Wed, Oct 21

Lecture 06B:

Collaborating with Git

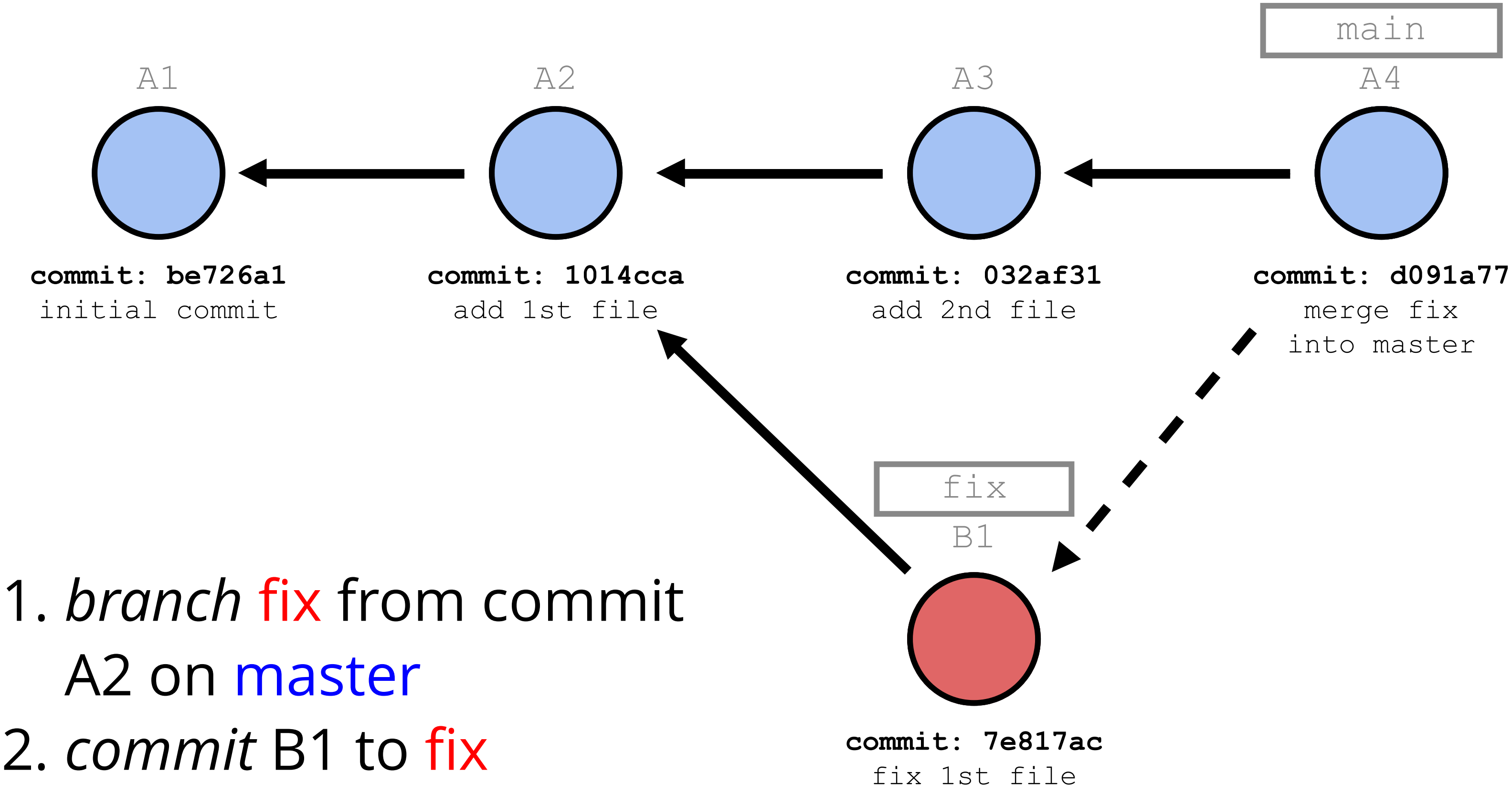
Clematis fremontii
© Kathy Melton/
Missouri Botanical Garden

Practical Bioinformatics (Biol 4220)
Instructor: Michael Landis
Email: michael.landis@wustl.edu

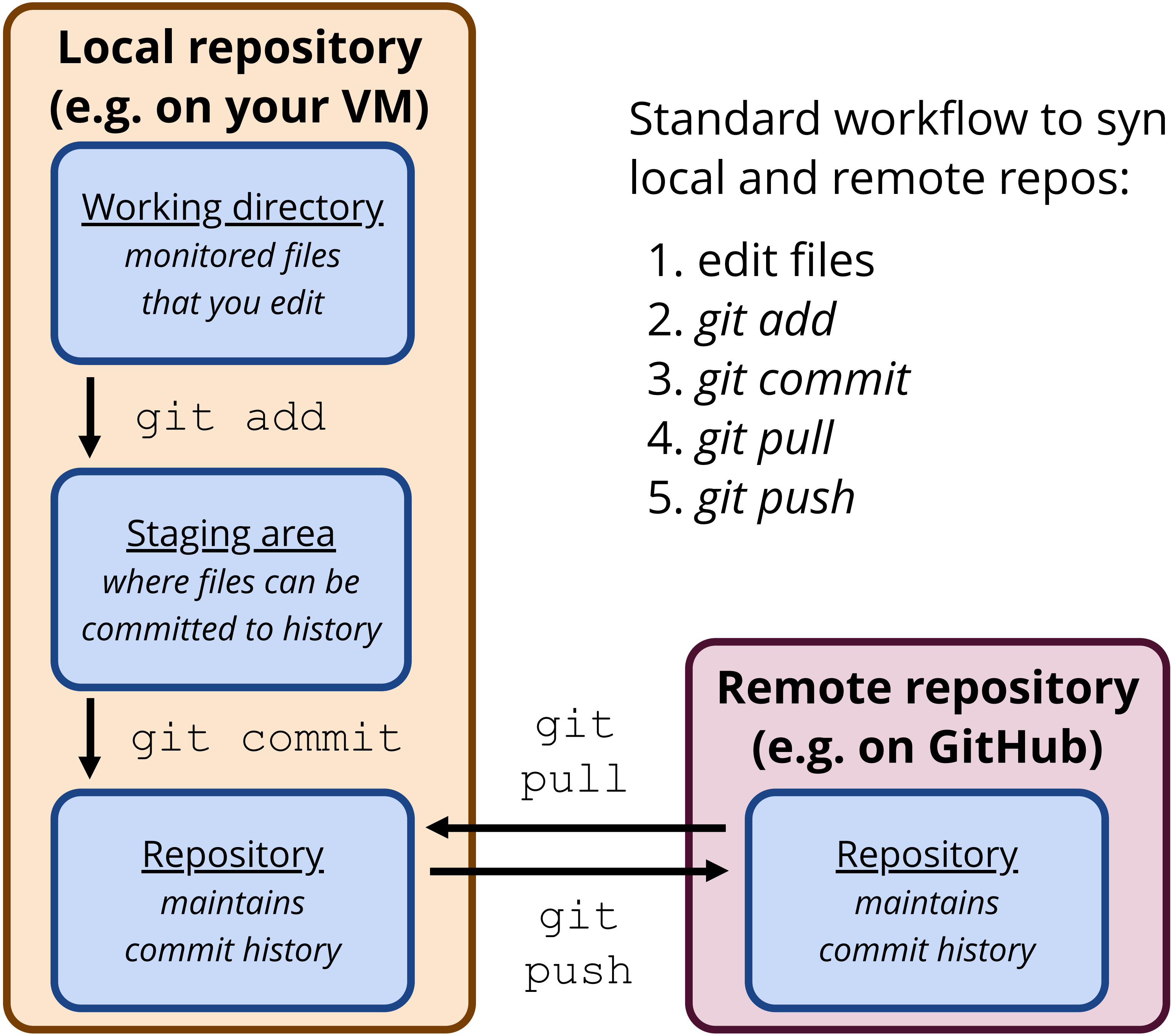
Lecture 6B outline

1. Collaborating with git
2. The HEAD pointer
3. More git commands
4. Lab 6B overview

Branching and merging



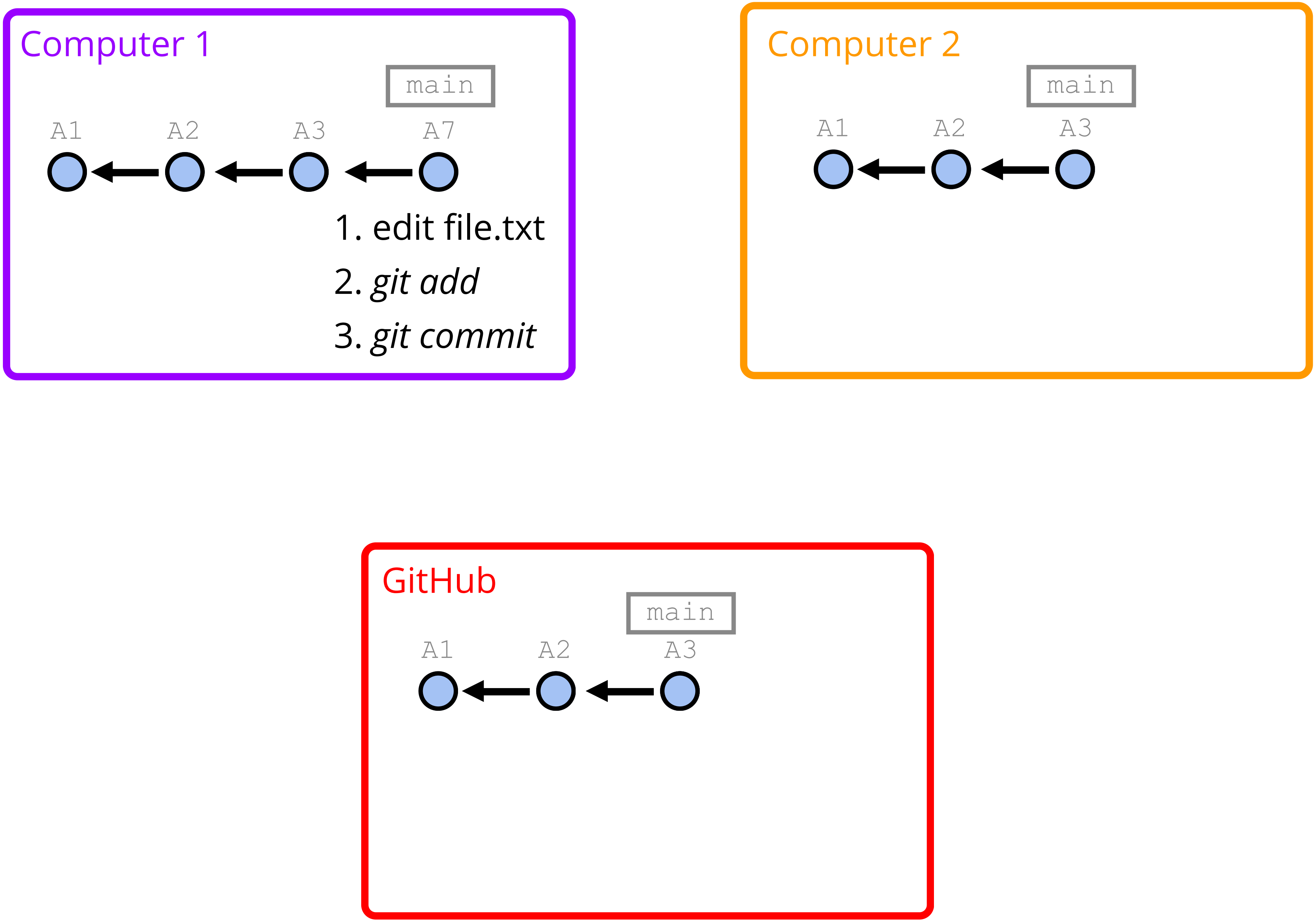
1. *branch* fix from commit A2 on master
2. *commit* B1 to fix
3. *merge* fix into master as commit A4



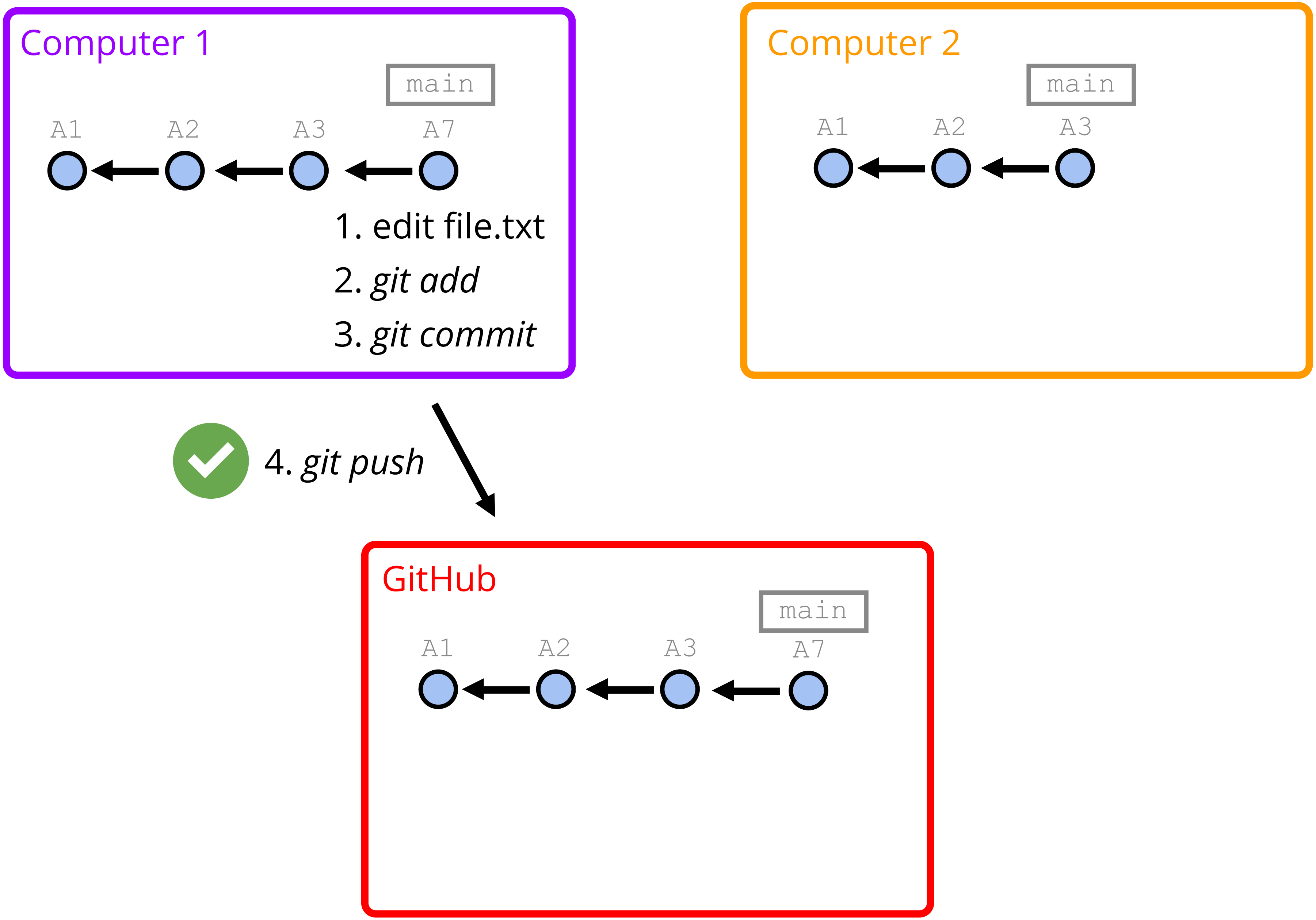
Standard workflow to sync local and remote repos:

1. edit files
2. *git add*
3. *git commit*
4. *git pull*
5. *git push*

Example 1



1. edit file.txt
2. *git add*
3. *git commit*



Computer 1

main

A1 A2 A3 A7

1. edit file.txt
2. *git add*
3. *git commit*

Computer 2

main

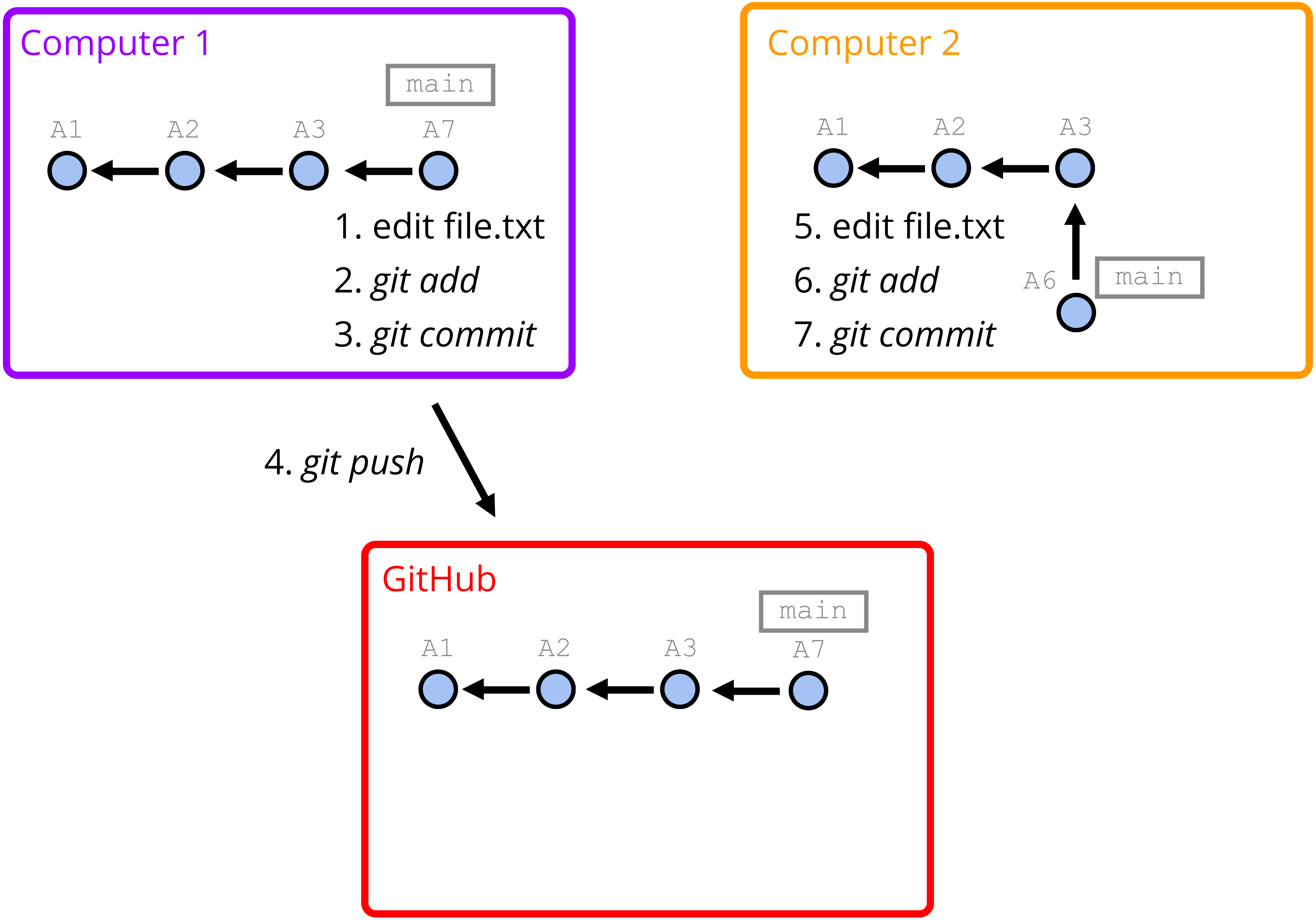
A1 A2 A3

✓ 4. *git push*

GitHub

main

A1 A2 A3 A7



1. edit file.txt

2. *git add*

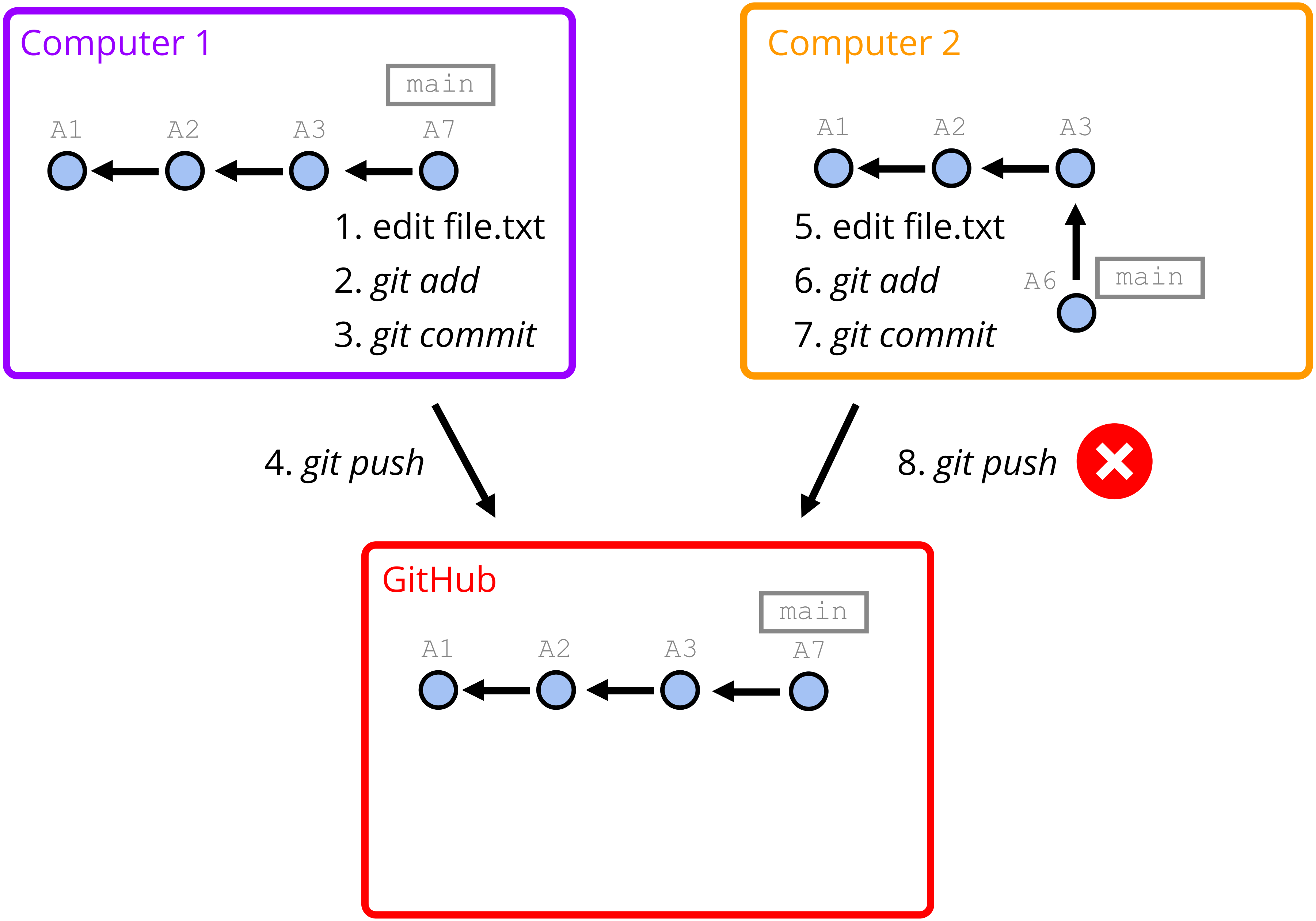
3. *git commit*

4. *git push*

5. edit file.txt

6. *git add*

7. *git commit*



1. edit file.txt

2. *git add*

3. *git commit*

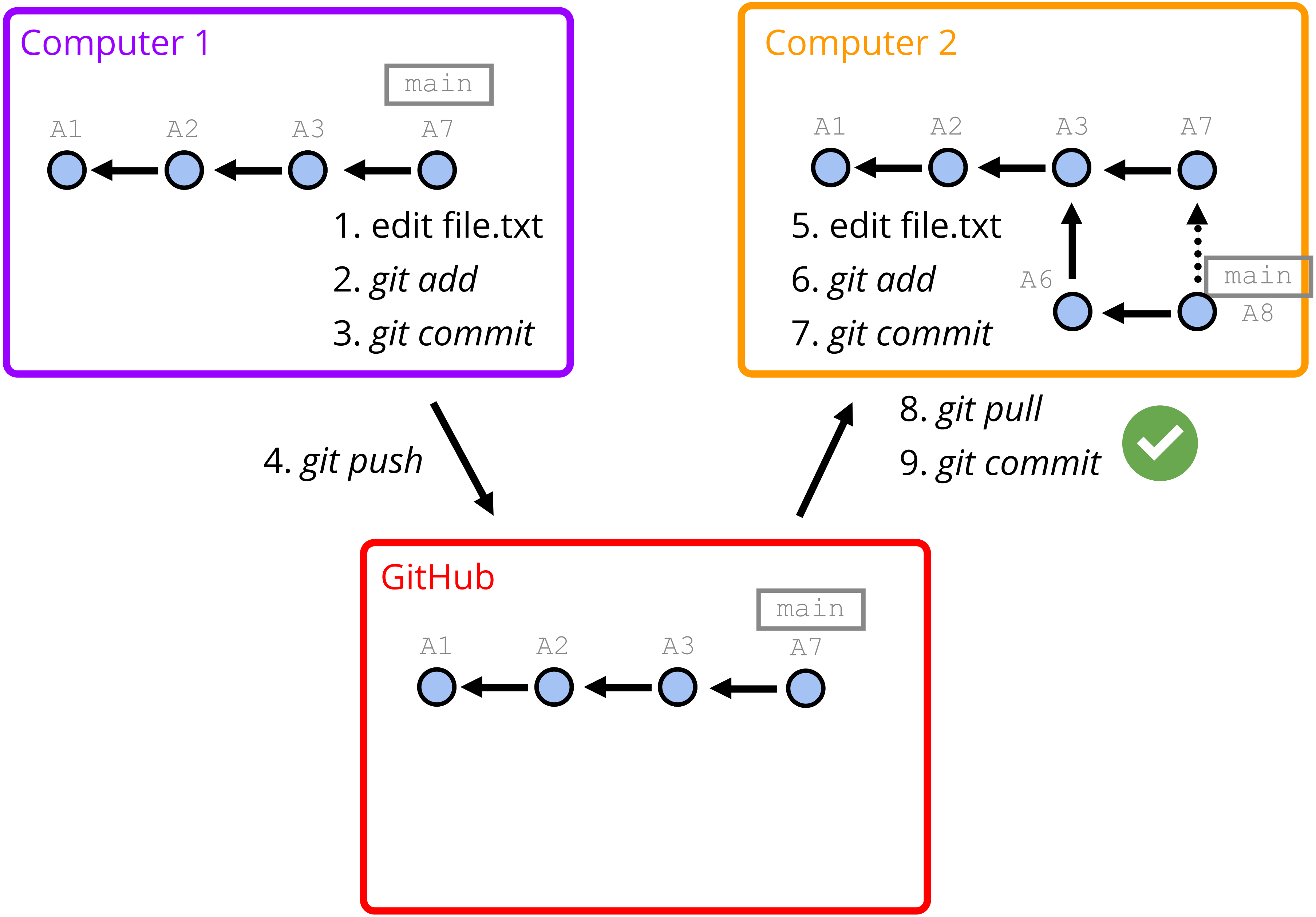
4. *git push*

5. edit file.txt

6. *git add*

7. *git commit*

8. *git push*

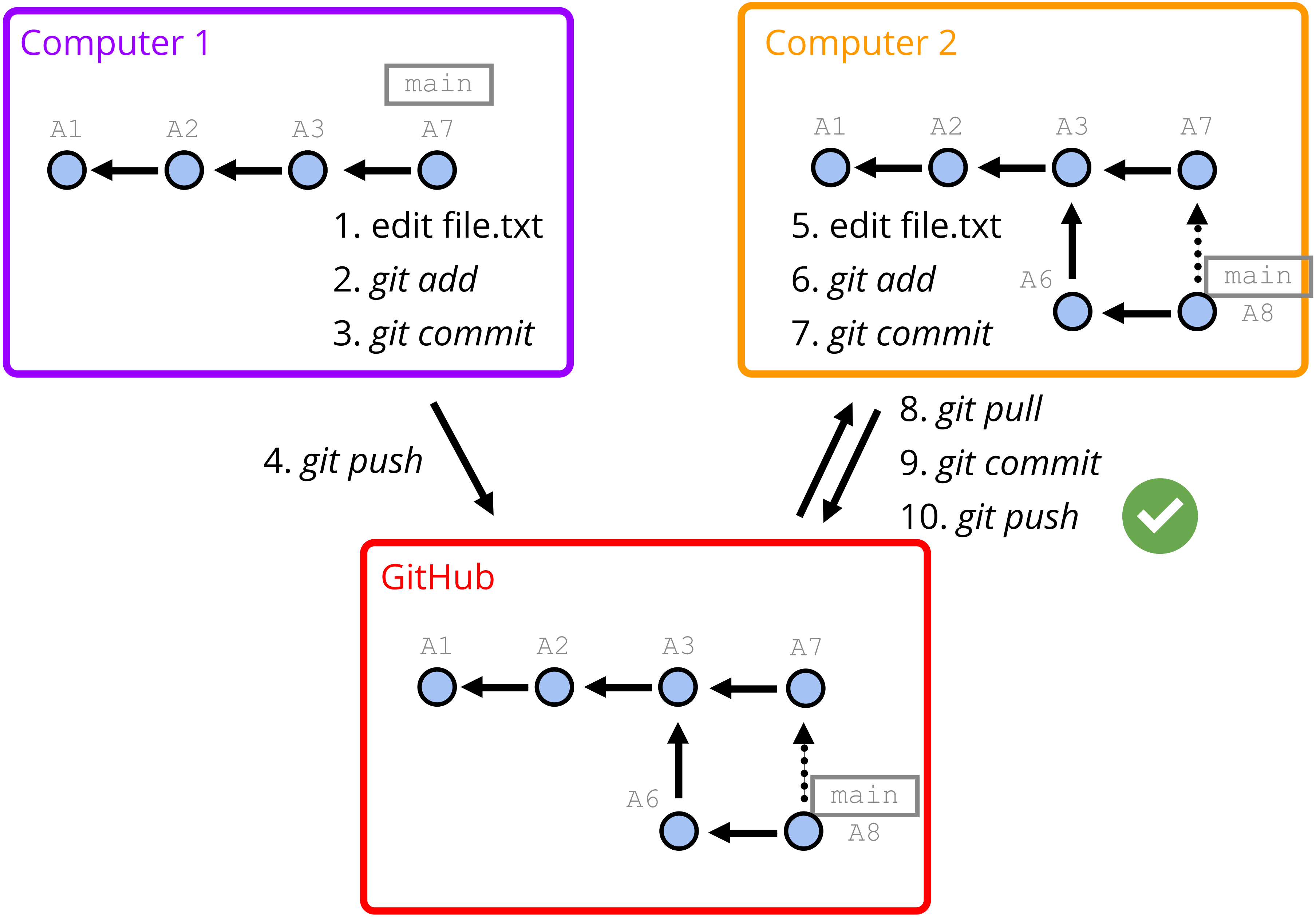


1. edit file.txt
2. *git add*
3. *git commit*

4. *git push*

5. edit file.txt
6. *git add*
7. *git commit*

8. *git pull*
9. *git commit* ✓



Computer 1

1. edit file.txt
2. *git add*
3. *git commit*

4. *git push*

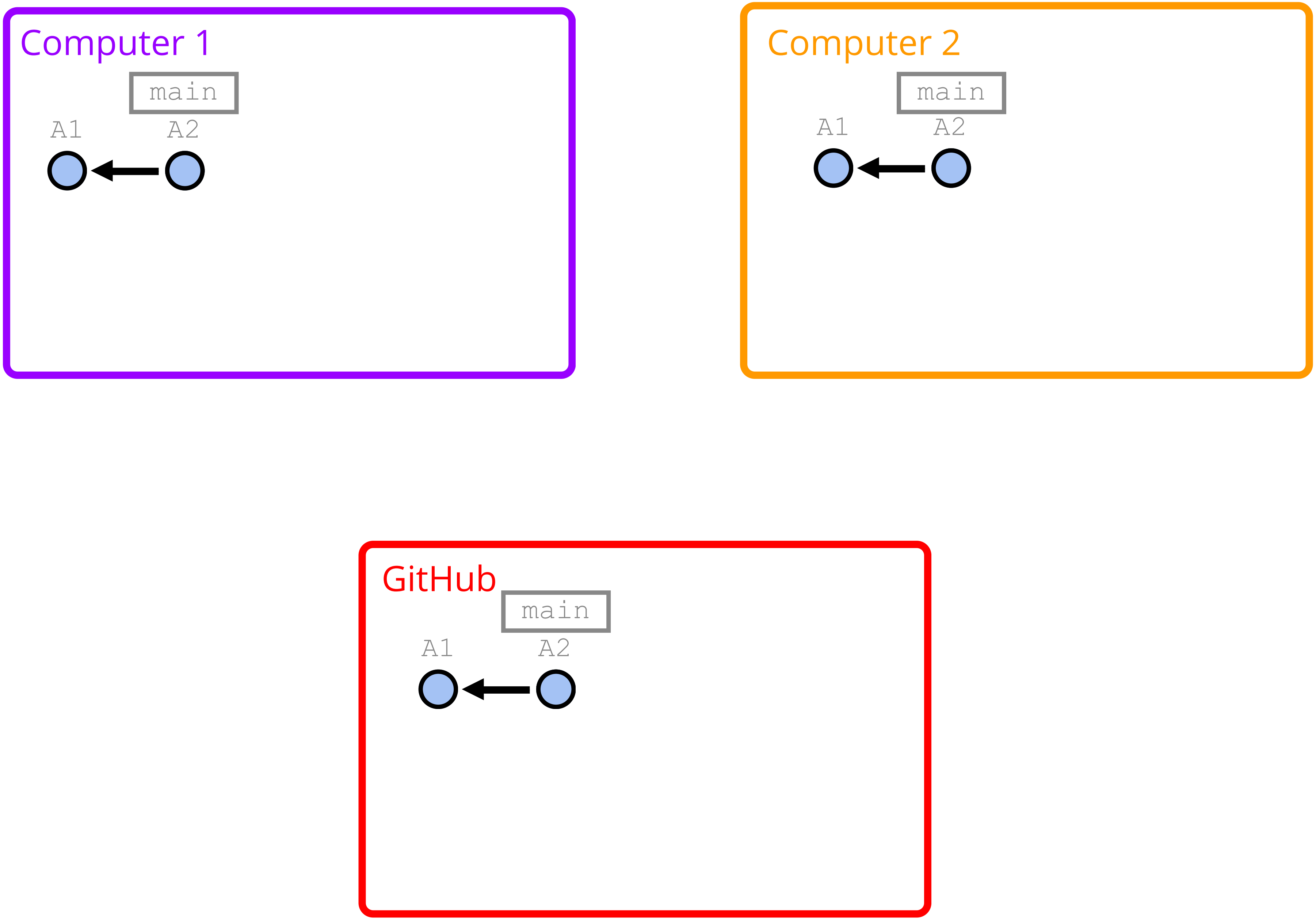
Computer 2

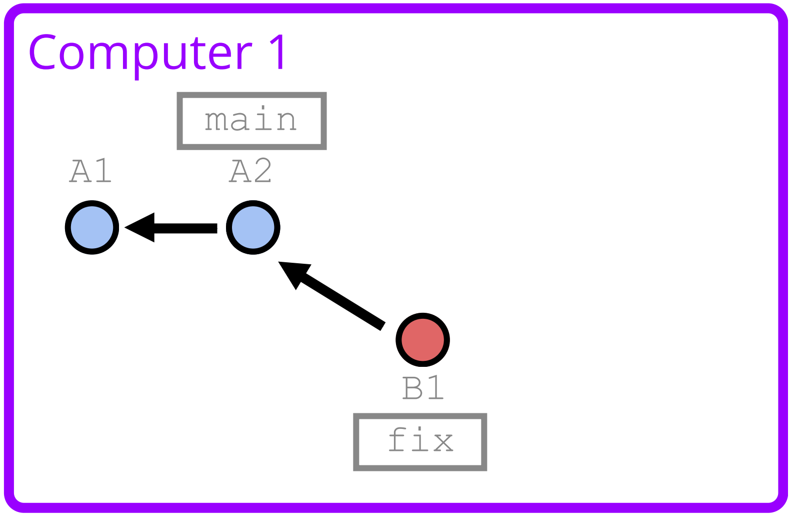
5. edit file.txt
6. *git add*
7. *git commit*

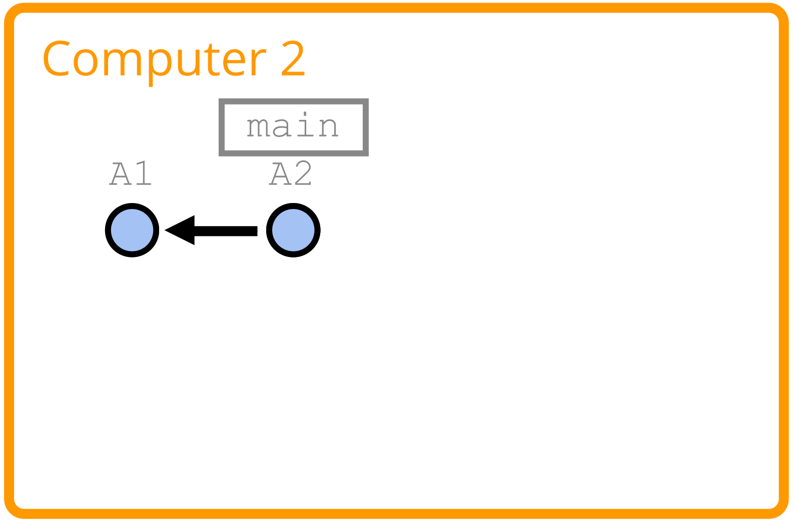
8. *git pull*
9. *git commit*
10. *git push* ✓

GitHub

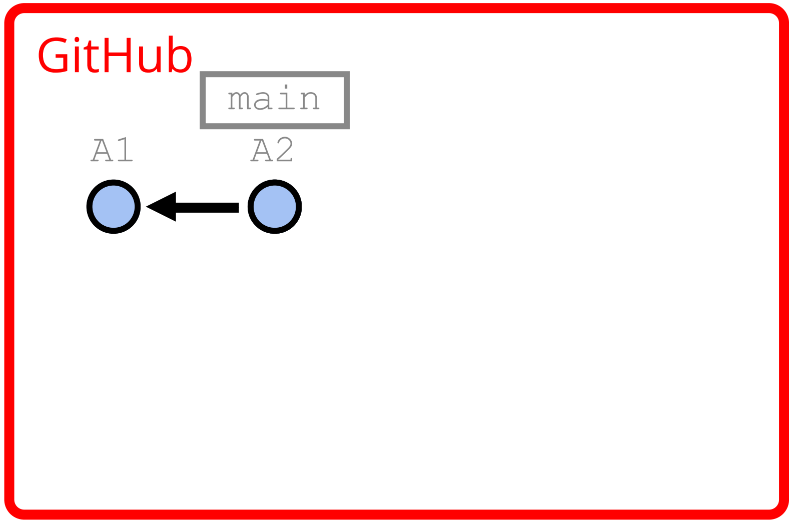
Example 2

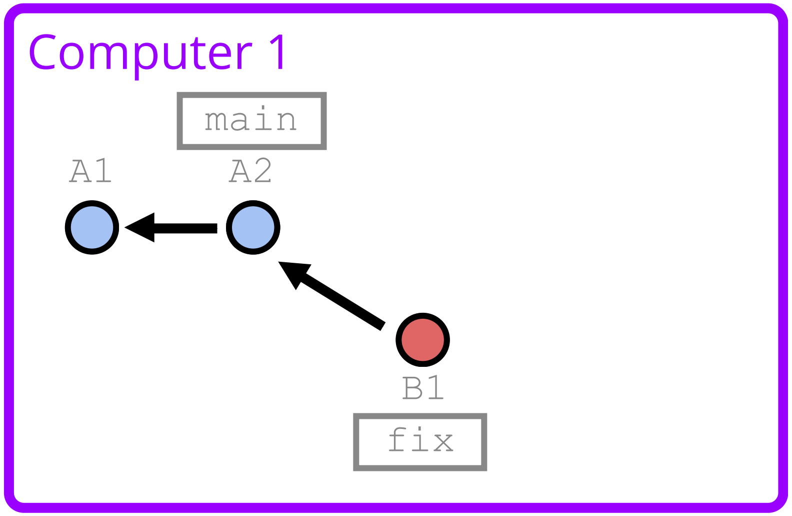

Computer 1
main
A1
A2
Computer 2
main
A1
A2
GitHub
main
A1
A2

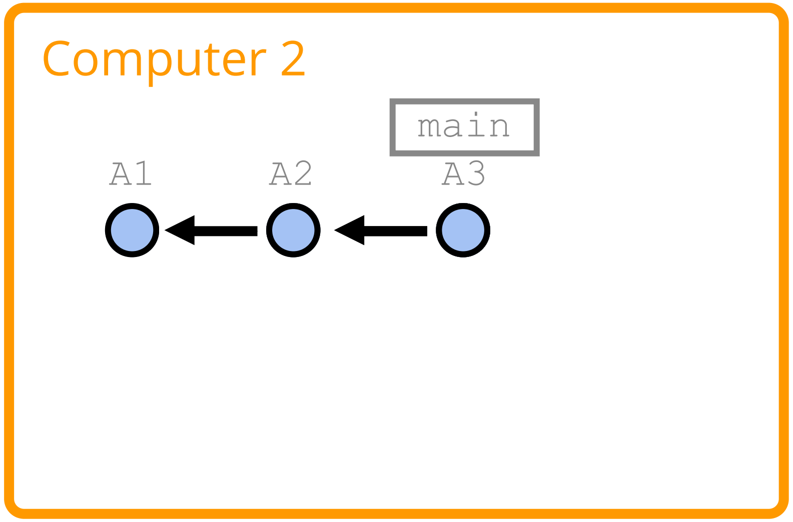




1. git checkout -b fix
2. edit file.txt
3. git add
4. git commit

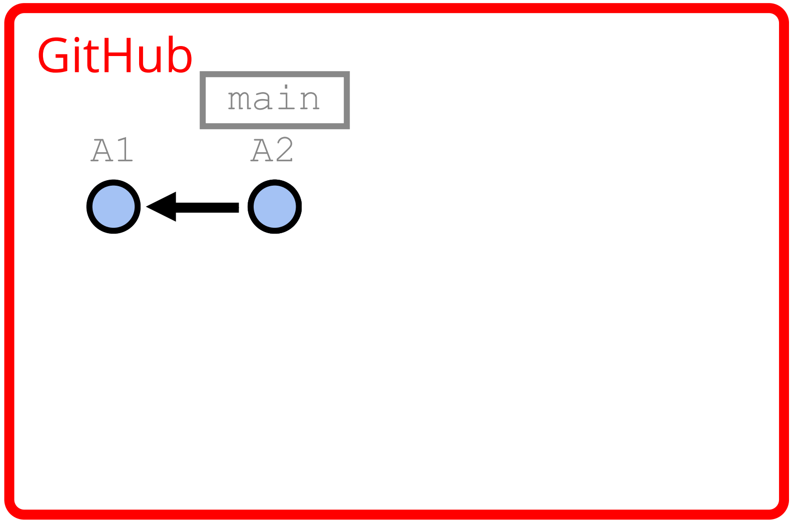


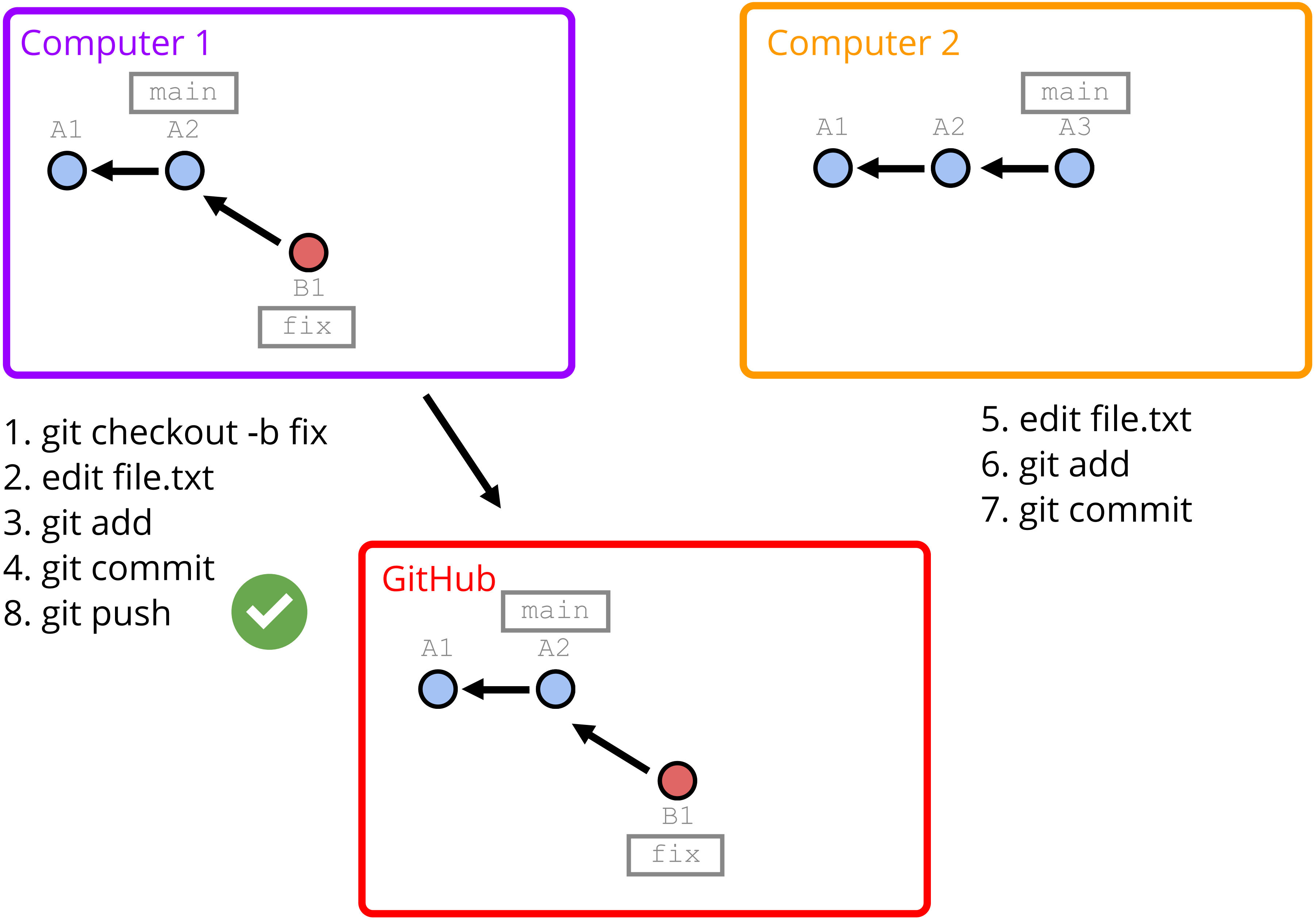




1. git checkout -b fix
2. edit file.txt
3. git add
4. git commit

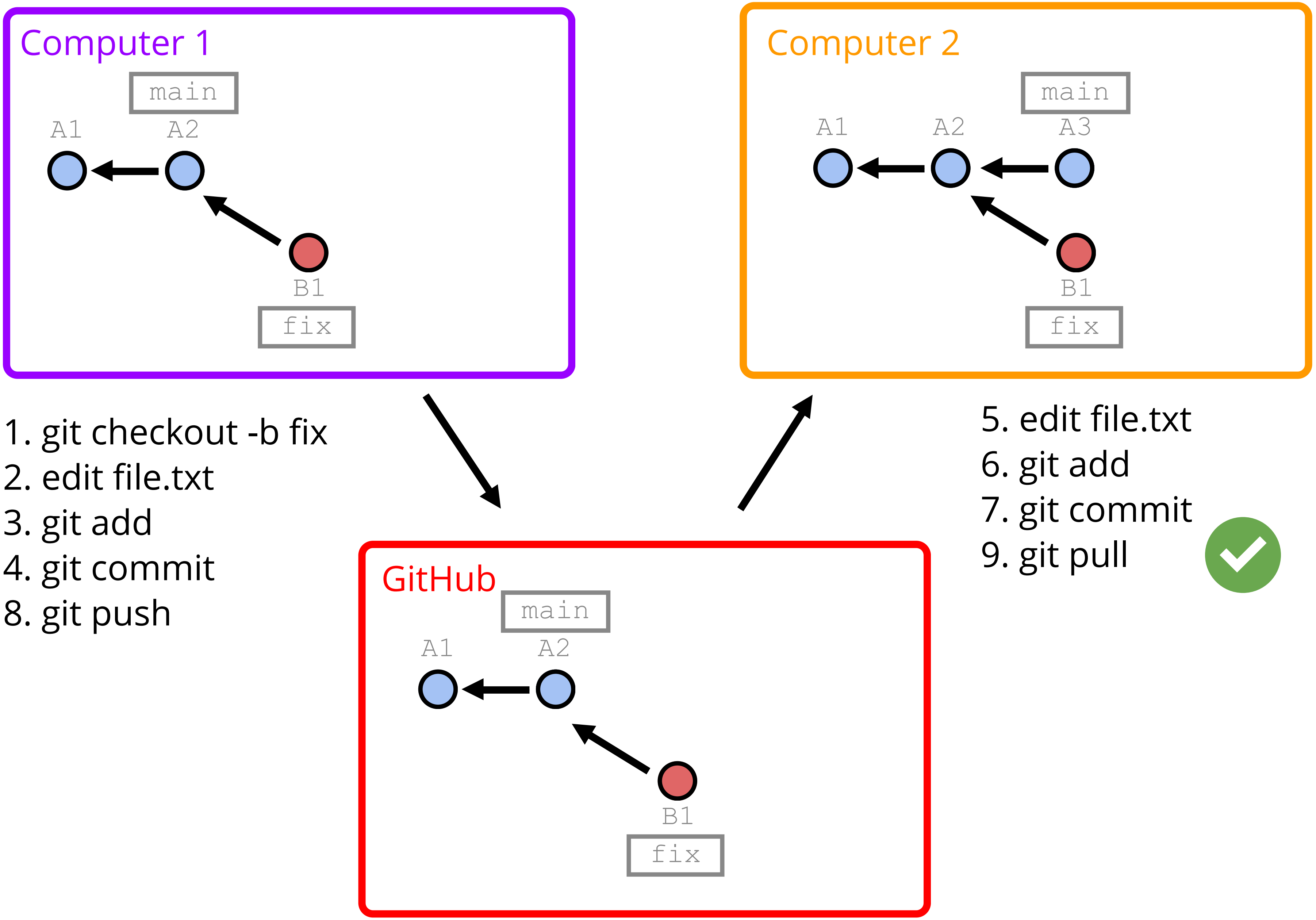
5. edit file.txt
6. git add
7. git commit





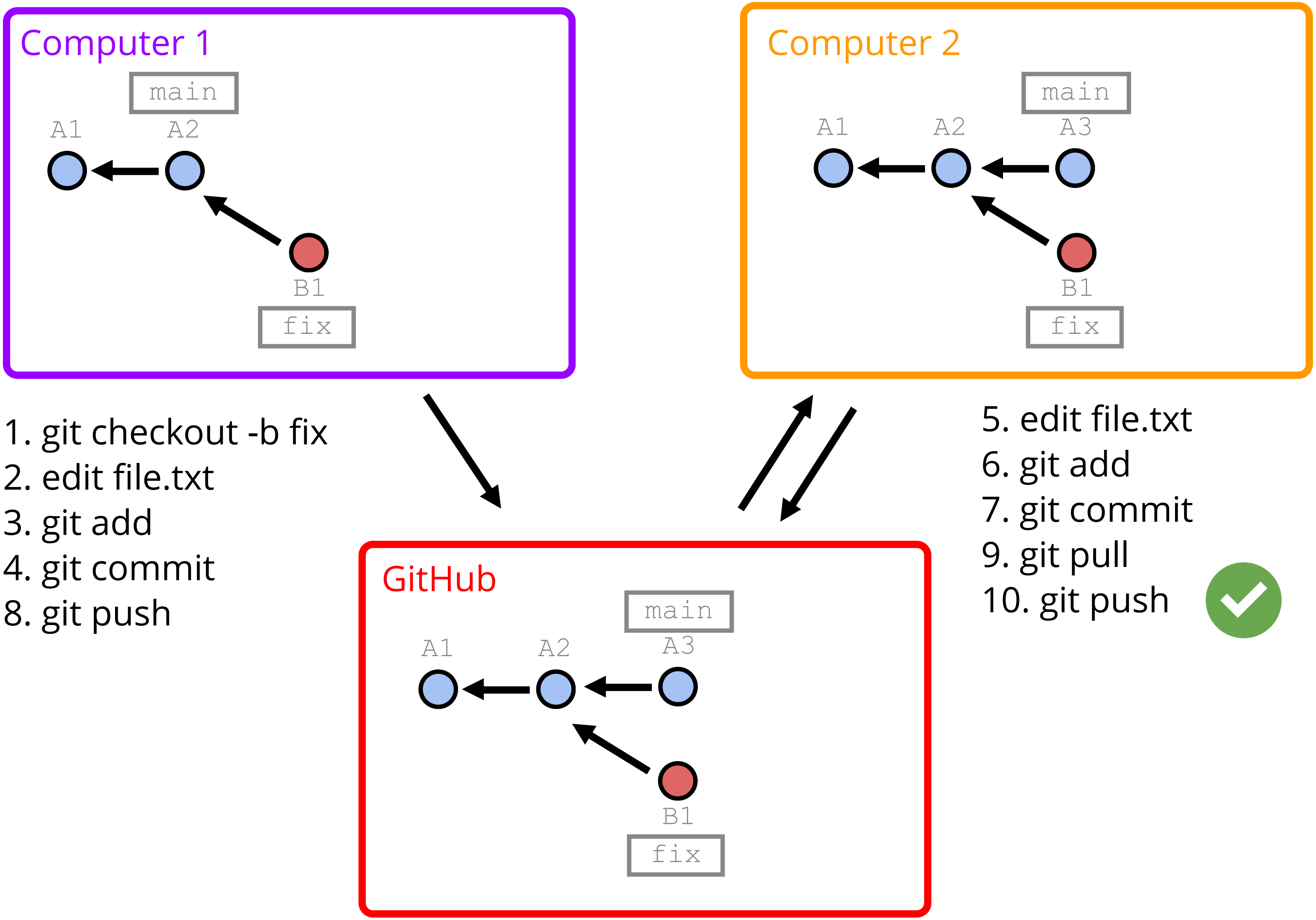
1. git checkout -b fix
2. edit file.txt
3. git add
4. git commit
8. git push ✓

5. edit file.txt
6. git add
7. git commit



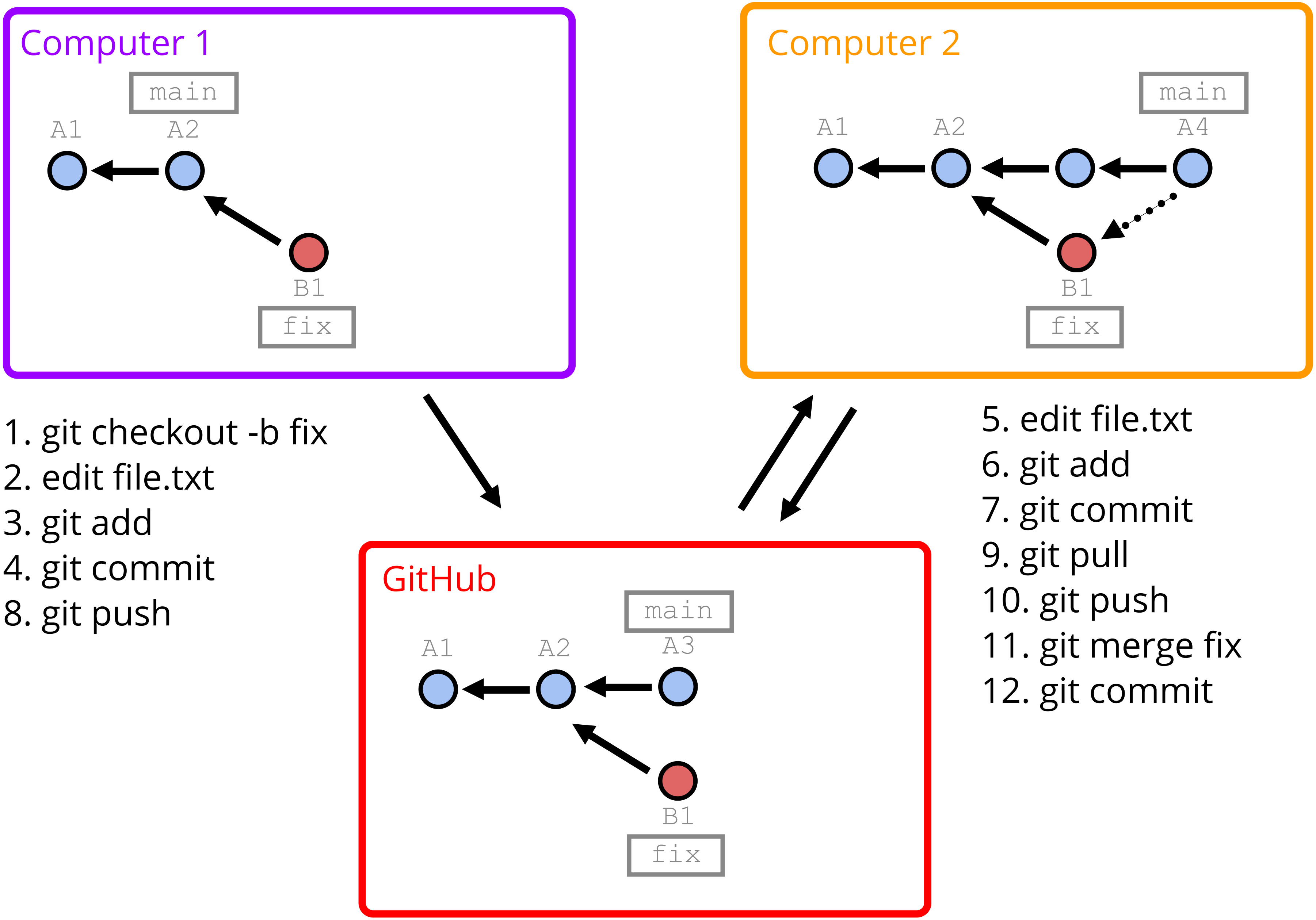
1. git checkout -b fix
2. edit file.txt
3. git add
4. git commit
8. git push

5. edit file.txt
6. git add
7. git commit
9. git pull ✓



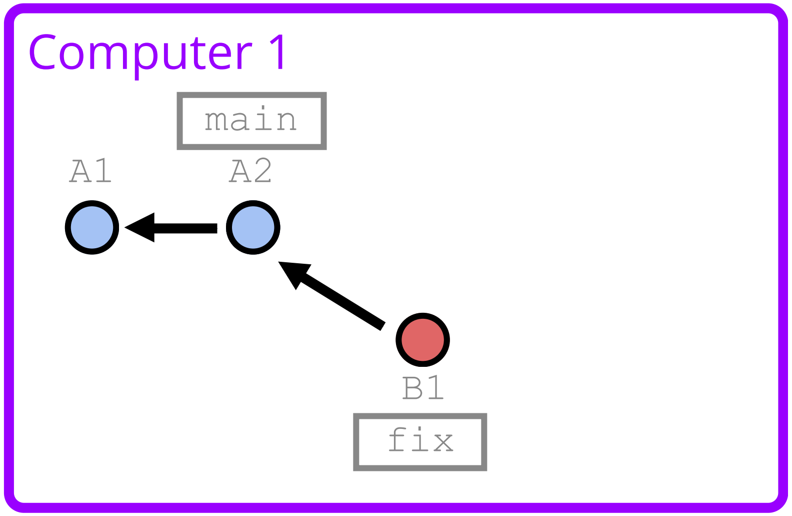
1. git checkout -b fix
2. edit file.txt
3. git add
4. git commit
8. git push

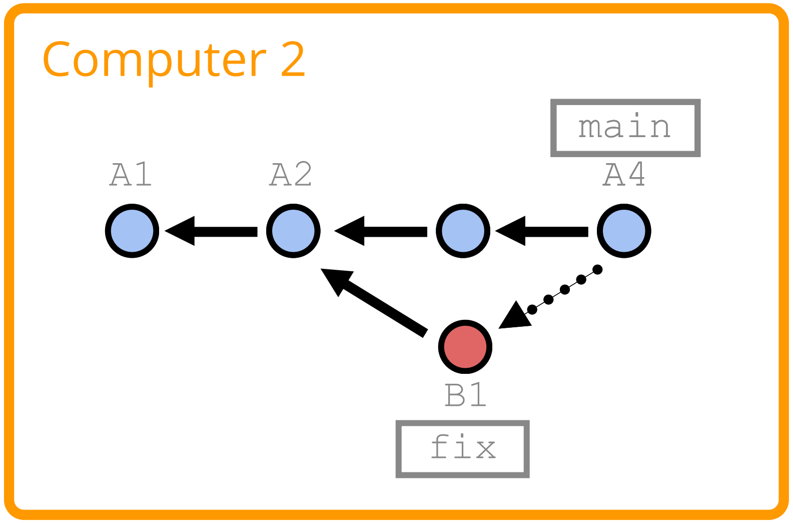
5. edit file.txt
6. git add
7. git commit
9. git pull
10. git push ✓



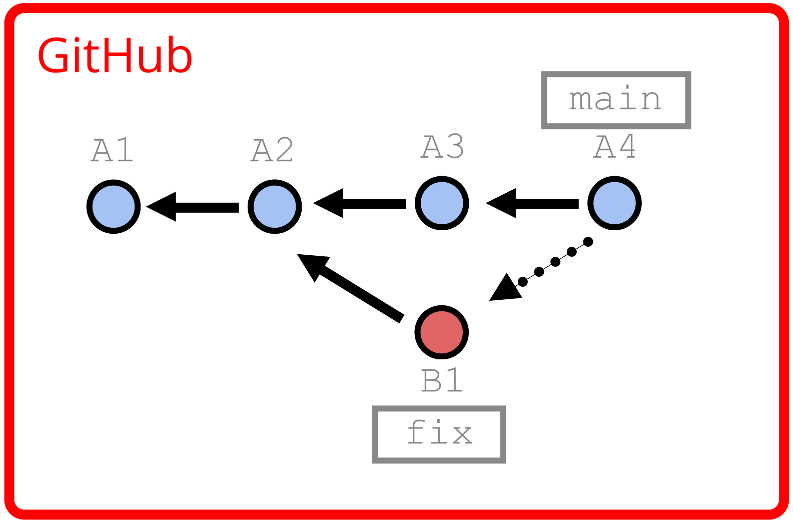
1. git checkout -b fix
2. edit file.txt
3. git add
4. git commit
8. git push

5. edit file.txt
6. git add
7. git commit
9. git pull
10. git push
11. git merge fix
12. git commit



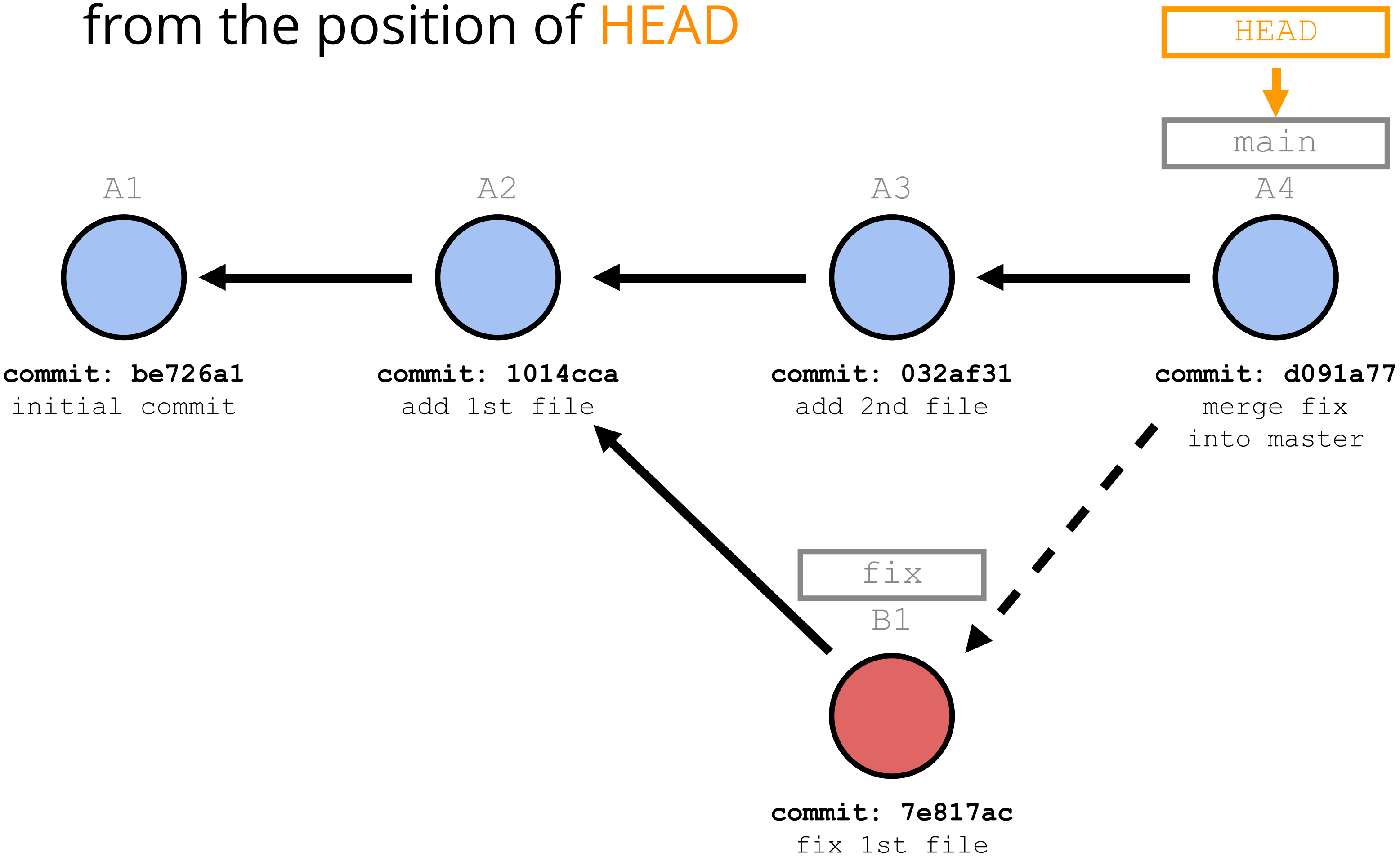


1. git checkout -b fix
2. edit file.txt
3. git add
4. git commit
8. git push

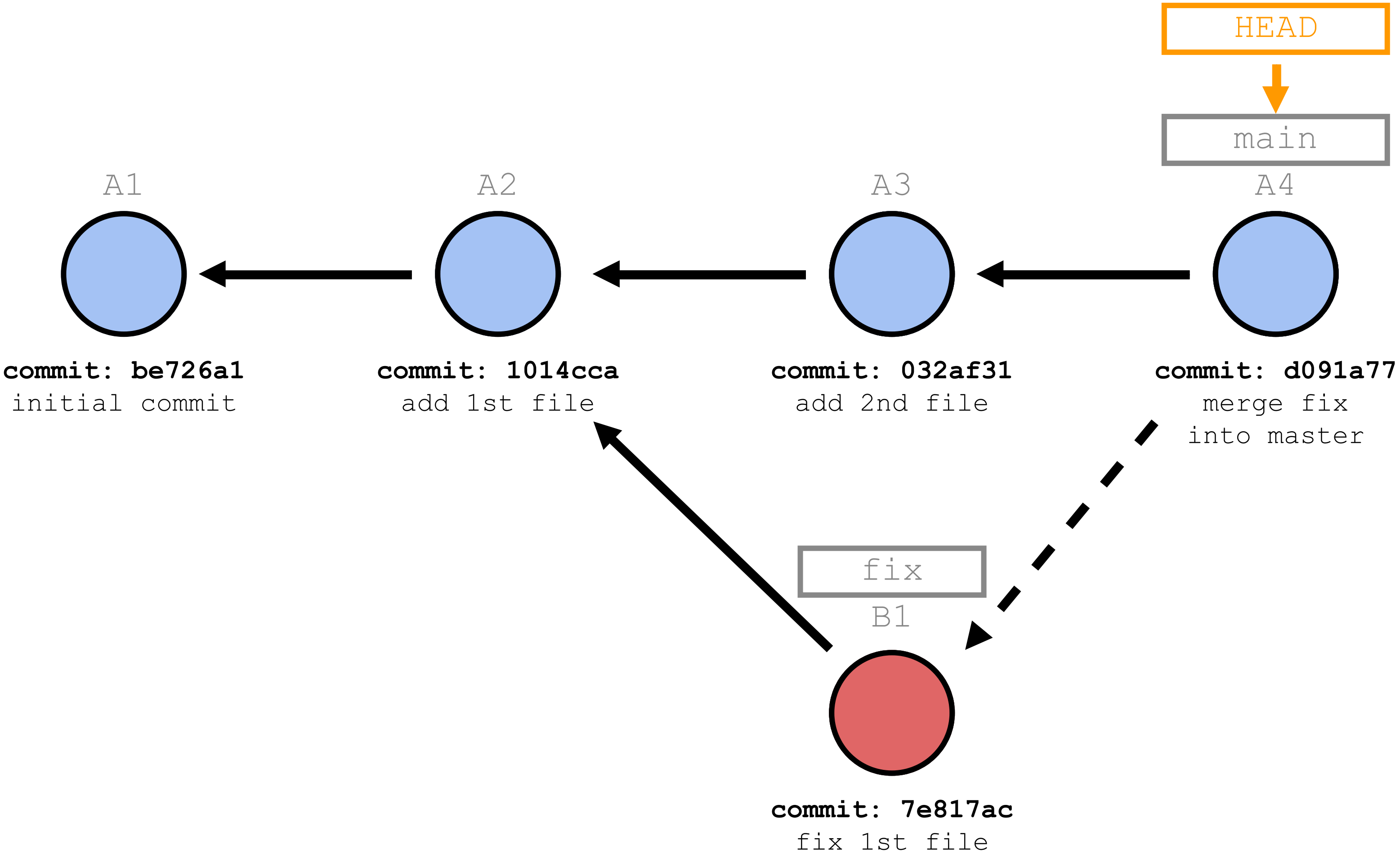


5. edit file.txt
6. git add
7. git commit
9. git pull
10. git push
11. git merge fix
12. git commit
13. git pull (to be safe)
14. git push ✓

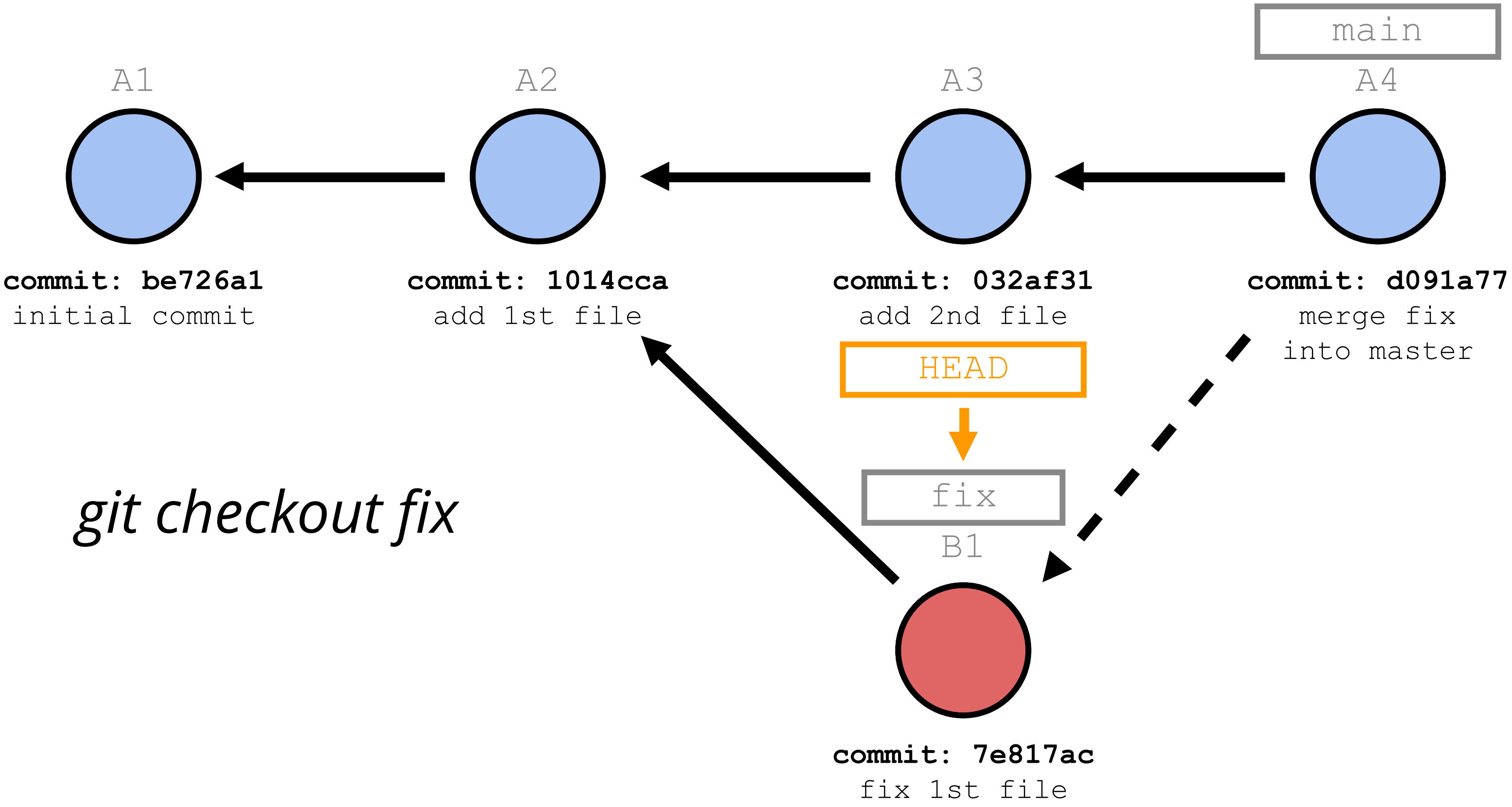
HEAD points to a commit in the git history; filesystem edits and commits derive from the position of HEAD



HEAD will generally track any recent commits or branch switches

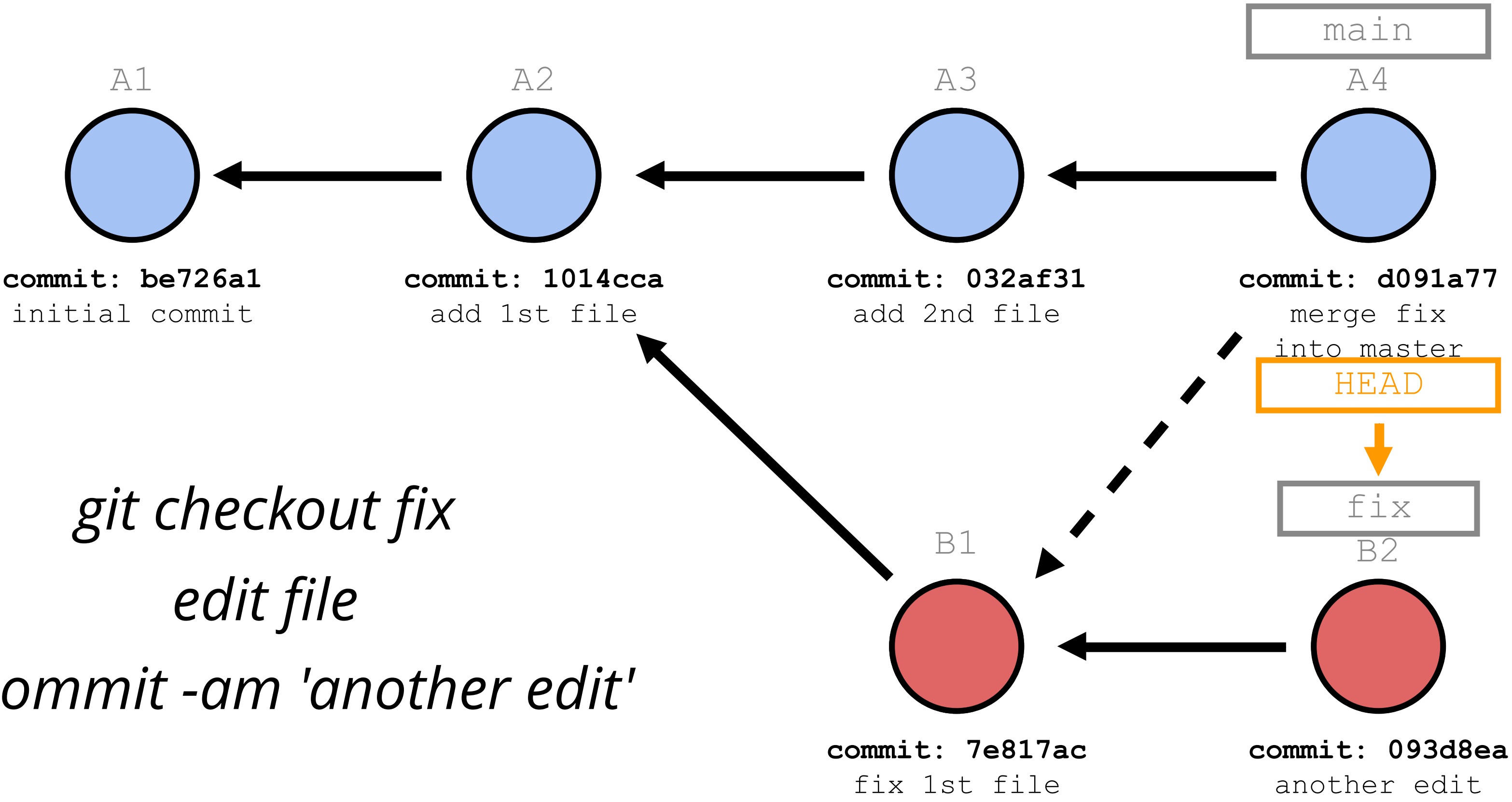


HEAD will generally track any recent commits or branch switches



git checkout fix

HEAD will generally track any recent commits or branch switches



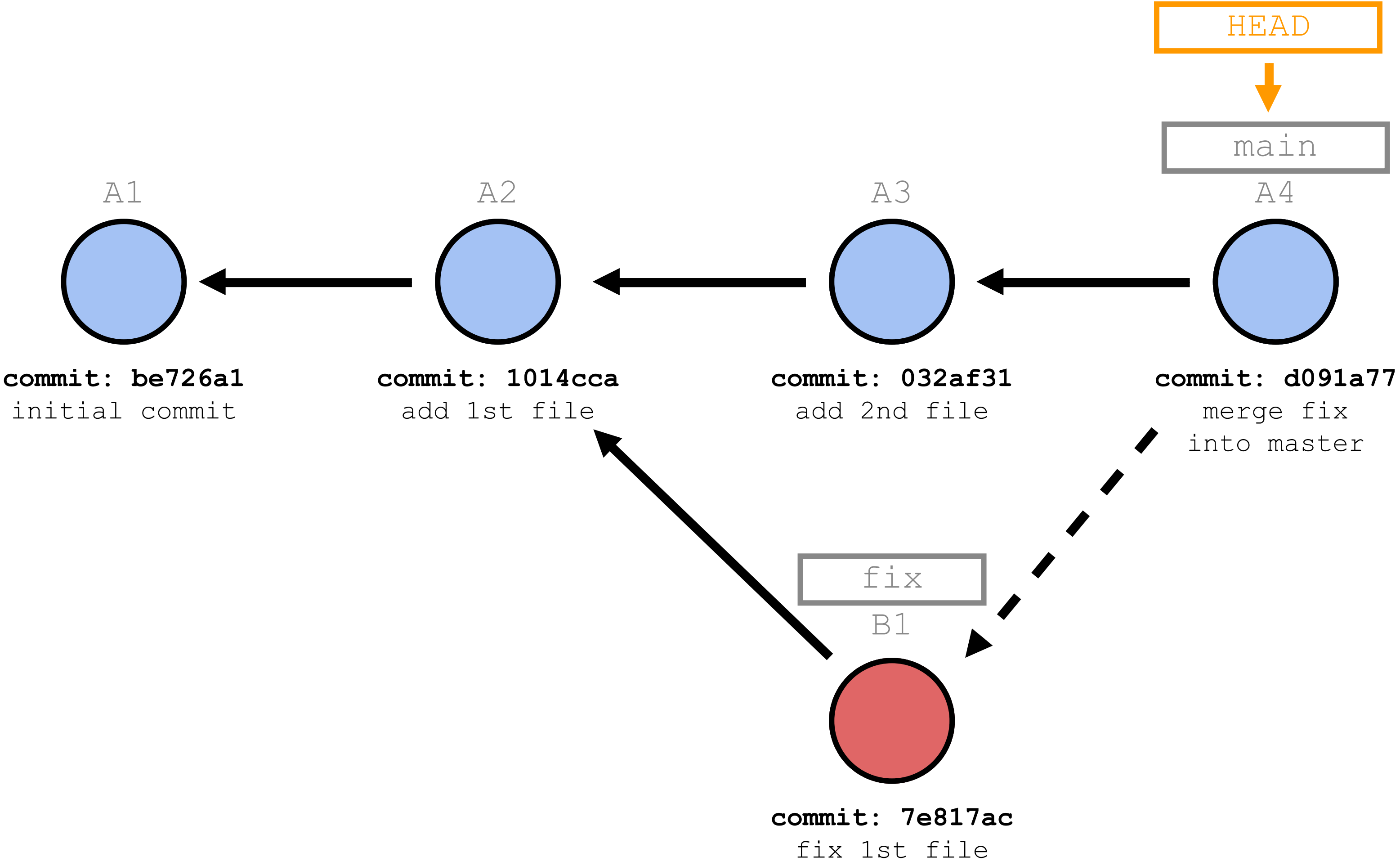
git checkout fix

edit file

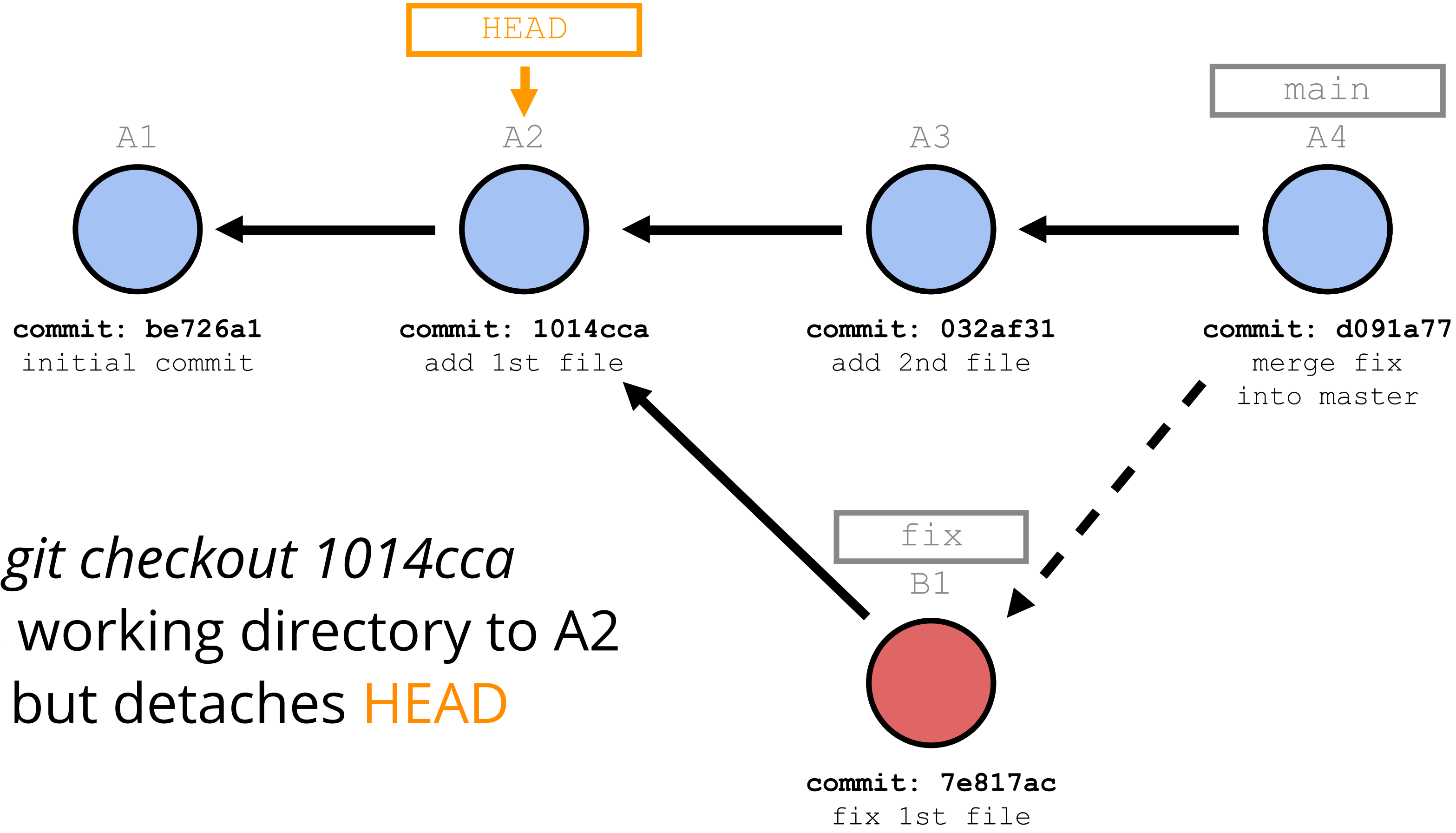
git commit -am 'another edit'

HEAD is ***detached*** when it points to a commit but not a branch; new commits under a detached HEAD may not appear as intended

(new example, starting fresh)



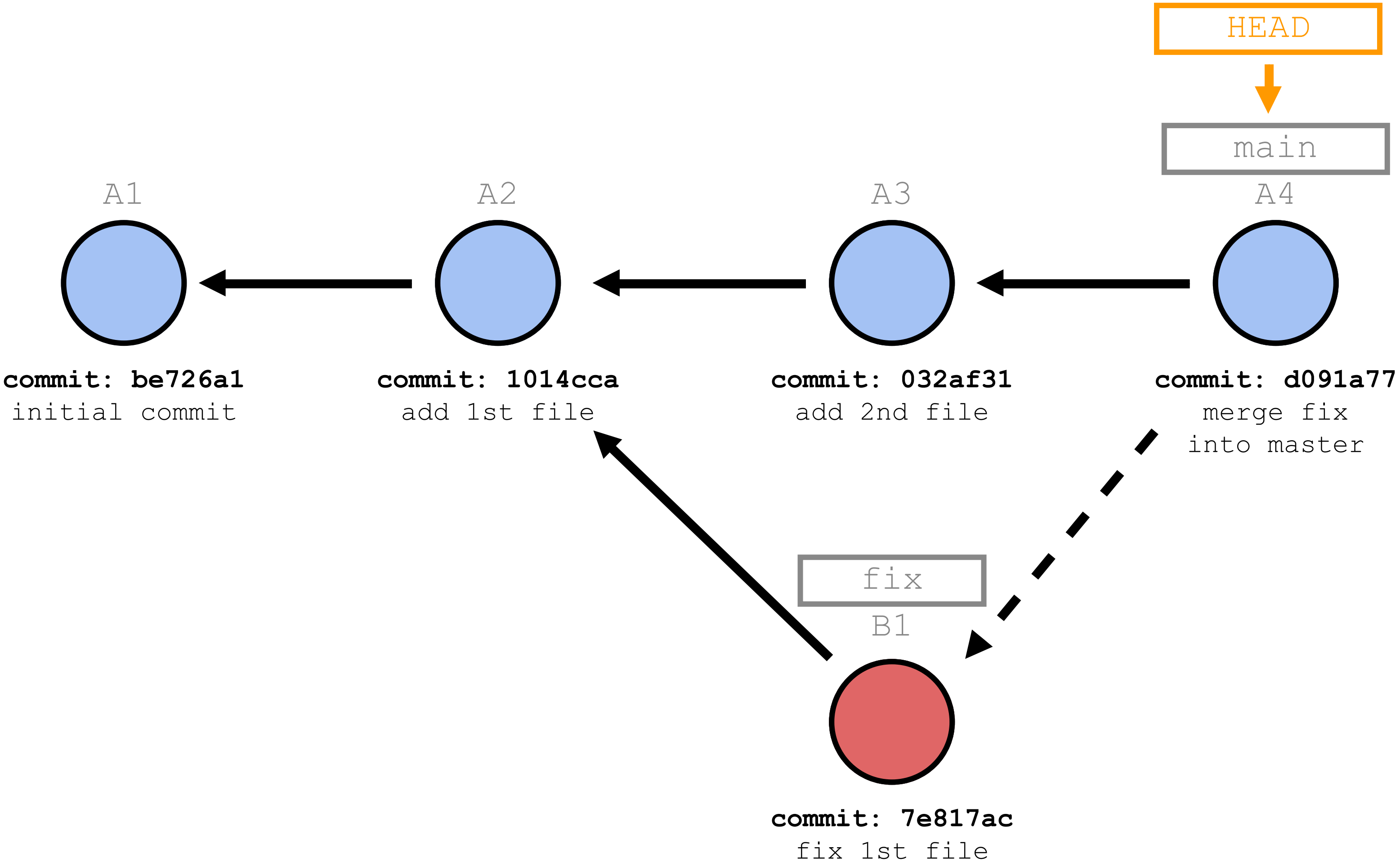
HEAD is ***detached*** when it points to a commit but not a branch; new commits under a detached HEAD may not appear as intended



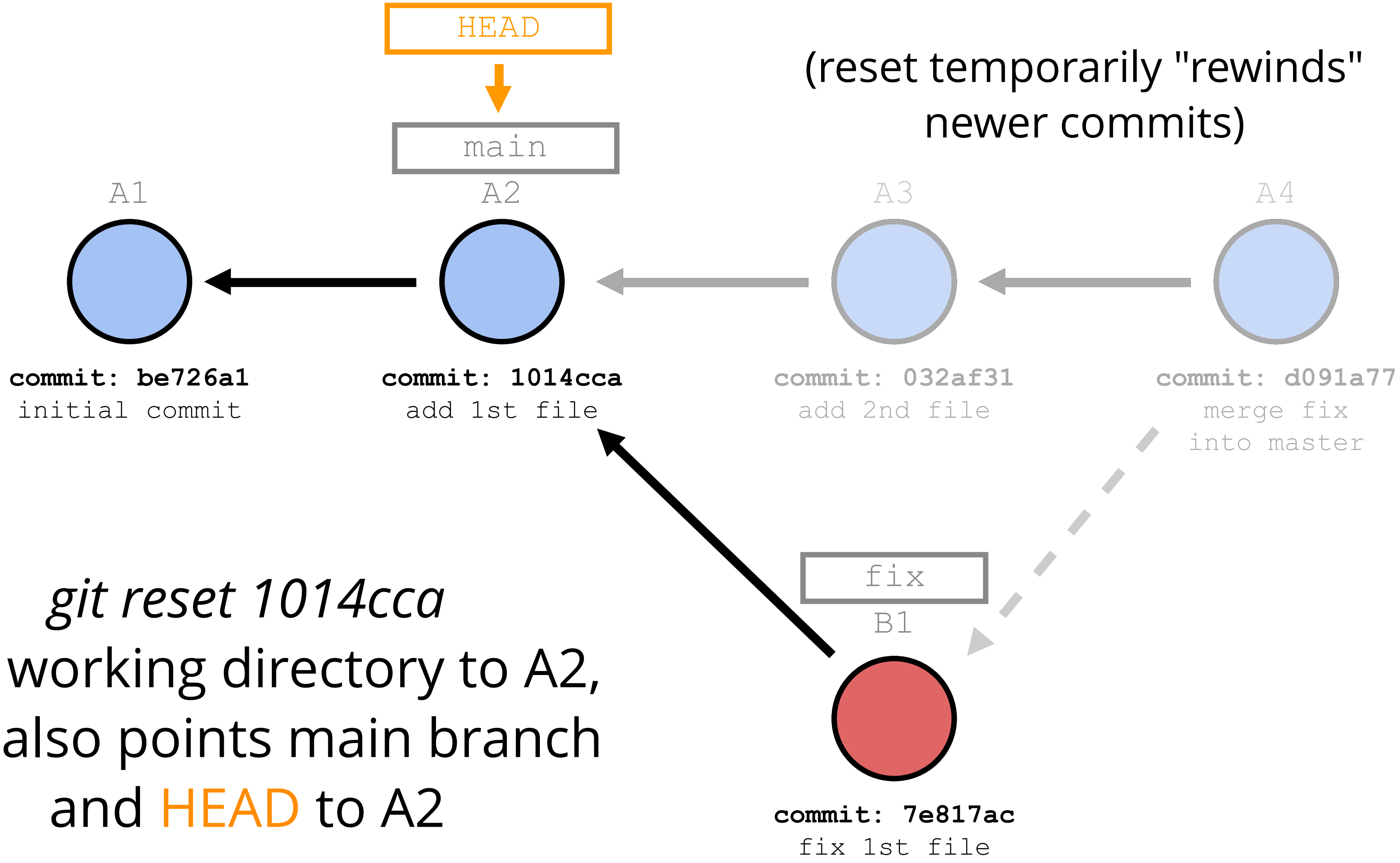
git checkout 1014cca
sets working directory to A2
but detaches HEAD

One alternative is to use ***git reset***, which "rewinds" the branch and HEAD to a previous commit; HEAD remains attached, but ***reset*** can muddle the history

(new example, starting fresh)



One alternative is to use ***git reset***, which "rewinds" the branch and HEAD to a previous commit; HEAD remains attached, but ***reset*** can muddle the history

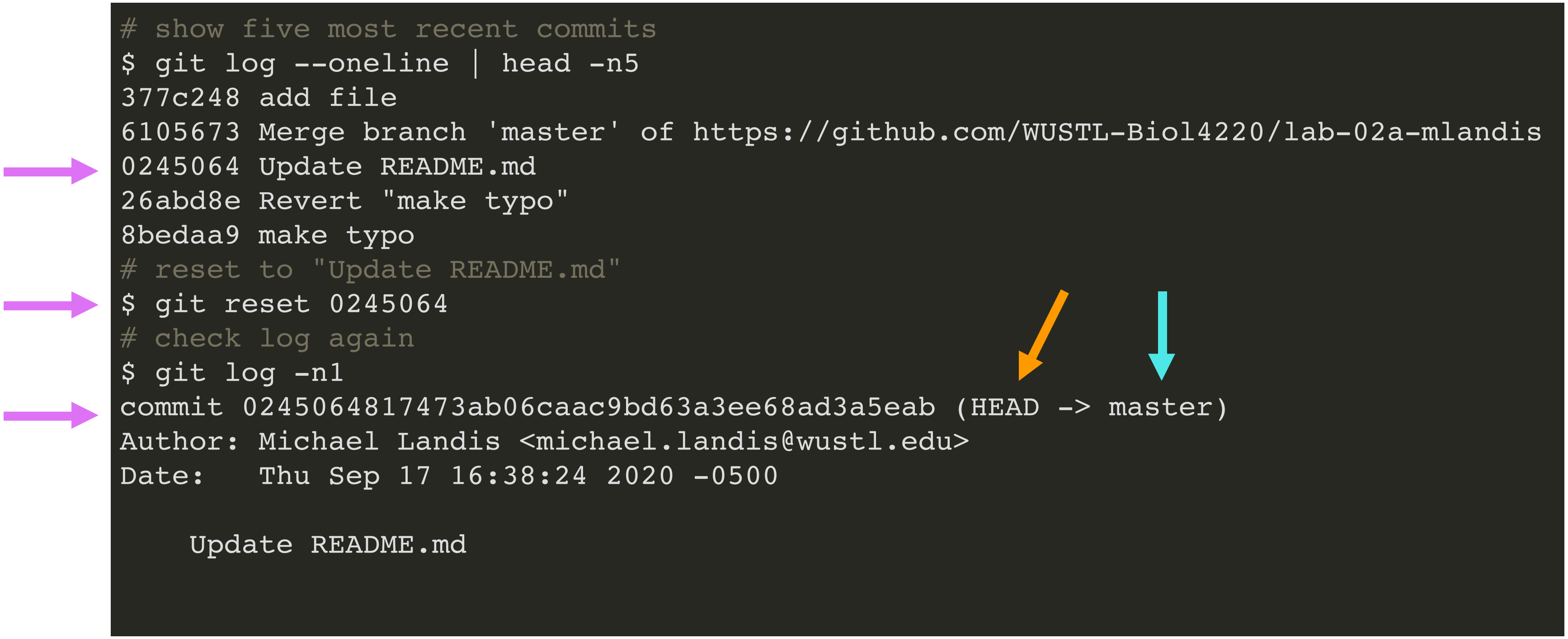


(reset temporarily "rewinds" newer commits)

git reset 1014cca
sets working directory to A2, and also points main branch and HEAD to A2

git reset

Changes state of working directory to a commit *and* moves HEAD and branch pointers; ***or*** unstages a file from the staging area; ***or*** …

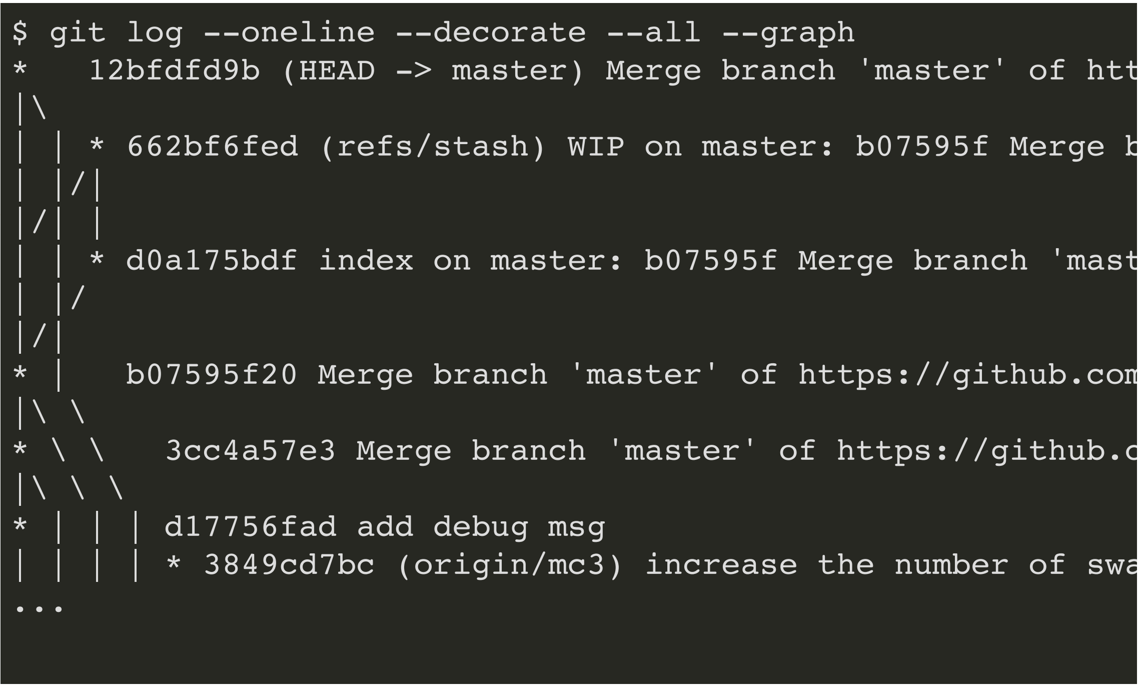


```
# show five most recent commits
$ git log --oneline | head -n5
377c248 add file
6105673 Merge branch 'master' of https://github.com/WUSTL-Biol4220/lab-02a-mlandis
0245064 Update README.md
26abd8e Revert "make typo"
8bedaa9 make typo
# reset to "Update README.md"
$ git reset 0245064
# check log again
$ git log -n1
commit 0245064817473ab06caac9bd63a3ee68ad3a5eab (HEAD -> master)
Author: Michael Landis <michael.landis@wustl.edu>
Date:   Thu Sep 17 16:38:24 2020 -0500

    Update README.md
```

git log --oneline --decorate --all --graph

Prints graph-based visualization
of commit history



```
$ git log --oneline --decorate --all --graph
*   12bfdfd9b (HEAD -> master) Merge branch 'master' of htt
|\
| | * 662bf6fed (refs/stash) WIP on master: b07595f Merge b
| |/|
|/| |
| | * d0a175bdf index on master: b07595f Merge branch 'mast
| |/
|/|
* |   b07595f20 Merge branch 'master' of https://github.com
|\ \
* \ \   3cc4a57e3 Merge branch 'master' of https://github.c
|\ \ \
* | | | d17756fad add debug msg
| | | | * 3849cd7bc (origin/mc3) increase the number of swa
...
```

branch

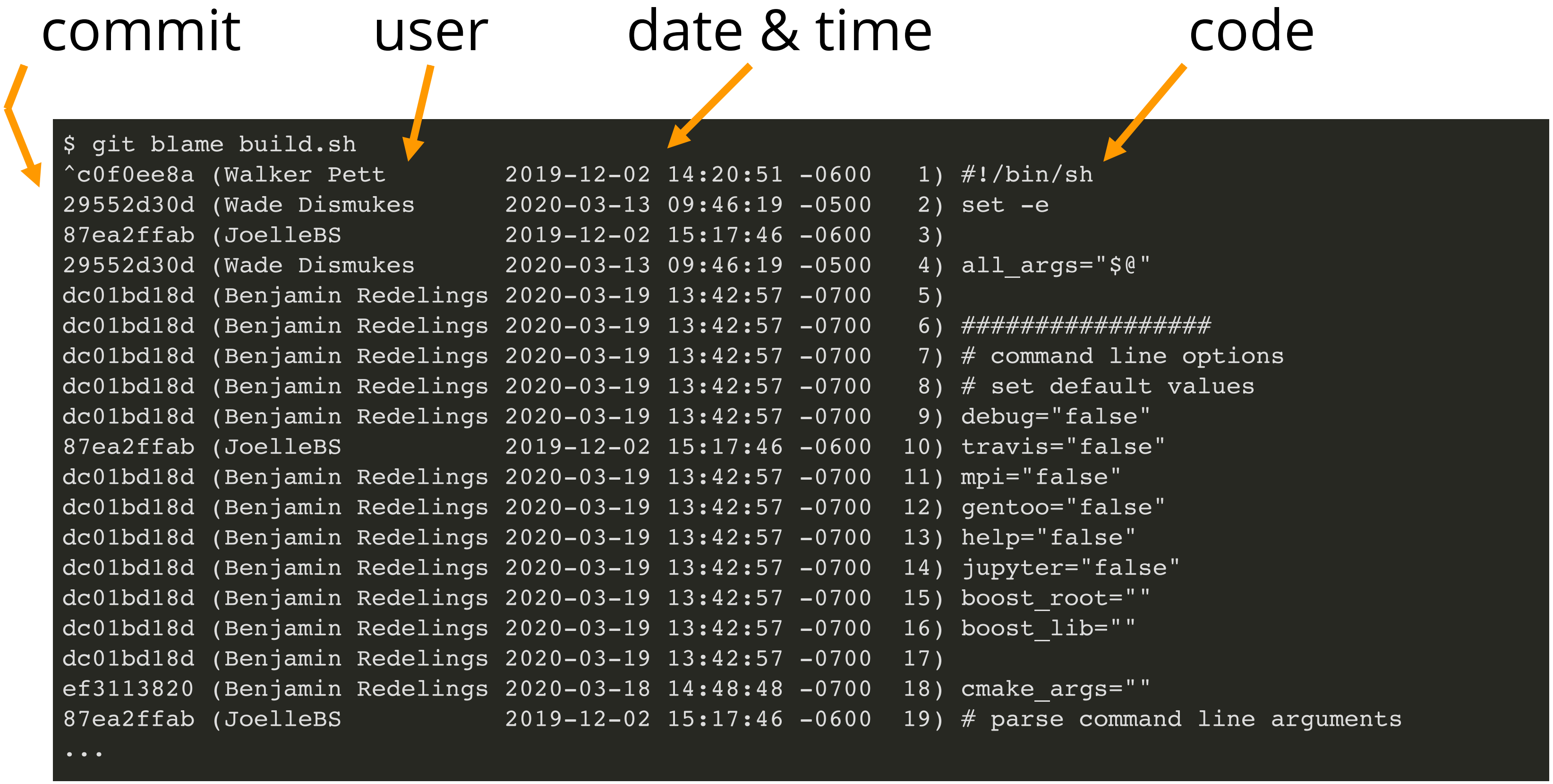
commit

merge

commit ID
+ message

git blame

Reports who, when, and how each code in a file was last modified



commit user date & time code

```
$ git blame build.sh
^c0f0ee8a (Walker Pett          2019-12-02 14:20:51 -0600   1) #!/bin/sh
29552d30d (Wade Dismukes        2020-03-13 09:46:19 -0500   2) set -e
87ea2ffab (JoelleBS             2019-12-02 15:17:46 -0600   3)
29552d30d (Wade Dismukes        2020-03-13 09:46:19 -0500   4) all_args="$@"
dc01bd18d (Benjamin Redelings 2020-03-19 13:42:57 -0700   5)
dc01bd18d (Benjamin Redelings 2020-03-19 13:42:57 -0700   6) #################
dc01bd18d (Benjamin Redelings 2020-03-19 13:42:57 -0700   7) # command line options
dc01bd18d (Benjamin Redelings 2020-03-19 13:42:57 -0700   8) # set default values
dc01bd18d (Benjamin Redelings 2020-03-19 13:42:57 -0700   9) debug="false"
87ea2ffab (JoelleBS             2019-12-02 15:17:46 -0600  10) travis="false"
dc01bd18d (Benjamin Redelings 2020-03-19 13:42:57 -0700  11) mpi="false"
dc01bd18d (Benjamin Redelings 2020-03-19 13:42:57 -0700  12) gentoo="false"
dc01bd18d (Benjamin Redelings 2020-03-19 13:42:57 -0700  13) help="false"
dc01bd18d (Benjamin Redelings 2020-03-19 13:42:57 -0700  14) jupyter="false"
dc01bd18d (Benjamin Redelings 2020-03-19 13:42:57 -0700  15) boost_root=""
dc01bd18d (Benjamin Redelings 2020-03-19 13:42:57 -0700  16) boost_lib=""
dc01bd18d (Benjamin Redelings 2020-03-19 13:42:57 -0700  17)
ef3113820 (Benjamin Redelings 2020-03-18 14:48:48 -0700  18) cmake_args=""
87ea2ffab (JoelleBS             2019-12-02 15:17:46 -0600  19) # parse command line arguments
...
```

Lab 6B

github.com/WUSTL-Biol4220/home/labs/lab_06B.md