

# Using Git

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# Outline

- 1 Revision Control System
- 2 Git: Basic Principles
- 3 Advices Using Git
- 4 Séance Machine

# Backups: The Old Good Time

- **Basic problems:**

- ▶ “Oh, my disk crashed.” / “Someone has stolen my laptop!”
- ▶ “@#%!!, I’ve just deleted this important file!”
- ▶ “Oops, I introduced a bug a long time ago in my code, how can I see how it was before?”

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- Historical solutions:

- ▶ Replicate:

```
$ cp -r ~/project/ ~/backup/
```

(or better, copy to a remote machine like your Ensimag account)

- ▶ Keep history:

```
$ cp -r ~/project/ ~/backup/project-2013-02-02
```

- ▶ ...

# Collaborative Development: The Old Good Time

- **Basic problems:** Several persons working on the same set of files
  - 1 “Hey, you’ve modified the same file as me, how do we merge?”,
  - 2 “Your modifications are broken, your code doesn’t even compile. Fix your changes before sending it to me!”,

# Collaborative Development: The Old Good Time

- Basic problems: Several persons working on the same set of files
  - 1 “Hey, you’ve modified the same file as me, how do we merge?”,
  - 2 “Your modifications are broken, your code doesn’t even compile. Fix your changes before sending it to me!”,
- **Historical solutions:**
  - ▶ Never two person work at the same time. ⇒ Doesn’t scale up! Unsafe.
  - ▶ People work on the same directory (same machine, NFS, ACLs . . . )  
⇒ Painful because of (2) above.
  - ▶ People work trying to avoid conflicts, and **merge** later.

# Merging: Problem and Solution

## ● My version

```
#include <stdio.h>

int main () {
    printf("Hello");

    return EXIT_SUCCESS;
}
```

## ● Your version

```
#include <stdio.h>

int main () {
    printf("Hello!\n");

    return 0;
}
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## ● Common ancestor

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This merge can be done for you by an automatic tool

**Merging relies on history!**

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Collaborative development linked to backups

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Space of possible revisions  
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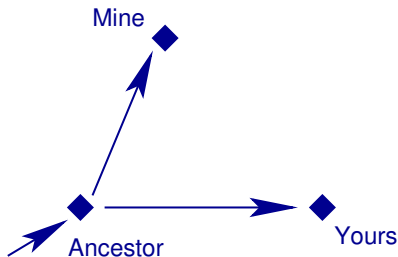
Mine



Yours

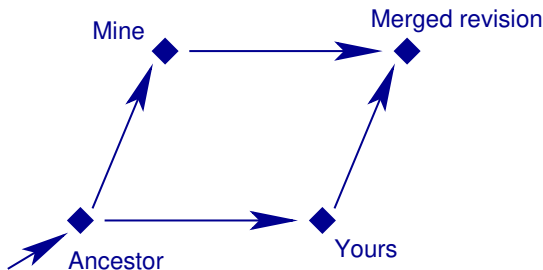
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# Revision Control System: Basic Idea

- Keep track of **history**:
  - ▶ `commit` = snapshot of the current state,
  - ▶ Meta-data (user's name, date, descriptive message, . . . ) recorded in `commit`.
- Use it for **merging**/collaborative development.
  - ▶ Each user works on its own copy,
  - ▶ User explicitly “takes” modifications from others when (s)he wants.

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# Git: Basic concepts

- Each working directory contains:
  - ▶ The files you work on (as usual)
  - ▶ The history, or “repository” (in the directory `.git/`)
- Basic operations:
  - ▶ **git clone**: get a copy of an existing repository (files + history)
  - ▶ **git commit**: create a new revision in a repository
  - ▶ **git pull**: get revisions from a repository
  - ▶ **git push**: send revisions to a repository
  - ▶ **git add**, **git rm** and **git mv**: tell Git which files should be tracked
  - ▶ **git status**: know what's going on
- For us:
  - ▶ Each team creates a shared repository, in addition to work trees

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- **Never** exchange files outside Git's control (email, scp, usb key), except if you *really* know what you're doing;

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- **Never** exchange files outside Git's control (email, scp, usb key), except if you *really* know what you're doing;
- Make a `git status` before each command;
- Always use `git commit` with `-a` (beginners only, later use `git add` or even `git add -p`);
- Make a `git push` after each `git commit -a` (use `git pull` if needed);
- Do `git pull` regularly, to remain synchronized with your teammates. You need to make a `git commit -a` before you can make a `git pull` (this is to avoid mixing manual changes with merges).
- **Do not make useless changes to your code.** Do not let your editor/IDE reformat code that is not yours.

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# Séance Machine

- Énoncé : Stage Unix, Partie Unix Avancé, Séance 1, (Ensiwiki → Gitlab)
- À terminer en libre service après la séance encadrée
- cf. aussi « Introduction à Git » dans EnsiWiki
- Pour ceux connaissant déjà Git/Gitlab:
  - Variantes Branches, Git Internals, Git History;
  - Documentation additionnelle : Branches, Git Internals, History, Tools