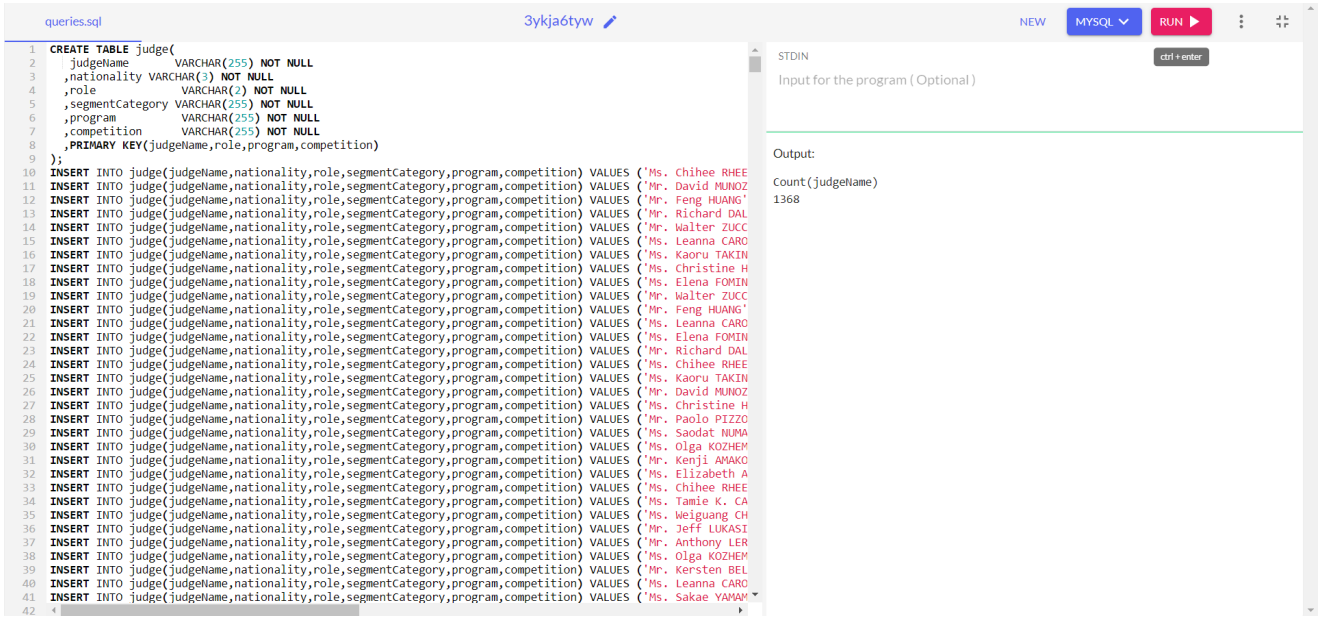
DATABASE IMPLEMENTATION TABLES

Created table for Judges




```
CREATE TABLE judge(
   judgeName      VARCHAR(255) NOT NULL
  ,nationality VARCHAR(3) NOT NULL
  ,role             VARCHAR(2) NOT NULL
  ,segmentCategory VARCHAR(255) NOT NULL
  ,program          VARCHAR(255) NOT NULL
  ,competition      VARCHAR(255) NOT NULL
  ,PRIMARY KEY(judgeName,role,program,competition)
);
INSERT INTO judge(judgeName,nationality,role,segmentCategory,program,competition) VALUES ('Ms. Chihee RHEE
INSERT INTO judge(judgeName,nationality,role,segmentCategory,program,competition) VALUES ('Mr. David MUNOZ
INSERT INTO judge(judgeName,nationality,role,segmentCategory,program,competition) VALUES ('Mr. Feng HUANG'
INSERT INTO judge(judgeName,nationality,role,segmentCategory,program,competition) VALUES ('Mr. Richard DAL
INSERT INTO judge(judgeName,nationality,role,segmentCategory,program,competition) VALUES ('Mr. Walter ZUCC
INSERT INTO judge(judgeName,nationality,role,segmentCategory,program,competition) VALUES ('Ms. Leanna CARO
INSERT INTO judge(judgeName,nationality,role,segmentCategory,program,competition) VALUES ('Ms. Kaoru TAKIN
INSERT INTO judge(judgeName,nationality,role,segmentCategory,program,competition) VALUES ('Ms. Christine H
INSERT INTO judge(judgeName,nationality,role,segmentCategory,program,competition) VALUES ('Ms. Elena FOMIN
INSERT INTO judge(judgeName,nationality,role,segmentCategory,program,competition) VALUES ('Mr. Walter ZUCC
INSERT INTO judge(judgeName,nationality,role,segmentCategory,program,competition) VALUES ('Mr. Feng HUANG'
INSERT INTO judge(judgeName,nationality,role,segmentCategory,program,competition) VALUES ('Ms. Leanna CARO
INSERT INTO judge(judgeName,nationality,role,segmentCategory,program,competition) VALUES ('Ms. Elena FOMIN
INSERT INTO judge(judgeName,nationality,role,segmentCategory,program,competition) VALUES ('Mr. Richard DAL
INSERT INTO judge(judgeName,nationality,role,segmentCategory,program,competition) VALUES ('Ms. Chihee RHEE
INSERT INTO judge(judgeName,nationality,role,segmentCategory,program,competition) VALUES ('Ms. Kaoru TAKIN
INSERT INTO judge(judgeName,nationality,role,segmentCategory,program,competition) VALUES ('Mr. David MUNOZ
INSERT INTO judge(judgeName,nationality,role,segmentCategory,program,competition) VALUES ('Ms. Christine H
INSERT INTO judge(judgeName,nationality,role,segmentCategory,program,competition) VALUES ('Mr. Paolo PIZZO
INSERT INTO judge(judgeName,nationality,role,segmentCategory,program,competition) VALUES ('Ms. Saodat NUMA
INSERT INTO judge(judgeName,nationality,role,segmentCategory,program,competition) VALUES ('Ms. Olga KOZHEM
INSERT INTO judge(judgeName,nationality,role,segmentCategory,program,competition) VALUES ('Mr. Kenji AMAKO
INSERT INTO judge(judgeName,nationality,role,segmentCategory,program,competition) VALUES ('Ms. Elizabeth A
INSERT INTO judge(judgeName,nationality,role,segmentCategory,program,competition) VALUES ('Ms. Chihee RHEE
INSERT INTO judge(judgeName,nationality,role,segmentCategory,program,competition) VALUES ('Ms. Tamie K. CA
INSERT INTO judge(judgeName,nationality,role,segmentCategory,program,competition) VALUES ('Ms. Weiguang CH
INSERT INTO judge(judgeName,nationality,role,segmentCategory,program,competition) VALUES ('Mr. Jeff LUKASI
INSERT INTO judge(judgeName,nationality,role,segmentCategory,program,competition) VALUES ('Mr. Anthony LER
INSERT INTO judge(judgeName,nationality,role,segmentCategory,program,competition) VALUES ('Ms. Olga KOZHEM
INSERT INTO judge(judgeName,nationality,role,segmentCategory,program,competition) VALUES ('Mr. Kersten BEL
INSERT INTO judge(judgeName,nationality,role,segmentCategory,program,competition) VALUES ('Ms. Leanna CARO
INSERT INTO judge(judgeName,nationality,role,segmentCategory,program,competition) VALUES ('Ms. Sakae YAMAM
```

Created table for Skaters

```
CREATE TABLE skater(
   name        VARCHAR(39) NOT NULL PRIMARY KEY
  ,nationality VARCHAR(3) NOT NULL
);

INSERT IGNORE INTO skater(name,nationality) VALUES ('Aliona SAVCHENKO / Bruno MASSOT','GER');
INSERT IGNORE INTO skater(name,nationality) VALUES ('Evgenia TARASOVA / Vladimir MOROZOV','RUS');
INSERT IGNORE INTO skater(name,nationality) VALUES ('Natalia ZABIIAKO / Alexander ENBERT','RUS');
INSERT IGNORE INTO skater(name,nationality) VALUES ('Vanessa JAMES / Morgan CIPRES','FRA');
INSERT IGNORE INTO skater(name,nationality) VALUES ('Marissa CASTELLI / Mervin TRAN','USA');
INSERT IGNORE INTO skater(name,nationality) VALUES ('Miriam ZIEGLER / Severin KIEFER','AUT');
INSERT IGNORE INTO skater(name,nationality) VALUES ('Aliona SAVCHENKO / Bruno MASSOT','GER');
INSERT IGNORE INTO skater(name,nationality) VALUES ('Vanessa JAMES / Morgan CIPRES','FRA');
INSERT IGNORE INTO skater(name,nationality) VALUES ('Evgenia TARASOVA / Vladimir MOROZOV','RUS');
INSERT IGNORE INTO skater(name,nationality) VALUES ('Natalia ZABIIAKO / Alexander ENBERT','RUS');
INSERT IGNORE INTO skater(name,nationality) VALUES ('Marissa CASTELLI / Mervin TRAN','USA');
INSERT IGNORE INTO skater(name,nationality) VALUES ('Miriam ZIEGLER / Severin KIEFER','AUT');
INSERT IGNORE INTO skater(name,nationality) VALUES ('Gabriella PAPADAKIS / Guillaume CIZERON','FRA');
INSERT IGNORE INTO skater(name,nationality) VALUES ('Elena ILINYKH / Ruslan ZHIGANSHIN','RUS');
INSERT IGNORE INTO skater(name,nationality) VALUES ('Madison HUBBELL / Zachary DONOHUE','USA');
INSERT IGNORE INTO skater(name,nationality) VALUES ('Piper GILLES / Paul POIRIER','CAN');
INSERT IGNORE INTO skater(name,nationality) VALUES ('Isabella TOBIAS / Ilia TKACHENKO','ISR');
INSERT IGNORE INTO skater(name,nationality) VALUES ('Marie-Jade LAURIAULT / Romain LE GAC','FRA');
INSERT IGNORE INTO skater(name,nationality) VALUES ('Alexandra NAZAROVA / Maxim NIKITIN','UKR');
INSERT IGNORE INTO skater(name,nationality) VALUES ('Cortney MANSOUR / Michal CESKA','CZE');
INSERT IGNORE INTO skater(name,nationality) VALUES ('Lorenza ALESSANDRINI / Pierre SOUQUET','FRA');
INSERT IGNORE INTO skater(name,nationality) VALUES ('Viktoria KAVALIOVA / Yurii BIELIAIEV','BLR');
INSERT IGNORE INTO skater(name,nationality) VALUES ('Gabriella PAPADAKIS / Guillaume CIZERON','FRA');
```

Created table for Scores

queries.sql 3ykja6tyw NEW MYSQL RUN

```sql
CREATE TABLE score(
   skaterName          VARCHAR(255) NOT NULL
  ,competitionName     VARCHAR(255)  NOT NULL
  ,program             VARCHAR(255) NOT NULL
  ,judgeRole           VARCHAR(2) NOT NULL
  ,avgComponentScore FLOAT NOT NULL
  ,PRIMARY KEY(skaterName,competitionName,program,judgeRole)
);
INSERT INTO score(skaterName,competitionName,program,judgeRole,avgComponentScore) VALUES ('Aliona SAVCHENK
INSERT INTO score(skaterName,competitionName,program,judgeRole,avgComponentScore) VALUES ('Aliona SAVCHENK
INSERT INTO score(skaterName,competitionName,program,judgeRole,avgComponentScore) VALUES ('Aliona SAVCHENK
INSERT INTO score(skaterName,competitionName,program,judgeRole,avgComponentScore) VALUES ('Aliona SAVCHENK
INSERT INTO score(skaterName,competitionName,program,judgeRole,avgComponentScore) VALUES ('Aliona SAVCHENK
INSERT INTO score(skaterName,competitionName,program,judgeRole,avgComponentScore) VALUES ('Aliona SAVCHENK
INSERT INTO score(skaterName,competitionName,program,judgeRole,avgComponentScore) VALUES ('Aliona SAVCHENK
INSERT INTO score(skaterName,competitionName,program,judgeRole,avgComponentScore) VALUES ('Aliona SAVCHENK
INSERT INTO score(skaterName,competitionName,program,judgeRole,avgComponentScore) VALUES ('Aliona SAVCHENK
INSERT INTO score(skaterName,competitionName,program,judgeRole,avgComponentScore) VALUES ('Evgenia TARASOV
INSERT INTO score(skaterName,competitionName,program,judgeRole,avgComponentScore) VALUES ('Evgenia TARASOV
INSERT INTO score(skaterName,competitionName,program,judgeRole,avgComponentScore) VALUES ('Evgenia TARASOV
INSERT INTO score(skaterName,competitionName,program,judgeRole,avgComponentScore) VALUES ('Evgenia TARASOV
INSERT INTO score(skaterName,competitionName,program,judgeRole,avgComponentScore) VALUES ('Evgenia TARASOV
INSERT INTO score(skaterName,competitionName,program,judgeRole,avgComponentScore) VALUES ('Evgenia TARASOV
INSERT INTO score(skaterName,competitionName,program,judgeRole,avgComponentScore) VALUES ('Evgenia TARASOV
INSERT INTO score(skaterName,competitionName,program,judgeRole,avgComponentScore) VALUES ('Evgenia TARASOV
INSERT INTO score(skaterName,competitionName,program,judgeRole,avgComponentScore) VALUES ('Evgenia TARASOV
INSERT INTO score(skaterName,competitionName,program,judgeRole,avgComponentScore) VALUES ('Natalia ZABIIAK
INSERT INTO score(skaterName,competitionName,program,judgeRole,avgComponentScore) VALUES ('Natalia ZABIIAK
INSERT INTO score(skaterName,competitionName,program,judgeRole,avgComponentScore) VALUES ('Natalia ZABIIAK
INSERT INTO score(skaterName,competitionName,program,judgeRole,avgComponentScore) VALUES ('Natalia ZABIIAK
INSERT INTO score(skaterName,competitionName,program,judgeRole,avgComponentScore) VALUES ('Natalia ZABIIAK
INSERT INTO score(skaterName,competitionName,program,judgeRole,avgComponentScore) VALUES ('Natalia ZABIIAK
INSERT INTO score(skaterName,competitionName,program,judgeRole,avgComponentScore) VALUES ('Natalia ZABIIAK
INSERT INTO score(skaterName,competitionName,program,judgeRole,avgComponentScore) VALUES ('Natalia ZABIIAK
INSERT INTO score(skaterName,competitionName,program,judgeRole,avgComponentScore) VALUES ('Natalia ZABIIAK
INSERT INTO score(skaterName,competitionName,program,judgeRole,avgComponentScore) VALUES ('Vanessa JAMES /
INSERT INTO score(skaterName,competitionName,program,judgeRole,avgComponentScore) VALUES ('Vanessa JAMES /
```

STDIN

Input for the program (Optional)

Output:

```
COUNT(*)
1422
```

Created table for Competitions

queries.sql 3ykjbhfjm

```sql
CREATE TABLE competition(
    name          VARCHAR(255) NOT NULL PRIMARY KEY
    -- location, start date, end date not included for now
);

CREATE TABLE admin(
    userID        VARCHAR(255) NOT NULL PRIMARY KEY,
    password      VARCHAR(255) NOT NULL
);


INSERT INTO competition(name) VALUES ('ISU European Figure Skating Championships 2017');
INSERT INTO competition(name) VALUES ('ISU Four Continents Championships 2017');
INSERT INTO competition(name) VALUES ('ISU GP 2016 Skate Canada International');
INSERT INTO competition(name) VALUES ('ISU GP 2017 Skate Canada International');
INSERT INTO competition(name) VALUES ('ISU GP Audi Cup of China 2016');
INSERT INTO competition(name) VALUES ('ISU GP Audi Cup of China 2017');
INSERT INTO competition(name) VALUES ('ISU Grand Prix of Figure Skating Final 2016');
INSERT INTO competition(name) VALUES ('Grand Prix Final 2017 Senior and Junior');
INSERT INTO competition(name) VALUES ('ISU GP Trophee de France 2016');
INSERT INTO competition(name) VALUES ('ISU GP Internationaux de France de Patinage 2017');
INSERT INTO competition(name) VALUES ('ISU GP NHK Trophy 2016');
INSERT INTO competition(name) VALUES ('ISU GP NHK Trophy 2017');
INSERT INTO competition(name) VALUES ('ISU GP Rostelecom Cup 2016');
```

Created table for Admins

```sql
CREATE TABLE Admin(
    userID VARCHAR(255) NOT NULL PRIMARY KEY
   ,password VARCHAR(255) NOT NULL
);
```

TWO ADVANCED SQL QUERIES

Average score judge gives to skaters of different nationalities

queries.sql — 3ykja6tyw — NEW — MYSQL — RUN

```
INSERT IGNORE INTO skater(name,nationality) VALUES ('Evgenia MEDVEDEVA','RUS');
INSERT IGNORE INTO skater(name,nationality) VALUES ('Gabrielle DALEMAN','CAN');
INSERT IGNORE INTO skater(name,nationality) VALUES ('Maria SOTSKOVA','RUS');
INSERT IGNORE INTO skater(name,nationality) VALUES ('Laurine LECAVELIER','FRA');
INSERT IGNORE INTO skater(name,nationality) VALUES ('Wakaba HIGUCHI','JPN');
INSERT IGNORE INTO skater(name,nationality) VALUES ('So Youn PARK','KOR');
INSERT IGNORE INTO skater(name,nationality) VALUES ('Alena LEONOVA','RUS');
INSERT IGNORE INTO skater(name,nationality) VALUES ('Mao ASADA','JPN');
INSERT IGNORE INTO skater(name,nationality) VALUES ('Anastasia GALUSTYAN','ARM');
INSERT IGNORE INTO skater(name,nationality) VALUES ('Gracie GOLD','USA');
INSERT IGNORE INTO skater(name,nationality) VALUES ('Mae Berenice MEITE','FRA');
INSERT IGNORE INTO skater(name,nationality) VALUES ('Yuka NAGAI','JPN');
INSERT IGNORE INTO skater(name,nationality) VALUES ('Evgenia MEDVEDEVA','RUS');
INSERT IGNORE INTO skater(name,nationality) VALUES ('Maria SOTSKOVA','RUS');
INSERT IGNORE INTO skater(name,nationality) VALUES ('Wakaba HIGUCHI','JPN');
INSERT IGNORE INTO skater(name,nationality) VALUES ('So Youn PARK','KOR');
INSERT IGNORE INTO skater(name,nationality) VALUES ('Mae Berenice MEITE','FRA');
INSERT IGNORE INTO skater(name,nationality) VALUES ('Gabrielle DALEMAN','CAN');
INSERT IGNORE INTO skater(name,nationality) VALUES ('Laurine LECAVELIER','FRA');
INSERT IGNORE INTO skater(name,nationality) VALUES ('Gracie GOLD','USA');
INSERT IGNORE INTO skater(name,nationality) VALUES ('Yuka NAGAI','JPN');
INSERT IGNORE INTO skater(name,nationality) VALUES ('Mao ASADA','JPN');
INSERT IGNORE INTO skater(name,nationality) VALUES ('Anastasia GALUSTYAN','ARM');
INSERT IGNORE INTO skater(name,nationality) VALUES ('Alena LEONOVA','RUS');

-- average score judge gives skaters of different nationalities

SELECT judgeName, judge.nationality AS judgeNat, skater.nationality AS skaterNat, AVG(avgComponentScore)
FROM skater JOIN score ON name = skaterName JOIN judge ON competitionName = competition AND score.program
GROUP BY judgeName, judge.nationality, skater.nationality
LIMIT 15;
```

STDIN

Input for the program (Optional)

Output:

```
judgeName       judgeNat        skaterNat       avgScoreFromJudge
Mr. Alexandre GOROJDANOV        BLR     BLR     6.900000
Mr. Alexandre GOROJDANOV        BLR     CAN     8.750000
Mr. Alexandre GOROJDANOV        BLR     FRA     7.600000
Mr. Alexandre GOROJDANOV        BLR     USA     8.600000
Mr. Alexandre GOROJDANOV        BLR     ISR     8.575000
Mr. Alexandre GOROJDANOV        BLR     RUS     9.125000
Mr. Alexandre GOROJDANOV        BLR     CZE     6.625000
Mr. Alexandre GOROJDANOV        BLR     UKR     7.625000
Mr. Alexei BELETSKI     ISR     BLR     6.375000
Mr. Alexei BELETSKI     ISR     CAN     8.500000
Mr. Alexei BELETSKI     ISR     FRA     7.708333
Mr. Alexei BELETSKI     ISR     USA     8.475000
Mr. Alexei BELETSKI     ISR     ISR     8.550000
Mr. Alexei BELETSKI     ISR     RUS     8.675000
Mr. Alexei BELETSKI     ISR     CZE     6.975000
```

Select the highest and lowest average score a judge gives to a nationality and compare them to average score they give per nationality

queries.sql — 3ykja6tyw — NEW — MYSQL — RUN

```
INSERT IGNORE INTO skater(name,nationality) VALUES ('Gabrielle DALEMAN','CAN');
INSERT IGNORE INTO skater(name,nationality) VALUES ('Maria SOTSKOVA','RUS');
INSERT IGNORE INTO skater(name,nationality) VALUES ('Laurine LECAVELIER','FRA');
INSERT IGNORE INTO skater(name,nationality) VALUES ('Wakaba HIGUCHI','JPN');
INSERT IGNORE INTO skater(name,nationality) VALUES ('So Youn PARK','KOR');
INSERT IGNORE INTO skater(name,nationality) VALUES ('Alena LEONOVA','RUS');
INSERT IGNORE INTO skater(name,nationality) VALUES ('Mao ASADA','JPN');
INSERT IGNORE INTO skater(name,nationality) VALUES ('Anastasia GALUSTYAN','ARM');
INSERT IGNORE INTO skater(name,nationality) VALUES ('Gracie GOLD','USA');
INSERT IGNORE INTO skater(name,nationality) VALUES ('Mae Berenice MEITE','FRA');
INSERT IGNORE INTO skater(name,nationality) VALUES ('Yuka NAGAI','JPN');
INSERT IGNORE INTO skater(name,nationality) VALUES ('Evgenia MEDVEDEVA','RUS');
INSERT IGNORE INTO skater(name,nationality) VALUES ('Maria SOTSKOVA','RUS');
INSERT IGNORE INTO skater(name,nationality) VALUES ('Wakaba HIGUCHI','JPN');
INSERT IGNORE INTO skater(name,nationality) VALUES ('So Youn PARK','KOR');
INSERT IGNORE INTO skater(name,nationality) VALUES ('Mae Berenice MEITE','FRA');
INSERT IGNORE INTO skater(name,nationality) VALUES ('Gabrielle DALEMAN','CAN');
INSERT IGNORE INTO skater(name,nationality) VALUES ('Laurine LECAVELIER','FRA');
INSERT IGNORE INTO skater(name,nationality) VALUES ('Gracie GOLD','USA');
INSERT IGNORE INTO skater(name,nationality) VALUES ('Yuka NAGAI','JPN');
INSERT IGNORE INTO skater(name,nationality) VALUES ('Mao ASADA','JPN');
INSERT IGNORE INTO skater(name,nationality) VALUES ('Anastasia GALUSTYAN','ARM');
INSERT IGNORE INTO skater(name,nationality) VALUES ('Alena LEONOVA','RUS');

-- average score judge gives skaters of different nationalities

-- SELECT judgeName, judge.nationality AS judgeNat, skater.nationality AS skaterNat, AVG(avgComponentScor
-- FROM skater JOIN score ON name = skaterName JOIN judge ON competitionName = competition AND score.prog
-- GROUP BY judgeName, judge.nationality, skater.nationality
-- LIMIT 15;

-- select the highest and lowest avg score a judge gives to a nationality and compare to average score th

SELECT judgeName, MAX(avgScoreFromJudge), MIN(avgScoreFromJudge), AVG(avgScoreFromJudge)
FROM (
  SELECT judgeName, judge.nationality AS judgeNat, skater.nationality AS skaterNat, AVG(avgComponentScore
  FROM skater JOIN score ON name = skaterName JOIN judge ON competitionName = competition AND score.progr
  GROUP BY judgeName, judge.nationality, skater.nationality) avgs
GROUP BY judgeName
LIMIT 15
```

STDIN

Input for the program (Optional)

Output:

```
judgeName       MAX(avgScoreFromJudge)  MIN(avgScoreFromJudge)  AVG(avgScoreFrom
Mr. Alexandre GOROJDANOV        9.125000        6.625000        7.9750000000
Mr. Alexei BELETSKI     8.675000        6.375000        7.8541666250
Mr. Daniel DELFA        9.325000        5.850000        7.6829860833
Mr. John MILLIER        9.150000        5.800000        7.6135416250
Mr. Massimo ORLANDINI   9.175000        6.050000        7.8142360833
Mr. Richard KOSINA      8.287500        6.250000        7.4372727273
Mr. Steve WINKLER       9.150000        5.875000        7.6770833333
Mr. Yuri GUSKOV 9.200000        6.500000        7.9447222000
Ms. Christiane MÌÎÎRTH 9.150000        6.525000        7.5657407778
Ms. Christine HURTH     8.750000        6.100000        7.6635416250
Ms. Dagmar LURZ-PROTT   8.100000        6.550000        7.4571428571
Ms. Elena LISOVA        9.200000        6.625000        7.9885416250
Ms. Elisabeth LOUESDON  9.125000        6.575000        7.6337500000
Ms. Francoise DE RAPPARD        9.125000        6.850000        7.7037500000
Ms. Helene CUCUPHAT     8.850000        6.025000        7.8050000000
```

INDEXING ANALYSIS

Query #1

Performance without indexes:

Query #1a

Performance with index on skater nationality. This query was chosen because it is the one of the attributes that is used in the aggregate group-by function. Thus, we thought that being able to locate skaters of the same nationalities with a clustered index would benefit the runtime of the aggregation. We can see that the runtime of the query decreased from 32ms to 24ms.

Query#1b

Performance with an index on the judge's role in a competition/program. We chose to try indexing on this attribute because it is used in the operation to JOIN the judge and score that was assigned to a player by a particular judge. Since JOIN is an expensive operation, we wanted to see if we could reduce runtime for finding attributes used in the join. We can see that this was a good idea, as it decreased the runtime immensely from 32ms to just 9ms

Query#1c

Because of the promising results of the indexing on skater nationality, we wanted to see if indexing with the rest of the group-by attributes would have any benefits. Unfortunately, no combination of group-by attributes (judge name, judge nationality and skater nationality) resulted in better performance than 24ms. Additional combinations we tried were skater nationality and judge role (since judge role led to such improvement), but including other indexes with judge role led to slower performance than just judge role by itself, as shown below with 18ms.

Schema SQL

```
878 INSERT IGNORE INTO skater(name,nationality) VALUES ('Yuka
    NAGAI','JPN');
879 INSERT IGNORE INTO skater(name,nationality) VALUES ('Mao
    ASADA','JPN');
880 INSERT IGNORE INTO skater(name,nationality) VALUES ('Anastasia
    GALUSTYAN','ARM');
881 INSERT IGNORE INTO skater(name,nationality) VALUES ('Alena
    LEONOVA','RUS');
882
883 # CREATE INDEX idx_judge_name ON judge(judgeName);
884 # CREATE INDEX idx_judge_nat ON judge(nationality);
885 CREATE INDEX idx_skater_nat ON skater(nationality);
886 CREATE INDEX idx_j_role ON judge(role);
887
```

Text to DDL

Query SQL

```
1 -- average score judge gives skaters of different nationalities
2
3 EXPLAIN ANALYZE SELECT judgeName, judge.nationality AS judgeNat,
  skater.nationality AS skaterNat, AVG(avgComponentScore) AS
  avgScoreFromJudge
4 FROM skater JOIN score ON name = skaterName JOIN judge ON
  competitionName = competition AND score.program = judge.program
  AND judgeRole = role
5 GROUP BY judgeName, judge.nationality, skater.nationality;
6
7 -- select the highest and lowest avg score a judge gives to a
  nationality and compare to average score they give per
  nationality
```

Results

Copy as Markdown

Query #1 **Execution time: 18ms**

EXPLAIN

-> Table scan on <temporary> (actual time=8.299..8.333 rows=226 loops=1) -> Aggregate using temporary table (actual time=8.297..8.297 rows=226 loops=1) -> Nested loop inner join (cost=41613.25 rows=5616) (actual time=0.126..7.318 rows=702 loops=1) -> Nested loop inner join (cost=41032.15 rows=5616) (actual time=0.120..6.896 rows=702 loops=1) -> Table scan on score (cost=70.45 rows=702) (actual time=0.092..0.395 rows=702 loops=1) -> Index lookup on judge using idx_j_role (role=score.judgeRole), with index condition: ((judge.competition = score.competitionName) and (score.program = judge.program)) (cost=0.75 rows=8) (actual time=0.009..0.009 rows=1 loops=702) -> Single-row index lookup on skater using PRIMARY (name=score.skaterName) (cost=0.25 rows=1) (actual time=0.000..0.000 rows=1 loops=702)

Schema SQL

```
871 INSERT IGNORE INTO skater(name,nationality) VALUES ('Maria
    SOTSKOVA','RUS');
872 INSERT IGNORE INTO skater(name,nationality) VALUES ('Wakaba
    HIGUCHI','JPN');
873 INSERT IGNORE INTO skater(name,nationality) VALUES ('So Youn
    PARK','KOR');
874 INSERT IGNORE INTO skater(name,nationality) VALUES ('Mae Berenice
    MEITE','FRA');
875 INSERT IGNORE INTO skater(name,nationality) VALUES ('Gabrielle
    DALEMAN','CAN');
876 INSERT IGNORE INTO skater(name,nationality) VALUES ('Laurine
    LECAVELIER','FRA');
877 INSERT IGNORE INTO skater(name,nationality) VALUES ('Gracie
    GOLD','USA');
```

Text to DDL

Query SQL

```
1 -- average score judge gives skaters of different nationalities
2
3 EXPLAIN ANALYZE SELECT judgeName, judge.nationality AS judgeNat,
  skater.nationality AS skaterNat, AVG(avgComponentScore) AS
  avgScoreFromJudge
4 FROM skater JOIN score ON name = skaterName JOIN judge ON
  competitionName = competition AND score.program = judge.program
  AND judgeRole = role
5 GROUP BY judgeName, judge.nationality, skater.nationality;
6
7 -- select the highest and lowest avg score a judge gives to a
  nationality and compare to average score they give per
  nationality
```

Results

Copy as Markdown

Query #1 **Execution time: 29ms**

EXPLAIN

-> Table scan on <temporary> (actual time=27.538..27.573 rows=226 loops=1) -> Aggregate using temporary table (actual time=27.537..27.537 rows=226 loops=1) -> Nested loop inner join (cost=1268.01 rows=2808) (actual time=0.418..26.443 rows=702 loops=1) -> Inner hash join (no condition) (cost=285.21 rows=2808) (actual time=0.328..0.689 rows=2808 loops=1) -> Table scan on judge (cost=0.19 rows=72) (actual time=0.070..0.115 rows=72 loops=1) -> Hash -> Covering index scan on skater using idx_skater_nat (cost=4.15 rows=39) (actual time=0.169..0.175 rows=39 loops=1) -> Filter: (score.program = judge.program) (cost=0.25 rows=1) (actual time=0.009..0.009 rows=0 loops=2808) -> Single-row index lookup on score using PRIMARY (skaterName=skater.`name`, competitionName=judge.competition, program=judge.program, judgeRole=judge.`role`) (cost=0.25 rows=1) (actual time=0.009..0.009 rows=0 loops=2808)

Query #2

Performance without indices. (Runtime: 28.47 ms.)

Query #2a

Performance with index on skater nationality. (Runtime: 24.44 ms.) We create an index on the skater(nationality) attribute, as this is being called in the inner SELECT function. As seen when comparing the two queries of EXPLAIN ANALYZE on the default index as well as the newly created index for the skater(nationality), the latter query has a faster runtime than the former… aka, an index for the skater nationality really benefits the runtime for this query.

Query #2b

Performance with index on judge program. (Runtime: 17.52 ms.) We create an index on the judge(program) attribute, as this is being called in the FROM function; the multiple tables are being joined based on the judge.program being equal to score.program, ensuring that they are both from the same discipline/event type (e.g., Men's Short Program). We can see that similar to Query #2a, an index for the judge program really benefits the runtime for this query (even more so than Query #2a).

Query #2c

Performance with index on the average component score. (Runtime: 32.19 ms.) We create an index on the score(avgComponentScore), as this is being called in the inner SELECT function. Unfortunately, it seems that an index on this particular attribute slows the runtime by approximately ~4 ms, which is not ideal. It is possible that this occurs because every score will have a unique component score, ranging from 0 - 10 with a 0.25 step. (E.g., 8.00, 8.25, 8.50, 8/75, etc.)