

DATABASE SYSTEMS I

HARVARD UNIVERSITY



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WELCOME TO HARVARD!



Why do we need a Database?

01

Manages large amounts of data

02

Accurate

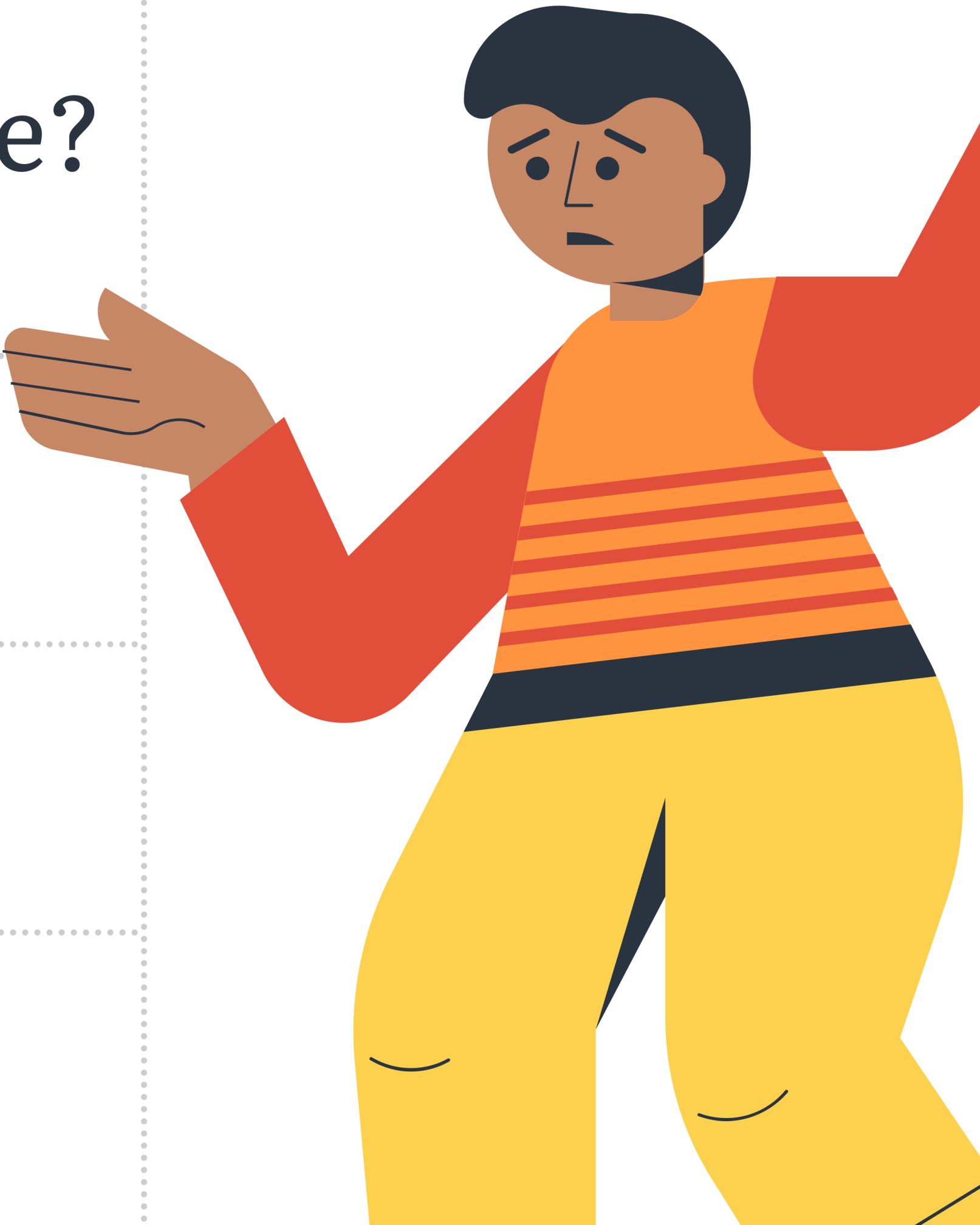
03

Easy to update data

Security of data

Data integrity

Easy to research data



I UNDERSTOOD

LET'S START

START



why we
choose this
topic?

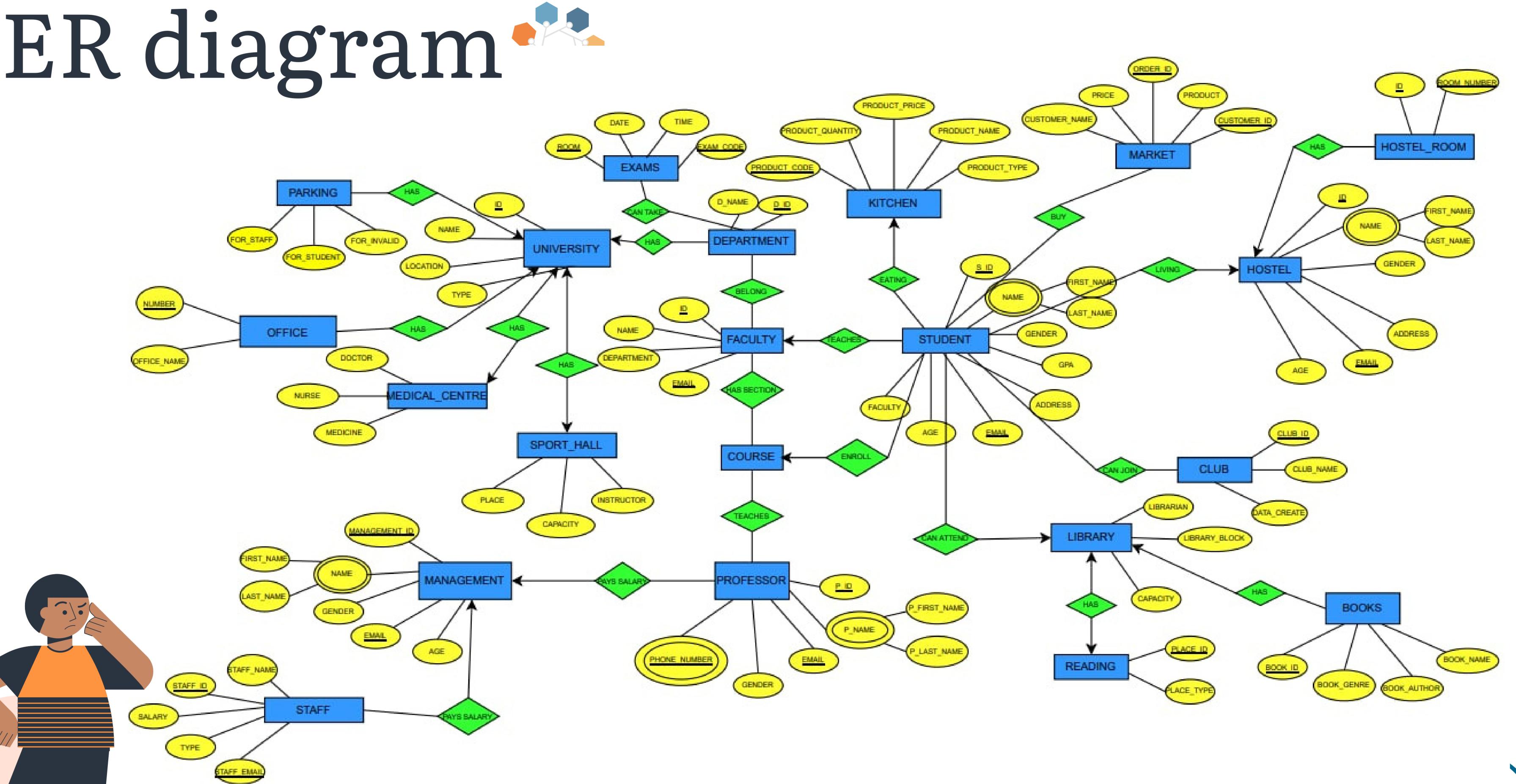
where we get idea?

how that's all
started?



INTRODUCTION PART

ER diagram



MySQL

University

UNIVERSITY												+ ▾
Table	Data	Indexes	Model	Constraints	Grants	Statistics	UI Defaults	Triggers	Dependencies	SQL	REST	Sample Queries
	Add Column	Modify Column	Rename Column	Drop Column	Rename	Copy	Drop	Truncate	Create Lookup Table	Create App		
Column Name	Data Type				Nullable			Default		Primary Key		
ID	NUMBER				No			-		1		
NAME	VARCHAR2(30)				Yes			-		-		
LOCATION	VARCHAR2(30)				Yes			-		-		
TYPE	VARCHAR2(30)				Yes			-		-		

UNIVERSITY												+ ▾
Table	Data	Indexes	Model	Constraints	Grants	Statistics	UI Defaults	Triggers	Dependencies	SQL	REST	Sample Queries
Query Count Rows Insert Row Load Data												
EDIT	ID	NAME			LOCATION				TYPE			
	1	Harvard University			Massachusetts Hall Cambridge				Public			

The table shows the overall description

of the ER Diagram for University

Management System. It has a complete overview

of the project's information.

Department

Column Name	Data Type	Nullable	Default	Primary Key
DEPARTMENT_NAME	VARCHAR2(100)	No	-	1
DEPARTMENT_ID	NUMBER	No	-	2

DEPARTMENT

Table Data Indexes Model Constraints Grants Statistics UI Defaults Triggers Dependencies SQL REST Sample Queries

Query Count Rows Insert Row Load Data



EDIT	DEPARTMENT_NAME	DEPARTMENT_ID
	BIOLOGY	9
	BUSINESS SCHOOL	4
	CHEMISTRY	8
	ECONOMY	6
	ENGINEERING	1
	JOURNALISM	10
	LAW	3
	MARKETING	7
	MATHEMATICS	5
	TFL	2

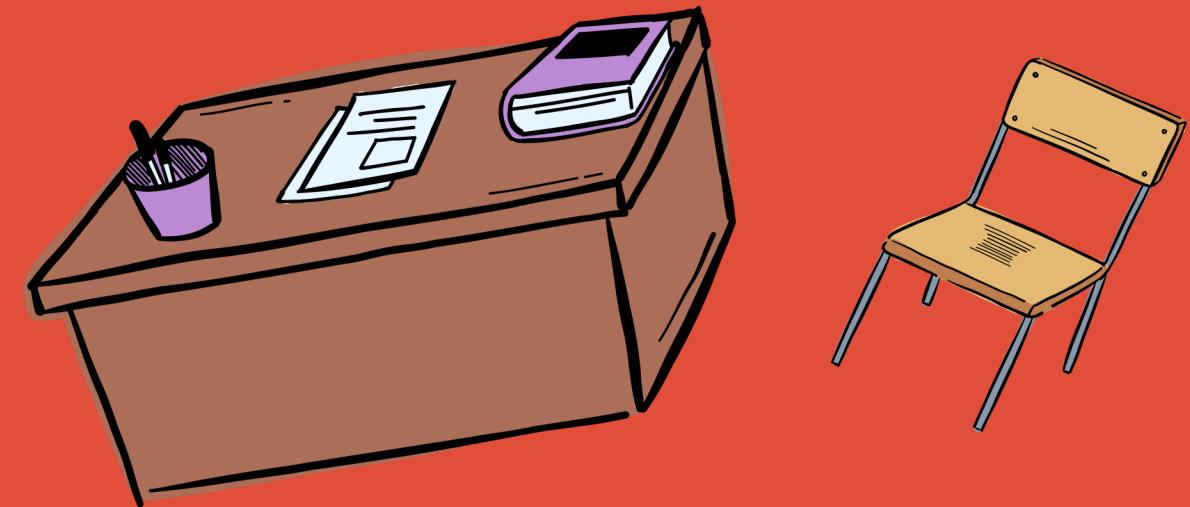
Faculty



Table: **FACULTY** (?)

Column	Data Type	Length	Precision	Scale	Nullable
ID	NUMBER	22	-	0	No
NAME	VARCHAR2	30	-	-	Yes
DEPARTMENT	VARCHAR2	30	-	-	Yes
EMAIL	VARCHAR2	30	-	-	Yes

1 - 4



Student

Column Name	Data Type
S_ID	NUMBER
FIRST_NAME	VARCHAR2(100)
LAST_NAME	VARCHAR2(100)
GENDER	VARCHAR2(50)
GPA	NUMBER
ADDRESS	VARCHAR2(255)
EMAIL	VARCHAR2(50)
AGE	NUMBER
FACULTY	VARCHAR2(50)



STUDENT

Table	Data	Indexes	Model	Constraints	Grants	Statistics	UI Defaults	Triggers	Dependencies	SQL	REST	Sample Queries
STUDENT												
EDIT	S_ID	FIRST_NAME	LAST_NAME	GENDER	GPA	ADDRESS	EMAIL	AGE	FACULTY			
	1	Kairat	Bekmuratov	Male	3.3	london 1 house	kairat_bekmuratov@harvard.student	19	Engineering			
	2	Zhibek	Durward	Female	1.7	62715 Muir Point	hdurward1@flickr.com	20	Systems Administrator II			
	3	Matthieu	Aldhous	Male	1.9	1153 Gateway Way	maldhous2@slate.com	19	Data Coordinator			
	4	Alta	Guiness	Female	3.9	72 Schmedeman Pass	aguiness3@telegraph.co.uk	20	Project Manager			
	5	Colman	Scourgie	Male	1.6	39216 Hanover Drive	cscourgie4@reuters.com	19	Senior Editor			
	6	Gunter	Gentreau	Male	1.8	56 Drewry Point	ggentreau5@cdbaby.com	22	Web Designer II			
	7	Shurlocke	Gianni	Male	2.1	2825 Birchwood Plaza	sgianni6@baidu.com	21	Legal Assistant			
	8	Luis	Kose	Male	2.5	8998 Canary Street	lkose7@ameblo.jp	18	Analog Circuit Design manager			
	9	Noach	Wisam	Male	1.2	4 Hovde Center	nwisam8@sogou.com	19	Product Engineer			
	10	Valentina	Fogarty	Female	2.2	4 Petterle Street	vfogarty9@yahoo.co.jp	19	Design Engineer			
	11	Thornie	Syddon	Male	1.8	0758 Oriole Center	tsyddona@uiuc.edu	18	Chemical Engineer			
	12	Melisent	Connue	Female	3.5	8 2nd Lane	mconnueb@sbwire.com	20	Information Systems Manager			



Course



Tables Columns

Table: COURSE ?

Column	Data Type	Length	Precision	Scale	Nullable
COURSE_NUMBER	NUMBER	22	-	0	No
CREDITS	NUMBER	22	-	0	Yes
TITLE	VARCHAR2	100	-	-	Yes
COURSE_NAME	VARCHAR2	100	-	-	Yes

1 - 4

Professor

PROFESSOR



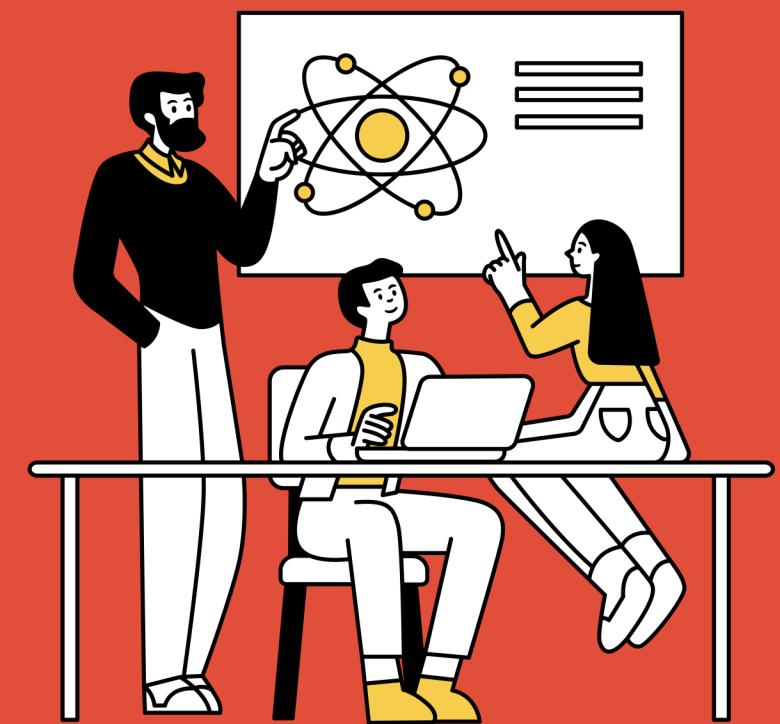
EDIT	P_ID	P_FIRST_NAME	P_LAST_NAME	P_EMAIL	P_GENDER	PHONE_NUMBER
	1	Delcina	Beaven	dbeaven0@latimes.com	Female	921-329-6514
	2	Stevena	Sier	ssier1@artisteer.com	Female	874-448-3528
	3	Jelene	MacGillreich	jmacgillreich2@qq.com	Female	424-364-1075
	4	Dodie	Parkinson	dparkinson3@pinterest.com	Female	836-939-4559
	5	Maryanna	Rape	mrape4@w3.org	Female	975-554-9320
	6	Emiline	d' Elboux	edelboux5@senate.gov	Female	602-781-9903
	7	Howie	Muldoon	hmuldoon6@businesswire.com	Male	259-400-9048
	8	Kellen	Dzeniskevich	kdzeniskevich7@freewebs.com	Male	602-112-0575
	9	Octavius	Deboy	odeboy8@icio.us	Male	159-483-9280
	10	Risa	McFayden	rmcfayden9@tinyurl.com	Genderfluid	273-565-2595
	11	amaal	Mingaye	jmingaya@over-blog.com	Male	246-596-7552
	12	Gwenette	Toma	gtomab@va.gov	Female	219-958-
	13		Gockeler	kgockeler@purevolume.com	Female	15.



Management

MANAGEMENT

Table	Data	Indexes	Model	Constraints	Grants	Statistics	UI Defaults	Triggers	Dependencies	SQL	REST	Sample Queries
Actions												
Column Name		Data Type			Nullable		Default		Primary Key			
MANAGEMENT_ID		NUMBER			No		-		1			
FIRST_NAME		VARCHAR2(100)			Yes		-		-			
LAST_NAME		VARCHAR2(100)			Yes		-		-			
GENDER		VARCHAR2(50)			Yes		-		-			
EMAIL		VARCHAR2(100)			Yes		-		-			
AGE		NUMBER			Yes		-		-			



Staff

STAFF

+ ▾

Table	Data	Indexes	Model	Constraints	Grants	Statistics	UI Defaults	Triggers	Dependencies	SQL	REST	Sample Queries
Actions												
Column Name	Data Type			Nullable		Default			Primary Key			
STAFF_NAME	VARCHAR2(100)			Yes		-			-			
STAFF_ID	NUMBER			Yes		-			-			
SALARY	NUMBER			Yes		-			-			
TYPE	VARCHAR2(255)			Yes		-			-			
STAFF_EMAIL	VARCHAR2(255)			Yes		-			-			

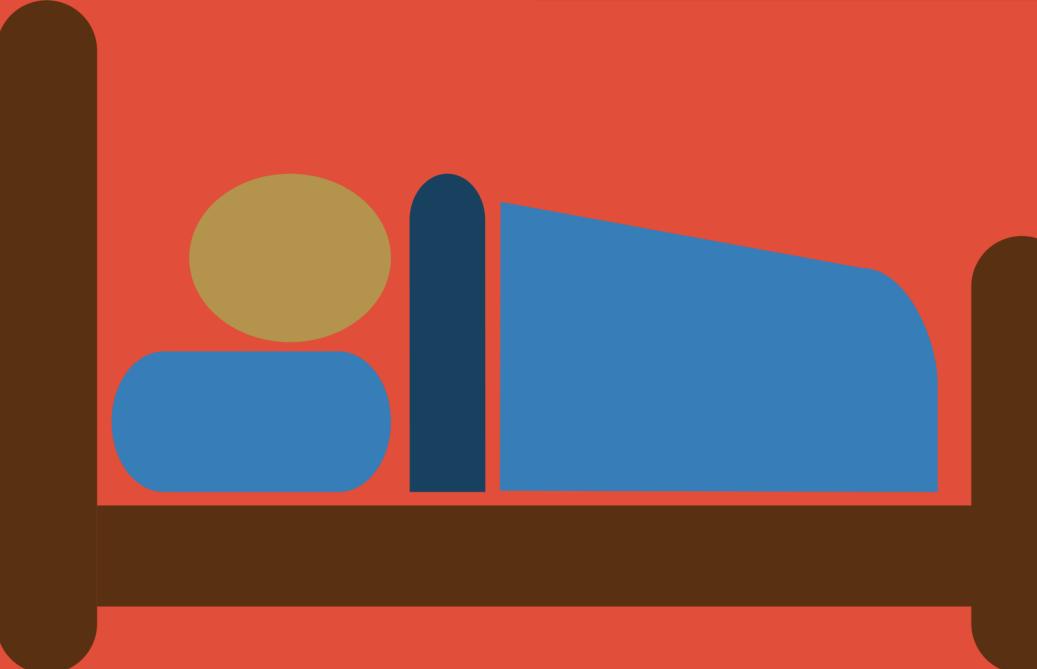


Hostel



HOSTEL

Table	Data	Indexes	Model	Constraints	Grants	Statistics	UI Defaults	Triggers	Dependencies	SQL	REST	Sample Queries
	Add Column	Modify Column	Rename Column	Drop Column	Rename	Copy	Drop	Truncate	Create Lookup Table	Create App		
Column Name	Data Type			Nullable		Default		Primary Key				
ID	NUMBER			Yes		-		-				
FIRST_NAME	VARCHAR2(100)			Yes		-		-				
LAST_NAME	VARCHAR2(100)			Yes		-		-				
EMAIL	VARCHAR2(50)			Yes		-		-				
GENDER	VARCHAR2(50)			Yes		-		-				
AGE	NUMBER			Yes		-		-				
ADDRESS	VARCHAR2(255)			Yes		-		-				



Hostel_rooms

HOSTEL_ROOM

EDIT	ID	ROOM_NUMBER
	1	178
	2	163
	3	192
	4	142
	5	137
	6	185
	7	156
	8	140
	9	114
	10	194
	11	187
	12	190



Kitchen



KITCHEN

Table Data Indexes Model Constraints Grants Statistics UI Defaults Triggers Dependencies SQL REST Sample Queries

Query Count Rows Insert Row Load Data

EDIT	PRODUCT_CODE	PRODUCT_QUANTITY	PRODUCT_PRICE	PRODUCT_NAME	PRODUCT_TYPE
	67938-0858	71	531	COCA-COLA	DRINK
	10191-1857	4	998	FANTA	DRINK
	53113-218	66	285	MAXI CHAI	DRINK
	54473-176	67	1446	AIRAN	DRINK
	59779-930	39	304	SPRITE	DRINK
	68788-9744	99	1122	PEPSI	DRINK
	58118-0170	93	228	LIMON WATER	DRINK
	63181-0018	68	1670	ASU	DRINK
	54473-185	27	874	TASSAY	DRINK
	68737-227	36	848	FUSE TEA	DRINK
	49884-086	51	1257	CHICKEN	DONER

MARKET

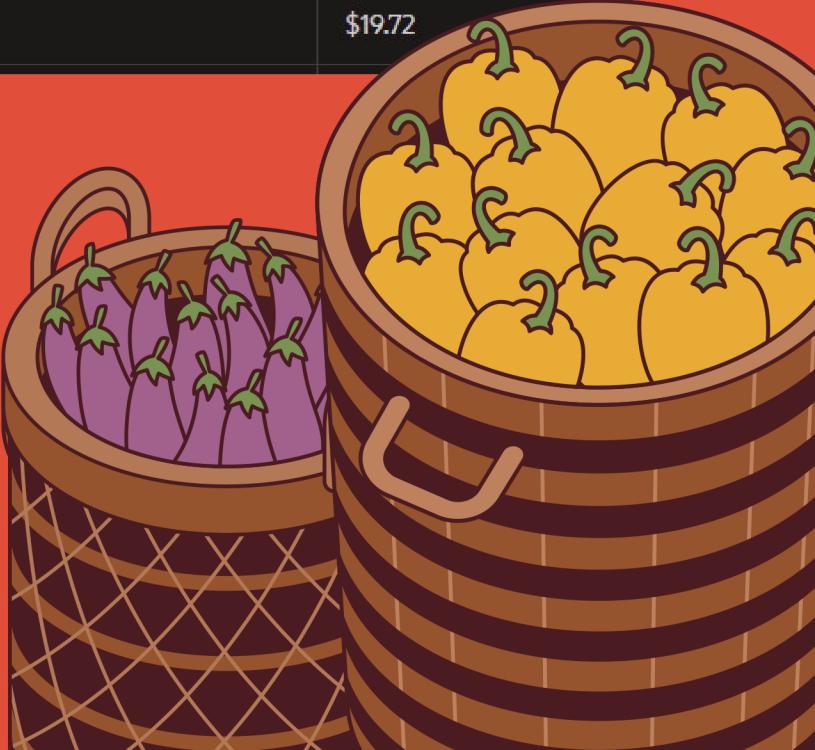
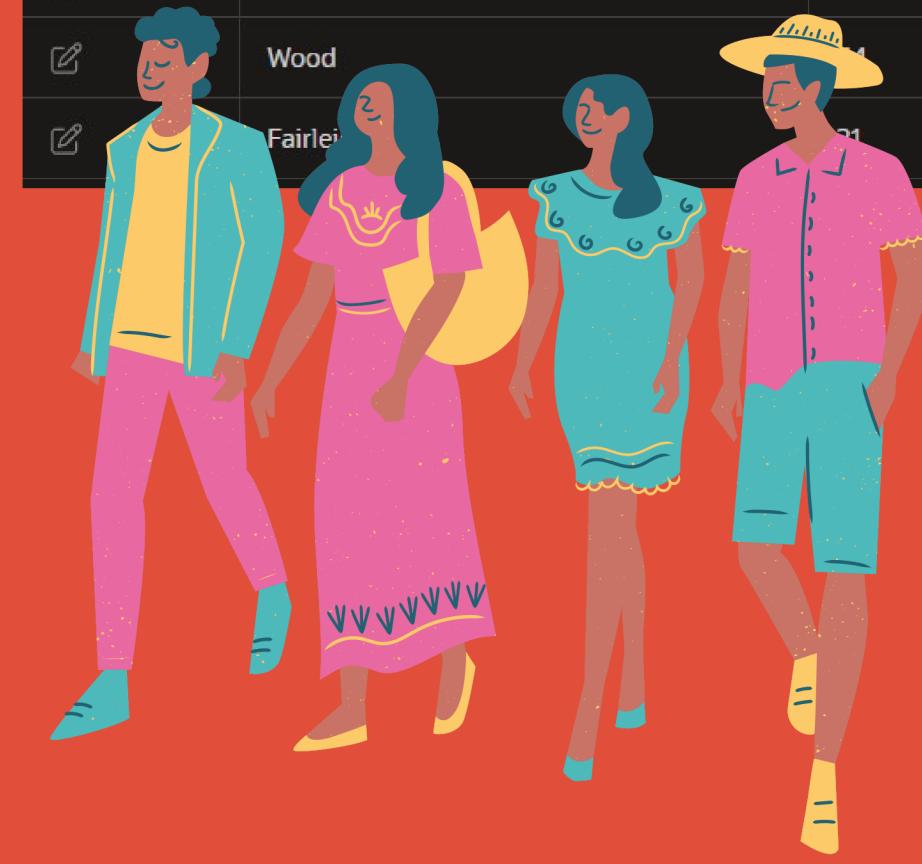
MARKET

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Table Data Indexes Model Constraints Grants Statistics UI Defaults Triggers Dependencies SQL REST Sample Queries

Query Count Rows Insert Row Load Data

EDIT	CUSTOMER_NAME	CUSTOMER_ID	ORDER_ID	PRODUCT	PRICE
	Torin	48	52	Wine - Red, Concha Y Toro	\$71.39
	Page	84	39	Salt And Pepper Mix - Black	\$94.68
	Jack	83	73	Graham Cracker Mix	\$68.21
	Stafford	79	16	Cheese - Cheddar, Mild	\$92.13
	Lucius	79	89	Dill - Primerba, Paste	\$75.03
	Marcelo	49	21	Coriander - Ground	\$97.88
	Dean	93	86	Melon - Honey Dew	\$38.47
	Maximilian	46	66	Pork - Ham Hocks - Smoked	\$59.52
	Vernor	47	41	Lettuce - Curly Endive	\$93.20
	Wood	5	5	Wine - Cousino Macul Antiguas	\$10.84
	Fairley	21	91	Beef - Prime Rib Aaa	\$19.72



Library



LIBRARY

Table	Data	Indexes	Model	Constraints	Grants	Statistics	UI Defaults	Triggers	Dependencies	SQL	REST	Sample Queries
Add Column Modify Column Rename Column Drop Column Rename Copy Drop Truncate Create Lookup Table Create App												
Column Name	Data Type				Nullable		Default		Primary Key			
LIBRARIAN	VARCHAR2(100)				Yes		-		-			
LIBRARY_BLOCK	VARCHAR2(100)				Yes		-		-			
CAPACITY	NUMBER				Yes		-		-			



Reading



READING

+ ▾

Table	Data	Indexes	Model	Constraints	Grants	Statistics	UI Defaults	Triggers	Dependencies	SQL	REST	Sample Queries							
Actions																			
Add Column		Modify Column		Rename Column		Drop Column		Rename		Copy		Drop	Truncate	Create Lookup Table	Create App				
Column Name	Data Type			Nullable	Default			Primary Key											
PLACE_ID	NUMBER			Yes	-			-											
PLACE_TYPE	VARCHAR2(255)			Yes	-			-											



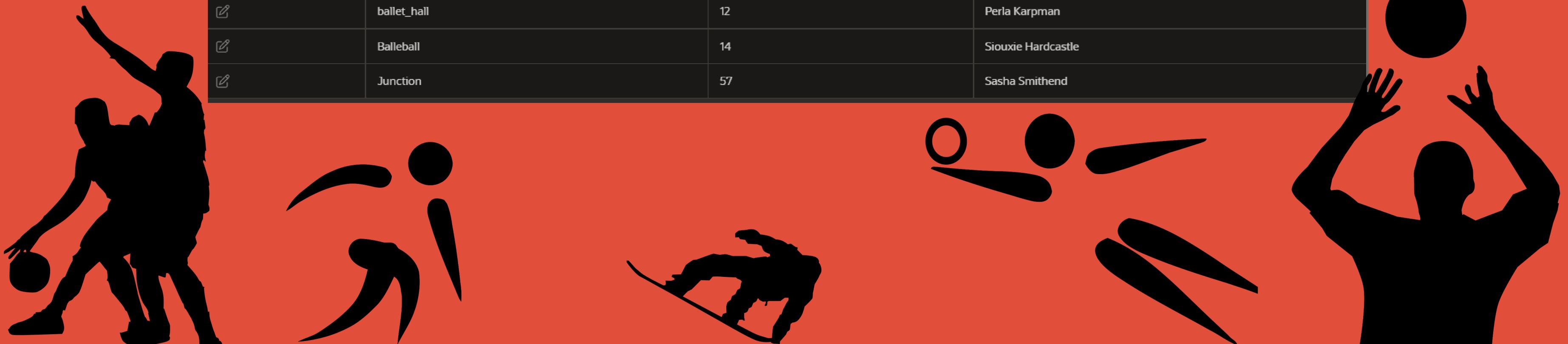
Sport_Hall



SPORT_HALL

+ ▾

Table	Data	Indexes	Model	Constraints	Grants	Statistics	UI Defaults	Triggers	Dependencies	SQL	REST	Sample Queries
Main Table Data:												
	EDIT	PLACE			CAPACITY			INSTRUCTOR				
		basketball_pole			90			Hanafia				
		football_pole			24			Alvan Greer				
		table_tennis			6			Horace Drioli				
		Place			88			Sena Glede				
		Drive			45			Kevan Earwaker				
		Chess			2			Hersh Donahue				
		Point			78			Celinda Denslow				
		ballet_hall			12			Perla Karpman				
		Balleball			14			Siouxie Hardcastle				
		Junction			57			Sasha Smithend				



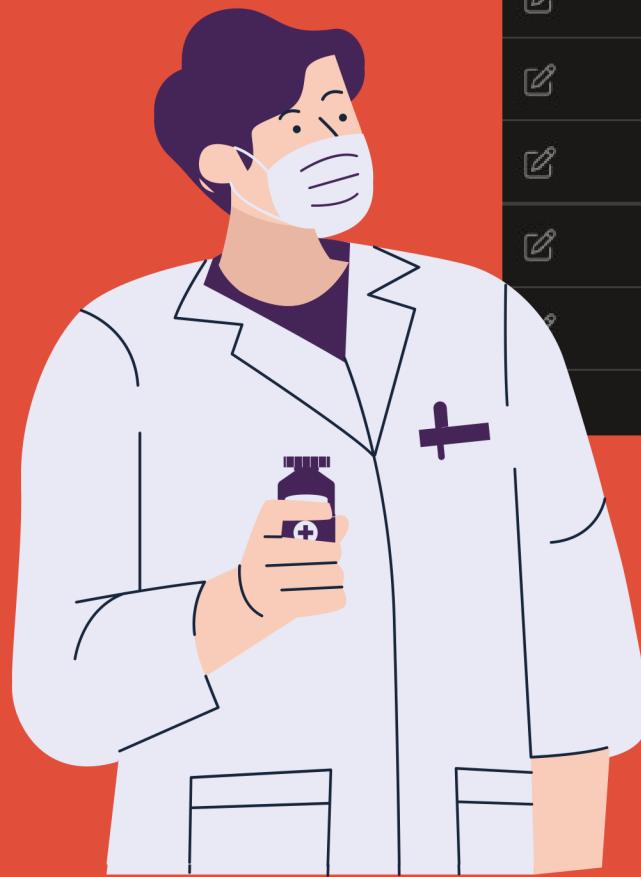
Medical_center



MEDICAL_CENTER

+ New

Table	Data	Indexes	Model	Constraints	Grants	Statistics	UI Defaults	Triggers	Dependencies	SQL	REST	Sample Queries
	Query	Count Rows	Insert Row	Load Data								
EDIT	DOCTOR	NURSE			MEDICINE							
Edit	DR.David Telman	Miss Akerke Yerkin										терафлю
Edit	-	-										грипго
Edit	-	-										цитрамон
Edit	-	-										Donnatal
Edit	-	-										Nymalize
Edit	-	-										durex
Edit	-	-										Oxygen
Edit	-	-										Levetiracetam
Edit	-	-										Sore Throat
Edit	-	-										Clean and Clear Advantage Acne Cleanser
Edit	-	-										Cows Milk

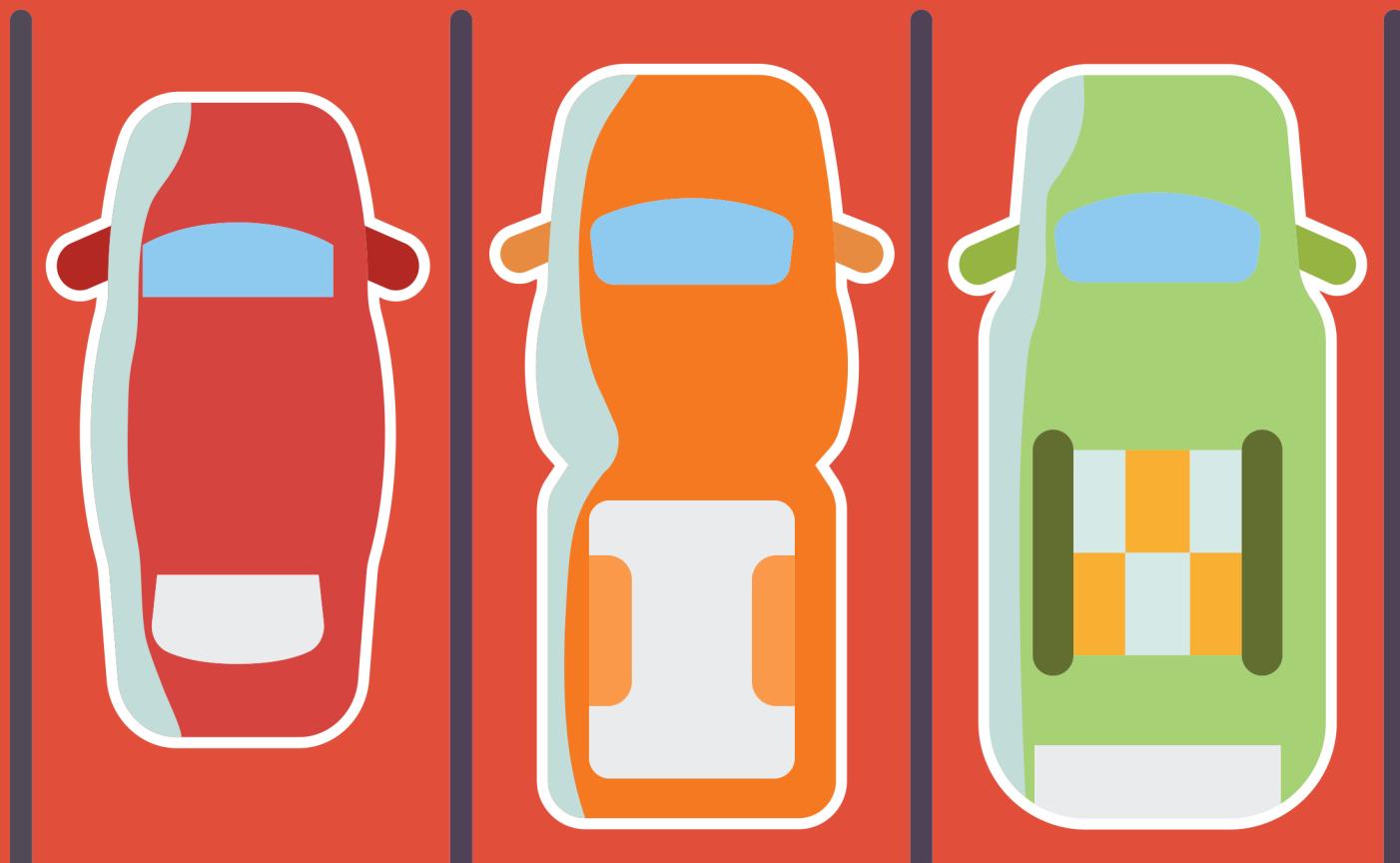


Parking



PARKING

Table	Data	Indexes	Model	Constraints	Grants	Statistics	UI Defaults	Triggers	Dependencies	SQL	REST	Sample Queries		
Actions														
	Add Column	Modify Column	Rename Column	Drop Column	Rename	Copy	Drop	Truncate	Create Lookup Table	Create App				
Column Name			Data Type			Nullable		Default		Primary Key				
FOR_STAFF			NUMBER			Yes		-		-				
FOR_STUDENT			NUMBER			Yes		-		-				
FOR_INVALID			NUMBER			Yes		-		-				



Exam

EXAMS

+ ▾

Table	Data	Indexes	Model	Constraints	Grants	Statistics	UI Defaults	Triggers	Dependencies	SQL	REST	Sample Queries
Add Column Modify Column Rename Column Drop Column Rename Copy Drop Truncate Create Lookup Table Create App												
Column Name		Data Type			Nullable		Default		Primary Key			
ROOM		NUMBER			Yes		-		-	-	-	-
DATE_		DATE			Yes		-		-	-	-	-
TIME		VARCHAR2(50)			Yes		-		-	-	-	-
EXAM_CODE		VARCHAR2(50)			Yes		-		-	-	-	-



Normalisations

CLUB_INF																			
Table	Data	Indexes	Model	Constraints	Grants	Statistics	UI Defaults	Triggers	Dependencies	SQL	REST	Sample Queries							
Add Column		Modify Column		Rename Column		Drop Column		Rename		Copy		Drop		Truncate		Create Lookup Table		Create App	
Column Name			Data Type			Nullable		Default		Primary Key									
CLUB_NAME			VARCHAR2(100)			Yes		-		-									
CREATOR			VARCHAR2(50)			Yes		-		-									
FACULTY			VARCHAR2(50)			Yes		-		-									
CLUB_ID			NUMBER			Yes		-		-									
ABOUT_CLUB			VARCHAR2(255)			Yes		-		-									

CREATOR	FACULTY
KAIRAT BEKMURATOV	ENGNEERY
JIBEK DOSSYMOVA	ECONOMY
Dyana Perrygo	Services
Jessey Guilliland	Marketing
Delano Archer	Engineering

CLUB_NAME	CLUB_ID
IT CLUB	101
DANCE	102
Kris	103
Dene	104
Tully	105

CREATOR	FACULTY	CLUB_ID
KAIRAT BEKMURATOV	ENGINEERING	101
Felipe Amos	Product Management	2
Eden Duiguid	Business Development	3
Sallie Ert	Sales	4
Mylo McGirr	Engineering	5

CLUB_ID	CLUB_NAME	ABOUT_CLUB
101	IT CLUB	HELPS 1 COURSE STUDENTS FOR LEARNING JAVA
2	Business Development	quis turpis eget elit sodales scelerisque mauris
3	Legal	id justo sit amet sapien
4	Support	quam pharetra magna ac consequat
5	Business Development	diam cras pellentesque volutpat dui

Query

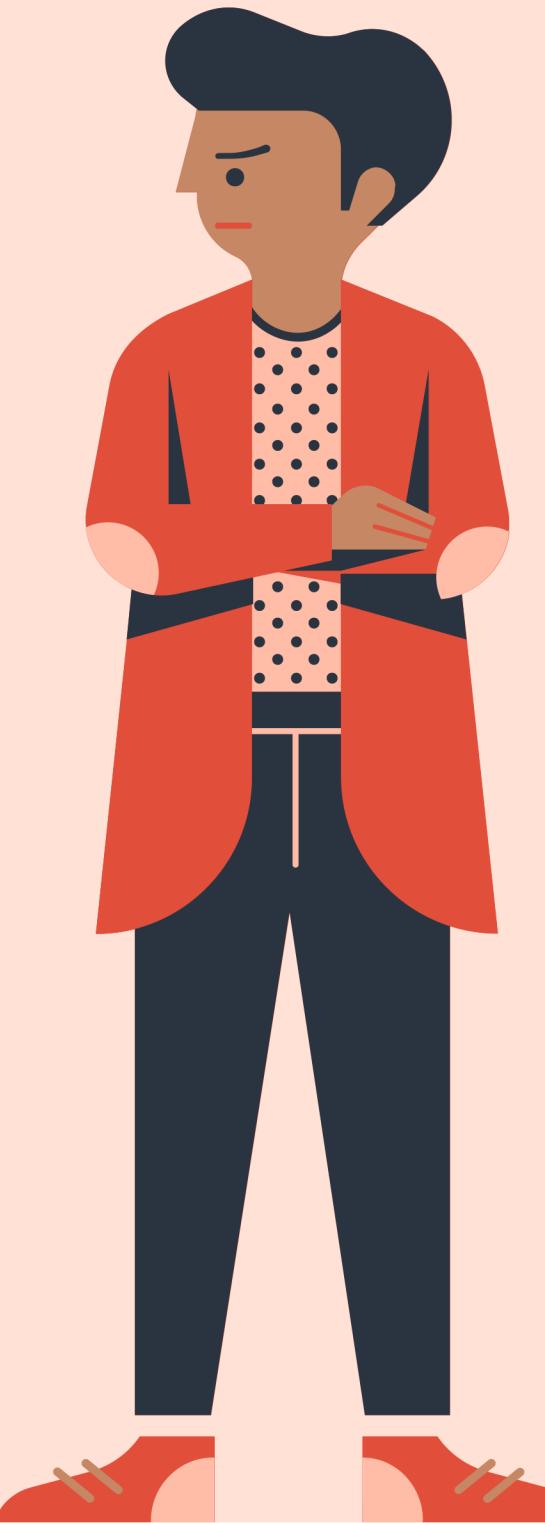
Relational Algebra



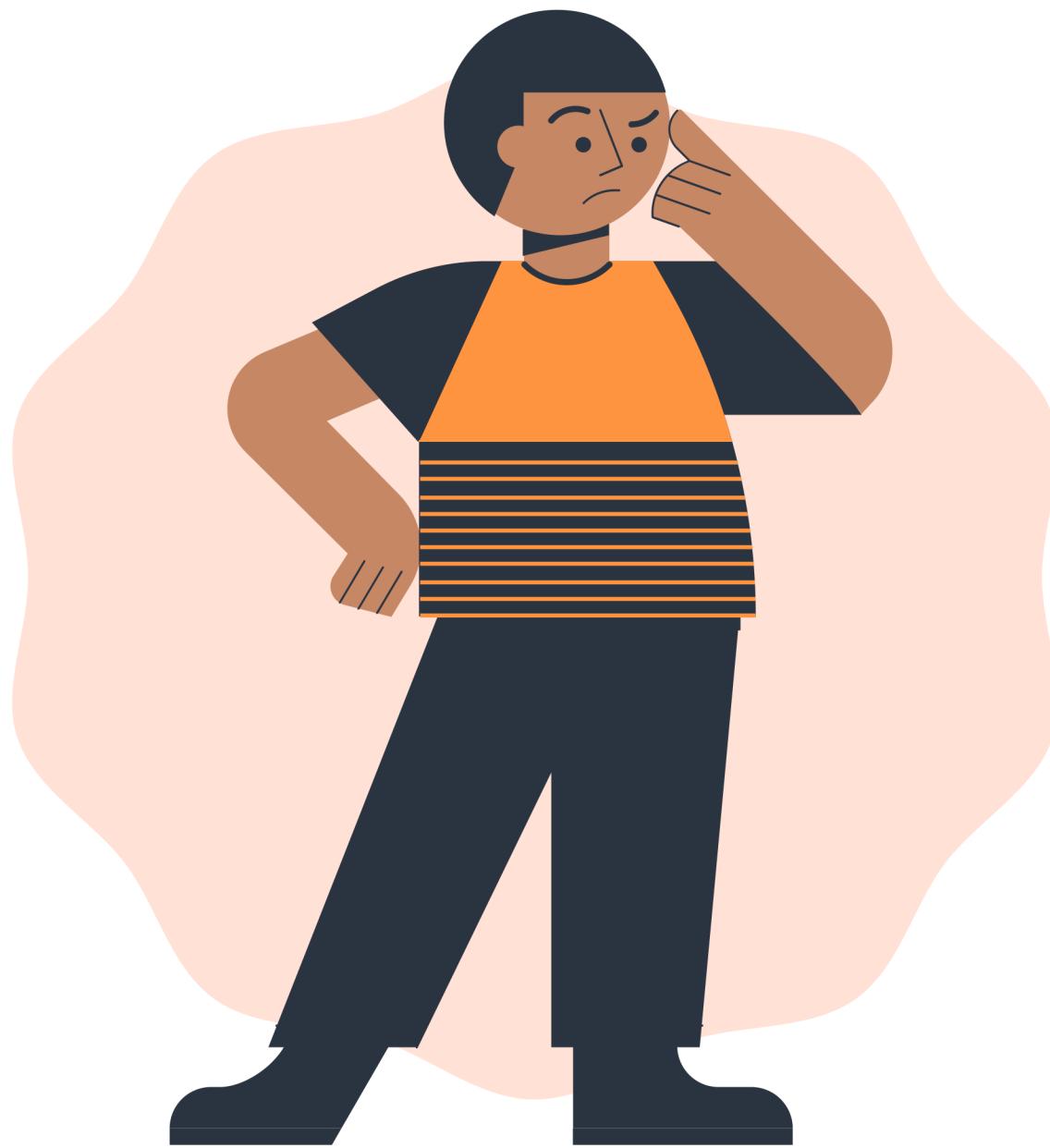
$f(x)$



TRIGGERS



TRANSACTION



ATOMIC



A transaction must be an atomic unit of work, which means that all the modified data are performed or none of them will be.

CONSISTENT



This property ensures that the transaction maintains data integrity constraints, leaving the data consistent.

ISOLATED



This property ensures the isolation of each transaction, ensuring that the transaction will not be changed by any other concurrent transaction.

DURABLE



Once a transaction is completed and committed, its changes are persisted permanently in the database.

iNDEX

When we can use index?

```
CREATE INDEX KAIRAT  
ON CLUB(CREATOR)
```

**Фильтрация
Объединение
Сортировка**

```
SQL> DROP INDEX KAIRAT  
INDEX DELETED
```







THANK YOU!