Department of Data Science, Bishop Heber College Tiruchirappalli
Modern Database Systems Lab 11

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Question 1

> db.students.find({"name.first":"Sam", year:1995});

{ "_id" : "sam", "name" : { "first" : "Sam", "last" : "Peter" }, "year" : 1995, "courses" : ["php", "python", "java"] }

```
> db.students.find({"name.first":"Sam", year:1995});
{ "_id" : "sam", "name" : { "first" : "Sam", "last" : "Peter" }, "year" : 1995, "courses" : [ "php", "python", "java" ] }
```

Question 2

Find coureses delivered by john peter

Note that the order of fields for first and last names can be arbitrary

```
db.courses.find({
    $or: [
        { "professor.first": "John", "professor.last": "Peter" },
        { "professor.first": "Peter", "professor.last": "John" }
    ]
});
```

{ "_id" : "php", "title" : "PHP Programming", "year" : 2007, "professor" : { "first" : "John", "last" : "Peter" }, "rating" : 53, "students" : ["arun", "sam", "sylvia", "divya", "hazel"], "departments" : ["cs", "ca"], "campus" : ["Tricy", "Singapore"] }

```
{ "_id" : "php", "title" : "PHP Programming", "year" : 2007, "professor" : { "first" : "John", "last" : "Peter" }, "rat
ing" : 53, "students" : [ "arun", "sam", "sylvia", "divya", "hazel" ], "departments" : [ "cs", "ca" ], "campus" : [ "Tr
icy", "Singapore" ] }
```

Question 3:

Find students with first name Sam who take the course php
Return names of these students only

```
db.students.find({
    "name.first": "Sam",
    courses: "php"
}, {
    "name": 1,
    "_id": 0
});
{ "name" : { "first" : "Sam", "last" : "Peter" } }
```

```
> db.students.find({
...    "name.first": "Sam",
...    courses: "php"
... }, {
...    "name": 1,
...    "_id": 0
... });
{ "name" : { "first" : "Sam", "last" : "Peter" } }
```

Question 4:
Find courese delivered between years 2000 and 2005 such that they have a professor specified
Return course identifier only
Order the result by ratings in descending order and then by years in ascending order

```
db.courses.find({
    year: { $gte: 2000, $lte: 2005 },
    "professor": { $exists: true }
}, {
    "_id": 1
}).sort({
    "rating": -1,
    "year": 1
});
```

```
> db.courses.find({
...     year: { $gte: 2000, $lte: 2005 },
...     "professor": { $exists: true }
... }, {
...     "_id": 1
... }).sort({
...     "rating": -1,
...     "year": 1
... });
{ "_id" : "os" }
{ "_id" : "network" }
```

Question 5

Find students who studied courses, java, or php
Return student identifier only
Propose two different approaches

```
db.students.find({
    courses: { $in: ["java", "php"] }
}, {
    "_id": 1
});
```

```
> db.students.find({
...     courses: { $in: ["java", "php"] }
... }, {
...     "_id": 1
... });
{ "_id" : "arun" }
{ "_id" : "sam" }
{ "_id" : "anna" }
{ "_id" : "sylvia" }
{ "_id" : "Benita" }
```

```
db.students.find({
    $or: [
        { courses: "java" },
        { courses: "php" }
    ]
}, {
    "_id": 1
});
```

```
> db.students.find({
...     $or: [
...         { courses: "java" },
...         { courses: "php" }
...     ]
... }, {
...     "_id": 1
... });
{ "_id" : "arun" }
{ "_id" : "sam" }
{ "_id" : "anna" }
{ "_id" : "sylvia" }
{ "_id" : "Benita" }
```

Question 6
Find students who studied courses both java and php
Return student identifier only
Propose two different approaches
```
db.students.aggregate([
    {
        $match: {
            courses: { $all: ["java", "php"] }
        }
    },
    {
        $project: {
            _id: 1
        }
```

```
  }
]);
```

```
> db.students.aggregate([
...     {
...         $match: {
...             courses: { $all: ["java", "php"] }
...         }
...     },
...     {
...         $project: {
...             _id: 1
...         }
...     }
... ]);
{ "_id" : "arun" }
{ "_id" : "sam" }
```

```
db.students.find({
   courses: "java"
}, {
   "_id": 1
}).toArray().filter(student => {
   return db.students.findOne({
      _id: student._id,
      courses: "php"
   });
});
```

```
> db.students.find({
...    courses: "java"
... }, {
...    "_id": 1
... }).toArray().filter(student => {
...    return db.students.findOne({
...      _id: student._id,
...      courses: "php"
...    });
... });
[ { "_id" : "arun" }, { "_id" : "sam" } ]
```

Question 7
Find courses with Tamil title equal to Python Programming
Return course title only
Note that there are two ways how course titles are defined

```
db.courses.aggregate([
  {
    $match: {
      $or: [
        { "title.tamil": "Python Programming" },
        { "title.en": "Python Programming" }
      ]
    }
  },
  {
    $project: {
      _id: 0,
      title: 1
    }
  }
]);
```

```
> db.courses.aggregate([
...    {
...      $match: {
...        $or: [
...          { "title.tamil": "Python Programming" },
...          { "title.en": "Python Programming" }
...        ]
...      }
...    },
...    {
...      $project: {
...        _id: 0,
...        title: 1
...      }
...    }
... ]);
{ "title" : { "tamil" : "Python Programming", "en" : "Python Programming" } }
```

Question 8:
Find courses that have a National award from 2005
Return course identifier and all awards

db.courses.find({
    "awards.type": "National Award",
    "awards.year": 2005
}, {
    "_id": 1,
    "awards": 1
});

```
> db.courses.find({
...    "awards.type": "National Award",
...    "awards.year": 2005
... }, {
...    "_id": 1,
...    "awards": 1
... });
{ "_id" : "graphics", "awards" : [ { "type" : "National Award"
, "year" : 1996 }, { "type" : "International Award", "category
" : "Core CS", "year" : 2005 } ] }
```

Question 9
Find courses that are offered in cs and ca departments at the same time or have a
rating 80 or more
Return course identifier and at most 2 campuses
db.courses.find({
    $or: [
        {
            departments: { $all: ["cs", "ca"] }
```

```
      },
      {
        rating: { $gte: 80 }
      }
    ]
  },
  {
    "_id": 1,
    "campus": { $slice: 2 }
});
```

```
> db.courses.find({
...     $or: [
...         {
...             departments: { $all: ["cs", "ca"] }
...         },
...         {
...             rating: { $gte: 80 }
...         }
...     ]
... },
... {
...     "_id": 1,
...     "campus": { $slice: 2 }
... });
{ "_id" : "java", "campus" : [ "Trichy", "Dubai" ] }
{ "_id" : "php", "campus" : [ "Tricy", "Singapore" ] }
{ "_id" : "os", "campus" : [ "Trichy", "Sharjah" ] }
{ "_id" : "graphics" }
```