1-

$\rho_a(\pi_{actor,genre}(casts *_{title} genres\_movies)$

$\rho_b(\pi_{actor,genre,COUNT('x')\ by\_genre}\ \mathcal{G}_{actor,genre}(a))$

$\rho_c(\pi_{actor\ ,COUNT('x')\ total}\ \mathcal{G}_{actor}\ (a))$

$\pi_{actor,genre,by\_genre,total}\ \tau_{actor}(b *_{actor} c)$

```
WITH a AS (SELECT actor,genre from iaa10.casts JOIN iaa10.genres_movies USING (title)),
     b AS (SELECT actor,genre,COUNT('x') by_genre FROM a GROUP BY actor,genre),
     c AS (SELECT actor,COUNT('x') total FROM a GROUP BY actor)
SELECT DISTINCT actor,genre,by_genre,total FROM b JOIN c USING (actor) ORDER BY actor;
```

2-

$\rho_a(\pi_{filming\_language,COUNT('x')\ n\_movies}\tau_{n\_movies}(\ \mathcal{G}_{filming\_language}\ (movies))$

$\pi_{filming\_languaje,n\_movies}(\sigma_{rownum<5}(a))$

```
WITH a as (SELECT filming_language,COUNT('x') n_movies FROM iaa10.movies GROUP BY
filming_language ORDER BY n_movies DESC)
SELECT A.filming_language, A.n_movies FROM a WHERE rownum<5;
```

3-

$\pi_{name}((\pi_{client,\ avg(PCT)\ as\ mean}\ (\mathcal{G}_{client}\ (taps\_movies *_{title} lic\_movies))\cup_a (\mathcal{G}_{client}\ (taps\_series *_{title,season} lic\_series))\ \theta_{a.client=c.clientid\ AND\ mean<60}\ clients\ c))$

```
SELECT name FROM
        (select client,avg(PCT) mean from iaa10.taps_movies JOIN iaa10.lic_movies USING (title)
        GROUP BY client
        UNION
        select client,avg(PCT) mean from iaa10.taps_series JOIN iaa10.lic_series USING (title,season)
        GROUP BY client) a
JOIN iaa10.clients c ON (a.client=c.clientid AND mean<60);
```

4-

$\pi_{director\_name,COUNT('x')}\ (\ \mathcal{G}_{director\_name}\ (\sigma_{2*gross>budget\ AND\ UPPER(country)='USA'} movies)$

```
select director_name,count('x') FROM  iaa10.movies where 2*gross>budget AND UPPER(country)='USA'
group by director_name;
```

5-

$\rho_a(\pi_{actor,genre}(casts *_{title} genres\_movies)$

$\rho_b(\pi_{genre,actor,COUNT('x')\ by\_genre}\ \mathcal{G}_{actor,genre}(a))$

$\rho_c(\pi_{genre,MAX(by\_genre)\ maximo}\ \mathcal{G}_{genre}\ (b))$

$\rho_d(\pi_{genre,actor,maximo}(c\ \theta_{c.maximo=b.by\_genre\ AND\ c.genre=b.genre}\ b)$

$\pi_{genre,listagg(actor,',\ ')\ by\ null}\ \mathcal{G}_{genre}\ (d)$

```
WITH a AS (SELECT actor,genre FROM iaa10.casts JOIN iaa10.genres_movies USING (title)),
    b AS (SELECT genre,actor,count('x') by_genre FROM a GROUP BY genre,actor),
    c AS (SELECT genre,MAX(by_genre) AS maximo FROM b GROUP BY genre),
    d AS (SELECT C.genre,actor,maximo FROM c JOIN b on (c.maximo=b.by_genre and c.genre =
b.genre))
SELECT genre, listagg(actor,', ') WITHIN GROUP (ORDER BY NULL) names FROM d GROUP BY
d.genre;
```