

NAME : HARIKRISHNA N

SRN: PES1UG21CS217

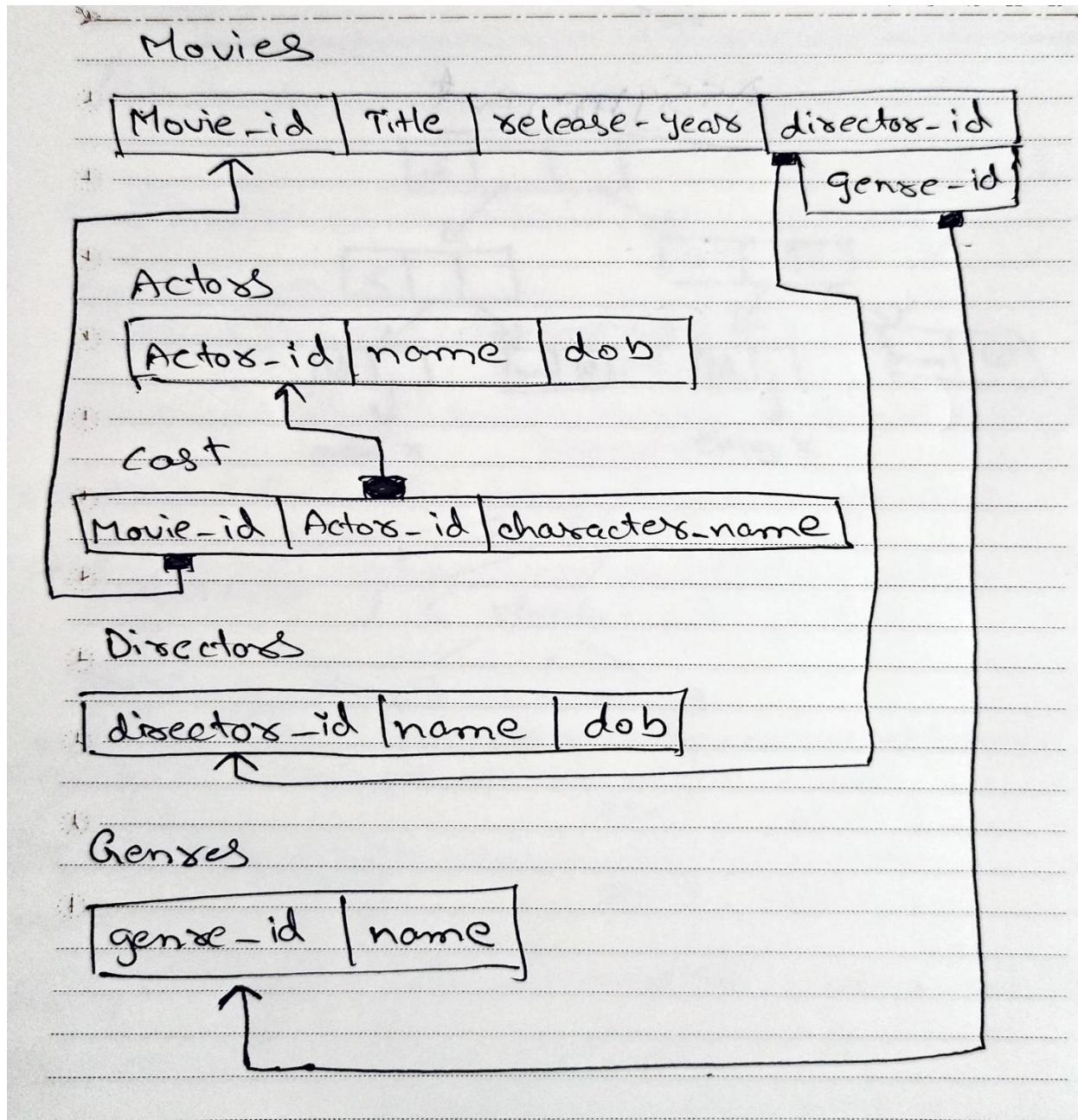
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SUB: DATABASE TECHNOLOGIES

ASSIGNMENT - 1

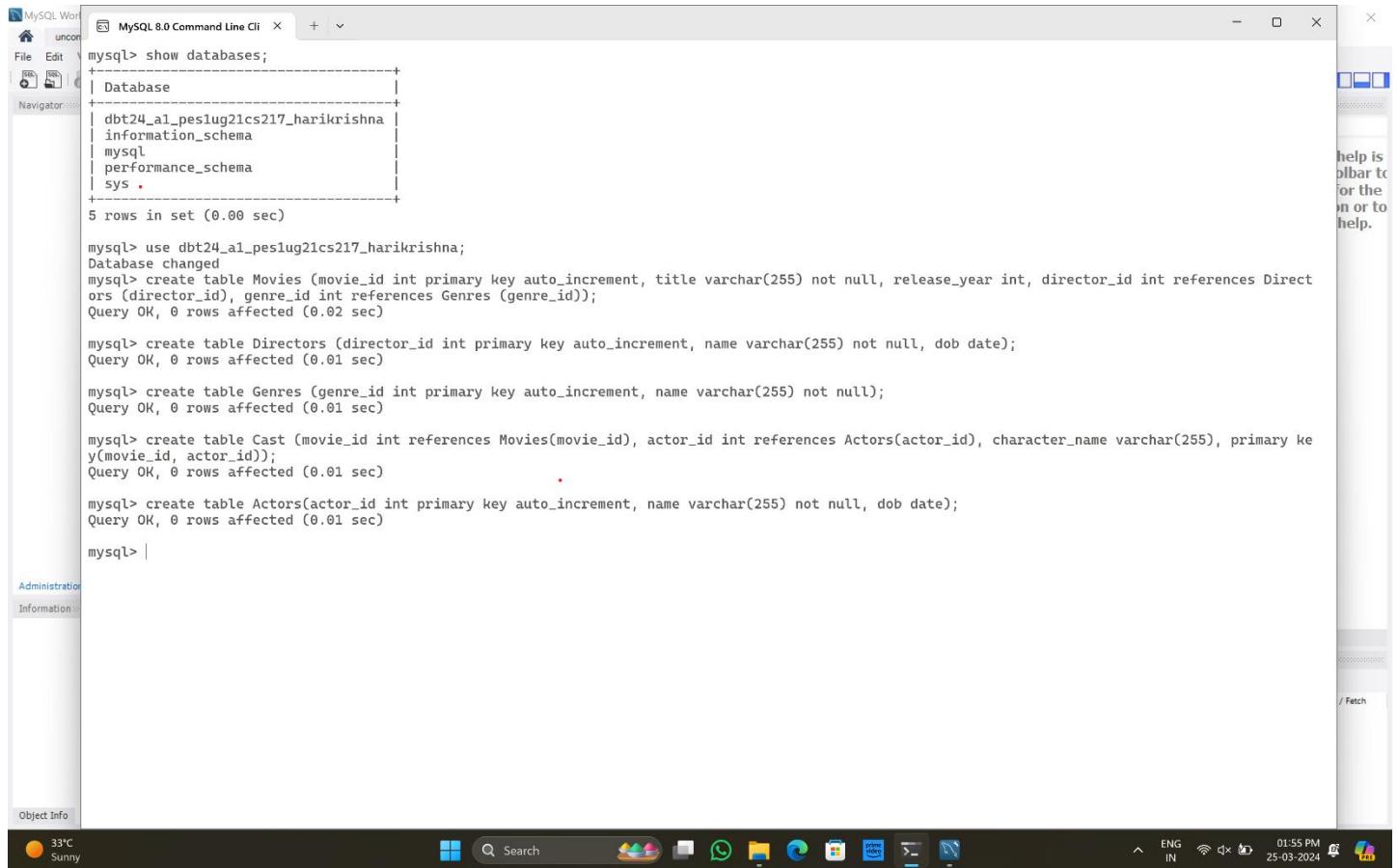
(a) Database Preparation: -

Relational schema: schema with 5 tables, with 4 relations.



Database creation: creating the database as

'dbt24_a1_pes1ug21cs217_Harikrishna'.



The screenshot shows a MySQL Workbench interface with a command-line window. The user has run the command `show databases;` which lists the database `dbt24_a1_pes1ug21cs217_harikrishna` among others. The user then switches to this database with `use dbt24_a1_pes1ug21cs217_harikrishna;` and creates several tables: `Movies`, `Directors`, `Genres`, `Cast`, and `Actors`. Each table creation includes primary key definitions and foreign key references to other tables like `Genres` and `Actors`.

```
mysql> show databases;
+--------------------+
| Database           |
+--------------------+
| dbt24_a1_pes1ug21cs217_harikrishna |
| information_schema |
| mysql              |
| performance_schema |
| sys               |
+--------------------+
5 rows in set (0.00 sec)

mysql> use dbt24_a1_pes1ug21cs217_harikrishna;
Database changed
mysql> create table Movies (movie_id int primary key auto_increment, title varchar(255) not null, release_year int, director_id int references Directors (director_id), genre_id int references Genres (genre_id));
Query OK, 0 rows affected (0.02 sec)

mysql> create table Directors (director_id int primary key auto_increment, name varchar(255) not null, dob date);
Query OK, 0 rows affected (0.01 sec)

mysql> create table Genres (genre_id int primary key auto_increment, name varchar(255) not null);
Query OK, 0 rows affected (0.01 sec)

mysql> create table Cast (movie_id int references Movies(movie_id), actor_id int references Actors(actor_id), character_name varchar(255), primary key(movie_id, actor_id));
Query OK, 0 rows affected (0.01 sec)

mysql> create table Actors(actor_id int primary key auto_increment, name varchar(255) not null, dob date);
Query OK, 0 rows affected (0.01 sec)

mysql> |
```

Tables creation: creating 5 tables namely movies, directors, genres, cast and actors.

```

mysql> select * from Movies;
Empty set (0.00 sec)

mysql> ^C
mysql> select * from Movies;
+-----+-----+-----+-----+
| movie_id | title | release_year | director_id | genre_id |
+-----+-----+-----+-----+
| 1 | dbtdybcmgbkbebvjrsbyhmbnijlegtitrrfymqcthjzwydamj | 2021 | 89 | 5 |
| 2 | qrjamrkfgaxdmstcptwtcgrvwnncbqgboyzzhdenvcbxrykaeh | 2017 | 54 | 4 |
| 3 | iokdtgvqvoetrlzfearaucatjyupkumkrhohpivgdnlvyqaeb | 2007 | 50 | 4 |
| 4 | gbcrcdiuyhrhaamwvegcurjkqgimbjejqzujavazourisdnuzj | 2015 | 77 | 5 |
| 5 | tbnxapnsrlgrkiolztiqamssxlrtrvxrwdctqmwrhwknseii | 1996 | 22 | 4 |
| 6 | tvhaavdppevwzepovxpohfjfpgkqemulbuskycfmainzkktxxo | 2012 | 94 | 3 |
| 7 | ceaaavnrdhnmvqkqzlpnkbezxkiipmwwcdzearyfutufkleobei | 2017 | 28 | 5 |
| 8 | oynphvisdhbjaflxosfzonxtntekyddenzkelatthjbuwowrj | 2002 | 40 | 2 |
| 9 | hhjrwccnftcssvpfkflxmpivkjgyujylowkbhytzfvuficzgfp | 1993 | 67 | 3 |
| 10 | epfejbiwaiuqhsrhzdzoosvrzvcyngpxfceldvdvqrqaiawq | 1999 | 96 | 2 |
| 11 | nrzymmkjyymmmzeceqtxtdptyvqolblmibxoupzdaeusmrddgfk | 2015 | 98 | 5 |
| 12 | fddzahleiuhakeffgysohfohdwsezqvkgaxoyhxgamkzyfhme | 2023 | 26 | 2 |
| 13 | dpmgaxadyueiuhuzomtjqkkvwccfymphvjunivaiiikbrpwxt | 1999 | 3 | 4 |
| 14 | hijmcqwnppkyuozojjmmlugknfxrljixifuwtecelferncldre | 2019 | 52 | 1 |
| 15 | rzfhxflazkjqhhypatztuunwrgjigawkmpitxiqiensijsctde | 1993 | 35 | 4 |
| 16 | churtqzfsejhugajvonirnuzajpjqqwqzryxzrokdrufixeqv | 2015 | 17 | 1 |
| 17 | neyqycjvjonumvksncgjwnmsdcswvhmukxhcoufjoxfwesdr | 2002 | 88 | 5 |
| 18 | wuryimpfrpfbhqbpgwtpkbbkdxjalwahseesgxnatytwebvfv | 2022 | 89 | 1 |
| 19 | glptmiphxycllhfqohotqzxmongrmlvnychpikkvlkusqniyq | 2015 | 2 | 5 |
| 20 | kruhuubyvkrbczonzcvrcryeveqrokevkwwydyoyxlogqqqrhh | 1994 | 80 | 3 |
| 21 | zcmpugfppqgfuxekihxigvxlbzjqdbqbdgezcasvegqxwcz | 1995 | 82 | 5 |
| 22 | hmrdweviuhkibdnhdquhowzgouxauqdjjzdrscggddhkyllpn | 1990 | 8 | 5 |
| 23 | srnmesomakimpqvvnhyybbnfxnqvcgylwxncfmrmtanrorsqn | 1993 | 11 | 2 |
| 24 | ygmjkryjuxdhsutwyrvpobycdrsp1qnahnbaejprsnwbrzla | 1992 | 52 | 5 |
| 25 | gpmapllybnmititlwjijgfjizizr qxvqfzlzthwvwvwytyjerhym | 1996 | 28 | 5 |
| 26 | rccytnqblqppfgsiybjkheudlgjvxyxnqlwhdvbwoxnpyzjngj | 1997 | 48 | 3 |
| 27 | zriihkjihxdnywlccszkkhpcelmrtnjolmlmjgndubdfshizwhlp | 2017 | 67 | 5 |
+-----+-----+-----+-----+

```

2 items | 1

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Windows Search Bar

Icons: File, Home, Task View, Start, Taskbar Icons (including Microsoft Edge, File Explorer, Task Manager, etc.)

System Tray: ENG IN, WiFi, Battery, Date/Time (01:58 PM, 25-03-2024)

Next, populating the database with 10,000+ entries in movies and actors tables, other tables with decent number of rows using **code.py** program, which generates random strings, dob, years, values and put it in the tables, where first the directors table is filled with 100 rows, then 5 genres are added to genres table, then 10000 actors filled in actors table, then 10000 movies to moves table, then based on the 4 tables data the cast table is filled where it reached to 19,974.

(b) Queries Creation and Performance Measurement: -

Execute "SELECT *" queries on all tables to display data and count the rows:

```
4.p MySQL 8.0 Command Line Cli + ▾
mysql> select count(*) from Movies;
+-----+
| count(*) |
+-----+
| 10000 |
+-----+
1 row in set (0.01 sec)

mysql> select * from Actors;
+----+----+----+
| actor_id | name | dob |
+----+----+----+
| 1 | PES1UG21CS217 Harikrishna | 2003-09-09 |
| 2 | efvhwdwyvbcgkluosgkz | 1992-02-13 |
| 3 | uyjtspbxhduetwoogoluj | 1996-08-15 |
| 4 | mdhlthtsxjtlncjpjh | 1960-04-02 |
| 5 | zsqwuujlrlptaltxcqfw | 1995-11-27 |
| 6 | xokkxvlazjftxcqhrmk | 2003-05-27 |
| 7 | enrcreiblakvdhmuiscel | 1979-08-04 |
| 8 | pixxvmrxgcmidslsmy | 1978-01-16 |
| 9 | zsjrharrrqpuaiawattq | 1998-01-21 |
| 10 | fhkoyizgixygonluhouc | 1989-02-02 |
| 11 | bilqlskinypceounjhlp | 1990-07-17 |
| 12 | cdcsgjnwnwrrntocdchhg | 1961-12-19 |
| 13 | mayrkknndfltcmvqqsfv | 1975-02-24 |
| 14 | yuocfpixksyeqnegarugm | 1986-09-18 |
| 15 | ddbymwhuslxnlnlamtzksz | 2001-07-20 |
| 16 | oyypyjcaqdhhgqazkqpww | 1966-09-27 |
| 17 | ncunudfossbjdfiamchio | 2003-01-24 |
| 18 | rjxcnxeornzlorsoe lr | 1994-04-15 |
| 19 | chpanvjepfucbplkuju | 1967-06-26 |
| 20 | zvwxweoyybbkkqtllghi | 1983-12-25 |
| 21 | ahldjsiwkedqmuhjmqtad | 1999-03-23 |
| 22 | egtrmfnnvisikggbjngtz | 1991-02-18 |
| 23 | klxeyxacgawkcxvuljhz | 1987-03-15 |
| 24 | ycnajlxaoqacvpfjnk | 1969-05-20 |
| 25 | usenvjxiismsejlgskncn | 1990-11-11 |
| 26 | joixytccentyafibphof | 1969-09-08 |
| 27 | gvhmexyuztpppxsriha | 1978-02-11 |
| 28 | bhacpligplojpcnexibd | 1996-08-09 |
| 29 | ejywuzaxfytsczaykbki | 1998-03-02 |
| 30 | mbvgsgsgcwioezfjsyi | 1969-10-09 |
| 31 | vlpebjdwnukwkeuerhyo | 2005-04-21 |
+----+----+----+
31 rows in set (0.00 sec)
```

5.p MySQL 8.0 Command Line Cli +

```
0001 rows in set (0.00mysql> select count(*) from Actors;
+-----+
| count(*) |
+-----+
| 10001 |
+-----+
1 row in set (0.00 sec)

mysql> select * from Directors;
+-----+-----+-----+
| director_id | name | dob |
+-----+-----+-----+
| 1 | nddxodrqghpxashhkhyk | 1993-06-18 |
| 2 | avlnqzycsugxvhptbdjt | 2000-06-04 |
| 3 | oyuoibnrzbghpinuphrfj | 1959-06-06 |
| 4 | ouwfehwljmdrstjgxfbr | 1981-11-05 |
| 5 | ktdstixbpLngnbvmofwz | 1974-05-27 |
| 6 | agdversvncaqlkfjzcwf | 1983-02-17 |
| 7 | qvbuijksgvlcifduhlex | 1983-09-11 |
| 8 | jtxbijyphveeqccioir | 1968-12-03 |
| 9 | kpmimjrdvjesqgybsncp | 1964-06-16 |
| 10 | xuakwrdfvyspcpzfeihj | 1965-04-16 |
| 11 | snbuccqsmjzbkjfegoei | 1961-09-14 |
| 12 | tggtstjwwuirkomomqlk | 1979-10-26 |
| 13 | zyqxrarxezdaxmijstyr | 1958-05-18 |
| 14 | enpywwishyzzkphuygcc | 1953-04-14 |
| 15 | bboawoejslsjsgxpqgly | 1940-12-22 |
| 16 | jkhqulluffpvnvfpxvccy | 1967-11-14 |
| 17 | agwpiagydgtfequddprw | 1997-11-06 |
| 18 | xzjzqbjaapmcqgjipwdz | 1971-10-13 |
| 19 | jzgxtzkzfjhvcxtshngr | 1994-07-02 |
| 20 | wtigrroteeupacqzacoc | 1962-09-06 |
| 21 | fuhlpbovidqvgbymmwvtc | 1959-05-23 |
| 22 | feefgrewcujmzmlztxdp | 1972-07-08 |
| 23 | ltpbyjchximvajtgipst | 1955-02-11 |
| 24 | valmkpkcjalupddqttky | 2000-09-19 |
| 25 | snnkihumpwraemgcwv | 1974-02-04 |
| 26 | rzjobgdldbnchmikspah | 2000-04-10 |
| 27 | qcuuujtyvunagekwviaa | 1987-09-25 |
| 28 | zrljogloflNpncdnhpff | 1949-11-25 |
| 29 | likdykcnqikqqaontdtw | 1942-02-10 |
| 30 | tqodguxenoheceqczdtw | 1975-04-06 |
+-----+
```

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```
7.p MySQL 8.0 Command Line Cli + v
+-----+
| 100 | ghptgnmodiqwkoqxxtfy | 1967-03-28 |
+-----+
100 rows in set (0.00 sec)

mysql> ^C
mysql> select count(*) from Directors;
+-----+
| count(*) |
+-----+
| 100 |
+-----+
1 row in set (0.00 sec)

mysql> select * from Genres;
+-----+
| genre_id | name   |
+-----+
| 1        | Action  |
| 2        | Comedy  |
| 3        | Drama   |
| 4        | Thriller|
| 5        | Sci-Fi |
+-----+
5 rows in set (0.00 sec)

mysql> select count(*) from genres;
ERROR 1146 (42S02): Table 'dbt24_a1_peslug21cs217_harikrishna.generes' doesn't exist
mysql> select count(*) from genres;
+-----+
| count(*) |
+-----+
| 5 |
+-----+
1 row in set (0.00 sec)

mysql> select * from Cast;
+-----+
| movie_id | actor_id | character_name   |
+-----+
| 1         | 1162    | kttsvsgthambzllnfle |
| 1         | 9486    | bpvivlxdijbfrmocrtuu |
| 2         | 2418    | awbkctbftohdpjzhkpiz |
| 2         | 4548    | rulrojvxjgbmxtbelzhy |
| 2         | 5125    | tndamvxznxlsknwpnnvc |
+-----+
```

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```

MySQL 8.0 Command Line Cli 7.p MySQL 8.0 Command Line Cli + v - □ ×

| 77 | 1554 | xuojlzttauzkqfxhmforq |
| 78 | 4783 | ielaxmaznfpqyuuthffg |
| 79 | 4297 | fgozaclajsbaiewaoaqkj |
| 79 | 7675 | mnibtirejaivnifiktxts |
| 80 | 3649 | sbonfxcyjhjvhqfqctg |
| 80 | 4340 | fyrrvjsjyxtdthqbdfiq |
| 80 | 6383 | gggzvydihwagoduvlbsi |
| 81 | 1893 | zfewrbnjmnygvaarccs |
| 81 | 3470 | itzkagjkwlwszohdapeyq |
| 81 | 8471 | xihumsumlcixlaiytbmr |
| 82 | 2583 | ueyejfwszokacanijfy |
| 83 | 6709 | wemvzmlmcdxtyjqnwmxs |
| 83 | 9699 | oclgdapsqykxkwlpdtsm |
| 84 | 2143 | evjncwiilljlogbpozig |
| 84 | 3816 | hqkfahtnderjbvfqatnme |
| 84 | 7767 | zLwhmhaiplviplmuiss |
| 85 | 2040 | vuuxjrebsnrxgpikllnib |
| 86 | 1949 | csxtlsehbqgzdtfxgrrod |
| 86 | 5171 | vyfuojqphgdmkqzhoeih |
| 87 | 130 | nldphejtllvlglyudlwq |
| 87 | 7339 | mstrzegovgqxepnrmufh |
| 88 | 4668 | opfgajdxfaqhhuomvvvh |
| 89 | 4224 | pgshrdnoxcxamajvizcje |
| 90 | 2062 | nuzlckvdldudxzwfzrpq |
| 90 | 5124 | clbsvzlypluxydxrqdcv |
| 90 | 7961 | nakjahcwsmfxphrefugq |
| 91 | 7463 | wsgecosdsgizvuayzkn |
| 92 | 1577 | dkauakcrolhddoscwsjmd |
| 92 | 4574 | jtvrzrjinqeemuwrizsu |
| 93 | 2076 | vjhbwcrcrimxlnwrzwsdy |
| 93 | 9350 | nxgrtyvgrwzpcqeuzmey |
| 94 | ^ 2991 | adfupnrgmlljfledcijc |

20109 rows in set (0.01 sec)

mysql> select count(*) from Cast;
+-----+
| count(*) |
+-----+
| 20109 |
+-----+
1 row in set (0.00 sec)

mysql> |
```

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Index scan example 1 using ix_mov_gen for faster query processing: It took 0.01 sec for execution

MySQL Workbench

MySQL 8.0 Command Line Cli

```
mysql> create index idx_mov_gen on movies(genre_id);
Query OK, 0 rows affected (0.06 sec)
Records: 0 Duplicates: 0 Warnings: 0

mysql> select * from movies where genre_id=2;
+-----+-----+-----+-----+
| movie_id | title | release_year | director_id | genre_id |
+-----+-----+-----+-----+
| 8       | oyvpwhisdbjafxllosfzonzxtwtekyddenzkelatthjbuuwoj | 2002 | 40 | 2
| 10      | eppfebjiwaiuqhsrhrdzoeosvrzvcympgfcclwdvkrqaiawq | 1999 | 96 | 2
| 12      | fddzahleiuuhmehybbnffgysohfodwsezqvgkaxoyhxgankzyfhme | 2023 | 26 | 2
| 23      | srmnsmakimpqvmhelybbnfxnqsgcylwxncfmrmtnarorsqn | 1993 | 11 | 2
| 35      | ftacldhrfpwuqgxoktlyjggfjmbsqlbyamodepktxzaeicjc | 1998 | 79 | 2
| 39      | vjzvrtbysblyaqqlmvrribitszvvrqdsflbszivtskschlv | 2014 | 14 | 2
| 47      | qchgzqaqnoycedeekzxunxrusdamohvmlshqbzdofwyuqktlwgb | 2015 | 90 | 2
| 53      | irksiztgyhuemvjbwcwfcnlmzuxpefbircjsolrkfvsrdcha | 2010 | 14 | 2
| 60      | fgccusfkzjyngljeeyhlrtljouquhnsqwuhjotukwndeucyjgf | 1997 | 98 | 2
| 68      | bgozbmdmsynrkjtcyjqweztzsbsupoztuijykgpcibczvgti | 2011 | 7 | 2
| 75      | rnxjzrwoyxzrbzljyqalueiosuanxzcsjzlspehrrouicd | 1993 | 45 | 2
| 77      | kvjzlausvfxndlslasapqaxhpqzulnhfjktevdvxabsqmclieu | 2022 | 62 | 2
| 81      | otrqwfmdyokslfprxgqfzqygcckbxrwyqtdbuixquscsmlamjyu | 2009 | 84 | 2
| 86      | pbjfoclqjcuqzijgtnpobhctbwtjcyprxtuxnbacurpmtdh | 2016 | 66 | 2
| 89      | kpozxgmigvzcwbtgnzjhmruqenxndsohyzrqrqepgwpxwhu | 1996 | 61 | 2
| 96      | ogjimeigrvasqmwqonjjzwzegwhoxbtqyxdmdnasdyflept | 1997 | 75 | 2
| 100     | xmrtphexodckpsezwugjideptxbollwgkevntgonlnwgfoopd | 1992 | 33 | 2
| 101     | eajhelptbsomzreflkfeewmogikirvwnpvccipomfyusxytw | 1995 | 6 | 2
| 105     | zxlejwxtugepibhbiopqggaxxfklferbdpvvhfqcicuzjazpr | 1999 | 85 | 2
| 106     | afkpnkmlozlyyqxlclwbrbyolptkkkgfnzqgxgqyhfocksoddrp | 2009 | 9 | 2
| 107     | tfxxpqnsftidsbeaicbtrojijjjallxswijwwgijzhyymcvtni | 2016 | 86 | 2
| 110     | phsdugmxzqvrykqanjtluopvuuiejupecmxrlrgurtmrifj | 2002 | 68 | 2
| 114     | lkakslmgmsgarjrxlrcwyrqgocujtqmyjcwnehnmuwyxtqblu | 2010 | 58 | 2
| 119     | jhktdimstowrzhlkhmjdtitiwevcvaqlbfyarfxfkllnqscoli | 2016 | 70 | 2
| 121     | iwlvojqtipnkvzeqrntocjlpbmavayrpgglabatoxywnwgze | 1992 | 27 | 2
| 140     | rsqxmtdgqowuoxzlmntyfamprvtnldfomtdfbvkccnuwbfj | 2013 | 21 | 2
| 156     | xqhtebbaduzvjmnapyptswcxycumofhyokhfdpnmzfjtbudnx | 1998 | 69 | 2
| 161     | bpvllfvcdccfculgfcydeeesjifkbguyofpsampkbpfcuxyue | 1998 | 99 | 2
| 163     | hewmdiylkuumrtfyjzjxrccrttgfwssukhafnxunkuyezhkhgnj | 2020 | 83 | 2
| 165     | nuauwlpfcfcjbpuficmuryrbqlfwssrkwbzbepxhuhpyweanfm | 2001 | 3 | 2
| 177     | ucegakdesdemlrcmkemvvcyvbtakfgcozojaxxeiasktbxkllpq | 1998 | 2 | 2
| 180     | bsszekgibowlxtjttapegdibgmwwlizjscffetrxynlrczpfcr | 2003 | 60 | 2
| 181     | rmouuvvzyxmriisckggzbhfmqjuhpvcuzgcqayviwykryatagwh | 2005 | 30 | 2
| 182     | lghyysrbefdehqwjbnntomctddxduffvoyssemvwivxrtpr | 2020 | 34 | 2
| 190     | nwwcdmsqjucbnmphegivjlykpbeejjmomobvtrtohbjjjwpw | 1996 | 41 | 2

```

Object Info

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Search

File Edit Navigator Administration Information Object Info Help

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Index scan example 2 using ix_mov_year for faster query processing:
 It took 0.00 sec for execution

```

ind MySQL 8.0 Command Line Cli + -
mysql> create index ix_mov_year_on on movies(release_year);
Query OK, 0 rows affected (0.05 sec)
Records: 0 Duplicates: 0 Warnings: 0

mysql> select count(*) from movies where release_year=2000;
+-----+
| count(*) |
+-----+
| 282 |
+-----+
1 row in set (0.00 sec)

mysql> select * from movies where release_year=2000;
+-----+-----+-----+-----+
| movie_id | title | release_year | director_id | genre_id |
+-----+-----+-----+-----+
| 38 | svbjieIfgcrzfouxfdehflybyhewkqdoggfpqaojwdawasc | 2000 | 73 | 4 |
| 69 | mzhsvyxxkszsmbhhwqmmsskgcxzkgzhukpcncgdyelxrbbrv | 2000 | 53 | 3 |
| 95 | kquezrtbrntwgnfkzbmnhxrrzkkpaqlcjtibazvfmobs | 2000 | 78 | 1 |
| 118 | jpddiwoucxdhzygcmywootvoazuwzqdlzgwtshgsiludsfcn | 2000 | 34 | 1 |
| 198 | prntecutcxghmvegozvqfjbaezchvpujaekyvgzbalxhvppay | 2000 | 62 | 2 |
| 200 | daeeszjiijqtxexcdqldugzphfhkmbrqiqirfydfhfiikmzheux | 2000 | 84 | 4 |
| 202 | ycxweakewhpevpgwdyqcdffwpxmopgdhtqyeutcpsswicqb | 2000 | 34 | 5 |
| 229 | qnlurvpdradkvmrnbniefnggcqkhbupwhudvnazluyhmzpkme | 2000 | 7 | 4 |
| 236 | ubhhuyqsohdkntdvlscicycedndgxjwutgpprejbugirniste | 2000 | 44 | 1 |
| 243 | ofoodldotrdyfpkxurhqtjmsrzkfptoktdguzakrohixir | 2000 | 30 | 5 |
| 270 | gurwdxckiyqegwlxzcbmefpzgixhcmgbwcvfxdiqzboyxb | 2000 | 76 | 1 |
| 273 | yhnfiipqikwllqoqgrnpnyebnwrcztbdufcwbpwdmhfgjhz | 2000 | 9 | 2 |
| 296 | dlbbhwbnrjbjktzhdoxhnmmdmcgvkydeiewdpccgwlsiwdonanzdb | 2000 | 71 | 1 |
| 300 | tqcuqjnissxjcbseyewoqobwnzphrljhrsmdgnzajbumyhcxxvvc | 2000 | 66 | 3 |
| 306 | rdmrxsadmvqbdvrcrymqnctzsxjggcoeyxjeftqywiotd | 2000 | 52 | 5 |
| 543 | wnyrcmcznblouzyibwbbomqvyketwdagdonzfspmsLykgky | 2000 | 33 | 1 |
| 556 | onfrurswgybautasoejjosqglwnkhryiilqefiudktvfnvzfxd | 2000 | 74 | 3 |
| 587 | attyrlphqddfwmzfnketcmtmuclclqgwjyouhpjzoghdpuvrffp | 2000 | 88 | 1 |
| 631 | adopwkswvtmrjzlsrgcqswpcwxfpdftkctomfwlllijomkjiga | 2000 | 66 | 1 |
| 633 | fekhljtjvgzinscqvomxidmuuaeipqhexnwbxjikmksxmyjmfy | 2000 | 78 | 5 |
| 668 | eivbdvmtghdqjuxmrhqlrzavgdqzzhvyqbzboscenpcdqbu1 | 2000 | 49 | 1 |
| 704 | hwditweelwmpbdnopoziqgxceyyuaauazhbhmfllwomhtjidaq | 2000 | 79 | 1 |
| 728 | htwtcuplmeushihwtdzxkswwepucrsmitenenvhxwmdhhabynf | 2000 | 95 | 3 |
| 749 | adwfauatbfmjaheremnoesshprarswrtxrhcyfokrdsgeqetc | 2000 | 13 | 4 |
| 822 | rzaapzqvvdffrxropiigbxigdbgprukwgvxwuqafchrvrzohq | 2000 | 93 | 3 |
| 839 | fqmstsvzexoznkfqqaingugsmeffgeptrofysyhspkxidxnrud | 2000 | 17 | 3 |
| 859 | skbpgnqgrfcyiqvibocsxidgapzmpmtjghmkwpwimvjwqyevq | 2000 | 8 | 3 |
+-----+-----+-----+-----+

```

Table scan example 1:

```
MySQL 8.0 Command Line Cli + x
mysql> select * from movies where release_year>2005;
+-----+-----+-----+-----+
| movie_id | title | release_year | director_id | genre_id |
+-----+-----+-----+-----+
1 | dbtdybcmlbgkbbebjrsbyhmbnijlegtirrrfymqctjhzwdamj | 2021 | 89 | 5
2 | qrjamzkgarxdmnsctptwctgrwvncbgbgboyzzhhdenvcbxrrkaeh | 2017 | 54 | 4
3 | iokdtgvqzoetrzlfeanucuatjyupkumkrohnpivgdnilyqaeb | 2007 | 50 | 4
4 | gbcrdciuyhrhaamwvegcjurjkggmmbjeqzujvazourrisdvnuj | 2015 | 77 | 5
5 | tvhaavdppevwzepovxphofjpfkqgqemulbuskycfmaiznktxxo | 2012 | 94 | 3
6 | ceavavhndnmqvkgzlpnkbezxkipmwwcdzearyfutufkleobei | 2017 | 28 | 5
7 | nrymmkjyimmmezceqxydptyvqolblmqibouxpdzaeumrddgfk | 2015 | 98 | 5
8 | fddzaehleriuahakeffgysohfohodwsezqvgkaxoyhxgamkzyfhme | 2023 | 26 | 2
9 | hjxmccqwnppkyuozojjnlmlugknfxljiixfuwcclerfncldre | 2019 | 52 | 1
10 | churtqzfsejhhugqjvoniruzajpojqwqzrxzrokdruffixeqv | 2015 | 17 | 1
11 | wurympfrpfhpqpgwtpkkbkdxjalwahsesgxnatytwbvf | 2022 | 89 | 1
12 | glptmiphxyclnhfquhotqzxmokgrmlvnychpkvvklkusqniyq | 2015 | 2 | 5
13 | zrihkjhxdnywlccszkhpcelmtrnjolmlmjngndubdfshizwhlp | 2017 | 67 | 5
14 | ewijebiwtptstjsuuetuxzcldeefcwtxujekqdztlaadiuorv | 2007 | 29 | 1
15 | gpvqxexdfzieiohkedxesvevogsizzlnlnfsfthicktayunuqh | 2008 | 97 | 5
16 | lykwnmvpccbqzqiaobprchdgcagmagfgyxicesnnwpylppuja | 2017 | 40 | 3
17 | gmwulnvrjrvsqzqiaobprchdgcagmagfgyxicesnnwpylppuja | 2007 | 30 | 3
18 | vjzvrtbsysb1voagg1mvrrbitszzvrrqdsflbsz1vtslksc1v | 2014 | 14 | 2
19 | okditedecazjxicnlhrfxtodxfrrfweqrqparpydwvnftxxao | 2012 | 51 | 4
20 | kibzueumwyoroatehcjlhpccydyoehzatefpbdqvnoutooyh | 2020 | 49 | 4
21 | wvgpcjkhnppudmkzjlmwljduboaatgkqohuigwcmmsppqjcyj | 2015 | 16 | 4
22 | hdvhrasrzgeedwnihofdlmxpyhhrpsrsfikrtbydxpnccgoyju | 2018 | 76 | 1
23 | qchgzzaqnoycedeekzxunxrudamohvmkshqbzodufwyuqktlwqb | 2015 | 90 | 2
24 | zuprazswpocwxwp1ldasojeizecjgyifkpusqzd1jxhqtht | 2015 | 12 | 3
25 | hsueueogxqoqismtmnhgywhjvmpghcalyubqltvhoaorarmjre | 2021 | 29 | 3
26 | lsyxjuyttxthmwqtpuxwfdkbrrfvnhyplddveekpmukjiaucgk | 2015 | 54 | 1
27 | irksiztyhuemvjibwcwfcklmnzuxpefbircjsolrkfvtsrdcha | 2010 | 14 | 2
28 | yvzhwejnywbalparztdoxls1stscpkqfqsqnlzujfkqerlcjm | 2023 | 28 | 4
29 | raurynzgnzbkvgykolfgpcwkqtcgcvcuzvjjxiquybpjmcdfx | 2017 | 71 | 1
30 | pjhawtovlrskuafwbjxoovlbozajddsfbmszesnteuqhavdh | 2014 | 97 | 4
31 | jtxdxxmgyhidxqidkapdinrthuuedoeihoymhwmlxypykph | 2011 | 52 | 4
32 | psftzqlnwbfqbdhplfnsemvjfwfvvuujdakwuvvbfsgnwhfue | 2023 | 10 | 1
33 | cujyqhfyalwqbmcyamljfrumqabwdcvorghwuzquzjmpdydl | 2009 | 63 | 1
34 | rxhazardxodhhnlndyqddevbixanzjurfxfcxxipizzaxilxha | 2022 | 11 | 3
35 | bgozbmhdc -- query aborted
36 | dsynrkJtcyjqwezotzwsbupoztuijyxpckcibczvgti | 2011 | 7 | 2 |
+-----+-----+-----+-----+
5281 rows in set (0.01 sec)

mysql> select count(*) from movies where release_year=2005;
+-----+
| count(*) |
+-----+
| 294 |
+-----+
```

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Table scan example 2:

It took 0.00 sec for execution

MySQL 8.0 Command Line Cli X + v

```

339 rows in set (0.0339 rows in set (0.00 sec)

mysql> select count(*) from actors where dob>'2004-07-19';
+-----+
| count(*) |
+-----+
|      339 |
+-----+
1 row in set (0.01 sec)

mysql> select * from actors where dob>'2004-07-19';^C
mysql> select * from actors where dob>'2004-07-19';
+-----+-----+-----+
| actor_id | name          | dob        |
+-----+-----+-----+
|      31  | vlpebjdwnukwkeuerhyo | 2005-04-21 |
|      48  | fgqghclcvretpadlmsja | 2005-11-15 |
|     103  | alkeigocmbtbrgvzvnig | 2005-07-02 |
|     138  | coqaxjysklepjotwsuay | 2005-01-10 |
|     139  | oitzugzcafympadkwpt | 2004-08-04 |
|     181  | bfdbjijbegmtedonmhwn | 2005-02-08 |
|     194  | kejjcxbdbkototbmcceu | 2004-09-16 |
|     287  | ayfzxgdezxaehzeftan | 2005-11-14 |
|     300  | fhapzxvufeutwwqqldw | 2005-02-13 |
|     328  | qauwvnlmmcqdndqxpexs | 2005-03-11 |
|     352  | nezrnohvdytgsxzlsan | 2005-04-01 |
|     365  | tgtppoqihbnajiqgvny | 2005-07-08 |
|     407  | oerphptpscwlkvbgmodxj | 2004-08-20 |
|     418  | hpddydhmqvkhkqmpdzjc | 2004-10-28 |
|     432  | vvpaxjwheamvomccppvv | 2005-02-19 |
|     585  | lftpumilrtdexuiqsd | 2005-09-15 |
|     589  | vwdcadifkudqnvyumqro | 2004-09-10 |
|     623  | zciglbfeillmxhajkqlru | 2005-06-06 |
|     671  | efs eosfdcisryrmemwiw | 2004-10-20 |
|     686  | ygjrdyjefolkmjdamyjok | 2005-06-09 |
|     688  | maymjntrqrheteabolikgi | 2005-07-07 |
|     724  | zxsscskgkbxarlxyknjw | 2005-11-11 |
|     741  | jepqylqvdahmlwvmutbs | 2005-04-09 |
|     746  | zgzeigoiedginsbicyrt | 2004-12-23 |
|     750  | qemdqmftogtzocnjgkcn | 2004-09-06 |
|     765  | ddjunjcrzytvetmazebn | 2005-06-10 |
|     771  | ivszkngocgbwysjeiid | 2005-04-27 |
|     782  | hbtugvtgqijsmdkclkb | 2005-07-19 |
|     808  | ocwqtdthwosxvgbhvnlr | 2005-09-09 |
|     877  | hb1mjznuuwkazfxhfjfz | 2005-01-14 |
|     887  | uvgicmxfmwlpxmzjutdn | 2004-11-10 |
|     890  | lpfuixvkzernrvecqavd | 2005-02-15 |
|     894  | uxzamgbibbzfxxayaw | 2004-11-08 |

```

Today's high Near record

Search

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Multi-table joins involving 3 tables -

Using "SELECT *" query with a subset of columns:

```

MySQL 8.0 Command Line Cli  ×  +  ▾
+-----+-----+-----+
| 8394 | tpenqttvprodxmgbyfr | 2005-09-28 |
| 8397 | rbyijjxaxinwfjwpmxb | 2005-07-06 |
| 8438 | ckkybekfxjkmudivaoag | 2005-02-07 |
| 8447 | zoopwtgxsoftfxxcqatd | 2005-07-26 |
| 8457 | qjgzuhqjebkhwuxifgqj | 2004-08-19 |
| 8549 | ihrhwkyblzegikfzfjkh | 2004-08-12 |
| 8561 | rygmndonsviydanxvkqtb | 2004-09-01 |
| 8562 | cmmjstcmqviarbpwhokd | 2004-11-24 |
| 8592 | waroabfokrrjtelzvp | 2004-10-21 |
| 8607 | ikklogynvgavbmwmymrxx | 2005-08-27 |
| 8622 | gnjrzrjkqhhljyssgicdn | 2005-07-22 |
| 8628 | hakeytuptpxazblfgxryi | 2004-09-18 |
| 8660 | vmbxwikfefqbcgseysve | 2005-10-28 |
| 8727 | zgyecexvzebshuegsllqq | 2005-02-13 |
| 8732 | fwsomwuunihkfwlxsysp | 2004-12-24 |
| 8771 | bmzogkrtojggnufcpgz | 2005-03-18 |
| 8795 | xsnnlktkjkmzhbrxqhan | 2005-10-05 |
| 8876 | tgtrtxpgdjtawsrlhdg | 2004-12-13 |
| 8933 | pvbppuguzsqbzrhcqwy | 2005-08-08 |
| 8934 | sgepovlxwxwnnskvxaor | 2005-09-17 |
| 8969 | tcnrikwlvxffjgaeztwh | 2005-09-17 |
| 8986 | ktbxqqauiqzpykfuidy | 2005-06-02 |
+-----+-----+-----+
339 rows in set (0.0339 rows in set (0.00 sec)

mysql> select movies.title, genres.name as genre, actors.name as actor_name from movies
-> join genres on movies.movie_id=genres.genre_id
-> join cast on movies.movie_id=cast.movie_id
-> join actors on cast.actor_id=actors.actor_id;
+-----+-----+-----+
| title           | genre  | actor_name   |
+-----+-----+-----+
| dbtdybcmlbgkbebvjrsbyhmbnijlegtitrrfymqccthjzwydamj | Action | rmzmrjfpopgeqtjpztrb |
| dbtdybcmlbgkbebvjrsbyhmbnijlegtitrrfymqccthjzwydamj | Action | qkszgmmmyfoexmrvtlod |
| qrjamrkfgarxdmstcptwtcgrwwncbqgboyzzhdenvcbxrrkaeh | Comedy | dcpvvlcdymrkwzjlbkv |
| qrjamrkfgarxdmstcptwtcgrwwncbqgboyzzhdenvcbxrrkaeh | Comedy | diyrbvbbspaphcdodfrz |
| qrjamrkfgarxdmstcptwtcgrwwncbqgboyzzhdenvcbxrrkaeh | Comedy | wubjrbnnjitisadyhswin |
| iokdtgvqzoetrzlfeanucuatjyupkumkrohnpivgdnilyqaeb | Drama  | lowmpwgsebielefhwzx |
| gbrdcruiyhrhaammwvegcuzjkgqmmbejqzujvazourrisdvnuzj | Thriller | dcajzkvshzqxmdutdagh |
| gbrdcruiyhrhaammwvegcuzjkgqmmbejqzujvazourrisdvnuzj | Thriller | fkntdlgipbbwmxmjvurcs |
| gbrdcruiyhrhaammwvegcuzjkgqmmbejqzujvazourrisdvnuzj | Thriller | wfecbpfucecoswahbtr |
| tbnxapnsrlgrkiolztigamssxlrtvrxrndctqmwrhwknsesii | Sci-Fi | vjpvjijibxzqksqebet |
| tbnxapnsrlgrkiolztigamssxlrtvxiwndctqmwrhwknsesii | Sci-Fi | mliupbzsjpfoarslori |
| tbnxapnsrlgrkiolztigamssxlrtvxiwndctqmwrhwknsesii | Sci-Fi | nvcpxsrsszadmykruyjoe |
+-----+-----+-----+
12 rows in set (0.00 sec)

mysql> |

```

Using conditional "SELECT" query with a subset of columns:

It took 0.03 sec for execution

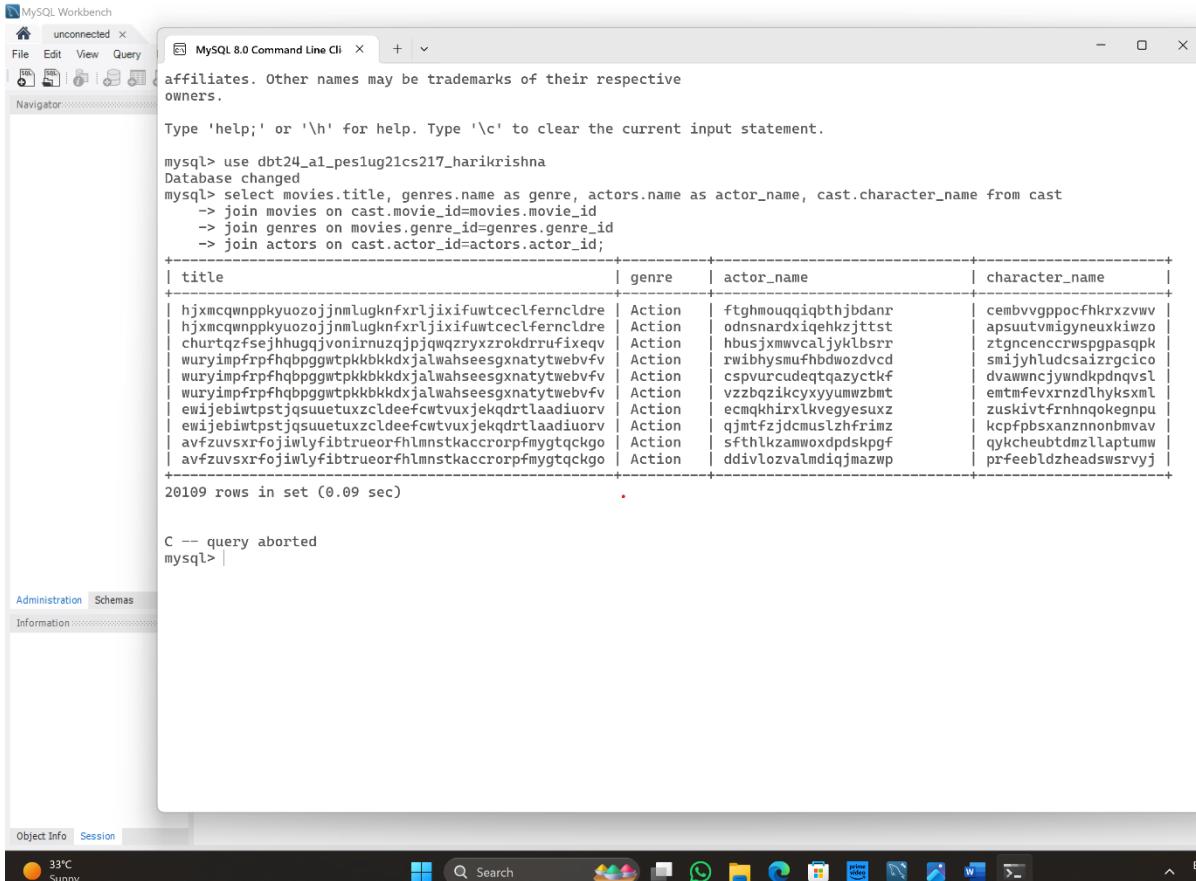
```

--> ^
mysql> select movies.title, actors.name as actor_name, cast.character_name from movies
-> join cast on movies.movie_id=cast.movie_id
-> join actors on cast.actor_id=actors.actor_id
-> where movies.release_year>2000;
+-----+-----+-----+
| title          | actor_name   | character_name |
+-----+-----+-----+
| dbtdybcmlbgkbbebvjrsbyhmbnijlegtrrrfymqcthjzwydamj | rmzmrjfpopgeqtjpztrb | kttsvsgthambzllnfle
| dbtdybcmlbgkbbebvjrsbyhmbnijlegtrrrfymqcthjzwydamj | qkszgmmnyfoexmrvtntlod | bpvivlxdiqbfrmocrtuu
| qrjamrkgarxdmstcptwcrgrwwncbgboyzzhdenvcbxrrkaeh | dcpvvlcdxymkzwjlbkv | awbkctbftohdpjhkpiz
| qrjamrkgarxdmstcptwcrgrwwncbgboyzzhdenvcbxrrkaeh | diyrwbvbssaphcdochfrz | rulrojxjgzbmxthelzhyl
| qrjamrkgarxdmstcptwcrgrwwncbgboyzzhdenvcbxrrkaeh | wubjrbnnjtisadhywin | tndamvxznxlslknwpnnvc
| iokdgtvqzoetrlzlfeanucuatjyupkumkrohnpivgdnilqaebl | lowmpwgsebielefhwzx | wrmyibsefduzslxqpxfa
| gbrdcrciuyhzaamwwegcurjkqgammbejqzqjvazourrisdnuzj | dcajzkvsbzqxmduitdagh | zjjobfawigevxjvqpszc
| gbrdcrciuyhzaamwwegcurjkqgammbejqzqjvazourrisdnuzj | fkntdlglipbbwmxmjvurcs | omkourqjffofvtducqkqp
| gbrdcrciuyhzaamwwegcurjkqgammbejqzqjvazourrisdnuzj | wfecbpfcusecoswahbr | iuophttaluenxehuzkmh
| tvhaavdpewwzepovxphofjpfpkgemulbuskycfmaiznktxxo | qtxyengngocmrolarkdbku | xcohqoxkbgtfgzoqmwvg
| tvhaavdpewwzepovxphofjpfpkgemulbuskycfmaiznktxxo | htrzbihdkupsqaghqxn | fyftlxqbxkhagndyh1x1p
| tvhaavdpewwzepovxphofjpfpkgemulbuskycfmaiznktxxo | otgygxwjahechzlrzqgq | umsadpqayjuqwqjzdnzfb
| ceaanvrhdmnvqvkgzlpnkbezkimpmwccdezearyfutufkleobei | qsymsrthxkumzhpxtnf | qcsxbchoughabcfhesdp
| ceaanvrhdmnvqvkgzlpnkbezkimpmwccdezearyfutufkleobei | ezeppqqubgdssduubtadb | xfoqzvplkxvtjzzvsh
| ceaanvrhdmnvqvkgzlpnkbezkimpmwccdezearyfutufkleobei | ogoctifforxsmdmkwgctp | nypcxeyleqnfoljiljkl
| oynpvhisdhbjaflosfxzonxtwtekyddenzgkelatthjbuwowj | fuowtclcvohopycav | eqeklkykrkbrjreiafcia
| oynpvhisdhbjaflosfxzonxtwtekyddenzgkelatthjbuwowj | jhqvysgbjicimamjnqtw | jyataykrlhwbumbsazq
| oynpvhisdhbjaflosfxzonxtwtekyddenzgkelatthjbuwowj | vwqxqcgkbrtrsmmmmbuylc | datwmvfvqjirzabysrbc
| nrzymmkjyymmmececeqxytdptyvgolb1mqibouxzdaemzrdgfk | gsqfikmgdbvzczvhilbz | qmnqwsjmcntughqsusun
| nrzymmkjyymmmececeqxytdptyvgolb1mqibouxzdaemzrdgfk | mzqixexspduhyggqdad | bkyqhxozuuxumukmqnuy
| fddzahleiuhakeffgysohfohdwsebzqvgkaxoyhxgamkzfyme | bfwnaipdnkinqpbqzsly | fdvqdqrfcivvebumfpcm
| fddzahleiuhakeffgysohfohdwsebzqvgkaxoyhxgamkzfyme | zofrdxaoxywgbzhsbovf | ulzoumtqjfwiiuhzbcr
| hjxmcqcnppkyuojojnmulgknfxlljixifutwcelferncldre | ftghmouqqiqbthjbdanr | cembvgppocfhkrxzvww
| hjxmcqcnppkyuojojnmulgknfxlljixifutwcelferncldre | odnsnardiqehkjttst | apsuwtmigyneuxukiwo
| churtqzfsejhuggqjvonoruzqjbjpqwqzryxzrokdrifixeqv | hbusjxmwvcalyjklbsrr | ztgncencrrwspgaspak
| neyqvcjvjonumvkssncjwjnnscsvhmulkxhcuufjoxfwsdr | kmqtsfhmbbdsexmkdsf | azrpwlbxlqhcnmescubi
| neyqvcjvjonumvkssncjwjnnscsvhmulkxhcuufjoxfwsdr | pggskhrggkydenxxwtxd | dcukkermikuaoopcpcnmam
| wuryimpfrpfhqbpggwtpkkbkkdxjalwahlseesgxnatytwebvfv | rwibhysmuflbwdwzvcd | smijyhldcsaizrcicio
| wuryimpfrpfhqbpggwtpkkbkkdxjalwahlseesgxnatytwebvfv | cspvurcudeqtqazycukt | dvawwnccjywndkpdnqvs
| wuryimpfrpfhqbpggwtpkkbkkdxjalwahlseesgxnatytwebvfv | vzzbzqzikcyxxuyumwzbmt | emtmfevxrnzdlyhksxml
| glptniphycylhhfquhotqzxmokqmvlvnychpikkvlkusqnijq | bnqymusdhknxaytzrcxx | quoedafahovzfialgdij
| zrihkhjxdnywlccszkhhpcelmrtnjolmlmjndubdfshizwhlp | ggluqmrhjwarzsbnmc | glpbwaotrppaxqukrirk
| zrihkhjxdnywlccszkhhpcelmrtnjolmlmjndubdfshizwhlp | tagbsfppdkjbpvqpbjo | xqbkztdqjcbclsrvnrnk
| ewijebiwtpstjqsuetutxcldeefcwtvuxjekqdrtlaadiuorv | ecmqkhirkxrkvegesuxz | zuskivtfrnhnqokegnpu
| ewijebiwtpstjqsuetutxcldeefcwtvuxjekqdrtlaadiuorv | qjmtfzjdcmuslzhfrimz | kcpfpbsxanznnbnmvav
| hzfdvnopnrbvnxthxyxmdpzdlrejiwsselfvwokxnmcdotto | qvsrtptsvboguximlh | kltgxhtovlercbthnm
| hzfdvnopnrbvnxthxyxmdpzdlrejiwsselfvwokxnmcdotto | acxwpealrdlolaxtoflc | tivixcdcqhtefdwexhgo
| gpvqexzdfzieiohkedsevevosizzlnlfnsfhthickayunuq | pcmsngkqxreyoilmxly | yijsbckabofcyobpnqje
| hxermtakytkjvtlexaiynwaxpstyjmvnqopdxdqxafzkikmml | nluxbosohbrlxsonmicxs | umlzcsfcupnqdfdesvd
| hxermtakytkjvtlexaiynwaxpstyjmvnqopdxdqxafzkikmml | rhpmwnrzldahoigjwnfw | djtsshcnwshtwfzxdymc

```

(c) Indexing for Query Performance Improvement: -

Before indexing sample three table join: as you can see before the indexing the run time is 0.09 secs.



```

MySQL Workbench
File Edit View Query
MySQL 8.0 Command Line Cli + -
affiliates. Other names may be trademarks of their respective
owners.

Type 'help;' or '\h' for help. Type '\c' to clear the current input statement.

mysql> use dbt24_a1_peslug21cs217_harikrishna
Database changed
mysql> select movies.title, genres.name as genre, actors.name as actor_name, cast.character_name from cast
-> join movies on cast.movie_id=movies.movie_id
-> join genres on movies.genre_id=genres.genre_id
-> join actors on cast.actor_id=actors.actor_id;
+-----+-----+-----+-----+
| title          | genre | actor_name | character_name |
+-----+-----+-----+-----+
| hjxmcqwnppkyuozejjmmlugknfxrljixifuwtcclferncldre | Action | ftghmouqqiqqbthjbdanr | cembvvgppocfhkrxzvwv
| hjxmcqwnppkyuozejjmmlugknfxrljixifuwtcclferncldre | Action | odnsnاردxiquehkzttst | apsuutvmigyneuxkiwiزو
| churtqzfsejhuggjivonirnuzqjpjqwqzryxxzrokdrufixedq | Action | hbusjxmwwvcaljyklbsrr | ztgnccencrwspppasqpk
| wuryimpfrpfhqbpqggwtppkkbkdxjalwahsesgxnatytwebvfv | Action | rwibhysmuuhbdwzodvcd | smijyhludcsaizrgcico
| wuryimpfrpfhqbpqggwtppkkbkdxjalwahsesgxnatytwebvfv | Action | cspvurcudeqtgazyctkf | dvawwncjywndkpdngvsl
| wuryimpfrpfhqbpqggwtppkkbkdxjalwahsesgxnatytwebvfv | Action | vzzbzqzikcyyyuumwzbmt | emntfexvrnzdlhyksxml
| ewijebiwtptstjqsuuetuzxcldeefcwtxujekqdrtlaadiuvrz | Action | ecmqkhirkxlkvegesuxz | zuski4vtfrnhnqokegnpu
| ewijebiwtptstjqsuuetuzxcldeefcwtxujekqdrtlaadiuvrz | Action | qjntfzjdcmslzhrimz | kcpfpbsxanznnonbmav
| avfzuvsxxrfojiwlyfibtrueorfhlmnstkacccorpmygtqckgo | Action | sftblkzamwoxdpdkpgf | qykcheubtdmzllaptumw
| avfzuvsxxrfojiwlyfibtrueorfhlmnstkacccorpmygtqckgo | Action | ddivlozvalmdiqjmazwp | prfeebldzheadsrsrvj
+-----+-----+-----+-----+
20109 rows in set (0.09 sec)

C -- query aborted
mysql> |

```

Indexing some tables:

After indexing sample three table join: as you can see the execution time decreased to 0.07 secs, After indexing sample three table join with (Explain):

```
MySQL Workbench
```

MySQL 8.0 Command Line Cli

```
mysql> select movies.title, genres.name as genre, actors.name as actor_name, cast.character_name from cast
   > join movies on cast.movie_id=movies.movie_id
   > join genres on movies.genre_id=genres.genre_id
   > join actors on cast.actor_id=actors.actor_id;
+-----+-----+-----+-----+
| title | genre | actor_name | character_name |
+-----+-----+-----+-----+
| hjmpmcqwnppkyuozojjnnlugknfxrljixifuwteclferncldre | Action | ftghmouqqiqgbthjbdanr | cembvvgppocfhkrxzwv |
| hjmpmcqwnppkyuozojjnnlugknfxrljixifuwteclferncldre | Action | odnsnاردیهکزjtst | apsuutvmیgneuxkiwz |
| churtqzfsejhhuqqjvонiruzqjpjqwqzryxrodrufixeqv | Action | hbusjxmwvcaljklsrr | ztgcencenccrwspgpaqspk |
| wuryimpfrphqbpgwtpkbbkdxjalwhseesgnatytwebfv | Action | rwibhysmuvhbdwodvcd | smijhhludcsaizrgcico |
| wuryimpfrphqbpgwtpkbbkdxjalwhseesgnatytwebfv | Action | cspvurcudeqtqazycfkf | dvawwnncjwndkpdnqvsl |
| wuryimpfrphqbpgwtpkbbkdxjalwhseesgnatytwebfv | Action | vzzbzqzikcyxxuymwzbmt | emtnfevxnzdhyksxm |
| ewijobiwtpstjqsuuetuxzcldeefcwtxujekqdrtlaadiuorv | Action | ecmgkhirxlkvgeyesuzxz | zuskivtfrnhngokegnpuu |
+-----+-----+-----+-----+
20189 rows in set (0.07 sec)

mysql> explain
   > select movies.title, genres.name as genre, actors.name as actor_name, cast.character_name from cast
   > join movies on cast.movie_id=movies.movie_id
   > join genres on movies.genre_id=genres.genre_id
   > join actors on cast.actor_id=actors.actor_id;
+-----+-----+-----+-----+
| id | select_type | table | partitions | type | possible_keys | key | key_len | ref | rows | filtered | Extra |
+-----+-----+-----+-----+
| 1 | SIMPLE | genres | NULL | ALL | PRIMARY | NULL | NULL | NULL | 5 | 100.00 | NULL |
| 1 | SIMPLE | movies | NULL | ref | PRIMARY, idx_mov_gen, ix_mov_gen_id | idx_mov_gen | 5 | dbt24_a1_pes1ug21cs217_harikrishna.genres.genre_id | 1978 | 100.00 | NULL |
| 1 | SIMPLE | cast | NULL | ref | PRIMARY, ix_cst_mov_id, ix_cst_act_id | PRIMARY | 4 | dbt24_a1_pes1ug21cs217_harikrishna.movies.movie_id | 1 | 100.00 | NULL |
| 1 | SIMPLE | actors | NULL | eq_ref | PRIMARY | PRIMARY | 4 | dbt24_a1_pes1ug21cs217_harikrishna.cast.actor_id | 1 | 100.00 | NULL |
+-----+-----+-----+-----+
4 rows in set, 1 warning (0.01 sec)
```

Object Info Session

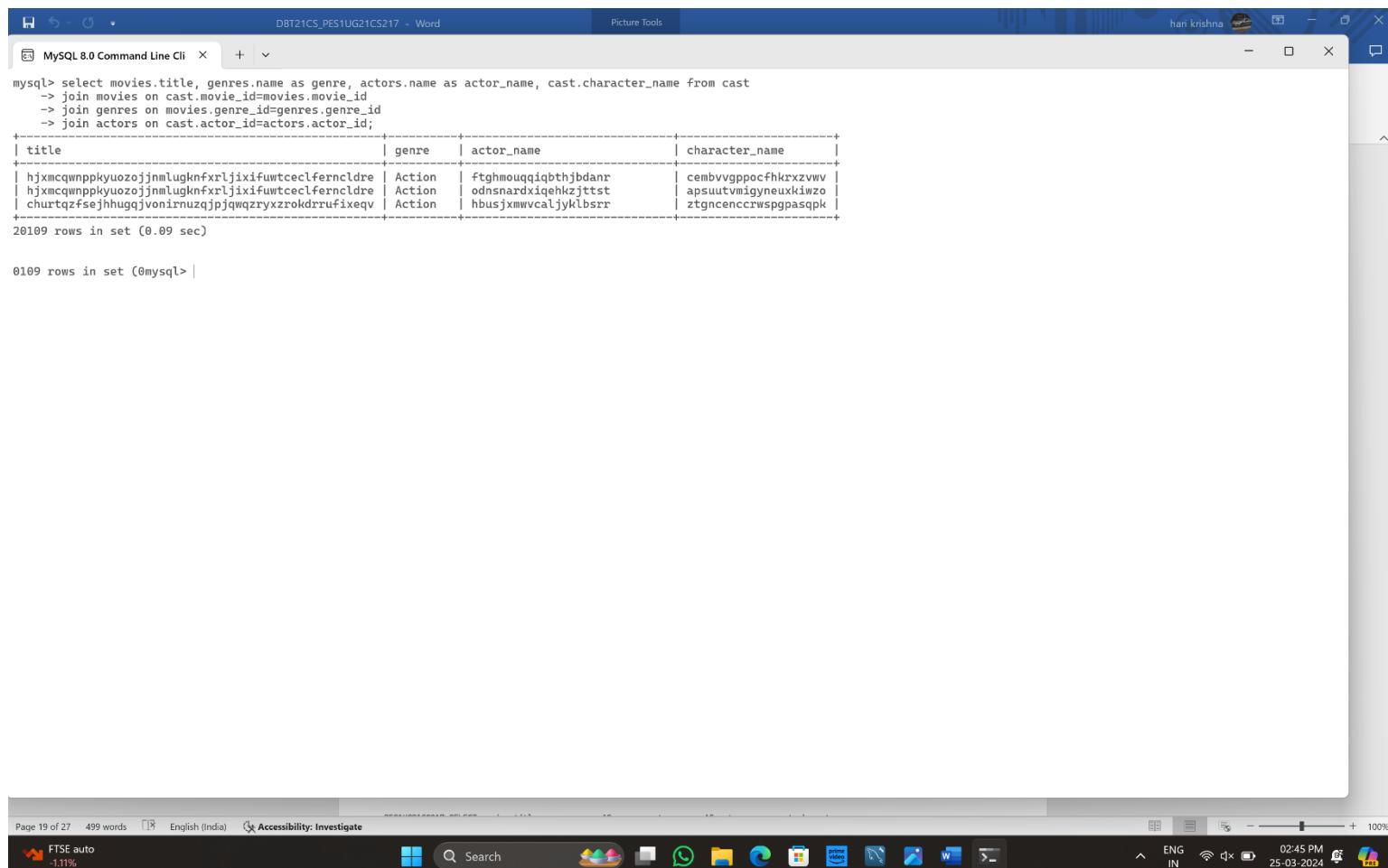
33°C Sunny

Search

02:39 PM 25-03-2024

(d) Query Optimization with Varied Join Orders and Types: -

Altering the join order of tables in multi-table join query example 1



```

DBT21CS_PES1UG21CS217 - Word Picture Tools
MySQL 8.0 Command Line Cli + hari krishna

mysql> select movies.title, genres.name as genre, actors.name as actor_name, cast.character_name from cast
-> join movies on cast.movie_id=movies.movie_id
-> join genres on movies.genre_id=genres.genre_id
-> join actors on cast.actor_id=actors.actor_id;
+-----+-----+-----+-----+
| title | genre | actor_name | character_name |
+-----+-----+-----+-----+
| hjxmcqwnppkyuozojjnmqlugknfxrljixifuwrtceclferncldre | Action | ftghmouqqiqgbthjbdanr | cembvvgppocfhkxxzvww |
| hjxmcqwnppkyuozojjnmqlugknfxrljixifuwrtceclferncldre | Action | odnsnarxiviehkzjttst | apsuutvmigyneuxkiwzo |
| churtqzfsejhuggqjvonirnuqjpjqwqzryxzrokdrufixeqv | Action | hbusjxmwmvcaljyklbsrr | ztgncencrcwspgpasqpk |
+-----+-----+-----+-----+
20109 rows in set (0.09 sec)

20109 rows in set (0@mysql> |

```

Altering the join order of tables in multi-table join query example 2:

MySQL Workbench

MySQL 8.0 Command Line Cli

```
mysql> select movies.title, genres.name as genre, actors.name as actor_name, cast.character_name from cast
-> join actors on cast.actor_id=actors.actor_id
-> join movies on cast.movie_id=movies.movie_id
-> join genres on movies.genre_id=genres.genre_id;
+-----+-----+-----+-----+
| title          | genre | actor_name   | character_name |
+-----+-----+-----+-----+
| h j x m c q w n p p k y u o z j j n m l u g k n f x r l j i x i f u w t c e c l f e r n l d r e | Action | ftghmouqqiqbthjbdanr | cembvvgppocfhkrxzvww |
| h j x m c q w n p p k y u o z j j n m l u g k n f x r l j i x i f u w t c e c l f e r n l d r e | Action | odnsnardxigezhkzjtst | apsuutvmigyneuxkiwzo |
| churtqzfsejhhugqjvonirnuzajpjwqzryxzzokdrufixeqv | Action | hbusjxmwwcaljyklbsrr | ztgnccencrswspgasqpk |
| wuryimpfrphqbgpgwtpkkbkkdxjalwahseesgxnatytwebvfv | Action | rwibhysmuuhbdwozvcd | smijyhLudcsaizrgcico |
| wuryimpfrphqbgpgwtpkkbkkdxjalwahseesgxnatytwebvfv | Action | cspvurcudeqtqazystkf | dvawwnncjywndkpdnqvs1 |
| wuryimpfrphqbgpgwtpkkbkkdxjalwahseesgxnatytwebvfv | Action | vzzbzqzikcyxyC -- query aborted |
| yyumwzbmt | emtnfevxrnzdlyhksxml |
+-----+-----+-----+-----+
20109 rows in set (0.07 sec)
```

mysql> |

Object Info Session

Tomorrow's high Near record

Search

File Explorer

WhatsApp

Folder

File

Print

PowerShell

Visual Studio Code

WPS Office

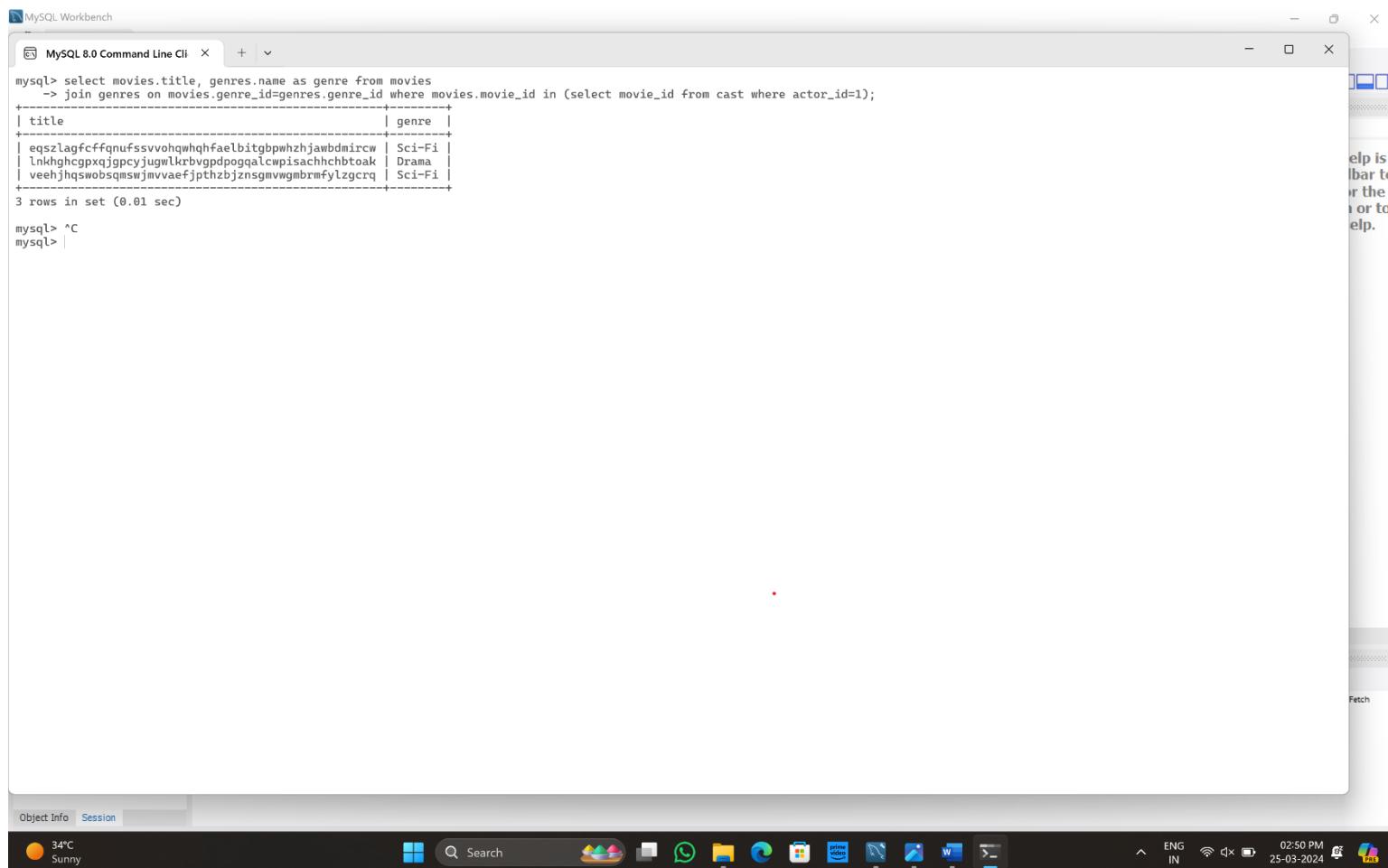
Task View

Start

ENG IN

25-03-2024 02:49 PM

Incorporate a variety of join types such as left joins:



The screenshot shows a Windows desktop environment with the MySQL Workbench application open. The application window title is "MySQL Workbench" and the tab selected is "MySQL 8.0 Command Line Cli". The command line shows the following SQL query and its results:

```
mysql> select movies.title, genres.name as genre from movies
   -> join genres on movies.genre_id=genres.genre_id where movies.movie_id in (select movie_id from cast where actor_id=1);
+-----+-----+
| title          | genre |
+-----+-----+
| eqszlagfcffqnuffffsvohqwhqhfaelbitgbpwhzhjawbdmircw | Sci-Fi |
| lnkhghcgpqxjgpcyjugwlkrbvgpdpgqalcwpisachchbtoak | Drama  |
| veehjhqswobsqmswjmvaefjpthbzjznsgnvwmbrmfylzgcrq | Sci-Fi |
+-----+-----+
3 rows in set (0.01 sec)
```

After the query, the user types `^C` to cancel the execution. The MySQL prompt then shows `mysql>`. The system tray at the bottom of the screen displays the date and time as "25-03-2024 02:50 PM".

Incorporate a variety subquery:

```

1.log MySQL 8.0 Command Line Cli + ...
mysql> select movies.title, genres.name as genre from movies
   > join genres on movies.genre_id=genres.genre_id where movies.movie_id in (select movie_id from cast where actor_id=1);
+-----+-----+
| title | genre |
+-----+-----+
| eqszlagfcffgnufssvohqwhqhfaelbitgbpwmhzjyawbdmirw | Sci-Fi |
| lnkhghcpnxqjpcyjgwukrbvypdpogqalcwpisachhchbtoak | Drama |
| veebjhqswobsqmswjvvaefjpthzbjznsngvwgnbrsfylzgcrq | Sci-Fi |
+-----+
3 rows in set (0.00 sec)

mysql> select movies.title, genres.name as genre from movies
   > join genres on movies.genre_id=genres.genre_id where movies.movie_id in (select movie_id from cast where actor_id=3);
+-----+-----+
| title | genre |
+-----+-----+
| ceoyrxbcnstjccjwcgnmvabodxmgzjbtwlcduhpyfihyczm | Thriller |
| vxbicukxokjbpptzahjkcclxpstdlxavdujymxsqaznb | Drama |
| hryvarwlogpambkhepsvmmudtfpmrxzvxgruhsddgcyrbuw | Sci-Fi |
| seaevgvefreuxtaugohjwwmavgkgdewlcrxyzbvymsvplxy | Thriller |
+-----+
4 rows in set (0.00 sec)

mysql>

```

System tray icons at the bottom:

- Temperature: 34°C Sunny
- Search bar
- Start button
- Taskbar icons: Paint, WhatsApp, File Explorer, Edge, Amazon, Mail, Task View, Task Manager
- System status: 86%, ENG IN, Wi-Fi, Battery, 02:57 PM, 25-03-2024

(e) Query Analysis and Optimization: -

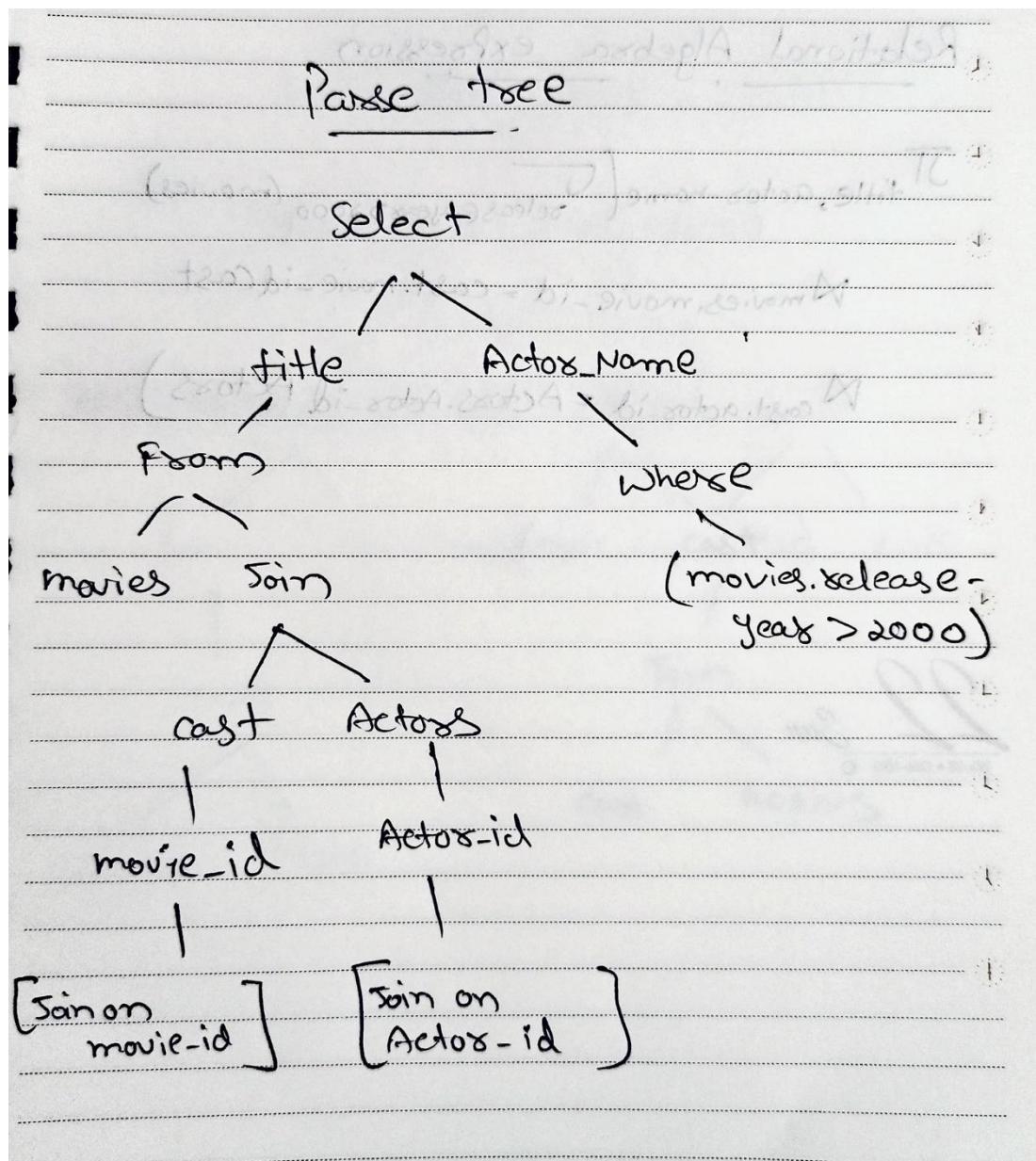
Part 1: Query Analysis:

Complex three table join query:

```
>> select movies.title, actors.name as
   actor_name from movies join cast on
   movies.movie_id=cast.movie_id join actors on
   cast.actor_id=actors.actor_id where
   movies.release_year>2000;
```

The query is to extract movie title, actors name from joins of movies, cast and actors tables and filter them by 2000 year.

Parse tree for the complex query:



Relational algebra expression for the query:

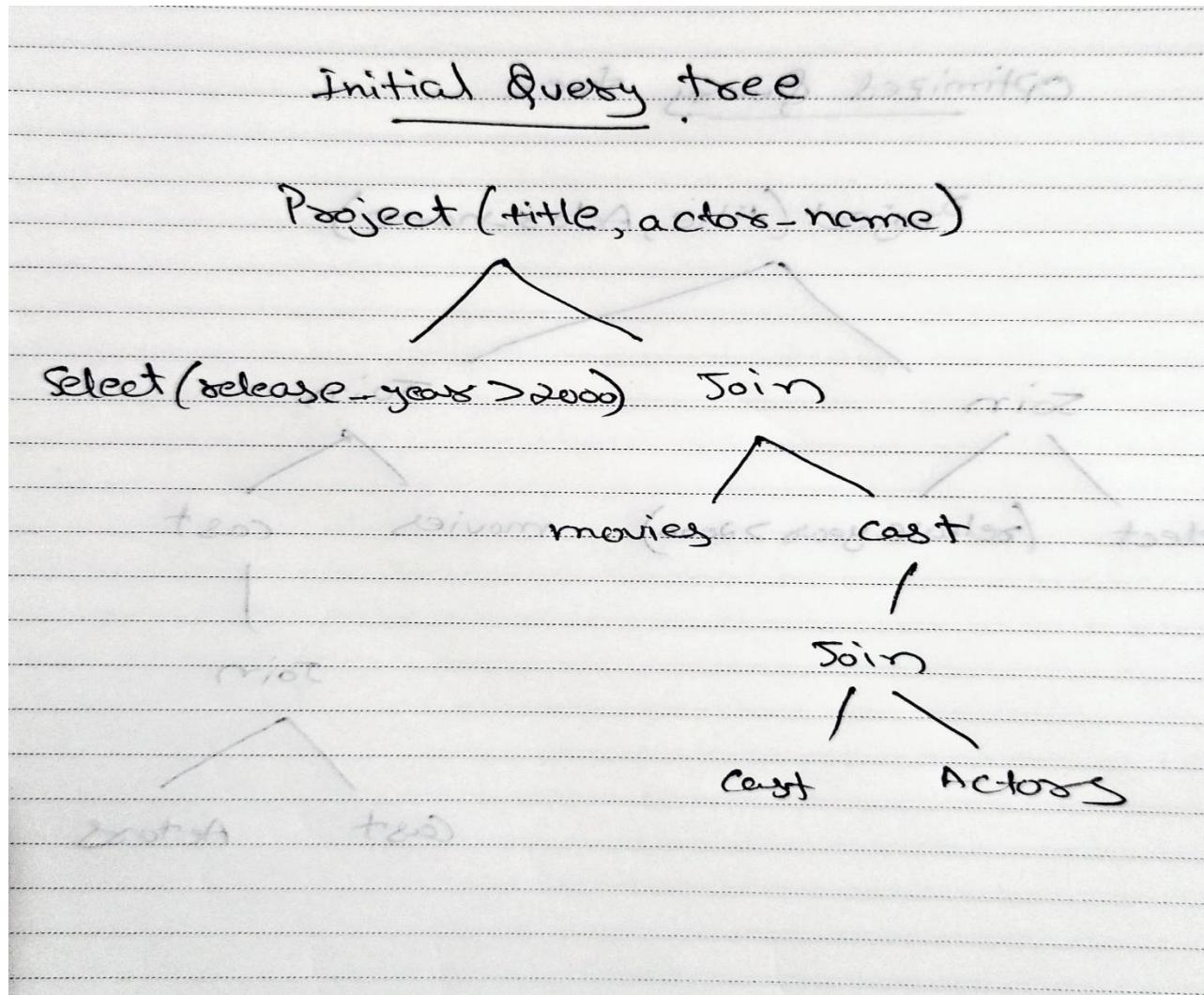
Relational Algebra expression

$\exists \text{title, actor-name} \left(\exists \text{release_year} \geq 2000 \text{ (movies)} \right)$

$\forall \text{movies.movie-id} = \text{cast.movie-id} \text{ cast}$

$\forall \text{cast.actor-id} = \text{Actors.Actor-id} \text{ Actors}$

Initial query tree based on the relational algebra expression:



Part 2: Query Optimization:

Optimizing the initial query tree to enhance query performance:

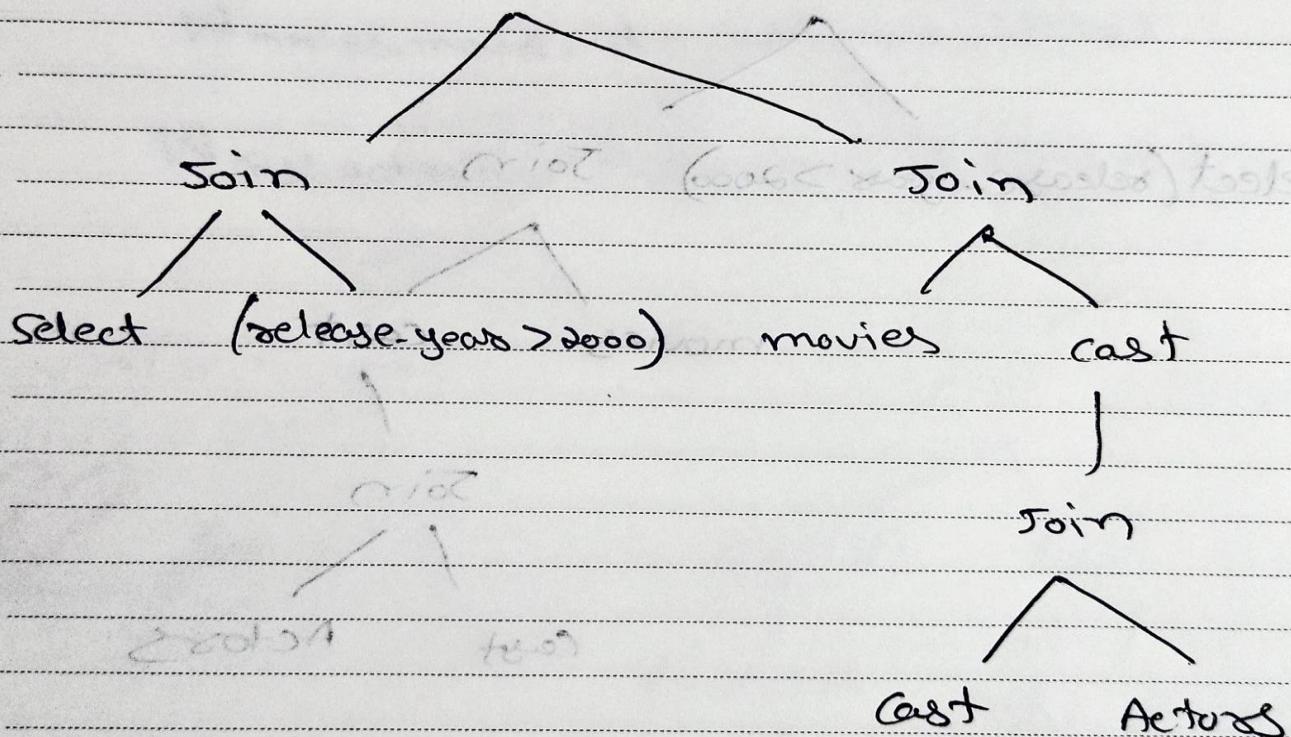
Push down selection (predicate pushing):

Move the selection on release_year down to the Movies table before joining. This reduces the number of rows processed in subsequent joins.

Heritage Day (South Africa), Saint Rupert's Day (Austria)

Optimized Query tree

Project (title, Actor.name)



By pushing down the selection, the database filters movies based on the release year before joining them with the Cast and Actors tables. This can significantly improve performance, especially for large datasets.