Sean Fletcher
Database Systems Assignment 04
.PDF writeup

Deliverable 1: All the Python methods should follow the names specified in the assignment. Make sure your code is documented well:

    a. For Functions and Procedures 1, I added a method that calls the function stored in the database: "callAvgFunction()". This is the function I call when I do the time comparisons.

    b. For Functions and Procedure 2, I changed the parameters for both createProcedure() and updateRating(). Instead of using a series' name, I use the IMDB_id. I chose to do this because there are many series in the db that have the same name.

Deliverable 2: A .PDF file answering the question about functions in SQL and Python:

"In your PDF file, discuss these timings and explain which one was faster." -Behrooz Mansouri

    Initially I thought this was going to be a pretty straight forward answer. One set of calculations was going to be faster than the other, and that was going to be the beginning and ending of the "discussion". Well, one WAS significantly faster (see the print statement below), but that only brings up a new, and I think more interesting, discussion. I am going to briefly discuss two reasons as to why performing calculations in the database is faster than in an application layer, and then I am going to talk about a specific situation where one might choose to still perform some calculations in an application layer despite it being slower.

Print statement:
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The SQL function took 1.3107 seconds to run.
The Python function took 2.7202 seconds to run.
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    Yes, computing in the database is faster. This is because of quite a few reasons, but I am going to talk about two:

    1. The database server is optimized for data processing and takes advantage of the speed/efficiency gained by its indexing, caching, and query optimization capabilities. This is especially true for larger databases and larger amounts of computations.

    2. When calculations are done in the database, generally only the final result (a number, a subset of data, etc.) is transferred. When calculations are performed in the application layer ALL the data you're working with is transferred. By performing all the calculations in

the database a lot of time can be saved during the transferring process. This issue is compounded in situations where the internet is slow.

But what about situations where you might choose to do some of your computations in the application layer? One situation I'm going to discuss is scalability while using a structure that utilizes a collection of smaller independent services that communicate with each other through APIs (microservices architecture). While databases are designed to handle large amounts of traffic, by keeping calculations in the application layers you could scale any one of the services independently of the database. Now this example is assuming that each micro service is using the same database, when really each service often has its own dedicated database.

What also sometimes happens is a hybrid approach where some calculations, often less complex calculations, are performed in the database and more intensive tasks are done in the application layer.

In conclusion, database functions are an efficient and therefore powerful tool at our disposal. Let's use them when it is appropriate to do so!

Deliverable 3: copy-paste results from the console:

C:\Users\fletc\AppData\Local\Microsoft\WindowsApps\python3.11.exe
C:\Users\fletc\PycharmProjects\DB\mysql_playground\db_assignment4.py

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Method 1 results:
[(1874, 1), (1877, 1), (1878, 1), (1887, 2), (1888, 1), (1891, 1), (1892, 1), (1894, 14), (1895, 6), (1896, 7), (1897, 2), (1898, 5), (1899, 5), (1900, 5), (1902, 2), (1903, 4), (1904, 3), (1905, 2), (1906, 6), (1907, 2), (1908, 7), (1909, 14), (1910, 15), (1911, 25), (1912, 27), (1913, 28), (1914, 27), (1915, 33), (1916, 29), (1917, 41), (1918, 46), (1919, 46), (1920, 33), (1921, 36), (1922, 36), (1923, 37), (1924, 38), (1925, 74), (1926, 83), (1927, 96), (1928, 80), (1929, 131), (1930, 239), (1931, 231), (1932, 287), (1933, 262), (1934, 301), (1935, 353), (1936, 349), (1937, 350), (1938, 322), (1939, 336), (1940, 330), (1941, 359), (1942, 425), (1943, 381), (1944, 374), (1945, 303), (1946, 307), (1947, 302), (1948, 310), (1949, 350), (1950, 369), (1951, 385), (1952, 364), (1953, 389), (1954, 355), (1955, 392), (1956, 377), (1957, 427), (1958, 406), (1959, 383), (1960, 389), (1961, 385), (1962, 375), (1963, 356), (1964, 461), (1965, 497), (1966, 534), (1967, 546), (1968, 559), (1969, 531), (1970, 563), (1971, 616), (1972, 671), (1973, 650), (1974, 603), (1975, 554), (1976, 559), (1977, 573), (1978, 563), (1979, 605), (1980, 618), (1981, 643), (1982, 647), (1983, 732), (1984, 746), (1985, 773), (1986, 806), (1987, 902), (1988, 939), (1989, 942), (1990, 861), (1991, 873), (1992, 845), (1993, 942), (1994, 968), (1995, 1083), (1996, 1056), (1997, 1114), (1998, 1153), (1999, 1199), (2000, 1275), (2001, 1353), (2002, 1386), (2003, 1533), (2004, 1585), (2005, 1788), (2006, 1907), (2007, 1961), (2008, 2013), (2009, 2237), (2010,

2308), (2011, 2670), (2012, 2780), (2013, 3092), (2014, 3360), (2015, 3465), (2016, 3916), (2017, 4215), (2018, 4357), (2019, 4594), (2020, 4207), (2021, 4805), (2022, 5994), (2023, 2587)]
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Method 2 results:

Angelina Jolie has starred in:
['Eternals', 'Gone in 60 Seconds', 'Wanted', 'Kung Fu Panda', 'Mr. & Mrs. Smith', 'Those Who Wish Me Dead', 'Alexander', 'Salt', 'The Tourist', 'Kung Fu Panda 3', 'Lara Croft: Tomb Raider', 'Kung Fu Panda 2', 'Beowulf', 'Lara Croft: Tomb Raider - The Cradle of Life', 'Sky Captain and the World of Tomorrow', 'Cyborg 2: Glass Shadow', 'True Women', 'Kung Fu Panda Holiday', 'Shark Tale', 'Maleficent', 'Maleficent: Mistress of Evil', 'Beyond Borders', 'Kung Fu Panda: Secrets of the Masters', 'Girl, Interrupted', 'Gia', 'Changeling', 'A Mighty Heart', 'George Wallace', "Jane's Journey", 'Pushing Tin', 'Life or Something Like It', 'Hackers', 'The Bone Collector', 'Taking Lives', 'Playing God', "Hell's Kitchen", 'Brad Pitt: Breaking Hollywood', 'Indiana Jones: The Search for the Lost Golden Age', 'The Good Shepherd', 'Original Sin', 'By the Sea', 'Antonello Venditti: Alta marea', "The Lemonheads: It's About Time", 'Billy Bob Thornton: Angelina', 'Meat Loaf: Rock and Roll Dreams Come Through', 'Foxfire', 'Mojave Moon', 'Without Evidence']

Brad Pitt has starred in:
['Bullet Train', 'Fury', 'World War Z', 'Mr. & Mrs. Smith', 'Megamind', 'Allied', "The Devil's Own", 'Spy Game', 'Inglourious Basterds', 'Ad Astra', 'Seven Years in Tibet', 'Sinbad: Legend of the Seven Seas', 'The Mexican', 'Cool World', 'Voyage of Time', 'Sinbad and the Cyclops Island', 'The Big Short', 'Moneyball', '12 Years a Slave', 'The Assassination of Jesse James by the Coward Robert Ford', 'Jeff Buckley: Everybody Here Wants You', "Brad Pitt, la revanche d'un blond", 'Close Up', 'Babylon', 'Once Upon a Time in Hollywood', 'Snatch', 'Burn After Reading', 'War Machine', 'The Audition', 'The Favor', 'Johnny Suede', 'Cutting Class', 'Se7en', "Ocean's Eleven", 'Sleepers', "Ocean's Twelve", "Ocean's Thirteen", 'Kalifornia', 'Killing Them Softly', 'Too Young to Die?', 'Hitting the Apex', 'Brad Pitt: Breaking Hollywood', 'Fight Club', 'Troy', 'Meet Joe Black', 'The Curious Case of Benjamin Button', 'Legends of the Fall', 'Interview with the Vampire: The Vampire Chronicles', 'Babel', 'The Tree of Life', 'A River Runs Through It', 'By the Sea', 'The Oscars', '12 Monkeys', 'The Dark Side of the Sun', 'Across the Tracks', 'Super Bowl LV', 'Studio 42 with Bob Costas', 'Contact']

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Method 3 results:

Series featuring Angelina Jolie in the Documentary genre:
Title: Jane's Journey, Rating: 7.2
Title: Brad Pitt: Breaking Hollywood, Rating: 8.0
Title: Indiana Jones: The Search for the Lost Golden Age, Rating: 6.9

Series featuring Angelina Jolie in the Animation genre:
Title: Kung Fu Panda, Rating: 7.6
Title: Kung Fu Panda 3, Rating: 7.1
Title: Kung Fu Panda 2, Rating: 7.2
Title: Beowulf, Rating: 6.3
Title: Kung Fu Panda Holiday, Rating: 6.7
Title: Shark Tale, Rating: 6.0
Title: Kung Fu Panda: Secrets of the Masters, Rating: 6.8

Series featuring Angelina Jolie in the Sci-Fi genre:
Title: Cyborg 2: Glass Shadow, Rating: 3.9

Series featuring Brad Pitt in the Documentary genre:
Title: Voyage of Time, Rating: 7.1
Title: Jeff Buckley: Everybody Here Wants You, Rating: 7.7
Title: Brad Pitt, la revanche d'un blond, Rating: 6.9
Title: Close Up, Rating: 7.1
Title: Hitting the Apex, Rating: 8.1
Title: Brad Pitt: Breaking Hollywood, Rating: 8.0

Series featuring Brad Pitt in the Animation genre:
Title: Megamind, Rating: 7.3
Title: Sinbad: Legend of the Seven Seas, Rating: 6.7
Title: Cool World, Rating: 4.8
Title: Voyage of Time, Rating: 7.1
Title: Sinbad and the Cyclops Island, Rating: 6.6

Series featuring Brad Pitt in the Sci-Fi genre:
Title: 12 Monkeys, Rating: 8.0

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Method 4 results:

Angelina Jolie, Brad Pitt have starred together in:
['Mr. & Mrs. Smith', 'Brad Pitt: Breaking Hollywood', 'By the Sea']

Ewan McGregor, Hayden Christensen, Natalie Portman have starred together in:
['Star Wars: Episode III - Revenge of the Sith', 'Star Wars: Episode II - Attack of the Clones']

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Method 5 results:

Ewan McGregor starred in these popular series:
['Lipstick on Your Collar', 'Shallow Grave', 'The Pillow Book', 'Brassed Off', 'Trainspotting', 'Velvet Goldmine', 'Star Wars: Episode I - The Phantom Menace', 'Star Wars: Episode II - Attack of the Clones', 'Star Wars: Episode III - Revenge of the Sith', 'Little Voice', 'Moulin Rouge!', 'Black Hawk Down', 'Big Fish', 'Solid Geometry', 'Faster', 'Stay', 'The Island', 'Long Way Round', 'Miss Potter', "Cassandra's Dream", 'Angels & Demons', 'Long Way Down', 'I Love You Phillip Morris', 'Stormborn', 'The Ghost Writer', 'Long Way Up', 'Perfect Sense', 'Salmon Fishing in the Yemen', "Guillermo del Toro's Pinocchio", 'Faster & Faster', 'Beginners', 'You Sing Loud, I Sing Louder', 'The Impossible', 'Fastest', 'Charge', "Obi-Wan Kenobi: A Jedi's Return", 'T2 Trainspotting', 'Lo imposible: Making Of', 'Christopher Robin', 'Doctor Sleep', 'Obi-Wan Kenobi', 'Halston']

Hayden Christensen starred in these popular series:
['Star Wars: Episode II - Attack of the Clones', 'Star Wars: Episode III - Revenge of the Sith', 'Awake', 'Life as a House', 'Shattered Glass', 'Lego Star Wars: The Video Game', 'Star Wars: Episode III - The Return of Darth Vader', 'Obi-Wan Kenobi']

Natalie Portman starred in these popular series:
['Léon: The Professional', 'Star Wars: Episode I - The Phantom Menace', 'Star Wars: Episode II - Attack of the Clones', 'Star Wars: Episode III - Revenge of the Sith', 'Where the Heart Is', 'Garden State', 'Closer', 'True', 'V for Vendetta', "Goya's Ghosts", 'The Other Boleyn Girl', 'Brothers', 'My Blueberry Nights', 'Thor', 'Black Swan', 'Dolphin Reef', 'Hotel Chevalier', 'May December', 'Hesher', 'Jackie', 'Thor: The Dark World', 'Eating Animals', 'Secrets of the Elephants', 'Angel City', 'Annihilation', "The Lonely Island, feat Natalie Portman & Chris Parnell: Natalie's Rap", "The Lonely Island: Natalie's Rap 2.0"]

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Method 6 results:

Genre	Average Rating
Documentary	7.28
Short	6.96
Animation	6.79
Comedy	6.32
Sport	6.86
News	7.03
Horror	5.31
Biography	6.96
Western	6.00
Fantasy	6.31
Drama	6.52
Action	6.23
Crime	6.48
History	7.03
Adventure	6.38
War	6.66
Family	6.43
Romance	6.38
Thriller	5.79
Music	6.85
Sci-Fi	5.68
Mystery	6.24
Musical	6.45
Film-Noir	6.79
Talk-Show	6.91
Game-Show	6.56
Reality-TV	6.58
Adult	4.20

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Method 7 results:

Sci-Fi series staring Keanu Reeves where Lana Wachowski directed:
['The Matrix Resurrections', 'The Matrix Awakens: An Unreal Engine 5 Experience']

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Functions and Procedures 01 results:

The SQL function took 1.3107 seconds to run.
The Python function took 2.7202 seconds to run.

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Functions and Procedures 02 results:

calling createProcedure()
Stored procedure created successfully

calling updateRating() with IMDB_id 'tt0816711' (World War Z) and rating 9.9:
Rating for IMDb ID: tt0816711 is now 9.9

calling updateRating() with IMDB_id 'tt0187078' (Gone in 60 Seconds) and rating 11.1:
Error: 1644 (45000): Invalid rating. The rating must be between 0 and 10.

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Process finished with exit code 0