MongoDB

Or how I learned to stop worrying and love the database

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10gen

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The resulting [MongoDB] application has literally changed the way the pharma company conducts business. Whereas in the past, patient queries could take minutes to hours, results are now essentially real-time.

`http://news.cnet.com/8301-13846_3-10451248-62.html`

Used the mongodb profiler to help me get a query down from 1000ms down to 0ms by adding an index and a filter.

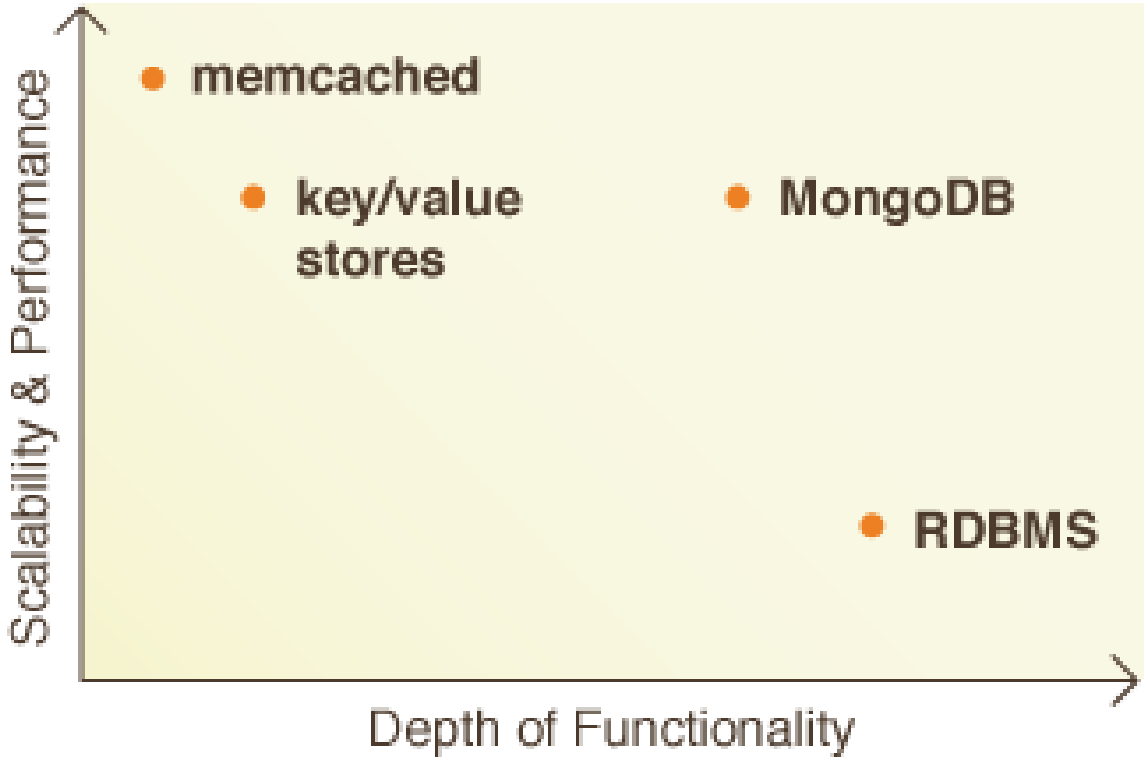
`http://twitter.com/mully/statuses/5583618526`

> *Compared to hadoop, mongo's speed and startup time make developing new queries much easier; what took us two weeks to get working on hadoop was done in two days on mongo.*

Emmett Shear, CTO (and developer) at Justin.tv

> *It took me half a day to go from not touching MongoDB to writing some fairly good functionality against it. It makes setting up, configuring, and interfacing with MySQL look archaic – ridiculously archaic.*

`http://geekaustin.org/2010/01/31/mongodb-day-geek-austin-data-series`


memcached
key/value stores
MongoDB
RDBMS
Scalability & Performance
Depth of Functionality

- Organized into Databases and Collections (like Tables)
- Document Oriented
- JSON-like (BSON)
- Schemaless
- Dynamic, Strong Typing
- Database can “reach into” objects

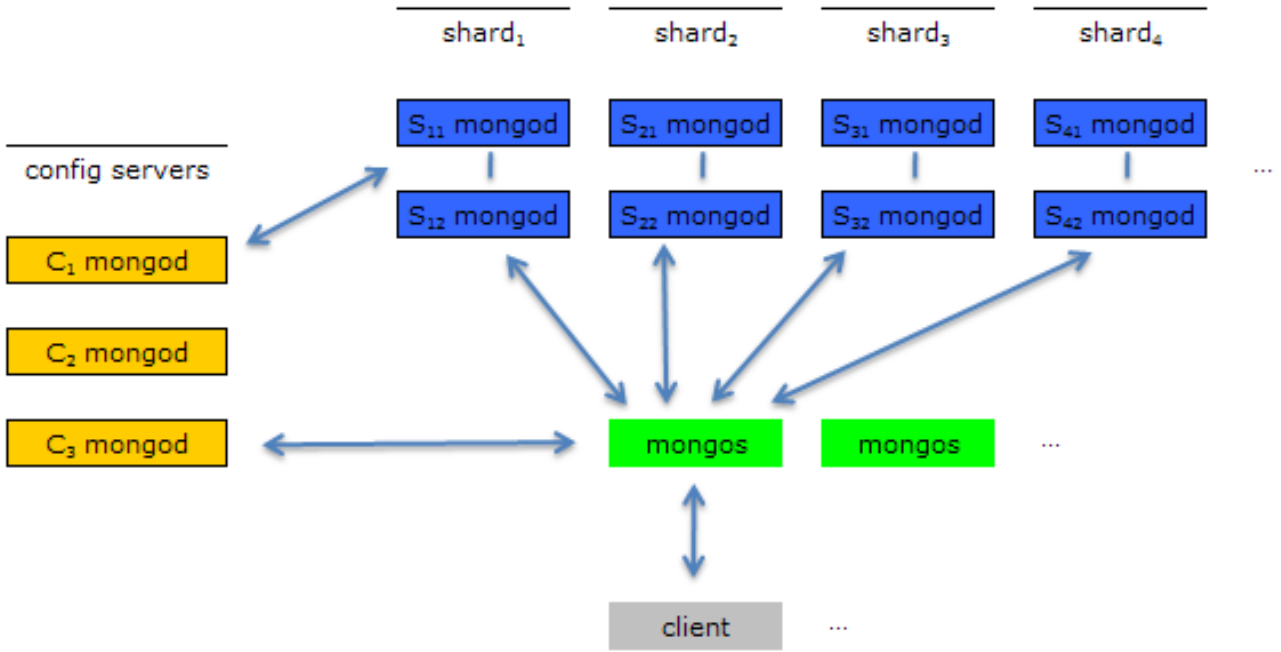
```
db.people.insert({
  _id: "mstearn",
  name: "Mathias Stearn",
  karma: 42,
  active: true,
  birthdate: new Date(517896000000),
  interests: ["MongoDB", "Hadoop", "Ünícødě"],
  subobject: {foo: "bar"}
});
```

JavaScript used for:

- Shell and Documentation
- (Very) Advanced Queries
- “Group By” Queries
- MapReduce

```
db.users.find({$where: "this.a + this.b >= 42"});
db.users.find({$where: "this.a + this.b >= 42"});
db.posts.group(
  { key: "user"
  , initial: {count:0, comments:0}
  , reduce: function(doc,out){
      out.count++;
      out.comments += doc.comments.length; }
  , finalize: function(out){
      out.avg = out.comments / out.count; }
  });
```

- Master-Slave replication for Availability and Reliability
  - Replica-Pairs support auto-negotiation for master
- Auto-Sharding for Horizontal Scalability
  - Distributes based on specified field
  - Currently alpha
- MMAP database files to automatically use available RAM
- Asynchronous modifications


shard1
shard2
shard3
shard4
S11 mongod
S21 mongod
S31 mongod
S41 mongod
S12 mongod
S22 mongod
S32 mongod
S42 mongod
config servers
C1 mongod
C2 mongod
C3 mongod
mongos
mongos
client

Official

- Java/JVM
- Python
- Ruby
- C/C++
- Perl
- PHP

Community Supported

Closure, Scala, C#, Haskell, Erlang, *and More*

JSON

- String (UTF8)
- Double
- Object (hash/map/dict)
- Array
- Bool
- Null / Undefined

Extras

- Date
- Int32 / Int64
- ObjectID (12 bytes: timestamp + host + pid + counter)
- Binary (with type byte)

- $set
- $inc
- $multiply (soon)
- $push / $pushAll
- $pull / $pullAll

```
db.posts.update({_id:SOMEID}, {$push:{tags:"mongodb"}})
db.tags.update({_id:"mongodb"}, {$inc:{count:1}},
                                {upsert:true})
```

Simple

```
db.posts.findOne({ user: "mstearn" });

var cursor = db.posts.find({ user: "mstearn" });
cursor.forEach(function(){
  doSomething(this.text);
});
```

Sorted

```
db.posts.find(
   { user: "mstearn" }
).sort({timestamp:-1})
```

Paginated

```
db.posts.find(
   { user: "mstearn" }
).sort({timestamp:-1}).skip(10).limit(10);
```

Simple Tag Search

```
db.posts.find(
   { user: "mstearn"
   , tags: "mongo"
   }
).sort({timestamp:-1}).skip(10).limit(10);
```

Complex Tag Search

```
db.posts.find(
   { user: "mstearn"
   , tags: {$in: ["mongo", "mongodb"]}
   }
).sort({timestamp:-1}).skip(10).limit(10);
```

Nested Objects

```
db.posts.find(
   { user: "mstearn"
   , tags: {$in: ["mongo", "mongodb"]}
   , comments.user: "mdirolf"
   }
).sort({timestamp:-1}).skip(10).limit(10);
```

Regular Expressions

```
db.posts.find(
   { user: "mstearn"
   , tags: {$in: ["mongo", "mongodb"]}
   , comments.user: "mdirolf"
   , text: /windows/i
   }
).sort({timestamp:-1}).skip(10).limit(10);
```

Ranges

```
db.posts.find(
   { user: "mstearn"
   , tags: {$in: ["mongo", "mongodb"]}
   , comments.user: "mdirolf"
   , text: /windows/i
   , points: {$gt: 10, $lt 100}
   }
).sort({timestamp:-1}).skip(10).limit(10);
```

Arbitrary JavaScript

```
db.posts.find(
   { user: "mstearn"
   , tags: {$in: ["mongo", "mongodb"]}
   , comments.user: "mdirolf"
   , text: /windows/i
   , points: {$gt: 10, $lt 100}
   , $where: "this.a + this.b >= 42"
   }
).sort({timestamp:-1}).skip(10).limit(10);
```

```
db.posts.mapReduce(
   function() {
     this.comments.forEach(x){
       emit(c.user,
            {count:1, words:c.words.length}) } }
 , function(key, values){
     for (var i=1; i<values.length; i++){
       values[0].count += values[i].count;
       values[0].words += values[i].words; } }
 , { finalize: function(out){
       out.avg = out.words / out.count;
       return out;}
   , query: {posted: {$gt: new Date(2010,0,1)}}
   , out: 'posts.comment_stats'
   }
 });
```

Links

- http://mongo.kylebanker.com (Try mongo in your browser)
- http://www.mongodb.org
- #mongodb on irc.freenode.net
- mongodb-user on google groups

- mathias@10gen.com
- @mathias_mongo on titter