Couchbase

Architecture and Administration Basics

Workshop **Day 1 - Labs**

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Agenda

1. Installation and configuration
2. Testing installation
3. Buckets Operations
4. Cluster Operations
5. Security
6. Backup and restore
7. XDCR

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1 Installation & Configuration

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Start a Node with Docker

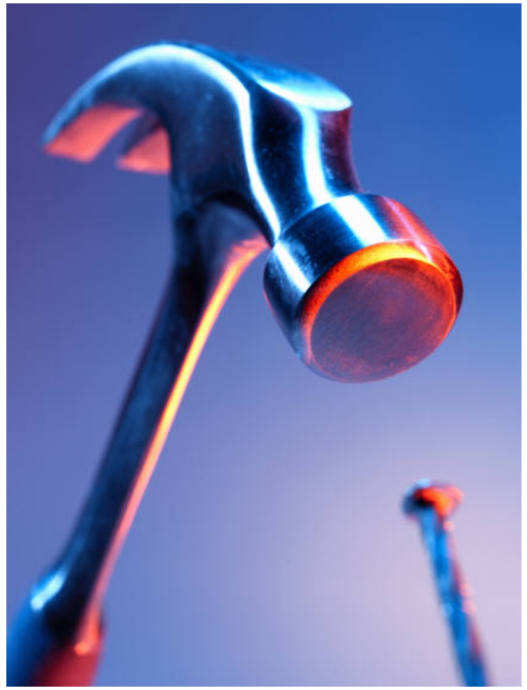
Perform the following steps

- Start Docker container with Couchbase already installed

```
docker run -d --name couchbase-1 -p 8091-8096:8091-8096 \
-p 11210-11211:11210-11211 couchbase:7.1.4
```

- Get the IP of your first node with Docker

```
docker inspect couchbase-1 | grep IPAddress
```



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

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Setup new Cluster

http://localhost:8091

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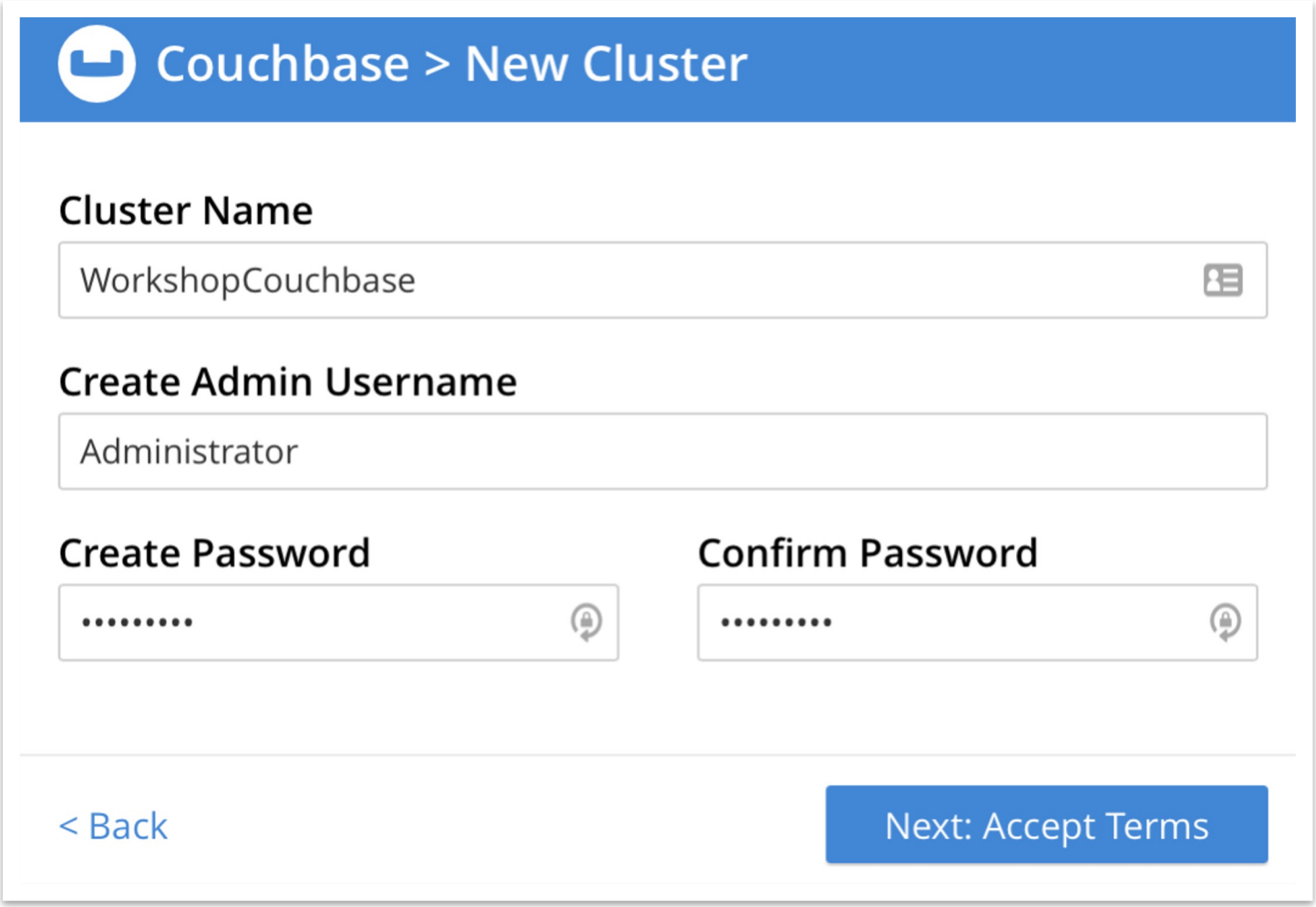
Setup new Cluster

Password: couchbase



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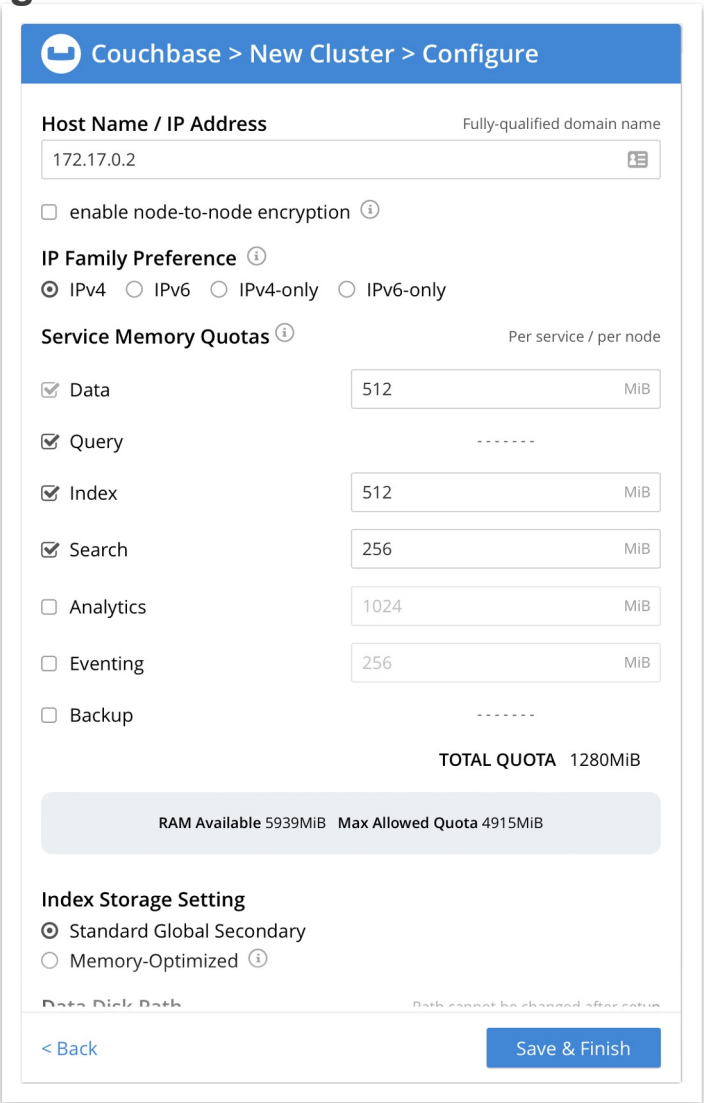
Setup new Cluster

Configure



- **Hostname**: local docker IP address.

- **Data Service**: 512Mo
- **Index Service**: 512Mo
- **Search Service**: 256Mo
- *Analytics Service: X (disabled)*
- *Eventing: X (disabled)*
- *Backup: X (disabled)*

- **Index Storage Setting**: Standard Global Secondary (Plasma)
- **Data Disk Path**: /opt/couchbase/var/lib/couchbase/data
- **Indexes Disk Path**: /opt/couchbase/var/lib/couchbase/index

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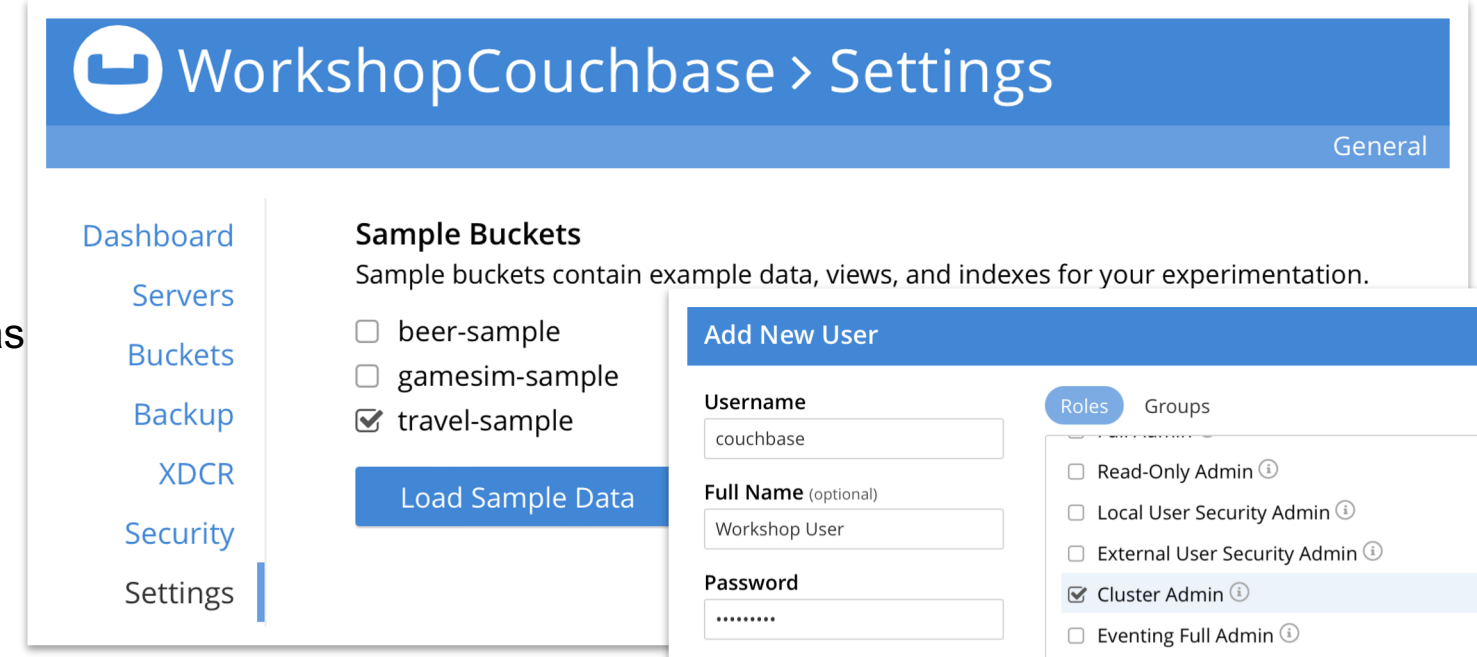
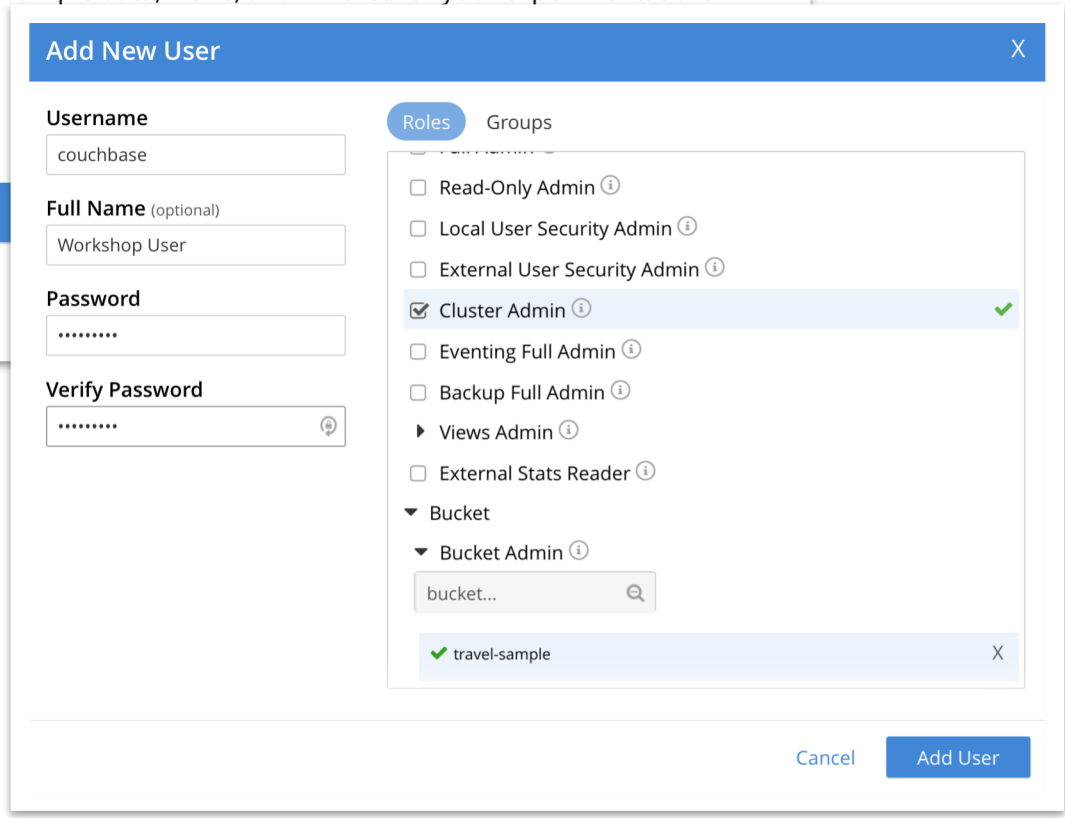
Setup new Cluster

Sample buckets

- Add the *travel-sample* bucket
- Edit the *travel-sample* bucket configuration and remove the replicas
- Create a bucket Administrator in Security.
  Username: couchbase
  Password: couchbase
- Browse the UI and check Statistics.
(while travel-sample is loading)
- Check that Couchbase Server has started.

```
docker logs couchbase-1
```





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2 Testing Installation

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Testing the Installation

REST API

- Cluster Status:

```
http://localhost:8091/nodeStatuses
curl -u Administrator:couchbase
http://localhost:8091/nodeStatuses | jq
```

- System Statistics

```
http://localhost:8091/pools
```

- Cluster Details:

```
http://localhost:8091/pools/default
```

- Bucket Monitoring

```
http://localhost:8091/pools/default/buckets/travel-
sample
```

- Tasks running:

```
http://localhost:8091/pools/default/tasks
```

- Performance on Queries:

```
http://localhost:8093/admin/vitals
```

- Statistics on indexes (check storage mode):

```
http://localhost:9102/stats
```

- *Install a plug-in in Browser to format JSON*

  Ex: Beautiful JSON {J}

- *Install a CLI plug-in to format JSON*

  Ex: yum install jq

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Testing the Installation

CLI

- Login to docker containers

```
docker exec -it couchbase-1 bash
```

- List the nodes & buckets of your current cluster

```
couchbase-cli server-list --cluster=localhost:8091 -u Administrator -p couchbase
```

- Investigate data and index directory

```
# You should see approximately 1030 files in this directory.
# So one file per vBucket + some extra files.

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

# list index files

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

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Testing the Installation

cbc-pillowfight

- Create a bucket

```
couchbase-cli bucket-create -c <IP>:8091 --username Administrator \
--password couchbase --bucket test --bucket-type couchbase --bucket-ramsize 128
```

- Generate a workload on the bucket "test »
  - 50% write & 50% read (r = % of write workload => 100 means 100% writes, 0 means 100% reads)
  - Size = 100 bytes
  - Number of items = 250 000
  - Number of threads = 2
  - Json documents

```
cbc-pillowfight -U couchbase://localhost/test -u Administrator -P couchbase -I 250000 \
-r 50 -m 100 -t 2 -J
```

- Observe the Metrics on the UI

https://docs.couchbase.com/sdk-api/couchbase-c-client-3.2.4/md_doc_cbc_pillowfight.html

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3 Buckets Operations

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Edit a Bucket

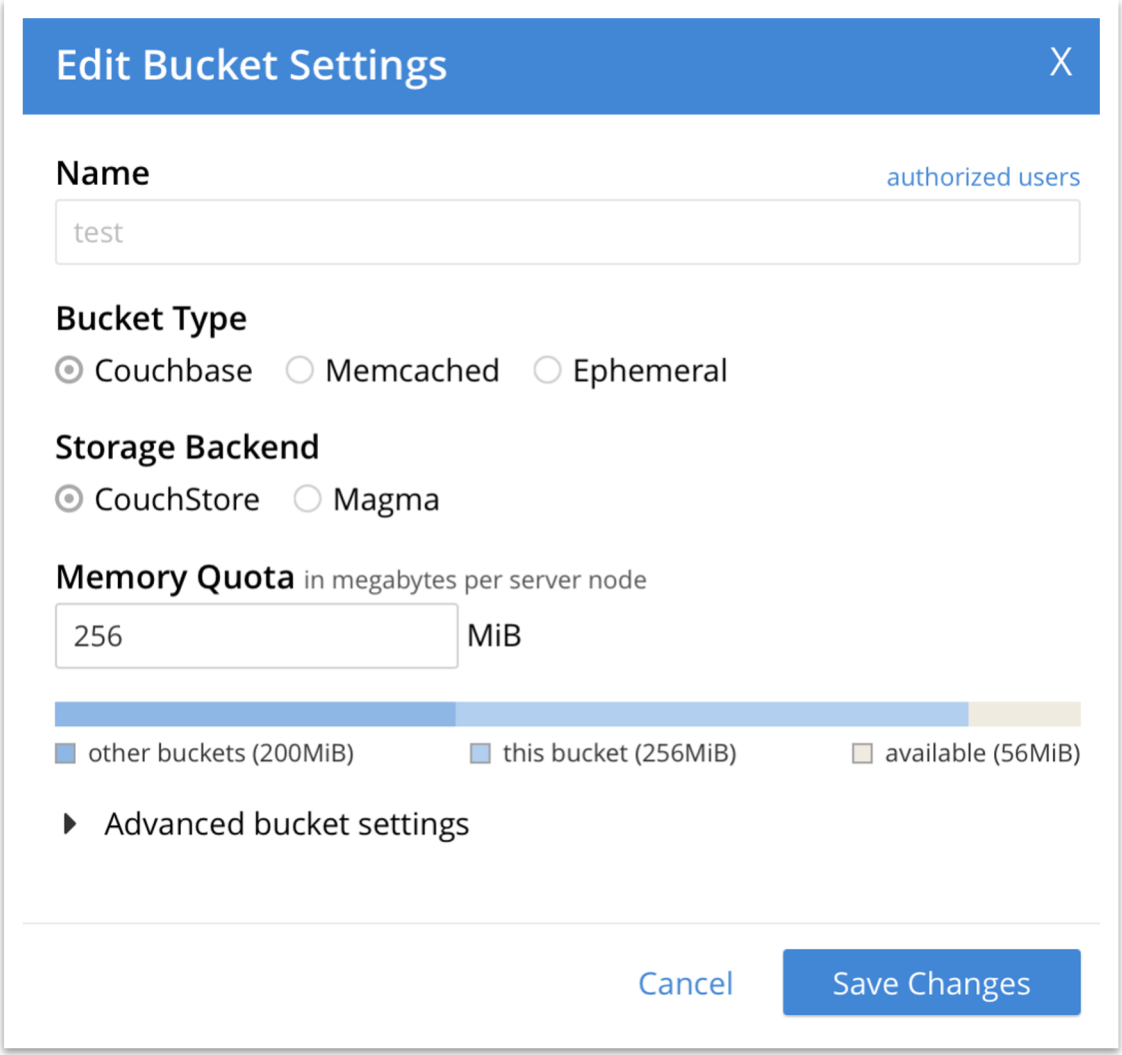
Perform the following steps in order to edit a bucket

- Open the Web Admin UI and go to the ‘Buckets’ tab

http://localhost: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 from the UI



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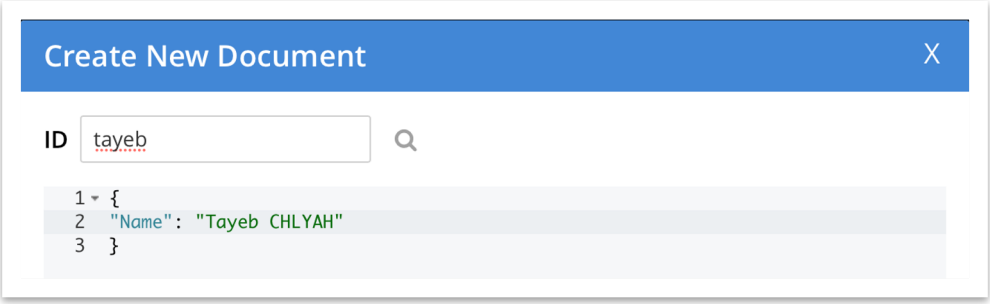
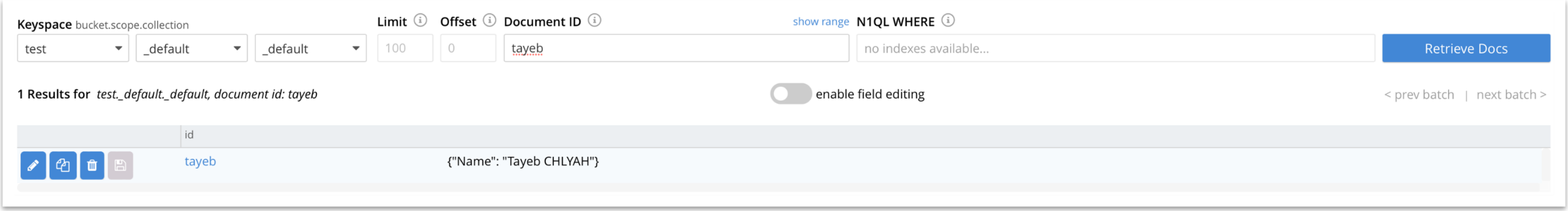
Create a document in the Bucket

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)



- Search for it with the name of the key.



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4 Cluster Operations

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Start a Cluster with Docker

Perform the following steps

- Start 2 new Docker containers with Couchbase already installed, without port mapping

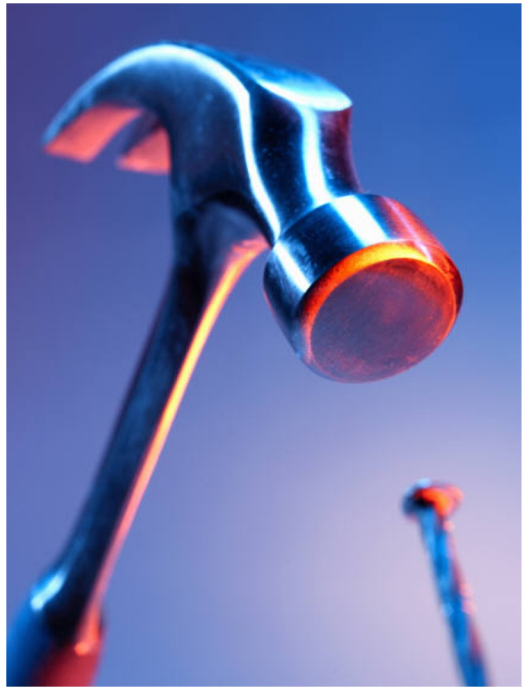
```
docker run -d --name couchbase-2 couchbase
docker run -d --name couchbase-3 couchbase
```

- Get the IP of each node with Docker

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

- Test if all nodes are reachable

```
docker exec -it couchbase-1 bash
bash-4.2# curl http://<IP couchbase-$i>:8091/pools
```



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

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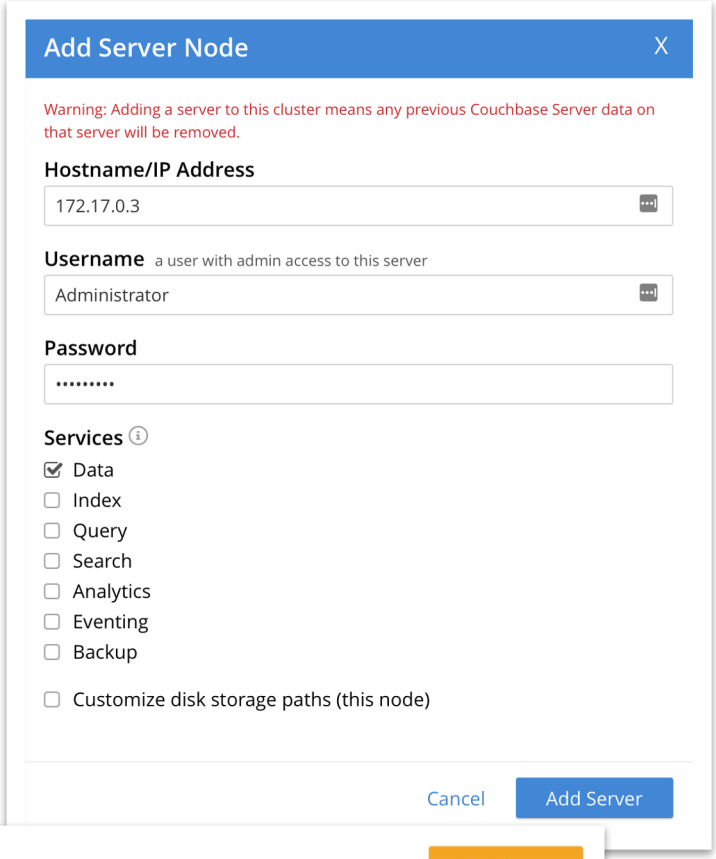
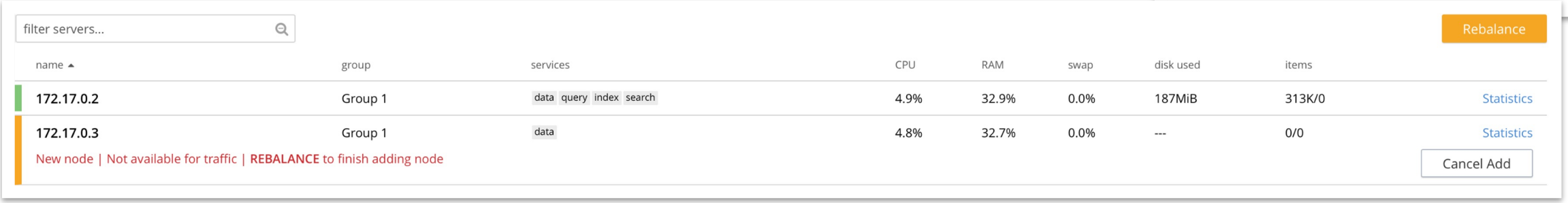
Add the 2nd node via UI

Perform the following steps

- Add the 2nd node via the UI with IP of couchbase-2
  - IP from docker inspect on couchbase-2
  - Username = Administrator
  - Password = couchbase
  - Load only Data Service (disable all remaining services)

- Add Server





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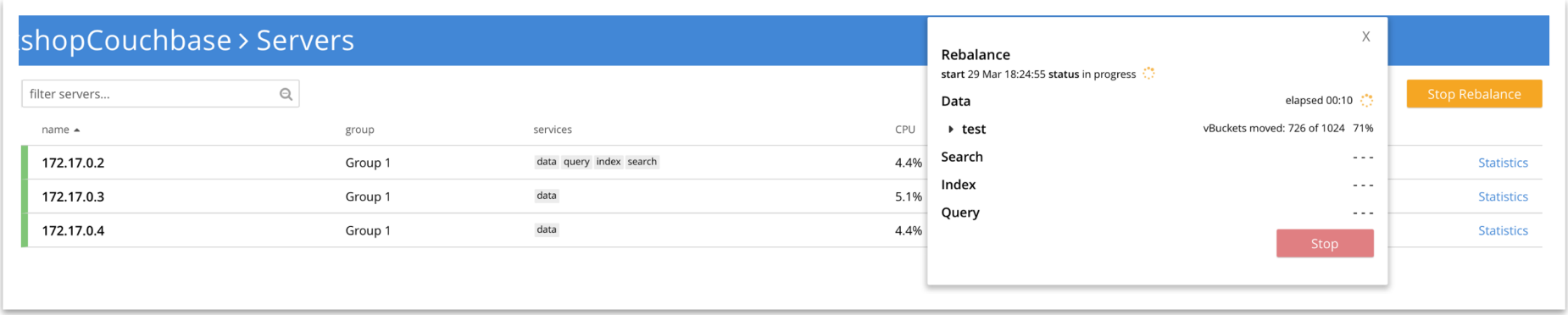
Add the 3rd node via CLI

Perform the following steps

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

```
# docker exec -it couchbase-3 bash
bash-4.2# couchbase-cli server-add --server-add=<IP couchbase-3> \
--server-add-username=Administrator --server-add-password=couchbase \
-c <IP couchbase-1> -u Administrator -p couchbase
```

- Don’t forget to rebalance in the UI!



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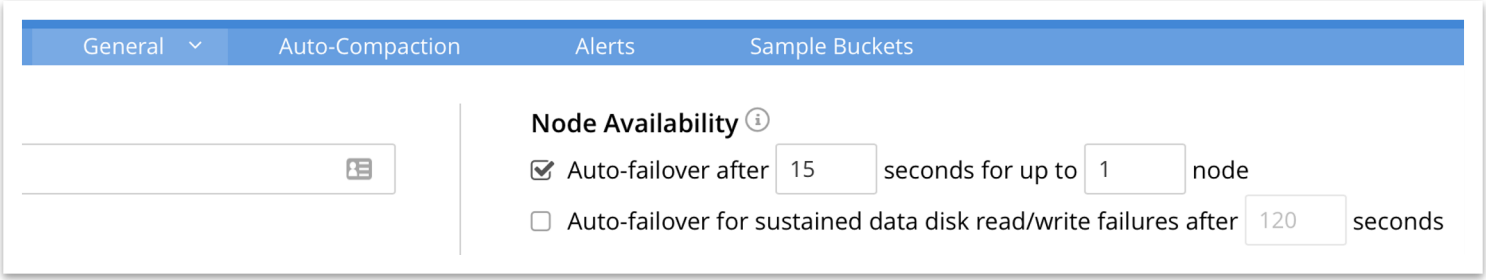
Auto-failover

Perform the following steps

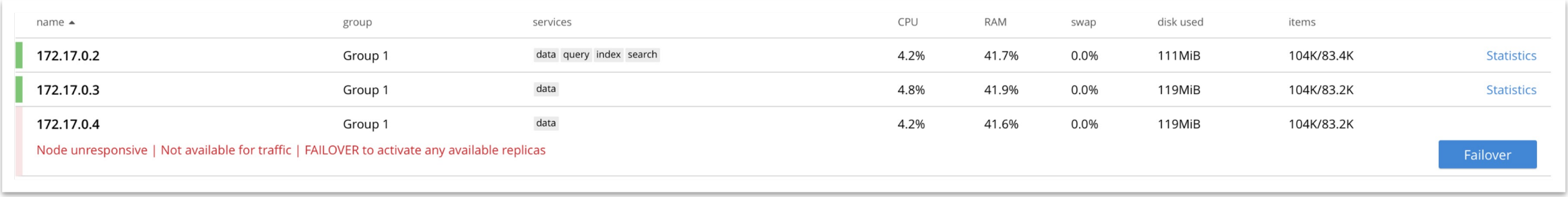
- Enable Auto-Failover in the Cluster to 15s



- Stop couchbase service on Node 3 to simulate a failure.

```
# docker stop couchbase-3
```

- 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 query index search	4.2%	41.7%	0.0%	111MiB	104K/83.4K	Statistics
172.17.0.3	Group 1	data	4.8%	41.9%	0.0%	119MiB	104K/83.2K	Statistics
172.17.0.4	Group 1	data	4.2%	41.6%	0.0%	119MiB	104K/83.2K	

Node unresponsive | Not available for traffic | FAILOVER to activate any available replicas

Failover

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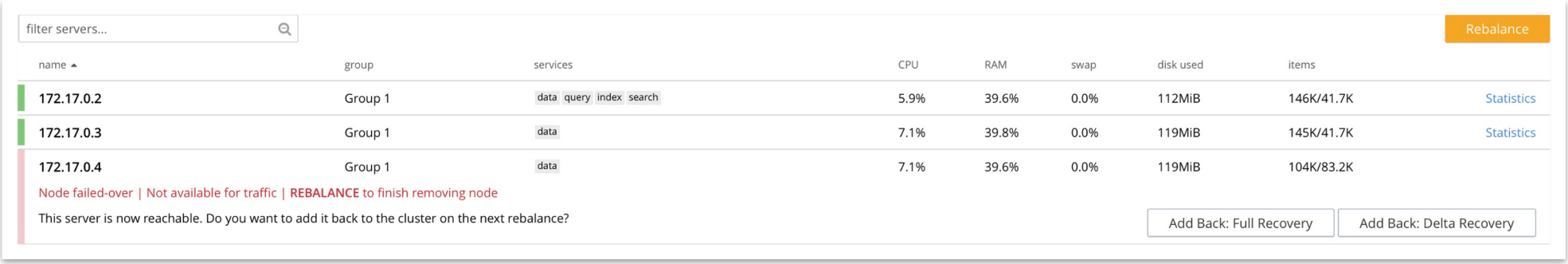
Recover from a Failure

Perform the following steps

- Restart the failing node

```
# docker start couchbase-3
```

- Monitor the UI “Servers” tab.
- Couchbase should be back as reachable.
- You have 2 options:
  - **Full Recovery**: Erase RAM and restore from replicas
  - **Delta Recovery**: Compare and recover mutations which happened after failures.
- Rebalance



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5 Security

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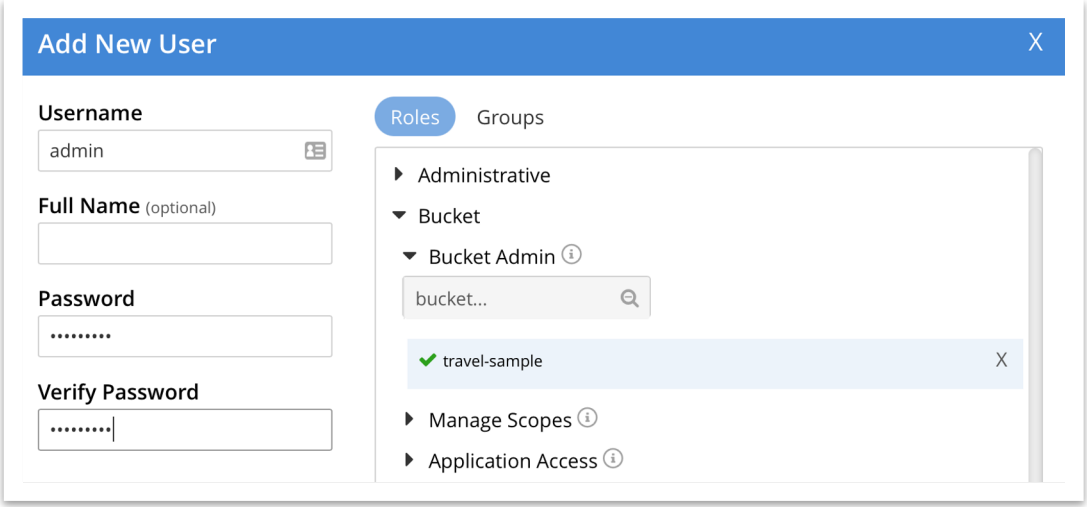
Create a User with limited permissions

Perform the following steps

- 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?



- Log back as Administrator.
- Grant more permissions to your user.

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

- Test again with the new user

https://docs.couchbase.com/server/current/learn/security/roles.html

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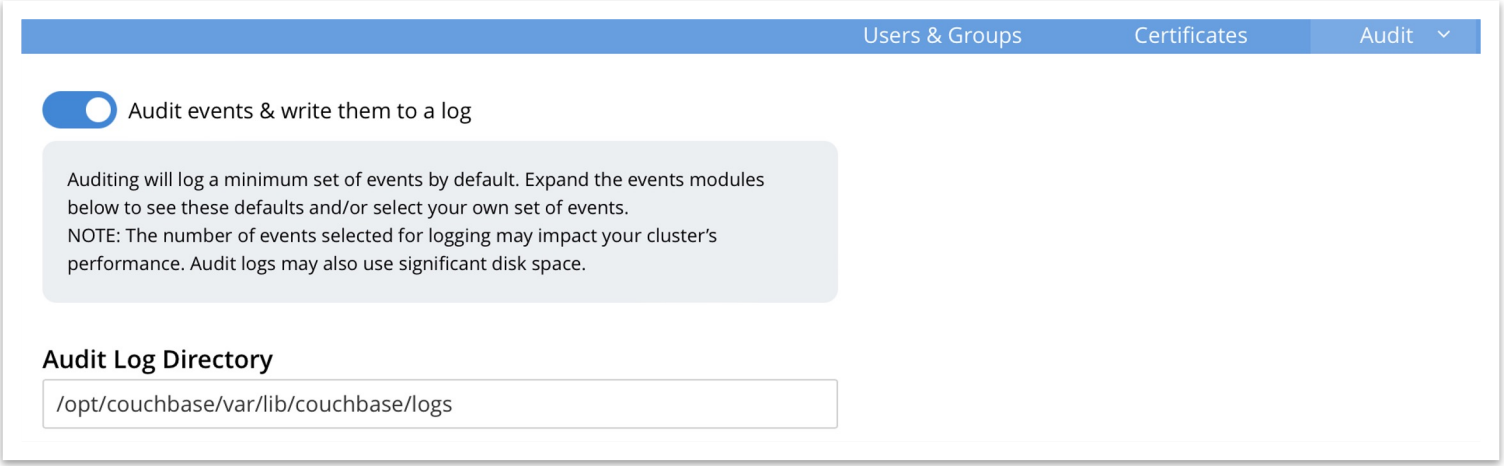
Enable Auditing - Admin

Perform the following steps

- Enable Auditing in the Security tab
- Perform some Administration tasks
  - Change Auto-Compaction to 20%.
- Check the audit.log file.




```
{"database_fragmentation_threshold":{"percentage":20},"description":"Compaction settings
were
modified","id":8225,"index_circular_compaction_abort":false,"index_circular_compaction_in
terval":{"from_hour":0,"from_minute":0,"to_hour":0,"to_minute":0},"index_compaction_mode"
:"circular","local":{"ip":"172.17.0.2","port":8091},"magma_fragmentation_percentage":50,"
name":"modify compaction
settings","parallel_db_and_view_compaction":false,"purge_interval":3,"real_userid":{"doma
in":"builtin","user":"Administrator"},"remote":{"ip":"172.17.0.1","port":62322},"sessioni
d":"323bb7b9a258ff86c3aa73388574a9415d2428cc","timestamp":"2022-03-
29T18:50:33.783Z","view_fragmentation_threshold":{"percentage":30}}
```


https://docs.couchbase.com/server/current/learn/security/auditing.html

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6 Backup & Restore

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Backup Couchbase

Perform the following steps in order to backup some data

- Create a target folder

```
cd /tmp

mkdir cb-backup
```

- Prepare the backup archive

```
cbbackupmgr config  --archive /tmp/cb-backup --repo workshop
```

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

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

cbbackupmgr info -archive /tmp/cb-backup --repo workshop
```

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Restore Couchbase

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 2022-03-30T18_07_25.462463124+01_00 --end 2022-03-
30T18_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 2022-03-30T18_07_25.462463124+01_00 --end 2022-03-
30T18_07_25.462463124+01_00 --force-updates
```

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7 XDCR

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Replicate a Bucket

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

name	IP/hostname
WorkshopCouchbase	172.17.0.2:8091

Outgoing Replications

source bucket	destination bucket	remote cluster	status
travel-sample	travel-destination	WorkshopCouchbase	replicating .. 2

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Replicate a Bucket – Update Source

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.


```
{
  "id": "airline_10",
  "rev": "1-14f33c01fd1f00000000000002000000",
  "expiration": 0,
  "flags": 33554432
}
```



```
{
  "id": "airline_10",
  "rev": "2-14f671d35bd20000000000002000000",
  "expiration": 0,
  "flags": 33554432
}
```


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Replicate a Bucket – Filtering on Airlines

Let's XDCR all document with type "airlines" from the travel-sample bucket to a new bucket "airline-destination"

- Create a new bucket "airline-destination"
  - RAM Quota = 100MB
  - No Replica
  - Conflict Resolution: Sequence Number
  - Flush: Enable
- Add replication from "travel-sample" to "airline-destination"
  - Enable **Advance Filtering**.
  - Enter a filter expression ***REGEXP_CONTAINS(META().id, "airline*")***
  - **Start Replication**
  - Run the **following query** & compare the

```
SELECT COUNT(*) FROM `travel-sample` WHERE
meta().id LIKE "airline%"
```

Outgoing Replications 56.5K mutations remaining

source bucket	destination bucket	remote cluster	status
travel-sample filter	airline-destination	WorkshopCouchbase	replicating ... 2
travel-sample	travel-destination	WorkshopCouchbase	replicating ... 2

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THANK YOU

Couchbase

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