TED Replication by Galera
Experimental test in lab
Report #6

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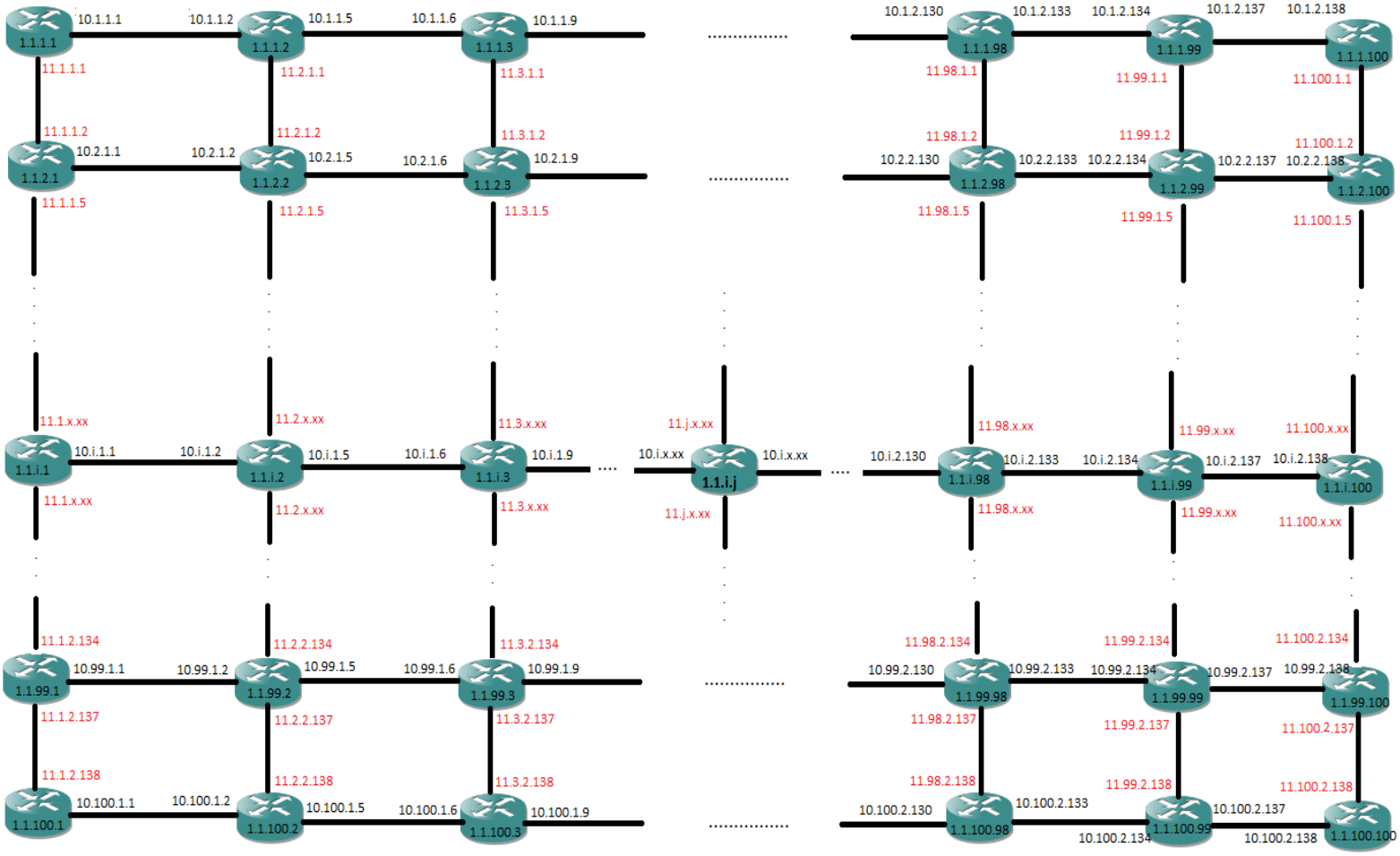
Testbed Configuration

CentOS Linux release 7.3.1611 (Core) 3.10.0-514.6.1.el7.x86_64
Server version: 10.0.29-MariaDB-wsrep MariaDB Server, wsrep_25.16.rc3fc46e

Each VM has 2 cores 2GB of RAM 8GB disk

- SYNC_BINLOG=0
- Innidb_flush_log_at_trx_commit =2

Topology Configuration



As you can see in IP Addresses:

Router ID: 1.1.i.j where:
i shows position of router in Row
j shows position of router in Column

Horizontal Links: 10.i.x.xx where
10 shows this is a horizontal link
i shows position on link in Row

Vertical Links: 11.j.x.xx
10 shows this is a vertical link
j shows position of link in Column

IP Address range for horizontal links:

Row 1: 10.1.1.1 – 10.1.1.254 and 10.1.2.1 – 10.1.2.138
Row 2: 10.2.1.1 – 10.2.1.254 and 10.2.2.1 – 10.2.2.138
…
Row 100: 10.100.1.1 – 10.100.1.254 and 10.100.2.1 – 10.100.2.138

IP Address range for vertical links:

Column 1: 11.1.1.1 – 11.1.1.254 and 11.1.2.1 – 11.1.2.138
Column 2: 11.2.1.1 – 11.2.1.254 and 11.2.2.1 – 11.2.2.138
…
Column 100: 11.100.1.1 – 11.100.1.254 and 11.100.2.1 – 11.100.2.138

IP Addresses distributed for links in such way we preserve Network and Broadcast addresses; so some of addresses dropped for them.

10.1.1.1 10.1.1.2 10.1.1.3 10.1.1.4 10.1.1.5 10.1.1.6 10.1.1.7 10.1.1.8 …

Table Configuration

Field	Type	Null	Key	Default	Extra
RouterID	varchar(15)	NO		NULL	
Linktype	tinyint(1) unsigned	NO		NULL	
LinkID	varchar(15)	NO		NULL	
LocalIFAdr	varchar(15)	NO	PRI	NULL	
RemIFAdr	varchar(15)	NO		NULL	
TEmetric	int(4) unsigned	NO		NULL	
MaxBW	varchar(10)	NO		NULL	
MaxRsvBW	varchar(10)	NO		NULL	
UnRsvBW_P_0	varchar(10)	NO		NULL	
UnRsvBW_P_1	varchar(10)	NO		NULL	
UnRsvBW_P_2	varchar(10)	NO		NULL	
UnRsvBW_P_3	varchar(10)	NO		NULL	
UnRsvBW_P_4	varchar(10)	NO		NULL	
UnRsvBW_P_5	varchar(10)	NO		NULL	
UnRsvBW_P_6	varchar(10)	NO		NULL	
UnRsvBW_P_7	varchar(10)	NO		NULL	
AdminGrp	int(4) unsigned	NO		NULL	

As you can see, I did my best to simulate Traffic Engineering Database exactly same as IETF reference model described here: https://tools.ietf.org/html/rfc3630 .

PRIMARY KEY for TED table in Domain_1 Database is LocalIFAdr which is Local interface IP Address.

And also I used Administrative Group (AdminGrp) to indicate that, this link is in which Row and Link Type (Linktype) to indicate that, this link is in which column.

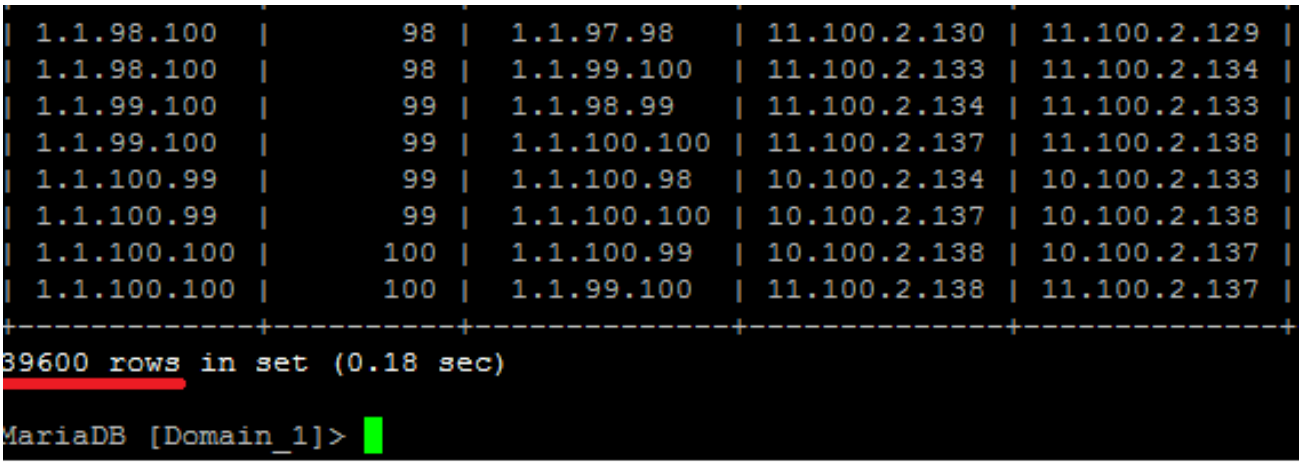
Table after inserting topology data

RouterID	Linktype	LinkID	LocalIFAdr	RemIFAdr	TEmetric	MaxBW	MaxRsvBW	UnRsvBW_P_0	UnRsvBW_P_1	UnRsvBW_P_2	UnRsvBW_P_3	UnRsvBW_P_4	UnRsvBW_P_5	UnRsvBW_P_6	UnRsvBW_P_7	AdminGrp
1.1.1.1	1	1.1.1.2	10.1.1.1	10.1.1.2	2	100 Mbps	100 Mbps	100Mbps	100Mbps	100Mbps	100Mbps	100Mbps	100Mbps	100Mbps	100Mbps	1
1.1.1.1	1	1.1.2.1	11.1.1.1	11.1.1.2	2	100 Mbps	100 Mbps	100Mbps	100Mbps	100Mbps	100Mbps	100Mbps	100Mbps	100Mbps	100Mbps	1
1.1.1.2	2	1.1.1.1	10.1.1.2	10.1.1.1	2	100 Mbps	100 Mbps	100Mbps	100Mbps	100Mbps	100Mbps	100Mbps	100Mbps	100Mbps	100Mbps	1
1.1.2.1	2	1.1.3.1	11.1.1.5	11.1.1.6	2	100 Mbps	100 Mbps	100Mbps	100Mbps	100Mbps	100Mbps	100Mbps	100Mbps	100Mbps	100Mbps	1
1.1.1.2	2	1.1.1.3	10.1.1.5	10.1.1.6	2	100 Mbps	100 Mbps	100Mbps	100Mbps	100Mbps	100Mbps	100Mbps	100Mbps	100Mbps	100Mbps	1
1.1.2.1	2	1.1.1.2	11.1.1.2	11.1.1.1	2	100 Mbps	100 Mbps	100Mbps	100Mbps	100Mbps	100Mbps	100Mbps	100Mbps	100Mbps	100Mbps	1
1.1.3.1	3	1.1.2.3	11.1.1.6	11.1.1.5	2	100 Mbps	100 Mbps	100Mbps	100Mbps	100Mbps	100Mbps	100Mbps	100Mbps	100Mbps	100Mbps	1
1.1.3.1	3	1.1.4.1	11.1.1.9	11.1.1.10	2	100 Mbps	100 Mbps	100Mbps	100Mbps	100Mbps	100Mbps	100Mbps	100Mbps	100Mbps	100Mbps	1
1.1.1.3	3	1.1.1.4	10.1.1.9	10.1.1.10	2	100 Mbps	100 Mbps	100Mbps	100Mbps	100Mbps	100Mbps	100Mbps	100Mbps	100Mbps	100Mbps	1
1.1.1.3	3	1.1.1.2	10.1.1.6	10.1.1.5	2	100 Mbps	100 Mbps	100Mbps	100Mbps	100Mbps	100Mbps	100Mbps	100Mbps	100Mbps	100Mbps	1
1.1.4.1	4	1.1.5.1	11.1.1.13	11.1.1.14	2	100 Mbps	100 Mbps	100Mbps	100Mbps	100Mbps	100Mbps	100Mbps	100Mbps	100Mbps	100Mbps	1
1.1.1.4	4	1.1.1.5	10.1.1.13	10.1.1.14	2	100 Mbps	100 Mbps	100Mbps	100Mbps	100Mbps	100Mbps	100Mbps	100Mbps	100Mbps	100Mbps	1
1.1.4.1	4	1.1.3.4	11.1.1.10	11.1.1.9	2	100 Mbps	100 Mbps	100Mbps	100Mbps	100Mbps	100Mbps	100Mbps	100Mbps	100Mbps	100Mbps	1
1.1.1.4	4	1.1.1.3	10.1.1.10	10.1.1.9	2	100 Mbps	100 Mbps	100Mbps	100Mbps	100Mbps	100Mbps	100Mbps	100Mbps	100Mbps	100Mbps	1
1.1.1.5	5	1.1.1.6	10.1.1.17	10.1.1.18	2	100 Mbps	100 Mbps	100Mbps	100Mbps	100Mbps	100Mbps	100Mbps	100Mbps	100Mbps	100Mbps	1
1.1.5.1	5	1.1.4.5	11.1.1.14	11.1.1.13	2	100 Mbps	100 Mbps	100Mbps	100Mbps	100Mbps	100Mbps	100Mbps	100Mbps	100Mbps	100Mbps	1
1.1.5.1	5	1.1.6.1	11.1.1.17	11.1.1.18	2	100 Mbps	100 Mbps	100Mbps	100Mbps	100Mbps	100Mbps	100Mbps	100Mbps	100Mbps	100Mbps	1
1.1.1.5	5	1.1.1.4	10.1.1.14	10.1.1.13	2	100 Mbps	100 Mbps	100Mbps	100Mbps	100Mbps	100Mbps	100Mbps	100Mbps	100Mbps	100Mbps	1
1.1.1.6	6	1.1.1.7	10.1.1.21	10.1.1.22	2	100 Mbps	100 Mbps	100Mbps	100Mbps	100Mbps	100Mbps	100Mbps	100Mbps	100Mbps	100Mbps	1
1.1.6.1	6	1.1.5.6	11.1.1.18	11.1.1.17	2	100 Mbps	100 Mbps	100Mbps	100Mbps	100Mbps	100Mbps	100Mbps	100Mbps	100Mbps	100Mbps	1
1.1.6.1	6	1.1.7.1	11.1.1.21	11.1.1.22	2	100 Mbps	100 Mbps	100Mbps	100Mbps	100Mbps	100Mbps	100Mbps	100Mbps	100Mbps	100Mbps	1
1.1.1.6	6	1.1.1.5	10.1.1.18	10.1.1.17	2	100 Mbps	100 Mbps	100Mbps	100Mbps	100Mbps	100Mbps	100Mbps	100Mbps	100Mbps	100Mbps	1

Closer look to important parts:

RouterID	Linktype	LinkID	LocalIFAdr	RemIFAdr
1.1.1.1	1	1.1.1.2	10.1.1.1	10.1.1.2
1.1.1.1	1	1.1.2.1	11.1.1.1	11.1.1.2
1.1.1.2	2	1.1.1.1	10.1.1.2	10.1.1.1
1.1.2.1	2	1.1.3.1	11.1.1.5	11.1.1.6
1.1.1.2	2	1.1.1.3	10.1.1.5	10.1.1.6
1.1.2.1	2	1.1.1.2	11.1.1.2	11.1.1.1
1.1.3.1	3	1.1.2.3	11.1.1.6	11.1.1.5
1.1.3.1	3	1.1.4.1	11.1.1.9	11.1.1.10
1.1.1.3	3	1.1.1.4	10.1.1.9	10.1.1.10
1.1.1.3	3	1.1.1.2	10.1.1.6	10.1.1.5
1.1.4.1	4	1.1.5.1	11.1.1.13	11.1.1.14
1.1.1.4	4	1.1.1.5	10.1.1.13	10.1.1.14
1.1.4.1	4	1.1.3.4	11.1.1.10	11.1.1.9
1.1.1.4	4	1.1.1.3	10.1.1.10	10.1.1.9
1.1.1.5	5	1.1.1.6	10.1.1.17	10.1.1.18
1.1.5.1	5	1.1.4.5	11.1.1.14	11.1.1.13
1.1.5.1	5	1.1.6.1	11.1.1.17	11.1.1.18
1.1.1.5	5	1.1.1.4	10.1.1.14	10.1.1.13
1.1.1.6	6	1.1.1.7	10.1.1.21	10.1.1.22
1.1.6.1	6	1.1.5.6	11.1.1.18	11.1.1.17
1.1.6.1	6	1.1.7.1	11.1.1.21	11.1.1.22
1.1.1.6	6	1.1.1.5	10.1.1.18	10.1.1.17

After inserting all of topology data we have:



```
| 1.1.98.100  |       98 |  1.1.97.98   | 11.100.2.130 | 11.100.2.129 |
| 1.1.98.100  |       98 |  1.1.99.100  | 11.100.2.133 | 11.100.2.134 |
| 1.1.99.100  |       99 |  1.1.98.99   | 11.100.2.134 | 11.100.2.133 |
| 1.1.99.100  |       99 |  1.1.100.100 | 11.100.2.137 | 11.100.2.138 |
| 1.1.100.99  |       99 |  1.1.100.98  | 10.100.2.134 | 10.100.2.133 |
| 1.1.100.99  |       99 |  1.1.100.100 | 10.100.2.137 | 10.100.2.138 |
| 1.1.100.100 |      100 |  1.1.100.99  | 10.100.2.138 | 10.100.2.137 |
| 1.1.100.100 |      100 |  1.1.99.100  | 11.100.2.138 | 11.100.2.137 |
+-------------+----------+--------------+--------------+--------------+
39600 rows in set (0.18 sec)

MariaDB [Domain_1]>
```

In each Row we have 100 Router and 99 Bidirectional Links between them: 99

Each Link has 2 primary key LocalIFAdr in TED, so: 99 * 2 =198

We have 100 Row, so: 198*100 = 19800

Also, we have the same amount of Links and LoalIFAdr in Columns

So: 19800 * 2 = 39600

Data Base and Table Size with topology data (39600 Row)

```
MariaDB [Domain_1]> SELECT TABLE_SCHEMA, TABLE_NAME,(INDEX_LENGTH+DATA_LENGTH)/(1024*
+--------------------+-----------------------------------------------------+----------+
| TABLE_SCHEMA       | TABLE_NAME                                          | SIZE_MB  |
+--------------------+-----------------------------------------------------+----------+
| Domain_1           | TED                                                 |   9.5156 |
| performance_schema | events_statements_summary_by_account_by_event_name  |   0.0000 |
| performance_schema | events_waits_summary_global_by_event_name           |   0.0000 |
| performance_schema | setup_instruments                                   |   0.0000 |
| performance_schema | events_statements_history_long                      |   0.0000 |
| performance_schema | events_waits_summary_by_user_by_event_name          |   0.0000 |
| performance_schema | setup_consumers                                     |   0.0000 |
| performance_schema | events_waits_summary_by_thread_by_event_name        |   0.0000 |
| performance_schema | setup_actors                                        |   0.0000 |
| performance_schema | events_statements_history                           |   0.0000 |
+--------------------+-----------------------------------------------------+----------+
10 rows in set (0.01 sec)

MariaDB [Domain_1]> SELECT table_schema mysql, sum( data_length + index_length ) / 1(
+--------------------+----------------------+
| mysql              | Data Base Size in MB |
+--------------------+----------------------+
| Domain_1           |           9.51562500 |
| information_schema |           0.07812500 |
| mysql              |           0.65300179 |
| performance_schema |           0.00000000 |
+--------------------+----------------------+
4 rows in set (0.03 sec)

MariaDB [Domain_1]>
```

As you can see the size of Database is about 9.5 MB