mongoDB

NoSQL

Introduction

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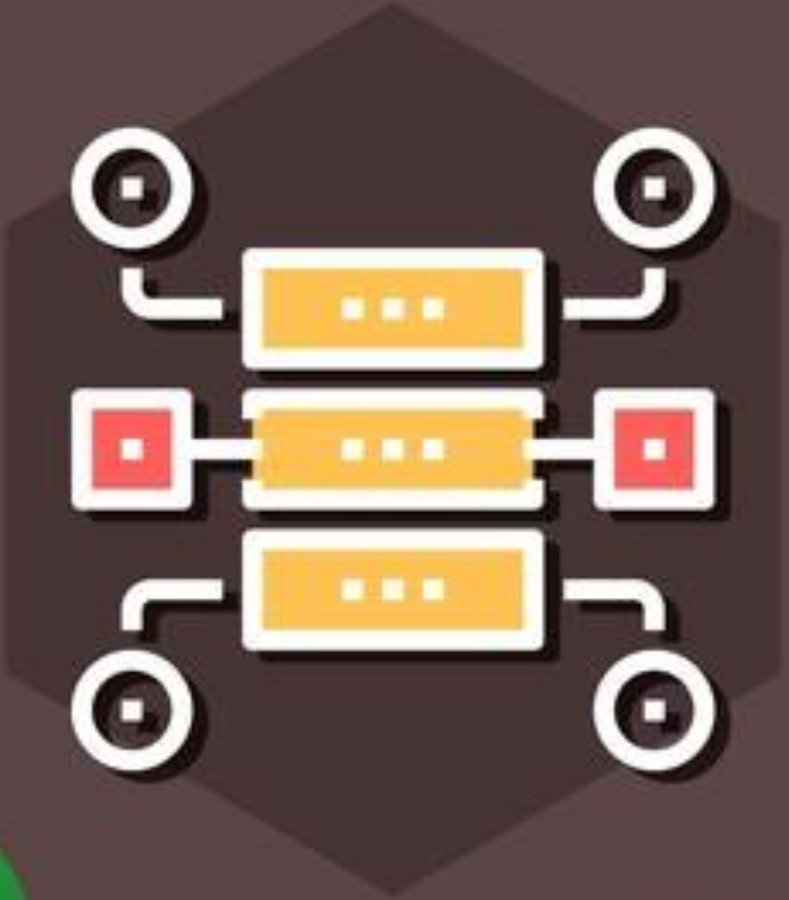
Data Modeling (Relationships)



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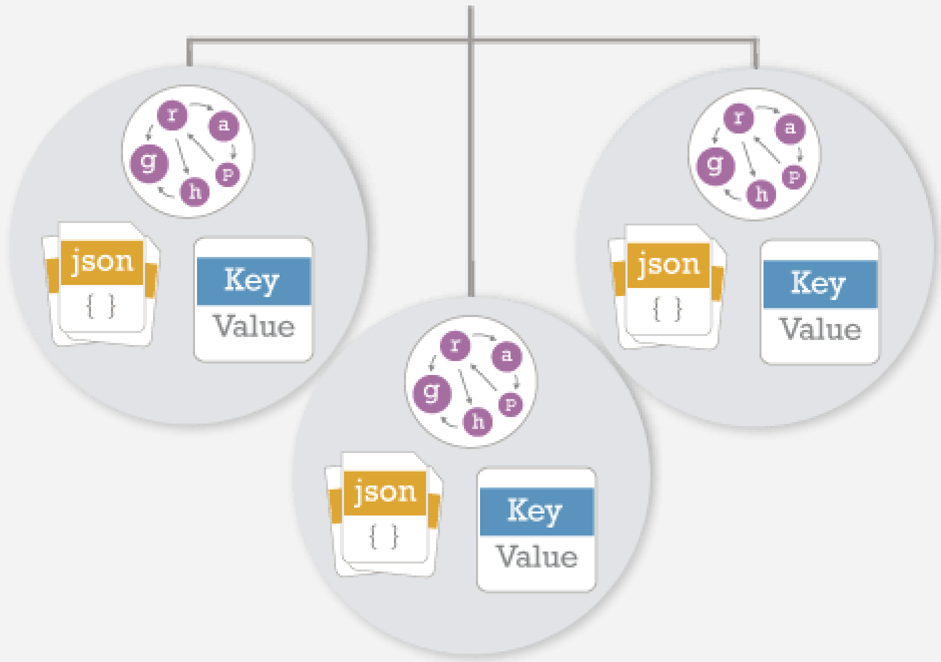
Data Modeling

Document Structure

- ✓Reference
- ✓Embeded



Consideration

- ✓Data Usage
- ✓Document growth

Embedding Documents

A single document can contain its own relationships.
Embedded documents capture relationships between data by storing related data in a single document structure.
MongoDB documents make it possible to embed document structures in a field or array within a document.
These *denormalized* data models allow applications to retrieve and manipulate related data in a single database operation.

Employee document

Embeded document

```
{
     _id:1,
    name:"Eman",
    department: {
          name:"SD",
          phone:"01234"
    }
}
```

Embedding Documents

Duplicate department Information for each Employee

Employee documents

```
{
    _id:1,
   name:”Eman”,
   department: {
           name:”SD”,
           phone:”01234”
   }
}
```

```
{
    _id:2,
   name:”Mona”,
   department: {
           name:”SD”,
           phone:”01234”
   }
}
```

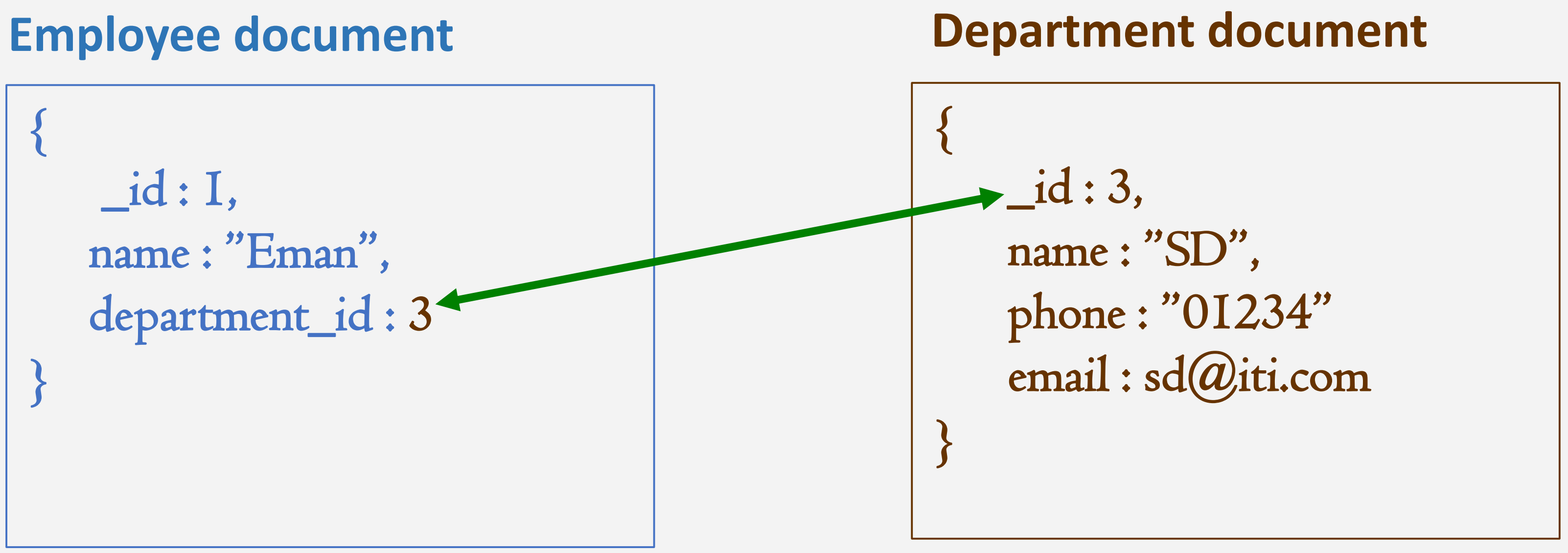
```
{
    _id:3,
   name:”Ali”,
   department: {
           name:”SD”,
           phone:”01234”
   }
}
```

```
db.employees.find({},{dept:true,_id:false});
```

Referencing Documents

References store the relationships between data by including links or *references* from one document to another. Applications can resolve these references to access the related data. Broadly, these are *normalized* data models.

MongoDB does not see anything but value-pair filed



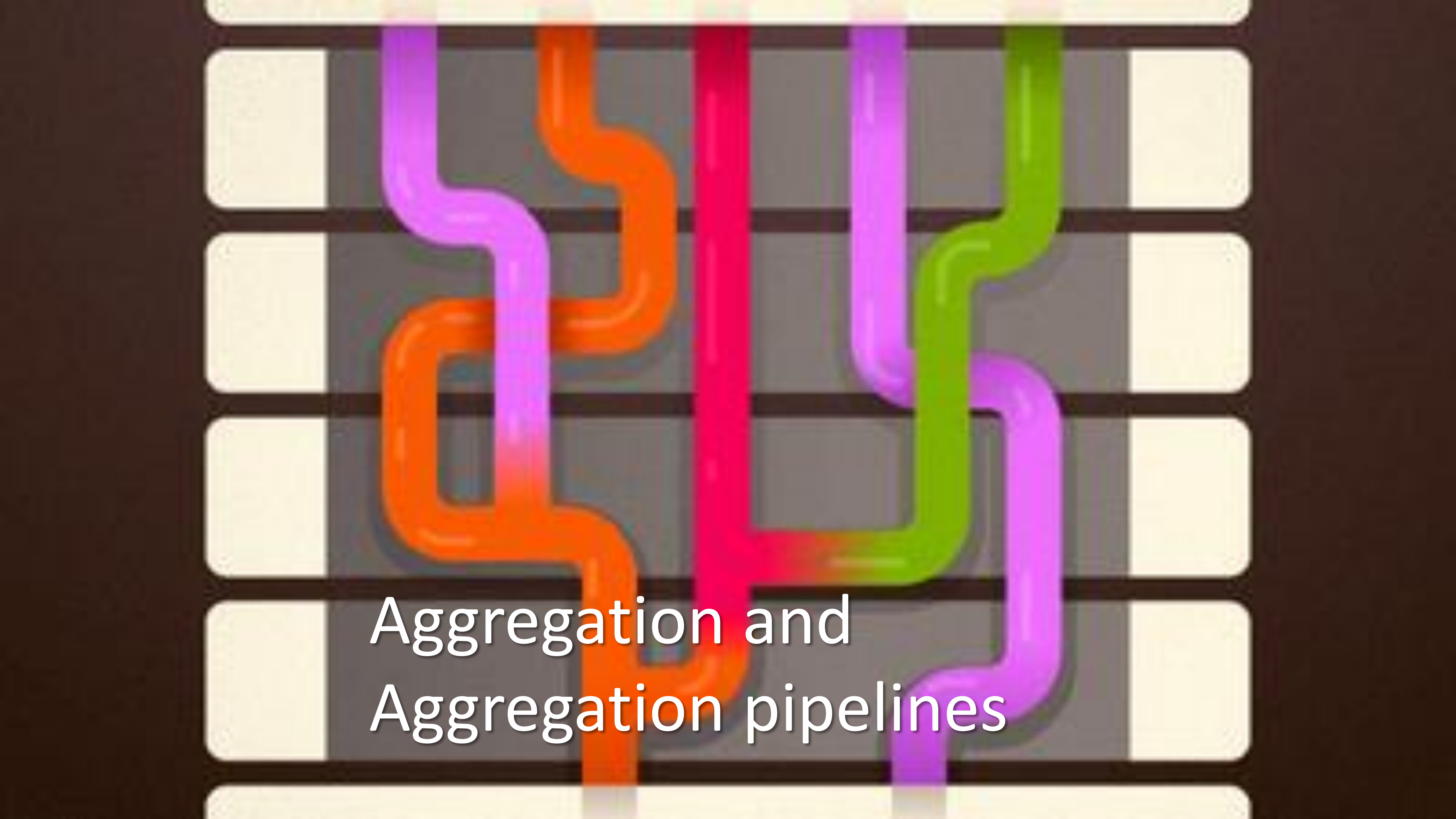
Employee document

```
{
   _id : 1,
   name : "Eman",
   department_id : 3
}
```

Department document

```
{
   _id : 3,
   name : "SD",
   phone : "01234"
   email : sd@iti.com
}
```

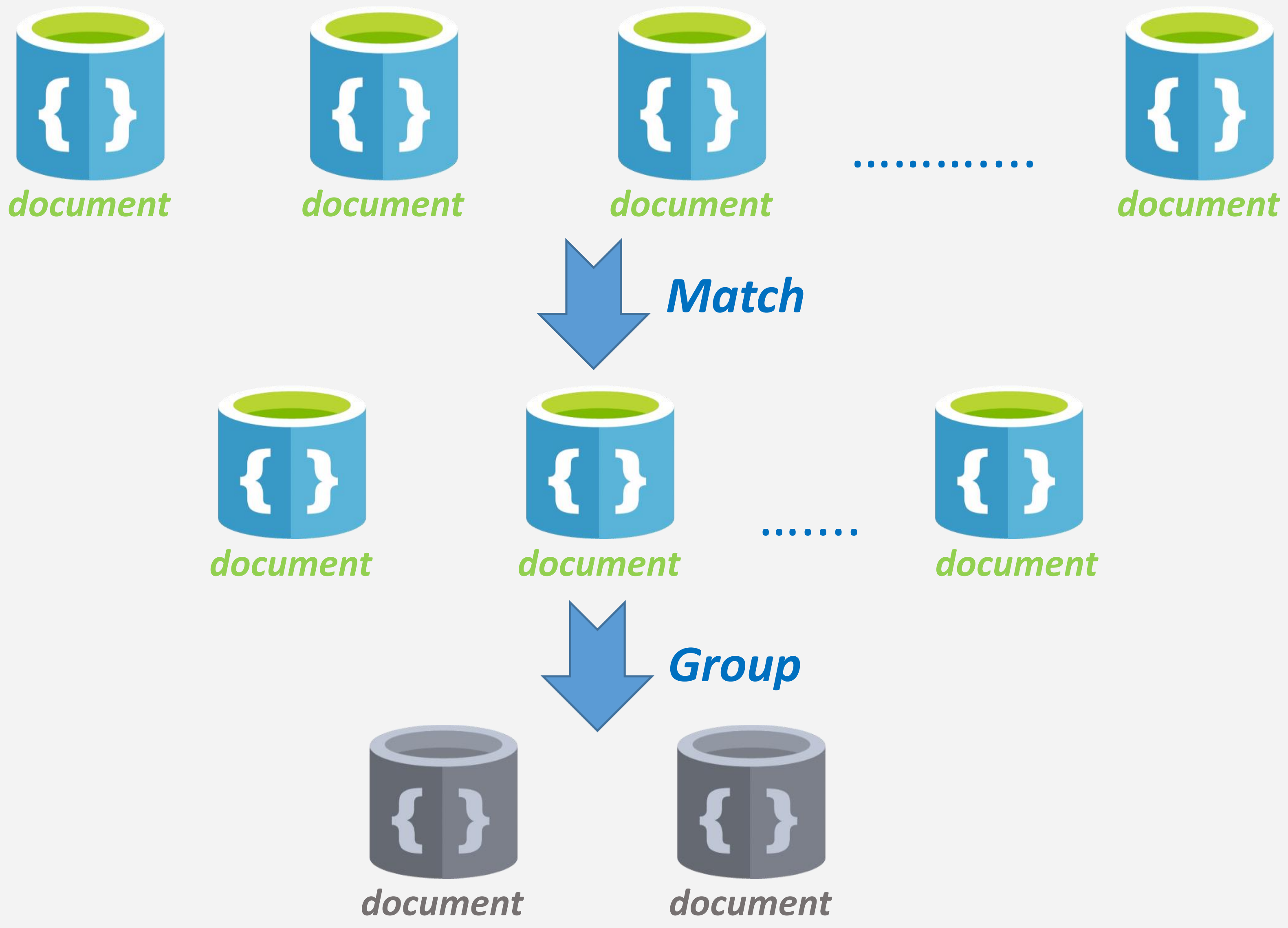
```
employee=db.employees.findOne({name:"Mohammed"});

db.departments.find({_id:employee["dept_id"]})
```



Aggregation and Aggregation pipelines

Aggregation

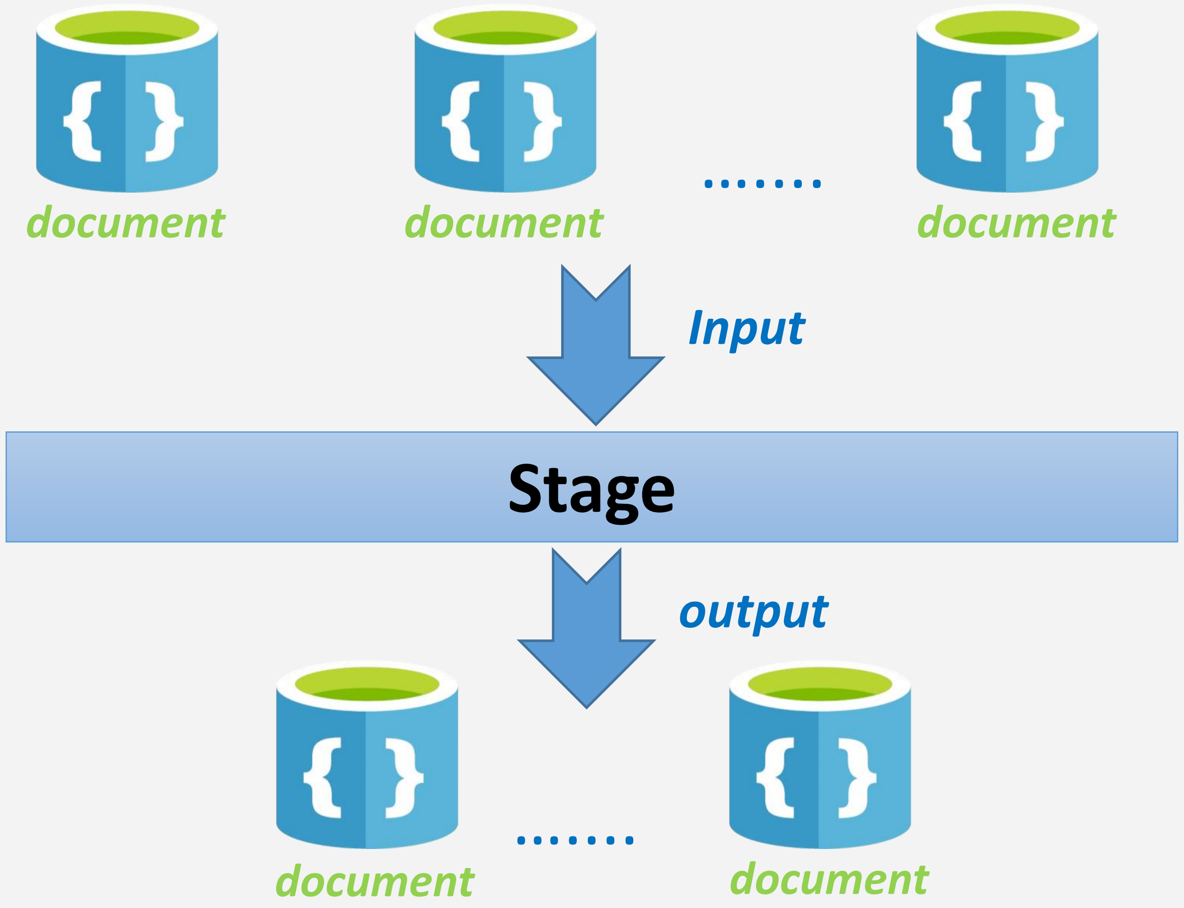
Aggregations operations process data records and return computed results. Aggregation operations group values from multiple documents together, and can perform a variety of operations on the grouped data to return a single result.



aggregate()

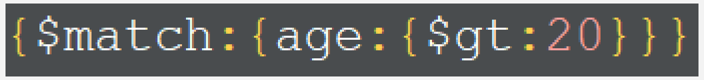
Documents during aggregation process pass through number of stages. Stages (Pipelines) are arrays of objects , separated by comma. Documents first are passed to stage one and the result of stage one are passed to stage two and so on..

```
db.collection.aggregate([
Satge1 ,
Stage2,
…
,…..
StageN]);
```

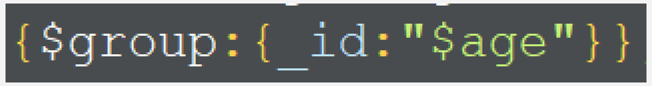


aggregate() Stage Operators

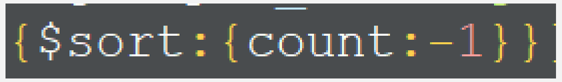
Each Stage starts from the stage operator {<$StageOperator>: {} }



```
{$match:{age:{$gt:20}}}
```



```
{$group:{_id:"$age"}}
```



```
{$sort:{count:-1}}
```

Name	Description
$group	Groups input documents by a specified identifier expression and applies the accumulator expression(s)
$limit	Passes the first *n* documents unmodified to the pipeline where *n* is the specified limit.
$match	Filters the document stream to allow only matching documents to pass unmodified into the next pipeline stage.
$out	Writes the resulting documents of the aggregation pipeline to a collection.
$project	Reshapes each document in the stream, such as by adding new fields or removing existing fields.
$count	Returns a count of the number of documents at this stage of the aggregation pipeline.
$sort	Reorders the document stream by a specified sort key

$match

Match documents according to specified condition

{$match : {<query>}}

```
db.employees.aggregate([{$match:{salary:{$gt:2000}}}])
```

```
db.employees.aggregate([{$match:{age:20}}])
```

```
db.employees.aggregate([{$match:{salary:{$gt:2000},age:20}}]);
```

$match

Match documents according to specified condition

{$match : {<query>}}

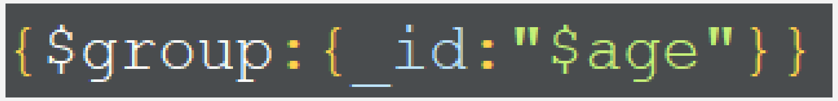
```
db.employees.aggregate([{$match:{salary:{$gt:2000}}}])
```

```
db.employees.aggregate([{$match:{age:20}}])
```

```
db.employees.aggregate([{$match:{salary:{$gt:2000},age:20}}]);
```

Aggregation Expression

Expression refers to the name of the filed in input documents   <$FieldName>



```
{$group:{_id:"$age"}}
```

Result:

```
{ "_id" : 25}
{ "_id" : 30}
{ "_id" : 20}
{ "_id" : 40}
```

$group

Groups documents by some specified expression and outputs to the next stage a document for each distinct grouping. The output documents contain an _id field which contains the distinct group by key. The output documents can also contain computed fields that hold the values of some accumulator expression grouped by the $groups'id_id field. $group does *not* order its output documents.

{ $group: { _id: <expression>, <field1>: { <accumulator1> : <expression1> }, ... } }

```
db.employees.aggregate([{$group:{_id:"$age"}}]);
```

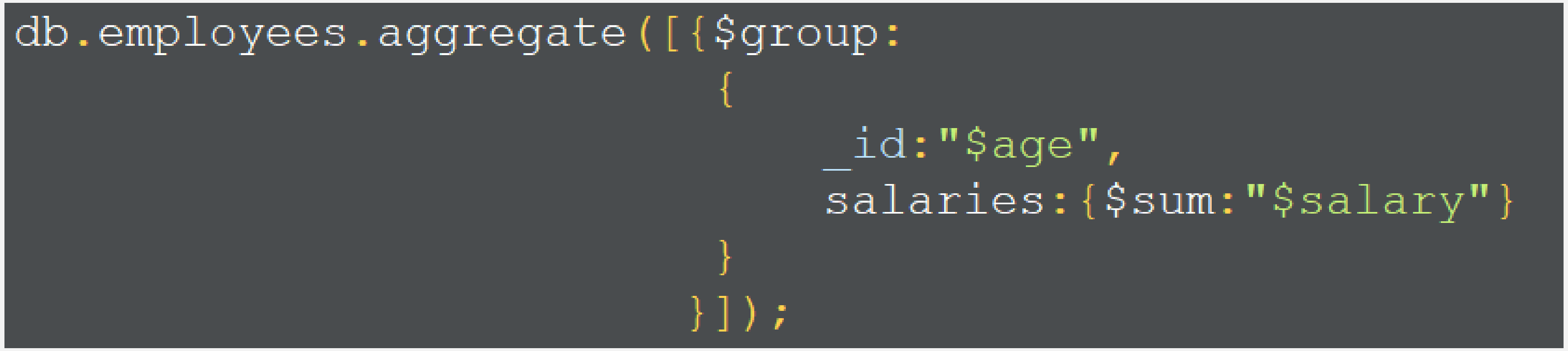
```
db.employees.aggregate([{$group:{_id:{age:"$age",salary:"$saraly"}}}]);
```

```
{$group:{_id:"$department.name"}}
```

```
{$group:{_id:"$age",total:{$sum:"$salary"}}}
```

Accumulators

{ $avg: <expression> }
{ $sum: <expression> }
{ $min: <expression> }
{ $max: <expression> }



```
db.employees.aggregate([{$group:
                          {
                              _id:"$age",
                              salaries:{$sum:"$salary"}
                          }
                         }]);
```

$count

Passes a document to the next stage that contains a count of the number of documents input to the stage.

{ $count:<string> }

```
db.employees.aggregate([{$count:"allDocumentsCount"}]);
```

Result: {"allDocumentsCount" : 8}

```
db.employees.aggregate([{$count:"total"}]);
```

Result: {“total" : 8}

$sort

Sorts all input documents and returns them to the pipeline in sorted order.

{ $sort: { <field1>: +|-1 <field2>: +|-1... } }

```
db.employees.aggregate([{$sort:{name:1}}]);
```

```
db.employees.aggregate([{$sort:{name:1,age:-1}}]);
```

$project

Passes along the documents with the requested fields to the next stage in the pipeline. The specified fields can be existing fields from the input documents or newly computed fields.

{ $project: {<field1>: 1|0<field2>: 1|0... } }

```
db.employees.aggregate([{$project:{name:1,age:1}}]);
```

```
db.employees.aggregate([{$project:{_id:0,name:1}}]);
```

```
db.employees.aggregate([{$project:{_id:0,salary:0}}]);
```

```
db.employees.aggregate([{$project:{name:1,employeeAge:"$age"}}]);
```

```
db.employees.aggregate([{$project:{name:1,
                                   info:{
                                        salary:"$salary",
                                        age:"$age"
                                        }
    }}]);
```

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Indexing

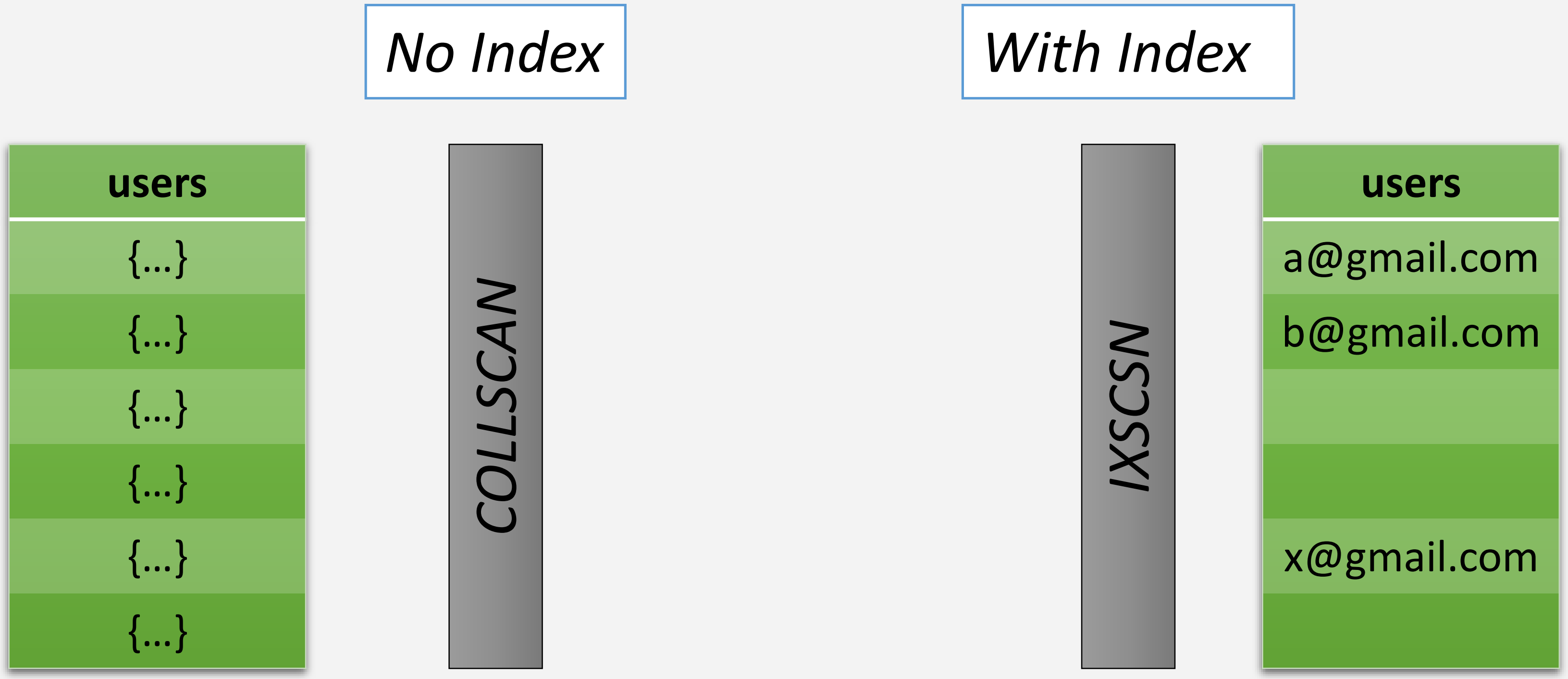
Indexing

How are Indexes special in MongoDB?

MongoDB allows you to do different operations to the data you store in it. A very big feature compared to other Document DBs is that it supports secondary indexes on its collections. You can create simple and complex indexes and they will be used for speeding up finds (queries), matches (in aggregates) and sorts. It has support for indexes on multiple fields, on arrays, on geospatial fields and even text indexes to speed up searching for string content.

Indexing

```
db.users.find({"email":"x@gmail.com"});
```



Scan all documents then filter

Jump to filtered document