Git
Revision Control

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Abstract

Git is a free and open source distributed version control system designed to handle everything from small to very large projects with speed and efficiency.

Git is easy to learn and has a tiny footprint with lightning fast performance. It outclasses SCM tools like Subversion, CVS, Perforce, and ClearCase with features like cheap local branching, convenient staging areas, and multiple workflows.[1]

[1] Git - https://git-scm.com/

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- **Branch** - [FIXME: Need data]
- **Git** - Quoting Linus: I'm an egotistical bastard, and I name all my projects after myself. First 'Linux', now 'Git'. ('git' is British slang for "pig headed, think they are always correct, argumentative").[2]
- **Repo** - "The multiple repository tool. Repo is a tool that we built on top of Git. Repo helps us manage the many Git repositories, does the uploads to our revision control system, and automates parts of the Android development workflow. Repo is not meant to replace Git, only to make it easier to work with Git in the context of Android. The repo command is an executable Python script that you can put anywhere in your path."
  https://code.google.com/p/git-repo/
- **Tag** - [FIXME: Need data]

[2] Git FAQ
https://git.wiki.kernel.org/index.php/GitFaq#Why_the_.27Git.27_name.3F

Introduction

Git is a distributed revision control system with an emphasis on speed,[3] data integrity,[4] and support for distributed, non-linear workflows.[5] Git was initially designed and developed by Linus Torvalds for Linux kernel development in 2005, and has since become one of the most widely adopted version control systems for software development.[6]

As with most other distributed revision control systems, and unlike most clientserver systems, every Git working directory is a full-fledged repository with complete history and full version-tracking capabilities, independent of network access or a central server.[7] Like the Linux kernel, Git is free software distributed under the terms of the GNU General Public License version 2.[8]

[3] Torvalds, Linus (2005-04-07). "Re: Kernel SCM saga..." linux-kernel (Mailing list). "So I'm writing some scripts to try to track things a whole lot faster."

[4] Torvalds, Linus (2007-06-10). "Re: fatal: serious inflate inconsistency". git (Mailing list). A brief description of Git's data integrity design goals.

[5] Linus Torvalds (2007-05-03). Google tech talk: Linus Torvalds on git. Event occurs at 02:30. Retrieved 2007-05-16.

[6] "Eclipse Community Survey 2014 results — Ian Skerrett". Ianskerrett.wordpress.com. 2014-06-23. Retrieved 2014-06-23.

[7] Chacon, Scott (24 December 2014). Pro Git (2nd ed.). New York, NY: Apress. pp. 2930. ISBN 978-1484200773.

[8] Git (software), From Wikipedia, the free encyclopedia, https://en.wikipedia.org/wiki/Git_(software)

Command Reference

Command	Description
`add`	Add file contents to the index
`apply`	Apply a patch to files and/or to the index
`clone`	Get a complete copy of a repository
`commit`	Record changes to the repository
`pull`	Fetch from and integrate with another repository or a local branch
`push`	Update remote refs along with associated objects
`rebase`	Forward-port local commits to the updated upstream head
`status`	Show the working tree status

Table 1: Commands

Add

Add file contents to the index

This command updates the index using the current content found in the working tree, to prepare the content staged for the next commit. It typically adds the current content of existing paths as a whole, but with some options it can also be used to add content with only part of the changes made to the working tree files applied, or remove paths that do not exist in the working tree anymore.[9]

Examples

Create and add `.repo/manifests/default.xml` file and `.repo/manifests/manifest.xml`

```
covellite:~/git/.repo/manifests$ git add default.xml
covellite:~/git/.repo/manifests$ git commit default.xml
covellite:~/git/.repo/manifests$ cd ..
covellite:~/git/.repo/$ ln -s manifests/default.xml manifest.xml
covellite:~/git/.repo/$ git add manifest.xml
covellite:~/git/.repo/$ git commit
```

[9] git-add - Add file contents to the index
https://git-scm.com/docs/git-add

Clone

To grab a complete copy of another user's repository, use git clone like this:

```
$ git clone https://github.com/USERNAME/REPOSITORY.git
# Clones a repository to your computer
```

When you run `git clone`, the following actions occur:
> A new folder called repo is made
> It is initialized as a Git repository
> A remote named origin is created, pointing to the URL you cloned from
> All of the repository's files and commits are downloaded there
> The default branch (usually called master) is checked out

For every branch `foo` in the remote repository, a corresponding remote-tracking branch `refs/remotes/origin/foo` is created in your local repository. You can usually abbreviate such remote-tracking branch names to `origin/foo`.[10]

Examples

To clone repository named `git` from GitHub to local `covellite` workstation:

```
covellite:~$ git clone https://github.com/marcilr/git.git
Cloning into 'git'...
warning: You appear to have cloned an empty repository.
Checking connectivity... done.
covellite:~$
```

[10] Fetching a remote, `git clone`, `git fetch`, `git merge`, `git pull`, https://help.github.com/articles/fetching-a-remote/

Clone `.repo` repository into `git/` directory:

```
covellite:~/git$ git clone https://github.com/marcilr/.repo
Cloning into '.repo'...
warning: You appear to have cloned an empty repository.
Checking connectivity... done.
covellite:~/git$
```

To clone a Git repository over SSH, you can specify ssh:// URL like this:

```
$ git clone ssh://user@server/project.git
```

Or you can use the shorter scp-like syntax for the SSH protocol:

```
$ git clone user@server:project.git
```

You can also not specify a user, and Git assumes the user you're currently logged in as.[11]

[FIXME: Need more commands here.]

Remotes

"To be able to collaborate on any Git project, you need to know how to manage your remote repositories. Remote repositories are versions of your project that are hosted on the Internet or network somewhere. You can have several of them, each of which generally is either read-only or read/write for you. Collaborating with others involves managing these remote repositories and pushing and pulling data to and from them when you need to share work. Managing remote repositories includes knowing how to add remote repositories, remove remotes that are no longer valid, manage various remote branches and define them as being tracked or not, and more. In this section, well cover some of these remote-management skills."[12]

Remote Repositories

GitHub's collaborative approach to development depends on publishing commits from your local repository for other people to view, fetch, and update.[13]

A remote URL is Git's fancy way of saying "the place where your code is stored." That URL could be your repository on GitHub, or another user's fork, or even on a completely different server.

You can only push to two types of URL addresses:

> An HTTPS URL like `https://github.com/user/repo.git`
> An SSH URL, like `git@github.com:user/repo.git`

Git associates a remote URL with a name, and your default remote is usually called origin.

[11] Git on the Server - The Protocols, The SSH Protocol, https://git-scm.com/book/en/v2/Git-on-the-Server-The-Protocols

[12] Git Basics - Working with Remotes, http://git-scm.com/book/en/v2/Git-Basics-Working-with-Remotes

[13] About remote repositories, https://help.github.com/articles/about-remote-repositories/

Remote Commands

Command	Description
`remote add`	Add a new remote in the directory your repository is stored at.
`remote set-url`	Change a remote's URL.
`remote rename`	Rename an existing remote.
`remote rm`	Remove a remote URL from your repository.

Table 2: Remote Commands

For further reading see "Working with Remotes" from the Pro Git book.[14]

[14]Pro Git book, http://git-scm.com/book/en/Git-Basics-Working-with-Remotes

git remote add

To add a new remote, use the `git remote add` command on the terminal, in the directory your repository is stored at.[15]

The `git remote add` command takes two arguments:
`$ git remote add <NAME> <REMOTE_URL>`

Where:

`<NAME>` - A remote name, for example, `origin`
`<REMOTE_URL>` - A remote URL, for example, `https://github.com/user/repo.git`

Git associates a remote URL with a name, and your default remote is usually called origin.[16]

Examples

```
# This associates the name origin with SSH URL for repo.git repository.
$ git remote add origin git@github.com:user/repo.git
```

Alternatively using https syntax:

```
$ git remote add origin https://github.com/user/repo.git
# Set a new remote

$ git remote -v
# Verify new remote
origin  https://github.com/user/repo.git (fetch)
origin  https://github.com/user/repo.git (push)
```

[15] Adding a remote, https://help.github.com/articles/adding-a-remote/
[16] About remote repositories, https://help.github.com/articles/about-remote-repositories/

git remote set-url

The `git remote set-url` command changes an existing remote repository URL.[17]

The git remote set-url command takes two arguments:
> An existing remote name. For example, `origin` or `upstream` are two common choices.
> A new URL for the remote. For example:

> If you're updating to use HTTPS, your URL might look like:
`https://github.com/USERNAME/OTHERREPOSITORY.git`

> If you're updating to use SSH, your URL might look like:
`git@github.com:USERNAME/OTHERREPOSITORY.git`

Switching remote URLs from SSH to HTTPS

1. Open Terminal (for Mac and Linux users) or the command prompt (for Windows users).[18]
2. Change the current working directory to your local project.
3. List your existing remotes in order to get the name of the remote you want to change.

```
$ git remote -v
# origin  git@github.com:USERNAME/REPOSITORY.git (fetch)
# origin  git@github.com:USERNAME/REPOSITORY.git (push)
```

4. Change your remote's URL from SSH to HTTPS with the git remote set-url command.

```
$ git remote set-url origin \
https://github.com/USERNAME/OTHERREPOSITORY.git
```

5. Verify that the remote URL has changed.

```
$ git remote -v
# Verify new remote URL
# origin  https://github.com/USERNAME/OTHERREPOSITORY.git (fetch)
# origin  https://github.com/USERNAME/OTHERREPOSITORY.git (push)
```

[17] Changing a remote's URL, https://help.github.com/articles/changing-a-remote-s-url/
[18] Switching remote URLs from HTTPS to SSH, https://help.github.com/articles/changing-a-remote-s-url/

Switching remote URLs from HTTPS to SSH

1. Open Terminal (for Mac and Linux users) or the command prompt (for Windows users).[19]

2. Change the current working directory to your local project.

3. List your existing remotes in order to get the name of the remote you want to change.

```
$ git remote -v
origin  https://github.com/USERNAME/REPOSITORY.git (fetch)
origin  https://github.com/USERNAME/REPOSITORY.git (push)
```

4. Change your remote's URL from HTTPS to SSH with the git remote set-url command.

```
$ git remote set-url origin \
git@github.com:USERNAME/OTHERREPOSITORY.git
```

5. Verify that the remote URL has changed.

```
$ git remote -v
# Verify new remote URL
origin  git@github.com:USERNAME/OTHERREPOSITORY.git (fetch)
origin  git@github.com:USERNAME/OTHERREPOSITORY.git (push)
```

git remote rename

Use the git remote rename command to rename an existing remote.[20]

The git remote rename command takes two arguments:

> An existing remote name, for example, origin A new name for the
> remote, for example, destination

[19] Switching remote URLs from HTTPS to SSH, https://help.github.com/articles/changing-a-remote-s-url/
[20] Renaming a remote, https://help.github.com/articles/renaming-a-remote/

Example
The examples below assume you're cloning using HTTPS, which is recommended.

```
$ git remote -v
# View existing remotes
origin  https://github.com/OWNER/REPOSITORY.git (fetch)
origin  https://github.com/OWNER/REPOSITORY.git (push)

$ git remote rename origin destination
# Change remote name from 'origin' to 'destination'

$ git remote -v
# Verify remote's new name
destination  https://github.com/OWNER/REPOSITORY.git (fetch)
destination  https://github.com/OWNER/REPOSITORY.git (push)
```

git remote rm

Use the `git remote rm` command to remove a remote URL from your repository.[21]

The `git remote rm` command takes one argument:

> A remote name, for example, destination

Example

The examples below assume you're cloning using HTTPS, which is recommended.

```
$ git remote -v
# View current remotes
origin  https://github.com/OWNER/REPOSITORY.git (fetch)
origin  https://github.com/OWNER/REPOSITORY.git (push)
destination  https://github.com/FORKER/REPOSITORY.git (fetch)
destination  https://github.com/FORKER/REPOSITORY.git (push)

$ git remote rm destination
# Remove remote
$ git remote -v
# Verify it's gone
origin  https://github.com/OWNER/REPOSITORY.git (fetch)
origin  https://github.com/OWNER/REPOSITORY.git (push)
```

Note: `git remote rm` does not delete the remote repository from the server. It simply removes the remote and its references from your local repository.

[21] Removing a remote, https://help.github.com/articles/removing-a-remote/

The SSH Protocol

A common transport protocol for Git when self-hosting is over SSH. This is because SSH access to servers is already set up in most places and if it isnt, it's easy to do. SSH is also an authenticated network protocol; and because its ubiquitous, it's generally easy to set up and use.

To clone a Git repository over SSH, you can specify ssh:// URL like this:

```
$ git clone ssh://user@server/project.git
```

Or you can use the shorter scp-like syntax for the SSH protocol:

```
$ git clone user@server:project.git
```

You can also not specify a user, and Git assumes the user youre currently logged in as.

The Pros

The pros of using SSH are many. First, SSH is relatively easy to set up SSH daemons are commonplace, many network admins have experience with them, and many OS distributions are set up with them or have tools to manage them. Next, access over SSH is secure all data transfer is encrypted and authenticated. Last, like the HTTP/S, Git and Local protocols, SSH is efficient, making the data as compact as possible before transferring it.

The Cons

The negative aspect of SSH is that you cant serve anonymous access of your repository over it. People must have access to your machine over SSH to access it, even in a read-only capacity, which doesnt make SSH access conducive to open source projects. If youre using it only within your corporate network, SSH may be the only protocol you need to deal with. If you want to allow anonymous read-only access to your projects and also want to use SSH, youll have to set up SSH for you to push over but something else for others to fetch over.[22]

[22] Ibid.

Branching & Tagging

In short: Best practice is branch out, merge often and keep always in sync.

There are pretty clear conventions about keeping your code in a separate branches from master branch:

1. You are about to make an implementation of major or disruptive change
2. You are about to make some changes that might not be used
3. You want to experiment on something that you are not sure it will work
4. When you are told to branch out, others might have something they need to do in master

Rule of thumb is after branching out, you should keep in sync with the master branch. Because eventually you need to merge it back to master. In order to avoid a huge complicated mess of conflicts when merging back, you should commit often, merge often.[23]

[23] Git branching and tagging best practices
http://programmers.stackexchange.com/questions/165725/git-branching-and-tagging-best-practices

Cloud Repository

A cloud repository provides easy access from distributed locations and alleviates backup issues. Candidates for a cloud repository include Bitbucket,[24] GitHub,[25] or Google Code.[26]

GitHub

[FIXME: Still need cli list, rename, and delete functionality.]

Create a Github Repo from the Command Line

Creating a GitHub repository from the command line is incredibly convenient.

Googled up some simple shell script to create GitHub repo via command line:

```
"curl -u $username:$token" https://api.github.com/user/repos \
-d '{"name":"'$repo_name'"}'}
```

To use, you could simply replace `$username` with your GitHub username, `$token` with a Personal Access Token[27] for the same user (available for generation in your GitHub Settings > Applications), and `$repo_name` with your desired new Repository name.[28]

Creating a repo from the command line is definitely faster than going to Github and using the web app to get the job done, but in order to truly make this task speedy, we need some Bash programming.

[24] Bitbucket - Code, Manage, Collaborate, Bitbucket is the Git solution for professional teams
https://bitbucket.org/

[25] GitHub - Where software is built
https://github.com/

[26] Google Code - Provides a free collaborative development environment for open source projects.
https://code.google.com/

[27] GitHub supports Personal access tokens, under Settings, click Personal access tokens. Personal access tokens function like ordinary OAuth access tokens. They can be used instead of a password for Git over HTTPS, or can be used to authenticate to the API over Basic Authentication. I set mine to the usual:)
https://github.com/settings/tokens

[28] Create a Github Repo from the Command Line, by Eli Fatsi - Jan 29, 2014,
https://viget.com/extend/create-a-github-repo-from-the-command-line

```
github-create() {
  repo_name=$1

  dir_name=‘basename $(pwd)‘

  if [ "$repo_name" = "" ]; then
    echo "Repo name (hit enter to use ’$dir_name’)?"
    read repo_name
  fi

  if [ "$repo_name" = "" ]; then
    repo_name=$dir_name
  fi

  username=‘git config github.user‘
  if [ "$username" = "" ]; then
    echo "Could not find username, run ’git config \
    --global github.user <username>’"
    invalid_credentials=1
  fi

  token=‘git config github.token‘
  if [ "$token" = "" ]; then
    echo "Could not find token, run ’git config \
    --global github.token <token>’"
    invalid_credentials=1
  fi

  if [ "$invalid_credentials" == "1" ]; then
    return 1
  fi

  echo -n "Creating Github repository ’$repo_name’ ..."
  curl -u "$username:$token" https://api.github.com/user/repos \
  -d ’{"name":"’$repo_name’"}’ > /dev/null 2>&1
  echo " done."

  echo -n "Pushing local code to remote ..."
  git remote add origin git@github.com:$username/$repo_name.git \
  > /dev/null 2>&1
  git push -u origin master > /dev/null 2>&1
  echo " done."
}
```

Plop this function into your `~/.bash_profile`, open a new Terminal window or source `~/.bash_profile`, and the function will be loaded up and ready for use.

Then while in an existing git project, running `github-create` will create the repo and push your master branch up in one shot. You will need to set some github config variables (instructions will be spit out if you don't have them). Heres an example:

```
BASH:projects $ rails new my_new_project
  ..... (a whole lot of generated things)
BASH:projects $ cd my_new_project/
BASH:my_new_project $ git init && git add . && git commit \
-m 'Initial commit'
 ..... (a whole lot of git additions)
BASH:my_new_project $ github-create
  Repo name (hit enter to use 'my_new_project')?

  Creating Github repository 'my_new_project' ... done.
  Pushing local code to remote ... done.
```

Had I called the function with an argument `github-create my_project` then it would have used the argument and skipped the Repo name question.[29]

On GCI Network Services, OSS `covellite` Debian jessie 8.2 workstation the `gtihub-create` did not execute. Put github-create() into a standalone `~/gtihub-create` script with call to `gtihub-create()` under main.

Tested with:

```
$ mkdir ~/quux
$ cd ~/quux
$ git init
Initialized empty Git repository in /home/marcilr/quux/.git/
$ github-create
Repo name (hit enter to use 'quux')?

Could not find username, run 'git config --global github.user <username>'
Could not find token, run 'git config --global github.token <token>'
$
```

[29] Create a Github Repo from the Command Line, by Eli Fatsi - Jan 29, 2014, https://viget.com/extend/create-a-github-repo-from-the-command-line

Configured the GetHub username and token to alleviate GutHub credential errors:

```
$ git config --global github.user marcilr
$ git config --global github.token <token>
```

Was then able to run `~/github-create` successfully:

```
$ cd ~/quux/
$ github-create
Repo name (hit enter to use 'quux')? <enter>

Creating Github repository 'quux' ... done.
Pushing local code to remote ... done.
$
```

Checking GtiHub via online access I found the new `quux` repo.

[FIXME: Need Bitbucket vs. GitHub section]

Repo

"Repo is a repository management tool that we built on top of Git. Repo unifies the many Git repositories when necessary, does the uploads to a revision control system, and automates parts of the development workflow. Repo is not meant to replace Git, only to make it easier to work with Git in the context of Android. The `repo` command is an executable Python script that you can put anywhere in your path. In working with source files, you will use Repo for across-network operations. For example, with a single Repo command you can download files from multiple repositories into your local working directory."[30]

[FIXME: The above `repo` quote has been heavily modified. Need to rewrite with original verbage.]

`.repo/` subdirectory

The `.repo/` subdirectory, located in the repository base, holds repo configuration. The configuration includes a manifest with information about all the projects and where their associated git repositories are located.

Files within the `.repo/` subdirectory includes:

```
manifests/
manifests.git
manifest.xml -> manifests/default.xml
project-objects
projects/
repo/
```

To create the `.repo/` subdirectory:

```
$ cd <my_repo>
$ mkdir .repo/
$
```

Manifest

The repo keeps a manifest, "within the hidden directory named '.repo'," in "a git project named '`manifests`' which usually contains a file named '`default.xml`'. This file contains information about all the projects and where their associated git repositories are located. This file is also versioned thus when you use the '`repo init -b XYZ`' command it will be reverted and you can back to older branches that may have added/removed git projects compared to the head."[31]

[30] Developing – http://source.android.com/source/developing.html

[31] How does the Android repo manifest repository work?
http://stackoverflow.com/questions/6149725/how-does-the-android-repo-manifest-repository-work

The `default.xml` file is symlinked to `.repo/manifest.xml` and is created when the repo was initialized using:

```
repo init -u <manifest path>
```

Examples

Following is a manifest, in `.repo/manifests/default.xml` file, showing use of GitHub with username, ssh:// URL syntax, and 3 project repos with different usernames:[32]

```
<?xml version="1.0" encoding="UTF-8"?>
<manifest>
  <remote name="origin" fetch="ssh://git@github.com/" />
  <default revision="master" remote="origin" />

  <project path="lib/plist-lib"
           name="keiji/AndroidPListLib.git" remote="origin" />

  <project path="lib/json-pull-parser"
           name="vvakame/JsonPullParser.git" remote="origin" />

  <project path="apps/twicca_megane_plugin"
           name="zaki50/TwiccaMeganePlugin.git" remote="origin" />
</manifest>
```

[32]Keiji Ariyama, https://github.com/keiji/repo-sample/blob/master/default.xml

Commands

Repo usage takes the following form:[33]

```
repo <COMMAND> <OPTIONS>
```

Optional elements are shown in brackets [ ]. For example, many commands take a project list as an argument. You can specify project-list as a list of names or a list of paths to local source directories for the projects:

```
repo sync [<PROJECT0> <PROJECT1> <PROJECTN>]
repo sync [</PATH/TO/PROJECT0> ...  </PATH/TO/PROJECTN>]
```

Once Repo is installed, you can find the latest documentation starting with a summary of all commands by running:

```
repo help
```

You can get information about any command by running this within a Repo tree:

```
repo help <COMMAND>
```

NOTE: For `repo` commands without syntax here see the Repo command reference.[34]

[33] Repo command reference
https://source.android.com/source/using-repo.html#help

[34] Ibid.

Command	Description
abandon	Permanently abandon a development branch
branch	View current topic branches
branches	View current topic branches
checkout	Checkout a branch for development
cherry-pick	Cherry-pick a change
diff	Show changes between commit and working tree
diffmanifests	Manifest diff utility
download	Download and checkout a change
grep	Print lines matching a pattern
forall	Executes the given shell command in each project.[35]
help	Display detailed help on a command
info	Get info on the manifest branch, current branch or unmerged branches
init	Install repo in the current working directory
list	List projects and their associated directories
overview	Display overview of unmerged project branches
prune	Prune (delete) already merged topics
rebase	Rebase local branches on upstream branch
start	Start a new branch for development
status	Show the working tree status
sync	Update working tree to the latest revision
upload	Upload changes for code review

Table 3: Repo Commands

init

`$ repo init -u <URL> [<OPTIONS>]`
Installs Repo in the current directory. This creates a `.repo/` directory that contains Git repositories for the Repo source code and the standard Android manifest files. The `.repo/` directory also contains `manifest.xml`, which is a symlink to the selected manifest in the `.repo/manifests/` directory.[36]

Command	Description
-u	Specify a URL from which to retrieve a manifest repository. The common manifest can be found at: `https://android.googlesource.com/platform/manifest`
-m	Select a manifest file within the repository. If no manifest name is selected, the default is default.xml.
-b	Specify a revision, i.e., a particular manifest-branch.

Table 4: init Options

Examples

This will create a new place to hold your local copy of the source tree. "url" should point to a Manifest repository that describes the whole sources. It is a special project with a file (default.xml) that lists all the projects that Android is made of. In the Manifest file, each projects has attributes about: where to place it in the tree, where to download it from (git server), revision that will be used (usually a branch name, tag or commit sha-id).[37]

```
repo init -u <url> -b <branch>
```

Note: For all remaining Repo commands, the current working directory must either be the parent directory of `.repo/` or a subdirectory of the parent directory.[38]

[FIXME: Need example of GitHub checkout]

[36]Repo command reference – https://source.android.com/source/using-repo.html
[37]Repo: Tips & Tricks,
http://xda-university.com/as-a-developer/repo-tips-tricks
[38]Repo command reference – https://source.android.com/source/using-repo.html

Appendix

A successful Git branching model
by Vincent Driessen on Tuesday, January 05, 2010
Fine branching diagram here.
http://nvie.com/posts/a-successful-git-branching-model/

Bitbucket vs. GitHub: Which project host has the most?
The right choice boils down to a number of factors – you might even consider using both
http://www.infoworld.com/article/2611771/application-development/application-development-bitbucket-v

Developing
Has Repo and Gerrit details with syntax and examples.
http://source.android.com/source/developing.html

Fetching a remote
> `git clone`
> `git fetch`
> `git merge`
> `git pull`
https://help.github.com/articles/fetching-a-remote/

Git
https://git-scm.com/

Git (software)
From Wikipedia, the free encyclopedia
https://en.wikipedia.org/wiki/Git_(software)

Git About
https://git-scm.com/about

Git branching and tagging best practices
Excellent details and semantics.
http://programmers.stackexchange.com/questions/165725/git-branching-and-tagging-best-practices

Git FAQ
https://git.wiki.kernel.org/index.php/GitFaq

Git on the Server - The Protocols, The SSH Protocol
The Git Book
https://git-scm.com/book/en/v2/Git-on-the-Server-The-Protocols

Git (software)
From Wikipedia, the free encyclopedia
https://en.wikipedia.org/wiki/Git_(software)

Git repositories on gerrit
https://gerrit.googlesource.com/

GitHub
Project host
https://github.com/

How does the Android repo manifest repository work?
http://stackoverflow.com/questions/6149725/how-does-the-android-repo-manifest-repository-work

Installing Repo
http://source.android.com/source/downloading.html#installing-repo

Manifest Format for repo
https://gerrit.googlesource.com/git-repo/+/master/docs/manifest-format.txt

Pro Git (the git book)
Available as pdf, epub, mobi, and html.
http://git-scm.com/book/en/v2/

Re: repo + private repositories in github
Details on manifest for google repo use.
https://groups.google.com/forum/embed/#!topic/repo-discuss/kCXO-NdFvj4

Repo Command Reference
Using Repo and Git - very useful details here.
http://source.android.com/source/using-repo.html

Repo: Tips & Tricks
http://xda-university.com/as-a-developer/repo-tips-tricks

repo - The multiple repository tool
https://code.google.com/p/git-repo/

Set Up Git
>Creating a repository
>Forking a repository
>Being social
https://help.github.com/articles/set-up-git/