HBase Disaster Recovery Solution at Huawei

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About.html

- Senior Technical Leader at Huawei
- Around 6 years of experience in Big Data related projects
- Apache HBase Committer

Agenda

- **Why Disaster Recovery ?**
- Backup Vs Disaster Recovery
- HBase Disaster Recovery
- Solution
- Miscellaneous
- Future Work

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Why Disaster Recovery ?

- Natural Disaster
- Cyber Attack
- System Failures
- Cost of Downtime
- Brand Reputation
- Customer Retention
- Human Errors
- Always Available
- Compliance

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Backup Vs Disaster Recovery

Two different problems and solutions

	Backup	**Disaster Recovery**
Process	Archive items to cold media	Replicate to secondary site
Infrastructure	Medium level	Duplicate of active cluster (high level)
Cost	Affordable	Expensive
Restore process	One to few at a time	One to everything
Restore time	Slow	Fast
Production usage	Common	Rare

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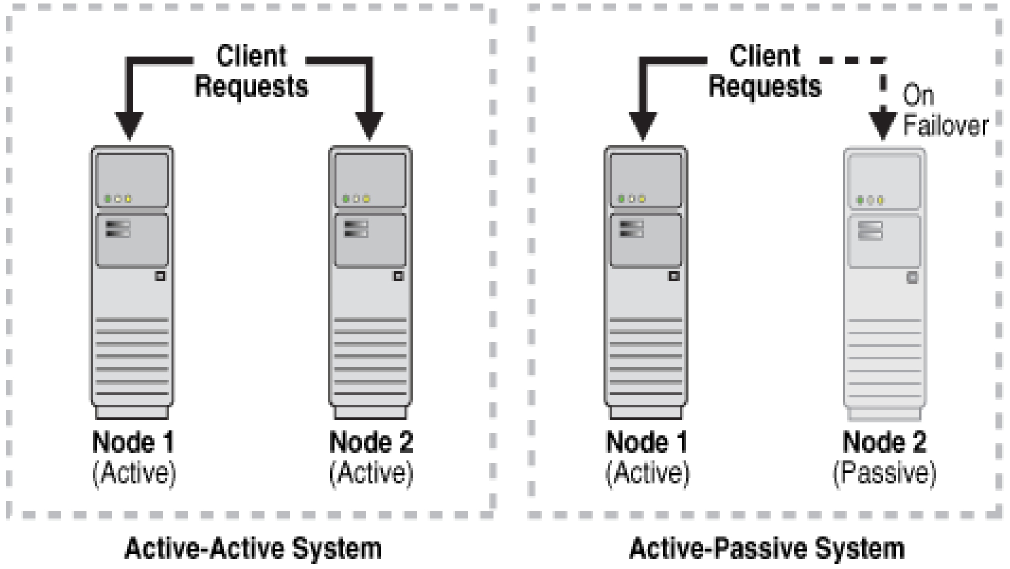
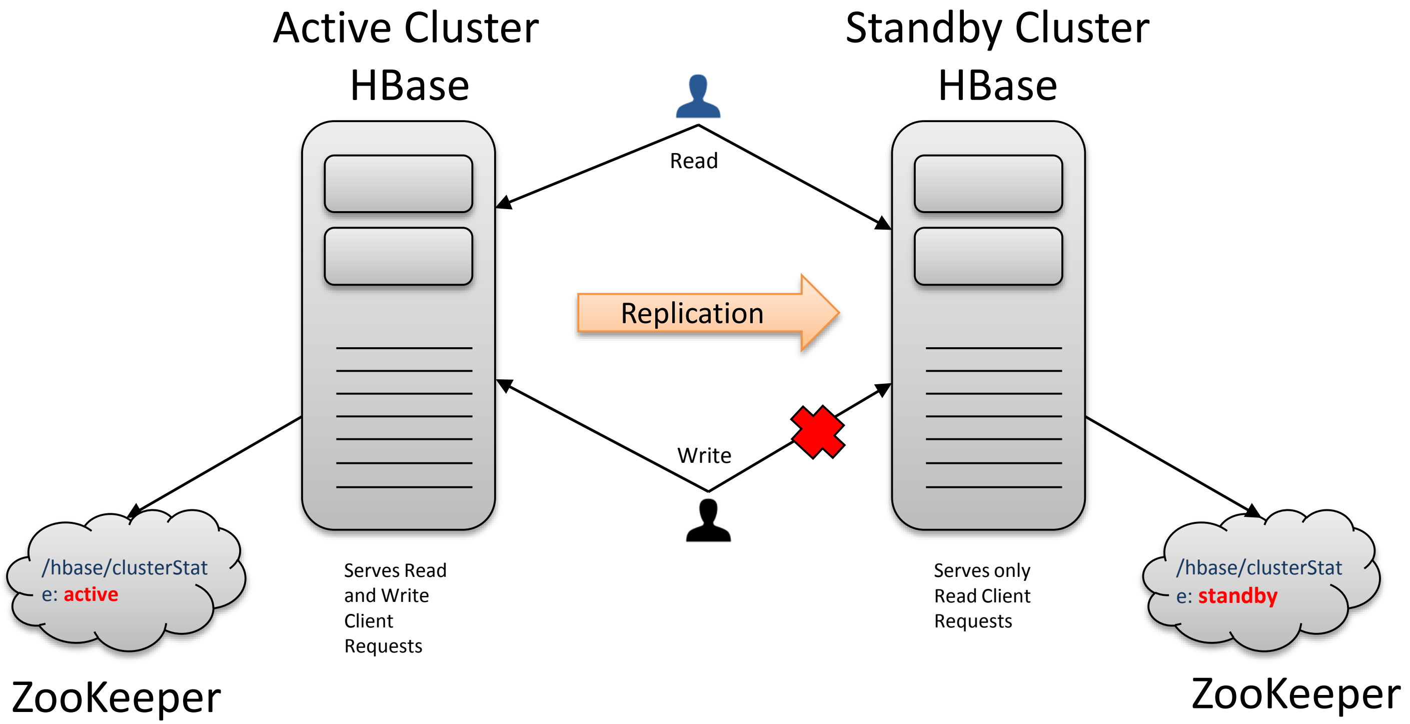
HBase Disaster Recovery

- HBase Disaster recovery is based on replication, which mirrors data across a network in real time.
- The technology is used to move data from a local source location to one or more target locations.
- Replication over WAN has become an ideal technology for disaster recovery to prevent data loss in the event of failure.

Deployment Strategies



Active – Standby Cluster


Active Cluster
HBase
Standby Cluster
HBase
Read
Replication
Write
/hbase/clusterState: active
Serves Read and Write Client Requests
Serves only Read Client Requests
/hbase/clusterState: standby
ZooKeeper
ZooKeeper

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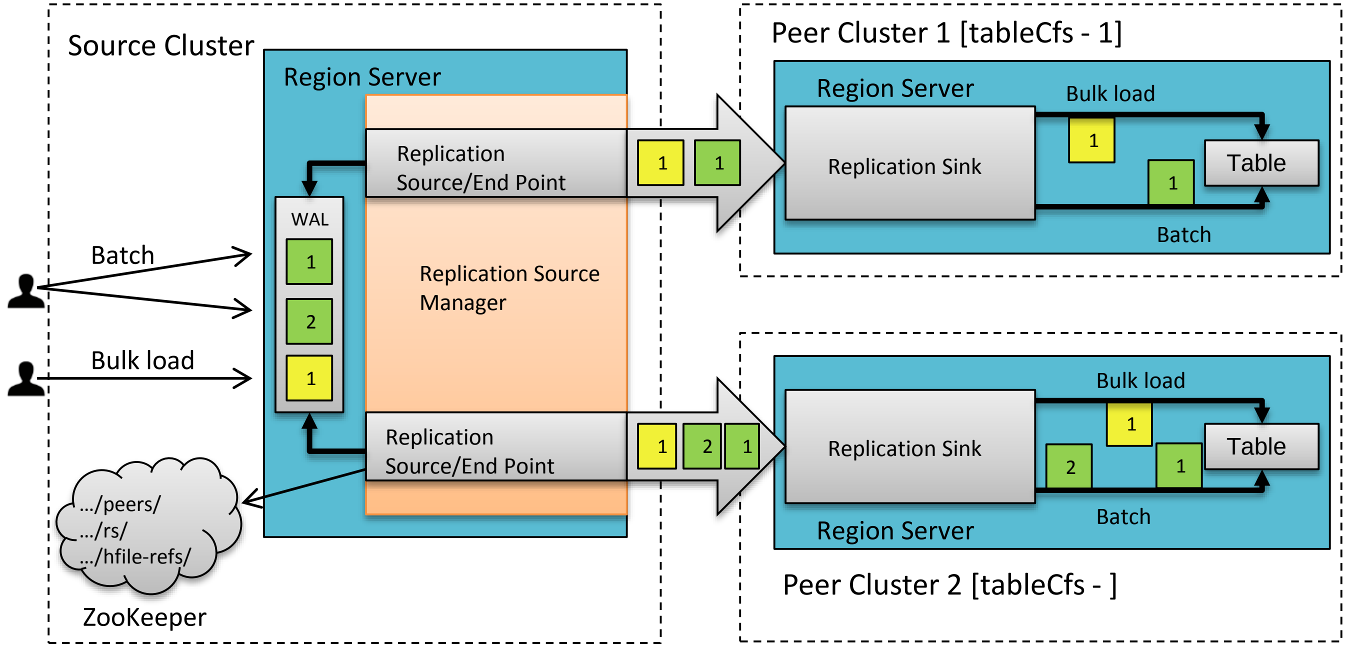
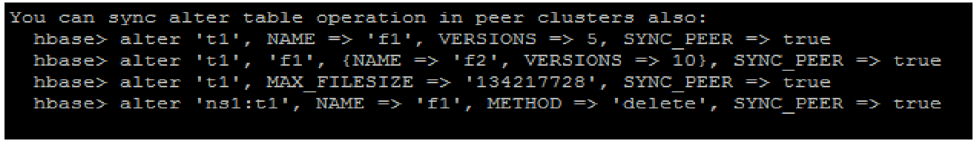
Replication



Sync DDL Operations

- Synchronize the table properties across clusters
  - Any change in the source cluster, reflects immediately in the peer clusters.
  - Does not break the replication.
- An additional option with DDL command to sync
  - Internally sync those changes to peer clusters.



```
You can sync alter table operation in peer clusters also:
  hbase> alter 't1', NAME => 'f1', VERSIONS => 5, SYNC_PEER => true
  hbase> alter 't1', 'f1', {NAME => 'f2', VERSIONS => 10}, SYNC_PEER => true
  hbase> alter 't1', MAX_FILESIZE => '134217728', SYNC_PEER => true
  hbase> alter 'ns1:t1', NAME => 'f1', METHOD => 'delete', SYNC_PEER => true
```

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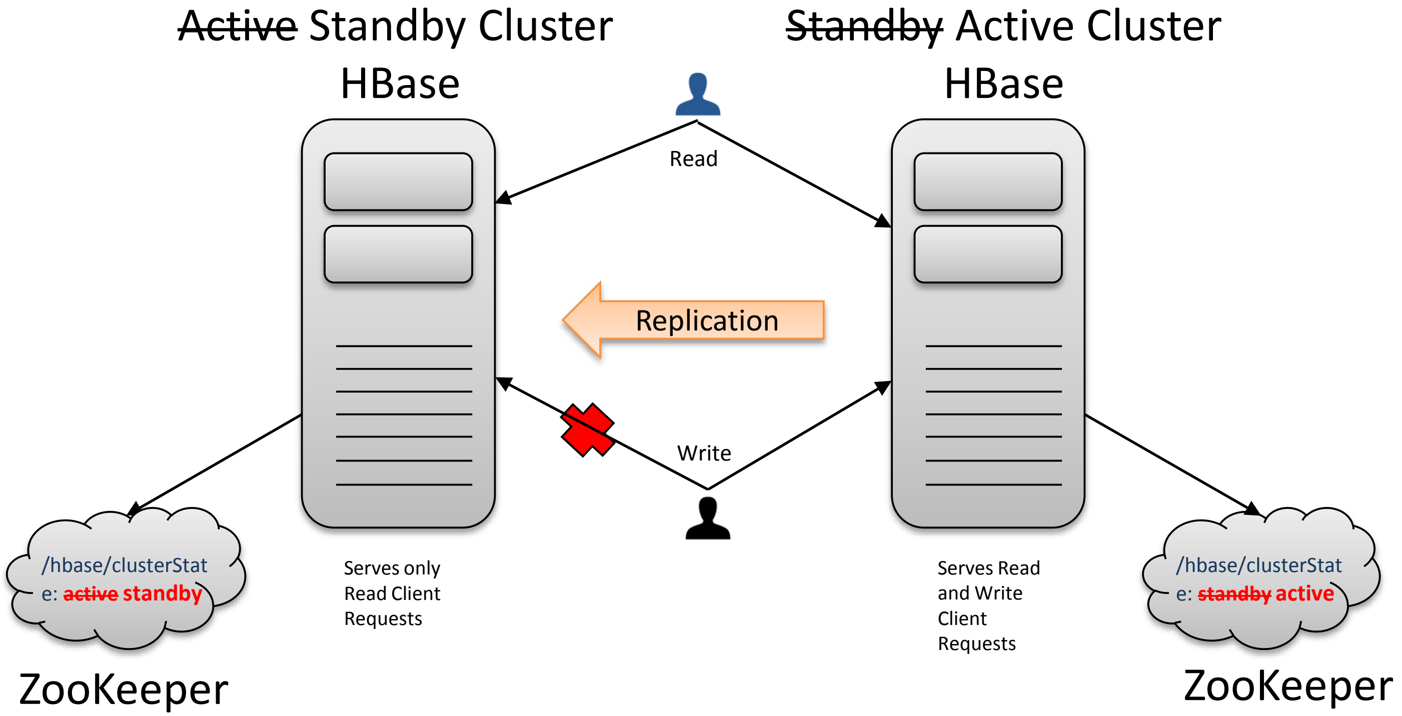
Sync Security related Data

- Synchronize security related HBase data across the clusters
  - Any update in the source cluster ACL, Quota or Visibility Labels table, reflects immediately in peer clusters.
  - A custom WAL entry filter is added in replication for this.
  - Does not break the security for HBase data access.

Read Only Cluster

- Enable a cluster to serve only read requests
  - A coprocessor based solution
  - Standby cluster will serve all the read requests
  - Standby cluster will serve write requests only if the requests is coming from a,
    - Super user
    - From a list of accepted IPs

Cluster Recovery


~~Active~~ Standby Cluster
HBase
~~Standby~~ Active Cluster
HBase
Read
Replication
Write
/hbase/clusterState: ~~active~~ standby
/hbase/clusterState: ~~standby~~ active
Serves only Read Client Requests
Serves Read and Write Client Requests
ZooKeeper
ZooKeeper

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Miscellaneous

- Increased the default *replication.source.ratio* to 0.5
- Adaptive *hbase.replication.rpc.timeout*
- Active cluster HDFS server configurations are maintained in Standby cluster ZooKeeper for bulk loaded data replication.

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Future work

- Move HBase Replication tracking from ZooKeeper to HBase table (HBASE-15867)
- Copy bulk loaded data to peer with data locality
- Replication data network bandwidth throttling.

Thank You !

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