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> cd part1
> go test -v -race -run TestElectionFollowerComesBack |& tee /tmp/raftlog
go: downloading github.com/fortytw/leaktest v1.3.0
=== RUN TestElectionFollowerComesBack
11:04:37.545384 [0] listening at [::]:46439
11:04:37.545511 [1] listening at [::]:40455 insert a custom meeting notes template
11:04:37.545561 [2] listening at [::]:38523
11:04:37.546545 [0] election timer started (286ms), term=0
11:04:37.546545 [2] election timer started (292ms), term=0
11:04:37.546595 [1] election timer started (244ms), term=0
11:04:37.796881 [1] becomes Candidate (currentTerm=1); log=[]
11:04:37.797105 [1] sending RequestVote to 2: {Term:1 CandidateId:1 LastLogIndex:0 LastLogTerm:0}
11:04:37.797055 [1] sending RequestVote to 0: {Term:1 CandidateId:1 LastLogIndex:0 LastLogTerm:0}
11:04:37.797231 [1] election timer started (156ms), term=1
11:04:37.799819 [0] RequestVote: {Term:1 CandidateId:1 LastLogIndex:0 LastLogTerm:0} [currentTerm=0, votedFor=-1]
11:04:37.799933 [0] ... term out of date in RequestVote
11:04:37.799964 [0] becomes Follower with term=1; log=[]
11:04:37.800017 [0] ... RequestVote reply: &{Term:1 VoteGranted:true}
11:04:37.800142 [0] election timer started (291ms), term=1
11:04:37.801003 [1] received RequestVoteReply {Term:1 VoteGranted:true}
11:04:37.801059 [1] wins election with 2 votes
11:04:37.801102 [1] becomes Leader; term=1, log=[]
11:04:37.801280 [1] sending AppendEntries to 2: ni=0, args={Term:1 LeaderId:1 PrevLogIndex:0 PrevLogTerm:0 Entries:[] LeaderCommit:0}
11:04:37.801292 [1] sending AppendEntries to 0: ni=0, args={Term:1 LeaderId:1 PrevLogIndex:0 PrevLogTerm:0 Entries:[] LeaderCommit:0}
11:04:37.803161 [2] RequestVote: {Term:1 CandidateId:1 LastLogIndex:0 LastLogTerm:0} [currentTerm=0, votedFor=-1]
11:04:37.803255 [2] ... term out of date in RequestVote
11:04:37.803294 [2] becomes Follower with term=1; log=[]
11:04:37.803352 [2] ... RequestVote reply: &{Term:1 VoteGranted:true}
11:04:37.803591 [2] election timer started (156ms), term=1
11:04:37.803966 [1] received RequestVoteReply {Term:1 VoteGranted:true}
11:04:37.804009 [1] while waiting for reply, state = Leader
11:04:37.804705 [2] AppendEntries: {Term:1 LeaderId:1 PrevLogIndex:0 PrevLogTerm:0 Entries:[] LeaderCommit:0}
11:04:37.804795 [2] AppendEntries reply: {Term:1 Success:true}
11:04:37.806226 [0] AppendEntries: {Term:1 LeaderId:1 PrevLogIndex:0 PrevLogTerm:0 Entries:[] LeaderCommit:0}
11:04:37.806314 [0] AppendEntries reply: {Term:1 Success:true}
11:04:37.806724 [2] in election timer term changed from 0 to 1, bailing out
11:04:37.806725 [0] in election timer term changed from 0 to 1, bailing out
11:04:37.807630 [1] in election timer state=Leader, bailing out
11:04:37.848121 [TEST] Disconnect 2
11:04:37.852095 [1] sending AppendEntries to 2: ni=0, args={Term:1 LeaderId:1 PrevLogIndex:0 PrevLogTerm:0 Entries:[] LeaderCommit:0}

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Bài test part 1 có 3 server trong mạng.

Từ dòng thứ 1 đến dòng thứ 3: trạng thái listening của 3 server

3 Dòng tiếp theo: start election timer đếm giờ cho mỗi server

Máy 2 hết timer -> trở thành candidate-> vote cho chính nó và gửi request vote cho 2 máy còn lại

Máy 2 reset timer election

Máy 1 phản hồi request vote và trở thành follower, reset election timer

Máy 1 win vote và trở thành leader

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11:04:37.806724 [2] in election timer term changed from 0 to 1, bailing out
11:04:37.806725 [0] in election timer term changed from 0 to 1, bailing out
11:04:37.807630 [1] in election timer state=Leader, bailing out
11:04:37.848121 [TEST] Disconnect 2
11:04:37.852095 [1] sending AppendEntries to 2: ni=0, args={Term:1 LeaderId:1 PrevLogIndex:0 PrevLogTerm:0 Entries:[] LeaderCommit:0}
11:04:37.852201 [1] sending AppendEntries to 0: ni=0, args={Term:1 LeaderId:1 PrevLogIndex:0 PrevLogTerm:0 Entries:[] LeaderCommit:0}
11:04:37.858502 [0] AppendEntries: {Term:1 LeaderId:1 PrevLogIndex:0 PrevLogTerm:0 Entries:[] LeaderCommit:0}
11:04:37.858635 [0] AppendEntries reply: {Term:1 Success:true}
11:04:37.901738 [1] sending AppendEntries to 2: ni=0, args={Term:1 LeaderId:1 PrevLogIndex:0 PrevLogTerm:0 Entries:[] LeaderCommit:0}
11:04:37.901818 [1] sending AppendEntries to 0: ni=0, args={Term:1 LeaderId:1 PrevLogIndex:0 PrevLogTerm:0 Entries:[] LeaderCommit:0}
11:04:37.905331 [0] AppendEntries: {Term:1 LeaderId:1 PrevLogIndex:0 PrevLogTerm:0 Entries:[] LeaderCommit:0}
11:04:37.905432 [0] AppendEntries reply: {Term:1 Success:true}
11:04:37.951313 [1] sending AppendEntries to 2: ni=0, args={Term:1 LeaderId:1 PrevLogIndex:0 PrevLogTerm:0 Entries:[] LeaderCommit:0}
11:04:37.951401 [1] sending AppendEntries to 0: ni=0, args={Term:1 LeaderId:1 PrevLogIndex:0 PrevLogTerm:0 Entries:[] LeaderCommit:0}
11:04:37.954116 [0] AppendEntries: {Term:1 LeaderId:1 PrevLogIndex:0 PrevLogTerm:0 Entries:[] LeaderCommit:0}
11:04:37.954253 [0] AppendEntries reply: {Term:1 Success:true}
11:04:37.963819 [2] becomes Candidate (currentTerm=2); log=[]
11:04:37.964048 [2] sending RequestVote to 1: {Term:2 CandidateId:2 LastLogIndex:0 LastLogTerm:0}
11:04:37.964068 [2] election timer started (299ms), term=2
11:04:37.964065 [2] sending RequestVote to 0: {Term:2 CandidateId:2 LastLogIndex:0 LastLogTerm:0}
11:04:38.002181 [1] sending AppendEntries to 0: ni=0, args={Term:1 LeaderId:1 PrevLogIndex:0 PrevLogTerm:0 Entries:[] LeaderCommit:0}
11:04:38.002261 [1] sending AppendEntries to 2: ni=0, args={Term:1 LeaderId:1 PrevLogIndex:0 PrevLogTerm:0 Entries:[] LeaderCommit:0}
11:04:38.007698 [0] AppendEntries: {Term:1 LeaderId:1 PrevLogIndex:0 PrevLogTerm:0 Entries:[] LeaderCommit:0}
11:04:38.007816 [0] AppendEntries reply: {Term:1 Success:true}
11:04:38.051980 [1] sending AppendEntries to 2: ni=0, args={Term:1 LeaderId:1 PrevLogIndex:0 PrevLogTerm:0 Entries:[] LeaderCommit:0}
11:04:38.052100 [1] sending AppendEntries to 0: ni=0, args={Term:1 LeaderId:1 PrevLogIndex:0 PrevLogTerm:0 Entries:[] LeaderCommit:0}
11:04:38.055793 [0] AppendEntries: {Term:1 LeaderId:1 PrevLogIndex:0 PrevLogTerm:0 Entries:[] LeaderCommit:0}
11:04:38.055925 [0] AppendEntries reply: {Term:1 Success:true}
11:04:38.102211 [1] sending AppendEntries to 2: ni=0, args={Term:1 LeaderId:1 PrevLogIndex:0 PrevLogTerm:0 Entries:[] LeaderCommit:0}
11:04:38.102297 [1] sending AppendEntries to 0: ni=0, args={Term:1 LeaderId:1 PrevLogIndex:0 PrevLogTerm:0 Entries:[] LeaderCommit:0}
11:04:38.103792 [0] AppendEntries: {Term:1 LeaderId:1 PrevLogIndex:0 PrevLogTerm:0 Entries:[] LeaderCommit:0}
11:04:38.103901 [0] AppendEntries reply: {Term:1 Success:true}
11:04:38.152179 [1] sending AppendEntries to 0: ni=0, args={Term:1 LeaderId:1 PrevLogIndex:0 PrevLogTerm:0 Entries:[] LeaderCommit:0}
11:04:38.152266 [1] sending AppendEntries to 2: ni=0, args={Term:1 LeaderId:1 PrevLogIndex:0 PrevLogTerm:0 Entries:[] LeaderCommit:0}
11:04:38.153763 [0] AppendEntries: {Term:1 LeaderId:1 PrevLogIndex:0 PrevLogTerm:0 Entries:[] LeaderCommit:0}
11:04:38.153855 [0] AppendEntries reply: {Term:1 Success:true}
11:04:38.201825 [1] sending AppendEntries to 2: ni=0, args={Term:1 LeaderId:1 PrevLogIndex:0 PrevLogTerm:0 Entries:[] LeaderCommit:0}
11:04:38.201938 [1] sending AppendEntries to 0: ni=0, args={Term:1 LeaderId:1 PrevLogIndex:0 PrevLogTerm:0 Entries:[] LeaderCommit:0}
11:04:38.204391 [0] AppendEntries: {Term:1 LeaderId:1 PrevLogIndex:0 PrevLogTerm:0 Entries:[] LeaderCommit:0}
11:04:38.204534 [0] AppendEntries reply: {Term:1 Success:true}
11:04:38.252016 [1] sending AppendEntries to 2: ni=0, args={Term:1 LeaderId:1 PrevLogIndex:0 PrevLogTerm:0 Entries:[] LeaderCommit:0}
11:04:38.252089 [1] sending AppendEntries to 0: ni=0, args={Term:1 LeaderId:1 PrevLogIndex:0 PrevLogTerm:0 Entries:[] LeaderCommit:0}
11:04:38.256122 [0] AppendEntries: {Term:1 LeaderId:1 PrevLogIndex:0 PrevLogTerm:0 Entries:[] LeaderCommit:0}
11:04:38.256232 [0] AppendEntries reply: {Term:1 Success:true}
11:04:38.265101 [2] becomes Candidate (currentTerm=3); log=[]
11:04:38.265277 [2] election timer started (215ms), term=3
11:04:38.265273 [2] sending RequestVote to 1: {Term:3 CandidateId:2 LastLogIndex:0 LastLogTerm:0}
11:04:38.265322 [2] sending RequestVote to 0: {Term:3 CandidateId:2 LastLogIndex:0 LastLogTerm:0}
11:04:38.301315 [1] sending AppendEntries to 0: ni=0, args={Term:1 LeaderId:1 PrevLogIndex:0 PrevLogTerm:0 Entries:[] LeaderCommit:0}
11:04:38.301325 [1] sending AppendEntries to 2: ni=0, args={Term:1 LeaderId:1 PrevLogIndex:0 PrevLogTerm:0 Entries:[] LeaderCommit:0}

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test Máy 2 disconnect,

Máy 3 máy 1 chuyển về trạng thái candidate sau khi không nhận được ping của leader

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11:04:38.451655 [1] sending AppendEntries to 2: ni=0, args={Term:1 LeaderId:1 PrevLogIndex:0 PrevLogTerm:0 Entries:[] LeaderCommit:0}
11:04:38.451723 [1] sending AppendEntries to 0: ni=0, args={Term:1 LeaderId:1 PrevLogIndex:0 PrevLogTerm:0 Entries:[] LeaderCommit:0}
11:04:38.455619 [0] AppendEntries: {Term:1 LeaderId:1 PrevLogIndex:0 PrevLogTerm:0 Entries:[] LeaderCommit:0}
11:04:38.455781 [0] AppendEntries reply: {Term:1 Success:true}
11:04:38.485808 [2] becomes Candidate (currentTerm=4); log=[]
11:04:38.485957 [2] election timer started (236ms), term=4
11:04:38.486040 [2] sending RequestVote to 0: {Term:4 CandidateId:2 LastLogIndex:0 LastLogTerm:0}
11:04:38.486091 [2] sending RequestVote to 1: {Term:4 CandidateId:2 LastLogIndex:0 LastLogTerm:0}
11:04:38.499708 [TEST] Reconnect 2
11:04:38.502194 [1] sending AppendEntries to 0: ni=0, args={Term:1 LeaderId:1 PrevLogIndex:0 PrevLogTerm:0 Entries:[] LeaderCommit:0}
11:04:38.502201 [1] sending AppendEntries to 2: ni=0, args={Term:1 LeaderId:1 PrevLogIndex:0 PrevLogTerm:0 Entries:[] LeaderCommit:0}
11:04:38.505392 [2] AppendEntries: {Term:1 LeaderId:1 PrevLogIndex:0 PrevLogTerm:0 Entries:[] LeaderCommit:0}
11:04:38.505502 [2] AppendEntries reply: {Term:4 Success:false}
11:04:38.506102 [1] term out of date in heartbeat reply
11:04:38.506136 [1] becomes Follower with term=4; log=[]
11:04:38.506203 [1] election timer started (171ms), term=4
11:04:38.506851 [0] AppendEntries: {Term:1 LeaderId:1 PrevLogIndex:0 PrevLogTerm:0 Entries:[] LeaderCommit:0}
11:04:38.506952 [0] AppendEntries reply: {Term:1 Success:true}
11:04:38.687080 [1] becomes Candidate (currentTerm=5); log=[]
11:04:38.687207 [1] election timer started (220ms), term=5
11:04:38.687278 [1] sending RequestVote to 2: {Term:5 CandidateId:1 LastLogIndex:0 LastLogTerm:0}
11:04:38.687270 [1] sending RequestVote to 0: {Term:5 CandidateId:1 LastLogIndex:0 LastLogTerm:0}
11:04:38.688843 [0] RequestVote: {Term:5 CandidateId:1 LastLogIndex:0 LastLogTerm:0} [currentTerm=1, votedFor=1]
11:04:38.688938 [0] ... term out of date in RequestVote
11:04:38.688974 [0] becomes Follower with term=5; log=[]
11:04:38.689023 [0] ... RequestVote reply: {Term:5 VoteGranted:true}
11:04:38.689187 [0] election timer started (228ms), term=5
11:04:38.689376 [1] received RequestVoteReply {Term:5 VoteGranted:true}
11:04:38.689450 [1] wins election with 2 votes
11:04:38.689482 [1] becomes Leader; term=5, log=[]
11:04:38.689575 [1] sending AppendEntries to 2: ni=0, args={Term:5 LeaderId:1 PrevLogIndex:0 PrevLogTerm:0 Entries:[] LeaderCommit:0}
11:04:38.689638 [1] sending AppendEntries to 0: ni=0, args={Term:5 LeaderId:1 PrevLogIndex:0 PrevLogTerm:0 Entries:[] LeaderCommit:0}
11:04:38.690962 [0] in election timer term changed from 1 to 5, bailing out
11:04:38.691001 [2] RequestVote: {Term:5 CandidateId:1 LastLogIndex:0 LastLogTerm:0} [currentTerm=4, votedFor=2]
11:04:38.691086 [2] ... term out of date in RequestVote
11:04:38.691110 [2] becomes Follower with term=5; log=[]
11:04:38.691153 [2] ... RequestVote reply: {Term:5 VoteGranted:true}
11:04:38.691353 [2] election timer started (277ms), term=5
11:04:38.691529 [1] received RequestVoteReply {Term:5 VoteGranted:true}
11:04:38.691578 [1] while waiting for reply, state = Leader
11:04:38.694542 [2] AppendEntries: {Term:5 LeaderId:1 PrevLogIndex:0 PrevLogTerm:0 Entries:[] LeaderCommit:0}
11:04:38.694631 [2] AppendEntries reply: {Term:5 Success:true}
11:04:38.695904 [0] AppendEntries: {Term:5 LeaderId:1 PrevLogIndex:0 PrevLogTerm:0 Entries:[] LeaderCommit:0}
11:04:38.696000 [0] AppendEntries reply: {Term:5 Success:true}
11:04:38.696141 [2] in election timer term changed from 4 to 5, bailing out
11:04:38.698366 [1] in election timer state=Leader, bailing out
11:04:38.739918 [1] sending AppendEntries to 0: ni=0, args={Term:5 LeaderId:1 PrevLogIndex:0 PrevLogTerm:0 Entries:[] LeaderCommit:0}
11:04:38.739980 [1] sending AppendEntries to 2: ni=0, args={Term:5 LeaderId:1 PrevLogIndex:0 PrevLogTerm:0 Entries:[] LeaderCommit:0}
11:04:38.741524 [2] AppendEntries: {Term:5 LeaderId:1 PrevLogIndex:0 PrevLogTerm:0 Entries:[] LeaderCommit:0}
11:04:38.741619 [2] AppendEntries reply: {Term:5 Success:true}
11:04:38.741619 [2] AppendEntries reply: {Term:5 Success:true}
11:04:38.742896 [0] AppendEntries: {Term:5 LeaderId:1 PrevLogIndex:0 PrevLogTerm:0 Entries:[] LeaderCommit:0}
11:04:38.742979 [0] AppendEntries reply: {Term:5 Success:true}
11:04:38.790063 [1] sending AppendEntries to 2: ni=0, args={Term:5 LeaderId:1 PrevLogIndex:0 PrevLogTerm:0 Entries:[] LeaderCommit:0}
11:04:38.790120 [1] sending AppendEntries to 0: ni=0, args={Term:5 LeaderId:1 PrevLogIndex:0 PrevLogTerm:0 Entries:[] LeaderCommit:0}
11:04:38.791587 [2] AppendEntries: {Term:5 LeaderId:1 PrevLogIndex:0 PrevLogTerm:0 Entries:[] LeaderCommit:0}
11:04:38.791703 [2] AppendEntries reply: {Term:5 Success:true}
11:04:38.796066 [0] AppendEntries: {Term:5 LeaderId:1 PrevLogIndex:0 PrevLogTerm:0 Entries:[] LeaderCommit:0}
11:04:38.796169 [0] AppendEntries reply: {Term:5 Success:true}
11:04:38.803215 [0] becomes Dead
11:04:38.803320 [0] becomes Dead
11:04:38.803422 [0] becomes Dead
11:04:38.809306 [0] in election timer state=Dead, bailing out
11:04:38.812476 [2] in election timer state=Dead, bailing out
--- PASS: TestElectionFollowerComesBack (1.31s)
PASS
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