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Data Science e Tecnologie per le Basi di Dati
Quaderno 4 – MongoDB

Rispondere alle seguenti domande con interrogazioni MongoDB, riportando sia l'interrogazione che il suo risultato nel dataset fornito.

Domanda 1

Quante stazioni hanno rispettivamente status (extra.status) "online" e "offline"?

Query

```
db.bike_stations.aggregate(
    {$match:
        {
            "extra.status": {$in: ["online", "offline"]}
        }
    },
    {$group:
        {
            _id: "$extra.status",
            "count": {$sum: 1}
        }
    }
)
```

Risultato


```
Atlas atlas-65yja4-shard-0 [primary] Quad4> db.bike_stations.aggregate
[ { _id: 'offline', count: 28 }, { _id: 'online', count: 33 } ]
Atlas atlas-65yja4-shard-0 [primary] Quad4>
```

Domanda 2

Query

```
db.bike_stations.aggregate(
    {$match:
        {
            "extra.status": {$nin: ["online", "offline"]}
        }
    },
    {$group:
```

```
                {
                        _id: "$extra.status",
                        "count": {$sum: 1}
                }
        }
)
```

Risultato

```
[ { _id: 'maintenance', count: 4 } ]
```

Domanda 3

Query

```
db.bike_stations.aggregate(
        {$match:
                {
                        "extra.status": {$nin: ["online", "offline"]}
                }
        },
        {$project:
                {
                        status: "$extra.status",
                        _id:0
                }
        }
)
```

Risultato

```
[
  { status: 'maintenance' },
  { status: 'maintenance' },
  { status: 'maintenance' },
  { status: 'maintenance' }
]
```

Domanda 4

Query

```
db.bike_stations.aggregate(
        {$match:
                {
                        "extra.status": {$eq: "online"}
                }
        },
```

```
{$group:
        {
                _id: "$name",
                "avg_score": {$avg: "$extra.score"}
        }
},
{$match:
        {avg_score: {$gte: 4}}
},
{$project:
        {
                _id: 0,
                name:"$_id"
        }
},
{$sort: {_id: 1}}
)
```

Risultato

```
[
  { name: '02. Pettiti' },
  { name: 'Borromini' },
  { name: 'Principi d`Acaja 1' },
  { name: 'Porta Palatina' },
  { name: '06. Municipio' },
  { name: 'Politecnico 3' },
  { name: '04. Reggia' },
  { name: 'Principi d`Acaja 2' },
  { name: '10. Gallo Praile' },
  { name: 'Corte d`Appello' },
  { name: 'Belfiore' },
  { name: 'Giolitti 1' },
  { name: 'Politecnico 1' },
  { name: 'Castello 1' },
  { name: 'San Francesco da Paola' },
  { name: 'Sant´Anselmo' },
  { name: '08. San Marchese' },
  { name: 'Tribunale' }
]
```

Domanda 5

Query

```
db.bike_stations.aggregate(
        {$match:
                {
```

```
                    "extra.status": {$eq: "offline"},
                    $or: [
                            {free_bikes: {$gt: 0}},
                            {empty_slots: {$gt: 0}}
                    ]
            }
    },
    {$project:
            {

                    _id: 0,
                    name:1,
                    free_bikes:1,
                    empty_slots: 1
            }
    }
)
```

Risultato

```
[
  { empty_slots: 1, free_bikes: 0, name: '06. Le Serre' },
  { empty_slots: 0, free_bikes: 5, name: '05. Corso Garibaldi' }
]
```

Domanda 6

Query

```
db.bike_stations.aggregate(
    {$group:
            {
                    _id: null,
                    total_reviews: {$sum: "$extra.reviews"}
            }
    },
    {$project:
            {
                    _id:0,
                    total_reviews:1
            }
    }
)
```

Risultato

```
[ { total_reviews: 15311 } ]
```

Domanda 7

Query

```
db.bike_stations.aggregate(
        {$group:
                {
                        _id: "$extra.score",
                        num_stations: {$sum: 1}
                }
        },
        {$project:
                {
                        _id:0,
                        num_stations:1,
                        score:"$_id"
                }
        },
        {$sort: {score: -1}}
)
```

Risultato

```
[
  { num_stations: 1, score: 4.7 },
  { num_stations: 2, score: 4.5 },
  { num_stations: 2, score: 4.4 },
  { num_stations: 2, score: 4.3 },
  { num_stations: 7, score: 4.2 },
  { num_stations: 5, score: 4.1 },
  { num_stations: 9, score: 4 },
  { num_stations: 9, score: 3.9 },
  { num_stations: 1, score: 3.8 },
  { num_stations: 2, score: 3.7 },
  { num_stations: 1, score: 3.6 },
  { num_stations: 4, score: 3.5 },
  { num_stations: 3, score: 3.4 },
  { num_stations: 1, score: 3.2 },
  { num_stations: 4, score: 3 },
  { num_stations: 2, score: 2.8 },
  { num_stations: 1, score: 2.7 },
  { num_stations: 1, score: 2.5 },
  { num_stations: 1, score: 2.4 },
  { num_stations: 1, score: 2.1 },
  { num_stations: 1, score: 1.5 },
  { num_stations: 1, score: 1.4 },
  { num_stations: 1, score: 1.2 },
  { num_stations: 3, score: 1 }
]
```

Domanda 8

Query

```
db.bike_stations.aggregate(
        {$match:
                {"extra.status":
                        {$in: ["online", "offline"]}
                }
        },
        {$group:
                {
                        _id: "$extra.status",
                        avg_score: {$avg: "$extra.score"}
                }
        },
        {$project:
                {
                        _id:0,
                        status:"$_id",
                        avg_score:1
                }
        }
)
```

Risultato

```
[
  { avg_score: 3.8454545454545452, status: 'online' },
  { avg_score: 3.0285714285714285, status: 'offline' }
]
```

Domanda 9

Query

```
db.bike_stations.aggregate(
        {$addFields:
                {
                        category: {
                                $cond: {
                                        if: {$eq: ["$free_bikes", 0]},
                                        then: "no_free_bikes",
                                        else: "has_free_bikes"
                                }
                        }
                }
```

```
        },
        { $group:
                {
                        _id: "$category",
                        score: {$push: "$extra.score"}
                }
        },
        {$project:
                {
                        _id:0,
                        category:"$_id",
                        score:1
                }
        }
)
```

Risultato

```
[
  {
    score: [
      3.9, 3.9,   4,   4, 3.9, 4.2,   4, 3.9,
      3.9, 4.3, 4.2, 4.1, 4.5,   1, 3.4,   4,
      3.5, 3.5,   4,   4, 4.1, 4.1,   4, 4.1,
      3.7, 4.2, 4.2, 4.2, 3.6
    ],
    category: 'has_free_bikes'
  },
  {
    score: [
      3.4,   4, 3.4, 3.9, 4.2, 1.2, 3.2, 2.5,
      3.5,   3,   1, 3.7,   3,   4, 1.5, 2.8,
      1.4, 2.4, 3.9,   3,   3, 2.1, 2.8, 4.7,
      4.1, 3.5, 3.8, 4.4,   1, 4.4, 4.2, 4.5,
      3.9, 3.9, 4.3, 2.7
    ],
    category: 'no_free_bikes'
  }
]
```

Domanda 10

Query

```
db.bike_stations.aggregate(
        {$match:
```

```
                    {
                              "extra.status": {$eq: "online"}
                    }
          },
          {$addFields:
                    {
                              category: {
                                        $cond: {
                                                  if: {$eq: ["$free_bikes", 0]},
                                                  then: "no_free_bikes",
                                                  else: "has_free_bikes"
                                        }
                              }
                    }
          },
          { $group:
                    {
                              _id: "$category",
                              score: {$push: "$extra.score"}
                    }
          },
          {$project:
                    {
                              _id:0,
                              category:"$_id",
                              score:1
                    }
          }
)
```

<u>Risultato</u>

```
[
  {
    score: [
      3.9, 3.9,   4,   4, 3.9, 4.2,   4, 3.9,
      3.9, 4.3, 4.1, 4.5,   1, 3.4,   4, 3.5,
      3.5,   4,   4, 4.1, 4.1,   4, 4.1, 3.7,
      4.2, 4.2, 4.2, 3.6
    ],
    category: 'has_free_bikes'
  },
  { score: [ 3.4, 3.9, 4.1, 3.5, 3.8 ], category: 'no_free_bikes' }
]
```

Domanda 11

Query

```
db.bike_stations.find(
    {$and:
        [
            {
                free_bikes: {$gt: 0}
            },
            {location:
                {$near:
                    {$geometry:
                        {
                            type: "Point",
                            coordinates: [45.07456, 7.69463]
                        }
                    }
                }
            }
        ]
    },
    {
        _id:0,
        name:1,
        free_bikes:1
    }
).limit(3)
```

Risultato

```
[
  { free_bikes: 5, name: 'Palermo 2' },
  { free_bikes: 5, name: 'Castello 1' },
  { free_bikes: 4, name: 'San Francesco da Paola' }
]
```

Domanda 12

Query

```
db.bike_stations.find(
        {$and:
                [
                        {
                                free_bikes: {$gt: 0}
                        },
                        {location:
                                {$near:
                                        {$geometry:
                                                db.bike_stations.find(
                                                        {name: {$eq: "Politecnico 4"}},
                                                        {_id:0,location:1}
                                                ).next().location
                                        }
                                }
                        }
                ]
        },
        {
                _id:0,
                name:1,
                free_bikes:1
        }
).limit(3)
```

Risultato

```
[
  { free_bikes: 9, name: 'Politecnico 1' },
  { free_bikes: 5, name: 'Politecnico 3' },
  { free_bikes: 3, name: 'Tribunale' }
]
```