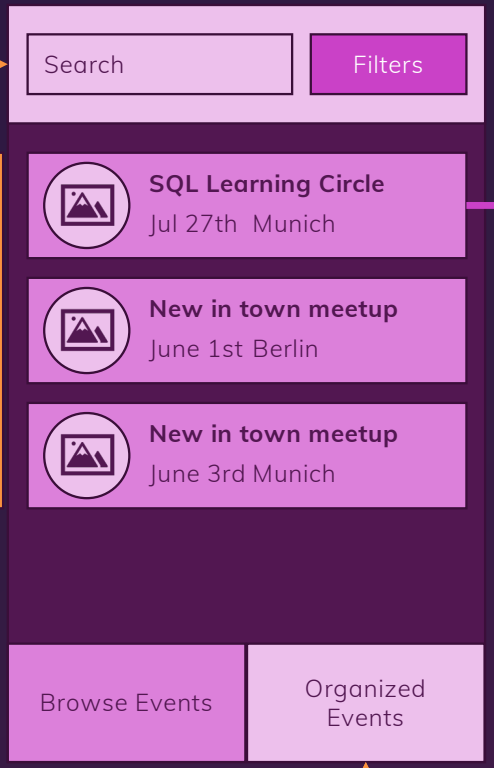
The Example Project

Search events (by name) or choose from various filters

List of all matching (filtered) events

List of filtered events where the user is the organizer

Being an organizer = user needs to create account



Various details (e.g. description, full location, ...) are shown on this screen

Registering requires no signup but does require some user details that are stored in the database

The Example Project

Database for a Meetup / Event Booking Application

Browse list of events

- All events
- Search name
- Within next week / month
- By tag
- By city
- Registered events
- Organized events

View event details

- Name
- Image
- Date & time
- Location
- Description
- Max. participants
- Min. age
- Tags
- Organizer

Register for events

- Full name
- Birthdate
- Email

Organize events

- Full name
- Birthdate
- Credentials

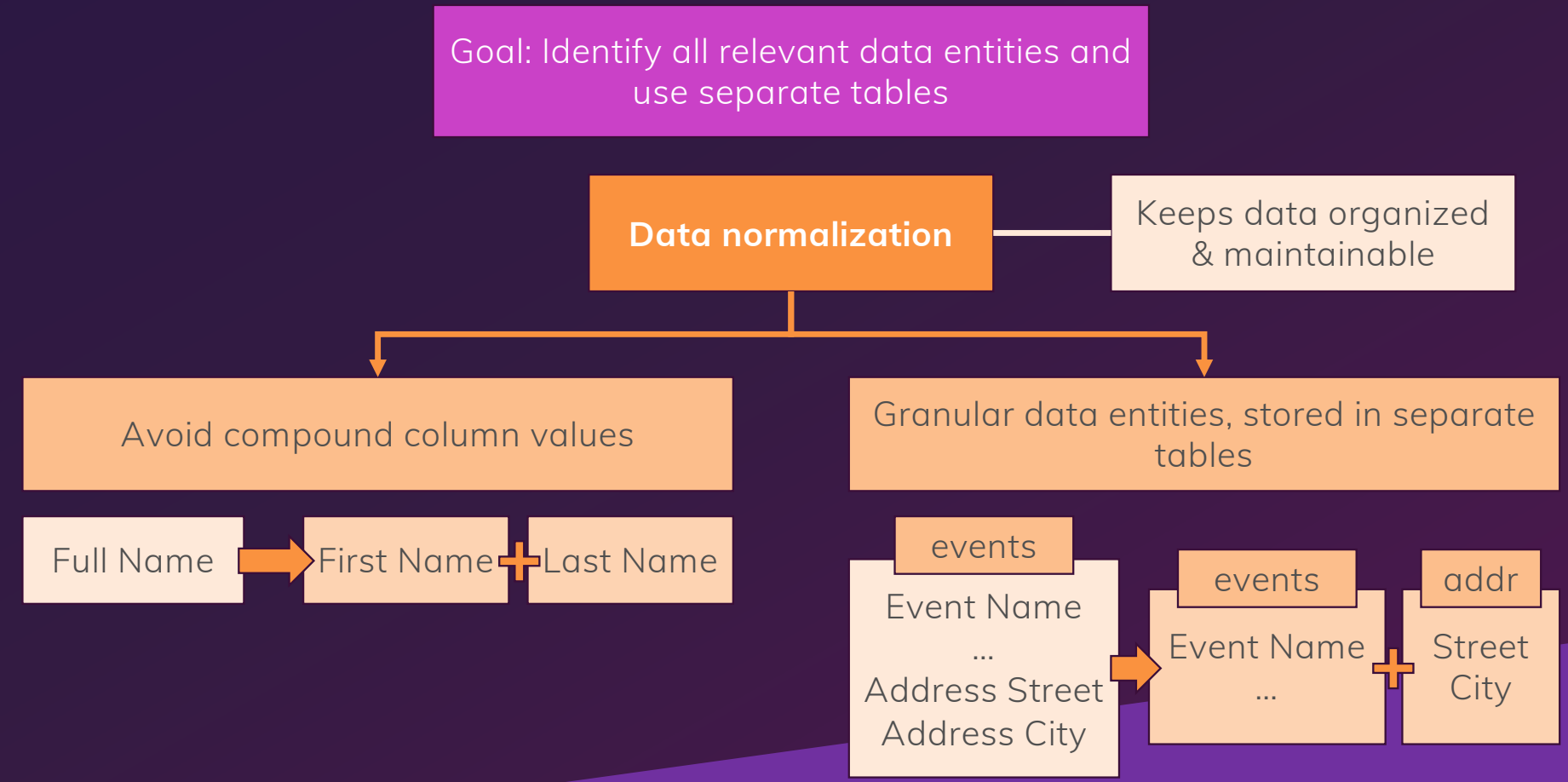
What We'll Do

1	Plan our data entities, relationships & database tables	Plan the database setup that the real application would use
2	Choose appropriate columns and value types	Prepare the tables such that real data can be inserted and stored correctly
3	Simulate app usage and insert / manipulate dummy data	Run commands that would be issued by the application – e.g. when a new event is created
4	Simulate app usage and run example queries	Run commands that would be issued by the application – e.g. get filtered events

As an exercise: Try doing all of that on your own

As a summary / overview: All key concepts will be explained step by step

Planning The Data Entities, Relationships & Tables



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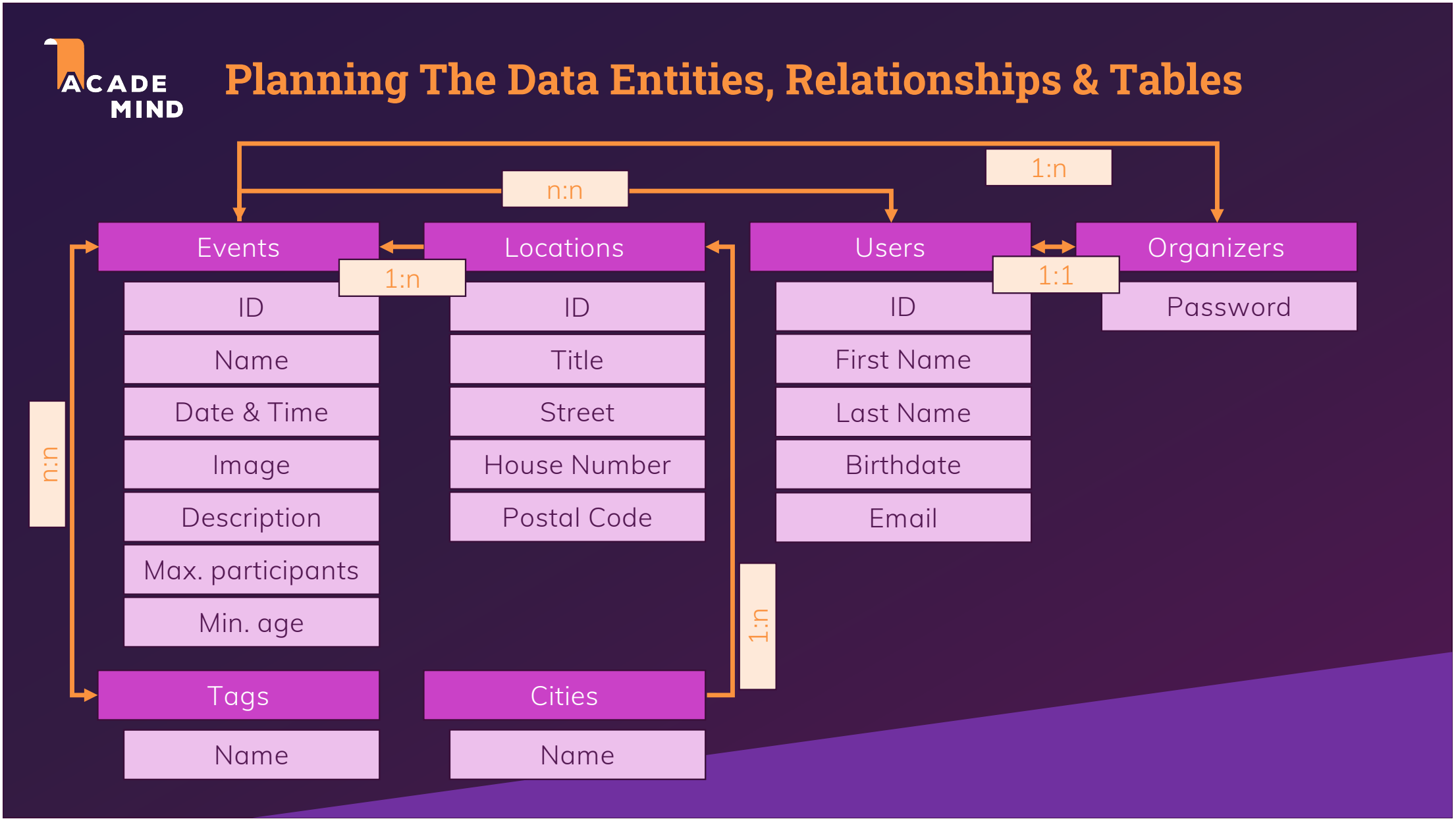
Planning The Data Entities, Relationships & Tables



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Data Relationships Are Everywhere!

One-to-Many
(1:n)

One record in table A has one or many related records in table B

e.g. an organizer might organize many events but every event has only one organizer

Many-to-Many
(n:n)

One record in table A has one or many related tables in table B – and vice versa

e.g. every event might have many participants and every participant might be registered for many events

One-to-One
(1:1)

One record in table A belongs to exactly one record in table B – and vice versa

e.g. a user can be an organizer and an organizer is exactly one user

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Key Data Types / Value Types

Text	Numeric	Date	Other
`CHAR(X)`	`INT, SMALLINT, …`	`DATE`	`BOOLEAN`
Store text up to X characters; shorter text will be space padded	Integer numbers (between min and max boundaries) are allowed	A value like 1986-10-20 (i.e. no hours or minutes)	True or false (0 or 1)
`VARCHAR(X)`	`DECIMAL, NUMERIC`	`DATETIME, TIMESTAMP`	`JSON`
Store text up to X characters; shorter strings will not be changed	Decimal numbers with a fixed precision (exact values)	A value like 1986-10-20 14:39:05 (i.e. with hours, minutes etc.)	JSON-formatted text data
`TEXT, LONGTEXT, …`	`FLOAT, REAL`		`SERIAL`
Text of any size can be stored without specifiy a max size first	Decimal numbers with floating points (approximated values)		An auto-incrementing integer number
`ENUM`			
Only values from a predefined set of allowed values are accepted			

Not all types are part of the official standard – and not all database systems support all types

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Integer Values

5 10 -20 ...

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Number Values With Decimal Places

3.14

5.58

-10.999

...

CHAR vs VARCHAR vs TEXT (vs LONGTEXT ...)

Pre-defined maximum length

CHAR(X)	VARCHAR(X)
	Typically used!
Text with max. length of X bytes	
One byte can be one character ➔ Depends on encoding	
Shorter text is space-padded	Shorter text is not changed
CHAR(4)	VARCHAR(4)
Inserted 'hi'	Inserted 'hi'
Stored 'hi'	Stored 'hi'

No maximum length
(database system limits apply)

TEXT	LONGTEXT, …
Typically used!	
Text with no user-defined max. length (max. length depends on data type)	
One byte can be one character ➔ Depends on encoding	
Max. size is 1GB in Postgres, 65,535 characters in MySQL	Not supported in Postgres, different types with different sizes in MySQL

Not part of the SQL standard but supported by many database systems

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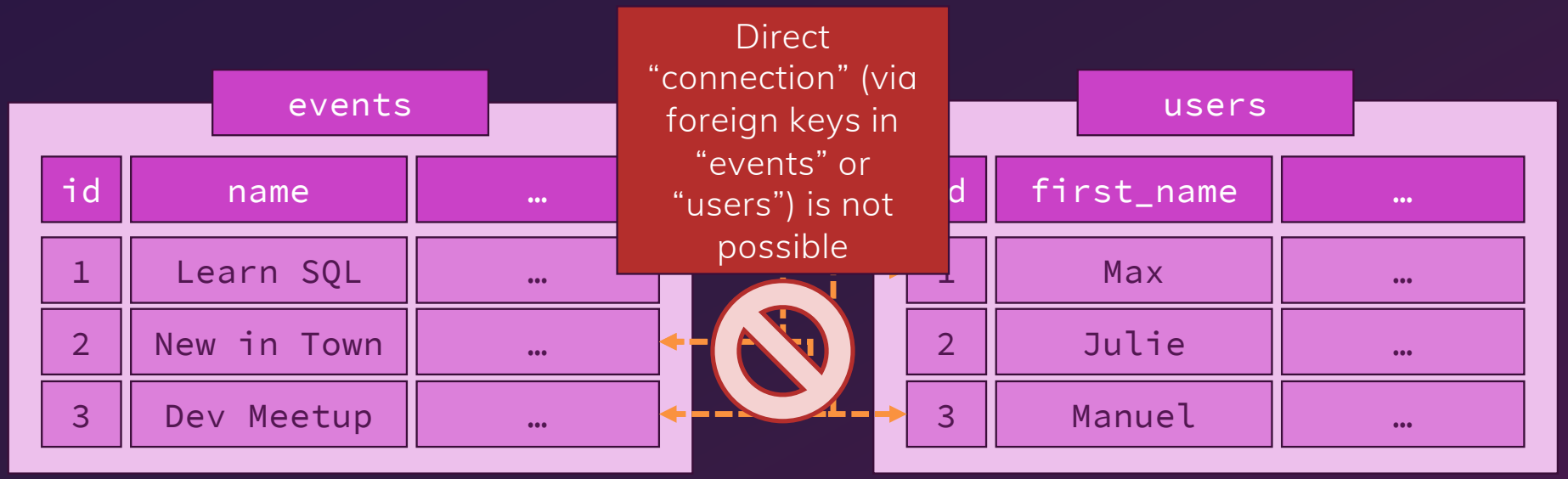
A Closer Look At Numeric Value Types

Integer ("Whole") Numbers	Exact Decimal Point Numbers	Approximate Decimal Point Numbers
`INT, SMALLINT, …`	`DECIMAL, NUMERIC`	`FLOAT, REAL, …`
`3, -10, -1831, 9418125`	`724.12, -8.195, 51413.1`	`724.12, -8.195, 51413.1`
Numbers without any decimal places	Numbers with decimal places and exact precision	Numbers with decimal places and approximate precision
Inserted numbers with decimal places are rounded	Inserted numbers are stored exactly (no data loss)	Stored approximately (data loss is possible)
Great for mathematical calculations	Great for data that requires exactness (e.g. monetary)	Great for numeric data where exactness is not required
Great performance	Slow performance	Great performance
Different types of integers occupy different amounts of space	Precision can be set when the table is created	Different types of numbers occupy different amounts of space

Many-To-Many Relations Need Intermediate Tables



n:n

One event can have many participants (users) and one user can be part of many events

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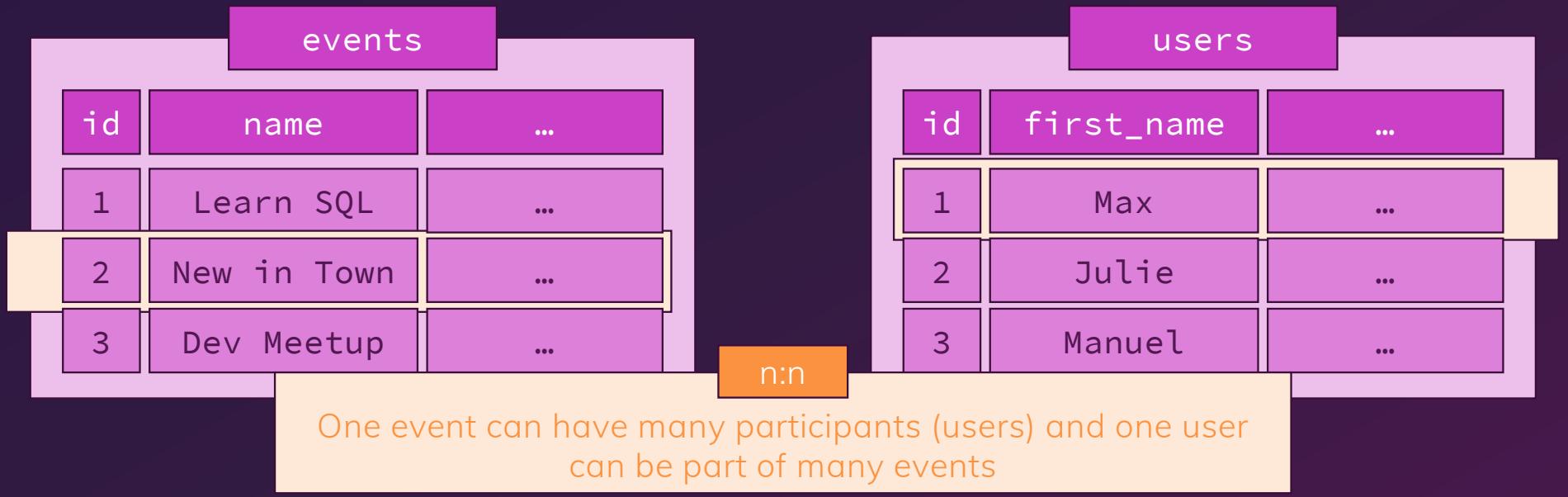
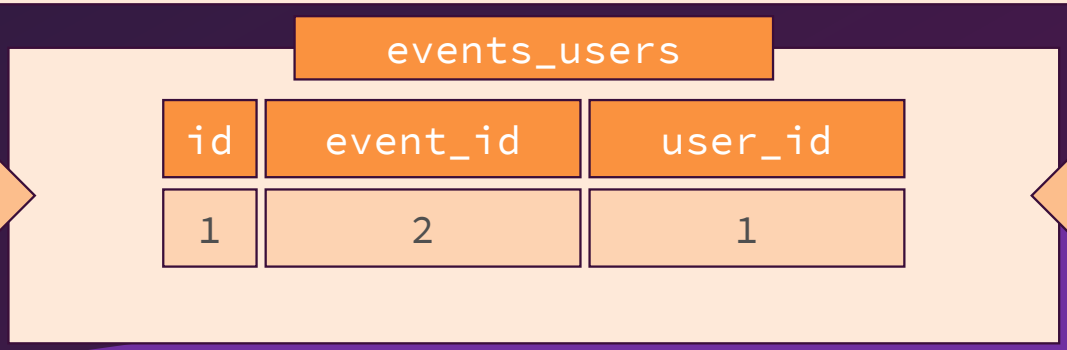
Many-To-Many Relations Need Intermediate Tables



An “intermediate table” is created and used to store the relations between “events” and “users”



One row per relation between the two “main tables”

Demo Data Manipulation Commands

- Insert example data
- Update existing events
- Delete existing event
- Register a user for an event
- Cancel a registration

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Example Queries

- Get all events with some (but not all) details – e.g. with title, date, city, tags
- Filter events by city or date (e.g. “within next 7 days”)
- Get all events a specific user registered for – also with extra filters
- Get all events a specific organizer organized – also with extra filters
- Get all the event details for a single event
- Get total number of participants for a given event
- Get average number of participants across all events – also with some filters
- Get all events with more than 5 participants
- Get all events with all their participants
- Get all cities and the number of events planned for each city