

Consistency Level

Consistency level determines how many nodes in the replica must respond for the coordinator node to successfully process a non-lightweight transaction.

The default CQL shell level is ONE.

```
cqlsh  
  
CONSISTENCY  
Current consistency level is ONE.
```

Setting a level

Level determines data availability versus data accuracy for transactions during the CQL shell session, some settings also may have high impact other transactions occurring in the cluster, such as ALL and SERIAL. The CQL shell setting supersedes Cassandra consistency level global setting.

When you initiate a transaction from the CQL shell, the coordinator node is typically the node where you started cqlsh; if you connect to a remote host, then the remote node is the coordinator.

Read Consistency Levels

Level	Replicas	Consistency	Availability
ALL	All	Highest	Lowest
EACH_QUORUM	Quorum in each data centers. Reads NOT supported.	Same across data centers	
QUORUM	Quorum of all nodes across all data centers. Some level of failure.		
LOCAL_QUORUM	Quorum of replicas in the same data center as the coordinator. Avoids latency of inter-datacenter communication.	Low in multi-data center	
ONE	Closest replica as determined by the snitch. Satisfies the needs of most users because consistency requirements are not stringent.	Lowest (READ)	Highest (READ)
TWO	Closest two replicas as determined by the snitch.		
THREE	Closest three replicas as determined by the snitch.		
LOCAL_ONE	Returns a response from the closest replica in the local data center. For security and quality, use in an off line datacenter to prevent automatic connection to online nodes in other datacenters.		
ANY	Closest replica, as determined by the snitch. If all replica nodes are down, write succeeds after a hinted handoff. Provides low latency, guarantees writes never fail.	Lowest (WRITE)	Highest (WRITE)
SERIAL	Returns results with the most recent data including inflight LWT (uncommitted). Commits inflight LWT as part of the read. Writes NOT supported.		
LOCAL_SERIAL	Same as SERIAL, but confined to the data center. Writes NOT supported.		

Restriction: CQL shell only supports read requests (SELECT statements) when the consistency level is set to SERIAL or LOCAL_SERIAL.

Examples

Set CONSISTENCY to force the majority of the nodes to respond:

```
cqlsh
```

```
CONSISTENCY QUORUM  
Consistency level set to QUORUM.
```

Set level to serial for LWT read requests:

```
CONSISTENCY SERIAL  
Consistency level set to SERIAL.
```

List all winners.

```
expand ON;  
Now Expanded output is enabled
```

```
SELECT * FROM "status_update_replies" WHERE "status_update_username" = 'alice' AND  
"status_update_id" = 97719c50-e797-11e3-90ce-5f98e903bf02;
```

```
@ Row 1
```

```
-----+-----  
status_update_username | alice  
status_update_id       | 97719c50-e797-11e3-90ce-5f98e903bf02  
id                     | b98df670-8014-11e8-bbfe-55b594efc7b0  
author_username        | bob  
body                   | Reply2
```

```
(1 rows)
```

```
INSERT INTO "status_update_replies" ("status_update_username",  
"status_update_id", "id", "author_username", "body")  
VALUES ('alice', 76e7a4d0-e796-11e3-90ce-5f98e903bf02, NOW(), 'bob',  
'Reply1');
```

```
InvalidRequest: Error from server: code=2200 [Invalid query] message="You must use c  
onditional updates for serializable writes"
```

Testing performance impact

Tracing records all activity related to a request. These steps use tracing to show queries on a keyspace with a replication factor of 3 using different consistency levels (CL):

- **ONE** processes responses from one of three replicas
- **QUORUM** from two of three replicas
- **ALL** from three of three replicas

```
cqlsh
```

```
CREATE KEYSPACE cycling_alt WITH replication = {'class':'SimpleStrategy', 'replication_factor':3};
```

```
USE cycling_alt;  
CREATE TABLE cycling_alt.testster (id int PRIMARY KEY, coll int, col2 int);
```

```
INSERT INTO cycling_alt.testster(id, coll, col2) VALUES(0, 0, 0);  
InvalidRequest: Error from server: code=2200 [Invalid query] message="You must use conditional updates for serializable writes"
```

```
CONSISTENCY ONE;  
Consistency level set to ONE.
```

```
INSERT INTO cycling_alt.testster(id, coll, col2) VALUES(0, 0, 0);
```

```
TRACING on;  
  
CONSISTENCY;  
Current consistency level is ONE.
```

```
SELECT * FROM cycling_alt.testster WHERE id = 0;
```

id	coll	col2
0	0	0

(1 rows)

Tracing session: 2cc8f8b0-801f-11e8-bbfe-55b594efc7b0

activity	timestamp	source	source_elapsed	client
execute CQL3 query	2018-07-05 06:46:41.851000	159.65.156.47	0	159.65.156.47
Parsing SELECT * FROM cycling_alt.testster WHERE id = 0; [Native-Transport-Requests-1]	2018-07-05 06:46:41.852000	159.65.156.47	632	159.65.156.47
READ message received from /159.65.156.47 [MessagingService-Incoming-/159.65.156.47]	2018-07-05 06:46:41.852000	159.65.146.132	47	159.65.156.47
Preparing statement [Native-Transport-Requests-1]	2018-07-05 06:46:41.852000	159.65.156.47	862	159.65.156.47
Executing single-partition query on testster [ReadStage-2]	2018-07-05 06:46:41.852000	159.65.146.132	450	159.65.156.47

```

speculating read retry on /159.65.146.132 [Native-Trans
port-Requests-1] | 2018-07-05 06:46:41.852000 | 159.65.156.47 | 1362 | 15
9.65.156.47

Acquiring sstable referenc
es [ReadStage-2] | 2018-07-05 06:46:41.852000 | 159.65.146.132 | 622 | 15
9.65.156.47

Merging memtable conten
ts [ReadStage-2] | 2018-07-05 06:46:41.852000 | 159.65.146.132 | 685 | 15
9.65.156.47

Executing single-partition query on test
er [ReadStage-2] | 2018-07-05 06:46:41.853000 | 159.65.156.47 | 1458 | 15
9.65.156.47

Read 1 live rows and 0 tombstone cel
ls [ReadStage-2] | 2018-07-05 06:46:41.853000 | 159.65.146.132 | 1157 | 15
9.65.156.47

Acquiring sstable referenc
es [ReadStage-2] | 2018-07-05 06:46:41.853000 | 159.65.156.47 | 1676 | 15
9.65.156.47

Enqueuing response to /159.65.156.
47 [ReadStage-2] | 2018-07-05 06:46:41.853000 | 159.65.146.132 | 1257 | 15
9.65.156.47

Merging memtable conten
ts [ReadStage-2] | 2018-07-05 06:46:41.853000 | 159.65.156.47 | 1770 | 15
9.65.156.47
Sending REQUEST_RESPONSE message to /159.65.156.47 [MessagingService-Outgoing-/159.
65.156.47-Small] | 2018-07-05 06:46:41.853000 | 159.65.146.132 | 1453 | 15
9.65.156.47
Sending READ message to /159.65.146.132 [MessagingService-Outgoing-/159.6
5.146.132-Small] | 2018-07-05 06:46:41.853000 | 159.65.156.47 | 1923 | 15
9.65.156.47

Read 1 live rows and 0 tombstone cel
ls [ReadStage-2] | 2018-07-05 06:46:41.853000 | 159.65.156.47 | 2052 | 15
9.65.156.47
REQUEST_RESPONSE message received from /159.65.146.132 [MessagingService-Incoming-
/159.65.146.132] | 2018-07-05 06:46:41.856000 | 159.65.156.47 | 26 | 15
9.65.156.47

Processing response from /159.65.146.132 [Request
ResponseStage-1] | 2018-07-05 06:46:41.856000 | 159.65.156.47 | 360 | 15
9.65.156.47

Initiating read-repair [Request
ResponseStage-1] | 2018-07-05 06:46:41.856000 | 159.65.156.47 | 516 | 15
9.65.156.47

Request complete | 2018-07-05 06:46:41.853363 | 159.65.156.47 | 2363 | 15
9.65.156.47

```

Change the consistency level to QUORUM to trace what happens during a read with a QUORUM consistency level.

```

CONSISTENCY quorum;
Consistency level set to QUORUM.

```


9.65.156.47

```

Merging memtable conten
ts [ReadStage-2] | 2018-07-05 06:47:37.554000 | 159.65.156.47 | 1527 | 15
9.65.156.47
Enqueuing response to /159.65.156.
47 [ReadStage-3] | 2018-07-05 06:47:37.554000 | 159.65.146.132 | 1858 | 15
9.65.156.47
Sending READ message to /159.89.167.247 [MessagingService-Outgoing-/159.8
9.167.247-Small] | 2018-07-05 06:47:37.554000 | 159.65.156.47 | 1578 | 15
9.65.156.47
Sending READ message to /159.65.146.132 [MessagingService-Outgoing-/159.6
5.146.132-Small] | 2018-07-05 06:47:37.554000 | 159.65.156.47 | 1734 | 15
9.65.156.47
Read 1 live rows and 0 tombstone cel
ls [ReadStage-2] | 2018-07-05 06:47:37.554000 | 159.65.156.47 | 1812 | 15
9.65.156.47
READ message received from /159.65.156.47 [MessagingService-Incoming
-/159.65.156.47] | 2018-07-05 06:47:37.555000 | 159.89.167.247 | 31 | 15
9.65.156.47
Sending REQUEST_RESPONSE message to /159.65.156.47 [MessagingService-Outgoing-/159.
65.156.47-Small] | 2018-07-05 06:47:37.555000 | 159.65.146.132 | 2315 | 15
9.65.156.47
Executing single-partition query on test
er [ReadStage-1] | 2018-07-05 06:47:37.555000 | 159.89.167.247 | 431 | 15
9.65.156.47
Acquiring sstable referenc
es [ReadStage-1] | 2018-07-05 06:47:37.555000 | 159.89.167.247 | 615 | 15
9.65.156.47
Merging memtable conten
ts [ReadStage-1] | 2018-07-05 06:47:37.555000 | 159.89.167.247 | 680 | 15
9.65.156.47
Read 1 live rows and 0 tombstone cel
ls [ReadStage-1] | 2018-07-05 06:47:37.556000 | 159.89.167.247 | 1005 | 15
9.65.156.47
Enqueuing response to /159.65.156.
47 [ReadStage-1] | 2018-07-05 06:47:37.556000 | 159.89.167.247 | 1106 | 15
9.65.156.47
Sending REQUEST_RESPONSE message to /159.65.156.47 [MessagingService-Outgoing-/159.
65.156.47-Small] | 2018-07-05 06:47:37.556000 | 159.89.167.247 | 1290 | 15
9.65.156.47
REQUEST_RESPONSE message received from /159.89.167.247 [MessagingService-Incoming-
/159.89.167.247] | 2018-07-05 06:47:37.557000 | 159.65.156.47 | 4691 | 15
9.65.156.47
Processing response from /159.89.167.247 [Request
ResponseStage-3] | 2018-07-05 06:47:37.557000 | 159.65.156.47 | 5028 | 15
9.65.156.47
REQUEST_RESPONSE message received from /159.65.146.132 [MessagingService-Incoming-
/159.65.146.132] | 2018-07-05 06:47:37.560000 | 159.65.156.47 | 23 | 15
9.65.156.47
Processing response from /159.65.146.132 [Request
ResponseStage-3] | 2018-07-05 06:47:37.560000 | 159.65.156.47 | 496 | 15
9.65.156.47
Initiating read-repair [Request
ResponseStage-3] | 2018-07-05 06:47:37.561000 | 159.65.156.47 | 669 | 15
```

9.65.156.47

Request **complete** | 2018-07-05 06:47:37.558208 | 159.65.156.47 | 6208 | 15
9.65.156.47

Change the consistency level to ALL and run the SELECT statement again.

```
CONSISTENCY ALL;  
Consistency level set to ALL.
```

```
SELECT * FROM cycling_alt.testster WHERE id = 0;
```

```
id | col1 | col2  
----+-----+-----  
0 | 0 | 0
```

(1 rows)

Tracing session: 6b693a80-801f-11e8-bbfe-55b594efc7b0

activity	timestamp	source	source_elapsed	cl
-----+-----+-----+-----+-----				
-----+-----+-----+-----+-----				

Execute CQL3 query	2018-07-05 06:48:26.920000	159.65.156.47	0	15
9.65.156.47				
Parsing SELECT * FROM cycling_alt.testster WHERE id = 0; [Native-Transport-Requests-1]	2018-07-05 06:48:26.921000	159.65.156.47	347	15
9.65.156.47				
Preparing statement [Native-Transport-Requests-1]	2018-07-05 06:48:26.921000	159.65.156.47	563	15
9.65.156.47				
READ message received from /159.65.156.47 [MessagingService-Incoming-/159.65.156.47]	2018-07-05 06:48:26.922000	159.65.146.132	45	15
9.65.156.47				
Executing single-partition query on testster [ReadStage-1]	2018-07-05 06:48:26.922000	159.65.146.132	424	15
9.65.156.47				
Acquiring sstable references [ReadStage-1]	2018-07-05 06:48:26.922000	159.65.146.132	534	15
9.65.156.47				
Merging memtable contents [ReadStage-1]	2018-07-05 06:48:26.922000	159.65.146.132	588	15
9.65.156.47				
Read-repair DC_LOCAL [Native-Transport-Requests-1]	2018-07-05 06:48:26.923000	159.65.156.47	2586	15
9.65.156.47				
Read 1 live rows and 0 tombstone cells [ReadStage-1]	2018-07-05 06:48:26.923000	159.65.146.132	927	15


```

9.65.156.47
                                reading digest from /159.65.146.132 [Native-Trans
port-Requests-1] | 2018-07-05 06:48:26.923000 | 159.65.156.47 | 2872 | 15
9.65.156.47
                                Read 1 live rows and 0 tombstone cel
ls [ReadStage-1] | 2018-07-05 06:48:26.923000 | 159.65.146.132 | 999 | 15
9.65.156.47
                                Executing single-partition query on test
er [ReadStage-2] | 2018-07-05 06:48:26.923000 | 159.65.156.47 | 2960 | 15
9.65.156.47
                                Enqueuing response to /159.65.156.
47 [ReadStage-1] | 2018-07-05 06:48:26.923000 | 159.65.146.132 | 1061 | 15
9.65.156.47
                                reading digest from /159.89.167.247 [Native-Trans
port-Requests-1] | 2018-07-05 06:48:26.923000 | 159.65.156.47 | 3051 | 15
9.65.156.47
                                Acquiring sstable referenc
es [ReadStage-2] | 2018-07-05 06:48:26.924000 | 159.65.156.47 | 3129 | 15
9.65.156.47
    Sending REQUEST_RESPONSE message to /159.65.156.47 [MessagingService-Outgoing-/159.
65.156.47-Small] | 2018-07-05 06:48:26.924000 | 159.65.146.132 | 1758 | 15
9.65.156.47
    Sending READ message to /159.65.146.132 [MessagingService-Outgoing-/159.6
5.146.132-Small] | 2018-07-05 06:48:26.924000 | 159.65.156.47 | 3148 | 15
9.65.156.47
                                Merging memtable conten
ts [ReadStage-2] | 2018-07-05 06:48:26.924000 | 159.65.156.47 | 3220 | 15
9.65.156.47
    Sending READ message to /159.89.167.247 [MessagingService-Outgoing-/159.8
9.167.247-Small] | 2018-07-05 06:48:26.924001 | 159.65.156.47 | 3494 | 15
9.65.156.47
                                Read 1 live rows and 0 tombstone cel
ls [ReadStage-2] | 2018-07-05 06:48:26.924001 | 159.65.156.47 | 3596 | 15
9.65.156.47
                                READ message received from /159.65.156.47 [MessagingService-Incoming
-/159.65.156.47] | 2018-07-05 06:48:26.925000 | 159.89.167.247 | 27 | 15
9.65.156.47
                                Executing single-partition query on test
er [ReadStage-1] | 2018-07-05 06:48:26.927000 | 159.89.167.247 | 1793 | 15
9.65.156.47
    REQUEST_RESPONSE message received from /159.65.146.132 [MessagingService-Incoming-
/159.65.146.132] | 2018-07-05 06:48:26.927000 | 159.65.156.47 | 7000 | 15
9.65.156.47
                                Acquiring sstable referenc
es [ReadStage-1] | 2018-07-05 06:48:26.927000 | 159.89.167.247 | 1912 | 15
9.65.156.47
                                Merging memtable conten
ts [ReadStage-1] | 2018-07-05 06:48:26.927000 | 159.89.167.247 | 1982 | 15
9.65.156.47
                                Read 1 live rows and 0 tombstone cel
ls [ReadStage-1] | 2018-07-05 06:48:26.927000 | 159.89.167.247 | 2437 | 15
9.65.156.47
                                Read 1 live rows and 0 tombstone cel
ls [ReadStage-1] | 2018-07-05 06:48:26.927000 | 159.89.167.247 | 2539 | 15

```

9.65.156.47

Enqueuing response to /159.65.156.

47 [ReadStage-1] | 2018-07-05 06:48:26.927000 | 159.89.167.247 | 2643 | 15

9.65.156.47

Sending REQUEST_RESPONSE message to /159.65.156.47 [MessagingService-Outgoing-/159.65.156.47-Small] | 2018-07-05 06:48:26.928000 | 159.89.167.247 | 3106 | 15

9.65.156.47

Processing response from /159.65.146.132 [RequestResponseStage-2] | 2018-07-05 06:48:26.928000 | 159.65.156.47 | 7508 | 15

9.65.156.47

REQUEST_RESPONSE message received from /159.89.167.247 [MessagingService-Incoming-/159.89.167.247] | 2018-07-05 06:48:26.928000 | 159.65.156.47 | 8004 | 15

9.65.156.47

Processing response from /159.89.167.247 [RequestResponseStage-2] | 2018-07-05 06:48:26.929000 | 159.65.156.47 | 8186 | 15

9.65.156.47

Request complete | 2018-07-05 06:48:26.929430 | 159.65.156.47 | 9430 | 15

9.65.156.47

Summary

CL	time
ONE	2363
QUORUM	6208
ALL	9430