The Git Parable

Johan Herland

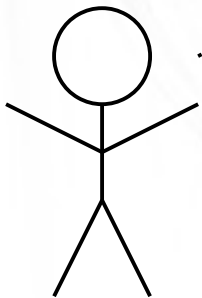<jherland@cisco.com>

The Git Parable

- Shamelessly stolen from Tom Preston-Werner
  http://tom.preston-werner.com/2009/05/19/the-git-parable.html

- I'm lazy...

- Also: Best introduction to Git I've found so far

The Git Parable

- Git - simple & powerful

The Git Parable

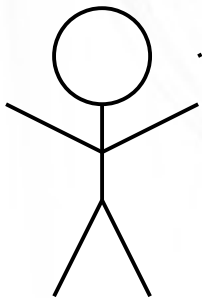- Git - simple & powerful

```
git init
git add …
git commit …
git branch …
git checkout …
git tag …
git diff …
git log …
git remote …
git fetch …
git pull …
git push …
...
```
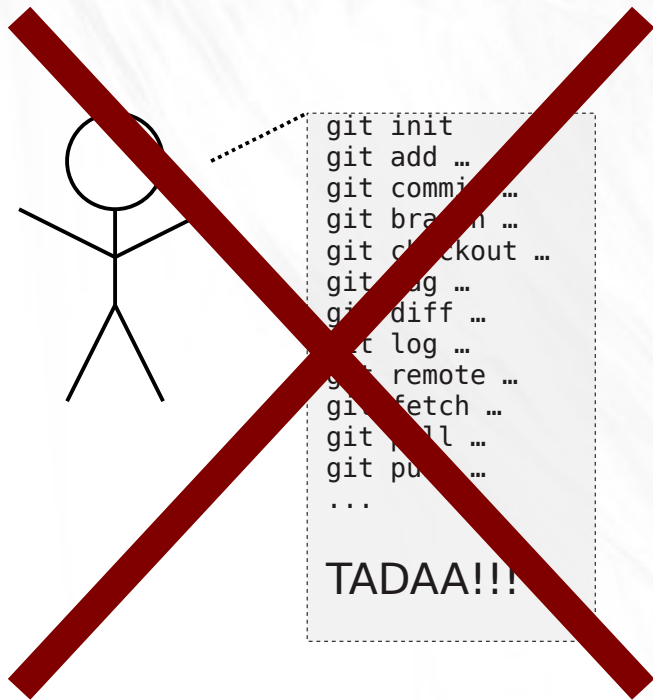
The Git Parable

- Git - simple & powerful

```
git init
git add …
git commit …
git branch …
git checkout …
git tag …
git diff …
git log …
git remote …
git fetch …
git pull …
git push …
...

TADAA!!!
```
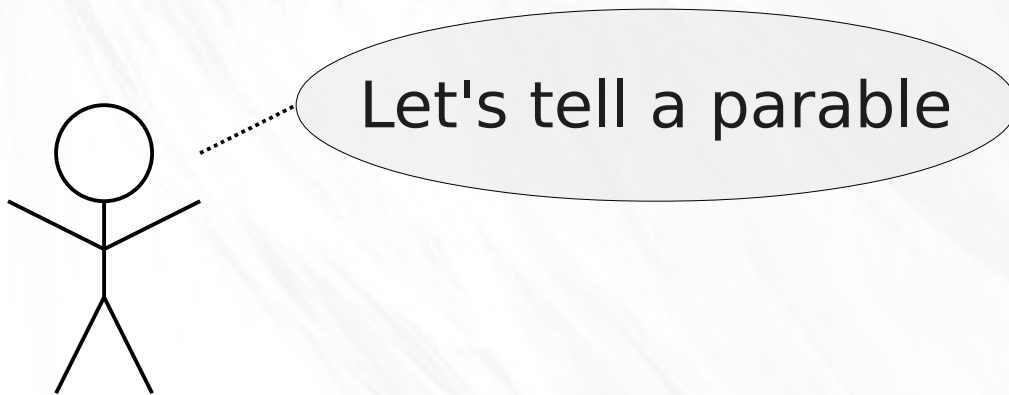
The Git Parable

- Git - simple & powerful

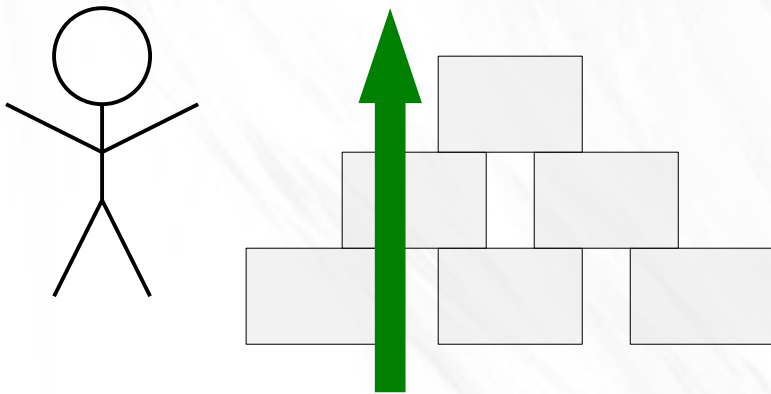# The Git Parable

- Git - simple & powerful
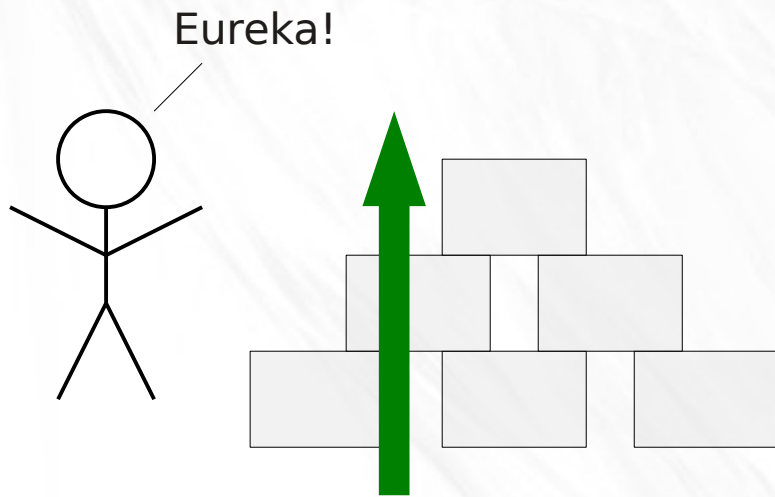
Let's tell a parable

The Git Parable

- Git - simple & powerful

The Git Parable

- Git - simple & powerful
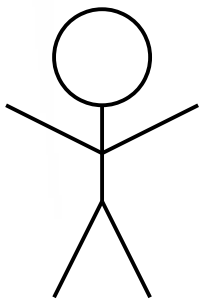
Eureka!

The Parable

- A simple computer
  - A text editor
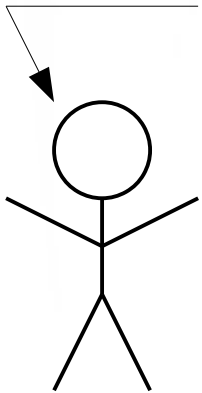 - A few filesystem commands

The Parable

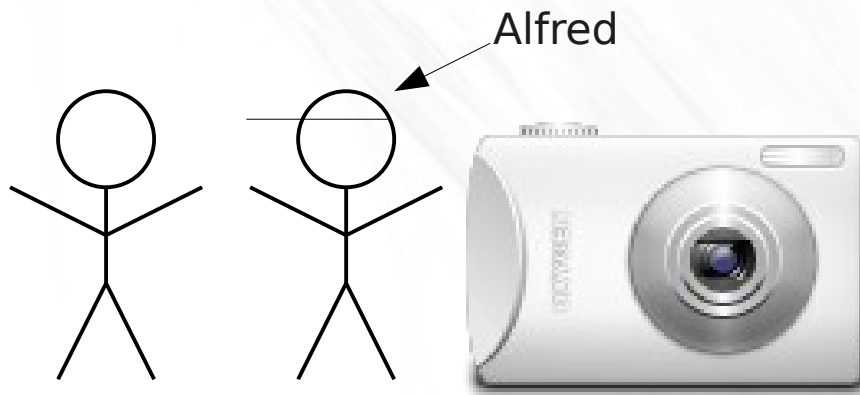- Write a large software program

The Parable

- Write a large software program
- Invent some method to keep track of versions
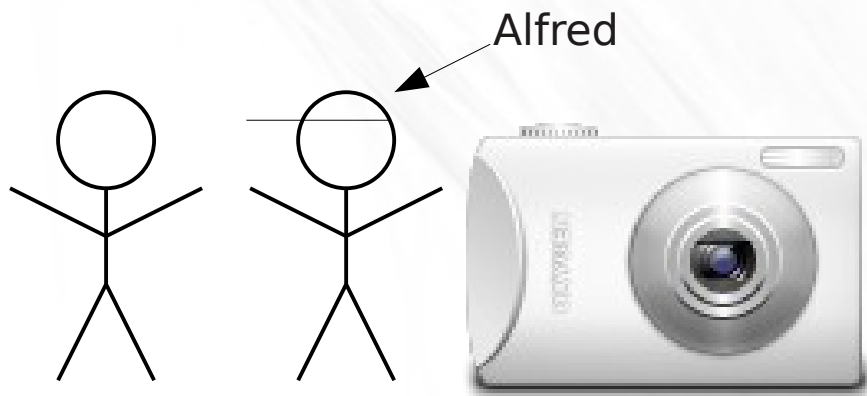   - retrieve code that you changed/deleted

Responsible!

Snapshots

- Alfred, the photographer
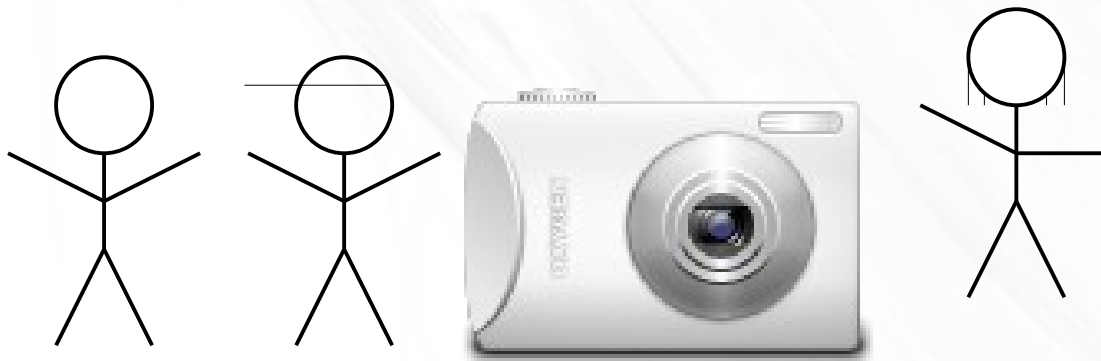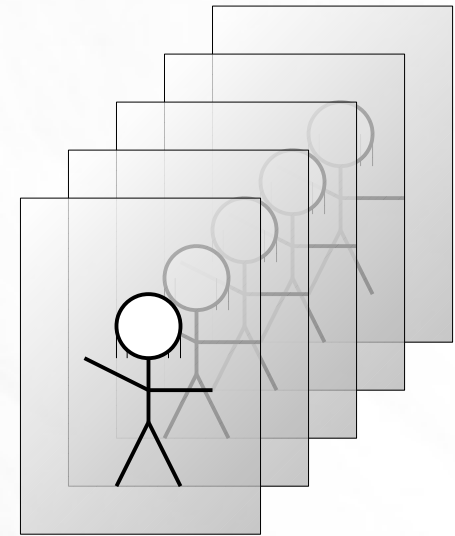
Alfred

Snapshots

- Alfred, the photographer

Alfred

AwkwardFamilyPhotos.com

Snapshots

- Alfred, the photographer
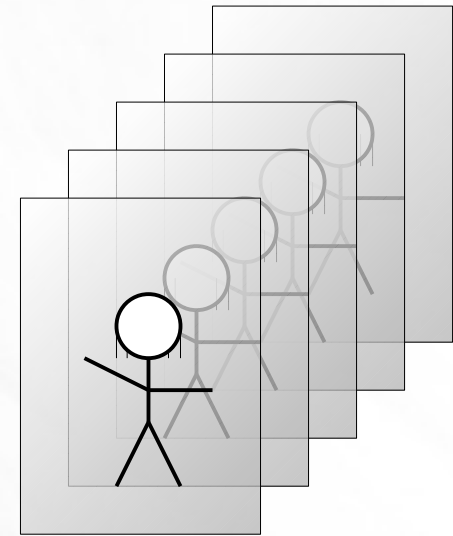- Hazel and her daughter
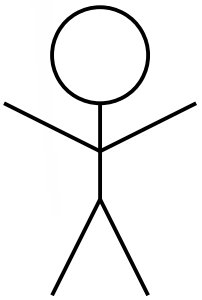
Hazel

daughter

Snapshots

- Alfred, the photographer
- Hazel and her daughter
    - Remember what the daughter was like at each different stage

Snapshots

- Alfred, the photographer
- Hazel and her daughter
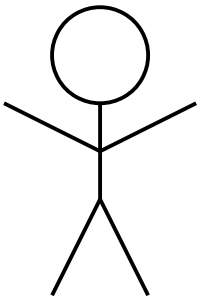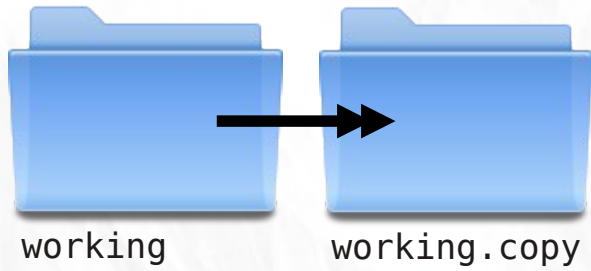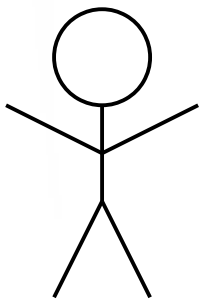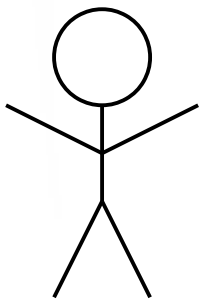 - Remember what the daughter was like at each different stage

Eureka!

Hazel

Snapshots

working

Snapshots

working   working.copy

Snapshots

Snapshots

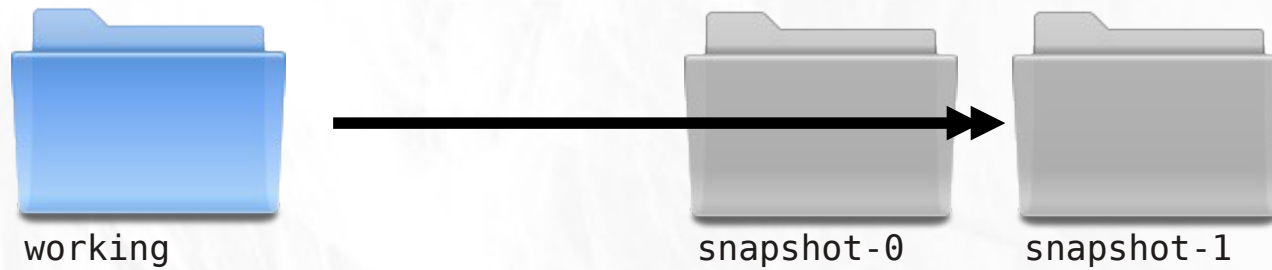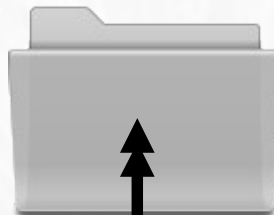working   snapshot-0   snapshot-1

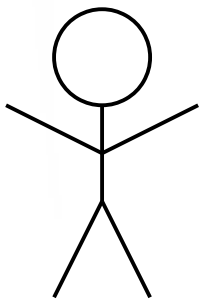# Snapshots

working

snapshot-0

snapshot-1

message

message

2009-05-20 12:34:56

Initial version

2009-05-21 23:45:01

Introduced a new foo, and reset the bar to xyzzy.

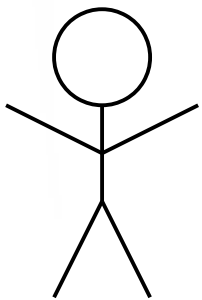# Branches

working

snapshot-0   snapshot-1   ▪ ▪ ▪

snapshot-99

Branches

working

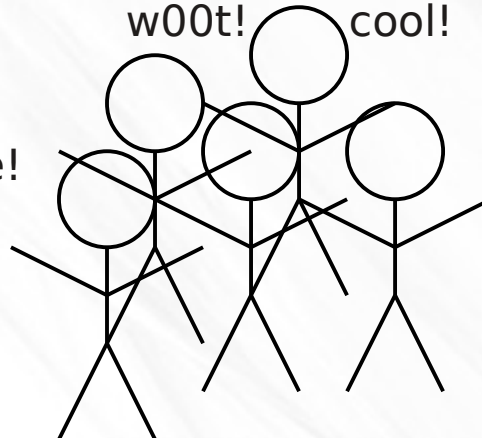snapshot-0   snapshot-1   . . .
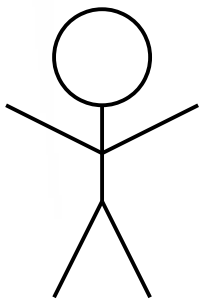
snapshot-99

w00t!   cool!

nice!

Branches

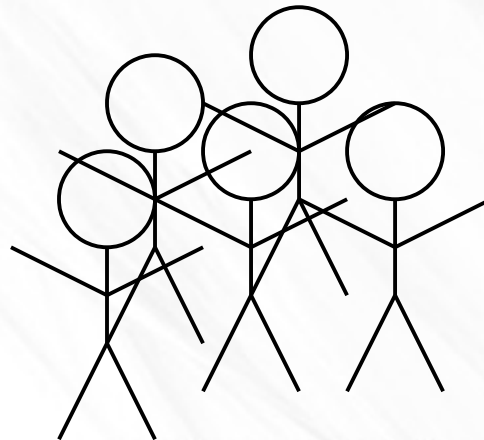working   snapshot-0   snapshot-1

snapshot-99   snapshot-109

Branches

working

snapshot-0   snapshot-1   .   .   .

snapshot-99   .   .   .   snapshot-109

Does not work!

Boo!

Branches

working

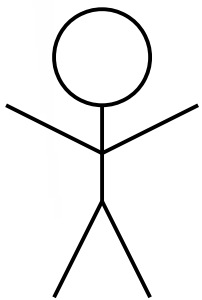snapshot-0   snapshot-1   ▪ ▪ ▪
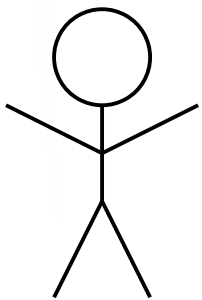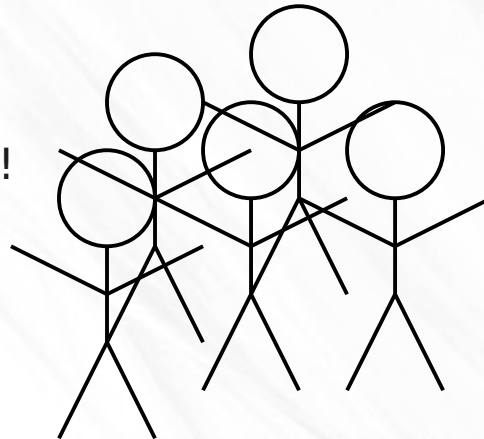
snapshot-99   ▪ ▪ ▪   snapshot-109
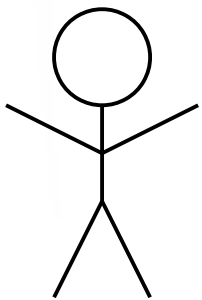
Branches

working

snapshot-0　　snapshot-1　　. . .

snapshot-99　　. . .　　snapshot-109

snapshot-110

?

?

Branches

Branches
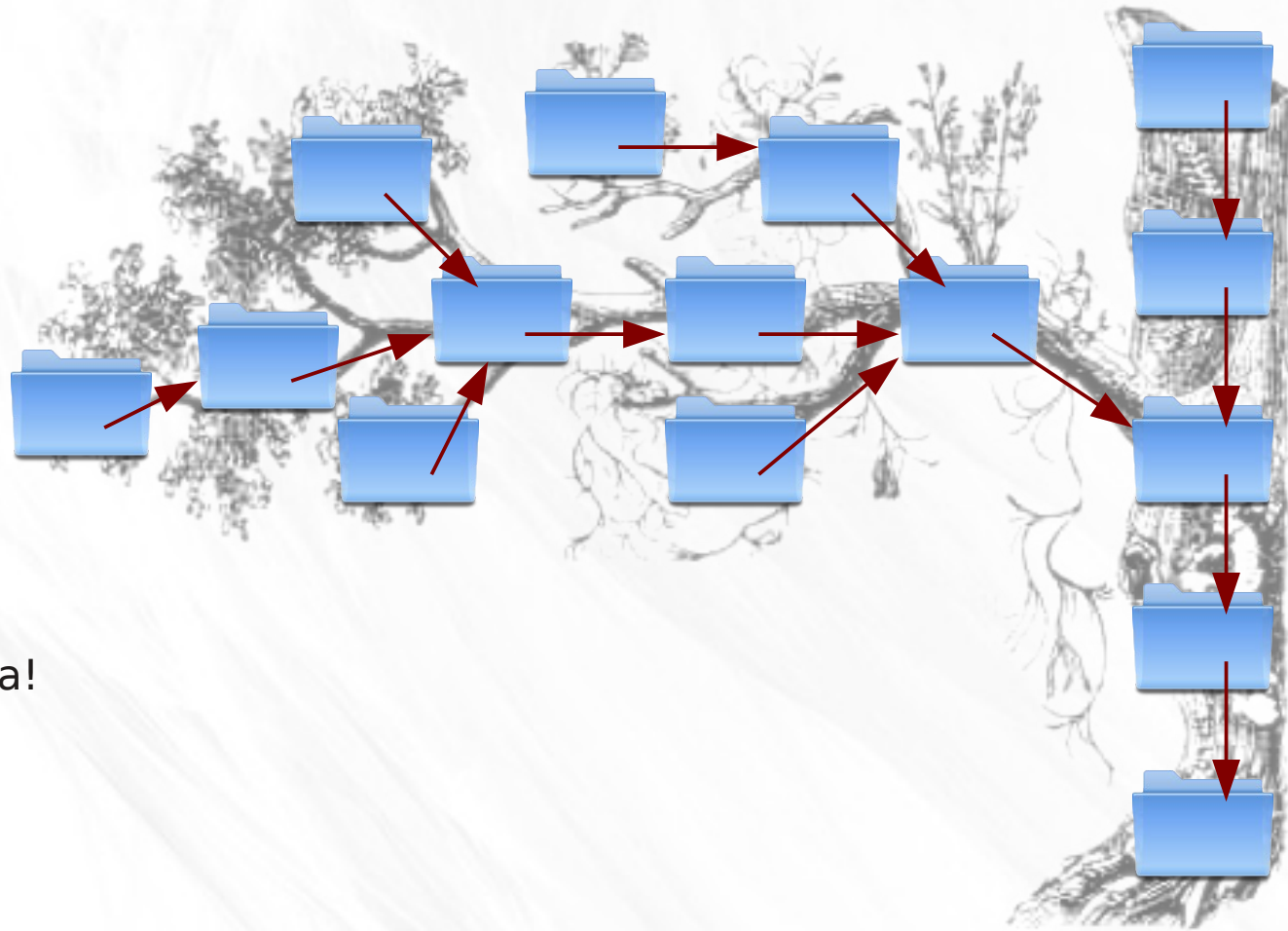
Eureka!

Branches

Branches

snapshot-1

snapshot-0

message
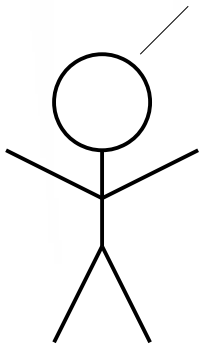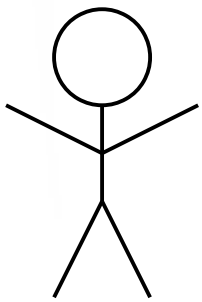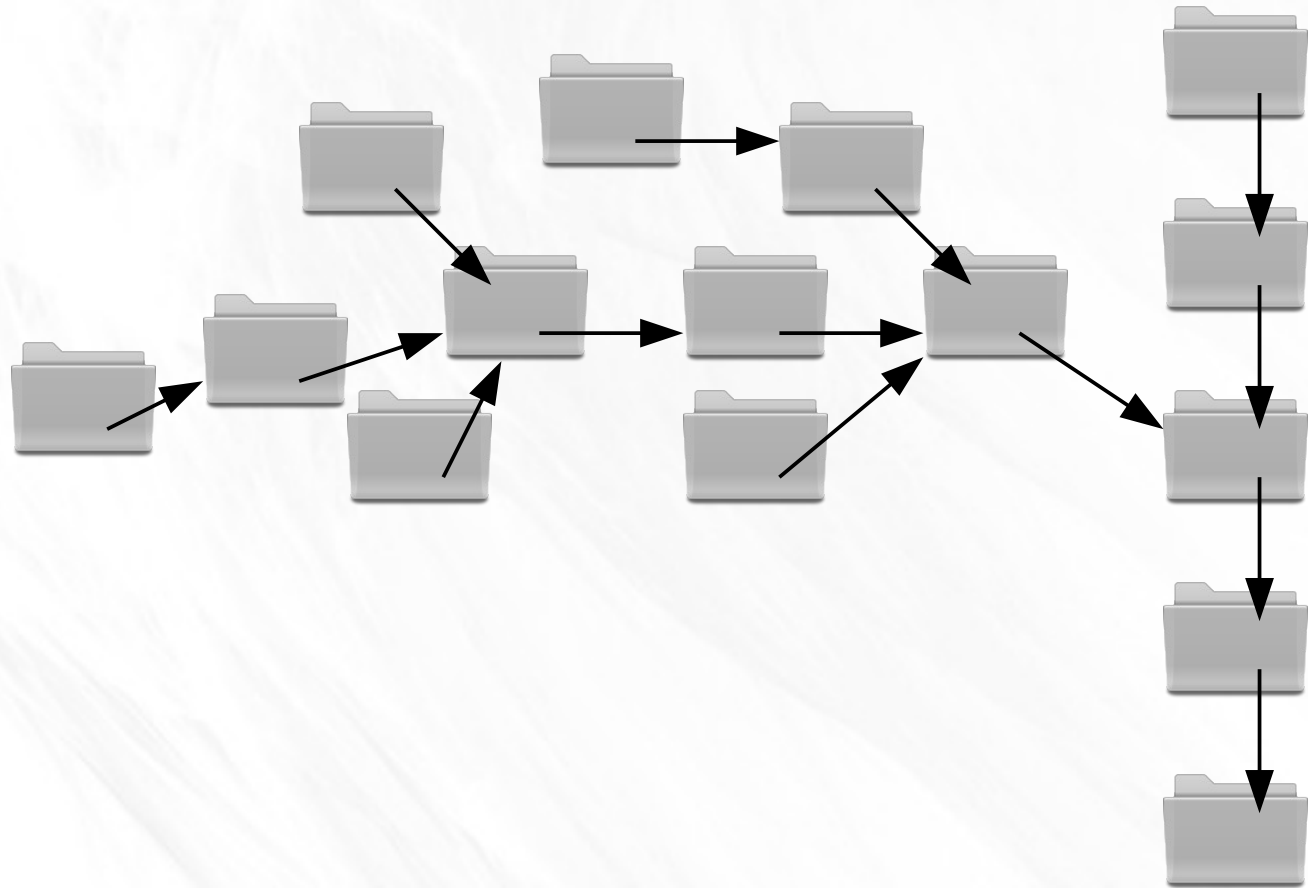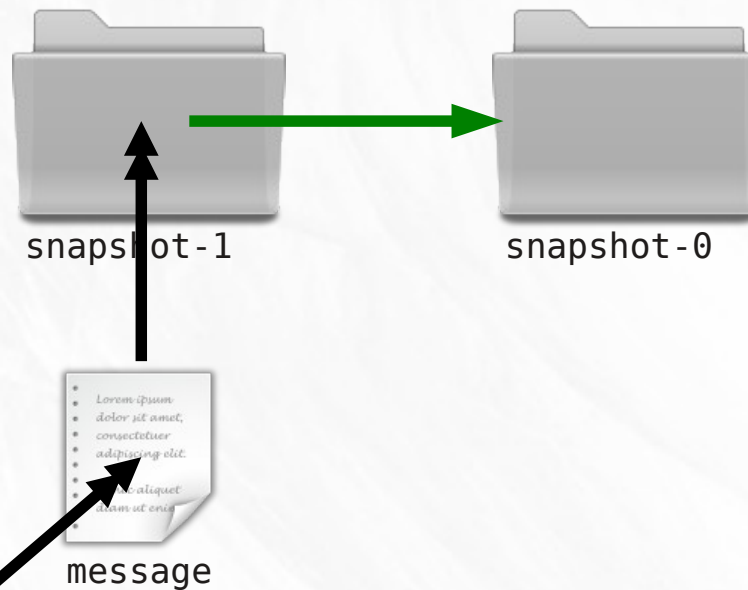
```
2009-05-21 23:45:01
parent: snapshot-0

Introduced a new foo,
and reset the bar to
xyzzy.
```

Branch Names

working

snapshot-110

snapshot-109

snapshot-99

snapshot-1
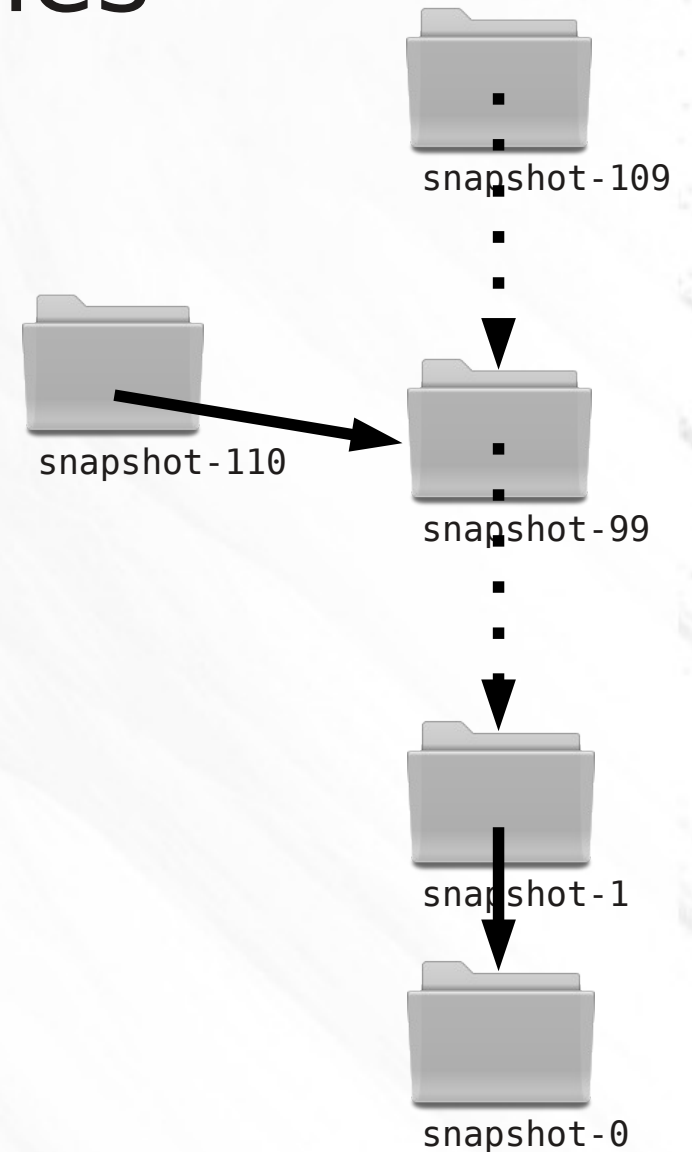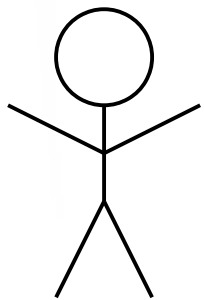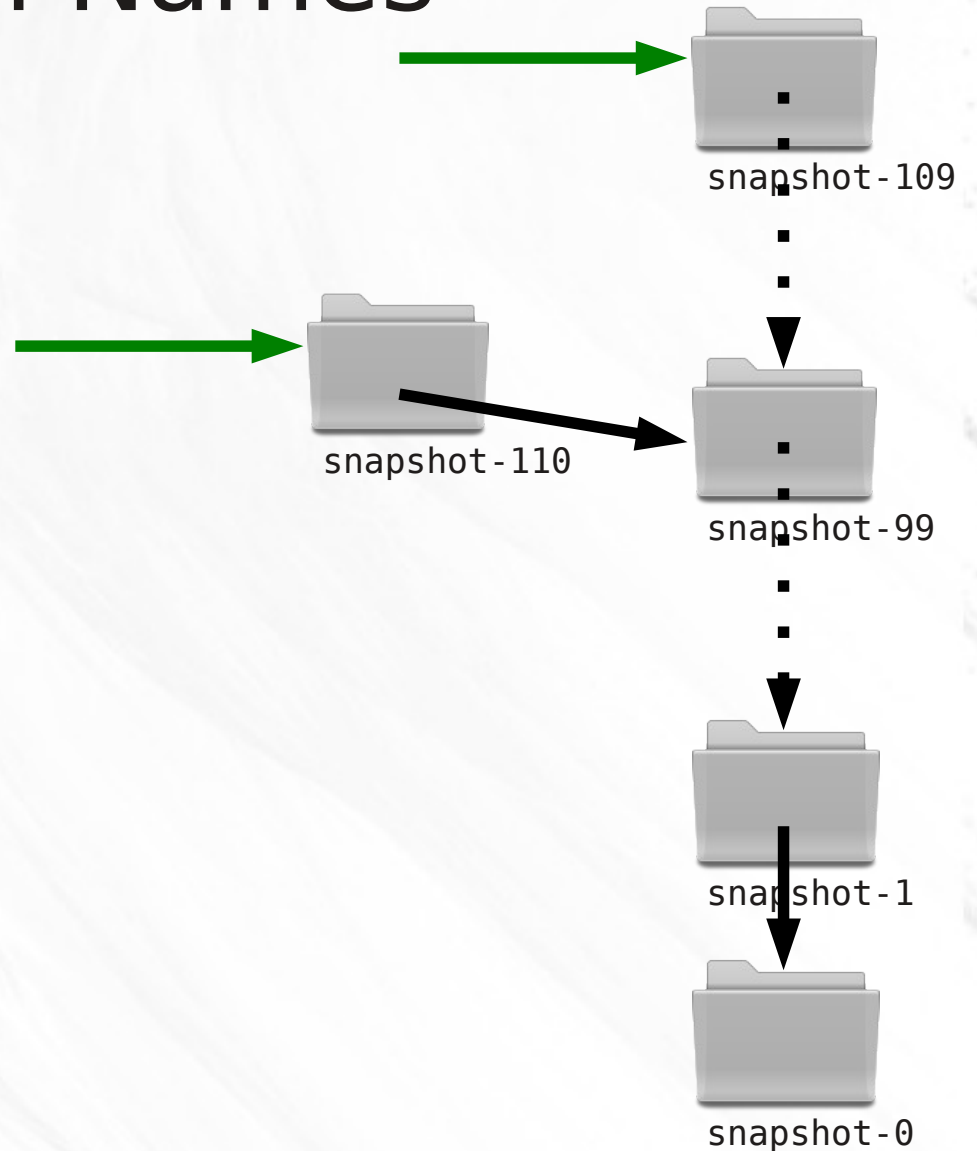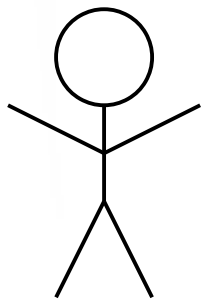
snapshot-0

Branch Names

Branch Names

Branch Names

working

snapshot-X

snapshot-X

snapshot-110

snapshot-X

snapshot-X

snapshot-109

snapshot-99

snapshot-1

snapshot-0

?
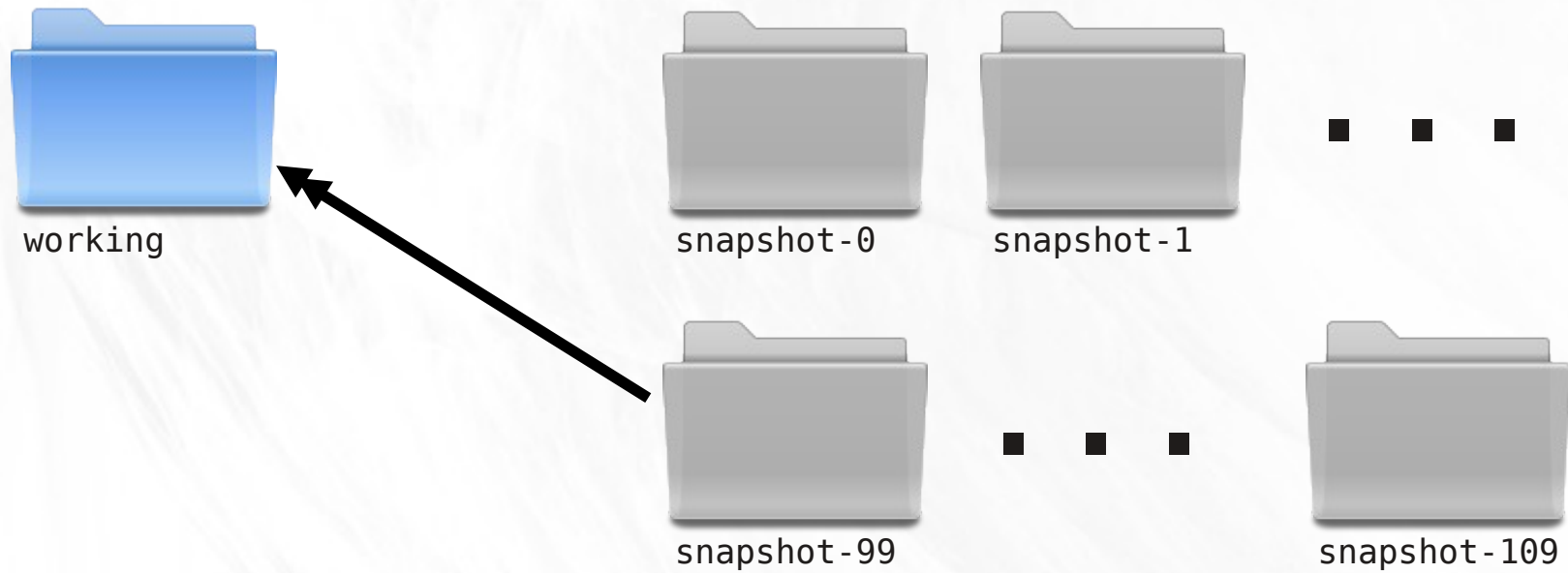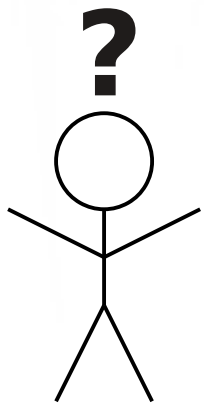
Branch Names

working

This is the
"master" branch

This will be the
"Version 1.0 Maintenance" Branch

snapshot-110

snapshot-109

snapshot-99

snapshot-1

snapshot-0

Branch Names

working
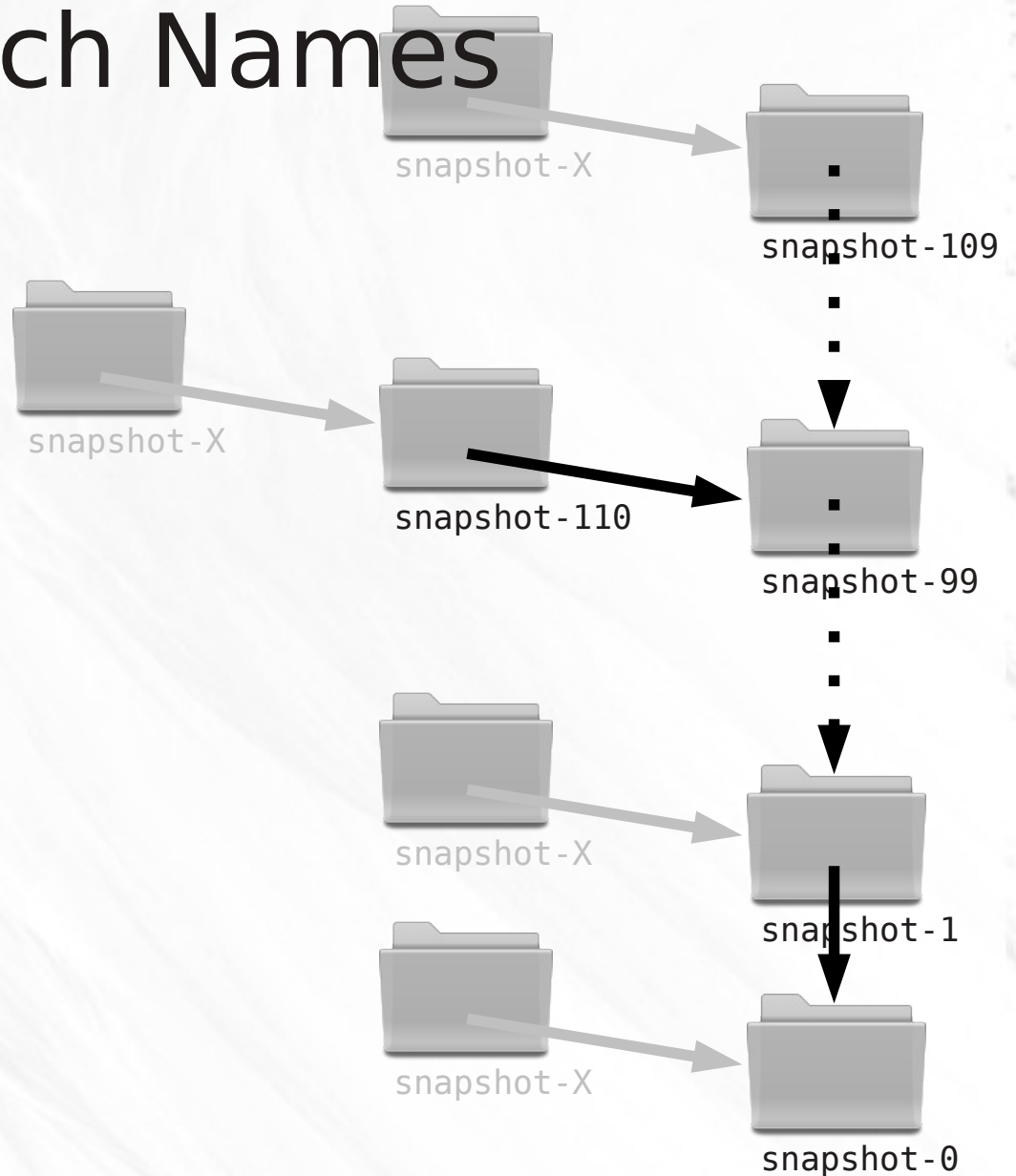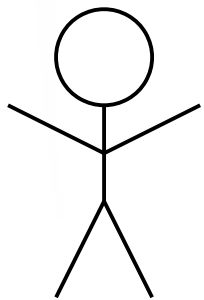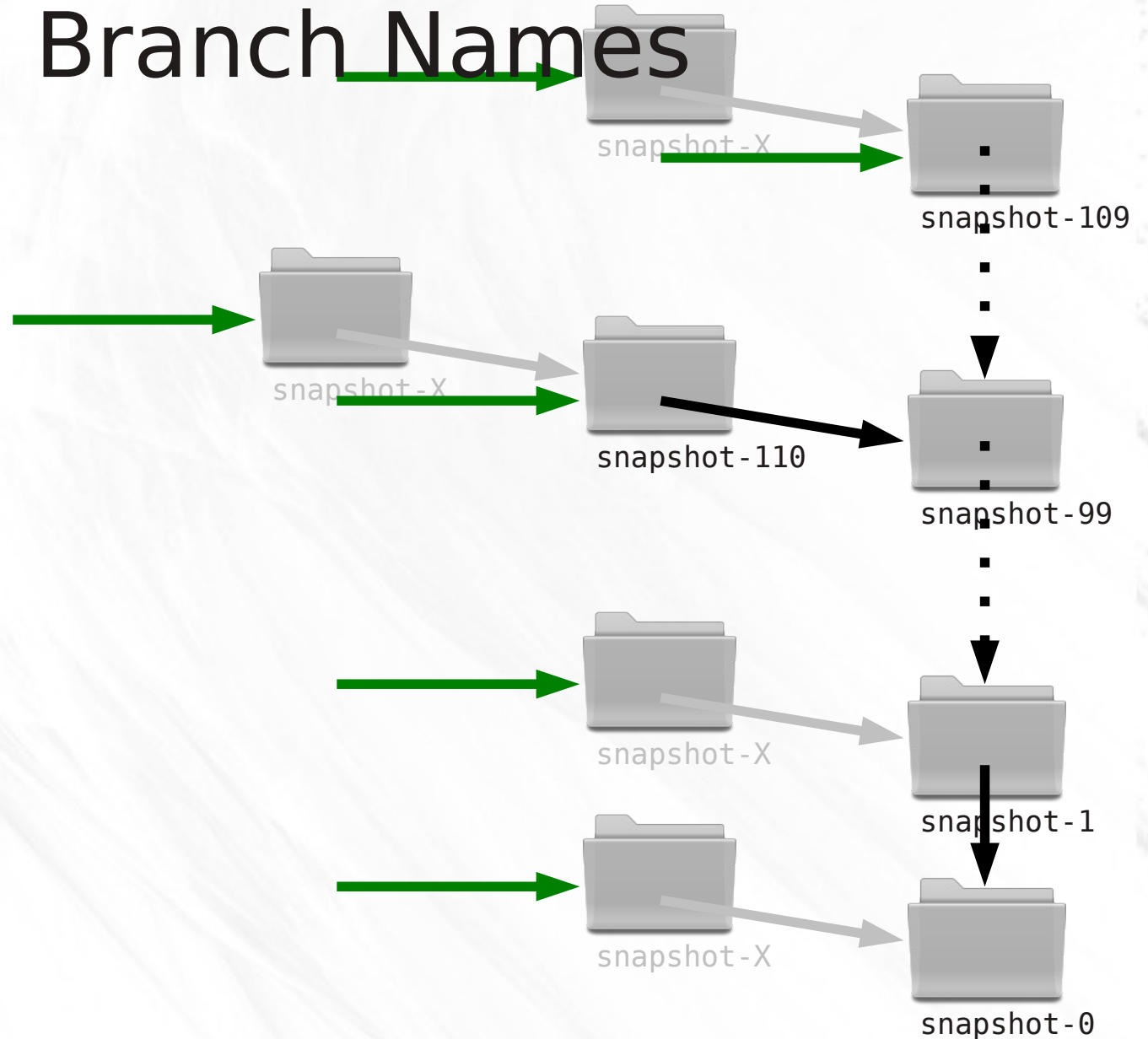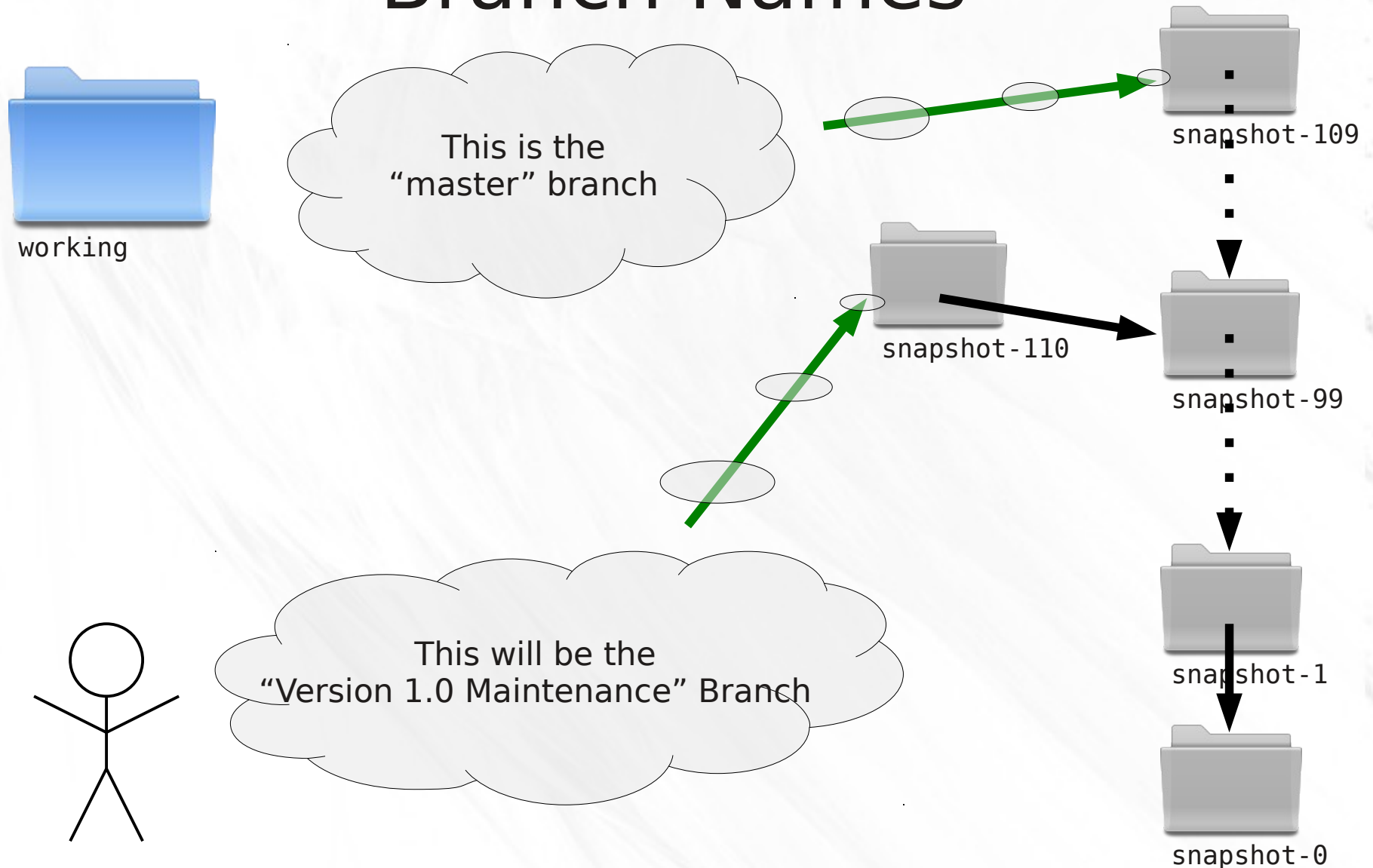
This is the
"master" branch.
It contains:
snapshot-109
(and its ancestors)
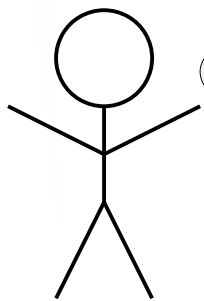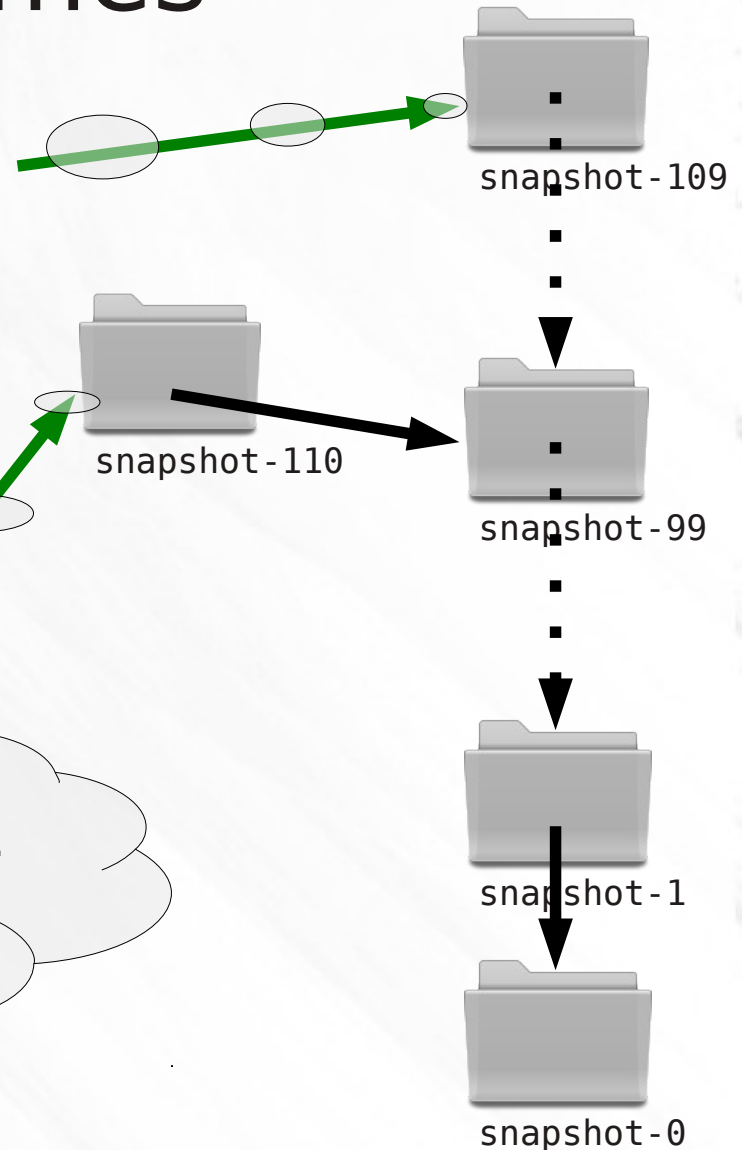
This is the
"Version 1.0 Maintenance" Branch.
It contains:
snapshot-110
(and its ancestors)

snapshot-109

snapshot-110

snapshot-99

snapshot-1

snapshot-0

Branch Names

working

branches

```
master:     snapshot-109
v1.0-maint: snapshot-110
```

snapshot-110

snapshot-109

snapshot-99

snapshot-1

snapshot-0

Branch Names

working

branches

```
master:     snapshot-109
v1.0-maint: snapshot-111
```

snapshot-111

snapshot-110

snapshot-109

snapshot-99

snapshot-1

snapshot-0

Tags

working

branches

```
master:      snapshot-109
v1.0-maint: snapshot-111
```

```
v1.0:    snapshot-99
v1.0.1: snapshot-110
```

tags

snapshot-111

snapshot-110

snapshot-109

snapshot-99

snapshot-1

snapshot-0

Distributed

working

branches

tags   Sigh...

Distributed

Distributed

working

branches

tags

working

branches

tags

Distributed

working
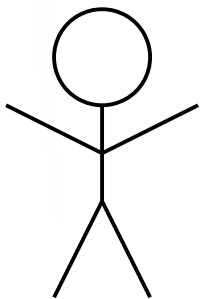
branches

tags

working

branches

tags

Bye!
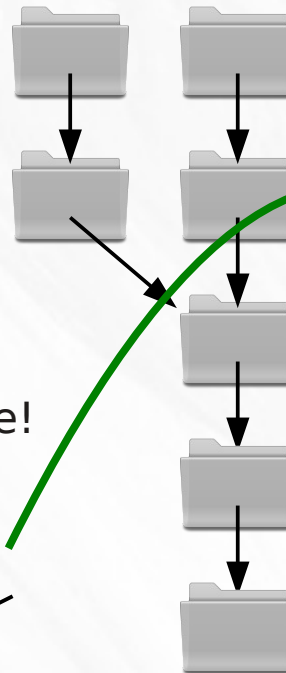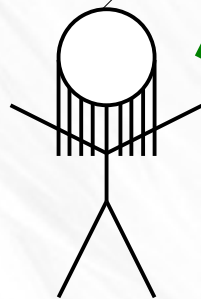
Distributed
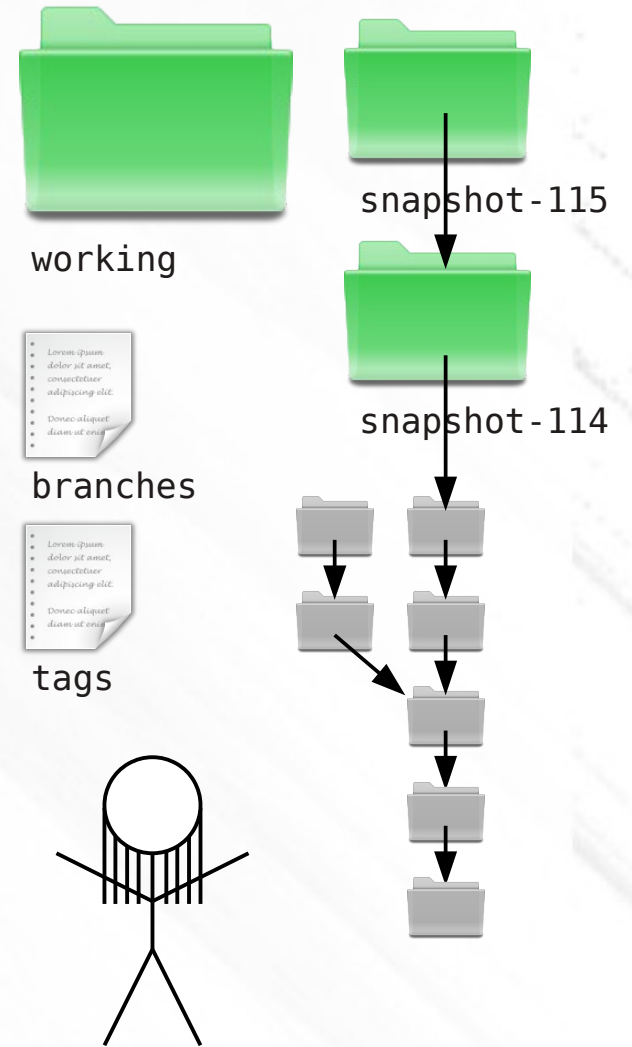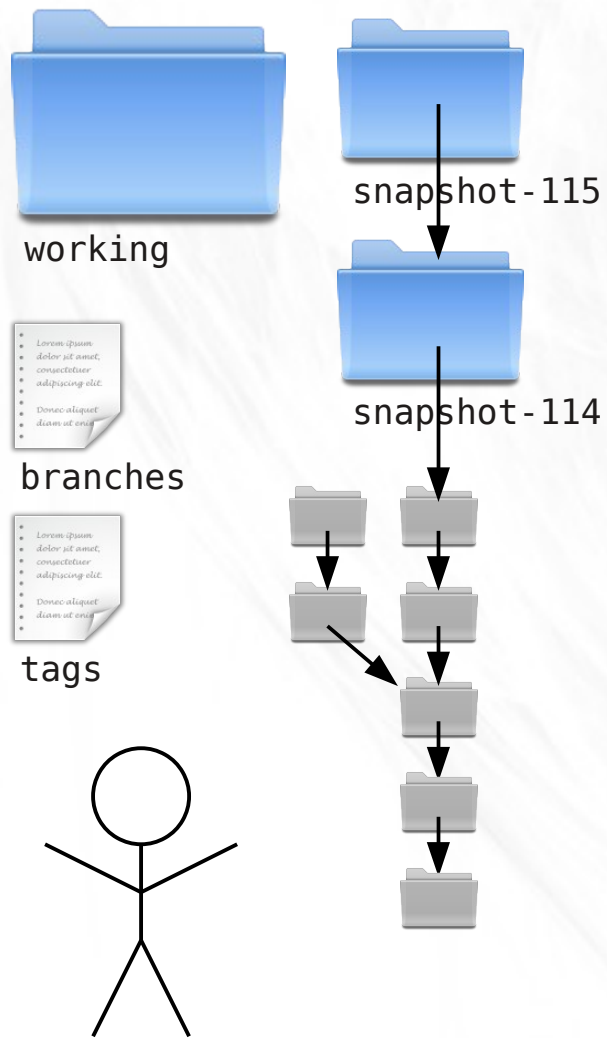
Distributed

snapshot-114

message

```
2009-05-22 12:12:12
parent: snapshot-113
author: Me <me@me.me>

Blarfle, a cool new
feature; extends the
existing blorg.
```

snapshot-114
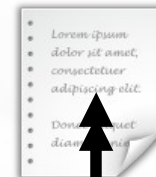
message

```
2009-05-21 23:45:01
parent: snapshot-113
author: Zoe <zoe@z.oe>

Introduced a new foo,
and reset the bar to
xyzzy.
```

Distributed

8ba3441b6b89cad23387ee875f2ae55069291f4b

SHA1
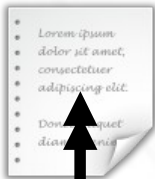
message

```
2009-05-22 12:12:12
parent: snapshot-113
author: Me <me@me.me>

Blarfle, a cool new
feature; extends the
existing blorg.
```

db9ecb5b5a6294a8733503ab57577db96ff2249e

SHA1
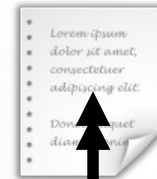
message

```
2009-05-21 23:45:01
parent: snapshot-113
author: Zoe <zoe@z.oe>

Introduced a new foo,
and reset the bar to
xyzzy.
```

Distributed

Distributed

working

083docf...

8ba3441...

branches

tags

?
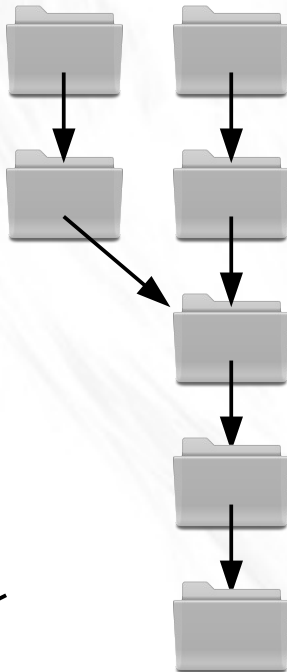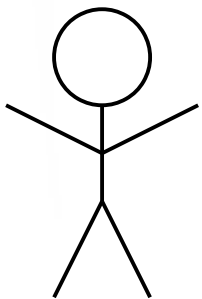
working

575db4b...

db9ecb5...
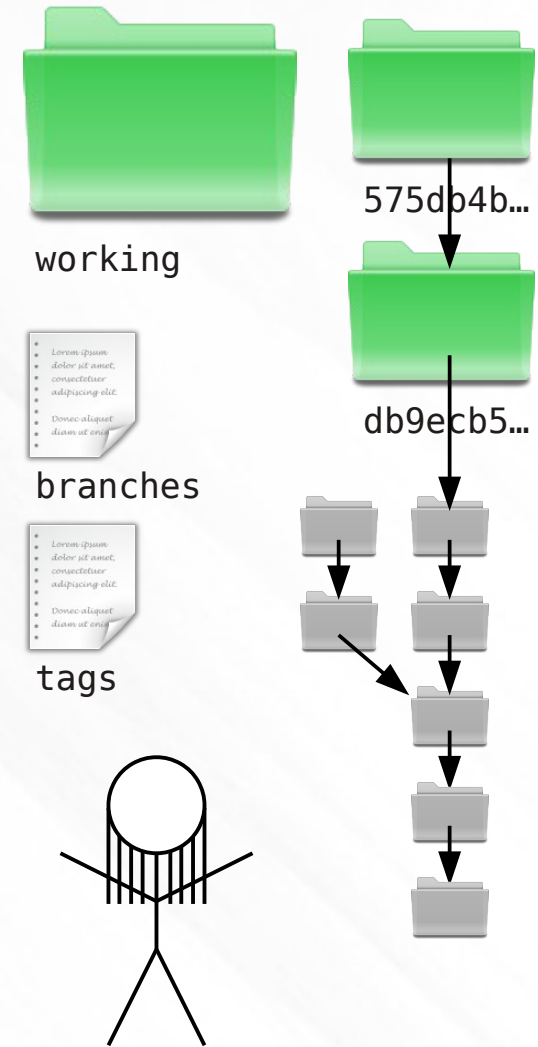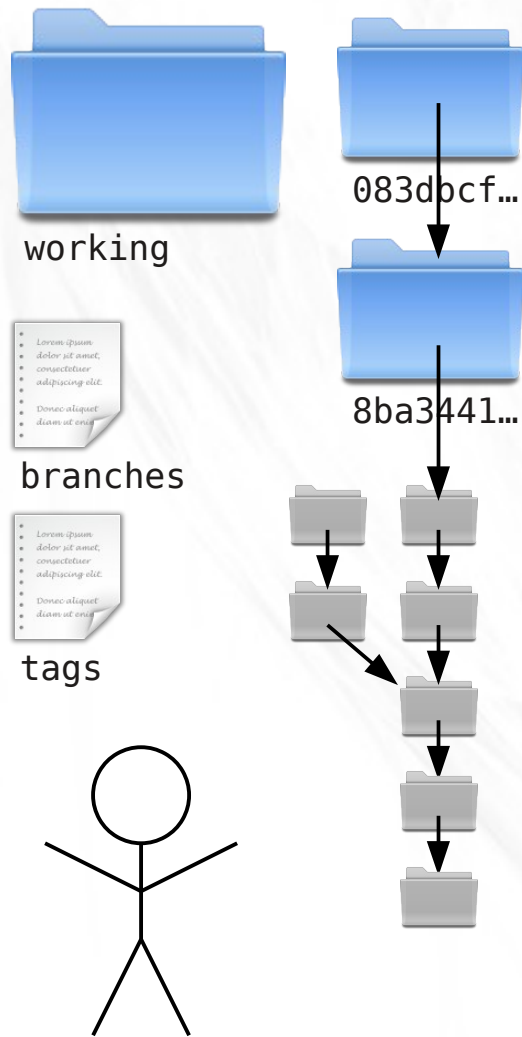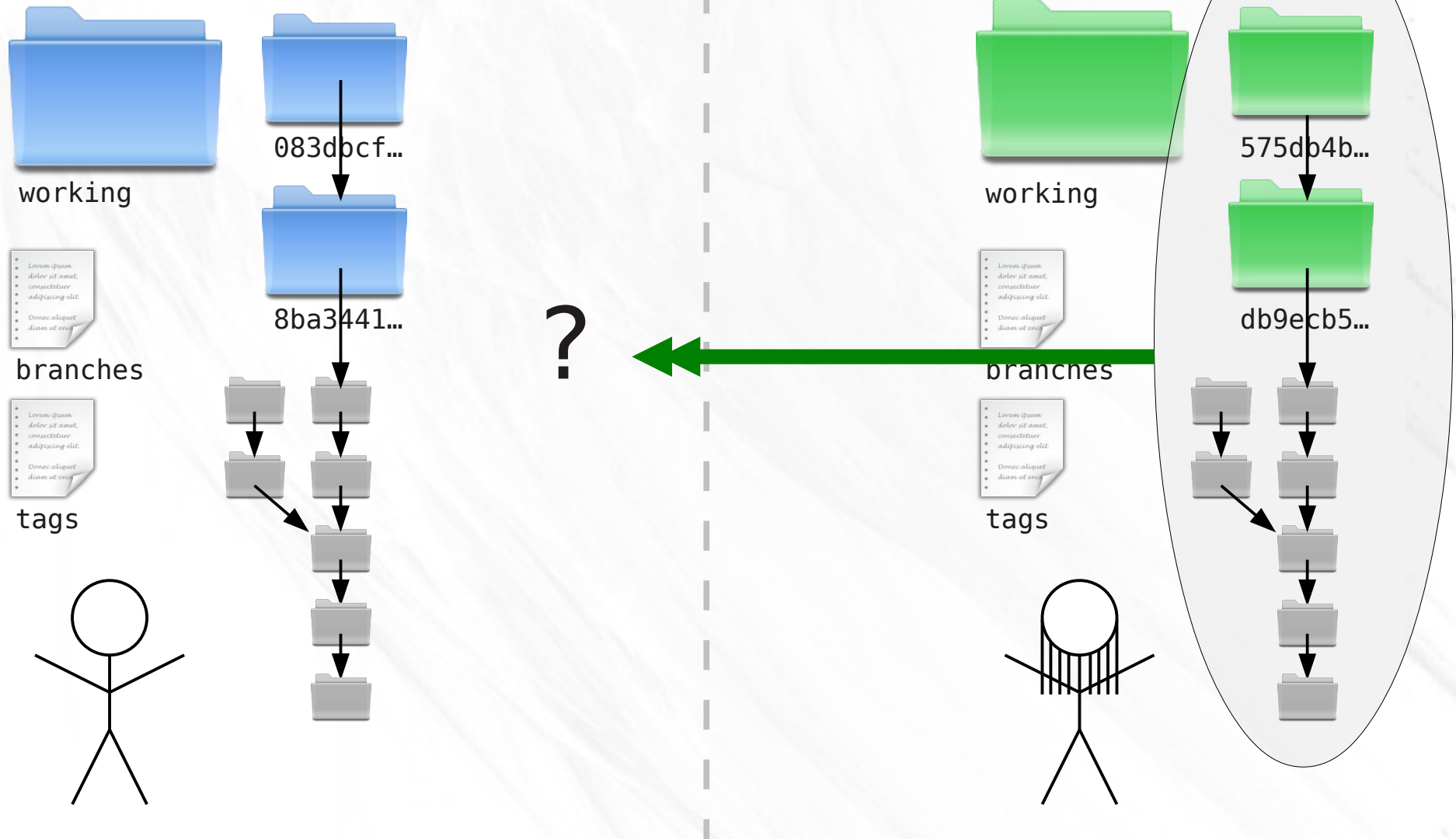
branches
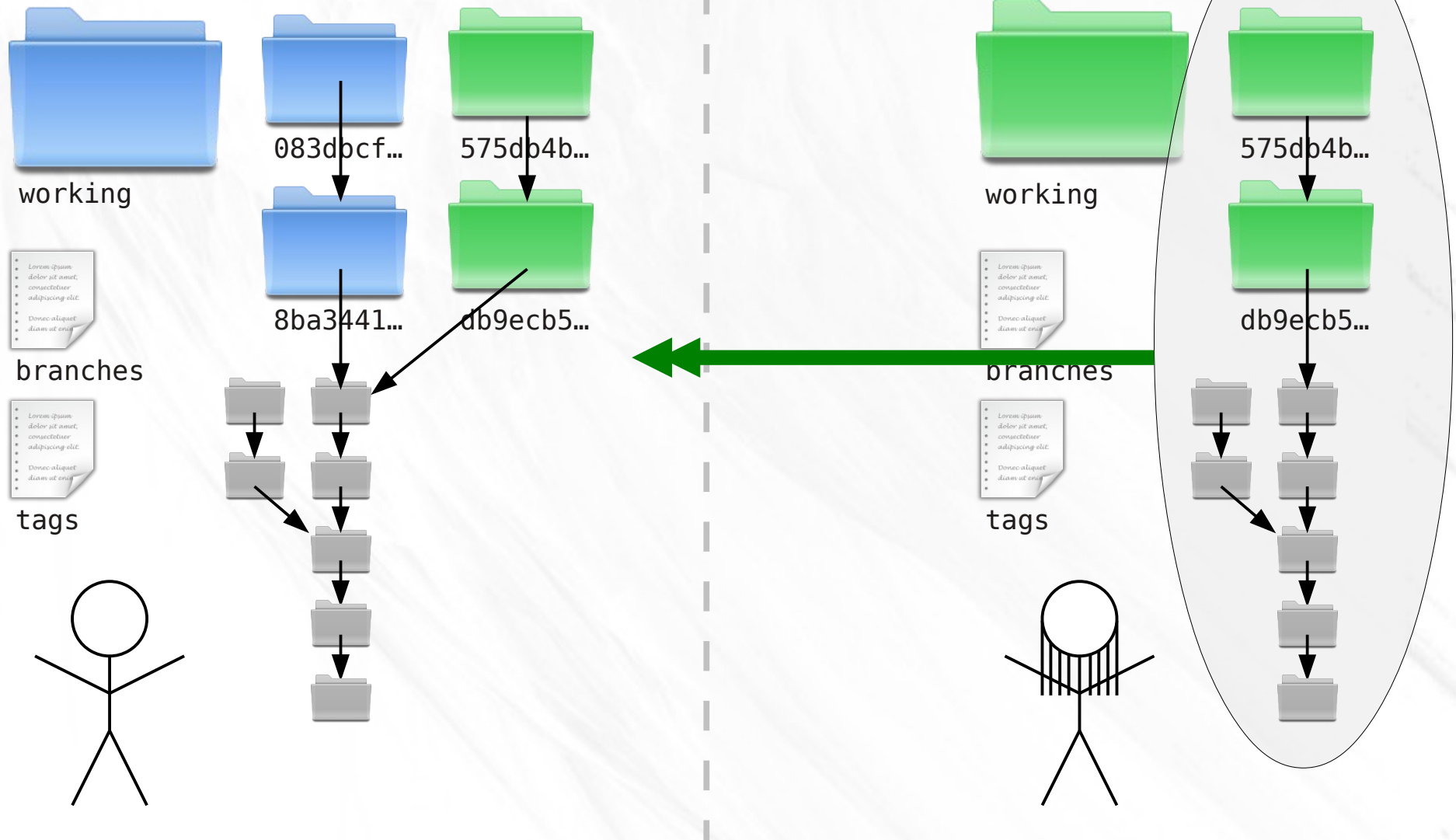
tags

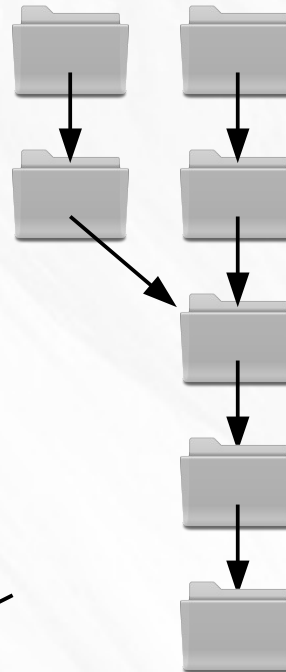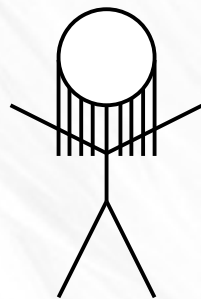# Distributed

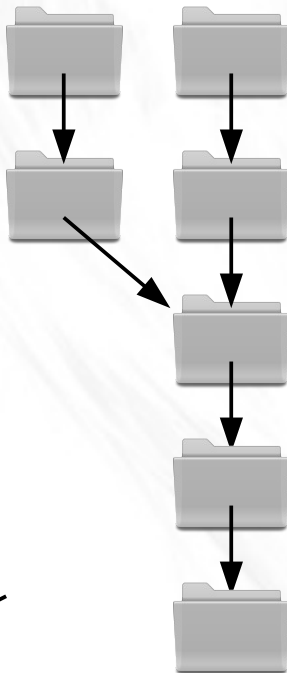# Distributed
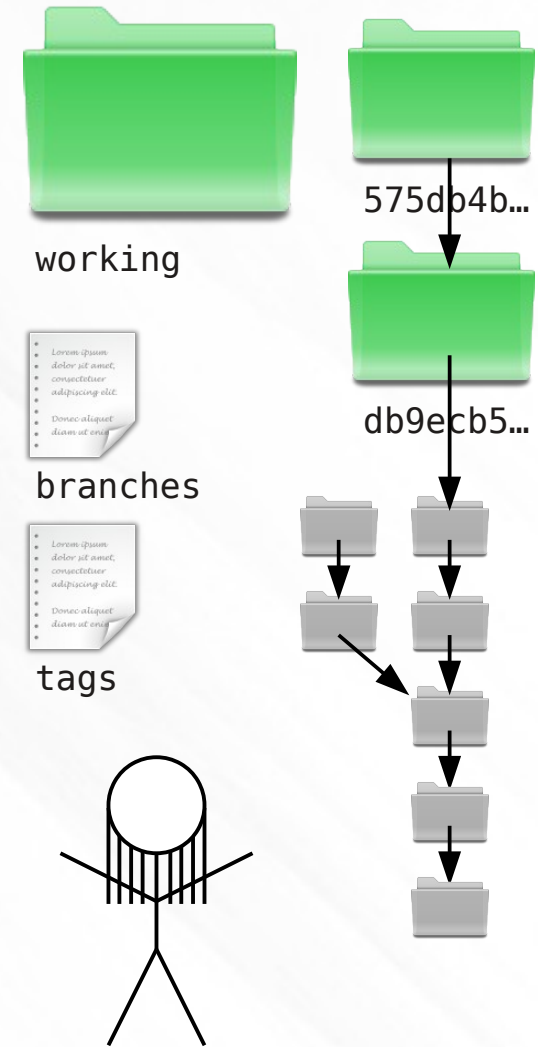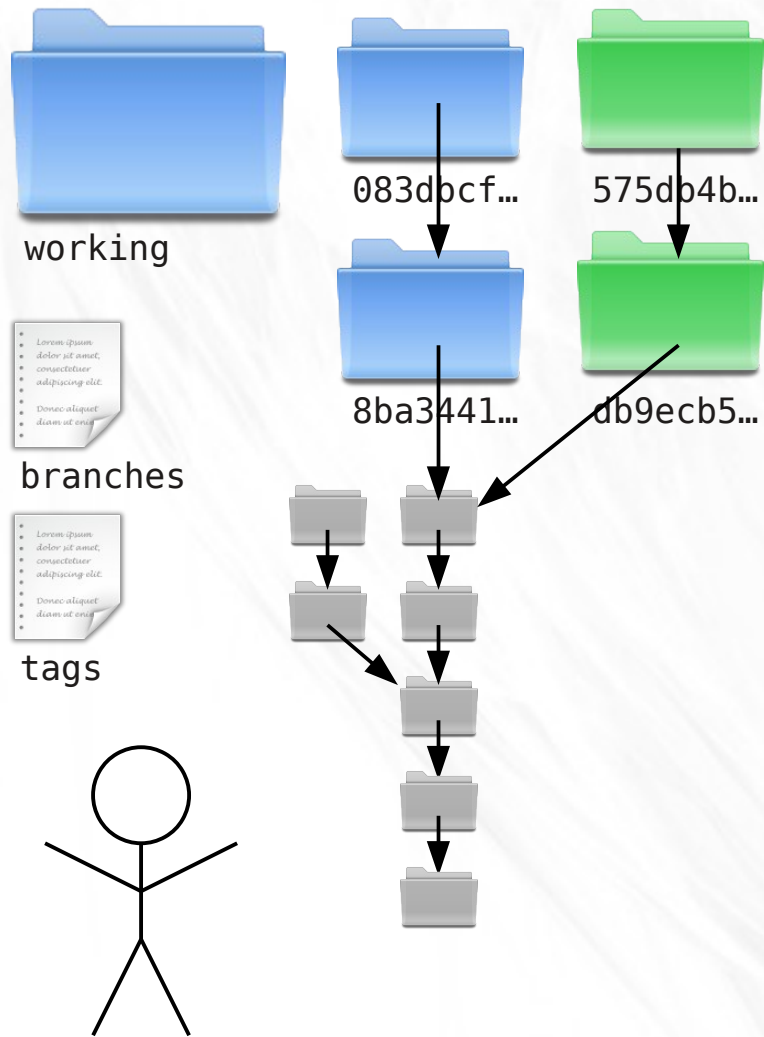
# Offline

working
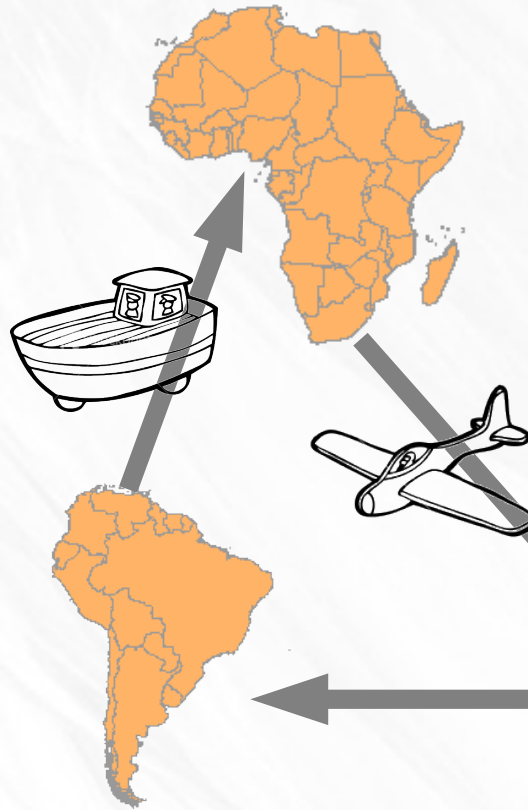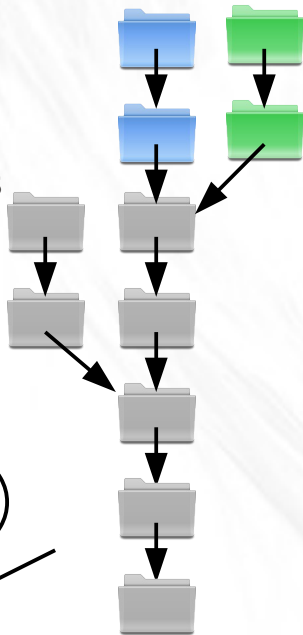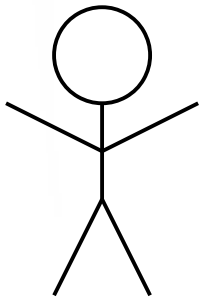
branches

tags

w00t!

working
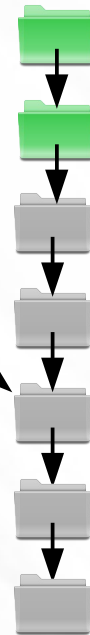
branches

tags

Offline

working
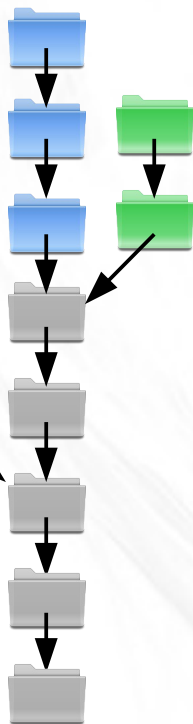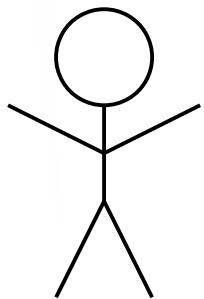
branches

tags

working
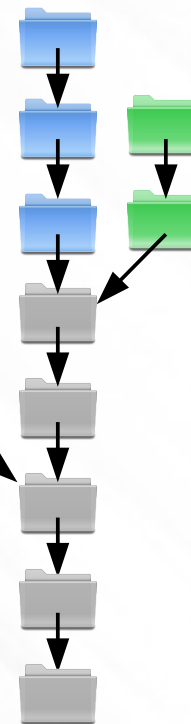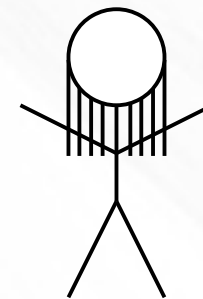
branches

tags

(simpler drawings)

working

working

branches

branches

tags

tags
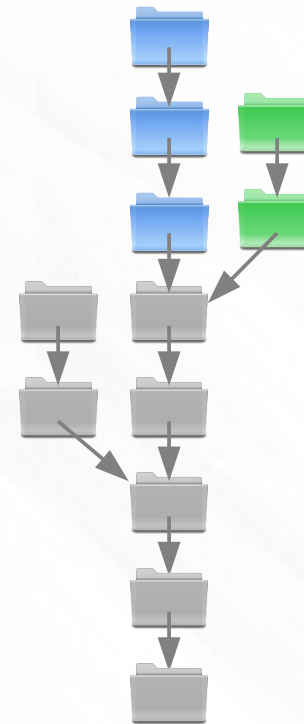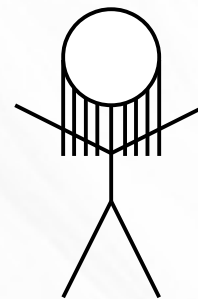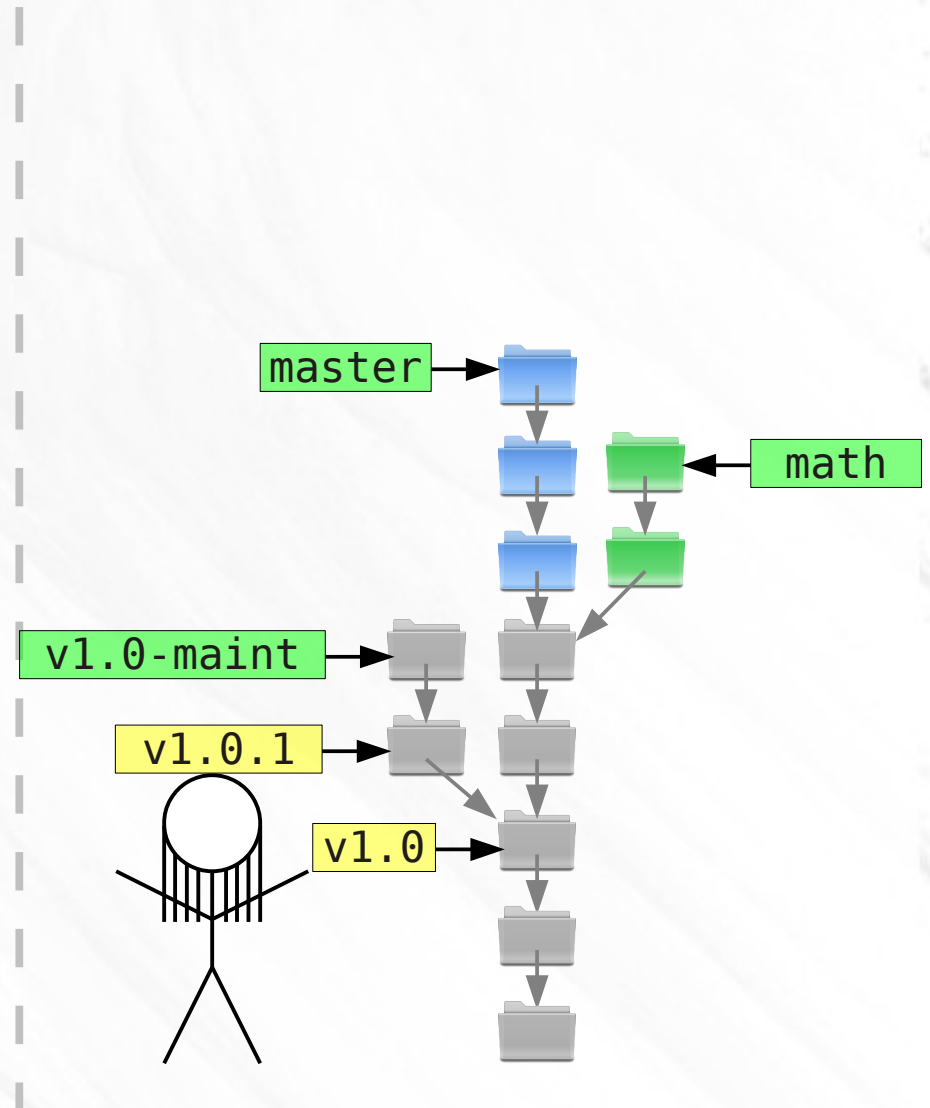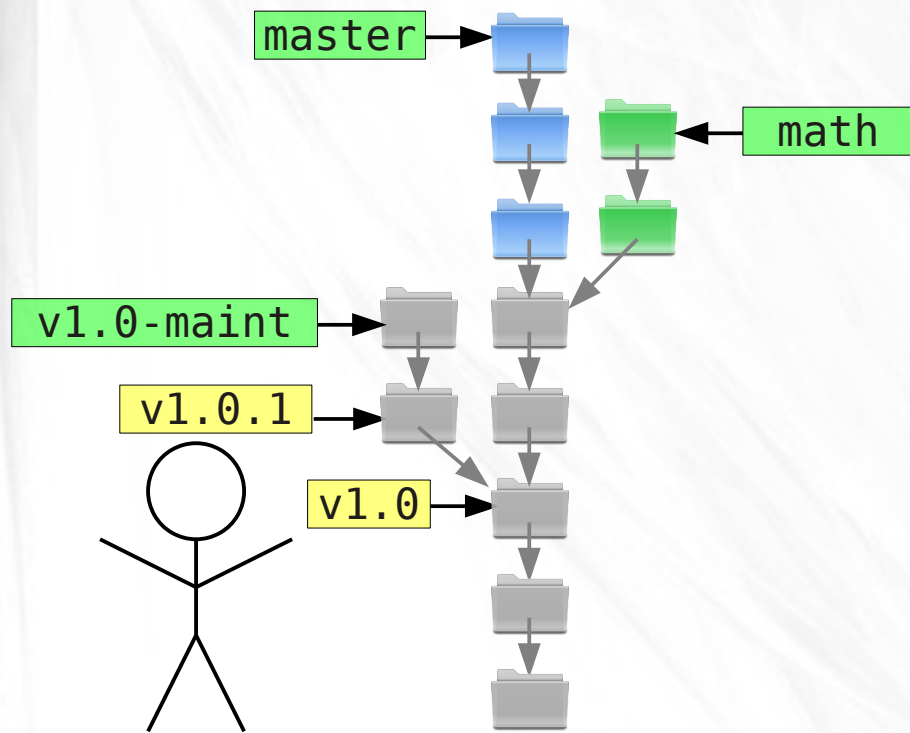
(simpler drawings)

(simpler drawings)
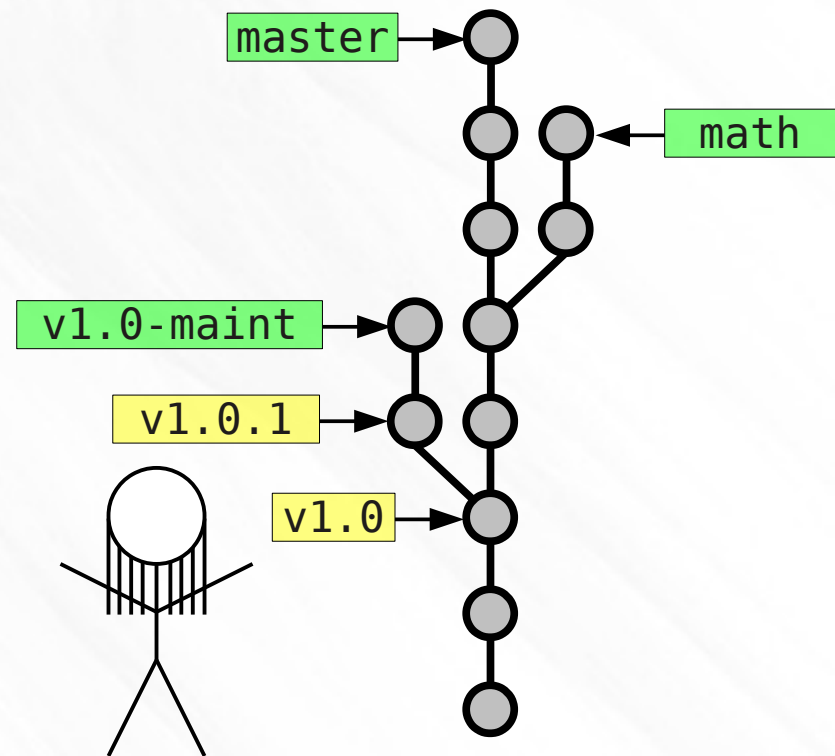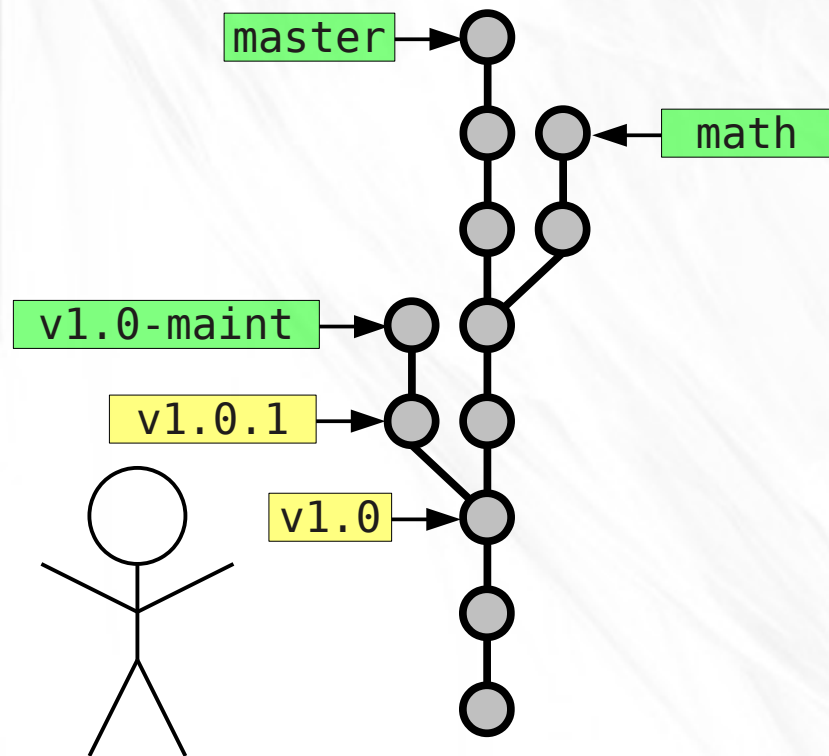
Merges
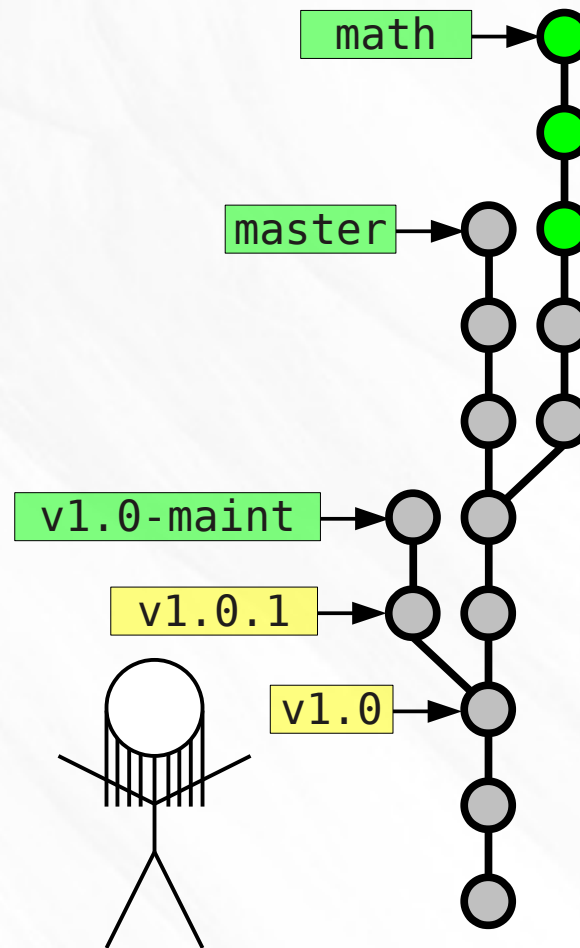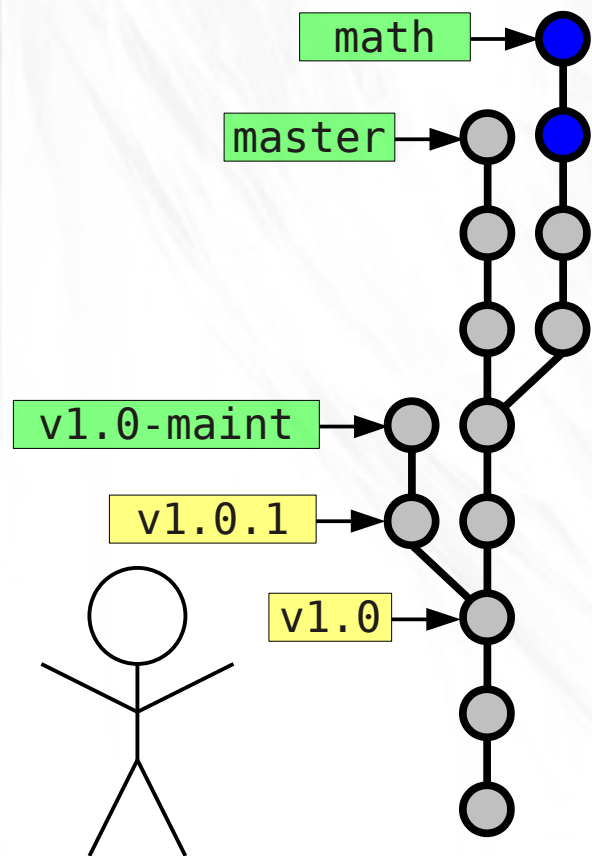
Merges
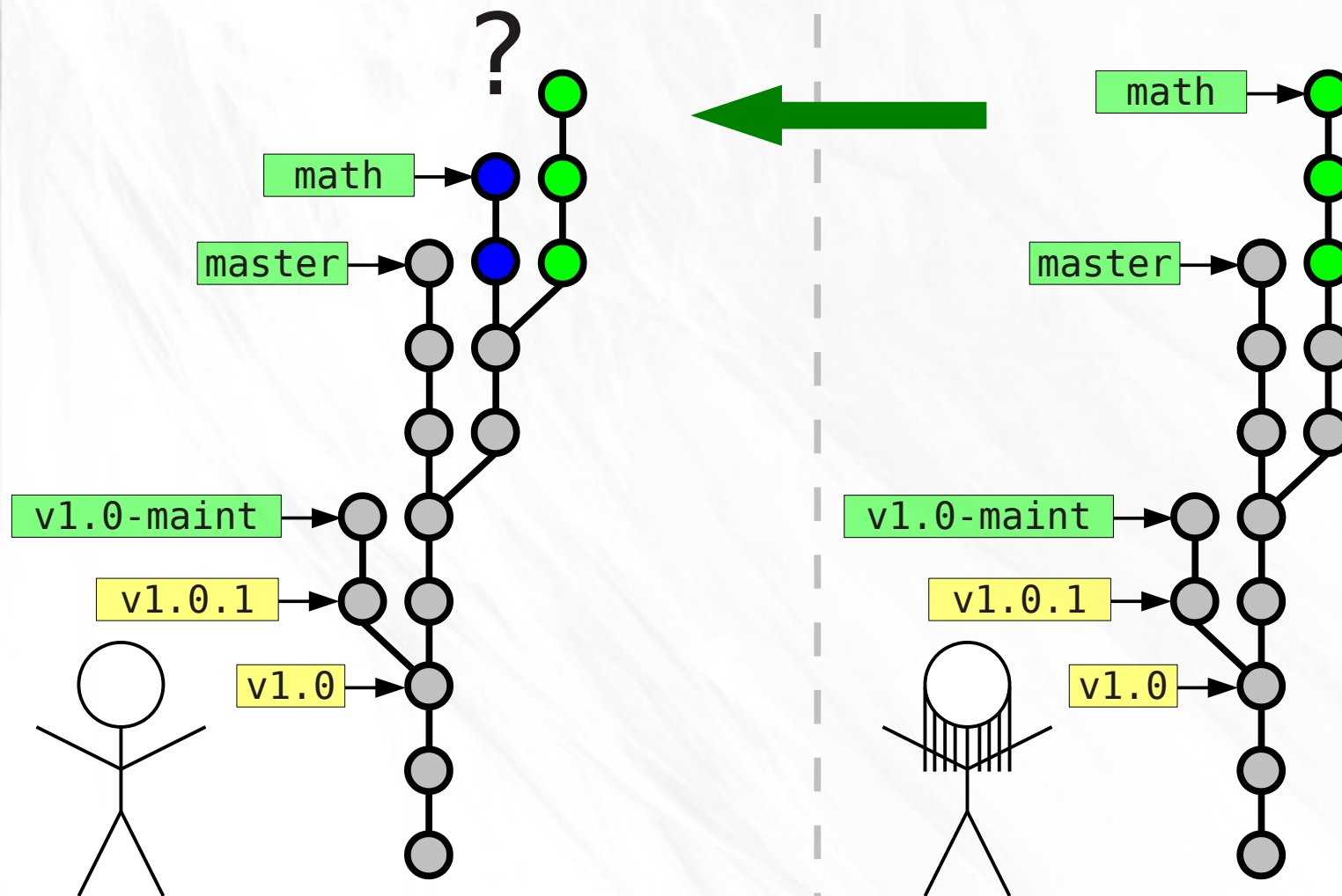
Merges
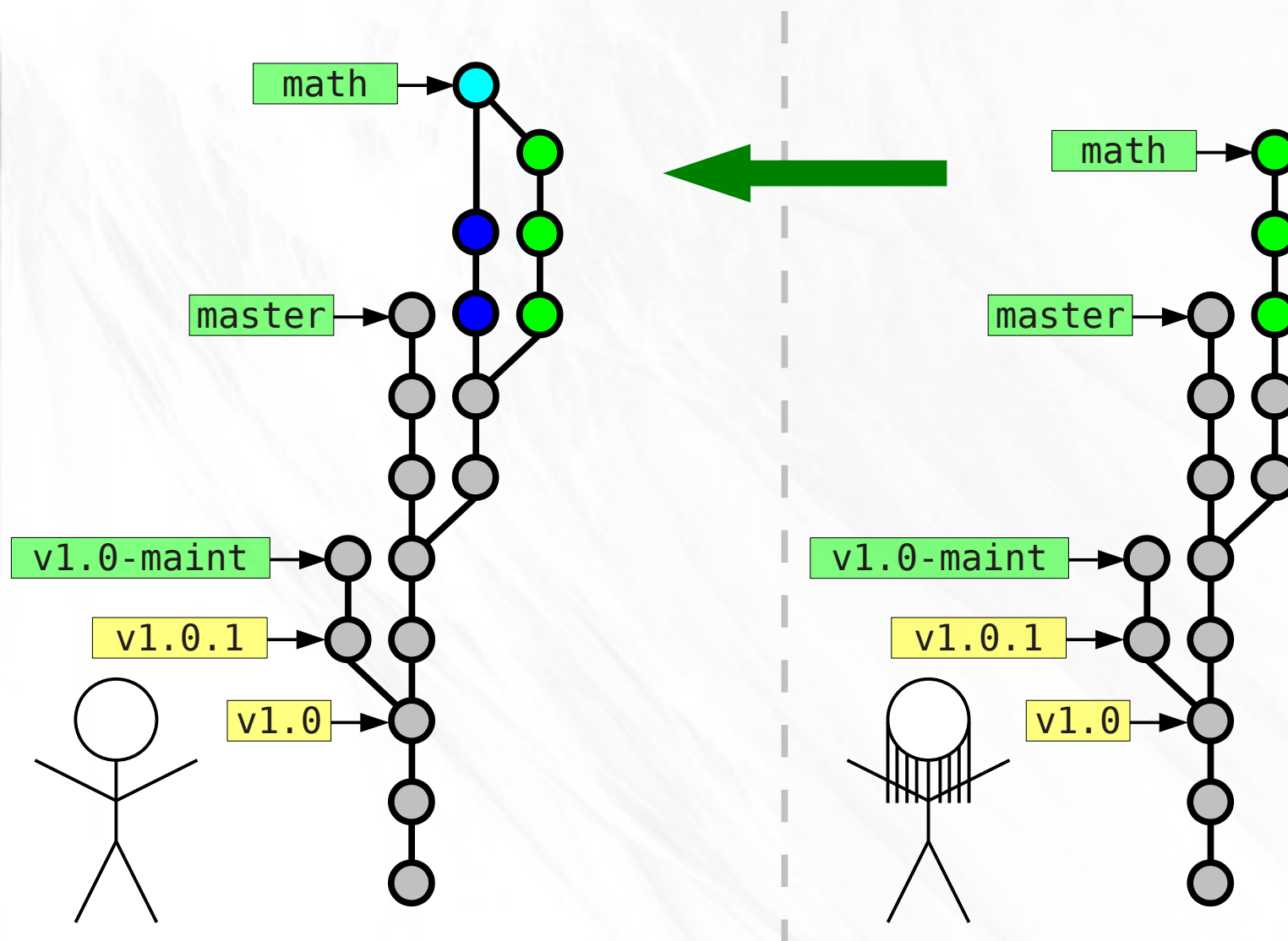
Merges
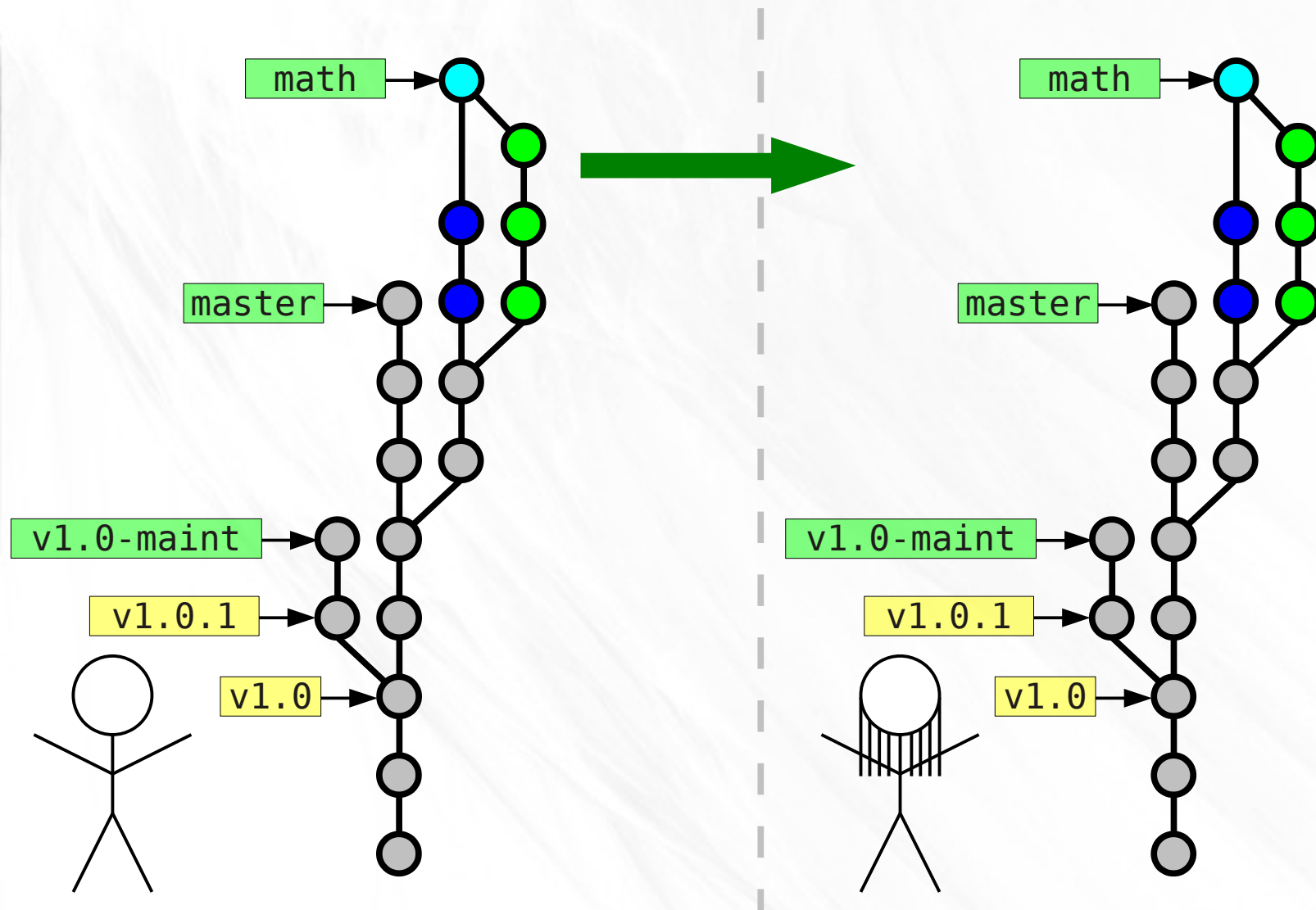
Rewriting History
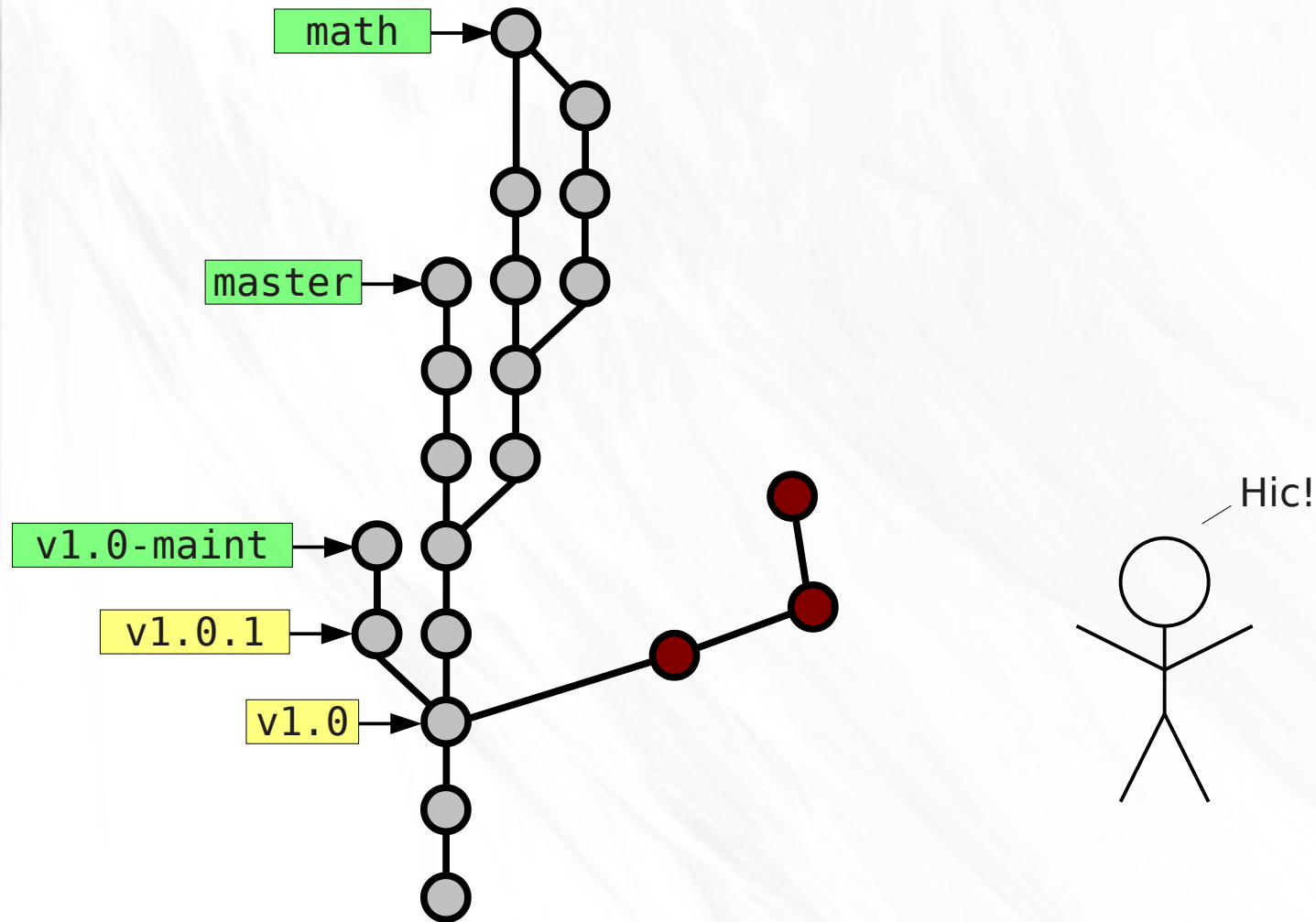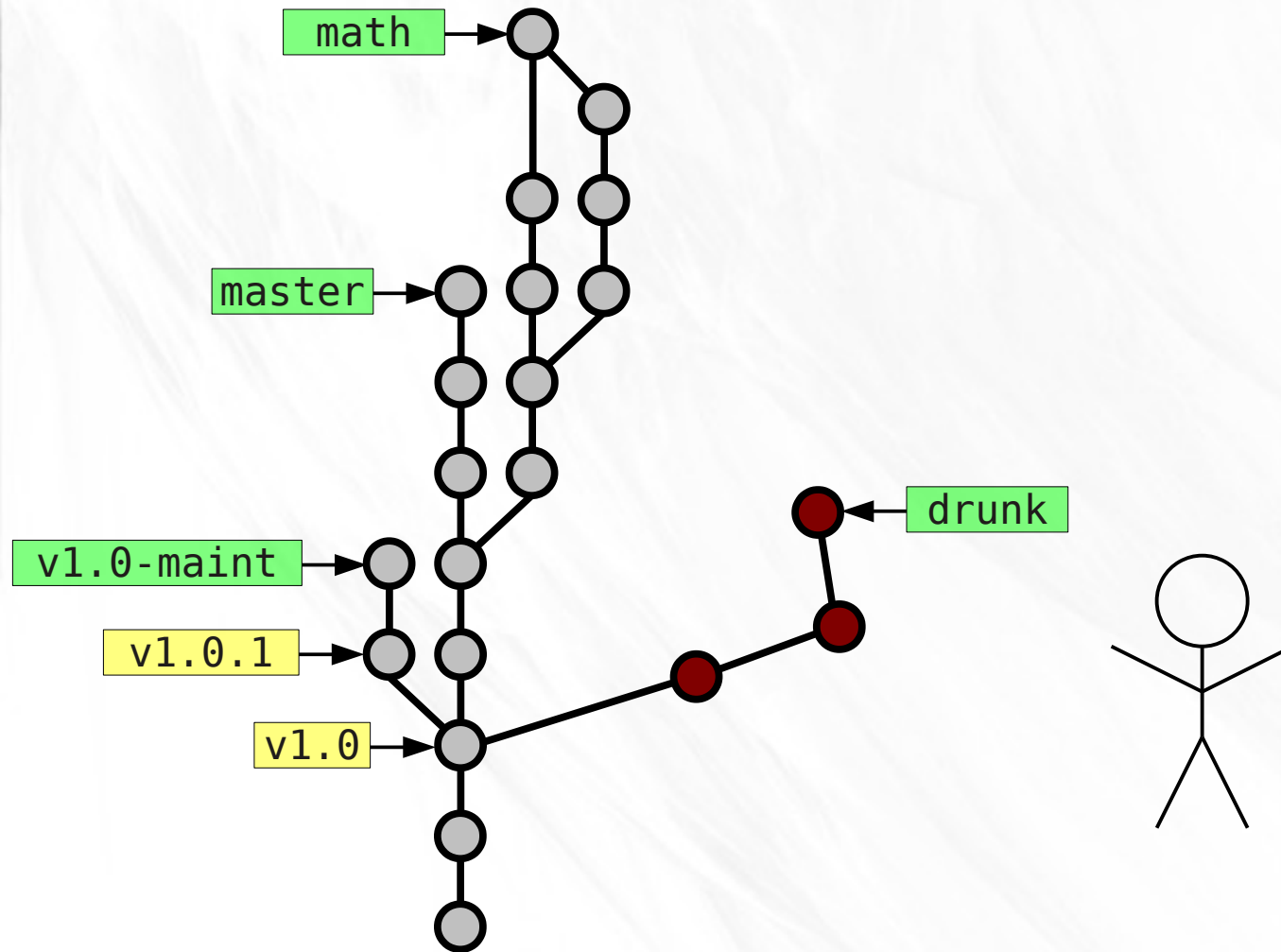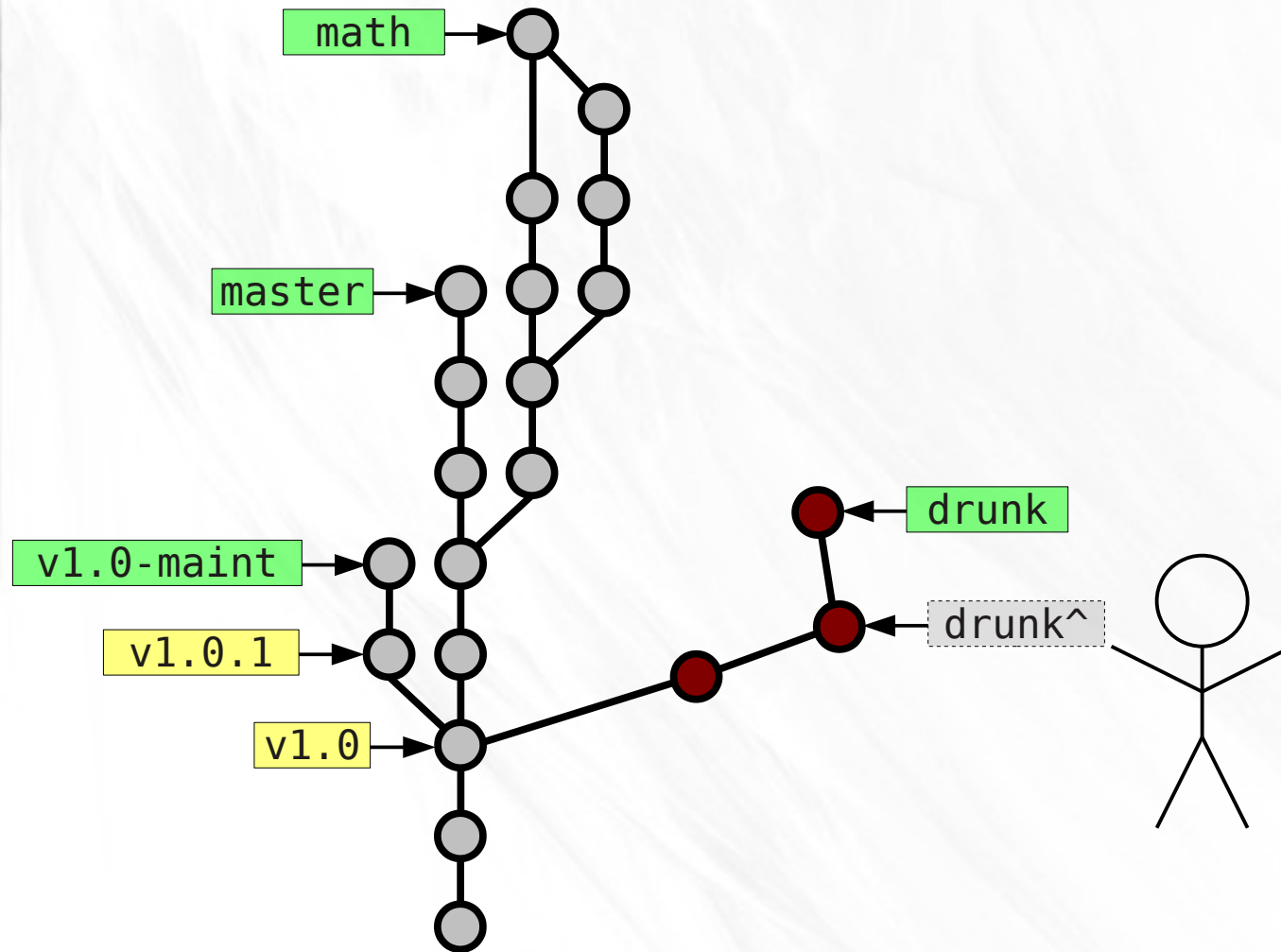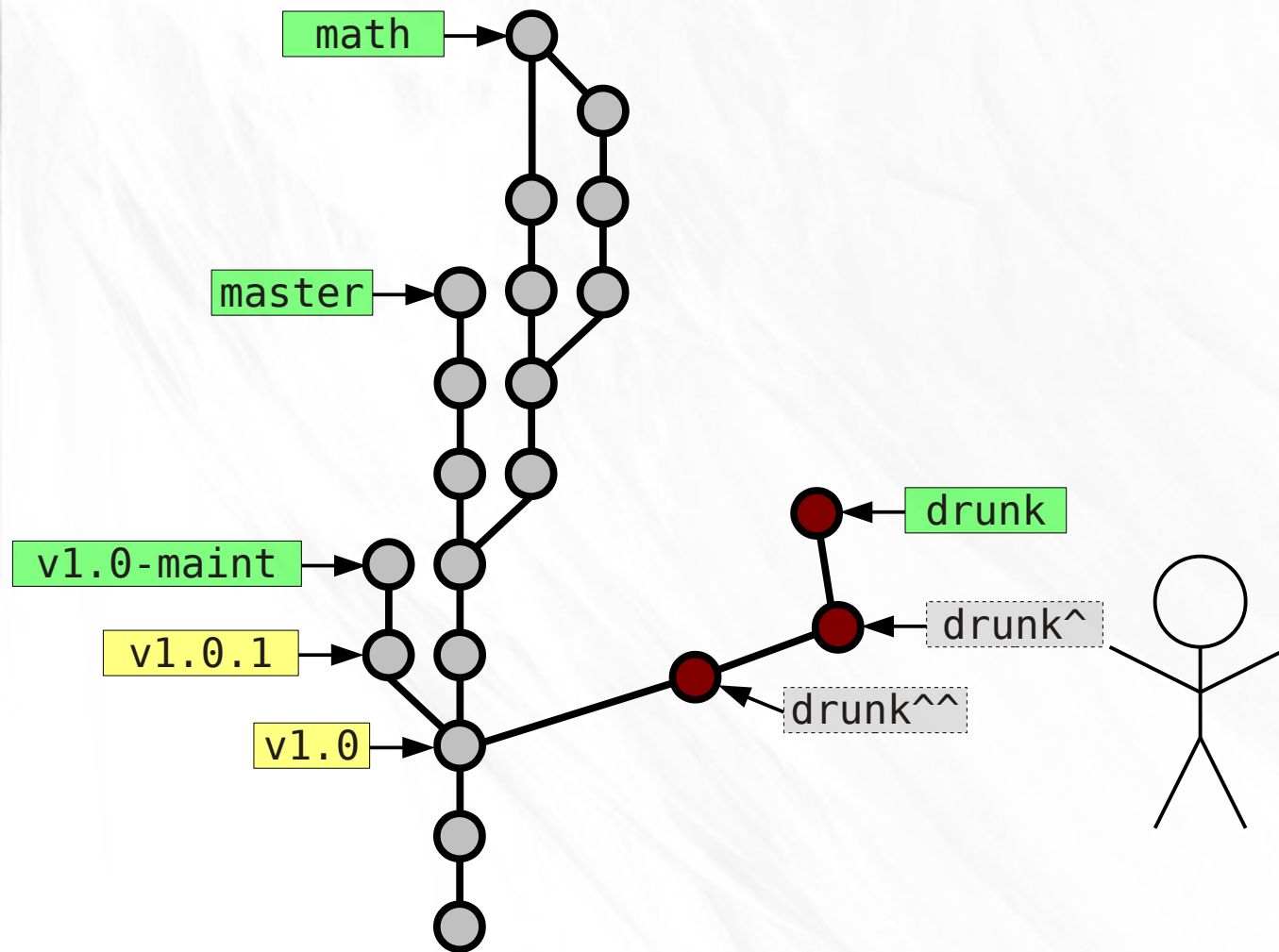
Rewriting History

Rewriting History

Rewriting History

Rewriting History

Rewriting History

Rewriting History

math

master

v1.0-maint

v1.0.1

v1.0

drunk^^^

working

drunk
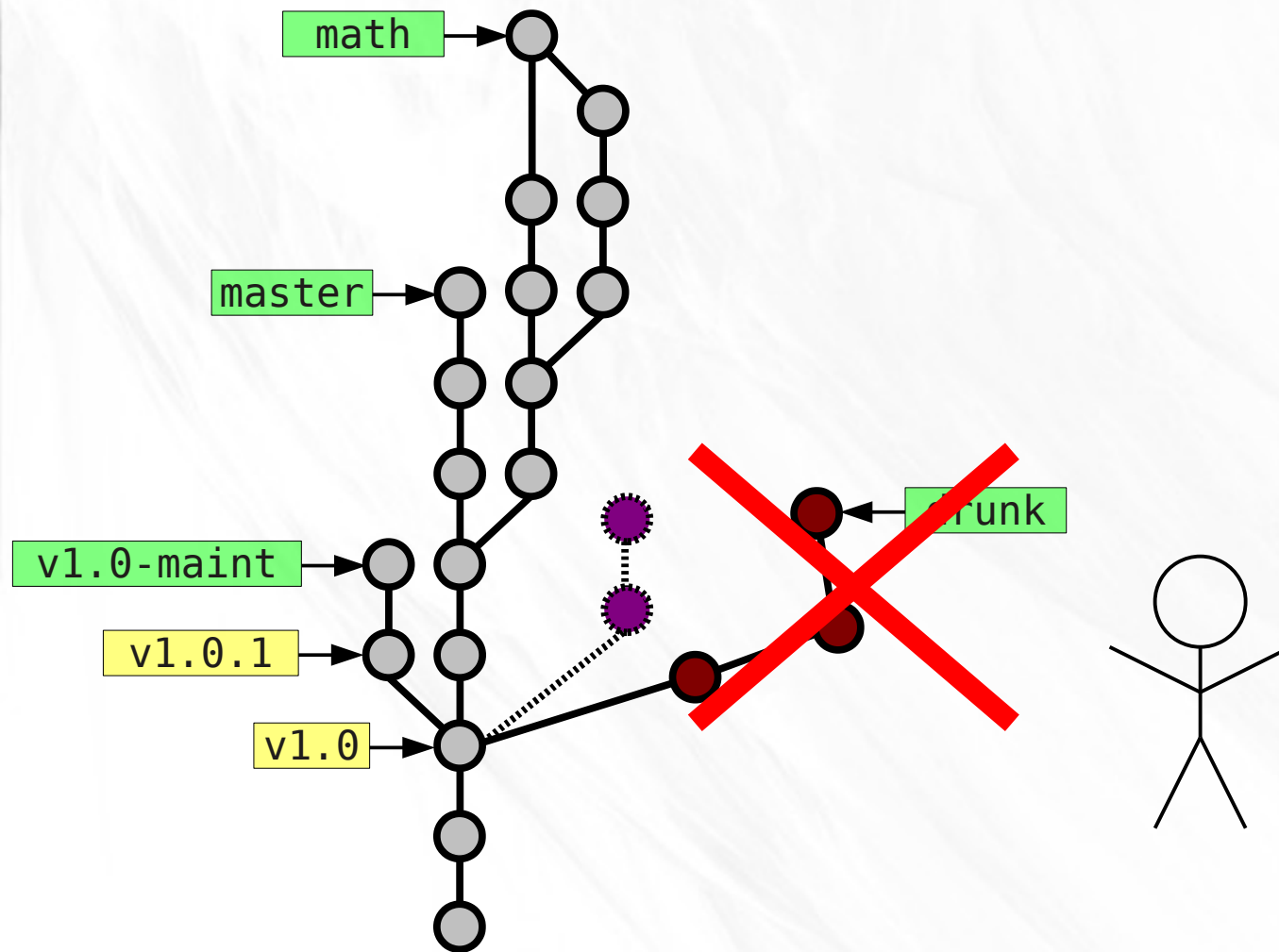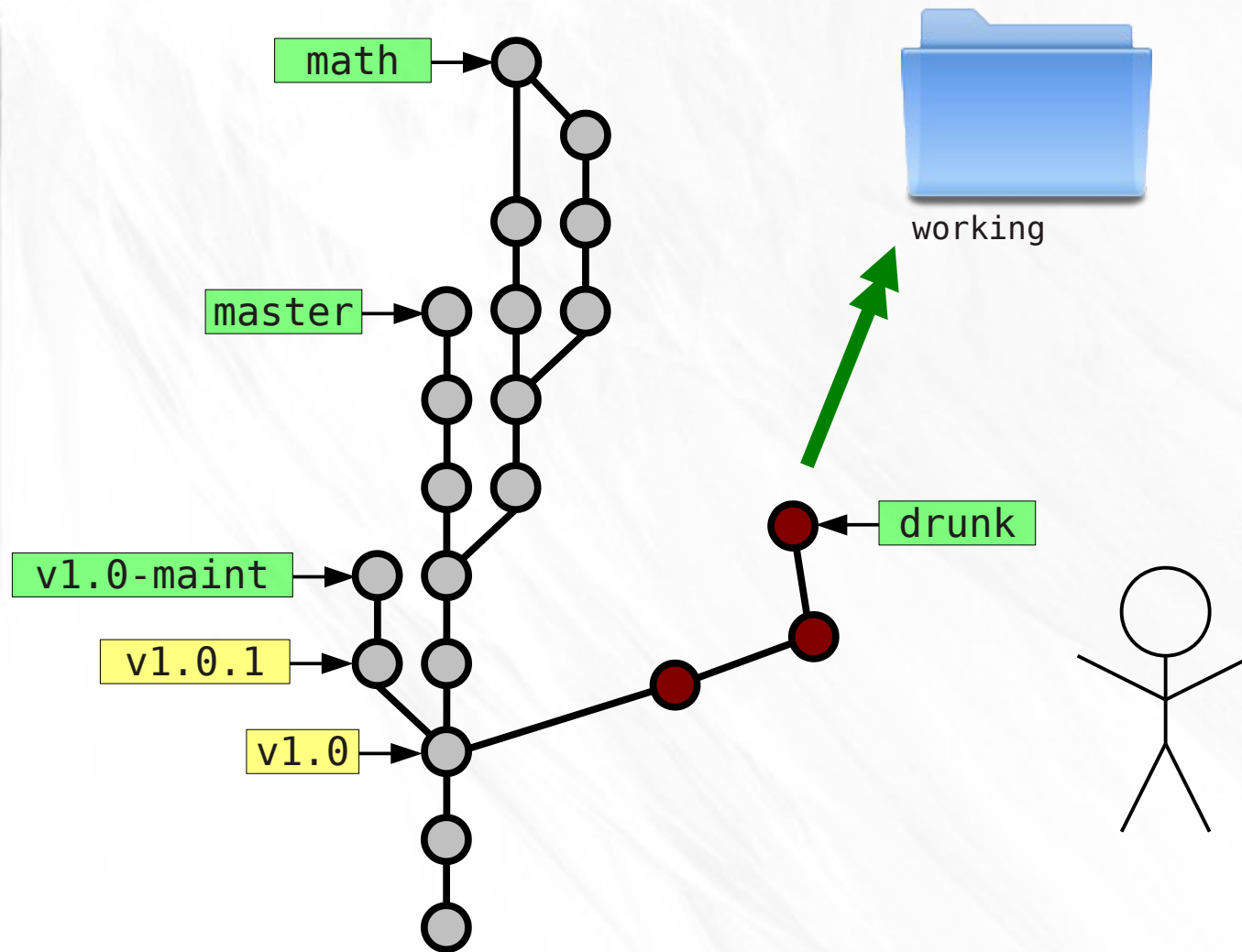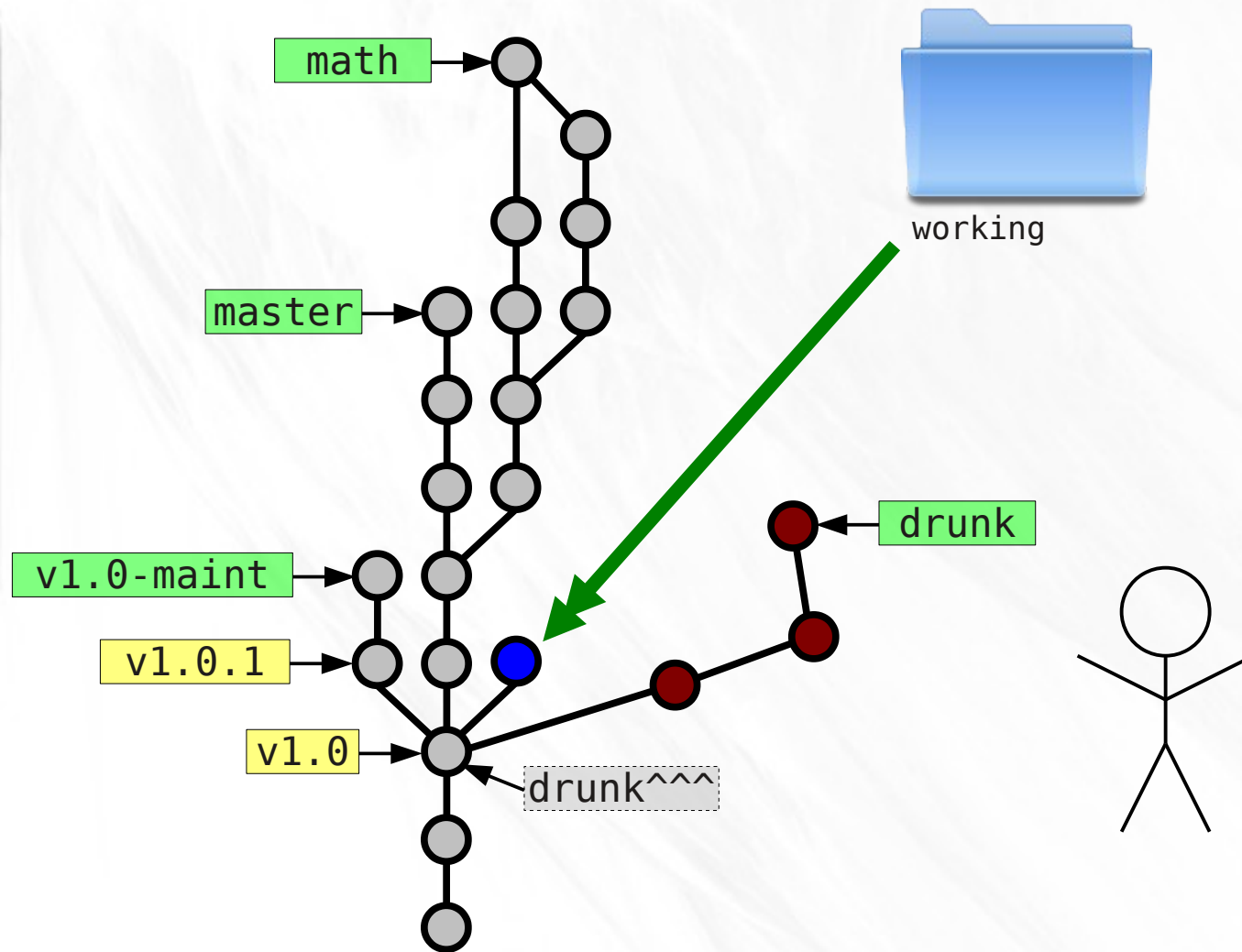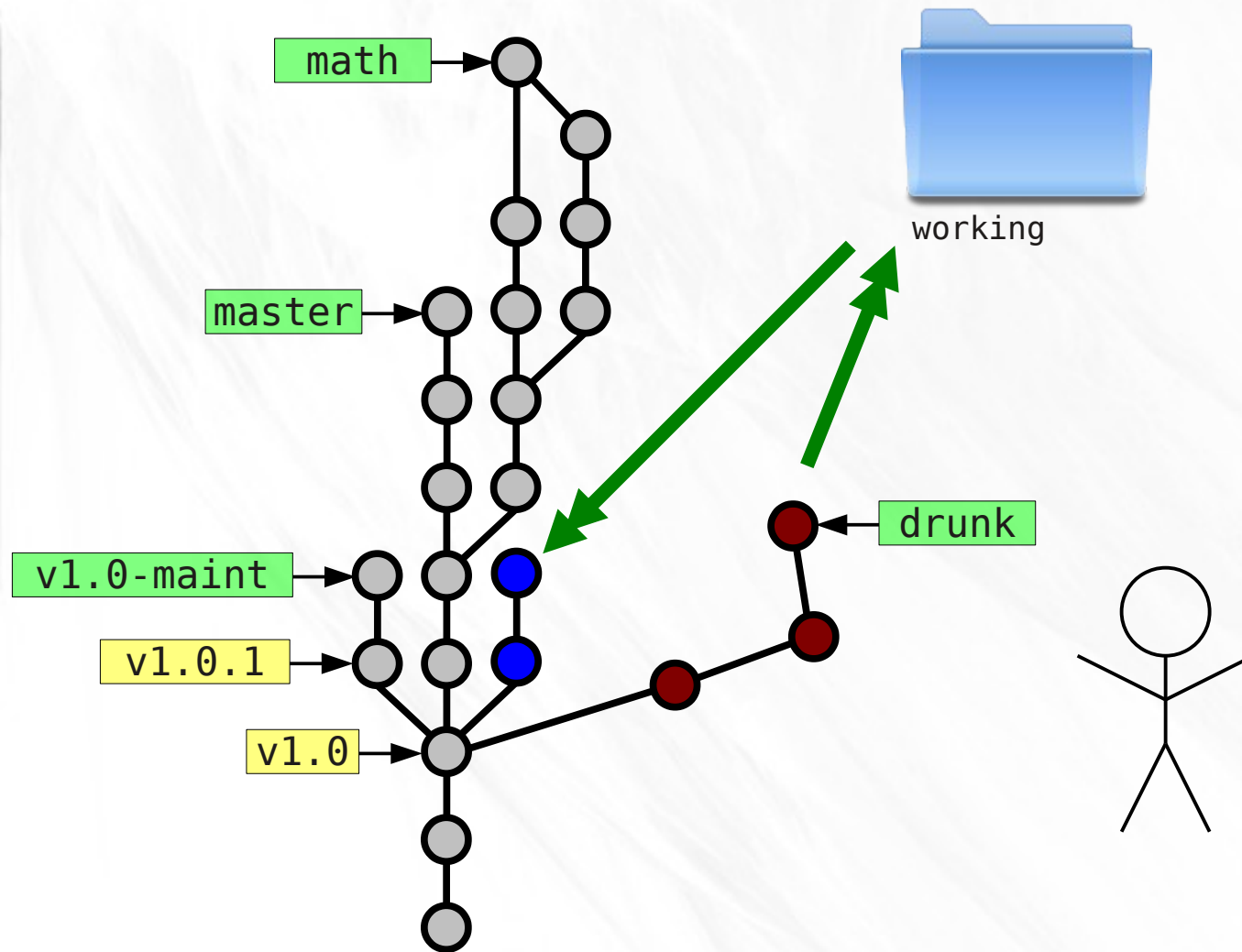
Rewriting History
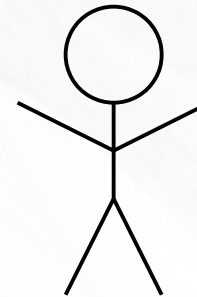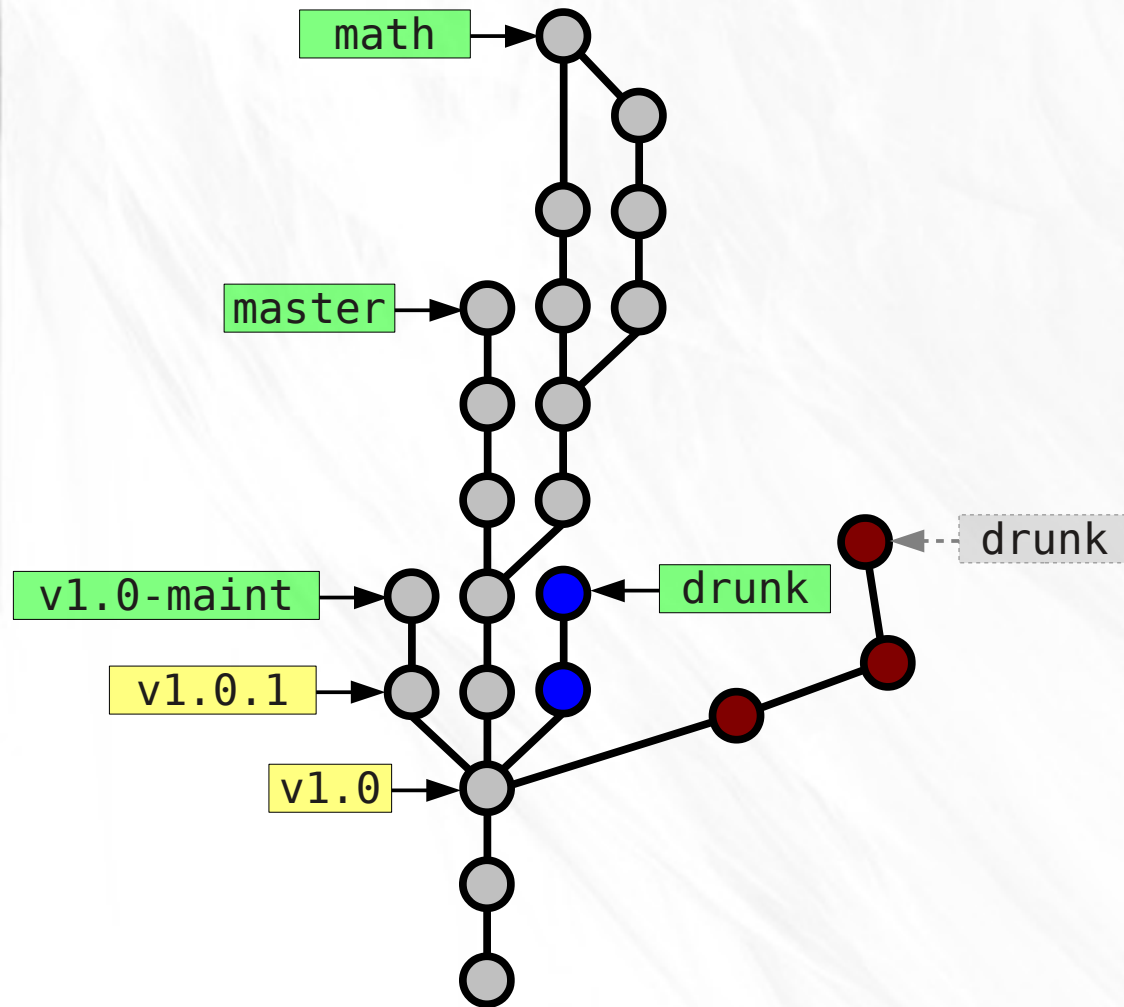
Rewriting History

Rewriting History

Staging Area

math

master

v1.0-maint

drunk

v1.0.1

v1.0

working

Oops...

Staging Area

Staging Area

Staging Area

Staging Area

Staging Area

Diffs

math

master

v1.0-maint

v1.0.1

v1.0

drunk
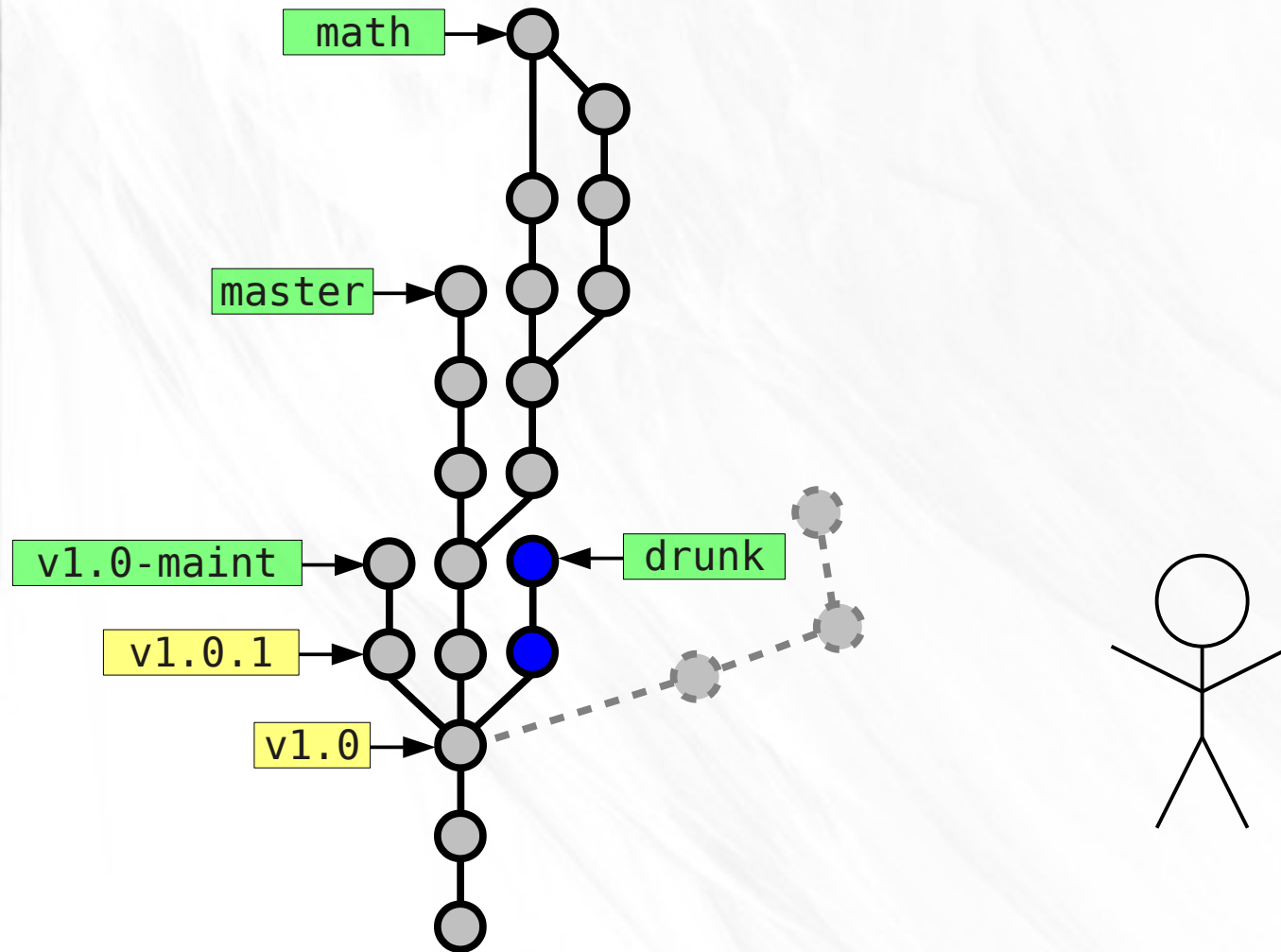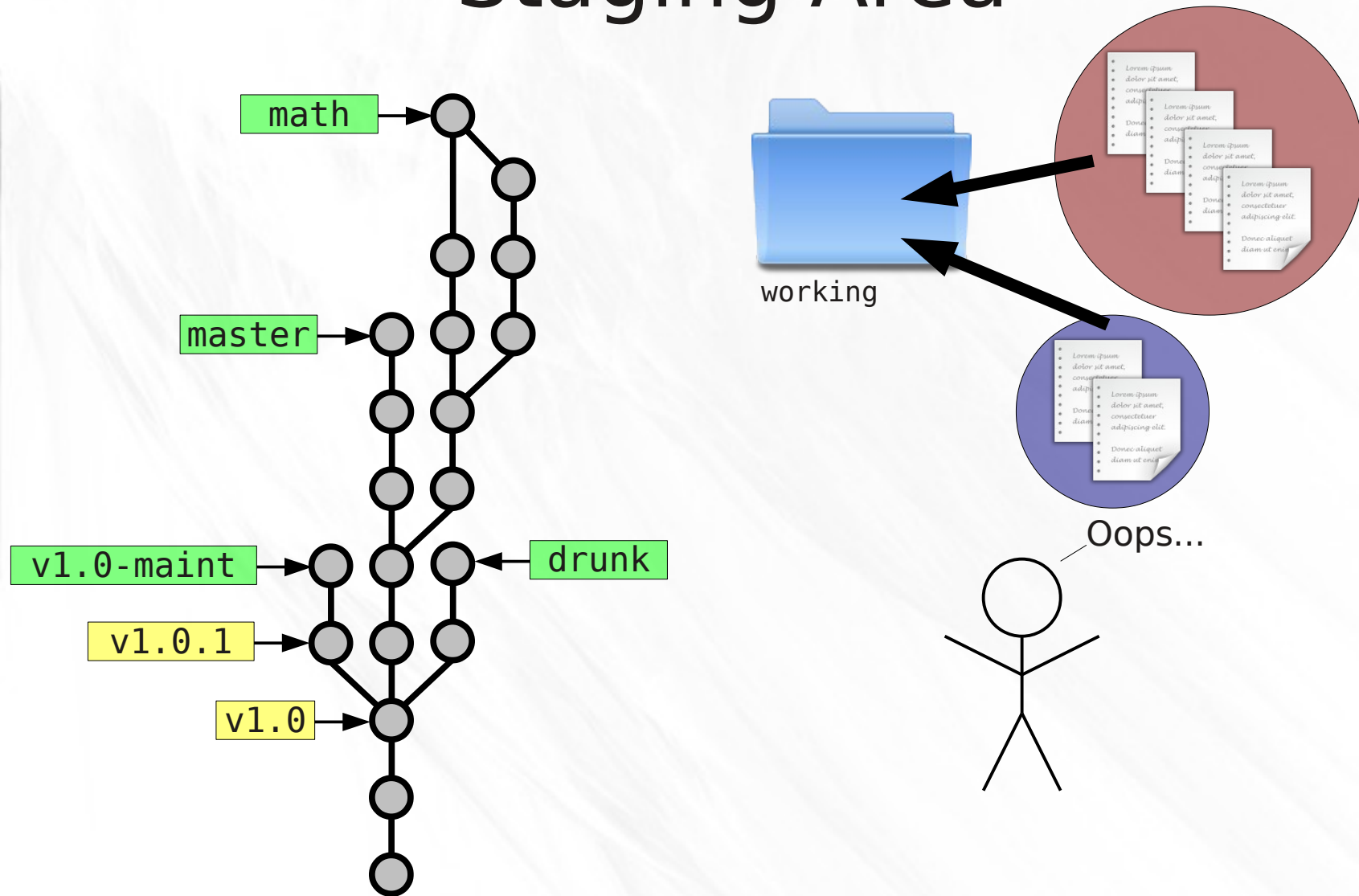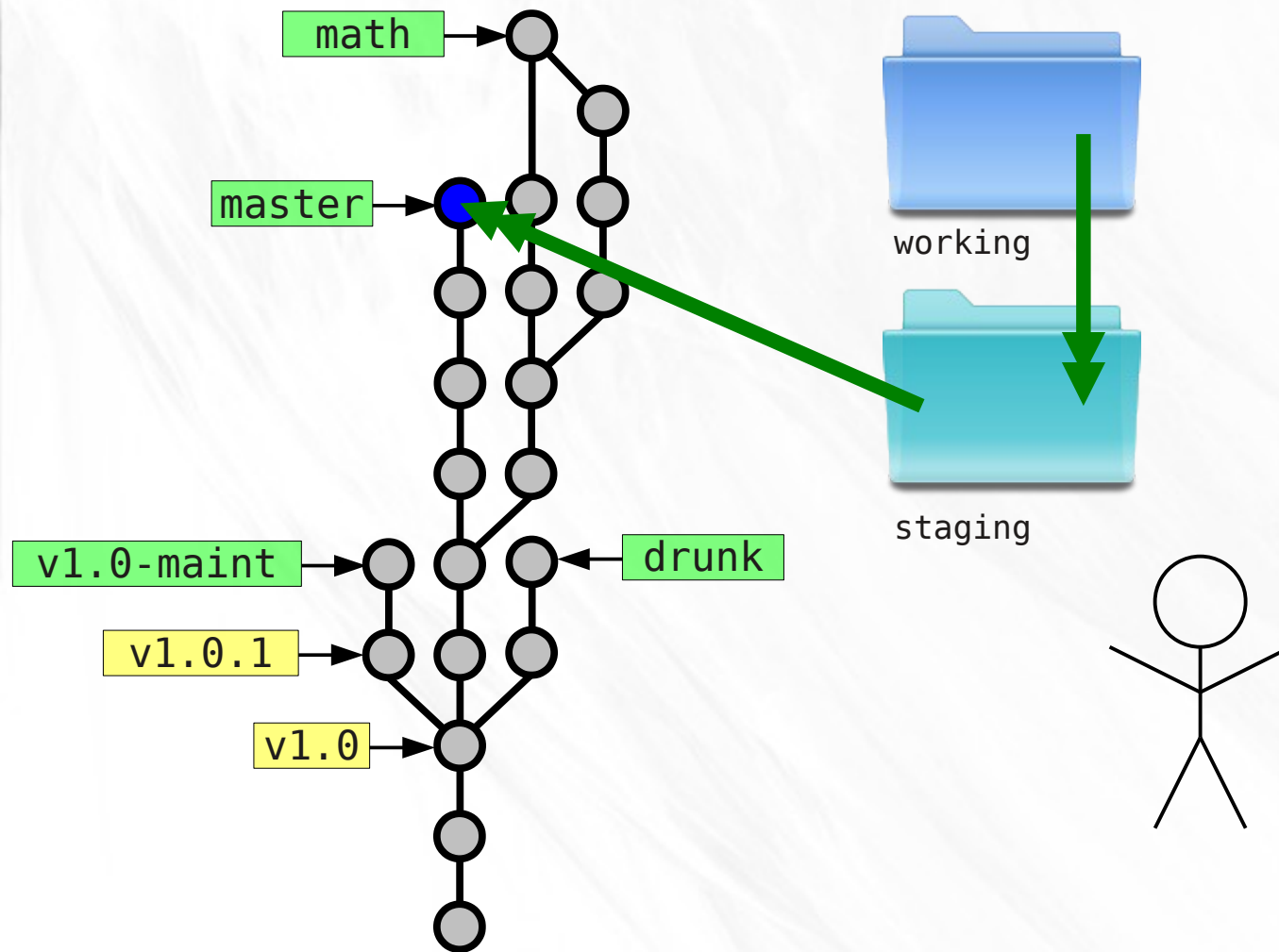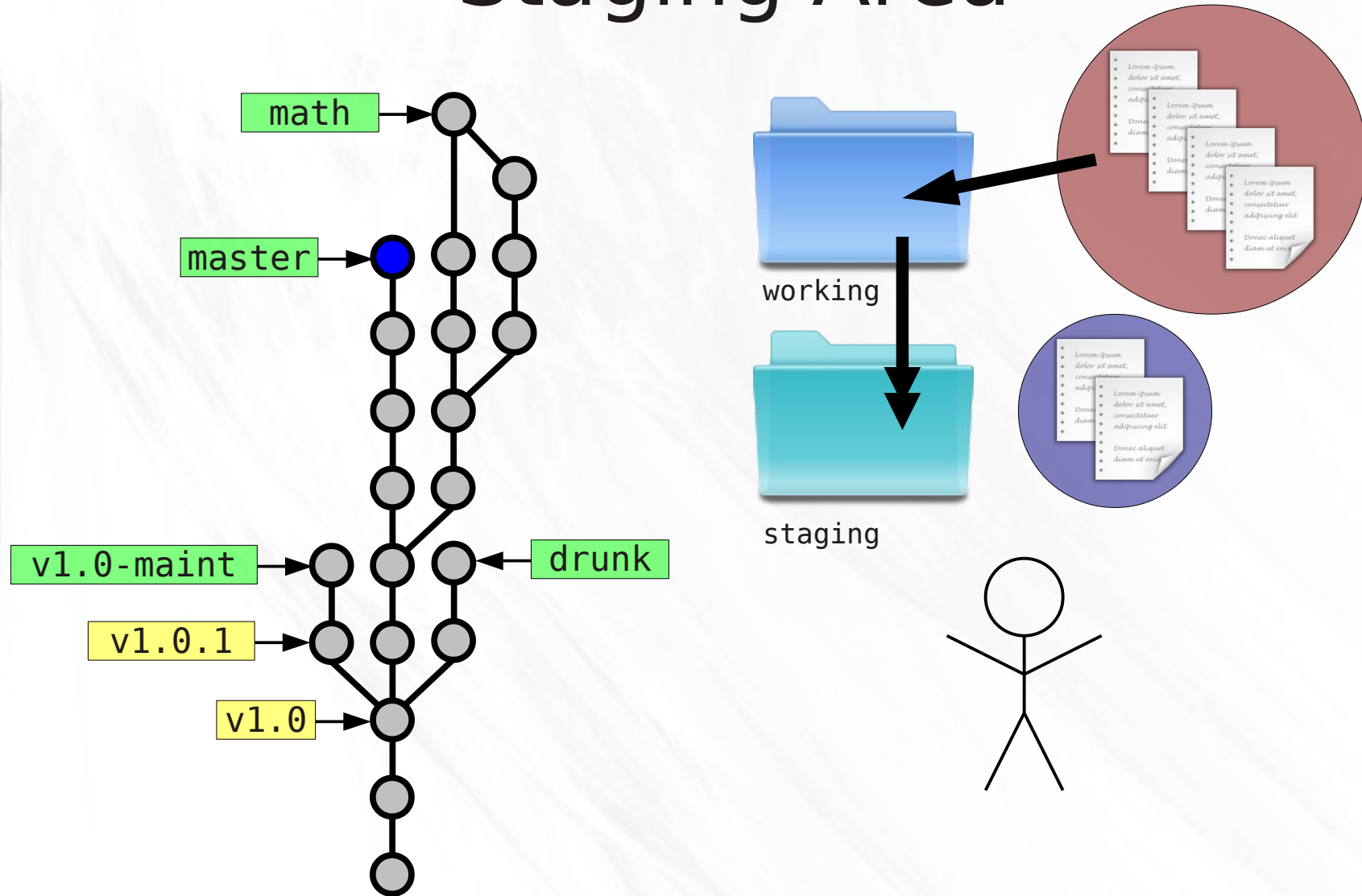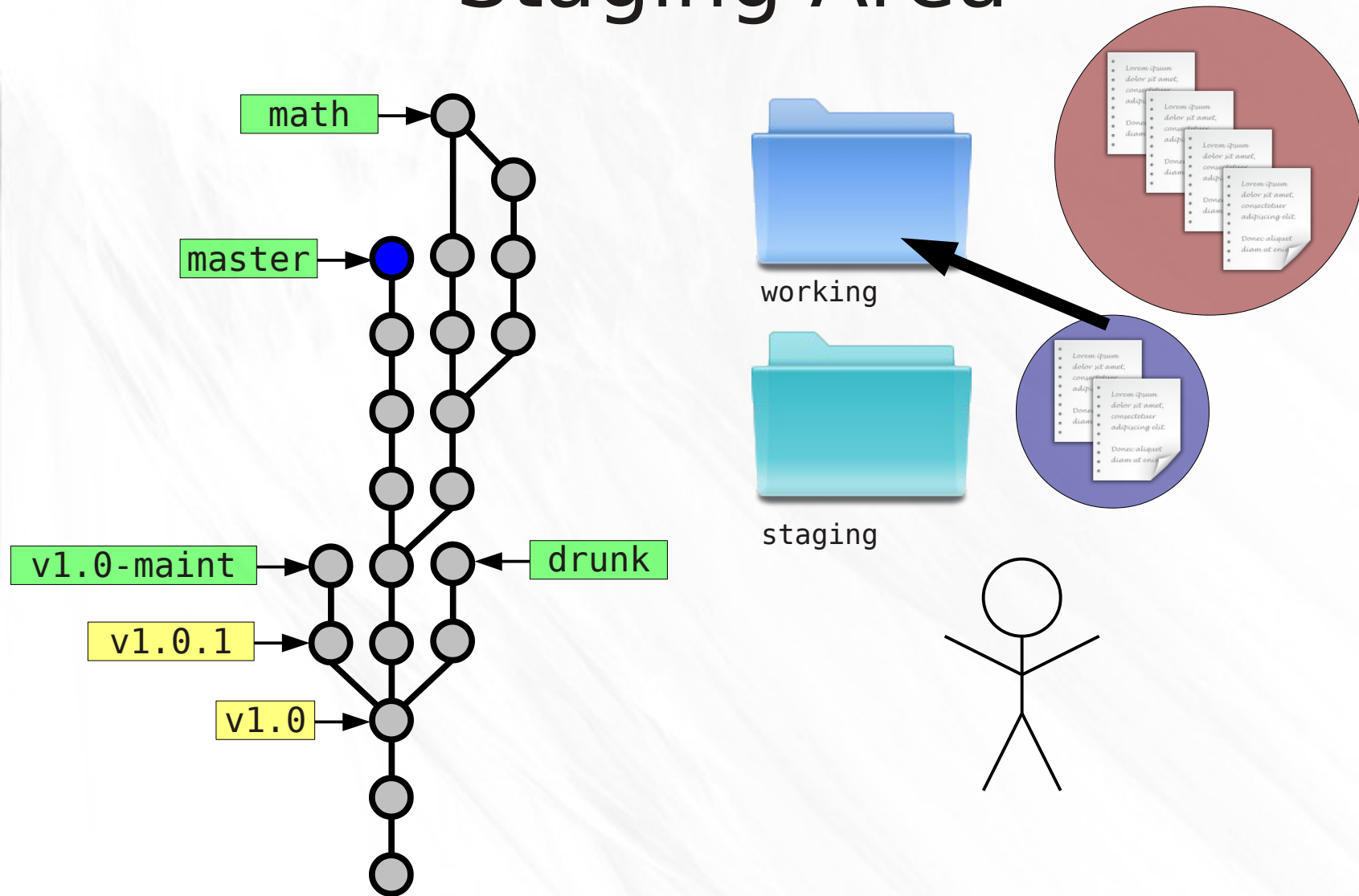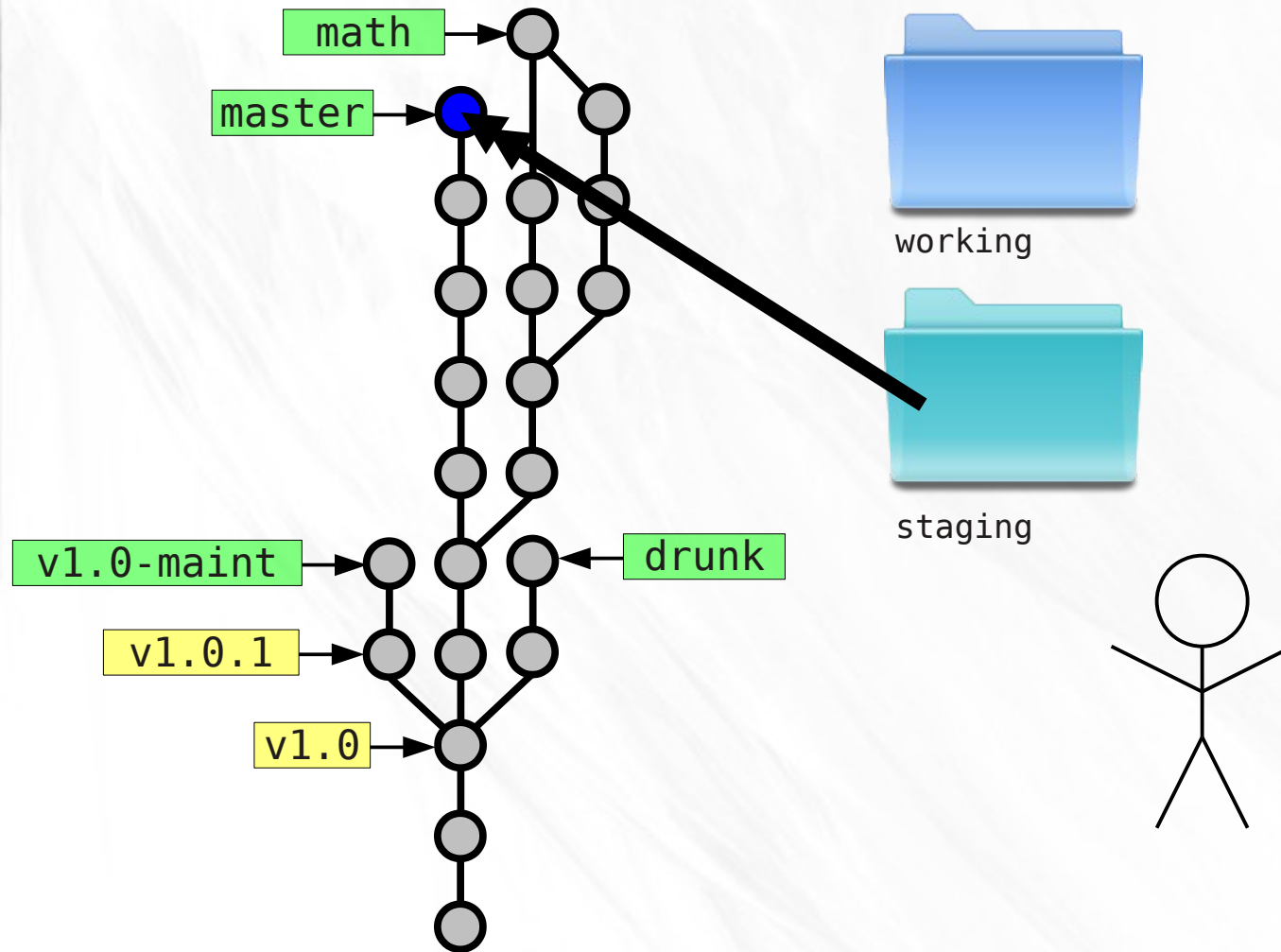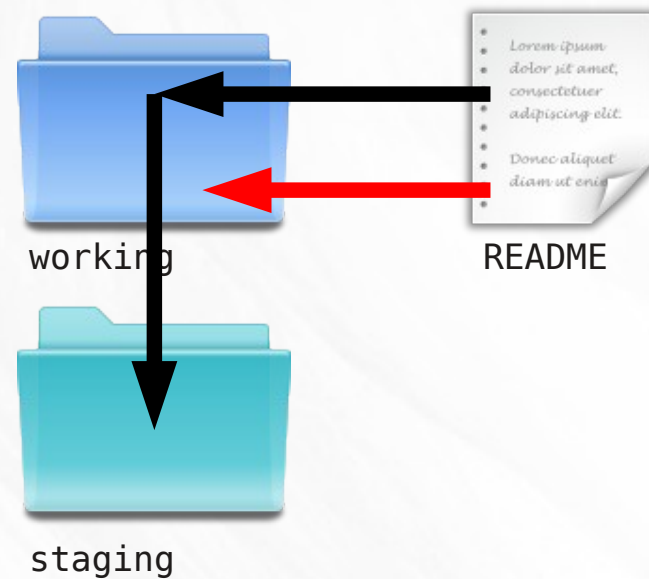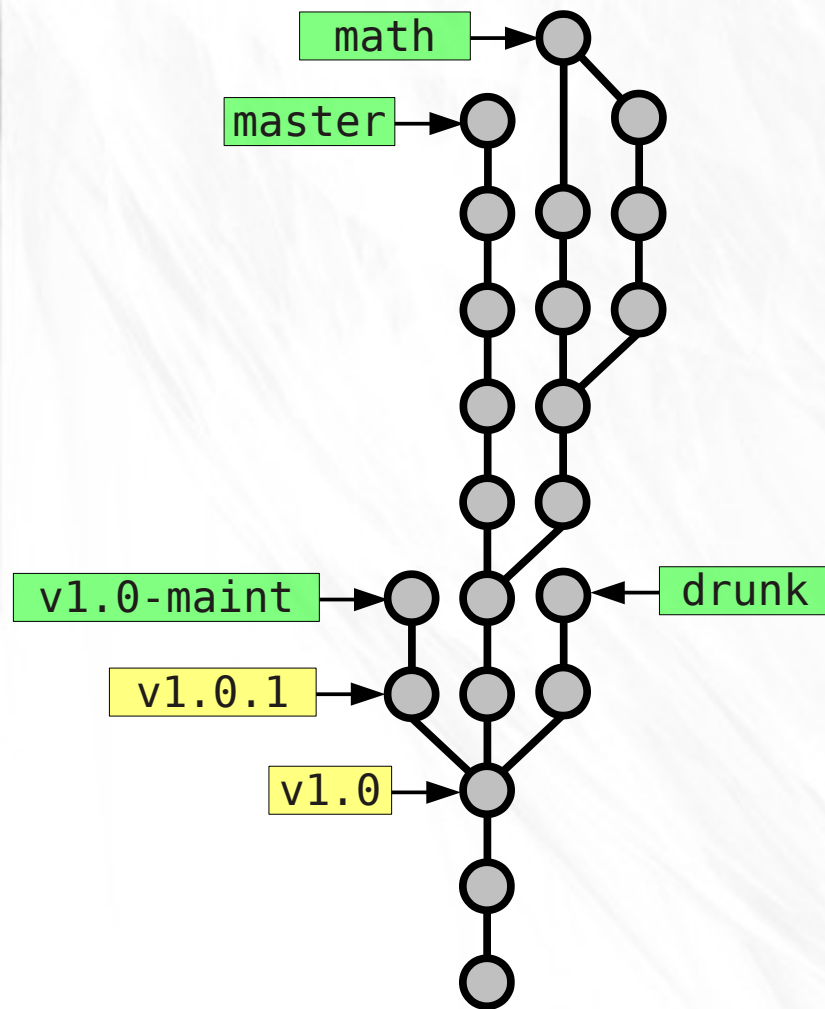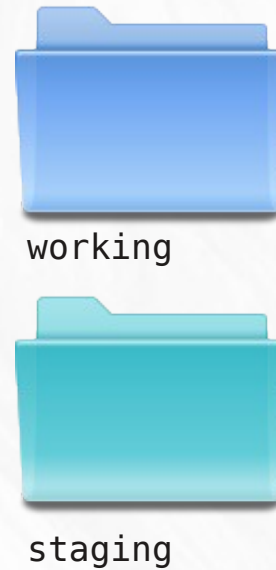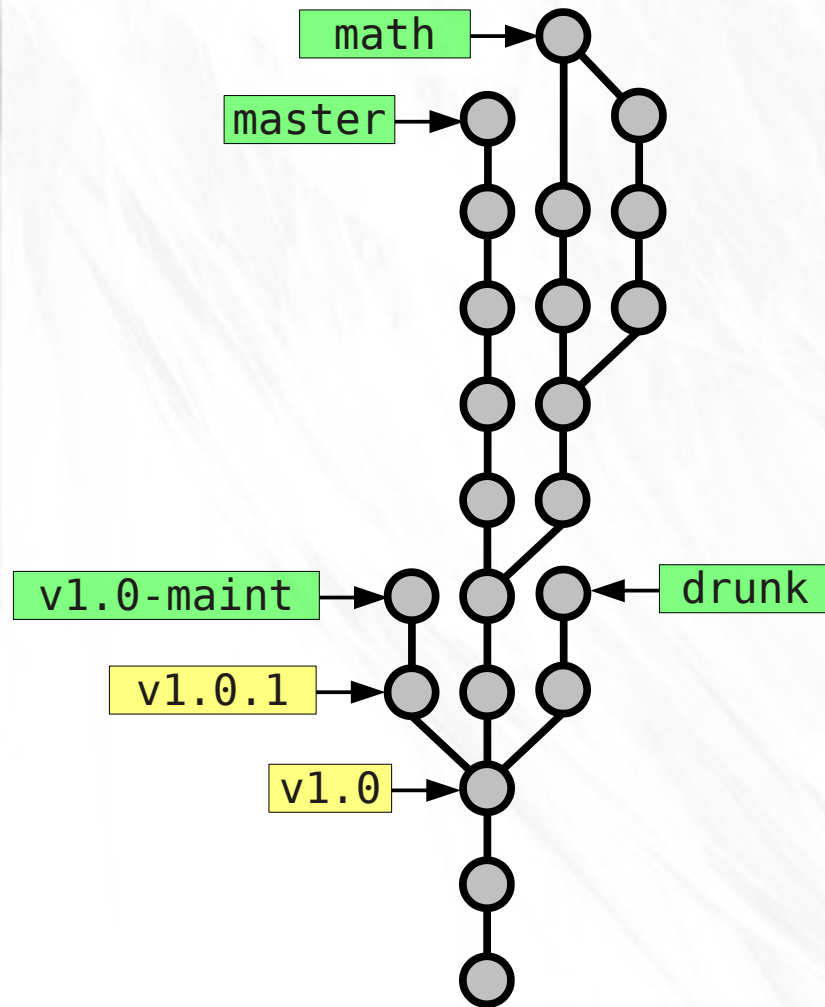
working

staging

What are the changes?
- working vs. staging
- working vs. snapshot X
- staging vs. snapshot X
- snapshot X vs. snapshot Y

Diffs

working   staging

Diff algorithm
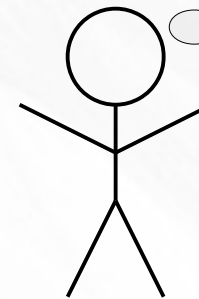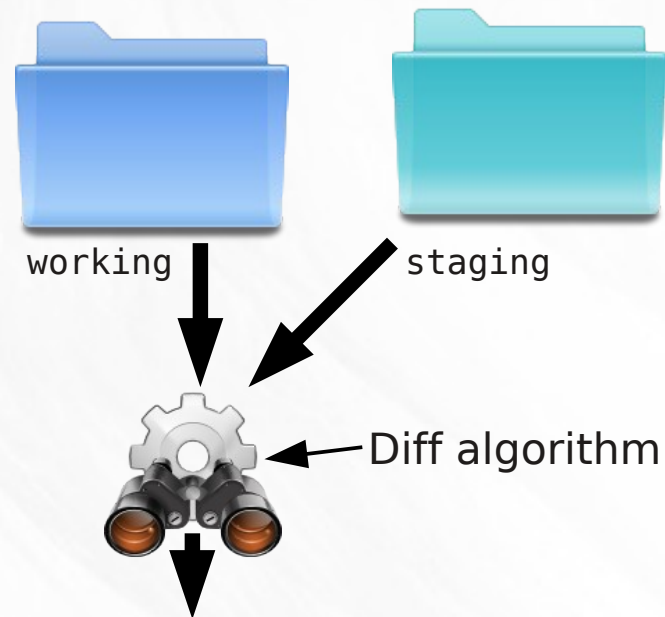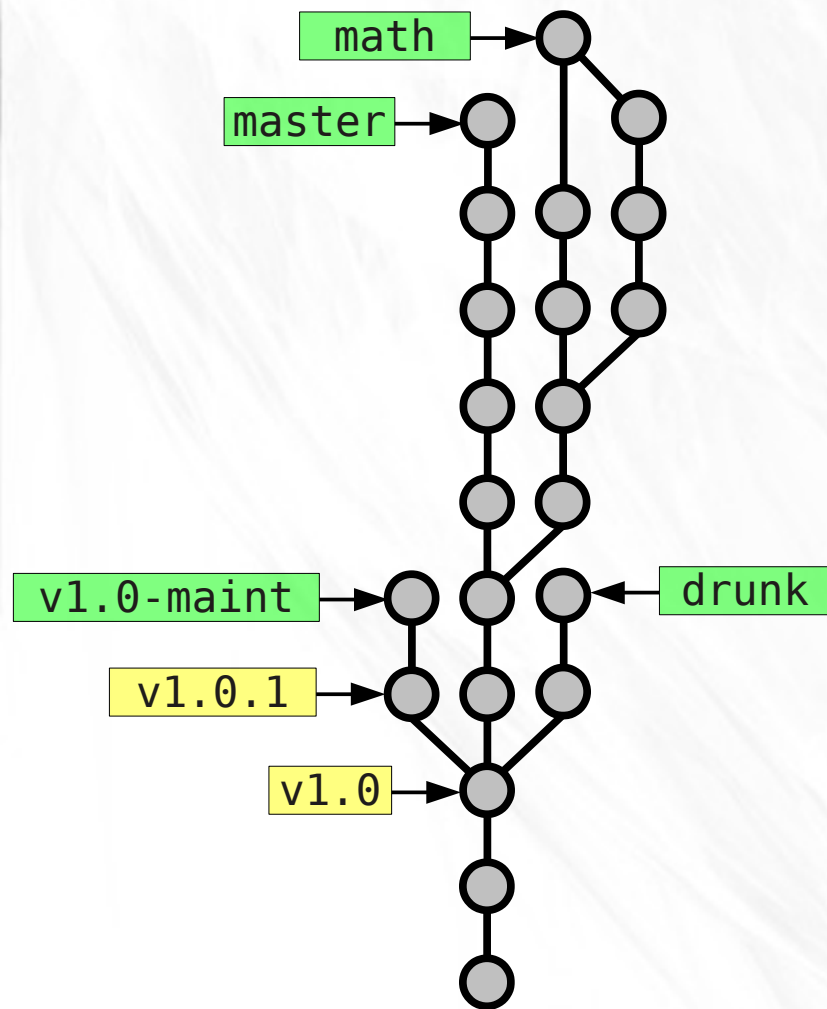
```
--- staging
+++ working

 foo
-baz
+bazzle
 xyzzy
```

math
master
v1.0-maint
v1.0.1
v1.0
drunk

Diffs

math

master

working   staging

v1.0-maint

v1.0.1

v1.0

drunk

```
--- 90b69eb...
+++ staging

 foo
-bar
+baz
 xyzzy
```

Diffs

working   staging

math

master

v1.0-maint   drunk

v1.0.1

v1.0

```
--- 1573d45...
+++ 90b69eb...

 foo
 bar
+xyzzy
```

Diffs

math

master

working   staging

v1.0-maint   drunk

v1.0.1

v1.0

```
--- 90b69eb...
+++ 5fa5d28...

 foo
 bar
-xyzzy
+lorem ipsum dolor
+sit amet, ...
```

Eliminating Duplication

Eliminating Duplication

math

master

working

staging

v1.0-maint

drunk

v1.0.1

v1.0

Eureka!

SHA1

2804133755c3ed396d162028c7b30a1cbcfecded

objects

Eliminating Duplication

working

staging

math

master

v1.0-maint

v1.0.1

v1.0

drunk

file3   file2   file1

file4   subsubdir1

subdir1   subdir2

c3c769c
(aka snapshot-0)

Temp file

objects

Eliminating Duplication

math

master

working

staging

v1.0-maint

v1.0.1

v1.0

drunk

file3   file2   file1

file4   subsubdir1

subdir1   subdir2

c3c769c
(aka snapshot-0)

Temp file

SHA1

a8458149fd2f6d1573d45707607d0befb8decb30

objects

Eliminating Duplication

blob a8458149fd2f6d1573d45707607d0befb8decb30 file1

working

staging

math

master

file3   file2   file1

Temp file

file4   subsubdir1

v1.0-maint

drunk

v1.0.1

subdir1   subdir2

v1.0

a8458149fd2f6d1573d45707607d0befb8decb30

c3c769c
(aka snapshot-0)

objects

Eliminating Duplication

blob a8458149fd2f6d1573d45707607d0befb8decb30 file1

working

staging

math

master

v1.0-maint

v1.0.1

v1.0

Temp file

file3   file2   file1

file4   subsubdir1

drunk

subdir1   subdir2

a8458149fd2f6d1573d45707607d0befb8decb30

objects

c3c769c
(aka snapshot-0)

Eliminating Duplication

blob a8458149fd2f6d1573d45707607d0befb8decb30 file1
blob ef1f8810341ab1e9948d5e49d2a03e1ce586b1a0 file2

math

master

working

staging

v1.0-maint

drunk

v1.0.1

v1.0

file3   file2

file4   subsubdir1

subdir1   subdir2

SHA1

ef1f8810341ab1e9948d5e49d2a03e1ce586b1a0

objects

c3c769c
(aka snapshot-0)

Eliminating Duplication

```
blob a8458149fd2f6d1573d45707607d0befb8decb30 file1
blob ef1f8810341ab1e9948d5e49d2a03e1ce586b1a0 file2
blob 376256ffd8737954c129dfc2f6f7cffc559b78b7 file3
```

working

staging

math

master

v1.0-maint

v1.0.1

v1.0

drunk

file3

file4

subsubdir1

subdir1

subdir2

c3c769c
(aka snapshot-0)

SHA1

376256ffd8737954c129dfc2f6f7cffc559b78b7

objects

Eliminating Duplication

```
blob a8458149fd2f6d1573d45707607d0befb8decb30 file1
blob ef1f8810341ab1e9948d5e49d2a03e1ce586b1a0 file2
blob 376256ffd8737954c129dfc2f6f7cffc559b78b7 file3
```

working

staging

math

master

v1.0-maint

v1.0.1

v1.0

drunk

file4

subsubdir1

subdir1

subdir2

c3c769c
(aka snapshot-0)

SHA1

8aa73a2b1cf458c7c88dc16202ae794f5c99ef10

objects

Eliminating Duplication

`tree 8aa73a2b1cf458c7c88dc16202ae794f5c99ef10 subsubdir1`

working

staging

math

master

v1.0-maint

drunk

v1.0.1

v1.0

New temp file

file4

subsubdir1

8aa73a2b1cf458c7c88dc16202ae794f5c99ef10

subdir1

subdir2

c3c769c
(aka snapshot-0)

objects

Eliminating Duplication


```
tree 8aa73a2b1cf458c7c88dc16202ae794f5c99ef10 subsubdir1
blob be17eaddd5e696239e8a5f6e6e3dbce524707983 file4
```

working

staging

math

master

v1.0-maint

v1.0.1

v1.0

drunk

file4

New temp file

SHA1

be17eaddd5e696239e8a5f6e6e3dbce524707983

subdir1

subdir2

c3c769c
(aka snapshot-0)

objects

Eliminating Duplication

```
tree 8aa73a2b1cf458c7c88dc16202ae794f5c99ef10 subsubdir1
blob be17eaddd5e696239e8a5f6e6e3dbce524707983 file4
```

working

staging

math

master

v1.0-maint

drunk

v1.0.1

v1.0

subdir1   subdir2

c3c769c
(aka snapshot-0)

SHA1

67a3c2a9119a3c3c769c0b1e8735fa5d28d94a12

objects

Eliminating Duplication

tree 2804133755c3ed396d162028c7b30a1cbcfecded subdir1
tree 67a3c7a9119a3c3c769c0b1e8735fa5d28d94a12 subdir2

New temp file

SHA1

working

staging

math

master

v1.0-maint

drunk

v1.0.1

v1.0

subdir1

subdir2

c3c769c
(aka snapshot-0)

8ff0b253a4f3744576427c7dd575db4bfdb8259d

objects

Eliminating Duplication

working

staging

math

master

v1.0-maint

drunk

v1.0.1

v1.0

8ff0b253a4f3744576427c7dd575db4bfdb8259d

c3c769c
(aka snapshot-0)

objects
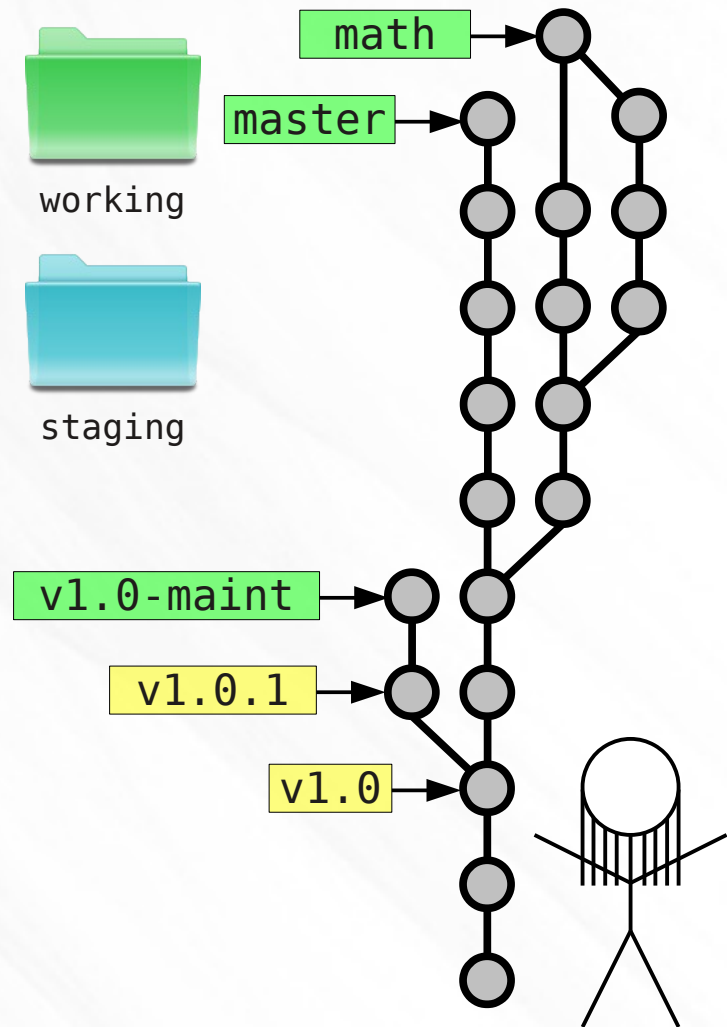
Eliminating Duplication

working

staging

math

master

v1.0-maint

v1.0.1

v1.0

drunk

```
tree: 8ff0b253a4f3744576427c7dd575db4bfdb8259d
date: 2009-05-22 12:12:12
author: Me <me@me.me>

Initial version
```

message

8ff0b253a4f3744576427c7dd575db4bfdb8259d

c3c769c
(aka snapshot-0)

objects

Eliminating Duplication

math

master

working

staging

v1.0-maint

v1.0.1

v1.0

drunk

c3c769c
(aka snapshot-0)

```
tree: 8ff0b253a4f3744576427c7dd575db4bfdb8259d
date: 2009-05-22 12:12:12
author: Me <me@me.me>

Initial version
```
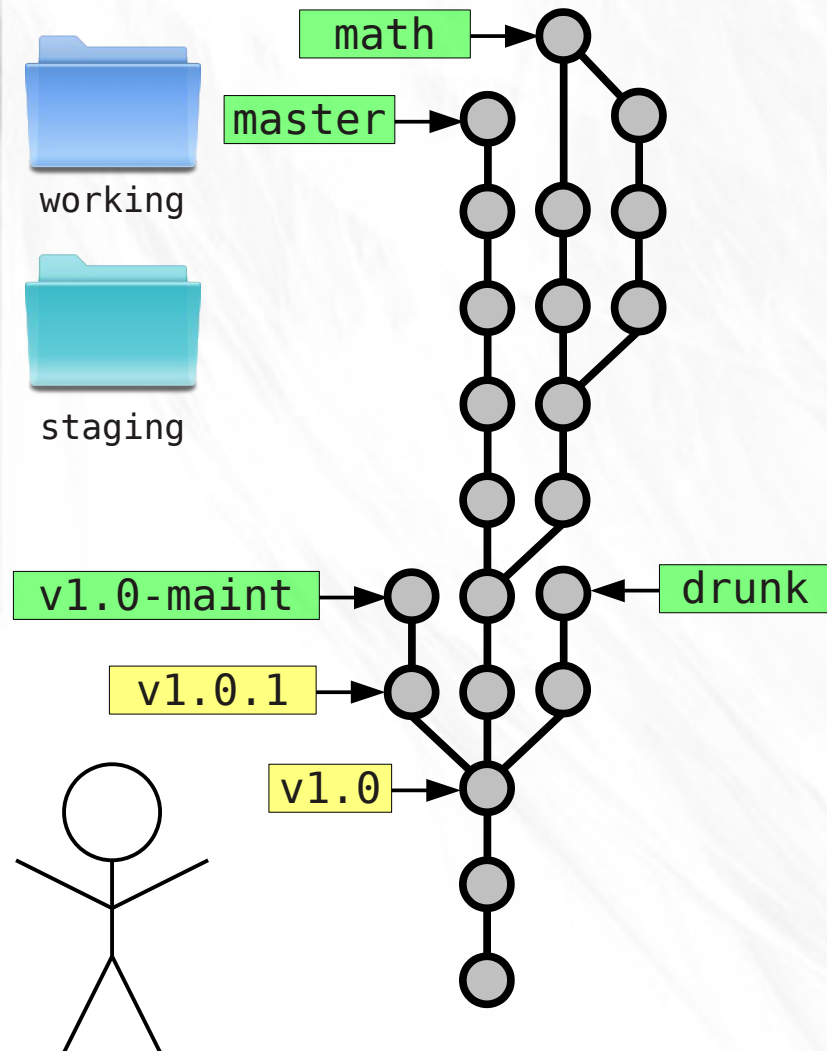
SHA1

5a2fa987819083dbcf44d36697b7ecbe3bfc9a3f
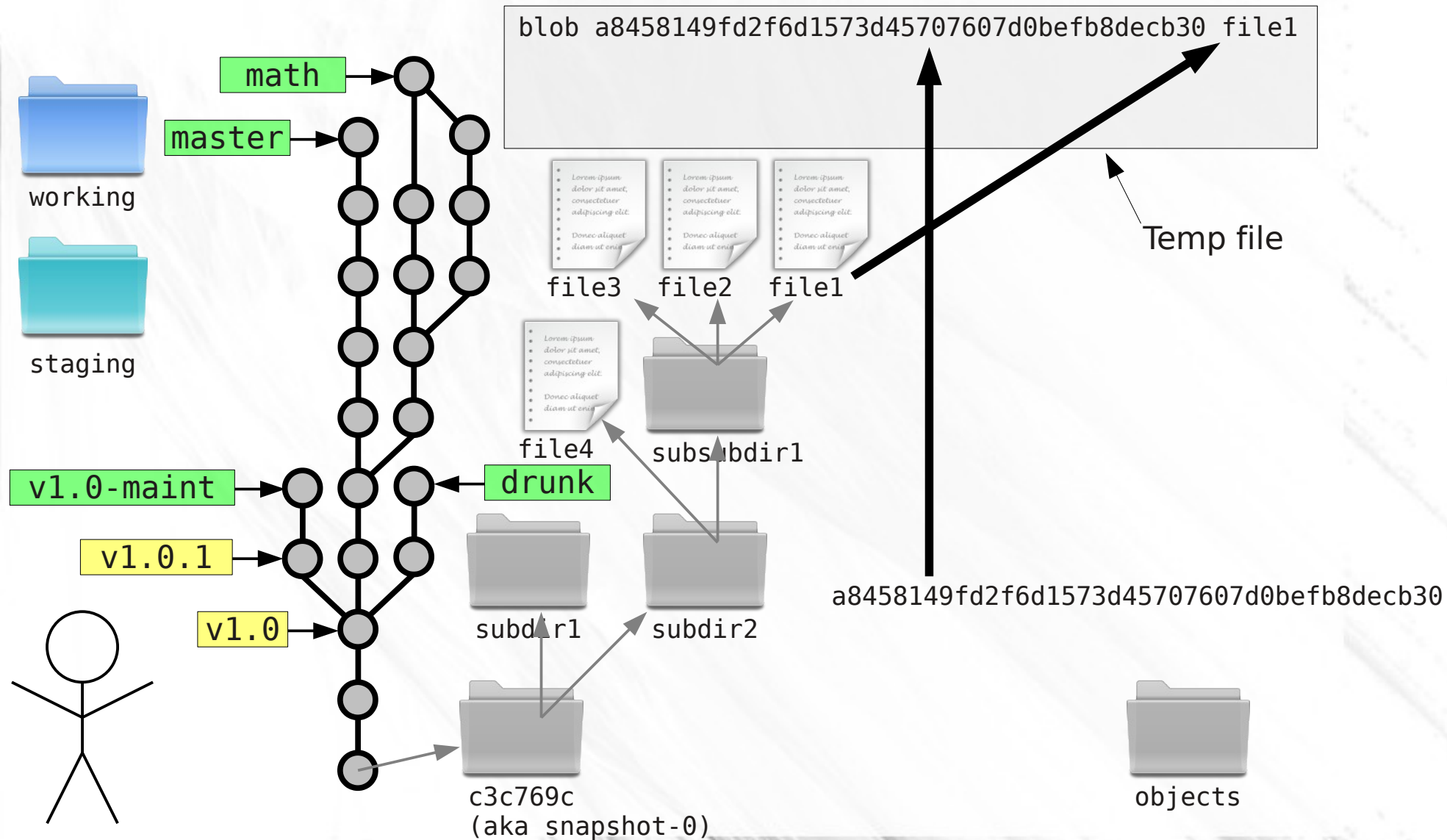
objects

Eliminating Duplication

Eliminating Duplication

math

master

working

staging

v1.0-maint

drunk

v1.0.1

v1.0

objects

Eliminating Duplication

Compressing Blobs
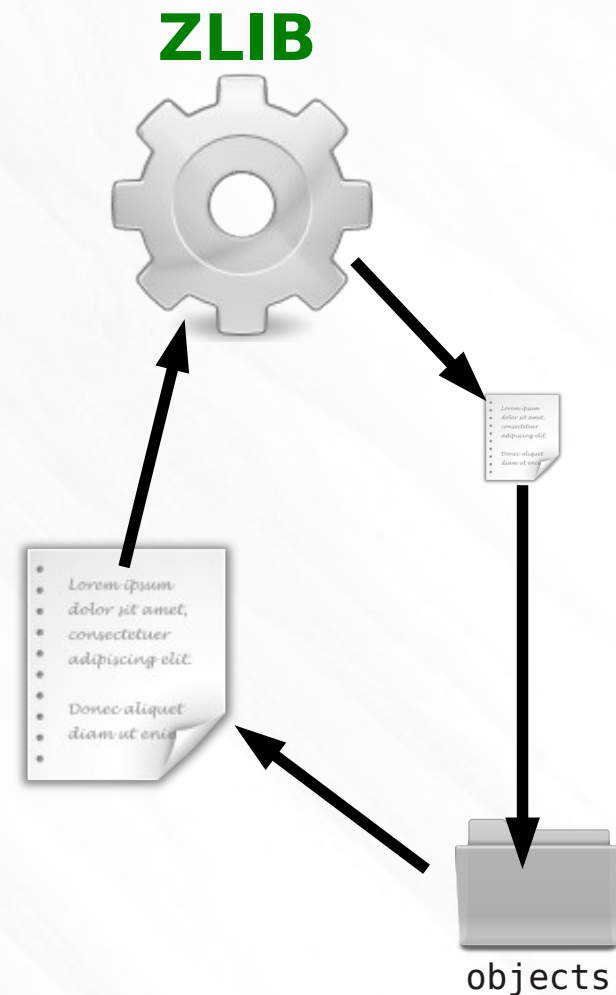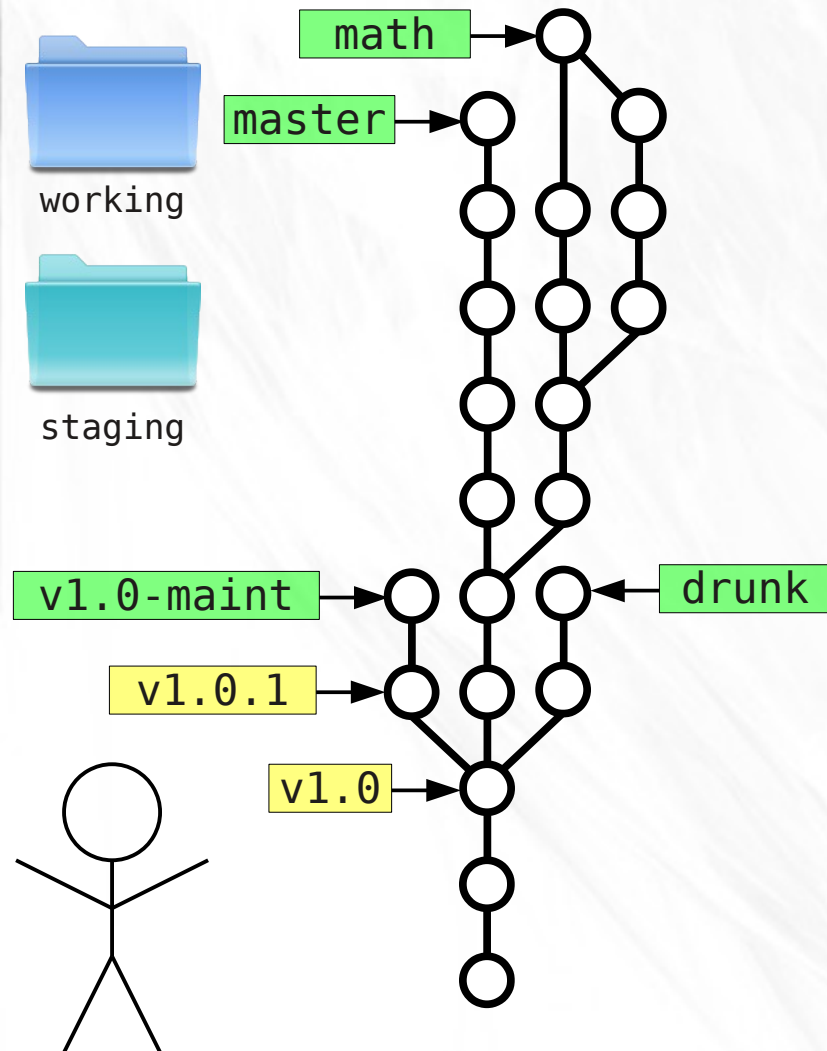
The True Git
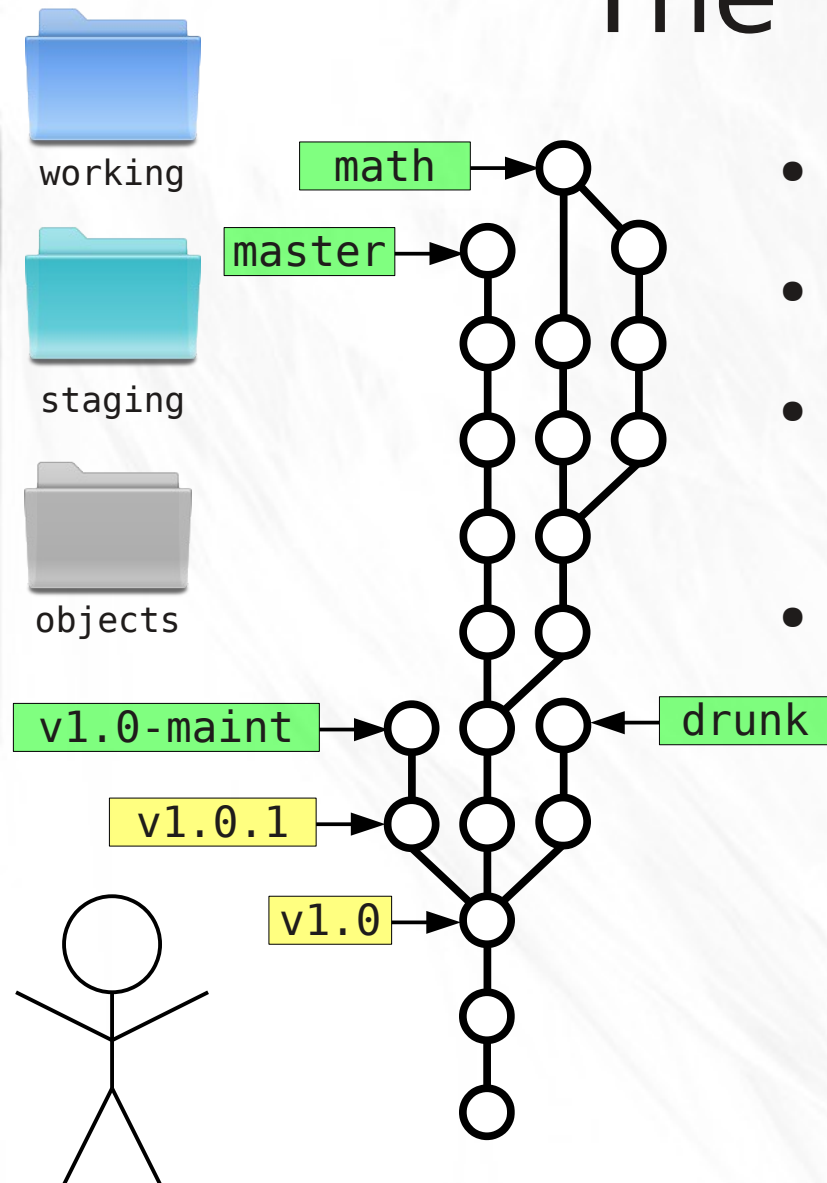
- TADAA!

- This is pretty much Git

- Nicer command line tools for all these operations

- Many, many other tools

Commands: Getting Started

- First, tell Git who you are:
    - `git config --global user.name "My Name"`
    - `git config --global user.email "my@email.address"`
- Get help:

    – `git <command> -h`

    – `git help <command>`
- Start a new Git repository:

    – `git init`

Commands: Making snapshots

working ➡ staging
- `git add`

} `git commit -a`

staging ➡ snapshot
- `git commit`

snapshot ... snapshot
- `git log`

working / staging ?
- `git status`
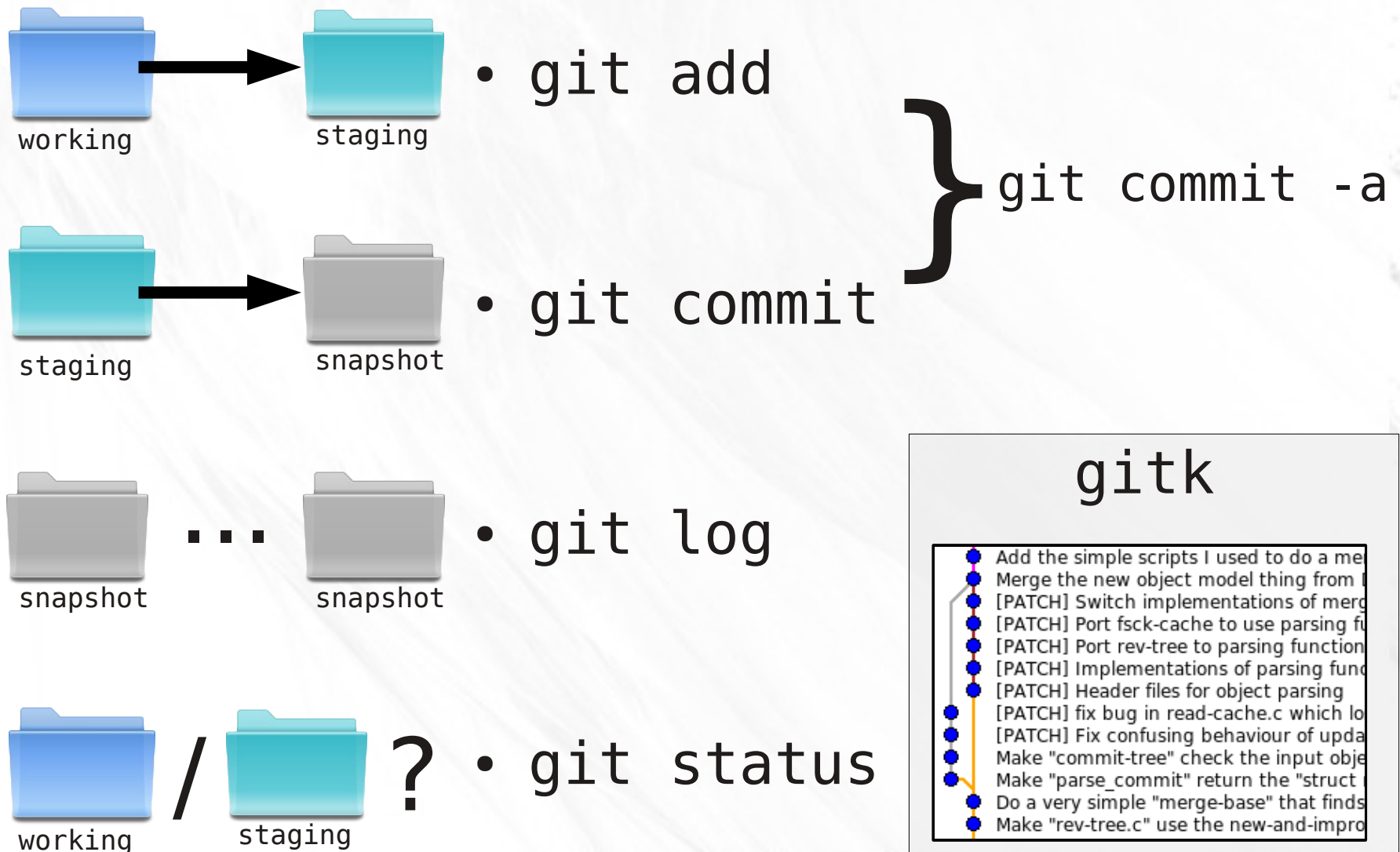
gitk

Add the simple scripts I used to do a me
Merge the new object model thing from
[PATCH] Switch implementations of merg
[PATCH] Port fsck-cache to use parsing fu
[PATCH] Port rev-tree to parsing function
[PATCH] Implementations of parsing fund
[PATCH] Header files for object parsing
[PATCH] fix bug in read-cache.c which lo
[PATCH] Fix confusing behaviour of upda
Make "commit-tree" check the input obje
Make "parse_commit" return the "struct
Do a very simple "merge-base" that finds
Make "rev-tree.c" use the new-and-impro

Commands: Diffing

working vs. staging
- `git diff`

staging vs. snapshot
- `git diff --staged`

working vs. snapshot
- `git diff HEAD`

snapshot vs. snapshot
- `git diff <from> <to>`

Commands: Branches & Tags

- `git branch`

- `git branch <branch>`

  } `git checkout -b ...`

- `git checkout <branch>`

- `git tag -l`

- `git tag <tag>`

Commands: Fetching & Merging

- `git remote add <name> <URL>`

- `git fetch <name>`

- `git merge <name>/<branch>`

`}` `git pull`

Conclusion

working

staging

objects

math

master

v1.0-maint

drunk

v1.0.1

v1.0
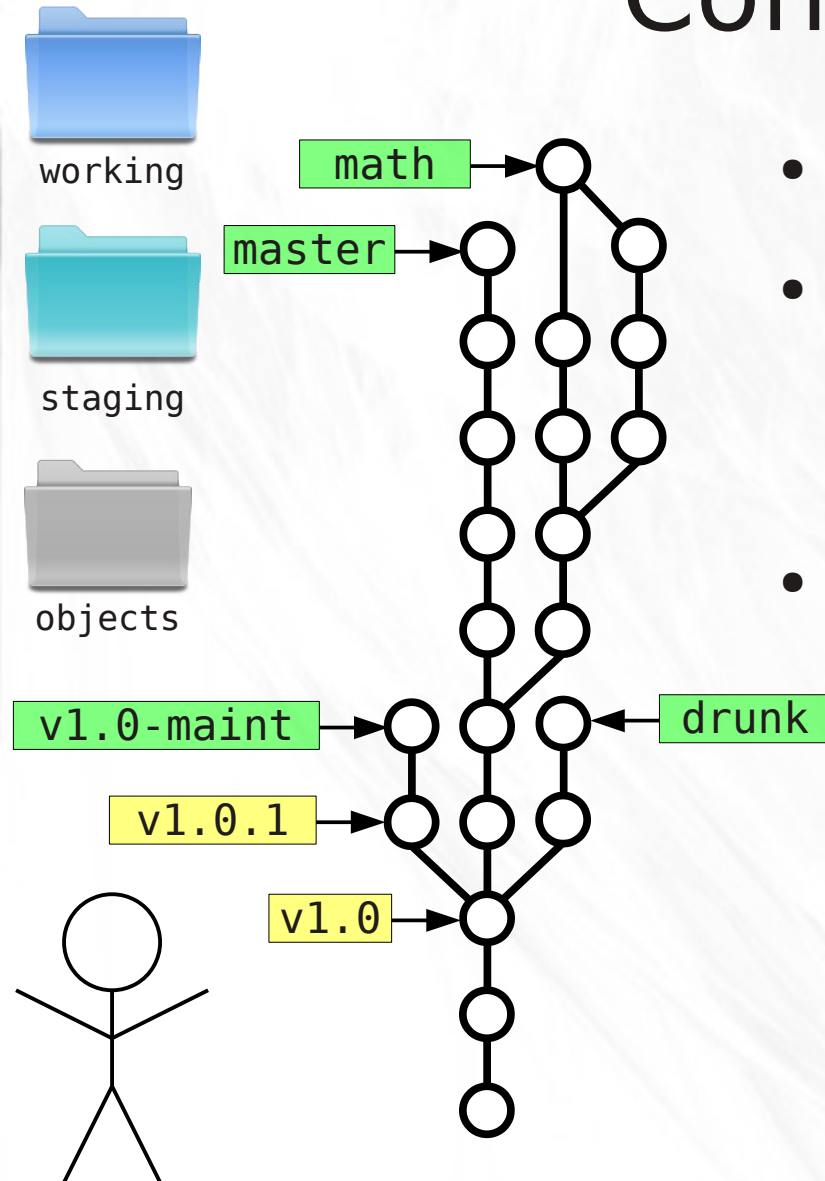
- Keep this parable in mind
- Git is simple and powerful

- One more thing:

  `git reflog`

Where to go next?

- @ Cisco:

  - https://rdwiki.cisco.com/wiki/Git_Tutorial

    - Especially the "More resources" section

  - IRC: #git / Email: gitadmin@cisco.com

- In general:

  - Git homepage: http://git-scm.com

  - Pro Git: http://git-scm.com/book

  - Git Reference: http://gitref.org

  - GitHub: http://github.com

  - Gitorious: http://gitorious.org

Questions?

- Thanks for your attention!

- This presentation is available at:
  git@git.rd.tandberg.com:users/jherland/git_parable

- Reach me at <jherland@cisco.com>