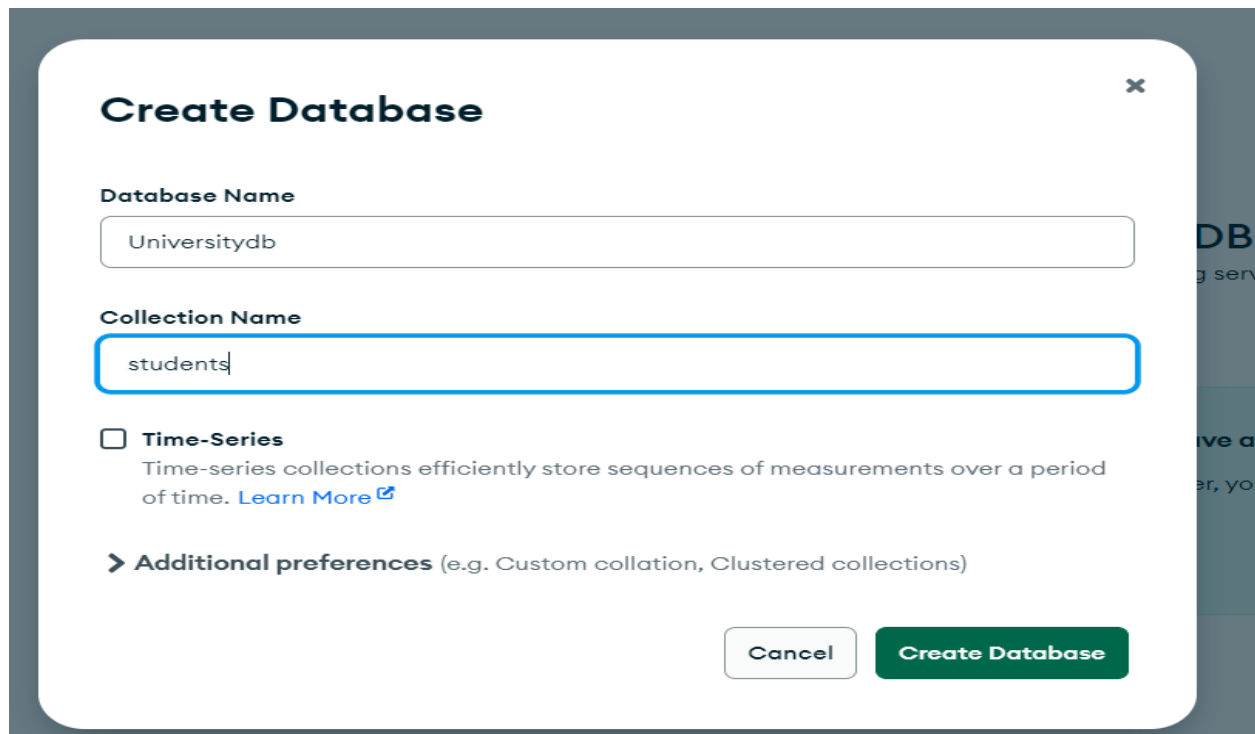


IT2234: Web Service and Server Technologies - Practical
ICAIE 02
Department of Physical Science
Faculty of Applied Science, University of Vavuniya
2021/ICT/24

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



Create Database ✕

Database Name
Universitydb

Collection Name
students

☐ **Time-Series**
Time-series collections efficiently store sequences of measurements over a period of time. [Learn More](#)

> Additional preferences (e.g. Custom collation, Clustered collections)

Cancel Create Database

```
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
  }
])

```

```

< {
  acknowledged: true,
  insertedIds: {
    '0': ObjectId('64b1fcd1f4a13a001e3d41a1'),
    '1': ObjectId('64b1fcd1f4a13a001e3d41a2'),
    '2': ObjectId('64b1fcd1f4a13a001e3d41a3'),
    '3': ObjectId('64b1fcd1f4a13a001e3d41a4'),
    '4': ObjectId('64b1fcd1f4a13a001e3d41a5'),
    '5': ObjectId('64b1fcd1f4a13a001e3d41a6'),
    '6': ObjectId('64b1fcd1f4a13a001e3d41a7'),
    '7': ObjectId('64b1fcd1f4a13a001e3d41a8'),
    '8': ObjectId('64b1fcd1f4a13a001e3d41a9'),
    '9': ObjectId('64b1fcd1f4a13a001e3d41aa')
  }
}

```

```

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") }
])

```

```

< {
  acknowledged: true,
  insertedIds: {
    '0': ObjectId('68277e345072905987914051'),
    '1': ObjectId('68277e345072905987914052'),
    '2': ObjectId('68277e345072905987914053'),
    '3': ObjectId('68277e345072905987914054'),
    '4': ObjectId('68277e345072905987914055'),
    '5': ObjectId('68277e345072905987914056'),
    '6': ObjectId('68277e345072905987914057'),
    '7': ObjectId('68277e345072905987914058'),
    '8': ObjectId('68277e345072905987914059'),
    '9': ObjectId('68277e34507290598791405a'),
    '10': ObjectId('68277e34507290598791405b'),
    '11': ObjectId('68277e34507290598791405c'),
    '12': ObjectId('68277e34507290598791405d'),
    '13': ObjectId('68277e34507290598791405e'),
    '14': ObjectId('68277e34507290598791405f'),
    '15': ObjectId('68277e345072905987914060'),
    '16': ObjectId('68277e345072905987914061'),
    '17': ObjectId('68277e345072905987914062'),
    '18': ObjectId('68277e345072905987914063'),
    '19': ObjectId('68277e345072905987914064')
  }
}

```

2. Show both collections in table view.

students					
	_id ObjectId	name String	enrollmentYear Int32	major String	email String
1	ObjectId('64b1fcd1f4a13a0...	"Alice Johnson"	2021	"Computer Science"	"alice.johnson@examp...
2	ObjectId('64b1fcd1f4a13a0...	"Bob Smith"	2020	"Mathematics"	"bob.smith@example.co...
3	ObjectId('64b1fcd1f4a13a0...	"Clara Lee"	2022	"Physics"	"clara.lee@example.co...
4	ObjectId('64b1fcd1f4a13a0...	"Daniel Kim"	2021	"Engineering"	"daniel.kim@example.co...
5	ObjectId('64b1fcd1f4a13a0...	"Eva Chen"	2020	"Biology"	"eva.chen@example.co...
6	ObjectId('64b1fcd1f4a13a0...	"Frank Wright"	2019	"Chemistry"	"frank.wright@exampl...
7	ObjectId('64b1fcd1f4a13a0...	"Grace Liu"	2022	"Economics"	"grace.liu@example.co...
8	ObjectId('64b1fcd1f4a13a0...	"Henry Davis"	2021	"Philosophy"	"henry.davis@example...
9	ObjectId('64b1fcd1f4a13a0...	"Ivy Zhang"	2020	"Statistics"	"ivy.zhang@example.co...
10	ObjectId('64b1fcd1f4a13a0...	"Jack Lee"	2023	"Business"	"jack.lee@example.co...

ADD DATA

EXPORT DATA

UPDATE

DELETE

25

1 - 20 of 20

grades

	_id ObjectId	subject String	score Int32	term String	studentId ObjectId				
1	ObjectId('68277e345072905...	"Mathematics"	85	"Fall 2022"	ObjectId('64b1fcd1f...				
2	ObjectId('68277e345072905...	"English"	90	"Fall 2022"	ObjectId('64b1fcd1f...				
3	ObjectId('68277e345072905...	"Mathematics"	75	"Spring 2022"	ObjectId('64b1fcd1f...				
4	ObjectId('68277e345072905...	"Statistics"	80	"Fall 2022"	ObjectId('64b1fcd1f...				
5	ObjectId('68277e345072905...	"Physics"	92	"Fall 2022"	ObjectId('64b1fcd1f...				
6	ObjectId('68277e345072905...	"Mathematics"	86	"Spring 2023"	ObjectId('64b1fcd1f...				
7	ObjectId('68277e345072905...	"Engineering"	89	"Fall 2021"	ObjectId('64b1fcd1f...				
8	ObjectId('68277e345072905...	"Mathematics"	84	"Spring 2022"	ObjectId('64b1fcd1f...				
9	ObjectId('68277e345072905...	"Biology"	78	"Spring 2021"	ObjectId('64b1fcd1f...				
10	ObjectId('68277e345072905...	"Chemistry"	82	"Fall 2021"	ObjectId('64b1fcd1f...				
11	ObjectId('68277e345072905...	"Chemistry"	88	"Fall 2021"	ObjectId('64b1fcd1f...				
12	ObjectId('68277e345072905...	"Physics"	79	"Spring 2022"	ObjectId('64b1fcd1f...				
13	ObjectId('68277e345072905...	"Economics"	83	"Spring 2023"	ObjectId('64b1fcd1f...				
14	ObjectId('68277e345072905...	"English"	89	"Fall 2022"	ObjectId('64b1fcd1f...				
15	ObjectId('68277e345072905...	"Philosophy"	91	"Fall 2022"	ObjectId('64b1fcd1f...				
16	ObjectId('68277e345072905...	"History"	77	"Spring 2023"	ObjectId('64b1fcd1f...				

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

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

```
< {
  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
}
```

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

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

```
{
  _id: ObjectId('64b1fcd1f4a13a001e3d41a1'),
  name: 'Alice Johnson',
  enrollmentYear: 2021,
  major: 'Computer Science',
  email: 'alice.johnson@example.com',
  gender: 'Female',
  age: 20
}
{
  _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: 'Eve Smith',
  enrollmentYear: 2020,
  major: 'Biology',
  email: 'eve.smith@example.com',
  gender: 'Female',
  age: 22
}
```

```
{
  _id: ObjectId('64b1fcd1f4a13a001e3d41a7'),
  name: 'Grace Liu',
  enrollmentYear: 2022,
  major: 'Economics',
  email: 'grace.liu@example.com',
  gender: 'Female',
  age: 20
}
{
  _id: ObjectId('64b1fcd1f4a13a001e3d41aa'),
  name: 'Jack Lee',
  enrollmentYear: 2023,
  major: 'Business',
  email: 'jack.lee@example.com',
  gender: 'Male',
  age: 18
}
```


5. Find all grades for "Alice Johnson"

```
db.students.aggregate([
  { $match: { name: "Alice Johnson" } },
  {
    $lookup: {
      from: "grades",
      localField: "_id",
      foreignField: "studentId",
      as: "grades"
    }
  },
  { $unwind: "$grades" }
]);
```

```
_id: ObjectId('64b1fcd1f4a13a001e3d41a1'),
name: 'Alice Johnson',
enrollmentYear: 2021,
major: 'Computer Science',
email: 'alice.johnson@example.com',
gender: 'Female',
age: 20,
grades: {
  _id: ObjectId('68277e345072905987914051'),
  subject: 'Mathematics',
  score: 85,
  term: 'Fall 2022',
  studentId: ObjectId('64b1fcd1f4a13a001e3d41a1')
}
}
{
  _id: ObjectId('64b1fcd1f4a13a001e3d41a1'),
  name: 'Alice Johnson',
  enrollmentYear: 2021,
  major: 'Computer Science',
  email: 'alice.johnson@example.com',
  gender: 'Female',
  age: 20,
  grades: {
    _id: ObjectId('68277e345072905987914052'),
    subject: 'English',
    score: 90,
    term: 'Fall 2022',
```

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

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

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

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

```
db.students.aggregate([
  {
    $lookup: {
      from: "grades",
      localField: "_id",
      foreignField: "studentId",
      as: "grades"
    }
  },
  { $unwind: "$grades" },
  { $match: { "grades.term": "Fall 2022" } }
]);
```

```

    _id: ObjectId('64b1fcd1f4a13a001e3d41a1'),
    name: 'Alice Johnson',
    enrollmentYear: 2021,
    major: 'Computer Science',
    email: 'alice.johnson@example.com',
    gender: 'Female',
    age: 20,
    grades: {
      _id: ObjectId('68277e345072905987914051'),
      subject: 'Mathematics',
      score: 85,
      term: 'Fall 2022',
      studentId: ObjectId('64b1fcd1f4a13a001e3d41a1')
    }
  }
}
{
  _id: ObjectId('64b1fcd1f4a13a001e3d41a1'),
  name: 'Alice Johnson',
  enrollmentYear: 2021,
  major: 'Computer Science',
  email: 'alice.johnson@example.com',
  gender: 'Female',
  age: 20,
  grades: {
    _id: ObjectId('68277e345072905987914052'),
    subject: 'English',
    score: 90,
    term: 'Fall 2022',

```

```

    _id: ObjectId('64b1fcd1f4a13a001e3d41a2'),
    name: 'Bob Smith',
    enrollmentYear: 2020,
    major: 'Mathematics',
    email: 'bob.smith@example.com',
    gender: 'Male',
    age: 22,
    grades: {
      _id: ObjectId('68277e345072905987914054'),
      subject: 'Statistics',
      score: 80,
      term: 'Fall 2022',
      studentId: ObjectId('64b1fcd1f4a13a001e3d41a2')
    }
  }
}
{
  _id: ObjectId('64b1fcd1f4a13a001e3d41a3'),
  name: 'Clara Lee',
  enrollmentYear: 2022,
  major: 'Physics',
  email: 'clara.lee@example.com',
  gender: 'Female',
  age: 19,
  grades: {
    _id: ObjectId('68277e345072905987914055'),
    subject: 'Physics',
    score: 92,
    term: 'Fall 2022',

```

```

{
  _id: ObjectId('64b1fcd1f4a13a001e3d41a9'),
  name: 'Ivy Zhang',
  enrollmentYear: 2020,
  major: 'Statistics',
  email: 'ivy.zhang@example.com',
  gender: 'Female',
  age: 21,
  grades: {
    _id: ObjectId('68277e345072905987914062'),
    subject: 'Data Science',
    score: 88,
    term: 'Fall 2022',
    studentId: ObjectId('64b1fcd1f4a13a001e3d41a9')
  }
}

```

```

name: 'Grace Liu',
enrollmentYear: 2022,
major: 'Economics',
email: 'grace.liu@example.com',
gender: 'Female',
age: 20,
grades: {
  _id: ObjectId('68277e34507290598791405e'),
  subject: 'English',
  score: 89,
  term: 'Fall 2022',
  studentId: ObjectId('64b1fcd1f4a13a001e3d41a7')
}
}
{
  _id: ObjectId('64b1fcd1f4a13a001e3d41a8'),
  name: 'Henry Davis',
  enrollmentYear: 2021,
  major: 'Philosophy',
  email: 'henry.davis@example.com',
  gender: 'Male',
  age: 22,
  grades: {
    _id: ObjectId('68277e34507290598791405f'),
    subject: 'Philosophy',
    score: 91,
    term: 'Fall 2022',
    studentId: ObjectId('64b1fcd1f4a13a001e3d41a8')
  }
}

```