Assumptions:

1. Assuming that for orders made in same time by the same customer, it is handled by same employee.
2. Assuming that unit price is fix across all customers.
3. Assuming that for the same part, they have the same cage code.

Raw Table

CustomerName	CustomerNumber	CustomerType	Date	Time	Employee	PartNumber	PartName	PartType	CageCode	QuantityOrdered	UnitPrice
Jeff Peterson	HG54587	Consumer	7/1/2024	10:30 am	D. Harrison	10654, 10456, 10776, 10657	Float Control, Modulator, Hose Assembly, Float Assembly	Plumbing, Electrical, Plumbing, Plumbing	G413, H433, G413, G413	4, 3, 7, 5	12, 7, 9, 10

1NF: Identify Primary key (Composite primary key in this case). Customer number, date, time, and part number can be primary key as we trying to record the order detail of each part No multiple value stored in single cell so we split the parts into different rows. Each row represent an order part.

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

2NF: Every non-key attribute depend on the whole key of that relation. Customer, part, and order employee should be in their own table because they only depends on part of the PK.

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

place_order(1→0..*)

ordered(1→0..*)

purchased(1→0..*)

responsible_employee

customerNumber(PK,FK))	date(PK)	time(PK)	employee
HG54587	**7/1/2024**	**10:30 am**	D. Harrison

part_ordered

customerNumber(PK,FK)	*date(PK, FK)*	*time(PK, FK)*	*partNumber(PK,FK)*	quantityOrdered
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

order_contain(1→1..*)

3NF: This should be the same as 2NF in this situation because none of the field are dependent on other 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

place order(1→0..*)

ordered(1→0..*)

purchased(1→0..*)

responsible_employee

customerNumber(PK,FK))	date(PK)	time(PK)	employee
HG54587	**7/1/2024**	**10:30 am**	D. Harrison

part_ordered

customerNumber(PK,FK)	*date(PK, FK)*	*time(PK, FK)*	partNumber(PK,FK)	quantityOrdered
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

order_contain(1→1..*)

Assumption
1. Therapist can work in different branch.
2. Patient can go to different branch
3. We don't store any information about the branch except branch number.
4. A patient can have no appointment history.

Raw Data

staffNo	therapistName	patNo	patName	appointment 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	Q10
S1024	Heidi Pierce	P108	Andy Mckee	9/12/2022 10:00	Q10
S1024	Heidi Pierce	P108	Andy Mckee	9/14/2022 14:00	M15
S1032	Richard Levin	P105	Jill Baker	9/14/2022 16:30	M15
S1032	Richard Levin	P110	Jimmy Winter	9/15/2022 18:00	B13

1NF: composite PK could be patNo + appointment date and time. For it to be 1NF, I also have to split the appoint date time column into two columns

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

2NF: patName depends only on patNo; therapistName depends only on staffNo. Thus move them into separate tables

patient

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

staff

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

reserve(1→0..*)

responsible for(1→0..*)

appointment

patNo(PK, FK)	appointmentDate(PK)	appointmentTime(PK)	*staffNo(FK)*	branchNo
P100	**9/12/2022**	**10:00**	*S1011*	M15
P105	**9/12/2022**	**12:00**	*S1011*	Q10
P108	**9/12/2022**	**10:00**	*S1024*	Q10
P108	**9/14/2022**	**14:00**	*S1024*	M15
P105	**9/14/2022**	**16:30**	*S1032*	M15
P110	**9/15/2022**	**18:00**	*S1032*	B13

3NF is the same as 2NF as we don't have any data for branch. So there are no any field depend on other no PK field.

patient

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

staff

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

reserve(1→0..*)

responsible for(1→0..*)

appointment

patNo(PK, FK)	appointmentDate(PK)	appointmentTime(PK)	*staffNo(FK)*	branchNo
P100	**9/12/2022**	**10:00**	*S1011*	M15
P105	**9/12/2022**	**12:00**	*S1011*	Q10
P108	**9/12/2022**	**10:00**	*S1024*	Q10
P108	**9/14/2022**	**14:00**	*S1024*	M15
P105	**9/14/2022**	**16:30**	*S1032*	M15
P110	**9/15/2022**	**18:00**	*S1032*	B13

Assumption

1. One contract applied to only one event. One event can have multiple contract.
2. uniquely identifies an employee. contractNo uniquely identifies a contract. eventNo uniquely identifies an event.

Raw 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

1NF: Identify Primary key.

eNo(PK)	contractNo(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

Dependency Observe

1. Hours depends on eNo and contractNo
2. eName depends on eNo
3. eventNo depends on contractNo
4. eventLoc depends on eventNo

2NF: Move out eName depends on eNo, eventNo depends on contrackNo, eventLoc depends on contrackNo as they depend only on one of the PK

employee

eNo(PK)	eName
1135	Smith J
1057	Hocine D
1068	White T

worklog

eNo(PK,FK)	*contractNo(PK,FK)*	hours
1135	***C1024***	16
1057	***C1024***	24
1068	***C1025***	28
1135	***C1025***	15
1135	***C1026***	10

works

worked by

contract

contractNo(PK)	eventNo	eventLoc
C1024	H25	Queens
C1025	H4	Yonkers
C1026	H25	Queens

3NF: eventLoc depends on eventNo which is not a PK. Thus we need to create a separate table for eventNo to be PK with eventLoc stored.

employee

eNo(PK)	eName
1135	Smith J
1057	Hocine D
1068	White T

worklog

eNo(PK,FK)	*contractNo(PK,FK)*	hours
1135	***C1024***	16
1057	***C1024***	24
1068	***C1025***	28
1135	***C1025***	15
1135	***C1026***	10

worked by (1→0..*)

contract

contractNo(PK)	eventNo(FK)
C1024	*H25*
C1025	*H4*
C1026	*H25*

event

eventNo(PK)	eventLoc
H25	Queens
H4	Yonkers

have (1→0..*)