git

Git History

- Created by Linus Torvalds for work on the Linux kernel ~2005
- Used by:

Nearly everybody at this stage…

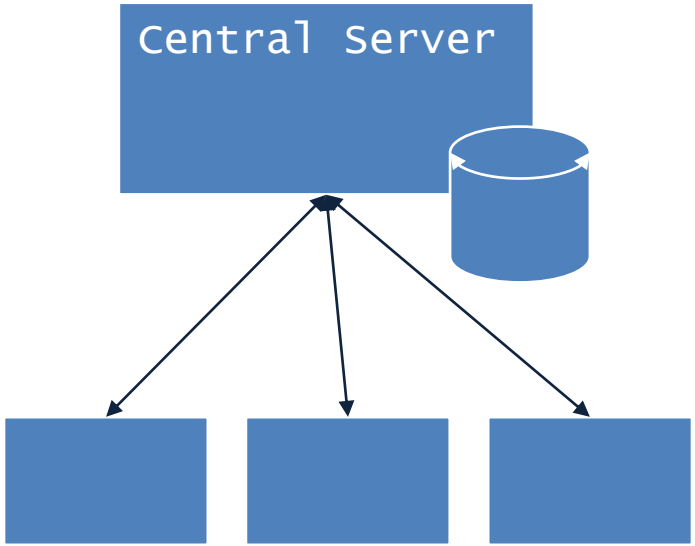
What’s Git

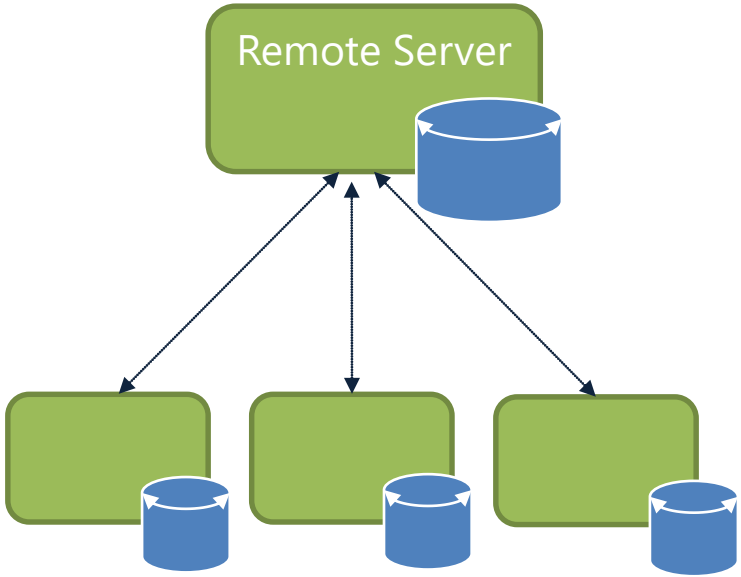
- Distributed Version Control
- Directory Content Management
- Tree Based History
- Everybody has complete history

Distributed Content

- Everyone has their own copy
- Work Offline
- No Central Authority
  - Except by mutual agreement
- Changes can be shared without a server…
  - Can be configured to work peer to peer
  - Can keep collaborating even if server is gone…

Centralised vs Distributed



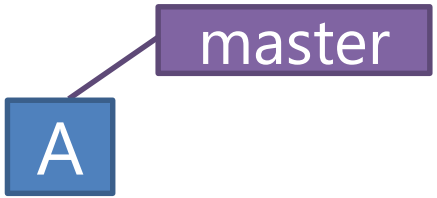


Branching

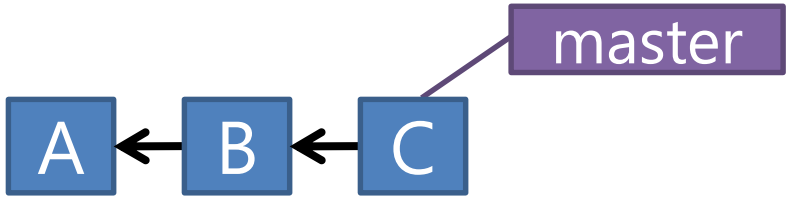
- Like a label on a graph node
- All branching takes place in the same folder/directory
  - Things might appear to disappear depending on what branch you work on…
- You can switch branches
  - Analogous to moving label from one node to another

Initialising a repo…

```
[ec2-user@ip-10-34-209-81 ~]$ mkdir myproject
[ec2-user@ip-10-34-209-81 ~]$ cd myproject
[ec2-user@ip-10-34-209-81 myproject]$ git init
Initialized empty Git repository in /home/ec2-user/myproject/.git/
 git config --global user.name “fxwalsh“
git config --global user.email fxwalsh@wit.com
[ec2-user@ip-10-34-209-81 myproject]$ vi README.txt
[ec2-user@ip-10-34-209-81 myproject]$ git add .
[ec2-user@ip-10-34-209-81 myproject]$ git commit -m 'initial commit'
[master (root-commit) 7d738f4] initial commit
1 file changed, 1 insertion(+)
 create mode 100644 README.txt
[ec2-user@ip-10-34-209-81 myproject]$
```

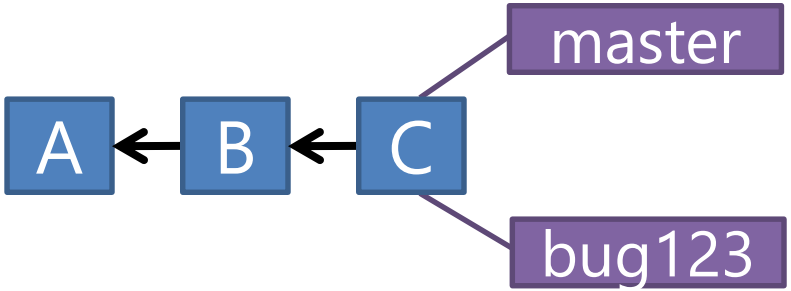


Multiple Commits



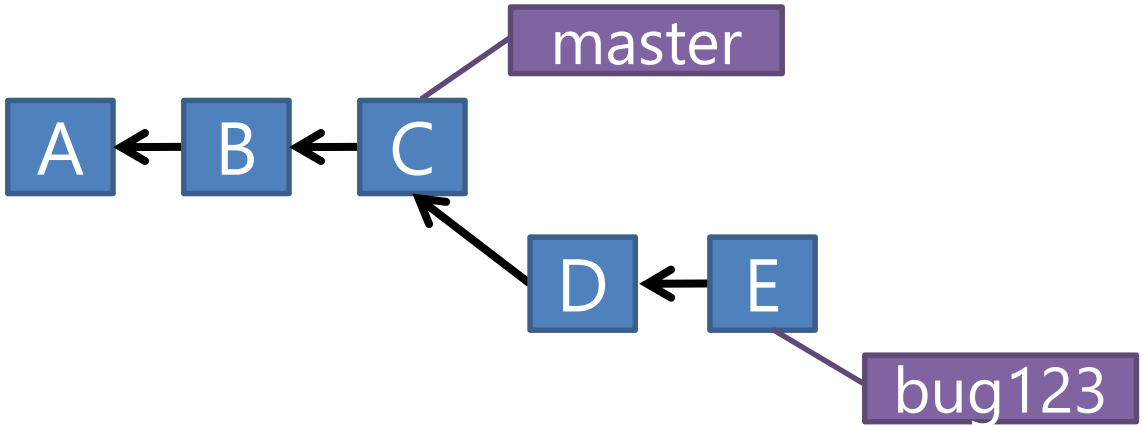
git commit –m “updated text file”
git commit –m “updated text file again”

Branching




```
git checkout -b bug123
Switched to a new branch 'bug123'
```

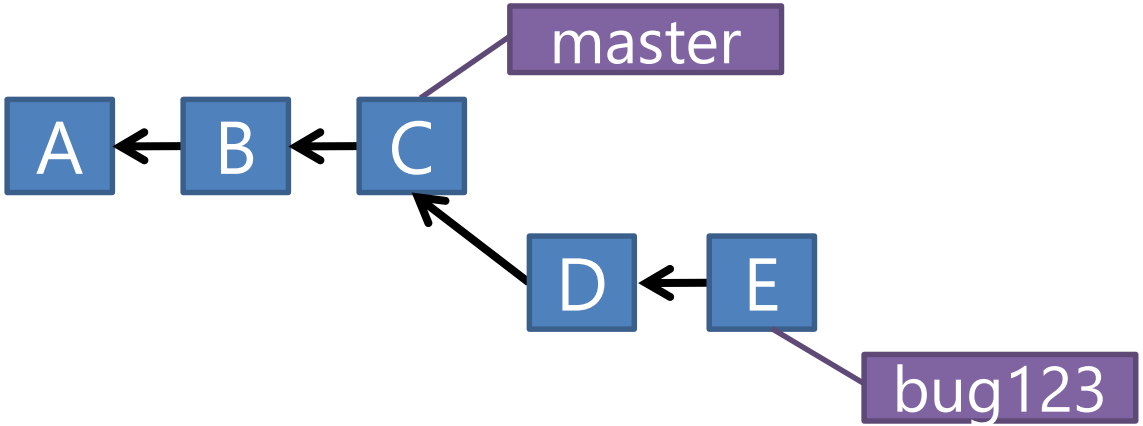
Branching



git commit –m “bug fix”

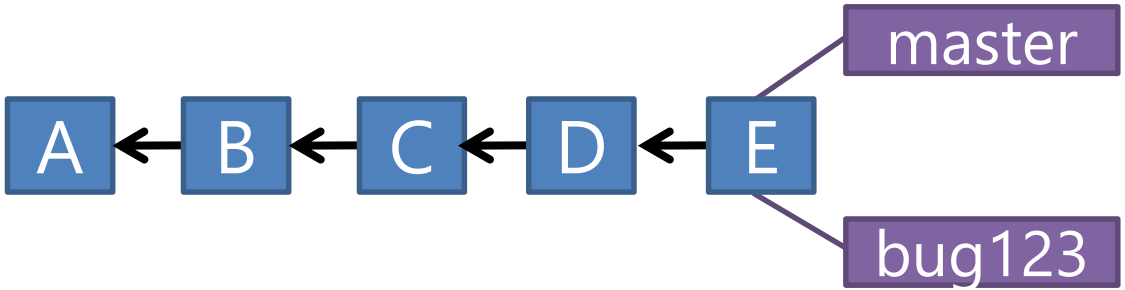
git commit –m “another code fix”

Branching



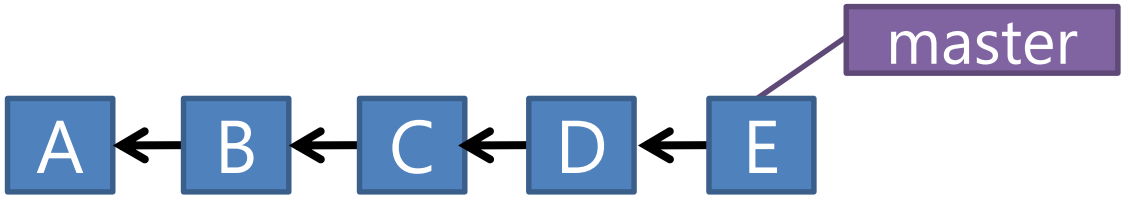

```
git checkout master
vi README.txt
```

Branching



git merge bug123

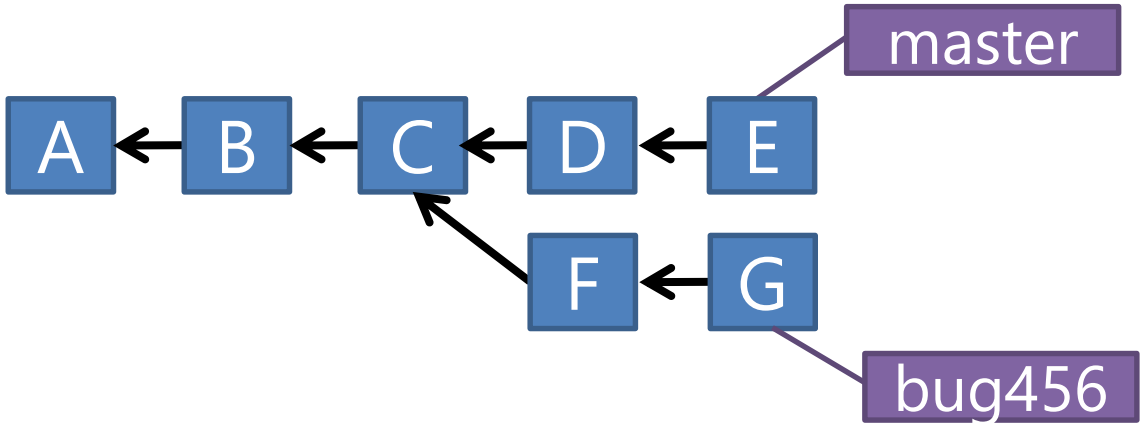
Delete Branch




```
git branch -d bug123
```

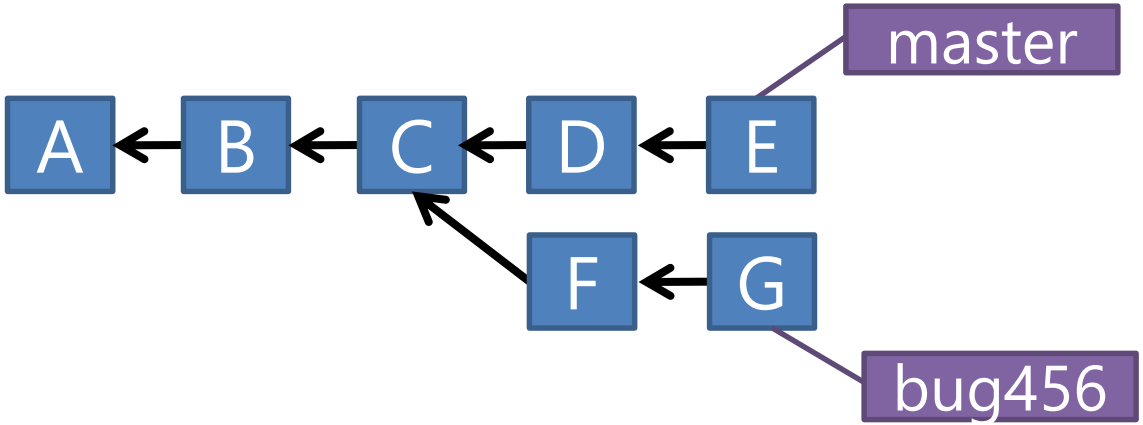
Deleted branch bug123 (was 0e85eb8).

Branching



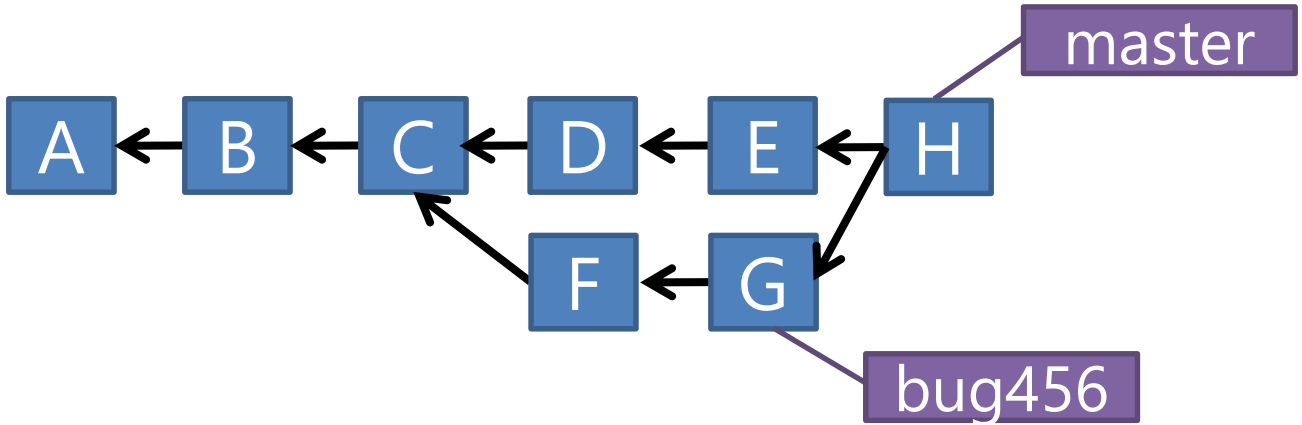
•Suppose another bug branch off of (C).
•Also, changes have happened in master (bug 123 which we just merged) since then.
•Also, two commits in bug456.

Merging



git checkout master

Merging

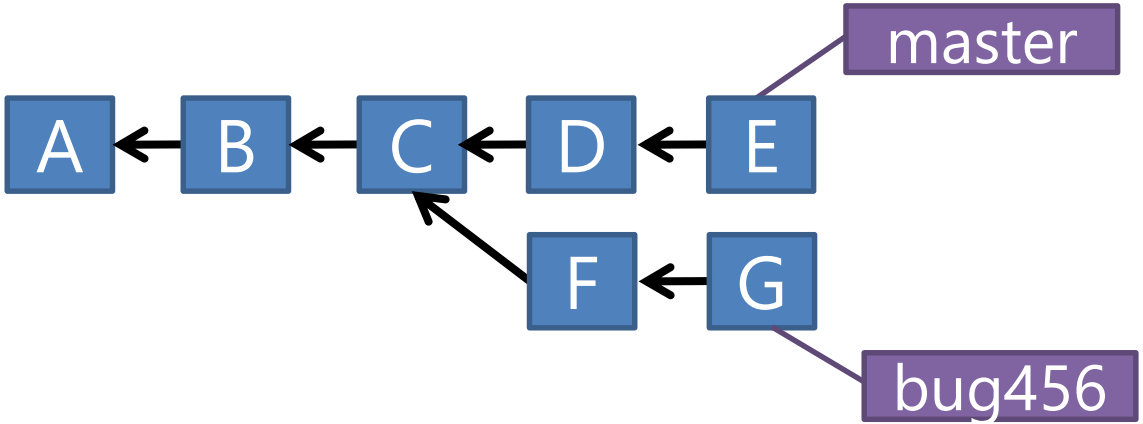


git merge bug456

if there are conflicts, they need to be resolved manually

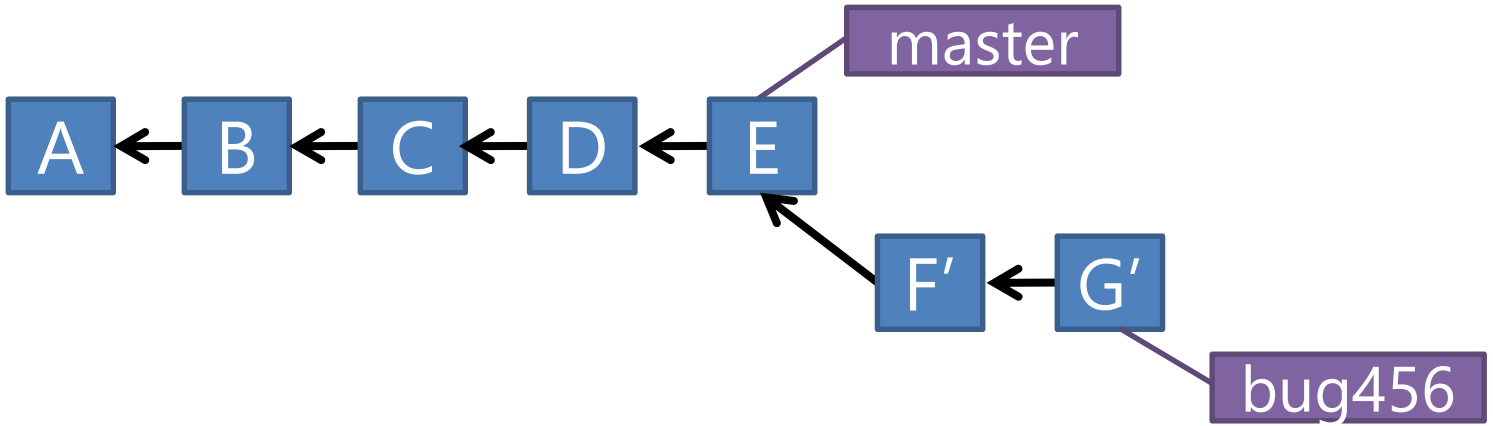
Also deleting the bug456 branch can leave a non-linear, messy structure.

Merging - Rebase



As before, but this time we rebase first….

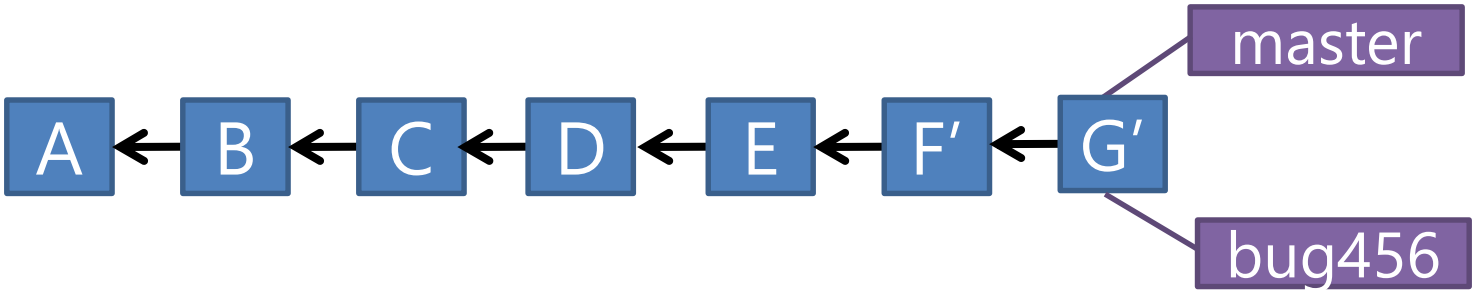
Merging: Rebase



- Changes on (C) are undone and applied to (E) instead.

```
git checkout bug456
git rebase master
```

Merging: Rebase



git checkout master
git merge bug456

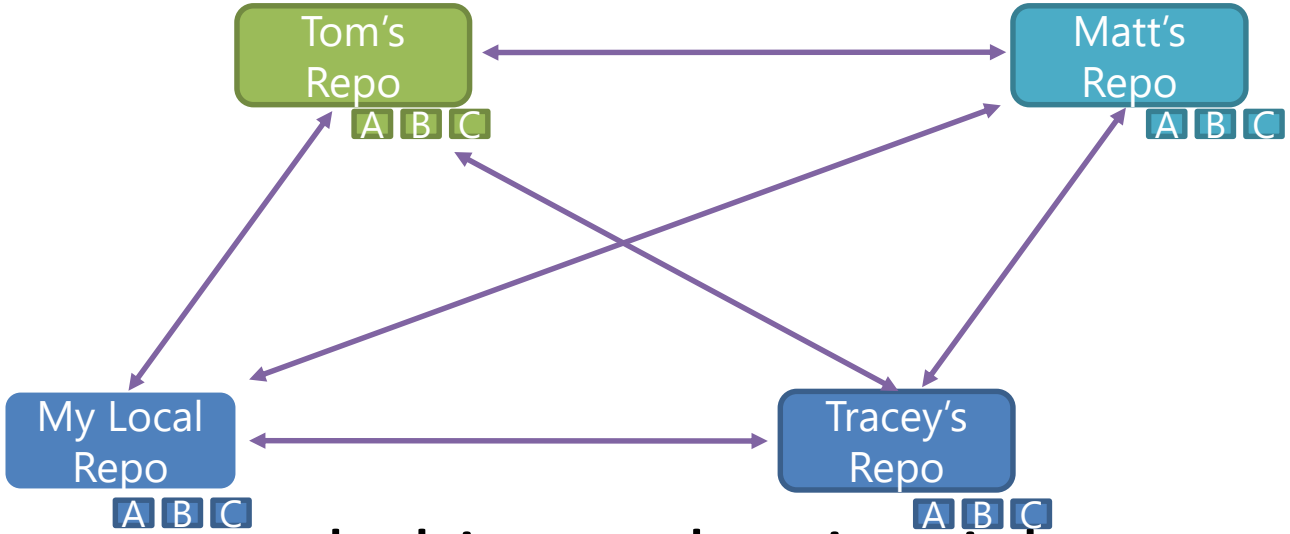
- Linear, causal flow of changes.
- Less snapshots in repository

Branching and Merging: Key points

- Quick and Easy to create ‘Feature’ Branches
- Very capable tool to manage changes
- Rebasing helps keep things clearer.

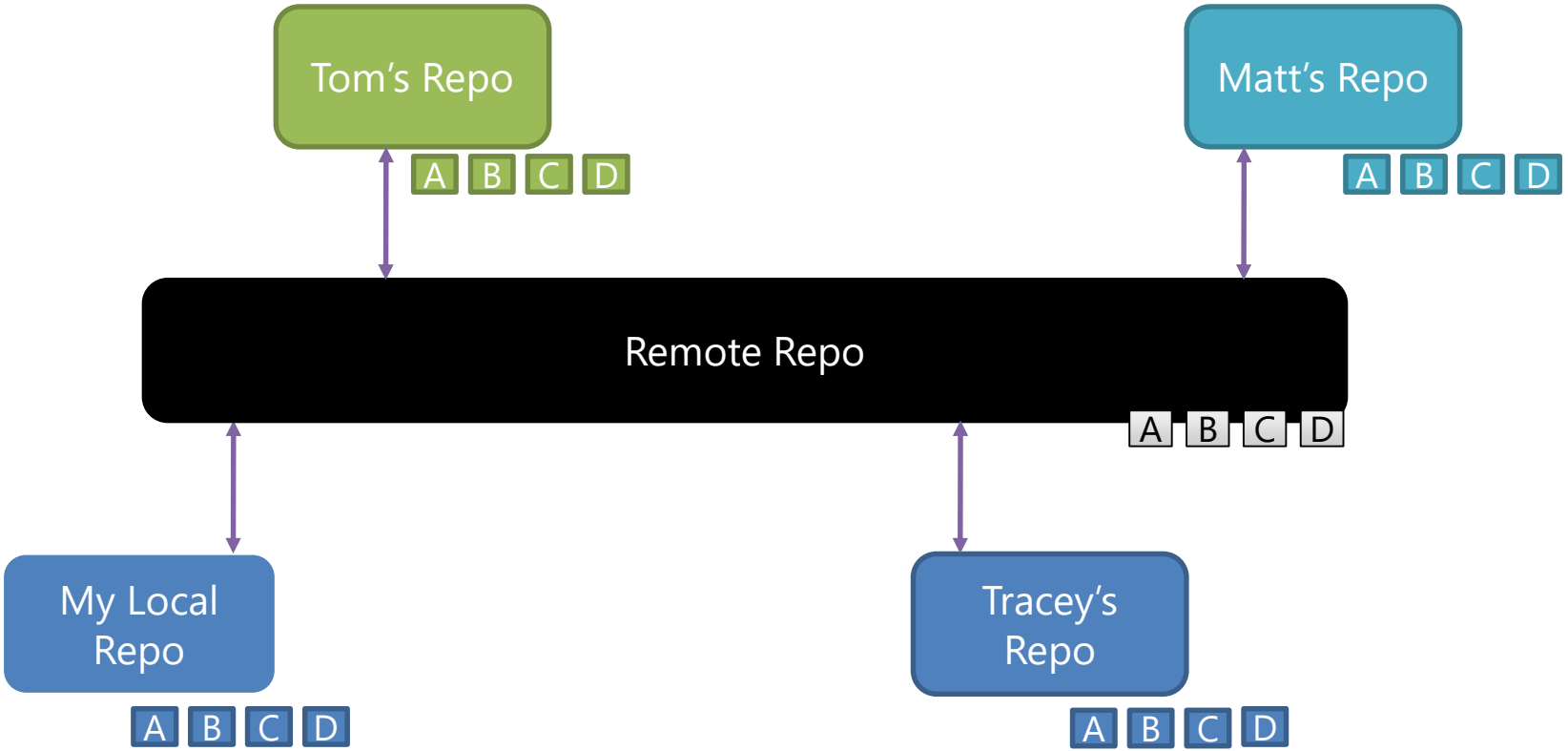
Collaborating with Git

Peer – to Peer



- You can work this way but it might get complicated

Central Repository (e.g. GitHub)



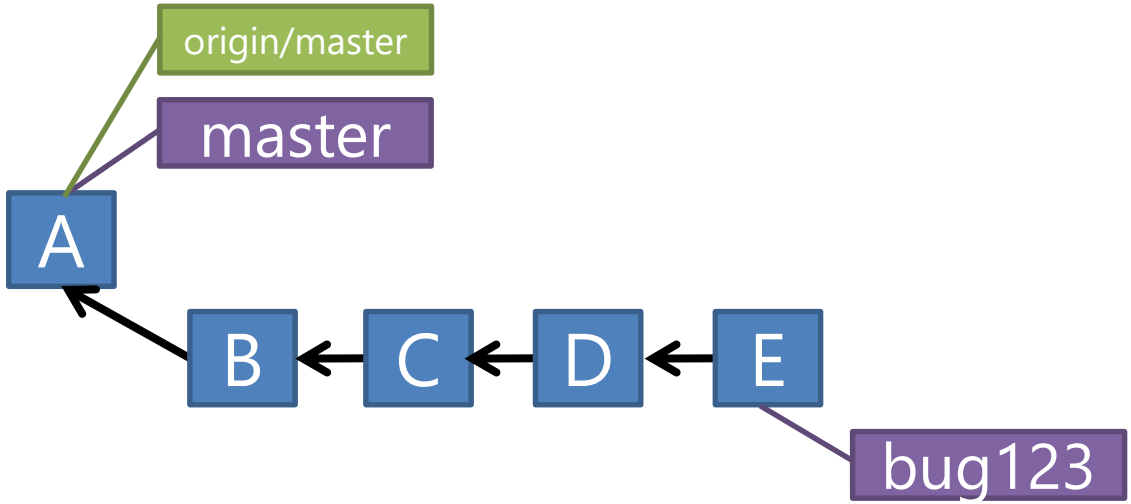
Adding a Remote Repo to Existing Project

```
 git remote add origin https://github.com/fxwalsh/BSc4Repo.git
 git remote -v
origin  https://github.com/fxwalsh/BSc4Repo.git (fetch)
origin  https://github.com/fxwalsh/BSc4Repo.git (push)
```

Setting up Remote via Cloning

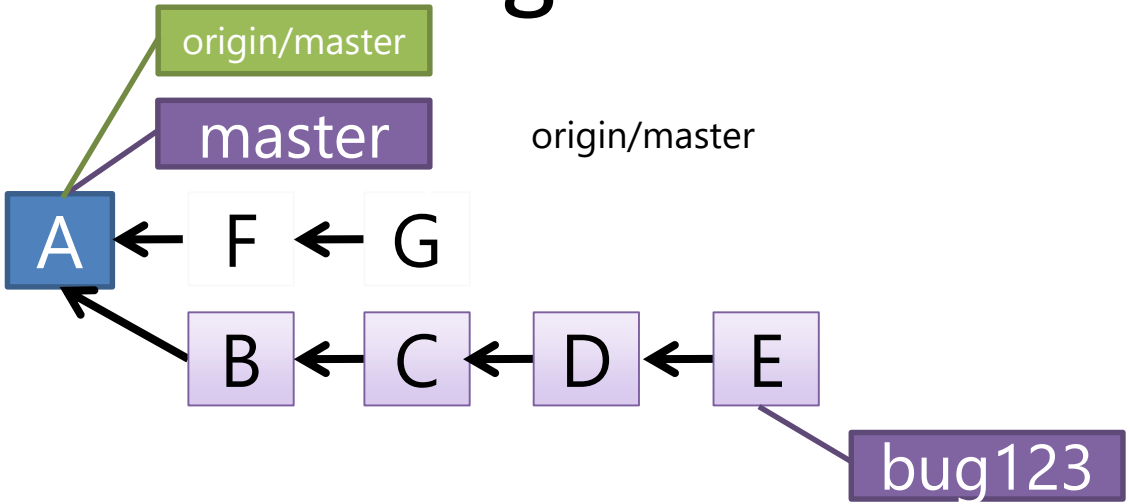
```
 git clone
……
 git remote -v
origin  https://github.com/fxwalsh/BSc4Repo.git (fetch)
origin  https://github.com/fxwalsh/BSc4Repo.git (push)
```

Branching with Remote



Changes on Bug123 branch are only local.

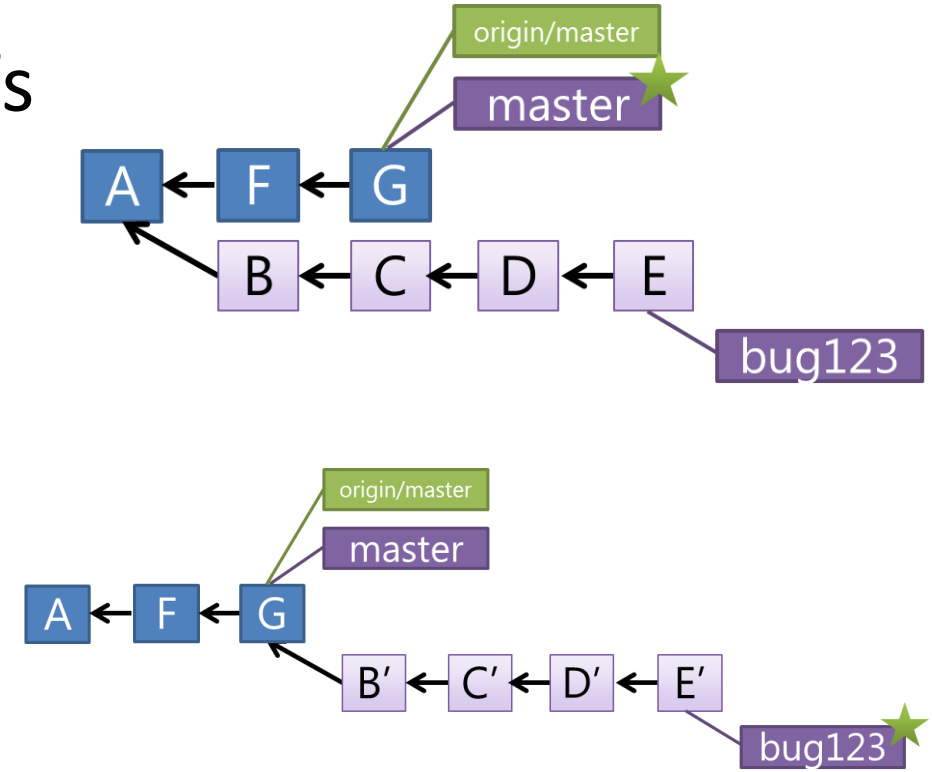
Branching with Remote



- Can have situation where there's two versions of the origin/master
  1. what was last known about the upstream master
  2. what is actually up there (which we don't know about).

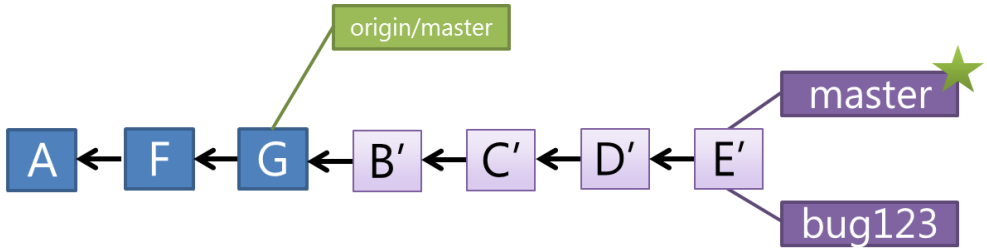
Branching with Remote

- Update Master to what's on remote
  - git checkout master
  - git pull origin
- Rebase the bug123 branch
  - git checkout bug123
  - git rebase

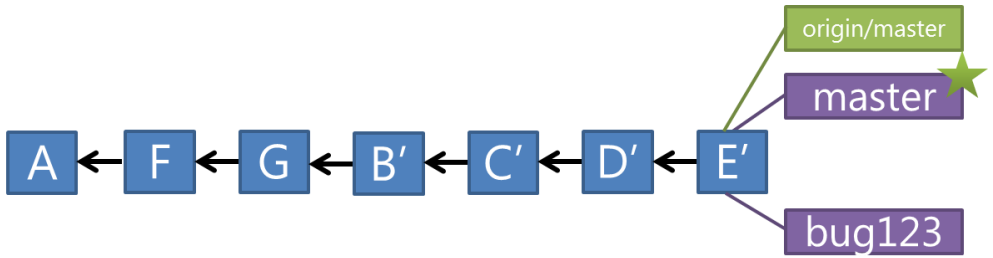


Branching with Remote

```
git merge bug123
```




```
git push origin
```



Push

- Pushes your changes to remote
- Changes will be rejected if newer changes exist on remote
- Good to pull then push
  - merge locally, then push the results.