

# Git Reference

## 1 Settings

- show git configuration:

```
git config --list
git config --get user.name
```

- set configuration:

```
git config --global --add user.name "John Doe"
git config --add color.ui "auto"
```

--global makes the setting global for all repos.

- some common or useful settings:

Setting	Meaning
user.name	User name.
user.email	User email.
color.ui	Use colors ("auto!")?
core.editor	Which editor to use?
help.autocorrect	Time (in 100 ms).

The `help.autocorrect` setting makes git correct typos automatically after the given time has lapsed. E.g. `git bull` is corrected to `git pull`.

## 2 Basic Git

- Create a repository:

```
cd projDir
git init
```

- Add files to version control:

```
git add file1 file2
```

or

```
git add *
```

If the files have been added before, they will be included in the 'staging area' and thus committed with the next git [commit](#).

- Status, log and information:

```
git status # current status
git log # log of changes
git show [object]
git whatchanged -p # log along with the diff for each commit
```

[object] may be a commit, branch or something like `stash@{0}`.

- Commit changes:

```
git commit changedFile -m "Commit message."
```

or

```
git commit -a
```

Open the editor specified by `core.editor` for editing the commit message and then commit all changed files (skip staging files).

```
git commit file1 file2
```

Only commit `file1` and `file2`, open editor for editing the commit message.

- change last commit:

```
git commit --amend
```

Opens the text editor to change the commit message. Also notices files that have been changed and staged (`git add file`) or removed.

- remove file from version control:

– also remove file from disk:

```
git rm file
```

– keep file on disk:

```
git rm --cached file
```

- go back to `fileName`'s last committed version:

```
git checkout -- fileName
```

- get help:

```
git stash --help
```

shows the man page for `git stash`.

- rename a versioned file:

```
git mv oldName newName
```

- diff for all files:

```
git diff
```

diff for a single file:

```
git diff fileName
```

diff for changes that are already staged:

```
git diff --cached
```

There is also `git difftool`, which opens a tool with a UI, see [Graphical Tools](#).

- let git ignore certain files: create a file `.gitignore` and add it to the repo:

```
# comment
.so
!bla.so
TODO
```

This makes git ignore the file `TODO` and all `.so` files, except `bla.so`.

## 3 Undoing stuff

There are at least two different ways to reset to working directory to the last versioned status:

### 3.1 Checkout: Forget about changes

1. changes have not been committed yet

```
git checkout -- fileName
```

resets `fileName` to the last checked in version - the change in the working directory is lost! If multiple files are to be reset,

```
git reset --hard HEAD
```

sets the working tree back to the latest commit.

```
git checkout commitName
```

gets back to commit `commitName`. Note that information on `HEAD` is lost in this case. However, `git reflog` still remembers where `HEAD` was.

If the changes might be needed later, it is wise to stash them away (see [Stashes: keep changes](#)).

2. changes have been already been committed

In this case, the commit can be reverted:

```
git revert HEAD
```

creates a new commit the reverts the last commit. Older commits may be reverted by using e.g. `git revert HEAD~3`.

## 3.2 Stashes: keep changes

- changes in a working directory may be 'stashed' away:

```
git stash save "Status before going back"
```

- stashes are listed with:

```
git stash list
```

- apply the stash on top of the stack again:

```
git stash apply
```

keeps the stash saved, whereas

```
git stash pop
```

applies the stash and also removes the stash from the list.

- delete a stash:

```
git stash drop
```

deletes the stash on top of the stack, whereas

```
git stash drop stash@{2}
```

deletes the stash `stash@{2}`.

## 4 Branches

- list branches:

```
git branch
```

Add `-r` for remote branches, use `-a` for remote and local branches.

- create new branch:

```
git branch newBranch
```

Create a branch and check it out immediately:

```
git checkout -b newBranch
```

- checkout a branch:

```
git checkout branchName
```

- delete branch:

```
git branch -d branchName
```

for branches that branch off [HEAD](#);

```
git branch -D branchName
```

for any branch.

- merge other branch into current branch:

```
git merge other
```

- remove merge conflicts by replacing the code in *scissors*

```
<<<<<<< HEAD:file
code from branch to merge into
=====
conflicting code from branch to merge in
>>>>>>> branchToMerge
```

by an appropriate resolution. Then, staging the fixed file tells git that all conflicts have been removed.

- push all branches to remote repository:

```
git push --all
```

For more options with remotes, see [Using git with remote repositories](#).

- rename a branch:

```
git branch -m oldBranch newBranch
```

- checkout single files from another branch to current branch:

```
git checkout branchToUse fileName
```

- create a tracking branch (automatically pull and push from/to the tracked branch - used to follow remote changes) **branchName**:

```
git checkout --track remoteAlias/branchName
```

A different local name **localName** can be used with

```
git checkout -b localName remoteAlias/branchName
```

Alternatively,

```
git pull theirBranch
```

will fetch **origin/theirBranch** and merge with the local **theirBranch** branch.

- make the current branch track a remote branch

```
git branch --set-upstream-to=remoteAlias/remoteBranch
```

This can be combined with push as follows:

```
git push -u remoteAlias remoteBranch
```

This pushes the branch you're on to `remoteAlias/remoteBranch` and makes your branch tracking.

- pick commits from a different branch:

```
git checkout branchToApplyCommitTo
git cherry-pick SHA1HashOfCommit
```

## 5 Some Git Notions

- **HEAD**: pointer the branch we are on.
- **branch**: pointer to a commit.
- **commit**: snapshot of the git 'filesystem' including information on parent commits/snapshots.
- **working directory**: copies of files under version control.
- **staging area**: copy of the git 'filesystem' to be included in the next commit.

## 6 Using git with remote repositories

- add alias `myRepo` for remote repository:

```
git remote add remoteAlias ssh://user@host.domain.tld/directory/myRepo
```

- show aliases for remote repositories:

```
git remote
git remote show remoteAlias
```

The second line gives details (also on branches).

- rename a remote:

```
git remote rename oldAlias newAlias
```

- remove a remote (and all tracking branches already fetched):

```
git remote rm remoteAlias
```

- clone a copy of a remote repository and create a local repository with a suitable remote origin set:

```
git clone URL
```

`clone` will get create a sub-folder, fill (fetch) the sub-folder with the contents of the repo and then create and checkout the default branch.

- retrieve all remote branches with

```
git fetch remoteAlias
```

No local branches will be altered ([merging](#) possibly needed).

- get a specific branch from the remote and start working in it:

```
git checkout -b branchName origin/branchName
```

- fetch a remote branch and merge it with the current branch:

```
git pull remoteAlias branchName
```

The working copy shall be clean for this operation.

- after a branch has been deleted from a remote repo,

```
git prune remoteAlias
```

will delete the remote-tracking branches that do not exist in the remote anymore.

- push local changes back to the remote with

```
git push remoteAlias branchName
```

A different name for the branch will be used by

```
git push remoteAlias localBranchName:remoteBranchName
```

- delete remote branch:

```
git push remoteAlias :branchName
```

## 6.1 With central repository

- Create a repository on central server:

```
mkdir foo
cd foo
git init --bare --shared foo.git
chgrp -R dev foo.git (optional)
```

`shared` makes the repo group writable. `bare` means there is no working copy. On a server, bare repositories are preferred as one cannot push to repositories with a working directory.

- push local repo to server:

```
cd localRepo
git push ssh://user@host.domain.tld/home/user/foo.git '*:*
```

This pushes the local repo [all branches!] to the server. Instead of `':*'`, individual branches can be pushed using

```
git push ssh://user@host.domain.tld/home/user/foo.git myName:theirName
```

In any case, it may be wise to make the branches [tracking](#).

- clone new working directory that tracks the one on the server:

```
git clone ssh://user@host.domain.tld/home/user/foo.git newRepo
```

- after hacking in `newRepo`, update repo on server using `git push`. For more options, see above.

## 6.2 With GitHub

- create repository `repoName` from the web interface

- teach local repository about the remote one:

```
cd repoName
git remote add origin git@github.com:githubuser/repoName.git
```

- push files to GitHub:

```
cd repoName
git push
```

- to clone the GitHub repo:

```
git clone git@github.com:githubuser/repoName.git newRepo
```

- push changes back to GitHub:

```
cd repoName
git push
```

For more options, see above.

## 7 Useful stuff

- tags are alternative names for entries in the history:

```
git tag tagname commit_id # create a tag
git tag -d tagname # delete a tag
git tag tagname commit_id -a "My tag 'tagname'" # annotate a tag
git push origin tagname
```

- archives of files under version:

```
git archive --output master.tar.gz master
```

`master` can also be a tag/commit-id/...

- hacking on uncommitted changes on different machines:



```
git diff stash@{0}~ stash@{0} > changes.patch # create patch
git apply changes.patch # on other machine
```

A throw-away branch might be more suitable though.

- cleaning all files not tracked by `git`:

```
git clean -f
```

Files that match any `.gitignore` are not deleted (add `-x` to delete those, too).  
Add `-d` to remove untracked directories as well.

## 8 Graphical tools

- `git gui`: Perform adding, committing, branching etc. graphically (also worth a look: `git cola`).
- `gitk`: View commit history and branches (also available: the GTK tool `gitg`).
- `git difftool`: View diffs graphically (needs setting `diff.tool` in `.gitconfig`).

## 9 Links

- Git reference: <http://gitref.org/>
- "Pro Git" book: <http://progit.org/>
- Git community book: <http://book.git-scm.com/>
- Git with central sever: <http://toroid.org/ams/git-central-repo-howto>
- specifying a commit etc.: <http://git-scm.com/book/en/Git-Tools-Revision-Selection>
- "interactive" help on `git`: `#git` on Freenode

## 10 TODO

- add rebasing
- add cherry-picking
- fix bugs (that certainly do exist in here)