



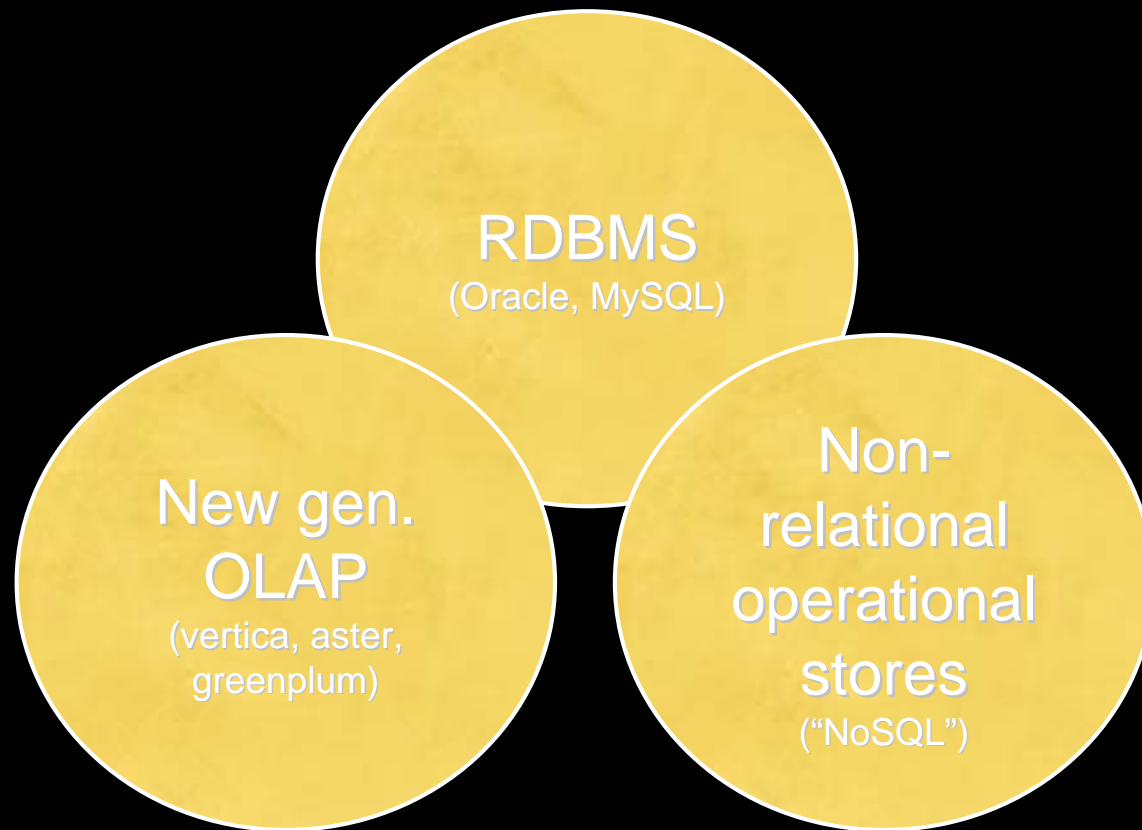
mongoDB

open-source, high-performance,  
schema-free, document-oriented  
database

Dwight Merriman  
CEO, 10gen

*10gen provides commercial support and sponsorship of the MongoDB project*

# The database world is changing no longer one-size-fits-all



NoSQL really means:

(scalable) non-relational next generation  
operational datastores and databases

# Scaling out

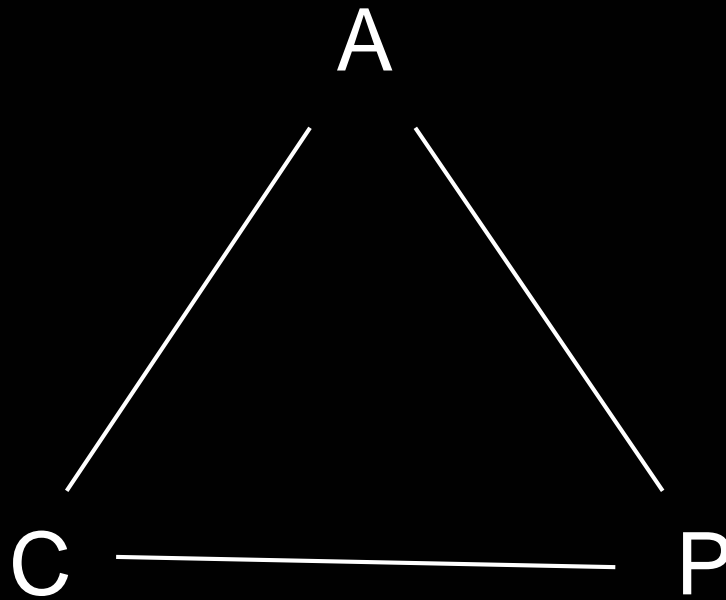
no joins +

light transactional semantics =

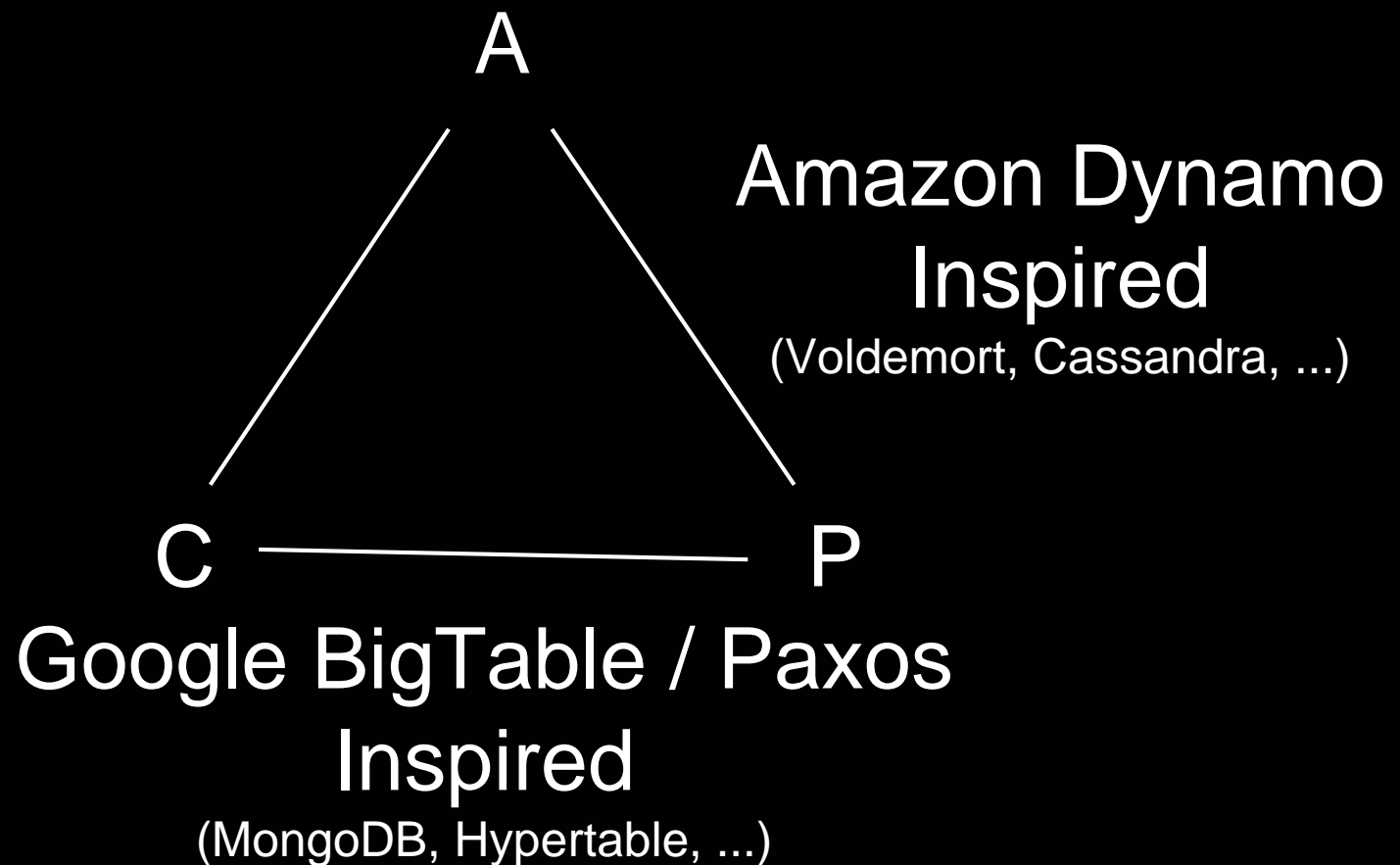
horizontally scalable architectures

# Scaling out - CAP

pick any two



# Scaling out - CAP



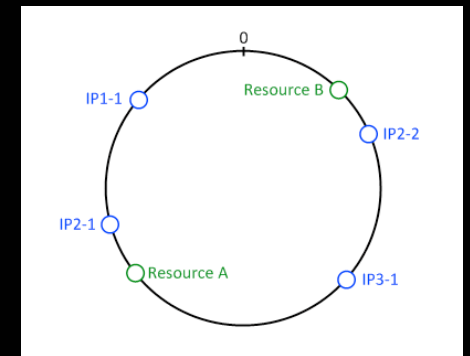
# Scaling out

distribution & query models

consistent hashing

range chunking  
order preserving

scatter / gather



collection	minkey	maxkey	location
users	{ name : 'Miller' }	{ name : 'Nessman' }	shard <sub>2</sub>
users	{ name : 'Nessman' }	{ name : 'Ogden' }	shard <sub>4</sub>
...			

# Data models

no joins +

light transactional semantics =  
horizontally scalable architectures

important side effect :

new data models =

improved ways to develop applications

# Data Models

Key/Value

Column-oriented / tabular

Document-based

# Data Models

## Key/Value

memcached, dynamo, voldemort, memcached

## Column-oriented / tabular

bigtable, hbase, hypertext

## Document-oriented

mongodb, couchdb. JSON stores

Scalability & Performance

● memcached

● key/value stores

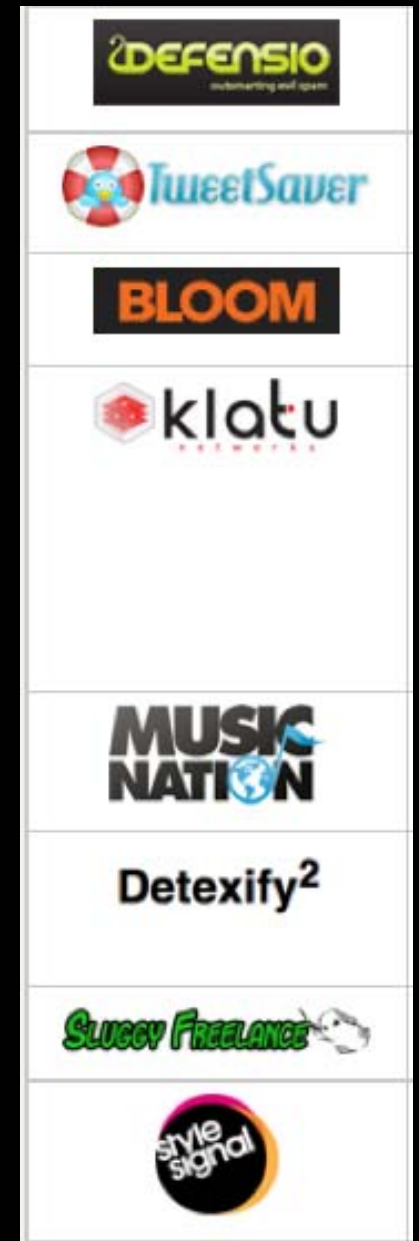
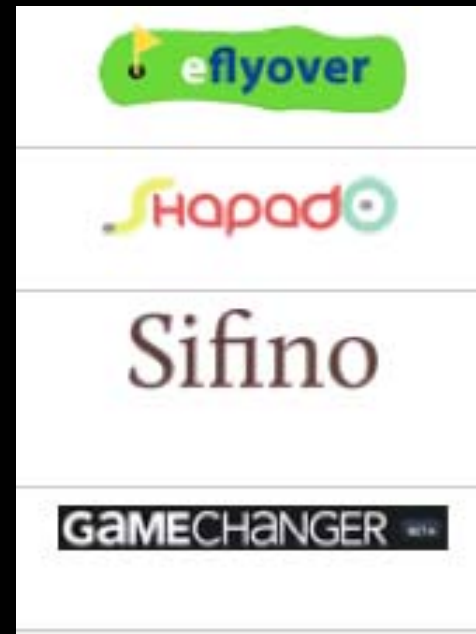
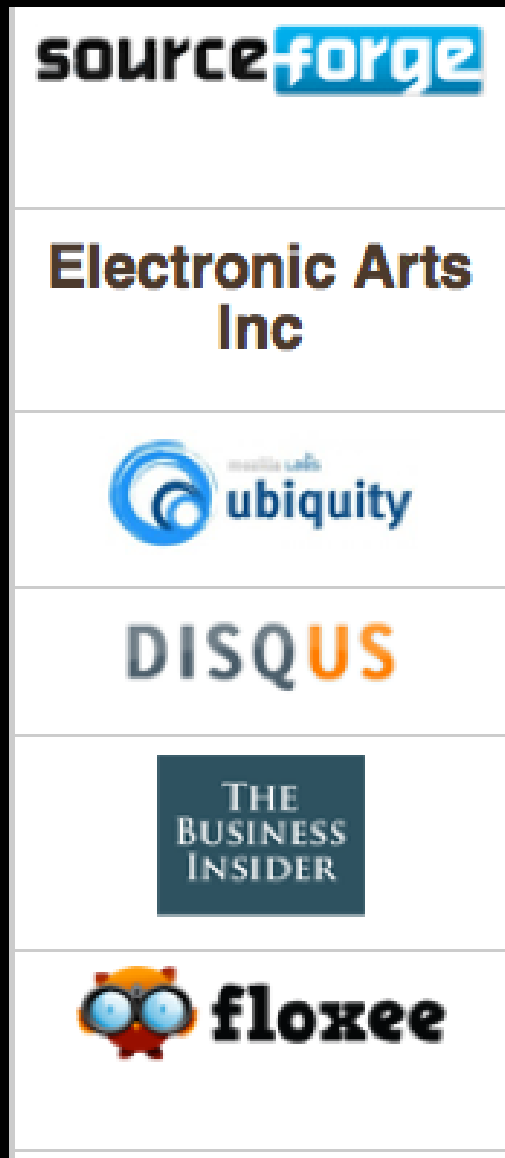
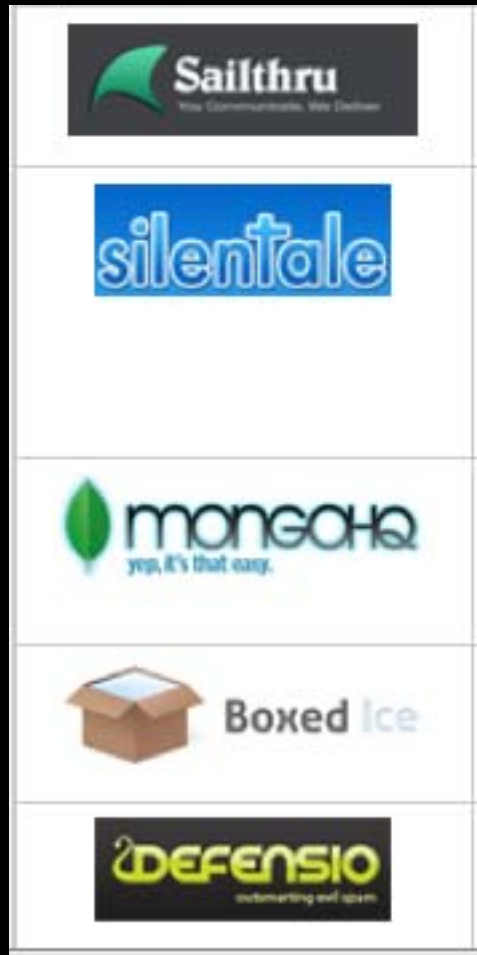
● MongoDB

● RDBMS

Depth of Functionality



# Production Deployments



# Case Study



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Ian - "We're using LAMP - Linux, Apache, MongoDB, PHP"

<http://www.businessinsider.com/how-we-use-mongodb-2009-11>

# Business Insider Data Model

```
{ title: 'Too Big to Fail',  
  text: 'article text here...',  
  author: 'John S',  
  ts: Date("05-Nov-09 10:33"),  
  comments: [ { author: 'Tan White',  
               comment: 'Great article!' },  
              { author: 'Joe Smith',  
                comment: 'But how fast is it?',  
                replies: [ { author: 'Jane Smith',  
                           comment: 'scalable?' } ]  
              }  
            ]  
  ,  
  tags: ['finance', 'economy']  
}
```

# MongoDB Query Example

```
// select * from posts where 'economy' in tags
// order by ts DESC limit 10
```

```
cursor =
```

```
  db.posts.find({tags : 'economy'}).sort({ts:-1}).limit(10);
```

```
{ title: 'Too Big to Fail',
  author: 'John S',
  ts: Date("05-Nov-09 10:33"),
  comments: [ { author: 'Ian White',
                comment: 'Great article!' },
              { author: 'Joe Smith',
                comment: 'But how fast is it?',
                replies: [ { author: 'Jane Smith',
                            comment: 'scalable?' } ]
              }
            ]
  ,
  tags: ['finance', 'economy']
}
```

# MongoDB Queries

```
db.posts.ensureIndex({tags:1});  
db.posts.ensureIndex({ts:1});  
db.posts.ensureIndex({tags:1,ts:-1}); // compound
```

```
cursor =  
  db.posts.find({tags : 'economy'}).sort({ts:-1}).limit(10);
```

```
{ title: 'Too Big to Fail',  
  author: 'John S',  
  ts: Date("05-Nov-09 10:33"),  
  comments: [ { author: 'Ian White',  
               comment: 'Great article!' },  
              { author: 'Joe Smith',  
                comment: 'But how fast is it?',  
                replies: [ { author: 'Jane Smith',  
                             comment: 'scalable?' } ]  
              }  
            ]  
  ,  
  tags: ['finance', 'economy']  
}
```

# MongoDB Queries

```
db.posts.find({ts : {$gt : new Date("1-Nov-2009")}})
```

```
db.posts.find({author : { $in : ['johns', 'fredy'] }});
```

```
db.posts.find( { author : /^John/ } )
```

```
{ title: 'Too Big to Fail',  
  author: 'John S',  
  ts: Date("05-Nov-09 10:33"),  
  comments: [ { author: 'Ian White',  
                comment: 'Great article!' },  
              { author: 'Joe Smith',  
                comment: 'But how fast is it?',  
                replies: [ { author: 'Jane Smith',  
                             comment: 'scalable?' } ]  
              }  
            ]  
  ,  
  tags: ['finance', 'economy']  
}
```

# MongoDB Queries - Dot Notation

```
db.users.find( { "addr.state" : 'ny' } )
```

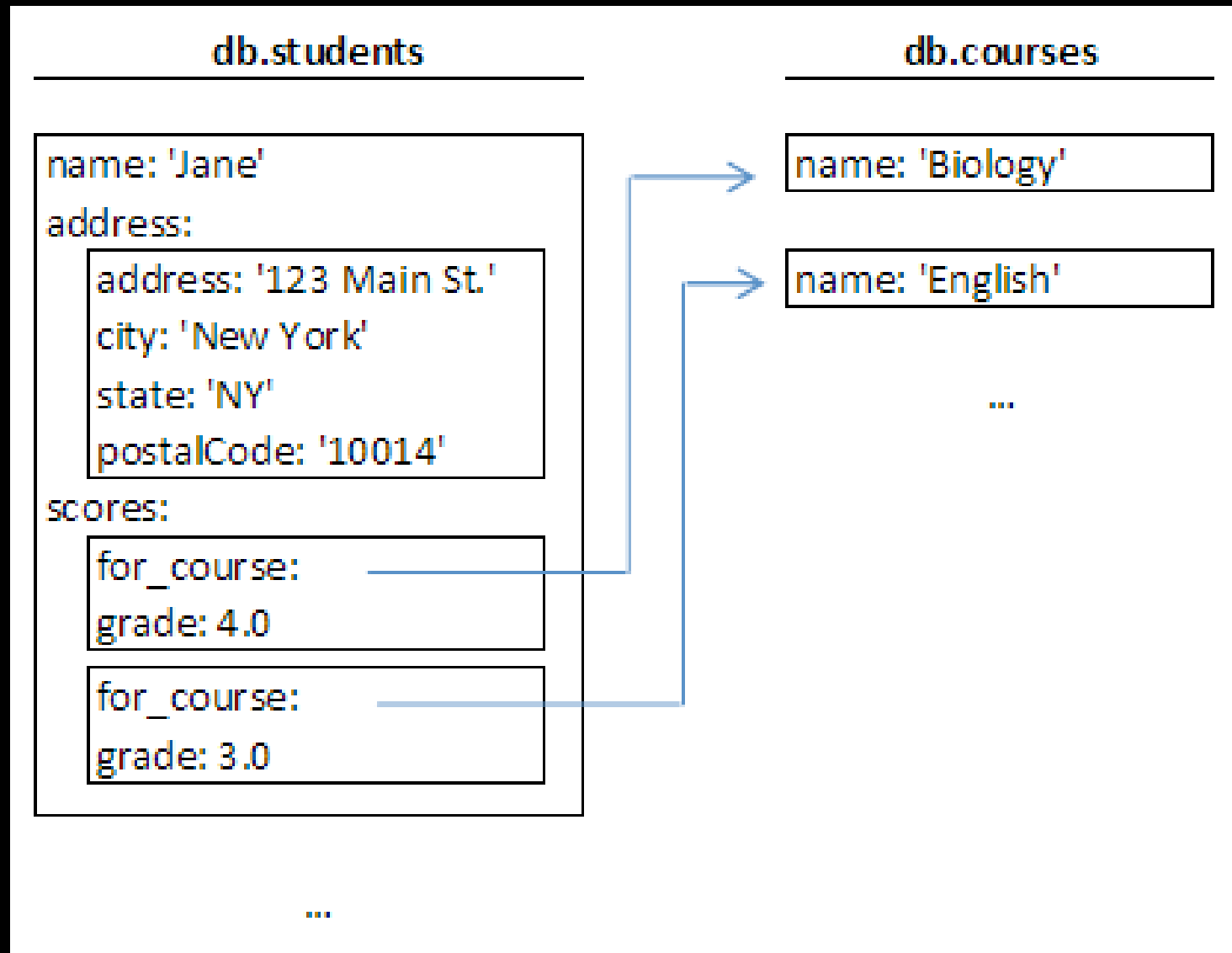
```
{ name : 'je',  
  addr : { city : 'new york', state : 'ny', zip : '10014' }  
}
```

# Fast Updates in Place

```
db.my_collection.update( { _id : ... }, { $inc : { y : 2 } } );
```

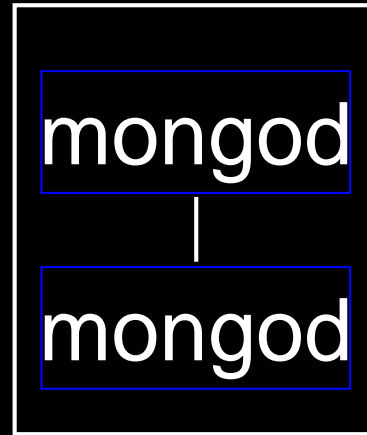
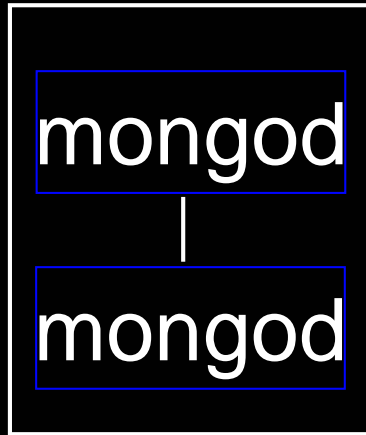
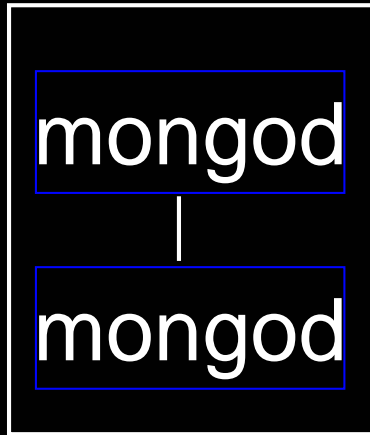
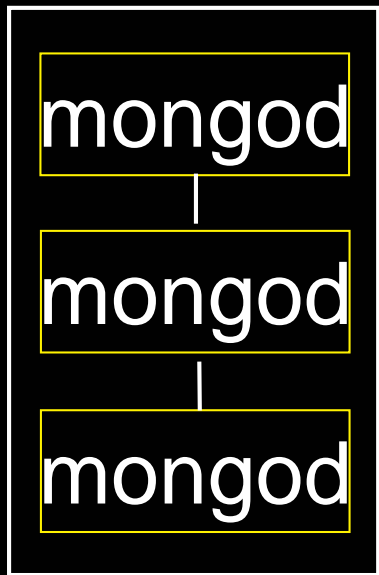
```
db.my_collection.update(  
  { _id : ... },  
  { $inc : { y : 2 } },  
  true /* upsert */  
  ) );
```

# Schemas and References

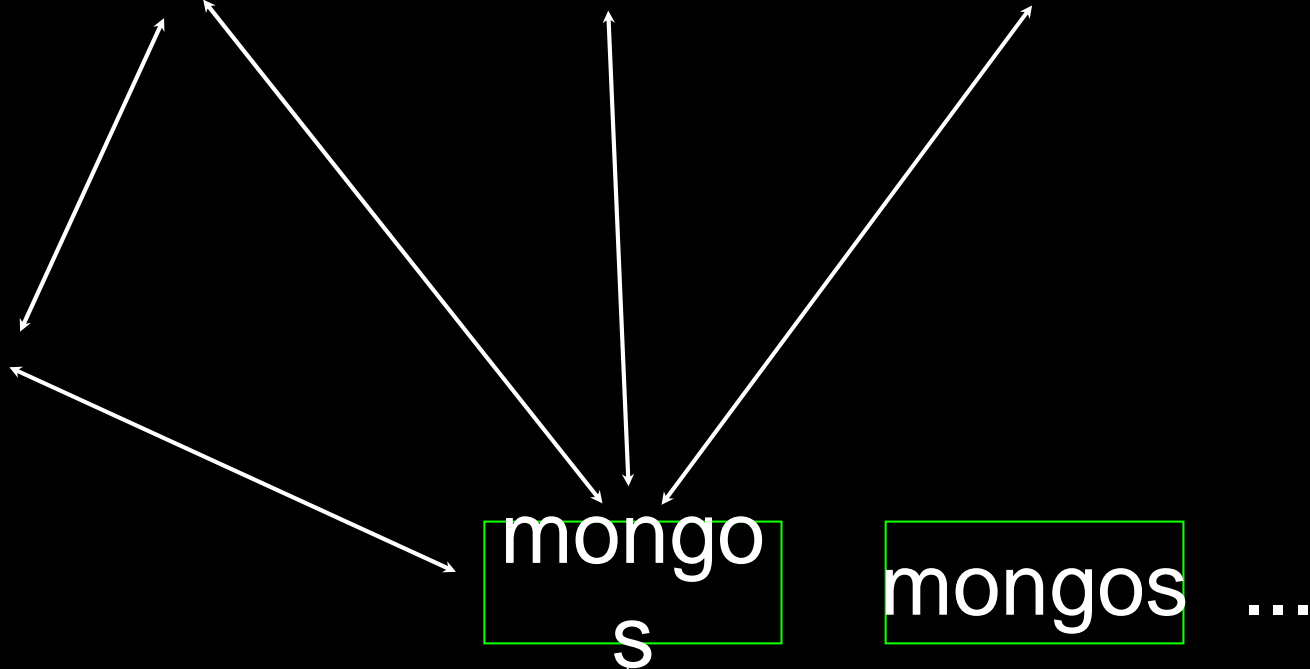


# Shards

## Config Servers



...

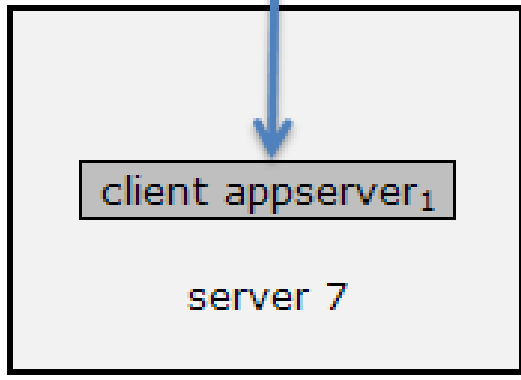
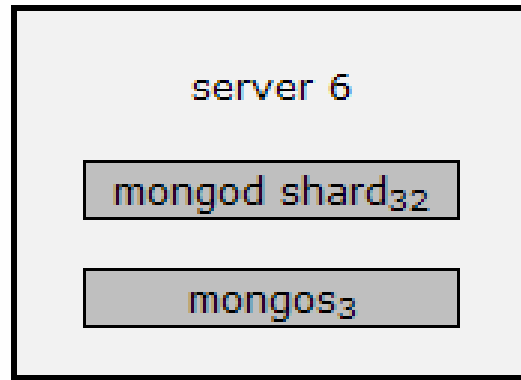
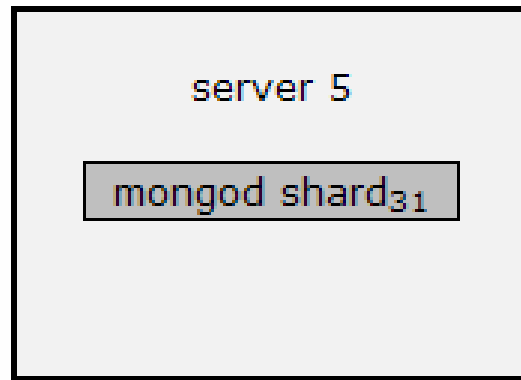


mongos

mongos ...

client

collection	minkey	maxkey	location
users	{ name : 'Miller' }	{ name : 'Nessman' }	shard <sub>2</sub>
users	{ name : 'Nessman' }	{ name : 'Ogden' }	shard <sub>4</sub>
...			



...

# Release Status



Core Server ("mongod") - production

Replication - production

Auto Sharding ("mongos") - alpha

Map/Reduce - alpha

<http://www.mongodb.org/display/DOCS/Downloads>



{name: "mongo", type: "db"}

# Questions?

10gen is hiring, email [dwight@10gen.com](mailto:dwight@10gen.com)

download MongoDB: [www.mongodb.org](http://www.mongodb.org)

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