

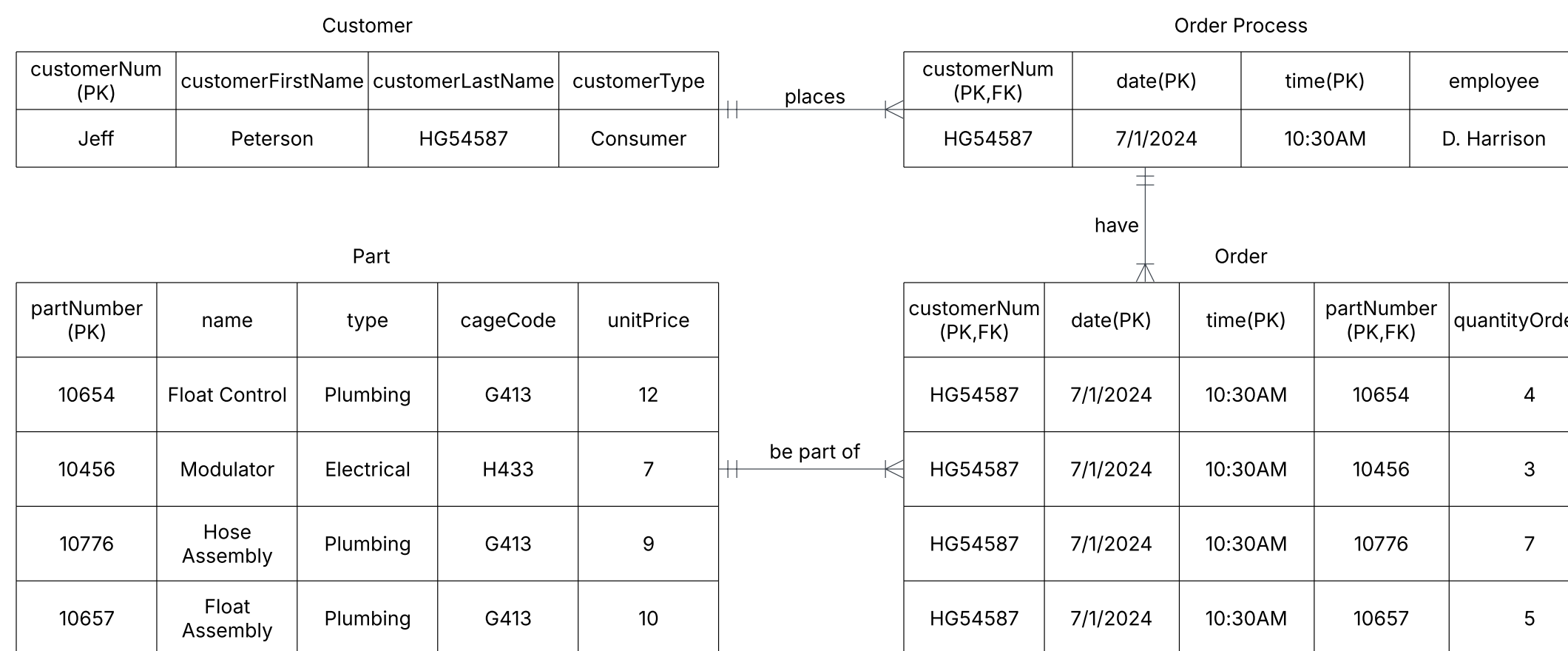
EXERCISE 1

| Happy Supplies<br>Parts Warehouse |                |                       |           |                  |            |  |
|-----------------------------------|----------------|-----------------------|-----------|------------------|------------|--|
| Customer Name: Jeff Peterson      |                | Date: 7/1/2024        |           |                  |            |  |
| Customer Number: H 654587         |                | Time: 10:30am         |           |                  |            |  |
| Customer Type: Consumer           |                | Employee: D. Harrison |           |                  |            |  |
| Part Number                       | Name           | Type                  | Cage Code | Quantity Ordered | Unit Price |  |
| 10654                             | Float Control  | Plumbing              | G413      | 4                | 12         |  |
| 10456                             | Modulator      | Electrical            | H433      | 3                | 7          |  |
| 10776                             | Hose Assembly  | Plumbing              | G413      | 7                | 9          |  |
| 10657                             | Float Assembly | Plumbing              | G413      | 5                | 10         |  |

I converted this chart into a 3NF table. Everything is very straightforward; each attribute is clearly labeled.

| customerFirstName | customerLastName | customerNum | 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        |

**Problem:**  
-attributes like customerName and customerType depend only on customerNum.  
-Part attributes depend only on partNumber  
2NF Fix: Remove partial dependencies



**Form: 3NF**  
-there are no transitive dependencies  
**Primary Key:**  
-customerNum, date, time, partNumber  
**Foreign Key:**  
-Order: customerNum references Customer, partNumber references Part

EXERCISE 2

**Assumptions:**  
-staffNo uniquely identifies each therapist  
-patNo uniquely identifies each patient  
-branchNo uniquely identifies each branch  
-a therapist can work at multiple branches, but only works on one branch a day  
-an appointment is uniquely identified by therapist, patient, date, time  
-therapistName is dependent on staffNo  
-patName is dependent on patNo

| 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 | M15      |
| S1024   | Heidi Pierce  | P108  | Andy McKee   | 9/12/2022        | 10:00 | C10      |
| S1024   | Heidi Pierce  | P108  | Andy McKee   | 9/14/2022        | 14:00 | C10      |
| S1032   | Richard Levin | P105  | Jill Baker   | 9/14/2022        | 16:30 | M15      |
| S1032   | Richard Levin | P110  | Jimmy Winter | 9/15/2022        | 18:00 | B13      |

**Primary Key:** staffNo, patNo, appointment date, time  
-staffNo: one therapist can have many appointments  
-patNo: one patient can have many appointments  
-appointment date: there can be many appointments in a day  
-time: one time can have many appointments  
-Combined: uniquely identifies one specific appointment event. A therapist cannot see two patients at the exact same time.

**Problem:**  
-multiple fields in appointment date time  
**Fix:**  
-make appointment date and time into two separate columns

**Form: 3NF**  
-all attributes contain atomic values.

| staffNo | therapistName | patNo | patName      | appointmentDate | appointmentTime | 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      |

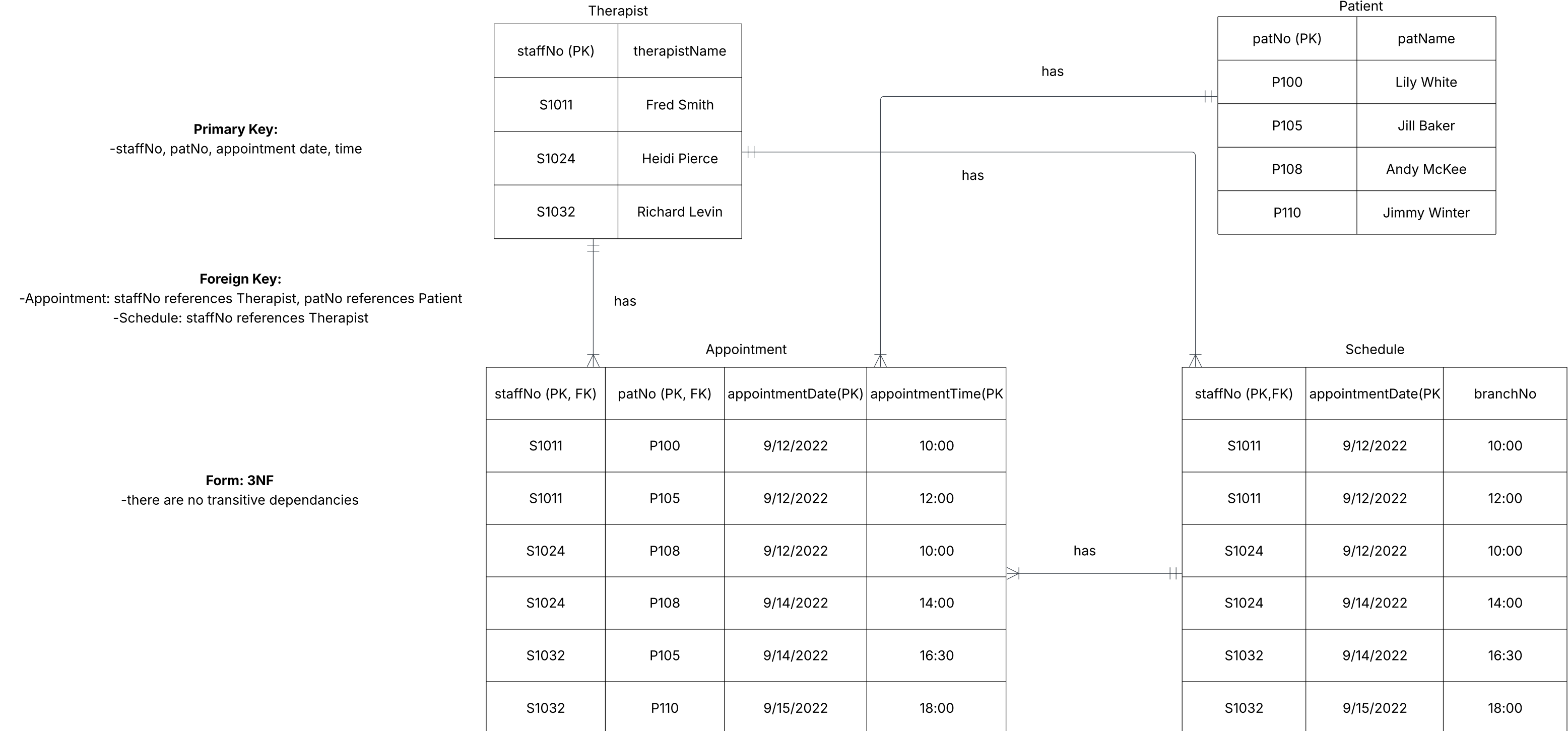
**2NF Fix:**  
-remove partial dependencies  
**Problem:**  
-therapistName depends only on staffNo  
-patName depends only on patNo  
-branchNo depends on staffNo, appointment date

| Therapist    |               | Patient    |              |
|--------------|---------------|------------|--------------|
| staffNo (PK) | therapistName | patNo (PK) | patName      |
| S1011        | Fred Smith    | P100       | Lily White   |
| S1024        | Heidi Pierce  | P105       | Jill Baker   |
| S1032        | Richard Levin | P108       | Andy McKee   |
|              |               | P110       | Jimmy Winter |

**Primary Key:** staffNo, patNo, appointment date, time  
**Form: 2NF**  
-there are no partial dependencies

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

**Fix:**  
-remove this transitive dependency of branchNo  
**Problem:**  
-branchNo depends on the combination of staffNo and appointment date, not other two primary key.



**Primary Key:**  
-staffNo, patNo, appointment date, time  
**Foreign Key:**  
-Appointment: staffNo references Therapist, patNo references Patient  
-Schedule: staffNo references Therapist

**Form: 3NF**  
-there are no transitive dependencies

EXERCISE 3

**Assumptions:**  
-eNo uniquely identifies each employee  
-contractNo uniquely identifies each contract  
-eventNo uniquely identifies each event  
-each contract has a specific event  
-each event has a fixed location

| 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   |

**Primary Key:**  
-eNo, contractNo

**Form: 3NF**

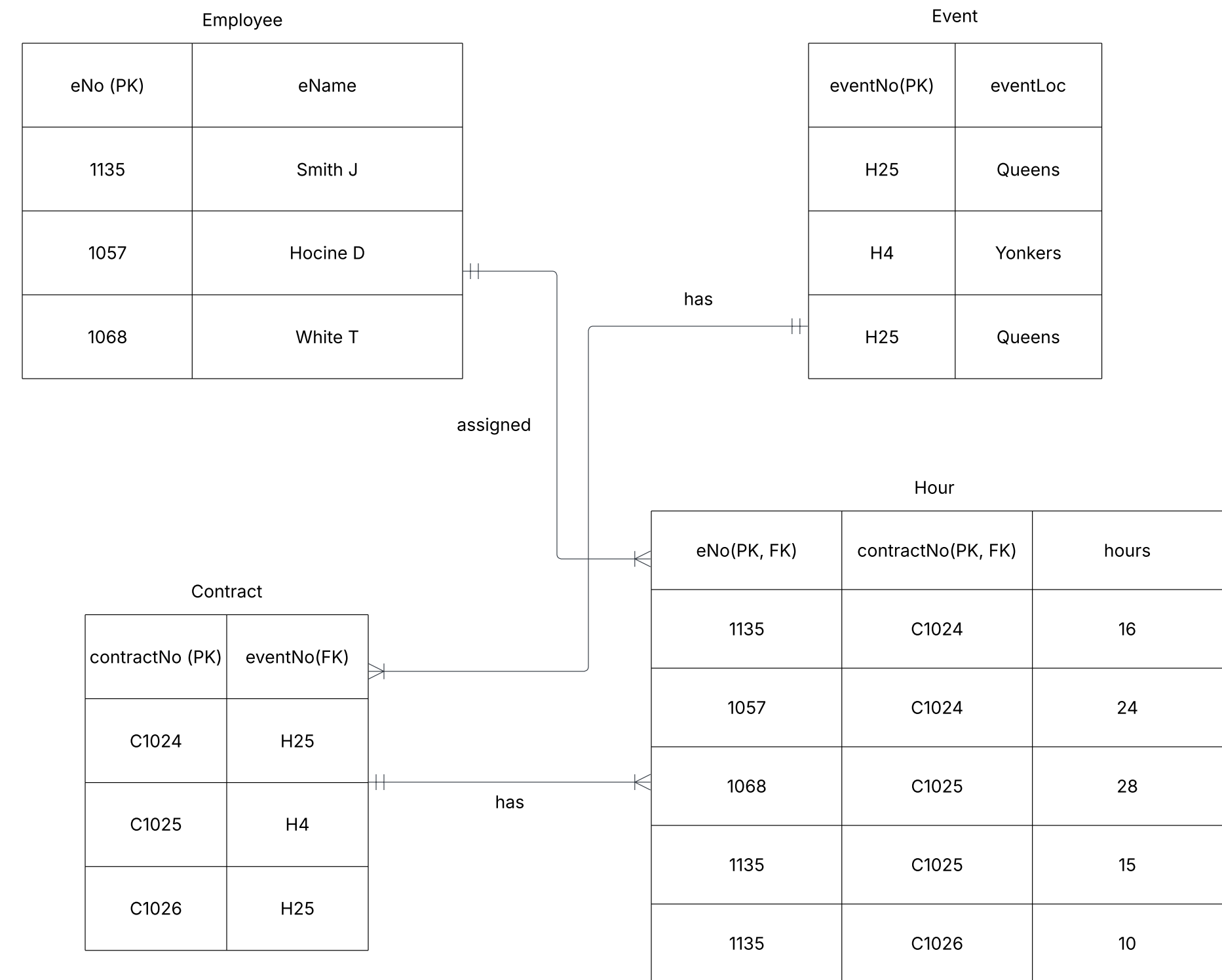
**Problem:**  
-eName depends only on eNo  
-eventNo and eventLoc depend only on contractNo  
**2NF Fix:**  
-remove partial dependencies

| Employee |          | Contract        |         |          |
|----------|----------|-----------------|---------|----------|
| eNo (PK) | eName    | contractNo (PK) | eventNo | eventLoc |
| 1135     | Smith J  | C1024           | H25     | Queens   |
| 1057     | Hocine D | C1025           | H4      | Yonkers  |
| 1068     | White T  | C1026           | H25     | Queens   |

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

**Form: 2NF**  
-there are no partial dependencies  
**Primary Key:** eNo, contractNo

**Fix:**  
-remove this transitive dependency of eventNo  
**Problem:**  
-eventLoc depends on eventNo, not directly on the primary key contractNo.



**Form: 3NF**  
-there are no transitive dependencies  
**Primary Key:**  
-eNo, contractNo, eventNo  
**Foreign Key:**  
-Contract: eventNo references Event  
-Hour: eNo references Employee, contractNo references Contract