1. List all the movies that are premiering in particular city and theatre.

- Query:
  - select distinct(movie_name) from movie_tbl as mov join show_tbl as s on (s.mid=mov.movie_id) join screen_tbl as sc on (s.sno=sc.screen_no) join theatre_tbl as theatre on (theatre.theatre_id=sc.tid) join city_tbl as city on (theatre.cid=city.city_id) where theatre_name='Time Cinema Ahmedabad CG Road' and city.city_name='Ahmedabad';
- Relational Algebra:
  - $\pi_{\text{movie\_name}}$ ($\sigma_{\text{(theatre\_name = 'Time cinema' AND city\_name = 'Ahemdabad')}}$ (movie_tbl $\bowtie$ $<_{\text{movie\_id =mid}}>$ show_tbl $\bowtie$ $<_{\text{sno = screen\_no}}>$ screen_tbl $\bowtie$ $<_{\text{tid = theatre\_id}}>$ theatre_tbl $\bowtie$ $<_{\text{cid = city\_id}}>$ city_tbl))

Data Output | Explain | Messag

	movie_name character varying (50)
1	Dolly Kitty Aur Woh Chamakt...
2	Khaali Peeli
3	Laxmmi Bomb
4	The Glorias

2. List all the theatres according to the city.

- Query:
    - select theatre_name from theatre_tbl as th join city_tbl as city on (th.cid=city.city_id) where city.city_name='Ahmedabad';
- Relational Algebra:
    - $\pi_{\text{theatre\_name}} (\sigma_{(\text{city\_name} = \text{‘Ahemdabad’})} (\text{theatre\_tbl} \bowtie_{<\text{cid} = \text{city\_id}>} \text{city\_tbl}))$

Data Output | Explain | Messages

	theatre_name character varying (50)
1	Cinepolis
2	Time Cinema Ahmedabad CG Road
3	PVR
4	Carnival Cinemas
5	City Gold The Multiplex- Ashram Road

3. Movies according to language and genre.

- Query:
    - select movie_name from movie_genre_tbl as mg join movie_tbl as movie on (mg.mid=movie.movie_id) where gname='Comedy' and movie_language='Hindi';
- Relational Algebra:

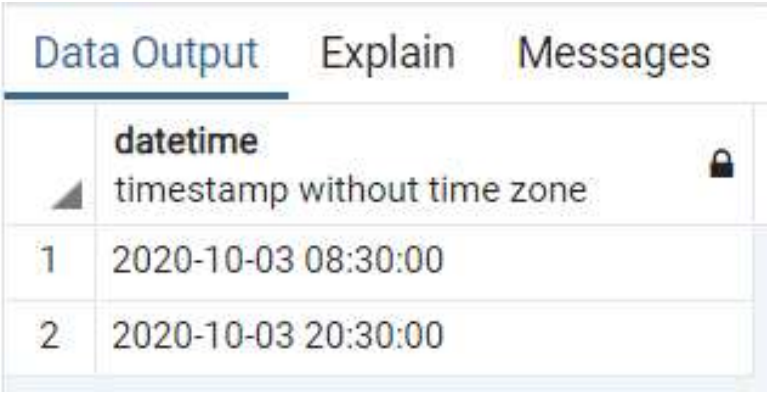
- $\pi_{\text{movie\_name}} (\sigma_{(\text{gname} = \text{'Comedy'} \text{ AND } \text{movie\_language} = \text{'Hindi'})} (\text{movie\_tbl} \bowtie_{\text{movie\_id} = \text{mid}} \text{movie\_genre\_tbl}))$

Data Output | Explain | Messa

	movie_name character varying (50)
1	Dolly Kitty Aur Woh Chamakt...
2	Lootcase
3	Dil Bechara
4	Angrezi Medium
5	Laxmmi Bomb

4. Timing of a movie at a theatre

- Query:
    - select datetime from movie_tbl as mov join show_tbl as s on (s.mid=mov.movie_id) join screen_tbl as sc on (s.sno=sc.screen_no) join theatre_tbl as theatre on (theatre.theatre_id=sc.tid) where theatre_name='Time Cinema Ahmedabad CG Road' and movie_name='Khaali Peeli';
- Relational Algebra:
    - $\Pi_{\text{datetime}}(\sigma_{\text{theatre\_name='Time Cinema Ahmedabad CG Road' and movie\_name='Khaali Peeli'}}(\text{movie\_tbl} \bowtie_{(\text{movie\_tbl.movie\_id=show\_tbl.mid})} \text{show\_tbl} \bowtie_{(\text{show\_tbl.sno=screen\_tbl.screen\_no})} \text{screen\_tbl} \bowtie_{(\text{screen\_tbl.tid=theatre\_tbl.theatre\_id})} \text{theatre\_tbl})$



Data Output | Explain | Messages

	datetime timestamp without time zone
1	2020-10-03 08:30:00
2	2020-10-03 20:30:00

5. List all the customers who haven't booked any movie from this system.

- Query:
    - select contact_no from customer_tbl as customer LEFT JOIN booked_tbl as booking on (customer.contact_no=booking.cno) except select cno from booked_tbl;
- Relational algebra:

- $\Pi_{contact\_no}(customer\_tbl \bowtie_{(customer\_tbl.contact\_no=booked\_tbl.cno)} booked\_tbl)$ EXCEPT $\Pi_{cno}(booked\_tbl)$

Data Output | Expla

	contact_no bigint
1	7984221122
2	7741259863
3	9696961235
4	9877441122
5	9909523999
6	9987411458
7	9654123478
8	9874125468
9	7796545899
10	7944124489

6. Show the count of theatres city wise and statewide.

- Query [city wise]
  - select city_name, count(theatre_id) as no_of_theatres from theatre_tbl as th join city_tbl as ct on (th.cid=ct.city_id) group by city_id;
- Relational Algebra:
  - $\Pi_{city\_name,NO\_OF\_THEATRES}(_{city\_id}\mathcal{F}_{count(theatre\_id)\ ->\ NO\_OF\_THEATRES}(theatre\_tbl \bowtie_{(theatre\_tbl.cid=city\_tbl.city\_id)} city\_tbl)$

Data Output | Explain | Messages | Notifications

	city_name character varying (20)	no_of_theatres bigint
1	Mumbai	3
2	Indore	3
3	Kochi	2
4	Udaipur	1
5	Jaipur	1
6	Ahmedabad	5

- Query [state wise]:
    - select state_name,count(theatre_id) as no_of_theatres from theatre_tbl as th join city_tbl as ct on (th.cid=ct.city_id) join state_tbl as s on (ct.sid=s.state_id) group by state_id;
- Relational Algebra:
    - $\Pi_{\text{state\_name,NO\_OF\_THEATRES}}(_{\text{state\_id}}\mathcal{F}_{\text{count(theatre\_id) -> NO\_OF\_THEATRES}}(\text{theatre\_tbl} \bowtie_{\text{(theatre\_tbl.cid=city\_tbl.city\_id)}} \text{city\_tbl} \bowtie_{\text{(city\_tbl.sid=state\_tbl.state\_id)}} \text{state\_tbl})$

Data Output | Explain | Messages | Notifications

	state_name character varying (20)	no_of_theatres bigint
1	Madhya Pradesh	3
2	Maharashtra	3
3	Kerala	2
4	Gujarat	5
5	Rajasthan	2

7. Show the theatre and amount of tickets sold.

- Query:
  - select theatre_name,count(tno) from booked_tbl as b join ticket_tbl as ti on(b.tno=ti.ticket_no) join seat_tbl as s on(ti.sno=s.seat_no) join screen_tbl as sc on(s.sno=sc.screen_no) join theatre_tbl as th on(sc.tid=th.theatre_id) group by th.theatre_id having theatre_name='cinepolis';
- Relational Algebra:
  - $\Pi_{\text{theatre\_name},\mathcal{F}\text{count(tno)}}(\sigma_{\text{(theatre\_name='cinepolis')}}\ \upsilon$ (theatre_id,theatre_name,count(tno)) booked_tbl $\bowtie_{<\text{tno=ticket\_no}>}$ ticket_tbl $\bowtie_{<\text{sno=seat\_no}>}$ seat_tbl $\bowtie_{<\text{sno=screen_no}>}$screen_tbl $\bowtie_{<\text{tid=theatre\_id}>}$ theatre_tbl)

Data Output | Explain | Messages | Notifications

	theatre_name character varying (50)	count bigint
1	Cinepolis	18

8. List all the movies which have rating more than 6.

- Query:
  - SELECT MOVIE_NAME, avg(RATING) FROM REVIEW AS R JOIN MOVIE_TBL AS MO ON(R.MID=MO.MOVIE_ID) GROUP BY MO.MOVIE_ID HAVING AVG(RATING)>6;
- Relational Algebra:
  - $\Pi_{\text{movie\_name},\mathcal{F}\text{avg(rating)}}(\sigma_{\text{(avg(rating)>6)}}\ \upsilon$ (movie_id,movie_name,avg(rating)) review $\bowtie_{<\text{mid=movie\_id}>}$ movie_tbl)

Data Output | Explain | Messages | Notifications

	movie_name character varying (50)	avg numeric
1	Dil Bechara	7.0000000000000000
2	David Attenborough: A Life ...	8.0000000000000000
3	Clash of the Titians	7.0000000000000000
4	The Glorias	7.0000000000000000
5	Human Nature	8.0000000000000000
6	Shakuntala Devi	7.0000000000000000

9. Show the payments received for 'XYZ' movie.(count of online/offline mode or the total amount of the tickets sold).

- Query:
    - select movie_name,sum(amount) from payment_tbl as pa join booked_tbl

as b on(pa.payment_id=b.pid) join ticket_tbl as ti on(b.tno=ti.ticket_no) join show_tbl as s on(ti.sid=s.show_id) join movie_tbl as mo on(s.mid=mo.movie_id) group by mo.movie_id having movie_name='khaali peeli';

- Relational Algebra:
  - $\pi_{\text{movie\_name},\mathcal{F}\text{sum(amount)}}(\sigma_{\text{(movie\_name='khaali peeli')}}\ \upsilon_{\text{(movie\_id,movie\_name,sum(amount))}}$ payment_tbl $\bowtie_{\text{payment\_id=b.pid}}$ booked_tbl $\bowtie_{\text{tno=ticket\_no}}$ ticket_tbl $\bowtie_{\text{sid=show\_id}}$ show_tbl $\bowtie_{\text{mid=movie\_id}}$ movie_tbl)

Data Output | Explain | Messages | Notifications

	movie_name character varying (50)	sum numeric
1	Khaali Peeli	5950.00

10. Show the no. of available seats for 'XYZ' movie.

- Query:
  - select movie_name,count(seat_no) from booked_tbl as b join ticket_tbl as ti on(b.tno=ti.ticket_no) right join seat_tbl as s on(ti.sno=s.seat_no) join screen_tbl as sc on(s.sno=sc.screen_no) join show_tbl as sh on(sh.sno=sc.screen_no) join movie_tbl as mo on(sh.mid=mo.movie_id) where ti.sno is null group by mo.movie_id having movie_name='khaali peeli';

- Relational Algebra:
  - $\pi_{\text{movie\_name},\mathcal{F}\text{count(seat\_no)}}(\sigma_{\text{ti.sno is null and movie\_name='khaali peeli'}})$ $(\rho_{\text{(b,booked\_tbl)}} \bowtie_{\text{b.tno=ti.ticket\_no}} \rho_{\text{(ti,ticket\_tbl)}} \bowtie_{\text{ti.sno=s.seat\_no}} \rho_{\text{(s,screen\_tbl)}} \bowtie_{\text{s.sno=sc.screen\_no}}$

$\rho_{(sc,screen\_tbl)} <_{sh.sno=sc.screen\_no}> \bowtie \rho_{(sh,show\_tbl)} \bowtie <_{sh.mid=mo.movie\_id}> \rho_{(mo, movie\_tbl)})$

Data Output | Explain | Messages | Notifications

	movie_name character varying (50)	count bigint
1	Khaali Peeli	15

11. List movies having at least 3 genres.

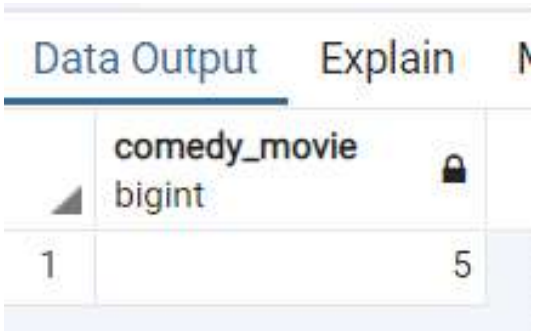
- Query:
  - select movie_name,count(gname) from movie_genre_tbl as mg join movie_tbl as movie on (mg.mid=movie.movie_id) GROUP BY movie.movie_id HAVING COUNT(gname)>2;
- Relational Algebra:
  - $\pi_{movie\_name,\mathcal{F}count(gname)} (\sigma_{COUNT(gname)>2})(\rho_{(mg, movie\_genre\_tbl)} \bowtie <_{mg.mid=movie.movie\_id}> \rho_{(movie,movie\_tbl)})$

Data Output | Explain | Messages | Notifications

	movie_name character varying (50)	count bigint
1	Khuda Haafiz	5
2	Dil Bechara	3
3	The Commuter	3
4	Dolly Kitty Aur Woh Chamakt...	3
5	Raat Akeli Hai	3
6	Lootcase	3
7	Sadak 2	4
8	Khaali Peeli	4
9	Gunjan Saxena: The Kargil Girl	3

12. Count the no. of movies having genre comedy.

- Query:
    - select count(distinct mid) as comedy_movie from movie_genre_tbl where gname = 'Comedy';
- Relational Algebra:
    - $\pi(\rho_{(comedy\_movie,\mathcal{F}(count(distinct\ mid))})(\sigma_{gname = 'Comedy'})($ movie_genre_tbl)



13. List customers who ever watched a movie with genre comedy in theatre xyz.

- Query:
    - select cst.contact_no,cst.customer_name from customer_tbl as cst
      join booked_tbl as bkng on cst.contact_no = bkng.cno
      join ticket_tbl as tkt on bkng.tno = tkt.ticket_no
      join show_tbl as shw on shw.show_id = tkt.sid
      join movie_tbl as mv on shw.mid = mv.movie_id
      join movie_genre_tbl as mv_gnr on mv.movie_id = mv_gnr.mid
      join screen_tbl as scrn on scrn.screen_no = shw.sno
      join theatre_tbl as thtr on thtr.theatre_id = scrn.tid

where mv_gnr.gname = 'Comedy'
and thtr.theatre_name = 'Time Cinema Ahmedabad CG Road';

- Relational Algebra:
  - π cst.contact_no,cst.customer_name(σ mv_gnr.gname = 'Comedy' and thtr.theatre_name = 'Time Cinema Ahmedabad CG Road')(σ(cst,customer_tbl) $\bowtie$< cst.contact_no = bkng.cno>
    σ(bkng,booked_tbl)) $\bowtie$<bkng.tno = tkt.ticket_no> σ(tkt,ticket_tbl) $\bowtie$<shw.show_id = tkt.sid>
    σ (shw,show_tbl) $\bowtie$<shw.mid = mv.movie_id>
    σ (mv,movie_tbl) $\bowtie$<mv_gnr on mv.movie_id = mv_gnr.mid>
    σ (mv_gnr,movie_genre_tbl) $\bowtie$< scrn.screen_no = shw.sno>
    σ (scrn,screen_tbl) $\bowtie$< thtr.theatre_id = scrn.tid> σ(thtr,theatre_tbl))

Data Output | Explain | Messages | Notificati

	contact_no [PK] bigint	customer_name character varying (30)
1	9978353466	Raj Verma
2	7745989896	Jheel Singh

14. List customers who booked a movie xyz, three or more days prior to the first

show of that particular movie.

- Query:
  - select cst.contact_no,cst.customer_name from customer_tbl as cst
    join booked_tbl as bkng on cst.contact_no = bkng.cno
    join ticket_tbl as tkt on bkng.tno = tkt.ticket_no
    join show_tbl as shw on shw.show_id = tkt.sid
    join movie_tbl as mv on shw.mid = mv.movie_id
    where mv.movie_name = 'Khaali Peeli'
    group by
    mv.movie_id,cst.contact_no,cst.customer_name,bkng.booking_time
    having date_part('day',bkng.booking_time-min(shw.datetime)) > 3
    order by mv.movie_id;

- Relational Algebra:

  R1<- $\sigma_{\text{movie\_name='Khaali Peeli'}}$(movie_tbl $\bowtie_{\text{movie\_tbl.movie\_id=show\_tbl.mid}}$ show_tbl $\bowtie_{\text{show\_tbl.show\_id=ticket\_tbl.sid}}$ ticket_tbl $\bowtie_{\text{ticket\_tbl.ticket\_no=booked\_tbl.tno}}$ booked_tbl $\bowtie_{\text{booked\_tbl.cno=customer\_tbl.contact\_no}}$ customer)

  Result <- $\pi_{\text{contact\_no, customer\_name}}$ (movie_tbl.movie_id,customer_tbl.contact_no,customer_tbl.name ,booked_tbl.bookingtime$\mathcal{F}_{\text{(booked_tbl.booking_time- MIN(show_tbl.datetime))>3}}$ (R1)

Data Output | Explain | Messages | Notifica

	contact_no [PK] bigint	customer_name character varying (30)
1	7574986541	Lavina Agarwal
2	9641223547	Anushka Pania
3	9725339725	Virat Kohli
4	9825293153	Meenakshi Menon

15. **List of customers who booked more than 1 ticket for movie xyz.**

- Query:
  - select customer_name, count(tno) from customer_tbl as cu join booked_tbl as b on(cu.contact_no=b.cno) join ticket_tbl as ti on(b.tno=ti.ticket_no) join show_tbl as s on(ti.sid=s.show_id) join movie_tbl as mo on(s.mid=mo.movie_id) where movie_name='khaali peeli' group by cu.customer_name having count(tno)>1;
- Relational Algebra:
  - R1<- $\sigma_{\text{movie\_name='Khaali Peeli'}}$(movie_tbl $\bowtie_{\text{movie\_tbl.movie\_id=show\_tbl.mid}}$ show_tbl $\bowtie_{\text{show\_tbl.show\_id=ticket\_tbl.sid}}$ ticket_tbl $\bowtie_{\text{ticket\_tbl.ticket\_no=booked\_tbl.tno}}$ booked_tbl $\bowtie_{\text{booked\_tbl.cno=customer\_tbl.contact\_no}}$ customer)

    Result<- π (customer_name,count(customer_name$\mathcal{F}$count(tno)>1(R1))

Data Output | Explain | Messages | Notifications

	customer_name character varying (30)	count bigint
1	Anushka Pania	3
2	Bhuveneshwar Kumar	2
3	Jasprit Bumrah	2
4	Lavina Agarwal	2
5	Meenakshi Menon	2
6	Raj Verma	2

16. List all the theatre names which appear in all states.

- Query:
    - select theatre_name from theatre_tbl
      except
      select theatre_name from
      (

select t.theatre_name,s.state_id from state_tbl as s cross join theatre_tbl as t
Except
select tt.theatre_name,cty.sid from theatre_tbl as tt join city_tbl as cty on cty.city_id = tt.cid) as r

- Relational Algebra:
  - $\pi_{\text{show\_id ,datetime}, \mathcal{F}\text{count(ticket\_no)}} (\sigma_{\text{(movie\_name='Khaali Peeli' AND theatre\_name='Cinepolis' AND date(datetime)='2020-10-03'}})(\text{show\_tbl} \bowtie_{<\text{mid=movie\_id}>} \text{movie\_tbl} \bowtie_{<\text{screen\_no=sno}>} \text{screen\_tbl} \bowtie_{<\text{theatre\_id=tid}>} \text{theatre\_tbl} \bowtie_{<\text{sid=show\_id}>} \text{ticket\_tbl}))$

    r1 <- $\pi_{\text{theatre\_name,state\_id}}$(state_tbl X theatre_tbl)
    r2 <- r1 – $\pi_{\text{theatre\_name,state\_id}}$(theatre_tbl $\bowtie_{<\text{cid= city_id}>}$city_tbl)
    r2x <- $\pi_{\text{theatre\_name}}$(r2)
    r3 <- $\pi_{\text{theatre\_name}}$(theatre_tbl) – r2x

17. Show the number of tickets sold for all the show of "Khaali Peeli" movie in 'Cinepolis' for date '2020-10-03'. (Group by and count Function)

- Query:
  - select show_id,datetime,count(ticket_no) from show_tbl as s join movie_tbl as movie on(s.mid=movie.movie_id)
    join screen_tbl as screen on (screen.screen_no=s.sno) join theatre_tbl as th

```
on (th.theatre_id=screen.tid)
join ticket_tbl as ticket on (ticket.sid=s.show_id) where
movie.movie_name='Khaali Peeli' and theatre_name='Cinepolis'
and date(datetime)='2020-10-03'
GROUP BY(show_id)
```

- Relational Algebra:
  - π show_id ,datetime, $\mathcal{F}$count(ticket_no) (σ(movie_name='Khaali Peeli' AND theatre_name='Cinepolis' AND date(datetime)='2020-10-03')(show_tbl $\bowtie$ $<_{mid=movie\_id}>$ movie_tbl $\bowtie$ $<_{screen\_no=sno}>$ screen_tbl $\bowtie$ $<_{theatre\_id=tid}>$ theatre_tbl $\bowtie$ $<_{sid=show\_id}>$ ticket_tbl))

Data Output | Explain | Messages | Notifications

	show_id [PK] integer	datetime timestamp without time zone	cou big
1	1	2020-10-03 10:00:00	

18. Find the names of Movies starting with ('Kh') and in which theater they are premiering in Ahmedabad City. (Search Filter)

- Query:
  -
```
select th.theatre_name,mov.movie_name from show_tbl as s join
movie_tbl as mov on (mov.movie_id=s.mid) join screen_tbl as sc
on(sc.screen_no=s.sno)
join theatre_tbl as th on(th.theatre_id=sc.tid) join city_tbl as city on
(th.cid=city.city_id) where city.city_name='Ahmedabad'
and mov.movie_name like 'Kh%'
```

- Relational Algebra:
    - π theatre_name, movie_name ($\sigma_{(city\_name='Ahmedabad' \text{ AND } movie\_name \text{ like } 'Kh\%')}$(show_tbl $\bowtie_{<movie\_id=mid>}$ movie_tbl $\bowtie_{<screen\_no=sno>}$ screen_tbl $\bowtie_{<theatre\_id=tid>}$ theatre_tbl $\bowtie_{<cid=city\_id>}$ city_tbl)

Data Output | Explain | Messages | Notifications

	theatre_name character varying (50)	movie_name character varying (50)
1	Carnival Cinemas	Khuda Haafiz
2	Cinepolis	Khaali Peeli
3	PVR	Khuda Haafiz
4	Time Cinema Ahmedabad C...	Khaali Peeli

19. Names of cities which have more than 2 theatres

- Query:
    - SELECT city_name,COUNT(theatre_id) FROM theatre_tbl AS tb JOIN city_tbl AS ct ON (tb.cid=ct.city_id) GROUP BY city_id HAVING count(THEATRE_ID)>2;

- Relational Algebra:
    - $\pi_{\text{city\_name,count}}$ (city_name $\mathcal{F}$ COUNT(theatre_id)>2 (theatre_name $\bowtie_{\text{<cid=city\_id>}}$ city_tbl)

Data Output | Explain | Messages | Notifications

	city_name character varying (20)	count bigint
1	Mumbai	3
2	Indore	3
3	Ahmedabad	5

20. List the names of the movie whose release date is 10/01/2020 and number of people who have already booked their tickets.

- Query:
    - SELECT movie_name,release_date,count(tno) FROM booked_tbl AS bt JOIN ticket_tbl AS tt ON (bt.tno=tt.ticket_no) JOIN seat_tbl AS st ON (tt.sno=st.seat_no) JOIN screen_tbl AS sc ON (st.sno=sc.screen_no) JOIN theatre_tbl as tb ON sc.tid=tb.theatre_id JOIN show_tbl as s ON (sc.screen_no=s.sno) JOIN movie_tbl as mt ON (s.mid=mt.movie_id) GROUP BY mt.movie_id HAVING release_date='01-Oct-2020';

- Relational Algebra:

- $\pi_{\text{movie\_name,release\_date,}\mathcal{F}\text{count(tno)}}(\ \sigma_{\text{(release\_date='01-Oct-2020')}})$ (booked_tbl $\bowtie_{\text{tno=ticket\_no}}$ ticket_tbl $\bowtie_{\text{sno=seat\_no}}$ seat_tbl $\bowtie_{\text{sno=screen\_no}}$ screen_tbl $\bowtie_{\text{tid=theatre\_id}}$ theatre_tbl $_{\text{screen\_no=sno}}\bowtie$ show_tbl $_{\text{mid=movie\_id}}\bowtie$ movie_tbl)

Data Output | Explain | Messages | Notifications

	movie_name character varying (50)	release_date date	count bigint
1	Khaali Peeli	2020-10-01	8