Ejercicios de Normalizacion

1. Ordenes

| **Order ID** | **Customer Name** | **Customer Phone** | **Address** | **Item ID** | **Item Name** | **Price** | **Quantity** | **Special Request** | **Delivery Time** |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 001 | Alice | 123-456-7890 | 123 Main St | 101 | Cheeseburger | $8 | 2 | No onions | 6:00 PM |
| 001 | Alice | 123-456-7890 | 123 Main St | 102 | Fries | $3 | 1 | Extra ketchup | 6:00 PM |
| 002 | Bob | 987-654-3210 | 456 Elm St | 103 | Pizza | $12 | 1 | Extra cheese | 7:30 PM |
| 002 | Bob | 987-654-3210 | 456 Elm St | 104 | Fries | $2 | 2 | None | 7:30 PM |
| 003 | Claire | 555-123-4567 | 789 Oak St | 105 | Salad | $6 | 1 | No croutons | 12:00 PM |
| 004 | Claire | 555-123-4567 | 464 Georgia St | 106 | Water | $1 | 1 | None | 5:00 PM |

**Primera Forma Normal (1FN)**

Cada fila debe tener una clave primaria única.

Cada columna debe contener datos atómicos (no listas, no múltiples valores).

| **Order ID** | **Customer Name** | **Customer Phone** | **Address** | **Delivery Time** | **Item ID** | **Item Name** | **Price** | **Quantity** | **Special Request** |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 001 | Alice | 123-456-7890 | 123 Main St | 6:00 PM | 101 | Cheeseburger | $8 | 2 | No onions |
| 001 | Alice | 123-456-7890 | 123 Main St | 6:00 PM | 102 | Fries | $3 | 1 | Extra ketchup |
| 002 | Bob | 987-654-3210 | 456 Elm St | 7:30 PM | 103 | Pizza | $12 | 1 | Extra cheese |
| 002 | Bob | 987-654-3210 | 456 Elm St | 7:30 PM | 104 | Fries | $2 | 2 | None |
| 003 | Claire | 555-123-4567 | 789 Oak St | 12:00 PM | 105 | Salad | $6 | 1 | No croutons |
| 004 | Claire | 555-123-4567 | 464 Georgia St | 5:00 PM | 106 | Water | $1 | 1 | None |

Justificación 1FN: asegurar PK única y columnas atómicas; si hubiera valores repetibles/“multivaluados”, se separan en otra tabla y se relacionan (como se hace con dueños de autos en el material).

**Segunda Forma Normal (2FN)**

Eliminar dependencias parciales; solo aplica si la PK es compuesta. Si ya usas un id único y cumples 1FN, 2FN se cumple automáticamente.

1 **Orders** (depende de orderID)

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **OrderID** | **CustomerName** | **CustomerPhone** | **Address** | **DeliveryTime** |
| 1 | Alice | 123-456-7890 | 123 Main St | 18:00 |
| 2 | Bob | 987-654-3210 | 456 Elm St | 19:30 |
| 3 | Claire | 555-123-4567 | 789 Oak St | 12:00 |
| 4 | Claire | 555-123-4567 | 464 Georgia St | 17:00 |

2 **Items** (depende de ItemID)

|  |  |  |
| --- | --- | --- |
| **ItemID** | **ItemName** | **BasePrice** |
| 101 | Cheeseburger | $8 |
| 102 | Fries | $3 |
| 103 | Pizza | $12 |
| 104 | Fries | $2 |
| 105 | Salad | $6 |
| 106 | Water | $1 |

3 **Order\_items** (solo atributos que dependen de (OrderID, ItemID))

|  |  |  |  |
| --- | --- | --- | --- |
| **OrderID** | **ItemID** | **Quantity** | **SpecialRequest** |
| 1 | 101 | 2 | No onions |
| 1 | 102 | 1 | Extra ketchup |
| 2 | 103 | 1 | Extra cheese |
| 2 | 104 | 2 | None |
| 3 | 105 | 1 | No croutons |
| 4 | 106 | 1 | None |

Justificación 2FN: mover atributos que no dependen de **toda** la PK compuesta a sus tablas naturales (pedido o producto).

**Tercera Forma Normal (3FN)**

Eliminar dependencias transitivas (atributos no clave que dependen de otro atributo no clave en lugar de la PK).

En ORDERS, CustomerName y CustomerPhone dependen del cliente, no del OrderID directamente.

**Customers**

|  |  |  |
| --- | --- | --- |
| **CustomerID** | **CustomerName** | **CustomerPhone** |
| C001 | Alice | 123-456-7890 |
| C002 | Bob | 987-654-3210 |
| C003 | Claire | 555-123-4567 |

**Orders**

|  |  |  |  |
| --- | --- | --- | --- |
| **OrderID** | **CustomerID** | **Address** | **DeliveryTime** |
| 1 | C001 | 123 Main St | 18:00 |
| 2 | C002 | 456 Elm St | 19:30 |
| 3 | C003 | 789 Oak St | 12:00 |
| 4 | C003 | 464 Georgia St | 17:00 |

**ITEMS** y **ORDER\_ITEMS** se mantienen.

Beneficio 3FN: cada atributo no clave depende solo de la clave primaria de su tabla; mejoras en consistencia e integridad.

**Esquema final (3FN)**

* **CUSTOMERS**(CustomerID PK, CustomerName, CustomerPhone)
* **ORDERS**(OrderID PK, CustomerID FK, Address, DeliveryTime)
* **ITEMS**(ItemID PK, ItemName, BasePrice)
* **ORDER\_ITEMS**(OrderID FK, ItemID FK, Quantity, SpecialRequest, *UnitPriceAtOrder opcional*).

Relaciones:

* CUSTOMER 1:N ORDERS
* ORDERS N:M ITEMS a través de ORDER\_ITEMS (tabla puente N:N, tal como recomienda el material).

1. Cars\_raw

| **VIN** | **Make** | **Model** | **Year** | **Color** | **Owner ID** | **Owner Name** | **Owner Phone** | **Insurance Company** | **Insurance Policy** |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 1HGCM82633A | Honda | Accord | 2003 | Silver | 101 | Alice | 123-456-7890 | ABC Insurance | POL12345 |
| 1HGCM82633A | Honda | Accord | 2003 | Silver | 102 | Bob | 987-654-3210 | XYZ Insurance | POL54321 |
| 5J6RM4H79EL | Honda | CR-V | 2014 | Blue | 103 | Claire | 555-123-4567 | DEF Insurance | POL67890 |
| 1G1RA6EH1FU | Chevrolet | Volt | 2015 | Red | 104 | Dave | 111-222-3333 | GHI Insurance | POL98765 |

**Primera Formula (1FN)**

Cada fila tiene una clave primaria única.

Cada columna contiene un solo valor atómico (nada de listas/columnas duplicadas).

La tabla ya tiene valores atómicos; el punto débil es la PK. Para poder detectar dependencias en 2FN**, definimos temporalmente una PK compuesta: (VIN, OwnerID)** (una fila por “auto–propietario”).

Justificación 1FN: aseguramos PK única y columnas atómicas; si existieran valores multivaluados, se deben separar y relacionar (como en el ejemplo de autos y dueños del material).

**Segunda Forma Normal (2FN)**

En tablas con PK compuesta, mover a otras tablas los atributos que dependen solo de una parte de la PK. Si usáramos un id único y ya cumplimos 1FN, normalmente 2FN queda cubierta.

Detectando dependencias parciales

* Atributos que dependen solo de VIN: Make, Model, Year, Color.
* Atributos que dependen solo de OwnerID: OwnerName, OwnerPhone.
* InsuranceCompany, InsurancePolicy no dependen de toda la PK; los trataremos en 3FN.

**Cars** (depende de VIN)

PK:VIN

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **VIN** | **Make** | **Model** | **Year** | **Color** |
| 1HGCM826.. | Honda | Accord | 2003 | Silver |
| 5J6RM4H7.. | Honda | CR-V | 2014 | Blue |
| 1G1RA6EH.. | Chevrolet | Volt | 2015 | Red |

**Owners** (depende de OwnerID)

PK:OwnerID

|  |  |  |
| --- | --- | --- |
| **OwnerID** | **OwnerName** | **OwnerPhone** |
| 101 | Alice | 123-456-7890 |
| 102 | Bob | 987-654-3210 |
| 103 | Claire | 555-123-4567 |
| 104 | Dave | 111-222-3333 |

**Car\_owners** (solo lo que depende de VIN y OwnerID)

Table puente Relacion N:N entre autos y dueños

PK:VIN, OwnerID; FK:CARS, FK:Owners

|  |  |
| --- | --- |
| **VIN** | **OwnerID** |
| 1HGCM826.. | 101 |
| 1HGCM826.. | 102 |
| 5J6RM4H7.. | 103 |
| 1G1RA6EH.. | 104 |

Justificación 2FN: trasladamos a su tabla natural lo que dependía solo de una parte de la PK compuesta.

**Tercera Forma Normal (3FN)**

Ningún atributo no-clave debe depender de otro **no-clave**; debe depender **solo de la PK** de su table.

InsuranceCompany depende de InsurancePolicy (una póliza implica su aseguradora). Además, una póliza no depende de (VIN, OwnerID) completo.

**Insurance\_companies**

PK:CompanyID

|  |  |
| --- | --- |
| **CompanyID** | **CompanyName** |
| C1 | ABC Insurance |
| C2 | XYZ Insurance |
| C3 | DEF Insurance |
| C4 | GHI Insurance |

**Insurance\_policies**

PK: PolicyNumber; FK:Insurance\_Companies

|  |  |
| --- | --- |
| **PolicyNumber** | **CompanyID** |
| POL12345 | C1 |
| POL54321 | C2 |
| POL67890 | C3 |
| POL98765 | C4 |

**Car\_Insurances**

Para cubrir tanto “una sola póliza activa” como “histórico o múltiples pólizas”, modelamos una relación (1:N o N:N) entre **auto** y **póliza**. Sin fechas, usamos una tabla de vínculo flexible:

PK: VIN, PolicyNumber; FK:CARS, FK:INSURANCE\_POLICIES

|  |  |
| --- | --- |
| **VIN** | **PolicyNumber** |
| 1HGCM826.. | POL12345 |
| 1HGCM826.. | POL54321 |
| 5J6RM4H7.. | POL67890 |
| 1G1RA6EH.. | POL98765 |

Justificación 3FN: quitamos la transitiva “Compañía ← Póliza” separando compañías y pólizas, y relacionamos el auto con la póliza mediante una tabla propia

Esquema final (3FN)

CARS(VIN PK, Make, Model, Year, Color)

OWNERS(OwnerID PK, OwnerName, OwnerPhone)

CAR\_OWNERS(VIN FK, OwnerID FK, PK(VIN, OwnerID)) ← puente N:N

INSURANCE\_COMPANIES(CompanyID PK, CompanyName)

INSURANCE\_POLICIES(PolicyNumber PK, CompanyID FK)

CAR\_INSURANCES(VIN FK, PolicyNumber FK, PK(VIN, PolicyNumber))

Relaciones:

* CARS 1:N CAR\_INSURANCES N:1 INSURANCE\_POLICIES N:1 INSURANCE\_COMPANIES
* CARS N:N OWNERS vía CAR\_OWNERS.

**Revision de Tabla Cars**

**Tabla actual:** Cumple 3FN pero no es recomendable para gran escala de informacion

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **VIN** | **Make** | **Model** | **Year** | **Color** |
| 1HGCM826.. | Honda | Accord | 2003 | Silver |
| 5J6RM4H7.. | Honda | CR-V | 2014 | Blue |
| 1G1RA6EH.. | Chevrolet | Volt | 2015 | Red |

Vamos a evitar repetir strings para que cada auto solo guarda IDs que apuntan a tablas, esto deberia de reducir redundancia y evitar errores de escritura.

Tabla de Marcas

|  |  |
| --- | --- |
| **make\_id** | **make\_name** |
| 1 | Honda |
| 2 | Chevrolet |
| 3 | Toyota |

Tabla de Modelo

|  |  |  |
| --- | --- | --- |
| **model\_id** | **make\_id** | **model\_name** |
| 10 | 1 | Accord |
| 11 | 2 | Volt |
| 12 | 3 | Yaris |

Tabla de Colores

|  |  |
| --- | --- |
| **color\_id** | **color\_name** |
| 3 | Silver |
| 5 | Blue |
| 8 | Red |

Tabla de especificaciones

|  |  |  |
| --- | --- | --- |
| **spec\_id** | **model\_id** | **year** |
| 101 | 10 | 2003 |
| 202 | 11 | 2015 |
| 303 | 12 | 2018 |

**Nueva Tabla de Cars**

|  |  |  |
| --- | --- | --- |
| **vin** | **spec\_id** | **color\_id** |
| JTDKB20U123456789 | 101 | 3 |
| JTDKB20U987654321 | 101 | 5 |
| 3N1AB7AP8KY123456 | 202 | 3 |