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Current Situation and Project Objective



Overview:

The client is posed as a staple product line across the United States and beyond built on the foundation of healthcare and senior living

Situation:

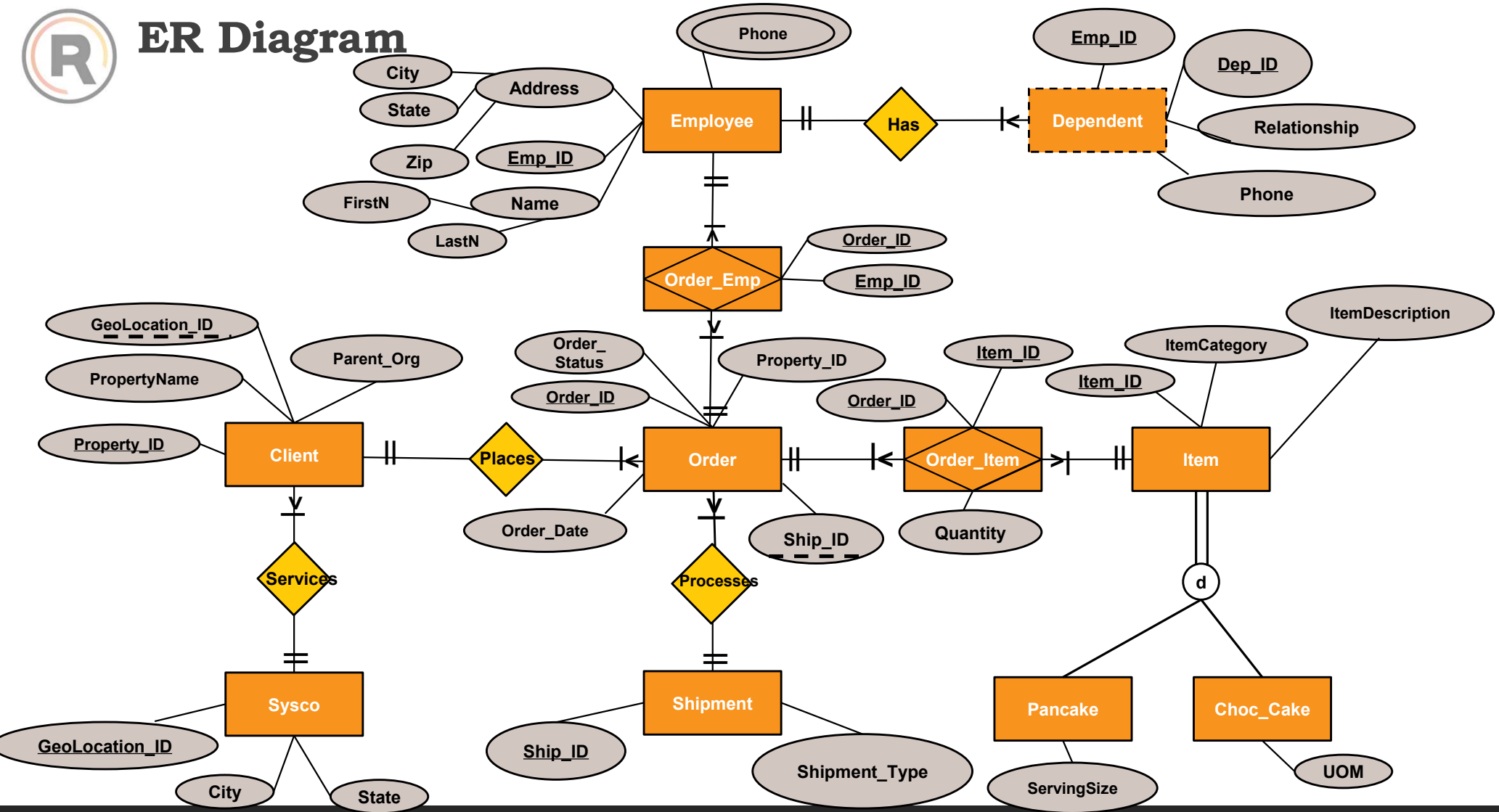
Currently the organization manages data using excel sheets, but wants to migrate to databases as they have the advantage to handle large volumes of data

Objective:

To create a database that is reliable, up-to-date and that can be used to make decisions across the organization



ER Diagram





Relational Schema

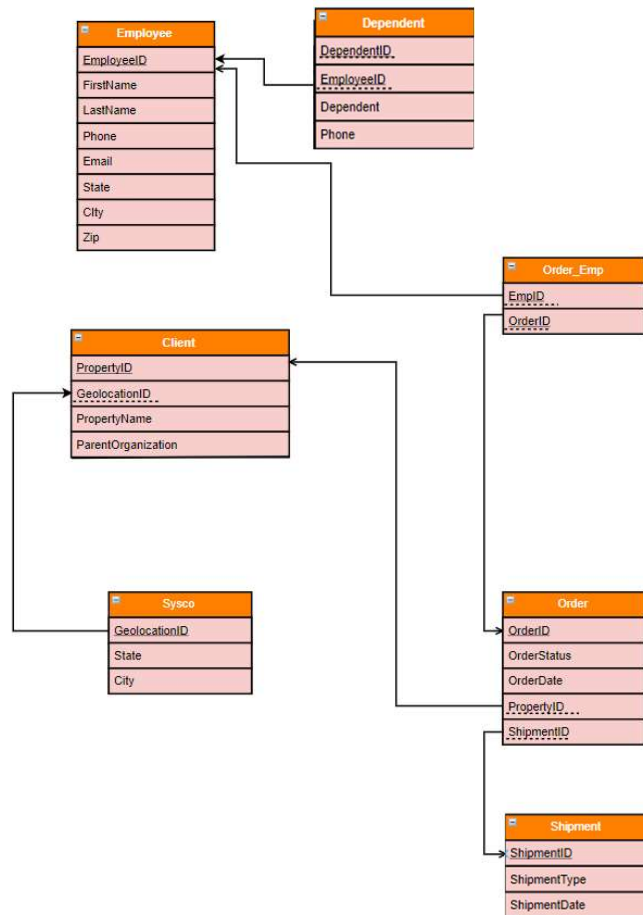


Table Name	Primary Key	Foreign Key
Employee	EmployeeID	
Dependent	EmployeeID, DependentID	EmployeeID,DependentID
Order_Emp	EmplD,OrderID	EmplD,OrderID
Client	PropertyID	GeolocationID
Sysco	GeolocationID	
Order	OrderID	PropertyID,ShipmentID
Order_Item	OrderID,ItemID	OrderID,ItemID
Item	ItemID	
Pancake	ItemID	ItemID
Choc_cake	ItemID	ItemID

Normalization

Initially, the database consisted of 2 master tables with ~10 columns each

Property ID	Order ID	Parent Organisation	Property Name	GeoLocation ID	State	City	OrderStatus	OrderDate	ShipmentID
128	3948087	Focused Acute Partners	Focused Care at Orange	69OJ7	Texas	Orange	Shipped	5/11/2022	128
108	3977812	Stonegate	Baybrooke Village Care and Rehabilitation Center	C1W33	Texas	McKinney	Shipped	5/25/2022	108
18	4010754	Frontier Management	Sagebrook Senior Living at Bellevue	3JQON	Washington	Bellevue	Shipped	6/5/2022	18
124	4047601	Frontier Management	Homplace Special Care at Oak Harbor	7S096	Washington	Oak Harbor	Shipped	6/23/2022	124
47	4099413	Focused Acute Partners	Focused Care at Crane	N9447	Texas	Crane	Shipped	7/25/2022	47
140	4107687	Stonegate	Accel Rehabilitation Hospital of Plano	B02NJ	Texas	Plano	Shipped	7/29/2022	140
15	4175650	Focused Acute Partners	Focused Care at Summer Place	M6J1L	Texas	Beaumont	Shipped	9/6/2022	15
70	4176867	Frontier Management	Crescent Landing at Garden Grove Memory Care	A4DFX	California	Garden Grove	Shipped	9/7/2022	70
91	4180482	Sonata Senior Living	Sonate Hunter's Creek	8ZBHY	Florida	Kissimmee	Shipped	9/9/2022	91
63	4180483	Frontier Management	The Terrace at Beverly Lake A Memory Care Residence	HCP49	Washington	Everett	Shipped	9/9/2022	63
69	4180484	Frontier Management	Crescent Landing at Fullerton Memory Care	9C4Q8	California	Fullerton	Shipped	9/9/2022	69
14	4185181	Focused Acute Partners	Focused Care at Cedar Bayou	50CLF	Texas	Baytown	Shipped	9/12/2022	14
64	4196944	Pegasus	The Village at Rancho Solano	72PU7	California	Fairfield	Shipped	9/20/2022	64

Insertion Anomaly :

We cannot enter client information as a prospect if they have not placed an order.

Updation Anomaly :

Modification in the name of Frontier Management will cause changes in multiple rows

Deletion Anomaly :

Deleting the highlighted order details will delete information about property too !



Normalization 1st Normal Form

Only `Employees` had multivalued attribute

Old form: ONF

EmployeeID	EmployeePhone
100138	(430) 412-5763,(430) 412-5764
100479	(767) 841-3239
100409	(977) 542-2296
100383	(757) 502-8045
100071	(429) 421-3552
100012	(642) 461-5645
100261	(978) 707-2915
100347	(324) 406-0398
100012	(427) 410-5314,(427) 410-5315
100075	(689) 747-1088,(689) 747-1089
100453	(487) 495-9679
100430	(917) 334-8239



New form: 1NF

EmployeeID	EmployeePhone
100138	(430) 412-5763
100138	(430) 412-5764
100125	(767) 841-3239
100054	(977) 542-2296
100123	(757) 502-8045
100168	(429) 421-3552
100291	(642) 461-5645
100472	(978) 707-2915
100194	(324) 406-0398
100382	(427) 410-5314
100382	(427) 410-5315
100075	(689) 747-1088
100075	(689) 747-1089
100103	(487) 495-9679
100212	(917) 334-8239
100142	(893) 719-145
100142	(893) 719-145



Normalization 2nd Normal Form

Every tuple contains exactly 1 value for each attribute – 1NF Satisfied.

OrderID	ItemID	ItemCategory	ItemDescription	UOM	OrderStatus	OrderDate	PropertyID	Quantity	ShipmentID	ShipmentType
3948087	BPM911621-1	Pancake	Vegan Pancake Case	0	Shipped	5/11/2022	128	3	6528489	UPS 3 Day Select
3948087	BPM911621-1	Pancake	Vegan Pancake Case	0	Shipped	5/11/2022	128	2	6528489	UPS 3 Day Select
3948087	BPM911621-2	Pancake	Chocolate Pancake Case	0	Shipped	5/11/2022	128	3	6528489	UPS 3 Day Select
3948087	BPM911621-2	Pancake	Chocolate Pancake Case	0	Shipped	5/11/2022	128	2	6528489	UPS 3 Day Select
3948087	BPM911621-4	Pancake	Sweet Potato Pancake Case	0	Shipped	5/11/2022	128	4	6528489	UPS 3 Day Select
3948087	BPM911621-5	Pancake	Blueberry Pancake Case	0	Shipped	5/11/2022	128	3	6528489	UPS 3 Day Select
3948087	BPM911621-6	Pancake	Carrot Pancake Case	0	Shipped	5/11/2022	128	1	6528489	UPS 3 Day Select
3948087	BPM911621-7	Pancake	Japanese Souffle Pancake Case	0	Shipped	5/11/2022	128	2	6528489	UPS 3 Day Select
3948087	BPM911621-8	Pancake	Pineapple Pancake Case	0	Shipped	5/11/2022	128	4	6528489	UPS 3 Day Select
3948087	BPM911621-9	Pancake	Ketto Pancake Case	0	Shipped	5/11/2022	128	3	6528489	UPS 3 Day Select
3948087	CCM910148-2	Cake	Chocolate Cake Pouch	EA	Shipped	5/11/2022	128	1	6528489	UPS 3 Day Select
3948087	CCM910150-2	Cake	Double Chocolate Cake Pouch	EA	Shipped	5/11/2022	128	4	6528489	UPS 3 Day Select
3977812	15113	Cake	Oreo Biscuit Cake Case	CS	Shipped	5/25/2022	108	1	1186304	UPS NDA Saver
3977812	15113	Cake	Oreo Biscuit Cake Case	CS	Shipped	5/25/2022	108	5	1186304	UPS NDA Saver
3977812	15115	Cake	Carrot Cake Case	CS	Shipped	5/25/2022	108	5	1186304	UPS NDA Saver

OrderID,ItemID → Quantity

OrderID → OrderStatus, OrderDate, PropertyID, ShipmentID, ShipmentType

ItemID → ItemCategory, ItemDescription,UOM

Every non-key attribute is **NOT FULLY** functionally dependent on the primary key



Decomposition to 2NF

OrderID (OrderID, OrderStatus, OrderDate, PropertyID, ShipmentID, ShipmentType)

OrderID	OrderStatus	OrderDate	PropertyID	ShipmentID	ShipmentType	Shipment Date
3948087	Shipped	5/11/2022	128	6528489	UPS 3 Day Select	5/14/2022
3977812	Shipped	5/25/2022	108	1186304	UPS NDA Saver	5/28/2022
4010754	Shipped	6/5/2022	18	6528489	UPS 3 Day Select	6/8/2022
4047601	Shipped	6/23/2022	124	3553097	FedEx Ground	6/28/2022

OrderID, ItemID → Quantity

OrderID → OrderStatus, OrderDate, PropertyID, ShipmentID, ShipmentType

ItemID → ItemCategory, ItemDescription

Order_Item(OrderID, ItemID, Quantity)

Item_ID	Order_ID	Quantity
15111	4099413	1
15111	4176867	2
15111	4180482	2
15111	4180483	5
15111	4203335	5
15111	4204075	2
15111	4204075	5
15111	4204100	1

ItemID (ItemID, ItemCategory, ItemDescription, UOM)

ItemID	ItemCategory	ItemDescription	UOM
15111	Cake	Chocolate Cake Case	CS
15112	Cake	Double Chocolate Cake Case	CS
15113	Cake	Oreo Biscuit Cake Case	CS
15114	Cake	Red Velvet Cake Case	CS
15115	Cake	Carrot Cake Case	CS
CCM910148-2	Cake	Chocolate Cake Pouch	EA
CCM910150-2	Cake	Double Chocolate Cake Pouch	EA
CCM910150-4	Cake	Oreo Biscuit Cake Pouch	EA
CCM910150-6	Cake	Red Velvet Cake Pouch	EA



Check if table is in 3rd Normal Form

OrderID (OrderID, OrderStatus, OrderDate, PropertyID, ShipmentID, ShipmentType)

OrderID	OrderStatus	OrderDate	PropertyID	ShipmentID	ShipmentType
4257570	Shipped	7/6/2022	40	3482984	FedEx Priority Overnight
4268423	Shipped	7/15/2022	14	3482984	FedEx Priority Overnight
4280135	Shipped	8/31/2022	101	3482984	FedEx Priority Overnight
4310475	Received	8/14/2022	109	3482984	FedEx Priority Overnight
4338558	Shipped	6/29/2022	124	3482984	FedEx Priority Overnight
4343425	Received	8/25/2022	106	3482984	FedEx Priority Overnight
4366918	Shipped	8/4/2022	43	3482984	FedEx Priority Overnight
4384198	Started	5/13/2022	102	3482984	FedEx Priority Overnight

OrderID → OrderStatus, OrderDate, PropertyID, ShipmentID
ShipmentID → ShipmentType, ShipmentDate

Transitive dependency exists – table NOT in 3NF !!
OrderID → ShipmentID → ShipmentType, ShipmentDate



Resolving into 3NF

OrderID → OrderStatus, OrderDate, PropertyID, ShipmentID
ShipmentID → ShipmentType, ShipmentDate

OrderID	OrderStatus	OrderDate	PropertyID	ShipmentID
4257570	Shipped	7/6/2022	40	3482984
4268423	Shipped	7/15/2022	14	3482984
4280135	Shipped	8/31/2022	101	3482984
4310475	Received	8/14/2022	109	3482984
4338558	Shipped	6/29/2022	124	3482984
4343425	Received	8/25/2022	106	3482984
4366918	Shipped	8/4/2022	43	3482984
4384198	Started	5/13/2022	102	3482984
4387472	Received	6/3/2022	81	3482984
4397784	Started	8/15/2022	139	3482984
4416920	Received	6/17/2022	23	3482984
4436634	Cancelled	6/17/2022	95	3482984

ShipmentID	ShipmentType
2308221	UPS Ground
6231958	WILL CALL
1186304	UPS NDA Saver
551152	UPS Next Day Air
8111357	UPS 2nd Day Air
6261423	UPS Ground Residential
6528489	UPS 3 Day Select
3553097	FedEx Ground
3482984	FedEx Priority Overnight

1NF ✓
2NF ✓
3NF ✓

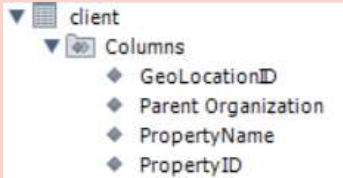
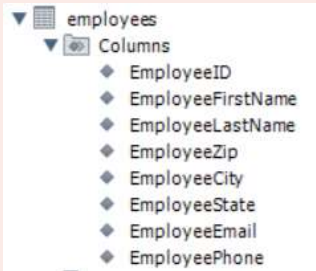
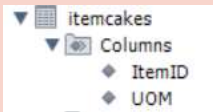
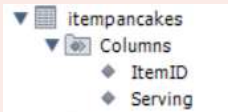


Database

TABLE	ROW COUNT	COL COUNT	DESCRIPTION
Client	142	4	List of clients belonging to a specific geographic region along with details for their parent organization
Employees	51	8	Employee details of people who are involved with preparing the order and shipping them
Itemcake	9	2	A sub-type of Items, which focus on variety of cakes
ItemPancake	12	2	A sub-type of items which focus on variety of pancakes
Items	21	2	Super-type of ItemCake and ItemPancake having generalized description
Order_Employee	74	2	Associative entity of Orders and Employees involved in preparing that order
Order_Item	6309	3	Associative entity of orders and items involved in each order
Orders	556	6	Details of an order to track the order date and shipment date
Shipment	9	2	Shipment type and its unique identifier
Sycso	142	3	Geographical locations where clients can reside

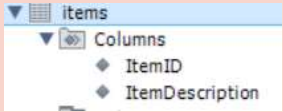
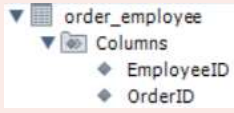
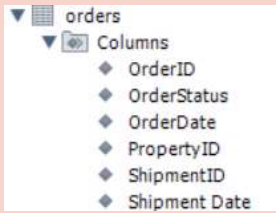
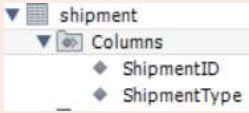



Database (Cont'd)

Table Name	Column List	Primary Key	Foreign Key
Client		PropertyID	GeoLocationID → SysCo(GeoLocationID)
Employees		EmployeeID	
ItemCake		ItemID	ItemID → Items(ItemID)
ItemPancakes		ItemID	ItemID → Items(ItemID)



Database (Cont'd)

Table Name	Column List	Primary Key	Foreign Key
Items		ItemID	
Order_Employee		EmployeeID, OrderID	EmployeeID → Employee(EmployeeID) OrderID → Orders(OrderID)
Orders		OrderID	PropertyID → Client (PropertyID) ShipmentID → Shipment (ShipmentID)
Shipment		ShipmentID	
Sysco		GeoLocationID	



Insights driven from SQL Queries

Sr.No	Queries	Purpose
1	List which clients' orders were cancelled the most?	Re-evaluate engagement with the client for future orders.
2	Which and how many items were ordered by the clients belonging to the parent Organization 'Frontier Management'?	Forecast the sales for Frontier Management and offer incentives based on the past orders for more engagement opportunities.
3	Which item is the most popular	Production can be scaled for that product
4	Which employees made the most orders?	Reward the employees based on the orders they handled
5	In which month the sales were highest and lowest?	Exploration on what factors contributed to low sales to get prepped for the next cycle
6	List the distinct States in which the corresponding Parent Organizations fall under.	Get insights with regards to the presence of Parent Organization
7	How ordered were made from Texas Clients?	Plan distribution based on forecasted orders for pancakes from Texas State
8	Which Cakes were least preferred by Clients from Florida in their order of preference?	Work on the feedback comments to improve the quality of product that is least preferred
9	Which pancake is the most sold to the clients	Scaling the raw material to make the desired pancake
10	Which Shipment Type is most preferred for Orders	Negotiate with the Shipment company for larger consignments.
11	Employee belong to mostly which state?	Using customer demographics, recruitment can be focused there
12	What is the average number of days between Order Received and Shipment?	To improve SLAs in future for faster delivery

Thank You

