

Part 1: Happy Supplies Parts Warehouse

Step 2: Define important terms

Primary key (PK):

customerNumber, date, time, partNumber, because a customer places an order at anytime on any day, containing multiple parts.

Candidate key:

customerNumber, date, time, partNumber, because a customer places an order at anytime on any day, containing multiple parts.

Other attributes cannot uniquely identify each row.

Functional dependency (FD):

1. customerNumber → customerName, customerType
2. (customerNumber, date, time) → employeeFor each order from a customer at a specific time and date is assisted by one employee

3. partNumber → partName, partType, cageCode, unitPrice
4. customerNumber, date, time, partNumber → quantityOrdered

Partial dependency:

1. customerName, customerType only dependent on customerNumber
2. employee only dependent on (customerNumber, date, time)

Transitive dependency:

1. customerName, customerType dependent on customerNumber
2. employee only dependent on (customerNumber, date, time)

3. separate partName, partType, cageCode, unitPrice only dependent on partNumber

Step 1: Look at the raw table

Attributes:

customerNumber, customerName, customerType, date, time, employee, partNumber, Name, Type, cageCode, quantityOrdered, unitPrice

Assumption:

Each physical handwritten form corresponds to one order.

Any employee can assist any customer, which means that multiple orders from the same customer at different time and date could be assisted by different employees.

order									
customerNumber(PK)	customerName	customerType	date(PK)	time(PK)	employee	partNumber(PK)	partName	partType	cageCode
H054587	Jeff Peterson	consumer	7/1/2024	10:30am	D.Harrison	10654	Float Control	Plumbing	G413
H054587	Jeff Peterson	consumer	7/1/2024	10:30am	D.Harrison	10456	Modulator	Electrical	H433
H054587	Jeff Peterson	consumer	7/1/2024	10:30am	D.Harrison	10776	Hose Assembly	Plumbing	G413
H054587	Jeff Peterson	consumer	7/1/2024	10:30am	D.Harrison	10657	Float Assembly	Plumbing	G413

Step 3: Find candidate keys

Composite key (customerNumber, date, time, partNumber) uniquely identifies a row.

Since a customer can order different parts at multiple times in multiple days, four keys facilitate as a composite key for determination.

Since each of these four is not unique.

Since date, time is not unique (different customers can order at the same time).

Since customerNumber, partNumber is not unique (a customer can order same part multiple times).

So (customerNumber, date, time, partNumber) → primary key.

Step 4: Check Normal Forms

1NF (Eliminate repeating groups)

Already satisfied: each cell has atomic values (no lists).

But there are redundancies.

customerNumber, customerName, customerType, date, time, and employee repeated.

There are partial dependencies.

customerName, customerType dependent on customerNumber

employee only dependent on (customerNumber, date, time)

3. separate partName, partType, cageCode, unitPrice only dependent on partNumber

Step 5: Move to 2NF (Eliminate partial dependencies)

Problem: Partial dependencies exist in the 1NF, which certain attributes are not fully dependent on the composite PKs.

1. customerName, customerType only dependent on customerNumber

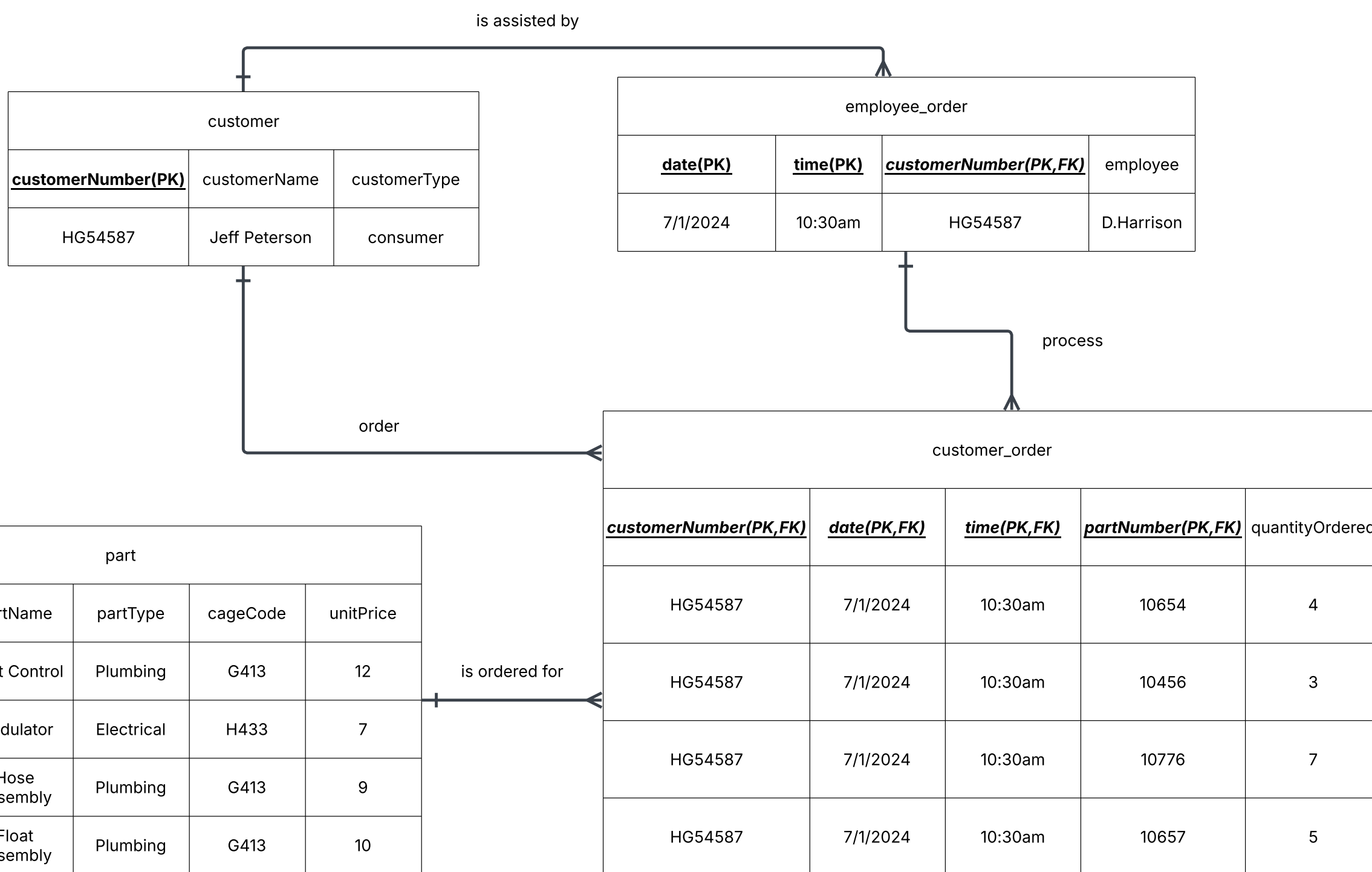
2. employee only dependent on (customerNumber, date, time)

3. partName, partType, cageCode, unitPrice only dependent on partNumber

Fix: 1. separate customerName and customerType with customerNumber as PK (table: customer)

2. separate employee with (customerNumber, date, time) as composite PK (table: employee_order)

3. separate partName, partType, cageCode, unitPrice with partNumber as PK (table: part)



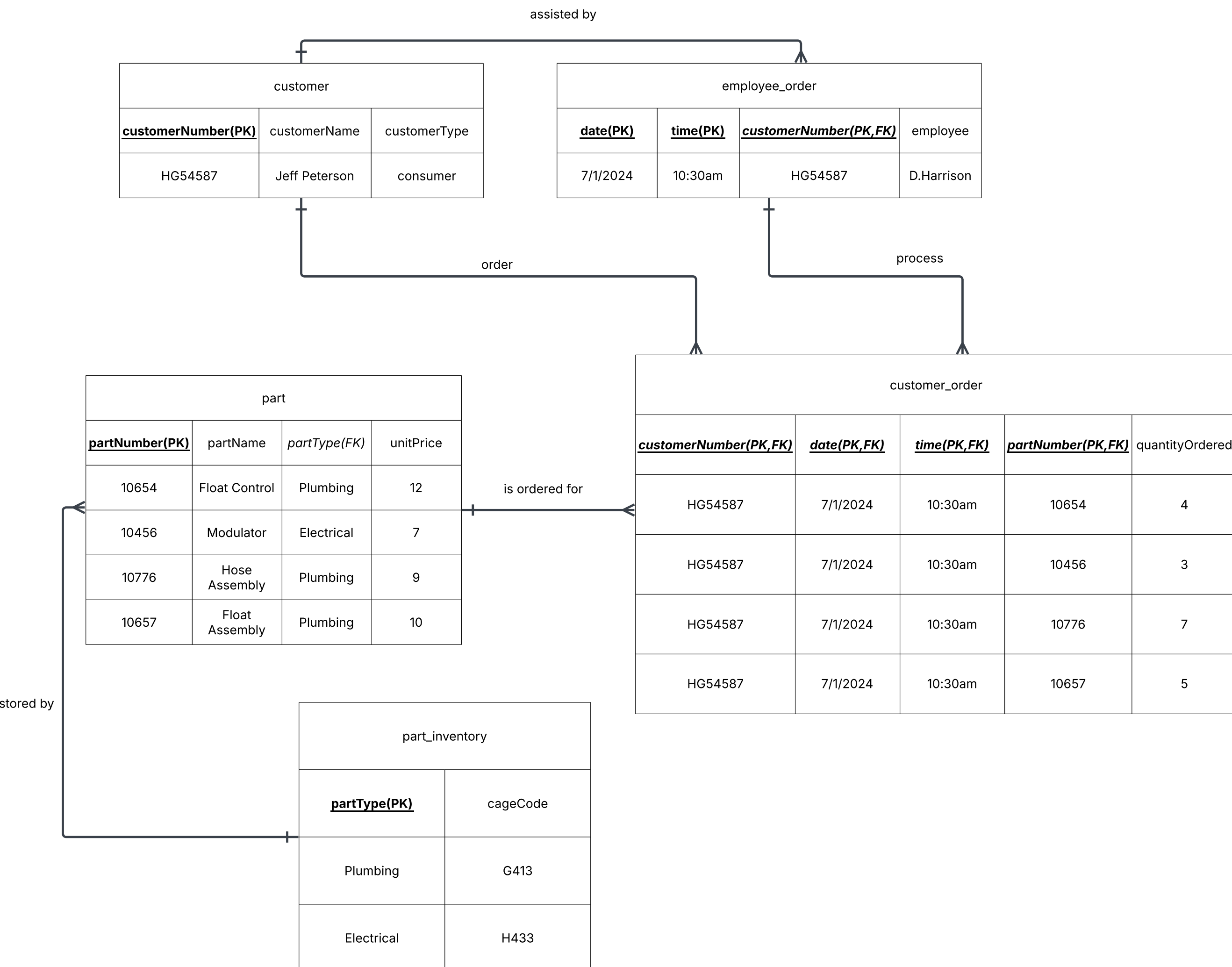
Step 6: Move to 3NF (Eliminate transitive dependencies)

Problem: Transitive dependencies exist in the 2NF, which an attribute is not directly dependent on PK.

1. customerName → partType → cageCode

2. since parts are categorized and organized by part type that maps to different cage code.

Fix: Separate cageCode to another table with partType as PK (table: part_inventory)



Part 2: Panacea Mental Health Corporation

Step 2: Define important terms

Primary key (PK):

(staffNo, appointmentDate, appointmentTime) as a composite PK

Identifies each appointment between a patient and a therapist since a therapist at one branch on a day and can only meet with one patient at one time period.

Candidate key:

(staffNo, appointmentDate, appointmentTime) can be one

(staffNo, partNo, appointmentDate, appointmentTime) can be one

but that introduces redundancy, since a therapist cannot see two different patients in the same exact time slot.

(staffNo, appointmentDate, appointmentTime) can be one

because a patient cannot double-check appointment with different therapists at the same time, but it does not fully indicate therapist's time slot uniqueness, which is not sufficiently satisfy the demand of company to track therapists.

Other combinations are not:

For example, (appointmentDate, appointmentTime, branchNo) are not valid because at the same time, date and branch, multiple therapists can see multiple different customers.

Functional dependency (FD):

1. staffNo → therapistName

2. (staffNo, appointmentDate) → branchNo

3. (staffNo, appointmentDate, appointmentTime) → partNo, partName

Partial dependency:

1. therapistName only dependent on staffNo

2. branchNo only dependent on (staffNo, appointmentDate)

3. partName only dependent on (staffNo, appointmentDate, appointmentTime)

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