

1.

parts_order

customerNumber(PK)	customerName	customerType	date(PK)	time(PK)	employee	partNumber(PK)	partName	partType	cageCode	quantity	unitPrice
HG54587	Jeff Peterson	Consumer	7/1/2024	10:30 am	D. Harrison	10654	Float Control	Plumbing	G413	4	12
HG54587	Jeff Peterson	Consumer	7/1/2024	10:30 am	D. Harrison	10456	Modulator	Electrical	H433	3	7
HG54587	Jeff Peterson	Consumer	7/1/2024	10:30 am	D. Harrison	10776	Hose Assembly	Plumbing	G413	7	9
HG54587	Jeff Peterson	Consumer	7/1/2024	10:30 am	D. Harrison	10657	Float Assembly	Plumbing	G413	5	10

Assumptions:

One customer is always the same type.

Part name, part type, cage code and unit price all depend on part number alone.

There's one and only one employee works for a specific customer at specific date and time.

Normalization Process:

The data is already 1NF since it has a primary key(customerNumber, date, time, partNumber) and no repeating groups.

parts_order

customerNumber(PK)	customerName	customerType	date(PK)	time(PK)	employee	partNumber(PK)	partName	partType	cageCode	quantity	unitPrice
HG54587	Jeff Peterson	Consumer	7/1/2024	10:30 am	D. Harrison	10654	Float Control	Plumbing	G413	4	12
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HG54587	Jeff Peterson	Consumer	7/1/2024	10:30 am	D. Harrison	10776	Hose Assembly	Plumbing	G413	7	9
HG54587	Jeff Peterson	Consumer	7/1/2024	10:30 am	D. Harrison	10657	Float Assembly	Plumbing	G413	5	10

It's not in 2NF, because:

Customer name and customer type depend on customer number alone.

Part name, part type, cage code and unit price depend on part number alone.

Employee depends on customer number, date and time alone.

The 2NF version of the tables then becomes: (and it is already in 3NF since none of the fields are dependent on any of the non-PK fields)

customer

customerNumber(PK)	customerName	customerType
HG54587	Jeff Peterson	Consumer

part

partNumber(PK)	partName	partType	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

employee

<u>customerNumber(PK)</u>	<u>date(PK)</u>	<u>time(PK)</u>	employee
HG54587	7/1/2024	10:30 am	D. Harrison

order

<u>customerNumber(PK, FK)</u>	<u>date(PK, FK)</u>	<u>time(PK, FK)</u>	<u>partNumber(PK, FK)</u>	quantity
HG54587	7/1/2024	10:30 am	10654	4
HG54587	7/1/2024	10:30 am	10456	3
HG54587	7/1/2024	10:30 am	10776	7
HG54587	7/1/2024	10:30 am	10657	5

Relationship:

Employee(customerNumber, date, time) is responsible for order.

Part(partNumber) is included in order.

Customer(customerNumber) places order.

2.

appointment

staffNo	therapistName	patNo	patName	appointmentDate&Time	brachNo
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

Assumptions:

Suppose a therapist can only accept one patient's appointment at a specific date and time.

Normalization Process:

The data is not in 1NF since it has multiple values in appointmentDate&Time. In order to move the data to 1NF, the repeating group must be removed. This results in a new table:

appointment

<u>staffNo(PK)</u>	therapistName	patNo	patName	<u>date(PK)</u>	<u>time(PK)</u>	brachNo
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

It's not in 2NF, because:

therapistName depends on staffNo alone.

branchNo depends on staffNo and date only.

Then the 2NF version of the tables then becomes:

staff

<u>staffNo(PK)</u>	therapistName
S1011	Fred Smith
S1024	Heidi Pierce
S1032	Richard Levin

branch

staffNo(PK)	date(PK)	brachNo
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

appointment

staffNo(PK)	date(PK)	time(PK)	patNo	patName
S1011	9/12/2022	10:00	P100	Lily White
S1011	9/12/2022	12:00	P105	Jill Baker
S1024	9/12/2022	10:00	P108	Andy McKee
S1024	9/14/2022	14:00	P108	Andy Mckee
S1032	9/14/2022	16:30	P105	Jill Baker
S1032	9/15/2022	18:00	P110	Jimmy Winter

It's not in 3NF since there's a transitive dependency between patNo and patName. The 3NF would then be:

staff

staffNo(PK)	therapistName
S1011	Fred Smith
S1024	Heidi Pierce
S1032	Richard Levin

branch

staffNo(PK)	date(PK)	brachNo
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

patient

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

appointment

<u>staffNo(PK, FK)</u>	<u>date(PK, FK)</u>	<u>time(PK)</u>	<u>patNo(FK)</u>
S1011	9/12/2022	10:00	P100
S1011	9/12/2022	12:00	P105
S1024	9/12/2022	10:00	P108
S1024	9/14/2022	14:00	P108
S1032	9/14/2022	16:30	P105
S1032	9/15/2022	18:00	P110

Relationship:

Staff(staffNo) is responsible for appointment.

Patient(patNo) makes appointment.

Brach(staffNo, date) is chosen in appointment.

3.

contact

eNo(PK)	contactNo(PK)	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

Assumptions:

One event can only take place in one specific location.

The working hours are listed in the contact for each employee.

Normalization Process:

It is already in 1NF since it has a primary key and no repeating groups.

contact

<u>eNo(PK)</u>	<u>contactNo(PK)</u>	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

It is not in 2NF because eName depends on eNo alone and eventNo and eventLoc depends on contactNo alone. Then the 2NF results in 3 tables:

contact

<u>eNo(PK)</u>	<u>contactNo(PK)</u>	hours
1135	C1024	16
1057	C1024	24
1068	C1025	28
1135	C1025	15
1135	C1026	10

employee

<u>eNo(PK)</u>	eName
1135	Smith J
1057	Hocine D
1068	White T

event

<u>contactNo(PK)</u>	eventNo	eventLoc
C1024	H25	Queens
C1025	H4	Yonkers

It is not in 3NF since eventLoc only depends on eventNo. Then the 3NF should be:

contact

<u>eNo(PK, FK)</u>	<u>contactNo(PK, FK)</u>	hours
1135	C1024	16
1057	C1024	24
1068	C1025	28
1135	C1025	15
1135	C1026	10

employee

<u>eNo(PK)</u>	eName
1135	Smith J
1057	Hocine D
1068	White T

event

<u>contactNo(PK)</u>	eventNo(FK)
C1024	H25
C1025	H4

location

<u>eventNo(PK)</u>	eventLoc
H25	Queens
H4	Yonkers

Relationship:

Employee(eNo) signs the contact.

Contact(contactNo) serves the event.

Event(eventNo) takes place in location.