

# **Modelo relacional. Vistas y disparadores**

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## Introducción

En esta práctica de la asignatura Administración y diseño de bases de datos, trabajaremos con la base de datos *alquilerdvd*. El objetivo es aplicar los conceptos del modelo relacional, las vistas y los disparadores (triggers), así como analizar la estructura de la base de datos, identificar sus elementos principales y reforzar la integridad de los datos mediante restricciones y automatizaciones.

Durante el desarrollo se realiza la restauración de la base de datos, la exploración de sus tablas, vistas y secuencias, la creación de consultas avanzadas con joins y agrupamientos, y posteriormente se implementan vistas que facilitan su reutilización. Además, se añaden restricciones CHECK para validar la coherencia de los datos y se diseñan disparadores para registrar automáticamente las inserciones y eliminaciones de películas.

El informe recopila los pasos seguidos, las sentencias SQL empleadas y un análisis del modelo de datos.

## Enunciados

- 1. Realice la restauración de la base de datos [alquilerdvd.tar](#). Observe que la base de datos no tiene un formato SQL como el empleado en actividades anteriores.**

Descargamos el archivo proporcionado. Lo trasladamos al directorio deseado y ejecutamos el siguiente comando:

```
SQL
sudo -u postgres pg_restore -C -d postgres AlquilerPractica.tar
```

Este comando crea y restaura la base de datos *alquilerdvd*.

## 2. Identifique las tablas, vistas y secuencias.

```
alquilerdvd=# \d
```

List of relations			
Schema	Name	Type	Owner
public	actor	table	postgres
public	actor_actor_id_seq	sequence	postgres
public	address	table	postgres
public	address_address_id_seq	sequence	postgres
public	category	table	postgres
public	category_category_id_seq	sequence	postgres
public	city	table	postgres
public	city_city_id_seq	sequence	postgres
public	country	table	postgres
public	country_country_id_seq	sequence	postgres
public	customer	table	postgres
public	customer_customer_id_seq	sequence	postgres
public	film	table	postgres
public	film_actor	table	postgres
public	film_category	table	postgres
public	film_film_id_seq	sequence	postgres
public	inventory	table	postgres
public	inventory_inventory_id_seq	sequence	postgres
public	language	table	postgres
public	language_language_id_seq	sequence	postgres
public	payment	table	postgres
public	payment_payment_id_seq	sequence	postgres
public	rental	table	postgres
public	rental_rental_id_seq	sequence	postgres
public	staff	table	postgres
public	staff_staff_id_seq	sequence	postgres
public	store	table	postgres
public	store_store_id_seq	sequence	postgres

(28 rows)

El comando `\d` lista tablas, vistas y secuencias.

## 3. Identifique las tablas principales y sus principales elementos.

```
alquilerdvd=# \dt
```

List of relations			
Schema	Name	Type	Owner
public	actor	table	postgres
public	address	table	postgres
public	category	table	postgres
public	city	table	postgres
public	country	table	postgres
public	customer	table	postgres
public	film	table	postgres
public	film_actor	table	postgres
public	film_category	table	postgres
public	inventory	table	postgres
public	language	table	postgres
public	payment	table	postgres
public	rental	table	postgres
public	staff	table	postgres
public	store	table	postgres

(15 rows)

El comando `\dt` lista todas las tablas de la base de datos actual.

Table "public.film"				
Column	Type	Collation	Nullable	Default
film_id	integer		not null	nextval('film_film_id_seq'::regclass)
title	character varying(255)		not null	
description	text			
release_year	year			
language_id	smallint		not null	
rental_duration	smallint		not null	3
rental_rate	numeric(4,2)		not null	4.99
length	smallint			
replacement_cost	numeric(5,2)		not null	19.99
rating	mpaa_rating			'G'::mpaa_rating
last_update	timestamp without time zone		not null	now()
special_features	text[]			
fulltext	tsvector		not null	

- Clave primaria: *film\_id*
- Columnas importantes: *title*, *description*, *rental\_rate*, *length*, *rating*, *language\_id*

Accedemos a esta información sobre cada tabla mediante el comando `\d+ public.[tabla]`.

Table "public.customer"				
Column	Type	Collation	Nullable	Default
customer_id	integer		not null	nextval('customer_customer_id_seq'::regclass)
store_id	smallint		not null	
first_name	character varying(45)		not null	
last_name	character varying(45)		not null	
email	character varying(50)			
address_id	smallint		not null	
activebool	boolean		not null	true
create_date	date		not null	'now'::text::date
last_update	timestamp without time zone			now()
active	integer			

- Clave primaria: *customer\_id*
- Columnas importantes: *email*, *address\_id*, *store\_id*

Table "public.address"				
Column	Type	Collation	Nullable	Default
address_id	integer		not null	nextval('address_address_id_seq'::regclass)
address	character varying(50)		not null	
address2	character varying(50)			
district	character varying(20)		not null	
city_id	smallint		not null	
postal_code	character varying(10)			
phone	character varying(20)		not null	
last_update	timestamp without time zone		not null	now()

- Clave primaria: *address\_id*
- Columnas importantes: *city\_id*, *phone*, *address*, *address2*

Table "public.payment"				
Column	Type	Collation	Nullable	Default
payment_id	integer		not null	nextval('payment_payment_id_seq'::regclass)
customer_id	smallint		not null	
staff_id	smallint		not null	
rental_id	integer		not null	
amount	numeric(5,2)		not null	
payment_date	timestamp without time zone		not null	

- Clave primaria: *payment\_id*
- Columnas importantes: *customer\_id*, *staff\_id*, *rental\_id*, *amount*, *payment\_date*

Table "public.rental"				
Column	Type	Collation	Nullable	Default
rental_id	integer		not null	nextval('rental_rental_id_seq'::regclass)
rental_date	timestamp without time zone		not null	
inventory_id	integer		not null	
customer_id	smallint		not null	
return_date	timestamp without time zone			
staff_id	smallint		not null	
last_update	timestamp without time zone		not null	now()

- Clave primaria: *rental\_id*
- Columnas importantes: *rental\_date*, *inventory\_id*, *customer\_id*, *return\_id*, *staff\_id*

Column	Type	Table "public.staff"			Default
		Collation	Nullable		
staff_id	integer		not null		nextval('staff_staff_id_seq'::regclass)
first_name	character varying(45)		not null		
last_name	character varying(45)		not null		
address_id	smallint		not null		
email	character varying(50)				
store_id	smallint		not null		
active	boolean		not null		true
username	character varying(16)		not null		
password	character varying(40)				
last_update	timestamp without time zone		not null		now()
picture	bytea				

- Clave primaria: *staff\_id*
- Columnas importantes: *first\_name*, *last\_name*, *email*, *store\_id*, *active*, *username*, *password*

Column	Type	Table "public.inventory"			Default
		Collation	Nullable		
inventory_id	integer		not null		nextval('inventory_inventory_id_seq'::regclass)
film_id	smallint		not null		
store_id	smallint		not null		
last update	timestamp without time zone		not null		now()

- Clave primaria: *inventory\_id*
- Columnas importantes: *film\_id*, *store\_id*

Column	Type	Table "public.store"			Default
		Collation	Nullable		
store_id	integer		not null		nextval('store_store_id_seq'::regclass)
manager_staff_id	smallint		not null		
address_id	smallint		not null		
last_update	timestamp without time zone		not null		now()

- Clave primaria: *store\_id*
- Columnas importantes: *manager\_staff\_id*, *address\_id*

#### 4. Realice las siguientes consultas.

- Obtenga las ventas totales por categoría de películas ordenadas descendientemente.

SQL

```
SELECT c.name AS categoria, SUM(p.amount) AS venta_total
FROM payment p
INNER JOIN rental r ON r.rental_id = p.rental_id
INNER JOIN inventory i on i.inventory_id = r.inventory_id
INNER JOIN film_category fc ON fc.film_id = i.film_id
INNER JOIN category c ON c.category_id = fc.category_id
GROUP BY categoria
ORDER BY venta_total DESC;
```

categoria	venta_total
Sports	4892.19
Sci-Fi	4336.01
Animation	4245.31
Drama	4118.46
Comedy	4002.48
New	3966.38
Action	3951.84
Foreign	3934.47
Games	3922.18
Family	3830.15
Documentary	3749.65
Horror	3401.27
Classics	3353.38
Children	3309.39
Travel	3227.36
Music	3071.52
(16 rows)	

- b. Obtenga las ventas totales por tienda, donde se refleje la ciudad, el país (concatenar la ciudad y el país empleando como separador la ", "), y el encargado. Pudiera emplear GROUP BY, ORDER BY

SQL

```
SELECT s.store_id AS tienda, ci.city AS ciudad, co.country AS pais,
       st.first_name AS nombre_encagado, st.last_name AS apellido_encargado,
       SUM(p.amount) AS venta_total
FROM payment p
     INNER JOIN rental r ON r.rental_id = p.rental_id
     INNER JOIN inventory i ON i.inventory_id = r.inventory_id
     INNER JOIN store s ON s.store_id = i.store_id
     INNER JOIN address a ON a.address_id = s.address_id
     INNER JOIN city ci ON ci.city_id = a.city_id
     INNER JOIN country co ON co.country_id = ci.country_id
     INNER JOIN staff st ON st.staff_id = s.manager_staff_id
GROUP BY s.store_id, ci.city, co.country, st.first_name, st.last_name
ORDER BY venta_total DESC;
```

tienda	ciudad	pais	nombre_encagado	apellido_encargado	venta_total
2	Woodridge	Australia	Jon	Stephens	30683.13
1	Lethbridge	Canada	Mike	Hillyer	30628.91
(2 rows)					

- c. Obtenga una lista de películas, donde se reflejen el identificador, el título, descripción, categoría, el precio, la duración de la película, clasificación, nombre y apellidos de los actores (puede realizar una concatenación de ambos). Pudiera emplear GROUP BY

SQL

```
SELECT f.film_id AS id_pelicula, f.title AS titulo, f.description AS descripcion,
       c.name AS categoria, f.rental_rate AS precio, f.length AS duracion,
       f.rating AS clasificacion,
```

```

string_agg(a.first_name || a.last_name, ',') AS actores
FROM film f
INNER JOIN film_category fc ON fc.film_id = f.film_id
INNER JOIN category c ON c.category_id = fc.category_id
INNER JOIN film_actor fa ON fa.film_id = f.film_id
INNER JOIN actor a ON a.actor_id = fa.actor_id
GROUP BY f.film_id, f.title, f.description, c.name, f.rental_rate,
f.length,
f.rating
ORDER BY f.film_id;

```

id película	actores	description	categoria	precio	duracion	clasificacion
1   Academy Dinosaur	RockOvakakis,MaryKeitel,JohnnyCage,PeneLopeGuiness,SandraPeck,ChristianGable,Opr	A Epic Drama of a Feminist And a Mad Scientist who must Battle a Teacher in The Canadian Rockies	Documentary	0.99	86	PG
2   Ace Goldfinger	MinnieZellweger,ChrisDepp,BobFawcett,SeanGuiness	A Astounding Epistle of a Database Administrator And a Explorer who must Find a Car in Ancient China	Horror	4.99	48	G
3   Adaptation Holes	CameronStrep,BobFawcett,NickMahlberg,RayJohansson,JullianneDench	A Astounding Reflection of a Lumberjack And a Car who must Sink a Lumberjack in A Baloon Factory	Documentary	2.99	50	NC-17
4   Affair Prejudice	JodieBeneses,KennethPeck,FayKinslet,OprahKilner,ScarlettDamon	A Fanciful Documentary of a Frisbee And a Lumberjack who must Chase a Monkey in A Shark Tank	Horror	2.99	117	G
5   African Egg	DustinDantou,MatthewLeigh,GaryPhoenix,MatthewCarrey,ThoraTemple	A Fast-Paced Documentary of a Pastry Chef And a Dentist who must Pursue a Forensic Psychologist in The Gulf of Mexico	Family	2.99	130	G
6   Agent Truman	WarrenWolte,SandraKilner,JayneNesoon,MorganWilliams,KirstenPaltrow,KennethHoffe	A Intrepid Panorama of a Robot And a Boy who must Escape a Sumo Wrestler in Ancient China	Foreign	2.99	169	PG
7   Airplane Sierra	Menahopper,JimHestel,MichaelBolger,OprahKilner,RichardPenn	A Touching Saga of a Hunter And a Butler who must Discover a Butler in A Jet Boat	Comedy	4.99	62	PG-13
8   Airport Pollock	LucilleDee,SusanDavis,FayKilner,GeneWillis	A Epic Tale of a Moose And a Girl who must Confront a Monkey in Ancient India	Horror	4.99	54	R
9   Alabama Devil	WilliamHedman,RipCrawford,RipKinslet,GretaKeitel,ChristianGable,MenaTemple,Mer	A Thoughtful Panorama of a Database Administrator And a Mad Scientist who must Outgun a Mad Scientist in A Jet Boat	Horror	2.99	114	PG-13
10   Aladdin Calendar	GretaHalden,RockOvakakis,RayJohansson,ReneeTracy,ValBolger,JudyDean,JadaRyder,Al	A Action-Packed Tale of a Man And a Lumberjack who must Reach a Feminist in Ancient China	Sports	4.99	63	NC-17
11   Alamo Videotape	MichaelBening,JohnnyCage,ScarlettDamon,SeanGuiness	A Boring Epistle of a Butler And a Cat who must Fight a Pastry Chef in A MySQL Convention	Foreign	0.99	126	G
12   Alaska Phantom	ValBolger,BurtPosey,GeneMcKellen,JeffSilverstone,SylvesterDern,AlbertJohanson,	A Fanciful Saga of a Hunter And a Pastry Chef who must Vanquish a Boy in Australia	Music	0.99	136	PG
13   Ali Forever	ChristopherBerry,KennethTom,CaryMcConaughy,JonChase,MorganMcDormand	A Action-Packed Drama of a Dentist And a Crocodile who must Battle a Feminist in The Canadian Rockies	Horror	4.99	150	PG
14   Alice Fantasia	WoodyHoffman,RockOvakakis,MinnieZellweger,MorganWilliams	A Emotional Drama of a A Shark And a Database Administrator who must Vanquish a Pioneer in Soviet Georgia	Classics	0.99	94	NC-17
15   Alien Center	SidneyCroe,KennethPaltrow,HumphreyWillis,ReneeTracy,BurtDukakis,MenaHopper	A Brilliant Drama of a Cat And a Mad Scientist who must Battle a Feminist in A MySQL Convention	Foreign	2.99	46	NC-17
16   Alley Evolution	GregoryZoozing,JudeCruise,JohnSuvari,KarlBerry,AlbertJohansson	A Fast-Paced Drama of a Robot And a Composer who must Battle a Astronaut in New Orleans	Foreign	2.99	180	NC-17
17   Alone Trap	ReneeBall,EdChase,SpencerDepp,KarlBerry,LaurenceBullLock,WoodyZolie,ChrisDepp,Un	A Fast-Paced Character Study of a Composer And a Dog who must Outgun a Boat in An Abandoned Fun House	Music	0.99	82	R
18   Alter Victory	JadaRyder,AngelaWitherspoon,OprahKilner,ReeseKilner	A Thoughtful Drama of a Composer And a Feminist who must Meet a Secret Agent in The Canadian Rockies	Animation	0.99	57	PG-13
19   Amorous Hely	PeneLopeCronyn,KirkJowovich,JullianneQueen,JohnnyLollobrigida,ValBolger,JamesPitt	A Emotional Display of a Pioneer And a Technical Writer who must Battle a Man in A Baloon	Action	0.99	113	PG
20   Amolie Hellfighters	LaurBrody,CamereLut,EwanGosling,Tanithy,WalterTom,EPlanefield	A Boring Drama of a Woman And a Squirrel who must Conquer a Student in A Baloon	Music	4.99	70	R

d. Obtenga la información de los actores, donde se incluya sus nombres y apellidos, las categorías y sus películas. Los actores deben de estar agrupados y, las categorías y las películas deben estar concatenados por " : "

SQL

```

SELECT a.actor_id, a.first_name AS nombre, a.last_name AS apellido,
string_agg(c.name || ':' || f.title, ',') AS categorias_y_peliculas
FROM actor a
INNER JOIN film_actor fa ON fa.actor_id = a.actor_id
INNER JOIN film f ON f.film_id = fa.film_id
INNER JOIN film_category fc ON fc.film_id = f.film_id
INNER JOIN category c ON c.category_id = fc.category_id
GROUP BY a.actor_id, a.first_name, a.last_name
ORDER BY a.first_name, a.last_name;

```

actor_id	nombre	apellido	categorias_y_peliculas
71	Adam	Grant	Sci-Fi:Annie Identity,Foreign:Ballroom Mockingbird,Travel:Disciple Mother,Comedy:Fireball Philadelphia,Family:Gladiator Westward,Games:Glory Tracy,Comedy:Groundhog Uncut,Foreign:Happiness United,Children:Idols Snatchers,Action:Moonlight Westward,Comedy:Operation Operation,Sports:Seabiscuit Punk,Children:Splendor Patton,Classics:Tadpole Park,Children:Twisted Pirates,Games:Wanda Chamber
132	Adam	Hopper	Sci-Fi:Blindness Gun,Family:Blood Argonauts,Music:Chamber Italian Documentary,Clerks Angels,Action:Cueless Bucket,Foreign:Fiction Christmas,Family:Gables Metropolis,Family:Grease Youth,Comedy:Heaven Freedom,New:Low Mockingbird Hollywood,Children:Noon Papi,Sci-Fi:Open African,Documentary:Princess Giant,Comedy:Sadde Antitrust,New:Sleepy Japanese,Drama:Torque Bound,Classics:Towers Hurricane,Horror:Train Bunch,Sci-Fi:Vacation Boondock,Music:Words Hunter
165	Al	Garland	Documentary:Bill Others,New:Breakfast Goldfinger,Drama:Chitty Lock,Drama:Dalmations Sweden,Action:Drifter Commandments,Travel:Enough Raging,Action:Glass Dying,Action:Grail Frankenstein,Action:Handicap Boondock,Foreign:Jacket Frisco,Foreign:Muppet Mile,Animation:Oscar Gold,Action:Park Citizen,Animation:Potter Connecticut,Horror:Rock Instinct,Sports:Sense Greek,Sci-Fi:Silverado Goldfinger,Games:Sleuth Orient,Sports:Slipper Fidelity,Family:Splash Gump,Children:Splendor each,Classics:Wasteland Divine
173	Alan	Dreyfuss	Sci-Fi:Badman Dawn,Sci-Fi:Barbarella Streetcar,Music:Birch Antitrust,Family:Blanket Beverly,Games:Bulworth Commandments,Animation:Clash Freddy,Action:Cueless Bucket,Comedy:Crazy Home,Sci-Fi:Divide Monster,Horror:Fiction Antitrust,Children:Jumping Wrath,Travel:Kick Savannah,Comedy:Lonely Elephant,Family:Maguire Apache,Animation:Massage Image,Documentary:Metal Armageddon,Music:Monster Spartacus,Children:Polish Brooklyn,Family:Rush Goodfellas,Documentary:Sagebrush Clue
180	Albert	Johansson	Music:Alaska Phantom,Foreign:Alley Evolution,Drama:Apollo Teen,Games:Candles Grapes,Sci-Fi:Connecticut Tramp,Children:Crooked Frogmen,Sports:Crusade Honey,Foreign:Dangerous Uptown,Drama:Deceiver Betrayed,Music:Elf M
125	Albert	Nolte	Documentary:Bed Highball,Drama:Bright Encounters,Foreign:Brooklyn Desert,Sci-Fi:Camelot Vacation,Family:Confused Candles,Comedy:Crazy Home,Drama:Dalmations Sweden,Children:Doctor Grail,Action:Dragon Squad,Comedy:Flip Sports:Gleaming Jewbreaker,Sci-Fi:Goldmine Tycoon,Action:Handicap Boondock,Foreign:Hellfighters Sierra,Family:Homicide Peach,Sports:Honey Ties,Children:Idols Snatchers,Documentary:Kill Brotherhood,Family:Manchurian Curtain,Comedy:Memento Zoolander,Foreign:omforts,Classics:Right Cranes,Documentary:Road Roxanne,Comedy:Sweden Shining,Horror:Treasure Command,Horror:Undeclared Dalmations,Documentary:Virginian Pluto,Children:Walls Artist,Documentary:Wedding Apollo,Drama:West Lion
29	Alec	Wayne	Sports:Aladdin Calendar,Drama:Blade Polish,Action:Bull Shawshank,Children:Cabin Flash,Classics:Center Dinosaur,Music:Chamber Italian,Drama:Coneheads Smoochy,New:Destiny Saturday,Family:Effect Gladiator,Drama:Encount
144	Angela	Hudson	Fiction Christmas,Comedy:Freedom Cleopatra,Travel:Fugitive New,Hours Rage,Comedy:Hustler Party,Sci-Fi:Identity Lover,Music:Insider Arizona,Classics:Jeopardy Encino,Sports:Joan Northwest,Sports:Liberty Magnificent,Children:Magic Mallrats,New:Money Fiction,Documentary:Smoking Barbarella,Classics:Summer Scarface,Children:Uptown Young,Drama:Virgin Daisy
65	Angela	Hudson	Sci-Fi:Armageddon Lost,Games:Autumn Crow,Action:Brute Intrigue,Games:Bulworth Commandments,Games:Candles Grapes,Travel:Cassidy Wyoming,Music:Clones Pinocchio,Comedy:Element Freddy,New:Fatal Haunted,Sci-Fi:Frisko For
144	Angela	Witherspoon	Animation:Alter Victory,Action:Berets Agent,Drama:Blade Polish,New:Bolevedere Mob,Comedy:Bringing Hysterical Action:Bull Shawshank,Travel:Casablanca Super,Travel:Cassidy Wyoming,Comedy:Cat Coneheads,Action:Celebrity
144	Angela	Witherspoon	Animation:Alter Victory,Action:Berets Agent,Drama:Blade Polish,New:Bolevedere Mob,Comedy:Bringing Hysterical Action:Bull Shawshank,Travel:Casablanca Super,Travel:Cassidy Wyoming,Comedy:Cat Coneheads,Action:Celebrity
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## prefijo view\_ a su denominación.

SQL

-- a. Obtenga las ventas totales por categoría de películas ordenadas descendientemente.

```
CREATE VIEW view_ventas_por_categoria AS
    SELECT c.name AS categoria, SUM(p.amount) AS venta_total
    FROM payment p
    INNER JOIN rental r ON r.rental_id = p.rental_id
    INNER JOIN inventory i ON i.inventory_id = r.inventory_id
    INNER JOIN film_category fc ON fc.film_id = i.film_id
    INNER JOIN category c ON c.category_id = fc.category_id
    GROUP BY categoria
    ORDER BY venta_total DESC;
```

-- b. Obtenga las ventas totales por tienda, donde se refleje la ciudad, el país (concatenar la ciudad y el país empleando como separador la “,”), y el encargado. Pudiera emplear GROUP BY, ORDER BY

```
CREATE VIEW view_ventas_por_tienda AS
    SELECT s.store_id AS tienda, ci.city AS ciudad, co.country AS pais,
    st.first_name AS nombre_encagado,
    st.last_name AS apellido_encargado, SUM(p.amount) AS
venta_total
```

```
    FROM payment p
    INNER JOIN rental r ON r.rental_id = p.rental_id
    INNER JOIN inventory i ON i.inventory_id = r.inventory_id
    INNER JOIN store s ON s.store_id = i.store_id
    INNER JOIN address a ON a.address_id = s.address_id
    INNER JOIN city ci ON ci.city_id = a.city_id
    INNER JOIN country co ON co.country_id = ci.country_id
    INNER JOIN staff st ON st.staff_id = s.manager_staff_id
    GROUP BY s.store_id, ci.city, co.country, st.first_name,
    st.last_name
    ORDER BY venta_total DESC;
```

-- c. Obtenga las ventas totales por tienda, donde se refleje la ciudad, el país (concatenar la ciudad y el país empleando como separador la “,”), y el encargado. Pudiera emplear GROUP BY, ORDER BY

```
CREATE VIEW view_lista_peliculas AS
    SELECT f.film_id AS id_pelicula, f.title AS titulo,
    f.description AS descripcion, c.name AS categoria,
    f.rental_rate AS precio, f.length AS duracion,
    f.rating AS clasificacion,
    string_agg(a.first_name || a.last_name, ',') AS actores
    FROM film f
    INNER JOIN film_category fc ON fc.film_id = f.film_id
    INNER JOIN category c ON c.category_id = fc.category_id
    INNER JOIN film_actor fa ON fa.film_id = f.film_id
    INNER JOIN actor a ON a.actor_id = fa.actor_id
    GROUP BY f.film_id, f.title, f.description, c.name,
    f.rental_rate, f.length, f.rating
    ORDER BY f.film_id;
```



-- d. Obtenga la información de los actores, donde se incluya sus nombres y apellidos, las categorías y sus películas. Los actores deben de estar agrupados y, las categorías y las películas deben estar concatenados por ":"

```
CREATE VIEW view_info_actores AS
SELECT a.actor_id, a.first_name AS nombre, a.last_name AS apellido,
       string_agg(c.name || ':' || f.title, ',') AS
       categorias_y_peliculas
FROM actor a
      INNER JOIN film_actor fa ON fa.actor_id = a.actor_id
      INNER JOIN film f ON f.film_id = fa.film_id
      INNER JOIN film_category fc ON fc.film_id = f.film_id
      INNER JOIN category c ON c.category_id = fc.category_id
GROUP BY a.actor_id, a.first_name, a.last_name
ORDER BY a.first_name, a.last_name;
```

## 6. Haga un análisis del modelo e incluya las restricciones CHECK que considere necesarias.

- Análisis:
  - *film*: los campos numéricos no deben ser negativos (*rental\_rate* y *replacement\_cost*  $\geq 0$ , *rental\_duration* y *length*  $> 0$ ).
  - *customer*: *email* si existe debe tener un formato razonable, *create\_date* no debe ser en el futuro.
  - *address*: *phone* debe tener formato razonable, *postal\_code* longitud  $\leq 10$ .
  - *payment*: *amount*  $\geq 0$ , *payment\_date* no en el futuro.
  - *rental*: *return\_date* NULL o  $\geq$  *rental\_date*.
  - *staff*: *username* con tamaño mínimo, *active* boolean ya NOT NULL. *email* formato opcional.
- Creamos inicialmente las restricciones CHECK a añadir pero manteniéndolas NOT VALID:

SQL

-- film: tasas y costes no negativos, duracion y rental\_duration positivas

```
ALTER TABLE film
ADD CONSTRAINT chk_film_rental_rate_nonneg
CHECK (rental_rate >= 0) NOT VALID;
```

```
ALTER TABLE film
ADD CONSTRAINT chk_film_replacement_cost_nonneg
CHECK (replacement_cost >= 0) NOT VALID;
```

-- film: rental\_duration ya default 3 y NOT NULL pero aseguramos > 0

```
ALTER TABLE film
ADD CONSTRAINT chk_film_rental_duration_positive
CHECK (rental_duration > 0) NOT VALID;
```

-- film: length puede ser NULL en esquema. Si no es NULL, asegurar > 0

```
ALTER TABLE film
ADD CONSTRAINT chk_film_length_positive_or_null
CHECK (length IS NULL OR length > 0) NOT VALID;
```

```

-- customer: email (si no es NULL) debe tener formato clásico y create_date no debe
-- tener una fecha futura
ALTER TABLE customer
ADD CONSTRAINT chk_customer_email_format
CHECK (
    email IS NULL OR email ~* '^[A-Za-z0-9._%+-]+@[A-Za-z0-9.-]+\.[A-Za-z]{2,}$'
) NOT VALID;

ALTER TABLE customer
ADD CONSTRAINT chk_customer_create_date_past
CHECK (create_date <= now()::date) NOT VALID;

-- address: telefono y postal_code longitud máxima razonable
ALTER TABLE address
ADD CONSTRAINT chk_address_phone_format
CHECK (phone IS NULL OR TRIM(phone) = '' OR phone ~ '^[0-9\+\-\(\)\.]{6,20}$') NOT VALID;

ALTER TABLE address
ADD CONSTRAINT chk_address_postal_length
CHECK (postal_code IS NULL OR char_length(postal_code) <= 10) NOT VALID;

-- payment: importe positivo y payment_date no en el futuro
ALTER TABLE payment
ADD CONSTRAINT chk_payment_amount_positive
CHECK (amount >= 0) NOT VALID;

ALTER TABLE payment
ADD CONSTRAINT chk_payment_date_past
CHECK (payment_date <= now()) NOT VALID;

-- rental: return_date NULL o >= rental_date
ALTER TABLE rental
ADD CONSTRAINT chk_rental_return_after_rental
CHECK (return_date IS NULL OR return_date >= rental_date) NOT VALID;

-- staff: username con longitud mínima y email con formato clásico
ALTER TABLE staff
ADD CONSTRAINT chk_staff_username_len
CHECK (char_length(username) >= 3) NOT VALID;

ALTER TABLE staff
ADD CONSTRAINT chk_staff_email_format
CHECK (
    email IS NULL OR email ~* '^[A-Za-z0-9._%+-]+@[A-Za-z0-9.-]+\.[A-Za-z]{2,}$'
) NOT VALID;

```

- Una vez comprobado que no habían filas que incumpliesen, valido las constraints.

SQL

```
ALTER TABLE film VALIDATE CONSTRAINT chk_film_rental_rate_nonneg;
ALTER TABLE film VALIDATE CONSTRAINT chk_film_replacement_cost_nonneg;
ALTER TABLE film VALIDATE CONSTRAINT chk_film_rental_duration_positive;
ALTER TABLE film VALIDATE CONSTRAINT chk_film_length_positive_or_null;

ALTER TABLE customer VALIDATE CONSTRAINT chk_customer_email_format;
ALTER TABLE customer VALIDATE CONSTRAINT chk_customer_create_date_past;

ALTER TABLE address VALIDATE CONSTRAINT chk_address_phone_format;
ALTER TABLE address VALIDATE CONSTRAINT chk_address_postal_length;

ALTER TABLE payment VALIDATE CONSTRAINT chk_payment_amount_positive;
ALTER TABLE payment VALIDATE CONSTRAINT chk_payment_date_past;

ALTER TABLE rental VALIDATE CONSTRAINT chk_rental_return_after_rental;

ALTER TABLE staff VALIDATE CONSTRAINT chk_staff_username_len;
ALTER TABLE staff VALIDATE CONSTRAINT chk_staff_email_format;
```

## 7. Explique la sentencia que aparece en la tabla `customer`

### Triggers:

```
last_updated BEFORE UPDATE ON customer
```

```
FOR EACH ROW EXECUTE PROCEDURE last_updated()
```

### Identifique alguna tabla donde se utilice una solución similar.

Esa sentencia indica que existe un trigger que se ejecuta antes de cada operación `UPDATE` sobre la tabla `customer`. *FOR EACH ROW* significa que se ejecuta una vez por cada fila modificada y *EXECUTE PROCEDURE last\_updated()* llama a la función *last\_updated()*. La función *last\_updated()* actualiza el campo *last\_update* de la fila a la fecha/hora actual.

Una tabla que utiliza una solución similar es la tabla *address*:

```
Triggers:
  last_updated BEFORE UPDATE ON address FOR EACH ROW EXECUTE FUNCTION last_updated()
Access method: heap
```

## 8. Construya un disparador que guarde en una nueva tabla creada por usted la fecha de cuando se insertó un nuevo registro en la tabla `film` y el identificador del `film`.

SQL

```
-- Tabla para inserciones
CREATE TABLE film_insert_log (
  film_id      integer NOT NULL,
  last_date    timestamp,
  last_user    text
);
```

```

-- Función de trigger
CREATE FUNCTION film_insert_log_fn() RETURNS TRIGGER AS $film_insert_log_fn$
BEGIN
    IF NEW.film_id IS NULL THEN
        RAISE EXCEPTION 'film_id cannot be null';
    END IF;

    INSERT INTO film_insert_log (film_id, last_date, last_user)
    VALUES (NEW.film_id, current_timestamp, current_user);

    RETURN NEW;
END;
$film_insert_log_fn$ LANGUAGE plpgsql;

-- Trigger sobre film
CREATE TRIGGER trg_film_before_insert BEFORE INSERT ON film
FOR EACH ROW EXECUTE PROCEDURE film_insert_log_fn();

```

Comprobamos que funciona correctamente:

```

SQL
INSERT INTO film (title, language_id, rental_duration, rental_rate, replacement_cost,
fulltext)
VALUES ('test', 3, 3, 3, 3, to_tsvector('test'));

```

```

alquilerdvd=# SELECT *
alquilerdvd=# FROM film_insert_log;
 film_id |                last_date                | last_user
-----+-----+-----+-----
    1001 | 2025-10-27 17:20:11.461305 | postgres
    1002 | 2025-10-27 17:26:12.938995 | postgres
(2 rows)

```

**9. Construya un disparador que guarde en una nueva tabla creada por usted la fecha de cuando se eliminó un registro en la tabla `film` y el identificador del `film`.**

```

SQL
-- Tabla para eliminaciones
CREATE TABLE film_delete_log (
    film_id      integer NOT NULL,
    last_date    timestamp,
    last_user    text
);
-- Función de trigger
CREATE FUNCTION film_delete_log_fn() RETURNS TRIGGER AS $film_delete_log_fn$
BEGIN
    IF OLD.film_id IS NULL THEN
        RAISE EXCEPTION 'OLD.film_id cannot be null';
    END IF;

```

```

INSERT INTO film_delete_log (film_id, last_date, last_user)
VALUES (OLD.film_id, current_timestamp, current_user);

RETURN OLD;
END;
$film_delete_log_fn$ LANGUAGE plpgsql;

-- Trigger sobre film
CREATE TRIGGER trg_film_before_delete BEFORE DELETE ON film
FOR EACH ROW EXECUTE PROCEDURE film_delete_log_fn();

```

Comprobamos que funciona correctamente:

SQL

```
DELETE FROM film WHERE title = 'test';
```

```

alquilerdvd=# SELECT *
alquilerdvd=# FROM film_delete_log;
 film_id |          last_date          | last_user
-----+-----+-----
    1002 | 2025-10-27 17:40:38.539193 | postgres
(1 row)

```

## 10. Comente el significado y la relevancia de las secuencias.

Una secuencia es un objeto de la base de datos que entrega números enteros uno detrás de otro. Se usa habitualmente para asignar automáticamente identificadores (IDs) a las filas. Cuando una sesión pide el siguiente número con `nextval()` recibe un valor único y la secuencia avanza. Esto funciona bien aun cuando varias sesiones piden números a la vez porque PostgreSQL garantiza que no se repitan. Las secuencias se pueden configurar (valor inicial, incremento, caché) y, después de importar datos, es habitual sincronizarlas con `setval(...)` para que continúen desde el máximo ID existente. En resumen, las secuencias facilitan y hacen segura la generación automática de IDs en entornos con muchos usuarios simultáneos, aunque a costa de aceptar posibles huecos en la numeración.