Cassandra

Day 2

Day 2 - Overview

- CREATE, ALTER and DELETE Keyspace
- Creating Table
- Defining Columns and Data Types
- Primary Key
- Partition Key
- Clustering Key
- INSERT
- SELECT
- UPDATE
- DELETE

Keyspace in Cassandra

A keyspace is a data container in Cassandra, similar to a database in relational database management systems (RDMBS). A cluster has one keyspace per application, as many as needed, depending on requirements and system usage. Keyspaces are entirely separate entities, and the data they contain is unrelated to each other.

In a Cassandra cluster, a keyspace is an outermost object that determines how data replicates on nodes. Keyspaces consist of core objects called column families (which are like tables in RDBMS), rows indexed by keys, data types, data center awareness, replication factor, and keyspace strategy.
Replication Strategy

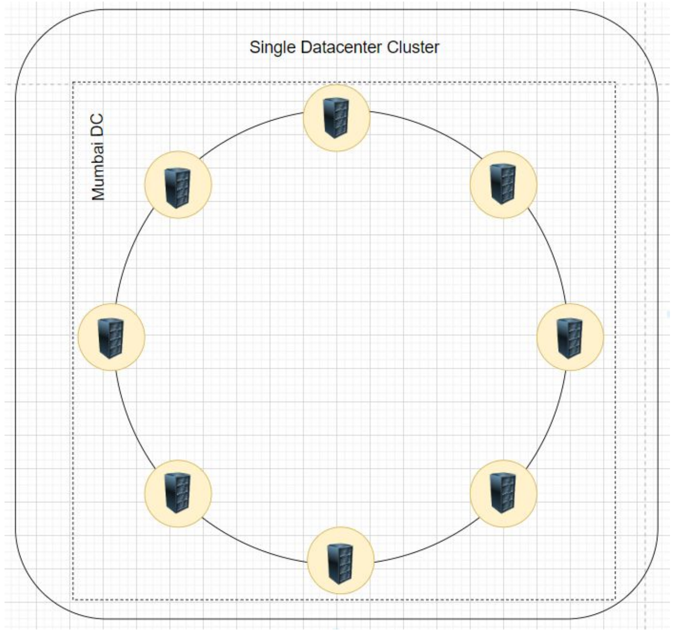
When defining a keyspace, the replication strategy specifies the nodes where replicas will be placed. By using multiple nodes to place replicas, you achieve fault tolerance, high availability, and reliability.

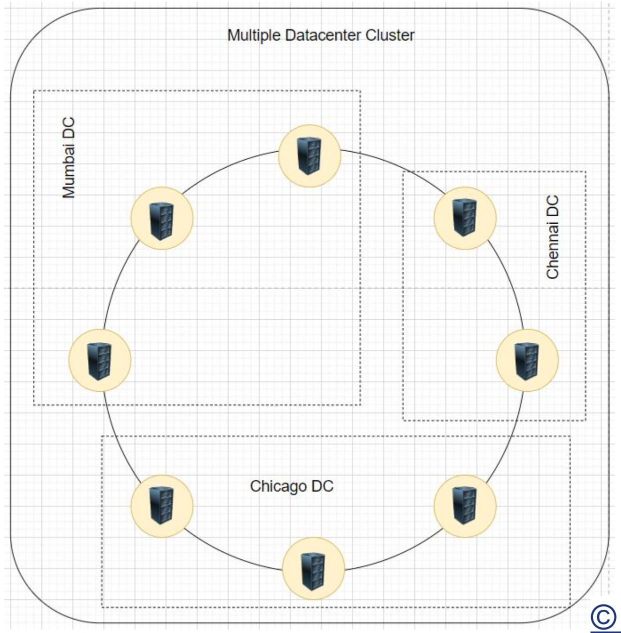
There are two possible strategies:

Simple Strategy. Use this strategy for test and development environments, and if you do not intend to deploy a cluster to more than one data center. The replication factor applies to the whole cluster. The partitioner decides where to put the first replica on a node. Then, other replicas are distributed clockwise on the next nodes irrespective of data center or location.

Network Topology Strategy. This strategy is suitable when you need to deploy your cluster to multiple data centers. However, you can use it even with a single data center so you can expand later. Network Topology Strategy works for both production and development. It tends to place replicas on nodes that are not in the same rack to avoid issues when one rack goes down. Each data center can have a separate replication factor by using this option.

Cassandra Cluster





Creating Keyspace

Simple

```
CREATE KEYSPACE simple_keyspace

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

Network Topology

```
CREATE KEYSPACE network_topology_keyspace

WITH replication = {'class':'NetworkTopologyStrategy', 'datacenter1' : 3};
```

Validate Existing Keyspace

Fetch All Keyspaces

```
select *
from system_schema.keyspaces;
```

Fetch a single Keyspace

```
select *
from system_schema.keyspaces
where keyspace_name = 'simple_keyspace';
```

Alter Keyspace

The only thing you cannot change is the keyspace name. Other than that you can alter the replication strategy, replication factor, and durable writes.

ALTER KEYSPACE simple_keyspace

WITH replication = {'class':'SimpleStrategy', 'replication_factor' : 1};

Deleting Keyspace

Deleting Keyspace without exists check

```
DROP KEYSPACE simple_keyspace_2;
```

Optional Drop, if exists

```
DROP KEYSPACE if exists simple_keyspace_2;
```

Data Types

Type	Constants supported	Description
ascii	string	ASCII character string and uses 1 byte per character
bigint	integer	64-bit signed long : range -9 quintillion to 9 quintillion
blob	blob	Arbitrary bytes (no validation)
boolean	boolean	Either true or false
counter	integer	Counter column (64-bit signed value). Can only be incremented or decremented
date	integer, string	A date (with no corresponding time value). Example yyyy-mm-dd
decimal	integer, float	Variable-precision decimal
double	integer float	64-bit IEEE-754 floating point
duration	duration,	A duration with nanosecond precision. Time elapsed or time since use case - 89h4m48s
float	integer, float	32-bit IEEE-754 floating point
inet	string	An IP address, either IPv4 (4 bytes long) or IPv6 (16 bytes long). Note that there is no inet constant, IP address should be input as strings.

Data Types - Continued

Type	Constants supported	Description
int	integer	32-bit signed int - ranging from approximately -2.1 billion to 2.1 billion
smallint	integer	16-bit signed int - ranging from -32,768 to 32,767
text	string	String - Alias for varchar
time	integer, string	A time (with no corresponding date value) with nanosecond precision. 08:12:54.123456789
timestamp	integer, string	A timestamp (date and time) with millisecond precision. 2011-02-03 04:05+0000
tinyint	integer	8-bit signed int - ranging from -128 to 127
uuid	uuid	A UUID (of any version)
varchar	string	string
varint	integer	Arbitrary-precision integer - it has no minimum or maximum value

https://medium.com/@apiltamang/unicode-utf-8-and-ascii-encodings-made-easy-5bfbe3a1c45a
https://cassandra.apache.org/doc/latest/cassandra/cql/types.html

Collections

Cassandra supports three kinds of collections: maps, sets and lists. The types of those collections is defined by:

```
collection_type::= MAP '<' cql_type',' cql_type'>'

          | SET '<' cql_type '>'

          | LIST '<' cql_type'>'
```

Partition Key and Clustering Key

```
USE simple_keyspace;

CREATE TABLE simple_keyspace.user (
        email           text,
        first_name          text,
        last_name          text,
        age          smallint,
        birth_city          text,
        birth_state          text,
        hobbies      list<text>,
        created_datetime       timestamp,
        PRIMARY KEY ((birth_state , birth_city), email)
);
```

List Table

```
SELECT table_name

FROM system_schema.tables

WHERE keyspace_name = 'simple_keyspace';
```

Alter Table

Alter Table to add a column

```
ALTER TABLE user
ADD middle_name text;
```

Alter Table to drop a column

```
ALTER TABLE user
DROP middle_name;
```

Drop Table

```
CREATE TABLE simple_table (
	email		text PRIMARY KEY
);

DROP table simple_table;
```

List All Columns for a Table and Keyspace

```
SELECT *

FROM system_schema.columns

WHERE keyspace_name = 'simple_keyspace'

        AND table_name = 'user';
```

Insert record into table

```
INSERT INTO user (email, first_name, last_name, age, birth_city, birth_state, hobbies,
created_datetime)
   VALUES ('saurav@gmail.com', 'Saurav', 'Samantray', 33, 'Bhubaneswar', 'Odisha', ['reading',
'cycling'], toUnixTimestamp(now())
);

INSERT INTO user (email, first_name, last_name, age, birth_city, birth_state, hobbies,
created_datetime)
   VALUES ('max@gmail.com', 'Max', 'Jone', 38, 'Mumbai', 'Maharastra', ['reading', 'cycling'],
toUnixTimestamp(now())
);
```

Fetch Records from table

```
SELECT * from user;

SELECT * from user where email='saurav@gmail.com' AND birth_city='Bhubaneswar' AND birth_state='Odisha';

SELECT * from user where email='saurav@gmail.com';

SELECT * from user where email='saurav@gmail.com' ALLOW FILTERING;
```

Update Record

Without Partitioning key- Error

```
UPDATE user SET hobbies = ['Reading','Cycling','Programming'] WHERE email = 'saurav@gmail.com';
```

With partitioning key

```
UPDATE user SET first_name='Saurav2' WHERE birth_state='Odisha' AND birth_city='Bhubaneswar' AND email='saurav@gmail.com';

UPDATE user SET hobbies = ['Reading','Cycling','Programming'] WHERE birth_state='Odisha' AND birth_city='Bhubaneswar' AND email='saurav@gmail.com';

DELETE hobbies[0] FROM user WHERE birth_state='Odisha' AND birth_city='Bhubaneswar' AND email='saurav@gmail.com';
```

Deleting Record

```
DELETE FROM user where birth_state='Odisha' AND birth_city='Bhubaneswar' AND
email='saurav@gmail.com';
```

Task

- Create a new keyspace with Simple Strategy and replication factor as 1
- Create one tables in the keyspace - employee
- Columns
    - email - String - clustering
    - name - String
    - department - String - partition
    - experience - double
    - active - Boolean
    - skills - Set
- Insert 5 records
- Update a record with new skills
- Delete one particular skill from a record
- Update the experience of a record

Q and A