

Lab03

- Kappa -

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Setup

Create a docker image with a MongoDB Server:

```
sudo docker run -d --rm --name mymongo -p 27017-27019:27017-27019 mongo:latest
```

Import data with Python script:

```
import sys
import os
from datetime import datetime, timedelta
from pymongo import MongoClient

BATCH_SIZE = 100_000

# Check args
if len(sys.argv) < 3:
    print("Error: No filename to import provided")
    sys.exit(1)

# Get filename from sysargs
path = sys.argv[1]
movie_path = sys.argv[2]

if not os.path.exists(path) or not os.path.exists(movie_path):
    print("Error: Invalid filename")
    sys.exit(1)

rows = []
movie_rows = []

batch_counter = 1

client = MongoClient("mongodb://localhost:27017")
db = client.movies

print("!!! Clearing data in the titles collection !!!")
db.titles.delete_many({})

with open(movie_path, "r", encoding = "ISO-8859-1") as f:
    line = f.readline()

    while line:
        if not line:
            break

        line_ar = line.rstrip().split(",")

        if str(line_ar[1]) == "NULL":
            movie_rows.append(
                {"_id": int(line_ar[0]), "title": str(line_ar[2])})
        else:
            movie_rows.append({"_id": int(line_ar[0]), "year": int(
                line_ar[1]), "title": str(line_ar[2])})
            line = f.readline()

    print("Inserting data into db...")
    result = db.titles.insert_many(movie_rows)
    print("Inserted " + str(db.titles.count_documents({})) + " title documents")

    print("!!! Clearing data in the reviews collection !!!")
    db.reviews.delete_many({})

    with open(path, "r") as f:
        while True:
            if batch_counter % BATCH_SIZE == 0:
                print("Processed " + str(batch_counter) + " lines")
                print("Writing to mongodb...")
                result = db.reviews.insert_many(rows)
                rows = []

            line = f.readline()
            if not line:
                break

            line = line.rstrip().split(",")
            date_of_rating = datetime.strptime(line[3], '%Y-%m-%d')

            rows.append({"movie_id": int(line[0]), "user_id": int(
                line[1]), "rating": int(line[2]), "time": date_of_rating})
            batch_counter += 1

    print("Inserted " + str(db.reviews.count_documents({})) + " documents")
    print("Done")
```

Tasks

- a) Compute the average rating, lowest rating, highest rating and number of ratings per movie

```
moviegroup = db.reviews.aggregate([
  {'$group':
    { '_id': "$movie_id",
      "count":
        { '$sum' : 1 },
      "average":
        { '$avg': '$rating' },
      "min":
        { '$min': '$rating' },
      "max":
        { '$max': '$rating' }
    }
  },
  {"$sort": { "_id": 1 }},
  {'$lookup': {'from': 'titles', 'localField': '_id', 'foreignField': '_id', 'as': 'title'}},
  {'$project': {'overall': 1, 'title.title': 1, 'count': 1, 'average': 1, 'min': 1, 'max': 1,
    '_id': 0}}
] )

for group in moviegroup:
    print(group)
```

{'average': 2.703488372093023, 'min': 1, 'max': 5, 'title': [{'title': 'Tai Chi 6 Forms'}]}

{'average': 4.220952380952381, 'min': 1, 'max': 5, 'title': [{'title': 'The Twelve Kingdoms'}]}

{'average': 3.7228849886768036, 'min': 1, 'max': 5, 'title': [{'title': 'Fatal Attraction'}]}

{'average': 2.5681818181818183, 'min': 1, 'max': 5, 'title': [{'title': 'Black Beauty (Animated)'}]}

{'average': 2.4784313725490197, 'min': 1, 'max': 5, 'title': [{'title': 'Mana: Beyond Belief'}]}

- b) Get the movie with the lowest overall rating. If the movies are tied for rating, take the movie with the lowest movie_id

```
lowestrating = db.reviews.aggregate(
  [
    {'$group':
      { '_id': '$movie_id',
        'overall':
          { '$avg': { '$sum': '$rating' } }
      }
    },
    {'$sort': {'overall': 1, '_id': 1}},
    {'$limit': 1},
    {'$lookup': {'from': 'titles', 'localField': '_id', 'foreignField': '_id', 'as': 'title'}},
    {'$project': {'overall': 1, 'title.title': 1, '_id': 0}}
  ]
)

for group in lowestrating:
    print(group)
```

{'overall': 1.2878787878787878, 'title': [{'title': 'Avia Vampire Hunter'}]}

c) Get the movie with the highest overall rating. If the movies are tied for rating, take the movie with the lowest movie_id

```
highestrating = db.reviews.aggregate([
    {
        '$group': {
            '_id': '$movie_id',
            'overall': {
                '$avg': {'$sum': '$rating'}}
        },
        '$sort': {'overall': -1, '_id': 1},
        '$limit': 1,
        '$lookup': {'from': 'titles', 'localField': '_id', 'foreignField': '_id', 'as': 'title'},
        '$project': {'overall': 1, 'title.title': 1, '_id': 0}
    ])

for group in highestrating:
    print(group)
```

```
{'overall': 4.723269925683507, 'title': [{'title': 'Lord of the Rings: The Return of the King: Extended Edition'}]}
```

d) Get the number of ratings in February 2002

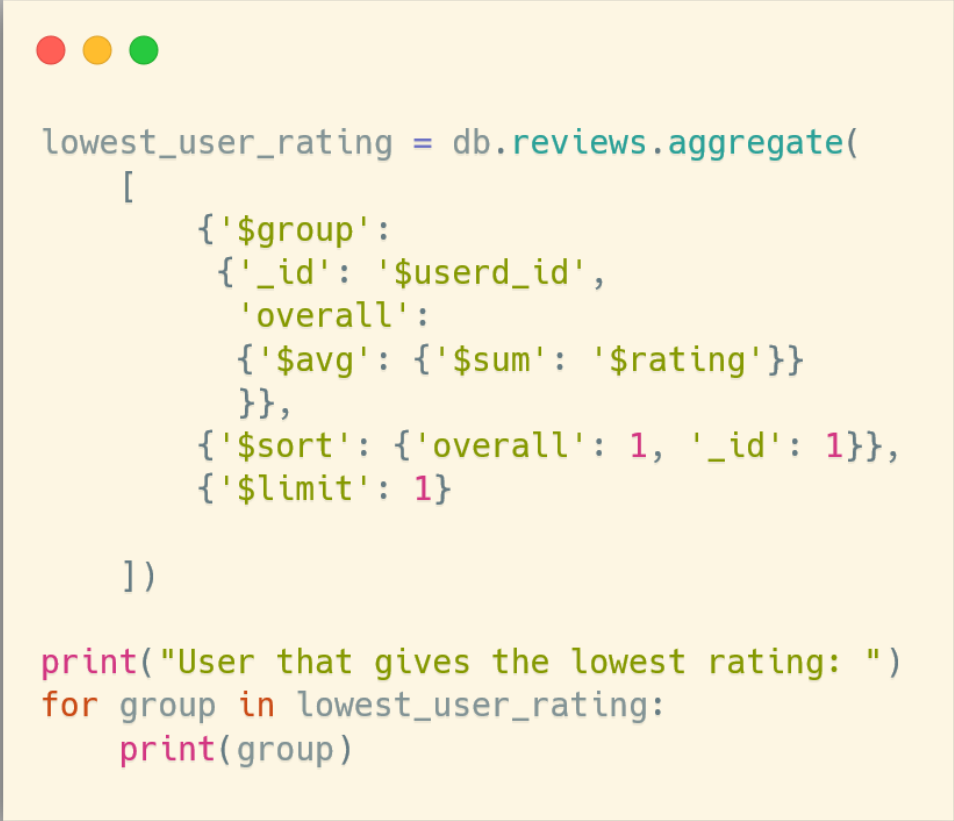
```
start_date = datetime.strptime('2002-02-01', '%Y-%m-%d')
end_date = datetime.strptime('2002-02-28', '%Y-%m-%d')

query = {"time": {"$gte": start_date, "$lte": end_date}}
sum_ratings_feb = db.reviews.count_documents(query)

print("Number of rating in February 2002:", sum_ratings_feb)
```

Number of rating in February 2002: 261954

e) Get the user that creates the lowest average rating and has rated at least 5 times. If two users are tied, use the one with the lower user_id



```
lowest_user_rating = db.reviews.aggregate([
    {'$group':
     {'_id': '$userd_id',
      'overall':
       {'$avg': {'$sum': '$rating'}}
     }},
    {'$sort': {'overall': 1, '_id': 1}},
    {'$limit': 1}

])

print("User that gives the lowest rating: ")
for group in lowest_user_rating:
    print(group)
```

```
{'_id': 3174, 'overall': 1.0}
```

f) For the movie “The Spy Who Loved Me”: Get the average rating for each year and month sorted by year and month in ascending order

```
result = db.titles.find({"title": "The Spy Who Loved Me"})

for r in result:
    spy_id = r.get("_id")

average_ratings_over_time = db.reviews.aggregate(
    [
        {'$project': {
            'month': {'$month': '$time'},
            'year': {'$year': '$time'},
            'movie_id': '$movie_id',
            'time': '$time',
            'rating': '$rating'
        }},
        {'$match': {
            'movie_id': spy_id
        }},
        {'$group': {
            '_id': ['$year', '$month'],
            'avg': {'$avg': '$rating'}}
        },
        {'$sort': {'_id': 1}}
    ]
)

for r in average_ratings_over_time:
    print(r)
```

```
{'_id': [2000, 1], 'avg': 3.3666666666666667}
```

```
{'_id': [2000, 2], 'avg': 3.5952380952380953}
```

```
{'_id': [2000, 3], 'avg': 3.3962264150943398}
```

```
{'_id': [2000, 4], 'avg': 3.6481481481481484}
```

```
{'_id': [2000, 5], 'avg': 3.2972972972972974}
```

```
{'_id': [2000, 6], 'avg': 3.4782608695652173}
```

```
{'_id': [2000, 7], 'avg': 4.5}
```

{'_id': [2000, 8], 'avg': 3.8}
{'_id': [2000, 9], 'avg': 3.6122448979591835}
{'_id': [2000, 10], 'avg': 3.3157894736842106}
{'_id': [2000, 11], 'avg': 3.4318181818181817}
{'_id': [2000, 12], 'avg': 3.6}
{'_id': [2001, 1], 'avg': 3.43}
{'_id': [2001, 2], 'avg': 3.4645669291338583}
{'_id': [2001, 3], 'avg': 3.596774193548387}
{'_id': [2001, 4], 'avg': 3.4285714285714284}
{'_id': [2001, 5], 'avg': 3.1333333333333333}
{'_id': [2001, 6], 'avg': 3.473684210526316}
{'_id': [2001, 7], 'avg': 3.452830188679245}
{'_id': [2001, 8], 'avg': 3.211267605633803}
{'_id': [2001, 9], 'avg': 3.357142857142857}
{'_id': [2001, 10], 'avg': 3.4035087719298245}
{'_id': [2001, 11], 'avg': 3.5}
{'_id': [2001, 12], 'avg': 3.4242424242424243}
{'_id': [2002, 1], 'avg': 3.486842105263158}
{'_id': [2002, 2], 'avg': 3.2666666666666666}
{'_id': [2002, 3], 'avg': 3.2}
{'_id': [2002, 4], 'avg': 3.857142857142857}
{'_id': [2002, 5], 'avg': 3.875}
{'_id': [2002, 6], 'avg': 3.2}
{'_id': [2002, 7], 'avg': 3.769230769230769}
{'_id': [2002, 8], 'avg': 3.0}
{'_id': [2002, 9], 'avg': 3.625}
{'_id': [2002, 10], 'avg': 3.3611111111111111}
{'_id': [2002, 11], 'avg': 3.4411764705882355}
{'_id': [2002, 12], 'avg': 3.488372093023256}
{'_id': [2003, 1], 'avg': 3.5142857142857142}
{'_id': [2003, 2], 'avg': 3.4}
{'_id': [2003, 3], 'avg': 3.909090909090909}

{'_id': [2003, 4], 'avg': 3.574468085106383}
{'_id': [2003, 5], 'avg': 3.545045045045045}
{'_id': [2003, 6], 'avg': 3.62751677852349}
{'_id': [2003, 7], 'avg': 3.606779661016949}
{'_id': [2003, 8], 'avg': 3.5727272727272728}
{'_id': [2003, 9], 'avg': 3.7943548387096775}
{'_id': [2003, 10], 'avg': 3.7047970479704797}
{'_id': [2003, 11], 'avg': 3.7598684210526314}
{'_id': [2003, 12], 'avg': 3.6545454545454548}
{'_id': [2004, 1], 'avg': 3.6657824933687}
{'_id': [2004, 2], 'avg': 3.6299019607843137}
{'_id': [2004, 3], 'avg': 3.7971311475409837}
{'_id': [2004, 4], 'avg': 3.749598715890851}
{'_id': [2004, 5], 'avg': 3.8121951219512193}
{'_id': [2004, 6], 'avg': 3.8466666666666667}
{'_id': [2004, 7], 'avg': 3.8508997429305913}
{'_id': [2004, 8], 'avg': 3.839103869653768}
{'_id': [2004, 9], 'avg': 3.9307692307692306}
{'_id': [2004, 10], 'avg': 3.828402366863905}
{'_id': [2004, 11], 'avg': 3.8620102214650767}
{'_id': [2004, 12], 'avg': 3.8952879581151834}
{'_id': [2005, 1], 'avg': 3.849740932642487}
{'_id': [2005, 2], 'avg': 3.913680781758958}
{'_id': [2005, 3], 'avg': 3.9312}
{'_id': [2005, 4], 'avg': 3.9008130081300814}
{'_id': [2005, 5], 'avg': 3.8392101551480957}
{'_id': [2005, 6], 'avg': 3.863128491620112}
{'_id': [2005, 7], 'avg': 3.918918918918919}
{'_id': [2005, 8], 'avg': 3.92625}
{'_id': [2005, 9], 'avg': 3.881491344873502}
{'_id': [2005, 10], 'avg': 3.9315726290516206}
{'_id': [2005, 11], 'avg': 3.958588957055215}


```
{'_id': [2005, 12], 'avg': 3.822125813449024}
```

Conclusion:

MongoDB proved to be the ideal solution due to the flexible aggregation pipeline.