Problem 1: Happy Supplies Parts Warehouse

Assumptions:

- A part can be ordered by different customers.
- Different employees can help the same customer on the same day if it's at a different time.
- No relationship between specific employees and customers.
- There is no relationship between type and cageCode. Although there appears to be one, I'm going to assume that this is coincidential and this relationship is not always present.

1NF

order

Primary Key: customerNumber, date, time, partNumber

customerName	**customerNumber**	customerType	**date**	**time**	employee	**partNumber**	name	type	cageCode	quantityOrdered	unitPrice
Jeff Peterson	HG54587	consumer	7/1/2024	10:30am	D. Harrison	10654	Float Control	Plumbing	G413	4	12
Jeff Peterson	HG54587	consumer	7/1/2024	10:30am	D. Harrison	10456	Modulator	Electrical	H433	3	7
Jeff Peterson	HG54587	consumer	7/1/2024	10:30am	D. Harrison	10776	Hose Assembly	Plumbing	G413	7	9
Jeff Peterson	HG54587	consumer	7/1/2024	10:30am	D. Harrison	10657	Float Assembly	Plumbing	G413	5	10

The table is in 1NF because it is comprised of atomic values, has no repeating groups/columns, and has a primary key (enforcing uniqueness).

The table is not in 2NF because there are partial dependencies (something is not dependent on the ENTIRE PK):

- customerName, customerType are dependent on **customerNumber**
- employee is dependent on **customerNumber**, **date**, **time**
- name, type, cageCode, unitPrice is dependent on **partNumber**
- quantityOrdered is dependent on **customerNumber**, **date**, **time**, **partNumber**

These partial dependencies need to be resolved for by creating new tables in order to bring this table into the "2NF" form.

3NF

part

partNumber	name	type	cageCode	unitPrice
10654	Float Control	Plumbing	G413	12
10456	Modulator	Electrical	H433	7
10776	Hose Assembly	Plumbing	G413	9
10657	Float Assembly	Plumbing	G413	10

customer

customerNumber	customerName	customerType
HG54587	Jeff Peterson	consumer

is in

1 ---< many

1 ---< many

order

customerNumber	**date**	**time**	**partNumber**	quantityOrdered
HG54587	7/1/2024	10:30am	10654	4
HG54587	7/1/2024	10:30am	10456	3
HG54587	7/1/2024	10:30am	10776	7
HG54587	7/1/2024	10:30am	10657	5

makes

works on

1 ---< many

employee

customerNumber	**date**	**time**	employee
HG54587	7/1/2024	10:30am	D. Harrison

After resolving the partial dependencies by creating new tables, we find that there are no transitive relationships, meaning that our table is now in 3NF form. Note that because there are no transitive relationships, we don't need any foreign keys.

Problem 2: Panacea Mental Health Corporation

Assumptions:

- A certain staff member and patient can meet more than one time per day (essentially making time part of the primary key).
- Therapists and patients have their own unique number.
- We follow all specification requirements stated in the prompt.
- Patients can only have one appointment at a time.
- A patient is given an appointment at a specific time and date at a particular branch with one therapist (staffNo can be determined by the combination patNo, date, time).

appointment_information

Q10	therapistName	patNo	patName	appointment		branchNo
				date	time	
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

This table is not in 1NF because the appointment part of the table has multiple values in one column. As a result, in order to get this table into 1NF, we need to split this into two columns.

1NF

staffNo	therapistName	**patNo**	patName	**date**	**time**	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

The table is in 1NF because it is comprised of atomic values, has no repeating groups/columns, and has a primary key (enforcing uniqueness).

The table is not in 2NF because there are partial dependencies (something is not dependent on the ENTIRE PK):

- therapistName is dependent on **staffNo**.
- patName is dependent on **patNo**
- branchNo is dependent on **staffNo**, **date** as stated in the prompt.
- staffNo, branchNo is dependent on **patNo**, **date**, **time** as stated in the prompt.

These partial dependencies need to be resolved for by creating new tables in order to bring this table into the "2NF" form.

3NF

staff

staffNo	therapistName
S1011	Fred Smith
S1024	Heidi Pierce
S1032	Richard Levin

assignment

staffNo	**date**	branchNo
S1011	9/12/2022	M15
S1024	9/12/2022	Q10
S1024	9/14/2022	Q10
S1032	9/14/2022	M15
S1032	9/15/2022	B13

assigned to

works on

1 ---< many

1 ---< many

appointment

patNo	**date**	**time**	*staffNo*
P100	9/12/2022	10:00	S1011
P105	9/12/2022	12:00	S1011
P108	9/12/2022	10:00	S1024
P108	9/14/2022	14:00	S1024
P105	9/14/2022	16:30	S1032
P110	9/15/2022	18:00	S1032

makes

1 ---< many

patient

patNo	patName
P100	Lily White
P105	Jill Baker
P108	Andy McKee
P110	Jimmy Winter

After resolving the partial dependencies by creating new tables, we find that there are no transitive relationships that we need to resolve, meaning that our table is now in 3NF form. Note that we do have a foreign key in the main table. Since we found that *staffNo* was dependent on **patNo**, **date**, **time**, it does not need to be part of our composite primary key. However, it is a primary key in the "staff" table, meaning it becomes a foreign key in the original table.

Assumptions:

- Employee number is a unique identifier for employee.
- Contract number is a unique identifier contract.
- Each contract only applies to one event.
- Each event is only in one location.
- An event can have multiple different contracts.

Problem 3: Maid Better temp agency

1NF

company_data

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

The table is in 1NF because it is comprised of atomic values, has no repeating groups/columns, and has a primary key (enforcing uniqueness).

The table is not in 2NF because there are partial dependencies (something is not dependent on the ENTIRE PK):

- eName is dependent on **eNo**
- eventNo is dependent on **contractNo**
- eventLoc is dependent on eventNo, which is dependent on **contractNo**, thus making it dependent on **contractNo**
- hours is dependent on **eNo**, **contractNo**

These partial dependencies need to be resolved for by creating new tables in order to bring this table into the "2NF" form.

2NF

employee

eNo	eName
1135	Smith J
1057	Hocine D
1068	White T

event

contractNo	eventNo	eventLoc
C1024	H25	Queens
C1025	H4	Yonkers
C1026	H25	Queens

1 ---< many

in

in

1 ---< many

time_worked

eNo	**contractNo**	hours
1135	C1024	16
1057	C1024	24
1068	C1025	28
1135	C1025	15
1135	C1026	10

After resolving the partial dependencies, we have now normalized our data into 2NF. However, there exists a transitive dependency in our tables that has not been resolved. eventLoc is dependent on eventNo, but eventNo is not a primary key in a table. As a result, we need to create a new table that illustrates this relationship.

3NF

employee

eNo	eName
1135	Smith J
1057	Hocine D
1068	White T

event

contractNo	*eventNo*
C1024	H25
C1025	H4
C1026	H25

1 ---< many

in

1 ---< many

in

time_worked

eNo	**contractNo**	hours
1135	C1024	16
1057	C1024	24
1068	C1025	28
1135	C1025	15
1135	C1026	10

1 ---< many

is at

location

eventNo	eventLoc
H25	Queens
H4	Yonkers

We have now resolved our transitive dependencies, meaning that we have normalized the data to the form 3NF. The foreign keys and relationships have been labled properly.