Distributed version control with git — a brief introduction

Andrei Chis

based on slides by Oscar Nierstrasz
Why version control?
Why version control?

Bob
Why version control?
Why version control?
Why version control?
Why version control?
Why version control?

A recipe for disaster!
Why version control?

Cope with the confusion that happens when multiple people edit the same files
Bob

Repository

Version 1

Version 2

Carol
Controlled evolution

Can still lead to disaster!
git
git
Tracks the history of a collection of files
git

Tracks the history of a collection of files

Can revert the collection of files to another version
git

distributed version control system
What is a distributed version control system?
What is a centralized version control system?
Bob

checkout

Central repository

checkout

Carol
Bob

commit

Central repository

Carol
Bob commits to the central repository, which is updated by Carol.
Bob commit Central repository

Central repository commit Carol
You must update before every commit.
What is a distributed version control system?
Remote repository (groupXY)
Bob

local repository

clone

Remote repository (groupXY)

Carol
Remote repository (groupXY)
Bob

local repository

Remote repository (groupXY)

local repository

Carol
Bob commits to the local repository. The changes are then pushed to the remote repository (groupXY).
Bob branches off and makes changes locally.

He then commits his changes and pushes them to the remote repository.

Carol pulls the changes.
Bob

commit

local repository

push

Remote repository (groupXY)

local repository

Carol
Bob commits to a local repository, which is then pushed to a remote repository (groupXY). The remote repository is then pushed to another local repository accessed by Carol.
Bob

commit

local repository

commit

push

conflict

remotes

X

local repository

commit

Carol

local repository

Remote repository (groupXY)
you must pull before every push
Remote repository (p2ubungen)
Remote repository (p2ubungen)
git remote add p2ubungen ...
```
git remote add p2ubungen ...
git pull p2ubungen master
```
do not commit after the deadline; it leads to merge conflicts
Basic git
A “commit” is “a set of changes” to a “set of files”
Most commits modify (or merge) earlier commits
A graph of commits may belong to a *branch*.
master
is the main branch
“HEAD “is the current branch
Create a git repo

```
mkdir repo
cd repo
git init
```

Diagram:
```
HEAD
  ↓
master
  ↓
C0
```
Tell git to “stage” changes

```git
add ...`

Diagram:
- HEAD
- master
- C0

Files:
- 
- 
- 
- 
- 
- 
- 
Commit your changes

```
git commit ...
```
Collaborating
John
Local repo

Public repo
-master
-C1
-C0

Jane
Local repo
John

Local repo

```
C0
C1
master
```

```
git clone ...
```

Public repo

```
C0
C1
master
```

```
git clone ...
```

Jane

Local repo

```
C0
C1
master
```
Local repo

```
C0
C1
C2
```

Public repo

```
C0
C1
C2
```

Local repo

```
C0
C1
C3
```

John

```
git add ...
git commit ...
```

Jane

```
git add ...
git commit ...
```
John

Local repo

Local repo

Public repo

Jane

(none new to pull)
John

Local repo

- master
  - C2
    - C1
      - C0

Public repo

- master
  - C2
    - C1
      - C0

Local repo

- master
  - C3
    - C2
      - C1
        - C0

```
git pull
```
NB: `git pull` = fetch + merge
John

Local repo

git pull

Public repo

Jane

Local repo
to be continued
Attribution-ShareAlike 3.0

You are free:
- to copy, distribute, display, and perform the work
- to make derivative works
- to make commercial use of the work

Under the following conditions:

**Attribution.** You must attribute the work in the manner specified by the author or licensor.

**Share Alike.** If you alter, transform, or build upon this work, you may distribute the resulting work only under a license identical to this one.

- For any reuse or distribution, you must make clear to others the license terms of this work.
- Any of these conditions can be waived if you get permission from the copyright holder.

Your fair use and other rights are in no way affected by the above.

http://creativecommons.org/licenses/by-sa/3.0/