NOSQL QUERIES:

Application, bill, program, university, user_employee, user_student tables were created in MONGODB compass(GUI) and the following queries were run

1)

Query to calculate total revenue per year in descending order.

```
db.bill.aggregate([
{$project:{year:{$year:{$dateFromString:{dateString: "$BILL_date"}}},bill_amount:1}},
{$group: {_id:"$year", totalamount: {$sum:"$bill_amount"}}},
{$sort:{totalamount: -1}},
{$project:{_id: 0, year: "$_id", totalamount:1}}
])
```

```
> db.bill.aggregate([{$project:{year:{$year:{$dateFromString:{dateString: "$BILL_date"}}},bill_amount:1}},
{$group: {_id:"$year", totalamount: {$sum:"$bill_amount"}}},
{$sort:{totalamount: -1}},
{$project:{_id: 0, year: "$_id", totalamount:1}}])
<   {
      totalamount: 58944,
      year: 2021
    }
    {
      totalamount: 50832,
      year: 2023
    }
    {
      totalamount: 44979,
      year: 2022
    }
```

2)

the query to calculate the total number of employees in each department in descending order.

```
db.user_employee.aggregate([
{$group: {_id: "$department_id", numberofemployees: {$sum:1}}},
{$project:{_id:0,department_id:"$_id",numberofemployees:1}},
{$sort:{numberofemployees: -1}}
])
```

```
> db.user_employee.aggregate([{$group: {_id: "$department_id", numberofemployees: {$sum:1}}},
  {$project:{_id:0,department_id:"$_id",numberofemployees:1}},
  {$sort:{numberofemployees: -1}}])
<   {
      numberofemployees: 4,
      department_id: 4
    }
    {
      numberofemployees: 4,
      department_id: 1
    }
    {
      numberofemployees: 1,
      department_id: 3
    }
    {
      numberofemployees: 1,
      department_id: 2
    }
```

3)

```
db.applications.aggregate([
{$group: {_id: "$university_id", numberofapplications: {$sum:1}}},
{$project :{_id: 0, university_id:"$_id", numberofapplications:1}},
{$sort:{numberofapplications: -1}},
{$limit: 3}
])
```

```
> db.applications.aggregate([{$group: {_id: "$university_id", numberofapplications: {$sum:1}}},
  {$project :{_id: 0, university_id:"$_id", numberofapplications:1}},
  {$sort:{numberofapplications: -1}},
  {$limit: 3}])
<   {
      numberofapplications: 275,
      university_id: 1
    }
    {
      numberofapplications: 261,
      university_id: 8
    }
    {
      numberofapplications: 253,
      university_id: 3
    }
```

4)

```
db.applications.aggregate([
  {$lookup: {from: "university", localField: "university_id", foreignField: "university_id",   as: "university"}},
  {$unwind: "$university"},
  {$group: {_id: "$university.country", NumberofApplications: { $sum: 1 }}},
  {$project: {Country: "$_id", NumberofApplications: 1, _id: 0}},
  {$sort:{NumberofApplications: -1}}
])
```

```
> db.applications.aggregate([
    {$lookup: {from: "university", localField: "university_id", foreignField: "university_id",    as: "university"}},
    {$unwind: "$university"},
    {$group: {_id: "$university.country", NumberofApplications: { $sum: 1 }}},
    {$project: {Country: "$_id", NumberofApplications: 1, _id: 0}},
    {$sort:{NumberofApplications: -1}}
  ])
<   {
      NumberofApplications: 1177,
      Country: 'United States'
    }
    {
      NumberofApplications: 983,
      Country: 'Canada'
    }
    {
      NumberofApplications: 229,
      Country: 'United Kingdom'
    }
```

5)

```
db.applications.aggregate([
  {$match:{"authorize_decision":"admitted"}},
  {$lookup:{from:"user_student",
            localField:"student_user_id",
            foreignField:"user_id",
            as: "user_student"}},
  {$unwind:"$user_student"},
  {$lookup: {from: "university",
             localField: "university_id",
             foreignField: "university_id",
             as: "university"}},
  {$unwind: "$university"},
  {$group:{_id: "$university.university_name", averageGPA:{$avg:"$user_student.GPA"}}},
  {$project: {university:"$_id", averageGPA: 1, _id:0}},
  {$sort:{averageGPA: -1}},
  {$limit:3}])
```

```
db.applications.aggregate([
    {$match:{"authorize_decision":"admitted"}},
    {$lookup:{from:"user_student", localField:"student_user_id", foreignField:"user_id", as: "user_student"}},
    {$unwind:"$user_student"},
    {$lookup: {from: "university", localField: "university_id", foreignField: "university_id",   as: "university"}},
    {$unwind: "$university"},
    {$group:{_id: "$university.university_name", averageGPA:{$avg:"$user_student.GPA"}}},
    {$project: {university:"$_id", averageGPA: 1, _id:0}},
    {$sort:{averageGPA: -1}},
    {$limit:3}])
{
    averageGPA: 3.304576271186441,
    university: 'University of Wisconsin - Platteville'
}
{
    averageGPA: 3.27093220338983,
    university: 'University of Portsmouth'
}
{
    averageGPA: 3.2702142857142857,
    university: 'University of Windsor'
}
```