# GIT: From Beginner To Fearless

GIT Real Life Activity 01:
I accidentally committed to master on my local.
What do I do?

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## Introduction

It happened. You were working away and you didn't realize it, but you accidentally put a couple of commits directly to the local master branch. Thankfully, you never pushed the commits to remote, but you need to keep your changes, and you need to get them on their own branch, while also restoring your master branch back to the state it should be in sync with the remote master.

At this point, we can breathe a bit easy because nothing was harmed at remote. However, we want to keep our changes as they should have been on our own branch, not master.

How do we fix the problem, keeping our commits and restoring master?

- 1) If scared, could backup master locally. There is no reason to do this, however.
- 2) Pick the commits to keep into our feature branch so that we don't lose them and have them where we want them
- 3) Make a choice: Could just delete local master and get a new local copy from remote [simplest option] OR
- 4) Perform a hard reset of master from remote [fastest option]
- 5) Checkout the feature branch with the correct commits and merge master into it OR rebase master
- 6) Push final version to remote from feature branch
- 7) Create PR and merge your changes

Let's get started.



## GFBTF: Git Real-Life Activity 01 – Accidentally committed to master

### Step 1: Setup the situation

a) Create a feature branch.

Make sure you are even with remote from master, then create a local feature branch.

```
[git checkout -b pick-and-reset]
[git push -u origin pick-and-reset]
```

```
Signit checkout -b pick-and-reset
Switched to a new branch 'pick-and-reset'
blgor@corsAIRONE MINGW64 /c/MGS/DemoArena/defaultweb/Defaultweb_WorkingDirectory (mass spit checkout -b pick-and-reset'
blgor@corsAIRONE MINGW64 /c/MGS/DemoArena/defaultweb/Defaultweb_WorkingDirectory (pick-reset)
s git push -u origin pick-and-reset
Total 0 (delta 0), reused 0 (delta 0)
remote:
remote: Create a pull request for 'pick-and-reset' on GitHub by visiting:
remote: https://github.com/blgorman/Defaultweb_WorkingDirectory/pull/new/pick-and-et
remote:
To https://github.com/blgorman/Defaultweb_WorkingDirectory.git
* [new branch] pick-and-reset -> pick-and-reset
Branch 'pick-and-reset' set up to track remote branch 'pick-and-reset' from 'origin'.
```

Move the feature branch ahead a couple of commits to simulate your workflow

```
blgor@corsairone Mingw64 /c/Mgs/Demoarena/defaultweb/Defaultweb_workingDirectory (pick-and-reset)
$ git commit -am "Important Feature change on index part 1"
[pick-and-reset 444333a] Important Feature change on index part 1
1 file changed, 1 insertion(+), 1 deletion(-)

blgor@corsairone Mingw64 /c/Mgs/Demoarena/defaultweb/Defaultweb_workingDirectory (pick-and-reset)
$ git commit -am "Another feature change on index part 2"
[pick-and-reset 73ec767] Another feature change on index part 2
1 file changed, 1 insertion(+), 1 deletion(-)

blgor@corsairone Mingw64 /c/Mgs/Demoarena/defaultweb/Defaultweb_workingDirectory (pick-and-reset)
$ git log --oneline
73ec767 (HEAD -> pick-and-reset) Another feature change on index part 2
444333a Important Feature change on index part 1
bff6968 (origin/pick-and-reset, origin/master, origin/HEAD, master) Merge pull request #1
```

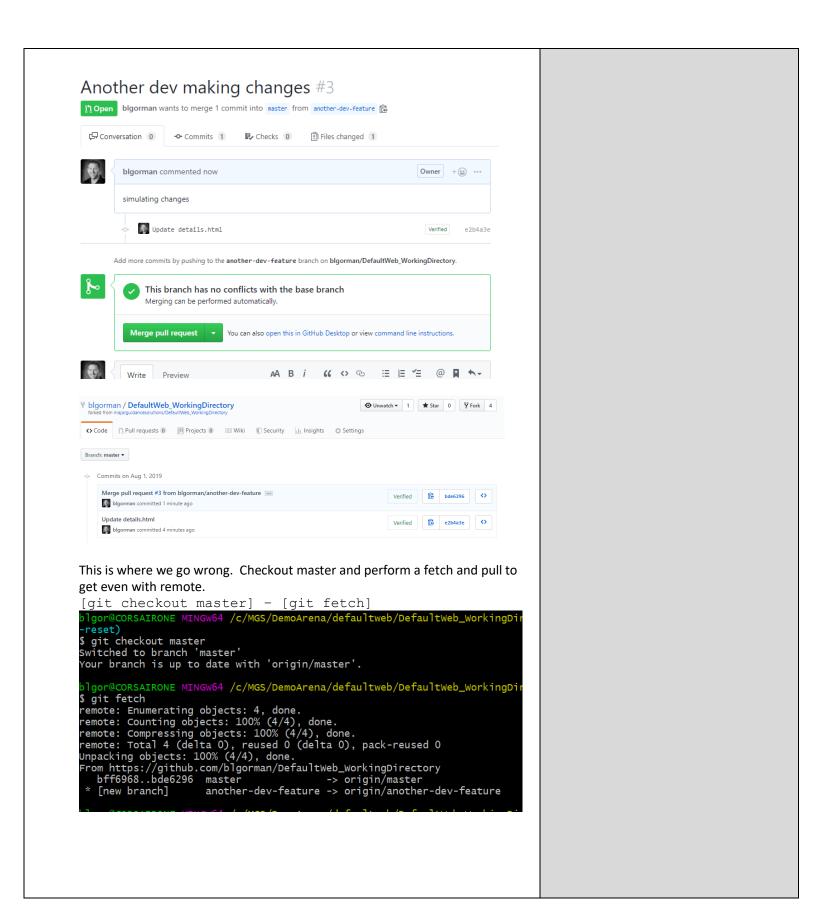
b) Create a couple of remote commits to move master ahead.

We need to simulate that we had a reason to sync up with master – which is why we would check it out and go wrong.

Go to Github and simulate another team member making some changes

Make any changes and then merge the pull request.



```
[git status] - [git pull] - [git log --oneline]
    blgor@CORSAIRONE MINGW64 /c/MGS/DemoArena/defaultw
   $ git status
   On branch master
   Your branch is behind 'origin/master' by 2 commits
      (use "git pull" to update your local branch)
   nothing to commit, working tree clean
           IRONE MINGW64 /c/MGS/DemoArena/defaultweb/Defaultweb_WorkingDirectory (master)
    5 git pull
Jpdating bff6968..bde6296
Fast-forward
details.html | 1 +
1 file changed, 1 insertion(+)
     gor@corsAirone Mingw64 /c/MGS/DemoArena/defaultweb/DefaultWeb_WorkingDirectory (master)
git log --oneline
de6296 (HEAD -> master, origin/master, origin/HEAD) Merge pull request #3 from blgorman/a
              c) Forget to go back to feature branch, and create a couple of new
   commits
   Forget to checkout the feature branch and make two or more new commits on
   master directly
   [git commit -am "your message..."]
    blgor@CORSAIRONE MINGW64 /c/MGS/DemoArena/defaultweb/Defaultw
    $ git commit -am "Making more important changes #3"
    [master 11190f7] Making more important changes #3
    1 file changed, 1 insertion(+), 1 deletion(-)
    lgor@corsairone Mingw64 /c/Mgs/DemoArena/defaultweb/Def
     git commit -am "Making more important changes #4"
    master 0e41cb3] Making more important changes #4
    1 file changed, 1 insertion(+), 1 deletion(-)
    [git status]
    $ git status
   On branch master
```

Your branch is ahead of 'origin/master' by 2 commits.
(use "git push" to publish your local commits)

Now that we are on master instead of our feature branch making commits, we realize our mistake, and need to clean it up.



# Step 2: Pick the commits that are on local master to the correct feature branch

a) Find the commits you want to keep from your local master [git log --oneline]

```
blgor@corsatrone MINGW64 /c/MGS/DemoArena/defaultweb/Defaultw $ git log --oneline 0e41cb3 (HEAD -> master) Making more important changes #4 11190f7 Making more important changes #3 bde6296 (origin/master, origin/HEAD) Merge pull request #3 fr Here I've identified commits 0e41cb3 and 11190f7, which I want to put on my feature branch.
```

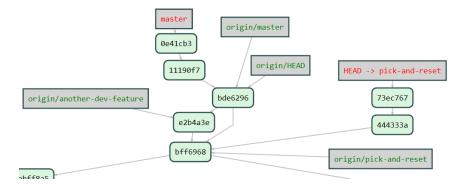
blgor@CORSAIRONE MINGW64 /c/MGS/DemoArena/defaultweb/De
\$ git checkout pick-and-reset
Switched to branch 'pick-and-reset'

b) Switch to the feature branch and validate commits before picking

Switched to branch 'pick-and-reset'
Your branch is ahead of 'origin/pick-and-reset' by 2 comes (use "git push" to publish your local commits)

blgor@CORSAIRONE MINGW64 /c/MGS/DemoArena/defaultweb/De

```
-reset)
$ git log --oneline
73ec767 (HEAD -> pick-and-reset) Another feature change
444333a Important Feature change on index part 1
bff6968 (origin/pick-and-reset) Merge pull request #1 f
```



c) Try to cherry-pick the two commits from master to the feature branch [git cherry-pick 11190f7..0e41cb3]

```
blgor@corsAIRONE MINGW64 /c/MGS/DemoArena/defaultweb/Defaultw-reset)
$ git cherry-pick 11190f7..0e41cb3
[pick-and-reset 4e0416e] Making more important changes #4
Date: Thu Aug 1 01:39:54 2019 -0500
1 file changed, 1 insertion(+), 1 deletion(-)
blgor@corsAIRONE MINGW64 /c/MGS/DemoArena/defaultweb/Defaultw-reset)
$ |
```

Uh-oh, that doesn't look like it did what I hoped







Ok, so that's not the answer either.

d) Pick the commits one-by-one onto the branch

```
One solution is we could just pick the commits one-by-one onto our branch: [git cherry-pick 11190f7]
```

Followed by

[git cherry-pick 0e41cb3]

```
blgor@corsairone Mingw64 /c/Mgs/DemoArena/defaultweb/Defaultweb_Nereset)

§ git cherry-pick 11190f7
[pick-and-reset d4b46cf] Making more important changes #3
Date: Thu Aug 1 01:36:57 2019 -0500

1 file changed, 1 insertion(+), 1 deletion(-)

blgor@corsairone Mingw64 /c/Mgs/DemoArena/defaultweb/Defaultweb_Nereset)

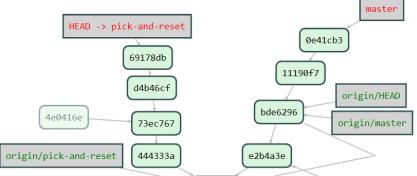
§ git cherry-pick 0e41cb3
[pick-and-reset 69178db] Making more important changes #4
Date: Thu Aug 1 01:39:54 2019 -0500

1 file changed, 1 insertion(+), 1 deletion(-)
```

#### And review

[git log --oneline]

```
$ git log --oneline
69178db (HEAD -> pick-and-reset) Making more important changes #4
d4b46cf Making more important changes #3
73ec767 Another feature change on index part 2
444333a Important Feature change on index part 1
bff6968 (origin/pick-and-reset) Merge pull request #1 from blgorman
```



So we know this would work, and we could go on...but what if there was an easier way?

e) [Optional] Reset and then get the commits with a rebase --onto operation:

This is optional, but I want to show it. First, reset back to the commit where you were two steps in but still needing the other two steps [should be the same reset command as earlier]:

```
[git reset --hard 73ec767]

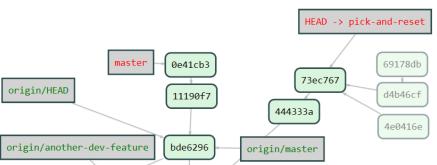
blgor@corsAIRONE MINGW64 /c/MGS/DemoArena/defaultweb/Defaultweb-reset)

$ git reset --hard 73ec767

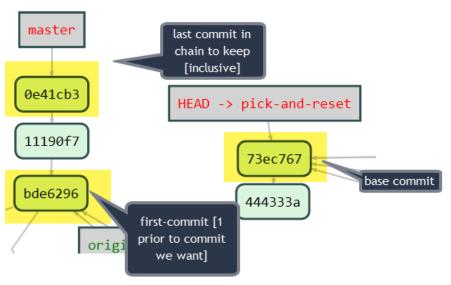
HEAD is now at 73ec767 Another feature change on index part 2
```







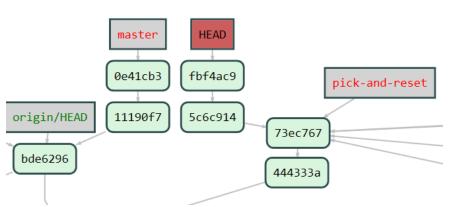
Now perform a "rebase --onto" operation. Important, the "Base-commit" is where you are putting commits to. The first commit is exclusive, so choose the commit PRIOR to the first commit you want to include, the last commit is inclusive, so choose the last commit in the chain (could be 3,4,5, or more commits ahead, still only use base, first, and last:



[git rebase --onto <base-commit> <first-commit> <last-commit>]
blgor@corsAIRONE MINGW64 /c/MGS/DemoArena/defa-reset)
\$ git rebase --onto 73ec767 bde6296 0e41cb3
First, rewinding head to replay your work on tapplying: Making more important changes #3
Applying: Making more important changes #4
blgor@corsAIRONE MINGW64 /c/MGS/DemoArena/defa...))
\$ |

This is doing what we want, but it's in a detached head state:



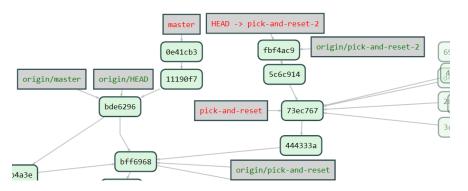


So our options are to checkout a new branch and then push that with our four commits and remove the 'pick-and-reset' branch, Or we could checkout a new branch and then merge that to pick-and-reset. It's the same result either way. Since we'll have all four and don't need a merge commit, let's do our new branch to upstream and then remove the local and upstream version of the original branch

[git checkout -b pick-and-reset-2]

```
blgor@corsairone mingw64 /c/Mgs/DemoArena/def
...))
$ git checkout -b pick-and-reset-2
Switched to a new branch 'pick-and-reset-2'
```

[git push -u origin pick-and-reset-2]



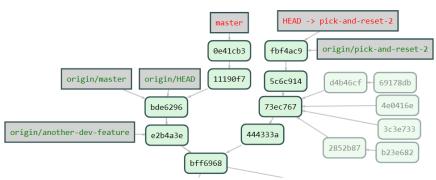
Now delete pick-and-reset at local and at origin

[git branch -D pick-and-reset]

```
blgor@corsairone Mingw64 /c/MGS/DemoArena/defaultwel-reset-2)
$ git branch -D pick-and-reset
Deleted branch pick-and-reset (was 73ec767).
```



```
[git push origin :pick-and-reset]
blgor@CORSAIRONE MINGW64 /c/MGS/DemoArena/defaultweb/Defaultwe
-reset-2)
$ git push origin :pick-and-reset
To https://github.com/blgorman/Defaultweb_WorkingDirectory.git
- [deleted] pick-and-reset
```



Now we have all of our changes in the pick-and-reset-2 branch, and we just need to cleanup master.

f) [Optional] Clean up local commit refs from the rebase and other reset operations.

As we have a bunch of orphaned commits, could clean these up locally by forcing the garbage collector to run.

```
[git reflog expire --expire-unreachable=now --all]
```

```
blgor@CORSAIRONE MINGW64 /c/MGS/DemoArena/defaultweb
-reset-2)
$ git reflog expire --expire-unreachable=now --all|
[git gc -prune=now]
```

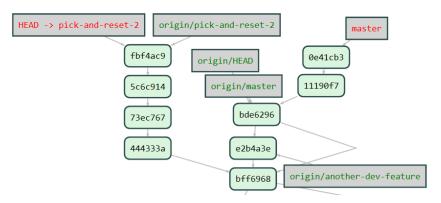
```
[git gc -prune=now]

blgor@CORSAIRONE MINGW64 /c/MGS/DemoArena/defaultw-reset-2)

$ git gc --prune=now
Enumerating objects: 163, done.
Counting objects: 100% (163/163), done.
Delta compression using up to 8 threads
Compressing objects: 100% (74/74), done.
Writing objects: 100% (163/163), done.
Total 163 (delta 78), reused 158 (delta 76)
```



#### Which gets us nice and clean:



## Step 3: Perform a hard reset of master

a) Hard reset local master to sync up with origin master

IMPORTANT: DON'T forget to checkout local master FIRST!
[git checkout master]

```
blgor@corsAIRONE MINGW64 /c/MGS/DemoArena/defaultweb/D-reset-2)
$ git checkout master
Switched to branch 'master'
Your branch is ahead of 'origin/master' by 2 commits.
(use "git push" to publish your local commits)
```

Perform a hard reset against origin/master to sync up the local master with remote [NOTE: this does NOT affect the remote branch, so no fear!] [git reset --hard origin/master]

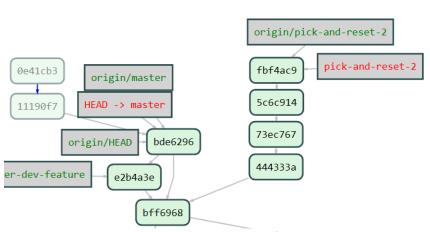
```
plgor@corsAirone Mingw64 /c/MGS/DemoArena/defaultweb/Defaultweb_WorkingDirectory (master)

$ git reset --hard origin/master

| double-check this | first!!!
```

blgor@CORSAIRONE MINGW64 /c/MGS/DemoArena/defaultweb/Defaultweb\_WorkingDirectory (master) \$ git reset --hard origin/master HEAD is now at bde6296 Merge pull request #3 from blgorman/another-dev-feature





And we have more orphaned commits, but that's ok, our local master is now good-to-go. We'll cleanup the orphaned commits later

# Step 4: Rebase master to your local feature, then create the Pull Request to merge your feature at remote

Since we've been doing a lot of merging, I want to do a rebase to get a better commit history in-line. Also, why not practice a rebase now, right?

NOTE: your master should be up-to-date after hard reset. If you walked away for a bit and a team member moved master forward, you would want to reset again or just do a fetch and pull to make sure your local master is even

a) Checkout feature branch and rebase master [git checkout pick-and-reset-2]

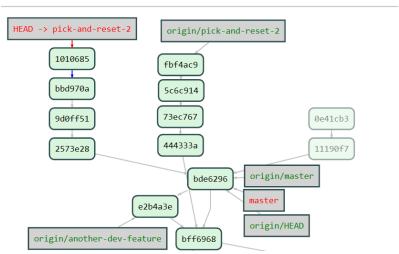
```
blgor@CORSAIRONE MINGW64 /c/MGS/DemoArena/defaultweb/Defaul
$ git checkout pick-and-reset-2
Switched to branch 'pick-and-reset-2'
Your branch is up to date with 'origin/pick-and-reset-2'.
```

[git rebase origin/master] [or] [git rebase master]

```
blgor@CORSAIRONE MINGW64 /c/MGS/DemoArena/defaultweb/Default
t-2)
$ git rebase origin/master
First, rewinding head to replay your work on top of it...
Applying: Important Feature change on index part 1
Applying: Another feature change on index part 2
Applying: Making more important changes #3
Applying: Making more important changes #4
blgor@CORSAIRONE MINGW64 /c/MGS/DemoArena/defaultweb/Default
```

Cool. That looks right! But....





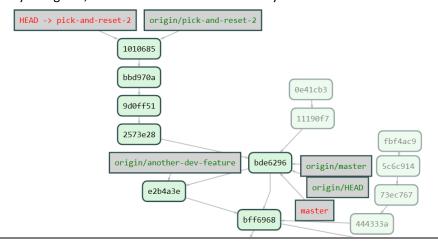
Oh CRAP, now we are out of sync with four new commit ids!

b) Sync after rebase local with master by doing a force-push to branch at origin.

This is where it will make sense to push your branch to origin with a "force-with-lease" --- which is the safe way to push without fear that someone else might have put a change in your commit tree at remote [i.e. checked in a commit after fbf4ac9] [note, again, make sure you are on your feature branch that you intend to push to remote, not master or another branch by accident] [git push --force-with-lease]

```
blgor@CORSAIRONE MINGW64 /c/MGS/DemoArena/defaultweb/Defaultweb_WorkingDiret-2)
$ git push --force-with-lease
Enumerating objects: 15, done.
Counting objects: 100% (15/15), done.
Delta compression using up to 8 threads
Compressing objects: 100% (10/10), done.
Writing objects: 100% (12/12), 1.21 KiB | 414.00 KiB/s, done.
Total 12 (delta 8), reused 2 (delta 2)
remote: Resolving deltas: 100% (8/8), completed with 3 local objects.
To https://github.com/blgorman/Defaultweb_WorkingDirectory.git
+ fbf4ac9...1010685 pick-and-reset-2 -> pick-and-reset-2 (forced update)
```

By doing this, we make sure our remote is in sync with our local



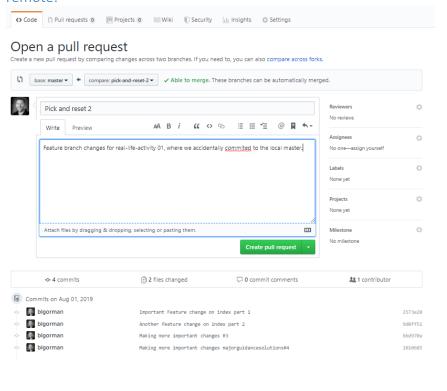


```
$ git log --oneline
1010685 (HEAD -> pick-and-reset-2, origin/pick-and-reset-2) bbd970a Making more important changes #3
9d0ff51 Another feature change on index part 2
2573e28 Important Feature change on index part 1
bde6296 (origin/master, origin/HEAD, master) Merge pull requesture

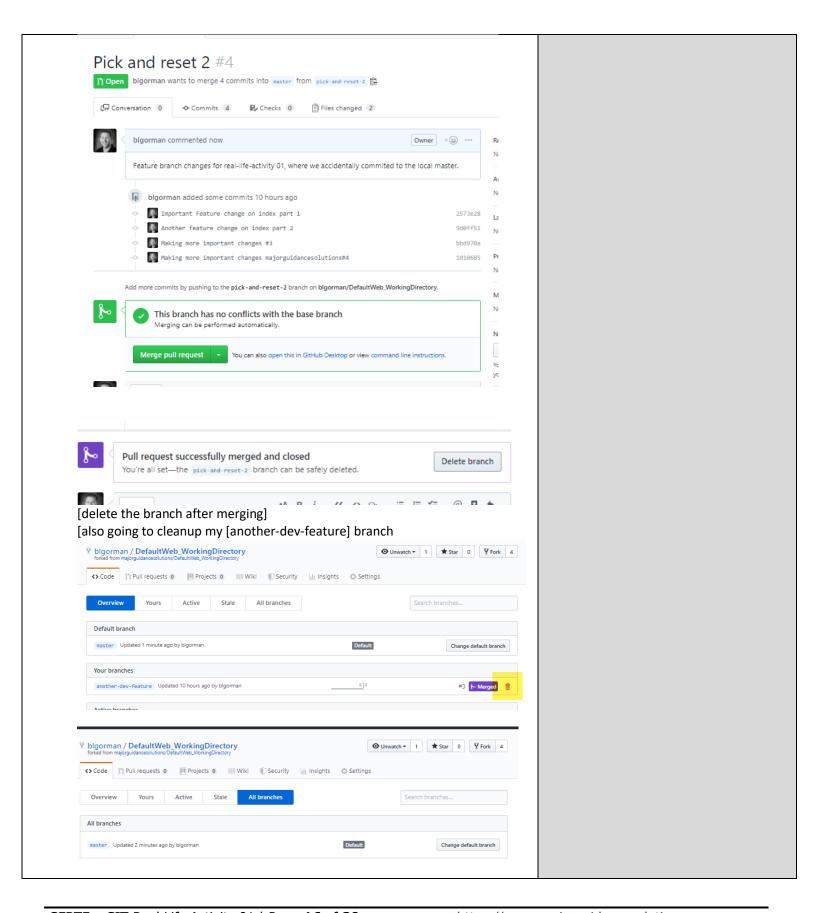
Now we know everything is ok and we are good-to-go! Prove it? Ok...
[git log --oneline --reverse master..]
blgor@corsalrone MINGW64 /c/MGS/DemoArena/defaultweb/Defaultweb_WorkingDirectory (pick-and-ret-2)
$ git log --oneline --reverse master..
2573e28 Important Feature change on index part 1
9d0ff51 Another feature change on index part 2
bbd970a Making more important changes #3
1010685 (HEAD -> pick-and-reset-2, origin/pick-and-reset-2) Making more important changes #4
```

# Step 5: Create and merge the pull request, and optional local cleanup

a) Now that everything is kosher, create and merge the pull request at remote:







SO now I have no active branches at remote, and I've completed the cleanup at GitHub.

b) Cleanup local branches by deleting pick branch and fetch/pull of master

```
[git checkout master]
[git fetch --prune]
[git pull]
```

```
CORSAIRONE MINGW64 /c/MGS/DemoArena/defaultweb/Defaultweb_WorkingDirec
$ git checkout master
Switched to branch 'master'
Your branch is up to date with 'origin/master'.
  lgor@CORSAIRONE MINGW64 /c/MGS/DemoArena/defaultweb/DefaultWeb_WorkingDirect
$ git fetch --prune
From https://github.com/blgorman/Defaultweb_WorkingDirectory
- [deleted] (none) -> origin/another-dev-featur
                                               -> origin/another-dev-feature
-> origin/pick-and-reset-2
    [deleted]
                               (none)
remote: Enumerating objects: 1, done.
remote: Counting objects: 100% (1/1), done.
remote: Total 1 (delta 0), reused 0 (delta 0), pack-reused 0
Unpacking objects: 100% (1/1), done.
bde6296..814d421 master -> origin/master
  gor@CORSAIRONE MINGW64 /c/MGS/DemoArena/defaultweb/Defaultweb_WorkingDirect
  git pull
Updating bde6296..814d421
 ast-forward
 index.html
 portfolio.html
 2 files changed, 4 insertions(+), 4 deletions(-)
```

Note that this has cleaned up my local origin refs to the deleted branches

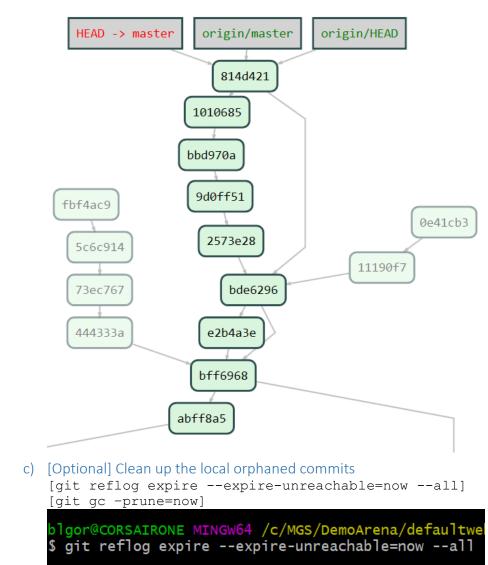
Delete any branches that are fully merged locally that no longer exist at remote [git branch -vv | grep ': gone]' | awk '{print \$1}' | xargs git branch -d]

```
blgor@CORSAIRONE MINGW64 /c/MGS/DemoArena/defaultweb/Defaultweb_WorkingDirec
$ git branch -vv | grep ': gone]' | awk '{print $1}' | xargs git branch -d
Deleted branch pick-and-reset-2 (was 1010685).
```

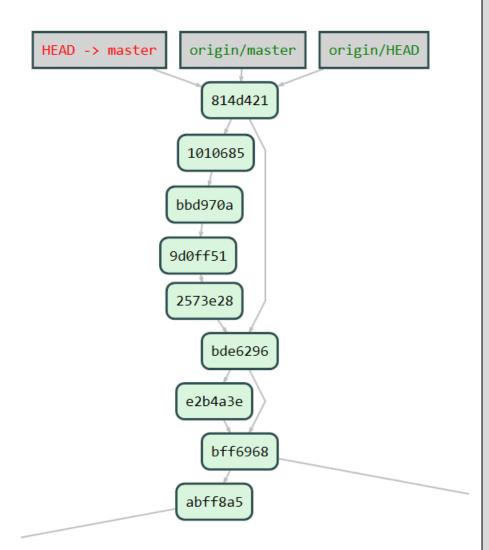
#### [git log -oneline]

```
blgor@corsairone Mingw64 /c/MGS/DemoArena/defaultweb/Defaultweb
$ git log --oneline
$14d421 (HEAD -> master, origin/master, origin/HEAD) Merge pull
nd-reset-2
1010685 Making more important changes #4
bbd970a Making more important changes #3
9d0ff51 Another feature change on index part 2
2573e28 Important Feature change on index part 1
bde6296 Merge pull request #3 from blgorman/another-dev-feature
e2b4a3e Update details.html
```





blgor@CORSAIRONE MINGW64 /c/MGS/DemoArena/defaultwe \$ git reflog expire --expire-unreachable=now --all blgor@CORSAIRONE MINGW64 /c/MGS/DemoArena/defaultwe \$ git gc --prune=now Enumerating objects: 160, done. Counting objects: 100% (160/160), done. Delta compression using up to 8 threads Compressing objects: 100% (77/77), done. Writing objects: 100% (160/160), done. Total 160 (delta 76), reused 148 (delta 70)



Now there are no more orphaned commits and all of our branches are cleaned up and we are ready to continue with our feature development on the next story.

This concludes our git real-life activity for accidental commit to local master.

# Closing Thoughts

In this activity we saw what it takes to undo the problem we created by	
committing on our local master branch.	Notes
This would have been bad if we would have pushed it out to remote, so we knew we had to do something to fix the issue. Additionally, we wanted to keep our commit so that we would not lose the changes that we had applied in that commit.	
Essentially, we go to combine some of the advanced skills we've learned around resetting and picking, and applied some additional commands along the way.	
Now that we understand how this works, we can do more advanced scenarios requiring us to rewrite history and make sure that commits are in history the correct way that we expect them to be, and not directly committed to our master branch.	