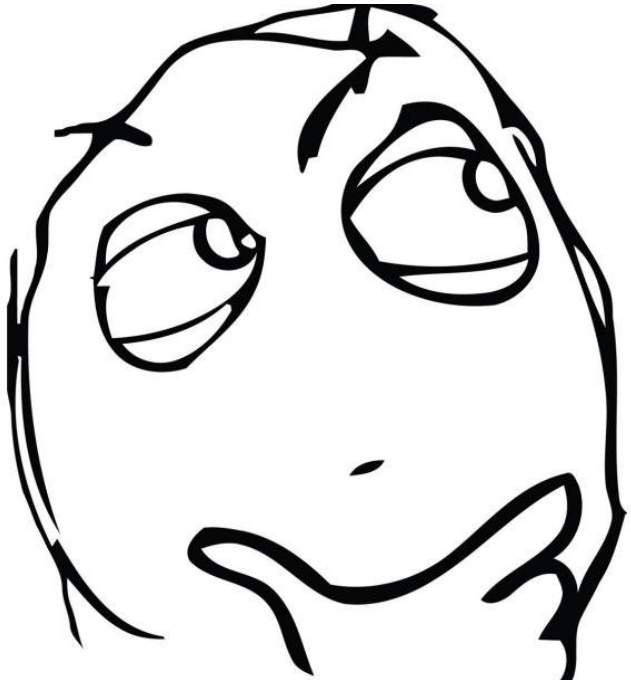
GIT is not a VCS.
That's why GIT is a great VCS



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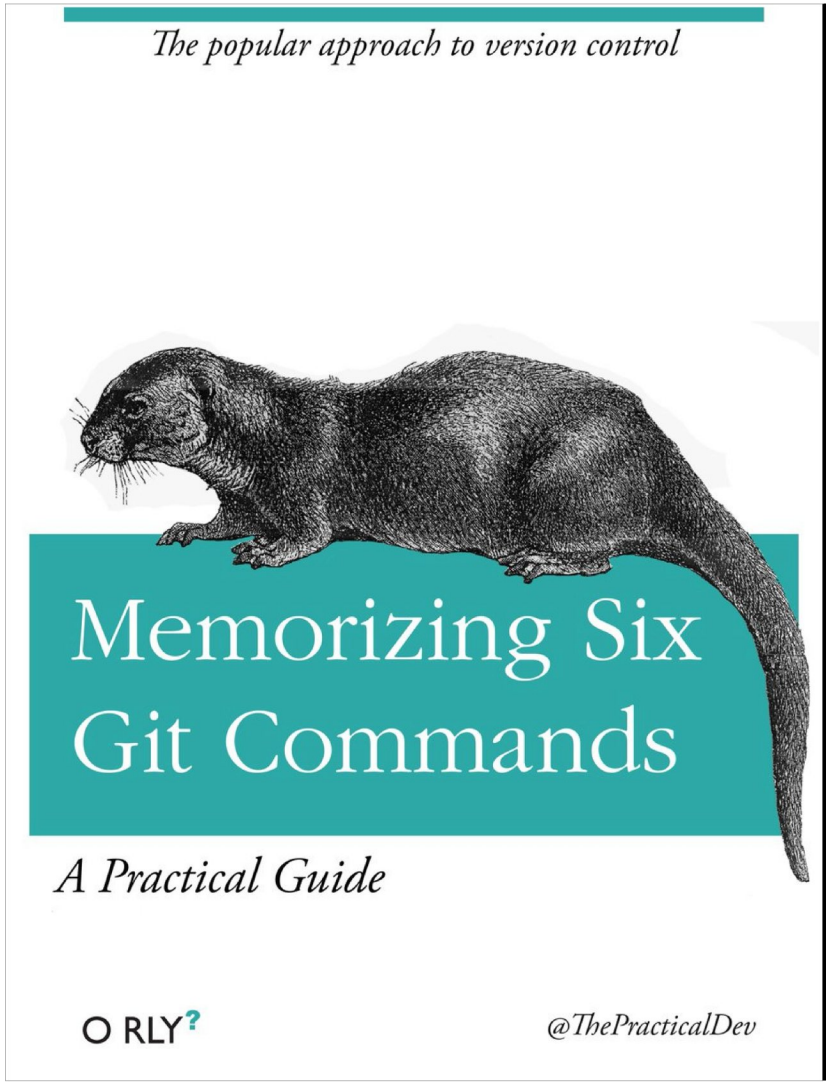
ern0@linkbroker.hu
2018.05.01

This is not a GIT course.



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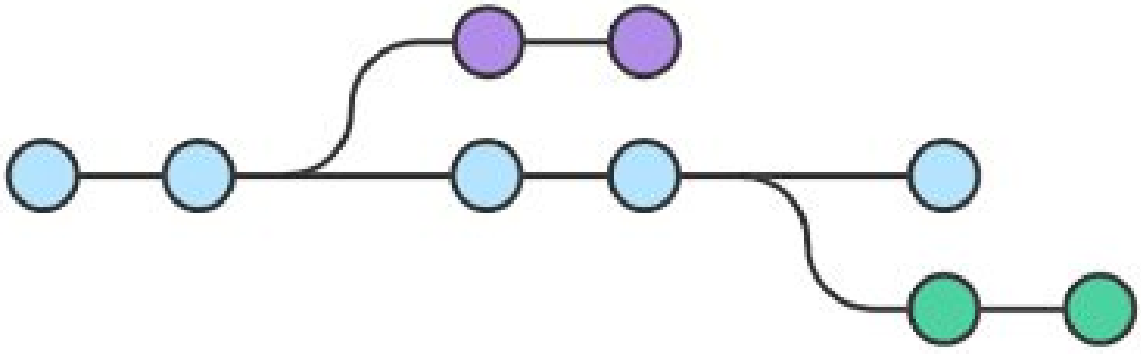
This is not a GIT course.

- Definiton of VCS
- Living without VCS
- Version controlling concepts
- How GIT works
- ~~GIT commands, tips'n'tricks~~



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Version Control System (VCS)

A component of software configuration management, **version control**, also known as **revision control** or **source control**,[1] is the management of changes to documents, computer programs, large web sites, and other collections of information. Changes are usually identified by a number or letter code, termed the "revision number", "revision level", or simply "revision". For example, an initial set of files is "revision 1". When the first change is made, the resulting set is "revision 2", and so on. Each revision is associated with a timestamp and the person making the change. Revisions can be compared, restored, and with some types of files, merged.

(Wikipedia)

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VCS features:

- Central file repository
- Store all changes
- Recall any snapshot
- Organize snapshots
- Teamwork support
- Side effect: backup

Thank you, Captain Obvious!

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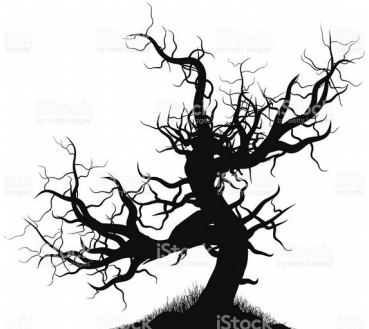
w/o VCS



Without VCS: editor backup

- myprg.bak
- myprogram.pas.bak
- myprogram.pas~
- myprg.pa~

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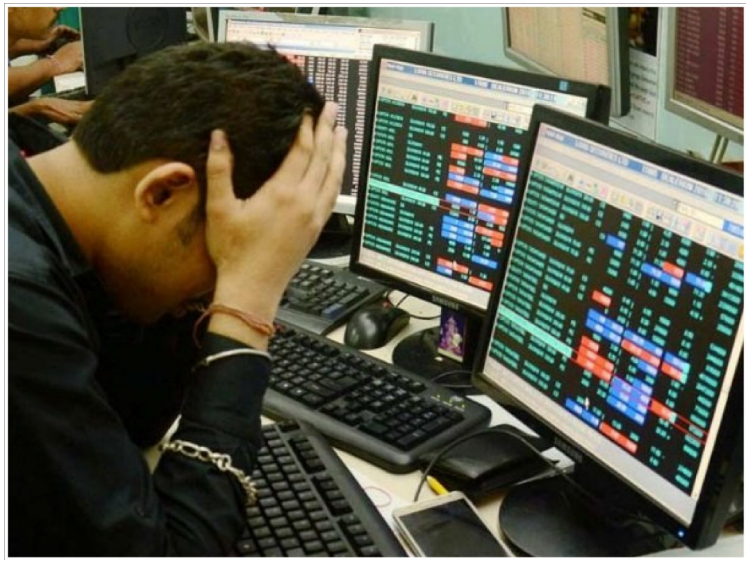
Without VCS: naming convention

- Logo2.psd
- Logo3b.psd
- Logo4-palettefix-veryfinal2.psd

Without VCS: manual snapshot

- app_old_2/
- app_1.3rc/
- app_1.4_20180402/
- app_bak_20180402.zip



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Without VCS: automatic backup

- local media
- network

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Almost VCS:

- file versioning (VAX / VMS)
- journaling filesystem (AIX JFS)
- Time Machine (Mac OS)

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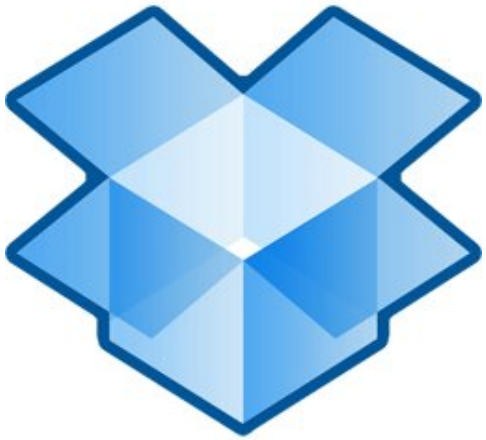
Poor man's VCS: Dropbox

- cloud sync (repo)
- file history (revert)
- pause sync (commit)



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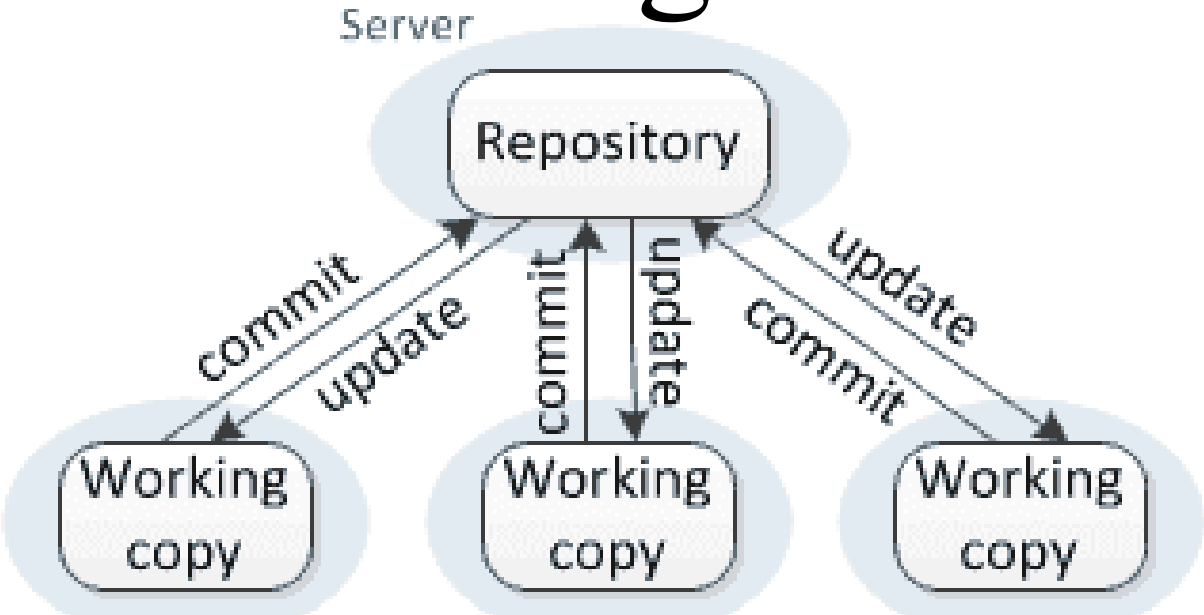
VCS

VCS infrastructure

- server
- repository
- client

VCS terms (basic)

- checkout
- working copy
- file is under version control
- **commit**, commit message
- revert
- changelog



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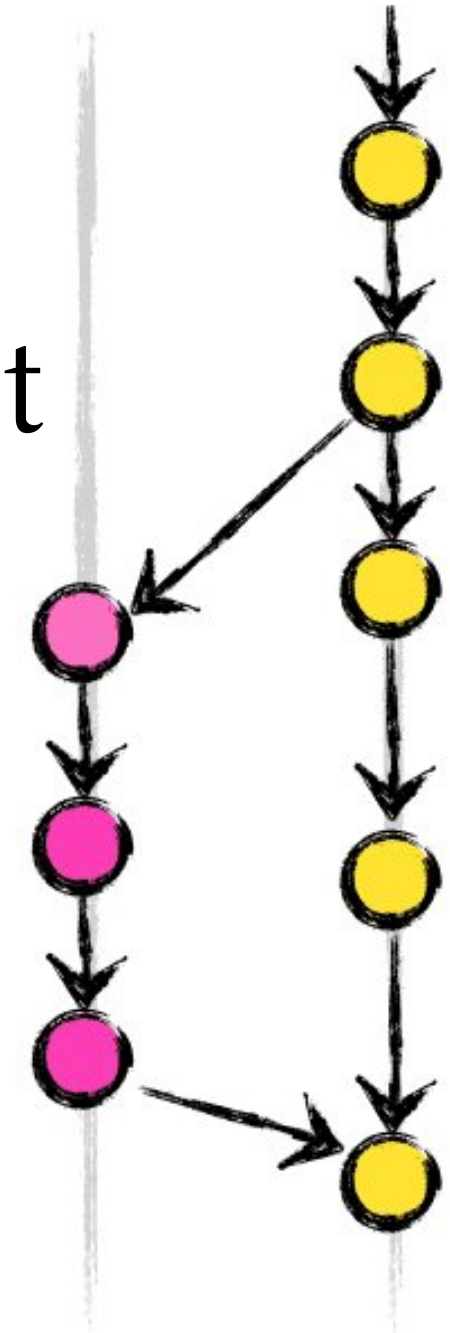
VCS terms (advanced)

- **branch**, head
- locking / shared checkout
- merge
- merge conflict
- diff (change, delta)
- merge conflict resolve



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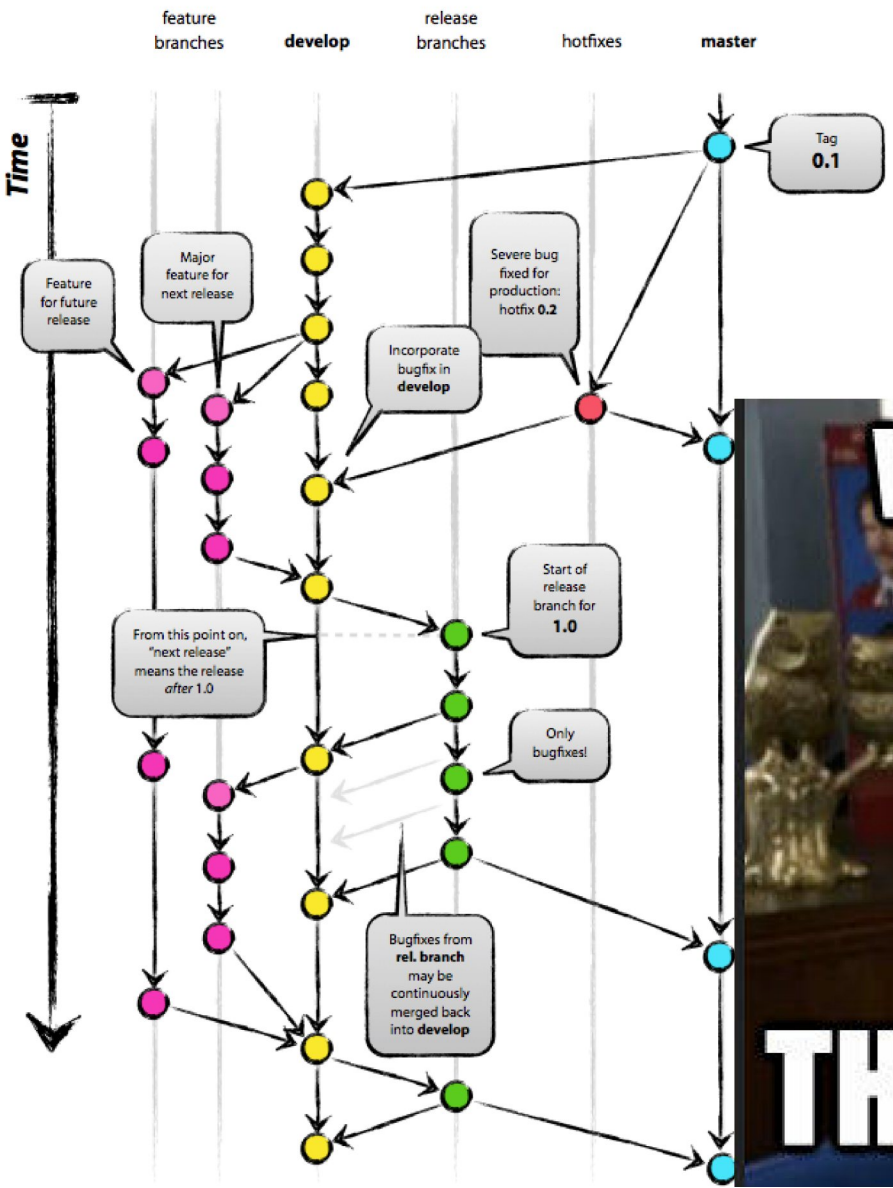
VCS is about branching



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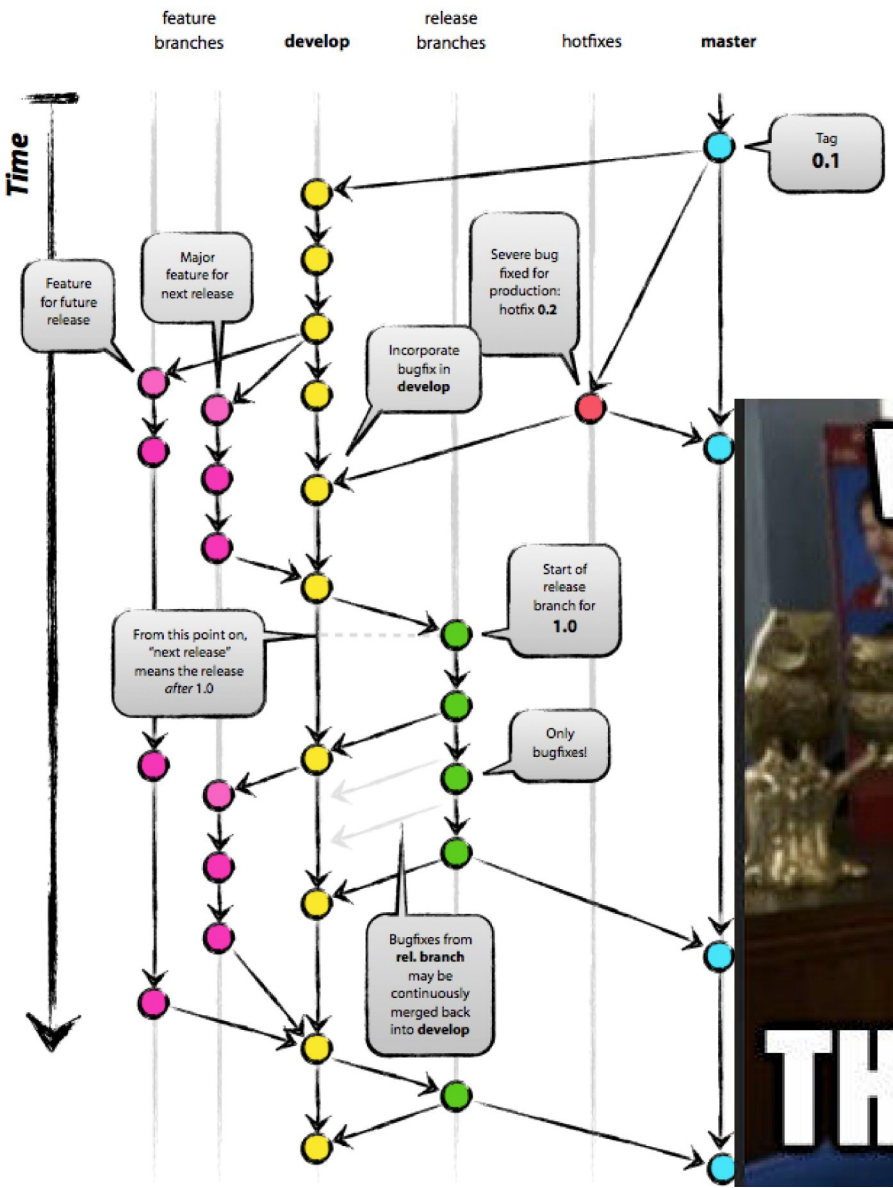
Development is about branching



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GIT

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GIT

Three states

- Working Directory
- Staging Area (a.k.a. Index)
- Local Repository `.git/`

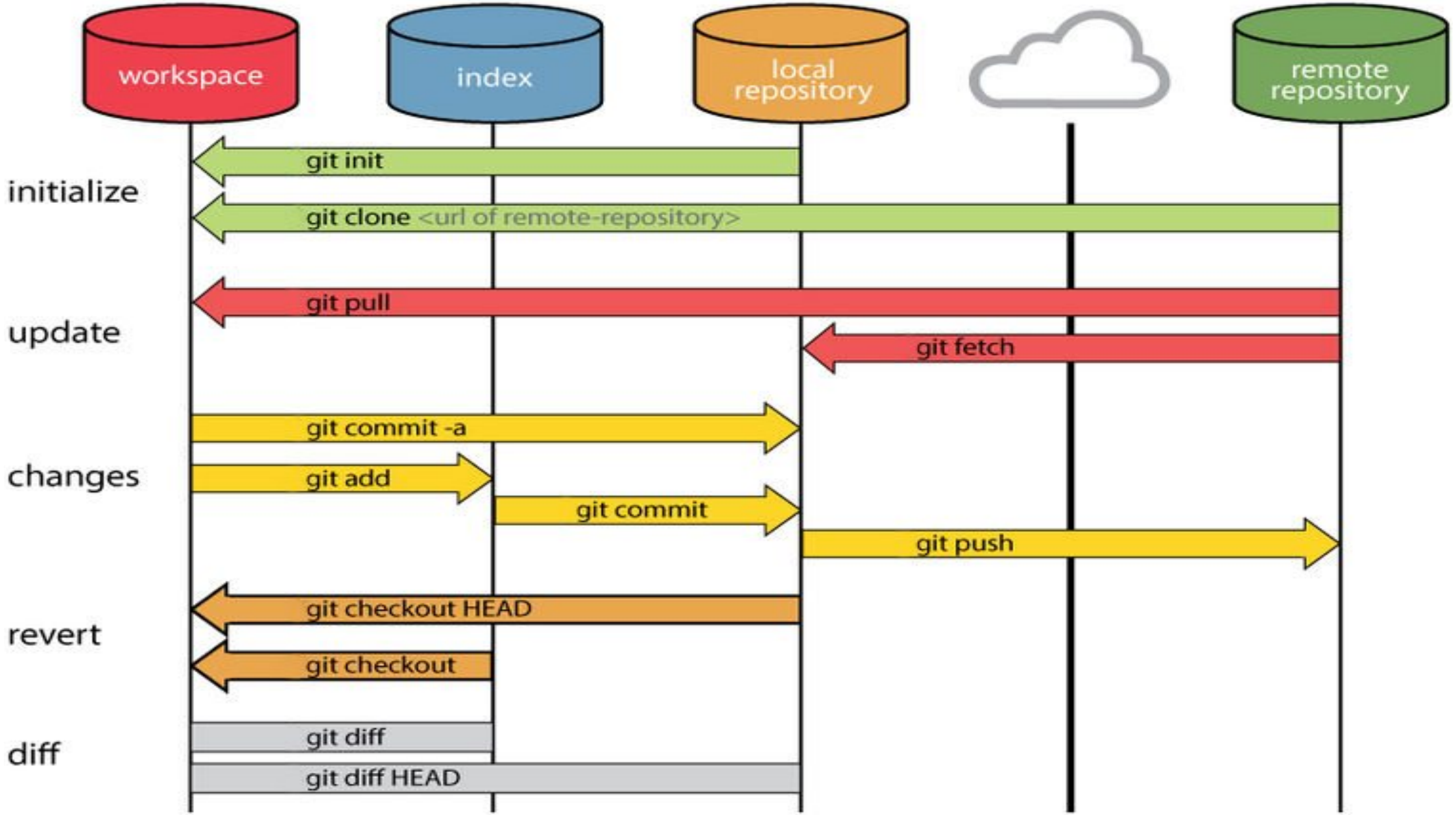
- Remote Repository

Three states

- Working Directory
- Staging Area (a.k.a. Index)
- Local Repository `.git/`

- Remote Repository
  (GitHub, GitLab etc.)

GIT is not a VCS. That's why GIT is a great VCS



diff

```
One two three four
Can I have a little cake
Five six seven eight nine ten
I love you
A B C D
Can I bring my friend to coffee
```

```
One two three four
Can I have a little more
Five six seven eight nine ten
I love you
A B C D
Can I bring my friend to tea
E F G H I J
I love you
```

```
--- a 2018-04-23
21:35:37.000000000 +0200
+++ b 2018-04-23
21:35:10.000000000 +0200
@@ -1,6 +1,8 @@
 One two three four
-Can I have a little cake
+Can I have a little more
 Five six seven eight nine ten
 I love you
 A B C D
-Can I bring my friend to coffee
+Can I bring my friend to tea
+E F G H I J
+I love you
```

colordiff

```
One two three four
Can I have a little cake
Five six seven eight nine ten
I love you
A B C D
Can I bring my friend to coffee
```

```
One two three four
Can I have a little more
Five six seven eight nine ten
I love you
A B C D
Can I bring my friend to tea
E F G H I J
I love you
```

```
--- a 2018-04-23
21:35:37.000000000 +0200
+++ b 2018-04-23
21:35:10.000000000 +0200
@@ -1,6 +1,8 @@
 One two three four
-Can I have a little cake
+Can I have a little more
 Five six seven eight nine ten
 I love you
 A B C D
-Can I bring my friend to coffee
+Can I bring my friend to tea
+E F G H I J
+I love you
```

(The Beatles: All Together Now)

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The repository

- series of snapshots
- diff to previous
- commit: new node
  based on selected one

(stay tuned)

hash (md1)

```
$ echo "We Build Robots" | sha1sum
0b19fb7e8ad55d5b0fc5bf27411c63a4c0b182fe  -

$ echo "We Build Robots." | sha1sum
99d7c75c3cf51f3712058a3eba56837314b35156  -

$ echo "We build robots" | sha1sum
fc3504b54ff836e66d956b1056c6549b991d01fa  -

$ echo "We Build Robots" | sha1sum
0b19fb7e8ad55d5b0fc5bf27411c63a4c0b182fe  -
```

hash (md1)

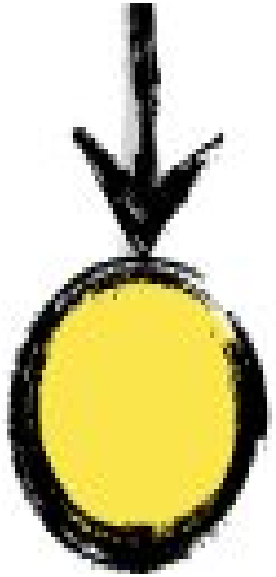
```
commit 029978ed2767be597f159b5e0eb29f754b410379
Author: ern0 <ern0@linkbroker.hu>
Date:   Fri Apr 20 00:00:24 2018 +0200

    fmt stub added

commit f705e402ceb518011bea3d8a813e45233101ed27
Author: ern0 <ern0@linkbroker.hu>
Date:   Thu Apr 19 22:46:03 2018 +0200

    added universal hash check function
```

git log

```
029978e 2018-04-20 00:00 ern0  o fmt stub added
f705e40 2018-04-19 22:46 ern0  o added universal hash check function
```

tig

The repository element (commit)



- commit ID (hash)
- previous commit ID
- snapshot (diff...)
- merged commit ID (opt.)
- timestamp
- author
- commit message

Working with commits

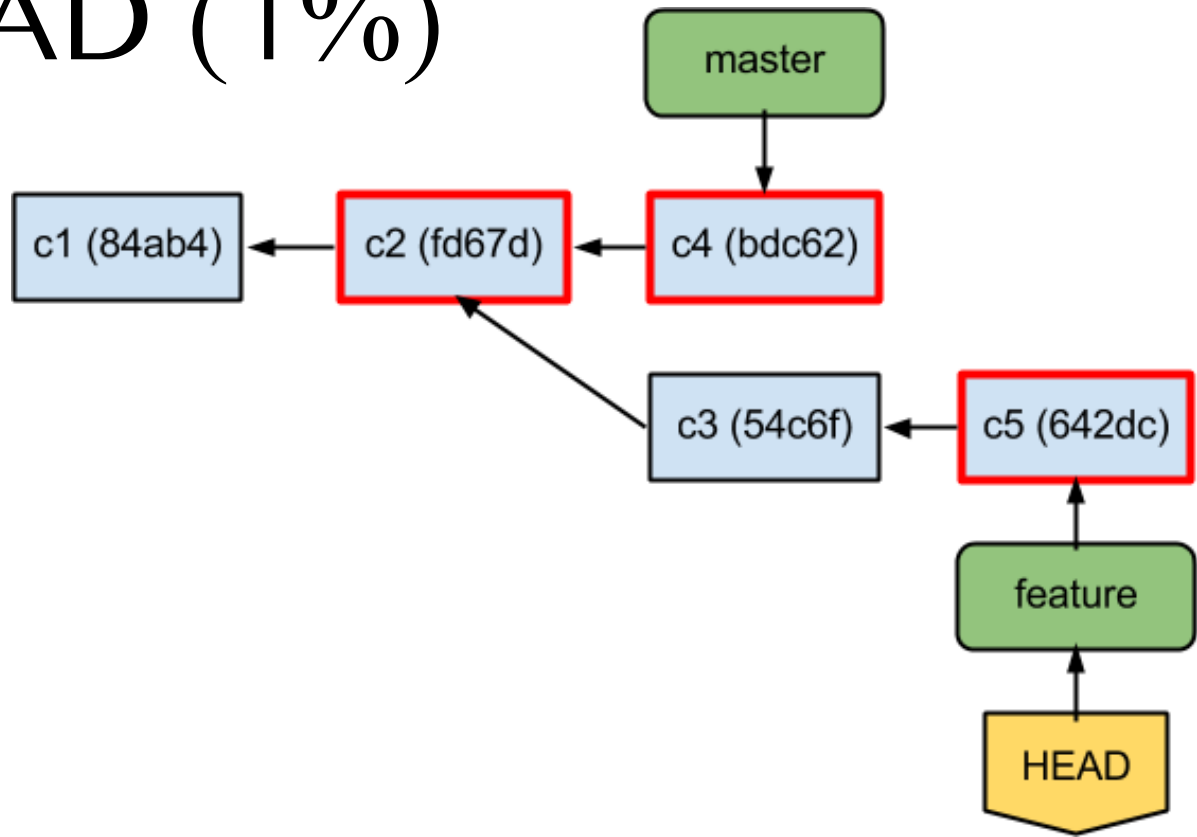
- pick a base commit
- apply changes
- add new commit
  to the repository

GIT logo

Referring to commits

- commit ID (0.00%) 

- tag (0.01%)
- relative to HEAD (1%)
- **branch** (99%)



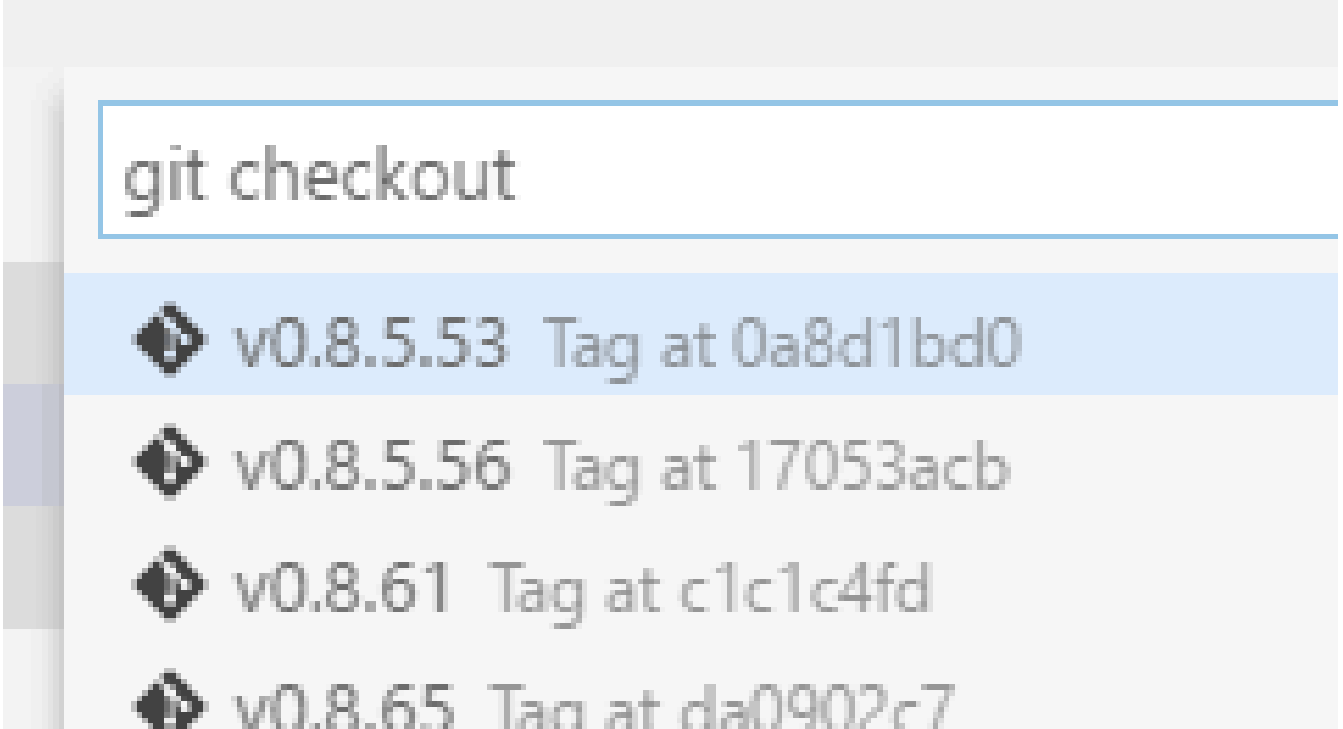
Referring by commit ID


```
$ git checkout fb154891753699fa38beb4525412ed7b1995ed4e
HEAD is now at fb15489 html file created

$ echo “</html>” >> index.html     # workspace
$ git add index.html               # staging

$ git commit -m "closing tag added to html file"
[detached HEAD bbbd55a] closing tag added to html file
 1 file changed, 1 insertion(+)

$ git log
commit bbbd55a86a6a54a360bc830700c720fb6b65edde (HEAD)
Author: ern0 <ern0@linkbroker.hu>
    closing tag added to html file

commit fb154891753699fa38beb4525412ed7b1995ed4e
Author: ern0 <ern0@linkbroker.hu>
    html file created
```

Referring by commit ID

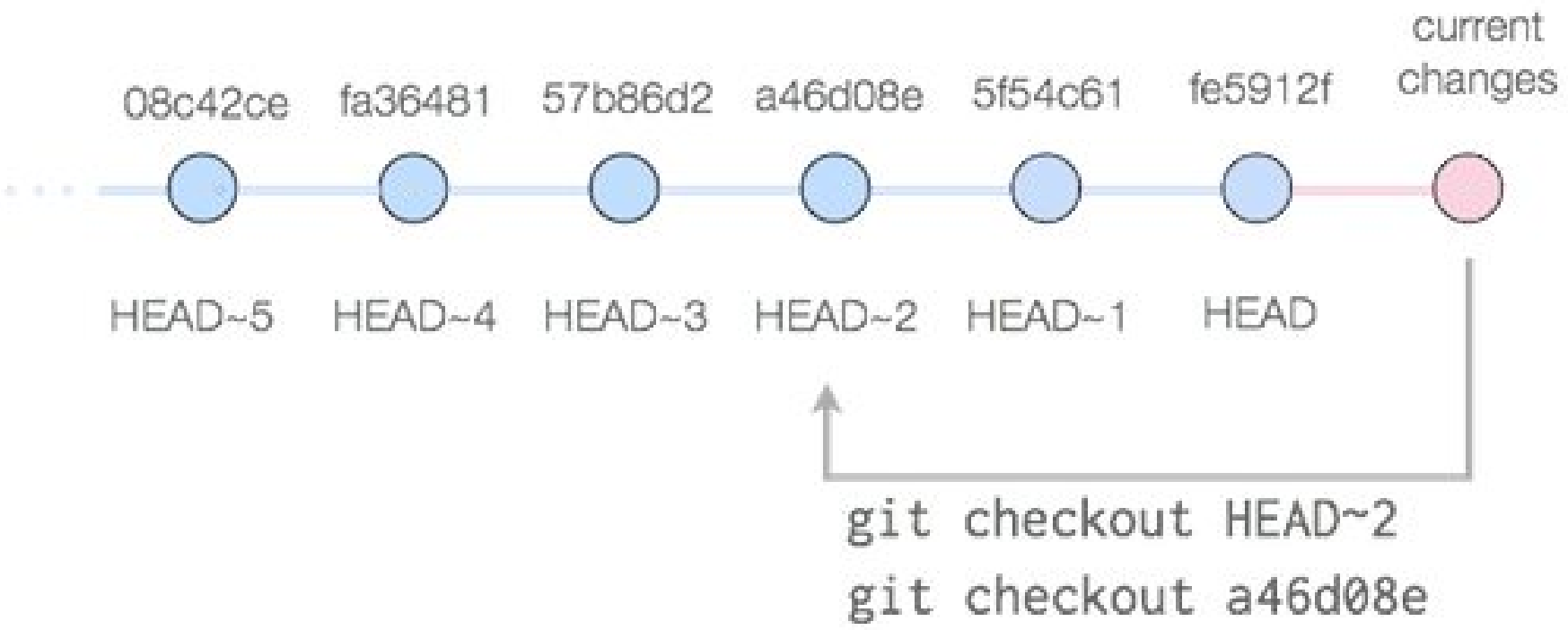
Referring by tag

- named reference to a node
- once set, never changes
- `git checkout v1.8.1`



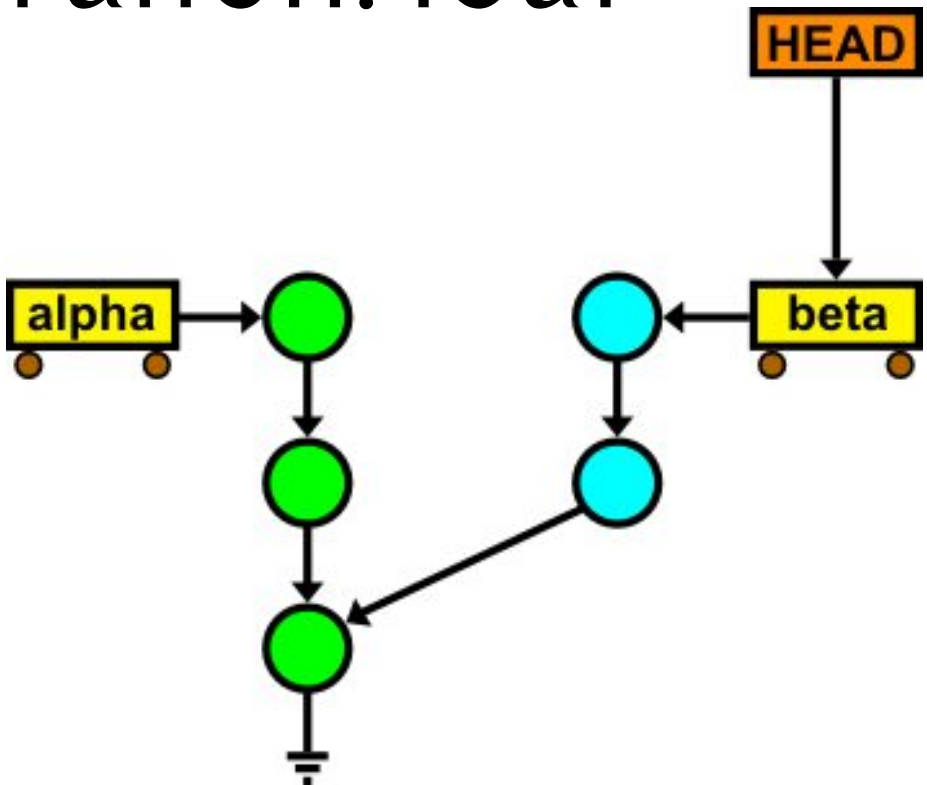
Referring relative to HEAD

- using *previuos commit ID* refs
- `git diff HEAD^`
- `git checkout HEAD~2`



Referring by **branch** (99%)

- named reference to a node
- actual branch follows HEAD
- repository: tree, branch: leaf
- detached HEAD:
  no branch,
  GC will delete it



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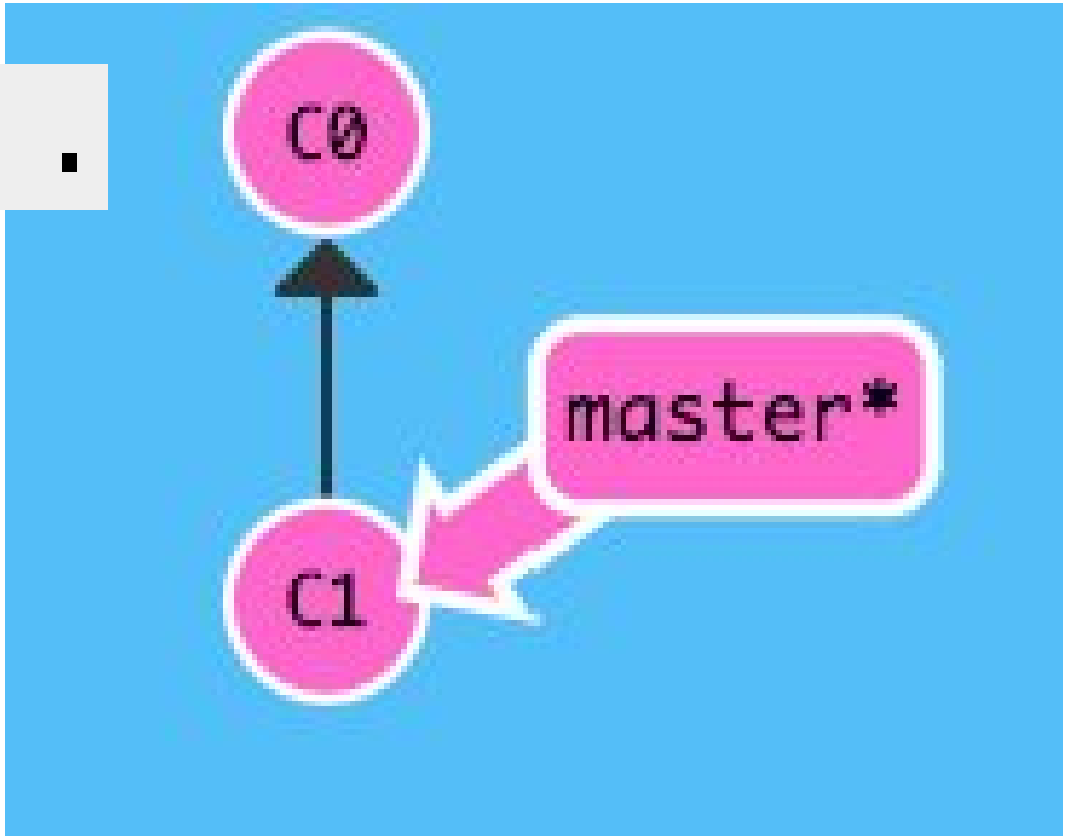
Branch

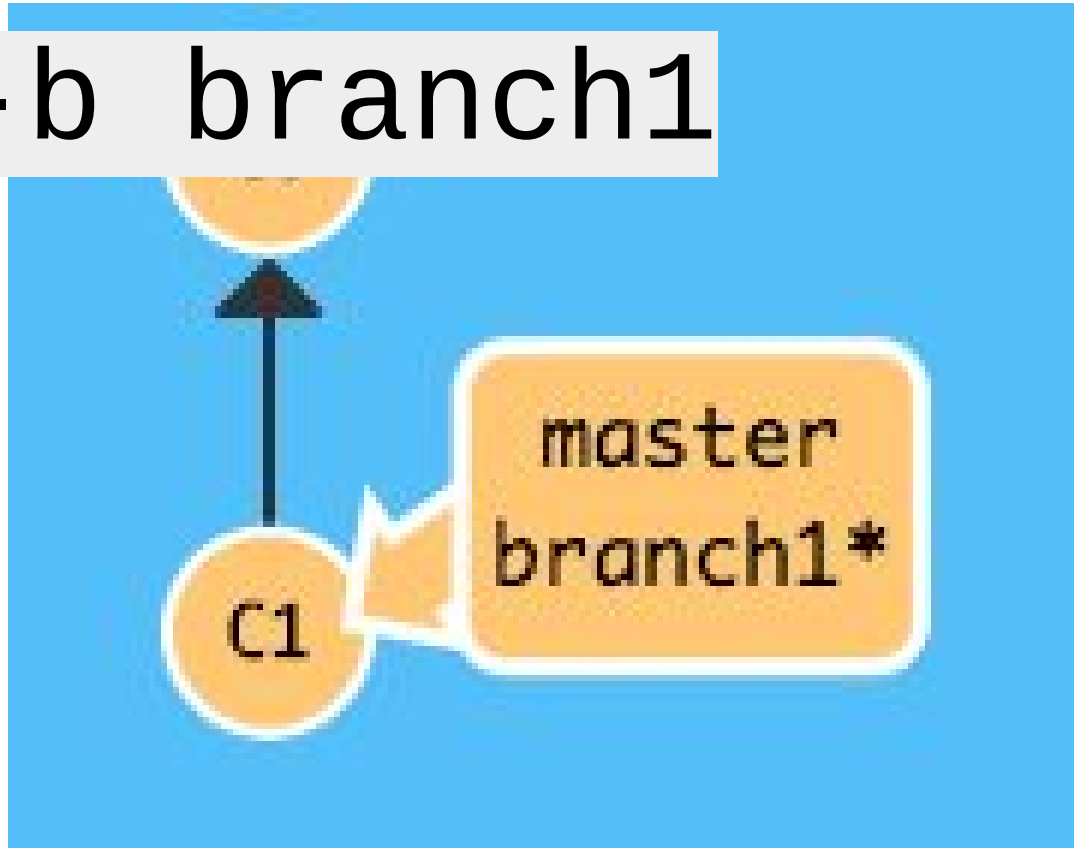
Creating a commit

```
git commit ...
```



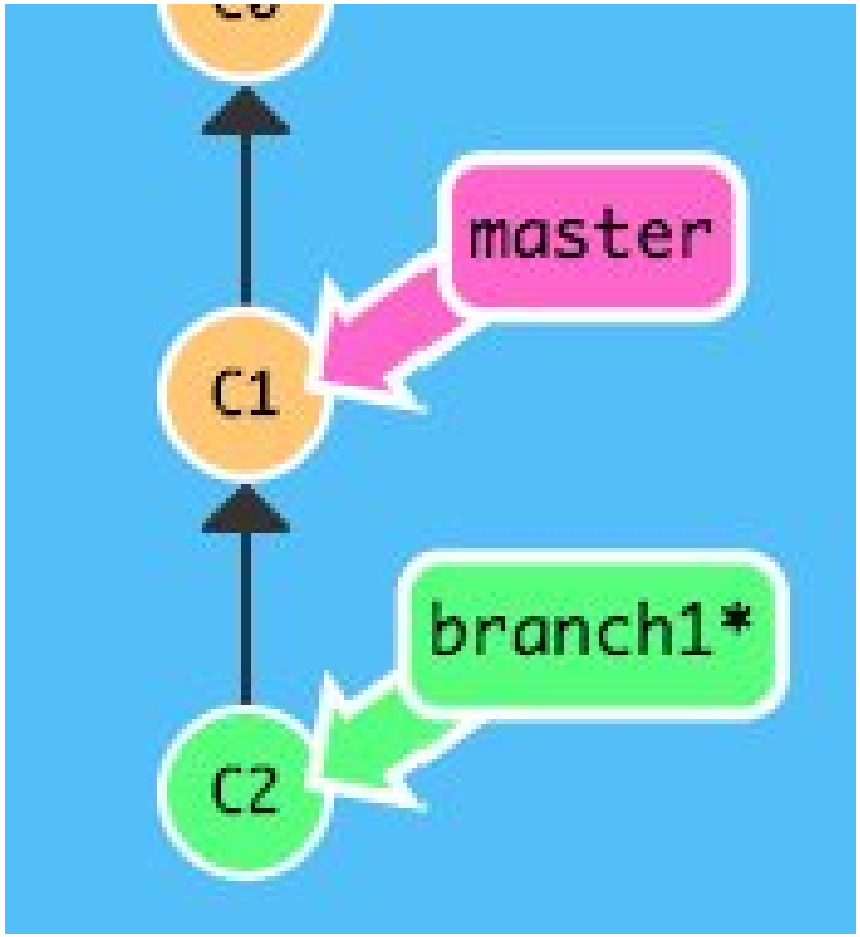
Creating a branch

```
git checkout-b branch1
```



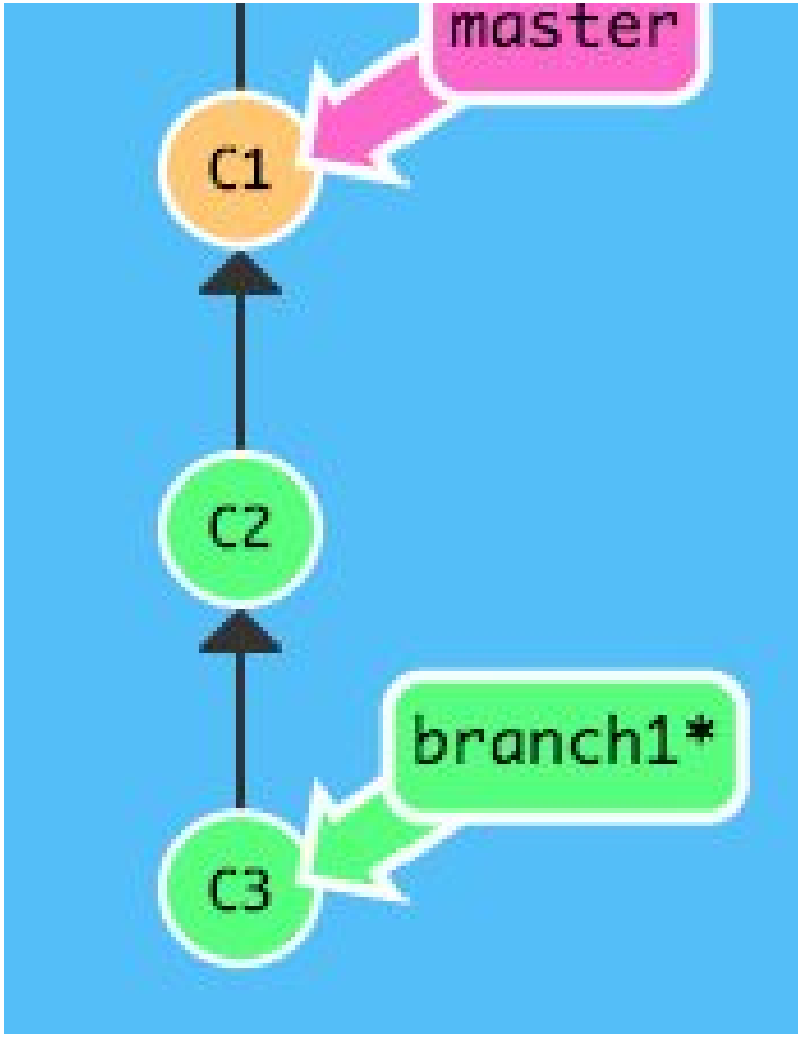
Commit on the new branch

```
git commit ...
```



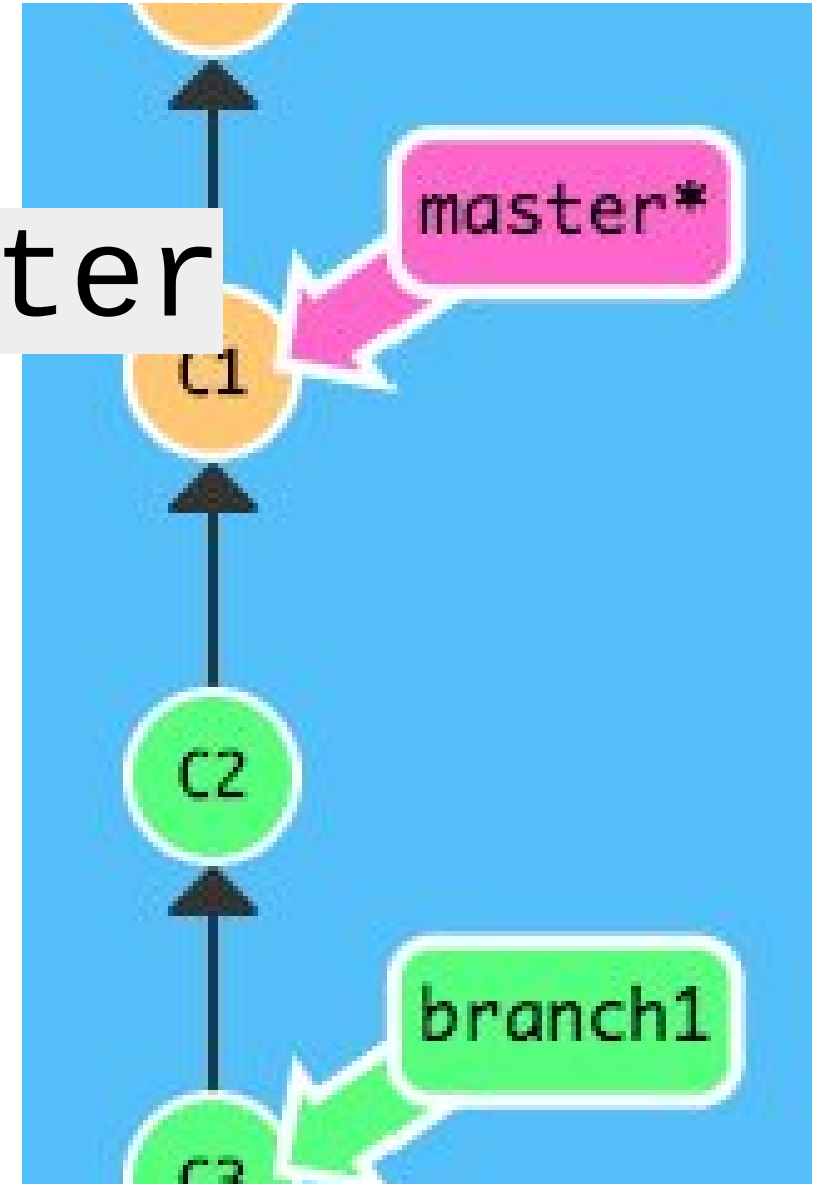
Another commit

```
git commit ...
```



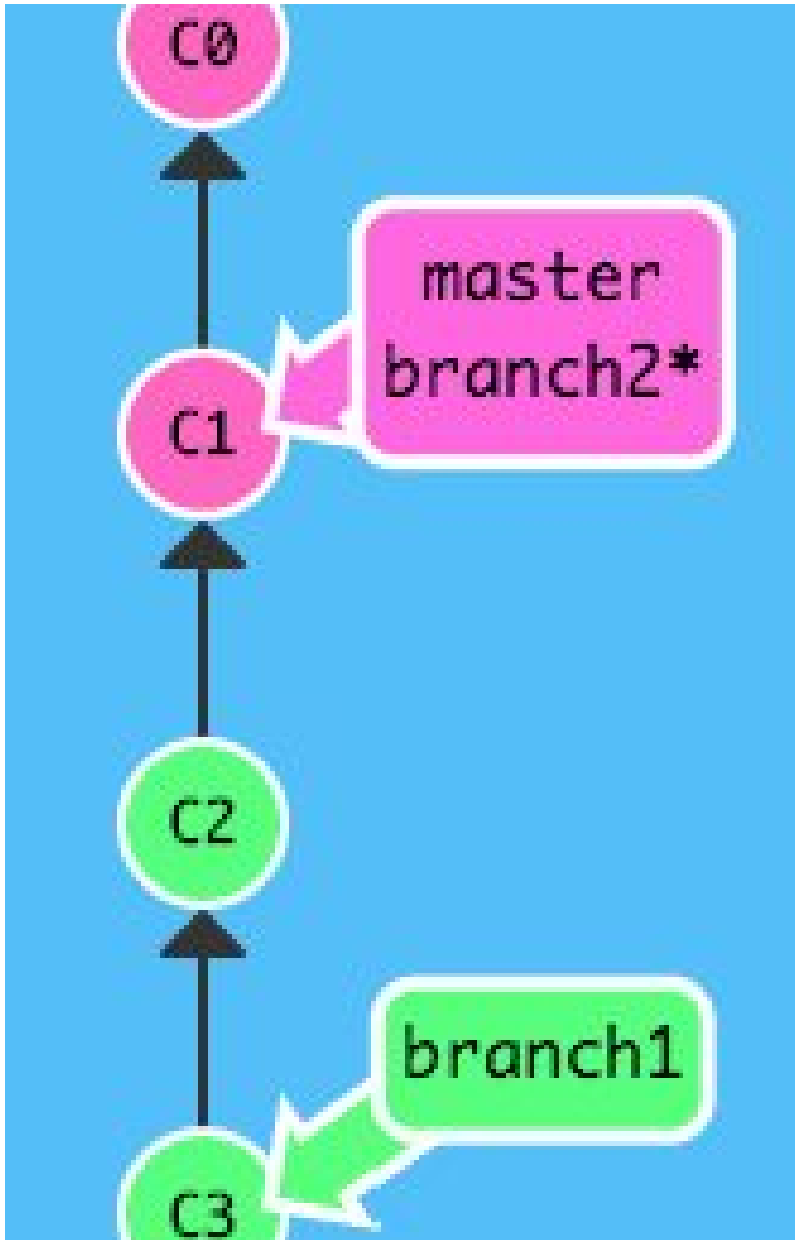
Back to master

```
git checkout master
```



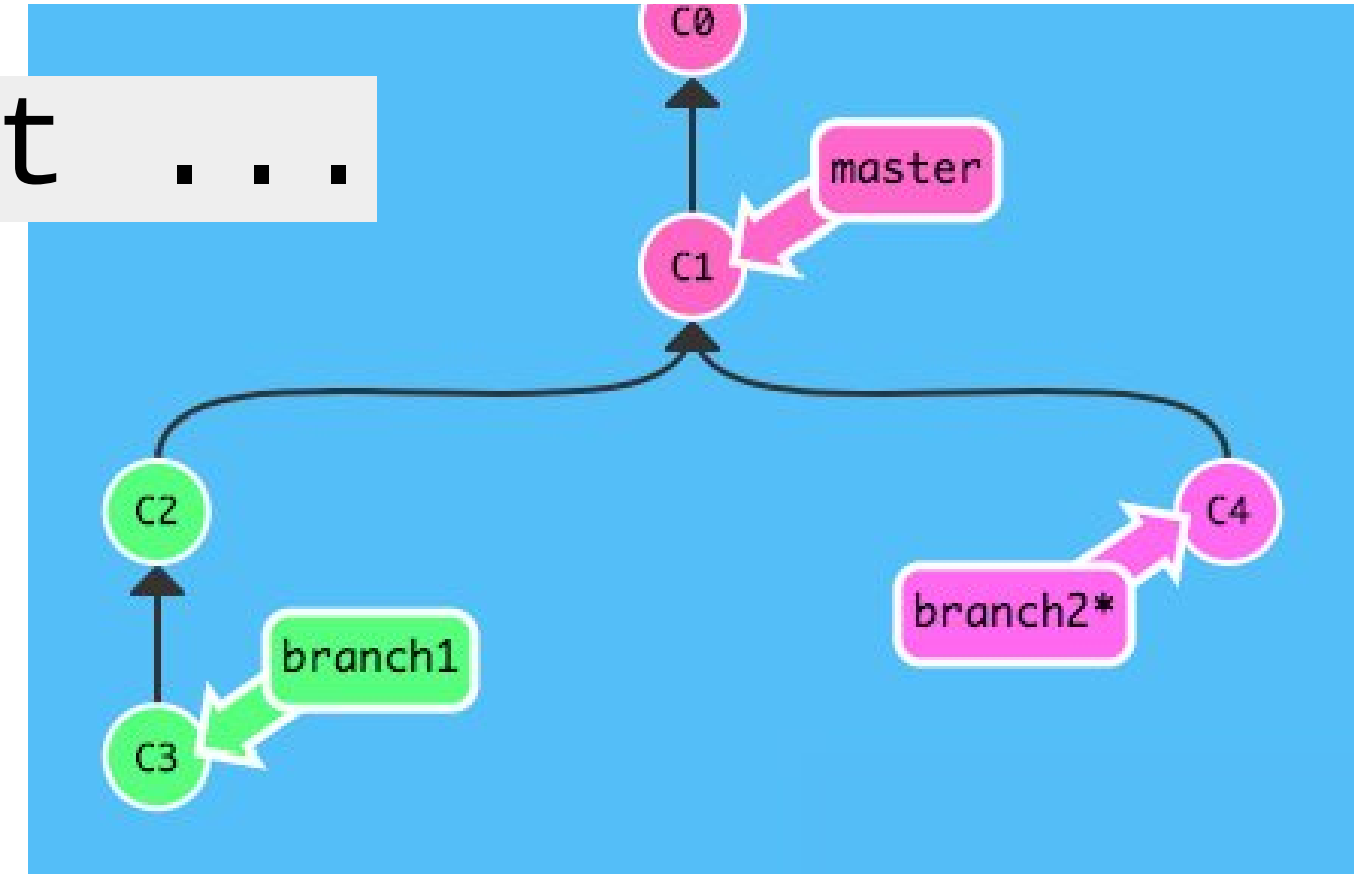
Another new branch

```
git checkout \
 -b branch2
```



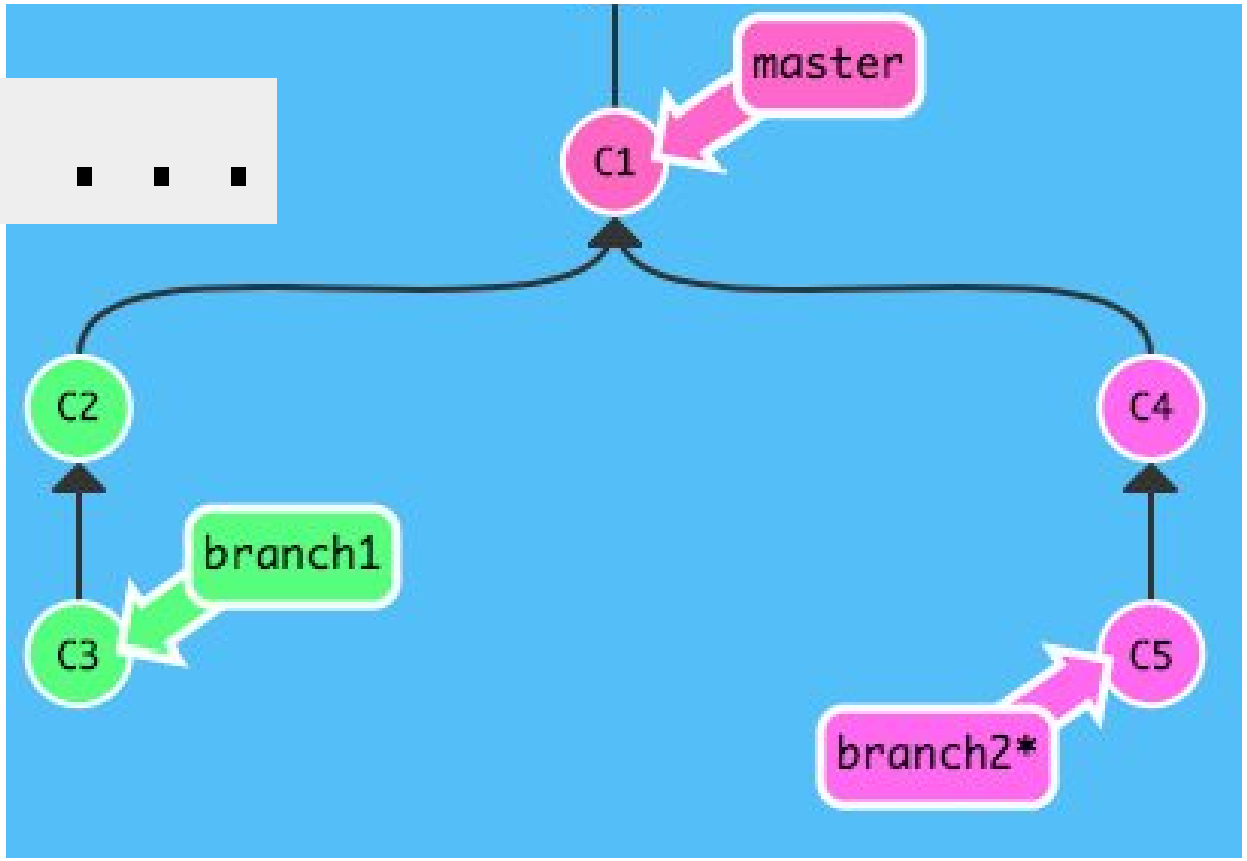
Commit on new branch

```
git commit ...
```



Another commit on new branch

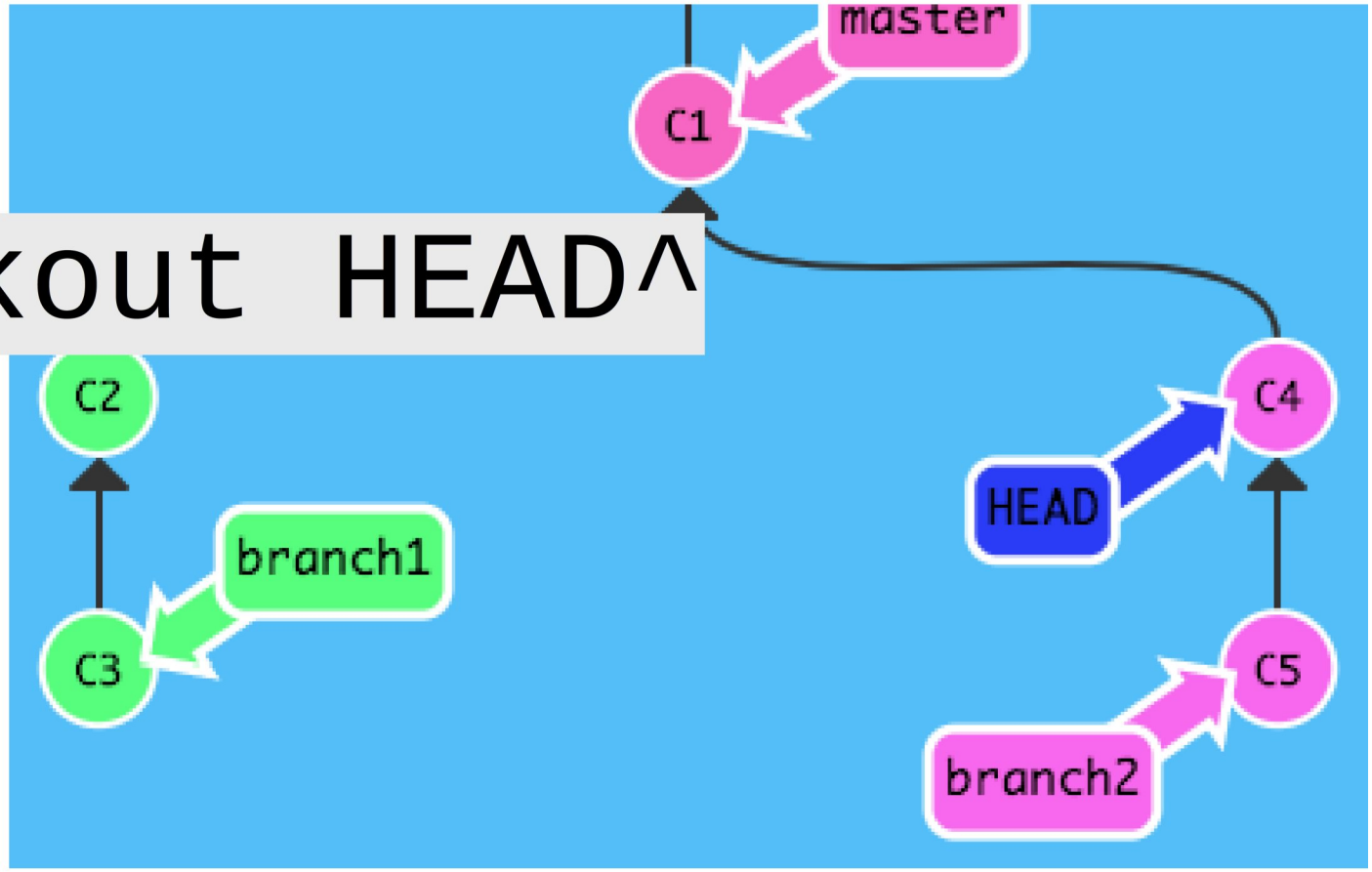
```
git commit ...
```



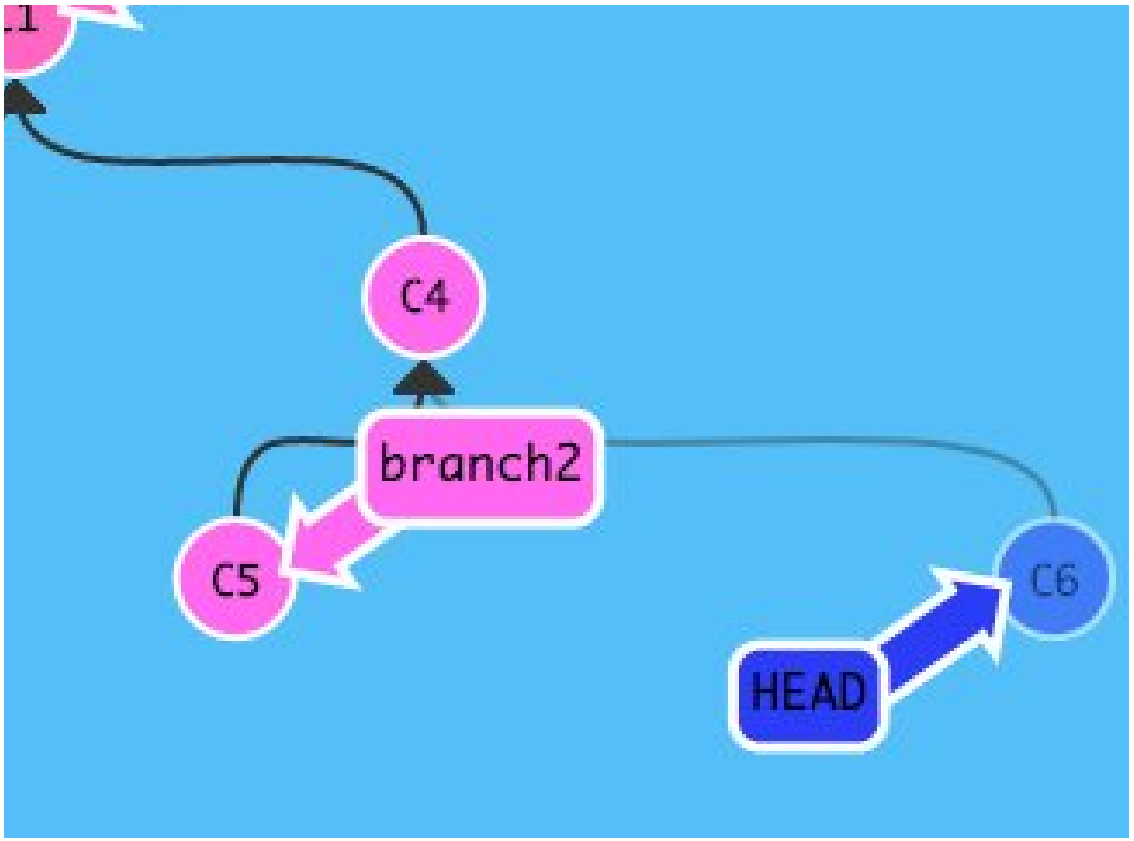
Step back

```
git checkout HEAD^
```

detached HEAD

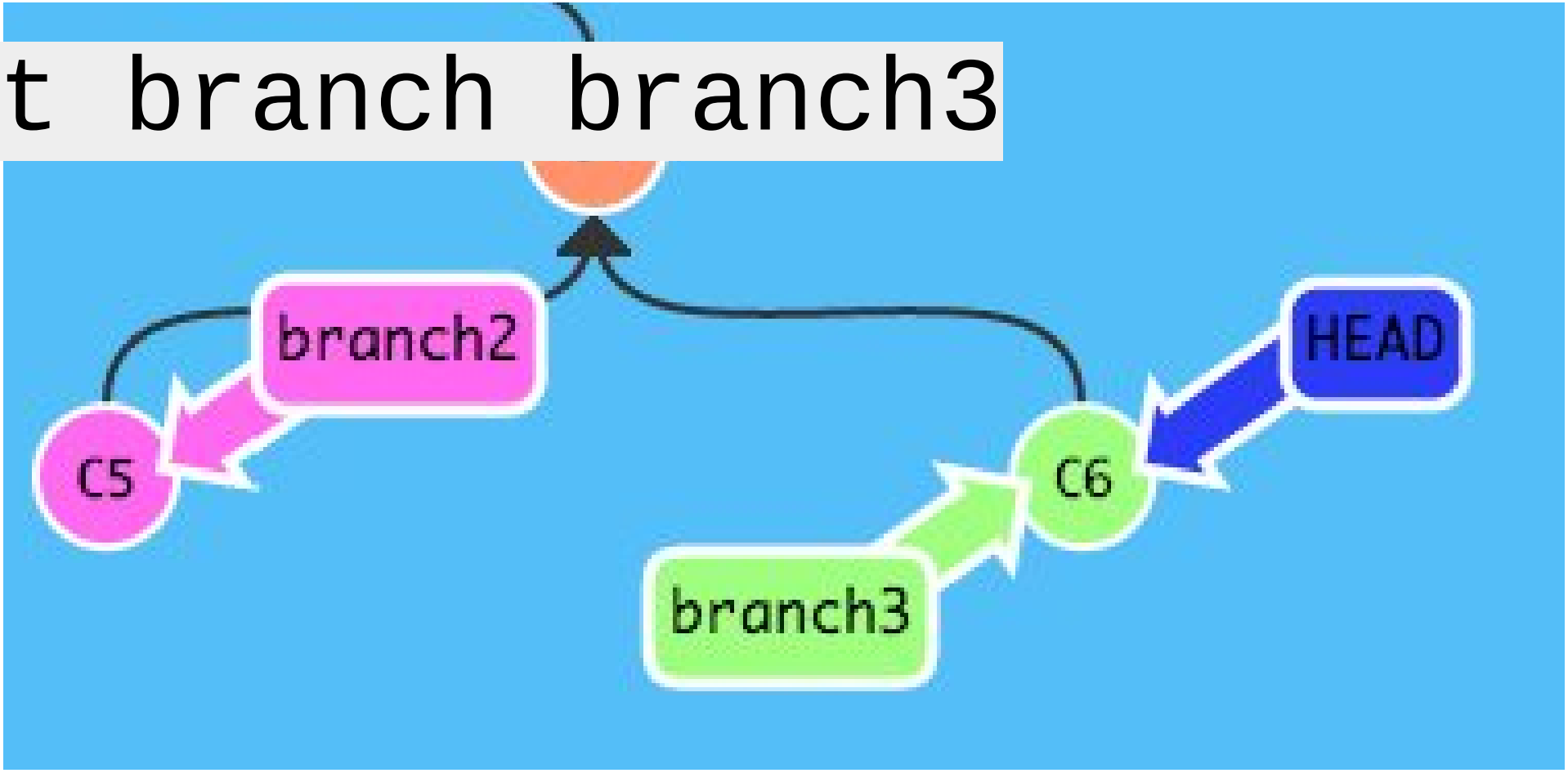


Commit on detached HEAD



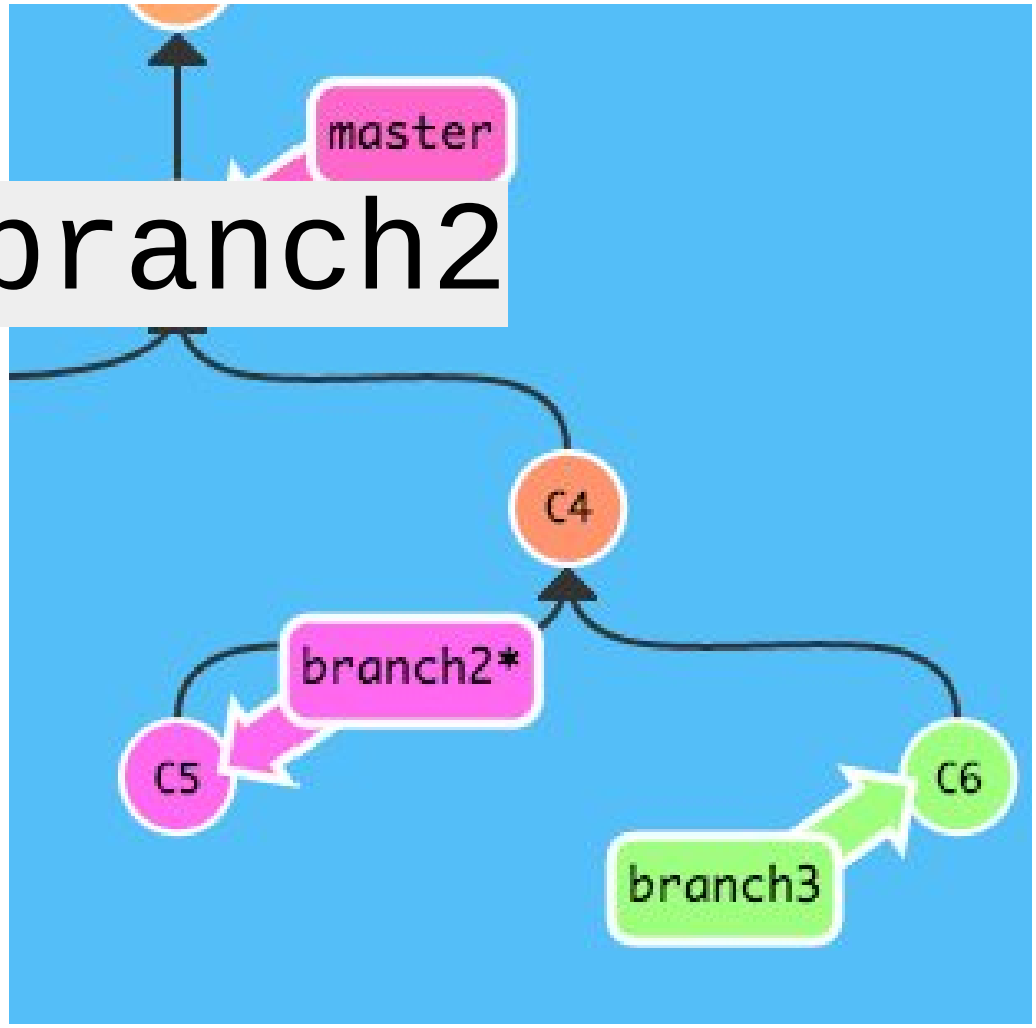
Give name to child

```
git branch branch3
```



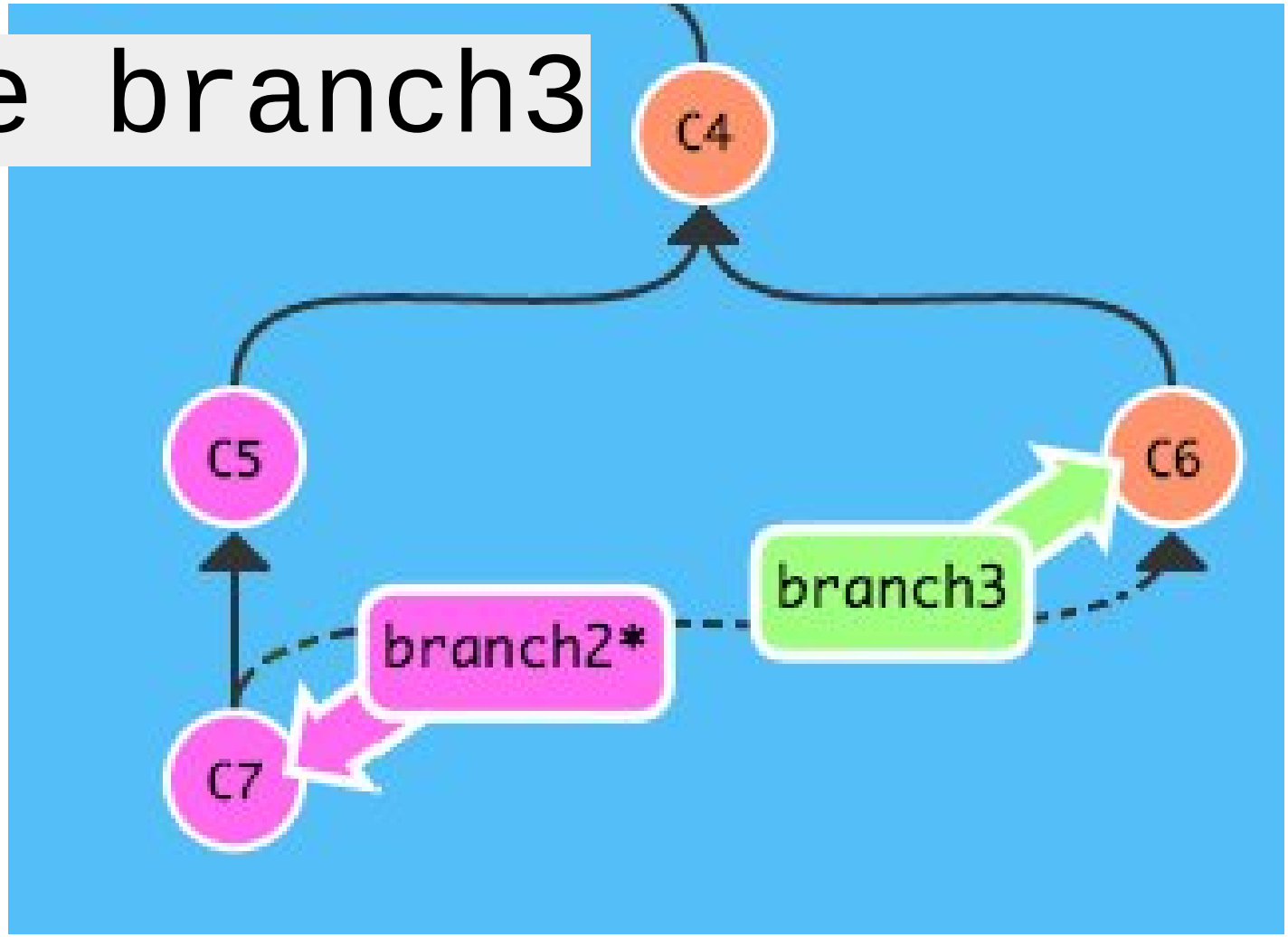
Merge 1/2.

```
git checkout branch2
```



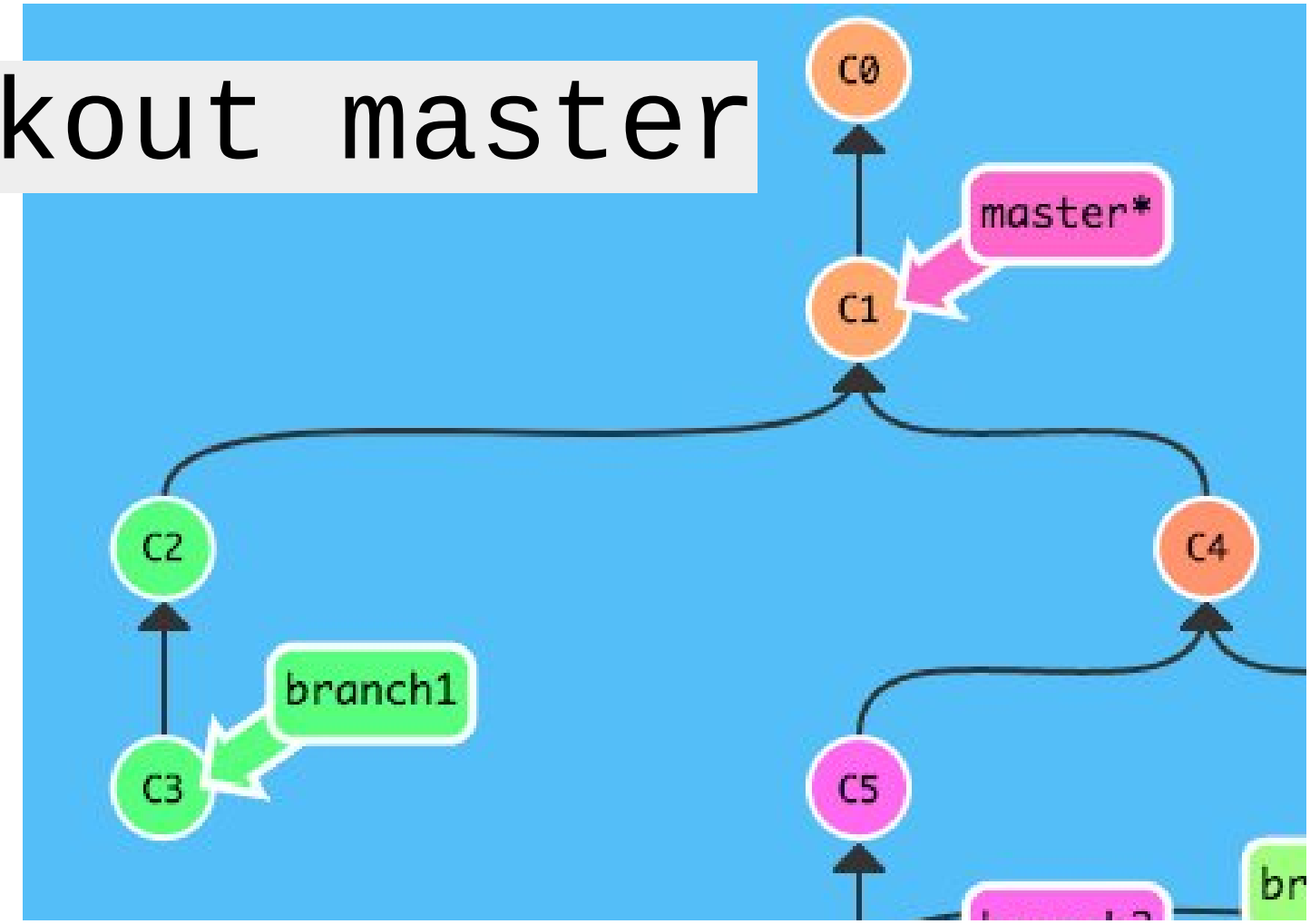
Merge 2/2.

```
git merge branch3
```



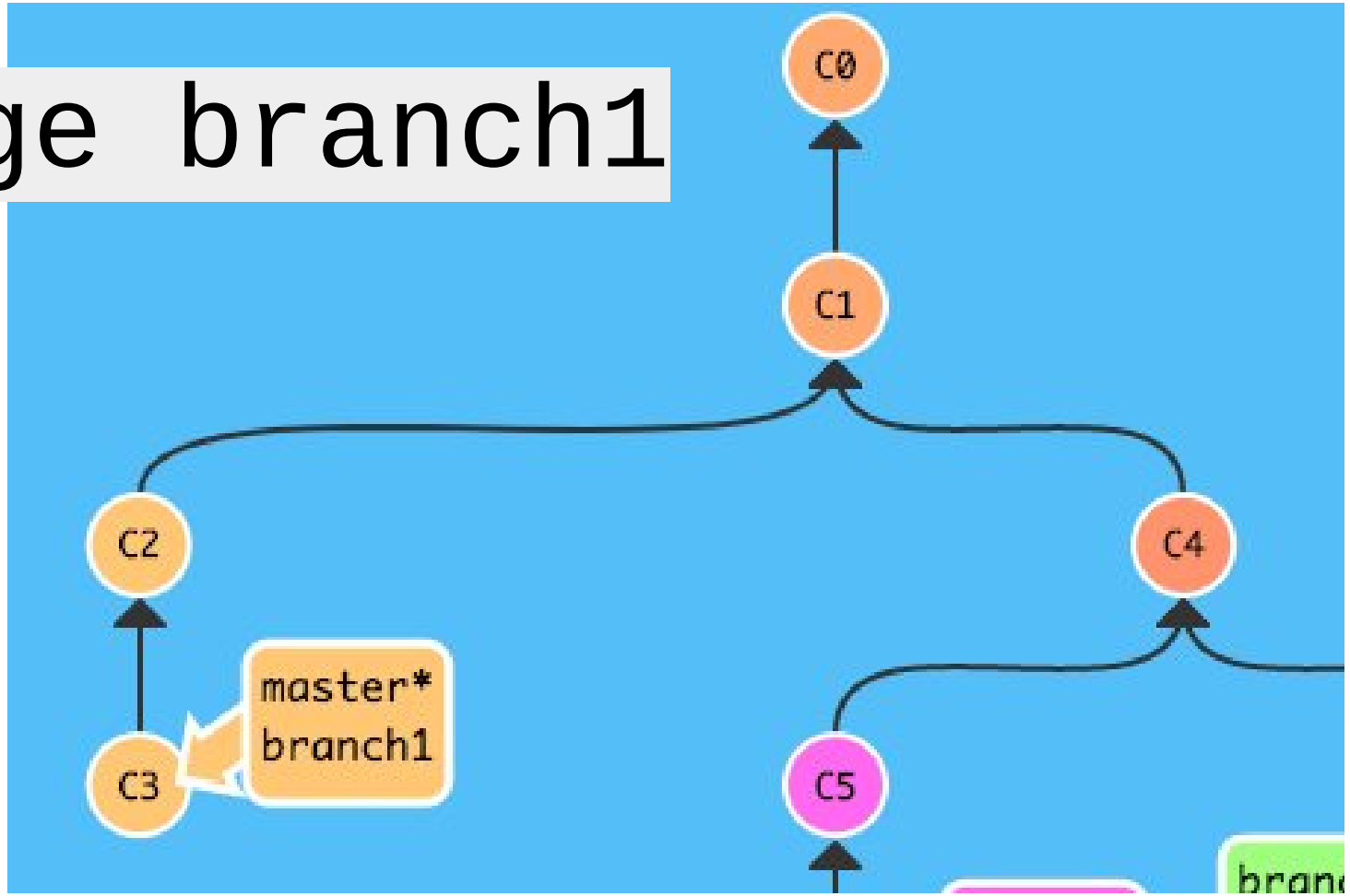
Merge ffwd 1/2.

```
git checkout master
```

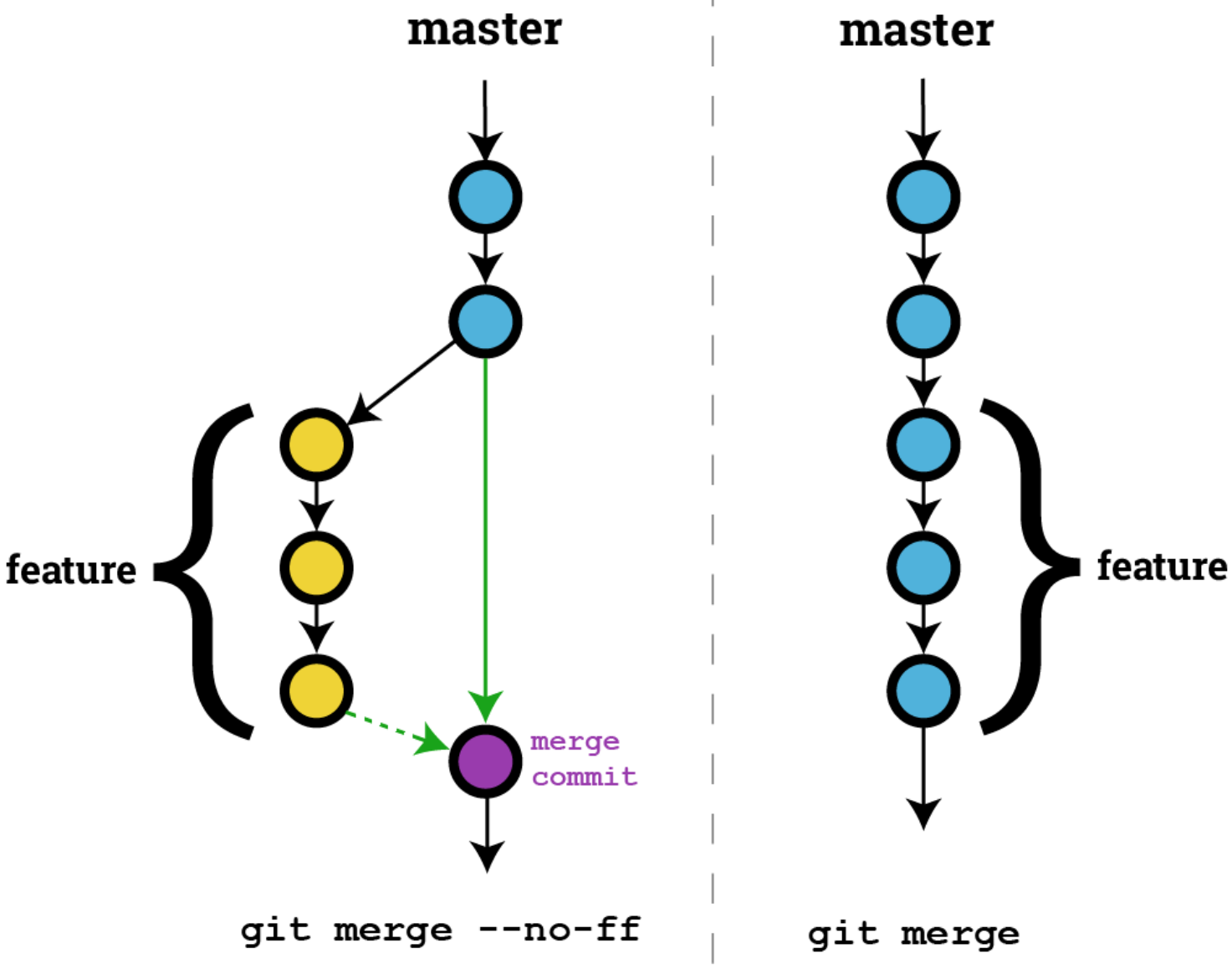


Merge ffwd 2/2.

```
git merge branch1
```



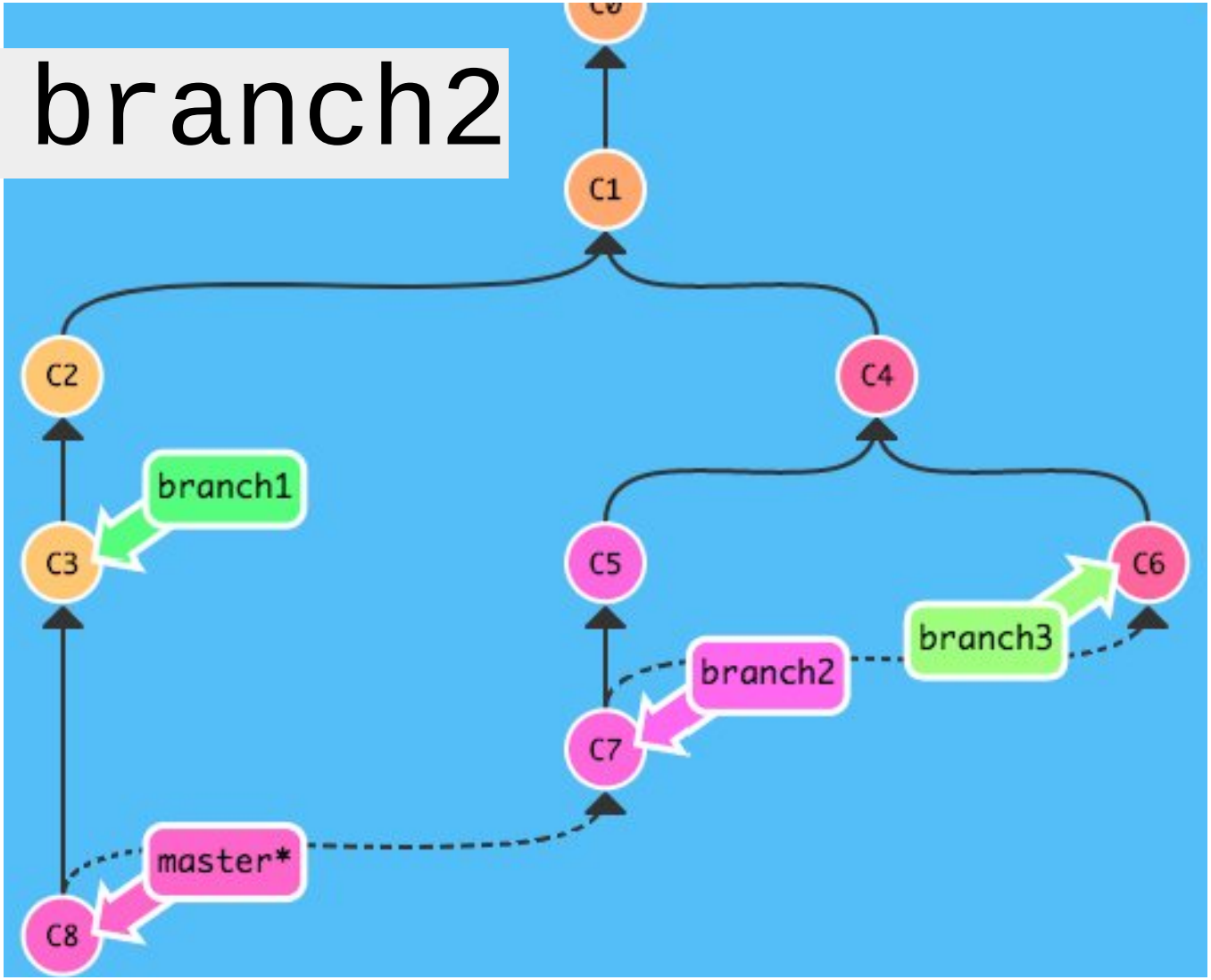
Merge fast forward



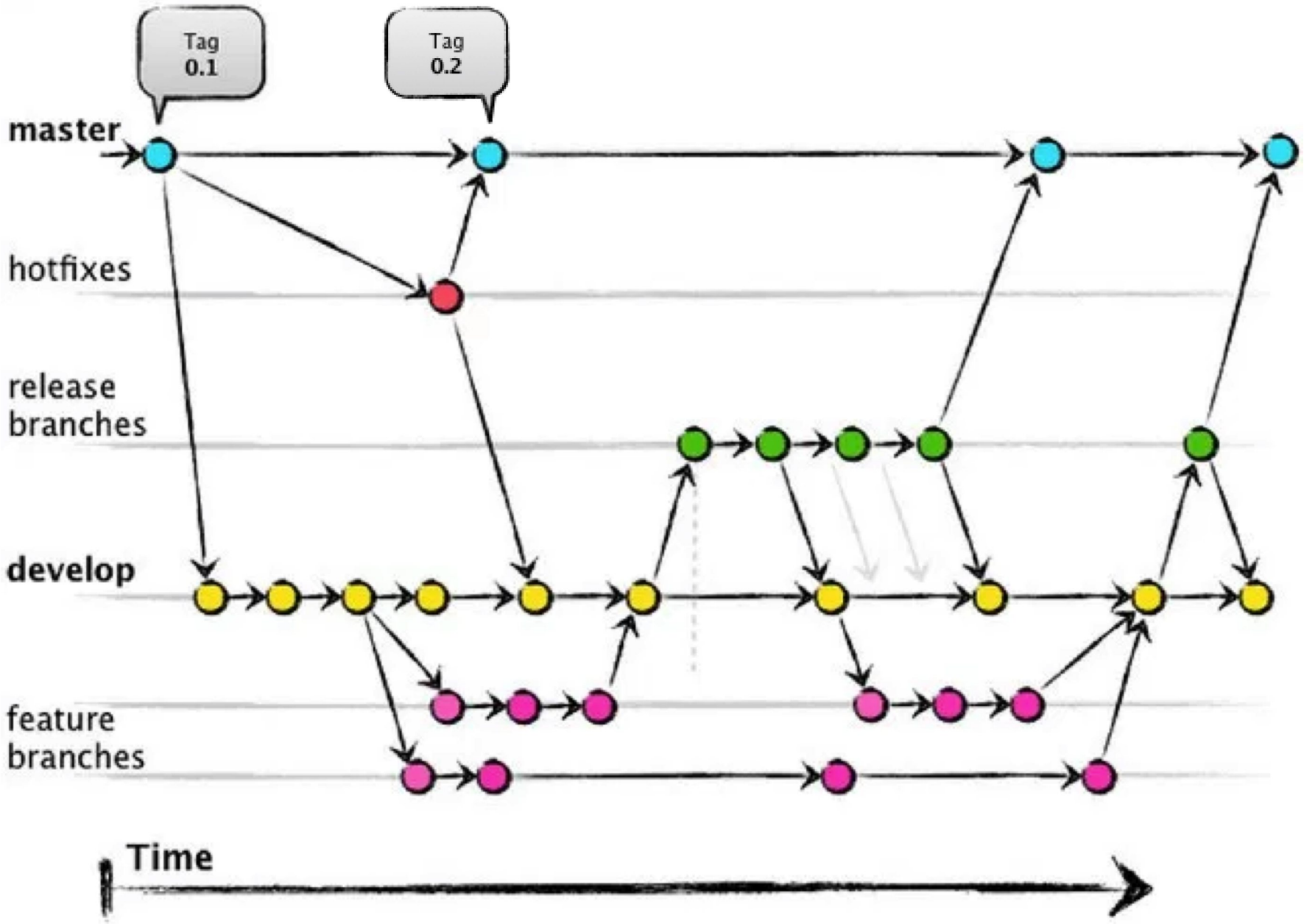
Basic branching strategy

`git merge branch2`

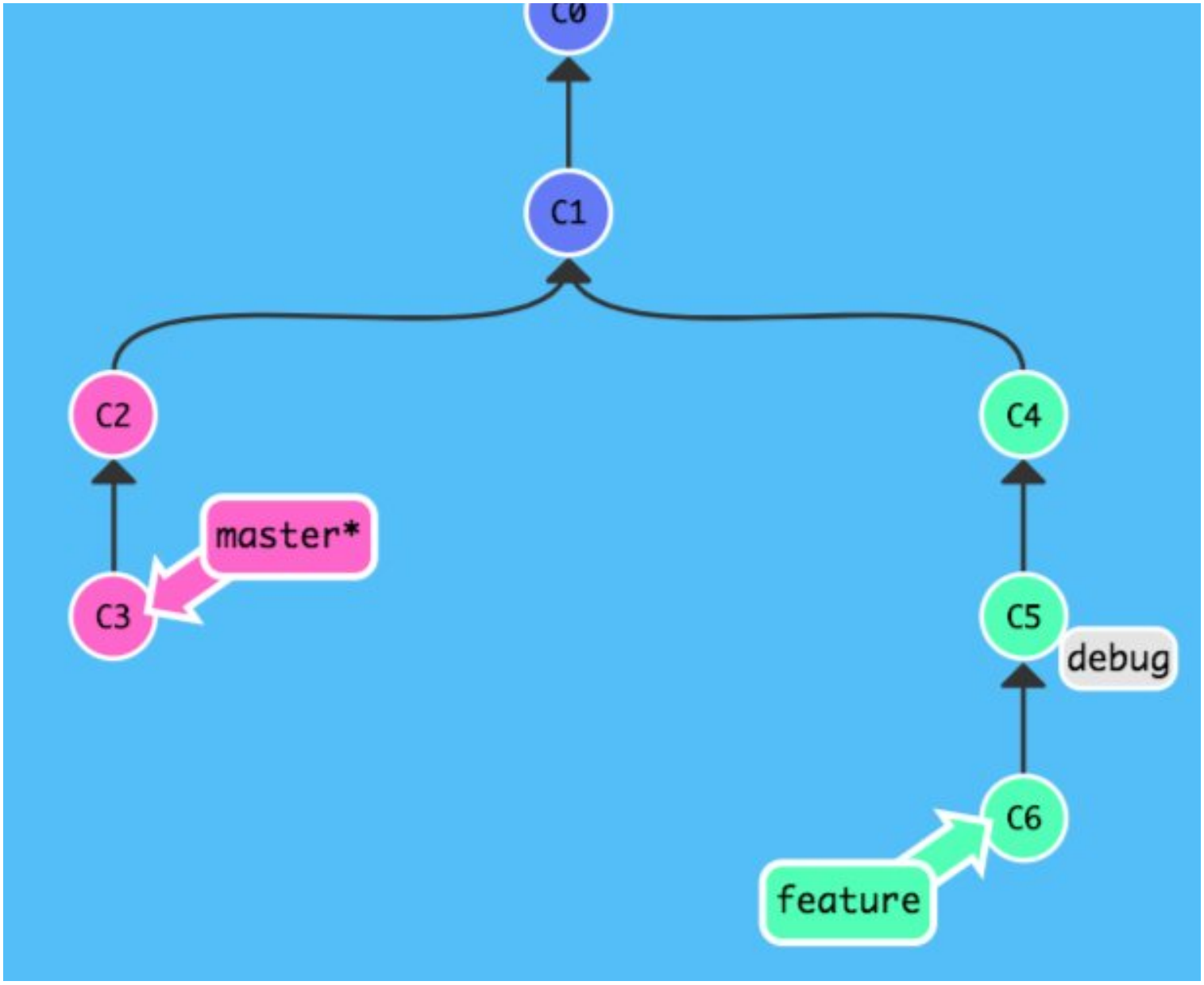
- merge to master
- pls delete merged branches



Gitflow

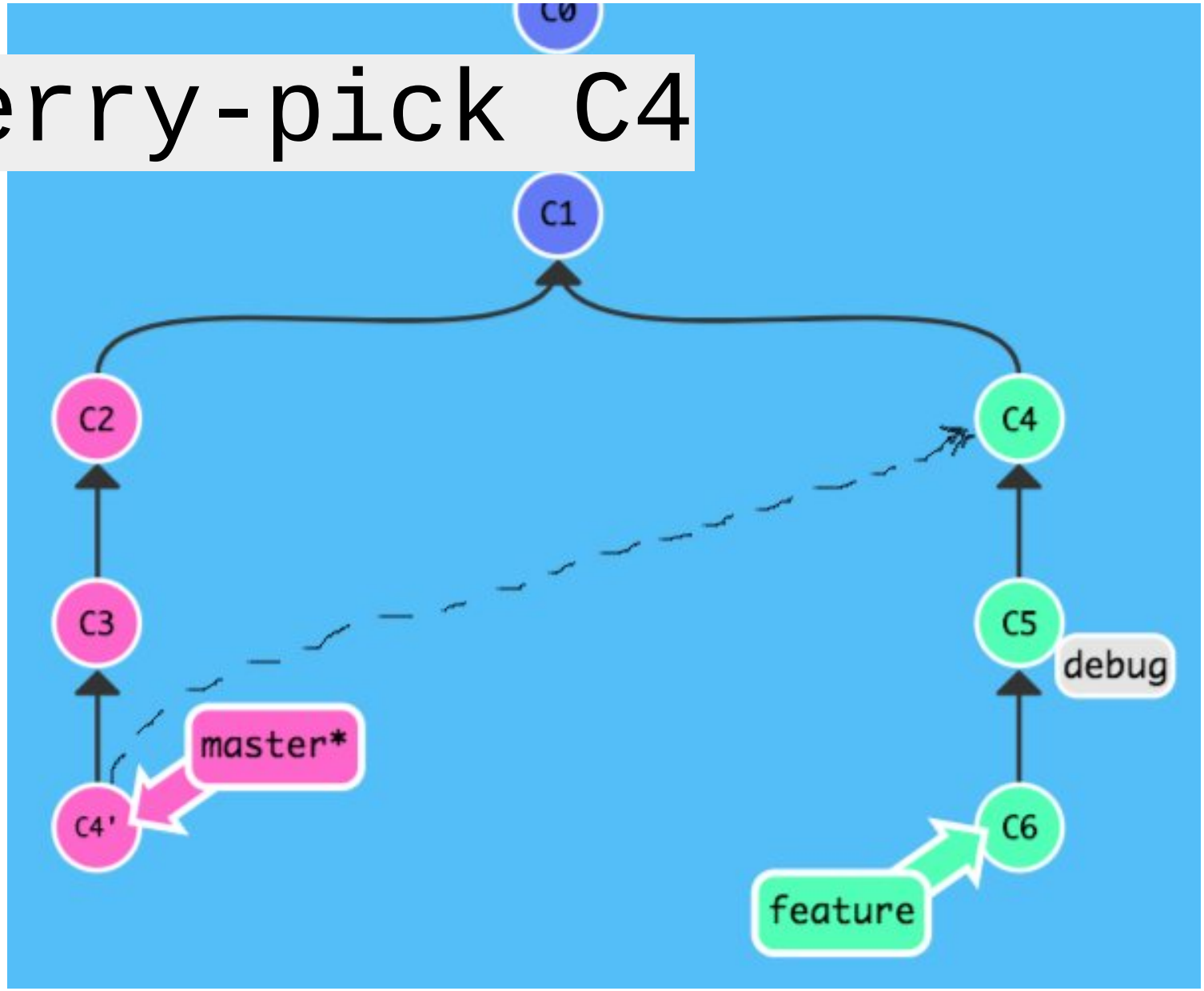

Tag
0.1
Tag
0.2
master
hotfixes
release
branches
develop
feature
branches
Time

Cherry-pick 1/3.



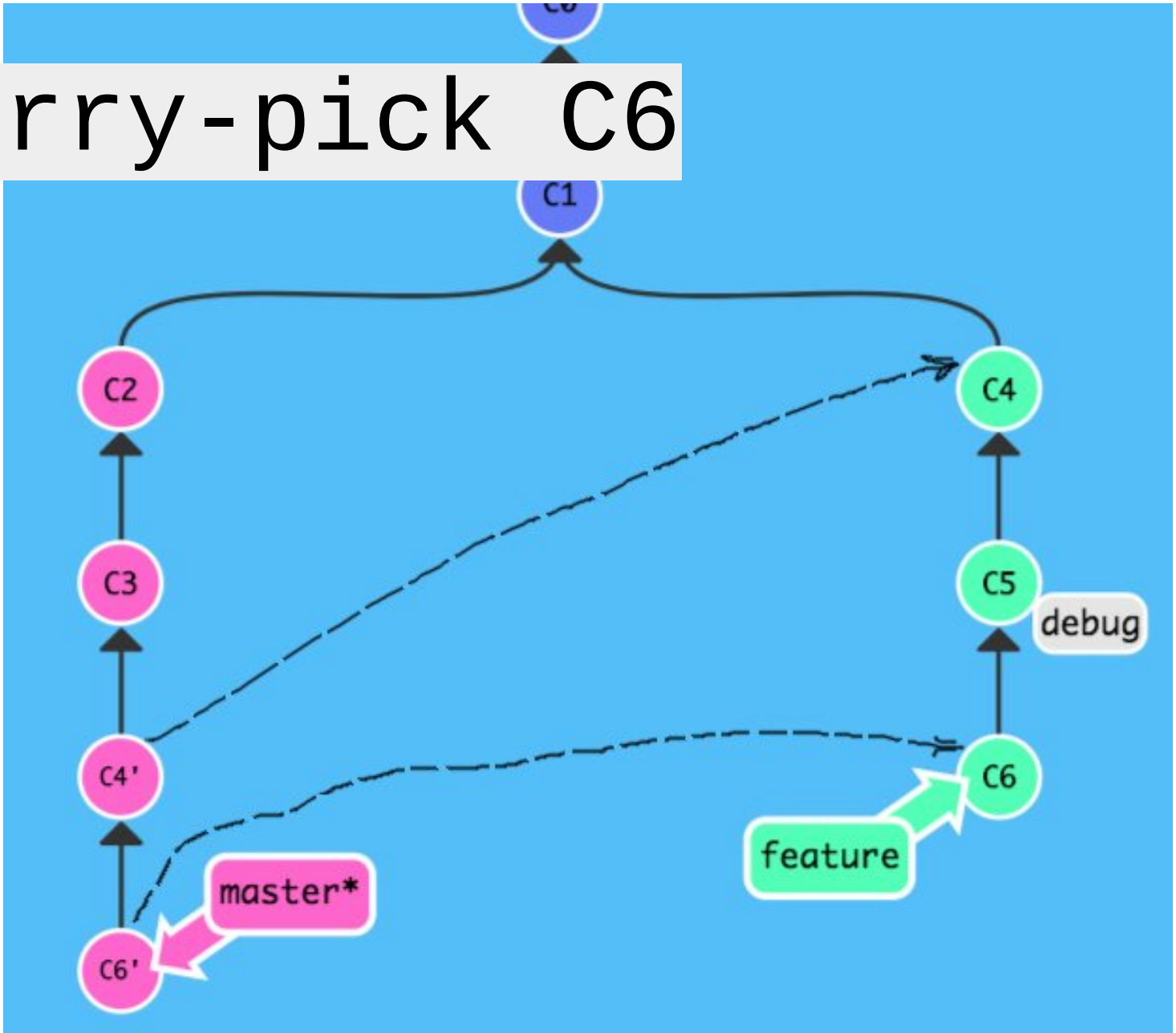
Cherry-pick 2/3.

```
git cherry-pick C4
```

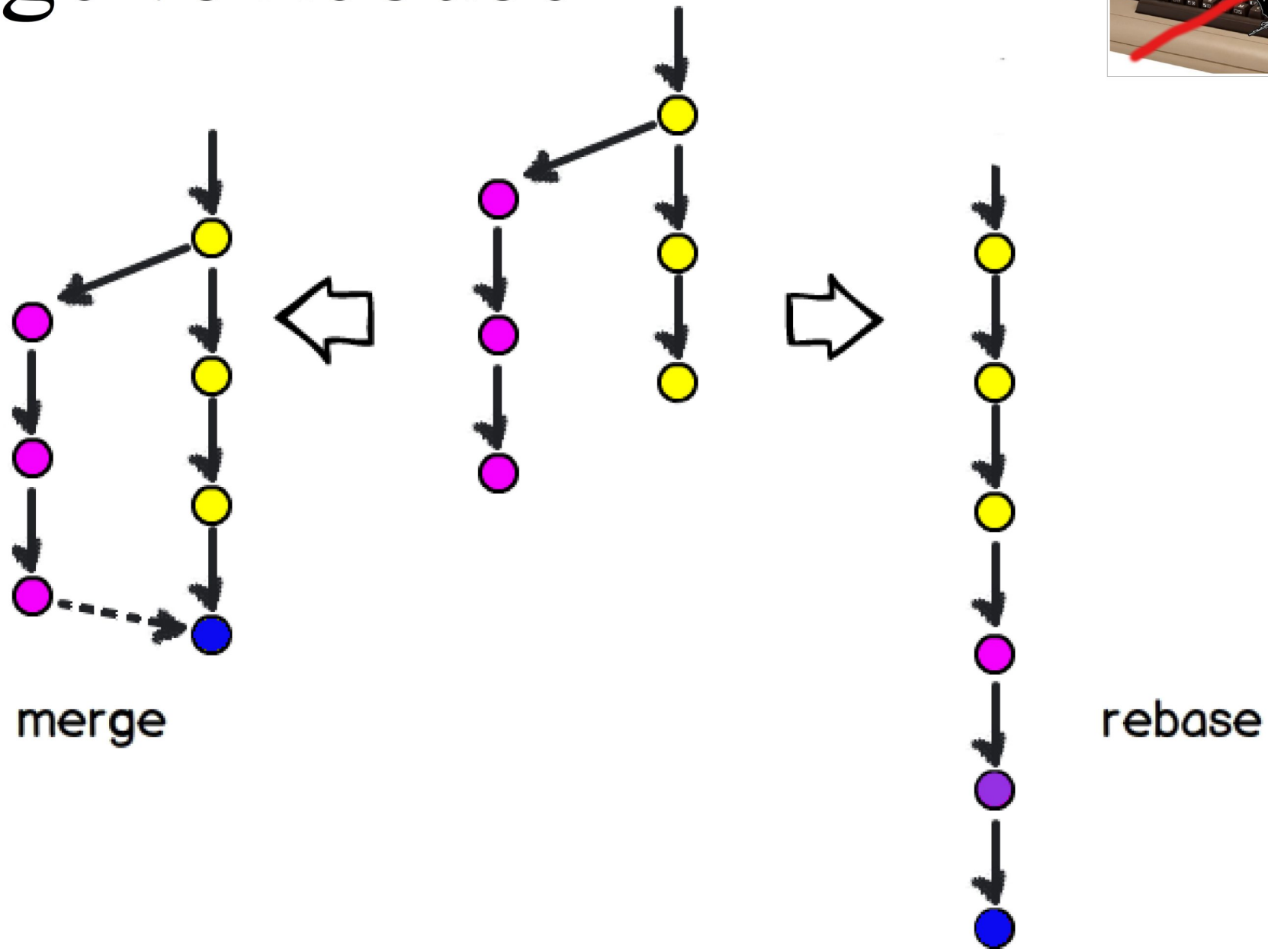


Cherry-pick 3/3.

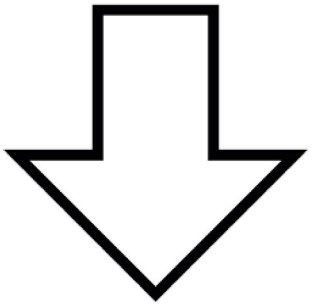
```
git cherry-pick C6
```



Merge vs Rebase



For more information: see internet



stackoverflow

HURBA

Survival pack

`git status` use often (it's free)

learngitbranching.js.org

```
sudo apt install git \
  tig gitk gitg ... meld
```

GitHub

GitLab

HURBA

Start now

```
cd myprj ; git init
```

HURBA

Start now

```
cd myprj ; git init
```

```
git status
```

HURBA

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ern0 - Zalka Ernő

ern0

Dataflow evangelist, oldschool

Pinned repositories

kolorwheel.js

Color palette generator JavaScript library

JavaScript ★ 22 2

posixi

Implemen
for POSIX

C++

256byte-xorlissj

256-byte DOS intro: XOR-pattern and Lissajous effect 2-in-1, released at Demobit2017

256b

256-byte
Function2