Basic Tools for System Management

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Objectives

- Learn how to manage your own computer
  - Using the shell
    - Linux / Windows
  - Version control and git
  - Installing a Virtual Machine
    - Linux Mint 18.4
  - Using bash

Continuous Improvements

- Continuous delivery of small batches
  - Fix bug, add feature
- Commits
  - Each commit contains all the project
  - Store only the difference with the previous commit
- History: sequence of commits, can go and back
- Branches
  - Can create separate independent branches
  - The master branch does not know about other branches
  - Merge can be done by pull requests (to be approved)

Version Control

- Complete history of the project available at any time
- Version Control Helps to collaborate
- Allows agility
  - Can undo whatever modification
- Git
  - Good for text-based files
  - Automated Tests, Documentation, web sites

Distributed Version Control

- A remote repository is stored in a data-center or cloud
- Each user has a local project history in his local repository
  - The local repository contains all the project
  - The user can continue working offline
  - This needs synchronization between local repositories and remote one

Git repository

- It contains a series of snapshots (called commits)
  - A new commit can be because of adding a file and/or modifying one
  - The user can go back to any of the snapshot at any time
- Installation
  - sudo apt install git

git [command] [--flags] [arguments]

- Commands
  - Status: what has been modified or add
    - **git status --short**
  - Add: add a new file
    - **git add file.txt**
  - Help
    - **git help**
    - **git help status**

git config

- Specify username and email used to see who has done what on the repository
  - git config --global user.name “Frederic”
  - git config --global user.email “fmallet@unice.fr”
- Configuration can be
  - Global: Your repositories only
  - Local: Only the local repository
  - System: every repository of every user
  - local >> global >> system
- Read: by forgetting the value (last parameter)

Git locations

- Project directory: contains the working tree and .git
  - Working Tree
    - Location on your computer that contains the directories and files
  - Staging Area / index
    - List of files planned to be included in the next commit (commit needs to be meaningful)
  - Local repository
    - All of the commits (version history)
- Remote Repository
  - Located on a remote computer

Create a local repository

```
~$ mkdir repos
~$ cd repos
repos$ mkdir myproj
repos$ cd myproj
repos/myproj$ git init
repos/myproj$ ls -a
```

Commit to a local repository

- View status of files in the working tree and staging area
  - Tells you what has been modified and on which branch you are

```
fmallet@chevalerios ~/git/myProj $ git status
On branch master

Initial commit

nothing to commit (create/copy files and use "git add" to track)
fmallet@chevalerios ~/git/myProj $ touch file1.txt
fmallet@chevalerios ~/git/myProj $ git status
On branch master

Initial commit

Untracked files:
  (use "git add <file>..." to include in what will be committed)

        file1.txt

nothing added to commit but untracked files present (use "git add" to track)
```

Working Tree to Staging Area

- git add <file-or-directory>

```
fmallet@chevalerios ~/git/myProj $ git add file1.txt
fmallet@chevalerios ~/git/myProj $ git status
On branch master

Initial commit

Changes to be committed:
  (use "git rm --cached <file>..." to unstage)

        new file:   file1.txt
```

Working Tree to Staging Area

- git add <file-or-directory>

```
fmallet@chevalerios ~/git/myProj $ git status
On branch master

Initial commit

Changes to be committed:
  (use "git rm --cached <file>..." to unstage)

        new file:   file1.txt

fmallet@chevalerios ~/git/myProj $ git status -s
A  file1.txt
fmallet@chevalerios ~/git/myProj $ mkdir dir
fmallet@chevalerios ~/git/myProj $ touch dir/f1.txt
fmallet@chevalerios ~/git/myProj $ touch dir/f2.txt
fmallet@chevalerios ~/git/myProj $ git status -s
A  file1.txt
?? dir/
fmallet@chevalerios ~/git/myProj $ git add dir
fmallet@chevalerios ~/git/myProj $ git status -s
A  dir/f1.txt
A  dir/f2.txt
A  file1.txt
```

Modified files

- git add <file-or-directory>

```
fmallet@chevalerios ~/git/myProj $ echo "test" >> dir/f1.txt
fmallet@chevalerios ~/git/myProj $ git status -s
AM dir/f1.txt
A  dir/f2.txt
A  file1.txt
fmallet@chevalerios ~/git/myProj $ git add dir/f1.txt
fmallet@chevalerios ~/git/myProj $ git status -s
A  dir/f1.txt
A  dir/f2.txt
A  file1.txt
```

Staging area to local repository

- git commit
- git commit -m “short message”

```
fmallet@chevalerios ~/git/myProj $ git commit -m "initial commit"
[master (root-commit) 8b9a96c] initial commit
 3 files changed, 1 insertion(+)
 create mode 100644 dir/f1.txt
 create mode 100644 dir/f2.txt
 create mode 100644 file1.txt
fmallet@chevalerios ~/git/myProj $ git status -s
fmallet@chevalerios ~/git/myProj $
```

Accessing the logs

- You can follow the commits by
  - git log

```
fmallet@chevalerios ~/git/myProj $ git log
commit 8b9a96ca096551f68c9003cdd04072a52636ecae
Author: Frederic Mallet <Frederic.Mallet@inria.fr>
Date:   Mon Sep 10 20:41:41 2018 +0200

    initial commit
fmallet@chevalerios ~/git/myProj $ git log --oneline
8b9a96c initial commit
fmallet@chevalerios ~/git/myProj $
```

Creating a remote repository

- Host in a data center or a cloud
  - http://www.github.com
  - http://www.bitbucket.org
    - https://bitbucket.org/<login>/myproj.git

Cloning a remote repository

- git clone
  - If you do not have a local repository
  - git clone url/<login>/repo.git [localname]
  - git remote -v displays info about remote repository
  - Alias name is “origin”
- git remote
  - If you do have a local repository
  - git remote add <name> <url>
  - Ex: git remote add origin http://bitbucket.org/...git

Local to Remote repositories

- All commits belong to a branch
- By default, a single branch called **master**
- **git push [-u] [repository] [branch]**
  - Commit the branch from local to remote
  - Repository can be shortcut (like origin) or url
  - Use -u the first time
    - Track origin to master
  - May need user name and password

Other tools

- On Windows
  - GitHub Desktop
- On Linux
  - gitk
- On any platform
  - git perspective in Eclipse