MongoDB Data Security - Custom Roles and Views

Webinar - Wednesday June 26th

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PERCONA

About Me

Adamo Tonete

I've been working at Percona since 2015 as a Senior Support Engineer.

Agenda

- Installing MongoDB in a secure way
- Default roles
- Creating your own role
- Using views
- Views + User Defined Roles for best security
- Questions

Installing MongoDB

By default MongoDB doesn't come with authentication and for this reason we do see a lot of news reporting data leaks and data ransomware.

From version 4.0+ it is mandatory to set the bindIP, or specify manually if the database must listen to all IPS.

Installing MongoDB - Listen IP

For new versions it is necessary to set a listening IP, which means the database will only answer queries and commands which come from this IP address.

Installing MongoDB - Listen IP

Bad Practice

```
net:
  bindIp: 0.0.0.0
```

Good Practice

```
net:
  bindIp: 172.10.10.122
```

Installing MongoDB - Enabling Authentication

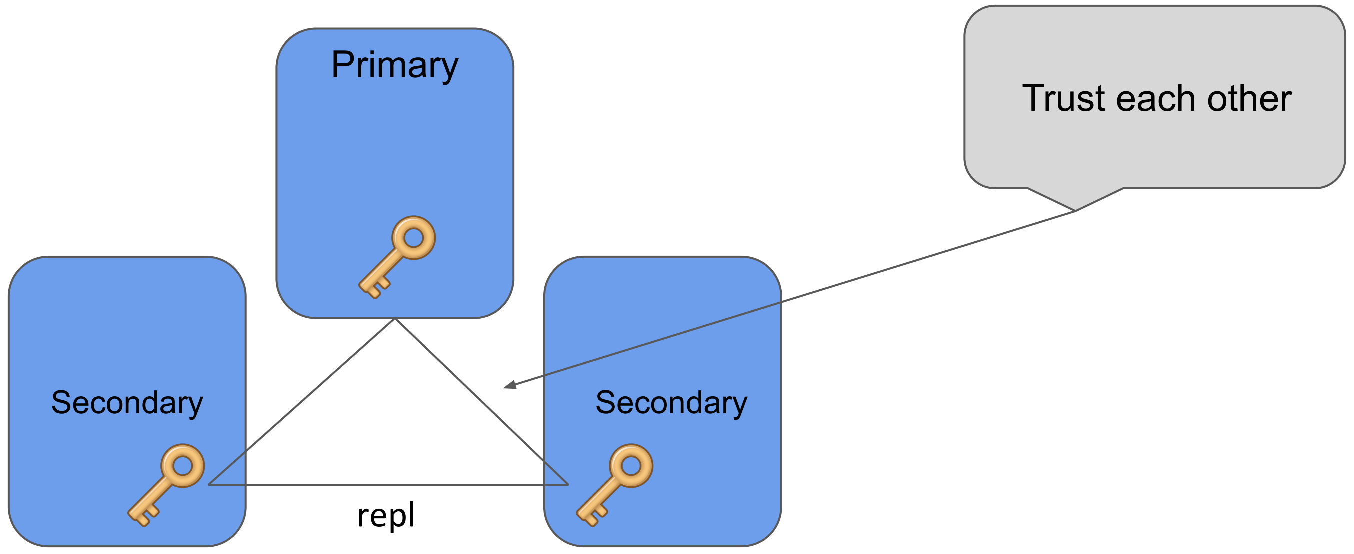
Authentication is not enabled by default, we need to configure and create the root user as the first step for a secure environment.

Installing MongoDB - Enabling Authentication

```
mongod.conf

    authorization.enabled : true



use admin

db.createUser({user : 'administrator',

               pwd :  '123321',

               roles : ["root"]})
```

Installing MongoDB - Replicasets?

The minimum security option for a replica set is having a key file, that will ensure the instances can talk each other.



Installing MongoDB - Replicasets?

```
openssl rand -base64 756 > mykeyfile

chmod 400 mykeyfile
```

```
mongod.conf

security.keyFile : mykeyfile
```

Alert: This change enables authentication as well!

Installing MongoDB - User IPS

Still talking about new versions, new users can have an IP number and the database will only accept commands from there.

Authentication Restrictions

```
use admin



db.createUser({user : 'local_administrator',

               pwd :  '123321',

               roles : ["root"],

authenticationRestrictions : {

       clientSource: ["127.0.0.1"]

}})
```

Roles

Database comes with several roles - that is enough for most of the cases

Default Roles

All the roles listed below come by default in the MongoDB database server

read	readWrite	dbAdmin	dbOwner	userAdmin
clusterAdmin	clusterManager	clusterMonitor	hostManager	backup
restore	readAnyDatabase	readWriteAnyDatabase		userAdminAnyDatabase
dbAdminAnyDatabase		root	__system	

Default Roles

```
use admin

db.createUser({user : 'read_any',
               pwd :  '123',
               roles : ["readAnyDatabase"]})
```

Creating Custom Role

```
db.createRole({

     role: "view_employee",

     privileges: [

       { resource: { db: "percona", collection: "employees" }, actions: [
"find","collStats"]}

     ],

     roles: [

       { role: "read", db: "admin" }

     ]
```

Views

How to create and maintain a view

Views

Views are pre-established code that is executed when querying from them.

For a user a view is just a collection and by default a view is read only. Views can run simple queries or complex aggregation pipelines.

For this example we are going to create a view that only gives employee name and id to a third party provider that will integrate with us.

Creating a View

Use database

```
db.createView('vw_emp_names', 'employee',
     [{ $project: { _id: 1, name : 1 } } ]
)
```

Creating View

How to create a view?

From the docs:

```
db.createView(<view>, <source>, <pipeline>, <options>)
```

Options is basically the collation

```
collation: {
   locale: <string>,
   caseLevel: <boolean>,
   caseFirst: <string>,
   strength: <int>,
   numericOrdering: <boolean>,
   alternate: <string>,
   maxVariable: <string>,
   backwards: <boolean>
}
```

Acceptable Pipeline Operator

All the operators used in a aggregation are available in a view meaning you can use $match, $unwind, $project.. and so on..

https://docs.mongodb.com/manual/meta/aggregation-quick-reference/

Accessing a view

In order to execute the view code we need to invoke a find command

The following command executes the code:

```
db.vw_emp_names.find()
```

Views are also visible as a collection, a `show collections` command will return the views as well.

Giving Access to Views

How to control who can query a view

Minimum Access

```
use admin
db.createRole(
   {
     role: "view_views",
     privileges: [
       { resource: { db: "percona", collection: "system.views" }, actions: [ "find" ]
},
       { resource: { db: "percona", collection: "employees_name" }, actions: [
"find","collStats"]}
     ],
     roles: [
       { role: "read", db: "admin" }
     ]
   }
)
```

Minimum Access

```
use admin

db.createUser({user : 'intern', pwd : '123', roles : ["view_views"]})
```

Live Demonstration

Live Demonstration

<live demo>

Questions

SAVE THE DATE

OPEN SOURCE DATABASE CONFERENCE

30 Sept - 2 Oct 2019

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Commands

```
db.employees.insert({ "_id" : ObjectId("5ce5e609444cde8078f337f2"), "name" : "Adamo Tonete", "salary" : { "year" : 1, "bonus" : 1 } })
db.employees.insert({ "_id" : ObjectId("5ce5e616444cde8078f337f3"), "name" : "Vinicius Grippa", "salary" : { "year" : 1, "bonus" : 1 } })
db.employees.insert({ "_id" : ObjectId("5ce5e627444cde8078f337f4"), "name" : "Marcos Albe", "salary" : { "year" : 1, "bonus" : 1 } })
db.employees.insert({ "_id" : ObjectId("5ce5e63f444cde8078f337f5"), "name" : "Vinodh Krishnaswamy", "salary" : { "year" : 1, "bonus" : 1 } })
db.employees.insert({ "_id" : ObjectId("5ce5e655444cde8078f337f6"), "name" : "Aayushi Mangal", "salary" : { "year" : 1, "bonus" : 1 } })

// create new user
use admin
db.createUser({user : 'read_only', pwd : '123', roles : [{db : 'percona', role : "read"}]})
db.employees.update({name : 'Adamo'}, {$set : { salary : {year: 500, bonus : 5}}})
// should raise an error



// log as root
db.createView('employees_name', 'employees',
   [{ $project: { _id: 1, name : 1 } } ])



use admin
db.createRole(   {     role: "view_views",
   privileges: [
     { resource: { db: "percona", collection: "system.views" }, actions: [ "find" ] },
     { resource: { db: "percona", collection: "employees_name" }, actions: [ "find","collStats"]}     ],
   roles: [       { role: "read", db: "admin" }]   })


db.createUser({user : 'intern', pwd : '123', roles : ["view_views"]})
```