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Git and GitHub

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Introduction

GitHub Administration

Pre Requisite Software Download/ Registration :

- ❖ Register @ <https://github.com/>
- ❖ Install git bash @ <https://git-scm.com/downloads>

Git Commands

When you install Git-bash, the first thing you should be doing is setting up your user details as follows only one time.

```
#git config --global user.name "DevOps Training Bangalore"
#git config --global user.email "devopstrainingblr@gmail.com"
```

Checking for settings

```
#git config --list
# git config --global --list
```

```
#git config --global --edit
```

You can also check what Git thinks a specific key's value is by typing git config <key>:

```
#git config user.name
```

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Task 1: Create the git local repository in local machine (Laptop/Desktop), add one file (DBConnect.java) and update that file, create the github remote repository (<https://github.com>) and move the local code to github repository.

Go to the directory where you want to create the git repository.

cd ~/Desktop

mkdir git-practice-commands

#cd git-practice-commands

#git init : Create a local Git empty repository.

Initialized empty Git repository in /Users/MithunReddy/git/git-practice-commands/.git/

#git status : Gives the status of your untracked files.

#touch DBConnect.java

#git status

#vim DBConnect.java

#git add DBConnect.java: Add the files(here DBConnect.java) into your staging area.

#git status

On branch master

Initial commit

Changes to be committed:

(use "git rm --cached <file>..." to unstage)

new file: DBConnect.java

#git status

On branch master

nothing to commit, working tree clean

➤ Open the file (DbConnect.java) and update with some text.

#vim DBConnect.java

#git commit -a -m "Updated DBConnect.java file" : If we use –a along with commit command, no need to execute git add command.

[master 7f795a7] Updated DbConnect.java file

1 file changed, 1 insertion(+)

➤ Create the repository in github as follows.

Login into github (<http://github.com>)

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On right side top corner click on “+” symbol and click on “**New repository**” and give the Repository name and click on Create repository.

#git remote add origin Remote Repo URL : Adding the URL for the remote repository where your local repository code will be pushed.

git remote -v :

#git remote show origin : It will give the information on a particular remote (here origin is the remote name)

git remote remove origin : It will remove the remote origins.

#git push origin master : Push the changes in your local repository to GitHub remote repository. (Here push is the git command , origin is the remote name and master is the branch name)

Counting objects: 6, done.

Delta compression using up to 4 threads.

Compressing objects: 100% (2/2), done.

Writing objects: 100% (6/6), 479 bytes | 0 bytes/s, done.

Total 6 (delta 0), reused 0 (delta 0)

To git@github.com:devopstrainingblr/test.git

* [new branch] master -> master

Branch master set up to track remote branch master from origin.

#git status

On branch master

Your branch is up-to-date with 'origin/master'.

nothing to commit, working tree clean

#git log : It will give all commit ids.

#git log -2 : It will display only 2 commit ids.

#git show --pretty="" --name-only << Commit ID >> : It will display all the files which are committed in that particular commit.

#git clean -n : It will preview the changes.

#git clean -f : If we want to remove new files from working area.

#git reset <<File Name>> : To untrack the tracked files (revert back to working area from staging area.).

#git revert <<Commit ID>> : It will revert the changes committed in that particular commit id from local repo.

#git push origin master -f: It will revert the changes from remote repo.

What is Version Control System?

When developers are creating something (an application, for example), they are making constant

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changes to the code and releasing new versions, up to and after the first official (non-beta) release.

Version control systems keep these revisions straight, and store the modifications in a central repository. This allows developers to easily collaborate, as they can download a new version of the software, make changes, and upload the newest revision. Every developer can see these new changes, download them, and contribute.

Git Ignore file (.gitignore)

Some times we don't want to commit the files, which are generated by IDE like .project and .classpath files or some node module folders like node_module folder into a git repository. To ignore these files and folders to commit we will create one file called .gitignore and we will keep the file names or directory names which we don't want to commit as follows.

```
.gitignore x
1  #Ignore files called .classpath and .project
2  .classpath
3  .project
4  #Ignore folder called node_modules
5  /node_modules
```

<https://www.atlassian.com/git/tutorials/saving-changes/gitignore>

Branches

Branch

- Branches are used to create another line of development.
- By default, Git has a master branch, which is same as trunk in Subversion (SVN). Usually, a branch is created to work on a new feature.
- Once the feature is completed, it is merged back with the master branch and we delete the branch.

Tags

- Tags similar to branches, but the difference is that tags are immutable.
- It means, tag is a branch, which nobody intends to modify. Once a tag is created for a particular commit, even if you create a new commit, it will not be updated.
- Usually, developers create tags for product releases.

#git branch : It gives the branch names in current repository.

#git branch bugfix : It will create the bugfix branch in local git repository.

#git branch -v: It will display all the branches in your repo, and also tell you what branch you're currently in.

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bugfix 87226db initial commit

* **master** 87226db initial commit

Note: Here * indicate currently in use branch.

git checkout bugfix : Switch to bugfix branch.

Switched to branch 'bugfix'

Update the Bhaskar.txt like change 2 – bugfix branch

git add . : Add one or more files to staging

git commit -m "bugfix commit"

git checkout master : Switch to master branch.

Switched to branch 'master'

Update the Bhaskar.txt like change 3 – master branch

git add .

git commit -m "master commit"

git checkout bugfix : Switch to bugfix branch.

Switched to branch 'bugfix'

Check the file and see the contents in file.

#git checkout master

#git diff master bugfix

#git merge bugfix

Fix the conflicts

#git add .

#git commit -m "merging"

#git push origin --all : Push all branches code to your remote repository.

#git branch -d bugfix: Deletes the bugfix branch in local repo.

#git push origin : bugfix (OR) git push origin --delete bugfix: It will delete a remote branch in the repository.

Tags

git tag : It will displays the tags.

git tag <<Tag Name>> : It will create the tag.

git push origin tag <<Tag Name>> : It will push the tag to remote repo.

git push origin --tags: It will push all the tags to remote repo.

Note: Tags are not automatically pushed when you push a branch or use the --all option. The --tags flag sends all of your local tags to the remote repository.

git tag -d <<Tag Name>> : It will delete the tag.

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git stash: git stash temporarily shelves (or stashes) changes you've made to your working copy so you can work on something else, and then come back and re-apply them later on. Stashing is handy if you need to quickly switch context and work on something else, but you're mid-way through a code change and aren't quite ready to commit.

git stash (OR) git stash save "Updated some code" :
git stash list :

git stash show : This command shows the summary of the stash diffs.
The above command considers only the latest stash.

git stash show -p : It will give you the detailed list of differences.

git stash show stash@{1}:

git stash apply stash@{0}:

git stash drop stash@{0} :

git stash list

vim mithun.txt

git stash

git stash list

git stash pop: It apply the latest stash and then immediately drop it from your stack.

git stash pop stash@{1} : It apply the particular stash and then immediately drop it from your stack.

git cherry-pick: Cherry picking in git means to choose a commit from one branch and apply it onto another.

git log

git branch

git checkout master

cat mithun.txt

git cherry-pick <<CID>

cat mithun.txt

git cherry-pick --abort: It will cancel the cherry-pick operation.

```
$ git push wallmart master
fatal: unable to access 'https://github.com/mithuntechnologiesnew/wallmart.git/':
SSL certificate problem: self signed certificate in certificate chain
```

When you get the above error while committing the code from local repository to remote repository execute the following command in git bash.

git config --global http.sslVerify false

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Steps for Code Checkout into local from Remote Repository

- Open the Gitbash
- Go to the directory where we need to commit the code/checkout the code
cd C:\MithunTecnologies\JavaWorkspace\MTWorkSpace
- Get the code from Git Repository using below command.

git clone <<GitHub URL>>

SSH Key

SSH keys are a way to identify trusted computers without involving passwords. You can generate an SSH key and add the public key to your GitHub account.

#ls -al ~/.ssh ---> To see if existing SSH keys are present in machine.

Generate SSH Key

ssh-keygen -t rsa -b 4096 -C "MySSHKey"

Here-t --> Specifies the type of key to create. The possible values are "rsa1" for protocol version 1 and "rsa" or "dsa" for protocol version 2.

-b --> Specifies the number of bits in the key to create. For RSA (Rivest, Shamir, and Adelman) keys, the minimum size is 768 bits and the default is 2048 bits. Generally, 2048 bits is considered sufficient. DSA (Digital Signature Algorithm)keys must be exactly 1024 bits as specified by FIPS 186-2.

-C --> Provides a new comment.

cat ~/.ssh/id_rsa.pub

Add SSH key to GitHub

Click on Setting ---> SSH and GPG keys ---> New SSH key or Add SSH key ---> Provide the name for Title and copy SSH key Key field ---> Click on Add SSH key button

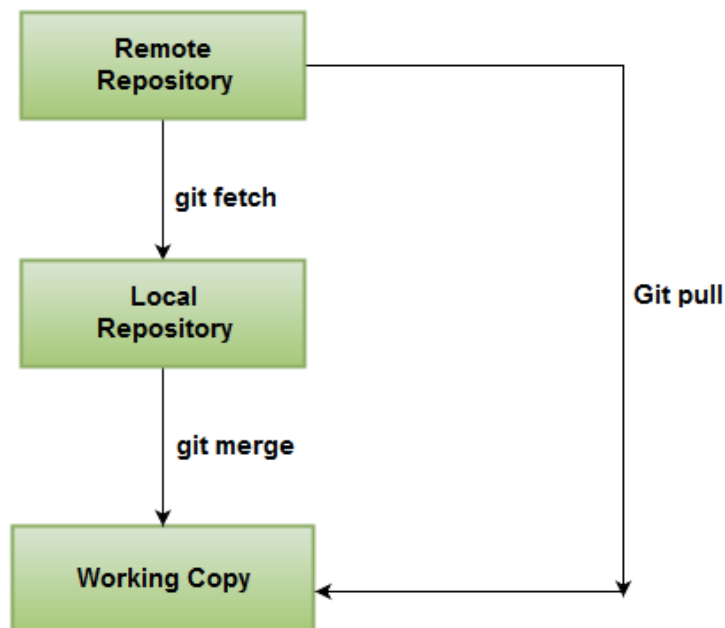
```
Bhaskars-MacBook:~ BhaskarReddy$ ssh-keygen -t rsa -b 4096 -C "devopstrainingblr@gmail.com"
Generating public/private rsa key pair.
Enter file in which to save the key (/Users/BhaskarReddy/.ssh/id_rsa): 
Enter passphrase (empty for no passphrase): 
Enter same passphrase again: 
Your identification has been saved in /Users/BhaskarReddy/.ssh/id_rsa.
Your public key has been saved in /Users/BhaskarReddy/.ssh/id_rsa.pub.
The key fingerprint is:
SHA256:P49RMpILQthwW/paCLQcY9peaHMY3yiPl120G7Stv4 devopstrainingblr@gmail.com
The key's randomart image is:
+----[RSA 4096]-----+
|  o  ooo                |
| . @.* o .             |
| . o / + +             |
| . = = = .             |
| o o 0 S o .           |
| . o 0 + + +           |
| o o = . +             |
| . + . =               |
| .o.E . .              |
+----[SHA256]-----+
Bhaskars-MacBook:~ BhaskarReddy$
```

What is the difference between git fetch and get pull?

Ans) git fetch : It will get the update from git remote repo and will update your local repo. But it will not merge with Local working copy.

git pull : It will get the update from git remote repo and will update your local repo as well it will merge with Local working copy also.

So **git pull = git fetch + git merge origin/master**



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```

bhaskars-air:gitpractice bhaskarreddyl$ git fetch
remote: Counting objects: 3, done.
remote: Compressing objects: 100% (2/2), done.
remote: Total 3 (delta 0), reused 0 (delta 0), pack-reused 0
Unpacking objects: 100% (3/3), done.
From github.com:devopstrainingblr/test12345
   574df20..40a3236  master    -> origin/master
bhaskars-air:gitpractice bhaskarreddyl$ cat DbConnect.java
public class Test{}
bhaskars-air:gitpractice bhaskarreddyl$ git pull origin master
From github.com:devopstrainingblr/test12345
 * branch            master      -> FETCH_HEAD
Updating 277214e..40a3236
Fast-forward
 DbConnect.java | 5 +++++
 1 file changed, 4 insertions(+), 1 deletion(-)
bhaskars-air:gitpractice bhaskarreddyl$ cat DbConnect.java
public class Test{

    public Test(){}
}

```

Personal Access Token (PAT)

Go to **Personal settings** ---> **Developer settings**

---> **Personal access tokens** ---> **Generate New Token** ---> **Provide some info about token in Token description** input box ---> Select the appropriate the Scopes and Click on **Generate token** button.

#git commit --amend -m "an updated commit message" : Change most recent Git commit message.

git grep "Test()" : Search the working directory for Test()

```

bhaskars-air:gitpractice bhaskarreddyl$ git grep "Test()"
DbConnect.java: public Test(){}
bhaskars-air:gitpractice bhaskarreddyl$ 

```

#git checkout <<Branch name>> : This will switch the branch.

Ex: git checkout development

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#git checkout -b <<Branch name>> : It will create the branch from currently using branch and will switch to new branch.

#git checkout -b feature master: It will create a branch called feature from master branch and will switch to new branch (featur).

#git checkout -b release-aadhar master: It will create a branch called relese-aadhar from master branch and will switch to new branch.

How to Rename a git branch name?

Ans) git branch -m <oldname> <newname>

Or, if you are already in the branch:

git branch -m <newname>

```

bhaskars-air:gitpractice bhaskarreddyl$ git branch
bugfix
* master
bhaskars-air:gitpractice bhaskarreddyl$ git branch -m bugfix bugfix
bhaskars-air:gitpractice bhaskarreddyl$ git branch
bugfix
* master
bhaskars-air:gitpractice bhaskarreddyl$ git checkout bugfix
Switched to branch 'bugfix'
bhaskars-air:gitpractice bhaskarreddyl$ git branch
bugfix
* bugfix
  master
bhaskars-air:gitpractice bhaskarreddyl$ git branch -m bugfixing
bhaskars-air:gitpractice bhaskarreddyl$ git branch
bugfixing
* bugfixing
  master
bhaskars-air:gitpractice bhaskarreddyl$

```

git branch : It will display all the local repo branches.

git branch -a : It will display all the remote and local repo branches.

git branch -r : It will display all the remote repo branches.

git config http.sslVerify false : To disable SSL verification for that singular repository

git config --global http.sslVerify false : To disable the SSL verification for Globally (For all repositories) --> Not suggested way

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git clone <<Git URL>> : To get the code from repository into your local machine.

git log : It will display the commit history.

s

git log -p -2 : which shows the difference introduced in each commit. You can also use -2, which limits the output to only the last two entries.

git log <FileName>: It will display the commits related to the specified file.

git log -2 StringUtilities.java: It will display 2 commit ids related to the StringUtilities.java file.

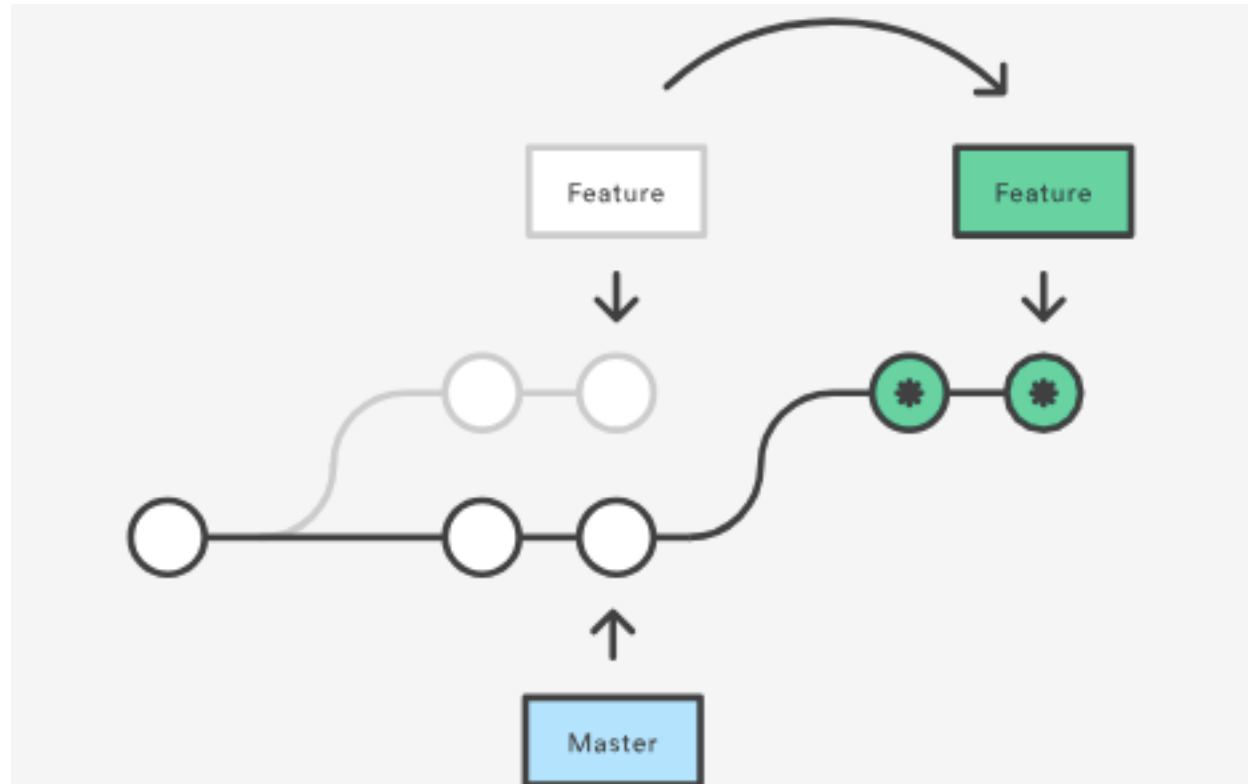
git log --stat: It will give all the files which are altered and number of lines that were added or deleted from each item.

git log --graph --decorate: --graph flag draws a text-based graph of commits on left side of commit message. --decorate adds names of branches or tags of commits shown.

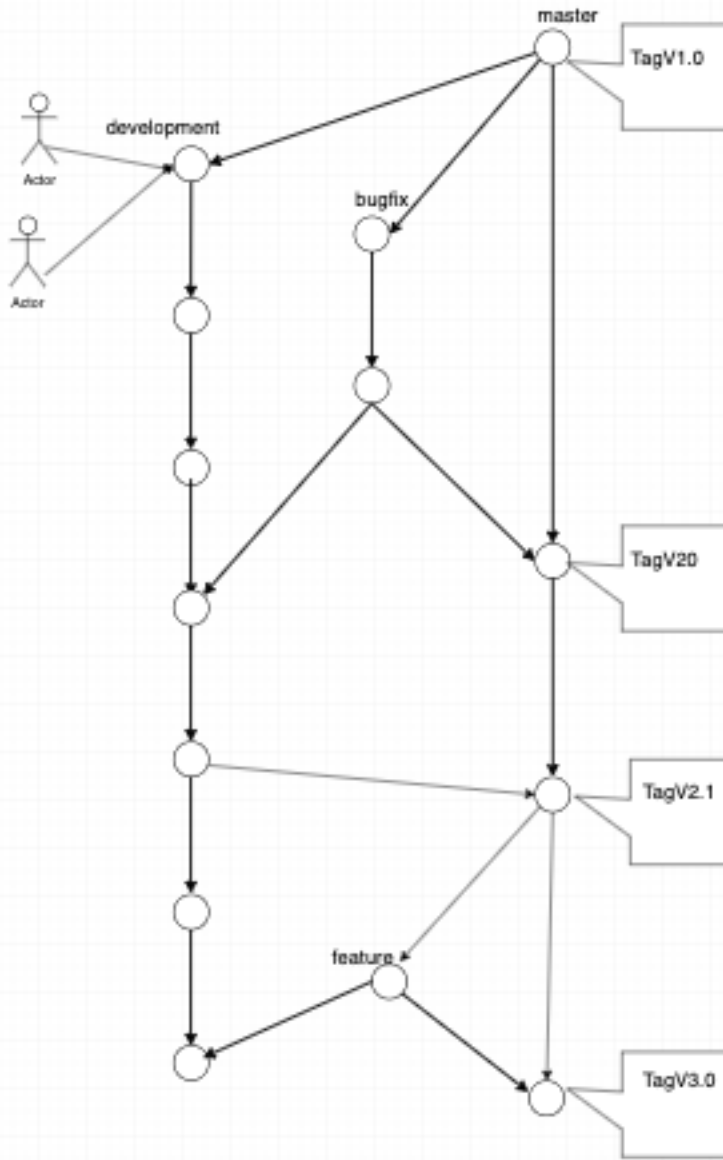
git log --author="devopstrainingblr@gmail.com": It will display all the commits which are committed by a particular author.

git rm: Removes files from your index and your working directory so they will not be tracked.

What is git rebase?



Git Branching Strategy



Git Hooks

Git Hooks are the scripts which trigger when you perform a specific action in Git.

These are useful to automate the tasks.

Ex: When you create a Git Hook to run commit validation every time you commit code.

There are Two types of git hooks.

- 1) Client-Side Hooks
- 2) Server-Side Hooks

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Client-Side Hooks are triggered by operations such as committing and merging.
Server-Side Hooks are triggered by network operations such as receiving pushed commits.

After you are initialising the git repo, using git init command, it will create a one folder called .git and it contains some sub folders called hooks, branches, info, objects... etc

There are some predefined client-side hooks are available in hooks folder.

```

applypatch-msg.sample
post-update.sample
pre-push.sample
prepare-commit-msg.sample
commit-msg.sample
pre-applypatch.sample
pre-rebase.sample
update.sample
fsmonitor-watchman.sample
pre-commit.sample
pre-receive.sample

```

To enable any hook from above list, remove the “.sample” from each hook.

Ex:

To enable pre-commit.sample hook, rename this file to "pre-commit".

<https://git-scm.com/book/en/v2/Customizing-Git-Git-Hooks>

README.md

You can add a README file to your repository to tell other people why your project is useful, what they can do with your project, and how they can use it.

A README is often the first item a visitor will see when visiting your repository. README files typically include information on:

- What the project does
- Why the project is useful
- How users can get started with the project
- Where users can get help with your project
- Who maintains and contributes to the project

Project Title

One Paragraph of project description goes here

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Getting Started

These instructions will get you a copy of the project up and running on your local machine for development and testing purposes. See deployment for notes on how to deploy the project on a live system.

Prerequisites

What things you need to install the software and how to install them
Give examples

Installing

A step by step series of examples that tell you how to get a development env running
Say what the steps will be.

Give the examples.
End with an example of getting some data out of the system or using it for a little demo

Running the tests

Explain how to run the automated tests for this system

Deployment

Add additional notes about how to deploy this on a live system

Versioning

Use versioning for each release and keep track of versions.

<https://semver.org/>

Authors

Add here Authors names.

License

Add the License here.

<https://gist.github.com/PurpleBooth/109311bb0361f32d87a2>

Git Best Practices

Use branching strategy and pull requests

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Commit once you finish the task.

Avoid merge commits.

Don't Commit Half-Done Work

Test your code before commit.

Write Good Commit Messages before you are committing

Try to use git commands rather than GUI tools.

Resources:

<https://github.com/>
<https://git-scm.com/book/en/v2/Getting-Started-First-Time-Git-Setup>
<https://www.atlassian.com/git/tutorials/comparing-workflows/>
<https://git-scm.com/book/en/v2/Git-Branching-Basic-Branching-and-Merging>
<http://www.vogella.com/tutorials/Git/article.html>
<https://help.github.com/articles/duplicating-a-repository/>
<https://www.atlassian.com/git/tutorials/git-stash>
<https://nathanhoad.net/tags/git>
<http://rogerdudler.github.io/git-guide>
<http://nvie.com/posts/a-successful-git-branching-model/>
<https://www.git-tower.com/blog/git-cheat-sheet/>

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