

Architecture and Administration Basics

C/C++ Labs



1

Installation & Configuration SDK



Perform the following steps in order to install libcouchbase

- Add Couchbase package repository (/etc/yum.repos.d)

```
sudo -i
```

```
vi /etc/yum.repos.d/couchbase.repo
```

```
[couchbase]
```

```
enabled=1
```

```
name=Couchbase package repository
```

```
baseurl=http://packages.couchbase.com/rpm/7/x86_64
```

```
gpgcheck=1
```

```
gpgkey=http://packages.couchbase.com/rpm/couchbase-rpm.key
```

- Install the packages 'libcouchbase2-bin', 'libcouchbase-devel' and 'libcouchbase2-libevent'.

```
yum check-update
```

```
yum install -y libcouchbase2-libevent libcouchbase-devel libcouchbase2-bin
```

Further Preparations



- Make sure Couchbase Server is running on your Machine.
- Clone the source repository in your home folder.

```
git clone https://github.com/vgasiunas/cb-workshop-2d.git
```

<http://developer.couchbase.com/documentation/server/current/sdk/c/start-using-sdk.html>

Load the Project into QtCreator

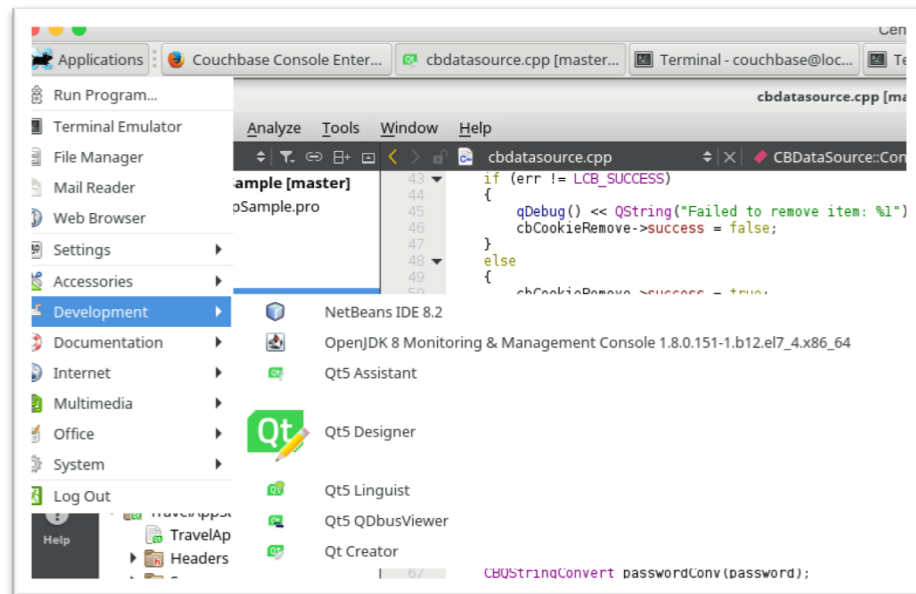


Perform the following steps:

- Start a Server X on your Oracle Virtual Box from a Terminal.

startxfce4

- Start QtCreator from the Applications.
- Open an Existing project using the TravelSampleApp-Empty.pro file.
- Build & Run your application.
- You should see an empty window.



Open the documentation for libcouchbase!

- <https://developer.couchbase.com/documentation/server/current/sdk/c/sample-app-backend.html>
- <https://developer.couchbase.com/documentation/server/current/sdk/c/start-using-sdk.html>
- <http://docs.couchbase.com/sdk-api/couchbase-c-client-2.10.0/>
- Open the TravelAppSample project also => This is the solution.
- Open the TravelAppSample-Empty project => This is where you start.
- Check the provided helper classes:

CouchbaseDocument
CBCookie*
CBQStringConvert



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Managing Connections


Create an applicative User via RBAC



Perform the following operations:

- Go the Security Tab in Couchbase
- Create a new User.
- Username = "travel"
- Password = "password"
- Roles
 - Application Access on `travel-sample`

Roles

- ▶ Administration & Global Roles
- ▶ All Buckets (*)
- ▼ travel-sample
 - ☐ Bucket Admin
 - ☒ Application Access 
 - ☐ XDCR Inbound
 - ▶ Data Service
 - ▶ Views
 - ▶ Query and Index Services
 - ▶ Search Service
 - ▶ Analytics Service

Connecting to Couchbase with RBAC



Implement the following methods in `CBDataSource`:

- `void Connect(QString connectionString, QString user, QString password);`

Implement the following methods in `CBDataSourceFactory`:

- `static void Create(QString connectionString, QString user, QString password);`

Test your implementation by executing:

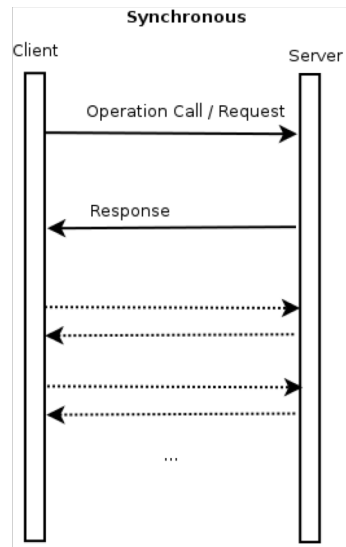
```
DemoCouchbaseConnect connectDemo;  
connectDemo.test();
```



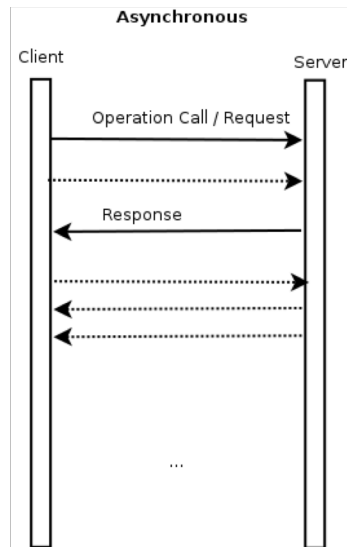
3

Working with Documents

- Libcouchbase is designed to use non-blocking I/O
 - Scheduled operations
- But `lcb_wait()` blocks by default
 - Waits for pending requests
 - Used for synchronous operation execution
- Callback functions are used
 - e.g. `storage_callback`



- External event loop integration
 - Provides mechanism to execute a callback function when a specific event occurs
 - e.g. libevent
- Asynchronous operation execution
- No need for `lcb_wait()`



Make sure that the travel-sample data is installed!
Implement the following methods in CBDataSource:

- `CouchbaseDocument Get (QString key);`

Test your implementation by executing:

```
DemoCouchbaseGet getDemo;  
getDemo.test();
```



Perform a Multi-Get



Implement the following methods in CBDataSource:

- `CouchbaseDocumentMap MultiGet(QStringList keys);`

Test your implementation by executing:

```
DemoCouchbaseMultiGet multiGetDemo;  
multiGetDemo.test();
```

Implement the following methods in `CBDataSource`:

- `bool Upsert(QString key, QString document)`

Test your implementation by executing:

```
DemoCouchbaseUpsert upsertDemo;  
upsertDemo.test();
```

Delete a Document



Implement the following methods in `CBDataSource`:

- `bool Delete(QString key);`

Test your implementation by executing:

```
DemoCouchbaseDelete deleteDemo;  
deleteDemo.test();
```




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Executing N1QL

Make sure that at least a Primary Index is created!

Also Double check that the Secondary Index on 'faa' is there!

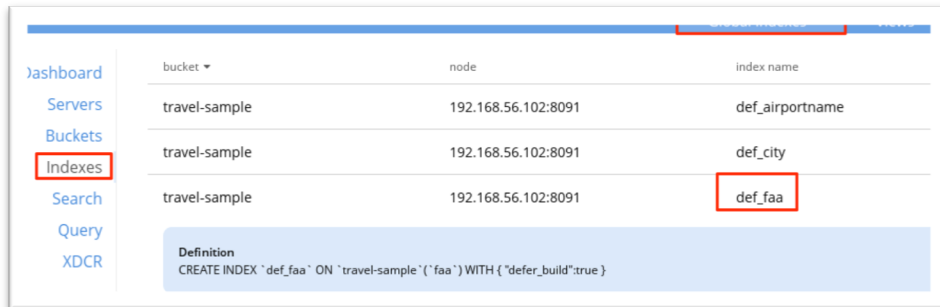
Implement the following methods in CBDataSource:

- CBN1qlResult QueryN1ql(QString query);

Test your implementation by executing:

```
DemoCouchbaseN1ql n1qlDemo;  
n1qlDemo.test();
```

Update the SELECT Query with more clauses and check the results!



bucket ▼	node	index name
travel-sample	192.168.56.102:8091	def_airportname
travel-sample	192.168.56.102:8091	def_city
travel-sample	192.168.56.102:8091	def_faa

Definition
CREATE INDEX `def_faa` ON `travel-sample` (`faa`) WITH { `defer_build`:true }



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Error Management & Logging

- Operations return `lcb_error_t` status code
- Check for
 - `err == LCB_SUCCESS`
- Error Codes
 - `<libcouchbase/error.h>`
- Examples
 - `LCB_KEY_EEXISTS`: Key already exists
 - `LCB_KEY_ENOENT`: Key does not already exist if replacing it
 - `LCB_ETIMEDOUT`: Transient error which indicates that something took too long
 - `LCB_ETMPFAIL`: Transient error which indicates that the server was too busy
 - `LCB_AUTH_ERROR`: Authentication error
 - `LCB_BUCKET_ENOENT`: Bucket does not exist

- LCB_LOGLEVEL environment variable
 - 1 – basic
 - 5 – verbose
- Programmatically
 - LCB_CNTL_CONLOGGER_LEVEL setting
 - console_log_level option in the connection string
- Log entry format

```
1ms [I0] {14780} [DEBUG] (lcbio_mgr - L:383) <localhost:11210>  
(HE=0xe56760)  
Creating new connection because none are available in the pool
```



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Travel Sample Application

A Sample Application



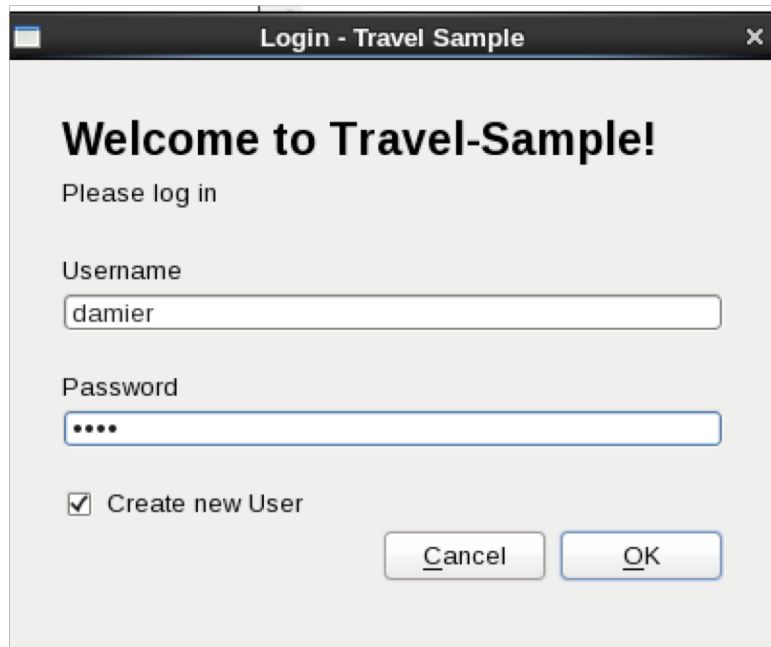
Inspect the full source code of the Travel-Sample application!

Run the Qt application!

- Search for a flight from 'LAX' to 'LHR'



A Sample Application

A screenshot of a login dialog box titled "Login - Travel Sample". The dialog has a light gray background and a dark gray title bar with a close button (X). The main content area contains the text "Welcome to Travel-Sample!" in bold, followed by "Please log in". Below this are two input fields: "Username" with the text "damier" and "Password" with four dots. At the bottom left is a checkbox labeled "Create new User" which is checked. At the bottom right are two buttons: "Cancel" and "OK".

Login - Travel Sample

Welcome to Travel-Sample!

Please log in

Username
damier

Password
....

☒ Create new User

Cancel OK

A Sample Application



Travel Sample

Couchbase Travel Sample C++/Qt

Logged in user: david

Flight Selection Available Flights Shopping Cart (0) Bookings (0)

Airport or City

From To

Los Angeles Intl

Heathrow

Travel Dates

Leave Return

Options

☒ Round Trip Travelers

Find Flights

A Sample Application



Couchbase Travel Sample C++/Qt Logged in user: david

Flight Selection Available Flights Shopping Cart (0) Bookings (0)

Outbound Leg

Airline	Flight	Departure	From	To	Aircraft	Price
American Airl...	AA632	21:35:00	LAX	LHR	77W	\$850
American Airl...	AA951	23:12:00	LAX	LHR	77W	\$762
American Airl...	AA938	11:57:00	LAX	LHR	77W	\$780
American Airl...	AA275	03:18:00	LAX	LHR	77W	\$797
British Airways	BA353	03:19:00	LAX	LHR	744 388	\$718
British Airways	BA245	05:21:00	LAX	LHR	744 388	\$815

Add to cart

Inbound Leg

Airline	Flight	Departure	From	To	Aircraft	Price
American Airl...	AA208	04:27:00	LHR	LAX	77W	\$736
American Airl...	AA005	07:18:00	LHR	LAX	77W	\$806
American Airl...	AA323	14:41:00	LHR	LAX	77W	\$788
British Airways	BA330	13:19:00	LHR	LAX	744 388	\$736
British Airways	BA069	01:36:00	LHR	LAX	744 388	\$797
British Airways	BA433	18:36:00	LHR	LAX	744 388	\$797

Add to cart

A Sample Application



Travel Sample

Couchbase Travel Sample C++/Qt

Logged in user: david

Flight Selection Available Flights Shopping Cart (2) Bookings (0)

Airline	Flight	Departure	From	To	Aircraft	Price
American Airl...	AA275	03:18:00	LAX	LHR	77W	\$797
American Airl...	AA005	07:18:00	LHR	LAX	77W	\$806

remove selected item

Total Price: **\$1603**

Book now

Thank you

