

Lab2-1 Leader-Election

实现思路

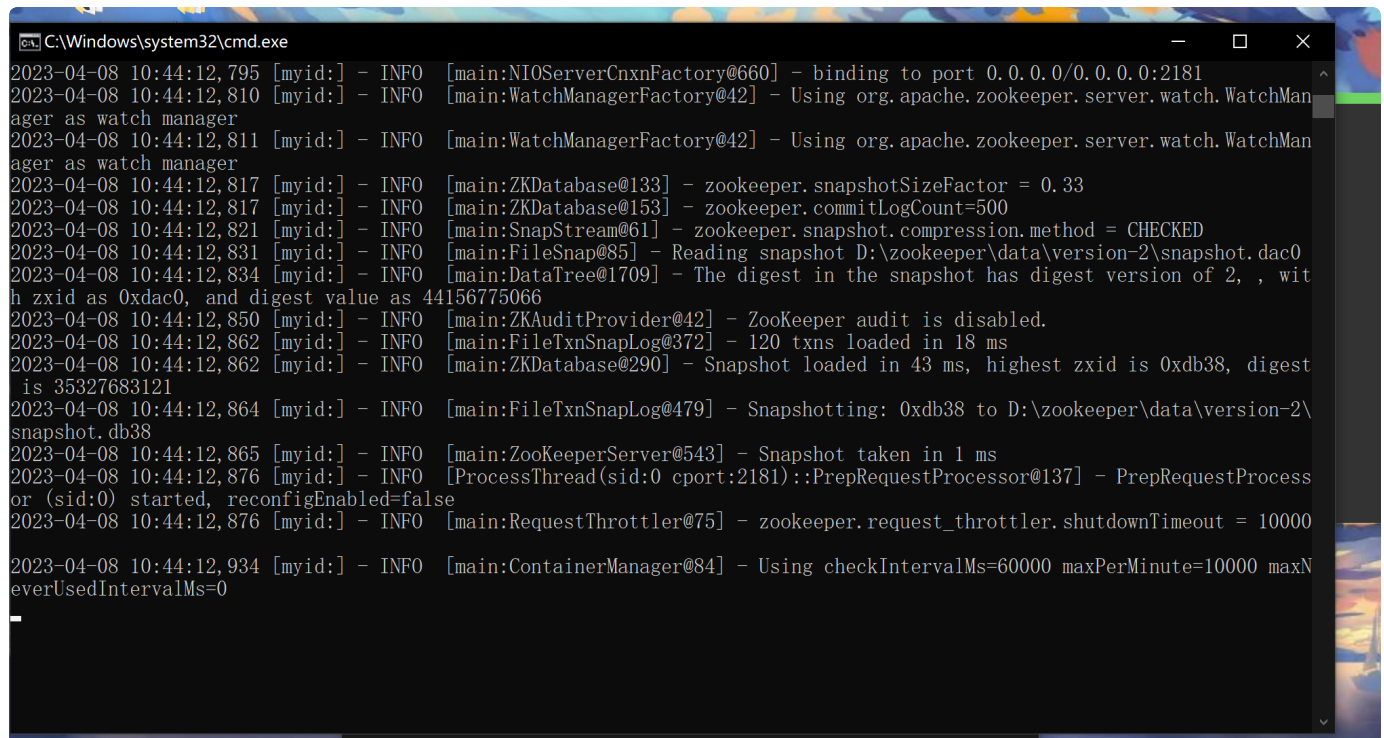
操作过程

实现思路

父节点election下有许多名字诸如node-0000000001、node-0000000002的子节点，每次创建一个新的子节点都首先调用leaderElection函数（判断当前节点是否是election节点下子节点中最小的那个，如果是则打印出"I am the leader"信息，并把当前节点名字写入父节点内容中；如果不是，则为最小的节点添加监听，并打印出"I am the follower, following"信息）。关于监听函数，则判断删除的是否是leader节点，如果是则触发再次选举，否则不做任何反应。

操作过程

首先进入到zookeeper安装的bin文件夹下，双击zkServer.cmd打开zookeeper服务



```
C:\Windows\system32\cmd.exe
2023-04-08 10:44:12,795 [myid:] - INFO [main:NIOServerCnxnFactory@660] - binding to port 0.0.0.0/0.0.0.0:2181
2023-04-08 10:44:12,810 [myid:] - INFO [main:WatchManagerFactory@42] - Using org.apache.zookeeper.server.watch.WatchMan
ager as watch manager
2023-04-08 10:44:12,811 [myid:] - INFO [main:WatchManagerFactory@42] - Using org.apache.zookeeper.server.watch.WatchMan
ager as watch manager
2023-04-08 10:44:12,817 [myid:] - INFO [main:ZKDatabase@133] - zookeeper.snapshotSizeFactor = 0.33
2023-04-08 10:44:12,817 [myid:] - INFO [main:ZKDatabase@153] - zookeeper.commitLogCount=500
2023-04-08 10:44:12,821 [myid:] - INFO [main:SnapStream@61] - zookeeper.snapshot.compression.method = CHECKED
2023-04-08 10:44:12,831 [myid:] - INFO [main:FileSnap@85] - Reading snapshot D:\zookeeper\data\version-2\snapshot.dac0
2023-04-08 10:44:12,834 [myid:] - INFO [main:DataTree@1709] - The digest in the snapshot has digest version of 2, , wit
h zxid as 0xdac0, and digest value as 44156775066
2023-04-08 10:44:12,850 [myid:] - INFO [main:ZKAuditProvider@42] - ZooKeeper audit is disabled.
2023-04-08 10:44:12,862 [myid:] - INFO [main:FileTxnSnapLog@372] - 120 txns loaded in 18 ms
2023-04-08 10:44:12,862 [myid:] - INFO [main:ZKDatabase@290] - Snapshot loaded in 43 ms, highest zxid is 0xdb38, digest
is 35327683121
2023-04-08 10:44:12,864 [myid:] - INFO [main:FileTxnSnapLog@479] - Snapshotting: 0xdb38 to D:\zookeeper\data\version-2\
snapshot.db38
2023-04-08 10:44:12,865 [myid:] - INFO [main:ZooKeeperServer@543] - Snapshot taken in 1 ms
2023-04-08 10:44:12,876 [myid:] - INFO [ProcessThread(sid:0 cport:2181)::PrepRequestProcessor@137] - PrepRequestProcess
or (sid:0) started, reconfigEnabled=false
2023-04-08 10:44:12,876 [myid:] - INFO [main:RequestThrottler@75] - zookeeper.request_throttler.shutdownTimeout = 10000
2023-04-08 10:44:12,934 [myid:] - INFO [main:ContainerManager@84] - Using checkIntervalMs=60000 maxPerMinute=10000 maxN
everUsedIntervalMs=0
```

在idea中设置类 ZNode 允许运行多个实例，每运行一个ZNode都代表新建了一个子节点

- TEST CASE1: 单个node

在zookeeper客户端查看节点内容

```
INFO org.apache.zookeeper.ClientCnxn - Session establishment complete on server [zk: localhost:2181(CONNECTED) 0] ls /
[leader, lxy, registry, servernode, test, zk_test, zookeeper]
INFO org.apache.zookeeper.ClientCnxn - Session establishment complete on server [zk: localhost:2181(CONNECTED) 1] ls /
[election, leader, lxy, registry, servernode, test, zk_test, zookeeper]
INFO org.apache.zookeeper.ClientCnxn - Session establishment complete on server [zk: localhost:2181(CONNECTED) 2] ls /election
[node-0000000000]
INFO org.apache.zookeeper.ClientCnxn - Session establishment complete on server [zk: localhost:2181(CONNECTED) 3]
INFO org.apache.zookeeper.ClientCnxn - Session establishment complete on server [zk: localhost:2181]
INFO org.apache.zookeeper.ClientCnxn - Session establishment complete on server [zk: localhost:2181]
```

ZNode打印情况

```
[main-SendThread(localhost:2181)] INFO org.apache.zookeeper.ClientCnxn - Opening socket connection to server localhost:2181. Ignoring SASL config status: Will not attempt to negotiate SASL because security properties are already set.
[main-SendThread(localhost:2181)] INFO org.apache.zookeeper.ClientCnxn - SASL config status: Will not attempt to negotiate SASL because security properties are already set.
[main-SendThread(localhost:2181)] INFO org.apache.zookeeper.ClientCnxn - Socket connection established
[main-SendThread(localhost:2181)] INFO org.apache.zookeeper.ClientCnxn - Session establishment complete on server localhost:2181. Ignoring SASL config status: Will not attempt to negotiate SASL because security properties are already set.
succeed creating znode with name /election/node-0000000000
/election/node-0000000000: I am the leader
election content: /election/node-0000000000
```

- TEST CASE2 : 多个node

在运行ZNode前, 已经存在三个Znode

```
[zk: localhost:2181(CONNECTED) 6] ls /election
[node-0000000001, node-0000000002, node-0000000003]
[zk: localhost:2181(CONNECTED) 7] ls /election
[node-0000000001, node-0000000002, node-0000000003, node-0000000007]
[zk: localhost:2181(CONNECTED) 8]
node-0000000001
touch on: /election/node-0000000001
```

运行node-0000000007

Znode打印情况

```
[main-SendThread(localhost:2181)] INFO org.apache.zookeeper.ClientCnxn - Session establishment complete on server localhost:2181. Ignoring SASL config status: Will not attempt to negotiate SASL because security properties are already set.
namespace exists!
succeed creating znode with name /election/node-0000000007
/election/node-0000000007: I am follower
following node-0000000001
Setting watch on: /election/node-0000000001
election content: /election/node-0000000001
```

默认自己为follower

- TEST CASE3: 删除Leader, 触发选举

```

[node-0000000001, node-0000000002, node-0000000003]
[zk: localhost:2181(CONNECTED) 7] ls /election
[node-0000000001, node-0000000002, node-0000000003, node-0000000007]
[zk: localhost:2181(CONNECTED) 8] ls /election
[node-0000000001, node-0000000002, node-0000000003, node-0000000007, node-0000000008]
[zk: localhost:2181(CONNECTED) 9] delete /election/node-0000000001
Node does not exist: /election/node-0000000001
[zk: localhost:2181(CONNECTED) 10] delete /election/node-0000000001
[zk: localhost:2181(CONNECTED) 11]

```

所有在运行的实例都触发leader-election

第一个实例

```

[main-SendThread(localhost:2181)] INFO org.apache.zookeeper.ClientCnxn - Session establishm
namespace exists!
succeed creating znode with name /election/node-0000000007
/election/node-0000000007: I am follower
following node-0000000001
Setting watch on: /election/node-0000000001
election content: /election/node-0000000001
/election/node-0000000001 was deleted, Triggering leader election!
/election/node-0000000007: I am follower
following node-0000000002
Setting watch on: /election/node-0000000002
election content: /election/node-0000000002

```

第二个实例

```

[main-SendThread(localhost:2181)] INFO org.apache.zookeeper.ClientCnxn - Session establis
namespace exists!
succeed creating znode with name /election/node-0000000008
/election/node-0000000008: I am follower
following node-0000000001
Setting watch on: /election/node-0000000001
election content: /election/node-0000000001
/election/node-0000000001 was deleted, Triggering leader election!
/election/node-0000000008: I am follower
following node-0000000002
Setting watch on: /election/node-0000000002
election content: /election/node-0000000002

```