# Ejercicios prácticos

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| **Asignatura**: Bases de datos |
| **Nombre**: Actividad práctica 1 |
| **Unidades**: 2, 3 y 4 |

## Guía

* Se plantean diferentes problemas que tratan aspectos de las unidades 2, 3 y 4
* Los diagramas E/R se pueden realizar con la aplicación: <https://www.drawio.com/> y solo es necesario poner una imagen o captura de pantalla.
* Para realizar el modelo físico se va a seguir está representación:

Nombre tabla (CAMPOS)

Los campos pueden ir con el siguiente formato:

* + Subrayado. Indica que es una clave primaria
  + Subrayado discontinuo. Indica que es una clave única o alternativa
  + **Negrita**. Indica que es un campo obligatorio
  + Sin formato. Indica que es un campo opcional.

Las claves foráneas irán después de la tabla con la siguiente forma,

{campo} es clave foránea de TABLA

Las claves únicas o alternativas se añadirán después de la tabla con la siguiente forma,

{campo} es clave alternativa

* Para aquellos ejercicios que se pide crear base de datos, tablas, índices, etc.. hay que poner todo el código SQL en el orden correspondiente y en formato texto.
* Se debe entregar este mismo documento en Word o PDF con las soluciones de cada ejercicio.

## Ejemplo

Para un garaje se quiere registrar todas las motocicletas que disponen con los pilotos que las conducen. Para ello se identificará mediante un código alfanumérico cada moto junto con su modelo, cilindrada y el tipo de combustible que utiliza.

Los pilotos tienen un código número como identificación que sirve para conocer su nombre, apellidos y edad. Los pilotos solo pueden tener una motocicleta, en cambio una motocicleta puede estar registrada sin que tenga asignado ningún piloto.

Elabora el diagrama E/R que de solución al problema. Muestra como sería la transformación al modelo físico y las sentencias SQL necesarias para crear la base de datos en MySQL.

**Diagrama E/R**

Diagrama

Descripción generada automáticamente

**Modelo Físico**

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| PILOTOS (codigo, **nombre**, **apellidos**, **edad**)  MOTOS (codigo, **modelo**, **cilindrada**, **combustible**, piloto)  {piloto} es clave foránea de PILOTOS |

**SQL**

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| DROP DATABASE IF EXISTS garaje;  CREATE DATABASE IF NOT EXISTS garaje;  USE garaje;  CREATE TABLE Pilotos (  codigo INT NOT NULL,  nombre VARCHAR(10) NOT NULL,  apellidos VARCHAR(30) NOT NULL,  edad INT NOT NULL,  PRIMARY KEY (codigo)  );  CREATE TABLE Motos (  codigo VARCHAR(5) NOT NULL,  modelo VARCHAR(10) NOT NULL,  cilindrada INT(4) NOT NULL,  combustible VARCHAR(30) NOT NULL,  piloto INT,  PRIMARY KEY (codigo),  CONSTRAINT Pilotos\_ibfk\_1 FOREIGN KEY (piloto) REFERENCES Pilotos (codigo)  ); |
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## Enunciado de los ejercicios

## Ejercicio 1.

Un cliente no ha pedido que se realice un sistema de ventas para registrar los pedidos de productos que realizan los clientes.

Nuestro jefe de departamento nos ha indicado que se realice el diagrama E/R por partes según los emails que nos envió el cliente con los requisitos.

Parte 1. Email recibido el 01/03/22.

“Nuestra empresa contiene empleados que actúan de comerciales y se identifican por un número de empleado que se imprime en cada tarjeta identificativa. A parte, se muestra su nombre y apellidos, junto con el número de extensión para poder llamarlo. La empresa formaliza un email a cada empleado para poder comunicarse con los clientes, el formato del email es el siguiente: “numero\_de\_[empleado@miempresa.com](mailto:empleado@miempresa.com)”. Por último conocemos la titulación de estudios máxima que presento el día de contratación.

Un aspecto importante es que algunos de estos empleados son supervisores de otros trabajadores para vigilar el trabajo que realizan. Puede darse el caso que un trabajador no tenga ningún supervisor por el tipo de trabajo que realizan.

La organización de la empresa se distribuye en oficinas que se identifican por “Of” y 5 dígitos. Cada oficina tiene un teléfono, dirección, otros datos relativos a la dirección (esta información no siempre esta disponible), población, provincia, código postal y país donde está ubicada. Cada oficina contiene un número indeterminado de trabajadores, pero cada empleado solo puede pertenecer a una sola oficina”

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| %3CmxGraphModel%3E%3Croot%3E%3CmxCell%20id%3D%220%22%2F%3E%3CmxCell%20id%3D%221%22%20parent%3D%220%22%2F%3E%3CmxCell%20id%3D%222%22%20value%3D%22OFICINA%22%20style%3D%22shape%3Dtable%3BstartSize%3D30%3Bcontainer%3D1%3Bcollapsible%3D1%3BchildLayout%3DtableLayout%3BfixedRows%3D1%3BrowLines%3D0%3BfontStyle%3D1%3Balign%3Dcenter%3BresizeLast%3D1%3B%22%20vertex%3D%221%22%20parent%3D%221%22%3E%3CmxGeometry%20x%3D%22560%22%20y%3D%22130%22%20width%3D%22250%22%20height%3D%22240%22%20as%3D%22geometry%22%2F%3E%3C%2FmxCell%3E%3CmxCell%20id%3D%223%22%20value%3D%22%22%20style%3D%22shape%3DpartialRectangle%3Bcollapsible%3D0%3BdropTarget%3D0%3BpointerEvents%3D0%3BfillColor%3Dnone%3Bpoints%3D%5B%5B0%2C0.5%5D%2C%5B1%2C0.5%5D%5D%3BportConstraint%3Deastwest%3Btop%3D0%3Bleft%3D0%3Bright%3D0%3Bbottom%3D1%3B%22%20vertex%3D%221%22%20parent%3D%222%22%3E%3CmxGeometry%20y%3D%2230%22%20width%3D%22250%22%20height%3D%2230%22%20as%3D%22geometry%22%2F%3E%3C%2FmxCell%3E%3CmxCell%20id%3D%224%22%20value%3D%22PK%22%20style%3D%22shape%3DpartialRectangle%3Boverflow%3Dhidden%3Bconnectable%3D0%3BfillColor%3Dnone%3Btop%3D0%3Bleft%3D0%3Bbottom%3D0%3Bright%3D0%3BfontStyle%3D1%3B%22%20vertex%3D%221%22%20parent%3D%223%22%3E%3CmxGeometry%20width%3D%2230%22%20height%3D%2230%22%20as%3D%22geometry%22%3E%3CmxRectangle%20width%3D%2230%22%20height%3D%2230%22%20as%3D%22alternateBounds%22%2F%3E%3C%2FmxGeometry%3E%3C%2FmxCell%3E%3CmxCell%20id%3D%225%22%20value%3D%22Of%20int(5)%20NOT%20NULL%20%22%20style%3D%22shape%3DpartialRectangle%3Boverflow%3Dhidden%3Bconnectable%3D0%3BfillColor%3Dnone%3Btop%3D0%3Bleft%3D0%3Bbottom%3D0%3Bright%3D0%3Balign%3Dleft%3BspacingLeft%3D6%3BfontStyle%3D5%3B%22%20vertex%3D%221%22%20parent%3D%223%22%3E%3CmxGeometry%20x%3D%2230%22%20width%3D%22220%22%20height%3D%2230%22%20as%3D%22geometry%22%3E%3CmxRectangle%20width%3D%22220%22%20height%3D%2230%22%20as%3D%22alternateBounds%22%2F%3E%3C%2FmxGeometry%3E%3C%2FmxCell%3E%3CmxCell%20id%3D%226%22%20value%3D%22%22%20style%3D%22shape%3DpartialRectangle%3Bcollapsible%3D0%3BdropTarget%3D0%3BpointerEvents%3D0%3BfillColor%3Dnone%3Bpoints%3D%5B%5B0%2C0.5%5D%2C%5B1%2C0.5%5D%5D%3BportConstraint%3Deastwest%3Btop%3D0%3Bleft%3D0%3Bright%3D0%3Bbottom%3D0%3B%22%20vertex%3D%221%22%20parent%3D%222%22%3E%3CmxGeometry%20y%3D%2260%22%20width%3D%22250%22%20height%3D%2230%22%20as%3D%22geometry%22%2F%3E%3C%2FmxCell%3E%3CmxCell%20id%3D%227%22%20value%3D%22FK1%22%20style%3D%22shape%3DpartialRectangle%3Boverflow%3Dhidden%3Bconnectable%3D0%3BfillColor%3Dnone%3Btop%3D0%3Bleft%3D0%3Bbottom%3D0%3Bright%3D0%3B%22%20vertex%3D%221%22%20parent%3D%226%22%3E%3CmxGeometry%20width%3D%2230%22%20height%3D%2230%22%20as%3D%22geometry%22%3E%3CmxRectangle%20width%3D%2230%22%20height%3D%2230%22%20as%3D%22alternateBounds%22%2F%3E%3C%2FmxGeometry%3E%3C%2FmxCell%3E%3CmxCell%20id%3D%228%22%20value%3D%22tel%C3%A9fono%20varchar(20)%20NOT%20NULL%22%20style%3D%22shape%3DpartialRectangle%3Boverflow%3Dhidden%3Bconnectable%3D0%3BfillColor%3Dnone%3Btop%3D0%3Bleft%3D0%3Bbottom%3D0%3Bright%3D0%3Balign%3Dleft%3BspacingLeft%3D6%3B%22%20vertex%3D%221%22%20parent%3D%226%22%3E%3CmxGeometry%20x%3D%2230%22%20width%3D%22220%22%20height%3D%2230%22%20as%3D%22geometry%22%3E%3CmxRectangle%20width%3D%22220%22%20height%3D%2230%22%20as%3D%22alternateBounds%22%2F%3E%3C%2FmxGeometry%3E%3C%2FmxCell%3E%3CmxCell%20id%3D%229%22%20value%3D%22%22%20style%3D%22shape%3DpartialRectangle%3Bcollapsible%3D0%3BdropTarget%3D0%3BpointerEvents%3D0%3BfillColor%3Dnone%3Bpoints%3D%5B%5B0%2C0.5%5D%2C%5B1%2C0.5%5D%5D%3BportConstraint%3Deastwest%3Btop%3D0%3Bleft%3D0%3Bright%3D0%3Bbottom%3D0%3B%22%20vertex%3D%221%22%20parent%3D%222%22%3E%3CmxGeometry%20y%3D%2290%22%20width%3D%22250%22%20height%3D%2230%22%20as%3D%22geometry%22%2F%3E%3C%2FmxCell%3E%3CmxCell%20id%3D%2210%22%20value%3D%22%22%20style%3D%22shape%3DpartialRectangle%3Boverflow%3Dhidden%3Bconnectable%3D0%3BfillColor%3Dnone%3Btop%3D0%3Bleft%3D0%3Bbottom%3D0%3Bright%3D0%3B%22%20vertex%3D%221%22%20parent%3D%229%22%3E%3CmxGeometry%20width%3D%2230%22%20height%3D%2230%22%20as%3D%22geometry%22%3E%3CmxRectangle%20width%3D%2230%22%20height%3D%2230%22%20as%3D%22alternateBounds%22%2F%3E%3C%2FmxGeometry%3E%3C%2FmxCell%3E%3CmxCell%20id%3D%2211%22%20value%3D%22direccion%20varchar(255)%22%20style%3D%22shape%3DpartialRectangle%3Boverflow%3Dhidden%3Bconnectable%3D0%3BfillColor%3Dnone%3Btop%3D0%3Bleft%3D0%3Bbottom%3D0%3Bright%3D0%3Balign%3Dleft%3BspacingLeft%3D6%3B%22%20vertex%3D%221%22%20parent%3D%229%22%3E%3CmxGeometry%20x%3D%2230%22%20width%3D%22220%22%20height%3D%2230%22%20as%3D%22geometry%22%3E%3CmxRectangle%20width%3D%22220%22%20height%3D%2230%22%20as%3D%22alternateBounds%22%2F%3E%3C%2FmxGeometry%3E%3C%2FmxCell%3E%3CmxCell%20id%3D%2212%22%20value%3D%22%22%20style%3D%22shape%3DpartialRectangle%3Bcollapsible%3D0%3BdropTarget%3D0%3BpointerEvents%3D0%3BfillColor%3Dnone%3Bpoints%3D%5B%5B0%2C0.5%5D%2C%5B1%2C0.5%5D%5D%3BportConstraint%3Deastwest%3Btop%3D0%3Bleft%3D0%3Bright%3D0%3Bbottom%3D0%3B%22%20vertex%3D%221%22%20parent%3D%222%22%3E%3CmxGeometry%20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Balign%3Dleft%3BspacingLeft%3D6%3B%22%20vertex%3D%221%22%20parent%3D%2243%22%3E%3CmxGeometry%20x%3D%2230%22%20width%3D%22220%22%20height%3D%2230%22%20as%3D%22geometry%22%3E%3CmxRectangle%20width%3D%22220%22%20height%3D%2230%22%20as%3D%22alternateBounds%22%2F%3E%3C%2FmxGeometry%3E%3C%2FmxCell%3E%3CmxCell%20id%3D%2246%22%20value%3D%22%22%20style%3D%22shape%3DpartialRectangle%3Bcollapsible%3D0%3BdropTarget%3D0%3BpointerEvents%3D0%3BfillColor%3Dnone%3Bpoints%3D%5B%5B0%2C0.5%5D%2C%5B1%2C0.5%5D%5D%3BportConstraint%3Deastwest%3Btop%3D0%3Bleft%3D0%3Bright%3D0%3Bbottom%3D0%3B%22%20vertex%3D%221%22%20parent%3D%2224%22%3E%3CmxGeometry%20y%3D%22240%22%20width%3D%22250%22%20height%3D%2230%22%20as%3D%22geometry%22%2F%3E%3C%2FmxCell%3E%3CmxCell%20id%3D%2247%22%20value%3D%22FK%22%20style%3D%22shape%3DpartialRectangle%3Boverflow%3Dhidden%3Bconnectable%3D0%3BfillColor%3Dnone%3Btop%3D0%3Bleft%3D0%3Bbottom%3D0%3Bright%3D0%3BfontStyle%3D1%22%20vertex%3D%221%22%20parent%3D%2246%22%3E%3CmxGeometry%20width%3D%2230%22%20height%3D%2230%22%20as%3D%22geometry%22%3E%3CmxRectangle%20width%3D%2230%22%20height%3D%2230%22%20as%3D%22alternateBounds%22%2F%3E%3C%2FmxGeometry%3E%3C%2FmxCell%3E%3CmxCell%20id%3D%2248%22%20value%3D%22id\_supervisor%20int%C2%A0%22%20style%3D%22shape%3DpartialRectangle%3Boverflow%3Dhidden%3Bconnectable%3D0%3BfillColor%3Dnone%3Btop%3D0%3Bleft%3D0%3Bbottom%3D0%3Bright%3D0%3Balign%3Dleft%3BspacingLeft%3D6%3B%22%20vertex%3D%221%22%20parent%3D%2246%22%3E%3CmxGeometry%20x%3D%2230%22%20width%3D%22220%22%20height%3D%2230%22%20as%3D%22geometry%22%3E%3CmxRectangle%20width%3D%22220%22%20height%3D%2230%22%20as%3D%22alternateBounds%22%2F%3E%3C%2FmxGeometry%3E%3C%2FmxCell%3E%3CmxCell%20id%3D%2249%22%20style%3D%22edgeStyle%3DorthogonalEdgeStyle%3Brounded%3D0%3BorthogonalLoop%3D1%3BjettySize%3Dauto%3Bhtml%3D1%3B%22%20edge%3D%221%22%20source%3D%2251%22%20target%3D%2231%22%20parent%3D%221%22%3E%3CmxGeometry%20relative%3D%221%22%20as%3D%22geometry%22%2F%3E%3C%2FmxCell%3E%3CmxCell%20id%3D%2250%22%20style%3D%22edgeStyle%3DorthogonalEdgeStyle%3Brounded%3D0%3BorthogonalLoop%3D1%3BjettySize%3Dauto%3Bhtml%3D1%3B%22%20edge%3D%221%22%20source%3D%2251%22%20target%3D%229%22%20parent%3D%221%22%3E%3CmxGeometry%20relative%3D%221%22%20as%3D%22geometry%22%2F%3E%3C%2FmxCell%3E%3CmxCell%20id%3D%2251%22%20value%3D%22Pertenece%22%20style%3D%22rhombus%3BwhiteSpace%3Dwrap%3Bhtml%3D1%3B%22%20vertex%3D%221%22%20parent%3D%221%22%3E%3CmxGeometry%20x%3D%22385%22%20y%3D%22195%22%20width%3D%2280%22%20height%3D%2280%22%20as%3D%22geometry%22%2F%3E%3C%2FmxCell%3E%3CmxCell%20id%3D%2252%22%20value%3D%22N%3A1%22%20style%3D%22text%3Bhtml%3D1%3Balign%3Dcenter%3BverticalAlign%3Dmiddle%3Bresizable%3D0%3Bpoints%3D%5B%5D%3Bautosize%3D1%3BstrokeColor%3Dnone%3BfillColor%3Dnone%3B%22%20vertex%3D%221%22%20parent%3D%221%22%3E%3CmxGeometry%20x%3D%22405%22%20y%3D%22130%22%20width%3D%2240%22%20height%3D%2230%22%20as%3D%22geometry%22%2F%3E%3C%2FmxCell%3E%3CmxCell%20id%3D%2253%22%20value%3D%22(1%2CN)%22%20style%3D%22text%3Bhtml%3D1%3Balign%3Dcenter%3BverticalAlign%3Dmiddle%3Bresizable%3D0%3Bpoints%3D%5B%5D%3Bautosize%3D1%3BstrokeColor%3Dnone%3BfillColor%3Dnone%3B%22%20vertex%3D%221%22%20parent%3D%221%22%3E%3CmxGeometry%20x%3D%22295%22%20y%3D%22198%22%20width%3D%2250%22%20height%3D%2230%22%20as%3D%22geometry%22%2F%3E%3C%2FmxCell%3E%3CmxCell%20id%3D%2254%22%20value%3D%22(1%2C1)%22%20style%3D%22text%3Bhtml%3D1%3Balign%3Dcenter%3BverticalAlign%3Dmiddle%3Bresizable%3D0%3Bpoints%3D%5B%5D%3Bautosize%3D1%3BstrokeColor%3Dnone%3BfillColor%3Dnone%3B%22%20vertex%3D%221%22%20parent%3D%221%22%3E%3CmxGeometry%20x%3D%22505%22%20y%3D%22198%22%20width%3D%2250%22%20height%3D%2230%22%20as%3D%22geometry%22%2F%3E%3C%2FmxCell%3E%3C%2Froot%3E%3C%2FmxGraphModel%3E  IMG_256**DIAGRAMA E/R:**  **MODELO FÍSICO:**  EMPLEADOS(empleado\_id, **nombre**, **apellidos**, **num\_extension, email, titulacion,** Of, id\_supervisor)  {Of} es clave foránea de OFICINAS  {id\_supervisor] es clave foránea de la propia entidad EMPLEADOS  OFICINAS(Of, **teléfono**, **dirección**, **población**, **provincia, cod\_postal, país**)  **SQL:**  DROP DATABASE IF EXISTS ventas;  CREATE DATABASE IF NOT EXISTS ventas;  USE ventas;  CREATE TABLE Empleados(  empleado\_id INT NOT NULL,  nombre VARCHAR(50) NOT NULL,  num\_extension VARCHAR(10) NOT NULL,  email VARCHAR(50) NOT NULL,  titulacion VARCHAR(50) NOT NULL,  Of int(5) NOT NULL,  id\_supervisor int(10),  PRIMARY KEY (empleado\_id)  CONSTRAINT Of\_ibfk\_1 FOREIGN KEY (Of) REFERENCES Oficinas (Of)  CONSTRAINT id\_supervisor\_ibfk\_2 FOREIGN KEY (id\_supervisor) REFERENCES Empleados(empleado\_id)  );  CREATE TABLE Oficinas(  Of int(5) NOT NULL,  telefono VARCHAR(20) NOT NULL,  direccion VARCHAR(50),  provincia VARCHAR(50) NOT NULL,  cod\_postal VARCHAR(50) NOT NULL,  PRIMARY KEY (Of),  ); |

Parte 2. Email recibido el 04/03/22

“Nuestros clientes son particulares y se registran por un número, su nombre, primer apellido, segundo apellido, teléfono, email, dirección, población, provincia, código postal y país. Aún que es un dato opcional también queremos conocer el importe límite de crédito para hacer pagos.

Los clientes realizan pedidos, asesorados por un comercial de nuestras oficinas. Un cliente no puede tener más de un comercial, aún que puede darse el caso, que tengamos algún cliente sin comercial por realizar pedidos por la página web. Debido a la escases de empleados que tenemos pueden haber empleados que asesoren a un cliente o que tengan una cartera de clientes y lleven más de uno.

Los clientes registrados en el sistema pueden ser que aún no hayan hecho ningún pedido o más de uno. Los pedidos deben poder identificarse por un código numérico e indicar la fecha del pedido, fecha de envió, el estado en el que se encuentra, si esta pagado o no y opcionalmente algún comentario que sea de consideración para el pedido. Si que es cierto que si el estado del pedido no es enviado no debe aparecer ninguna fecha de envió.

Se quiere conocer los pagos que han realizado los clientes, así como su fecha del pago realizado, la cantidad abonada y la forma de pago. Cada pago debe poder relacionarse con su pedido y además vamos a dar la posibilidad a nuestros clientes de fraccionar el importe del pedido, con lo cual, puede haber más de un pago sobre un pedido. Cuando se haya abonado la totalidad del pedido, el estado pasara a pagado.”

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| **DIAGRAMA E/R:**  IMG_256  **MODELO FÍSICO:**  CLIENTES(cliente\_id, **nombre, primer\_apellido, segundo\_apellido, telefono, email, direccion, poblacion, provincia, cod\_postal, pais, importe\_limite\_credito**, comercial\_id).  {comercial\_id} es clave foránea de COMERCIALES (puede ser nulo)  COMERCIALES(comercial\_id, ...)  PEDIDOS(pedido\_id, **fecha\_pedido, fecha\_envio, estado, pagado, comentario**, cliente\_id, comercial\_id)  {cliente\_id} es clave foránea de CLIENTES  {comercial\_id} es clave foránea de COMERCIALES (si es que un comercial está asociado, podría ser nulo)  PAGOS(pago\_id, f**echa\_pago, cantidad\_abonada, forma\_pago**, pedido\_id)  {pedido\_id} es clave foránea de PEDIDOS (pago\_id es la clave primaria de PAGOS)  **SQL:**  CREATE TABLE Comerciales (  comercial\_id INT PRIMARY KEY,  nombre VARCHAR(255),  apellidos VARCHAR(255)  );  CREATE TABLE Clientes (  cliente\_id INT PRIMARY KEY,  nombre VARCHAR(255),  primer\_apellido VARCHAR(255),  segundo\_apellido VARCHAR(255),  telefono VARCHAR(50),  email VARCHAR(255),  direccion VARCHAR(255),  poblacion VARCHAR(255),  provincia VARCHAR(255),  cod\_postal VARCHAR(20),  pais VARCHAR(50),  importe\_limite\_credito DECIMAL(10, 2),  comercial\_id INT,  FOREIGN KEY (comercial\_id) REFERENCES Comerciales(comercial\_id)  );  CREATE TABLE Pedidos (  pedido\_id INT PRIMARY KEY,  fecha\_pedido DATE,  fecha\_envio DATE,  estado VARCHAR(50),  pagado BOOLEAN,  comentario TEXT,  cliente\_id INT,  FOREIGN KEY (cliente\_id) REFERENCES Clientes(cliente\_id)  );  CREATE TABLE Pagos (  pago\_id INT PRIMARY KEY,  fecha\_pago DATE,  cantidad\_abonada DECIMAL(10, 2),  forma\_pago VARCHAR(255),  pedido\_id INT,  FOREIGN KEY (pedido\_id) REFERENCES Pedidos(pedido\_id)  ); |

Parte 3. Email recibido el 15/03/22

“Nuestra empresa dispone de la página web [www.miempresa.com](http://www.miempresa.com) donde los clientes pueden ver el catálogo de productos clasificados por categorías. Las categorías se identifican por un código, nombre, descripción y una imagen que se muestra en la página, que si no existe se muestra un texto alternativo. No puede haber categorías vacías sin productos, con lo cual, mínimamente debe de existir un producto dentro de la categoría. Y los productos deben estar categorizados si o si para facilitar su búsqueda por la página web, aún que pueden estar en más de una categoría.

Los productos que ofrecemos son variados con lo cual debemos poder identificarlos de forma clara, debido a que nuestros sistemas son anticuados y los sistemas de código de barras solo permite 10 caracteres como máximo. Por cada producto se muestra en la página web el nombre, su descripción y el precio de venta. Desde el departamento de compras necesitan la información del nombre del proveedor, precio de compra y el stock que hay de cada producto. No puede haber ningún producto sin esta información vital para mejorar el funcionamiento con el departamento de compras.

Los pedidos se tramitan identificando los productos que se adquieren, pudiendo haber más de un producto en un pedido. Para incrementar los pedidos, el departamento de marketing lanza campañas de descuento sobre productos para incentivar las comprar, dando lugar a que no haya descuentos fijos, si no que cambian constantemente. Con lo cual, el descuento se registrar sobre el producto justo en el momento en que se tramita el pedido, con la cantidad adquirida y el precio unitario que había en ese momento.”

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| **DIAGRAMA E/R:**  IMG_256 |
| **MODELO FÍSICO:**  PRODUCTOS(producto\_id, **nombre, descripcion, precio\_venta, precio\_compra, stock,** proveedor\_id, categoria\_id) {proveedor\_id} es clave foránea de PROVEEDORES (puede ser nulo) {categoria\_id} es clave foránea de CATEGORIAS  CATEGORIAS(categoria\_id, nombre, descripcion, imagen)  PEDIDOS(pedido\_id, **fecha\_pedido, estado**)  DESCUENTOS(descuento\_id, **porcentaje, fecha\_inicio, fecha\_final**)  DETALLES\_PEDIDOS(pedido\_id, producto\_id, **cantidad, precio\_unitario,** descuento\_id)  {pedido\_id} es clave foránea de PEDIDOS  {producto\_id} es clave foránea de PRODUCTOS  {descuento\_id} es clave foránea de DESCUENTOS (puede ser nulo)  **SQL:**  CREATE TABLE Categorias(  categoria\_id INT AUTO\_INCREMENT PRIMARY KEY,  nombre VARCHAR(255) NOT NULL,  descripcion TEXT,  imagen VARCHAR(255)  );  CREATE TABLE Productos(  producto\_id INT AUTO\_INCREMENT PRIMARY KEY,  nombre VARCHAR(255) NOT NULL,  descripcion TEXT,  precio\_venta DECIMAL(10, 2) NOT NULL,  precio\_compra DECIMAL(10, 2) NOT NULL,  stock INT NOT NULL,  proveedor\_id INT, -- Asumiendo que existirá una tabla Proveedores  categoria\_id INT NOT NULL,  FOREIGN KEY (categoria\_id) REFERENCES CATEGORIAS(categoria\_id)  -- FOREIGN KEY (proveedor\_id) REFERENCES PROVEEDORES(proveedor\_id) -- Para el caso de ser necesario crear una tabla de Proveedores  );  CREATE TABLE Pedidos(  pedido\_id INT AUTO\_INCREMENT PRIMARY KEY,  fecha\_pedido DATE NOT NULL,  estado VARCHAR(255) NOT NULL  );  CREATE TABLE Descuentos(  descuento\_id INT AUTO\_INCREMENT PRIMARY KEY,  porcentaje DECIMAL(5, 2) NOT NULL,  fecha\_inicio DATE NOT NULL,  fecha\_final DATE NOT NULL  );  CREATE TABLE Detalles-pedidos (  pedido\_id INT,  producto\_id INT,  cantidad INT NOT NULL,  precio\_unitario DECIMAL(10, 2) NOT NULL,  descuento\_id INT,  PRIMARY KEY (pedido\_id, producto\_id),  FOREIGN KEY (pedido\_id) REFERENCES PEDIDOS(pedido\_id),  FOREIGN KEY (producto\_id) REFERENCES PRODUCTOS(producto\_id),  FOREIGN KEY (descuento\_id) REFERENCES DESCUENTOS(descuento\_id)  ); |

## Ejercicio 2.

A partir del diagrama del ejercicio anterior, realiza la transformación al modelo físico. Se considerará que toda la información del enunciado anterior es obligatoria, a no ser, que se haya dicho lo contrario.

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| **MODELO FÍSICO:**  EMPLEADOS(empleado\_id, **nombre**, **apellidos**, **num\_extension, email, titulacion,** Of, id\_supervisor)  {Of} es clave foránea de OFICINAS  {id\_supervisor] es clave foránea de la propia entidad EMPLEADOS  OFICINAS(Of, **teléfono**, **dirección**, **población**, **provincia, cod\_postal, país**)  CLIENTES(cliente\_id, **nombre, primer\_apellido, segundo\_apellido, telefono, email, direccion, poblacion, provincia, cod\_postal, pais, importe\_limite\_credito**, comercial\_id).  {comercial\_id} es clave foránea de COMERCIALES (puede ser nulo)  COMERCIALES(comercial\_id, ...)  PEDIDOS(pedido\_id, **fecha\_pedido, fecha\_envio, estado, pagado, comentario**, cliente\_id, comercial\_id)  {cliente\_id} es clave foránea de CLIENTES  {comercial\_id} es clave foránea de COMERCIALES (si es que un comercial está asociado, podría ser nulo)  PAGOS(pago\_id, f**echa\_pago, cantidad\_abonada, forma\_pago**, pedido\_id)  {pedido\_id} es clave foránea de PEDIDOS (pago\_id es la clave primaria de PAGOS)  PRODUCTOS(producto\_id, **nombre, descripcion, precio\_venta, precio\_compra, stock,** proveedor\_id, categoria\_id) {proveedor\_id} es clave foránea de PROVEEDORES (puede ser nulo) {categoria\_id} es clave foránea de CATEGORIAS  CATEGORIAS(categoria\_id, nombre, descripcion, imagen)  PEDIDOS(pedido\_id, **fecha\_pedido, estado**)  DESCUENTOS(descuento\_id, **porcentaje, fecha\_inicio, fecha\_final**)  DETALLES\_PEDIDOS(pedido\_id, producto\_id, **cantidad, precio\_unitario,** descuento\_id)  {pedido\_id} es clave foránea de PEDIDOS  {producto\_id} es clave foránea de PRODUCTOS  {descuento\_id} es clave foránea de DESCUENTOS (puede ser nulo) |

## Ejercicio 3.

A partir del modelo físico obtenido en el ejercicio anterior, genera todas las sentencias SQL necesarias para tener la estructura de la base de datos. La base de datos se tiene que llamar *ventas*.

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| DROP DATABASE IF EXISTS ventas;  CREATE DATABASE IF NOT EXISTS ventas;  USE ventas;  CREATE TABLE Empleados(  empleado\_id INT NOT NULL,  nombre VARCHAR(50) NOT NULL,  num\_extension VARCHAR(10) NOT NULL,  email VARCHAR(50) NOT NULL,  titulacion VARCHAR(50) NOT NULL,  Of int(5) NOT NULL,  id\_supervisor int(10),  PRIMARY KEY (empleado\_id)  CONSTRAINT Of\_ibfk\_1 FOREIGN KEY (Of) REFERENCES Oficinas (Of)  CONSTRAINT id\_supervisor\_ibfk\_2 FOREIGN KEY (id\_supervisor) REFERENCES Empleados(empleado\_id)  );  CREATE TABLE Oficinas(  Of int(5) NOT NULL,  telefono VARCHAR(20) NOT NULL,  direccion VARCHAR(50),  provincia VARCHAR(50) NOT NULL,  cod\_postal VARCHAR(50) NOT NULL,  PRIMARY KEY (Of),  );  CREATE TABLE Comerciales (  comercial\_id INT PRIMARY KEY,  nombre VARCHAR(255),  apellidos VARCHAR(255)  );  CREATE TABLE Clientes (  cliente\_id INT PRIMARY KEY,  nombre VARCHAR(255),  primer\_apellido VARCHAR(255),  segundo\_apellido VARCHAR(255),  telefono VARCHAR(50),  email VARCHAR(255),  direccion VARCHAR(255),  poblacion VARCHAR(255),  provincia VARCHAR(255),  cod\_postal VARCHAR(20),  pais VARCHAR(50),  importe\_limite\_credito DECIMAL(10, 2),  comercial\_id INT,  FOREIGN KEY (comercial\_id) REFERENCES Comerciales(comercial\_id)  );  CREATE TABLE Pedidos (  pedido\_id INT PRIMARY KEY,  fecha\_pedido DATE,  fecha\_envio DATE,  estado VARCHAR(50),  pagado BOOLEAN,  comentario TEXT,  cliente\_id INT,  FOREIGN KEY (cliente\_id) REFERENCES Clientes(cliente\_id)  );  CREATE TABLE Pagos (  pago\_id INT PRIMARY KEY,  fecha\_pago DATE,  cantidad\_abonada DECIMAL(10, 2),  forma\_pago VARCHAR(255),  pedido\_id INT,  FOREIGN KEY (pedido\_id) REFERENCES Pedidos(pedido\_id)  );  CREATE TABLE Categorias(  categoria\_id INT AUTO\_INCREMENT PRIMARY KEY,  nombre VARCHAR(255) NOT NULL,  descripcion TEXT,  imagen VARCHAR(255)  );  CREATE TABLE Productos(  producto\_id INT AUTO\_INCREMENT PRIMARY KEY,  nombre VARCHAR(255) NOT NULL,  descripcion TEXT,  precio\_venta DECIMAL(10, 2) NOT NULL,  precio\_compra DECIMAL(10, 2) NOT NULL,  stock INT NOT NULL,  proveedor\_id INT, -- Asumiendo que existirá una tabla Proveedores  categoria\_id INT NOT NULL,  FOREIGN KEY (categoria\_id) REFERENCES Categorias(categoria\_id)  -- FOREIGN KEY (proveedor\_id) REFERENCES Proveedores(proveedor\_id) -- );  CREATE TABLE Pedidos(  pedido\_id INT AUTO\_INCREMENT PRIMARY KEY,  fecha\_pedido DATE NOT NULL,  estado VARCHAR(255) NOT NULL  );  CREATE TABLE Descuentos(  descuento\_id INT AUTO\_INCREMENT PRIMARY KEY,  porcentaje DECIMAL(5, 2) NOT NULL,  fecha\_inicio DATE NOT NULL,  fecha\_final DATE NOT NULL  );  CREATE TABLE Detalles-pedidos (  pedido\_id INT,  producto\_id INT,  cantidad INT NOT NULL,  precio\_unitario DECIMAL(10, 2) NOT NULL,  descuento\_id INT,  PRIMARY KEY (pedido\_id, producto\_id),  FOREIGN KEY (pedido\_id) REFERENCES Pedidos(pedido\_id),  FOREIGN KEY (producto\_id) REFERENCES Productos(producto\_id),  FOREIGN KEY (descuento\_id) REFERENCES Descuentos(descuento\_id)  ); |