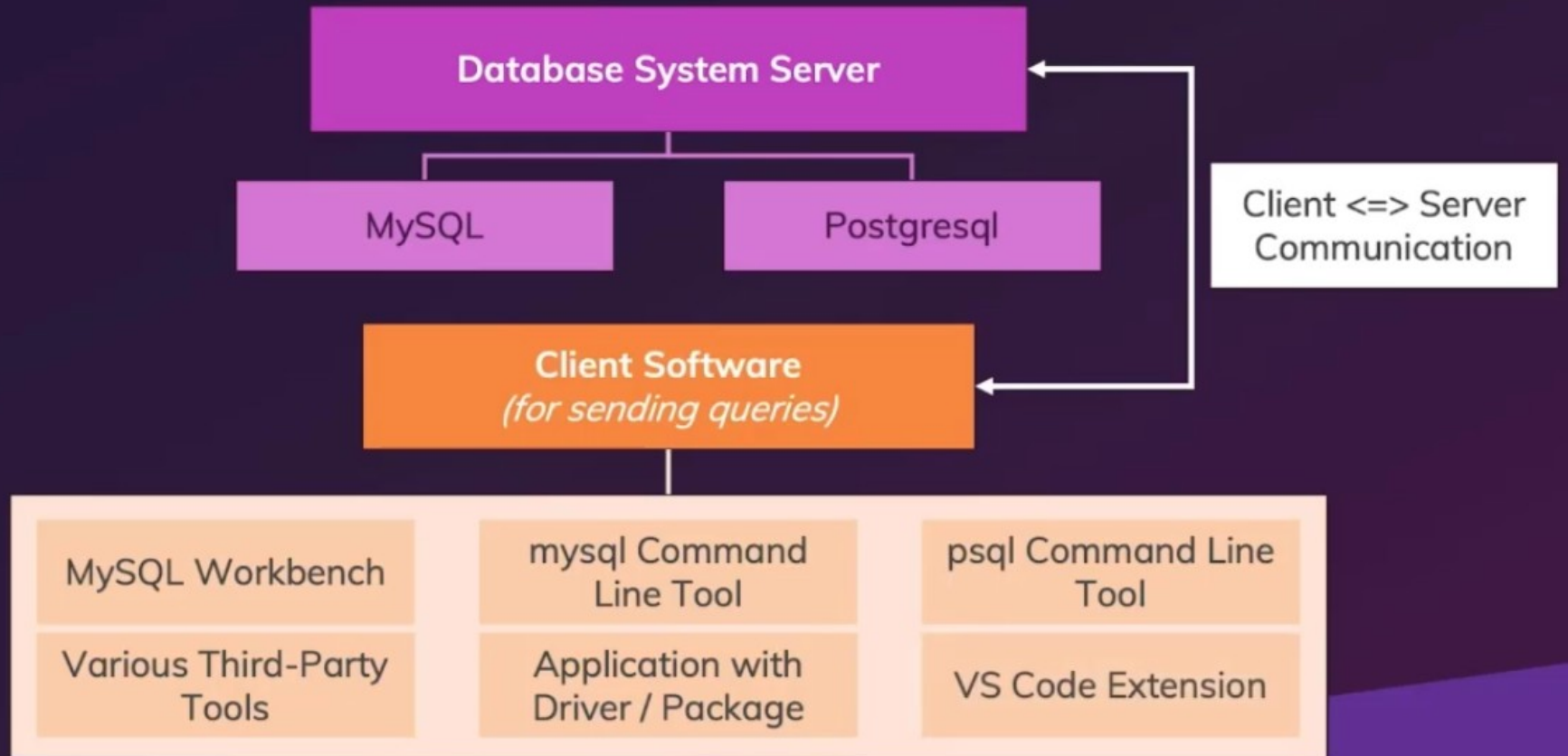
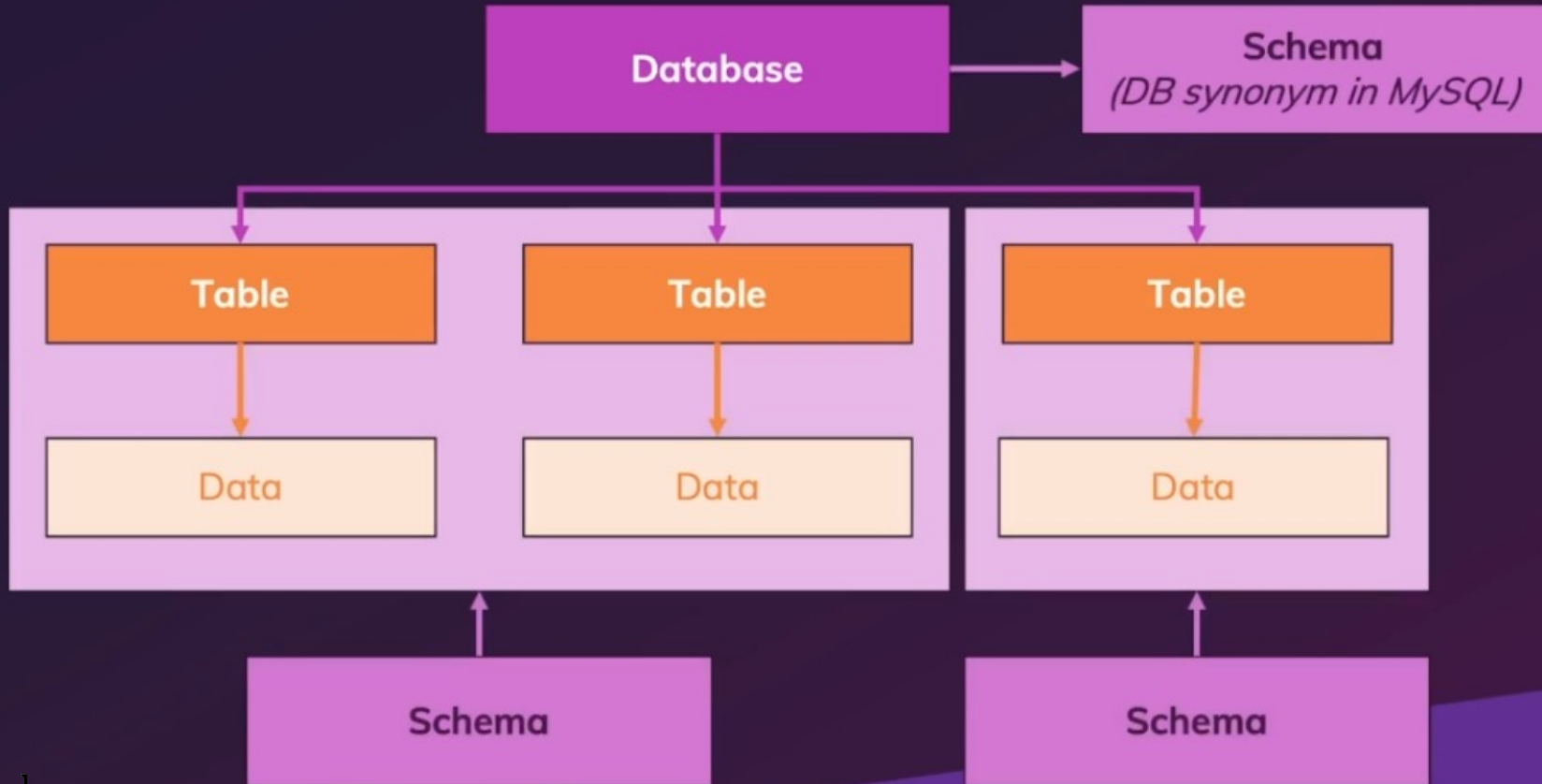


# Data Base

پریسا حامد روح بخش  
موسسه ی پارس پژوهان



# Database & Table Hierarchy



# Core SQL Syntax Rules



SQL statements must end with semicolons – if you got more than one SQL statement in the same command



A single SQL statement in a command doesn't need a semicolon at the end



SQL statements are case-insensitive – SELECT is the same as select

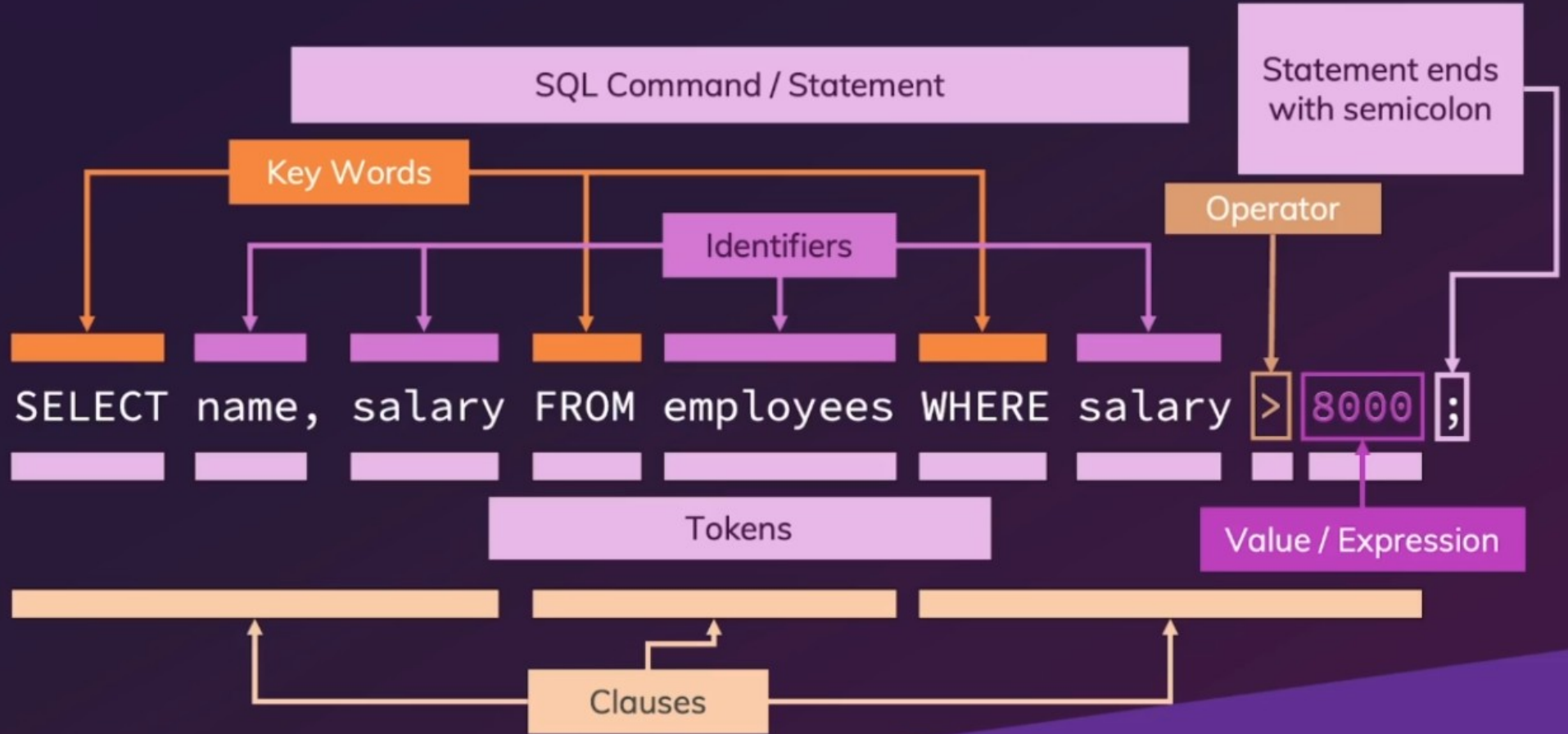


Identifiers (e.g. table names, column names) can be surrounded with double quotes (or backticks in MySQL) to avoid clashes with built-in keywords

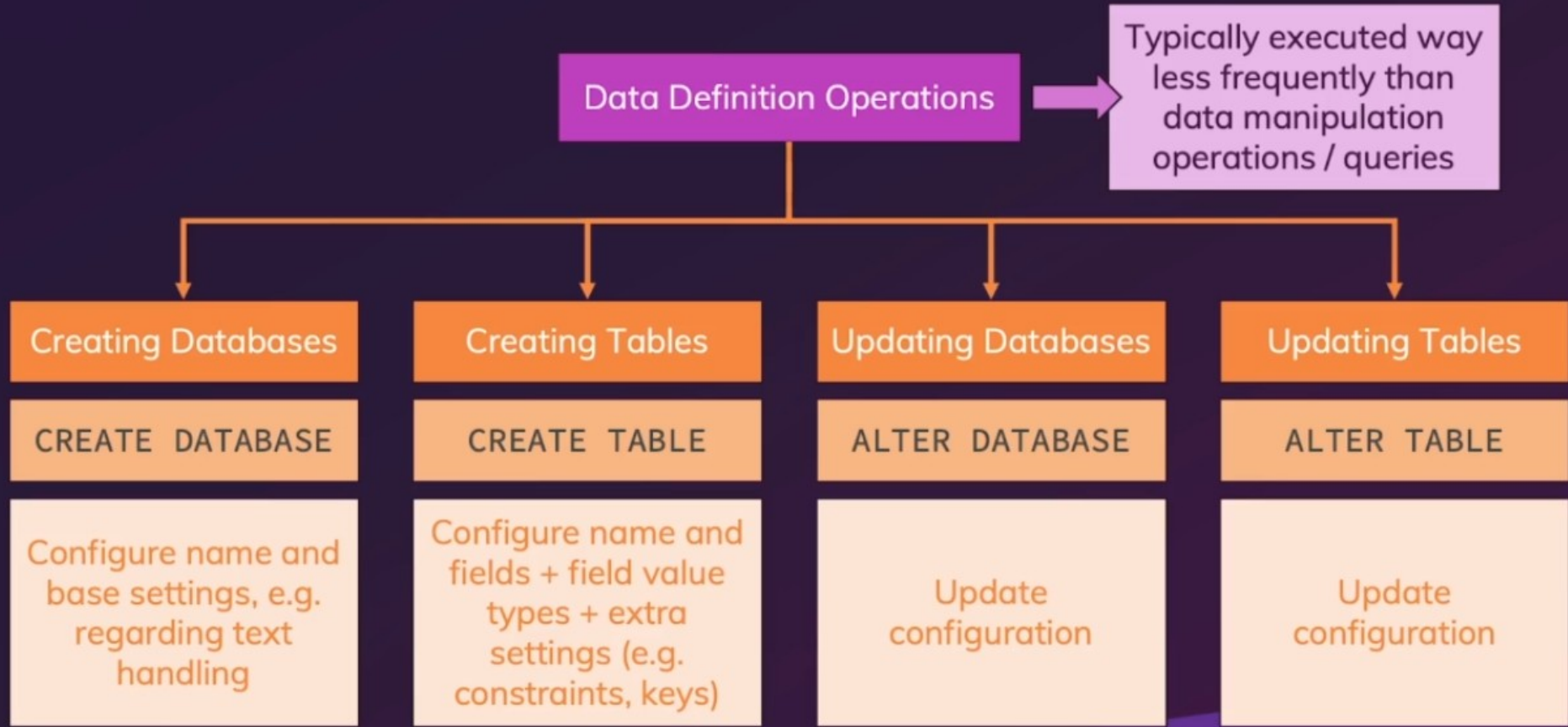


Statements can consist of one or more clauses – but the order of clauses must be correct (e.g. SELECT before FROM and WHERE)

# Core SQL Syntax Rules



# Managing Databases & Tables





# Key Data Types / Value Types

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

[https://www.w3schools.com/sql/sql\\_datatypes.asp](https://www.w3schools.com/sql/sql_datatypes.asp)

# 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



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

Pre-defined maximum length

CHAR(X)

VARCHAR(X)

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'

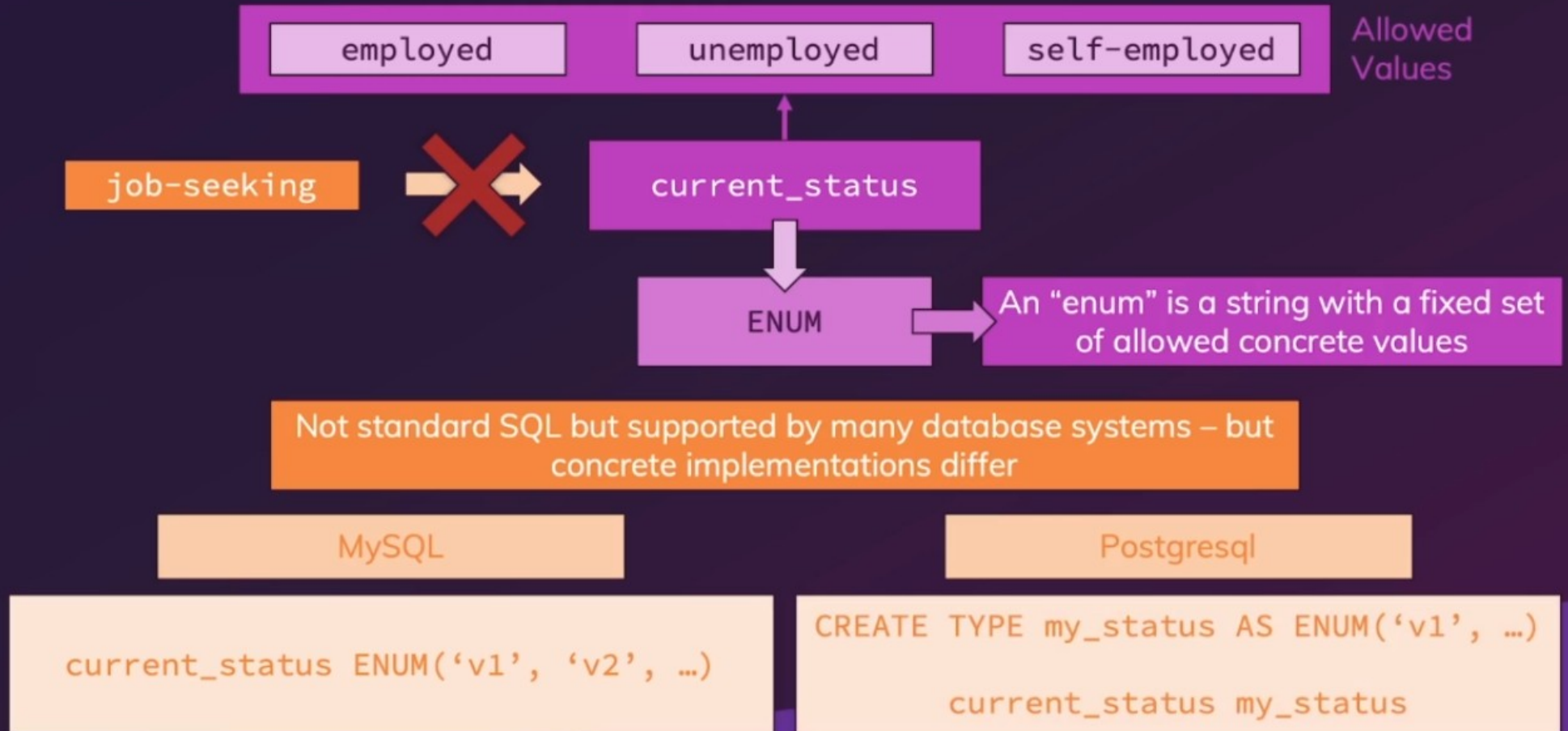
Stored

' hi '

Stored

'hi'

# Enums



# تمرین

student

Results		Messages					
	ST_id	ST_name	ST_family	ST_fname	ST_major	ST_dgree	ST_year
1	1	ali	rezaee	mohammad	IT	BS	1386
2	2	Sarah	alavi	ali	IT	BS	1385
3	3	Zahra	Sadeghi	hasan	IT	BS	1386
4	4	Samira	fatemi	ali	IT	BS	1384

# تمرین

Proof

	Results	Messages			
	P_id	P_name	P_family	P_dgree	
1	1	ali	akbari	phd	
2	2	Fatemeh	sedaghati	phd	
3	3	Sarah	Sadeghi	IT	

lesson

	Results	Messages			
	L_id	L_name	L_course	ST_id	P_id
1	1	mathematic	3	1	3
2	2	physics	3	2	2
3	3	database	3	4	1
4	4	Operating system	3	1	3

# تمرین

## customers

#	customer_id	first_name	last_name	birth_date	phone	address	city	state	points
1	1	Babara	MacCaffrey	1986-03-28	781-932-9754	0 Sage Terrace	Waltham	MA	2273
2	2	Ines	Brushfield	1986-04-13	804-427-9456	14187 Commercial Trail	Hampton	VA	947
3	3	Freddi	Boagey	1985-02-07	719-724-7869	251 Springs Junction	Colorado Springs	CO	2967
4	4	Ambur	Roseburgh	1974-04-14	407-231-8017	30 Arapahoe Terrace	Orlando	FL	457
5	5	Clemmie	Betchley	1973-11-07	NULL	5 Spohn Circle	Arlington	TX	3675
6	6	Elka	Twiddell	1991-09-04	312-480-8498	7 Manley Drive	Chicago	IL	3073
7	7	Ilene	Dowson	1964-08-30	615-641-4759	50 Lillian Crossing	Nashville	TN	1672
8	8	Thacher	Naseby	1993-07-17	941-527-3977	538 Mosinee Center	Sarasota	FL	205
9	9	Romola	Rumgay	1992-05-23	559-181-3744	3520 Ohio Trail	Visalia	CA	1486
10	10	Levy	Mynett	1969-10-13	404-246-3370	68 Lawn Avenue	Atlanta	GA	796
*	NULL	NULL	NULL	NULL	NULL	NULL	NULL	NULL	NULL

# تمرین

shippers

#	shipper_id	name
1	1	Hettinger LLC
2	2	Schinner-Predovic
3	3	Satterfield LLC
4	4	Mraz, Renner and Nolan
5	5	Waters, Mayert and Prohaska
*	NULL	NULL

products

#	product_id	name	quantity_in_stock	unit_price
1	1	Foam Dinner Plate	70	1.21
2	2	Pork - Bacon,back Peameal	49	4.65
3	3	Lettuce - Romaine, Heart	38	3.35
4	4	Brocolinni - Gaylan, Chinese	90	4.53
5	5	Sauce - Ranch Dressing	94	1.63
6	6	Petit Baguette	14	2.39
7	7	Sweet Pea Sprouts	98	3.29
8	8	Island Oasis - Raspberry	26	0.74
9	9	Longan	67	2.26
10	10	Broom - Push	6	1.09
*	NULL	NULL	NULL	NULL



# تمرین

## orders

#	order_id	customer_id	order_date	status	comments	shipped_date	shipper_id
1	1	6	2019-01-30	1	NULL	NULL	NULL
2	2	7	2018-08-02	2	NULL	2018-08-03	4
3	3	8	2017-12-01	1	NULL	NULL	NULL
4	4	2	2017-01-22	1	NULL	NULL	NULL
5	5	5	2017-08-25	2		2017-08-26	3
6	6	10	2018-11-18	1	Aliquam erat volutpat. In congue.	NULL	NULL
7	7	2	2018-09-22	2	NULL	2018-09-23	4
8	8	5	2018-06-08	1	Mauris enim leo, rhoncus sed, vestibulum sit amet, cursus id, turpis.	NULL	NULL
9	9	10	2017-07-05	2	Nulla mollis molestie lorem. Quisque ut erat.	2017-07-06	1
10	10	6	2018-04-22	2	NULL	2018-04-23	2
*	NULL	NULL	NULL	NULL	NULL	NULL	NULL

## order\_statuses

#	order_status_id	name
1	1	Processed
2	2	Shipped
3	3	Delivered
*	NULL	NULL

## order\_item\_notes

#	note_id	order_id	product_id	note
1	1	1	2	first note
2	2	1	2	second note
*	NULL	NULL	NULL	NULL

#	order_id	product_id	quantity	unit_price
1	2	4	4	1.66
2	2	6	2	2.94
3	6	2	4	3.28
4	6	5	1	3.45
5	1	4	4	3.74
6	10	9	9	4.28
7	10	1	10	6.01
8	4	10	7	6.40
9	8	5	2	6.94
10	4	3	7	6.99
11	9	6	5	7.28
12	6	3	4	7.46
13	8	8	2	8.59
14	6	1	4	8.65
15	2	1	2	9.10
16	3	3	10	9.12
17	7	3	7	9.17
18	5	2	3	9.89

order\_items



**Question?**