NoSQLite

Milestone

University of Windsor

Index

Planned

- Initial Setup
- Decide Standardization

Accomplished

Everything planned has been on track so far. Initial setup and standardization were successfully completed within the decided time frames. Additionally, we were able to accomplish a couple of sub tasks from the main task, Develop Interface, as well. Given the current updates, all the members were able to finish **100% of the allocated tasks till milestone**.

Since there was no development planned before milestone, no commits have been submitted to GitHub. As part of basic setup for a project, we do have created the GitHub repository which can be accessed here.

S. No.	Task	Sub Task	Assignee	Time Spent	End Date
1.	Research open-source API for MongoDB		Siddharth, Jimish	3 days	12-06-2021
2.	Initial Setup	Get a VM setup on school server for project work.	Pinged Sys Admin –Robert Mavrinac	2 days	16-06-2021
		Database setup – Install and run database on Linux server	Srishti	2 hrs	16-06-2021
		Compile and run open-source libraries for connection - Hiredis	Srishti	1 hr	16-06-2021
		Compile and run open-source libraries for connection – Mongo-CXX	Jimish, Srishti	4 days	19-06-2021
		Develop code for connection to DB via Hiredis – SET, GET, DEL	Margaret	4 days	17-06-2021
		Develop code for connection to DB via Hiredis – HSET, HGET, HDEL	Siddharth	5 days	18-06-2021
		Develop code for connection to DB via Mongo-CXX	Jimish	2 days	20-06-2021
3.	Decide Standardization	Decide common and unique functionalities to implement.	Srishti + Margaret	2 hrs	28-06-2021
		Define standard for features	Jimish + Siddharth	3 hrs	29-06-2021
4.	Develop Interface	Design Base for NoSQL DBs	Srishti	2 hrs	30-06-2021
		Develop base for NoSQL DBs	Srishti	In Progress	

Note:

1. Tasks with comma separated assignees indicate – the secondary assignee was involved to resolve some issue or help out when primary assignee was stuck.

2. Tasks with '+' separated assignees indicate – both the members equally contributed to the task.

Other Accomplishments include:

1. Familiarity with Linux & C++ environment for the team members.
2. Understanding CMake and Make
3. Resolving compile time errors

Work In-Progress

```
jain71@proj3:/home/shared$ ps -ef
UID          PID    PPID  C STIME TTY          TIME CMD
root           1       0  0 Jun18 ?        00:00:56 /sbin/init
root          49       1  0 Jun18 ?        00:01:44 /lib/systemd/systemd-journald
message+     102       1  0 Jun18 ?        00:00:26 /usr/bin/dbus-daemon --system --address=systemd: --nofork --nopidfile --systemd-activation
root         103       1  0 Jun18 ?        00:00:06 /lib/systemd/systemd-logind
root         104       1  0 Jun18 ?        00:00:20 /usr/sbin/rsyslogd -n -iNONE
root         106       1  0 Jun18 ?        00:00:44 /usr/sbin/nscd
root         124       1  0 Jun18 ?        00:00:00 /sbin/agetty -o -p -- \u --noclear --keep-baud console 115200,38400,9600 linux
root         125       1  0 Jun18 pts/1    00:00:00 /sbin/agetty -o -p -- \u --noclear --keep-baud tty2 115200,38400,9600 linux
root         126       1  0 Jun18 pts/0    00:00:00 /sbin/agetty -o -p -- \u --noclear --keep-baud tty1 115200,38400,9600 linux
root         135       1  0 Jun18 ?        00:00:37 /usr/sbin/sshd -D
nslcd        148       1  0 Jun18 ?        00:00:18 /usr/sbin/nslcd
root         154       1  0 Jun18 ?        00:00:06 /usr/sbin/cron -f
root         302       1  0 Jun18 ?        00:00:13 /usr/lib/postfix/sbin/master -w
postfix      304     302  0 Jun18 ?        00:00:03 qmgr -l -t unix -u
redis      12537       1  0 Jun19 ?        00:37:46 /usr/bin/redis-server 127.0.0.1:6379
mongodb    14285       1  0 Jun19 ?        02:17:59 /usr/bin/mongod --config /etc/mongod.conf
jain71     21863       1  0 Jun21 ?        00:00:00 /lib/systemd/systemd --user
jain71     21864   21863  0 Jun21 ?        00:00:00 (sd-pam)
```

1 - Server image after setting up and running Redis and MongoDB.

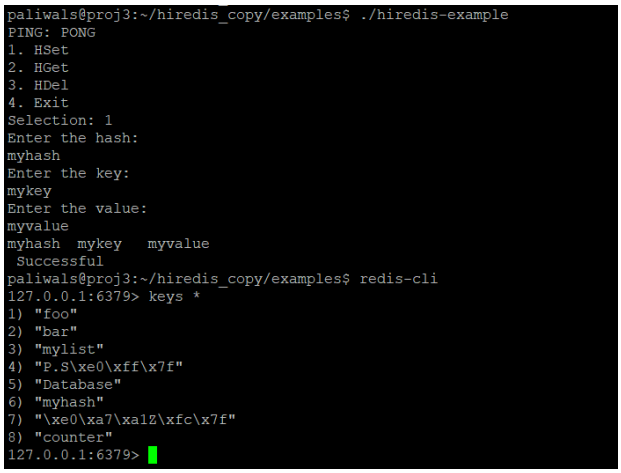
```
jain71@proj3:/home/shared$ ls
cmake-3.20.4  hiredis  hiredis_copy  mongo-c-driver-1.17.6  mongo-cxx-driver
jain71@proj3:/home/shared$ cd hiredis
jain71@proj3:/home/shared/hiredis$ ls
CHANGELOG.md  README.md     async.c  dict.c    fmacros.h          hiredis.c  hiredis.pc     net.c  read.c  sds.c  sdsalloc.h  win32.h
COPYING       adapters      async.h  dict.h    hired_build_logs.txt  hiredis.h  libhiredis.a   net.h  read.h  sds.h  test.c
Makefile      appveyor.yml  async.o  examples  hiredis-test       hiredis.o  libhiredis.so  net.o  read.o  sds.o  test.o
jain71@proj3:/home/shared/hiredis$ cd ../mongo-cxx-driver/
jain71@proj3:/home/shared/mongo-cxx-driver$ cd src/mongocxx/
jain71@proj3:/home/shared/mongo-cxx-driver/src/mongocxx$ ls
CMakeFiles          client_session.cpp   exception                      libmongocxx-mocked.so          options             test
CMakeLists.txt      client_session.hpp   gridfs                         libmongocxx-mocked.so.3.6.5    pipeline.cpp        test_util
CTestTestfile.cmake cmake                hint.cpp                       libmongocxx-mocked.so._noabi   pipeline.hpp        uri.cpp
Makefile            cmake_install.cmake  hint.hpp                       libmongocxx.so                 pool.cpp            uri.hpp
bulk_write.cpp      collection.cpp       index_model.cpp                libmongocxx.so.3.6.5           pool.hpp            validation_criteria.cpp
bulk_write.hpp      collection.hpp       index_model.hpp                libmongocxx.so._noabi          private             validation_criteria.hpp
change_stream.cpp   config               index_view.cpp                 logger.cpp                     read_concern.cpp    write_concern.cpp
change_stream.hpp   cursor.cpp           index_view.hpp                 logger.hpp                     read_concern.hpp    write_concern.hpp
client.cpp          cursor.hpp           instance.cpp                   model                          read_preference.cpp write_type.hpp
client.hpp          database.cpp         instance.hpp                   mongocxx-config-version.cmake  read_preference.hpp
client_encryption.cpp database.hpp       libmongocxx-config-version.cmake mongocxx-config.cmake        result
client_encryption.hpp events             libmongocxx-config.cmake       mongocxx_targets.cmake         stdx.hpp
```

2 - Server image after compiling source codes for Redis API, Hiredis, and MongoDB API, Mongo-CXX-Driver.

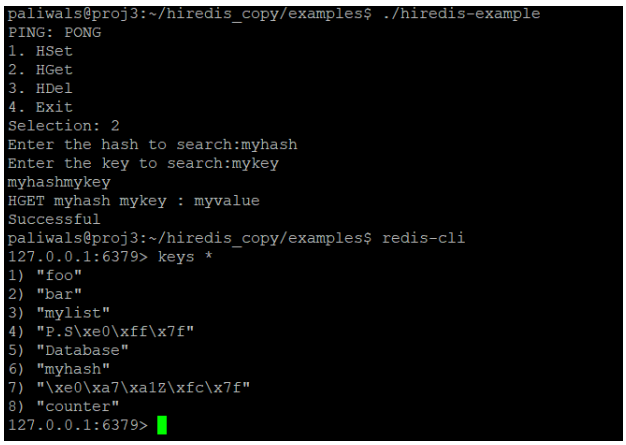
```
nesarajm@proj3:/home/shared/hiredis_copy/examples$ ./hiredis-example
PING: PONG
1. Set
2. Get
3. Delete
4. Exit
Selection: 1
Enter the key
Computer
Enter the value
CS
Computer        CSSET: OK
nesarajm@proj3:/home/shared/hiredis_copy/examples$ ./hiredis-example
PING: PONG
1. Set
2. Get
3. Delete
4. Exit
Selection: 2
Enter the key to searchComputer
Computer
GET Computer: CS
```

3 - Output for sample code for Hiredis API to execute SET & GET command

4 - Output for sample code for Hiredis API to execute DEL command



5 - Output for sample code for Hiredis API to execute HSET command



6 - Output for sample code for Hiredis API to execute HGET command

```
paliwals@proj3:~/hiredis_copy/examples$ ./hiredis-example
PING: PONG
1. HSet
2. HGet
3. HDel
4. Exit
Selection: 3
Enter the hash to delete:myhash
Enter the key to delete:mykey
HDEL deleted myhash mykey
 Successful
paliwals@proj3:~/hiredis_copy/examples$ redis-cli
127.0.0.1:6379> keys *
1) "foo"
2) "bar"
3) "mylist"
4) "P.S\xe0\xff\x7f"
5) "Database"
6) "\xe0\xa7\xa1Z\xfc\x7f"
7) "counter"
127.0.0.1:6379>
```

7 - Output for sample code for Hiredis API to execute HDEL command

```
shah1bu@proj3:~/mongo-cxx-driver_copy/examples/mongocxx$ ./create
shah1bu@proj3:~/mongo-cxx-driver_copy/examples/mongocxx$ mongo
MongoDB shell version v4.4.6
connecting to: mongodb://127.0.0.1:27017/?compressors=disabled&gssapiServiceName=mongodb
Implicit session: session { "id" : UUID("681f79b1-864c-4a43-8e01-62bc259e4711") }
MongoDB server version: 4.4.6
---
The server generated these startup warnings when booting:
        2021-06-19T19:14:05.127+00:00: Using the XFS filesystem is strongly recommended with the WiredTiger storage engine. See http://dochub.mongodb.org/core/prodnotes
-filesystem
        2021-06-19T19:14:06.694+00:00: Access control is not enabled for the database. Read and write access to data and configuration is unrestricted
        2021-06-19T19:14:06.696+00:00: You are running on a NUMA machine. We suggest launching mongod like this to avoid performance problems: numactl --interleave=all
mongod [other options]
---
---
        Enable MongoDB's free cloud-based monitoring service, which will then receive and display
        metrics about your deployment (disk utilization, CPU, operation statistics, etc).

        The monitoring data will be available on a MongoDB website with a unique URL accessible to you
        and anyone you share the URL with. MongoDB may use this information to make product
        improvements and to suggest MongoDB products and deployment options to you.

        To enable free monitoring, run the following command: db.enableFreeMonitoring()
        To permanently disable this reminder, run the following command: db.disableFreeMonitoring()
---
> show dbs
admin   0.000GB
config  0.000GB
local   0.000GB
test    0.000GB
> use test
switched to db test
> show collections
restaurants
> db.restaurants.find()
{ "_id" : ObjectId("60df6bafcda1ea61ef250c52"), "address" : { "street" : "2 Avenue", "zipcode" : 10075, "building" : "1480", "coord" : [ -73.9557413, 40.7720266 ] }, "b
orough" : "Manhattan", "cuisine" : "Italian", "grades" : [ { "date" : ISODate("1970-01-01T00:00:12.323Z"), "grade" : "A", "score" : 11 }, { "date" : ISODate("1970-01-01
T00:02:01.212Z"), "grade" : "B", "score" : 17 } ], "name" : "Vella", "restaurant_id" : "41704620" }
>
```

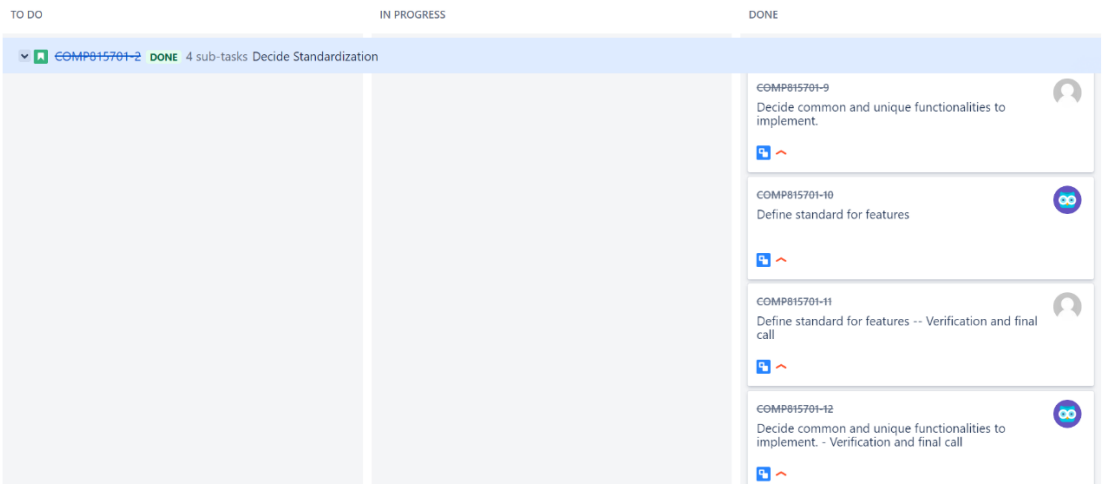
8 - Create a document and check on mongo interface for successful completion

```
shah1bu@proj3:~/mongo-cxx-driver_copy/examples/mongocxx$ ./update
shah1bu@proj3:~/mongo-cxx-driver_copy/examples/mongocxx$ mongo
MongoDB shell version v4.4.6
connecting to: mongodb://127.0.0.1:27017/?compressors=disabled&gssapiServiceName=mongodb
Implicit session: session { "id" : UUID("c4014b6b-1e8f-4a30-98df-16498858942a") }
MongoDB server version: 4.4.6
---
The server generated these startup warnings when booting:
        2021-06-19T19:14:05.127+00:00: Using the XFS filesystem is strongly recommended with the WiredTiger storage engine. See http://dochub.mongodb.org/core/prodnotes
-filesystem
        2021-06-19T19:14:06.694+00:00: Access control is not enabled for the database. Read and write access to data and configuration is unrestricted
        2021-06-19T19:14:06.696+00:00: You are running on a NUMA machine. We suggest launching mongod like this to avoid performance problems: numactl --interleave=all
mongod [other options]
---
---
        Enable MongoDB's free cloud-based monitoring service, which will then receive and display
        metrics about your deployment (disk utilization, CPU, operation statistics, etc).

        The monitoring data will be available on a MongoDB website with a unique URL accessible to you
        and anyone you share the URL with. MongoDB may use this information to make product
        improvements and to suggest MongoDB products and deployment options to you.

        To enable free monitoring, run the following command: db.enableFreeMonitoring()
        To permanently disable this reminder, run the following command: db.disableFreeMonitoring()
---
> show dbs
admin   0.000GB
config  0.000GB
local   0.000GB
test    0.000GB
> use test
switched to db test
> show collections
restaurants
> db.restaurants.find()
{ "_id" : ObjectId("60df7fd3a0e6e176df328352"), "name" : "Vella 2", "address" : { "coord" : [ -73.9557413, 40.7720266 ], "building" : "1480", "street" : "2 Avenue", "zi
pcode" : "10075" } }
>
```

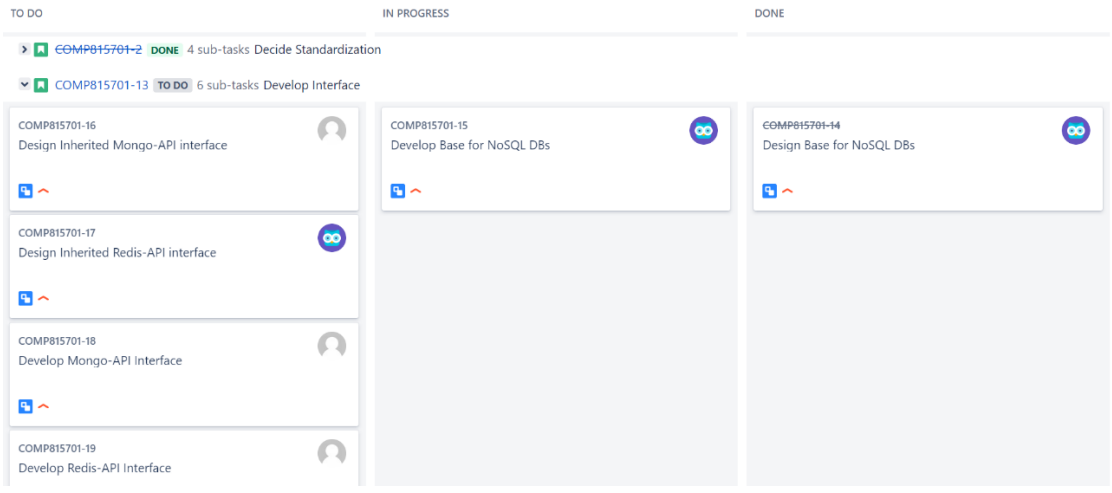
9 - Update a document and confirm execution using mongo interface

```
shah1bu@proj3:~/mongo-cxx-driver_copy/examples/mongocxx$ ./remove
shah1bu@proj3:~/mongo-cxx-driver_copy/examples/mongocxx$ mongo
MongoDB shell version v4.4.6
connecting to: mongodb://127.0.0.1:27017/?compressors=disabled&gssapiServiceName=mongodb
Implicit session: session { "id" : UUID("0069db41-dfe2-423d-a692-30edfbc36c2a") }
MongoDB server version: 4.4.6
---
The server generated these startup warnings when booting:
        2021-06-19T19:14:05.127+00:00: Using the XFS filesystem is strongly recommended with the WiredTiger storage engine. See http://dochub.mongodb.org/core/prodnotes
-filesystem
        2021-06-19T19:14:06.694+00:00: Access control is not enabled for the database. Read and write access to data and configuration is unrestricted
        2021-06-19T19:14:06.696+00:00: You are running on a NUMA machine. We suggest launching mongod like this to avoid performance problems: numactl --interleave=all
mongod [other options]
---
---
        Enable MongoDB's free cloud-based monitoring service, which will then receive and display
        metrics about your deployment (disk utilization, CPU, operation statistics, etc).

        The monitoring data will be available on a MongoDB website with a unique URL accessible to you
        and anyone you share the URL with. MongoDB may use this information to make product
        improvements and to suggest MongoDB products and deployment options to you.

        To enable free monitoring, run the following command: db.enableFreeMonitoring()
        To permanently disable this reminder, run the following command: db.disableFreeMonitoring()
---
> show dbs
admin   0.000GB
config  0.000GB
local   0.000GB
>
```

10 – Remove doc and confirm result on mongo interface



11 - Jira Board for Sprint-2



12 - Jira board Sprint - 2

Challenges

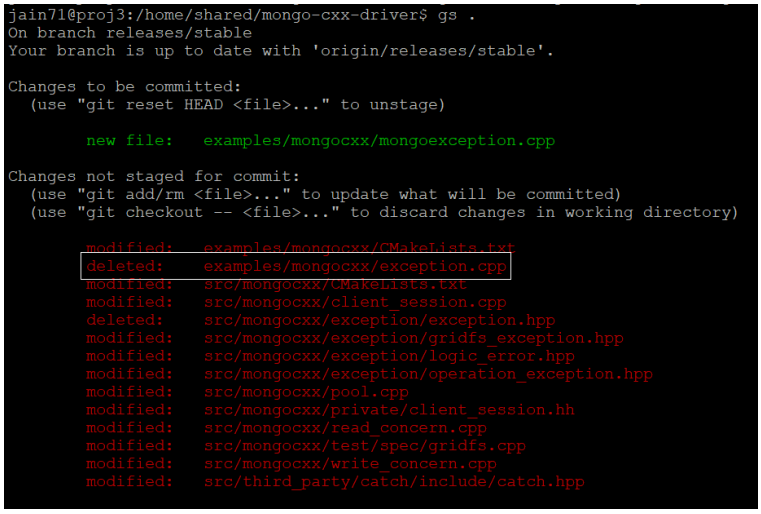
There were some tasks that were closed before the initially predicted time frame, while the others took longer due to unexpected scenarios. Following were the hurdles we crossed:

1. **Mongo-CXX-Driver compilation issues for examples**

This resulted in almost 3 days of effort addition due to unavailability of a possible solution. Research of 2 days led us to this problem and thereby understanding of what actually was happening in our scenario.

Issue: Including a header file without extension and having executable with a same name resulted in gcc/g++ compiler picking the executable instead of header and therefore resulting in thousands of errors.

Solution: We made changes to source code to ensure compilation.



```
jain71@proj3:/home/shared/mongo-cxx-driver$ git diff src/mongocxx/test/spec/gridfs.cpp
diff --git a/src/mongocxx/test/spec/gridfs.cpp b/src/mongocxx/test/spec/gridfs.cpp
index e1b777b49..382d01bfd 100644
--- a/src/mongocxx/test/spec/gridfs.cpp
+++ b/src/mongocxx/test/spec/gridfs.cpp
@@ -13,7 +13,7 @@
 // limitations under the License.

 #include <cmath>
-#include <exception>
+#include </usr/include/c++/8/ext/pb_ds/exception.hpp>
 #include <fstream>
 #include <functional>
 #include <memory>
jain71@proj3:/home/shared/mongo-cxx-driver$ git diff src/mongocxx/client_session.cpp
diff --git a/src/mongocxx/client_session.cpp b/src/mongocxx/client_session.cpp
index f979dfcb9..811a9f233 100644
--- a/src/mongocxx/client_session.cpp
+++ b/src/mongocxx/client_session.cpp
@@ -13,7 +13,7 @@
 // limitations under the License.

 #include <bsoncxx/stdx/make_unique.hpp>
-#include <mongocxx/exception/exception.hpp>
+#include <mongocxx/exception/mongoexception.hpp>
 #include <mongocxx/exception/private/mongoc_error.hh>
 #include <mongocxx/private/client.hh>
 #include <mongocxx/private/client_session.hh>
```

2. Hiredis library returned garbage value for every command

```
nesarajm@proj3:/home/shared/hiredis_copy/examples$ ./hiredis-example
PING: PONG
1. Set
2. Get
3. Delete
4. Exit
Selection: 2
Enter the key to searchDatabase
Database
GET ?????: DBMS
```

On executing any command through Hiredis API, return value was always garbage. After giving sufficient time on fixing this, we moved to google to check for existing issues and found that latest version of the API had some issue. Moving to v0.14 worked for us.

3. **Technology constraint**

Since the team is new to both C++ and Redis, onboarding was a challenge. During initial setup, we ensured everyone worked on all components to have an experience of how things work.