



A Tutorial

# About Git

**Version Control System (VCS)** for tracking changes in computer files

Created in 2005 by **Linus Torvalds**

**Distributed** version control for local and remote repositories

# Why use Git?

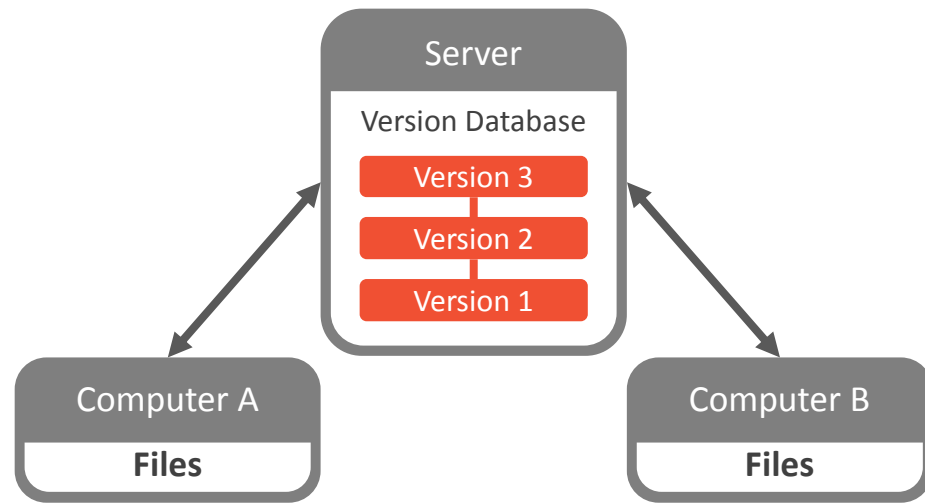
Freedom to work on any file at any time when **Collaborating**

**Restoring** previous versions and undoing changes

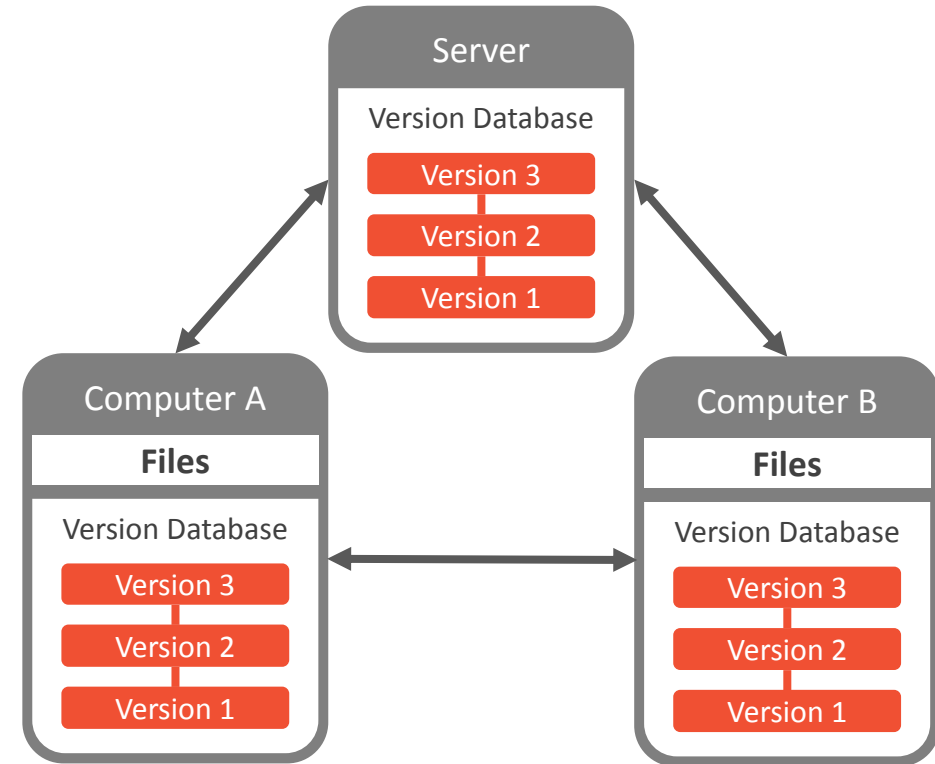
Documenting project **Evolution** coherently

Complete **Backup** on collaborator machines

# Version Control Systems



**Centralized SVN, CVS, Perforce**

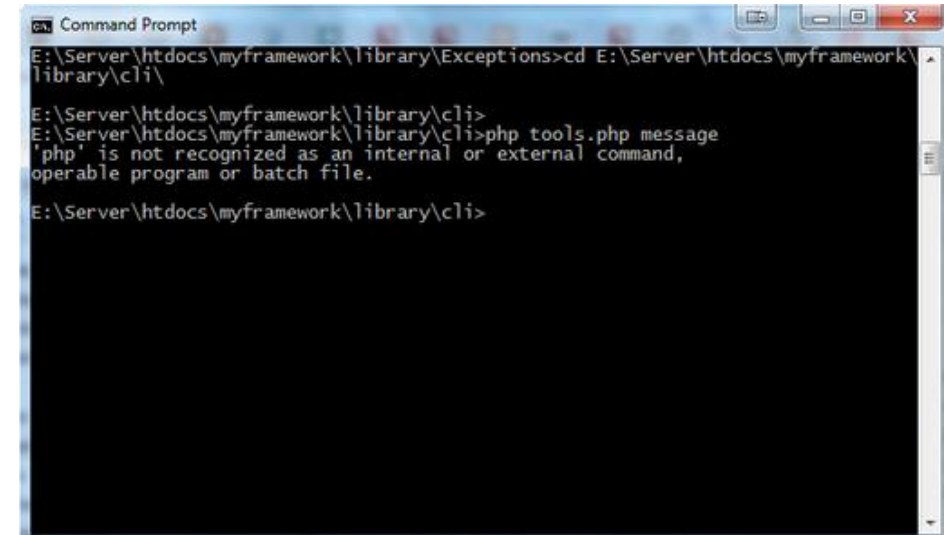


**Distributed Git, Mercurial**

# CLI and GUI Integration

## Command Line Interface (CLI)

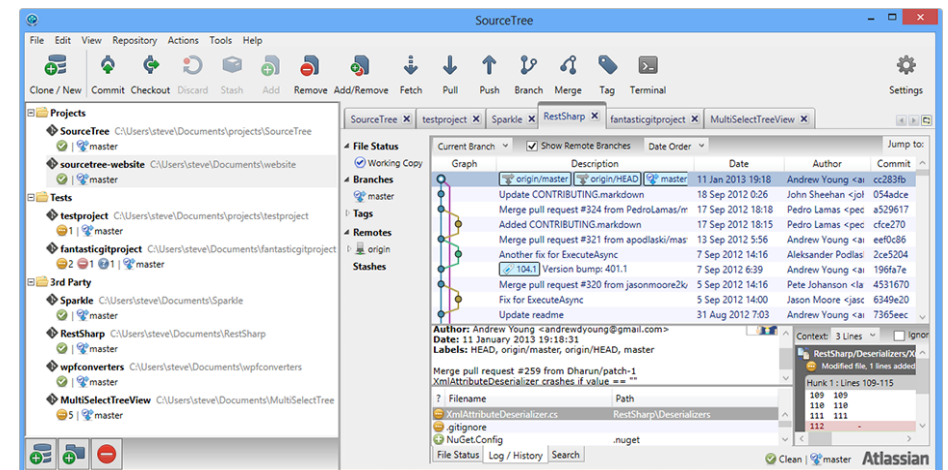
- Only option for **certain tasks**
- Commands are **platform-independent**
- Certainty of calling **correct** command



```
Command Prompt
E:\Server\htdocs\myframework\library\Exceptions>cd E:\Server\htdocs\myframework\library\cli\
E:\Server\htdocs\myframework\library\cli>
E:\Server\htdocs\myframework\library\cli>php tools.php message
'php' is not recognized as an internal or external command,
operable program or batch file.
E:\Server\htdocs\myframework\library\cli>
```

## Graphical User Interface (GUI)

- Saves **typing**
- Lower **barrier-of-entry**
- **Graphically** represents collaboration



# Configure Git

## Verify installed git **Version**

```
git --version
```

## Configure git

```
git config -global user.name "your name"  
git config -global user.email "your@email.nl"  
git config --list
```

## Open **documentation** of verb

```
git help <verb>  
git <verb> --help
```

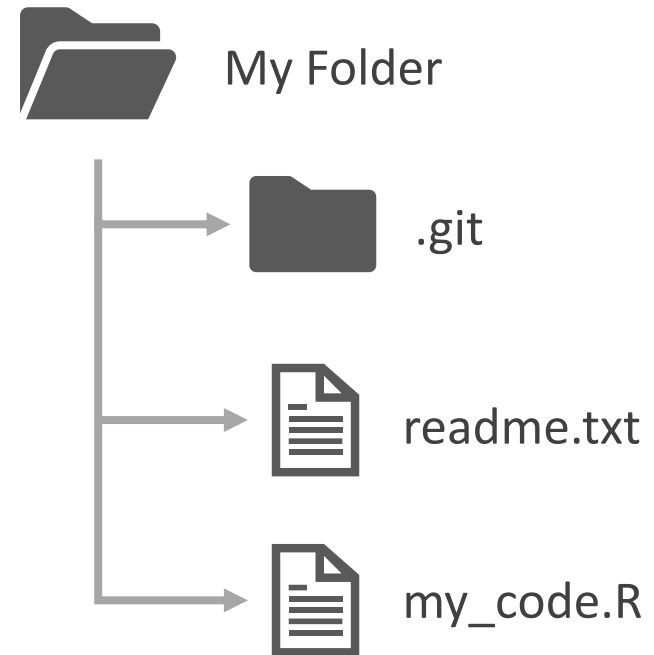
# Working directory

## Initialize **Repository**

```
git init
```

## Check **Status** of repository

```
git status
```



# File Status Lifecycle

**Stage** untracked/modified file

```
git add <file>
```

**Commit** staged files

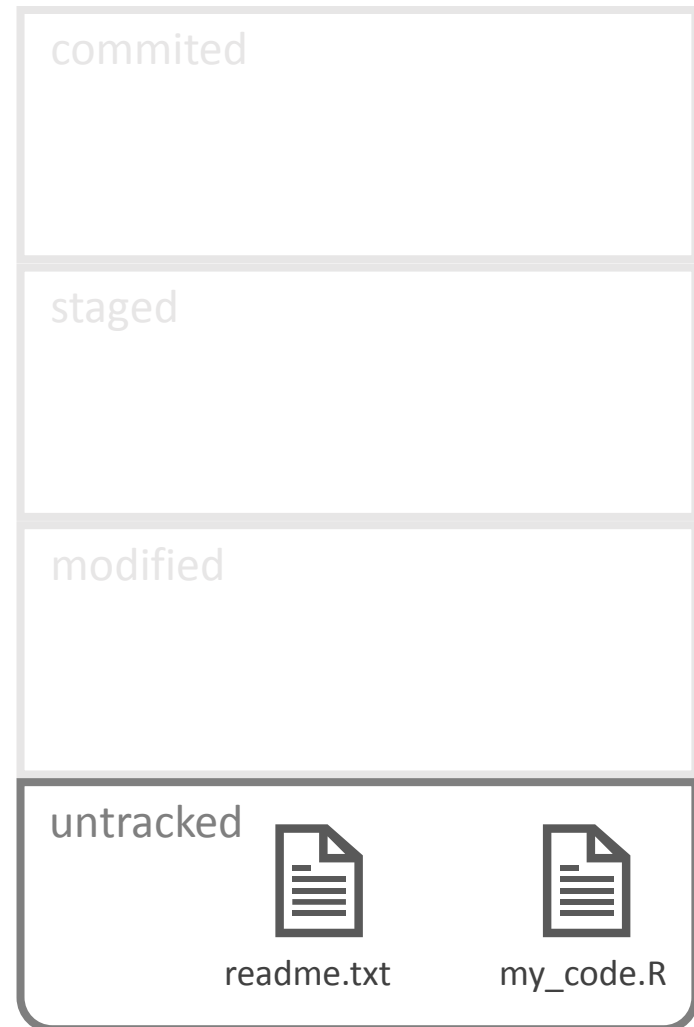
```
git commit -m "message"
```

Show **modification**

```
git diff
```

**Stage** all files

```
git add -A
```





# Log

Show **Logged** commits

```
git log
```



Show command **options**

```
git help log
```

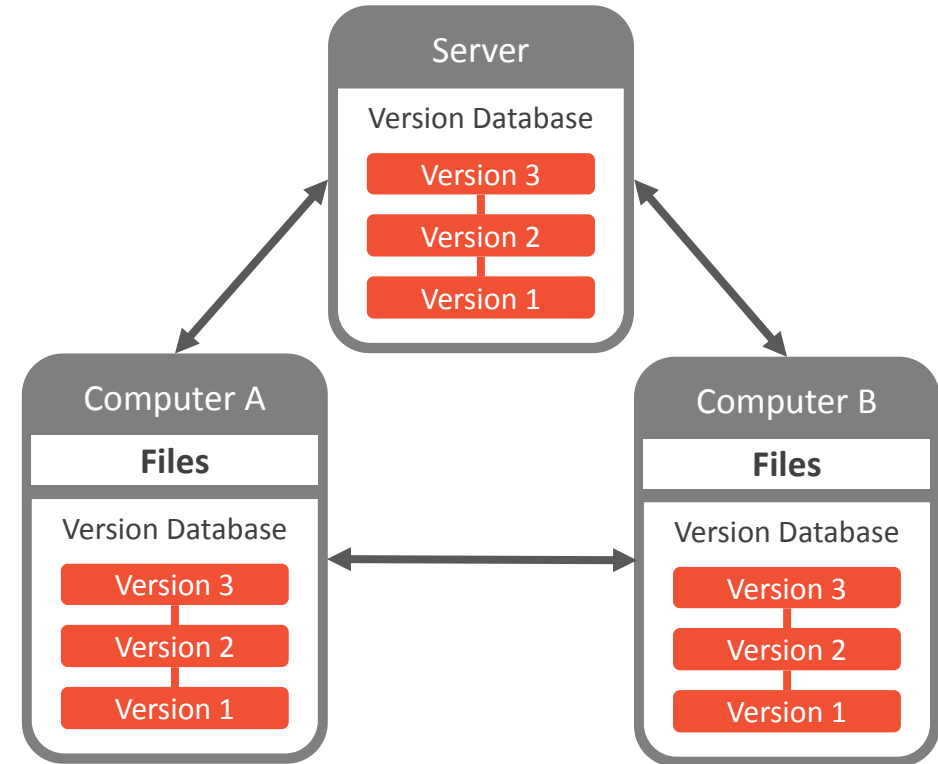
Show **Formatted** log message and **Graph**

```
git log --graph --oneline
```

# Remote Repositories

**Bare repository** only contains version database

**Working repository** generates working directory from version database



**Distributed** Version Control System

# GitHub

**Repositories** store all files of a particular project

Contribute by **forking** repositories

**Visualize** changelogs

**Social network** infrastructure

The screenshot shows the GitHub repository page for OHDSI / PatientLevelPrediction. The repository has 67 watches, 23 stars, and 23 forks. It contains 305 commits, 9 branches, 5 releases, and 6 contributors. The latest commit is by PRIjnbeek, adding a link to an existing models vignette, 6 hours ago. The file list includes .settings, R, data, demo, extras, inst, man-roxygen, man, src, tests, vignettes, .Rbuildignore, .cproject, .gitattributes, .gitignore, .project, and .travis.yml.

File	Description	Commit Time
.settings	Nesting the vignette study in a diabetes population to reduce size. S...	3 years ago
R	delayed files	13 days ago
data	New simulation profile, with two outcomes instead of one, for better ...	2 years ago
demo	Fixes #27	10 months ago
extras	added function for existing model	13 days ago
inst	added function for existing model	13 days ago
man-roxygen	Auto code formatting	2 years ago
man	delayed files	13 days ago
src	Fixed some more check problems, including Rcpp's new issue with funct...	5 months ago
tests	removed multianalyses	2 months ago
vignettes	added function for existing model	13 days ago
.Rbuildignore	temporarily stop using drat	8 months ago
.cproject	Nesting the vignette study in a diabetes population to reduce size. S...	3 years ago
.gitattributes	silly windoz cr/lf issues	3 years ago
.gitignore	- merged Logger feature in	2 years ago
.project	Nesting the vignette study in a diabetes population to reduce size. S...	3 years ago
.travis.yml	removing uploading git token	6 months ago

# Remote Repositories

## Clone a remote repository

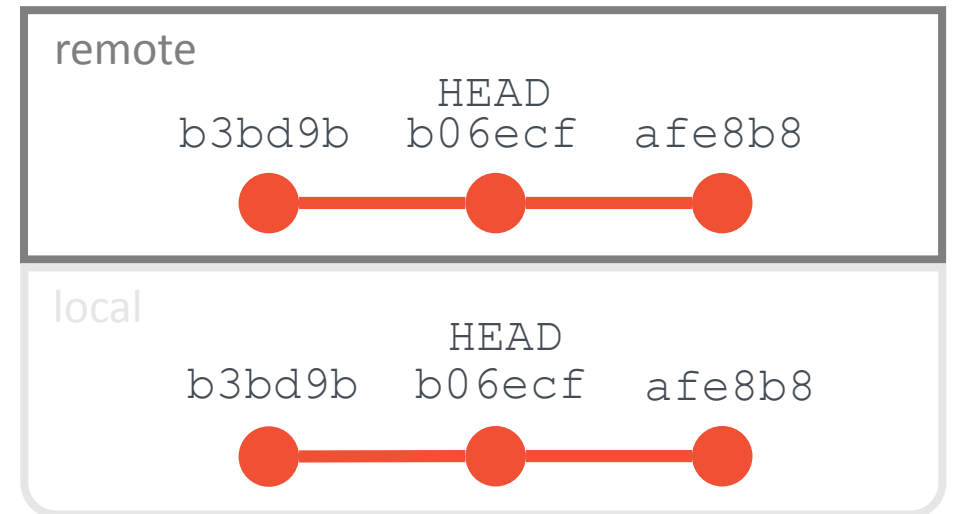
```
git clone <url> <where to clone>
```

## Lists remote repository Information

```
git remote -v  
git branch -a
```

## Push changes to remote repository

```
git pull origin master  
git push origin master
```



# Branches

## List local branches

```
git branch
```

## Create a branch

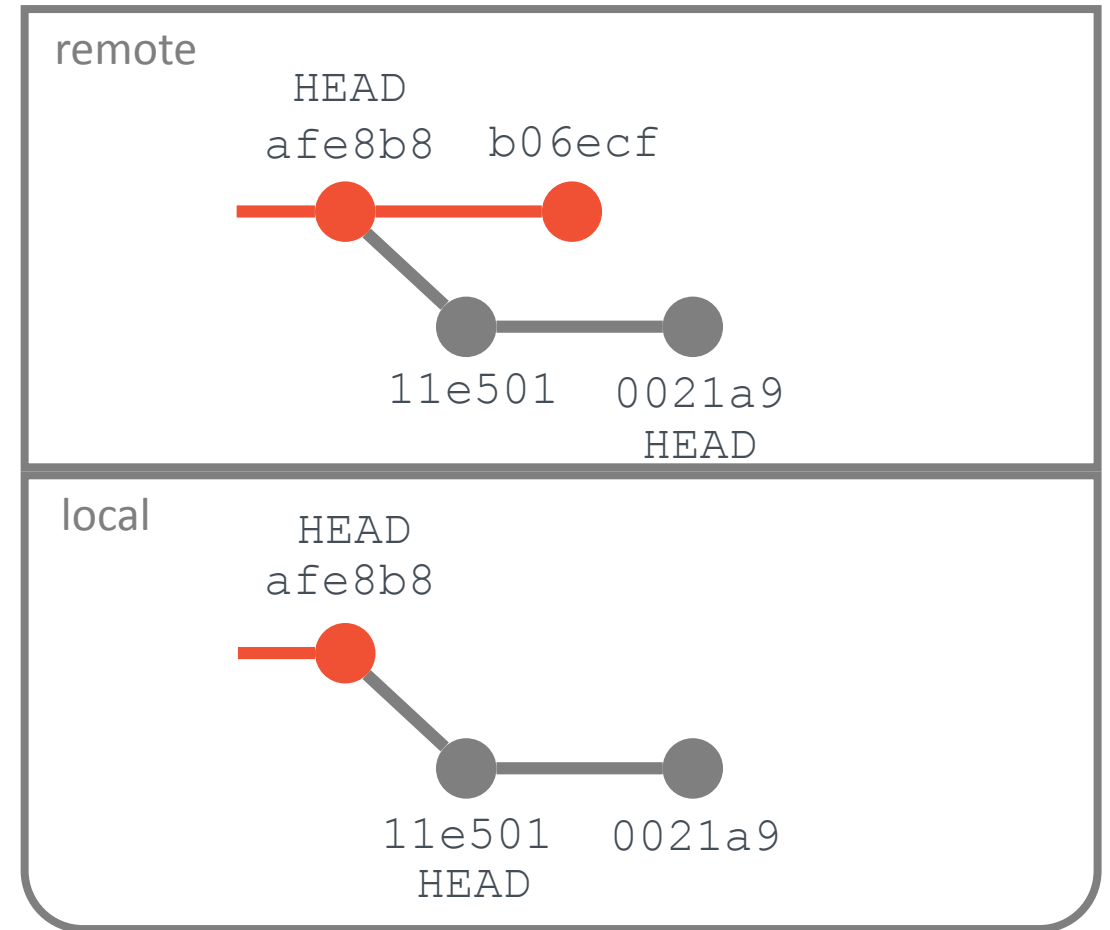
```
git branch <branch>
```

## Enter a branch

```
git checkout <branch>
```

## Push branch to repository

```
git push -u origin <branch>
```



# Merging

## Pull **Master** branch changes

```
git checkout master  
git pull origin master
```

## Show **Merged** branches

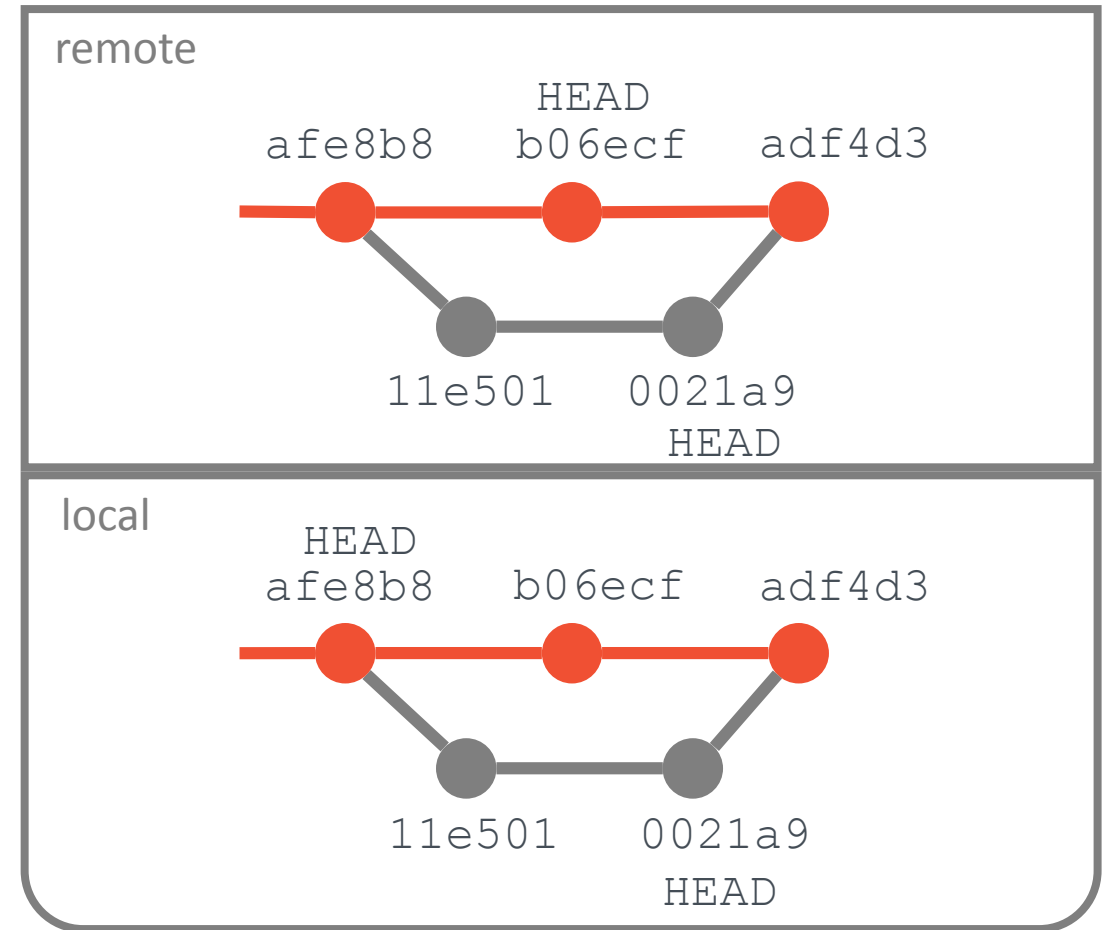
```
git branch --merged
```

## **Merge** branch into master

```
git merge <branch>
```

## **Push** merge to repository

```
git push origin master
```



# Removing Branch

Show **Merged** branches

```
git branch --merged
```

**Remove** branch

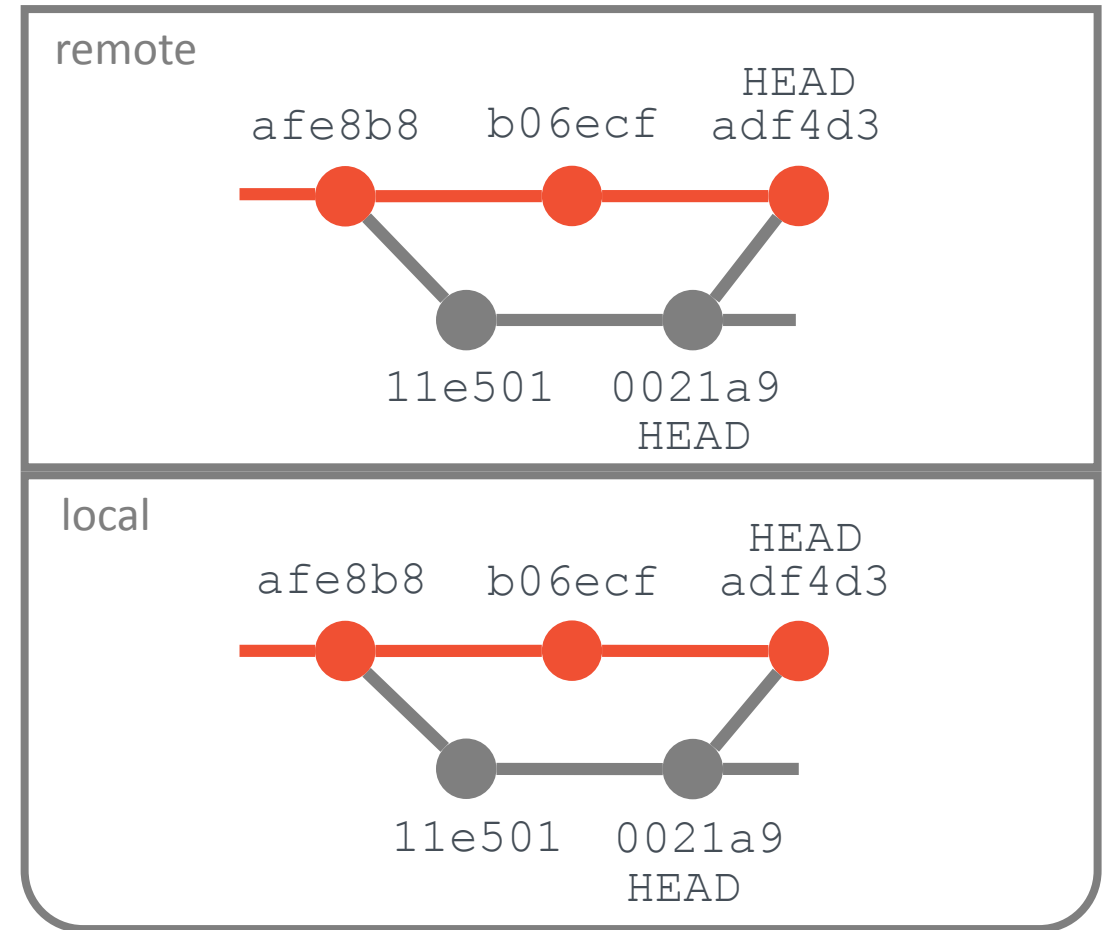
```
git branch -d <branch>
```

List **remote** branches

```
git branch -a
```

Remove branch from **remote** repository

```
git push origin -delete <branch>
```

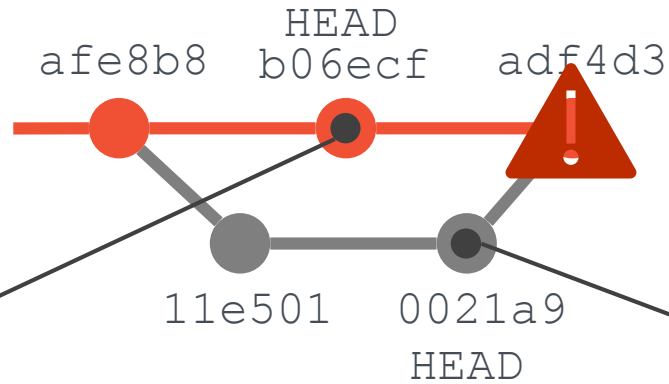


# Merge Conflicts

```
# Take sum of vector
sum <- function(x) {
  sum <- 0
  <<<<<<< HEAD
  # if (any(is.na(x))) {
  sum <- stop("x has NA values")
  }
  sum <- 0
  =====
  if (any(is.na(x)) {
    stop ("x has NA values")
  }
  >>>>>>> myBranch
  for (val in x) {
    sum <- sum + val
  }
  sum
}
```



sum.R



```
git merge myBranch
```

```
Auto-merging sum.R
```

```
CONFLICT (content): merge
conflict in sum.R
```

```
Automatic merge failed; fix
conflicts and then commit the
result.
```

```
# Take sum of vector
sum <- function(x) {
  sum <- 0

  if (any(is.na(x)) {
    stop ("x contains NA")
  }

  for (val in x) {
    sum <- sum + val
  }
  sum
}
```



sum.R



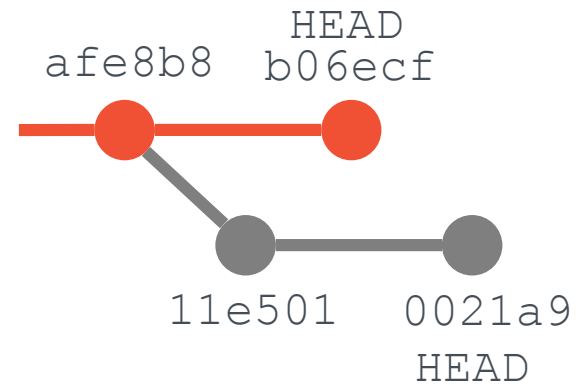
# Rebase

## Rebase branch

```
git checkout <branch>  
git rebase master
```

## Fast-Forward merge

```
git checkout master  
git merge <branch>
```



# Useful

## Stage and Commit all files

```
git commit -am "message"
```

## Tag a commit

```
git tag
```

## Set **Editor** for commit messages - *default* vim

```
git config --global core.editor <editor>
```

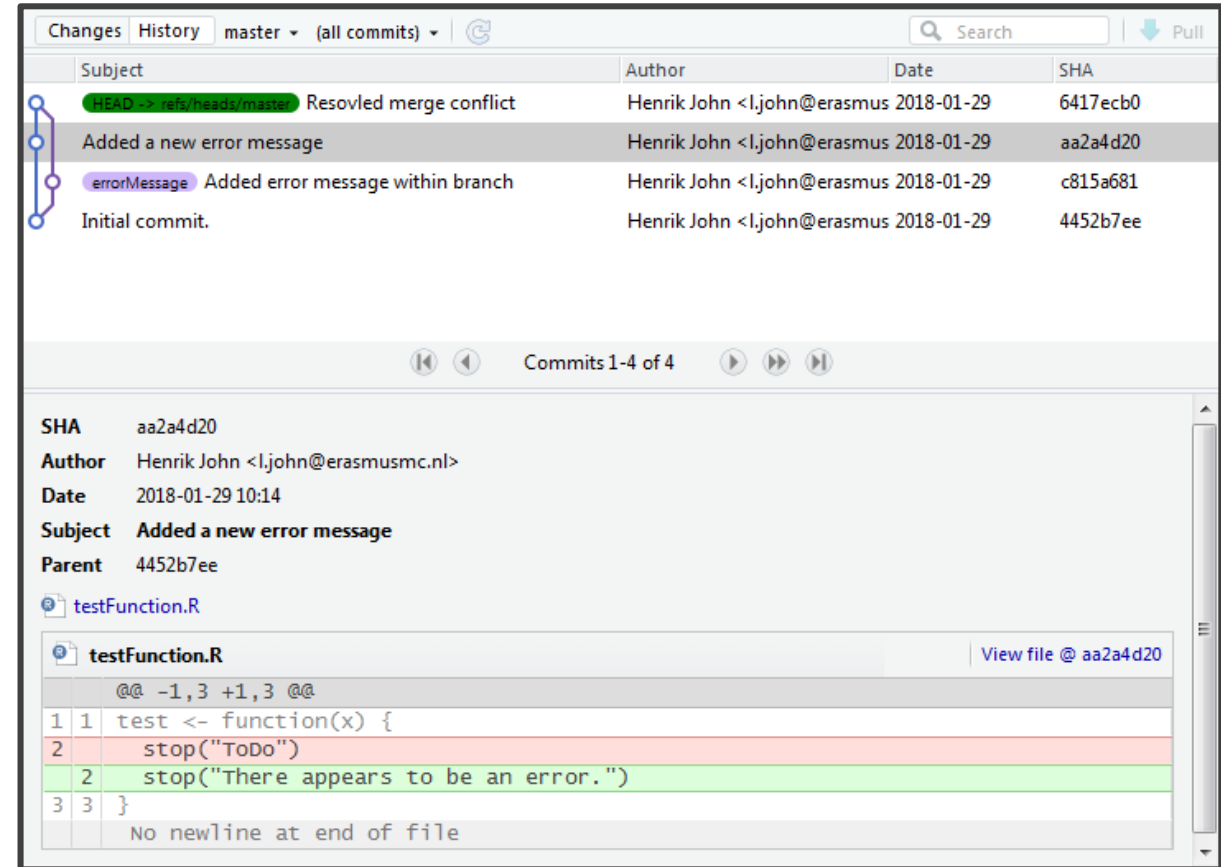


.gitignore

# RStudio GUI

**Visualize** branches and changes

**Merging** functionality not available



# Documentation

**Installation** files <https://git-scm.com/downloads>

**Official Documentation** <https://git-scm.com/documentation>