GUIDE TO MAKE A REAL CONTRIBUTION TO AN OPEN SOURCE PROJECT

WHO AM I?

@tushar_rishav

- GSoC'16 student contributing to coala - a static code analysis tool, under Python Software Foundation.
- A senior year, pursuing B.Tech from the National Institute of Technology, Trichy, India.
- More at www.gtushar.co

LET'S GET STARTED

http://tinyurl.com/epworkshop2016
http://tinyurl.com/epwgist

VERSION CONTROL SYSTEMS

WHAT?

- A software tool that *manages changes* to source code over time.

HOW?

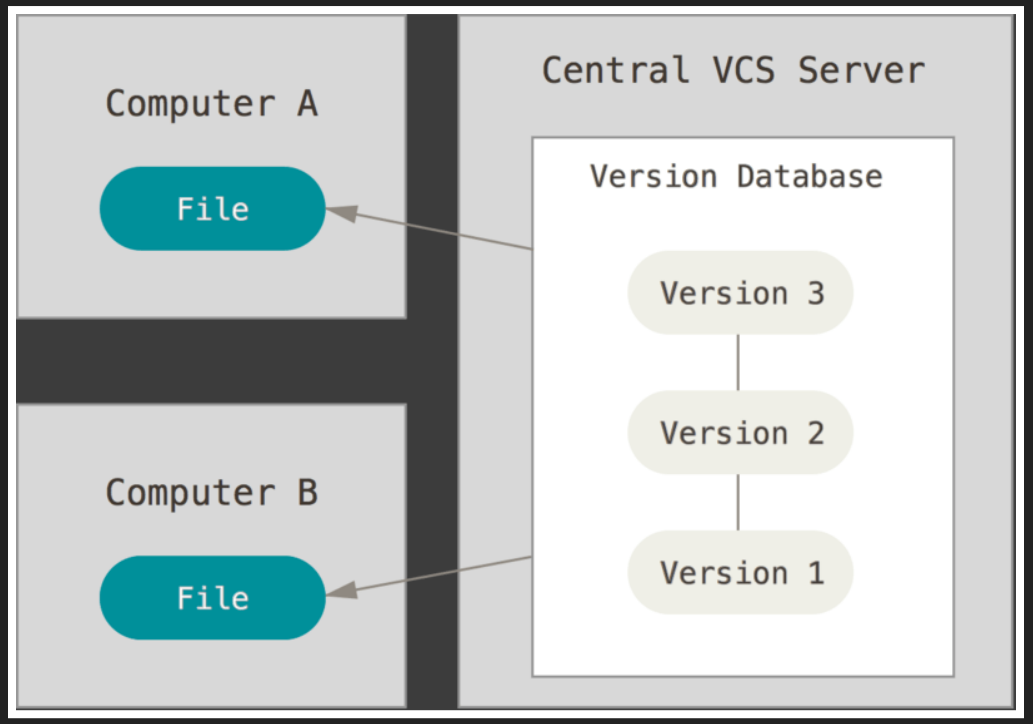
- Keeps track of every changes using simple database and hence the changes can be easily reverted if required.
  So don't panic if your colleague messed up!

WHY?

- Enables collaborative programming (we will do shortly) with minimum disruptions.
- Developers can work on unrelated features or changes and at the end get changes merged back together.

CENTRALISED VS DISTRIBUTED VCS

CENTRALISED VCS



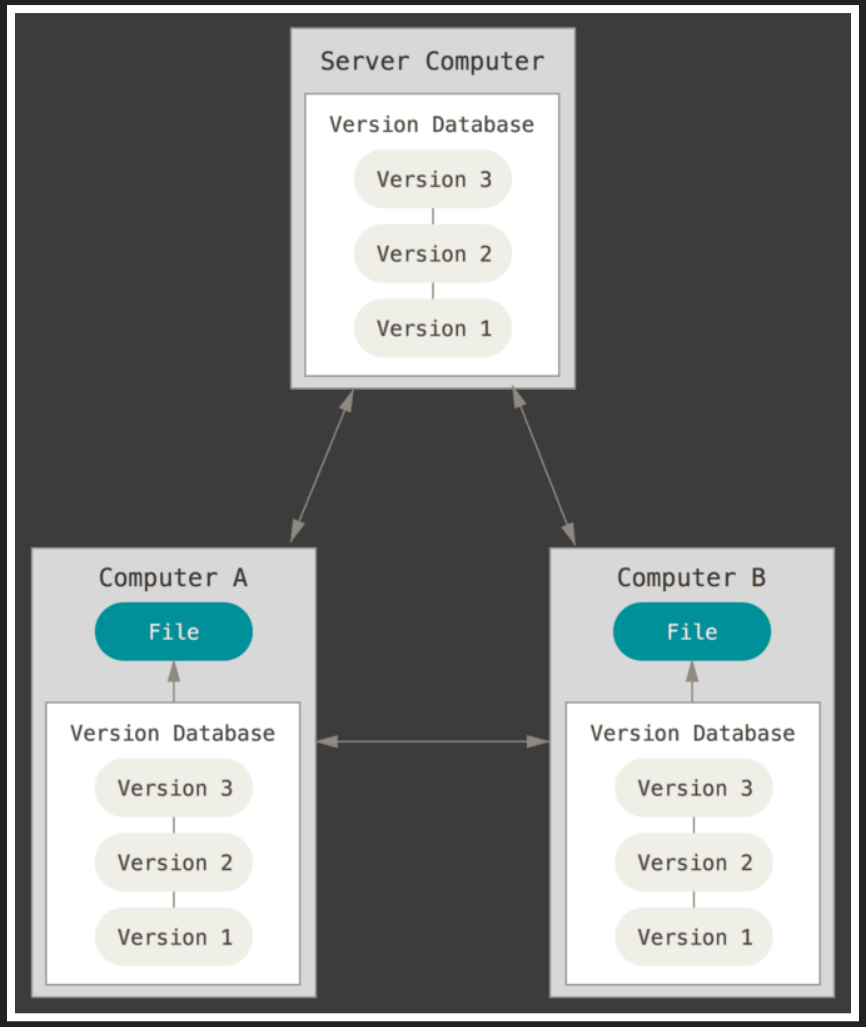
- A single server that contains all the versioned files, and a number of clients that check out working copy from that central place. Eg: Subversion.

MAJOR DRAWBACK

- **Temporary failure**: Being centralised, if the server goes down for certain period of time, then nobody can collaborate at all.
- **Permanent failure**: If proper backups haven't been kept and the central database becomes corrupt, then we lose the entire history of the project.

Having the entire history of the project in a single place, we risk losing everything.

DISTRIBUTED VCS



- Developers fully mirror the repository.

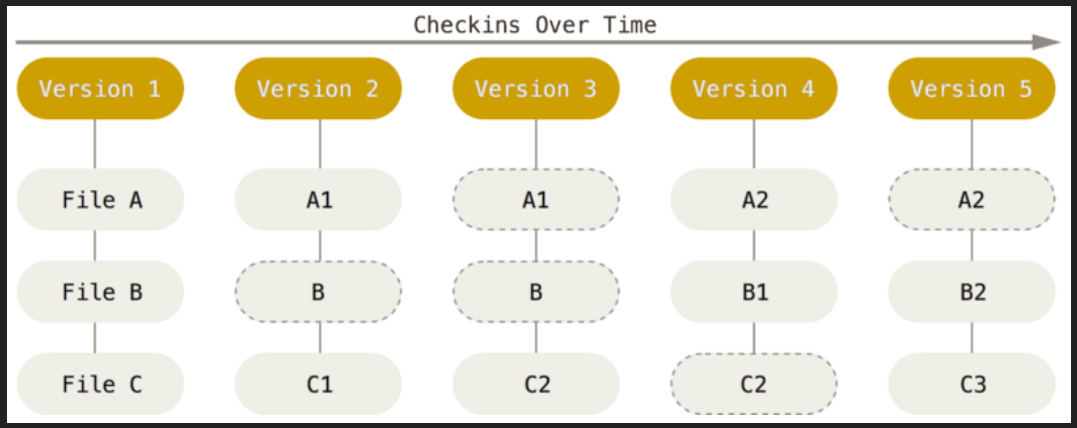
DISTRIBUTED VCS

- Every clone is really a full backup of all the data.
- If the server is down or corrupted, then any of the client repositories can be copied back up to the server to restore it.
- Examples are Mercurial and Git.

git

Created by Linus Torvalds and
the Linux development community.

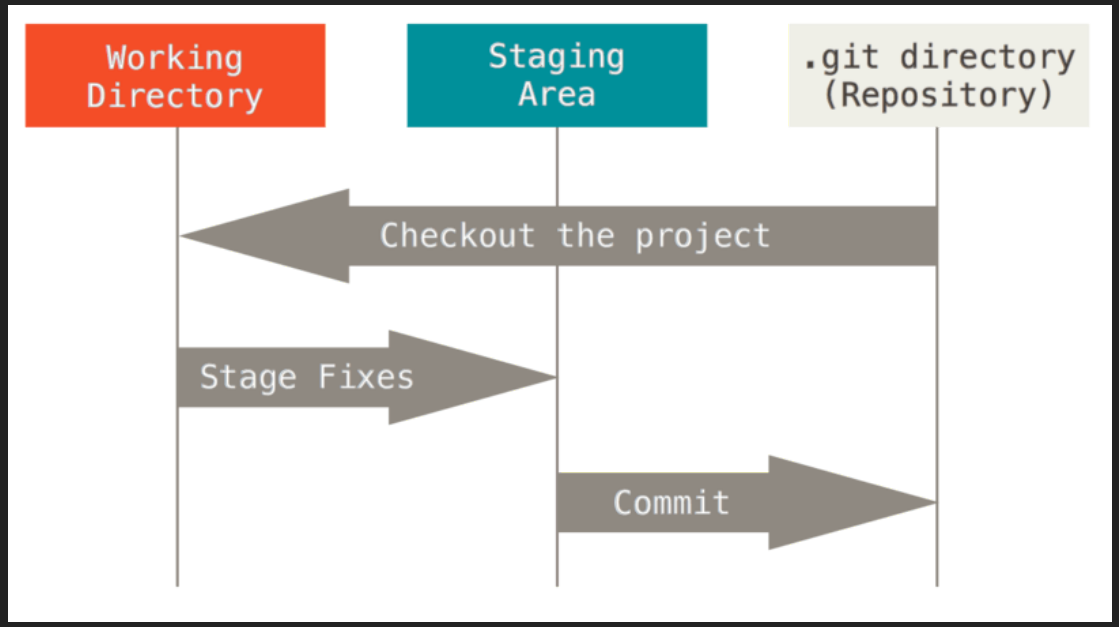
FUNDAMENTALS



- Stores data as a set of snapshots of a miniature file systems.
- Nearly every operation is local. One can work offline and requires network connection while pushing/fetching the changes to/from the remote server only.

FUNDAMENTALS

WORKFLOW



1. Working Area 2. Staging Area 3. Committed Area

FUNDAMENTALS

WORKFLOW

- Working Area:
  Have changed the file but have not committed it to your database yet.
- Staging Area:
  Have marked a modified file in its current version to go into your next commit snapshot.
- Committed Area:
  The data is safely stored in your local database.

~/git> commands

Git Commands

git configs

```
$ git help    # Your git manual page.
$ git config --global user.name "Tushar Gautam"
$ git config --global user.email tushar.rishav@gmail.com
```

- Important as every git commit uses this information.
- Run without `--global` to override for a particular project.

Default text editor for git. In my case *vim*

```
$ git config --global core.editor vim
```

See complete list

```
$ git config --list
```

Git Commands

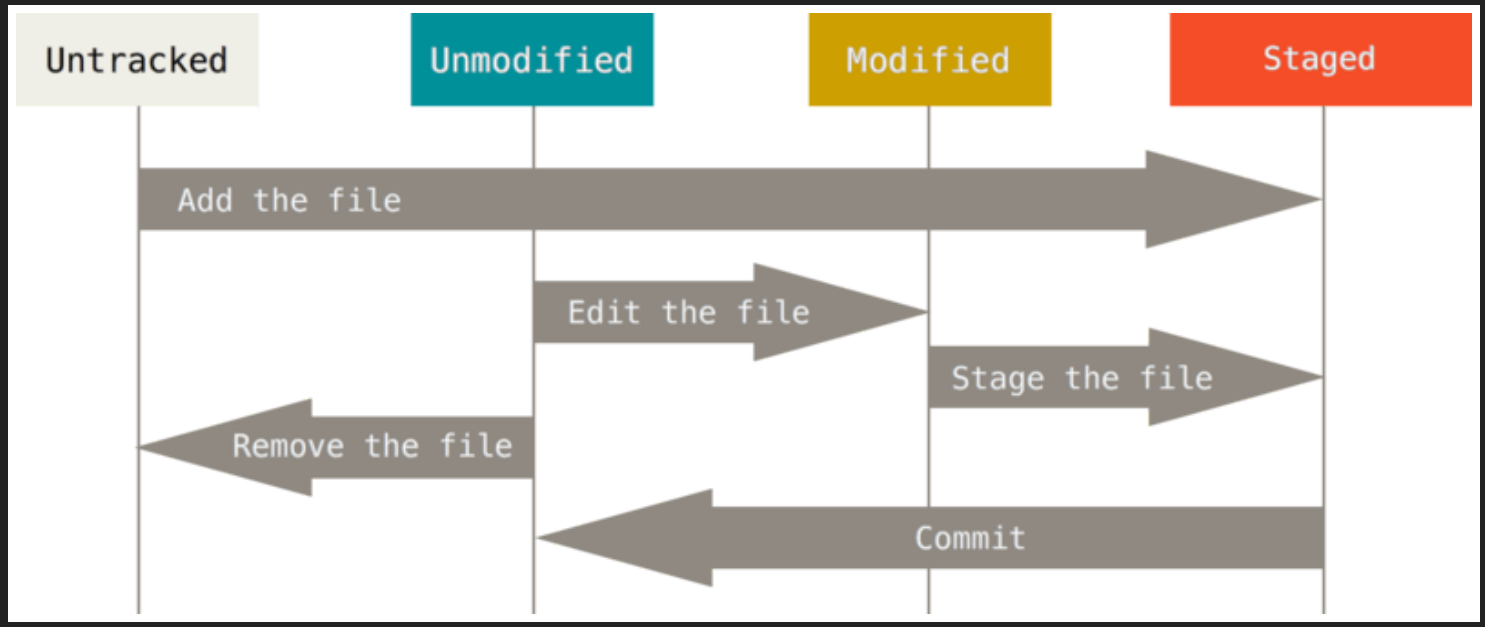
- Inititalise a repository in a given directory.

```
git init <directory>
# leaving `directory` will initialis a repo
# in the current directory.
```

- Cloning an existing repository.

```
git clone <repo-url> [<target-directory>
# creates a directory called "coala".
git clone https://github.com/coala-analyzer/coala.git
# creates a directory called "my-directory"
git clone https://github.com/coala-analyzer/coala.git my-directory
```

FILE STATUS



- Tracked: files that were in the last snapshot; they can be unmodified, modified, or staged.
- Untracked: files in your working directory that were not in your last snapshot and are not in your staging area.

File status

```
$ git add <file-name> # Add `file-name` to staging area.
$ git status # check status for files.
$ git status -s # same as above but less verbose.
```

- If we modify any file in staging area, we need to `add` it again otherwise Git stages a file exactly as it is when you run the git add command.
- `.gitignore` can be used to avoid Git to automatically add or even show you as being untracked.

File status

```
$ git diff # To see what you've changed but not yet staged,
$ git diff --staged
$ git diff --cached    # same as above
# To see what have been staged that will go into next commit,
# compares the staged changes to last commit.
```

- If we modify any file in staging area, we need to `add` it again otherwise Git stages a file exactly as it is when you run the git add command.
- `.gitignore` can be used to avoid Git to automatically add or even show you as being untracked.

Git Commit

```
$ git commit # Opens default editor with output from `git status`
$ git commit -v # Similar but displays `diff` for the changes.
$ git commit -m "commit message" # Inline.
$ git commit -am "commit message"
$ git show <commit_hash>
# default is recent commit.
# Skip staging area and commit all changed files. Careful!
$ git rm <file>
# remove `file` from staging area and the filesystem.
$ git rm --cached <file>
# remove from staging area only.
```

- Commits the staged snapshot to the project history. Committed snapshots can be thought of as “safe” versions of a project—Git will never change them unless you explicity ask it to (covered later).
- Every time a commit is performed, we’re recording a snapshot of the project that we can revert to or compare to later.

to later.

Git Log or History

```
$ git log
# Lists all commits with most recent commits show up first.
$ git log -p
# Shows diffs introduced with each commit.
$ git log -p -3 # Show first 3 entries only.
$ git log --oneline # Less verbose.
$ git log --graph --oneline.
# Shows graphical structure for branch and merge history.
$ git log --help # for more options.
```

Make changes

```
$ git commit --amend
# Change the last commit message.
$ git checkout <commit_hash>
# checkout to the repo state wrt to the commit.
$ git checkout -- <file>
# Drop the changes for `file`. Careful!
```

Remote

- Remote repositories are versions of your project that are hosted on the Internet or network somewhere.
- Saved in **.git/config** file.

```
$ git remote -v
# List all remotes with their urls.
$ git remote add <name | alias> <url> # add remote.
$ git remote rename <old-name> <new-name> # rename remote.
$ git remote set-url <name> <url>
# change the url for a remote.
$ git remote rm <name> # remove remote.
$ git fetch <remote-name> # fetch from remote.
# ^ Only downloads the data and not merge or modifies.
$ git merge # merge the changes.
$ git pull  # fetch + merge
$ git push <remote-name> <branch-name> # use `-f` to force push.
```

Workflow

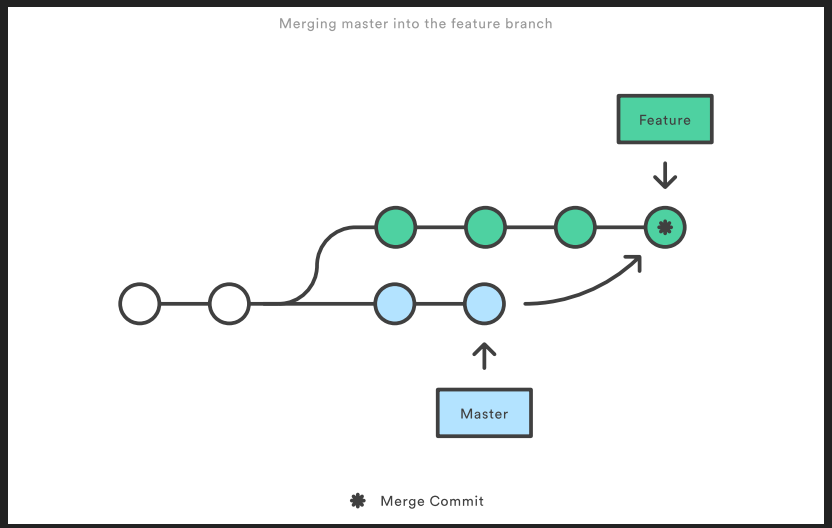
1. Add remote.
2. Create branch.
3. Add/Make changes and commit.
4. Fetch from remote and rebase.
5. Push or force push.
6. Create a pull request.

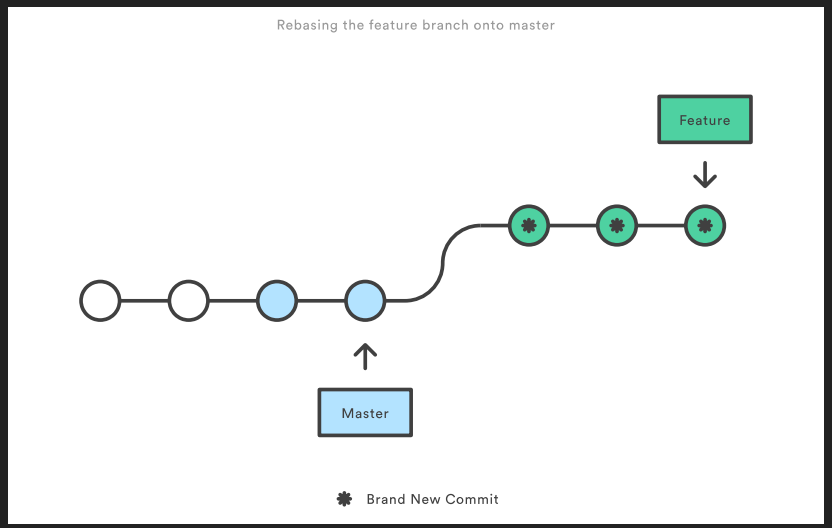
We have talked about all except 6 and 7.

```
$ git fetch <remote-name>
$ git rebase -i <remote/branch-name>
$ git request-pull [-p] <start> <url> [<end>]
# Use git request-pull and a mailing list. eg. Linux kernel.
```

Branching

```
$ git branch # display branch
$ git branch -a # all branch
$ git branch <new-branch> # create a new branch.
$ git checkout <new-branch> # Checkout to new branch.
$ git checkout -b <other-new-branch> # Combines above two.
$ git checkout -D <brnach-name>
# Force delete branch with unmerged changes.
```





- Merge: Adds a merge commit.
- Rebase: Re-writes the project history by creating new commits. It adds the local commits on top of the

```
$ git merge
# merge changes from feature to master
$ git rebase
$ git rebase -i  # interactive rebase.
```

Cherry-pick

```
$ git cherry-pick <commit_hash>
$ git revert
$ git reset HEAD
# HEAD means current commit
$ git reset --hard HEAD
# Move branch pointer to certain commit state
```

REFERENCE

- Git Books - Scott Chacon

Let's start the contribution process :)