Introduction to Version Control using Git and GitLab

About You
- Who already knows Git?
- Who knows any of these?
  - CVS, Subversion,
  - Mercurial, Bzr, GnuArch

About This Presentation
- Objectives
  - get convinced by version control systems
  - learn practical Git skills
  - learn about GitLab for collaboration
  - hands on with some "code": a LaTeX paper
- Don't Hesitate
  - to ask questions
  - to interrupt me
  - to ping me after, when trying to practice

Version Control Using Git and GitLab
- Introduction to Version Control and Git
- Git basics
- Schizophrenic Git
- Collaborating using Git and GitLab (or github)
- Summing it up

Version Control: What?
- A version control system (VCS)
  - records what you and your collaborators have done
  - allows easy replication across machines
  - allows you to easily see changes
  - allows you to easily experiment new things
- Why dropbox/google drive/... is not sufficient
  - safety of your data
  - ownership of your data
  - semantics of your changes
- Why CVS/Subversion might not be sufficient
  - centralized: a host of the repository
  - working in the train/plane/countryside
  - speed limit

SVN-Git migration in progress. 8h to retrieve full SVN history.
less than 3min to push full history to Git (same network)!
@clan_bousillier
**Git**

- Git (/gɪt/) is a distributed revision control and source code management (SCM) system with an emphasis on speed, data integrity, and support for distributed, non-linear workflows. Git was initially designed and developed by Linus Torvalds for Linux kernel development in 2005, and has since become the most widely adopted version control system for software development.

- History of Git
  - open source
  - initiated by Linus Torvalds
  - first release: 7 April 2005
  - version 2.12: 30 September 2014
  - fast and efficient
  - most used

- Good alternative: mercurial (hg)

**Version Control Using Git and Gitlab**

- Introduction to Version Control and Git
- Git basics
- Schizophrenic Git
- Collaborating using Git and GitLab (or github)
- Summing it up

**Starting with Git**

- Initializing your project
  ```
  git init
  ```

- What's up?
  ```
  git status
  ```

- Deciding what is relevant
  ```
  git add file1 file2 ...
  git commit
  ```

- first: introduce yourself

**Let's try it**

```shell
cp -r base mypaper ; cd mypaper

git init

git status

git add mypaper.tex cvpr.sty

git status

git commit

... and more

...```

**Recap**

- Beginning
  ```
  git init
  git add ...
  git commit [-m ...]
  ```

- Working
  ```
  git status
  git add ...
  git commit [-m ...]
  ```

**Recap 2**

- Keep your project clean: ignoring files
  ```
  .gitignore file(s)
  blabla.* .!blabla.my_precious *
  ```

- What did I just modify?
  ```
  git status
  git diff [...]```
**Notable (vs CVS, Subversion)**

- You have the complete repository
  - have all commits locally
  - commit often, fast and everywhere (train, plane, here)
  - merge with 0-stress
  - warning: commit ≠ backup
- Need to "git add" modifications
- Repository ≠ project
  - SVN has a big tree-shaped repository
  - SVN allows to "checkout" any subtree
  - Git works at the repository level
  - you’ll have a set of repository
  - commits are at the repository level

**GUI for Git**

- Bundled with git: *git gui*
- Many others (gitg, qgit, GitX, tortoisegit, Netbeans, …)
- graphical user interfaces for Git
- huge list of frontends and tools

**Customizing Git**

- Introducing yourself
  
  ```
  git config --global user.name "John Doe"
  git config --global user.email john@doe.com
  ```

- Fancy colors and shortcuts
  
  ```
  git config --global color.ui true
  git config --global alias.st status
  git config --global alias.ci commit
  ```

- Configuration in `~/.gitconfig`

**About History**

- Remember *git log*?
- Each commit is written in stone
  - parent(s) commit
  - modifications
  - sha1sum (e.g. cb6dc3cbf4f5eb15c1d9b2b2b5a741cd73c0554)
- can be diffed against
  
  ```
  git diff cb6dc3...
  ```

- can be retrieved
  
  ```
  git checkout cb6dc3...
  ```

**Back to the Future: parallel universes**

  ```
  git log
  gitk  # or gitg
  git checkout 41474a33e098689b...
  emacs paper.tex
  git commit
  gitk
  gitk --all
  ...
  ... and more
  ```
Recap

- Branch
  - a label for a commit
  - automatically follows on new commit (git commit)
- Always commit before merging
  - commit is cheap, easy and local
  - you never lose anything when merging
- Use of "shal" or branch-name (e.g. brrrr)
- Shortcuts
  - cb6dc3, brrrr, HEAD,
  - HEAD^, HEAD~, HEAD++, HEAD~2, HEAD~42,
  - HEAD^2, cb6dc3^42, tagggg

Recap 2

- Moving in the history
  - git checkout sha-or-branch-name
- Creating a new branch at current position
  - git checkout -b new-branch-name
- Merging "brrrr" into "master"
  - git checkout master
  - git merge brrrr

Recap 3

- Automatic git merge ⇒ automatic commit
- On conflicting git merge
  - (partial merge)
  - solve conflict
  - git add
  - git commit
- Exploring history
  - git log
  - gitk [--all]
  - log --graph --decorate --oneline --all --color

Best Practices

- commit early and often
- always commit before merge (or pull)
- use meaningful commit messages
- avoid committing
  - binary files that change often (NB: word/excel/... are binary)
  - generated files (that can be regenerated in a reasonable time)
  - temporary files
- keep your git status clean
- don’t put git repositories inside git repositories
- more

Version Control Using Git and Gitlab

- Introduction to Version Control and Git
- Git basics
- Schizophrenic Git
- Collaborating using Git and Gitlab (or github)
- Summing it up

What is GitLab (and GitHub)

- GitLab
  - a company providing support and advanced features
  - an open source project (Community Edition)
  - a web application
    - collaboration platform
    - hosting git repositories
    - visualizing repositories
    - managing issues/tickets

GitLab offers git repository management, code reviews, issue tracking, activity feeds, wikis.
Let's Go

- Create a repository on GitLab
  - Push our content
    - link our repository to the remote repository (on GitLab)
    - push the changes to this remote repository
  - On another machine
    - clone the repository
    - make changes, commit and push them
  - On this machine
    - pull changes: fetch them and then merge

Recap GitLab (and Git remotes)

- GitLab project == git repository (+ more)

More GitLab (additions to git)

- Groups
  - groups of users (e.g., PhD student and supervisors)
  - automatic access to the projects of the group
- Forking
  - take a repository on GitLab
  - make a "personal" copy of this repository (still on GitLab)
- Merge requests (pull requests in GitHub)
  - ask for another repo to integrate changes from your fork
- Issues
  - bug
  - questions
  - feature requests
- Wikis
  - set of pages
  - (also accessible as a git repository)

Things to Know at UJM

- SSH access is disabled
  - always use "https://gitlab..." to clone your repository
- To avoid typing your login every time
  - add your user name and @ after https://
  - e.g.,
    - git clone https://gitlab.gitlab.univ-st-etienne.fr/reml.jouannet/pqtidomash.git
  - in case you forget, you can edit .git/config

- In case of problems while pushing big sets of commits
  - error: RPC failed; result=22, HTTP code = 411
  - fatal: The remote end hung up unexpectedly
  - just run git config http.postBuffer 524288000

How to Get an Account on GitLab

- For people with a UJM account
  - open a ticket and asking "to get an account on GitLab"
  - wait until you're notified it has been done
  - visit http://gitlab.univ-st-etienne.fr/
  - use your UJM login/pass to connect
  - ignore the email you’ll receive

- For other people (interns, external collaborators)
  - a person from UJM needs to open a ticket asking for the account
    - providing an email and a name (for each collaborator)
  - upon creation, you receive your credentials
  - to log in, visit https://gitlab.univ-st-etienne.fr/
  - click on the "Standard" tab
  - use the credentials you’ve been given

Version Control Using Git and Gitlab

- Introduction to Version Control and Git
- Git basics
- Schizophrenic Git
- Collaborating using Git and GitLab (or github)
- Summing it up
**Key Points**

- **Version control**
  - keep track of what happened
  - store semantic snapshots/versions of your "code"

- **Git**
  - "distributed" version control: you have a complete repository
  - efficient and widely used
  - one repository per project

- **GitLab**
  - a place to share repositories (projects)
  - visualization of the repositories, wiki pages, issue tracker, …
  - groups of users (e.g., PhD student and supervisors)
  - available only via https, no SSH (in University Jean Monnet)

- **Links**
  - interactive learning of branching in Git
  - official website
  - graphical user interfaces for Git
  - for Git by a git, ask Linus Torvald
  - Pro Git book (available online)

**Correspondence git <-> svn**

- git commit --> none
- git commit ; git push --> svn commit
- git fetch --> none
- git fetch ; git merge --> svn update
- git pull == git fetch ; git merge

- NB: you can use git to collaborate with SVN users

**Going further**

- git remote add
- git tag
- git rebase
- git commit --amend
- git reflog
- git ls-files
- git revert
- git bisect

**Thanks!**