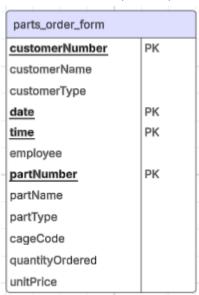# Exercise 1:

Assumptions:
- Each customer has a unique customer number
- Customer number, date, and time together identify an order
- Each part has a unique part number
- All parts of the same type are stored in the same cage
- Employees help with the entire order and not just specific items

All Data in One Table:

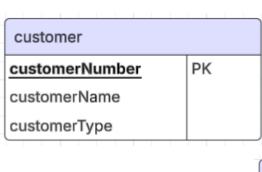| customerName	customerNumber	customerType	date	time	employee	partNumber	partName	partType	cageCode	quantityOrdered	unitPrice
Jeff Peterson	H054587	Consumer	7/1/2024	10:30 AM	D. Harrison	10654	Float Control	Plumbing	G413	4	12
Jeff Peterson	H054587	Consumer	7/1/2024	10:30 AM	D. Harrison	10456	Modulator	Electrical	H433	3	7
Jeff Peterson	H054587	Consumer	7/1/2024	10:30 AM	D. Harrison	10776	Hose Assembly	Plumbing	G413	7	9
Jeff Peterson	H054587	Consumer	7/1/2024	10:30 AM	D. Harrison	10657	Float Assembly	Plumbing	G413	5	10

(table title: parts_order_form)

Going to 1NF:
This table is in 1NF since there are no repeating groups. There are also primary keys which are "customerNumber", "date", "time", and "partNumber". Thus, the table in 1NF looks like:

parts_order_form

customerNumber	PK
customerName	
customerType	
date	PK
time	PK
employee	
partNumber	PK
partName	
partType	
cageCode	
quantityOrdered	
unitPrice	

Going to 2NF:
For a table to be in 2NF, it needs all of the non-key attributes to depend on the entire primary key, but our table has attributes depending only on parts of the composite key, like "customerName" depending only on "customerNumber". We can fix these partial dependencies by creating separate tables for customers, parts, orders, and order items, making each table's attributes fully dependent on that table's complete primary key. Thus, the tables in 2NF look like:
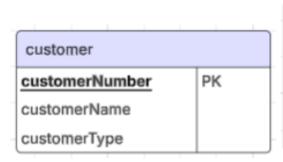
customer

customerNumber	PK
customerName	
customerType	

part

partNumber	PK
partName	
partType	
cageCode	
unitPrice	

order

customerName	PK
date	PK
time	PK
employee	

item_order

customerNumber	PK
date	PK
time	PK
partNumber	
quantityOrdered	

Going to 3NF:

For a table to be in 3NF, the transitive dependencies must be removed. These are where non-key attributes depend on other non-key attributes instead of the primary key. In the "part" table, the "cageCode" depends on "partType", and not fully on "partNumber", creating a dependency that we need to fix by separating "partType" and "cageCode" into their own table. Thus, the tables in 3NF look like:

customer

customerNumber	PK
customerName	
customerType	

order

customerName	PK
date	PK
time	PK
employee	

part_type

partType	PK
cageCode	

part

partNumber	PK
partName	
partType	FK
unitPrice	

item_order

customerNumber	PK, FK
date	PK, FK
time	PK, FK
partNumber	FK
quantityOrdered	

Exercise 2:

Assumptions:

- Each staffNo identifies unique a therapist
- Each patNo identifies a unique patient
- Therapist names are determined by their staff number
- A therapist works at only one branch on any given day
- The combination of staffNo, patNo, appointment date, and appointment time uniquely identifies an appointment
- branchNo depends on which therapist is working on a specific day

Original Data in One Table:

therapist_tracker						
staffNo	therapistName	**patNo**	patName	**appointmentDate**	**appointmentTime**	branchNo
S1011	Fred Smith	P100	Lily White	9/12/2022	10:00	M15
S1011	Fred Smith	P105	Jill Baker	9/12/2022	12:00	M15
S1024	Heidi Pierce	P108	Andy McKee	9/12/2022	10:00	Q10
S1024	Heidi Pierce	P108	Andy McKee	9/14/2022	14:00	Q10
S1032	Richard Levin	P105	Jill Baker	9/14/2022	16:30	M15
S1032	Richard Levin	P110	Jimmy Winter	9/15/2022	18:00	B13

Going to 1NF:

This table is in 1NF since there are no repeating groups. There are also primary keys which are "staffNo", "patNo", "appointmentDate", and "appointmentTime". Thus, the table in 1NF looks like:

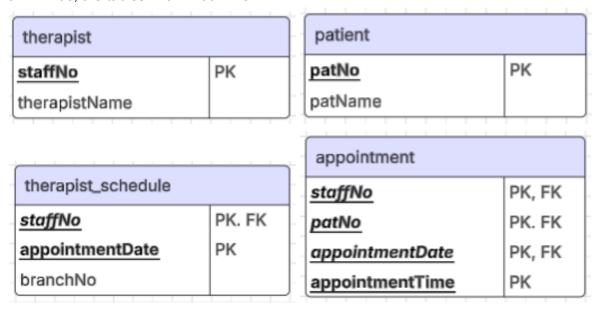| therapist_tracker	
staffNo	PK
therapistName	
patNo	PK
patName	
appointmentDate	PK
appointmentTime	PK
branchNo	

Going to 2NF:

For a table to be in 2NF, non-key attributes must depend on the entire primary key. In our case, "therapistName" depends only on "staffNo", "patName" depends only on "patNo", and "branchNo" depends on just "staffNo" and "appointmentDate", which are all partial dependencies. We can fix this by creating separate tables for therapists, patients, therapist branch assignments, and appointments, making each attribute depend on its table's complete primary key. Thus, the tables in 2NF look like:

therapist

staffNo	PK
therapistName	

patient

patNo	PK
patName	

therapist_schedule

staffNo	PK
appointmentDate	PK
branchNo	

appointment

staffNo	PK
patNo	PK
appointmentDate	PK
appointmentTime	PK

Going to 3NF:

For a table to be in 3NF, all transitive dependencies must be removed. Looking at the 2NF tables, we cannot find any of these dependencies since "therapistName" depends directly on "staffNo", "patName" on "patNo", and "branchNo" on the combination "staffNo" and "appointmentDate". With no transitive dependencies to remove, our 2NF tables are already in 3NF. Thus, the tables in 3NF look like:

therapist

staffNo	PK
therapistName	

patient

patNo	PK
patName	

therapist_schedule

staffNo	PK. FK
appointmentDate	PK
branchNo	

appointment

staffNo	PK, FK
patNo	PK. FK
appointmentDate	PK, FK
appointmentTime	PK

Exercise 3:

Assumptions:
- Each employee has a unique name
- Each contract applies to exactly one event
- Each event takes place at a single location
- The hours represent how long an employee worked on a specific contract

Original Data in One Table:

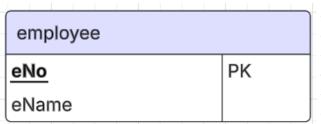| employee_hour_tracker					
eNo	**contractNo**	hours	eName	eventNo	eventLoc
1135	C1024	16	Smith J	H25	Queens
1057	C1024	24	Hocine D	H25	Queens
1068	C1025	28	White T	H4	Yonkers
1135	C1025	15	Smith J	H4	Yonkers
1135	C1026	10	Smith J	H25	Queens

Going to 1NF:

This table is in 1NF since there are no repeating groups. There are also primary keys which are "eNo" and "contracNo". Thus, the table in 1NF looks like:

employee_hour_tracker	
eNo	PK
contractNo	PK
hours	
eName	
eventNo	
eventLoc	

Going to 2NF:

For a table to be in 2NF, non-key attributes must depend on the entire primary key. In our table, "eName" depends only on "eNo" while "eventNo" and "eventLoc" depend only on "contractNo" - these are partial dependencies. We can fix this by creating three tables: one for employee data, one for contract data, and a bridging table for the relationship between employees and contracts with the hours attribute. Thus, the tables in 2NF look like:

employee

eNo	PK
eName	

contract

contractNo	PK
eventNo	
eventLoc	

employee_contract

eNo	PK
contractNo	PK
hours	

Going to 3NF:

For a table to be in 3NF, we must remove cases where non-key attributes depend on other non-key attributes. In the contract table, "eventLoc" depends on "eventNo" rather than directly on "contractNo" as the location is tied to the specific event. We can fix this by creating a separate event table with "eventNo" as its primary key and "eventLoc" as an attribute, and then referencing this from the contract table. Thus, the tables in 3NF look like:

employee

eNo	PK
eName	

contract

contractNo	PK
eventNo	FK

employee_contract

eNo	PK
contractNo	PK, FK
hours	

event

eventNo	PK
eventLoc	