

EX1

First step: Put everything on a table. It is already an 1NF.

| Happy Supplies Parts Warehouse | | | | | | | | | | | |
|--------------------------------|---------------|--------------|------------|--------------|----------------|------------|----------|-----------------|-----------|-----------|-----------|
| customerNumber | customerName | customerType | partNumber | employeeName | partName | partType | cageCode | quantityOrdered | unitPrice | orderDate | orderTime |
| HG5487 | Jeff Peterson | Consumer | 10654 | D.Harrison | Float Control | Plumbing | G413 | 4 | 12 | 7/1/2024 | 10:30am |
| HG5487 | Jeff Peterson | Consumer | 10456 | D.Harrison | Modulator | Electrical | H433 | 3 | 7 | 7/1/2024 | 10:30am |
| HG5487 | Jeff Peterson | Consumer | 10776 | D.Harrison | Hose assembly | Plumbing | G413 | 7 | 9 | 7/1/2024 | 10:30am |
| HG5487 | Jeff Peterson | Consumer | 10657 | D.Harrison | Float assembly | Plumbing | G413 | 5 | 10 | 7/1/2024 | 10:30am |

Second step: Second Normal Form(2NF)

| customer | | |
|----------------|---------------|--------------|
| customerNumber | customerName | customerType |
| HG5487 | Jeff Peterson | Consumer |

- Customer** (customerNumber, customerName, customerType)
- PK: customerNumber
 - Resolves: customerName and customerType depend only on customerNumber

| order_line | | | | |
|----------------|-----------|-----------|------------|-----------------|
| customerNumber | orderDate | orderTime | partNumber | quantityOrdered |
| HG5487 | 7/1/2024 | 10:30am | 10654 | 4 |
| HG5487 | 7/1/2024 | 10:30am | 10456 | 3 |
| HG5487 | 7/1/2024 | 10:30am | 10776 | 7 |
| HG5487 | 7/1/2024 | 10:30am | 10657 | 5 |

OrderLine (customerNumber, orderDate, orderTime, partNumber, quantityOrdered)

- PK: customerNumber + orderDate + orderTime + partNumber
- Contains only attributes dependent on full composite key

Final step: Third Normal Form(3NF)

| customer | | | Not transitive |
|----------------|---------------|--------------|----------------|
| customerNumber | customerName | customerType | |
| HG5487 | Jeff Peterson | Consumer | |

| order_line | | | | | Not transitive |
|----------------|-----------|-----------|------------|-----------------|----------------|
| customerNumber | orderDate | orderTime | partNumber | quantityOrdered | |
| HG5487 | 7/1/2024 | 10:30am | 10654 | 4 | |
| HG5487 | 7/1/2024 | 10:30am | 10456 | 3 | |
| HG5487 | 7/1/2024 | 10:30am | 10776 | 7 | |
| HG5487 | 7/1/2024 | 10:30am | 10657 | 5 | |

- FK: *customerNumber, orderDate, orderTime* references Order (composite FK)
- FK: *partNumber* references Part

| part_type | |
|------------|----------|
| partType | cageCode |
| Plumbing | G413 |
| Electrical | H433 |

Assumptions :

- This is not even a table
- Each customer is uniquely identified by customerNumber
- Each part is uniquely identified by partNumber
- An order is uniquely identified by the combination of customerNumber, orderDate, and orderTime (assuming a customer can only place one order at a specific date and time)
- Employees can help any customer (no special employee-customer relationship)
- A part is stored in one specific cage location (cageCode)

| part | | | | |
|------------|---------------|------------|----------|-----------|
| partNumber | partName | partType | cageCode | unitPrice |
| 10654 | Float Control | Plumbing | G413 | 12 |
| 10456 | Modulator | Electrical | H433 | 7 |
| 10776 | Hose | Plumbing | G413 | 9 |
| 10657 | Float | Plumbing | G413 | 10 |

Part (partNumber, partName, partType, cageCode, unitPrice)

- PK: partNumber
- Resolves: Part attributes depend only on partNumber

| order | | | |
|----------------|-----------|-----------|--------------|
| customerNumber | orderDate | orderTime | employeeName |
| HG5487 | 7/1/2024 | 10:30am | D.Harrison |

Order (customerNumber, orderDate, orderTime, employeeName)

- PK: customerNumber + orderDate + orderTime
- Resolves: employeeName depends on the order, not individual parts

FK: *customerNumber* references Customer

| order | | | | Not transitive |
|----------------|-----------|-----------|--------------|----------------|
| customerNumber | orderDate | orderTime | employeeName | |
| HG5487 | 7/1/2024 | 10:30am | D.Harrison | |

| part | | | |
|------------|---------------|------------|-----------|
| partNumber | partName | partType | unitPrice |
| 10654 | Float Control | Plumbing | 12 |
| 10456 | Modulator | Electrical | 7 |
| 10776 | Hose | Plumbing | 9 |
| 10657 | Float | Plumbing | 10 |

Part (partNumber, partName, partType, unitPrice)

- PK: partNumber
- FK: partType references PartType
- Resolves: Removed cageCode since it depends on partType, not partNumber

Part_Type (partType, cageCode)

- PK: partType
- New table created to store the relationship between part types and their cage locations
- Resolves: cageCode now depends directly on its primary key (partType)

EX2

First step: 1NF

| Seperate appointmentDate and appointmentTime to make it 1NF | | | | | | |
|---|---------------|-------|--------------|-----------------|-----------------|----------|
| Panacea Mental Health Corporation | | | | | | |
| 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 |

Final step: 3NF

| therapist | |
|-----------|---------------|
| staffNo | therapistName |
| S1011 | Fred Smith |
| S1024 | Heidi Pierce |
| S1032 | Richard Levin |

| patient | |
|---------|--------------|
| patNo | patName |
| P100 | Lily White |
| P105 | Jill Baker |
| P108 | Andy Mckee |
| P110 | Jimmy Winter |

- PK: staffNo
- Same as 2NF

- PK: patNo
- Same as 2NF

FK: *staffNo* references Therapist

Second step: 2NF

| therapist | |
|-----------|---------------|
| staffNo | therapistName |
| S1011 | Fred Smith |
| S1024 | Heidi Pierce |
| S1032 | Richard Levin |

- PK: staffNo
- Resolves: therapistName now depends on the complete primary key

| patient | |
|---------|--------------|
| patNo | patName |
| P100 | Lily White |
| P105 | Jill Baker |
| P108 | Andy Mckee |
| P110 | Jimmy Winter |

- PK: patNo
- Resolves: patName now depends on the complete primary key

| appointment | | | |
|-------------|-------|-----------------|-----------------|
| staffNo | patNo | appointmentDate | appointmentTime |
| S1011 | P100 | 9/12/2022 | 10:00 |
| S1011 | P105 | 9/12/2022 | 12:00 |
| S1024 | P108 | 9/12/2022 | 10:00 |
| S1024 | P108 | 9/14/2022 | 14:00 |
| S1032 | P105 | 9/14/2022 | 16:30 |
| S1032 | P110 | 9/15/2022 | 18:00 |

- FK: *staffNo* references Therapist
- FK: *patNo* references Patient
- FK: (*staffNo, appointmentDate*) references TherapistSchedule

EX3

First step: 1NF

| Maid Better temp agency | | | | | |
|-------------------------|------------|-------|----------|---------|----------|
| 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 |

Table is already in 1NF

Second step: Second Normal Form(2NF)

| employee | |
|----------|----------|
| eNo | eName |
| 1135 | Smith J |
| 1057 | Hocine D |
| 1068 | White T |

- PK: eNo
- Resolves: eName now depends on the complete primary key

| employee_contract | | |
|-------------------|------------|-------|
| eNo | contractNo | hours |
| 1135 | C1024 | 16 |
| 1057 | C1024 | 24 |
| 1068 | C1025 | 28 |
| 1135 | C1025 | 15 |
| 1135 | C1026 | 10 |

| employee_contract | | |
|-------------------|------------|-------|
| eNo | contractNo | hours |
| 1135 | C1024 | 16 |
| 1057 | C1024 | 24 |
| 1068 | C1025 | 28 |
| 1135 | C1025 | 15 |
| 1135 | C1026 | 10 |

- PK: eNo, contractNo
- FK: eNo references Employee
- FK: contractNo references Contract
- No changes from 2NF

| contract | |
|------------|---------|
| contractNo | eventNo |
| C1024 | H25 |
| C1025 | H4 |
| C1026 | H25 |

- PK: contractNo
- FK: eventNo references Event
- Resolves: Removed eventLoc; now only contains contractNo and its associated eventNo

Final step: Third Normal Form(3NF)

| employee | |
|----------|----------|
| eNo | eName |
| 1135 | Smith J |
| 1057 | Hocine D |
| 1068 | White T |

- PK: eNo
- No changes from 2NF

| event | |
|---------|----------|
| eventNo | eventLoc |
| H25 | Queens |
| H4 | Yonkers |

- PK: eventNo
- New table created to eliminate transitive dependency
- Resolves: eventLoc now depends directly on its primary key (eventNo)

| appointment | | | |
|-------------|-------|-----------------|-----------------|
| staffNo | patNo | appointmentDate | appointmentTime |
| S1011 | P100 | 9/12/2022 | 10:00 |
| S1011 | P105 | 9/12/2022 | 12:00 |
| S1024 | P108 | 9/12/2022 | 10:00 |
| S1024 | P108 | 9/14/2022 | 14:00 |
| S1032 | P105 | 9/14/2022 | 16:30 |
| S1032 | P110 | 9/15/2022 | 18:00 |

- PK: staffNo, patNo, appointmentDate, appointmentTime
- Resolves: No non-key attributes remain; this table represents the many-to-many relationship between therapists and patients at specific times

Assumptions

- Each therapist is uniquely identified by staffNo
- Each patient is uniquely identified by patNo
- Each branch is uniquely identified by branchNo
- An appointment is uniquely identified by the combination of staffNo, patNo, appointmentDate, and appointmentTime