It Ain't Tasseography

10 Key Performance Indicators for MongoDB

Kyle Banker

kyle@10gen.com

@hwaet

Questions about speed

MongoDB is a high-performance database, but how do I know that I'm getting the best performance?

We'll cover:

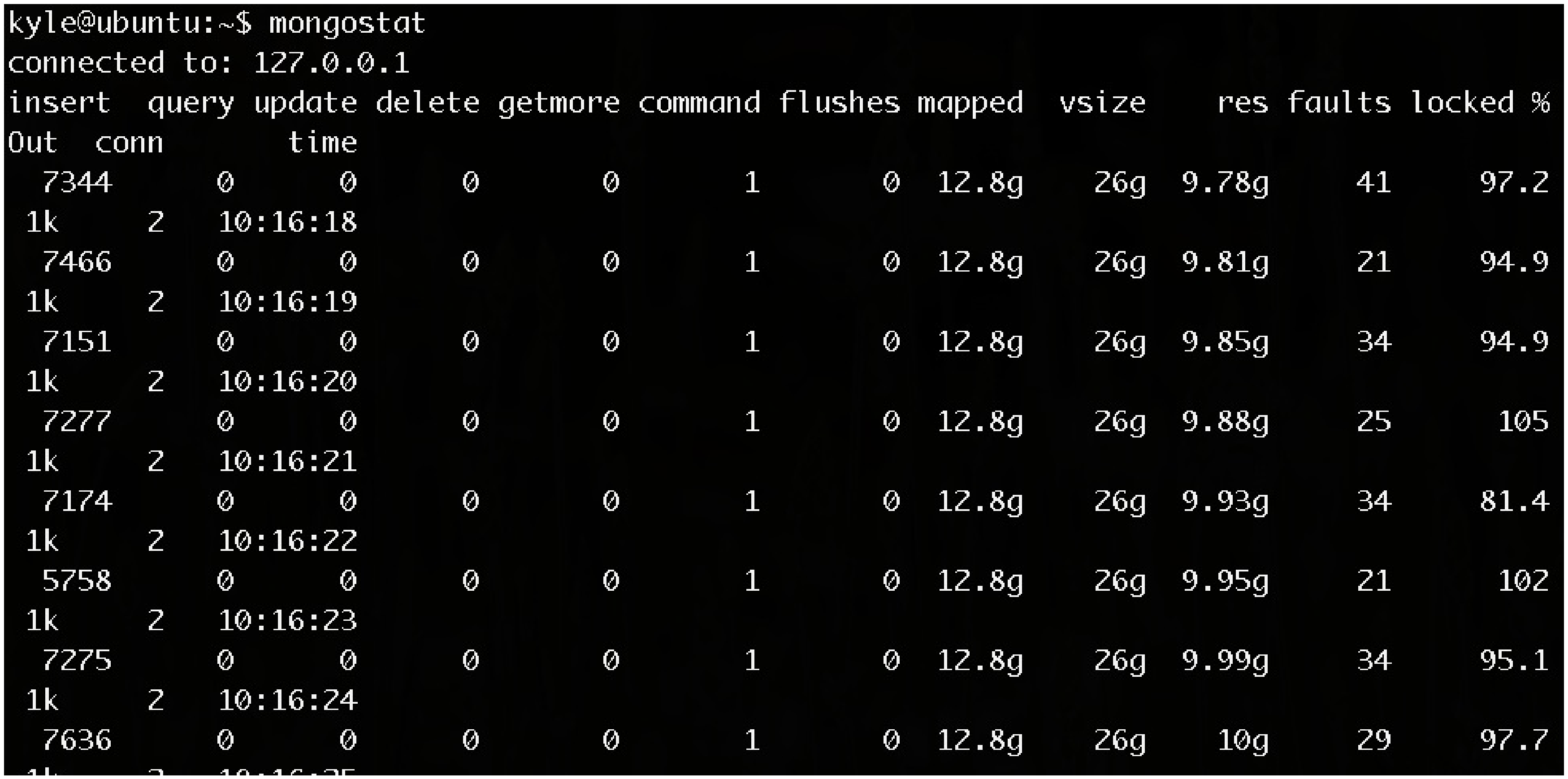
Tools

Performance Indicators

Remedies

Prelude: Tools

1. mongostat



```
kyle@ubuntu:~$ mongostat
connected to: 127.0.0.1
insert  query update delete getmore command flushes mapped  vsize    res faults locked %
Out   conn       time
  7344      0      0      0       0       1       0  12.8g    26g  9.78g     41     97.2
 1k      2   10:16:18
  7466      0      0      0       0       1       0  12.8g    26g  9.81g     21     94.9
 1k      2   10:16:19
  7151      0      0      0       0       1       0  12.8g    26g  9.85g     34     94.9
 1k      2   10:16:20
  7277      0      0      0       0       1       0  12.8g    26g  9.88g     25      105
 1k      2   10:16:21
  7174      0      0      0       0       1       0  12.8g    26g  9.93g     34     81.4
 1k      2   10:16:22
  5758      0      0      0       0       1       0  12.8g    26g  9.95g     21      102
 1k      2   10:16:23
  7275      0      0      0       0       1       0  12.8g    26g  9.99g     34     95.1
 1k      2   10:16:24
  7636      0      0      0       0       1       0  12.8g    26g    10g     29     97.7
```

2. serverStatus

```
db.serverStatus();
{
  "host" : "arete.local",
  "version" : "1.9.0-pre-",
  "process" : "mongod",
  "uptime" : 619052
}
// Lots more stats....
```

3. Profiler□

```
> db.setProfilingLevel(2)
{ "was" : 0, "slowms" : 100, "ok" : 1 }
```

```
> db.system.profile.find().sort({$natural: -1})
{ "ts" : ISODate("2011-05-24T14:20:09.711Z"),
  "info" : "query docs.spreadsheets reslen:257
            nscanned:1805535
            query: { query: {}, $explain: true }
            nreturned:1 1407ms",
  "millis" : 1407 }
```

4. Monitoring service

Nagios

Munin

MMS

Indicators

1. Slow ops

Here's how they appear in the log:

```
Sun May 22 19:01:47 [conn10]
  query docs.spreadsheets ntoreturn:100 reslen:510436
  nscanned:19976 { username: "Minner, Cori" }
  nreturned:100  147ms
```

2. Replication lag

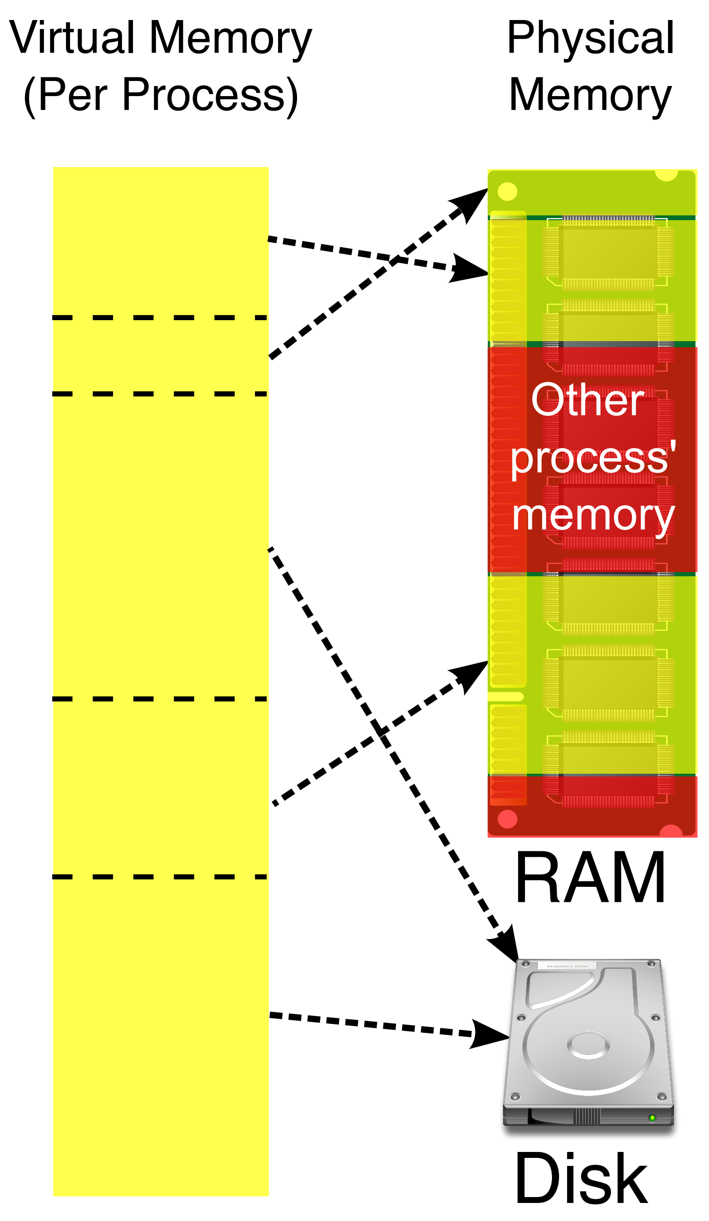
```
test-rs:PRIMARY> rs.status()
{
  "set" : "test-rs",
  "date" : ISODate("2011-05-24T14:19:35Z"),
  "myState" : 1,
  "members" : [
    {
      "_id" : 0,
      "name" : "localhost:30000",
      "stateStr" : "PRIMARY",

      "optimeDate" : ISODate("2011-05-18T19:19:26Z"),
    },
    {
      "_id" : 1,
      "name" : "localhost:30001",
      "stateStr" : "SECONDARY",

      "optimeDate" : ISODate("2011-05-22T14:14:29Z"),
    }
}
```

3. Resident memory

```
> db.serverStatus().mem
{
  "bits" : 64,              // Need 64, not 32
  "resident" : 7151,        // Physical memory
  "virtual" : 14248,        // Files + heap
  "mapped" : 6942           // Datafiles
}
```


Virtual Memory
(Per Process)
Physical
Memory
Other
process'
memory
RAM
Disk

```
use docs
> db.stats()
{
  "db" : "docs",
  "collections" : 3,
  "objects" : 805543,
  "avgObjSize" : 5107.312096312674,
  "dataSize" : 4114159508,          // ~4GB
  "storageSize" : 4282908160,       // ~4GB
  "numExtents" : 33,
  "indexes" : 3,
  "indexSize" : 126984192,          // ~126MB
  "fileSize" : 8519680000,          // ~8.5GB
  "ok" : 1
}
```

Note: `fileSize` include pre-allocation.

storageSize + indexSize = ~5GB

4. Page faults

```
> db.serverStatus().extra_info
{
  "note" : "fields vary by platform",
  "heap_usage_bytes" : 210656,
  "page_faults" : 2381
}
```

5. Write-lock percentage

```
> db.serverStatus().globalLock
{
  "totalTime" : 194616196335,
  "lockTime" : 53865711,
  "ratio" : 0.00027677917878571l,
}
```

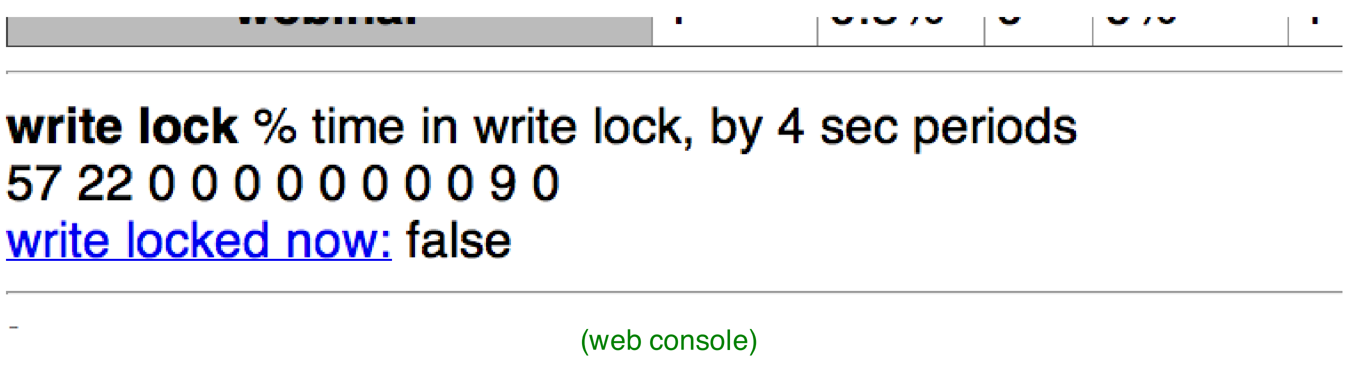
Concurrency

One writer OR many readers.

Global.

Yields on long-running ops.

ΔlockTime / ΔtotalTime



write lock % time in write lock, by 4 sec periods
57 22 0 0 0 0 0 0 0 0 9 0
write locked now: false

(web console)

High lock percentage?

You're probably paging.

6. Reader- and writer-queues

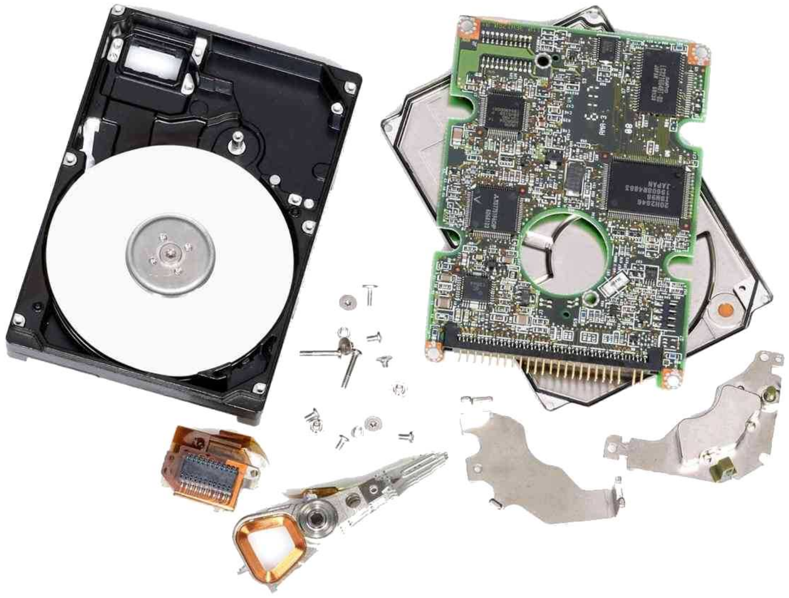
```
> db.serverStatus().globalLock
"globalLock" : {
    "totalTime" : 430154769,
    "lockTime" : 17547681,
    "ratio" : 0.04079387761013306,
    "currentQueue" : {
      "total" : 1,
      "readers" : 1,
      "writers" : 0
    },
    "activeClients" : {
      "total" : 2,
      "readers" : 1,
      "writers" : 1
    }
}
```

```
> db.currentOp()
{
  "inprog" : [
    {
      "opid" : 194285,
      "active" : true,
      "lockType" : "read",
      "waitingForLock" : true,
      "secs_running" : 0,
      "op" : "query",
      "ns" : "docs.spreadsheets",
      "query" : {
        "username" : "Auxier, Han"
      },
      "client" : "127.0.0.1:64918",
      "desc" : "conn"
    }
  ]
}
```

If you have dozens of ops waiting for locks, you've got a problem.

7. Background flushing□

```
> db.serverStatus().backgroundFlushing
{
  "flushes" : 5634,
  "total_ms" : 83556,
  "average_ms" : 14.830670926517572,
  "last_ms" : 4,
  "last_finished" : ISODate("2011-05-24T14:30:00.863Z")
}
```



32GB
mssd UATA 5000
msystems
WARNING!

Disk considerations

RAID

SSD

SAN?

8. Connections

```
> db.serverStatus().connections
{ "current" : 2, "available" : 202 }
```

9. Network bytes in and out

```
> db.serverStatus().network
{ "bytesIn" : 1132782538, "bytesOut" : 518175
```

10. Fragmentation

```
> db.spreadsheets.stats()
{
  "ns" : "docs.spreadsheets",

  "size" : 8200046932, // 8GB
  "storageSize" : 11807223808, // 11GB

  // Extra space for new documents.
  "paddingFactor" : 1.4302,

  // Does index size seem reasonable?
  "totalIndexSize" : 345964544,
  "indexSizes" : {
    "_id_" : 66772992,
    "username_1_filename_1" : 146079744,
    "username_1_updated_at_1" : 133111808
  },
  "ok" : 1
}
```

The magic number is: 2

storageSize / size < 2

Is it greater than 2?

Might not be reclaiming free space as quickly as needed.

Padding might not be correctly calibrated.

```
db.runCommand({compact: 1})
```

paddingFactor < 2

Is it greater than 2?

You might have the wrong data model.

Too many growing embedded documents?

See MongoDB Schema Design.

Compact command

```
// In MongoDB 1.9+
db.runCommand({ compact : 'spreadsheets' });
```

Summary