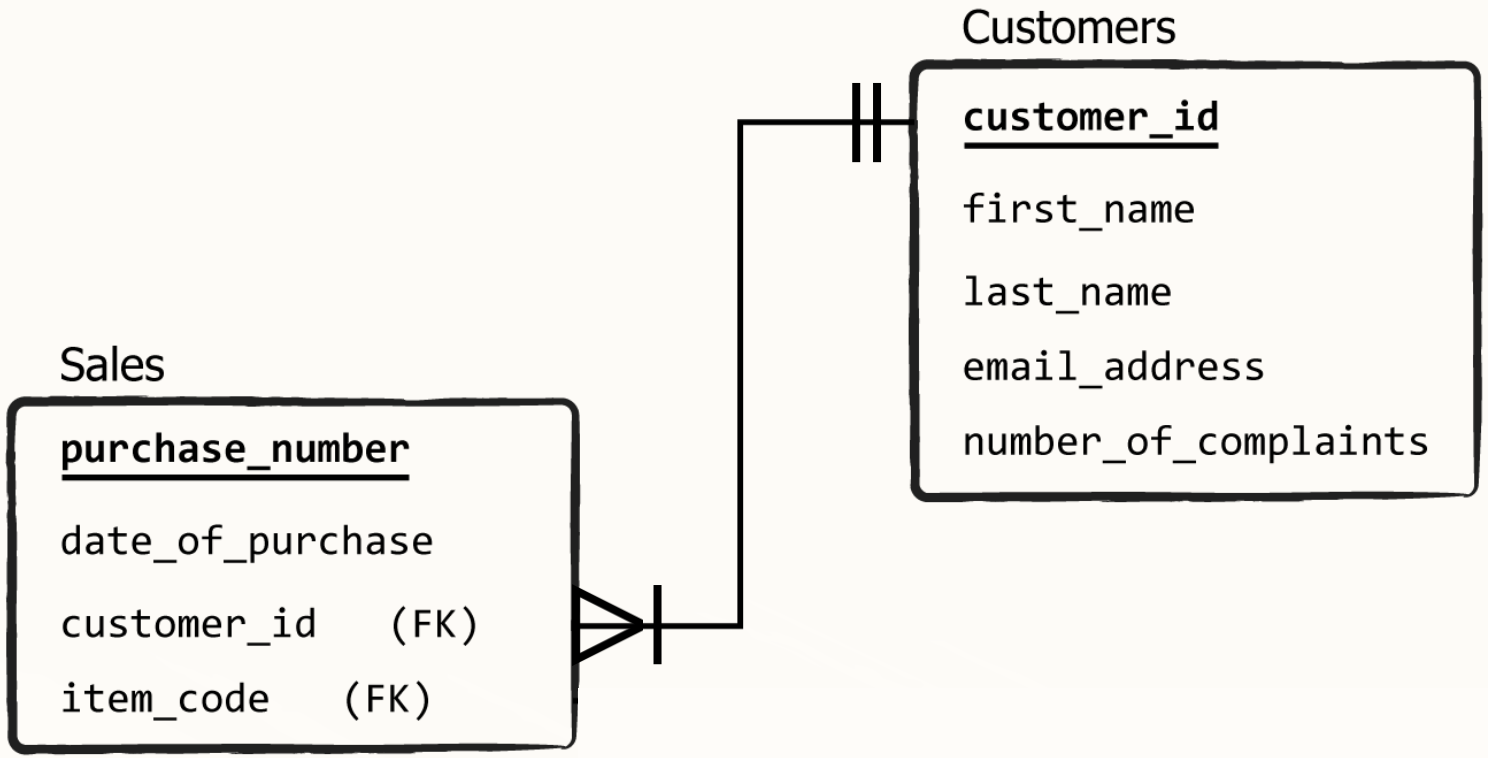

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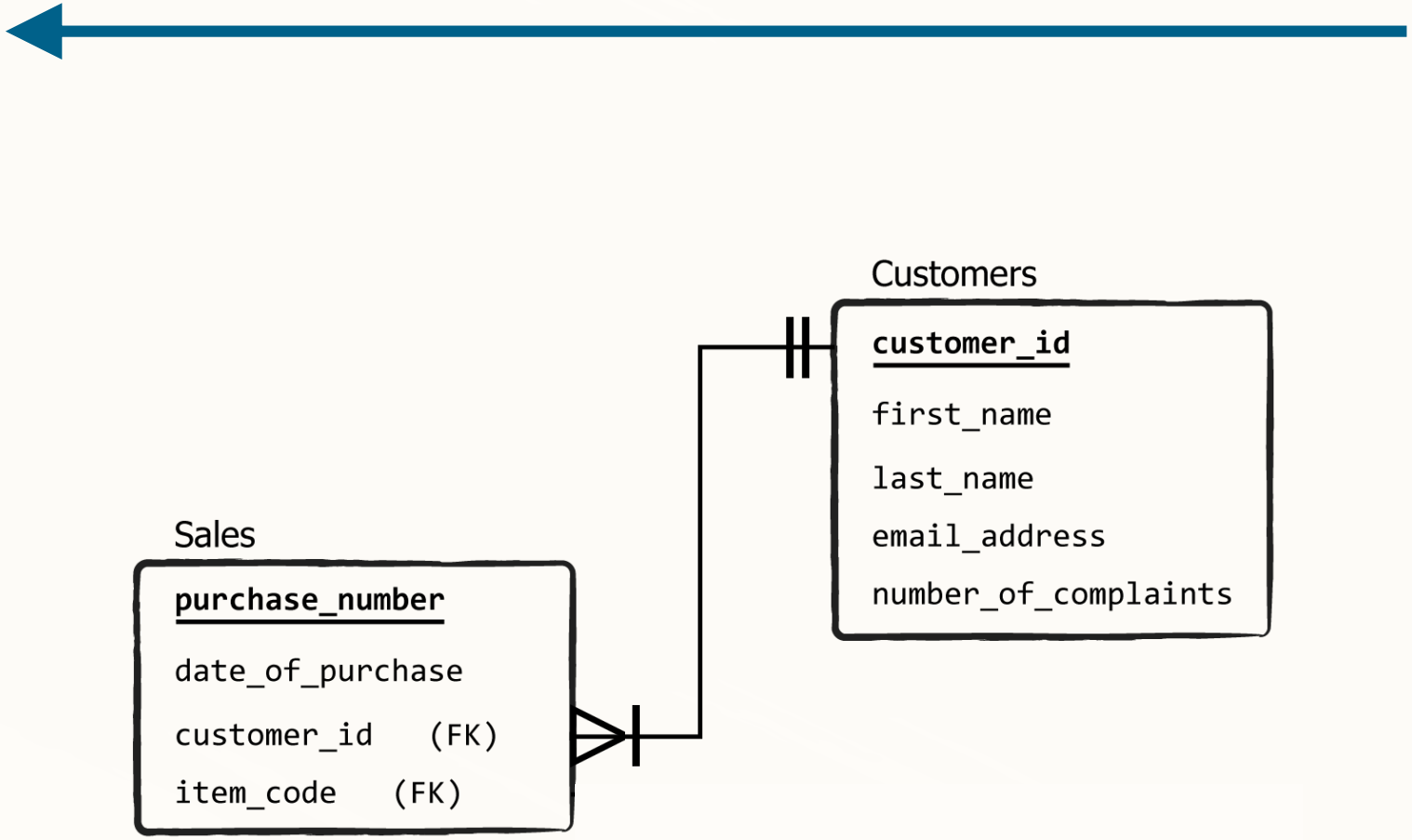

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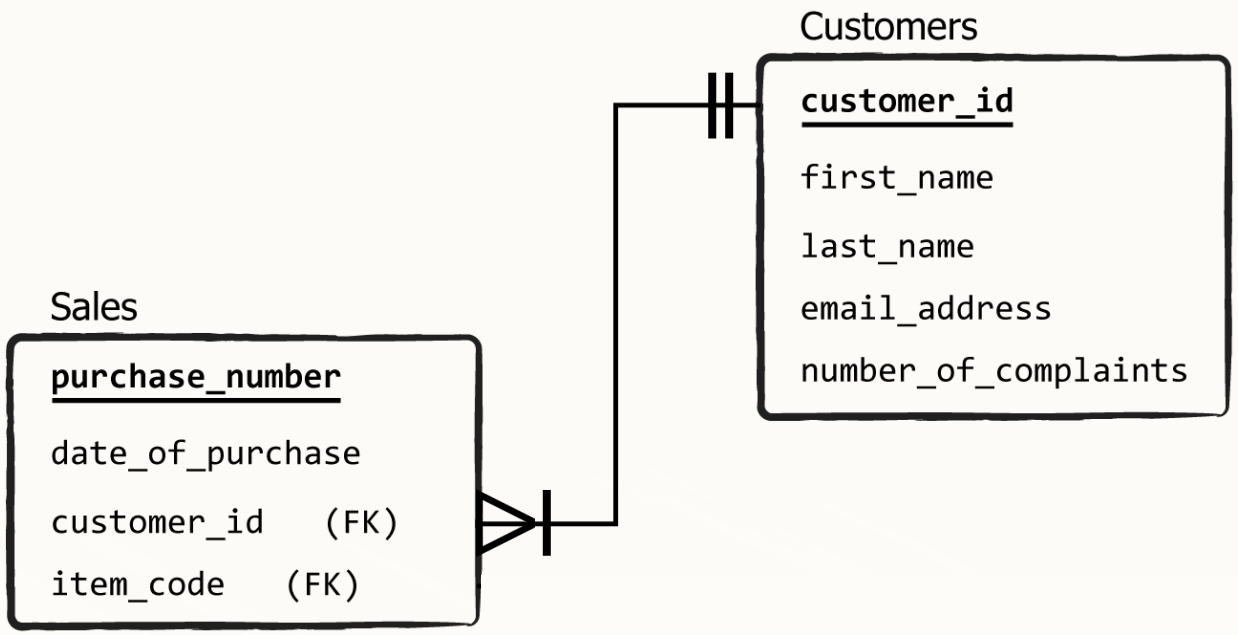
Relationships

Customers to Sales: *one-to-many*



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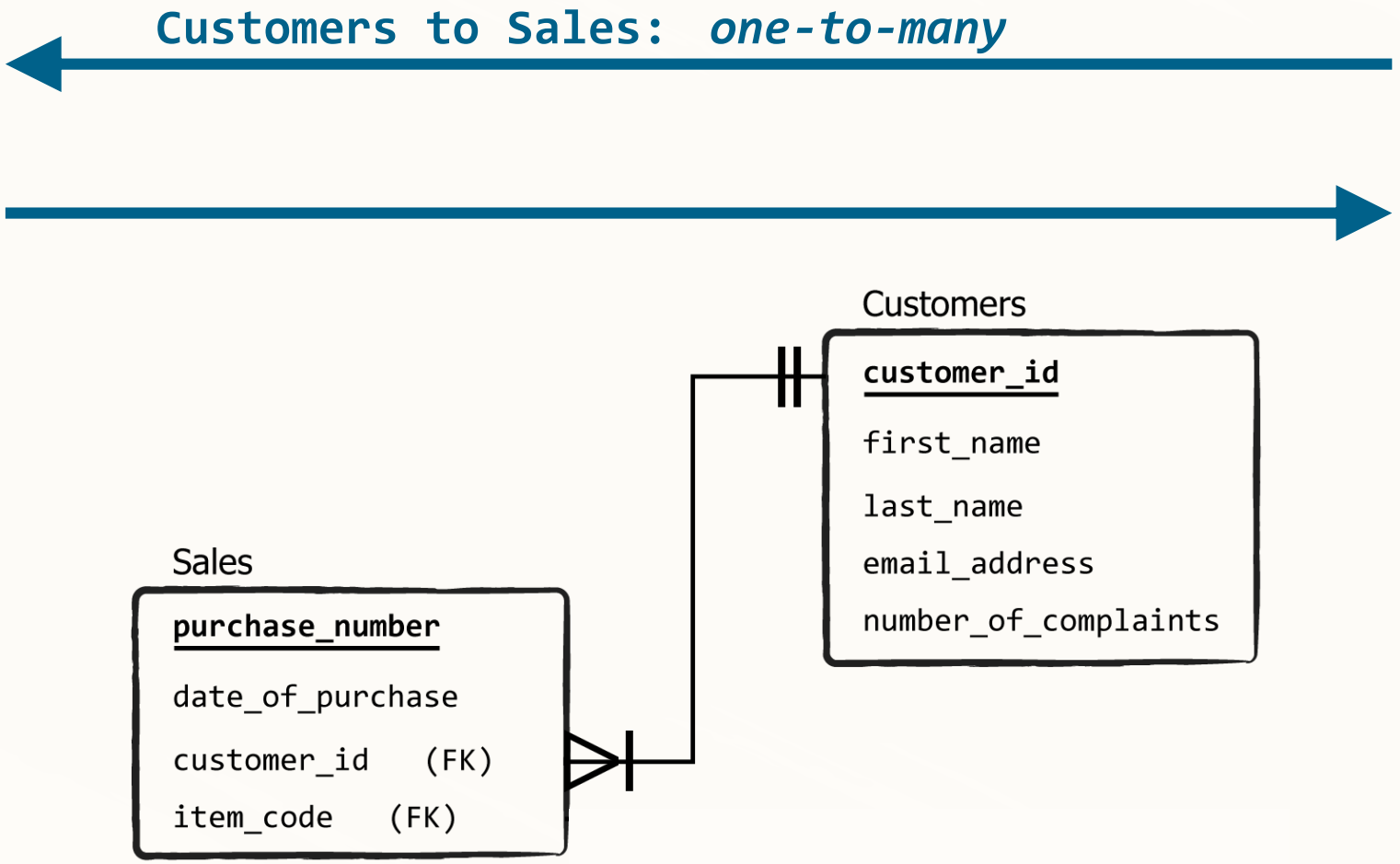

365 DataScience

Relationships

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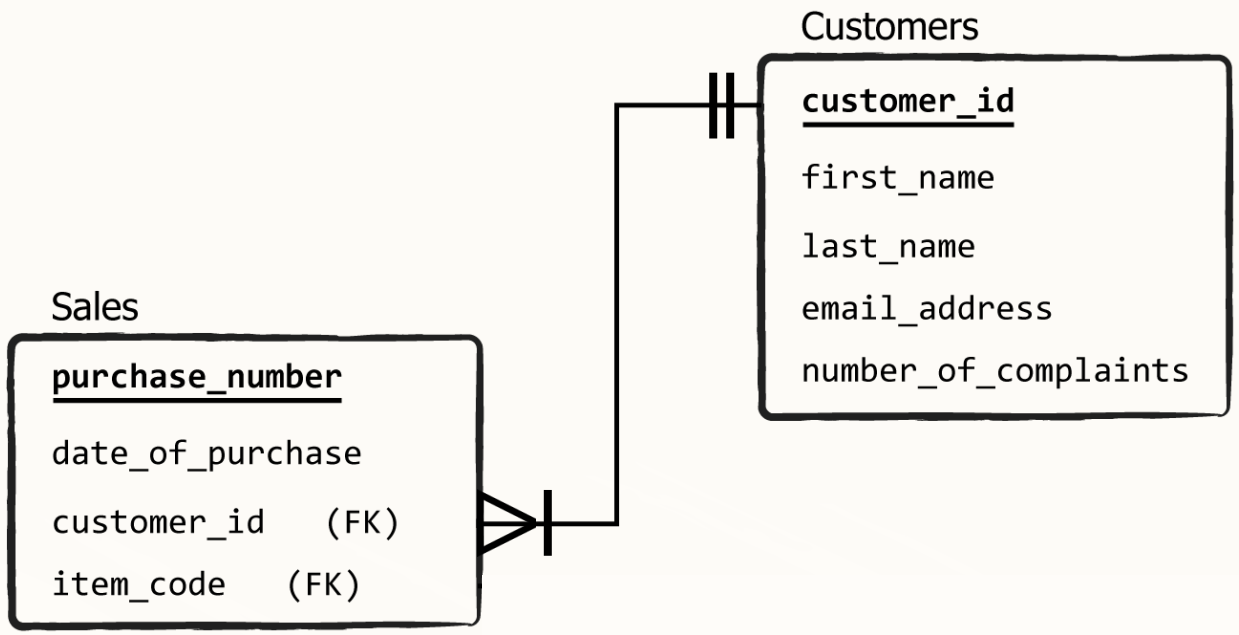
Sales to Customers: *many-to-one*



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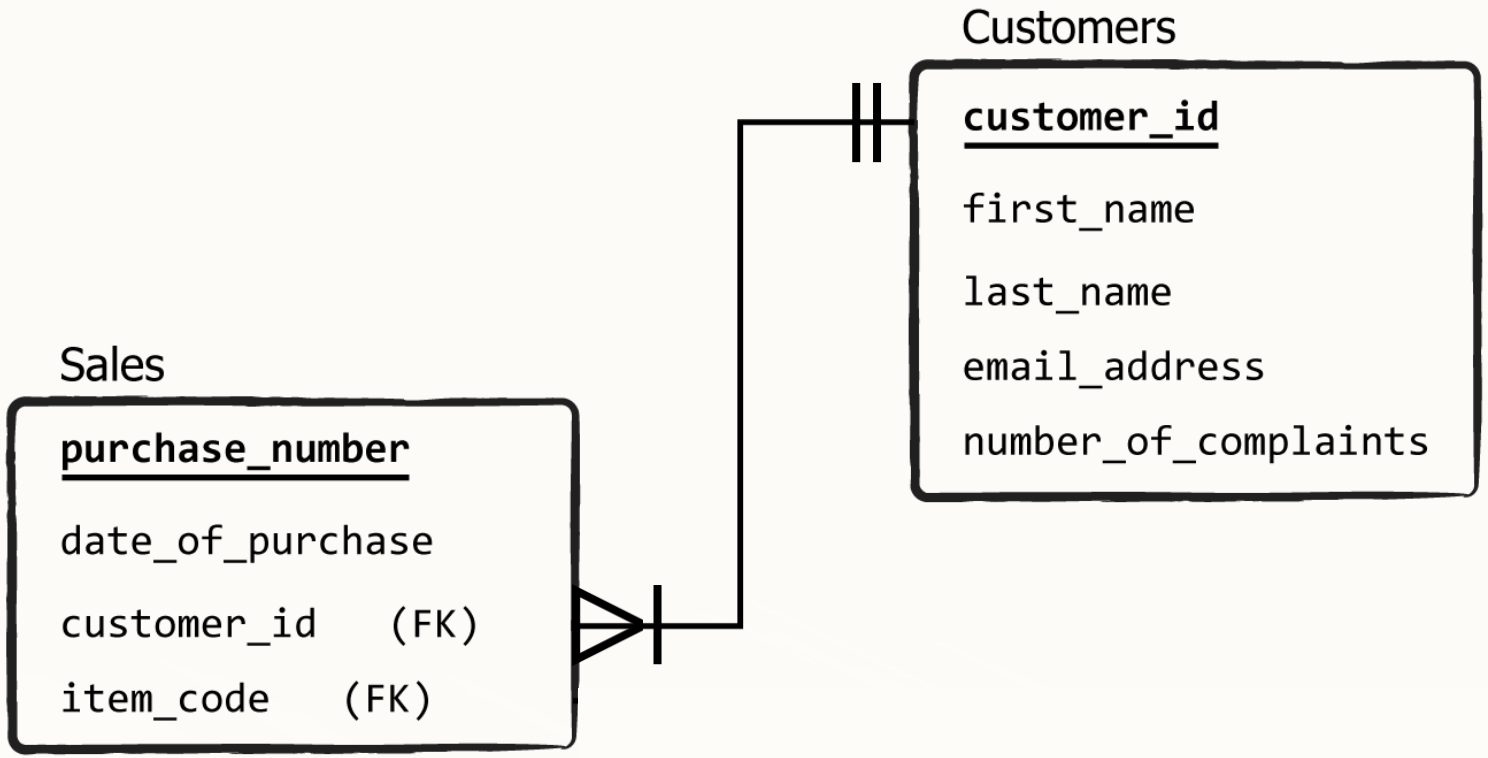

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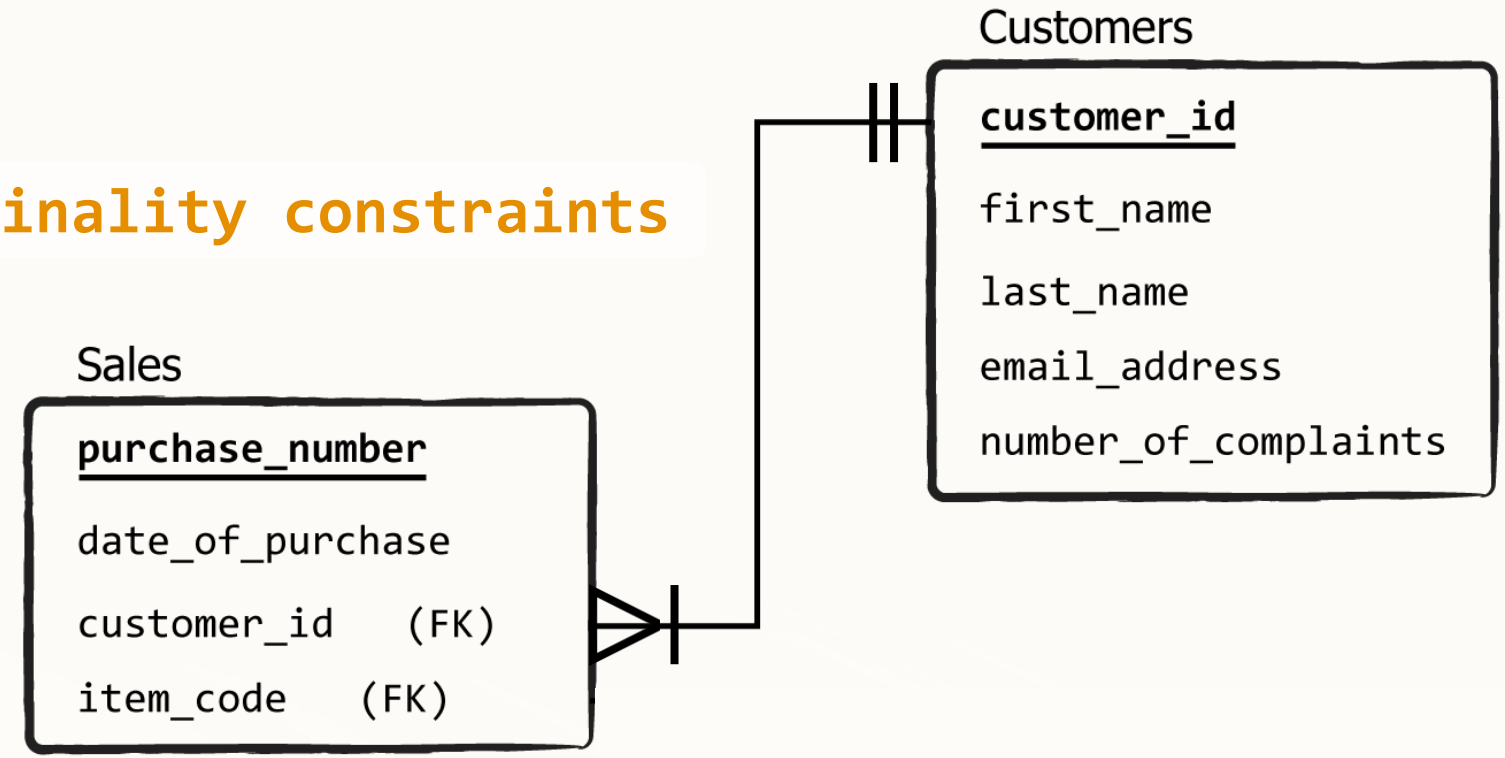
Relationships

cardinality constraints



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Relationships

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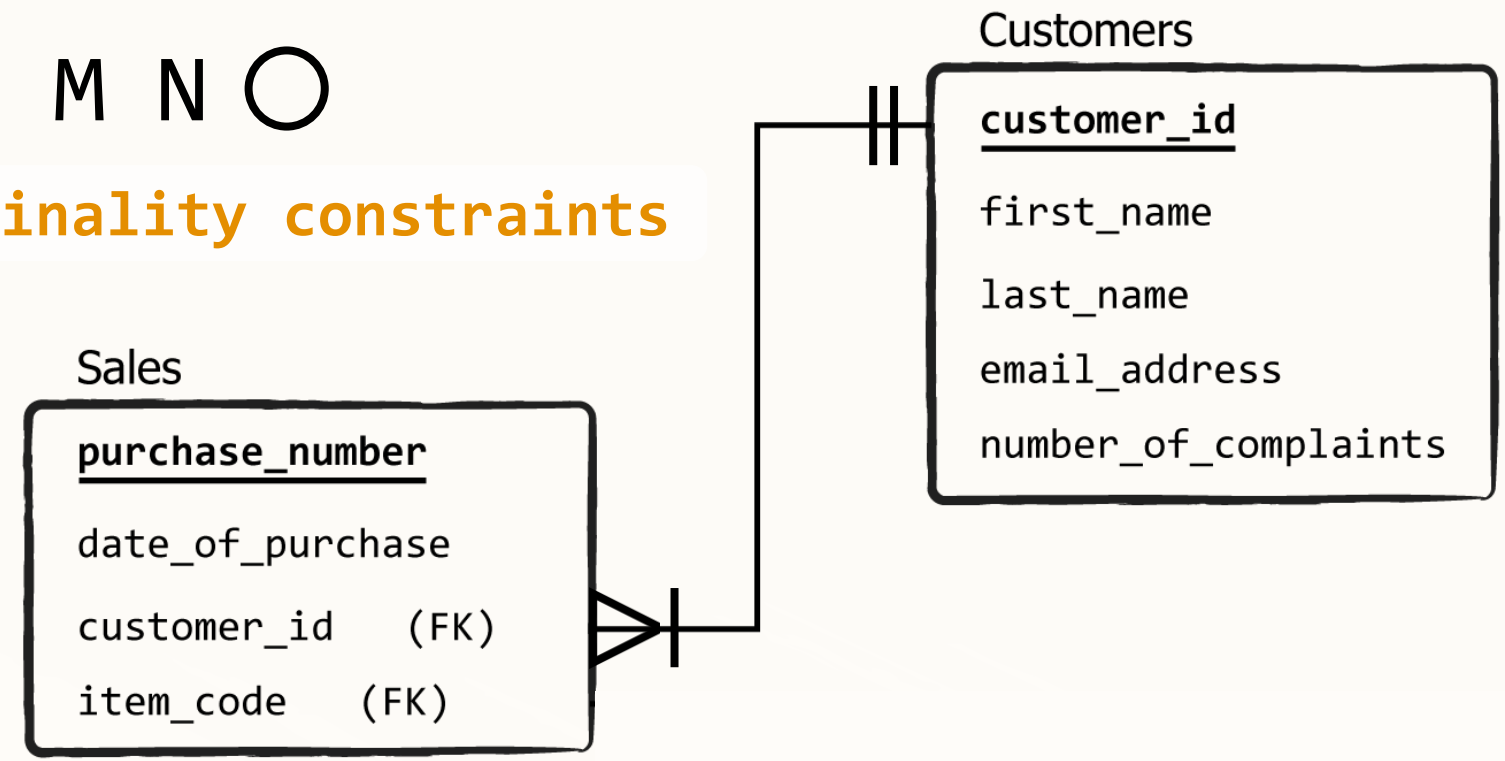

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365 DataScience

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- **types of relationships**

365 DataScience

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Relationships

- Relational schemas

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Relationships

Relational schemas

- represent the concept database administrators must implement

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Relationships

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- represent the concept database administrators must implement
- depict how a database is organized

365 DataScience

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= blueprints, or a plan for a database

365 DataScience

Relationships

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- *will help you immensely while writing your queries!*

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