Version control with Git for scientists

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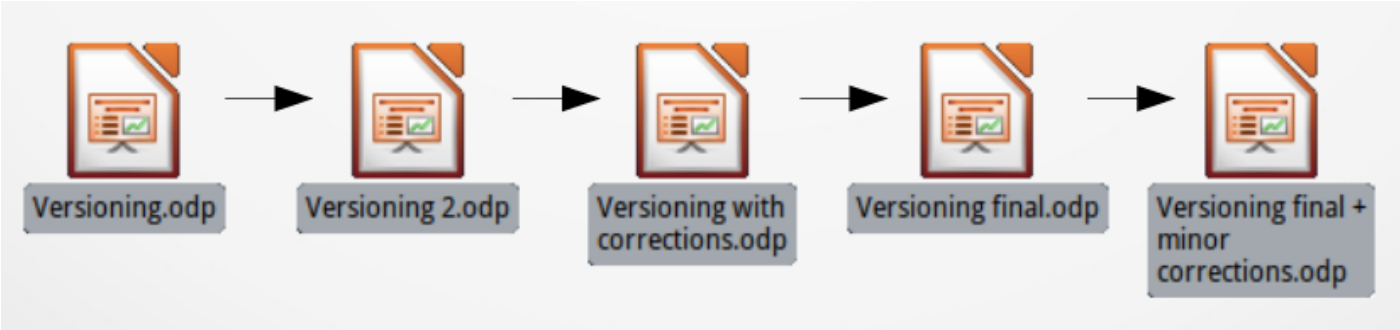
http://www.climate.be:3000/TECLIM/Git_Training

Discuss

How do you manage different file versions ?

How do you work with collaborators on the same files ?



Notions of code versioning

- Track the history and evolution of the project
  - think of it as a series of snapshots (commits) of your code
- Benefits:
  - team work
  - tracking bugs
  - recovering from mistakes
- Different usage:
  - local
  - client-server (SVN)
  - distributed (Git)

What is Git ?

Version control system

- Manage different versions of files
- Collaborate with yourself
- Collaborate with other people

Why use Git

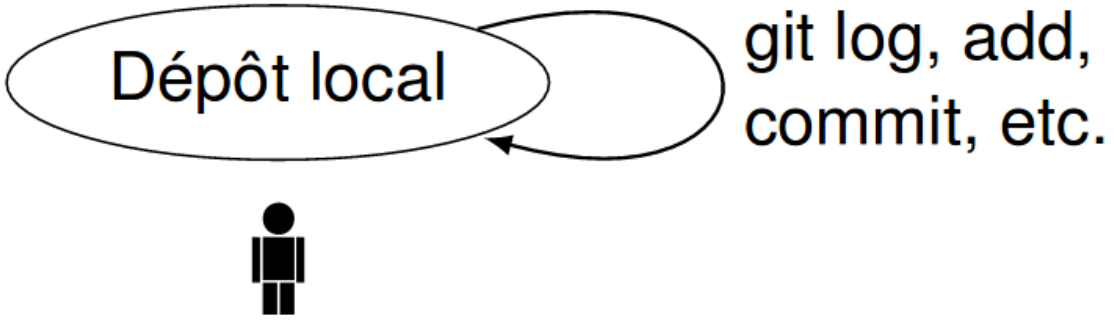
- “Always remember your first collaborator is your future self, and your past self doesn’t answer emails”

  → Christie Balhai

What is Git good for ?

Local

Backup, reproducibility

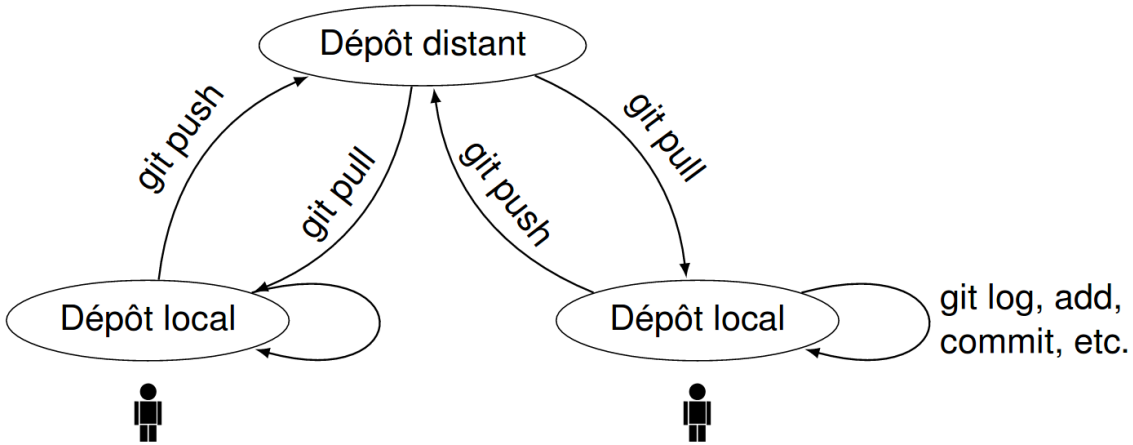


Utilisation locale

What is Git good for ?

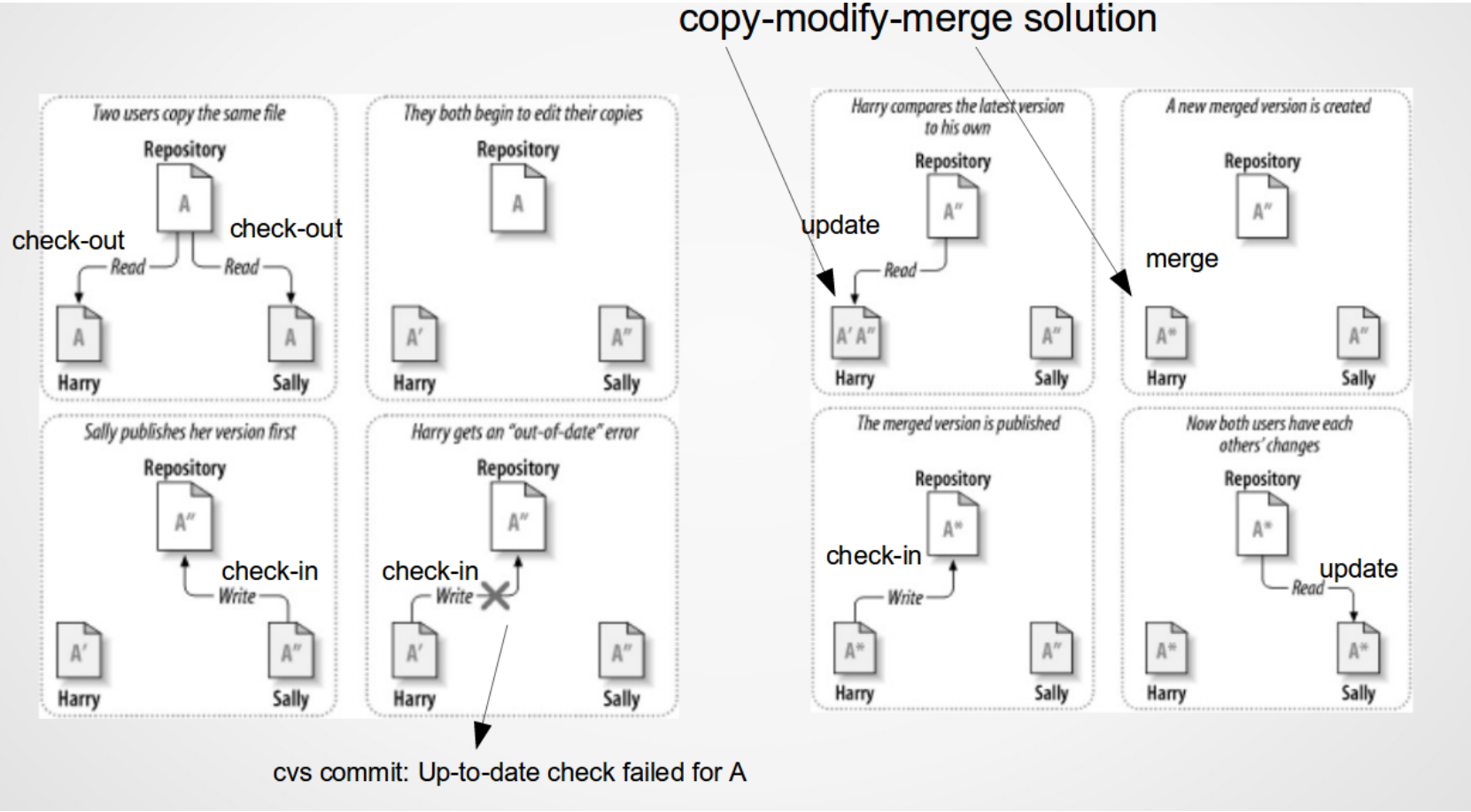
Client-Server

Backup, reproducibility, collaboration



Dépôt commun distant
(Gitolite, Redmine, FusionForge, *GitHub*)

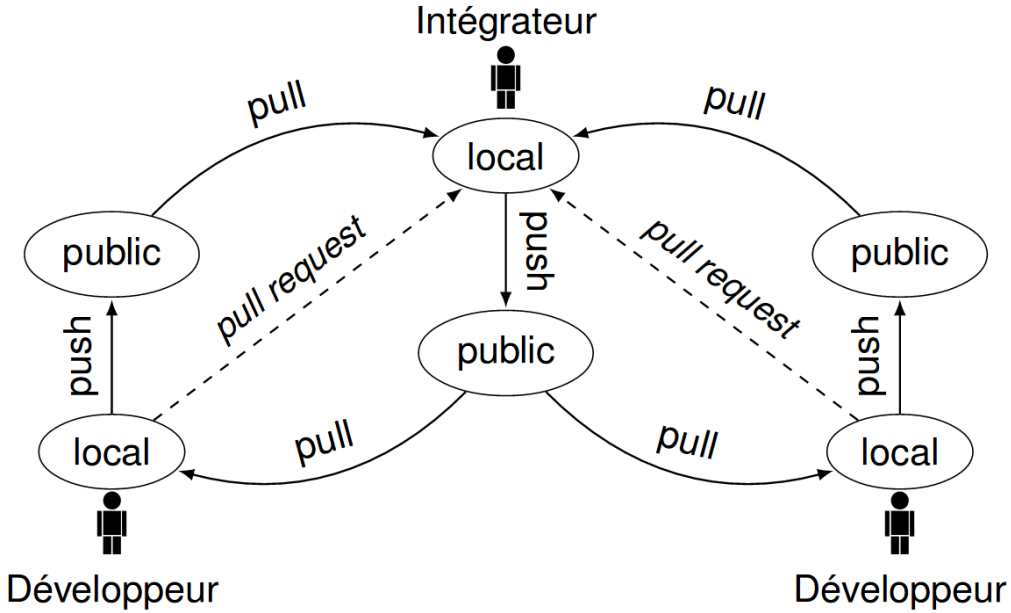
Limitation


copy-modify-merge solution
Two users copy the same file
Repository
A
check-out
check-out
Read
Read
A
A
Harry
Sally
They both begin to edit their copies
Repository
A
A'
A''
Harry
Sally
Harry compares the latest version to his own
Repository
A''
update
Read
A' A''
A''
Harry
Sally
A new merged version is created
Repository
A''
merge
A*
A''
Harry
Sally
Sally publishes her version first
Repository
A''
check-in
Write
A'
A''
Harry
Sally
Harry gets an "out-of-date" error
Repository
A''
check-in
Write
A'
A''
Harry
Sally
The merged version is published
Repository
A*
check-in
Write
A*
A''
Harry
Sally
Now both users have each others' changes
Repository
A*
update
Read
A*
A*
Harry
Sally
cvs commit: Up-to-date check failed for A

What is GIT good for ?

Distributed

Backup, reproducibility, collaboration, transparency



Utilisation distribuée (*GitHub*, Linux)

Difference between Git & GitHub?

Git is the version control system service

Git runs local if you don't use GitHub

GitHub is the hosting service, a website

on which you can publish (push) your Git repositories and collaborate with other people

- It provides a backup of your files
- It gives you a visual interface for navigating your repos
- It gives other people a way to navigate your repos
- It makes repo collaboration easy (e.g., multiple people contributing to the same project)
- **It provides a lightweight issue tracking system**

… and GitLab vs GitHub vs others

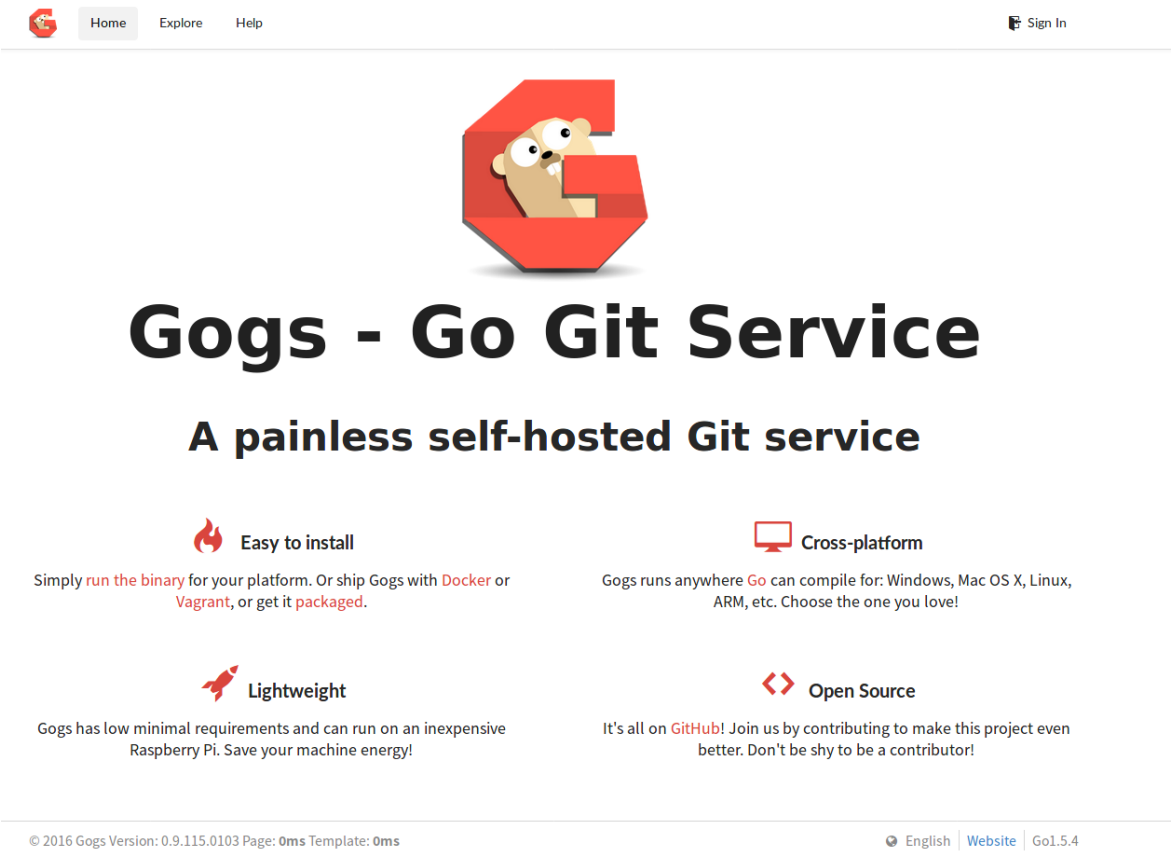
GitLab is an alternative to GitHub

- GitLab is free for unlimited private projects. GitHub doesn't provide private projects for free

And for ELIC, **Gogs** does the job

- shares the same features (Dashboard, File browser, Issue tracking, Groups support, Webhooks, etc)
- easy to install, cross-platform friendly,
- uses little memory, uses little CPU power
- … and 100% free

Gogs: http://www.climate.be:3000



Simple guide for getting started

Checkout a remote repository

create a local working copy of a remote repository by running the command

```
git clone http://pbarriat@www.climate.be:3000/TECLIM/Git_Training.git
or
git clone ssh://git@www.climate.be:3022/TECLIM/Git_Training.git
```

Add & commit

You can propose changes (add it to the Index)

You can commit these changes to the HEAD

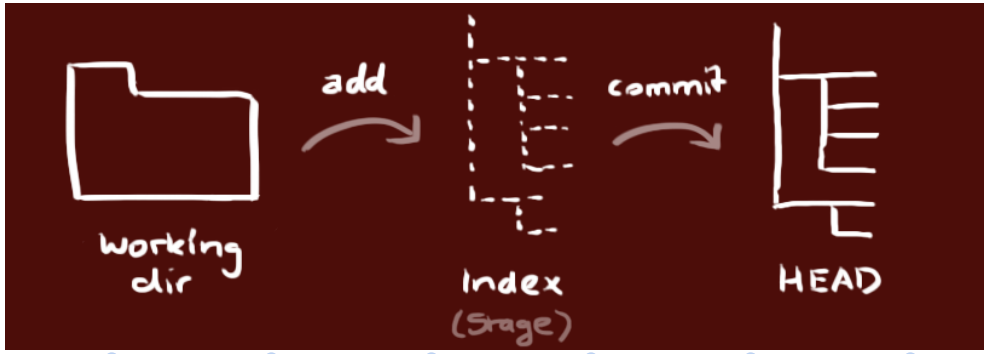
```
git add <filename>
```

```
git commit -m “Commit message”
```

Git workflow

Your local repository consists of three "trees" maintained by git

- the first one is your **Working Directory** which holds the actual files
- the second one is the **Index** which acts as a staging area
- and finally the **HEAD** which points to the last commit you've made



Simple guide for getting started

Pushing changes

Your changes are now in the HEAD of your local working copy. To send those changes to your remote repository

```
git push
```

Update

to update your local repository to the newest commit, execute

```
git pull
```

in your working directory to fetch and merge remote changes.

Replace local changes

In case you did something wrong, which for sure never happens ;), you can replace local changes using the command

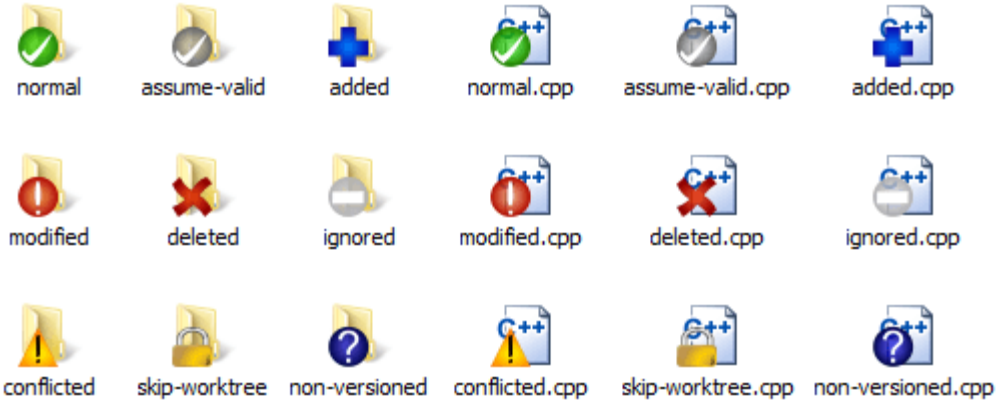
```
git checkout -- <filename>
```

this replaces the changes in your working tree with the last content in HEAD. Changes already added to the index, as well as new files, will be kept

Windows users

How commonly do programmers use Git GUIs instead of the command line?

use programs like SourceTree or TortoiseGit



But, to be familiar with Git, try the command line

(clone, push/pull, merge, rebase, log, tag, format-patch/am, bisect, blame, etc).

Simple Git Exercices

First, configure your environment (just once)

(on your laptop, on your ELIC account, etc)

```
git config --global user.name "Your Name"
git config --global user.email "foo@bar.be"
git config --global color.ui auto
git config --global core.editor "vim"

git config --list
```

Now, clone http://www.climate.be:3000/TECLIM/Git_Training

Theses are very simple exercices to learn to manipulate git. In each folder, simply run ./create.sh and follow the guide ;)