Explication et vérification du service Zookeeper Hyperflex UCS

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Introduction

Ce document décrit ZooKeeper, qui est essentiellement un service centralisé pour les systèmes distribués à un magasin de valeurs de clé hiérarchique. Il est utilisé pour fournir un service de configuration distribuée, un service de synchronisation et un registre d'attribution de noms pour les grands systèmes distribués. L'architecture de ZooKeeper prend en charge la haute disponibilité par le biais de services redondants. Les clients peuvent ainsi demander à un autre responsable ZooKeeper si le premier ne répond pas. Les noeuds ZooKeeper stockent leurs données dans un espace de noms hiérarchique, un peu comme un système de fichiers ou une structure de données arborescente. Les clients peuvent lire et écrire sur les noeuds et ainsi disposer d'un service de configuration partagé. ZooKeeper peut être vu comme un système de diffusion atomique par lequel les mises à jour sont totalement ordonnées.

ZooKeeper offre les fonctionnalités suivantes :

- Système fiable : le système est très fiable car il fonctionne toujours même en cas de défaillance d'un noeud.
- Architecture simple : l'architecture de ZooKeeper est assez simple. il utilise un espace de noms hiérarchique partagé, qui aide à la coordination des processus.
- Traitement rapide : ZooKeeper est particulièrement rapide pour les charges de travail dominantes en lecture.
- Évolutif : les performances de ZooKeeper peuvent être améliorées par l'ajout de noeuds.

Dans HX, il existe cette implémentation spécifique :

- Le service appelé **expositor** gère le démarrage/arrêt du zookeeper.
- Les processus du cluster HX sont des clients de Zookeeper et communiquent via le port tcp **2181** ex storfs, stmgr, etc.
- Les systèmes comportant plus de cinq noeuds disposent de certains noeuds autonomes. Les systèmes comportant cinq noeuds ou moins ne doivent jamais avoir de noeud autonome.
- Nombre minimum de noeuds requis pour Quorum = N/2 +1.

Par exemple, pour un cluster à trois noeuds - N/2=1,5 arrondi à 1 +1 = 2 (une seule défaillance de noeud peut être tolérée)

Par exemple, pour un cluster à cinq noeuds - N/2=2,5 arrondi à 2 +1 = 3 (seules deux défaillances de noeud peuvent être tolérées)

Puisque vous ne faites que cinq noeuds pour un cluster ZK, vous ne tolérez qu'un maximum de deux échecs de noeud pour un nombre quelconque de noeuds dans le cluster. C'est vrai pour les noeuds convergents.

Vérifier l'état du service aux exposants

```
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
```

Service Zookeeper de requête

Le Zookeeper possède une syntaxe de commande à quatre lettres qui vous permet d'interroger l'état, les connexions de liste, le nombre de znoeuds, etc.

Vérifiez l'état du zookeeper sur le noeud local - (plan ==> OK ?. imok==>Je suis OK).

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

Vérifiez si le zookeeper est un leader ou un suiveur.

```
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,recved=169146196,sent=169162634)
 /192.168.5.161:38614[1](queued=0,recved=186015,sent=186017)
 /192.168.5.164:44412[1](queued=0,recved=184398,sent=184399)
 /192.168.5.164:44447[1](queued=0,recved=561168,sent=563034)
 /127.0.0.1:60060[0](queued=0,recved=1,sent=0)
 /192.168.5.161:58754[1](queued=0,recved=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
```

Vérifiez la configuration du Zookeeper :

```
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
```

Fichiers journaux Zookeeper dans une configuration dynamique

S'il y a des problèmes dans les services Zookeeper, ces fichiers journaux vous aideront à trouver les traces :

- /var/log/zookeeper/zookeeper* : conserve les journaux archivés, les mots clés de recherche utiles AVERTISSEMENT, ERREUR, Adieu, Leader, etc.
- /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 ********
```

Quelques exemples de journaux - Sélection de la journalisation du Zookeeper

```
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
```

Fichiers journaux du Zookeeper de l'offre groupée de support (storfs)

Dans une offre groupée de support, il s'agit de fichiers importants à examiner :

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