2021ICT113-ThIsHa

IT2234: Web Service and Server Technologies- Practical ICAE 02-Answers

1. Create the students and grades collections and insert the sample documents into both collections.

a) Create database and collections:

```
use universityDB

db.createCollection("students")

db.createCollection("grades")
```

b) Insert documents into students collection:

```
db.students.insertMany([
 {
  _id: ObjectId("64b1fcd1f4a13a001e3d41a1"),
  name: "Alice Johnson",
  enrollmentYear: 2021,
  major: "Computer Science",
  email: "alice.johnson@example.com",
  gender: "Female",
  age: 20
 },
 {
  _id: ObjectId("64b1fcd1f4a13a001e3d41a2"),
  name: "Bob Smith",
  enrollmentYear: 2020,
  major: "Mathematics",
  email: "bob.smith@example.com",
  gender: "Male",
  age: 22
```

```
 },
 {
  _id: ObjectId("64b1fcd1f4a13a001e3d41a3"),
  name: "Clara Lee",
  enrollmentYear: 2022,
  major: "Physics",
  email: "clara.lee@example.com",
  gender: "Female",
  age: 19
 },
 {
  _id: ObjectId("64b1fcd1f4a13a001e3d41a4"),
  name: "Daniel Kim",
  enrollmentYear: 2021,
  major: "Engineering",
  email: "daniel.kim@example.com",
  gender: "Male",
  age: 21
 },
 {
  _id: ObjectId("64b1fcd1f4a13a001e3d41a5"),
  name: "Eva Chen",
  enrollmentYear: 2020,
  major: "Biology",
  email: "eva.chen@example.com",
  gender: "Female",
  age: 23
 },
 {
  _id: ObjectId("64b1fcd1f4a13a001e3d41a6"),
```

```
  name: "Frank Wright",
  enrollmentYear: 2019,
  major: "Chemistry",
  email: "frank.wright@example.com",
  gender: "Male",
  age: 24
 },
 {
  _id: ObjectId("64b1fcd1f4a13a001e3d41a7"),
  name: "Grace Liu",
  enrollmentYear: 2022,
  major: "Economics",
  email: "grace.liu@example.com",
  gender: "Female",
  age: 20
 },
 {
  _id: ObjectId("64b1fcd1f4a13a001e3d41a8"),
  name: "Henry Davis",
  enrollmentYear: 2021,
  major: "Philosophy",
  email: "henry.davis@example.com",
  gender: "Male",
  age: 22
 },
 {
  _id: ObjectId("64b1fcd1f4a13a001e3d41a9"),
  name: "Ivy Zhang",
  enrollmentYear: 2020,
  major: "Statistics",
```

```
    email: "ivy.zhang@example.com",
    gender: "Female",
    age: 21
  },
  {
    _id: ObjectId("64b1fcd1f4a13a001e3d41aa"),
    name: "Jack Lee",
    enrollmentYear: 2023,
    major: "Business",
    email: "jack.lee@example.com",
    gender: "Male",
    age: 18
  }
])
```

c) Insert documents into grades collection:

```
        db.grades.insertMany([
  { subject: "Mathematics", score: 85, term: "Fall 2022", studentId: ObjectId("64b1fcd1f4a13a001e3d41a1") },
  { subject: "English", score: 90, term: "Fall 2022", studentId: ObjectId("64b1fcd1f4a13a001e3d41a1") },

  { subject: "Mathematics", score: 75, term: "Spring 2022", studentId: ObjectId("64b1fcd1f4a13a001e3d41a2") },
  { subject: "Statistics", score: 80, term: "Fall 2022", studentId: ObjectId("64b1fcd1f4a13a001e3d41a2") },

  { subject: "Physics", score: 92, term: "Fall 2022", studentId: ObjectId("64b1fcd1f4a13a001e3d41a3") },
  { subject: "Mathematics", score: 86, term: "Spring 2023", studentId: ObjectId("64b1fcd1f4a13a001e3d41a3") },

  { subject: "Engineering", score: 89, term: "Fall 2021", studentId: ObjectId("64b1fcd1f4a13a001e3d41a4") },
  { subject: "Mathematics", score: 84, term: "Spring 2022", studentId: ObjectId("64b1fcd1f4a13a001e3d41a4") },
```

```
  { subject: "Biology", score: 78, term: "Spring 2021", studentId: ObjectId("64b1fcd1f4a13a001e3d41a5") },
  { subject: "Chemistry", score: 82, term: "Fall 2021", studentId: ObjectId("64b1fcd1f4a13a001e3d41a5") },

  { subject: "Chemistry", score: 88, term: "Fall 2021", studentId: ObjectId("64b1fcd1f4a13a001e3d41a6") },
  { subject: "Physics", score: 79, term: "Spring 2022", studentId: ObjectId("64b1fcd1f4a13a001e3d41a6") },

  { subject: "Economics", score: 83, term: "Spring 2023", studentId: ObjectId("64b1fcd1f4a13a001e3d41a7") },
  { subject: "English", score: 89, term: "Fall 2022", studentId: ObjectId("64b1fcd1f4a13a001e3d41a7") },

  { subject: "Philosophy", score: 91, term: "Fall 2022", studentId: ObjectId("64b1fcd1f4a13a001e3d41a8") },
  { subject: "History", score: 77, term: "Spring 2023", studentId: ObjectId("64b1fcd1f4a13a001e3d41a8") },

  { subject: "Statistics", score: 79, term: "Spring 2022", studentId: ObjectId("64b1fcd1f4a13a001e3d41a9") },
  { subject: "Data Science", score: 88, term: "Fall 2022", studentId: ObjectId("64b1fcd1f4a13a001e3d41a9") },

  { subject: "Business", score: 87, term: "Fall 2023", studentId: ObjectId("64b1fcd1f4a13a001e3d41aa") },
  { subject: "Finance", score: 82, term: "Spring 2024", studentId: ObjectId("64b1fcd1f4a13a001e3d41aa") }
])
```

2. Show both collections in table view.

3. Find the female students and only display their name, age and gender.

```
db.students.find(
  { gender: "Female" },
  { name: 1, age: 1, gender: 1, _id: 0 }
);
```

4. Find the students who are younger than 22 and enrolled after 2020.

```
db.students.find(
  { age: { $lt: 22 }, enrollmentYear: { $gt: 2020 } }
);
```

5. Find all grades for "Alice Johnson".

```
const student = db.students.findOne({ name: "Alice Johnson" });
db.grades.find({ studentId: student._id });
```

Or directly:

```
db.grades.find({ studentId: ObjectId("64b1fcd1f4a13a001e3d41a1") });
```

6. Find how many students followed the subject “Mathematics”.

```
db.grades.distinct("studentId", { subject: "Mathematics" }).length;
```

7. Find all students with grades in the term "Fall 2022".

```
const ids = db.grades.distinct("studentId", { term: "Fall 2022" });
db.students.find({ _id: { $in: ids } });
```