

Architecture and Administration Basics

Workshop Day 1 - Labs



1

Installation & Configuration



Perform the following steps in order install Couchbase Server on CentOS 7.x

■ Disable Swappiness

```
# Set the value for the running system
sudo sh -c 'echo 0 > /proc/sys/vm/swappiness'

# Backup sysctl.conf
sudo cp -p /etc/sysctl.conf /etc/sysctl.conf.`date +%Y%m%d-%H:%M`

# This disables it permanently
# Set the value in /etc/sysctl.conf so it stays after reboot.
sudo sh -c 'echo "" >> /etc/sysctl.conf'
sudo sh -c 'echo "#Set swappiness to 0 to avoid swapping" >> /etc/sysctl.conf'
sudo sh -c 'echo "vm.swappiness = 0" >> /etc/sysctl.conf'reboot
```



- Disable the Linux Firewall

- May be configured in a production environment regarding <http://developer.couchbase.com/documentation/server/current/install/install-ports.html>

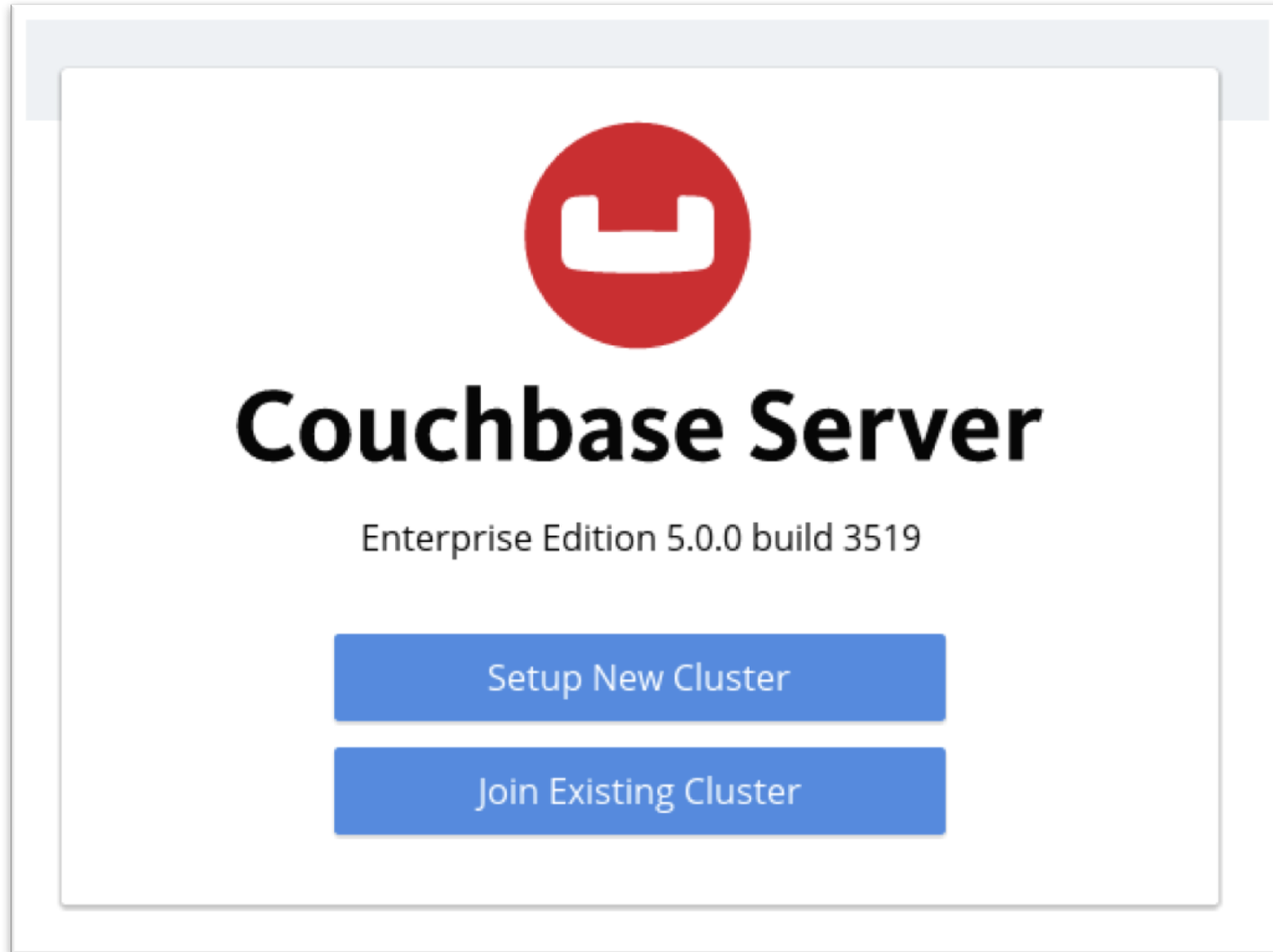
```
## Run as root or sudo
# Check the state
systemctl status firewalld

# Stop it
systemctl stop firewalld

# Disable it
systemctl disable firewalld
```




- Download the installation package from a browser or wget:
 - <https://www.couchbase.com/downloads>
 - https://packages.couchbase.com/releases/5.0.0/couchbase-server-enterprise-5.0.0-centos7.x86_64.rpm
- You may wish to download the .rpm to your local machine and then 'scp' the file to VMs.
 - `scp ${downloaded package}.rpm couchbase@://<public hostname of your VM>:/home/couchbase/Downloads/`
- Perform the installation by using RPM
 - `sudo rpm --install ${downloaded package}.rpm`
- Open the Web UI Wizard
 - `http://<public hostname of your VM>:8091`



Installation (password = couchbase)



 Couchbase > New Cluster

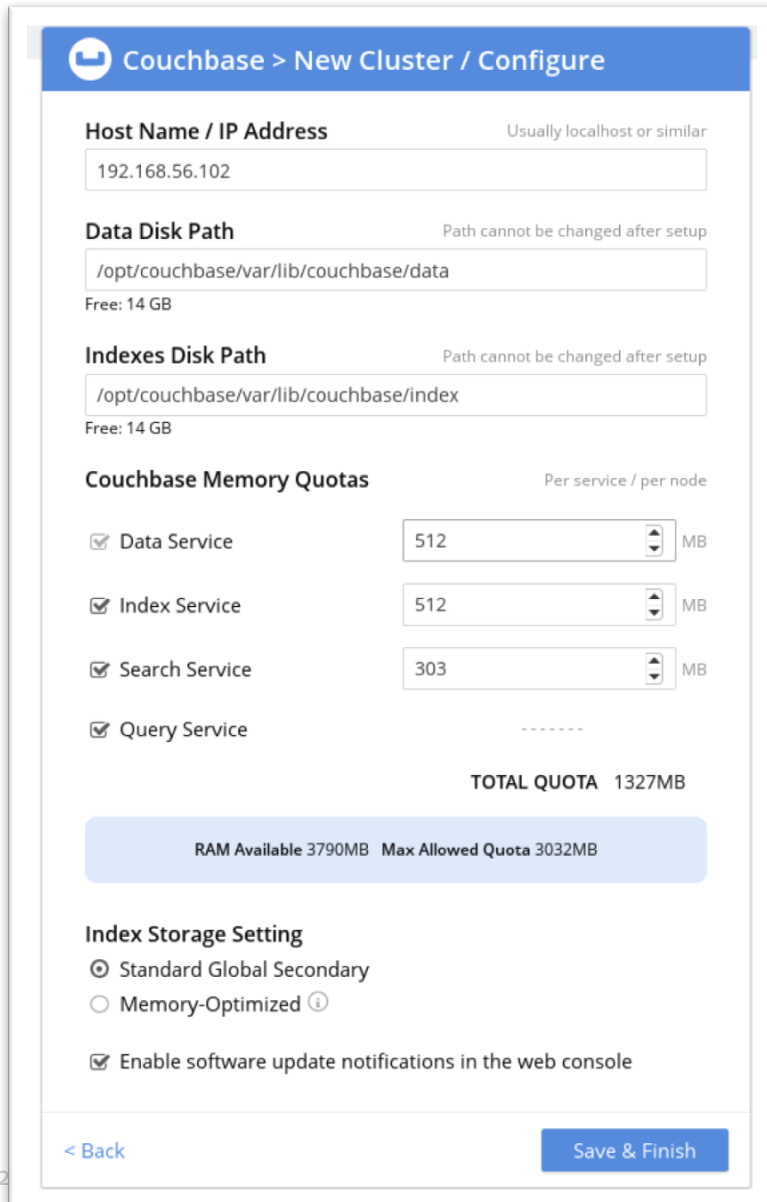
Cluster Name

Create Admin Username

Create Password

Confirm Password

[< Back](#)[Next: Accept Terms](#)



Couchbase > New Cluster / Configure

Host Name / IP Address Usually localhost or similar
192.168.56.102

Data Disk Path Path cannot be changed after setup
/opt/couchbase/var/lib/couchbase/data
Free: 14 GB

Indexes Disk Path Path cannot be changed after setup
/opt/couchbase/var/lib/couchbase/index
Free: 14 GB

Couchbase Memory Quotas Per service / per node

| | | |
|--|-------|----|
| <input checked="" type="checkbox"/> Data Service | 512 | MB |
| <input checked="" type="checkbox"/> Index Service | 512 | MB |
| <input checked="" type="checkbox"/> Search Service | 303 | MB |
| <input checked="" type="checkbox"/> Query Service | ----- | |

TOTAL QUOTA 1327MB

RAM Available 3790MB Max Allowed Quota 3032MB

Index Storage Setting

☒ Standard Global Secondary
☐ Memory-Optimized ⓘ

☒ Enable software update notifications in the web console

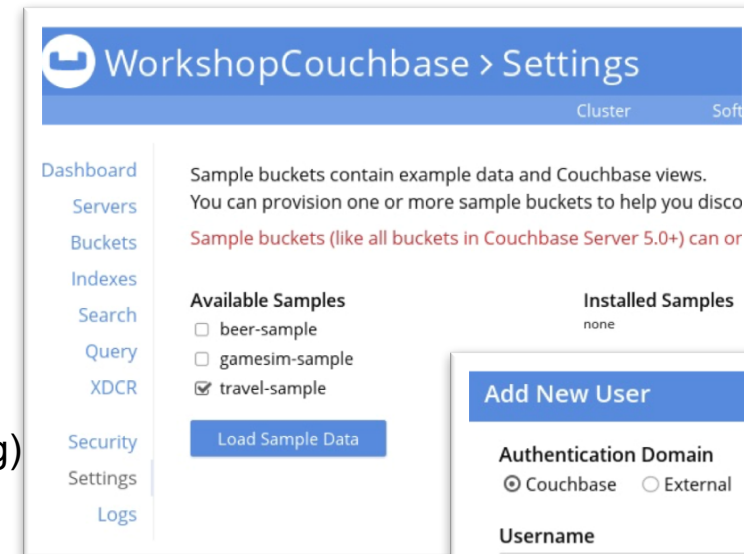
< Back Save & Finish

- **Hostname:** Your public IP or localhost.
- **Data Disk Path:** /opt/couchbase/var/lib/couchbase/data
- **Indexes Disk Path:** /opt/couchbase/var/lib/couchbase/index
- **Data Service:** 1024Mo
- **Index Service:** 512Mo
- **Search Service:** 256Mo
- **Index Storage Setting:** Standard Global Secondary (Plasma)

Installation – Sample buckets



- Perform further steps in the Wizard
 - Add the travel-sample bucket
 - Edit the Travel-Sample configuration and remove the replicas.
 - Create an Administrator in Settings.
User: couchbase
Password: couchbase
 - Browse the UI and check Statistics. (while travel-sample is loading)



- Start and stop the Couchbase Server

```
sudo systemctl stop couchbase-server  
sudo systemctl start couchbase-server
```

#Wait by double checking the state via the 'status' command

```
sudo systemctl status couchbase-server
```

- Set up the command line environment in the Path.

```
export PATH=$PATH:$HOME/bin:/opt/couchbase/bin
```



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Testing Installation



Perform the following steps with the REST API

■ Check some statistics

- Cluster Status:
`http://<Your Public IP>:8091/nodeStatuses`
`curl -u ${admin user}:${password} http://${Your Public IP}:8091/nodeStatuses | jq`
- System Statistics:
`http://<Your Public IP>:8091/pools`
- Cluster Details:
`http://<Your Public IP>:8091/pools/default`
- Bucket Monitoring:
`http://<Your Public IP>:8091/pools/default/buckets/travel-sample`
- Tasks running:
`http://<Your Public IP>:8091/pools/default/tasks`
- Performance on Queries:
`http://<Your Public IP>:8093/admin/vitals`
- Statistics on Indexes (check storage mode):
`http://<Your Public IP>:9102/stats`

- *Install a plug-in in Firefox to format JSON*
Ex: Beautiful JSON {J}
- *Install a CLI plug-in to format JSON*
Ex: `yum install jq`



Perform the following steps in order to test your installation

- List the nodes & buckets of your current cluster
 - `couchbase-cli server-list --cluster=${ip}:8091 -u=${admin user} -p=${password}`
 - `couchbase-cli bucket-list --cluster=${ip}:8091 -u=${admin user} -p=${password}`
- Investigate the data and index directory

You should see approximately 1030 files in this directory.

So one file per vBucket + some extra files.

```
sudo ls -al /opt/couchbase/var/lib/couchbase/data/travel-sample
```

#List index files

```
sudo ls -al /opt/couchbase/var/lib/couchbase/index/@2i/...
```



- Get some data & info from a vBucket file (here vbucket = 0)
 - `couch_dbdump /opt/couchbase/var/lib/couchbase/data/travel-sample/0.couch.1`
 - `couch_dbinfo /opt/couchbase/var/lib/couchbase/data/travel-sample/0.couch.1`
- Create an ephemeral moxi bucket & check connectivity with Telnet.
 - `couchbase-cli bucket-create -c <IP>:8091 --username Administrator \`
`--password couchbase --bucket test --bucket-type ephemeral \`
`--bucket-port 11252 --bucket-ramsize 128`
 - `sudo yum install telnet`
 - `telnet <IP host> 11252`

```
[couchbase@localhost bin]$ telnet 192.168.56.102 11252
Trying 192.168.56.102...
Connected to 192.168.56.102.
Escape character is '^]'.

```



- Retrieve some statistics of the default bucket

stats

- Set a new key with value (set \$key \$flags \$exptime \$numbytes \$value)

```
set test_key 0 300 4  
<Enter>  
data
```

- Get the key.

```
get test_key
```

- Quit

```
quit
```



- Generate a workload on the bucket “test”

```
cd /opt/couchbase/bin
```

- Generate a workload with cbworkloadgen
 - 50% write & 50% read
 - Size = 100 bytes
 - Number of items = 500 000
 - Number of threads = 2
 - Json documents

```
cbworkloadgen -n <IP>:8091 -u Administrator -p couchbase -b test -i 500000 -r .5  
-s 100 -t 2 -j
```

- Observe the Metrics on the UI.

<https://developer.couchbase.com/documentation/server/current/cli/cbworkloadgen-tool.html>



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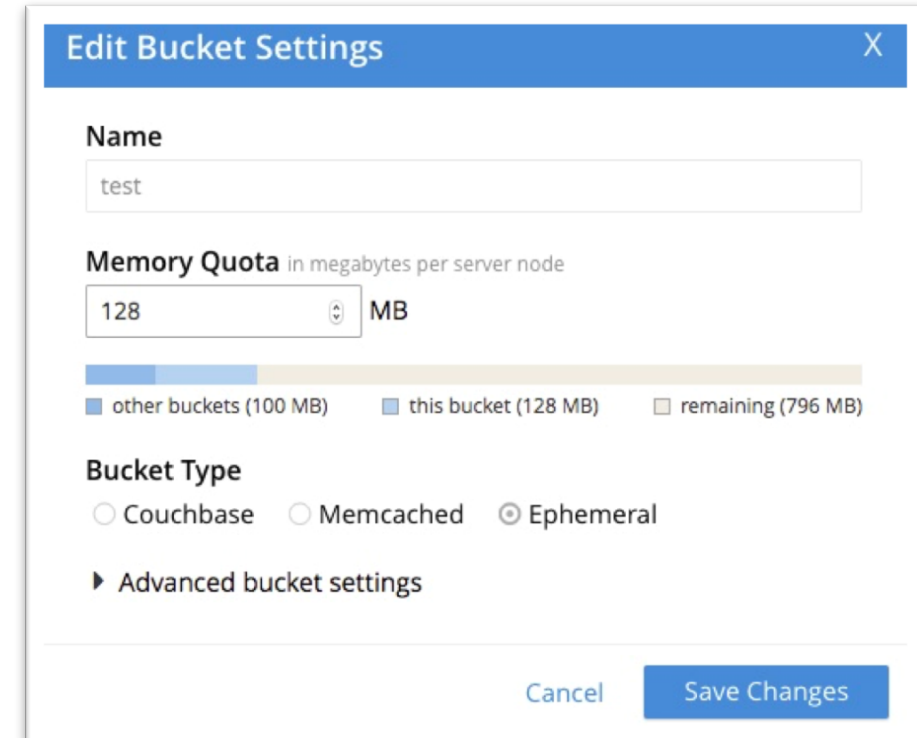
Buckets Operations

Perform the following steps in order to edit a bucket

- Open the Web Admin UI and go to the 'Buckets' tab

<http://<public hostname of your VM>:8091>

- Edit the bucket 'test' and configure the following:
 - Update the Memory quota to 256 MB RAM
 - Enable one Replica (Why do you get a Warning?)
 - Enable Flush
- Insert a new document in the bucket & search for it.



Edit Bucket Settings [X]

Name
test

Memory Quota in megabytes per server node
128 MB

other buckets (100 MB) this bucket (128 MB) remaining (796 MB)

Bucket Type
☐ Couchbase ☐ Memcached ☒ Ephemeral

▶ Advanced bucket settings

Cancel Save Changes

Create a document in the Bucket



Perform the following steps in order to add a document

- Open the Web Admin UI and go to the Buckets.
- Insert a new document in the bucket (check the Metadata)

The screenshot shows the Couchbase Web Admin UI. The breadcrumb navigation at the top reads 'WorkshopCouchbase > Documents > Documents Editing'. On the left, a sidebar contains links for 'Dashboard', 'Servers', 'Buckets', 'Indexes', and 'Search'. The main area is titled 'ludovic' and displays two JSON documents side-by-side. The left document is a simple object with a 'Name' field. The right document is a more complex object containing 'id', 'rev', 'expiration', and 'flags' fields. Action buttons 'Delete', 'Save As...', and 'Save' are visible in the top right corner of the document view.

```
1 {  
2   "Name": "Ludovic Dufrenoy"  
3 }  
  
1 {  
2   "id": "ludovic",  
3   "rev": "3-14f57c56d14c000000000000002000006",  
4   "expiration": 0,  
5   "flags": 33554438  
6 }
```

- Search for it with the name of the key.

The screenshot shows the document lookup interface. At the top, there is a dropdown menu with 'test' selected. To the right, there is a text input field labeled 'Document ID' and a blue button labeled 'Look Up ID'. Below this, a table with two columns, 'ID' and 'content sample', is shown. The table is currently empty. At the bottom, a message states: 'Documents are retrieved from ephemeral buckets by using the id lookup.'



4

Cluster Operations

Perform the following steps:

- Stop the local Couchbase instance again. (At each VM restart also)

```
sudo systemctl stop couchbase-server
```

- Start 3 Docker containers with Couchbase already installed.

```
sudo docker run -d --name couchbase-1 -p 8091-8094:8091-8094\  
-p 11210-11211:11210-11211 couchbase
```

```
sudo docker run -d --name couchbase-2 couchbase  
sudo docker run -d --name couchbase-3 couchbase
```

- Get the IP of your first node with Docker.

```
sudo docker inspect couchbase-$i | grep IPAddress
```



Couchbase Docker Repository:
https://hub.docker.com/_/couchbase/

Perform the following steps:

- Check you can access the Couchbase CLI

```
sudo docker exec -it couchbase-1 bin/bash
```

- Test if all nodes are reachable

```
curl http://<IP couchbase-1>:8091/pools  
curl http://<IP couchbase-2>:8091/pools  
curl http://<IP couchbase-3>:8091/pools
```

- You should get something like:

```
{"isAdminCreds":true,"isROAdminCreds":false,"isEnterprise":true,"pools":[],"settings":[],"uuid":[  
], "implementationVersion":"5.0.0-3519-  
enterprise", "componentsVersion":{"lhttpc":"1.3.0", "os_mon":"2.2.14", "public_key":"0.21", "asn1":"2  
.0.4", "kernel":"2.16.4", "ale":"5.0.0-3519-enterprise", "inets":"5.9.8", "ns_server":"5.0.0-3519-  
enterprise", "crypto":"3.2", "ssl":"5.3.3", "sasl":"2.3.4", "stdlib":"1.19.4"}}
```



Cluster Operations: Start a Cluster with Docker



Perform the following steps:

- Setup a New Cluster via the UI
 - ClusterName = Cluster_3_Nodes
 - User: Administrator (password = couchbase)
 - HostName = IP couchbase-1
- Load the travel-sample bucket.
- Add the 2nd node via the UI with IP of couchbase-2
- Rebalance.

Add Server Node

Warning: Adding a server to this cluster means any previous Couchbase Server data on that server will be removed.

Hostname/IP Address

172.17.0.3

Username

an existing username with admin access to this server

Administrator

Password

an existing password with admin access to this server

Services

☒ Data Service

☒ Index Service

☒ Search Service

☒ Query Service

Cancel

Add Server

| name ▾ | | group | services | CPU | RAM | swap | disk used | items | Rebalance |
|------------|--|---------|----------------------------|-------|-------|------|-----------|---------------|------------|
| 172.17.0.2 | | Group 1 | data full text index query | 4.41% | 70.7% | 0% | 77.6MB | 15.7 K/15.8 K | Statistics |
| 172.17.0.3 | | Group 1 | data full text index query | 4.9% | 70.7% | 0% | 35.1MB | 15.8 K/15.7 K | Statistics |



- On the 3rd node execute the following command
(you can log-in by using `docker exec -it couchbase-3 /bin/bash`)

```
/opt/couchbase/bin/couchbase-cli server-add --server-add=${node 3 name/ip}\  
--server-add-username=Administrator --server-add-password=couchbase\  
--group-name="Group 1" --cluster=${node1 name/ip}:8091\  
--user=Administrator --password=couchbase
```

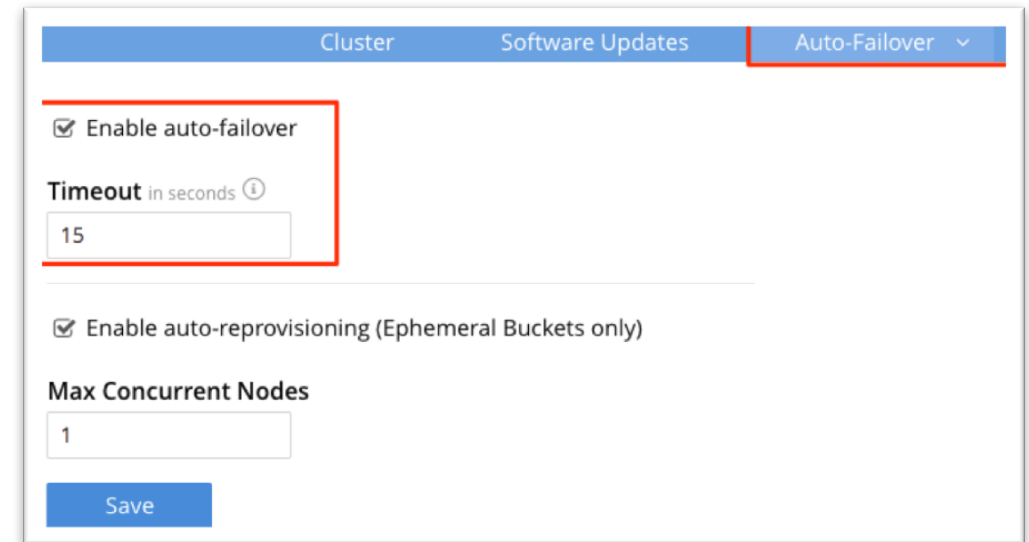
- Don't forget to rebalance!
 - Perform the Rebalance again via the UI
 - BTW: The CLI command 'couchbase-cli rebalance' can be used to invoke it from the command line
 - Which Service role was enabled on the 3rd node?
- To remove a node from the cluster:

```
couchbase-cli rebalance -c ${another name/ip}:8091 --server-remove=${to remove  
name/ip} --user=${admin user} --password=${password}
```

Perform the following steps:

- Enable Auto-Failover in the Cluster to 15s
- Stop couchbase service on Node 3.

```
sudo docker stop couchbase-3
```



Cluster Software Updates **Auto-Failover**

☒ Enable auto-failover

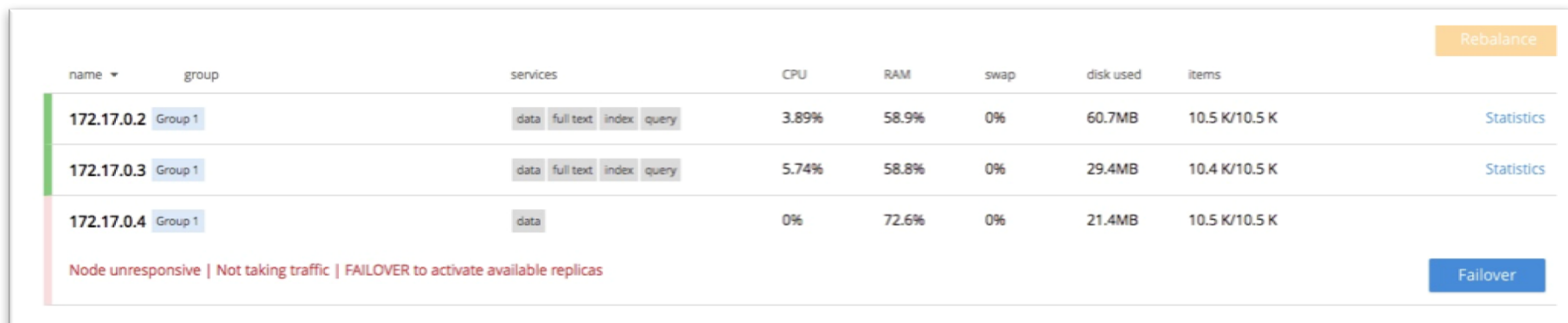
Timeout in seconds ⓘ
15

☒ Enable auto-reprovisioning (Ephemeral Buckets only)

Max Concurrent Nodes
1

Save

- Monitor the console on the tab Servers. (Is the bucket 100% available?)



| name | group | services | CPU | RAM | swap | disk used | items | |
|------------|---------|----------------------------|-------|-------|------|-----------|---------------|------------|
| 172.17.0.2 | Group 1 | data full text index query | 3.89% | 58.9% | 0% | 60.7MB | 10.5 K/10.5 K | Statistics |
| 172.17.0.3 | Group 1 | data full text index query | 5.74% | 58.8% | 0% | 29.4MB | 10.4 K/10.5 K | Statistics |
| 172.17.0.4 | Group 1 | data | 0% | 72.6% | 0% | 21.4MB | 10.5 K/10.5 K | |

Node unresponsive | Not taking traffic | FAILOVER to activate available replicas

Perform the following steps:

- Stop Couchbase on the 3 containers

```
sudo docker stop couchbase-1  
sudo docker stop couchbase-2  
sudo docker stop couchbase-3
```

- Delete the containers

```
sudo rm couchbase-1  
sudo rm couchbase-2  
sudo rm couchbase-3
```

- Check the containers are not anymore running

```
sudo docker ps
```



Couchbase Docker Repository:
https://hub.docker.com/_/couchbase/



5 | Security

Security: Create a User with limited permissions



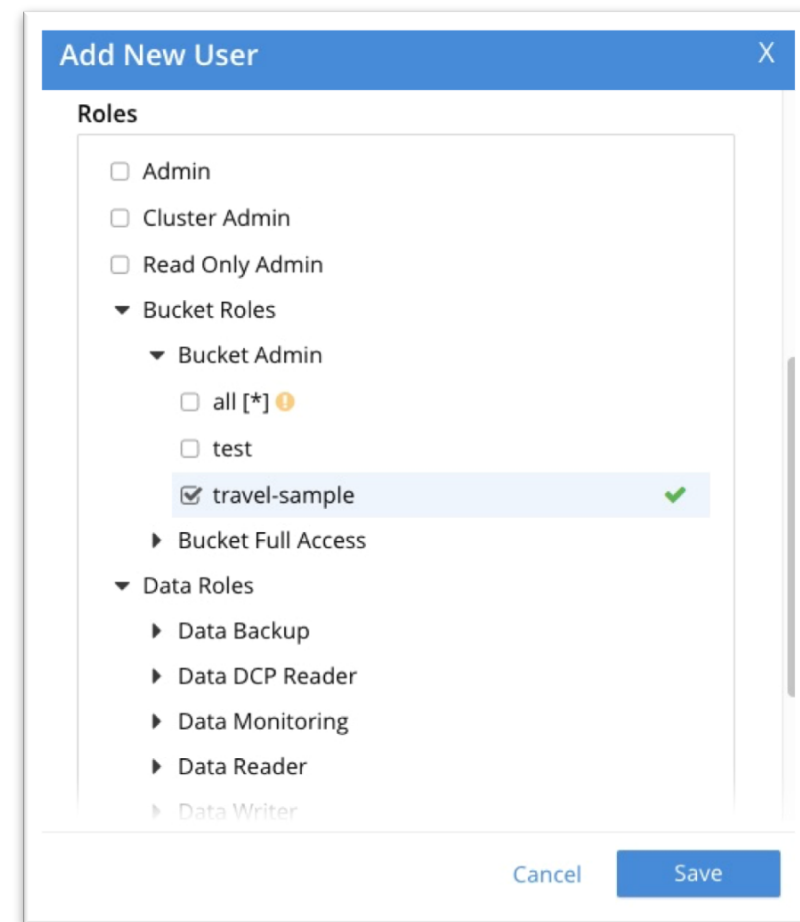
Perform the following steps:

- Start Couchbase

```
sudo systemctl start couchbase-server
```

- Create a User with “Bucket Admin” role on travel-sample.
- Logout and Login with the new user.
 - Can you change the settings of test bucket?
- In the Query tab, Grant more permissions to your user.

```
GRANT Cluster_Admin TO `Ludo`  
SELECT * FROM system:user_info
```

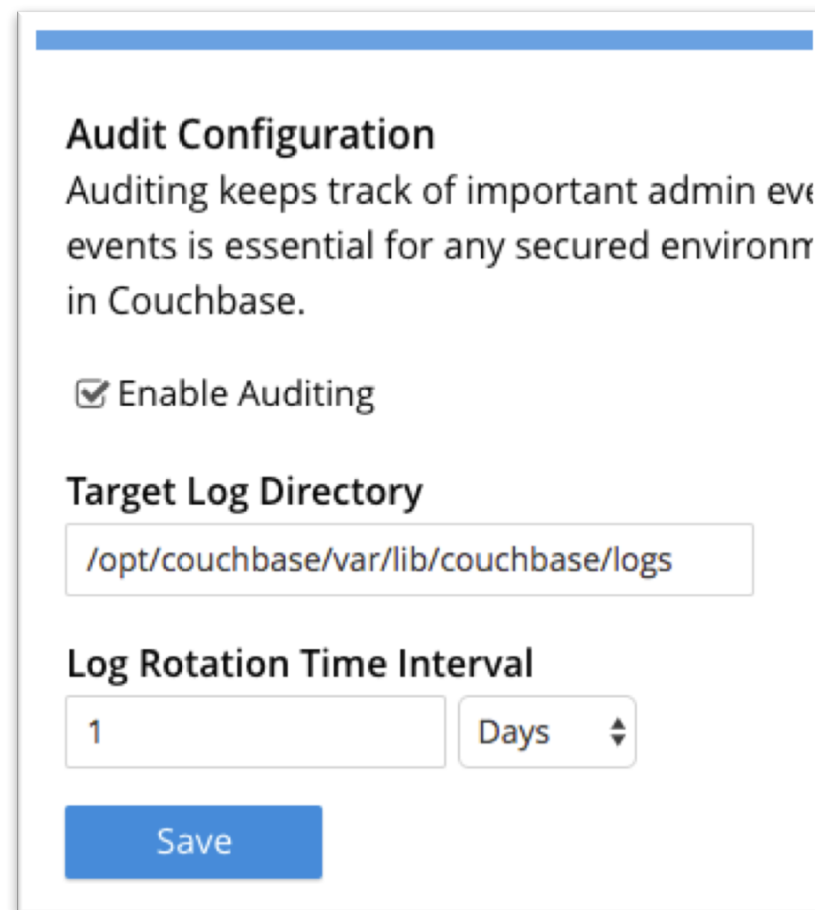


<https://developer.couchbase.com/documentation/server/current/security/concepts-rba-for-apps.html>

Perform the following steps:

- Enable Auditing in the Security tab
- Perform some Administration tasks
 - Change Auto-Failover to 30s.
- Check the Audit.log file.

```
{"timestamp":"2017-11-10T17:33:26.373190+01:00","real_userid":{"source":"internal","user":"couchbase"},"auditd_enabled":true,"descriptors_path":"/opt/couchbase/etc/security","hostname":"localhost.localdomain","log_path":"/opt/couchbase/var/lib/couchbase/logs","rotate_interval":86400,"version":1,"id":4096,"name":"configured audit daemon","description":"loaded configuration file for audit daemon"}
```



Audit Configuration

Auditing keeps track of important admin events is essential for any secured environment in Couchbase.

☒ Enable Auditing

Target Log Directory

/opt/couchbase/var/lib/couchbase/logs

Log Rotation Time Interval

1 Days

Save

<https://developer.couchbase.com/documentation/server/current/security/security-auditing.html>



6

Backup & Restore



Perform the following steps in order to backup some data

- Create a target folder

```
cd /tmp  
mkdir cb-backup  
cd /opt/couchbase/bin
```

- Prepare the backup archive

```
/opt/couchbase/bin/cbbackupmgr config --archive /tmp/cb-backup --repo workshop
```

- Backup the data twice and then use the list command to list the increments!

```
cbbackupmgr backup -a /tmp/cb-backup -r workshop -c http://localhost:8091  
-u Administrator -p couchbase
```

```
cbbackupmgr list -archive=/tmp/cb-backup --repo=workshop
```



Perform the following steps in order to restore some data

- Delete a document in the bucket travel-sample via the UI
- Get the count of document – 31590 (after delete)
- Restore the database.

```
cbbackupmgr list --archive=/tmp/cb-backup --repo=workshop
```

```
cbbackupmgr restore --archive /tmp/cb-backup --repo workshop -c http://localhost:8091 -u Administrator -p couchbase --start 2017-11-10T18_07_25.462463124+01_00 --end 2017-11-10T18_07_25.462463124+01_00
```

- Does the document come back? => Try again with --force-updates

```
cbbackupmgr restore --archive /tmp/cb-backup --repo workshop -c http://localhost:8091 -u Administrator -p couchbase --start 2017-11-10T18_07_25.462463124+01_00 --end 2017-11-10T18_07_25.462463124+01_00 --force-updates
```



7 | XDCR



Let's XDCR the travel-sample bucket to a new bucket "travel-destination"

- Create a new bucket "travel-destination"
 - RAM Quota = 100MB
 - No Replica
 - Conflict Resolution: Sequence Number
 - Flush: Enable
- Add a remote cluster (the local one)
 - Name of the Cluster: WorkshopCouchbase
 - IP of the local cluster.
- Add replication from "travel-sample" to "travel-destination"
 - Default Settings

Remote Clusters

Add Remote Cluster

| name | IP/hostname | |
|-------------------|---------------------|-----------------------|
| WorkshopCouchbase | 192.168.56.102:8091 | <div>DeleteEdit</div> |

Ongoing Replications

Add Replication

| bucket | protocol | from | to | filtered | status | when | |
|---------------|-----------|--------------|--|----------|-------------|-------------|-----------------------|
| travel-sample | Version 2 | this cluster | bucket "travel-destination" on cluster "WorkshopCouchbase" | No | Replicating | <div></div> | <div>DeleteEdit</div> |



Let's update a document in the source cluster.

- Update 1 document in travel-sample
 - Select 1 document “airline_10”
 - Check the metadata this document.
 - Save the revision (CAS) id.
- Create a new document in travel-sample
 - ID = airline_XX
- Check the “airline_10” document in the “travel-destination” bucket.
- Check the document count on both buckets.
- Bonus: Play with bi-directional replication.

```
1 {  
2   "id": "airline_10",  
3   "rev": "1-14f33c01fd1f00000000000002000000",  
4   "expiration": 0,  
5   "flags": 33554432  
6 }
```

```
1 {  
2   "id": "airline_10",  
3   "rev": "2-14f671d35bd2000000000000002000000",  
4   "expiration": 0,  
5   "flags": 33554432  
6 }
```

Thank you

