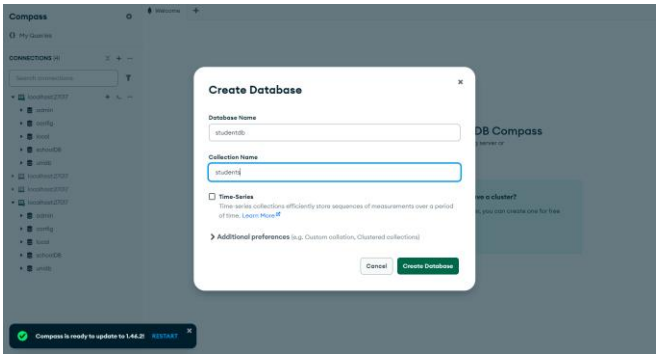
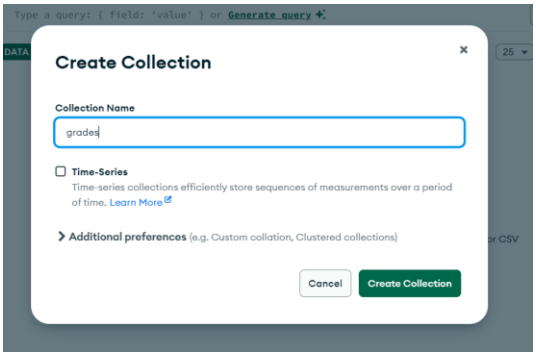
University of Vavuniya
Faculty of Applied Science
Department of physical science
Web service and server technology – IT2234(P)

2021/ICT/30 ICAE - 02

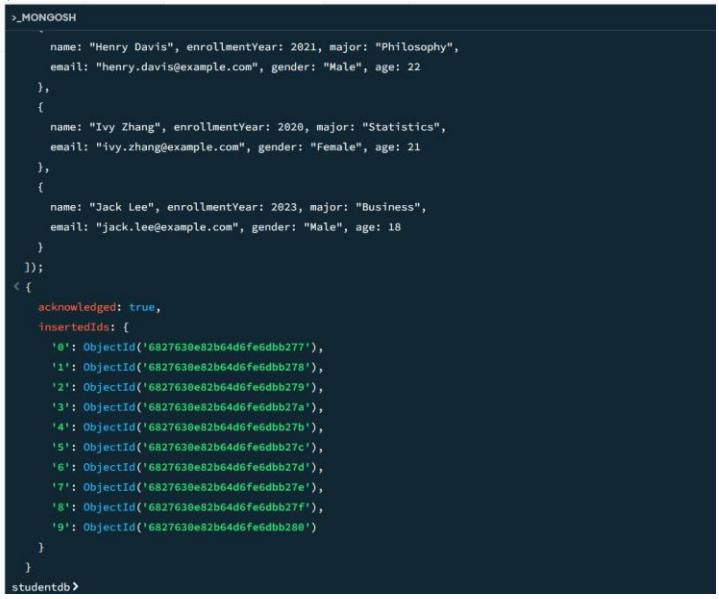
01) Create the students and grades collections and insert the sample documents into both collections.





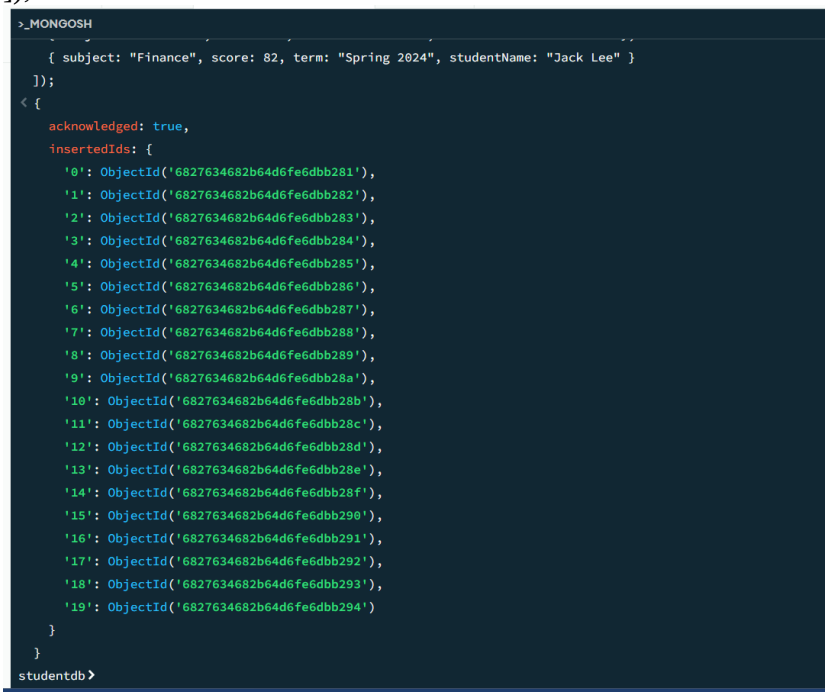

```
// Create and insert documents into students collection
db.students.insertMany([
  {
    name: "Alice Johnson", enrollmentYear: 2021, major: "Computer Science",
    email: "alice.johnson@example.com", gender: "Female", age: 20
  },
  {
    name: "Bob Smith", enrollmentYear: 2020, major: "Mathematics",
    email: "bob.smith@example.com", gender: "Male", age: 22
  },
  {
    name: "Clara Lee", enrollmentYear: 2022, major: "Physics",
    email: "clara.lee@example.com", gender: "Female", age: 19
  },
  {
    name: "Daniel Kim", enrollmentYear: 2021, major: "Engineering",
    email: "daniel.kim@example.com", gender: "Male", age: 21
  },
  {
    name: "Eva Chen", enrollmentYear: 2020, major: "Biology",
    email: "eva.chen@example.com", gender: "Female", age: 23
  },
  {
    name: "Frank Wright", enrollmentYear: 2019, major: "Chemistry",
    email: "frank.wright@example.com", gender: "Male", age: 24
  },
  {
```

```
    name: "Grace Liu", enrollmentYear: 2022, major: "Economics",
    email: "grace.liu@example.com", gender: "Female", age: 20
  },
  {
    name: "Henry Davis", enrollmentYear: 2021, major: "Philosophy",
    email: "henry.davis@example.com", gender: "Male", age: 22
  },
  {
    name: "Ivy Zhang", enrollmentYear: 2020, major: "Statistics",
    email: "ivy.zhang@example.com", gender: "Female", age: 21
  },
  {
    name: "Jack Lee", enrollmentYear: 2023, major: "Business",
    email: "jack.lee@example.com", gender: "Male", age: 18
  }
]);
```



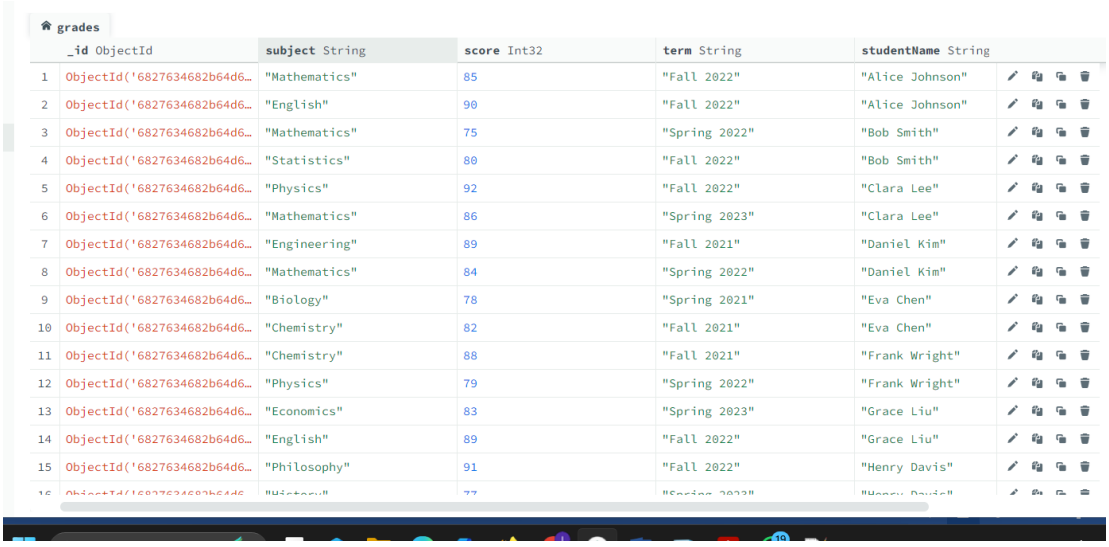

```
// Create and insert documents into grades collection
db.grades.insertMany([
  { subject: "Mathematics", score: 85, term: "Fall 2022", studentName: "Alice Johnson" },
  { subject: "English", score: 90, term: "Fall 2022", studentName: "Alice Johnson" },
  { subject: "Mathematics", score: 75, term: "Spring 2022", studentName: "Bob Smith" },
  { subject: "Statistics", score: 80, term: "Fall 2022", studentName: "Bob Smith" },
  { subject: "Physics", score: 92, term: "Fall 2022", studentName: "Clara Lee" },
  { subject: "Mathematics", score: 86, term: "Spring 2023", studentName: "Clara Lee" },
  { subject: "Engineering", score: 89, term: "Fall 2021", studentName: "Daniel Kim" },
  { subject: "Mathematics", score: 84, term: "Spring 2022", studentName: "Daniel Kim" },
  { subject: "Biology", score: 78, term: "Spring 2021", studentName: "Eva Chen" },
  { subject: "Chemistry", score: 82, term: "Fall 2021", studentName: "Eva Chen" },
  { subject: "Chemistry", score: 88, term: "Fall 2021", studentName: "Frank Wright" },
  { subject: "Physics", score: 79, term: "Spring 2022", studentName: "Frank Wright" },
```

```
  { subject: "Economics", score: 83, term: "Spring 2023", studentName: "Grace Liu" },
  { subject: "English", score: 89, term: "Fall 2022", studentName: "Grace Liu" },
  { subject: "Philosophy", score: 91, term: "Fall 2022", studentName: "Henry Davis" },
  { subject: "History", score: 77, term: "Spring 2023", studentName: "Henry Davis" },
  { subject: "Statistics", score: 79, term: "Spring 2022", studentName: "Ivy Zhang" },
  { subject: "Data Science", score: 88, term: "Fall 2022", studentName: "Ivy Zhang" },
  { subject: "Business", score: 87, term: "Fall 2023", studentName: "Jack Lee" },
  { subject: "Finance", score: 82, term: "Spring 2024", studentName: "Jack Lee" }
]);
```



02) Show both collections in table view.

Grades:



grades

	_id ObjectId	subject String	score Int32	term String	studentName String
1	ObjectId('6827634682b64d6…	"Mathematics"	85	"Fall 2022"	"Alice Johnson"
2	ObjectId('6827634682b64d6…	"English"	90	"Fall 2022"	"Alice Johnson"
3	ObjectId('6827634682b64d6…	"Mathematics"	75	"Spring 2022"	"Bob Smith"
4	ObjectId('6827634682b64d6…	"Statistics"	80	"Fall 2022"	"Bob Smith"
5	ObjectId('6827634682b64d6…	"Physics"	92	"Fall 2022"	"Clara Lee"
6	ObjectId('6827634682b64d6…	"Mathematics"	86	"Spring 2023"	"Clara Lee"
7	ObjectId('6827634682b64d6…	"Engineering"	89	"Fall 2021"	"Daniel Kim"
8	ObjectId('6827634682b64d6…	"Mathematics"	84	"Spring 2022"	"Daniel Kim"
9	ObjectId('6827634682b64d6…	"Biology"	78	"Spring 2021"	"Eva Chen"
10	ObjectId('6827634682b64d6…	"Chemistry"	82	"Fall 2021"	"Eva Chen"
11	ObjectId('6827634682b64d6…	"Chemistry"	88	"Fall 2021"	"Frank Wright"
12	ObjectId('6827634682b64d6…	"Physics"	79	"Spring 2022"	"Frank Wright"
13	ObjectId('6827634682b64d6…	"Economics"	83	"Spring 2023"	"Grace Liu"
14	ObjectId('6827634682b64d6…	"English"	89	"Fall 2022"	"Grace Liu"
15	ObjectId('6827634682b64d6…	"Philosophy"	91	"Fall 2022"	"Henry Davis"

Students:

students

	_id ObjectId	name String	enrollmentYear Int32	major String	email String
1	ObjectId('682766cf9a15a5b…	"Alice Johnson"	2021	"Computer Science"	"alice.johnson@examp
2	ObjectId('682766cf9a15a5b…	"Bob Smith"	2020	"Mathematics"	"bob.smith@example.c
3	ObjectId('682766cf9a15a5b…	"Clara Lee"	2022	"Physics"	"clara.lee@example.c
4	ObjectId('682766cf9a15a5b…	"Daniel Kim"	2021	"Engineering"	"daniel.kim@example.
5	ObjectId('682766cf9a15a5b…	"Eva Chen"	2020	"Biology"	"eva.chen@example.cor
6	ObjectId('682766cf9a15a5b…	"Frank Wright"	2019	"Chemistry"	"frank.wright@exampl
7	ObjectId('682766cf9a15a5b…	"Grace Liu"	2022	"Economics"	"grace.liu@example.c
8	ObjectId('682766cf9a15a5b…	"Henry Davis"	2021	"Philosophy"	"henry.davis@example
9	ObjectId('682766cf9a15a5b…	"Ivy Zhang"	2020	"Statistics"	"ivy.zhang@example.c
10	ObjectId('682766cf9a15a5b…	"Jack Lee"	2023	"Business"	"jack.lee@example.cor

03) 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 }
);
```

```
> db.students.find(
    { gender: "Female" },
    { name: 1, age: 1, gender: 1, _id: 0 }
  );
< {
    name: 'Alice Johnson',
    gender: 'Female',
    age: 20
  }
  {
    name: 'Clara Lee',
    gender: 'Female',
    age: 19
  }
  {
    name: 'Eva Chen',
    gender: 'Female',
    age: 23
  }
  {
    name: 'Grace Liu',
    gender: 'Female',
    age: 20
  }
  {
    name: 'Ivy Zhang',
    gender: 'Female',
    age: 21
```

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

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

```
> db.students.find(
    { age: { $lt: 22 }, enrollmentYear: { $gt: 2020 } }
  );
< {
    _id: ObjectId('682766cf9a15a5b357a266ee'),
    name: 'Alice Johnson',
    enrollmentYear: 2021,
    major: 'Computer Science',
    email: 'alice.johnson@example.com',
    gender: 'Female',
    age: 20
  }
  {
    _id: ObjectId('682766cf9a15a5b357a266f0'),
    name: 'Clara Lee',
    enrollmentYear: 2022,
    major: 'Physics',
    email: 'clara.lee@example.com',
    gender: 'Female',
    age: 19
  }
```

```
{
  _id: ObjectId('682766cf9a15a5b357a266f1'),
  name: 'Daniel Kim',
  enrollmentYear: 2021,
  major: 'Engineering',
  email: 'daniel.kim@example.com',
  gender: 'Male',
  age: 21
}
{
  _id: ObjectId('682766cf9a15a5b357a266f4'),
  name: 'Grace Liu',
  enrollmentYear: 2022,
  major: 'Economics',
  email: 'grace.liu@example.com',
  gender: 'Female',
  age: 20
}
{
  _id: ObjectId('682766cf9a15a5b357a266f7'),
  name: 'Jack Lee',
  enrollmentYear: 2023,
  major: 'Business',
  email: 'jack.lee@example.com',
  gender: 'Male',
  age: 18
}
```

05) Find all grades for "Alice Johnson".

```
db.grades.find(
        { studentName: "Alice Johnson" }
);
```

```
> db.grades.find(
    { studentName: "Alice Johnson" }
  );
< {
    _id: ObjectId('6827634682b64d6fe6dbb281'),
    subject: 'Mathematics',
    score: 85,
    term: 'Fall 2022',
    studentName: 'Alice Johnson'
  }
  {
    _id: ObjectId('6827634682b64d6fe6dbb282'),
    subject: 'English',
    score: 90,
    term: 'Fall 2022',
    studentName: 'Alice Johnson'
  }
studentdb>
```

06) Find how many students followed the subject “Mathematics”.

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

```
  }
> db.grades.distinct("studentName", { subject: "Mathematics" }).length
< 4
studentdb >
```

```
db.grades.aggregate([
  { $match: { subject: "Mathematics" }},
  { $group: { _id: "$studentName" }},
  { $count: "studentCount" }
]);
```

```
> db.grades.aggregate([
    { $match: { subject: "Mathematics" }},
    { $group: { _id: "$studentName" }},
    { $count: "studentCount" }
  ]);
< {
    studentCount: 4
  }
studentdb >
```

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

```
db.grades.find(
  { term: "Fall 2022" }
);
```

```
> db.grades.find(
    { term: "Fall 2022" }
  );
< {
    _id: ObjectId('6827634682b64d6fe6dbb281'),
    subject: 'Mathematics',
    score: 85,
    term: 'Fall 2022',
    studentName: 'Alice Johnson'
  }
  {
    _id: ObjectId('6827634682b64d6fe6dbb282'),
    subject: 'English',
    score: 90,
    term: 'Fall 2022',
    studentName: 'Alice Johnson'
  }
  {
    _id: ObjectId('6827634682b64d6fe6dbb284'),
    subject: 'Statistics',
    score: 80,
    term: 'Fall 2022',
    studentName: 'Bob Smith'
  }
```

```
>_MONGOSH
{
  _id: ObjectId('6827634682b64d6fe6dbb285'),
  subject: 'Physics',
  score: 92,
  term: 'Fall 2022',
  studentName: 'Clara Lee'
}
{
  _id: ObjectId('6827634682b64d6fe6dbb28e'),
  subject: 'English',
  score: 89,
  term: 'Fall 2022',
  studentName: 'Grace Liu'
}
{
  _id: ObjectId('6827634682b64d6fe6dbb28f'),
  subject: 'Philosophy',
  score: 91,
  term: 'Fall 2022',
  studentName: 'Henry Davis'
}
{
  _id: ObjectId('6827634682b64d6fe6dbb292'),
  subject: 'Data Science',
  score: 88,
  term: 'Fall 2022',
  studentName: 'Ivy Zhang'
}
```