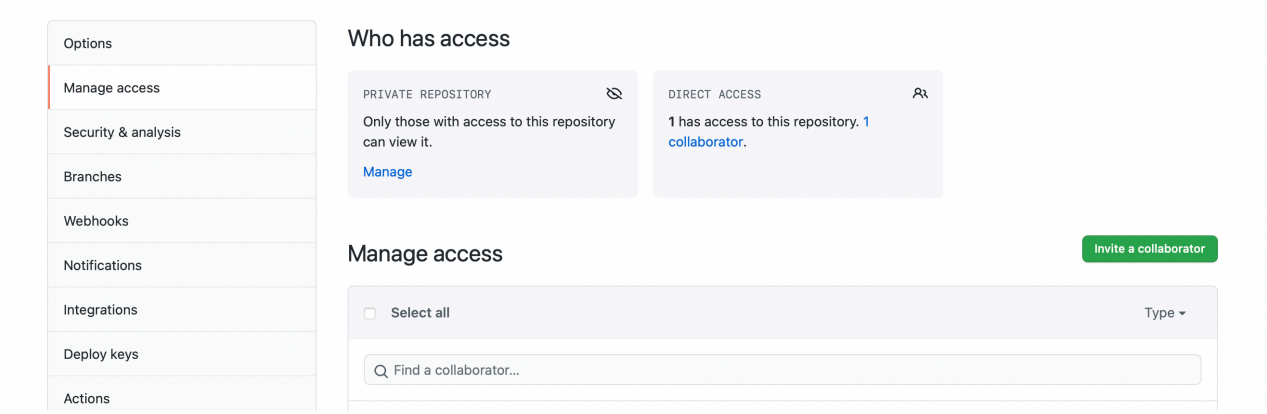
Raft Lab 0：配置环境及学习raft

提交须知：本Lab中暂不需要完成任何代码部分，但需要配置好环境，并回答下列的数个问题才可以获得全部分数。本Lab的ddl为7月18号的23:59分，将提交的文件发至yang_xinyu@sjtu.edu.cn

创建仓库

在本次lab中，需要你们创建一个private的仓库并给我相应的访问权限。



请在提交的文件中附上你的repo地址！

环境配置

在这部分中，你需要按照之前下发的文件配置相应的环境，并在raft目录下进行测试，预期的结果如下。

```
(base) malachite@yangxinyudeMacBook-Air src % cd raft
(base) malachite@yangxinyudeMacBook-Air raft % go test
Test (2A): initial election ...
--- FAIL: TestInitialElection2A (5.01s)
    config.go:326: expected one leader, got none
Test (2A): election after network failure ...
^Csignal: interrupt
FAIL    Raft/raft       12.067s
(base) malachite@yangxinyudeMacBook-Air raft %
```

关于这个部分不需要提交任何内容，但如存在环境问题**请尽快和助教联系**。

关于Raft的一些问题

在这部分中，你需要根据下发的论文去回答一些raft相关的问题。

1. Try to prove the Leader Completeness in your own words.

Leader Completeness: if a log entry is committed in a given term, then that entry will be present in the logs of the leaders for all higher-numbered terms. §5.4

2. Suppose we have the scenario shown in the Raft paper's Figure 7: a cluster of seven servers, with the log contents shown. The first server crashes (the one at the top of the figure), and cannot be contacted. A leader election ensues. For each of the servers marked (a), (d), and (f), could that server be elected? If yes, which servers would vote for it? If no, what specific Raft mechanism(s) would prevent it from being elected?

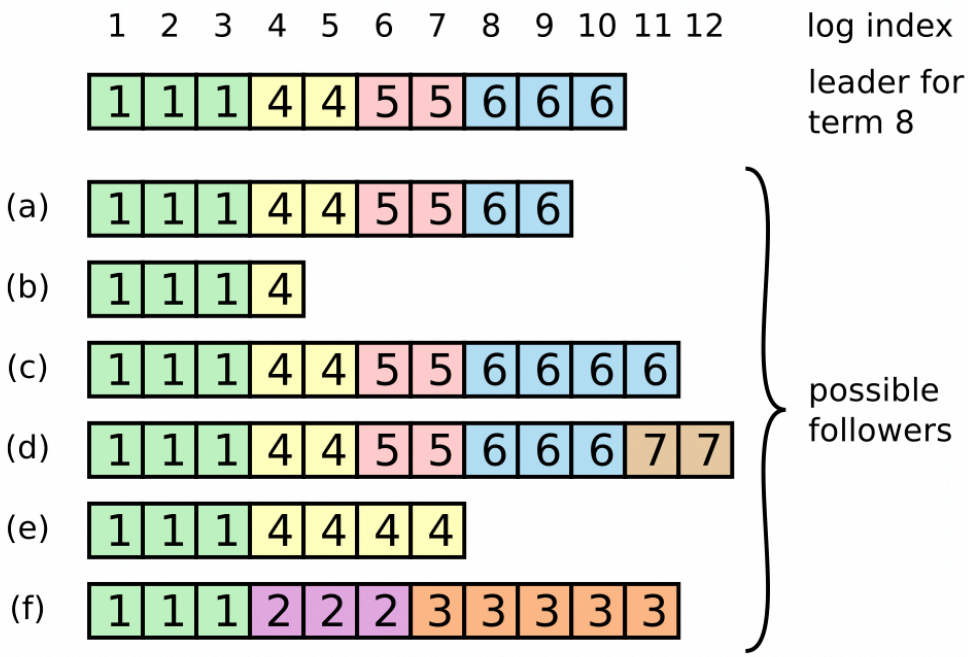
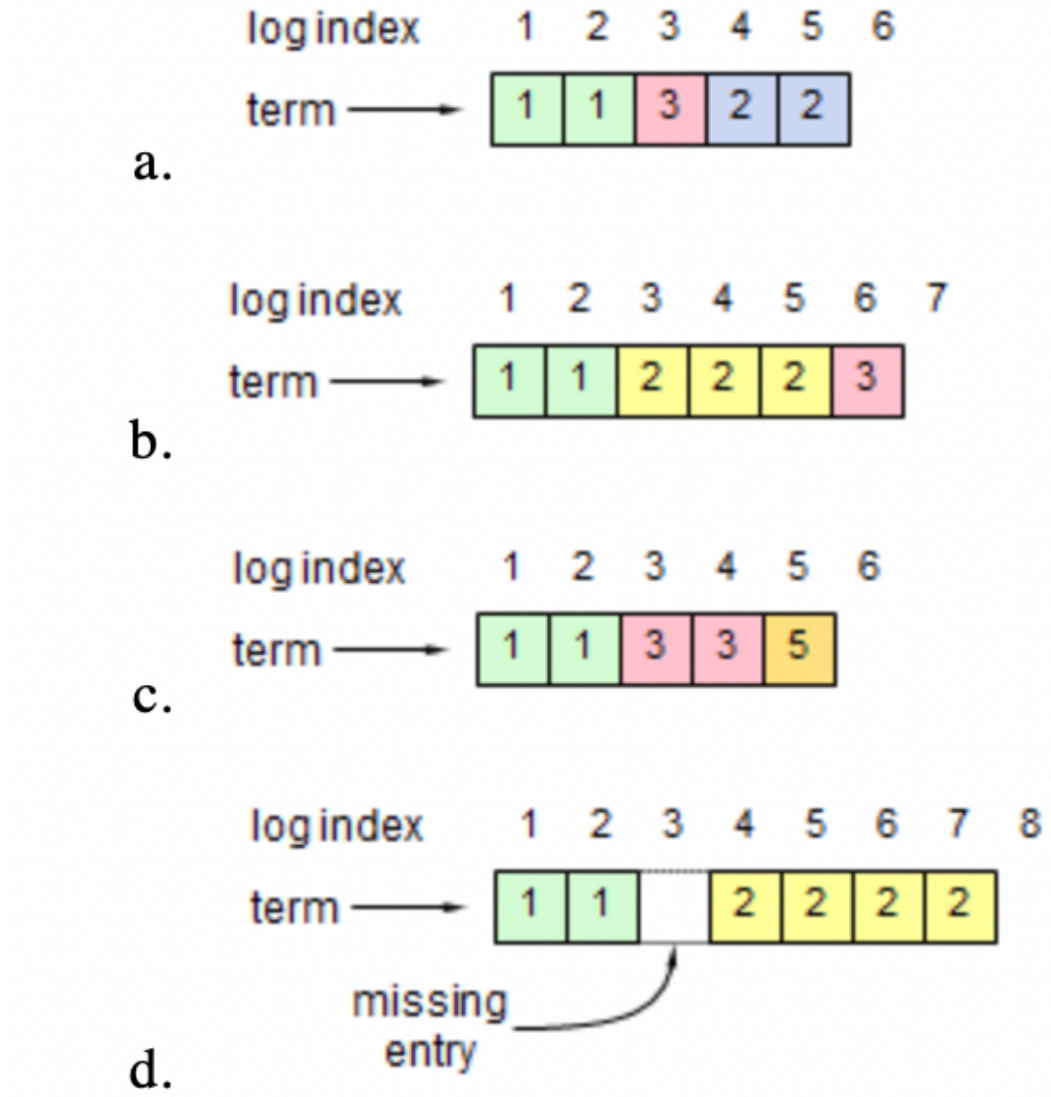


Figure 7: When the leader at the top comes to power, it is possible that any of scenarios (a–f) could occur in follower logs. Each box represents one log entry; the number in the box is its term. A follower may be missing entries (a–b), may have extra uncommitted entries (c–d), or both (e–f). For example, scenario (f) could occur if that server was the leader for term 2, added several entries to its log, then crashed before committing any of them; it restarted quickly, became leader for term 3, and added a few more entries to its log; before any of the entries in either term 2 or term 3 were committed, the server crashed again and remained down for several terms.

3. Each figure below shows a possible log configuration for a Raft server (the contents of log entries are not shown; just their indexes and terms). Considering each log in isolation, could that log configuration occur in a proper implementation of Raft? If the answer is "no," explain why not.



4. Suppose that a hardware or software error corrupts the nextIndex value stored by the leader for a particular follower. Could this compromise the safety of the system? Explain your answer briefly.
5. Try to list at least two differences between **Raft** and **Paxos**, and explain them briefly.

   Here are three reference, and you can also learn Paxos from Internet.

   Paxos & Raft: https://dl.acm.org/doi/pdf/10.1145/3293611.3331595

   Paxos vs. Raft: https://arxiv.org/pdf/2004.05074.pdf

   Paxos: https://lamport.azurewebsites.net/pubs/paxos-simple.pdf