MongoDB

You got a Database in my Key-Value Store!

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10gen

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Find this presentation at bit.ly/mongodb-berlin-buzzwords
Can people in the back read this line?

Warning: MongoDB is not fully buzzword compliant!!!

- Binary protocal not HTTP/REST
- BSON not “pure” JSON
- C++ not Erlang
- Queries use Indexes not MapReduce
- B-Trees not Hashing

Inserting

```
db.users.insert( {
    _id:'mstearn',
    company: '10gen',
    name: {first:'Mathias',
           last:'Stearn'}
    likes: ['Bier', 'Ampelmännchen', 'Python']
    posts: 42

    addresses: [
      {street: '17 W 18th St', floor: '8',
       city: 'New York', state:'NY', zip: '10019'},
      {street: '123 Fake St', country: 'Elbonia'}
    ]
})
```

Querying

```
db.users.findOne({_id: 'mstearn'}))
db.users.find({company: '10gen'})
db.users.find({posts: {$gte: 40, $lt: 50}})
db.users.find({'name.last': 'Stearn'})

db.users.ensureIndex({knows: 1})

db.users.find({likes: 'Bier'})
db.users.find({likes: {$in:['Bier', 'Beer']}})
db.users.find({likes: {$all:['Bier', 'Milch']}})
db.users.find({likes: /^Py/})
db.users.find().sort({posts:-1}).skip(10).limit(10)
```

Pretty Queries with MongoMagic

Shameless self-promotion

http://github.com/RedBeard0531/MongoMagic/

```
db.users.find( M._id == 'mstearn' )
db.users.find( M.company == '10gen' )
db.users.find( 40 <= M.posts < 50 )
db.users.find( M.name.last == 'Stearn' )
db.users.find( M.likes.IN('Bier', 'Beer') )
db.users.find( M.likes.ALL('Bier', 'Milch') )
db.users.find( M.likes.STARTSWITH('Py') )
```

2D Geospatial Queries

```
db.zips.insert({_id: '10011', loc: [43, -74]})

db.zips.ensureIndex({loc: '2d'})

db.zips.find({loc: {$near: [43, -74]}})

var box = [[x1, y1], [x2, y2]]
db.zips.find({loc: {$within: {$box: box}}})

var circle = [[x,y], radius]
db.zips.find({loc: {$within: {$center: circle}}})
```

Updating

```
db.posts.insert({_id: ObjectId(123),
                 by: 'mstearn',
                 title: 'Why is MongoDB Awesome?',
                 body: 'It just is MASSIVE TYPO',
                 tags: [] })

db.posts.update({_id: ObjectId(123)},
                {$set: {body: 'It just is' }})

db.posts.update({_id: ObjectId(123)},
                {$addToSet: {tags: 'Citation Needed'}})

db.tags.update({_id: 'Citation Needed'},
               {$inc: {count: 1}},
               {upsert: true})
```

Updating in an Array

```
db.posts.update({_id: ObjectId(123)},
                {$push: {comments:
                    {id: ObjectId(987),
                     by: 'joe_schmoe',
                     text: 'I Agree'}}})

db.posts.update({_id: ObjectId(123), comments.id: Object
                {$inc: {comments.$.votes: 1}})
```

Removing

```
db.stuff.remove({_id: SOME_ID})
db.stuff.remove({any: query})
```

Sidenote: Primary Keys

- Always called "_id"
- Automatically indexed
- Can be any type (except array)
- If you don't supply one, one will be created for you
- ObjectId("DEADBEEF C0FFEE ABBA BADFEE")
  - 4-Byte Timestamp (second)
  - 3-Byte Machine ID
  - 2-Byte PID
  - 3-Byte Incrementing Counter
  - Total: 12 Bytes (not 24)

Replication

- Replication: Just Do It!
  - No durability guarantees without clean shutdowns
- Master-Slave not ~~Potentially~~ Eventually Consistent
- Automatic fail-over
  - Replica Pairs (Depricated)
  - Replica Sets (Coming in 1.6)
- Slaves do an initial sync then pull operations
- Initial sync can be skipped if starting from snapshot

Replication Live Demo (If there's time)

Setup

```
rm -rf /tmp/{master,slave}
mkdir /tmp/{master,slave}
./mongod --master --dbpath /tmp/master --port 2000 > /tmp/master/log &
./mongod --slave  --dbpath /tmp/slave  --port 5000 --source localhost:2000 > /tmp/slave/log &
multitail  /tmp/{master,slave}/log
```

Master Shell

```
mongo --port 2000
db.foo.insert({_id:1, count:1})
db.foo.update({_id:1}, {$inc: {count:1}})
db.foo.find()
use local
db.oplog.$main.find({op: {$ne: 'n'}})
```

Slave Shell

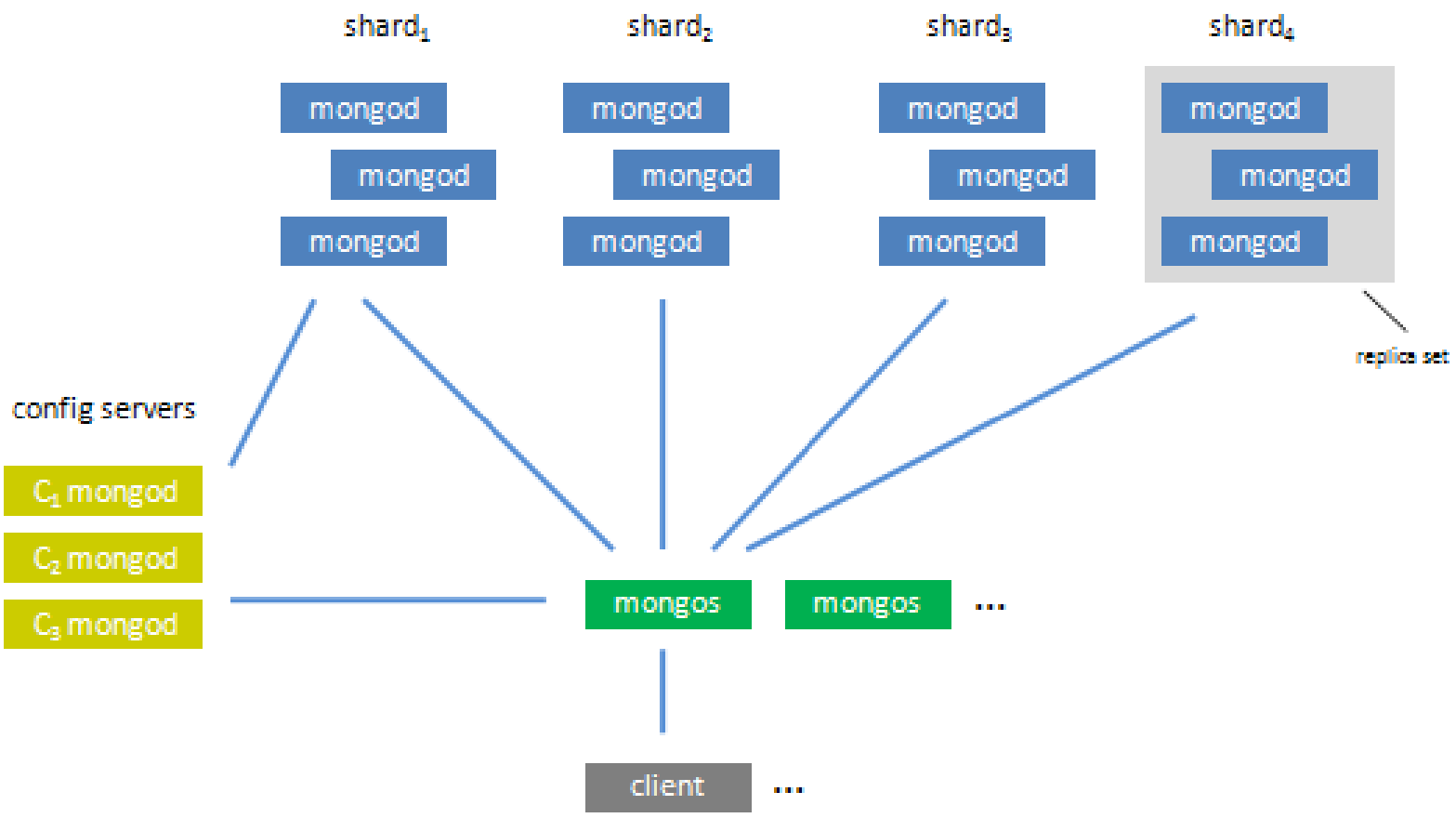
```
mongo --port 5000
db.foo.find()
```

Sharding: Preface

- You (probably) don't need sharding!
- Wordnik.com has 1.5TB in over 5 Billion docs
  - Sustained 100,000 inserts per second during loading
  - Sustained 250,000 fetches per second during testing
  - Production Queries are 4x faster than old MySQL setup
- Speed and Scalability are different things
  - But you only need scalability if you're too slow

Sharding: Details

- No single point of failure
- Automatic range-based partitioning
- You app connects to a *mongos* rather than a *mongod*
- You pick which collections are sharded
- You pick a shard-key for those collections
- No other changes are necessary in your app
- We handle the rest!


shard1
shard2
shard3
shard4
mongod
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mongod
mongod
mongod
mongod
replica set
config servers
C1 mongod
C2 mongod
C3 mongod
mongos
mongos
...
client
...

Questions?

Links

- http://media.mongodb.org/zips.json (for workshop)
- http://try.mongodb.org (Try mongo in your browser)
- http://www.mongodb.org
- #mongodb on irc.freenode.net
- mongodb-user on google groups

Contact

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- Or just find me here or at LinuxTag