MongoDB

MongoDB Features

- Scalable
- Open source
- High performance document database
- Use BSON to store data internally

MongoDB Basics

- Data are organized in collections
- A collection stores a set of documents
- Collections are like tables and documents are like rows/tuples
  - Each document can have a different set of attributes even in the same collection
- Only requirement: every document should have an “_id” field

MongoDB Example


```
{     "_id”: ObjectId("4efa8d2b7d284dad101e4bc7"),
    "Last Name": “Cousteau”,
    "First Name": “Jacques-Yves”,
    "Date of Birth": “06-1-1910” }

{     "_id": ObjectId("4efa8d2b7d284dad101e4bc8"),
   "Last Name": "PELLERIN",
   "First Name": "Franck",
   "Date of Birth": "09-19-1983",
   "Address": "1 chemin des Loges",
   "City": "VERSAILLES" }
```

MongoDB Example

```
{   “_id” ObjectId("4efa8d2b7d284dad101e4bc9"),
    “firstname": “ Pramod”,
    “citiesvisited": [“Chicago”, “London”, “Pune”, “Banglore”],
    “addresses": [
        { “state”: “AK”,
          “city”: “DILLINGHAM”,
          “type”: “R”
        },
        {“state": “MH”,
          “city": “PUNE",
          “type": “R”},
      ],
      “lastcity": “Chicago”
}
```

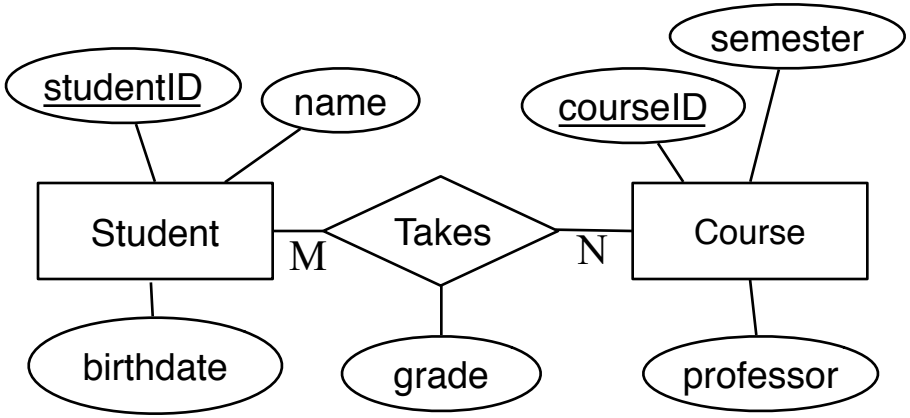
MongoDB Example

```
db.mycol.insertOne({
        first: ‘john’,
        last: ‘smith’,
        gender: ‘m’,
        hair_color: ‘brown’,
        occupation: ‘developer’,
        nationality: ‘american’
});
```

- “first”, “last”, “gender”, etc. are arbitrary tags

MongoDB Schema Diagrams

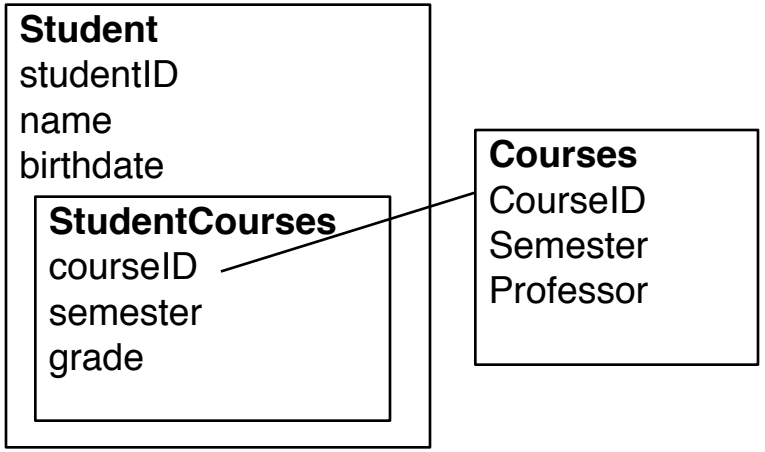
Relational Model



Students(studentID: string, birthdate:date, name:string)
Course(courseID: string, semester:string, professor:string)
Student_Course(studentID: string, courseID:string, grade:string)
Foreign key studentID refs Students(studentID)
Foreign key courseID refs Course(courseID)

Mongo Model

- **Document Embedding** can be embedded as documents (documents can be arrays and represent 1 to many)
- **Document Linking** is between documents (similar to joins in SQL)



Working on MongoDB

- Download and install MongoDB
  - https://docs.mongodb.com/manual/installation/
- The mongo Shell
  - Text-based MongoDB client
  - https://docs.mongodb.com/manual/mongo/
- MongoDB query language
  - Creating documents
  - Querying documents
  - Updating documents
  - Deleting documents

Creating Documents

- insertOne()
  - Insert a single document
- insertMany()
  - Insert multiple documents
  - Ordered(default)/unordered insert
    - As the second argument to insertMany()
    - Ordered: as soon as an error is encountered, the insertion is stopped

Querying Documents

- find()
  - findOne(): return the first document that satisfies the filter
  - Query operators
    - Comparison operators: $gt, $lt, $gte, $lte, $ne, $in
    - Element operators: $exists, $type
    - Logical operators: $or, $and
- Array fields
  - Exact match
  - Match anywhere in an array
  - Match specific element of an array (dot operator)

Querying Documents (Cont.)

- Cursors
  - A pointer to the current location of a result set
  - find() method returns a cursor
  - Use cursor to iterate through the result
- Projections
  - As the second argument passed to find()
  - _id is returned by default
  - Use 1 to include, 0 to exclude

Updating Documents

- updateOne()
- updateMany()
- Update operators
  - $set, $inc, $push, $each, $unset, $rename
- Upserts
  - As the third argument
  - Create a new document when no match
- replaceOne()
  - Replace the first matching document

Deleting Documents

- deleteOne()
  - Delete the first matching document
- deleteMany()
  - Delete all matching documents