

Question 1.

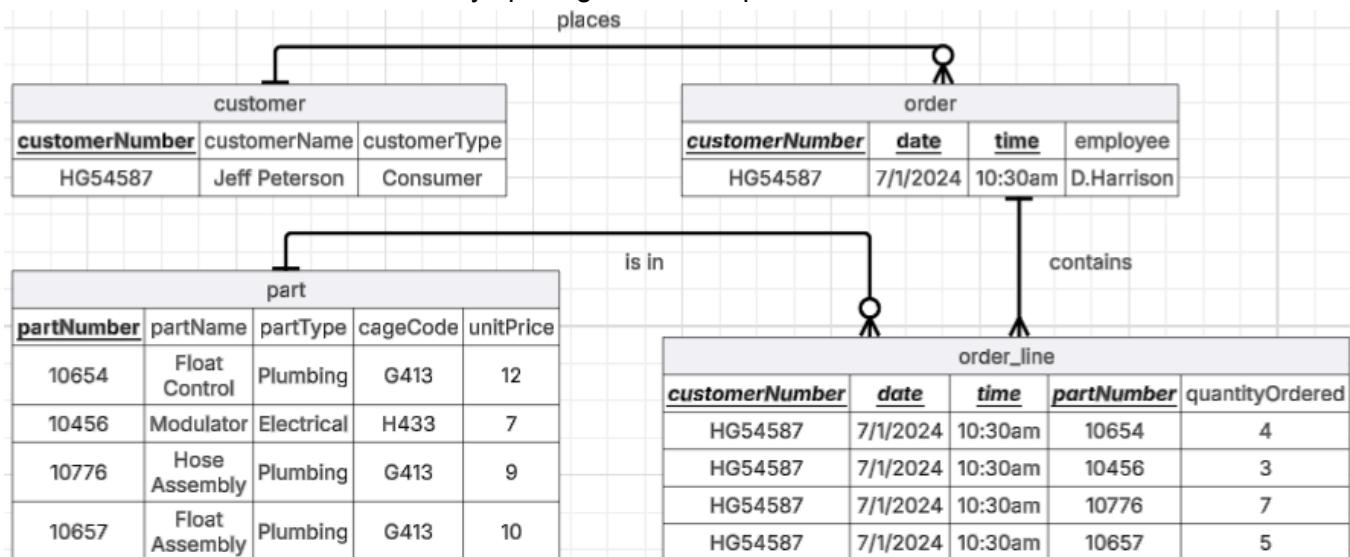
- a) Assumptions about the data
1. CustomerNumber uniquely identifies the customer
 2. The form represents one order event identified by customerNumber, date, time
 3. PartNumber uniquely identifies a part
 4. A single order can include multiple parts
 5. A customer cannot place multiple orders on the same exact timestamp.

b)

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

To ensure 1NF, I copy over the information from the order form into the table above, such as customerNumber, customerName, customerType, date, time, employee. The rest matches the original table at the bottom of the order. We obtain a composite PK consisting of customerNumber, date, time & partNumber.

Next, we move to 2NF by splitting this table up into 4 different tables :



c) d)

customer - PK: customerNumber

order - PK (composite): customerNumber, date, time

order - FK: customerNumber (customer)

part - PK: partNumber

order_line - PK (composite): customerNumber, date, time, partNumber

order_line - FK (composite): customerNumber (customer), date (order), time (order), partNumber (part)

We are automatically in 3NF as every non-key attribute depends only on the key.

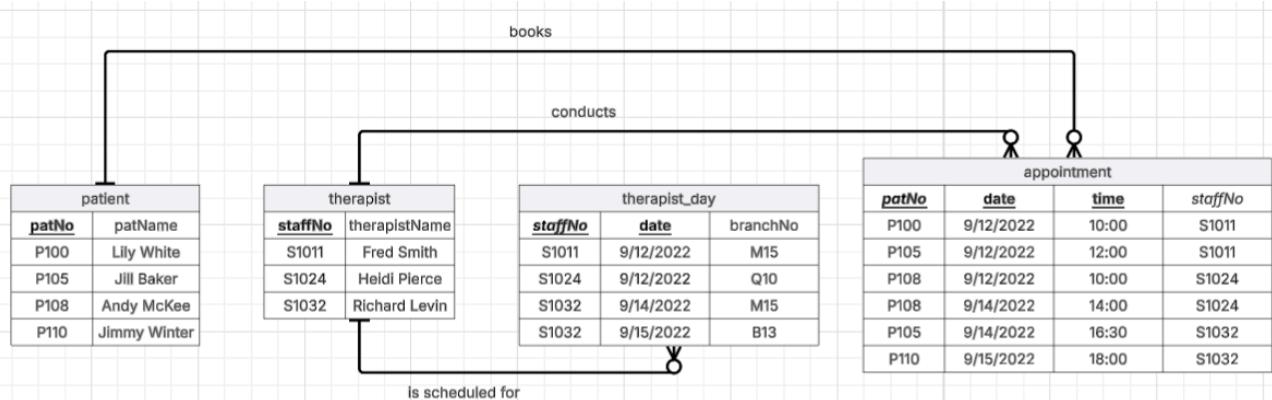
Question 2.

- a) Assumptions about the data
1. staffNo uniquely identifies a therapist
 2. patNo uniquely identifies a patient
 3. A patient cannot have overlapping appointments
 4. One therapist is assigned per appointment
 5. branchNo uniquely identifies a branch
- b) As the table is already in 1NF, we move to 2NF by removing partial dependency (patName depends on patNo) and we split the data in two following tables :

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

appointment					
patNo	date	time	staffNo	therapistName	branchNo
P100	9/12/2022	10:00	S1011	Fred Smith	M15
P105	9/12/2022	12:00	S1011	Fred Smith	M15
P108	9/12/2022	10:00	S1024	Heidi Pierce	Q10
P108	9/14/2022	14:00	S1024	Heidi Pierce	Q10
P105	9/14/2022	16:30	S1032	Richard Levin	M15
P110	9/15/2022	18:00	S1032	Richard Levin	B13

Next, we move to 3NF by removing transitive dependencies (therapistName depends on staffNo and branchNo depends on staffNo and date)



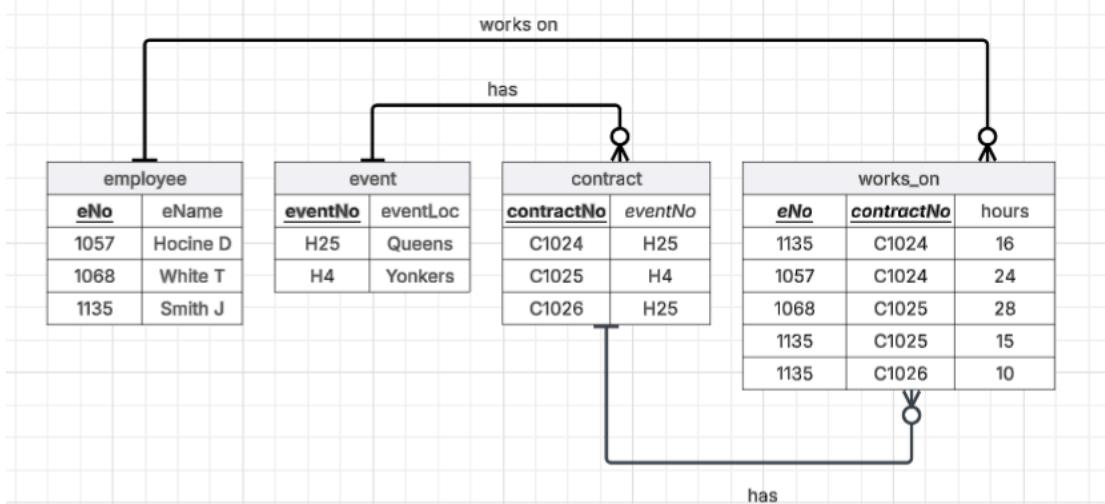
- c) In 3NF, PKs and FKs are as follows :
- patient - PK : patNo
 - therapist - PK : staffNo
 - therapist_day - PK (composite) : staffNo,date
 - therapist_day - FK : staffNo (therapist)
 - appointment - PK (composite) : patNo, date, time
 - appointment - FK : patNo (patient), staffNo (therapist)

Question 3.

- a) Assumptions about the data
1. eventNo uniquely identifies the event
 2. contractNo uniquely identifies a contract.
 3. Each contractNo is for exactly one event
 4. eventNo determines event location
- b) This table is already in 1NF so, we remove partial dependencies to move to 2NF.
 Partial dependencies are : eName depends only on eNo and eventNo depends only on contractNo. We obtain the following tables in 2NF :

employee		contract		works_on			
<u>eNo</u>	eName	<u>contractNo</u>	eventNo	<u>eNo</u>	<u>contractNo</u>	hours	eventLoc
1057	Hocine D	C1024	H25	1135	C1024	16	Queens
1068	White T	C1025	H4	1057	C1024	24	Queens
1135	Smith J	C1026	H25	1068	C1025	28	Yonkers
				1135	C1025	15	Yonkers
				1135	C1026	10	Queens

Now we need to remove transitive dependencies where eventNo depends on eventLoc and contractNo depends on eventNo. We obtain the following four tables :



- c) employee - PK : eNo
 event - PK : eventNo
 contract - PK : contractNo
 contract - FK : eventNo (event)
 works_on - PK (composite) : eNo, contractNo
 works_on - FK : eNo (employee), contractNo (contract)