Etcd migration from v2 to v3 data

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RedHat
2 Etcd migration
Etcd version 3

- etcd currently provides v2 and v3 versions of data store
- v3 data store has improved performance
- bigger v3 snapshots
- support for transactions, continuous event delivery, multi-versioned key-value storage, etc.
- etcd v3 data store default in OCP 3.6 installations
Prerequisites

- offline migration, etcd members and master stopped
- entire cluster is not operational during the process
- etcd cluster must be healthy
- all etcd members must converge (raft indices must differ by one unit at most)

```bash
# etcdctl <certificate details> <endpoint> cluster-health
member 2a3d833935d9d076 is healthy: got healthy result from https://etcd-test-1:2379
member a83a3258059fee18 is healthy: got healthy result from https://etcd-test-2:2379
member 22a9f2ddf18fee5f is healthy: got healthy result from https://etcd-test-3:2379
cluster is healthy
```

**Figure: Cluster health**

```bash
# ETCDCTL_API=3 etcdctl <certificate details> <endpoint> -w table endpoint status
+-----------------+----------+-----------+-----------+-----------+-----------+-----------+-----------+-----------+
| ENDPOINT        | ID       | VERSION   | DB SIZE   | IS_LEADER | RAFT_TERM | RAFT_INDEX |
+-----------------+----------+-----------+-----------+-----------+-----------+-----------+
| etcd-test-1:2379| 2a3d833935d9d076 | 3.1.9     | 25 kB    | false     | 415       | 995       |
| etcd-test-2:2379| a83a3258059fee18 | 3.1.9     | 25 kB    | true      | 415       | 995       |
| etcd-test-3:2379| 22a9f2ddf18fee5f | 3.1.9     | 25 kB    | false     | 415       | 995       |
+-----------------+----------+-----------+-----------+-----------+-----------+-----------+
```

**Figure: Raft indices**
**ETCDCTL_API=3** etcdctl migrate --data-dir=/var/lib/etcd

- the **--data-dir** can vary based on the deployment:
  - /var/lib/origin/openshift.local.etcd for embedded etcd
  - /var/lib/etcd/etcd.etcd for etcd system container

- when the TTL keys are migrated as well, one needs to run `oadm migrate etcd-ttl` to create lease for them

- validation of the migrated data is highly recommended

```bash
[root@jchaloup-openshift-master-42jz88-r1 ~]# ETCDCTL_API=3 etcdctl migrate --data-dir=/var/lib/etcd
using default transformer
2017-06-26 06:26:19.709455 I | etcdserver/api: enabled capabilities for version 3.1
2017-06-26 06:26:19.709726 I | etcdserver/membership: set the cluster version to 3.1 from store
finished transforming keys
```

**Figure:** Cluster health
1. The masters need to be re-configured to use the etcd3 storage backend

2. Start master daemons

```yaml
kubernetesMasterConfig:
  apiServerArguments:
    storage-backend:
      - etcd3
      - application/vnd.kubernetes.protobuf
```

**Figure:** master-config.yml
Supported deployments

- rpm based deployment
- container based deployment
- plan to support AH deployment
- embedded etcd not currently support due to etcd version constraints (need to update etcd rpm to 3.2.0)
Migration steps

1. Run pre-migration checks (etcd cluster is healthy, raft indices are converged, no v3 data available)
2. Backup etcd v2 data
3. Stop master daemons and etcd members
4. Migrate v2 data to v3
5. Start etcd members
6. Attach leases (and validate migrated data)
7. Re-configure masters to use the etcd3 storage backend
8. Start master daemons

- highly recommended to perform all the steps automatically
- at https://github.com/openshift/openshift-ansible
- by running playbooks/byo/openshift-etcd/migrate.yml

[PLAY] Run pre-checks
[PLAY] Backup v2 data
[PLAY] Prepare masters for etcd data migration
[PLAY] Migrate etcd data from v2 to v3
[PLAY] Configure masters if etcd data migration is successful
[PLAY] Start masters after etcd data migration
Thank you for your attention!