1- Películas con fecha del año 2000.

σ movies.year=2000 movies

movies.id	movies.name	movies.year	movies.quality
14942	Amores perros	2000	1
129185	Gladiator	2000	1
210511	Memento	2000	1
276085	Requiem for a Dream	2000	1

2- Mostrar el nombre y apellido de los directores de la base que tienen películas fechadas en el año 2000.

S1 = σ movies.year=2000 movies
S2 = π movies_directors.director_id (S1 ⋈ movies.id=movies_directors.movie_id movies_directors)
S3 = S2 ⋈ movies_directors.director_id=directors.id directors
π directors.first_name, directors.last_name S3

Versión cambiando el nombre de un atributo para poder hacer la junta natural.

S1 = σ movies.year=2000 movies
S2 = ρ id←movies_directors.director_id (π movies_directors.director_id (S1 ⋈ movies.id=movies_directors.movie_id movies_directors))
S3 = S2 ⋈ directors
π directors.first_name, directors.last_name S3

directors.first_name	directors.last_name
Alejandro	González Iñárritu
Ridley	Scott
Christopher	Nolan
Darren	Aronofsky

3- Mostrar los nombres de las películas filmadas por Woody Allen que figuren en la base.

π movies.name (((σ last_name='Allen' directors) ⋈ directors.id=movies_directors.director_id movies_directors) ⋈ movies_directors.movie_id=movies.id movies)

π movies.name (((σ last_name = 'Allen' directors) ⋈ directors.id = movies_directors.director_id movies_directors) ⋈ movies_directors.movie_id = movies.id movies)

movies.name
Annie Hall
Manhattan

4- Mostrar los nombres de las películas en que Hitler figure como actor.

π movies.name (((σ last_name='Hitler' actors) ⋈ actors.id=roles.actor_id roles) ⋈ roles.movie_id=movies.id movies)

π movies.name (((σ last_name = 'Hitler' actors) ⋈ actors.id = roles.actor_id roles) ⋈ roles.movie_id = movies.id movies)

movies.name
Judgment at Nuremberg

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5 - Algún director abarca todo los géneros?

π directors_genres.director_id,directors_genres.genre directors_genres ÷ π directors_genres.genre directors_genres

No

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6 - Directores que abarcaron (al menos) los mismos géneros que Polanski

GENRE_P = π directors_genres.genre (σ directors.last_name= 'Polanski' directors ⋈ directors_genres.director_id=directors.id directors_genres)
TODOS = π directors_genres.director_id,directors_genres.genre directors_genres ÷ GENRE_P
π directors.first_name,directors.last_name (TODOS ⋈ directors_genres.director_id=directors.id directors)

directors.first_name	directors.last_name
Francis Ford	Coppola
Roman	Polanski

Que Scorsese?

π directors.first_name, directors.last_name ((π directors_genres.director_id, directors_genres.genre directors_genres ÷ (π directors_genres.genre (σ directors.last_name = 'Scorsese' directors ⋈ directors_genres.director_id = directors.id directors_genres))) ⋈ directors_genres.director_id = directors.id directors)

directors.first_name	directors.last_name
Francis Ford	Coppola
Alfred (I)	Hitchcock
Martin	Scorsese

Que Tarantino?

π directors.first_name, directors.last_name ((π directors_genres.director_id, directors_genres.genre directors_genres ÷ (π directors_genres.genre (σ directors.last_name = 'Tarantino' directors ⋈ directors_genres.director_id = directors.id directors_genres))) ⋈ directors_genres.director_id = directors.id directors)

directors.first_name	directors.last_name
Otto	Preminger
Michael	Curtiz
Stanley	Kubrick
Akira	Kurosawa
Francis Ford	Coppola
Bob (III)	Clark
Steven	Spielberg
Quentin	Tarantino
Clint	Eastwood

7 - Año de la última película de la base.

π year movies - π m.year (ρ m (movies) ⋈ m.year < movies.year movies)

2005

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8 - Películas de la base del último año.
ρ AA (π year movies - π m.year (ρ m (movies) ⋈ m.year < movies.year movies)) ⋈ AA.year = movies.year movies

AA.year	movies.id	movies.name	movies.year	movies.quality
2005	30959	Batman Begins	2005	1
2005	302329	Sin City	2005	1

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9 - Películas del director Hichtcock en las que actuó Carroll

S1 = σ directors.last_name = 'Hitchcock' directors
S2 = π movies.id,movies.name (S1 ⋈ directors.id=movies_directors.director_id movies_directors ⋈ movies_directors.movie_id=movies.id movies)
S3 = ρ peli S2
S4 = S3 ⋈ peli.id=roles.movie_id roles ⋈ actors.id=roles.actor_id (σ actors.last_name='Carroll' actors)
π peli.name,actors.last_name S4

π peli.name, actors.last_name ((ρ peli (π movies.id, movies.name ((σ directors.last_name = 'Hitchcock' directors) ⋈ directors.id = movies_directors.director_id movies_directors ⋈ movies_directors.movie_id = movies.id movies))) ⋈ peli.id = roles.movie_id roles ⋈ actors.id = roles.actor_id (σ actors.last_name = 'Carroll' actors))

peli.name	actors.last_name
North by Northwest	Carroll
Strangers on a Train	Carroll

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10 - Películas del director Hichtcock en las que NO actuó Carroll

S1 = σ directors.last_name = 'Hitchcock' directors
S2 = π movies.id,movies.name (S1 ⋈ directors.id=movies_directors.director_id movies_directors ⋈ movies_directors.movie_id=movies.id movies)
S3 = ρ peli S2
S4 = S3 ⋈ peli.id=roles.movie_id roles
S5 = S4 ⋈ actors.id=roles.actor_id (σ actors.last_name='Carroll' actors)
S6 = π peli.id S5
S7 = π peli.id S4 - S6
S7 ⋈ peli.id=movies.id movies

(π peli.id ((ρ peli (π movies.id, movies.name ((σ directors.last_name = 'Hitchcock' directors) ⋈ directors.id = movies_directors.director_id movies_directors ⋈ movies_directors.movie_id = movies.id movies))) ⋈ peli.id = roles.movie_id roles) - (π peli.id (((ρ peli (π movies.id, movies.name ((σ directors.last_name = 'Hitchcock' directors) ⋈ directors.id = movies_directors.director_id movies_directors ⋈ movies_directors.movie_id = movies.id movies))) ⋈ peli.id = roles.movie_id roles) ⋈ actors.id = roles.actor_id (σ actors.last_name = 'Carroll' actors)))) ⋈ peli.id = movies.id movies

peli.id	movies.id	movies.name	movies.year	movies.quality
85669	85669	Dial M for Murder	1954	1
235676	235676	Notorious	1946	1
266574	266574	Psycho	1960	1
273543	273543	Rear Window	1954	1
352639	352639	Vertigo	1958	1

11 – Actores que participan en al menos 3 películas de la base.

S1= π movies.id,movies.name,roles.actor_id (movies ⋈ movies.id=roles.movie_id roles)
K1 = ρ p1 (S1)
K2 = ρ p2 (S1)
K3 = ρ p3 (S1)
π p1.actor_id (σ p1.id≠p2.id ∧ p2.id≠p3.id ∧ p1.id≠p3.id (K1 ⋈ p1.actor_id=p2.actor_id K2 ⋈ p2.actor_id=p3.actor_id K3)) ⋈ p1.actor_id=actors.id actors

actors.id actors

p1.actor_id	actors.id	actors.first_name	actors.last_name	actors.gender
43264	43264	Ed	Binns	M
683135	683135	Vivian	Kubrick	F
831289	831289	Sigourney	Weaver	F
204719	204719	Lance	Henriksen	M
24298	24298	Kenny (I)	Baker	M
455212	455212	James (I)	Stewart	M
132963	132963	Robert (I)	Duvall	M
140869	140869	R. Lee	Ermey	M
155223	155223	Harrison (I)	Ford	M
466098	466098	Tom	Tangen	M
400860	400860	Pat	Roach	M
49922	49922	Mark	Boone Junior	M
159346	159346	Morgan (I)	Freeman	M
65536	65536	Steve	Buscemi	M
96797	96797	Gino	Corrado	M
388280	388280	Claude	Rains	M
89951	89951	Edmund	Cobb	M
246753	246753	Milton	Kibbee	M
296451	296451	Hank (I)	Mann	M
621468	621468	Bess	Flowers	F
674054	674054	Grace (I)	Kelly	F
512541	512541	Bruce	Willis	M
358968	358968	Al	Pacino	M
201013	201013	Phil	Hawn	M
233082	233082	James Earl	Jones	M
376249	376249	Brad	Pitt	M
391057	391057	John	Ratzenberger	M
49120	49120	Ward	Bond	M
80930	80930	Eddy	Chandler	M
324391	324391	Thomas (I)	Mitchell	M
113561	113561	Robert	De Niro	M
138093	138093	Dick (I)	Elliott	M
433767	433767	Michael	Sheard	M
238369	238369	Eddie (I)	Kane	M
57356	57356	Al	Bridge	M
153422	153422	Sam	Flint	M
263943	263943	Mike (I)	Lally	M
350370	350370	Frank (I)	O Connor	M
502355	502355	H.B.	Warner	M
292028	292028	Michael (I)	Madsen	M
188411	188411	Alec	Guinness	M
92035	92035	Kenneth	Colley	M
211590	211590	William (I)	Holden	M
145850	145850	Tommy	Farrell	M
204388	204388	Len	Hendry	M
209748	209748	Alfred (I)	Hitchcock	M
341539	341539	Howard	Negley	M
512106	512106	Robert (I)	Williams	M
242760	242760	Harvey	Keitel	M
465636	465636	Charles A.	Tamburro	M