

# UCS Hyperflex Zookeeper服務說明和驗證

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## 簡介

本文檔介紹ZooKeeper，它實質上是一種將分散式系統集中到分層金鑰值儲存的服務。它用於為大型分散式系統提供分散式配置服務、同步服務和命名登錄檔。ZooKeeper的架構通過冗餘服務支援高可用性。客戶可以詢問另一個ZooKeeper的領導是否第一個沒有回答。ZooKeeper節點將其資料儲存在分層名稱空間中，非常類似於檔案系統或樹資料結構。客戶端可以讀取節點和寫入節點，從而具有共用配置服務。ZooKeeper可以視為一個原子廣播系統，通過它可完全訂購更新。

ZooKeeper具有以下主要功能：

- 可靠系統 — 系統非常可靠，因為即使在節點發生故障時系統仍能正常工作。
- 簡單的架構 — ZooKeeper的架構非常簡單；它使用共用的分層名稱空間，這有助於流程協調。
- 快速處理 — ZooKeeper尤其適用於讀取占主導地位的工作負載。
- 可擴展 — 可以通過新增節點來提高ZooKeeper的效能。

在HX中，有以下具體實施：

- 名為exhibitor的服務管理zookeeper啟動/關閉。
- HX群集中的進程是到Zookeeper的客戶端，並通過tcp埠2181 ex storfs、stmgr等進行通訊。
- 具有五個以上節點的系統將有一些節點處於獨立狀態。具有五個或更少節點的系統絕不應具有獨立節點。
- 仲裁所需的最小節點數 =  $N/2 + 1$ 。

例如，對於三節點群集 —  $N/2=1.5$ 四捨五入為  $1 + 1 = 2$  ( 只能容忍一個節點故障 )

例如，對於五節點群集 —  $N/2=2.5$ 舍入為  $2 + 1 = 3$  ( 只能容忍兩個節點故障 )

由於只為ZK群集執行五個節點，因此您最多只能容忍群集內任意數量的節點出現兩個節點故障。對於融合節點也是如此。

## 檢查參展商服務狀態

```
root@SpringpathControllerMSH7NHXRFL:/var/log/zookeeper# service exhibitor status
exhibitor start/running, process 4905
```

```
root@help:/var/log/springpath# ps -aux | grep -i exhibitor
root 12519 0.0 0.2 4690592 198892 ? Ssl May19 7:19 exhibitor -cp exhibitor.jar:/etc/exhibitor/ -
Xmx256M -XX:+HeapDumpOnOutOfMemoryError -
XX:HeapDumpPath=/var/log/exhibitor_heap_dump_2019_05_19_22:19:48.hprof -
Dlog4j.configuration=file:///etc/exhibitor/log4j.properties -
```

```
Dspringpath.zkdownscript=/usr/share/springpath/storfs-misc/zkMonitor.sh -
Djava.security.egd=file:/dev/./urandom -jar exhibitor.jar --hostname 10.197.252.100 -c file --
fsconfigdir /etc/exhibitor --port 8180 --listenaddress 10.197.252.100
root@help:/var/log/springpath# pidof exhibitor
12519
```

## 查詢Zookeeper服務

Zookeeper具有四個字母的命令語法，可用於查詢狀態、列出連線、區域節點數等。

檢查本地節點上的zookeeper狀態 — (==查>您沒事吧?. ==>「我沒事」)。

```
root@SpringpathControllerMSH7NHXRFL:/var/log/zookeeper# echo ruok|nc localhost 2181
imok
```

檢查縮放器是引線還是跟隨者。

```
root@SpringpathControllerMSH7NHXRFL:/var/log/zookeeper# echo srvr | nc localhost 2181
Zookeeper version: 3.4.6--1, built on 06/16/2015 22:50 GMT
Latency min/avg/max: 0/0/101
Received: 213128515
Sent: 213164119
Connections: 6
Outstanding: 0
Zxid: 0xa000301d0
Mode: leader
Node count: 17090
```

```
root@SpringpathControllerMSH7NHXRFL:/var/log/zookeeper# echo stat | nc localhost 2181
Zookeeper version: 3.4.6--1, built on 06/16/2015 22:50 GMT
Clients:
 /192.168.5.161:56128[1] (queued=0,recvd=169146196,sent=169162634)
 /192.168.5.161:38614[1] (queued=0,recvd=186015,sent=186017)
 /192.168.5.164:44412[1] (queued=0,recvd=184398,sent=184399)
 /192.168.5.164:44447[1] (queued=0,recvd=561168,sent=563034)
 /127.0.0.1:60060[0] (queued=0,recvd=1,sent=0)
 /192.168.5.161:58754[1] (queued=0,recvd=39233,sent=39261)
```

```
Latency min/avg/max: 0/0/101
Received: 213109927
Sent: 213145531
Connections: 6
Outstanding: 0
Zxid: 0xa000301d0
Mode: leader
Node count: 17090
```

```
root@SpringpathControllerMSH7NHXRFL:/var/log/zookeeper# echo mntr | nc localhost 2181
zk_version      3.4.6--1, built on 06/16/2015 22:50 GMT
zk_avg_latency   0
zk_max_latency   101
zk_min_latency   0
zk_packets_received 213148668
zk_packets_sent  213184272
zk_num_alive_connections 6
zk_outstanding_requests 0
zk_server_state  leader
zk_znode_count   17090
zk_watch_count   4305
```

```
zk_ephemerals_count      20
zk_approximate_data_size 1831768
zk_open_file_descriptor_count 43
zk_max_file_descriptor_count 4096
zk_followers             3
zk_synced_followers      3
zk_pending_syncs         0
```

檢查Zookeeper配置：

```
root@SpringpathControllerMSH7NHXRFL:/var/log/zookeeper# echo conf | nc localhost 2181
clientPort=2181
dataDir=/var/zookeeper/version-2
dataLogDir=/var/zookeeper/version-2
tickTime=3000
maxClientCnxns=60
minSessionTimeout=6000
maxSessionTimeout=60000
serverId=3
initLimit=10
syncLimit=3
electionAlg=3
electionPort=3888
quorumPort=2888
peerType=0
```

## 即時設定中的Zookeeper日誌檔案

如果Zookeeper服務中存在任何問題，這些日誌檔案將有助於查詢跟蹤：

- /var/log/zookeeper/zookeeper\* — 維護歸檔日誌、有用的搜尋關鍵字WARN、ERROR、Goodbye、Leader等。
- /var/log/springpath/zk-\*
- /var/log/springpath/exhibitor.log

```
root@SpringpathControllerMSH7NHXRFL:/var/log/zookeeper# grep -i leader
/var/log/zookeeper/zookeeper.log*
/var/log/zookeeper/zookeeper.log.7:2016-10-14 22:59:26,088 [myid:3] - INFO
[QuorumPeer[myid=3]/0:0:0:0:0:0:0:0:2181:Leader@60] - TCP NoDelay set to: true
/var/log/zookeeper/zookeeper.log.7:2016-10-14 22:59:26,099 [myid:3] - INFO
[QuorumPeer[myid=3]/0:0:0:0:0:0:0:0:2181:Leader@358] - LEADING - LEADER ELECTION TOOK - 354
/var/log/zookeeper/zookeeper.log.7:2016-10-14 22:59:26,120 [myid:3] - INFO [LearnerHandler-
/192.168.5.164:36487:LearnerHandler@522] - Received NEWLEADER-ACK message from 0
/var/log/zookeeper/zookeeper.log.7:2016-10-14 22:59:26,120 [myid:3] - INFO [LearnerHandler-
/192.168.5.163:43451:LearnerHandler@522] - Received NEWLEADER-ACK message from 1
/var/log/zookeeper/zookeeper.log.7:2016-10-14 22:59:26,120 [myid:3] - INFO
[QuorumPeer[myid=3]/0:0:0:0:0:0:0:0:2181:Leader@943] - Have quorum of supporters, sids: [ 0,1,3
]; starting up and setting last processed zxid: 0x100000000
/var/log/zookeeper/zookeeper.log.7:2016-10-14 22:59:26,272 [myid:3] - INFO
[WorkerReceiver[myid=3]:FastLeaderElection@597] - Notification: 1 (message format version), 3
(n.leader), 0x0 (n.zxid), 0x1 (n.round), LOOKING (n.state), 2 (n.sid), 0x0 (n.peerEpoch) LEADING
(my state)
/var/log/zookeeper/zookeeper.log.7:2016-10-14 22:59:26,291 [myid:3] - INFO [LearnerHandler-
/192.168.5.162:48778:LearnerHandler@486] - Sending snapshot last zxid of peer is 0x0 zxid of
leader is 0x100000000sent zxid of db as 0x100000000
/var/log/zookeeper/zookeeper.log.7:2016-10-14 22:59:26,298 [myid:3] - INFO [LearnerHandler-
/192.168.5.162:48778:LearnerHandler@522] - Received NEWLEADER-ACK message from 2
```

```
root@SpringpathControllerMSH7NHXRFL:/var/log/zookeeper# grep -i warn
/var/log/zookeeper/zookeeper.log*
```

```
/var/log/zookeeper/zookeeper.log.7:2016-10-14 22:46:30,354 [myid:] - WARN
[main:QuorumPeerMain@113] - Either no config or no quorum defined in config, running in
standalone mode
/var/log/zookeeper/zookeeper.log.7:2016-10-14 22:52:55,238 [myid:] - WARN
[main:QuorumPeerMain@113] - Either no config or no quorum defined in config, running in
standalone mode
```

```
root@SpringpathControllerMSH7NHXRFL:/var/log/zookeeper# grep -i goodbye
```

```
/var/log/zookeeper/zookeeper.log*
```

```
/var/log/zookeeper/zookeeper.log.1:2017-01-23 03:55:50,429 [myid:3] - WARN [LearnerHandler-
/192.168.5.163:44118:LearnerHandler@646] - ***** GOODBYE /192.168.5.163:44118 *****
/var/log/zookeeper/zookeeper.log.1:2017-01-24 23:30:14,956 [myid:3] - WARN [LearnerHandler-
/192.168.5.164:44720:LearnerHandler@646] - ***** GOODBYE /192.168.5.164:44720 *****
/var/log/zookeeper/zookeeper.log.3:2016-12-01 23:45:22,510 [myid:3] - WARN [LearnerHandler-
/192.168.5.164:44051:LearnerHandler@646] - ***** GOODBYE /192.168.5.164:44051 *****
/var/log/zookeeper/zookeeper.log.3:2016-12-08 00:36:37,752 [myid:3] - WARN [LearnerHandler-
/192.168.5.162:46577:LearnerHandler@646] - ***** GOODBYE /192.168.5.162:46577 *****
/var/log/zookeeper/zookeeper.log.4:2016-11-22 23:45:30,957 [myid:3] - WARN [LearnerHandler-
/192.168.5.163:49016:LearnerHandler@646] - ***** GOODBYE /192.168.5.163:49016 *****
/var/log/zookeeper/zookeeper.log.4:2016-11-23 00:03:59,397 [myid:3] - WARN [LearnerHandler-
/192.168.5.164:45952:LearnerHandler@646] - ***** GOODBYE /192.168.5.164:45952 *****
/var/log/zookeeper/zookeeper.log.4:2016-12-01 22:51:00,538 [myid:3] - WARN [LearnerHandler-
/192.168.5.163:45284:LearnerHandler@646] - ***** GOODBYE /192.168.5.163:45284 *****
/var/log/zookeeper/zookeeper.log.5:2016-11-10 23:39:47,477 [myid:3] - WARN [LearnerHandler-
/192.168.5.163:43576:LearnerHandler@646] - ***** GOODBYE /192.168.5.163:43576 *****
/var/log/zookeeper/zookeeper.log.5:2016-11-11 00:49:39,782 [myid:3] - WARN [LearnerHandler-
/192.168.5.164:35219:LearnerHandler@646] - ***** GOODBYE /192.168.5.164:35219 *****
```

## 某些日誌示例 — Zookeeper日誌記錄選擇

```
2017-01-22 23:47:29,427 [myid:3] - INFO [Thread-2:QuorumCnxManager$Listener@504] - My election
bind port: /192.168.5.161:3888
2017-01-22 23:47:29,435 [myid:3] - INFO
[QuorumPeer[myid=3]/0:0:0:0:0:0:0:0:2181:QuorumPeer@714] - LOOKING
2017-01-22 23:47:29,438 [myid:3] - INFO
[QuorumPeer[myid=3]/0:0:0:0:0:0:0:0:2181:FastLeaderElection@815] - New election. My id = 3,
proposed zxid=0x9000a6b4d
2017-01-22 23:47:29,443 [myid:3] - INFO [WorkerReceiver[myid=3]:FastLeaderElection@597] -
Notification: 1 (message format version), 2 (n.leader), 0x800055ea0 (n.zxid), 0x1 (n.round),
FOLLOWING (n.state), 0 (n.sid), 0x9 (n.peerEpoch) LOOKING (my state)
2017-01-22 23:47:29,444 [myid:3] - INFO [WorkerReceiver[myid=3]:FastLeaderElection@597] -
Notification: 1 (message format version), 2 (n.leader), 0x800055ea0 (n.zxid), 0x1 (n.round),
FOLLOWING (n.state), 1 (n.sid), 0x9 (n.peerEpoch) LOOKING (my state)
2017-01-22 23:47:29,444 [myid:3] - INFO [WorkerReceiver[myid=3]:FastLeaderElection@597] -
Notification: 1 (message format version), 3 (n.leader), 0x9000a6b4d (n.zxid), 0x1 (n.round),
LOOKING (n.state), 3 (n.sid), 0x9 (n.peerEpoch) LOOKING (my state)
2017-01-22 23:47:29,444 [myid:3] - INFO [WorkerReceiver[myid=3]:FastLeaderElection@597] -
Notification: 1 (message format version), 2 (n.leader), 0x800055ea0 (n.zxid), 0x1 (n.round),
FOLLOWING (n.state), 1 (n.sid), 0x9 (n.peerEpoch) LOOKING (my state)
2017-01-22 23:47:29,445 [myid:3] - INFO [WorkerReceiver[myid=3]:FastLeaderElection@597] -
Notification: 1 (message format version), 2 (n.leader), 0x800055ea0 (n.zxid), 0x1 (n.round),
LEADING (n.state), 2 (n.sid), 0x9 (n.peerEpoch) LOOKING (my state)
2017-01-22 23:47:29,445 [myid:3] - INFO [WorkerReceiver[myid=3]:FastLeaderElection@597] -
Notification: 1 (message format version), 2 (n.leader), 0x800055ea0 (n.zxid), 0x1 (n.round),
FOLLOWING (n.state), 0 (n.sid), 0x9 (n.peerEpoch) LOOKING (my state)
2017-01-22 23:47:29,446 [myid:3] - INFO
[QuorumPeer[myid=3]/0:0:0:0:0:0:0:0:2181:QuorumPeer@784] - FOLLOWING
2017-01-22 23:47:29,449 [myid:3] - INFO [QuorumPeer[myid=3]/0:0:0:0:0:0:0:0:2181:Learner@86] -
TCP NoDelay set to: true
2017-01-22 23:47:29,449 [myid:3] - INFO [WorkerReceiver[myid=3]:FastLeaderElection@597] -
Notification: 1 (message format version), 2 (n.leader), 0x800055ea0 (n.zxid), 0x1 (n.round),
LEADING (n.state), 2 (n.sid), 0x9 (n.peerEpoch) FOLLOWING (my state)
```

```
2017-01-22 23:47:29,660 [myid:3] - INFO
[QuorumPeer[myid=3]/0:0:0:0:0:0:0:0:2181:Environment@100] - Server
environment:zookeeper.version=3.4.6--1, built on 06/16/2015 22:50 GMT
2017-01-22 23:47:29,661 [myid:3] - INFO
[QuorumPeer[myid=3]/0:0:0:0:0:0:0:0:2181:Environment@100] - Server
environment:host.name=SpringpathControllerMSH7NHXRFL
2017-01-22 23:47:29,661 [myid:3] - INFO
[QuorumPeer[myid=3]/0:0:0:0:0:0:0:0:2181:Environment@100] - Server
environment:java.version=1.7.0_79
2017-01-22 23:47:29,661 [myid:3] - INFO
[QuorumPeer[myid=3]/0:0:0:0:0:0:0:0:2181:Environment@100] - Server
environment:java.vendor=Oracle Corporation
2017-01-22 23:47:29,661 [myid:3] - INFO
[QuorumPeer[myid=3]/0:0:0:0:0:0:0:0:2181:Environment@100] - Server
environment:java.home=/usr/lib/jvm/java-7-openjdk-amd64/jre
2017-01-22 23:47:29,661 [myid:3] - INFO
[QuorumPeer[myid=3]/0:0:0:0:0:0:0:0:2181:Environment@100] - Server
environment:java.class.path=/usr/share/zookeeper/bin/./build/classes:/usr/share/zookeeper/bin/./
./build/lib/*.jar:/usr/share/zookeeper/bin/./lib/slf4j-log4j12-
1.6.1.jar:/usr/share/zookeeper/bin/./lib/slf4j-api-
1.6.1.jar:/usr/share/zookeeper/bin/./lib/netty-
3.7.0.Final.jar:/usr/share/zookeeper/bin/./lib/log4j-
1.2.16.jar:/usr/share/zookeeper/bin/./lib/jline-
0.9.94.jar:/usr/share/zookeeper/bin/./zookeeper-
3.4.6.jar:/usr/share/zookeeper/bin/./src/java/lib/*.jar:/usr/share/zookeeper/bin/./conf:
2017-01-22 23:47:29,661 [myid:3] - INFO
[QuorumPeer[myid=3]/0:0:0:0:0:0:0:0:2181:Environment@100] - Server
environment:java.library.path=/usr/java/packages/lib/amd64:/usr/lib/x86_64-linux-
gnu/jni:/lib/x86_64-linux-gnu:/usr/lib/x86_64-linux-gnu:/usr/lib/jni:/lib:/usr/lib
2017-01-22 23:47:29,661 [myid:3] - INFO
[QuorumPeer[myid=3]/0:0:0:0:0:0:0:0:2181:Environment@100] - Server
environment:java.io.tmpdir=/tmp
2017-01-22 23:47:29,661 [myid:3] - INFO
[QuorumPeer[myid=3]/0:0:0:0:0:0:0:0:2181:Environment@100] - Server environment:java.compiler=
```

## LEADER ELECTION TOOK

```
root@SpringpathControllerMSH7NHXRFL:/var/log/springpath# cat zk-debug-storfs.log
```

```
2017-01-22 23:47:18,702:5866(0x7fd1f7ef5700):ZOO_INFO@check_events@1760: initiated connection to
server [192.168.5.163:2181]
2017-01-22 23:47:18,704:5866(0x7fd1f7ef5700):ZOO_INFO@check_events@1807: session establishment
complete on server [192.168.5.163:2181], sessionId=0x159165ff6310005, negotiated timeout=17001
2017-01-22 23:47:18,704:5866(0x7fd1f76f4700):ZOO_INFO@process_completions@2170: Calling a
watcher for node s], type = s
2017-01-23 01:50:16,809:5866(0x7fd1f7ef5700):ZOO_ERROR@handle_socket_error_msg@1778: Socket
[192.168.5.163:2181] zk retcode=-4, errno=112(Host is down): failed while receiving a server
response
2017-01-23 01:50:16,818:5866(0x7fd1f76f4700):ZOO_INFO@process_completions@2170: Calling a
watcher for node s], type = s
2017-01-23 01:50:16,818:5866(0x7fd1f7ef5700):ZOO_INFO@check_events@1760: initiated connection to
server [192.168.5.164:2181]
2017-01-23 01:50:16,818:5866(0x7fd1f7ef5700):ZOO_ERROR@handle_socket_error_msg@1778: Socket
[192.168.5.164:2181] zk retcode=-4, errno=112(Host is down): failed while receiving a server
response
2017-01-23 01:50:17,819:5866(0x7fd1f7ef5700):ZOO_ERROR@handle_socket_error_msg@1740: Socket
[192.168.5.162:2181] zk retcode=-4, errno=115(Operation now in progress): poll refused to accept
read/write from the client
```

```
root@help:/var/log/springpath# cat zkEvents.log
```

```
INFO:ZkEvents:Send changes to listeners
INFO:EventDB:Received message{"timestamp": 1559200009008, "description": "Cluster policy
compliance is satisfied", "id": "ClusterPolicyComplianceSatisfiedEvent"}
DEBUG:kazoo.client:Received EVENT: Watch(type=3, state=3,
path=u'/zkEvents/lastModificationTime')
DEBUG:kazoo.client:Sending request(xid=42): GetData(path='/zkEvents/lastModificationTime',
watcher=
```

**Cluster is healthy**

```
root@SpringpathControllerPZTMTRSH7K:/var/log/springpath# tail exhibitor.log
```

```
05-20 05:28:52.223 INFO org.mortbay.log - Started SocketConnector@10.197.252.99:8180
05-20 05:29:20.106 INFO com.netflix.exhibitor.core.activity.ActivityLog - State: down
05-20 05:29:20.106 INFO com.netflix.exhibitor.core.activity.ActivityLog - Attempting to stop
instance
05-20 05:29:20.106 INFO com.netflix.exhibitor.core.activity.ActivityLog - Attempting to
start/restart ZooKeeper
05-20 05:29:20.328 INFO com.netflix.exhibitor.core.activity.ActivityLog - jps didn't find
instance - assuming ZK is not running
05-20 05:29:20.347 INFO com.netflix.exhibitor.core.activity.ActivityLog - Process started via:
/usr/share/zookeeper/bin/zkServer.sh
05-20 05:29:20.353 ERROR com.netflix.exhibitor.core.activity.ActivityLog - ZooKeeper Server:
ZooKeeper JMX enabled by default
05-20 05:29:20.353 ERROR com.netflix.exhibitor.core.activity.ActivityLog - ZooKeeper Server:
Using config: /usr/share/zookeeper/bin/./conf/zoo.cfg
05-20 05:29:21.366 INFO com.netflix.exhibitor.core.activity.ActivityLog - ZooKeeper Server:
Starting zookeeper ... STARTED
05-20 05:29:50.128 INFO com.netflix.exhibitor.core.activity.ActivityLog - State: serving
```

## 來自支援捆綁包(storfs)的Zookeeper日誌檔案

在支援捆綁包中，需要檢視以下重要檔案：

zookeeper.log	/var/log/zookeeper
zk-storfs.log	/var/log/springpath
echo_stat_ nc_localhost_2181.out	under cmds_output