Version Control System

**Version Control System (VCS)** is a software that helps software developers to work together and maintain a complete history of their work.

Listed below are the functions of a VCS −

* Allows developers to work simultaneously.
* Does not allow overwriting each other’s changes.
* Maintains a history of every version.

Following are the types of VCS −

* Centralized version control system (CVCS).
* Distributed/Decentralized version control system (DVCS).

## Advantages of Git

### **Free and open source**

Git is released under GPL’s open source license. It is available freely over the internet. You can use Git to manage property projects without paying a single penny. As it is an open source, you can download its source code and also perform changes according to your requirements.

### **Fast and small**

As most of the operations are performed locally, it gives a huge benefit in terms of speed. Git does not rely on the central server; that is why, there is no need to interact with the remote server for every operation. The core part of Git is written in C, which avoids runtime overheads associated with other high-level languages. Though Git mirrors entire repository, the size of the data on the client side is small. This illustrates the efficiency of Git at compressing and storing data on the client side.

### **Implicit backup**

The chances of losing data are very rare when there are multiple copies of it. Data present on any client side mirrors the repository, hence it can be used in the event of a crash or disk corruption.

### **Security**

Git uses a common cryptographic hash function called secure hash function (SHA1), to name and identify objects within its database. Every file and commit is check-summed and retrieved by its checksum at the time of checkout. It implies that, it is impossible to change file, date, and commit message and any other data from the Git database without knowing Git.

### **No need of powerful hardware**

In case of CVCS, the central server needs to be powerful enough to serve requests of the entire team. For smaller teams, it is not an issue, but as the team size grows, the hardware limitations of the server can be a performance bottleneck. In case of DVCS, developers don’t interact with the server unless they need to push or pull changes. All the heavy lifting happens on the client side, so the server hardware can be very simple indeed.

### **Easier branching**

CVCS uses cheap copy mechanism, If we create a new branch, it will copy all the codes to the new branch, so it is time-consuming and not efficient. Also, deletion and merging of branches in CVCS is complicated and time-consuming. But branch management with Git is very simple. It takes only a few seconds to create, delete, and merge branches.

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| Git task | Notes | Git commands |
| [**Tell Git who you are**](https://www.atlassian.com/git/tutorials/setting-up-a-repository/git-config) | Configure the author name and email address to be used with your commits.  Note that Git [strips some characters](http://stackoverflow.com/questions/26159274/is-it-possible-to-have-a-trailing-period-in-user-name-in-git/26219423#26219423) (for example trailing periods) from user.name. | git config --global user.name "Sam Smith"  git config --global user.email sam@example.com |
| [**Create a new local repository**](https://www.atlassian.com/git/tutorials/setting-up-a-repository/git-init) |  | git init |
| [**Check out a repository**](https://www.atlassian.com/git/tutorials/setting-up-a-repository/git-clone) | Create a working copy of a local repository: | git clone /path/to/repository |
| For a remote server, use: | git clone username@host:/path/to/repository |
| [**Add files**](https://www.atlassian.com/git/tutorials/saving-changes#git-add) | Add one or more files to staging (index): | git add <filename>  git add \* |
| [**Commit**](https://www.atlassian.com/git/tutorials/saving-changes#git-commit) | Commit changes to head (but not yet to the remote repository): | git commit -m "Commit message" |
| Commit any files you've added with git add, and also commit any files you've changed since then: | git commit -a |
| [**Push**](https://www.atlassian.com/git/tutorials/syncing#git-push) | Send changes to the master branch of your remote repository: | git push origin master |
| [**Status**](https://www.atlassian.com/git/tutorials/inspecting-a-repository#git-status) | List the files you've changed and those you still need to add or commit: | git status |
| [**Connect to a remote repository**](https://www.atlassian.com/git/tutorials/syncing#git-remote) | If you haven't connected your local repository to a remote server, add the server to be able to push to it: | git remote add origin <server> |
| List all currently configured remote repositories: | git remote -v |
| [**Branches**](https://www.atlassian.com/git/tutorials/using-branches) | Create a new branch and switch to it: | git checkout -b <branchname> |
| Switch from one branch to another: | git checkout <branchname> |
| List all the branches in your repo, and also tell you what branch you're currently in: | git branch |
| Delete the feature branch: | git branch -d <branchname> |
| Push the branch to your remote repository, so others can use it: | git push origin <branchname> |
| Push all branches to your remote repository: | git push --all origin |
| Delete a branch on your remote repository: | git push origin :<branchname> |
| [**Update from the remote repository**](https://www.atlassian.com/git/tutorials/syncing) | Fetch and merge changes on the remote server to your working directory: | git pull |
| To merge a different branch into your active branch: | git merge <branchname> |
| View all the merge conflicts:  View the conflicts against the base file:  Preview changes, before merging: | git diff  git diff --base <filename>  git diff <sourcebranch> <targetbranch> |
| After you have manually resolved any conflicts, you mark the changed file: | git add <filename> |
| **Tags** | You can use tagging to mark a significant changeset, such as a release: | git tag 1.0.0 <commitID> |
| CommitId is the leading characters of the changeset ID, up to 10, but must be unique. Get the ID using: | git log |
| Push all tags to remote repository: | git push --tags origin |
| [**Undo local changes**](https://www.atlassian.com/git/tutorials/undoing-changes) | If you mess up, you can replace the changes in your working tree with the last content in head:  Changes already added to the index, as well as new files, will be kept. | git checkout -- <filename> |
| Instead, to drop all your local changes and commits, fetch the latest history from the server and point your local master branch at it, do this: | git fetch origin  git reset --hard origin/master |
| **Search** | Search the working directory for foo(): | git grep "foo()" |