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GitPython is a python library used to interact with git repositories, high-level like git-porcelain, or low-level like git-plumbing.

It provides abstractions of git objects for easy access of repository data, and additionally allows you to access the git repository more directly using either a pure python implementation, or the faster, but more resource intensive git command implementation.

The object database implementation is optimized for handling large quantities of objects and large datasets, which is achieved by using low-level structures and data streaming.

1.1 Requirements

- **Python >= 3.6**
- **Git 1.7.0 or newer** It should also work with older versions, but it may be that some operations involving remotes will not work as expected.
- **GitDB - a pure python git database implementation**

1.2 Installing GitPython

Installing GitPython is easily done using pip. Assuming it is installed, just run the following from the command-line:

```
# pip install GitPython
```

This command will download the latest version of GitPython from the Python Package Index and install it to your system. More information about pip and pypi can be found here:

- install pip
- pypi

Alternatively, you can install from the distribution using the `setup.py` script:
# python setup.py install

**Note:** In this case, you have to manually install GitDB as well. It would be recommended to use the `git source repository` in that case.

## 1.3 Limitations

### 1.3.1 Leakage of System Resources

GitPython is not suited for long-running processes (like daemons) as it tends to leak system resources. It was written in a time where destructors (as implemented in the `__del__` method) still ran deterministically.

In case you still want to use it in such a context, you will want to search the codebase for `__del__` implementations and call these yourself when you see fit.

Another way assure proper cleanup of resources is to factor out GitPython into a separate process which can be dropped periodically.

## 1.4 Getting Started

- *GitPython Tutorial* - This tutorial provides a walk-through of some of the basic functionality and concepts used in GitPython. It, however, is not exhaustive so you are encouraged to spend some time in the API Reference.

## 1.5 API Reference

An organized section of the GitPython API is at *API Reference*.

## 1.6 Source Code

GitPython’s git repo is available on GitHub, which can be browsed at:

- [https://github.com/gitpython-developers/GitPython](https://github.com/gitpython-developers/GitPython)

and cloned using:

```
$ git clone https://github.com/gitpython-developers/GitPython git-python
```

Initialize all submodules to obtain the required dependencies with:

```
$ cd git-python
$ git submodule update --init --recursive
```

Finally verify the installation by running unit tests:

```
$ python -m unittest
```
1.7 Questions and Answers

Please use stackoverflow for questions, and don’t forget to tag it with *gitpython* to assure the right people see the question in a timely manner.

http://stackoverflow.com/questions/tagged/gitpython

1.8 Issue Tracker

The issue tracker is hosted by GitHub:

https://github.com/gitpython-developers/GitPython/issues

1.9 License Information

GitPython is licensed under the New BSD License. See the LICENSE file for more information.
GitPython provides object model access to your git repository. This tutorial is composed of multiple sections, most of which explains a real-life usecase.

All code presented here originated from test_docs.py to assure correctness. Knowing this should also allow you to more easily run the code for your own testing purposes, all you need is a developer installation of git-python.

## 2.1 Meet the Repo type

The first step is to create a `git.Repo` object to represent your repository.

```python
from git import Repo

devel_repo = Repo(self.rorepo.working_tree_dir)
assert not repo.is_bare
```

In the above example, the directory `self.rorepo.working_tree_dir` equals `/Users/mtrier/Development/git-python` and is my working repository which contains the `.git` directory. You can also initialize GitPython with a `bare` repository.

```python
bare_repo = Repo.init(os.path.join(rw_dir, 'bare-repo'), bare=True)
assert bare_repo.is_bare
```

A repo object provides high-level access to your data, it allows you to create and delete heads, tags and remotes and access the configuration of the repository.

```python
repo.config_reader()                  # get a config reader for read-only access
with repo.config_writer():          # get a config writer to change configuration
    pass                            # call release() to be sure changes are written and
LOCKS ARE RELEASED
```
Query the active branch, query untracked files or whether the repository data has been modified.

```python
assert not bare_repo.is_dirty()  # check the dirty state
repo.untracked_files  # retrieve a list of untracked files
#'my_untracked_file'
```

Clone from existing repositories or initialize new empty ones.

```python
cloned_repo = repo.clone(os.path.join(rw_dir, 'to/this/path'))
assert cloned_repo.__class__ is Repo  # clone an existing repository
assert Repo.init(os.path.join(rw_dir, 'path/for/new/repo')).__class__ is Repo
```

Archive the repository contents to a tar file.

```python
with open(os.path.join(rw_dir, 'repo.tar'), 'wb') as fp:
    repo.archive(fp)
```

### 2.1.1 Advanced Repo Usage

And of course, there is much more you can do with this type, most of the following will be explained in greater detail in specific tutorials. Don’t worry if you don’t understand some of these examples right away, as they may require a thorough understanding of git’s inner workings.

Query relevant repository paths …

```python
assert os.path.isdir(cloned_repo.working_tree_dir)  # directory with
    →your work files
assert cloned_repo.git_dir.startswith(cloned_repo.working_tree_dir)  # directory
    →containing the git repository
assert bare_repo.working_tree_dir  # bare,
    →repositories have no working tree
```

**Heads** Heads are branches in git-speak. **References** are pointers to a specific commit or to other references. Heads and **Tags** are a kind of references. GitPython allows you to query them rather intuitively.

```python
self.assertEqual(repo.head.ref, repo.heads.master,  # head is a sym-ref pointing to
    →master
    "It's ok if TC not running from 'master'.")
self.assertEqual(repo.tags['0.3.5'], repo.tag('refs/tags/0.3.5'))  # you can access
    →tags in various ways too
self.assertEqual(repo.refs.master, repo.heads['master'])  # .refs provides
    →all refs, ie heads ...
if 'TRAVIS' not in os.environ:
    self.assertEqual(repo.refs['origin/master'], repo.remotes.origin.refs.master)  # .
        →remotes ...
    self.assertEqual(repo.refs['0.3.5'], repo.tags['0.3.5'])  # ... and tags
```

You can also create new heads …

```python
new_branch = cloned_repo.create_head('feature')  # create a new branch ..
→.
assert cloned_repo.active_branch != new_branch  # which wasn't checked
→out yet ...
selfr.assertEqual(new_branch.commit, cloned_repo.active_branch.commit)  # pointing to
    →the checked-out commit
```

(continues on next page)
It's easy to let a branch point to the previous commit, without affecting anything:

```python
assert new_branch.set_commit('HEAD~1').commit == cloned_repo.active_branch.commit.
```

Else:

Each reference provides access to the git object it points to, usually commits.

You can traverse down to `git objects` through references and other objects. Some objects like `commits` have additional meta-data to query.

```python
assert now.commit.message != past.commit.message
```

You can read objects directly through binary streams, no working tree required.

```python
assert (now.commit.tree / 'VERSION').data_stream.read().decode('ascii').startswith('3 ')  # This is a tag-object pointing to $s
```

The tag points to the specified commit.

```python
self.assertEqual(past.commit, new_branch.commit)
```

And tags...

```python
past = cloned_repo.create_tag('past', ref=new_branch, message="This is a tag-object pointing to $s" % new_branch.name)
sel.assertEqual(past.commit, new_branch.commit)  # the tag points to the provided commit
assert past.tag.message.startswith("This is")  # and its object carries the message provided
```

```python
now = cloned_repo.create_tag('now')  # This is a tag-reference. It may not carry meta-data
assert now.tag is None
```

```python
You can traverse trees as well to handle all contained files of a particular commit:
```

```python
file_count = 0
tree_count = 0
tree = past.commit.tree
for item in tree.traverse():
    file_count += item.type == 'blob'
    tree_count += item.type == 'tree'
sel.assertEqual(file_count and tree_count,  # we have accumulated all directories and files
                len(tree.blobs) + len(tree.trees), len(tree))  # a tree is iterable on its children
```

Remotes allow to handle fetch, pull and push operations, while providing optional real-time progress information to progress delegates.

```python
from git import RemoteProgress

class MyProgressPrinter(RemoteProgress):
    def update(self, op_code, cur_count, max_count=None, message=' '):
        print(op_code, cur_count, max_count, cur_count / (max_count or 100.0),
        message or "NO MESSAGE")
```

```python
self.assertEqual(len(cloned_repo.remotes), 1)  # we have been cloned, so should be one remote
```

```python
self.assertEqual(len(bare_repo.remotes), 0)  # this one was just initialized
origin = bare_repo.create_remote('origin', url=cloned_repo.working_tree_dir)
```
assert origin.exists()
for fetch_info in origin.fetch(progress=MyProgressPrinter()):
    print("Updated %s to %s" % (fetch_info.ref, fetch_info.commit))
    # create a local branch at the latest fetched master. We specify the name statically,
    # but you have all
    # information to do it programatically as well.
bare_master = bare_repo.create_head('master', origin.refs.master)
bare_repo.head.set_reference(bare_master)
assert not bare_repo.delete_remote(origin).exists()
# push and pull behave very similarly

The index is also called stage in git-speak. It is used to prepare new commits, and can be used to keep results of merge operations. Our index implementation allows to stream date into the index, which is useful for bare repositories that do not have a working tree.

self.assertEqual(new_branch.checkout(), cloned_repo.active_branch)  # checking out
→ branch adjusts the wtree
self.assertEqual(new_branch.commit, past.commit)  # Now the past
→ is checked out

new_file_path = os.path.join(cloned_repo.working_tree_dir, 'my-new-file')
on(open(new_file_path, 'wb')).close()  # create new file in
→ working tree
cloned_repo.index.add([new_file_path])  # add it to the index
# Commit the changes to deviate masters history
cloned_repo.index.commit("Added a new file in the past - for later merege")

# prepare a merge
master = cloned_repo.heads.master  # right-hand side is ahead
→ of us, in the future
merge_base = cloned_repo.merge_base(new_branch, master)  # allows for a three-way
→ merge
cloned_repo.index.merge_tree(master, base=merge_base)  # write the merge result
→ into index
cloned_repo.index.commit("Merged past and now into future ;)
parent_commits=(new_branch.commit, master.commit))

# now new_branch is ahead of master, which probably should be checked out and reset
→ softly.
# note that all these operations didn’t touch the working tree, as we managed it
→ ourselves.
# This definitely requires you to know what you are doing ;)
assert os.path.basename(new_file_path) in new_branch.commit.tree  # new file is now
→ in tree
master.commit = new_branch.commit  # let master point to most recent commit
cloned_repo.head.reference = master  # we adjusted just the reference, not
→ the working tree or index

Submodules represent all aspects of git submodules, which allows you query all of their related information, and manipulate in various ways.

# create a new submodule and check it out on the spot, setup to track master branch
→ of 'bare_repo'
# As our GitPython repository has submodules already that point to GitHub, make sure
→ we don’t
# interact with them

(continues on next page)
for sm in cloned_repo.submodules:
    assert not sm.remove().exists()  # after removal, the sm doesn't exist anymore
sm = cloned_repo.create_submodule('mysubrepo', 'path/to/subrepo', url=bare_repo.git_
    --dir, branch='master')

# .gitmodules was written and added to the index, which is now being committed
cloned_repo.index.commit("Added submodule")
assert sm.exists() and sm.module_exists()  # this submodule is definitely available
sm.remove(module=True, configuration=False)  # remove the working tree
assert sm.exists() and not sm.module_exists()  # the submodule itself is still available

# update all submodules, non-recursively to save time, this method is very powerful,
cloned_repo.submodule_update(recursive=False)  # go have a look
assert sm.module_exists()  # The submodules working tree was checked out by update

2.2 Examining References

References are the tips of your commit graph from which you can easily examine the history of your project.

import git
repo = git.Repo.clone_from(self._small_repo_url(), os.path.join(rw_dir, 'repo'),
    branch='master')

heads = repo.heads
master = heads.master  # lists can be accessed by name for convenience
master.commit  # the commit pointed to by head called master
master.rename('new_name')  # rename heads
master.rename('master')

Tags are (usually immutable) references to a commit and/or a tag object.

tags = repo.tags
tagref = tags[0]
tagref.tag  # tags may have tag objects carrying additional information
ntagref.commit  # but they always point to commits
repo.delete_tag(tagref)  # delete or
repo.create_tag("my_tag")  # create tags using the repo for convenience

A symbolic reference is a special case of a reference as it points to another reference instead of a commit.

head = repo.head  # the head points to the active branch/ref
master = head.reference  # retrieve the reference the head points to
master.commit  # from here you use it as any other reference

Access the reflog easily.
log = master.log()
log[0]  # first (i.e. oldest) reflog entry
log[-1]  # last (i.e. most recent) reflog entry

2.3 Modifying References

You can easily create and delete reference types or modify where they point to.

```python
new_branch = repo.create_head('new')  # create a new one
new_branch.commit = 'HEAD~10'  # set branch to another commit without changing index or working trees
repo.delete_head(new_branch)  # delete an existing head - only works if it is not checked out
```

Create or delete tags the same way except you may not change them afterwards.

```python
new_tag = repo.create_tag('my_new_tag', message='my message')  # you cannot change the commit a tag points to. Tags need to be re-created
self.assertRaises(AttributeError, setattr, new_tag, 'commit', repo.commit('HEAD~1'))
repo.delete_tag(new_tag)
```

Change the symbolic reference to switch branches cheaply (without adjusting the index or the working tree).

```python
new_branch = repo.create_head('another-branch')
repo.head.reference = new_branch
```

2.4 Understanding Objects

An Object is anything storable in git’s object database. Objects contain information about their type, their uncompressed size as well as the actual data. Each object is uniquely identified by a binary SHA1 hash, being 20 bytes in size, or 40 bytes in hexadecimal notation.

Git only knows 4 distinct object types being Blobs, Trees, Commits and Tags.

In GitPython, all objects can be accessed through their common base, can be compared and hashed. They are usually not instantiated directly, but through references or specialized repository functions.

```python
hc = repo.head.commit
hct = hc.tree
hc != hct  # @NoEffect
hc != repo.tags[0]  # @NoEffect
hc == repo.head.reference.commit  # @NoEffect
```

Common fields are...

```python
self.assertEqual(hct.type, 'tree')  # preset string type, being a class attribute
assert hct.size > 0  # size in bytes
assert len(hct.hexsha) == 40
assert len(hct.binsha) == 20
```

Index objects are objects that can be put into git’s index. These objects are trees, blobs and submodules which additionally know about their path in the file system as well as their mode.
Access blob data (or any object data) using streams.

```python
hct.blobs[0].data_stream.read()  # stream object to read data from
hct.blobs[0].stream_data(open(os.path.join(rw_dir, 'blob_data'), 'wb'))  # write data to given stream
```

## 2.5 The Commit object

A commit object carries all sorts of meta-data

```python
assert len(headcommit.hexsha) == 40
assert len(headcommit.parents) > 0
assert headcommit.tree.type == 'tree'
assert len(headcommit.author.name) != 0
assert isinstance(headcommit.authored_date, int)
assert len(headcommit.committer.name) != 0
assert isinstance(headcommit.committed_date, int)
assert headcommit.message != ''
```

Note: date time is represented in a seconds since epoch format. Conversion to human readable form can be accomplished with the various time module methods.

```python
import time
time.asctime(time.gmtime(headcommit.committed_date))
time.strftime("%a, %d %b %Y %H:%M", time.gmtime(headcommit.committed_date))
```

You can traverse a commit’s ancestry by chaining calls to parents
assert headcommit.parents[0].parents[0].parents[0] == repo.commit('master^^^')

The above corresponds to master^^^ or master~3 in git parlance.

## 2.6 The Tree object

A tree records pointers to the contents of a directory. Let’s say you want the root tree of the latest commit on the master branch

```python
tree = repo.heads.master.commit.tree
assert len(tree.hexsha) == 40
```

Once you have a tree, you can get its contents

```python
assert len(tree.trees) > 0  # trees are subdirectories
assert len(tree.blobs) > 0  # blobs are files
assert len(tree.blobs) + len(tree.trees) == len(tree)
```

It is useful to know that a tree behaves like a list with the ability to query entries by name

```python
self.assertEqual(tree['smmap'], tree / 'smmap')  # access by index and by sub-path
for entry in tree:  # intuitive iteration of tree members
    print(entry)
blob = tree.trees[1].blobs[0]  # let's get a blob in a sub-tree
assert blob.name
assert len(blob.path) < len(blob.abspath)
self.assertEqual(tree.trees[1].name + '/' + blob.name, blob.path)  # this is how relative blob path generated
self.assertEqual(tree[blob.path], blob)  # you can use paths like 'dir/file' in tree
```

There is a convenience method that allows you to get a named sub-object from a tree with a syntax similar to how paths are written in a posix system

```python
assert tree / 'smmap' == tree['smmap']
assert tree / blob.path == tree[blob.path]
```

You can also get a commit's root tree directly from the repository

```python
# This example shows the various types of allowed ref-specs
assert repo.tree() == repo.head.commit.tree
past = repo.commit('HEAD~5')
assert repo.tree(past) == repo.tree(past.hexsha)
self.assertEqual(repo.tree('v0.8.1').type, 'tree')  # yes, you can provide any refspec - works everywhere
```

As trees allow direct access to their intermediate child entries only, use the traverse method to obtain an iterator to retrieve entries recursively

```python
assert len(tree) < len(list(tree.traverse()))
```
Note: If trees return Submodule objects, they will assume that they exist at the current head’s commit. The tree it originated from may be rooted at another commit though, that it doesn’t know. That is why the caller would have to set the submodule’s owning or parent commit using the `set_parent_commit(my_commit)` method.

2.7 The Index Object

The git index is the stage containing changes to be written with the next commit or where merges finally have to take place. You may freely access and manipulate this information using the `IndexFile` object. Modify the index with ease.

```python
index = repo.index
# The index contains all blobs in a flat list
assert len(list(index.iter_blobs())) == len([o for o in repo.head.commit.tree.
    ←traverse() if o.type == 'blob'])
# Access blob objects
for (_path, _stage), entry in index.entries.items():
    pass
new_file_path = os.path.join(repo.working_tree_dir, 'new-file-name')
open(new_file_path, 'w').close()  # add a new file to the index
index.add([new_file_path])
index.remove(["LICENSE"])  # remove an existing one
assert os.path.isfile(os.path.join(repo.working_tree_dir, 'LICENSE'))  # working tree is untouched
self.assertEqual(index.commit("my commit message").type, 'commit')  # commit changed index
repo.active_branch.commit = repo.commit('HEAD~1')  # forget last commit
from git import Actor
author = Actor("An author", "author@example.com")
committer = Actor("A committer", "committer@example.com")
# commit by commit message and author and committer
index.commit("my commit message", author=author, committer=committer)
```

Create new indices from other trees or as result of a merge. Write that result to a new index file for later inspection.

```python
from git import IndexFile
# loads a tree into a temporary index, which exists just in memory
IndexFile.from_tree(repo, 'HEAD~1')
# merge two trees three-way into memory
merge_index = IndexFile.from_tree(repo, 'HEAD~10', 'HEAD', repo.merge_base('HEAD~10', '"HEAD")
# and persist it
merge_index.write(os.path.join(rw_dir, 'merged_index'))
```

2.8 Handling Remotes

Remotes are used as alias for a foreign repository to ease pushing to and fetching from them.
empty_repo = git.Repo.init(os.path.join(rw_dir, 'empty'))
origin = empty_repo.create_remote('origin', repo.remotes.origin.url)
assert origin.exists()
assert origin == empty_repo.remotes.origin == empty_repo.remotes['origin']
origin.fetch() # assure we actually have data. fetch() returns_
—useful information
# Setup a local tracking branch of a remote branch
empty_repo.create_head('master', origin.refs.master) # create local branch "master"_
—from remote "master"
empty_repo.heads.master.set_tracking_branch(origin.refs.master) # set local "master",_
—to track remote "master"
empty_repo.heads.master.checkout() # checkout local "master" to working tree
# Three above commands in one:
empty_repo.create_head('master', origin.refs.master).set_tracking_branch(origin.refs._
—master).checkout() # set local "master" to working tree
# rename remotes
origin.rename('new_origin')
# push and pull behaves similarly to 'git push|pull'
origin.pull()
origin.push()
# assert not empty_repo.delete_remote(origin).exists() # create and delete remotes

You can easily access configuration information for a remote by accessing options as if they were attributes. The
modification of remote configuration is more explicit though.

assert origin.url == repo.remotes.origin.url
with origin.config_writer as cw:
    cw.set("pushurl", "other_url")
# Please note that in python 2, writing origin.config_writer.set(...) is totally safe.
# In py3 __del__ calls can be delayed, thus not writing changes in time.

You can also specify per-call custom environments using a new context manager on the Git command, e.g. for using
a specific SSH key. The following example works with git starting at v2.3:

ssh_cmd = 'ssh -i id_deployment_key'
with repo.git.custom_environment(GIT_SSH_COMMAND=ssh_cmd):
    repo.remotes.origin.fetch()

This one sets a custom script to be executed in place of ssh, and can be used in git prior to v2.3:

ssh_executable = os.path.join(rw_dir, 'my_ssh_executable.sh')
with repo.git.custom_environment(GIT_SSH=ssh_executable):
    repo.remotes.origin.fetch()

Here’s an example executable that can be used in place of the ssh_executable above:

#!/bin/sh
ID_RSA=/var/lib/openshift/5562b947ecdd5ce939000038/app-deployments/id_rsa
exec /usr/bin/ssh -o StrictHostKeyChecking=no -i $ID_RSA "$@

Please note that the script must be executable (i.e. chmod +x script.sh). StrictHostKeyChecking=no is used to avoid
prompts asking to save the hosts key to ~/.ssh/known_hosts, which happens in case you run this as daemon.
You might also have a look at Git.update_environment(...) in case you want to setup a changed environment more
permanently.
2.9 Submodule Handling

Submodules can be conveniently handled using the methods provided by GitPython, and as an added benefit, GitPython provides functionality which behave smarter and less error prone than its original c-git implementation, that is GitPython tries hard to keep your repository consistent when updating submodules recursively or adjusting the existing configuration.

```python
repo = self.rorepo
sms = repo.submodules

assert len(sms) == 1
sm = sms[0]
self.assertEqual(sm.name, 'gitdb')  # git-python has gitdb as a
→ single submodule ...
self.assertEqual(sm.children()[0].name, 'smmap')  # ... which has smmap as a
→ single submodule

# The module is the repository referenced by the submodule
assert sm.module_exists()  # the module is available, which
→ doesn't have to be the case.
assert sm.module().working_tree_dir.endswith('gitdb')  # the submodule's absolute path is the module's path
assert sm.abspath == sm.module().working_tree_dir
self.assertEqual(len(sm.hexsha), 40)  # Its sha defines the
→ commit to checkout
assert sm.exists()  # yes, this submodule is valid and
→ exists
# read its configuration conveniently
assert sm.config_reader().get_value('path') == sm.path
self.assertEqual(len(sm.children()), 1)  # query the submodule
→ hierarchy
```

In addition to the query functionality, you can move the submodule’s repository to a different path `<move(.. .)`, write its configuration `<config_writer().set_value(...).release()>`, update its working tree `<update(...)>`, and remove or add them `<remove(...), add(...)>.`

If you obtained your submodule object by traversing a tree object which is not rooted at the head’s commit, you have to inform the submodule about its actual commit to retrieve the data from by using the `set_parent_commit(...)` method.

The special `RootModule` type allows you to treat your master repository as root of a hierarchy of submodules, which allows very convenient submodule handling. Its `update(...)` method is reimplemented to provide an advanced way of updating submodules as they change their values over time. The update method will track changes and make sure your working tree and submodule checkouts stay consistent, which is very useful in case submodules get deleted or added to name just two of the handled cases.

Additionally, GitPython adds functionality to track a specific branch, instead of just a commit. Supported by customized update methods, you are able to automatically update submodules to the latest revision available in the remote repository, as well as to keep track of changes and movements of these submodules. To use it, set the name of the branch you want to track to the `submodule.$name.branch` option of the `.gitmodules` file, and use GitPython update methods on the resulting repository with the `to_latest_revision` parameter turned on. In the latter case, the sha of your submodule will be ignored, instead a local tracking branch will be updated to the respective remote branch automatically, provided there are no local changes. The resulting behaviour is much like the one of `svn::externals`, which can be useful in times.
2.10 Obtaining Diff Information

Diffs can generally be obtained by subclasses of `Diffable` as they provide the `diff` method. This operation yields a `DiffIndex` allowing you to easily access diff information about paths.

Diffs can be made between the Index and Trees, Index and the working tree, trees and trees as well as trees and the working copy. If commits are involved, their tree will be used implicitly.

```python
hcommit = repo.head.commit
hcommit.diff()  # diff tree against index
hcommit.diff('HEAD~1')  # diff tree against previous tree
hcommit.diff(None)  # diff tree against working tree

index = repo.index
index.diff()  # diff index against itself yielding empty diff
index.diff(None)  # diff index against working copy
index.diff('HEAD')  # diff index against current HEAD tree
```

The item returned is a `DiffIndex` which is essentially a list of `Diff` objects. It provides additional filtering to ease finding what you might be looking for.

```python
# Traverse added Diff objects only
for diff_added in hcommit.diff('HEAD~1').iter_change_type('A'):
    print(diff_added)
```

Use the diff framework if you want to implement git-status like functionality.

- A diff between the index and the commit’s tree your HEAD points to
  - use `repo.index.diff(repo.head.commit)`
- A diff between the index and the working tree
  - use `repo.index.diff(None)`
- A list of untracked files
  - use `repo.untracked_files`

2.11 Switching Branches

To switch between branches similar to `git checkout`, you effectively need to point your HEAD symbolic reference to the new branch and reset your index and working copy to match. A simple manual way to do it is the following one

```python
# Reset our working tree 10 commits into the past
past_branch = repo.create_head('past_branch', 'HEAD~10')
repo.head.reference = past_branch
assert not repo.head.is_detached
# reset the index and working tree to match the pointed-to commit
repo.head.reset(index=True, working_tree=True)

# To detach your head, you have to point to a commit directly
repo.head.reference = repo.commit('HEAD~5')
assert repo.head.is_detached
# now our head points 15 commits into the past, whereas the working tree
# and index are 10 commits in the past
```
The previous approach would brutally overwrite the user’s changes in the working copy and index though and is less sophisticated than a `git-checkout`. The latter will generally prevent you from destroying your work. Use the safer approach as follows.

```python
# checkout the branch using git-checkout. It will fail as the working tree appears dirty
self.assertRaises(git.GitCommandError, repo.heads.master.checkout)
repo.heads.past_branch.checkout()
```

### 2.12 Initializing a repository

In this example, we will initialize an empty repository, add an empty file to the index, and commit the change.

```python
import git
gerpo_dir = os.path.join(rw_dir, 'my-new-repo')
file_name = os.path.join(repo_dir, 'new-file')

r = git.Repo.init(repo_dir)
# This function just creates an empty file ...
open(file_name, 'wb').close()
r.index.add([file_name])
r.index.commit("initial commit")
```

Please have a look at the individual methods as they usually support a vast amount of arguments to customize their behavior.

### 2.13 Using git directly

In case you are missing functionality as it has not been wrapped, you may conveniently use the `git` command directly. It is owned by each repository instance.

```python
git = repo.git
git.checkout('HEAD', b="my_new_branch") # create a new branch
git.branch('another-new-one')
git.branch('-D', 'another-new-one') # pass strings for full control over argument order
git.for_each_ref() # ')' becomes '_' when calling it
```

The return value will by default be a string of the standard output channel produced by the command.

Keyword arguments translate to short and long keyword arguments on the command-line. The special notion `git.command(flag=True)` will create a flag without value like `command --flag`.

If `None` is found in the arguments, it will be dropped silently. Lists and tuples passed as arguments will be unpacked recursively to individual arguments. Objects are converted to strings using the `str(...)` function.

### 2.14 Object Databases

`git.Repo` instances are powered by its object database instance which will be used when extracting any data, or when writing new objects.
The type of the database determines certain performance characteristics, such as the quantity of objects that can be read per second, the resource usage when reading large data files, as well as the average memory footprint of your application.

### 2.14.1 GitDB

The GitDB is a pure-python implementation of the git object database. It is the default database to use in GitPython 0.3. Its uses less memory when handling huge files, but will be 2 to 5 times slower when extracting large quantities of objects from densely packed repositories:

```
repo = Repo("path/to/repo", odbt=GitDB)
```

### 2.14.2 GitCmdObjectDB

The git command database uses persistent git-cat-file instances to read repository information. These operate very fast under all conditions, but will consume additional memory for the process itself. When extracting large files, memory usage will be much higher than the one of the GitDB:

```
repo = Repo("path/to/repo", odbt=GitCmdObjectDB)
```

### 2.15 Git Command Debugging and Customization

Using environment variables, you can further adjust the behaviour of the git command.

- **GIT_PYTHON_TRACE**
  - If set to non-0, all executed git commands will be shown as they happen
  - If set to `full`, the executed git command _and_ its entire output on stdout and stderr will be shown as they happen

  **NOTE**: All logging is outputted using a Python logger, so make sure your program is configured to show INFO-level messages. If this is not the case, try adding the following to your program:

```
import logging
logging.basicConfig(level=logging.INFO)
```

- **GIT_PYTHON_GIT_EXECUTABLE**
  - If set, it should contain the full path to the git executable, e.g. `c:\Program Files (x86)\Git\bin\git.exe` on windows or `/usr/bin/git` on linux.

### 2.16 And even more . . .

There is more functionality in there, like the ability to archive repositories, get stats and logs, blame, and probably a few other things that were not mentioned here.

Check the unit tests for an in-depth introduction on how each function is supposed to be used.
CHAPTER 3

API Reference

3.1 Version

```python
git.__version__
```
Current GitPython version.

3.2 Objects.Base

```python
class git.objects.base.Object (repo: Repo, binsha: bytes)
```
Implements an Object which may be Blobs, Trees, Commits and Tags

```python
NULL_BIN_SHA = b'\x00\x00\x00\x00\x00\x00\x00\x00\x00\x00\x00\x00\x00\x00\x00\x00
NULL_HEX_SHA = '0000000000000000000000000000000000000000'
TYPES = (b'blob', b'tree', b'commit', b'tag')
```

```python
__annotations__ = {'type': typing.Union[typing_extensions.Literal['commit', 'tag', 'blob', 'tree'], NoneType]}
```

```python
__eq__(other: Any) → bool
```
Returns True if the objects have the same SHA1

```python
__hash__() → int
```
Returns Hash of our id allowing objects to be used in dicts and sets

```python
__init__(repo: Repo, binsha: bytes)
```
Initialize an object by identifying it by its binary sha. All keyword arguments will be set on demand if None.

Parameters
- `repo` – repository this object is located in
- `binsha` – 20 byte SHA1
__module__ = 'git.objects.base'

__ne__ (other: Any) → bool

Returns True if the objects do not have the same SHA1

__repr__ () → str

Returns string with pythonic representation of our object

__slots__ = ('repo', 'binsha', 'size')

__str__ () → str

Returns string of our SHA1 as understood by all git commands

binsha

data_stream

Returns File Object compatible stream to the uncompressed raw data of the object

Note returned streams must be read in order

hexsha

Returns 40 byte hex version of our 20 byte binary sha

classmethod new (repo: Repo, id)

Returns New Object instance of a type appropriate to the object type behind id. The id of the newly created object will be a binsha even though the input id may have been a Reference or Rev-Spec

Parameters id – reference, rev-spec, or hexsha

Note This cannot be a __new__ method as it would always call __init__ with the input id which is not necessarily a binsha.

classmethod new_from_sha (repo: Repo, sha1: bytes) → Union[Commit, TagObject, Blob, Tree]

Returns new object instance of a type appropriate to represent the given binary sha1

Parameters sha1 – 20 byte binary sha1

type = None

class IndexObject (repo: Repo, binsha: bytes, mode: Union[None, int] = None, path: Union[None, str, os.PathLike] = None)

Base for all objects that can be part of the index file, namely Tree, Blob and SubModule objects

__hash__ () → int

Returns Hash of our path as index items are uniquely identifiable by path, not by their data!

__init__ (repo: Repo, binsha: bytes, mode: Union[None, int] = None, path: Union[None, str, os.PathLike] = None) → None

Initialize a newly instanced IndexObject

Parameters
- **repo** – is the Repo we are located in
- **binsha** – 20 byte sha1
- **mode** – is the stat compatible file mode as int, use the stat module to evaluate the information
- **path** – is the path to the file in the file system, relative to the git repository root, i.e. file.ext or folder/other.ext

  **Note** Path may not be set of the index object has been created directly as it cannot be retrieved without knowing the parent tree.

```python
__module__ = 'git.objects.base'
__slots__ = ('path', 'mode')
```

**abspath**

Returns

Absolute path to this index object in the file system (as opposed to the .path field which is a path relative to the git repository).

The returned path will be native to the system and contains ‘’ on windows.

**mode**

**name**

Returns Name portion of the path, effectively being the basename

**path**

### 3.3 Objects.Blob

**class** `git.objects.blob.Blob` *(repo: Repo, binsha: bytes, mode: Union[None, int] = None, path: Union[None, str, os.PathLike] = None)*

A Blob encapsulates a git blob object

```python
DEFAULT_MIME_TYPE = 'text/plain'
__annotations__ = {'type': typing_extensions.Literal['blob']}
__module__ = 'git.objects.blob'
__slots__ = ()
executable_mode = 33261
file_mode = 33188
link_mode = 40960
```

**mime_type**

Returns String describing the mime type of this file (based on the filename)

**Note** Defaults to ‘text/plain’ in case the actual file type is unknown.

**type** = 'blob'
3.4 Objects.Commit

```python
class git.objects.commit.Commit
```

Wraps a git Commit object.

This class will act lazily on some of its attributes and will query the value on demand only if it involves calling the git binary.

```python
__abstractmethods__ = frozenset()
__annotations__ = {'type': typing_extensions.Literal['commit']}
```

Instantiate a new Commit. All keyword arguments taking None as default will be implicitly set on first query.

**Parameters**

- **binsha** – 20 byte sha1
- **parents** – tuple( Commit, ... ) is a tuple of commit ids or actual Commits
- **tree** – Tree Tree object
- **author** – Actor is the author Actor object
- **authored_date** – int_seconds_since_epoch is the authored DateTime - use time.gmtime() to convert it into a different format
- **author_tz_offset** – int_seconds_west_of_utc is the timezone that the authored_date is in
- **committer** – Actor is the committer string
- **committed_date** – int_seconds_since_epoch is the committed DateTime - use time.gmtime() to convert it into a different format
- **committed_tz_offset** – int_seconds_west_of_utc is the timezone that the committed_date is in
- **message** – string is the commit message
- **encoding** – string encoding of the message, defaults to UTF-8
- **parents** – List or tuple of Commit objects which are our parent(s) in the commit dependency graph

**Returns** git.Commit
Note Timezone information is in the same format and in the same sign as what time.altzone returns. The sign is inverted compared to git’s UTC timezone.

```python
__module__ = 'git.objects.commit'
__parameters__ = ()
__slots__ = ('tree', 'author', 'authored_date', 'author_tz_offset', 'committer', 'committed_date', 'committer_tz_offset', 'message', 'parents', 'encoding', 'gpgsig')
__subclasshook__

author
author_tz_offset
authored_date
authored_datetime
committed_date
committed_datetime
committer
committer_tz_offset
conf_encoding = 'i18n.commitencoding'

count (paths: Union[str, os.PathLike, Sequence[Union[str, os.PathLike]]] = '', **kwargs) → int

Count the number of commits reachable from this commit

Parameters

- **paths** – is an optional path or a list of paths restricting the return value to commits actually containing the paths
- **kwargs** – Additional options to be passed to git-rev-list. They must not alter the output style of the command, or parsing will yield incorrect results

Returns int defining the number of reachable commits

```
```

Commit the given tree, creating a commit object.

Parameters

- **repo** – Repo object the commit should be part of
- **tree** – Tree object or hex or bin sha the tree of the new commit
- **message** – Commit message. It may be an empty string if no message is provided. It will be converted to a string , in any case.
- **parent_commits** – Optional Commit objects to use as parents for the new commit. If empty list, the commit will have no parents at all and become a root commit. If None , the current head commit will be the parent of the new commit object
- **head** – If True, the HEAD will be advanced to the new commit automatically. Else the HEAD will remain pointing on the previous commit. This could lead to undesired results when differing files.
• **author** – The name of the author, optional. If unset, the repository configuration is used
to obtain this value.
• **committer** – The name of the committer, optional. If unset, the repository configuration
is used to obtain this value.
• **author_date** – The timestamp for the author field
• **commit_date** – The timestamp for the committer field

**Returns** Commit object representing the new commit

**Note** Additional information about the committer and Author are taken from the environment or
from the git configuration, see git-commit-tree for more information

default_encoding = 'UTF-8'

encoding

env_author_date = 'GIT_AUTHOR_DATE'

env_committer_date = 'GIT_COMMITTER_DATE'

gpgsig

classmethod iter_items(repo: Repo, rev: Union[str, Commit, SymbolicReference], paths:
Union[str, os.PathLike, Sequence[Union[str, os.PathLike]]] = ", 
**kwargs) → Iterator[Commit]
Find all commits matching the given criteria.

**Parameters**

• **repo** – is the Repo
• **rev** – revision specifier, see git-rev-parse for viable options
• **paths** – is an optional path or list of paths, if set only Commits that include the path or
paths will be considered
• **kwargs** – optional keyword arguments to git rev-list where max_count is the maximum
number of commits to fetch skip is the number of commits to skip since all commits
since i.e. ‘1970-01-01’

**Returns** iterator yielding Commit items

iter_parents(paths: Union[str, os.PathLike, Sequence[Union[str, os.PathLike]]] = ", **kwargs)
→ Iterator[git.objects.commit.Commit]
Iterate _all_ parents of this commit.

**Parameters**

• **paths** – Optional path or list of paths limiting the Commits to those that contain at least
one of the paths
• **kwargs** – All arguments allowed by git-rev-list

**Returns** Iterator yielding Commit objects which are parents of self

message

name_rev

**Returns** String describing the commits hex sha based on the closest Reference. Mostly useful
for UI purposes

parents
replace(**kwargs) \rightarrow \text{git.objects.commit.Commit}
Create new commit object from existing commit object.

Any values provided as keyword arguments will replace the corresponding attribute in the new object.

stats
Create a git stat from changes between this commit and its first parent or from all changes done if this is the very first commit.

Returns \text{git.Stats}

summary

Returns First line of the commit message

tree
type = 'commit'

3.5 Objects.Tag

Module containing all object based types.

Non-Lightweight tag carrying additional information about an object we are pointing to.

__annotations__ = {'type': typing_extensions.Literal['tag']}

__init__(repo: Repo, binsha: bytes, object: Union[None, git.objects.base.Object] = None, tag: Union[None, str] = None, tagger: Union[None, Actor] = None, tagged_date: Optional[int] = None, tagger tz offset: Optional[int] = None, message: Optional[str] = None) \rightarrow \text{None}

Initialize a tag object with additional data

Parameters

- repo – repository this object is located in
- binsha – 20 byte SHA1
- object – Object instance of object we are pointing to
- tag – name of this tag
- tagger – Actor identifying the tagger
- tagged date – int_seconds_since_epoch is the DateTime of the tag creation - use time.gmtime to convert it into a different format
- tagged tz offset – int_seconds_west_of_utc is the timezone that the authored_date is in, in a format similar to time.altzone

__module__ = 'git.objects.tag'

__slots__ = ('object', 'tag', 'tagger', 'tagged_date', 'tagger tz offset', 'message')

message

object

tag
class git.objects.tree.TreeModifier (cache: List[Tuple[bytes, int, str]])
A utility class providing methods to alter the underlying cache in a list-like fashion.

Once all adjustments are complete, the _cache, which really is a reference to the cache of a tree, will be sorted. Assuring it will be in a serializable state

__delitem__(name: str) → None
Deletes an item with the given name if it exists

__init__(cache: List[Tuple[bytes, int, str]]) → None
Initialize self. See help(type(self)) for accurate signature.

__module__ = 'git.objects.tree'
__slots__ = '_cache'

add(sha: bytes, mode: int, name: str, force: bool = False) → git.objects.tree.TreeModifier
Add the given item to the tree. If an item with the given name already exists, nothing will be done, but a
ValueError will be raised if the sha and mode of the existing item do not match the one you add, unless
force is True

Parameters
• sha – The 20 or 40 byte sha of the item to add
• mode – int representing the stat compatible mode of the item
• force – If True, an item with your name and information will overwrite any existing item
  with the same name, no matter which information it has

Returns self

addUnchecked (binsha: bytes, mode: int, name: str) → None
Add the given item to the tree, its correctness is assumed, which puts the caller into responsibility to assure
the input is correct. For more information on the parameters, see add :param binsha: 20 byte binary sha

set_done () → git.objects.tree.TreeModifier
Call this method once you are done modifying the tree information. It may be called several times, but be
aware that each call will cause a sort operation :return self:

class git.objects.tree.Tree (repo: Repo, binsha: bytes, mode: int = 16384, path: Union[str,
  os.PathLike, None] = None)
Tree objects represent an ordered list of Blobs and other Trees.

Tree as a list:

Access a specific blob using the
  tree['filename'] notation.

You may as well access by index
  blob = tree[0]
__abstractmethods__ = frozenset()
__annotations__ = {'_map_id_to_type': typing.Dict[int, typing.Type[typing.Union[ForwardRef('Tree'), ForwardRef('Blob'), ForwardRef('Submodule')]]], 'type': typing_extensions.Literal['tree']}
__contains__(item: Union[Tree, Blob, Submodule, str, os.PathLike]) → bool
__getitem__(item: Union[str, int, slice]) → Union[git.objects.tree.Tree, git.objects.blob.Blob, 
git.objects.submodule.base.Submodule]
__getslice__(i: int, j: int) → List[Union[git.objects.tree.Tree, git.objects.blob.Blob, 
git.objects.submodule.base.Submodule]]
__init__(repo: Repo, binsha: bytes, mode: int = 16384, path: Union[str, os.PathLike, None] = None)
    Initialize a newly instanced IndexObject

    Parameters

    • repo – is the Repo we are located in
    • binsha – 20 byte sha1
    • mode – is the stat compatible file mode as int, use the stat module to evaluate the information
    • path – is the path to the file in the file system, relative to the git repository root, i.e. file.ext or folder/other.ext

    Note Path may not be set of the index object has been created directly as it cannot be retrieved without knowing the parent tree.

__iter__() → Iterator[Union[git.objects.tree.Tree, git.objects.blob.Blob, 
git.objects.submodule.base.Submodule]]
__len__() → int
__module__ = 'git.objects.tree'
__parameters__ = ()
__reversed__()
__slots__ = '_cache'
__subclasshook__()
__truediv__(file: str) → Union[git.objects.tree.Tree, git.objects.blob.Blob, 
git.objects.submodule.base.Submodule]
    For PY3 only

blob_id = 8
blobs

    Returns list(Blob, ...) list of blobs directly below this tree

cache

    Returns An object allowing to modify the internal cache. This can be used to change the tree’s contents. When done, make sure you call set_done on the tree modifier, or serialization behaviour will be incorrect. See the TreeModifier for more information on how to alter the cache

commit_id = 14
join(file: str) → Union[git.objects.tree.Tree, git.objects.blob.Blob, 
git.objects.submodule.base.Submodule]
    Find the named object in this tree’s contents :return: git.Blob or git.Tree or git.Submodule
Raises **KeyError** – if given file or tree does not exist in tree

```python
```

**Returns** IterableList with the results of the traversal as produced by traverse() `Tree -> IterableList[Union[‘Submodule’, ‘Tree’, ‘Blob’]]`

```python
symlink_id = 10
tree_id = 4
trees
```

**Returns** list(Tree, ...) list of trees directly below this tree

```python
type = 'tree'
```

### 3.7 Objects.Functions

Module with functions which are supposed to be as fast as possible

```python
git.objects.fun.tree_to_stream(entries: Sequence[Tuple[bytes, int, str]], write: Callable[[ReadableBuffer], Optional[int]]) → None
```

Write the give list of entries into a stream using its write method:

- **params**
  - `entries`: sorted list of tuples with (binsha, mode, name)
  - `write`: write method which takes a data string

```python
git.objects.fun.tree_entries_from_data(data: bytes) → List[Tuple[bytes, int, str]]
```

Reads the binary representation of a tree and returns tuples of Tree items:

- param data: data block with tree data (as bytes)
- return: list(tuple(binsha, mode, tree_relative_path), ...)

```python
git.objects.fun.traverse_trees_recursive(odb: GitCmdObjectDB, tree_shas: Sequence[Optional[bytes]], path_prefix: str) → List[Tuple[Optional[bytes], bytes, int, str]]
```

**Returns** list of list with entries according to the given binary tree-shas. The result is encoded in a list of n tuple|None per blob/commit, (n == len(tree_shas)), where * [0] == 20 byte sha * [1] == mode as int * [2] == path relative to working tree root The entry tuple is None if the respective blob/commit did not exist in the given tree.

**Parameters**

- **tree_shas** – iterable of shas pointing to trees. All trees must be on the same level. A tree-sha may be None in which case None
• **path_prefix** – a prefix to be added to the returned paths on this level, set it ‘’ for the first iteration

**Note** The ordering of the returned items will be partially lost

```python
git.objects.fun.traverse_tree_recursive(odb: GitCmdObjectDB, tree_sha: bytes, path_prefix: str) \rightarrow List[Tuple[bytes, int, str]]
```

**Returns** list of entries of the tree pointed to by the binary tree_sha. An entry has the following format: * [0] 20 byte sha * [1] mode as int * [2] path relative to the repository

**Parameters** path_prefix – prefix to prepend to the front of all returned paths

### 3.8 Objects.Submodule.base

```python
```

Implements access to a git submodule. They are special in that their sha represents a commit in the submodule’s repository which is to be checked out at the path of this instance. The submodule type does not have a string type associated with it, as it exists solely as a marker in the tree and index.

All methods work in bare and non-bare repositories.

```python
__abstractmethods__ = frozenset()
__annotations__ = {'type': typing_extensions.Literal['submodule']}
__eq__(other: Any) \rightarrow bool
    Compare with another submodule
__hash__() \rightarrow int
    Hash this instance using its logical id, not the sha
    \rightarrow None
    Initialize this instance with its attributes. We only document the ones that differ from IndexObject
```

**Parameters**

- **repo** – Our parent repository
- **binsha** – binary sha referring to a commit in the remote repository, see url parameter
- **parent_commit** – see set_parent_commit()
- **url** – The url to the remote repository which is the submodule
- **branch_path** – full (relative) path to ref to checkout when cloning the remote repository

```python
__module__ = 'git.objects.submodule.base'
__ne__(other: object) \rightarrow bool
    Compare with another submodule for inequality
```
__parameters__ = ()
__repr__(self) → str

Returns string with pythonic representation of our object

__slots__ = ('_parent_commit', '_url', '_branch_path', '_name', '__weakref__')
__str__(self) → str

Returns string of our SHA1 as understood by all git commands

__subclasshook__

__weakref__

list of weak references to the object (if defined)

classmethod add(repo: Repo, name: str, path: Union[str, os.PathLike], url: Optional[str] = None,
branch: Optional[str] = None, no_checkout: bool = False, depth: Optional[int] = None,
env: Optional[Mapping[str, str]] = None, clone_multi_options: Optional[Sequence[Any]] = None)

→ Submodule

Add a new submodule to the given repository. This will alter the index as well as the .gitmodules file, but
will not create a new commit. If the submodule already exists, no matter if the configuration differs from
the one provided, the existing submodule will be returned.

Parameters

• repo – Repository instance which should receive the submodule

• name – The name/identifier for the submodule

• path – repository-relative or absolute path at which the submodule should be located. It
will be created as required during the repository initialization.

• url – git-clone compatible URL, see git-clone reference for more information. If None,
the repository is assumed to exist, and the url of the first remote is taken instead. This is
useful if you want to make an existing repository a submodule of another one.

• branch – name of branch at which the submodule should (later) be checked out. The
given branch must exist in the remote repository, and will be checked out locally as a
tracking branch. It will only be written into the configuration if it not None, which is when
the checked out branch will be the one the remote HEAD pointed to. The result you get in
these situation is somewhat fuzzy, and it is recommended to specify at least ‘master’ here.
Examples are ‘master’ or ‘feature/new’

• no_checkout – if True, and if the repository has to be cloned manually, no checkout
will be performed

• depth – Create a shallow clone with a history truncated to the specified number of com-
mits.

• env – Optional dictionary containing the desired environment variables. Note: Provided
variables will be used to update the execution environment for git. If some variable is not
specified in env and is defined in os.environ, value from os.environ will be used. If you
want to unset some variable, consider providing empty string as its value.

• clone_multi_options – A list of Clone options. Please see git.repo.base.
Repo.clone for details.

Returns The newly created submodule instance

Note works atomically, such that no change will be done if the repository update fails for instance
branch
Returns The branch instance that we are to checkout

Raises InvalidGitRepositoryError – if our module is not yet checked out

branch_name
Returns the name of the branch, which is the shortest possible branch name

branch_path
Returns full(relative) path as string to the branch we would checkout from the remote and track

children () → git.util.IterableList[git.objects.submodule.base.Submodule][git.objects.submodule.base.Submodule]
Returns IterableList(Submodule, ...) an iterable list of submodules instances which are children of this submodule or 0 if the submodule is not checked out

config_reader () → git.config.SectionConstraint[git.objects.submodule.util.SubmoduleConfigParser][git.objects.submodule.util.SubmoduleConfigParser]
Returns ConfigReader instance which allows you to query the configuration values of this submodule, as provided by the .gitmodules file

Note The config reader will actually read the data directly from the repository and thus does not need nor care about your working tree.

Note Should be cached by the caller and only kept as long as needed

Raises IOError – If the .gitmodules file/blob could not be read

config_writer (index: Optional[IndexFile] = None, write: bool = True) →
git.config.SectionConstraint[ForwardRef('SubmoduleConfigParser')][SubmoduleConfigParser]
Returns a config writer instance allowing you to read and write the data belonging to this submodule into the .gitmodules file.

Parameters

• index – if not None, an IndexFile instance which should be written. defaults to the index of the Submodule’s parent repository.

• write – if True, the index will be written each time a configuration value changes.

Note the parameters allow for a more efficient writing of the index, as you can pass in a modified index on your own, prevent automatic writing, and write yourself once the whole operation is complete

Raises

• ValueError – if trying to get a writer on a parent_commit which does not match the current head commit

• IOError – if the .gitmodules file/blob could not be read

exists () → bool
Returns True if the submodule exists, False otherwise. Please note that a submodule may exist (in the .gitmodules file) even though its module doesn’t exist on disk

classmethod iter_items (repo: Repo, parent_commit: Union[Commit, TagObject, Blob, Tree, str] = 'HEAD', *Args, **kwargs) → Iterator[Submodule]
Returns iterator yielding Submodule instances available in the given repository

k_default_mode = 57344
k_head_default = 'master'
k_head_option = 'branch'

3.8. Objects.Submodule.base
k_modules_file = '.gitmodules'

module() → Repo

**Returns**  Repo instance initialized from the repository at our submodule path

**Raises**  *InvalidGitRepositoryError* – if a repository was not available. This could also mean that it was not yet initialized

module_exists() → bool

**Returns**  True if our module exists and is a valid git repository. See module() method

move(*module_path*, *configuration=True*, *module=True*)

Move the submodule to a another module path. This involves physically moving the repository at our current path, changing the configuration, as well as adjusting our index entry accordingly.

**Parameters**

- *module_path* – the path to which to move our module in the parent repository’s working tree, given as repository - relative or absolute path. Intermediate directories will be created accordingly. If the path already exists, it must be empty. Trailing(back)slashes are removed automatically
- *configuration* – if True, the configuration will be adjusted to let the submodule point to the given path.
- *module* – if True, the repository managed by this submodule will be moved as well. If False, we don’t move the submodule’s checkout, which may leave the parent repository in an inconsistent state.

**Returns**  self

**Raises**  *ValueError* – if the module path existed and was not empty, or was a file

**Note**  Currently the method is not atomic, and it could leave the repository in an inconsistent state if a sub - step fails for some reason

name

**Returns**  The name of this submodule. It is used to identify it within the .gitmodules file.

**Note**  by default, the name is the path at which to find the submodule, but in git - python it should be a unique identifier similar to the identifiers used for remotes, which allows to change the path of the submodule easily

parent_commit

**Returns**  Commit instance with the tree containing the .gitmodules file

**Note**  will always point to the current head’s commit if it was not set explicitly

remove(*module*: *bool* = *True*, *force*: *bool* = *False*, *configuration*: *bool* = *True*, *dry_run*: *bool* = *False*) → *git.objects submodule base Submodule*

Remove this submodule from the repository. This will remove our entry from the .gitmodules file and the entry in the .git / config file.

**Parameters**

- *module* – If True, the module checkout we point to will be deleted as well. If the module is currently on a commit which is not part of any branch in the remote, if the currently checked out branch working tree, or untracked files, is ahead of its tracking branch, if you have modifications in the In case the removal of the repository fails for these reasons, the submodule status will not have been altered. If this submodule has child - modules on its own, these will be deleted prior to touching the own module.
• **force** – Enforces the deletion of the module even though it contains modifications. This basically enforces a brute-force file system based deletion.

• **configuration** – if True, the submodule is deleted from the configuration, otherwise it isn’t. Although this should be enabled most of the times, this flag enables you to safely delete the repository of your submodule.

• **dry_run** – if True, we will not actually do anything, but throw the errors we would usually throw

**Returns** self

**Note** doesn’t work in bare repositories

**Note** doesn’t work atomically, as failure to remove any part of the submodule will leave an inconsistent state

**Raises**

• **InvalidGitRepositoryError** – thrown if the repository cannot be deleted

• **OSError** – if directories or files could not be removed

**rename** (new_name: str) → git.objects.submodule.base.Submodule

Rename this submodule

:note: This method takes care of renaming the submodule in various places, such as

• $parent_git_dir / config

• $working_tree_dir / .gitmodules

• (git >= v1.8.0: move submodule repository to new name)

As .gitmodules will be changed, you would need to make a commit afterwards. The changed .gitmodules file will already be added to the index

**Returns** this submodule instance

**set_parent_commit** (commit: Union[Commit, TagObject, Blob, Tree, None], check: bool = True) → Submodule

Set this instance to use the given commit whose tree is supposed to contain the .gitmodules blob.

**Parameters**

• **commit** – Commit’ish reference pointing at the root_tree, or None to always point to the most recent commit

• **check** – if True, relatively expensive checks will be performed to verify validity of the submodule.

**Raises**

• **ValueError** – if the commit’s tree didn’t contain the .gitmodules blob.

• **ValueError** – if the parent commit didn’t store this submodule under the current path

**Returns** self

**type = 'submodule'**


Update the repository of this submodule to point to the checkout we point at with the binsha of this instance.

**Parameters**
• **recursive** – if True, we will operate recursively and update child-modules as well.

• **init** – if True, the module repository will be cloned into place if necessary

• **to_latest_revision** – if True, the submodule’s sha will be ignored during checkout. Instead, the remote will be fetched, and the local tracking branch updated. This only works if we have a local tracking branch, which is the case if the remote repository had a master branch, or of the ‘branch’ option was specified for this submodule and the branch existed remotely

• **progress** – UpdateProgress instance or None if no progress should be shown

• **dry_run** – if True, the operation will only be simulated, but not performed. All performed operations are read-only

• **force** – If True, we may reset heads even if the repository in question is dirty. Additionally we will be allowed to set a tracking branch which is ahead of its remote branch back into the past or the location of the remote branch. This will essentially ‘forget’ commits. If False, local tracking branches that are in the future of their respective remote branches will simply not be moved.

• **keep_going** – if True, we will ignore but log all errors, and keep going recursively. Unless dry_run is set as well, keep_going could cause subsequent / inherited errors you wouldn’t see otherwise. In conjunction with dry_run, it can be useful to anticipate all errors when updating submodules

• **env** – Optional dictionary containing the desired environment variables. Note: Provided variables will be used to update the execution environment for *git*. If some variable is not specified in *env* and is defined in *os.environ*, value from *os.environ* will be used. If you want to unset some variable, consider providing empty string as its value.

• **clone_multi_options** – list of Clone options. Please see *git.repo.base.Repo.clone* for details. Only take effect with *init* option.

**Note** does nothing in bare repositories

**Note** method is definitely not atomic if recursive is True

**Returns** self

**url**

**Returns** The url to the repository which our module - repository refers to

```python
class git.objects.submodule.base.UpdateProgress

Class providing detailed progress information to the caller who should derive from it and implement the update(...) message

CLONE = 512
FETCH = 1024
UPDWKTREE = 2048
__annotations__ = {'_num_op_codes': <class 'int'>}
__module__ = 'git.objects.submodule.base'
__slots__ = ()
```
3.9 Objects.Submodule.root

```python
class git.objects.submodule.root.RootModule(repo: Repo)
    A (virtual) Root of all submodules in the given repository. It can be used to more easily traverse all submodules of the master repository

    __abstractmethods__ = frozenset()
    __init__(repo: Repo)
        Initialize this instance with its attributes. We only document the ones that differ from IndexObject

        Parameters
            • repo – Our parent repository
            • binsha – binary sha referring to a commit in the remote repository, see url parameter
            • parent_commit – see set_parent_commit()
            • url – The url to the remote repository which is the submodule
            • branch_path – full (relative) path to ref to checkout when cloning the remote repository

    __module__ = 'git.objects.submodule.root'
    __parameters__ = ()
    __slots__ = ()
    __subclasshook__(

    k_root_name = '__ROOT__'
    module() -> Repo

    Returns the actual repository containing the submodules


        Update the submodules of this repository to the current HEAD commit. This method behaves smartly by determining changes of the path of a submodules repository, next to changes to the to-be-checked-out commit or the branch to be checked out. This works if the submodules ID does not change. Additionally it will detect addition and removal of submodules, which will be handled gracefully.

        Parameters

            • previous_commit – If set to a commit’ish, the commit we should use as the previous commit the HEAD pointed to before it was set to the commit it points to now. If None, it defaults to HEAD@{1} otherwise

            • recursive – if True, the children of submodules will be updated as well using the same technique

            • force_remove – If submodules have been deleted, they will be forcibly removed. Otherwise the update may fail if a submodule’s repository cannot be deleted as changes have been made to it (see Submodule.update() for more information)

            • init – If we encounter a new module which would need to be initialized, then do it.

            • to_latest_revision – If True, instead of checking out the revision pointed to by this submodule’s sha, the checked out tracking branch will be merged with the latest remote branch fetched from the repository’s origin. Unless force_reset is specified, a local
```
tracking branch will never be reset into its past, therefore the remote branch must be in the future for this to have an effect.

- **force_reset** – if True, submodules may checkout or reset their branch even if the repository has pending changes that would be overwritten, or if the local tracking branch is in the future of the remote tracking branch and would be reset into its past.

- **progress** – RootUpdateProgress instance or None if no progress should be sent

- **dry_run** – if True, operations will not actually be performed. Progress messages will change accordingly to indicate the WOULD DO state of the operation.

- **keep_going** – if True, we will ignore but log all errors, and keep going recursively. Unless dry_run is set as well, keep_going could cause subsequent/inherited errors you wouldn’t see otherwise. In conjunction with dry_run, it can be useful to anticipate all errors when updating submodules

Returns

```python
class git.objects.submodule.root.RootUpdateProgress
    Utility class which adds more opcodes to the UpdateProgress

    BRANCHCHANGE = 16384
    PATHCHANGE = 8192
    REMOVE = 4096
    URLCHANGE = 32768
    __module__ = 'git.objects.submodule.root'
    __slots__ = ()
```

### 3.10 Objects.Submodule.util

```python
git.objects.submodule.util.sm_section(name: str) → str
    Returns section title used in .gitmodules configuration file

git.objects.submodule.util.sm_name(section: str) → str
    Returns name of the submodule as parsed from the section name

git.objects.submodule.util.mkhead(repo: Repo, path: Union[str, os.PathLike]) → Head
    Returns New branch/head instance

git.objects.submodule.util.find_first_remote_branch(remotes: Sequence[Remote],
branch_name: str) → RemoteReference
    Find the remote branch matching the name of the given branch or raise InvalidGitRepositoryError

class git.objects.submodule.util.SubmoduleConfigParser(*args, **kwargs)
    Catches calls to _write, and updates the .gitmodules blob in the index with the new data, if we have written into a stream. Otherwise it will add the local file to the index to make it correspond with the working tree. Additionally, the cache must be cleared

    Please note that no mutating method will work in bare mode

    __abstractmethods__ = frozenset()
__init__(*args, **kwargs) \rightarrow None

Initialize a configuration reader to read the given file_or_files and to possibly allow changes to it by setting read_only False

Parameters

- **file_or_files** – A single file path or file objects or multiple of these
- **read_only** – If True, the ConfigParser may only read the data, but not change it. If False, only a single file path or file object may be given. We will write back the changes when they happen, or when the ConfigParser is released. This will not happen if other configuration files have been included
- **merge_includes** – if True, we will read files mentioned in [include] sections and merge their contents into ours. This makes it impossible to write back an individual configuration file. Thus, if you want to modify a single configuration file, turn this off to leave the original dataset unaltered when reading it.
- **repo** – Reference to repository to use if [includeIf] sections are found in configuration files.

__module__ = 'git.objects.submodule.util'

flush_to_index() \rightarrow None

Flush changes in our configuration file to the index

set_submodule(submodule: Submodule) \rightarrow None

Set this instance’s submodule. It must be called before the first write operation begins

write() \rightarrow None

Write changes to our file, if there are changes at all

Raises IOError – if this is a read-only writer instance or if we could not obtain a file lock

3.11 Objects.Util

Module for general utility functions

git.objects.util.get_object_type_by_name(object_type_name: bytes) \rightarrow
Union[Type[Commit], Type[TagObject],
Type[Tree], Type[Blob]]

Returns type suitable to handle the given object type name. Use the type to create new instances.

Parameters object_type_name – Member of TYPES

Raises ValueError – In case object_type_name is unknown

git.objects.util.parse_date(string_date: str) \rightarrow Tuple[int, int]

Parse the given date as one of the following

- aware datetime instance
- Git internal format: timestamp offset
- ISO 8601 2005-04-07T22:13:13 The T can be a space as well

Returns Tuple(int(timestamp_UTC), int(offset)), both in seconds since epoch

Raises ValueError – If the format could not be understood
Note: Date can also be YYYY.MM.DD, MM/DD/YYYY and DD.MM.YYYY.

```python
git.objects.util.parse_actor_and_date(line: str) \rightarrow Tuple[git.util.Actor, int, int]
```

Parse out the actor (author or committer) info from a line like:

```
author Tom Preston-Werner <tom@mojombo.com> 1191999972 -0700
```

**Returns**  [Actor, int_seconds_since_epoch, int_timezone_offset]

```python
class git.objects.util.ProcessStreamAdapter(process: Popen, stream_name: str)
```

Class wiring all calls to the contained Process instance.

Use this type to hide the underlying process to provide access only to a specified stream. The process is usually wrapped into an AutoInterrupt class to kill it if the instance goes out of scope.

```python
__getattr__(attr: str) \rightarrow Any
__init__(process: Popen, stream_name: str) \rightarrow None
__module__ = 'git.objects.util'
__slots__ = ('_proc', '_stream')
```

```python
class git.objects.util.Traversable(*args, **kwargs)
```

Simple interface to perform depth-first or breadth-first traversals into one direction. Subclasses only need to implement one function. Instaces of the Subclass must be hashable

Defined subclasses = [Commit, Tree, SubModule]

```python
__abstractmethods__ = frozenset({'list_traverse', '_get_intermediate_items', 'traverse'}
__init__(*args, **kwargs)
__module__ = 'git.objects.util'
__parameters__ = ()
__slots__ = ()
__subclasshook__()
list_traverse(*args, **kwargs) \rightarrow Any
traverse(*args, **kwargs) \rightarrow Any
```

```python
git.objects.util.altz_to_utctz_str(altz: float) \rightarrow str
```

As above, but inverses the operation, returning a string that can be used in commit objects

```python
git.objects.util.utctz_to_altz(utctz: str) \rightarrow int
```

we convert utctz to the timezone in seconds, it is the format time.altzone returns. Git stores it as UTC timezone which has the opposite sign as well, which explains the -1 * ( that was made explicit here ) :param utctz: git utc timezone string, i.e. +0200

```python
git.objects.util.verify_utctz(offset: str) \rightarrow str
```

**Raises** ValueError – if offset is incorrect

**Returns** offset

```python
class git.objects.util.Actor(name: Optional[str], email: Optional[str])
```

Actors hold information about a person acting on the repository. They can be committers and authors or anything with a name and an email as mentioned in the git log entries.
__eq__(other: Any) → bool
    Return self==value.

__hash__() → int
    Return hash(self).

__init__(name: Optional[str], email: Optional[str]) → None
    Initialize self. See help(type(self)) for accurate signature.

__module__ = 'git.util'

__ne__(other: Any) → bool
    Return self!=value.

__repr__() → str
    Return repr(self).

__slots__ = ('name', 'email')

__str__() → str
    Return str(self).

classmethod author(config_reader: Union[None, GitConfigParser, SectionConstraint] = None) → Actor
    Same as committer(), but defines the main author. It may be specified in the environment, but defaults to
    the committer.

classmethod committer(config_reader: Union[None, GitConfigParser, SectionConstraint] = None) → Actor
    Returns Actor instance corresponding to the configured committer. It behaves similar to the
    git implementation, such that the environment will override configuration values of con-
    fig_reader. If no value is set at all, it will be generated

    Parameters config_reader – ConfigReader to use to retrieve the values from in case they
    are not set in the environment

    conf_email = 'email'
    conf_name = 'name'

    email
    env_author_email = 'GIT_AUTHOR_EMAIL'
    env_author_name = 'GIT_AUTHOR_NAME'
    env_committer_email = 'GIT_COMMITTER_EMAIL'
    env_committer_name = 'GIT_COMMITTER_NAME'

    name
    name_email_regex = re.compile('(.*) <(.*)>')
    name_only_regex = re.compile('<(.*)>')

class git.objects.util.tzoffset(secs_west_of_utc: float, name: Union[None, str] = None)

    __dict__ = mappingproxy({'__module__': 'git.objects.util', '__init__': <function tzoffset.__init__>, '__reduce__': ... '__dict__' of 'tzoffset' objects>, '__weakref__': <attribute '__weakref__' of 'tzoffset' objects>, '__doc__': None})

    __init__(secs_west_of_utc: float, name: Union[None, str] = None) → None
        Initialize self. See help(type(self)) for accurate signature.

    __module__ = 'git.objects.util'
3.12 Index.Base

class git.index.base.IndexFile (repo: Repo, file_path: Union[str, os.PathLike, None] = None)
Implements an Index that can be manipulated using a native implementation in order to save git command
function calls wherever possible.

It provides custom merging facilities allowing to merge without actually changing your index or your working
tree. This way you can perform own test-merges based on the index only without having to deal with the working
copy. This is useful in case of partial working trees.

Entries
The index contains an entries dict whose keys are tuples of type IndexEntry to facilitate access.
You may read the entries dict or manipulate it using IndexEntry instance, i.e.:

index.entries[index.entry_key(index_entry_instance)] = index_entry_instance

Make sure you use index.write() once you are done manipulating the index directly before operating on it using
the git command

S_IFGITLINK = 57344

add (items: Sequence[Union[str, os.PathLike, git.objects.blob.Blob, git.index.typ.BaseIndexEntry, Sub-
module]], force: bool = True, fprogress: Callable = <function IndexFile.<lambda>>,
path_rewriter: Optional[Callable[[...], Union[str, os.PathLike]]] = None, write: bool = True,
write_extension_data: bool = False) -> List[git.index.typ.BaseIndexEntry]
Add files from the working tree, specific blobs or BaseIndexEntries to the index.

Parameters
items – Multiple types of items are supported, types can be mixed within one call. Different types imply a different handling. File paths may generally be relative or absolute.

- path string strings denote a relative or absolute path into the repository pointing to an existing file, i.e. CHANGES, lib/myfile.ext, ‘/home/gitrepo/lib/myfile.ext’.

  Absolute paths must start with working tree directory of this index’s repository to be considered valid. For example, if it was initialized with a non-normalized path, like /root/repo./repo, absolute paths to be added must start with /root/repo./repo.

  Paths provided like this must exist. When added, they will be written into the object database.

  PathStrings may contain globs, such as ‘lib/__init__*’ or can be directories like ‘lib’, the latter ones will add all the files within the directory and subdirectories.

  This equals a straight git-add.

  They are added at stage 0

- Blob or Submodule object Blobs are added as they are assuming a valid mode is set. The file they refer to may or may not exist in the file system, but must be a path relative to our repository.

  If their sha is null (40*0), their path must exist in the file system relative to the git repository as an object will be created from the data at the path. The handling now very much equals the way string paths are processed, except that the mode you have set will be kept. This allows you to create symlinks by settings the mode respectively and writing the target of the symlink directly into the file. This equals a default Linux-Symlink which is not dereferenced automatically, except that it can be created on filesystems not supporting it as well.

  Please note that globs or directories are not allowed in Blob objects.

  They are added at stage 0

- BaseIndexEntry or type Handling equals the one of Blob objects, but the stage may be explicitly set. Please note that Index Entries require binary sha’s.

- force – CURRENTLY INEFFECTIVE If True, otherwise ignored or excluded files will be added anyway. As opposed to the git-add command, we enable this flag by default as the API user usually wants the item to be added even though they might be excluded.

- fprogress – Function with signature f(path, done=False, item=item) called for each path to be added, one time once it is about to be added where done==False and once after it was added where done=True. item is set to the actual item we handle, either a Path or a BaseIndexEntry Please note that the processed path is not guaranteed to be present in the index already as the index is currently being processed.

- path_rewriter – Function with signature (string) func(BaseIndexEntry) function returning a path for each passed entry which is the path to be actually recorded for the object created from entry.path. This allows you to write an index which is not identical to the layout of the actual files on your hard-disk. If not None and items contain plain paths, these paths will be converted to Entries beforehand and passed to the path_rewriter. Please note that entry.path is relative to the git repository.

- write – If True, the index will be written once it was altered. Otherwise the changes only exist in memory and are not available to Git commands.

- write_extension_data – If True, extension data will be written back to the index. This can lead to issues in case it is containing the ‘TREE’ extension, which will cause the git commit command to write an old tree, instead of a new one representing the now
changed index. This doesn’t matter if you use `IndexFile.commit()`, which ignores the `TREE` extension altogether. You should set it to `True` if you intend to use `IndexFile.commit()` exclusively while maintaining support for third-party extensions. Besides that, you can usually safely ignore the built-in extensions when using GitPython on repositories that are not handled manually at all. All current built-in extensions are listed here: [http://opensource.apple.com/source/Git/Git-26/src/git-htmldocs/technical/index-format.txt](http://opensource.apple.com/source/Git/Git-26/src/git-htmldocs/technical/index-format.txt)

**Returns** List(BaseIndexEntries) representing the entries just actually added.

**Raises** OSError – if a supplied Path did not exist. Please note that BaseIndexEntry Objects that do not have a null sha will be added even if their paths do not exist.

**checkout** (paths: Union[None, Iterable[Union[str, os.PathLike]]] = None, force: bool = False, fprogress: Callable = <function IndexFile.<lambda>>, **kwargs) → Union[None, Iterator[Union[str, os.PathLike]], Sequence[Union[str, os.PathLike]]]

Checkout the given paths or all files from the version known to the index into the working tree.

**Note** Be sure you have written pending changes using the `write` method in case you have altered the entries dictionary directly

**Parameters**

• **paths** – If `None`, all paths in the index will be checked out. Otherwise an iterable of relative or absolute paths or a single path pointing to files or directories in the index is expected.

• **force** – If `True`, existing files will be overwritten even if they contain local modifications. If `False`, these will trigger a CheckoutError.

• **fprogress** – see `IndexFile.add()` for signature and explanation. The provided progress information will contain `None` as path and item if no explicit paths are given. Otherwise progress information will be send prior and after a file has been checked out

• **kwargs** – Additional arguments to be passed to `git-checkout-index`

**Returns** iterable yielding paths to files which have been checked out and are guaranteed to match the version stored in the index

**Raises** exc.CheckoutError – If at least one file failed to be checked out. This is a summary, hence it will check out as many files as it can anyway. If one of files or directories do not exist in the index (as opposed to the original git command who ignores them). Raise GitCommandError if error lines could not be parsed - this truly is an exceptional state

**Note:** The checkout is limited to checking out the files in the index. Files which are not in the index anymore and exist in the working tree will not be deleted. This behaviour is fundamentally different to `head.checkout`, i.e. if you want `git-checkout` like behaviour, use `head.checkout` instead of `index.checkout`.


Commit the current default index file, creating a commit object. For more information on the arguments, see `tree.commit`.

**Note** If you have manually altered the `.entries` member of this instance, don’t forget to `write()` your changes to disk beforehand. Passing `skip_hooks=True` is the equivalent of using `-n` or `--no-verify` on the command line.

**Returns** Commit object representing the new commit
**diff**

\[
\text{diff} \quad (\text{other: Union[Type[git_diff.Diffable.Index], Tree, Commit, str, None]} = \langle\text{class 'git.diff.Diffable.Index'>, \text{paths: Union[str, os.PathLike, List[Union[str, os.PathLike]], Tuple[Union[str, os.PathLike], ...], None]} = \text{None}, \text{create_patch: bool = False, **kwargs} \rangle) \rightarrow \text{git.diff.DiffIndex}
\]

Diff this index against the working copy or a Tree or Commit object

For a documentation of the parameters and return values, see, Diffable.diff

**entries**

*classmethod entry_key* (*entry*) → Tuple[Union[str, os.PathLike], int]

*classmethod from_tree* (*repo: Repo, *treeish, **kwargs*) → IndexFile

Merge the given treeish revisions into a new index which is returned. The original index will remain unaltered

**Parameters**

- **repo** – The repository treeish are located in.
- **treeish** – One, two or three Tree Objects, Commits or 40 byte hexshas. The result changes according to the amount of trees. If 1 Tree is given, it will just be read into a new index If 2 Trees are given, they will be merged into a new index using a two way merge algorithm. Tree 1 is the ‘current’ tree, tree 2 is the ‘other’ one. It behaves like a fast-forward. If 3 Trees are given, a 3-way merge will be performed with the first tree being the common ancestor of tree 2 and tree 3. Tree 2 is the ‘current’ tree, tree 3 is the ‘other’ one
- **kwargs** – Additional arguments passed to git-read-tree

**Returns**

New IndexFile instance. It will point to a temporary index location which does not exist anymore. If you intend to write such a merged Index, supply an alternate file_path to its ‘write’ method.

**Note**

In the three-way merge case, –aggressive will be specified to automatically resolve more cases in a commonly correct manner. Specify trivial=True as kwarg to override that.

As the underlying git-read-tree command takes into account the current index, it will be temporarily moved out of the way to assure there are no unsuspected interferences.

*iter_blobs* (*predicate: Callable[[Tuple[int, git.objects.blob.Blob]], bool] = <function IndexFile.<lambda>>*) → Iterator[Tuple[int, git.objects.blob.Blob]]

Returns Iterator yielding tuples of Blob objects and stages, tuple(stage, Blob)

**Parameters** **predicate** – Function(t) returning True if tuple(stage, Blob) should be yielded by the iterator. A default filter, the BlobFilter, allows you to yield blobs only if they match a given list of paths.

*merge_tree* (*rhs: Union[git.objects.tree.Tree, git.objects.commit.Commit, str, bytes], base: Union[None, git.objects.tree.Tree, git.objects.commit.Commit, str, bytes] = None*) → git.index.base.IndexFile

Merge the given rhs treewish into the current index, possibly taking a common base treeish into account.

As opposed to the IndexFile.from_tree() method, this allows you to use an already existing tree as the left side of the merge

**Parameters**

- **rhs** – treewish reference pointing to the ‘other’ side of the merge.
• **base** – optional treeish reference pointing to the common base of ‘rhs’ and this index which equals lhs

**Returns** self (containing the merge and possibly unmerged entries in case of conflicts)

**Raises** *GitCommandError* – If there is a merge conflict. The error will be raised at the first conflicting path. If you want to have proper merge resolution to be done by yourself, you have to commit the changed index (or make a valid tree from it) and retry with a three-way index.from_tree call.

```python
def move(items: Sequence[Union[str, os.PathLike, git.objects.blob.Blob, git.index.typ.BaseIndexEntry, Submodule]], skip_errors: bool = False, **kwargs) -> List[Tuple[str, str]]
```

Rename/move the items, whereas the last item is considered the destination of the move operation. If the destination is a file, the first item (of two) must be a file as well. If the destination is a directory, it may be preceded by one or more directories or files.

The working tree will be affected in non-bare repositories.

**Parameters**

• **skip_errors** – If True, errors such as ones resulting from missing source files will be skipped.

• **kwargs** – Additional arguments you would like to pass to git-mv, such as dry_run or force.

**Returns** List(tuple(source_path_string, destination_path_string), ...) A list of pairs, containing the source file moved as well as its actual destination. Relative to the repository root.

**Raises** *ValueError* – If only one item was given GitCommandError: If git could not handle your request

```python
classmethod new(repo: Repo, *tree_sha) -> IndexFile
```

Merge the given treeish revisions into a new index which is returned. This method behaves like git-readtree –aggressive when doing the merge.

**Parameters**

• **repo** – The repository treeish are located in.

• **tree_sha** – 20 byte or 40 byte tree sha or tree objects

**Returns** New IndexFile instance. Its path will be undefined. If you intend to write such a merged Index, supply an alternate file_path to its ‘write’ method.

```python
def path()
```

**Returns** Path to the index file we are representing

```python
def remove(items: Sequence[Union[str, os.PathLike, git.objects.blob.Blob, git.index.typ.BaseIndexEntry, Submodule]], working_tree: bool = False, **kwargs) -> List[str]
```

Remove the given items from the index and optionally from the working tree as well.

**Parameters**

• **items** – Multiple types of items are supported which may be freely mixed.

  • **path string** Remove the given path at all stages. If it is a directory, you must specify the r=True keyword argument to remove all file entries below it. If absolute
paths are given, they will be converted to a path relative to the git repository
directory containing the working tree

The path string may include globs, such as *.

– **Blob Object** Only the path portion is used in this case.

– **BaseIndexEntry or compatible type** The only relevant information here Yis the
  path. The stage is ignored.

  • **working_tree** – If True, the entry will also be removed from the working tree,
    physically removing the respective file. This may fail if there are uncommitted
    changes in it.

  • **kwargs** – Additional keyword arguments to be passed to git-rm, such as ‘r’ to allow
    recursive removal of

**Returns** List(path_string, . . . ) list of repository relative paths that have been removed effec-
tively. This is interesting to know in case you have provided a directory or globs. Paths
are relative to the repository.

**repo**

**reset** (commit: Union[git.objects.commit.Commit, Reference, str] = 'HEAD', working_tree: bool =
False, paths: Union[None, Iterable[Union[str, os.PathLike]]] = None, head: bool = False,
**kwargs) → IndexFile

Reset the index to reflect the tree at the given commit. This will not adjust our HEAD reference as opposed
to HEAD.reset by default.

**Parameters**

  • **commit** – Revision, Reference or Commit specifying the commit we should repre-
sent. If you want to specify a tree only, use IndexFile.from_tree and overwrite the
default index.

  • **working_tree** – If True, the files in the working tree will reflect the changed index.
    If False, the working tree will not be touched Please note that changes to the working
    copy will be discarded without warning !

  • **head** – If True, the head will be set to the given commit. This is False by default, but
    if True, this method behaves like HEAD.reset.

  • **paths** – if given as an iterable of absolute or repository-relative paths, only these
    will be reset to their state at the given commit’ish. The paths need to exist at the
    commit, otherwise an exception will be raised.

  • **kwargs** – Additional keyword arguments passed to git-reset

**Note:** IndexFile.reset, as opposed to HEAD.reset, will not delete any files in order to maintain a consistent
working tree. Instead, it will just checkout the files according to their state in the index. If you want git-
reset like behaviour, use HEAD.reset instead.

**Returns** self

**resolve_blobs** (iter_blobs: Iterator[git.objects.blob.Blob]) → git.index.base.IndexFile

Resolve the blobs given in blob iterator. This will effectively remove the index entries of the respective
path at all non-null stages and add the given blob as new stage null blob.

For each path there may only be one blob, otherwise a ValueError will be raised claiming the path is
already at stage 0.
Raises `ValueError` – if one of the blobs already existed at stage 0

Returns `self`

Note You will have to write the index manually once you are done, i.e. `index.resolve_blobs(blobs).write()`

`unmerged_blobs()` → Dict[Union[str, os.PathLike], List[Tuple[int, git.objects.blob.Blob]]]

Returns Dict(path : list( tuple( stage, Blob, . . . ))), being a dictionary associating a path in the index with a list containing sorted stage/blob pairs

Note Blobs that have been removed in one side simply do not exist in the given stage. I.e. a file removed on the ‘other’ branch whose entries are at stage 3 will not have a stage 3 entry.

`update()` → git.index.base.IndexFile

Reread the contents of our index file, discarding all cached information we might have.

Note This is a possibly dangerous operations as it will discard your changes to index.entries

Returns `self`

`version`

`write(file_path: Union[None, str, os.PathLike] = None, ignore_extension_data: bool = False) → None`

Write the current state to our file path or to the given one

Parameters

• `file_path` – If None, we will write to our stored file path from which we have been initialized. Otherwise we write to the given file path. Please note that this will change the file_path of this index to the one you gave.

• `ignore_extension_data` – If True, the TREE type extension data read in the index will not be written to disk. NOTE that no extension data is actually written. Use this if you have altered the index and would like to use git-write-tree afterwards to create a tree representing your written changes. If this data is present in the written index, git-write-tree will instead write the stored/cached tree. Alternatively, use IndexFile.write_tree() to handle this case automatically

Returns `self` # does it? or returns None?

`write_tree()` → git.objects.tree.Tree

Writes this index to a corresponding Tree object into the repository’s object database and return it.

Returns Tree object representing this index

Note The tree will be written even if one or more objects the tree refers to does not yet exist in the object database. This could happen if you added Entries to the index directly.

 Raises

• `ValueError` – if there are no entries in the cache

• `UnmergedEntriesError` –


exception `git.index.base.CheckoutError` (message: `str`, failed_files: `Sequence[Union[str, os.PathLike]]`, valid_files: `Sequence[Union[str, os.PathLike]]`, failed_reasons: `List[str]`) Thrown if a file could not be checked out from the index as it contained changes.

The .failed_files attribute contains a list of relative paths that failed to be checked out as they contained changes that did not exist in the index.
The `.failed_reasons` attribute contains a string informing about the actual cause of the issue.

The `.valid_files` attribute contains a list of relative paths to files that were checked out successfully and hence match the version stored in the index.

```
__init__(message: str, failed_files: Sequence[Union[str, os.PathLike]], valid_files: Sequence[Union[str, os.PathLike]], failed_reasons: List[str]) → None
Initialize self. See help(type(self)) for accurate signature.
__module__ = 'git.exc'
__str__() → str
Return str(self).
```

### 3.13 Index.Functions

**`git.index.fun.write_cache(entries: Sequence[Union[git.index.typ.BaseIndexEntry, IndexEntry]], stream: IO[bytes], extension_data: Union[None, bytes] = None, ShaStreamCls: Type[git.util.IndexFileSHA1Writer] = <class 'git.util.IndexFileSHA1Writer'>) → None`**

Write the cache represented by entries to a stream

**Parameters**

- `entries` – sorted list of entries
- `stream` – stream to wrap into the AdapterStreamCls - it is used for final output.
- `ShaStreamCls` – Type to use when writing to the stream. It produces a sha while writing to it, before the data is passed on to the wrapped stream
- `extension_data` – any kind of data to write as a trailer, it must begin a 4 byte identifier, followed by its size (4 bytes)

**`git.index.fun.read_cache(stream: IO[bytes]) → Tuple[int, Dict[Tuple[Union[str, os.PathLike], int], git.index.typ.IndexEntry], bytes, bytes]`**

Read a cache file from the given stream :return: tuple(version, entries_dict, extension_data, content_sha)

- `version` is the integer version number
- `entries_dict` is a dictionary which maps IndexEntry instances to a path at a stage
- `extension_data` is 4 or 4 bytes of type + 4 bytes of size + size bytes
- `content_sha` is a 20 byte sha on all cache file contents

**`git.index.fun.write_tree_from_cache(entries: List[git.index.typ.IndexEntry], odb, sl: slice, si: int = 0) → Tuple[bytes, List[TreeCacheTup]]`**

Create a tree from the given sorted list of entries and put the respective trees into the given object database

**Parameters**

- `entries` – sorted list of IndexEntries
- `odb` – object database to store the trees in
- `si` – start index at which we should start creating subtrees
- `sl` – slice indicating the range we should process on the entries list

**Returns** tuple(binsha, list(tree_entry, ...)) a tuple of a sha and a list of tree entries being a tuple of hexsha, mode, name

**`git.index.fun.entry_key(*entry) → Tuple[Union[str, os.PathLike], int]`**

**Returns** Key suitable to be used for the index.entries dictionary

**Parameters** `entry` – One instance of type BaseIndexEntry or the path and the stage
git.index.fun.stat_mode_to_index_mode(mode: int) → int
    Convert the given mode from a stat call to the corresponding index mode and return it

git.index.fun.run_commit_hook(name: str, index: IndexFile, *args) → None
    Run the commit hook of the given name. Silently ignores hooks that do not exist.
    :param name: name of hook, like 'pre-commit'
    :param index: IndexFile instance
    :param args: arguments passed to hook file
    :raises HookExecutionError:

git.index.fun.hook_path(name: str, git_dir: Union[str, os.PathLike]) → str
    Returns path to the given named hook in the given git repository directory

3.14 Index.Types

Module with additional types used by the index

class git.index.typ.BlobFilter (paths: Sequence[Union[str, os.PathLike]])
    Predicate to be used by iter_blobs allowing to filter only return blobs which match the given list of directories
    or files.

    The given paths are given relative to the repository.

    __call__(stage_blob: git.objects.blob.Blob) → bool
        Call self as a function.

    __init__(paths: Sequence[Union[str, os.PathLike]]) → None
        Parameters
        paths – tuple or list of paths which are either pointing to directories or to files
        relative to the current repository

    __module__ = 'git.index.typ'
    __slots__ = 'paths'

    paths

class git.index.typ.BaseIndexEntry
    Small Brother of an index entry which can be created to describe changes done to the index in which case plenty
    of additional information is not required.

    As the first 4 data members match exactly to the IndexEntry type, methods expecting a BaseIndexEntry can also
    handle full IndexEntries even if they use numeric indices for performance reasons.

    __dict__ = mappingproxy({'__module__': 'git.index.typ', '__doc__': 'Small Brother of
        a

    __module__ = 'git.index.typ'

    static __new__(cls, inp_tuple: Union[Tuple[int, bytes, int, Union[str, os.PathLike]],
        Tuple[int, bytes, int, Union[str, os.PathLike], bytes, bytes, int, int, int, int]]) →
        git.index.typ.BaseIndexEntry
        Override __new__ to allow construction from a tuple for backwards compatibility

    __repr__() → str
        Return a nicely formatted representation string

    __str__() → str
        Return str(self).

    classmethod from_blob(blob: git.objects.blob.Blob, stage: int = 0) →
        git.index.typ.BaseIndexEntry
        Returns Fully equipped BaseIndexEntry at the given stage
hexsha
hex version of our sha

stage
Stage of the entry, either:
• 0 = default stage
• 1 = stage before a merge or common ancestor entry in case of a 3 way merge
• 2 = stage of entries from the ‘left’ side of the merge
• 3 = stage of entries from the right side of the merge

Note For more information, see http://www.kernel.org/pub/software/scm/git/docs/git-read-tree.html

to_blob (repo: Repo) → git.objects.blob.Blob
Returns Blob using the information of this index entry

class git.index.typ.IndexEntry
Allows convenient access to IndexEntry data without completely unpacking it.
Attributes usually accessed often are cached in the tuple whereas others are unpacked on demand.
See the properties for a mapping between names and tuple indices.

__module__ = 'git.index.typ'

ctime
Returns Tuple(int_time_seconds_since_epoch, int_nano_seconds) of the file’s creation time

classmethod from_base (base: git.index.typ.BaseIndexEntry) → git.index.typ.IndexEntry
Returns Minimal entry as created from the given BaseIndexEntry instance. Missing values will be set to null-like values

Parameters base – Instance of type BaseIndexEntry

classmethod from_blob (blob: git.objects.blob.Blob, stage: int = 0) → git.index.typ.IndexEntry
Returns Minimal entry resembling the given blob object

mtime
See ctime property, but returns modification time

3.15 Index.Util

Module containing index utilities

class git.index.util.TemporaryFileSwap (file_path: Union[str, os.PathLike])
Utility class moving a file to a temporary location within the same directory and moving it back on to where on object deletion.

__del__() → None

__init__ (file_path: Union[str, os.PathLike]) → None
Initialize self. See help(type(self)) for accurate signature.

__module__ = 'git.index.util'
__slots__ = ('file_path', 'tmp_file_path')
file_path

tmp_file_path
git.index.util.post_clear_cache(func: Callable[..., _T]) → Callable[..., _T]
Decorates functions that alter the index using the git command. This would invalidate our possibly existing entries dictionary which is why it must be deleted to allow it to be lazily reread later.

Note This decorator will not be required once all functions are implemented natively which in fact is possible, but probably not feasible performance wise.

git.index.util.default_index(func: Callable[..., _T]) → Callable[..., _T]
Decorator assuring the wrapped method may only run if we are the default repository index. This is as we rely on git commands that operate on that index only.

git.index.util.git_working_dir(func: Callable[..., _T]) → Callable[..., _T]
Decorator which changes the current working dir to the one of the git repository in order to assure relative paths are handled correctly.

### 3.16 GitCmd

class git.cmd.Git(working_dir: Union[None, str, os.PathLike] = None)
The Git class manages communication with the Git binary.

It provides a convenient interface to calling the Git binary, such as in:

```python
# calls 'git init' program
# calls 'git ls-files' program
```

Debugging Set the GIT_PYTHON_TRACE environment variable print each invocation of the command to stdout. Set its value to ‘full’ to see details about the returned values.

class AutoInterrupt(proc: Union[None, subprocess.Popen], args: Any)
Kill/Interrupt the stored process instance once this instance goes out of scope. It is used to prevent processes piling up in case iterators stop reading. Besides all attributes are wired through to the contained process object.

The wait method was overridden to perform automatic status code checking and possibly raise.

```python
__del__() → None
__getattr__(attr: str) → Any
__init__(proc: Union[None, subprocess.Popen], args: Any) → None
    Initialize self. See help(type(self)) for accurate signature.
__module__ = 'git.cmd'
__slots__ = ('proc', 'args')
args
proc
wait(stderr: Union[None, bytes] = b") → int
    Wait for the process and return its status code.
```

Parameters stderr – Previously read value of stderr, in case stderr is already closed.

Warn may deadlock if output or error pipes are used and not handled separately.
Raises `GitCommandError` – if the return status is not 0

class CatFileContentStream(size: int, stream: IO[bytes]):

Object representing a sized read-only stream returning the contents of an object. It behaves like a stream, but counts the data read and simulates an empty stream once our sized content region is empty. If not all data is read to the end of the objects’s lifetime, we read the rest to assure the underlying stream continues to work

```python
__annotations__ = {'__slots__': typing.Tuple[str, ...]}
__del__() → None
__init__(size: int, stream: IO[bytes]) → None
  Initialize self. See help(type(self)) for accurate signature.
__iter__() → git.cmd.Git.CatFileContentStream
__module__ = 'git.cmd'
__next__() → bytes
__slots__ = ('_stream', '_nbr', '_size')
next() → bytes
read(size: int = -1) → bytes
readline(size: int = -1) → bytes
readlines(size: int = -1) → List[bytes]
```

```
GIT_PYTHON_GIT_EXECUTABLE = 'git'
GIT_PYTHON_TRACE = False
USE_SHELL = False
__call__(**kwargs) → git.cmd.Git
  Specify command line options to the git executable for a subcommand call
  Parameters
  kwargs – is a dict of keyword arguments. these arguments are passed as in
  _call_process but will be passed to the git command rather than the subcommand.

Examples:
  git(work_tree='/tmp').difftool()

__getattr__(name: str) → Any
  A convenience method as it allows to call the command as if it was an object. :return: Callable object that
  will execute call _call_process with your arguments.
__getstate__() → Dict[str, Any]
__init__(working_dir: Union[None, str, os.PathLike] = None)
  Initialize this instance with:
  Parameters
  working_dir – Git directory we should work in. If None, we always work
  in the current directory as returned by os.getcwd(). It is meant to be the working tree
directory if available, or the .git directory in case of bare repositories.
__module__ = 'git.cmd'
__setstate__(d) → None
__slots__ = ('_working_dir', 'cat_file_all', 'cat_file_header', '_version_info', '_git')
cat_file_all
```

3.16. GitCmd
cat_file_header

clear_cache() → git.cmd.Git

Clear all kinds of internal caches to release resources.

Currently persistent commands will be interrupted.

Returns self

custom_environment(**kwargs)

A context manager around the above update_environment method to restore the environment back to its previous state after operation.

Examples:

```python
with self.custom_environment(GIT_SSH='bin/ssh_wrapper'):
    repo.remotes.origin.fetch()
```

Parameters **kwargs – see update_environment

environment()


Handles executing the command on the shell and consumes and returns the returned information (stdout)

Parameters

- **command** – The command argument list to execute. It should be a string, or a sequence of program arguments. The program to execute is the first item in the args sequence or string.
- **istream** – Standard input filehandle passed to subprocess.Popen.
- **with_extended_output** – Whether to return a (status, stdout, stderr) tuple.
- **with_exceptions** – Whether to raise an exception when git returns a non-zero status.
- **as_process** – Whether to return the created process instance directly from which streams can be read on demand. This will render with_extended_output and with_exceptions ineffective - the caller will have to deal with the details himself. It is important to note that the process will be placed into an AutoInterrupt wrapper that will interrupt the process once it goes out of scope. If you use the command in iterators, you should pass the whole process instance instead of a single stream.
- **output_stream** – If set to a file-like object, data produced by the git command will be output to the given stream directly. This feature only has any effect if as_process is False. Processes will always be created with a pipe due to issues with subprocess. This merely is a workaround as data will be copied from the output pipe to the given output stream directly. Judging from the implementation, you shouldn’t use this flag!
- **stdout_as_string** – if False, the commands standard output will be bytes. Otherwise, it will be decoded into a string using the default encoding (usually utf-8). The latter can fail, if the output contains binary data.
• **env** – A dictionary of environment variables to be passed to `subprocess.Popen`.

• **max_chunk_size** – Maximum number of bytes in one chunk of data passed to the output_stream in one invocation of write() method. If the given number is not positive then the default value is used.

• **subprocess_kwargs** – Keyword arguments to be passed to subprocess.Popen. Please note that some of the valid kwargs are already set by this method, the ones you specify may not be the same ones.

• **with_stdout** – If True, default True, we open stdout on the created process

• **universal_newlines** – if True, pipes will be opened as text, and lines are split at all known line endings.

• **shell** – Whether to invoke commands through a shell (see `Popen(..., shell=True)`). It overrides `USE_SHELL` if it is not `None`.

• **kill_after_timeout** – To specify a timeout in seconds for the git command, after which the process should be killed. This will have no effect if as_process is set to True. It is set to None by default and will let the process run until the timeout is explicitly specified. This feature is not supported on Windows. It’s also worth noting that kill_after_timeout uses SIGKILL, which can have negative side effects on a repository. For example, stale locks in case of git gc could render the repository incapable of accepting changes until the lock is manually removed.

**Returns**

- str(output) if extended_output = False (Default)
- tuple(int(status), str(stdout), str(stderr)) if extended_output = True

if output_stream is True, the stdout value will be your output stream: * output_stream if extended_output = False * tuple(int(status), output_stream, str(stderr)) if extended_output = True

Note git is executed with LC_MESSAGES="C" to ensure consistent output regardless of system language.

**Raises** *GitCommandError* –

**Note** If you add additional keyword arguments to the signature of this method, you must update the execute_kwargs tuple housed in this module.

**get_object_data** *(ref: str) → Tuple[str, str, int, bytes]*)

As get_object_header, but returns object data as well :return: (hexsha, type_string, size_as_int,data_string) :note: not threadsafe

**get_object_header** *(ref: str) → Tuple[str, str, int]*)

Use this method to quickly examine the type and size of the object behind the given ref.

**Note** The method will only suffer from the costs of command invocation once and reuses the command in subsequent calls.

**Returns** (hexsha, type_string, size_as_int)

git_exec_name = 'git'

classmethod is_cygwin() → bool

classmethod polish_url *(url: str, is_cygwin: Union[None, bool] = None) → Union[str, os.PathLike]*)

classmethod refresh *(path: Union[None, str, os.PathLike] = None) → bool*

This gets called by the refresh function (see the top level __init__).
**set_persistent_git_options** (**kwargs**) → None

Specify command line options to the git executable for subsequent subcommand calls.

**Parameters**

**kwargs** – is a dict of keyword arguments. These arguments are passed as in `_call_process` but will be passed to the git command rather than the subcommand.

**stream_object_data** (ref: str) → Tuple[str, str, int, git.cmd.Git.CatFileContentStream]

As `get_object_header`, but returns the data as a stream.

**Returns**

(hexsha, type_string, size_as_int, stream)

**Note**

This method is not threadsafe, you need one independent Command instance per thread to be safe!

**transform_kwarg** (name: str, value: Any, split_single_char_options: bool) → List[str]

**transform_kwargs** (split_single_char_options: bool = True, **kwargs) → List[str]

Transforms Python style kwargs into git command line options.

**update_environment** (**kwargs**) → None

Set environment variables for future git invocations. Return all changed values in a format that can be passed back into this function to revert the changes.

**Parameters**

**kwargs** – environment variables to use for git processes

**Returns**

dict that maps environment variables to their old values

**version_info** → tuple(int, int, int, int)

tuple with integers representing the major, minor and additional version numbers as parsed from git version. This value is generated on demand and is cached.

**working_dir** → Git directory we are working on

### 3.17 Config

Module containing module parser implementation able to properly read and write configuration files

**git.config.GitConfigParser**

alias of `git.config.GitConfigParser`

**class** `git.config.SectionConstraint` (config: T_ConfigParser, section: str)

Constrains a ConfigParser to only option commands which are constrained to always use the section we have been initialized with.

It supports all ConfigParser methods that operate on an option.

**Note**

If used as a context manager, will release the wrapped ConfigParser.

```
__del__() → None
__enter__() → git.config.SectionConstraint[~T_ConfigParser][T_ConfigParser]
__exit__(exception_type: str, exception_value: str, traceback: str) → None
```
3.18 Diff

class git.diff.Diffable
Common interface for all object that can be diffed against another object of compatible type.

Note Subclasses require a repo member as it is the case for Object instances, for practical reasons
we do not derive from Object.

class Index

    __dict__ = mappingproxy({'__module__': 'git.diff', '__dict__': <attribute '__dict__' of 'Index' objects>, '__weakref__': <attribute '__weakref__' of 'Index' objects>, '__doc__': None})

    __module__ = 'git.diff'

    __weakref__
    list of weak references to the object (if defined)

    __module__ = 'git.diff'

    __slots__ = ()

diff (other: Union[Type[Index], Tree, Commit, None, str, object] = <class 'git.diff.Diffable.Index'>,
paths: Union[str, os.PathLike, List[Union[str, os.PathLike]], Tuple[Union[str, os.PathLike], ...],
None] = None, create_patch: bool = False, **kwargs) → DiffIndex
Creates diffs between two items being trees, trees and index or an index and the working tree. It will
detect renames automatically.

Parameters

  • other – Is the item to compare us with. If None, we will be compared to the working
tree. If Treeish, it will be compared against the respective tree If Index ( type ), it
will be compared against the index. If git.NULL_TREE, it will compare against the
empty tree. It defaults to Index to assure the method will not by-default fail on bare
repositories.

  • paths – is a list of paths or a single path to limit the diff to. It will only include at
least one of the given path or paths.

  • create_patch – If True, the returned Diff contains a detailed patch that if applied
makes the self to other. Patches are somewhat costly as blobs have to be read and
diffed.
• **kwargs** – Additional arguments passed to git-diff, such as R=True to swap both sides of the diff.

**Returns**  
git.DiffIndex

**Note**  
On a bare repository, ‘other’ needs to be provided as Index or as as Tree/Commit, or a git command error will occur

**class** `git.diff.DiffIndex`

Implements an Index for diffs, allowing a list of Diffs to be queried by the diff properties.

The class improves the diff handling convenience

```python
__dict__ = mappingproxy({'__module__': 'git.diff', '__doc__': 'Implements an Index for diffs, allowing a list of Diffs to be queried by the diff properties.

The class improves the diff handling convenience

__module__ = 'git.diff'
__orig_bases__ = (typing.List[~T_Diff],)
__parameters__ = (~T_Diff,)
__weakref__
    list of weak references to the object (if defined)
change_type = ('A', 'C', 'D', 'R', 'M', 'T')

Returns iterator yielding Diff instances that match the given change_type

Parameters change_type – Member of DiffIndex.change_type, namely:

• 'A' for added paths
• 'D' for deleted paths
• 'R' for renamed paths
• 'M' for paths with modified data
• 'T' for changed in the type paths
```

**class** `git.diff.Diff`

A Diff contains diff information between two Trees.

It contains two sides a and b of the diff, members are prefixed with “a” and “b” respectively to indicate that.

Diffs keep information about the changed blob objects, the file mode, renames, deletions and new files.

There are a few cases where None has to be expected as member variable value:

**New File:**

- `a_mode is None`
- `a_blob is None`
- `a_path is None`

**Deleted File:**
Working Tree Blobs

When comparing to working trees, the working tree blob will have a null hexsha as a corresponding object does not yet exist. The mode will be null as well. But the path will be available though. If it is listed in a diff the working tree version of the file must be different to the version in the index or tree, and hence has been modified.

```
NULL_BIN_SHA = b'\x00\x00\x00\x00\x00\x00\x00\x00\x00\x00\x00\x00\x00\x00\x00\x00'
NULL_HEX_SHA = '0000000000000000000000000000000000000000'
```

```
__eq__(other: object) → bool
    Return self==value.

__hash__() → int
    Return hash(self).

__init__(repo: Repo, a_rawpath: Optional[bytes], b_rawpath: Optional[bytes], a_blob_id: Union[str, bytes, None], b_blob_id: Union[str, bytes, None], a_mode: Union[bytes, str, None], b_mode: Union[bytes, str, None], new_file: bool, deleted_file: bool, copied_file: bool, raw_rename_from: Optional[bytes], raw_rename_to: Optional[bytes], diff: Union[str, bytes, None], change_type: Optional[typing_extensions.Literal['A', 'D', 'C', 'M', 'R', 'T', 'U']][A, D, C, M, R, T, U]], score: Optional[int]) → None
    Initialize self. See help(type(self)) for accurate signature.

__module__ = 'git.diff'

__ne__(other: object) → bool
    Return self!=value.

__slots__ = ('a_blob', 'b_blob', 'a_mode', 'b_mode', 'a_rawpath', 'b_rawpath', 'new_file', 'deleted_file', 'copied_file', 'raw_rename_from', 'raw_rename_to', 'diff', 'change_type', 'score')

__str__() → str
    Return str(self).
```
raw_rename_to
renamed

Returns True if the blob of our diff has been renamed

Note This property is deprecated, please use renamed_file instead.

score

3.19 Exceptions

Module containing all exceptions thrown throughout the git package,

exception git.exc.CacheError
Base for all errors related to the git index, which is called cache internally

__module__ = 'git.exc'

exception git.exc.CheckoutError(message: str, failed_files: Sequence[Union[str, os.PathLike]],
valid_files: Sequence[Union[str, os.PathLike]], failed_reasons: List[str])
Thrown if a file could not be checked out from the index as it contained changes.
The .failed_files attribute contains a list of relative paths that failed to be checked out as they contained changes that did not exist in the index.
The .failed_reasons attribute contains a string informing about the actual cause of the issue.
The .valid_files attribute contains a list of relative paths to files that were checked out successfully and hence match the version stored in the index

__init__(message: str, failed_files: Sequence[Union[str, os.PathLike]], valid_files: Sequence[Union[str, os.PathLike]], failed_reasons: List[str]) → None
Initialize self. See help(type(self)) for accurate signature.

__module__ = 'git.exc'

__str__() → str
Return str(self).

exception git.exc.CommandError(command: Union[List[str], Tuple[str, ...], str], status: Union[str, int, None, Exception] = None, stderr: Union[bytes, str, None] = None, stdout: Union[bytes, str, None] = None)
Base class for exceptions thrown at every stage of Popen() execution.

Parameters command – A non-empty list of argv comprising the command-line.

__init__(command: Union[List[str], Tuple[str, ...], str], status: Union[str, int, None, Exception] = None, stderr: Union[bytes, str, None] = None, stdout: Union[bytes, str, None] = None) → None
Initialize self. See help(type(self)) for accurate signature.

__module__ = 'git.exc'
__str__ () → str
Return str(self).

exception git.exc.GitCommandError (command: Union[List[str], Tuple[str, ...], str], status: Union[str, int, None, Exception] = None, stderr: Union[bytes, str, None] = None, stdout: Union[bytes, str, None] = None)
Thrown if execution of the git command fails with non-zero status code.

__init__ (command: Union[List[str], Tuple[str, ...], str], status: Union[str, int, None, Exception] = None, stderr: Union[bytes, str, None] = None, stdout: Union[bytes, str, None] = None)
Initialize self. See help(type(self)) for accurate signature.

__module__ = 'git.exc'

exception git.exc.GitCommandNotFound (command: Union[List[str], Tuple[str, ...], str], cause: Union[str, Exception])
Thrown if we cannot find the git executable in the PATH or at the path given by the GIT_PYTHON_GIT_EXECUTABLE environment variable

__init__ (command: Union[List[str], Tuple[str, ...], str], cause: Union[str, Exception])
Initialize self. See help(type(self)) for accurate signature.

__module__ = 'git.exc'

exception git.exc.GitError
Base class for all package exceptions

__module__ = 'git.exc'

__weakref__
list of weak references to the object (if defined)

exception git.exc.HookExecutionError (command: Union[List[str], Tuple[str, ...], str], status: Union[str, int, None, Exception], stderr: Union[bytes, str, None] = None, stdout: Union[bytes, str, None] = None)
Thrown if a hook exits with a non-zero exit code. It provides access to the exit code and the string returned via standard output

__init__ (command: Union[List[str], Tuple[str, ...], str], status: Union[str, int, None, Exception], stderr: Union[bytes, str, None] = None, stdout: Union[bytes, str, None] = None)
Initialize self. See help(type(self)) for accurate signature.

__module__ = 'git.exc'

exception git.exc.InvalidGitRepositoryError
Thrown if the given repository appears to have an invalid format.

__module__ = 'git.exc'

exception git.exc.NoSuchPathError
Thrown if a path could not be access by the system.

__module__ = 'git.exc'

__weakref__
list of weak references to the object (if defined)

exception git.exc.RepositoryDirtyError (repo: Repo, message: str)
Thrown whenever an operation on a repository fails as it has uncommitted changes that would be overwritten

__init__ (repo: Repo, message: str)
Initialize self. See help(type(self)) for accurate signature.
exception `git.exc.UnmergedEntriesError`

Thrown if an operation cannot proceed as there are still unmerged entries in the cache

exception `git.exc.WorkTreeRepositoryUnsupported`

Thrown to indicate we can’t handle work tree repositories

### 3.20 Refs.symbolic

**class** `git.refs.symbolic.SymbolicReference` *(repo: Repo, path: Union[str, os.PathLike], check_path: bool = False)*

Represents a special case of a reference such that this reference is symbolic. It does not point to a specific commit, but to another Head, which itself specifies a commit.

A typical example for a symbolic reference is HEAD.

**Parameters**

- `repo` – Repository to create the reference in

**create** *(repo: Repo, path: Union[str, os.PathLike], reference: Union[Commit, TagObject, Blob, Tree, str] = 'HEAD', logmsg: Optional[str] = None, force: bool = False, **kwargs)*

Create a new symbolic reference, hence a reference pointing to another reference.

**Parameters**

- `repo` – Repository to create the reference in
• **path** – full path at which the new symbolic reference is supposed to be created at, i.e. “NEW_HEAD” or “symrefs/my_new_symref”

• **reference** – The reference to which the new symbolic reference should point to. If it is a commit’ish, the symbolic ref will be detached.

• **force** – if True, force creation even if a symbolic reference with that name already exists. Raise OSError otherwise

• **logmsg** – If not None, the message to append to the reflog. Otherwise no reflog entry is written.

**Returns** Newly created symbolic Reference

**Raises** OSError – If a (Symbolic)Reference with the same name but different contents already exists.

**Note** This does not alter the current HEAD, index or Working Tree

**classmethod delete**(repo, path)

Delete the reference at the given path

**Parameters**

• **repo** – Repository to delete the reference from

• **path** – Short or full path pointing to the reference, i.e. `refs/myreference` or just “myreference”, hence ‘refs/’ is implied. Alternatively the symbolic reference to be deleted

**classmethod dereference_recursive**(repo, ref_path)

Returns hexsha stored in the reference at the given ref_path, recursively dereferencing all intermediate references as required

**Parameters**

repo – the repository containing the reference at ref_path

**classmethod from_path**(repo, path)

Parameters path – full .git-directory-relative path name to the Reference to instantiate

**Note** use to_full_path() if you only have a partial path of a known Reference Type

**Returns** Instance of type Reference, Head, or Tag depending on the given path

**is_detached**

**Returns** True if we are a detached reference, hence we point to a specific commit instead to another reference

**is_remote**()

**Returns** True if this symbolic reference points to a remote branch

**is_valid**()

**Returns** True if the reference is valid, hence it can be read and points to a valid object or reference.

**classmethod iter_items**(repo: Repo, common_path: Union[str, os.PathLike, None] = None, *args, **kwargs)

Find all refs in the repository

**Parameters**

• **repo** – is the Repo
• **common_path** – Optional keyword argument to the path which is to be shared by all returned Ref objects. Defaults to class specific portion if None assuring that only refs suitable for the actual class are returned.

**Returns**

`git.SymbolicReference[]`, each of them is guaranteed to be a symbolic ref which is not detached and pointing to a valid ref

List is lexicographically sorted The returned objects represent actual subclasses, such as Head or TagReference

**log()**

**Returns** RefLog for this reference. Its last entry reflects the latest change applied to this reference

**Note:** As the log is parsed every time, its recommended to cache it for use instead of calling this method repeatedly. It should be considered read-only.

**log_append(oldbinsha, message, newbinsha=None)**

Append a logentry to the logfile of this ref

**Parameters**

• **oldbinsha** – binary sha this ref used to point to

• **message** – A message describing the change

• **newbinsha** – The sha the ref points to now. If None, our current commit sha will be used

**Returns** added RefLogEntry instance

**log_entry(index)**

**Returns** RefLogEntry at the given index

**Parameters**

`index` – python list compatible positive or negative index

**Note:** This method must read part of the reflog during execution, hence it should be used sparringly, or only if you need just one index. In that case, it will be faster than the `log()` method

**name**

**Returns** In case of symbolic references, the shortest assumable name is the path itself.

**object**

Return the object our ref currently refers to

**path**

**ref**

Returns the Reference we point to

**reference**

Returns the Reference we point to

**rename(new_path, force=False)**

Rename self to a new path

**Parameters**
• **new_path** – Either a simple name or a full path, i.e. `new_name` or `features/new_name`. The prefix `refs/` is implied for references and will be set as needed. In case this is a symbolic ref, there is no implied prefix.

• **force** – If True, the rename will succeed even if a head with the target name already exists. It will be overwritten in that case.

**Returns**
- `self`  

**Raises**
- `OSError` – In case a file at path but a different contents already exists

---

**repo**

```python
set_commit(commit: Union[git.objects.commit.Commit, SymbolicReference, str], logmsg=None)
```

As set_object, but restricts the type of object to be a Commit.

**Raises**
- `ValueError` – If commit is not a Commit object or doesn’t point to a commit

**Returns**
- `self`

---

**set_object**(object, logmsg=None)

Set the object we point to, possibly dereference our symbolic reference first. If the reference does not exist, it will be created.

**Parameters**

- **object** – a refspec, a SymbolicReference or an Object instance. SymbolicReferences will be dereferenced beforehand to obtain the object they point to.

- **logmsg** – If not None, the message will be used in the reflog entry to be written. Otherwise the reflog is not altered.

**Note**
- plain SymbolicReferences may not actually point to objects by convention

**Returns**
- `self`

---

**set_reference**(ref, logmsg=None)

Set ourselves to the given ref. It will stay a symbol if the ref is a Reference. Otherwise an Object, given as Object instance or refspec, is assumed and if valid, will be set which effectively detaches the reference if it was a purely symbolic one.

**Parameters**

- **ref** – SymbolicReference instance, Object instance or refspec string. Only if the ref is a SymbolicRef instance, we will point to it. Everything else is dereferenced to obtain the actual object.

- **logmsg** – If set to a string, the message will be used in the reflog. Otherwise, a reflog entry is not written for the changed reference. The previous commit of the entry will be the commit we point to now.

**See also:** `log_append()`

**Returns**
- `self`

**Note**
- This symbolic reference will not be dereferenced. For that, see `set_object(...)`

---

**classmethod** `to_full_path(path) → Union[str, os.PathLike]`

**Returns**
- string with a full repository-relative path which can be used to initialize a Reference instance, for instance by using `Reference.from_path`
3.21 Refs.reference

class git.refs.reference.Reference (repo: Repo, path: Union[str, os.PathLike], check_path: bool = True)

Represents a named reference to any object. Subclasses may apply restrictions though, i.e. Heads can only point to commits.

__abstractmethods__ = frozenset()

__init__ (repo: Repo, path: Union[str, os.PathLike], check_path: bool = True) → None

Initialize this instance:
:param repo: Our parent repository

Parameters

- path – Path relative to the .git/ directory pointing to the ref in question, i.e. refs/heads/master
- check_path – if False, you can provide any path. Otherwise the path must start with the default path prefix of this type.

__module__ = 'git.refs.reference'

__parameters__ = ()

__slots__ = ()

__str__ () → str

Return str(self).

__subclasshook__()

classmethod iter_items (repo: Repo, common_path: Union[str, os.PathLike, None] = None, *args, **kwargs) → Iterator[T_References]

Equivalent to SymbolicReference.iter_items, but will return non-detached references as well.

name

Returns (shortest) Name of this reference - it may contain path components

remote_head

remote_name

set_object (object: Union[Commit, TagObject, Blob, Tree], logmsg: Optional[str] = None) → Reference

Special version which checks if the head-log needs an update as well:
:return: self

3.22 Refs.head

class git.refs.head.HEAD (repo: Repo, path: Union[str, os.PathLike] = 'HEAD')

Special case of a Symbolic Reference as it represents the repository’s HEAD reference.

__init__ (repo: Repo, path: Union[str, os.PathLike] = 'HEAD')

Initialize self. See help(type(self)) for accurate signature.

__module__ = 'git.refs.head'

__slots__ = ()

orig_head () → git.refs.symbolic.SymbolicReference

Returns SymbolicReference pointing at the ORIG_HEAD, which is maintained to contain the previous value of HEAD
**reset** *(commit: Union[Commit, TagObject, Blob, Tree, git.refs.symbolic.SymbolicReference, str] = 'HEAD', index: bool = True, working_tree: bool = False, paths: Union[str, os.PathLike, Sequence[Union[str, os.PathLike]], None] = None, **kwargs) → HEAD*

Reset our HEAD to the given commit optionally synchronizing the index and working tree. The reference we refer to will be set to commit as well.

**Parameters**

- **commit** – Commit object, Reference Object or string identifying a revision we should reset HEAD to.
- **index** – If True, the index will be set to match the given commit. Otherwise it will not be touched.
- **working_tree** – If True, the working tree will be forcefully adjusted to match the given commit, possibly overwriting uncommitted changes without warning. If working_tree is True, index must be true as well
- **paths** – Single path or list of paths relative to the git root directory that are to be reset. This allows to partially reset individual files.
- **kwargs** – Additional arguments passed to git-reset.

**Returns**

The reference **self**

**class** **git.refs.head.Head**(repo: Repo, path: Union[str, os.PathLike], check_path: bool = True)

A Head is a named reference to a Commit. Every Head instance contains a name and a Commit object.

**Examples:**

```python
>>> repo = Repo("/path/to/repo")
>>> head = repo.heads[0]

>>> head.name
'master'

>>> head.commit
<git.Commit "1c09f16c2cb4100fb6935bb162daa4723f455">

>>> head.commit.hexsha
'1c09f16c2cb4100fb6935bb162daa4723f455'
```

• **force** – If True, changes to the index and the working tree will be discarded. If False, GitCommandError will be raised in that situation.

• **kwargs** – Additional keyword arguments to be passed to git checkout, i.e. b='new_branch' to create a new branch at the given spot.

**Returns** The active branch after the checkout operation, usually self unless a new branch has been created. If there is no active branch, as the HEAD is now detached, the HEAD reference will be returned instead.

**Note** By default it is only allowed to checkout heads - everything else will leave the HEAD detached which is allowed and possible, but remains a special state that some tools might not be able to handle.

```python
class Head:
    def __init__(self, repo, name, force=False):
        self.repo = repo
        self.name = name
        self.force = force
```

```python
config_reader() ➞ git.config.SectionConstraint
```

**Returns** A configuration parser instance constrained to only read this instance’s values

```python
class Writer:
    def __init__(self, repo, force=False):
        self.repo = repo
        self.force = force
```

```python
config_writer() ➞ git.config.SectionConstraint
```

**Returns** A configuration writer instance with read-and write access to options of this head

```python
classmethod delete(repo: Repo, *heads, **kwargs)
```

**Delete the given heads**

**Parameters**

• **force** – If True, the heads will be deleted even if they are not yet merged into the main development stream. Default False

```python
k_config_remote = 'remote'
k_config_remote_ref = 'merge'
```

```python
rename(new_path: Union[str, os.PathLike], force: bool = False) ➞ git.refs.head.Head
```

**Rename self to a new path**

**Parameters**

• **new_path** – Either a simple name or a path, i.e. new_name or features/new_name. The prefix refs/heads is implied

• **force** – If True, the rename will succeed even if a head with the target name already exists.

**Returns** self

**Note** respects the ref log as git commands are used

```python
set_tracking_branch(remote_reference: RemoteReference) ➞ Head
```

**Configure this branch to track the given remote reference. This will alter this branch’s configuration accordingly.**

**Parameters**

• **remote_reference** – The remote reference to track or None to untrack any references

**Returns** self

```python
tracking_branch() ➞ Optional[RemoteReference]
```

**Returns** The remote_reference we are tracking, or None if we are not a tracking branch
3.23 Refs.tag

class git.refs.tag.TagReference (repo: Repo, path: Union[str, os.PathLike], check_path: bool = True)
Class representing a lightweight tag reference which either points to a commit, a tag object or any other object.
In the latter case additional information, like the signature or the tag-creator, is available.

This tag object will always point to a commit object, but may carry additional information in a tag object:

```
tagref = TagReference.list_items(repo)[0]
print(tagref.commit.message)
if tagref.tag is not None:
    print(tagref.tag.message)
```

__abstractmethods__ = frozenset()
__module__ = 'git.refs.tag'
__parameters__ = ()
__slots__ = ()
__subclasshook__()

commit

Returns Commit object the tag ref points to

Raises ValueError – if the tag points to a tree or blob

Create a new tag reference.

Parameters

* path – The name of the tag, i.e. 1.0 or releases/1.0. The prefix refs/tags is implied
* ref – A reference to the object you want to tag. It can be a commit, tree or blob.
* logmsg – If not None, the message will be used in your tag object. This will also create an additional tag object that allows to obtain that information, i.e.:

```
tagref.tag.message
```

* message – Synonym for param logmsg: Included for backwards compatibility. :param logmsg is used in preference if both given.
* force – If True, to force creation of a tag even though that tag already exists.
* kwargs – Additional keyword arguments to be passed to git-tag

Returns A new TagReference

classmethod delete (repo: Repo, *tags) → None
Delete the given existing tag or tags

object

Return the object our ref currently refers to

tag

Returns Tag object this tag ref points to or None in case we are a lightweight tag
3.24 Refs.remote

```python
class git.refs.remote.RemoteReference(repo: Repo, path: Union[str, os.PathLike], check_path: bool = True)

Represents a reference pointing to a remote head.
```

```python
classmethod create(*args, **kwargs) → NoReturn

Used to disable this method
```

```python
classmethod delete(repo: Repo, *refs, **kwargs) → None

Delete the given remote references
```

```python
classmethod iter_items(repo: Repo, common_path: Union[str, os.PathLike, None] = None,
remote: Optional[Remote] = None, *args, **kwargs) → RemoteReference

Iterate remote references, and if given, constrain them to the given remote
```

3.25 Refs.log

```python
class git.refs.log.RefLog(filepath: Union[str, os.PathLike, None] = None)

A reflog contains RefLogEntrys, each of which defines a certain state of the head in question. Custom query
methods allow to retrieve log entries by date or by other criteria.

Reflog entries are ordered, the first added entry is first in the list, the last entry, i.e. the last change of the head
or reference, is last in the list.
```

```python
__abstractmethods__ = frozenset()
_init__(filepath: Union[str, os.PathLike, None] = None)

Initialize this instance with an optional filepath, from which we will initialize our data. The path is also
used to write changes back using the write() method
```

```python
__module__ = 'git.refs.log'
static __new__(cls, filepath: Union[str, os.PathLike, None] = None) → git.refs.log.RefLog

Create and return a new object. See help(type) for accurate signature.
```

```python
__orig_bases__ = (typing.List[git.refs.log.RefLogEntry], <class 'git.objects.util.Serializable'>)
__parameters__ = ()
__slots__ = ('_path',)
__subclasshook__()
```
classmethod append_entry

```python
(config_reader: Union[git.util.Actor, GitConfigParser, SectionConstraint, None], filepath: Union[str, os.PathLike], oldbinsha: bytes, newbinsha: bytes, message: str, write: bool = True) -> RefLogEntry
```

Append a new log entry to the revlog at filepath.

**Parameters**

- `config_reader` - configuration reader of the repository - used to obtain user information. May also be an Actor instance identifying the committer directly or None.
- `filepath` - full path to the log file
- `oldbinsha` - binary sha of the previous commit
- `newbinsha` - binary sha of the current commit
- `message` - message describing the change to the reference
- `write` - If True, the changes will be written right away. Otherwise the change will not be written

**Returns**

RefLogEntry objects which was appended to the log

**Note**

As we are append-only, concurrent access is not a problem as we do not interfere with readers.

classmethod entry_at

```python
(filepath: Union[str, os.PathLike], index: int) -> git.refs.log.RefLogEntry
```

Returns RefLogEntry at the given index

**Parameters**

- `filepath` - full path to the index file from which to read the entry
- `index` - python list compatible index, i.e. it may be negative to specify an entry counted from the end of the list

** Raises **

`IndexError` - If the entry didn’t exist

**Note:**

This method is faster as it only parses the entry at index, skipping all other lines. Nonetheless, the whole file has to be read if the index is negative

classmethod from_file

```python
(filepath: Union[str, os.PathLike]) -> git.refs.log.RefLog
```

Returns a new RefLog instance containing all entries from the reflog at the given filepath

**Parameters**

- `filepath` - path to reflog

** Raises **

`ValueError` - If the file could not be read or was corrupted in some way

classmethod iter_entries

```python
(stream: Union[str, BytesIO, mmap.mmap]) -> Iterator[git.refs.log.RefLogEntry]
```

Returns Iterator yielding RefLogEntry instances, one for each line read sfrom the given stream.

**Parameters**

- `stream` - file-like object containing the revlog in its native format or string instance pointing to a file to read

classmethod path

```python
(ref: SymbolicReference) -> str
```

Returns string to absolute path at which the reflog of the given ref instance would be found. The path is not guaranteed to point to a valid file though.
Parameters `ref` – SymbolicReference instance

`to_file` *(filepath: Union[str, os.PathLike]) → None*
Write the contents of the reflog instance to a file at the given filepath. :param filepath: path to file, parent directories are assumed to exist

`write` () → git.refs.log.RefLog
Write this instance’s data to the file we are originating from :return: self

class `git.refs.log.RefLogEntry`
Named tuple allowing easy access to the revlog data fields

__module__ = 'git.refs.log'

__orig_bases__ = (typing.Tuple[str, str, git.util.Actor, typing.Tuple[int, int], str],)

__parameters__ = ()

__repr__ () → str
Representation of ourselves in git reflog format

__slots__ = ()

actor
Actor instance, providing access

format () → str
Returns a string suitable to be placed in a reflog file

classmethod `from_line` *(line: bytes) → git.refs.log.RefLogEntry*
Returns New RefLogEntry instance from the given revlog line.

Parameters `line` – line bytes without trailing newline

Raises `ValueError` – If line could not be parsed

message
Message describing the operation that acted on the reference

Returns New instance of a RefLogEntry

`newhexsha`
The hexsha to the commit the ref now points to, after the change

`oldhexsha`
The hexsha to the commit the ref pointed to before the change

`time`
time as tuple:
  • [0] = int(time)
  • [1] = int(timezone_offset) in time.altzone format

3.26 Remote

class `git.remote.RemoteProgress`
Handler providing an interface to parse progress information emitted by git-push and git-fetch and to dispatch callbacks allowing subclasses to react to the progress.
BEGIN = 1
CHECKING_OUT = 256
COMPRESSING = 8
COUNTING = 4
DONE_TOKEN = 'done.'
END = 2
FINDING_SOURCES = 128
OP_MASK = -4
RECEIVING = 32
RESOLVING = 64
STAGE_MASK = 3
TOKEN_SEPARATOR = ', '
WRITING = 16
__annotations__ = {'_num_op_codes': <class 'int'>}
__init__() → None
   Initialize self. See help(type(self)) for accurate signature.
__module__ = 'git.util'
__slots__ = ('_cur_line', '_seen_ops', 'error_lines', 'other_lines')
error_lines
line_dropped(line: str) → None
   Called whenever a line could not be understood and was therefore dropped.
new_message_handler() → Callable[[str], None]
   Returns a progress handler suitable for handle_process_output(), passing lines on to this
   Progress handler in a suitable format
other_lines
re_op_absolute = re.compile('(remote: )?([\w\s]+):\s+()(\d+)()(. *)')
re_op_relative = re.compile('(remote: )?([\w\s]+):\s+(\d+)% \((\d+)/(\d+)\)(. *)')
update(op_code: int, cur_count: Union[str, float], max_count: Union[str, float, None] = None, mes-
   sage: str = '”) → None
   Called whenever the progress changes
Parameters
   • op_code – Integer allowing to be compared against Operation IDs and stage IDs.
   Stage IDs are BEGIN and END. BEGIN will only be set once for each Operation ID as well as END. It may be that BEGIN and END are set at once in case only one progress message was emitted due to the speed of the operation. Between BEGIN and END, none of these flags will be set
   Operation IDs are all held within the OP_MASK. Only one Operation ID will be active per call.
   • cur_count – Current absolute count of items
• **max_count** – The maximum count of items we expect. It may be None in case there is no maximum number of items or if it is (yet) unknown.

• **message** – In case of the ‘WRITING’ operation, it contains the amount of bytes transferred. It may possibly be used for other purposes as well.

You may read the contents of the current line in self._cur_line

```python
class git.remote.PushInfo:

Carries information about the result of a push operation of a single head:
```

```python
info = remote.push()[0]
info.flags  # bitflags providing more information about the result
info.local_ref  # Reference pointing to the local reference that was pushed
    # It is None if the ref was deleted.
info.remote_ref_string  # path to the remote reference located on the remote side
info.remote_ref  # Remote Reference on the local side corresponding to
    # the remote_ref_string. It can be a TagReference as well.
info.old_commit  # commit at which the remote_ref was standing before we pushed
    # it to local_ref.commit. Will be None if an error was indicated
info.summary  # summary line providing human readable english text about the
    # push
```

```python
DELETED = 64
ERROR = 1024
FAST_FORWARD = 256
FORCED_UPDATE = 128
NEW_HEAD = 2
NEW_TAG = 1
NO_MATCH = 4
REJECTED = 8
REMOTE_FAILURE = 32
REMOTE_REJECTED = 16
UP_TO_DATE = 512

__abstractmethods__ = frozenset()

__init__ (flags: int, local_ref: Optional[git.refs.symbolic.SymbolicReference], remote_ref_string: str, remote: git.remote.Remote, old_commit: Optional[str] = None, summary: str = '') → None
    Initialize a new instance local_ref: HEAD | Head | RemoteReference | TagReference | Reference | SymbolicReference | None

__module__ = 'git.remote'
__parameters__ = ()
__slots__ = ('local_ref', 'remote_ref_string', 'flags', '_old_commit_sha', '_remote',
    _push

flags

classmethod iter_items (repo: Repo, *args, **kwargs) → NoReturn
    For more information about the arguments, see list_items :return: iterator yielding Items
```

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### local_ref

### old_commit

### remote_ref

**Returns** Remote Reference or TagReference in the local repository corresponding to the remote_ref_string kept in this instance.

### remote_ref_string

### class git.remote.FetchInfo

```python
class git.remote.FetchInfo(ref: git.refs.symbolic.SymbolicReference, flags: int, note: str = '', old_commit: Union[Commit, TagObject, Blob, Tree, None] = None, remote_ref_path: Union[str, os.PathLike, None] = None):
    Carry information about the results of a fetch operation of a single head:
```

```python
info = remote.fetch()[0]
info.ref  # Symbolic Reference or RemoteReference to the changed
    # remote head or FETCH_HEAD
info.flags  # additional flags to be & with enumeration members,
    # i.e. info.flags & info.REJECTED
    # is 0 if ref is SymbolicReference
info.note  # additional notes given by git-fetch intended for the user
info.old_commit  # if info.flags & info.FORCED_UPDATE|info.FAST_FORWARD,
    # field is set to the previous location of ref, otherwise None
info.remote_ref_path  # The path from which we fetched on the remote. It's the...
```

### ERROR = 128

### FAST_FORWARD = 64

### FORCED_UPDATE = 32

### HEAD_UPTODATE = 4

### NEW_HEAD = 2

### NEW_TAG = 1

### REJECTED = 16

### TAG_UPDATE = 8

```python
__abstractmethods__ = frozenset()

__annotations__ = {'_flag_map': typing.Dict[typing_extensions.Literal[' ', '+', '-'], int]}

__init__(ref: git.refs.symbolic.SymbolicReference, flags: int, note: str = '', old_commit: Union[Commit, TagObject, Blob, Tree, None] = None, remote_ref_path: Union[str, os.PathLike, None] = None) -> None

Initialize a new instance

__module__ = 'git.remote'

__parameters__ = ()

__slots__ = ('ref', 'old_commit', 'flags', 'note', 'remote_ref_path')

__str__() -> str

Return str(self).

__subclasshook__()
commit

Returns Commit of our remote ref

flags

classmethod iter_items (repo: Repo, *args, **kwargs) → NoReturn

For more information about the arguments, see list_items :return: iterator yielding Items

name

Returns Name of our remote ref

note

old_commit

ref

classmethod refresh () → typing_extensions.Literal[True][True]

This gets called by the refresh function (see the top level __init__).

remote_ref_path

class git.remote.Remote (repo: Repo, name: str)

Provides easy read and write access to a git remote.

Everything not part of this interface is considered an option for the current remote, allowing constructs like remote.pushurl to query the pushurl.

NOTE: When querying configuration, the configuration accessor will be cached to speed up subsequent accesses.

__abstractmethods__ = frozenset()

__eq__ (other: object) → bool

Return self==value.

__getattribute__ (attr: str) → Any

Allows to call this instance like remote.special(*args, **kwargs) to call git-remote special self.name

__hash__ () → int

Return hash(self).

__init__ (repo: Repo, name: str) → None

Initialize a remote instance

Parameters

* repo – The repository we are a remote of
* name – the name of the remote, i.e. ‘origin’

__module__ = 'git.remote'

__ne__ (other: object) → bool

Return self!=value.

__parameters__ = ()

__repr__ () → str

Return repr(self).

__slots__ = ('repo', 'name', '_config_reader')

__str__ () → str

Return str(self).
classmethod add(repo: Repo, name: str, url: str, **kwargs) → Remote
Create a new remote to the given repository:

:param repo: Repository instance that is to receive the new remote.
:param name: Desired name of the remote.
:param url: URL which corresponds to the remote’s name.
:param kwargs: Additional arguments to be passed to the git-remote add command.
:raise GitCommandError: in case an origin with that name already exists.

add_url(url: str, **kwargs) → git.remote.Remote
Adds a new url on current remote (special case of git remote set_url).

This command adds new URLs to a given remote, making it possible to have multiple URLs for a single remote.

Parameters

url – string being the URL to add as an extra remote URL

Returns

self

config_reader

Returns

GitConfigParser compatible object able to read options for only our remote. Hence you may simple type config.get(“pushurl”) to obtain the information.

config_writer

Returns

GitConfigParser compatible object able to write options for this remote.

Note

You can only own one writer at a time - delete it to release the configuration file and make it usable by others.

To assure consistent results, you should only query options through the writer. Once you are done writing, you are free to use the config reader once again.

classmethod create(repo: Repo, name: str, url: str, **kwargs) → Remote
Create a new remote to the given repository:

:param repo: Repository instance that is to receive the new remote.
:param name: Desired name of the remote.
:param url: URL which corresponds to the remote’s name.
:param kwargs: Additional arguments to be passed to the git-remote add command.
:raise GitCommandError: in case an origin with that name already exists.

delete_url(url: str, **kwargs) → git.remote.Remote
Deletes a new url on current remote (special case of git remote set_url).

This command deletes new URLs to a given remote, making it possible to have multiple URLs for a single remote.

Parameters

url – string being the URL to delete from the remote

Returns

self

exists() → bool

Returns

True if this is a valid, existing remote. Valid remotes have an entry in the repository’s configuration.

fetch(refspec: Union[str, List[str], None] = None, progress: Union[git.util.RemoteProgress, None, UpdateProgress] = None, verbose: bool = True, **kwargs) →
git.util.IterableList[git.remote.FetchInfo][git.remote.FetchInfo]
Fetch the latest changes for this remote.

Parameters

* refspec – A “refspec” is used by fetch and push to describe the mapping between remote ref and local ref. They are combined with a colon in the format <src>:<dst>, preceded by an optional plus sign, +. For example: git fetch $URL refs/heads/master:refs/heads/origin means ‘grab the master branch head
from the $URL and store it as my origin branch head”. And git push $URL refs/heads/master:refs/heads/to-upstream means “publish my master branch head as to-upstream branch at $URL”. See also git-push(1).

Taken from the git manual

Fetch supports multiple refspecs (as the underlying git-fetch does) - supplying a list rather than a string for 'refspec' will make use of this facility.

- **progress** – See ‘push’ method
- **verbose** – Boolean for verbose output
- **kwargs** – Additional arguments to be passed to git-fetch

**Returns** IterableList(FetchInfo, . . . ) list of FetchInfo instances providing detailed information about the fetch results

**Note** As fetch does not provide progress information to non-ttys, we cannot make it available here unfortunately as in the ‘push’ method.

### classmethod iter_items(repo: Repo, *args, **kwargs) → Iterator[Remote]

**Returns** Iterator yielding Remote objects of the given repository

### pull(refspec: Union[str, List[str], None] = None, progress: Union[git.util.RemoteProgress, UpdateProgress, None] = None, **kwargs)

Pull changes from the given branch, being the same as a fetch followed by a merge of branch with your local branch.

**Parameters**

- **refspec** – see ‘fetch’ method
- **progress** – see ‘push’ method
- **kwargs** – Additional arguments to be passed to git-pull

**Returns** Please see ‘fetch’ method

### push(refspec: Union[str, List[str], None] = None, progress: Union[git.util.RemoteProgress, UpdateProgress, Callable[[], git.util.RemoteProgress], None] = None, **kwargs)

Push changes from source branch in refspec to target branch in refspec.

**Parameters**

- **refspec** – see ‘fetch’ method
- **progress** – Can take one of many value types:
  - None to discard progress information
  - A function (callable) that is called with the progress information. Signature: progress(op_code, cur_count, max_count=None, message=''). Click here for a description of all arguments given to the function.
  - An instance of a class derived from git.RemoteProgress that overrides the update() function.
- **kwargs** – Additional arguments to be passed to git-push

**Note** No further progress information is returned after push returns.
**Returns** list(PushInfo, ...) list of PushInfo instances, each one informing about an individual head which had been updated on the remote side. If the push contains rejected heads, these will have the PushInfo.ERROR bit set in their flags. If the operation fails completely, the length of the returned IterableList will be 0.

`refs`

**Returns** IterableList of RemoteReference objects. It is prefixed, allowing you to omit the remote path portion, i.e.: remote.refs.master # yields RemoteReference(‘/refs/remotes/origin/master’)

`classmethod remove`(repo: Repo, name: str)  → str
Remove the remote with the given name :return: the passed remote name to remove

`rename`(new_name: str)  → git.remote.Remote
Rename self to the given new_name :return: self

`repo`

`classmethod rm`(repo: Repo, name: str)  → str
Remove the remote with the given name :return: the passed remote name to remove

`set_url`(new_url: str, old_url: Optional[str] = None, **kwargs)  → git.remote.Remote
Configure URLs on current remote (cf command git remote set_url)

This command manages URLs on the remote.

**Parameters**

- **new_url** – string being the URL to add as an extra remote URL
- **old_url** – when set, replaces this URL with new_url for the remote

**Returns** self

`stale.refs`

**Returns**

IterableList RemoteReference objects that do not have a corresponding head in the remote reference anymore as they have been deleted on the remote side, but are still available locally.

The IterableList is prefixed, hence the ‘origin’ must be omitted. See ‘refs’ property for an example.

To make things more complicated, it can be possible for the list to include other kinds of references, for example, tag references, if these are stale as well. This is a fix for the issue described here: https://github.com/gitpython-developers/GitPython/issues/260

`update`(**kwargs)  → git.remote.Remote
Fetch all changes for this remote, including new branches which will be forced in (in case your local remote branch is not part the new remote branches ancestry anymore).

**Parameters** **kwargs – Additional arguments passed to git-remote update

**Returns** self

`urls`

**Returns** Iterator yielding all configured URL targets on a remote as strings

3.26. Remote
3.27 Repo.Base

class git.repo.base.Repo(path: Union[str, os.PathLike, None] = None, odbt: Type[gitdb.db.loose.LooseObjectDB] = <class 'git.db.GitCmdObjectDB'>, search_parent_directories: bool = False, expand_vars: bool = True)

Represents a git repository and allows you to query references, gather commit information, generate diffs, create and clone repositories query the log.

The following attributes are worth using:

‘working_dir’ is the working directory of the git command, which is the working tree directory if available or the .git directory in case of bare repositories.

‘working_tree_dir’ is the working tree directory, but will raise AssertionError if we are a bare repository.

‘git_dir’ is the .git repository directory, which is always set.

DAEMON_EXPORT_FILE = 'git-daemon-export-ok'

GitCommandWrapperType
alias of git.cmd.Git

__annotations__ = {'_common_dir': typing.Union[str, os.PathLike], '_working_tree_dir': typing.Union[str, os.PathLike], 'git_dir': typing.Union[str, os.PathLike], 'working_dir': typing.Union[str, os.PathLike, NoneType]}

__del__() → None

__dict__ = mappingproxy({'__module__': 'git.repo.base', '__annotations__': {'working_dir': typing.Union[str, os.PathLike, NoneType]}, '__dict__': <attribute '__dict__' of 'Repo' objects>, '__weakref__': <attribute '__weakref__' of 'Repo' objects>})

__enter__() → git.repo.base.Repo

__eq__(rhs: object) → bool

Return self==value.

__exit__(exc_type: Any, exc_value: Any, traceback: Any) → None

__hash__() → int

Return hash(self).

__init__(path: Union[str, os.PathLike, None] = None, odbt: Type[gitdb.db.loose.LooseObjectDB] = <class 'git.db.GitCmdObjectDB'>, search_parent_directories: bool = False, expand_vars: bool = True) → None

Create a new Repo instance

Parameters

- **path** – the path to either the root git directory or the bare git repo:

```
repo = Repo("/Users/matrier/Development/git-python")
repo = Repo("/Users/matrier/Development/git-python.git")
repo = Repo("~/Development/git-python.git")
repo = Repo("$REPOSITORIES/Development/git-python.git")
repo = Repo("C:\Users\matrier\Development\git-python\.git")
```

- In Cygwin, path may be a ‘cygdrive/...’ prefixed path.
- If it evaluates to false, GIT_DIR is used, and if this also evals to false, the current-directory is used.

- **odbt** – Object DataBase type - a type which is constructed by providing the directory containing the database objects, i.e. .git/objects. It will be used to access all object data
• `search_parent_directories` – if True, all parent directories will be searched for a valid repo as well.

Please note that this was the default behaviour in older versions of GitPython, which is considered a bug though.

**Raises**

• `InvalidGitRepositoryError`

• `NoSuchPathError`

**Returns** `git.Repo`

```python
__module__ = 'git.repo.base'
```

```python
__ne__(rhs: object) → bool
Return self!=value.
```

```python
__repr__() → str
Return repr(self).
```

```python
__weakref__
list of weak references to the object (if defined)
```

**active_branch**

The name of the currently active branch.

**Returns** 
`Head` to the active branch

**alternates**

Retrieve a list of alternates paths or set a list paths to be used as alternates

```python
archive(ostream: Union[TextIO, BinaryIO], treeish: Optional[str] = None, prefix: Optional[str] = None, **kwargs) → git.repo.base.Repo
Archive the tree at the given revision.
```

**Parameters**

• `ostream` – file compatible stream object to which the archive will be written as bytes

• `treeish` – is the treeish name/id, defaults to active branch

• `prefix` – is the optional prefix to prepend to each filename in the archive

• `kwags` – Additional arguments passed to git-archive
  – Use the ‘format’ argument to define the kind of format. Use specialized ostreams to write any format supported by python.
  – You may specify the special `path` keyword, which may either be a repository-relative path to a directory or file to place into the archive, or a list or tuple of multiple paths.

**Raises** `GitCommandError` – in case something went wrong

**Returns** `self`

**bare**

**Returns** True if the repository is bare

```python
blame(rev: Any, file: Any, incremental: bool = False, **kwargs) → Union[List[Commit], None]
```

The blame information for the given file at the given revision.
Parameters `rev` – revision specifier, see `git-rev-parse` for viable options.

Returns list: [git.Commit, list: [line]] A list of lists associating a Commit object with a list of lines that changed within the given commit. The Commit objects will be given in order of appearance.

`blame_incremental`(rev: Any, file: Any, **kwargs) → Optional[Iterator[git.repo.base.BlameEntry]]

Iterator for blame information for the given file at the given revision.

Unlike `.blame()`, this does not return the actual file’s contents, only a stream of BlameEntry tuples.

Parameters `rev` – revision specifier, see `git-rev-parse` for viable options.

Returns lazy iterator of BlameEntry tuples, where the commit indicates the commit to blame for the line, and range indicates a span of line numbers in the resulting file.

If you combine all line number ranges outputted by this command, you should get a continuous range spanning all line numbers in the file.

`branches`
A list of Head objects representing the branch heads in this repo

Returns `git.IterableList(Head, ...)`

`clone`(path: Union[str, os.PathLike], progress: Optional[Callable] = None, multi_options: Optional[List[str]] = None, **kwargs)

Create a clone from this repository.

Parameters

• `path` – is the full path of the new repo (traditionally ends with "/<name>.git").

• `progress` – See ‘git.remote.Remote.push’.

• `multi_options` – A list of Clone options that can be provided multiple times. One option per list item which is passed exactly as specified to clone. For example ["--config core.filemode=false", "--config core.ignorecase", "--recurse-submodule=repo1_path", "--recurse-submodule=repo2_path"]

• `kwargs`

  – odbt = ObjectDatabase Type, allowing to determine the object database implementation used by the returned Repo instance

  – All remaining keyword arguments are given to the git-clone command

Returns `git.Repo` (the newly cloned repo)

`classmethod clone_from`(url: Union[str, os.PathLike], to_path: Union[str, os.PathLike], progress: Optional[Callable] = None, env: Optional[Mapping[str, Any]] = None, multi_options: Optional[List[str]] = None, **kwargs)

Create a clone from the given URL.

Parameters

• `url` – valid git url, see http://www.kernel.org/pub/software/scm/git/docs/git-clone.html#URLS

• `to_path` – Path to which the repository should be cloned to

• `progress` – See ‘git.remote.Remote.push’.
• env – Optional dictionary containing the desired environment variables. Note: Provided variables will be used to update the execution environment for git. If some variable is not specified in env and is defined in os.environ, value from os.environ will be used. If you want to unset some variable, consider providing empty string as its value.

• multi_options – See clone method

• kwargs – see the clone method

Returns Repo instance pointing to the cloned directory

close() → None

commit (rev: Union[str, Commit, TagObject, Blob, Tree, None] = None) → git.objects.commit.Commit

The Commit object for the specified revision

Parameters rev – revision specifier, see git-rev-parse for viable options.

Returns git.Commit

commom_dir

Returns The git dir that holds everything except possibly HEAD, FETCH_HEAD, ORIG_HEAD, COMMIT_EDITMSG, index, and logs/.

config_level = ('system', 'user', 'global', 'repository')

config_reader (config_level: typing_extensions.Literal['system', 'global', 'user', 'repository'][system, global, user, repository] = None) → git.config.GitConfigParser

Returns

GitConfigParser allowing to read the full git configuration, but not to write it

The configuration will include values from the system, user and repository configuration files.

Parameters config_level – For possible values, see config_writer method If None, all applicable levels will be used. Specify a level in case you know which file you wish to read to prevent reading multiple files.

Note On windows, system configuration cannot currently be read as the path is unknown, instead the global path will be used.

config_writer (config_level: typing_extensions.Literal['system', 'global', 'user', 'repository'][system, global, user, repository] = 'repository') →
git.config.GitConfigParser

Returns GitConfigParser allowing to write values of the specified configuration file level. Config writers should be retrieved, used to change the configuration, and written right away as they will lock the configuration file in question and prevent other’s to write it.

Parameters config_level – One of the following values system = system wide configuration file global = user level configuration file repository = configuration file for this repository only

create_head (path: Union[str, os.PathLike], commit: str = 'HEAD', force: bool = False, logmsg: Optional[str] = None) → SymbolicReference

Create a new head within the repository. For more documentation, please see the Head.create method.

Returns newly created Head Reference

create_remote (name: str, url: str, **kwargs) → git.remote.Remote

Create a new remote.
For more information, please see the documentation of the Remote.create methods

**create_submodule** (*args, **kwargs*) → git.objects.submodule.base.Submodule
Create a new submodule

*Note* See the documentation of Submodule.add for a description of the applicable parameters

**create_tag** (*path: Union[str, os.PathLike], ref: str = 'HEAD', message: Optional[str] = None, force: bool = False, **kwargs*) → git.refs.tag.TagReference
Create a new tag reference. For more documentation, please see the TagReference.create method.

**currently_rebasimg_on** () → Union[SymbolicReference, Commit, TagObject, Blob, Tree, None]

*Returns* The commit which is currently being replayed while rebasing.
None if we are not currently rebasing.

**daemon_export**
If True, git-daemon may export this repository

**delete_head** (*heads*, **kwargs*) → None
Delete the given heads

**delete_remote** (remote: git.remote.Remote) → str
Delete the given remote.

**delete_tag** (*tags*) → None
Delete the given tag references

**description**
the project's description

**git = None**

**git_dir = ''**

**has_separate_working_tree** () → bool

*Returns* True if our git_dir is not at the root of our working_tree_dir, but a .git file with a platform agnostic symbolic link. Our git_dir will be wherever the .git file points to

*Note* bare repositories will always return False here

**head**

*Returns* HEAD Object pointing to the current head reference

**heads**
A list of Head objects representing the branch heads in this repo

*Returns* git.IterableList(Head, ...)

**ignored** (*paths*) → List[Union[str, os.PathLike]]
Checks if paths are ignored via .gitignore Doing so using the “git check-ignore” method.

**Parameters** paths – List of paths to check whether they are ignored or not

*Returns* subset of those paths which are ignored

**index**
**Returns** IndexFile representing this repository’s index.

**Note** This property can be expensive, as the returned IndexFile will be reinitialized. It’s recommended to re-use the object.

```python
classmethod init(path: Union[str, os.PathLike, None] = None, mkdir: bool = True, odbt: Type[git.db.GitCmdObjectDB] = <class ‘git.db.GitCmdObjectDB’>, expand_vars: bool = True, **kwargs) → git.repo.base.Repo
```

Initialize a git repository at the given path if specified

**Parameters**

- `path` – is the full path to the repo (traditionally ends with /<name>.git) or None in which case the repository will be created in the current working directory
- `mkdir` – if specified will create the repository directory if it doesn’t already exists. Creates the directory with a mode=0755. Only effective if a path is explicitly given
- `odbt` – Object DataBase type - a type which is constructed by providing the directory containing the database objects, i.e. .git/objects. It will be used to access all object data
- `expand_vars` – if specified, environment variables will not be escaped. This can lead to information disclosure, allowing attackers to access the contents of environment variables
- `kwargs` – keyword arguments serving as additional options to the git-init command

**Returns** git.Repo (the newly created repo)

`is_ancestor`(ancestor_rev: git.objects.commit.Commit, rev: git.objects.commit.Commit) → bool

Check if a commit is an ancestor of another

**Parameters**

- `ancestor_rev` – Rev which should be an ancestor
- `rev` – Rev to test against ancestor_rev

**Returns** True, ancestor_rev is an ancestor to rev.

`is_dirty`(index: bool = True, working_tree: bool = True, untracked_files: bool = False, submodules: bool = True, path: Union[str, os.PathLike, None] = None) → bool

**Returns** True, the repository is considered dirty. By default it will react like a git-status without untracked files, hence it is dirty if the index or the working copy have changes.

`is_valid_object`(sha: str, object_type: Optional[str] = None) → bool


A list of Commit objects representing the history of a given ref/commit

**Parameters**

- `rev` – revision specifier, see git-rev-parse for viable options. If None, the active branch will be used.
- `paths` – is an optional path or a list of paths to limit the returned commits to Commits that do not contain that path or the paths will not be returned.
- `kwargs` – Arguments to be passed to git-rev-list - common ones are max_count and skip
Note to receive only commits between two named revisions, use the “revA...revB” revision specifier

Returns `git.Commit[]`

**iter_submodules** (*args, **kwargs) -> Iterator[T_co]

An iterator yielding Submodule instances, see Traversable interface for a description of args and kwargs

:returns: Iterator

**iter_trees** (*args, **kwargs) -> Iterator[Tree]

Returns Iterator yielding Tree objects

Note Takes all arguments known to iter_commits method

**merge_base** (*rev, **kwargs) -> List[Union[Commit, TagObject, Blob, Tree, None]]

Find the closest common ancestor for the given revision (e.g. Commits, Tags, References, etc)

Parameters

- *rev* – At least two revs to find the common ancestor for.
- **kwargs** – Additional arguments to be passed to the repo.git.merge_base() command which does all the work.

Returns A list of Commit objects. If -all was not specified as kwarg, the list will have at max one Commit, or is empty if no common merge base exists.

Raises ValueError – If not at least two revs are provided

**re_author_committer_start** = re.compile('^\(author|committer\)$')

**re_envvars** = re.compile('\$(\{\s?)?\[a-zA-Z_]\w*(\}\s?)?|%\s?\[a-zA-Z_]\w*\s?%)')

**re_hexsha_only** = re.compile('^\[0-9A-Fa-f\]{40}$')

**re_hexsha_shortened** = re.compile('^\[0-9A-Fa-f\]{4,40}$')

**re_tab_full_line** = re.compile('^\t(.*)$')

**re_whitespace** = re.compile('\\s+')

**references**

A list of Reference objects representing tags, heads and remote references.

:returns: IterableList(Reference, ...)

**refs**

A list of Reference objects representing tags, heads and remote references.

:returns: IterableList(Reference, ...)

**remote** (name: str = 'origin') -> git.remote.Remote

Returns Remote with the specified name

Raises ValueError – if no remote with such a name exists

**remotes**

A list of Remote objects allowing to access and manipulate remotes

:returns: git.IterableList(Remote, ...)

**rev_parse** (rev: str) -> Union[Commit, Tag, Tree, Blob]

Returns Object at the given revision, either Commit, Tag, Tree or Blob

Parameters *rev* – git-rev-parse compatible revision specification as string, please see [http://www.kernel.org/pub/software/scm/git/docs/git-rev-parse.html](http://www.kernel.org/pub/software/scm/git/docs/git-rev-parse.html) for details
Raises

• **BadObject** – if the given revision could not be found
• **ValueError** – If rev couldn’t be parsed
• **IndexError** – If invalid reflog index is specified

`submodule` *(name: str) → git.objects.submodule.base.Submodule*

**Returns** Submodule with the given name

**Raises** **ValueError** – If no such submodule exists

`submodule_update` *(*args, **kwargs) → Iterator[T_co]*

Update the submodules, keeping the repository consistent as it will take the previous state into consideration. For more information, please see the documentation of RootModule.update

`submodules`

**Returns** `git.IterableList(Submodule, ...)` of direct submodules available from the current head

`tag` *(path: Union[str, os.PathLike]) → git.refs.tag.TagReference*

**Returns** TagReference Object, reference pointing to a Commit or Tag

**Parameters** `path` – path to the tag reference, i.e. 0.1.5 or tags/0.1.5

`tags`

A list of Tag objects that are available in this repo

```
:return: `git.IterableList(TagReference, ...)`
```

`tree` *(rev: Union[Commit, Tree, str, None] = None) → Tree*

The Tree object for the given treeish revision Examples:

```
repo.tree(repo.heads[0])
```

**Parameters** `rev` – is a revision pointing to a Treeish (being a commit or tree)

**Returns** `git.Tree`

**Note** If you need a non-root level tree, find it by iterating the root tree. Otherwise it cannot know about its path relative to the repository root and subsequent operations might have unexpected results.

`untracked_files`

**Returns**

`list(str,...)`

Files currently untracked as they have not been staged yet. Paths are relative to the current working directory of the git command.

**Note** ignored files will not appear here, i.e. files mentioned in .gitignore

**Note** This property is expensive, as no cache is involved. To process the result, please consider caching it yourself.

`working_dir = None`

`working_tree_dir`

**Returns** The working tree directory of our git repository. If this is a bare repository, None is returned.
3.28 Repo.Functions

Package with general repository related functions

git.repo.fun.rev_parse(repo: Repo, rev: str) \rightarrow \text{Union[Commit, Tag, Tree, Blob]}

Returns Object at the given revision, either Commit, Tag, Tree or Blob

Parameters rev – git-rev-parse compatible revision specification as string, please see http://www.kernel.org/pub/software/scm/git/docs/git-rev-parse.html for details

Raises
- BadObject – if the given revision could not be found
- ValueError – If rev couldn’t be parsed
- IndexError – If invalid reflog index is specified

git.repo.fun.is_git_dir(d: PathLike) \rightarrow \text{bool}
This is taken from the git setup.c:is_git_directory function.

@throws WorkTreeRepositoryUnsupported if it sees a worktree directory. It's quite hacky to do that here, but at least clearly indicates that we don’t support it. There is the unlikely danger to throw if we see directories which just look like a worktree dir, but are none.

git.repo.fun.touch(filename: str) \rightarrow \text{str}

git.repo.fun.find_submodule_git_dir(d: PathLike) \rightarrow \text{Optional[PathLike]}
Search for a submodule repo.

git.repo.fun.name_to_object(repo: Repo, name: str, return_ref: bool = False) \rightarrow \text{Union[git.refs.symbolic.SymbolicReference, Commit, TagObject, Blob, Tree]}

Returns object specified by the given name, hexshas (short and long) as well as references are supported

Parameters return_ref – if name specifies a reference, we will return the reference instead of the object. Otherwise it will raise BadObject or BadName

git.repo.fun.short_to_long(odb: GitCmdObjectDB, hexsha: str) \rightarrow \text{Optional[bytes]}

Returns long hexadecimal sha1 from the given less-than-40 byte hexsha or None if no candidate could be found.

Parameters hexsha – hexsha with less than 40 byte

git.repo.fun.deref_tag(tag: Tag) \rightarrow \text{TagObject}
Recursively dereference a tag and return the resulting object

git.repo.fun.to_commit(obj: git.objects.base.Object) \rightarrow \text{Union[Commit, TagObject]}
Convert the given object to a commit if possible and return it

git.repo.fun.find_worktree_git_dir(dotgit: PathLike) \rightarrow \text{Optional[str]}
Search for a gitdir for this worktree.

3.29 Util

git.util.stream_copy(source: BinaryIO, destination: BinaryIO, chunk_size: int = 524288) \rightarrow \text{int}
Copy all data from the source stream into the destination stream in chunks of size chunk_size
Returns amount of bytes written

```python
git.util.join_path(a: Union[str, os.PathLike], *p) → Union[str, os.PathLike]
```

Join path tokens together similar to osp.join, but always use '/' instead of possibly '\' on windows.

```python
git.util.to_native_path_linux(path: Union[str, os.PathLike]) → str
```

As join path, but makes sure an OS native path is returned. This is only needed to play it safe on my dear windows and to assure nice paths that only use '

```python
class git.util.Stats(total: git.types.Total_TD, files: Dict[Union[str, os.PathLike], git.types.Files_TD])
```

Represents stat information as presented by git at the end of a merge. It is created from the output of a diff operation.

Example:

```python
c = Commit( sha1 )
s = c.stats
s.total  # full-stat-dict
s.files  # dict( filepath : stat-dict )
```

Full-stat-dict

A dictionary with the following keys and values:

- **deletions** = number of deleted lines as int
- **insertions** = number of inserted lines as int
- **lines** = total number of lines changed as int, or deletions + insertions

File-stat-dict

In addition to the items in the stat-dict, it features additional information:

- **files** = number of changed files as int

```python
def __init__(total: git.types.Total_TD, files: Dict[Union[str, os.PathLike], git.types.Files_TD])
```

Initialize self. See help(type(self)) for accurate signature.

```python
def close() → bytes
```

Note Based on the dulwich project
```
f
sha1
tell() → int
write(data: AnyStr) → int
write_sha() → bytes

class git.util.Iterable
Defines an interface for iterable items which is to assure a uniform way to retrieve and iterate items within the
git repository

__module__ = 'git.util'
__slots__ = ()

classmethod iter_items(repo: Repo, *args, **kwargs) → Any
For more information about the arguments, see list_items :return: iterator yielding Items

classmethod list_items(repo, *args, **kwargs)
Deprecated, use IterableObj instead. Find all items of this type - subclasses can specify args and kwargs
differently. If no args are given, subclasses are obliged to return all items if no additional arguments arg
given.

Note Favor the iter_items method as it will
:return:list(Item,..) list of item instances

class git.util.IterableList(id_attr: str, prefix: str = '')
List of iterable objects allowing to query an object by id or by named index:

heads = repo.heads
heads.master
heads['master']
heads[0]

Iterable parent objects = [Commit, SubModule, Reference, FetchInfo, PushInfo] Iterable via inheritance =
[Head, TagReference, RemoteReference] ] It requires an id_attribute name to be set which will be queried
from its contained items to have a means for comparison.

A prefix can be specified which is to be used in case the id returned by the items always contains a prefix that
does not matter to the user, so it can be left out.

__contains__(attr: object) → bool
Return key in self.

__delitem__(index: Union[typing_extensions.SupportsIndex, int, slice, str]) → None
Delete self[key].

__getattr__(attr: str) → T_IterableObj

__getitem__(index: Union[typing_extensions.SupportsIndex, int, slice, str]) → T_IterableObj
x.__getitem__(y) <==> x[y]

__init__(id_attr: str, prefix: str = '') → None
Initialize self. See help(type(self)) for accurate signature.

__module__ = 'git.util'

static __new__(cls, id_attr: str, prefix: str = '') →

git.util.IterableList[git.util.IterableObj][git.util.IterableObj]
Create and return a new object. See help(type) for accurate signature.
```
class git.util.BlockingLockFile(
    file_path: Union[str, os.PathLike],
    check_interval_s: float = 0.3,
    max_block_time_s: int = 9223372036854775807
):

    The lock file will block until a lock could be obtained, or fail after a specified timeout.

    **Note** If the directory containing the lock was removed, an exception will be raised during the
    blocking period, preventing hangs as the lock can never be obtained.

__init__ (file_path: Union[str, os.PathLike], check_interval_s: float = 0.3, max_block_time_s: int = 9223372036854775807) → None

Configure the instance

Parameters

- **check_interval_s** – Period of time to sleep until the lock is checked the next
time. By default, it waits a nearly unlimited time

- **max_block_time_s** – Maximum amount of seconds we may lock

__module__ = 'git.util'
__slots__ = ('_check_interval', '_max_block_time')

class git.util.LockFile (file_path: Union[str, os.PathLike])

Provides methods to obtain, check for, and release a file based lock which should be used to handle concurrent
access to the same file.

As we are a utility class to be derived from, we only use protected methods.

Locks will automatically be released on destruction

__del__ () → None

__init__ (file_path: Union[str, os.PathLike]) → None

Initialize self. See help(type(self)) for accurate signature.

__module__ = 'git.util'
__slots__ = ('_file_path', '_owns_lock')

class git.util.Actor (name: Optional[str], email: Optional[str])

Actors hold information about a person acting on the repository. They can be committers and authors or anything
with a name and an email as mentioned in the git log entries.

__eq__ (other: Any) → bool

    Return self==value.

__hash__ () → int

    Return hash(self).

__init__ (name: Optional[str], email: Optional[str]) → None

    Initialize self. See help(type(self)) for accurate signature.

__module__ = 'git.util'
__ne__ (other: Any) → bool

    Return self!=value.

__repr__ () → str

    Return repr(self).

__slots__ = ('name', 'email')
__str__() → str
Return str(self).

classmethod author(config_reader: Union[None, GitConfigParser, SectionConstraint] = None) → Actor
Same as committer(), but defines the main author. It may be specified in the environment, but defaults to
the committer

classmethod committer(config_reader: Union[None, GitConfigParser, SectionConstraint] = None) → Actor
Returns Actor instance corresponding to the configured committer. It behaves similar to the
git implementation, such that the environment will override configuration values of con-
fig_reader. If no value is set at all, it will be generated

Parameters config_reader – ConfigReader to use to retrieve the values from in case they
are not set in the environment

conf_email = 'email'
conf_name = 'name'
email
env_author_email = 'GIT_AUTHOR_EMAIL'
env_author_name = 'GIT_AUTHOR_NAME'
env_committer_email = 'GIT_COMMITTER_EMAIL'
env_committer_name = 'GIT_COMMITTER_NAME'
name
name_email_regex = re.compile('(.*) <(.*)>')
name_only_regex = re.compile('<(.*)>')

git.util.get_user_id() → str
Returns string identifying the currently active system user as name@node

git.util.assure_directory_exists(path: Union[str, os.PathLike], is_file: bool = False) → bool
Assure that the directory pointed to by path exists.

Parameters is_file – If True, path is assumed to be a file and handled correctly. Otherwise it
must be a directory

Returns True if the directory was created, False if it already existed

class git.util.RemoteProgress
Handler providing an interface to parse progress information emitted by git-push and git-fetch and to dispatch
callbacks allowing subclasses to react to the progress.

BEGIN = 1
CHECKING_OUT = 256
COMPRESSING = 8
COUNTING = 4
DONE_TOKEN = 'done.'
END = 2
FINDING_SOURCES = 128
OP_MASK = -4
RECEIVING = 32
RESOLVING = 64
STAGE_MASK = 3
TOKEN_SEPARATOR = ', '
WRITING = 16
__annotations__ = {'_num_op_codes': <class 'int'>}
__init__() → None
Initialize self. See help(type(self)) for accurate signature.
__module__ = 'git.util'
__slots__ = ('_cur_line', '_seen_ops', 'error_lines', 'other_lines')

error_lines
line_dropped(line: str) → None
Called whenever a line could not be understood and was therefore dropped.

class CallableRemoteProgress(fn: Callable)
An implementation forwarding updates to any callable

__init__(fn: Callable) → None
Initialize self. See help(type(self)) for accurate signature.

Parameters
• op_code – Integer allowing to be compared against Operation IDs and stage IDs.
  Stage IDs are BEGIN and END. BEGIN will only be set once for each Operation ID as well as END. It may be that BEGIN and END are set at once in case only one progress message was emitted due to the speed of the operation. Between BEGIN and END, none of these flags will be set
  Operation IDs are all held within the OP_MASK. Only one Operation ID will be active per call.
• cur_count – Current absolute count of items
• max_count – The maximum count of items we expect. It may be None in case there is no maximum number of items or if it is (yet) unknown.
• message – In case of the ‘WRITING’ operation, it contains the amount of bytes transferred. It may possibly be used for other purposes as well.

You may read the contents of the current line in self._cur_line

class git.util.CallableRemoteProgress (fn: Callable)
An implementation forwarding updates to any callable

__init__(fn: Callable) → None
Initialize self. See help(type(self)) for accurate signature.
Called whenever the progress changes

**Parameters**

- **op_code** – Integer allowing to be compared against Operation IDs and stage IDs.
  Stage IDs are BEGIN and END. BEGIN will only be set once for each Operation ID as well as END. It may be that BEGIN and END are set at once in case only one progress message was emitted due to the speed of the operation. Between BEGIN and END, none of these flags will be set
  Operation IDs are all held within the OP_MASK. Only one Operation ID will be active per call.
- **cur_count** – Current absolute count of items
- **max_count** – The maximum count of items we expect. It may be None in case there is no maximum number of items or if it is (yet) unknown.
- **message** – In case of the ‘WRITING’ operation, it contains the amount of bytes transferred. It may possibly be used for other purposes as well.

You may read the contents of the current line in self._cur_line

```python
rmtree(path: Union[str, os.PathLike]) → None
```
Remove the given recursively.

**Note** we use shutil rmtree but adjust its behaviour to see whether files that couldn’t be deleted are read-only. Windows will not remove them in that case

```python
unbare_repo(func: Callable[..., T]) → Callable[..., T]
```
Methods with this decorator raise InvalidGitRepositoryError if they encounter a bare repository

```python
HIDE_WINDOWSKNOWN_ERRORS = False
```
We need an easy way to see if Appveyor TCs start failing, so the errors marked with this var are considered “acknowledged” ones, awaiting remedy, till then, we wish to hide them.
The full list of milestones including associated tasks can be found on GitHub: https://github.com/gitpython-developers/GitPython/issues
Select the respective milestone to filter the list of issues accordingly.
5.1 3.1.20

- This is the second typed release with a lot of improvements under the hood. * Tracking issue: https://github.com/gitpython-developers/GitPython/issues/1095

See the following for details: https://github.com/gitpython-developers/gitpython/milestone/52?closed=1

5.2 3.1.19 (YANKED)

- This is the second typed release with a lot of improvements under the hood. * Tracking issue: https://github.com/gitpython-developers/GitPython/issues/1095

See the following for details: https://github.com/gitpython-developers/gitpython/milestone/51?closed=1

5.3 3.1.18

- drop support for python 3.5 to reduce maintenance burden on typing. Lower patch levels of python 3.5 would break, too.

See the following for details: https://github.com/gitpython-developers/gitpython/milestone/50?closed=1

5.4 3.1.17

- Fix issues from 3.1.16 (see https://github.com/gitpython-developers/GitPython/issues/1238)
- Fix issues from 3.1.15 (see https://github.com/gitpython-developers/GitPython/issues/1223)
- Add more static typing information
See the following for details: https://github.com/gitpython-developers/gitpython/milestone/49?closed=1

5.5 3.1.16 (YANKED)

- Fix issues from 3.1.15 (see https://github.com/gitpython-developers/GitPython/issues/1223)
- Add more static typing information

See the following for details: https://github.com/gitpython-developers/gitpython/milestone/48?closed=1

5.6 3.1.15 (YANKED)

- add deprecation warning for python 3.5

See the following for details: https://github.com/gitpython-developers/gitpython/milestone/47?closed=1

5.7 3.1.14

- git.Commit objects now have a replace method that will return a copy of the commit with modified attributes.
- Add python 3.9 support
- Drop python 3.4 support

See the following for details: https://github.com/gitpython-developers/gitpython/milestone/46?closed=1

5.8 3.1.13

See the following for details: https://github.com/gitpython-developers/gitpython/milestone/45?closed=1

5.9 3.1.12

See the following for details: https://github.com/gitpython-developers/gitpython/milestone/44?closed=1

5.10 3.1.11

Fixes regression of 3.1.10.

See the following for details: https://github.com/gitpython-developers/gitpython/milestone/43?closed=1

5.11 3.1.10

See the following for details: https://github.com/gitpython-developers/gitpython/milestone/42?closed=1
5.12 3.1.9

See the following for details: https://github.com/gitpython-developers/gitpython/milestone/41?closed=1

5.13 3.1.8

- support for ‘includeIf’ in git configuration files
- tests are now excluded from the package, making it considerably smaller

See the following for more details: https://github.com/gitpython-developers/gitpython/milestone/40?closed=1

5.14 3.1.7

- Fix tutorial examples, which disappeared in 3.1.6 due to a missed path change.

5.15 3.1.6

- Greatly reduced package size, see https://github.com/gitpython-developers/GitPython/pull/1031

5.16 3.1.5

- rollback: package size was reduced significantly not placing tests into the package anymore. See https://github.com/gitpython-developers/GitPython/issues/1030

5.17 3.1.4

- all exceptions now keep track of their cause
- package size was reduced significantly not placing tests into the package anymore.

See the following for details: https://github.com/gitpython-developers/gitpython/milestone/39?closed=1

5.18 3.1.3

See the following for details: https://github.com/gitpython-developers/gitpython/milestone/38?closed=1

5.19 3.1.2

- Re-release of 3.1.1, with known signature

See the following for details: https://github.com/gitpython-developers/gitpython/milestone/37?closed=1
5.20 3.1.1

• support for PyOxidizer, which previously failed due to usage of `__file__`.

See the following for details: https://github.com/gitpython-developers/gitpython/milestone/36?closed=1

5.21 3.1.0

• Switched back to using gitdb package as requirement (gitdb#59)

5.22 3.0.9

• Restricted GitDB (gitdb2) version requirement to < 4
• Removed old nose library from test requirements

5.22.1 Bugfixes

• Changed to use UTF-8 instead of default encoding when getting information about a symbolic reference (#774)
• Fixed decoding of tag object message so as to replace invalid bytes (#943)

5.23 3.0.8

• Added support for Python 3.8
• Bumped GitDB (gitdb2) version requirement to > 3

5.23.1 Bugfixes

• Fixed Repo.__repr__ when subclassed (#968)
• Removed compatibility shims for Python < 3.4 and old mock library
• Replaced usage of deprecated unittest aliases and Logger.warn
• Removed old, no longer used assert methods
• Replaced usage of nose assert methods with unittest

5.24 3.0.7

Properly signed re-release of v3.0.6 with new signature (See #980)
5.25 3.0.6

Note: There was an issue that caused this version to be released to PyPI without a signature
See the changelog for v3.0.7 and #980

5.25.1 Bugfixes

- Fixed warning for usage of environment variables for paths containing $ or % (#832, #961)
- Added support for parsing Git internal date format (@<unix timestamp> <timezone offset>) (#965)
- Removed Python 2 and < 3.3 compatibility shims (#979)
- Fixed GitDB (gitdb2) requirement version specifier formatting in requirements.txt (#979)

5.26 3.0.5 - Bugfixes

see the following for details: https://github.com/gitpython-developers/gitpython/milestone/32?closed=1

5.27 3.0.4 - Bugfixes

see the following for details: https://github.com/gitpython-developers/gitpython/milestone/31?closed=1

5.28 3.0.3 - Bugfixes

see the following for (most) details: https://github.com/gitpython-developers/gitpython/milestone/30?closed=1

5.29 3.0.2 - Bugfixes

- fixes an issue with installation

5.30 3.0.1 - Bugfixes and performance improvements

- Fix a performance regression which could make certain workloads 50% slower
- Add currently_rebasing_on method on Repo, see the PR
- Fix incorrect requirements.txt which could lead to broken installations, see this issue for details.

5.31 3.0.0 - Remove Python 2 support

Motivation for this is a patch which improves unicode handling when dealing with filesystem paths. Python 2 compatibility was introduced to deal with differences, and I thought it would be a good idea to ‘just’ drop support right now, mere 5 months away from the official maintenance stop of python 2.7.
The underlying motivation clearly is my anger when thinking python and unicode, which was a hassle from the start, at least in a codebase as old as GitPython, which totally doesn’t handle encodings correctly in many cases.

Having migrated to using Rust exclusively for tooling, I still see that correct handling of encodings isn’t entirely trivial, but at least Rust makes clear what has to be done at compile time, allowing to write software that is pretty much guaranteed to work once it compiles.

Again, my apologies if removing Python 2 support caused inconveniences, please see release 2.1.13 which returns it.

see the following for (most) details: https://github.com/gitpython-developers/gitpython/milestone/27?closed=1
or run have a look at the difference between tags v2.1.12 and v3.0.0: https://github.com/gitpython-developers/GitPython/compare/2.1.12...3.0.0.

5.32 2.1.15

- Fixed GitDB (gitdb2) requirement version specifier formatting in requirements.txt (Backported from #979)
- Restricted GitDB (gitdb2) version requirement to < 3 (#897)

5.33 2.1.14

- Fixed handling of 0 when transforming kwargs into Git command arguments (Backported from #899)

5.34 2.1.13 - Bring back Python 2.7 support

My apologies for any inconvenience this may have caused. Following semver, backward incompatible changes will be introduced in a minor version.

5.35 2.1.12 - Bugfixes and Features

- Multi-value support and interface improvements for Git configuration. Thanks to A. Jesse Jiryu Davis.

or run have a look at the difference between tags v2.1.11 and v2.1.12: https://github.com/gitpython-developers/GitPython/compare/2.1.11...2.1.12

5.36 2.1.11 - Bugfixes

see the following for (most) details: https://github.com/gitpython-developers/gitpython/milestone/26?closed=1
or run have a look at the difference between tags v2.1.10 and v2.1.11: https://github.com/gitpython-developers/GitPython/compare/2.1.10...2.1.11

5.37 2.1.10 - Bugfixes

see the following for (most) details: https://github.com/gitpython-developers/gitpython/milestone/25?closed=1
5.38 2.1.9 - Dropping support for Python 2.6

see the following for (most) details: https://github.com/gitpython-developers/gitpython/milestone/24?closed=1

or run have a look at the difference between tags v2.1.9 and v2.1.10: https://github.com/gitpython-developers/GitPython/compare/2.1.9...2.1.10

5.39 2.1.8 - bugfixes

see the following for (most) details: https://github.com/gitpython-developers/gitpython/milestone/23?closed=1

or run have a look at the difference between tags v2.1.8 and v2.1.9: https://github.com/gitpython-developers/GitPython/compare/2.1.8...2.1.9

5.40 2.1.6 - bugfixes

• support for worktrees

5.41 2.1.3 - Bugfixes

All issues and PRs can be viewed in all detail when following this URL: https://github.com/gitpython-developers/GitPython/milestone/21?closed=1

5.42 2.1.1 - Bugfixes

All issues and PRs can be viewed in all detail when following this URL: https://github.com/gitpython-developers/GitPython/issues?q=is%3Aclosed+milestone%3A%22v2.1.1+-+Bugfixes%22

5.43 2.1.0 - Much better windows support!

Special thanks to @ankostis, who made this release possible (nearly) single-handedly. GitPython is run by its users, and their PRs make all the difference, they keep GitPython relevant. Thank you all so much for contributing!

5.43.1 Notable fixes

• The `GIT_DIR` environment variable does not override the `path` argument when initializing a `Repo` object anymore. However, if said `path` unset, `GIT_DIR` will be used to fill the void.

All issues and PRs can be viewed in all detail when following this URL: https://github.com/gitpython-developers/GitPython/issues?q=is%3Aclosed+milestone%3A%22v2.1.0+-+proper+windows+support%22
5.44 2.0.9 - Bugfixes

- `tag.commit` will now resolve commits deeply.
- `Repo` objects can now be pickled, which helps with multi-processing.
- `Head.checkout()` now deals with detached heads, which is when it will return the `HEAD` reference instead.
- `DiffIndex.iter_change_type(...)` produces better results when diffing

5.45 2.0.8 - Features and Bugfixes

- `DiffIndex.iter_change_type(...)` produces better results when diffing an index against the working tree.
- `Repo().is_dirty(...)` now supports the `path` parameter, to specify a single path by which to filter the output. Similar to `git status <path>`
- Symbolic refs created by this library will now be written with a newline character, which was previously missing.
- `blame()` now properly preserves multi-line commit messages.
- No longer corrupt ref-logs by writing multi-line comments into them.

5.46 2.0.7 - New Features

- `IndexFile.commit(..., skip_hooks=False)` added. This parameter emulates the behaviour of `--no-verify` on the command-line.

5.47 2.0.6 - Fixes and Features

- Fix: remote output parser now correctly matches refs with non-ASCII chars in them.
- API: Diffs now have `a_rawpath`, `b_rawpath`, `raw_rename_from`, `raw_rename_to` properties, which are the raw-bytes equivalents of their unicode path counterparts.
- Fix: TypeError about passing keyword argument to string decode() on Python 2.6.
- Feature: `setUrl` API on Remotes

5.48 2.0.5 - Fixes

- Fix: parser of fetch info lines choked on some legitimate lines

5.49 2.0.4 - Fixes

- Fix: parser of commit object data is now robust against cases where commit object contains invalid bytes. The invalid characters are now replaced rather than choked on.
- Fix: non-ASCII paths are now properly decoded and returned in `.diff()` output
- Fix: `RemoteProgress` will now strip the `.` prefix or suffix from messages.
• API: Remote.[fetch|push|pull](...) methods now allow the progress argument to be a callable. This saves you from creating a custom type with usually just one implemented method.

5.50 2.0.3 - Fixes

• Fix: bug in git-blame --incremental output parser that broken when commit messages contained \r characters
• Fix: progress handler exceptions are not caught anymore, which would usually just hide bugs previously.
• Fix: The Git.execute method will now redirect stdout to devnull if with_stdout is false, which is the intended behaviour based on the parameter’s documentation.

5.51 2.0.2 - Fixes

• Fix: source package does not include *.pyc files
• Fix: source package does include doc sources

5.52 2.0.1 - Fixes

• Fix: remote output parser now correctly matches refs with “@” in them

5.53 2.0.0 - Features

Please note that due to breaking changes, we have to increase the major version.

• IMPORTANT: This release drops support for python 2.6, which is officially deprecated by the python maintainers.
• CRITICAL: Diff objects created with patch output will now not carry the — and +++ header lines anymore. All diffs now start with the @@ header line directly. Users that rely on the old behaviour can now (reliably) read this information from the a_path and b_path properties without having to parse these lines manually.
• Commit now has extra properties authored_datetime and committer_datetime (to get Python datetime instances rather than timestamps)
• Commit.diff() now supports diffing the root commit via Commit.diff(NULL_TREE).
• Repo.blame() now respects incremental=True, supporting incremental blames. Incremental blames are slightly faster since they don’t include the file’s contents in them.
• Fix: Diff objects created with patch output will now have their a_path and b_path properties parsed out correctly. Previously, some values may have been populated incorrectly when a file was added or deleted.
• Fix: diff parsing issues with paths that contain “unsafe” chars, like spaces, tabs, backslashes, etc.
5.54 1.0.2 - Fixes

• IMPORTANT: Changed default object database of Repo objects to GitCmdObjectDB. The pure-python implementation used previously usually fails to release its resources (i.e. file handles), which can lead to problems when working with large repositories.

• CRITICAL: fixed incorrect Commit object serialization when authored or commit date had timezones which were not divisible by 3600 seconds. This would happen if the timezone was something like +0530 for instance.

• A list of all additional fixes can be found on GitHub

• CRITICAL: Tree.cache was removed without replacement. It is technically impossible to change individual trees and expect their serialization results to be consistent with what git expects. Instead, use the IndexFile facilities to adjust the content of the staging area, and write it out to the respective tree objects using IndexFile.write_tree() instead.

5.55 1.0.1 - Fixes

• A list of all issues can be found on GitHub

5.56 1.0.0 - Notes

This version is equivalent to v0.3.7, but finally acknowledges that GitPython is stable and production ready. It follows the semantic version scheme, and thus will not break its existing API unless it goes 2.0.

5.57 0.3.7 - Fixes

• IndexFile.add() will now write the index without any extension data by default. However, you may override this behaviour with the new write_extension_data keyword argument.

  – Renamed ignore_tree_extension_data keyword argument in IndexFile.write(...) to ignore_extension_data

• If the git command executed during Remote.push(...)|fetch(...) returns with an non-zero exit code and GitPython didn’t obtain any head-information, the corresponding GitCommandError will be raised. This may break previous code which expected these operations to never raise. However, that behaviour is undesirable as it would effectively hide the fact that there was an error. See this issue for more information.

• If the git executable can’t be found in the PATH or at the path provided by GIT_PYTHON_GIT_EXECUTABLE, this is made obvious by throwing GitCommandNotFound, both on unix and on windows.

  – Those who support GUI on windows will now have to set git.Git.USE_SHELL = True to get the previous behaviour.

• A list of all issues can be found on GitHub

5.58 0.3.6 - Features

• DOCS

  – special members like __init__ are now listed in the API documentation
tutorial section was revised entirely, more advanced examples were added.

**POSSIBLY BREAKING CHANGES**

- As `rev_parse` will now throw `BadName` as well as `BadObject`, client code will have to catch both exception types.
- `Repo.working_tree_dir` now returns `None` if it is bare. Previously it raised `AssertionError`.
- `IndexFile.add()` previously raised `AssertionError` when paths where used with bare repository, now it raises `InvalidGitRepositoryError`.

- Added `Repo.merge_base()` implementation. See the respective issue on GitHub.

- `include` sections in git configuration files are now respected.

- Added `GitConfigParser.rename_section()`.

- Added `Submodule.rename()`.

- A list of all issues can be found on GitHub.

### 5.59 0.3.5 - Bugfixes

- push/pull/fetch operations will not block anymore.

- `diff()` can now properly detect renames, both in patch and raw format. Previously it only worked when create_patch was True.

- `repo.odb.update_cache()` is now called automatically after fetch and pull operations. In case you did that in your own code, you might want to remove your line to prevent a double-update that causes unnecessary IO.

- `Repo(path)` will not automatically search upstream anymore and find any git directory on its way up. If you need that behaviour, you can turn it back on using the new `search_parent_directories=True` flag when constructing a `Repo` object.

- `IndexFile.commit()` now runs the `pre-commit` and `post-commit` hooks. Verified to be working on posix systems only.

- A list of all fixed issues can be found here: https://github.com/gitpython-developers/GitPython/issues?q=milestone%3A%22v0.3.5%2B%2Bbugfixes%22+

### 5.60 0.3.4 - Python 3 Support

- Internally, hexadecimal SHA1 are treated as ascii encoded strings. Binary SHA1 are treated as bytes.

- Id attribute of Commit objects is now `hexsha`, instead of `binsha`. The latter makes no sense in python 3 and I see no application of it anyway besides its artificial usage in test cases.

- **IMPORTANT**: If you were using the `config_writer()`, you implicitly relied on `__del__` to work as expected to flush changes. To be sure changes are flushed under PY3, you will have to call the new `release()` method to trigger a flush. For some reason, `__del__` is not called necessarily anymore when a symbol goes out of scope.

- The `Tree` now has a `.join('name')` method which is equivalent to `tree / 'name'`.
5.61 0.3.3

- When fetching, pulling or pushing, and an error occurs, it will not be reported on stdout anymore. However, if there is a fatal error, it will still result in a GitCommandError to be thrown. This goes hand in hand with improved fetch result parsing.
- Code Cleanup (in preparation for python 3 support)
  - Applied autpep8 and cleaned up code
  - Using python logging module instead of print statements to signal certain kinds of errors

5.62 0.3.2.1

- Fix for #207

5.63 0.3.2

- Release of most recent version as non-RC build, just to allow pip to install the latest version right away.
- Have a look at the milestones (https://github.com/gitpython-developers/GitPython/milestones) to see what’s next.

5.64 0.3.2 RC1

- git command wrapper
- Added version_info property which returns a tuple of integers representing the installed git version.
- Added GIT_PYTHON_GIT_EXECUTABLE environment variable, which can be used to set the desired git executable to be used. despite of what would be found in the path.
- Blob Type
- Added mode constants to ease the manual creation of blobs
- IterableList
- Added __contains__ and __delitem__ methods
- More Changes
  - Configuration file parsing is more robust. It should now be able to handle everything that the git command can parse as well.
  - The progress parsing was updated to support git 1.7.0.3 and newer. Previously progress was not enabled for the git command or only worked with ssh in case of older git versions.
  - Parsing of tags was improved. Previously some parts of the name could not be parsed properly.
  - The rev-parse pure python implementation now handles branches correctly if they look like hexadecimal sha’s.
  - GIT_PYTHON_TRACE is now set on class level of the Git type, previously it was a module level global variable.
  - GIT_PYTHON_GIT_EXECUTABLE is a class level variable as well.
5.65 0.3.1 Beta 2

- Added **reflog support** (reading and writing)
  - New types: RefLog and RefLogEntry
  - Reflog is maintained automatically when creating references and deleting them
  - Non-intrusive changes to SymbolicReference, these don’t require your code to change. They allow to append messages to the reflog.
    - `abspath` property added, similar to `abspath` of Object instances
    - `log()` method added
    - `log_append(...)` method added
    - `set_reference(...)` method added (reflog support)
    - `set_commit(...)` method added (reflog support)
    - `set_object(...)` method added (reflog support)

- **Intrusive Changes** to `Head` type
  - `create(...)` method now supports the reflog, but will not raise `GitCommandError` anymore as it is a pure python implementation now. Instead, it raises `OSError`.

- **Intrusive Changes** to `Repo` type
  - `create_head(...)` method does not support kwargs anymore, instead it supports a `logmsg` parameter

- `Repo.rev_parse` now supports the `[ref]@{n}` syntax, where `n` is the number of steps to look into the reference’s past

- **BugFixes**
  - Removed incorrect ORIG_HEAD handling

- **Flattened directory** structure to make development more convenient.

- **Note:** This alters the way projects using git-python as a submodule have to adjust their `sys.path` to be able to import git-python successfully.

- Misc smaller changes and bugfixes

5.66 0.3.1 Beta 1

- Full Submodule-Support
- Added unicode support for author names. `Commit.author.name` is now unicode instead of string.
- Head Type changes
  - `config_reader()` & `config_writer()` methods added for access to head specific options.
- `tracking_branch()` & `set_tracking_branch()` methods added for easy configuration of tracking branches.
5.67 0.3.0 Beta 2

- Added python 2.4 support

5.68 0.3.0 Beta 1

5.68.1 Renamed Modules

- For consistency with naming conventions used in sub-modules like gitdb, the following modules have been renamed
  - git.utils -> git.util
  - git.errors -> git.exc
  - git.objects.utils -> git.objects.util

5.68.2 General

- Object instances, and everything derived from it, now use binary sha’s internally. The ‘sha’ member was removed, in favor of the ‘binsha’ member. An ‘hexsha’ property is available for convenient conversions. They may only be initialized using their binary shas, reference names or revision specs are not allowed anymore.

- IndexEntry instances contained in IndexFile.entries now use binary sha’s. Use the .hexsha property to obtain the hexadecimal version. The .sha property was removed to make the use of the respective sha more explicit.

- If objects are instantiated explicitly, a binary sha is required to identify the object, where previously any rev-spec could be used. The ref-spec compatible version still exists as Object.new or Repo.commit|Repo.tree respectively.

- The .data attribute was removed from the Object type, to obtain plain data, use the data_stream property instead.

- ConcurrentWriteOperation was removed, and replaced by LockedFD

- IndexFile.get_entries_key was renamed to entry_key

- IndexFile.write_tree: removed missing_ok keyword, its always True now. Instead of raising GitCommandError it raises UnmergedEntriesError. This is required as the pure-python implementation doesn’t support the missing_ok keyword yet.

- diff.Diff.null_hex_sha renamed to NULL_HEX_SHA, to be conforming with the naming in the Object base class

5.69 0.2 Beta 2

- Commit objects now carry the ‘encoding’ information of their message. It wasn’t parsed previously, and defaults to UTF-8

- Commit.create_from_tree now uses a pure-python implementation, mimicking git-commit-tree
5.70 0.2

5.70.1 General

- file mode in Tree, Blob and Diff objects now is an int compatible to definitions in the stat module, allowing you to query whether individual user, group and other read, write and execute bits are set.
- Adjusted class hierarchy to generally allow comparison and hash for Objects and Refs
- Improved Tag object which now is a Ref that may contain a tag object with additional Information
- id_abbrev method has been removed as it could not assure the returned short SHA’s where unique
- removed basename method from Objects with path’s as it replicated features of os.path
- from_string and list_from_string methods are now private and were renamed to _from_string and _list_from_string respectively. As part of the private API, they may change without prior notice.
- Renamed all find_all methods to list_items - this method is part of the Iterable interface that also provides a more efficient and more responsive iter_items method
- All dates, like authored_date and committer_date, are stored as seconds since epoch to consume less memory - they can be converted using time.gmtime in a more suitable presentation format if needed.
- Named method parameters changed on a wide scale to unify their use. Now git specific terms are used everywhere, such as “Reference” ( ref ) and “Revision” ( rev ). Previously multiple terms where used making it harder to know which type was allowed or not.
- Unified diff interface to allow easy diffing between trees, trees and index, trees and working tree, index and working tree, trees and index. This closely follows the git-diff capabilities.
- Git.execute does not take the with_raw_output option anymore. It was not used by anyone within the project and False by default.

5.70.2 Item Iteration

- Previously one would return and process multiple items as list only which can hurt performance and memory consumption and reduce response times. iter_items method provide an iterator that will return items on demand as parsed from a stream. This way any amount of objects can be handled.
- list_items method returns IterableList allowing to access list members by name

5.70.3 objects Package

- blob, tree, tag and commit module have been moved to new objects package. This should not affect you though unless you explicitly imported individual objects. If you just used the git package, names did not change.

5.70.4 Blob

- former ‘name’ member renamed to path as it suits the actual data better
5.70.5 GitCommand

- `git.subcommand` call scheme now prunes out `None` from the argument list, allowing to be called more comfortably as `None` can never be a valid to the git command if converted to a string.
- Renamed ‘git_dir’ attribute to ‘working_dir’ which is exactly how it is used

5.70.6 Commit

- ‘count’ method is not an instance method to increase its ease of use
- ‘name_rev’ property returns a nice name for the commit’s sha

5.70.7 Config

- The git configuration can now be read and manipulated directly from within python using the GitConfigParser
- `Repo.config_reader()` returns a read-only parser
- `Repo.config_writer()` returns a read-write parser

5.70.8 Diff

- Members a a_commit and b_commit renamed to a_blob and b_blob - they are populated with Blob objects if possible
- Members a_path and b_path removed as this information is kept in the blobs
- Diffs are now returned as DiffIndex allowing to more quickly find the kind of diffs you are interested in

5.70.9 Diffing

- Commit and Tree objects now support diffing natively with a common interface to compare against other Commits or Trees, against the working tree or against the index.

5.70.10 Index

- A new Index class allows to read and write index files directly, and to perform simple two and three way merges based on an arbitrary index.

5.70.11 References

- References are object that point to a Commit
- SymbolicReference are a pointer to a Reference Object, which itself points to a specific Commit
- They will dynamically retrieve their object at the time of query to assure the information is actual. Recently objects would be cached, hence ref object not be safely kept persistent.
5.70.12 Repo

- Moved blame method from Blob to repo as it appeared to belong there much more.
- active_branch method now returns a Head object instead of a string with the name of the active branch.
- tree method now requires a Ref instance as input and defaults to the active_branch instead of master
- is_dirty now takes additional arguments allowing fine-grained control about what is considered dirty
- Removed the following methods:
  - ‘log’ method as it as effectively the same as the ‘commits’ method
  - ‘commits_since’ as it is just a flag given to rev-list in Commit.iter_items
  - ‘commit_count’ as it was just a redirection to the respective commit method
  - ‘commits_between’, replaced by a note on the iter_commits method as it can achieve the same thing
  - ‘commit_delta_from’ as it was a very special case by comparing two different repjrelated repositories, i.e. clones, git-rev-list would be sufficient to find commits that would need to be transferred for example.
  - ‘create’ method which equals the ‘init’ method’s functionality
  - ‘diff’ - it returned a mere string which still had to be parsed
  - ‘commit_diff’ - moved to Commit, Tree and Diff types respectively
- Renamed the following methods:
  - commits to iter_commits to improve the performance, adjusted signature
  - init_bare to init, implying less about the options to be used
  - fork_bare to clone, as it was to represent general clone functionality, but implied a bare clone to be more versatile
  - archive_tar_gz and archive_tar and replaced by archive method with different signature
- ‘commits’ method has no max-count of returned commits anymore, it now behaves like git-rev-list
- The following methods and properties were added
  - ‘untracked_files’ property, returning all currently untracked files
  - ‘head’, creates a head object
  - ‘tag’, creates a tag object
  - ‘iter_trees’ method
  - ‘config_reader’ method
  - ‘config_writer’ method
  - ‘bare’ property, previously it was a simple attribute that could be written
- Renamed the following attributes
  - ‘path’ is now ‘git_dir’
  - ‘wd’ is now ‘working_dir’
- Added attribute
  - ‘working_tree_dir’ which may be None in case of bare repositories
5.70.13 Remote

- Added Remote object allowing easy access to remotes
- Repo.remotes lists all remotes
- Repo.remote returns a remote of the specified name if it exists

5.70.14 Test Framework

- Added support for common TestCase base class that provides additional functionality to receive repositories tests can also write to. This way, more aspects can be tested under real-world (un-mocked) conditions.

5.70.15 Tree

- former ‘name’ member renamed to path as it suits the actual data better
- added traverse method allowing to recursively traverse tree items
- deleted blob method
- added blobs and trees properties allowing to query the respective items in the tree
- now mimics behaviour of a read-only list instead of a dict to maintain order.
- content_from_string method is now private and not part of the public API anymore

5.71 0.1.6

5.71.1 General

- Added in Sphinx documentation.
- Removed ambiguity between paths and treeishs. When calling commands that accept treeish and path arguments and there is a path with the same name as a treeish git cowardly refuses to pick one and asks for the command to use the unambiguous syntax where ‘-’ separates the treeish from the paths.
- Repo.commits, Repo.commits_between, Repo.commits_since, Repo.commit_count, Repo.commit, Commit.count and Commit.find_all all now optionally take a path argument which constrains the lookup by path. This changes the order of the positional arguments in Repo.commits and Repo.commits_since.

5.71.2 Commit

- Commit.message now contains the full commit message (rather than just the first line) and a new property Commit.summary contains the first line of the commit message.
- Fixed a failure when trying to lookup the stats of a parentless commit from a bare repo.
5.71.3 Diff

- The diff parser is now far faster and also addresses a bug where sometimes b_mode was not set.
- Added support for parsing rename info to the diff parser. Addition of new properties `Diff.renamed`, `Diff.rename_from`, and `Diff.rename_to`.

5.71.4 Head

- Corrected problem where branches was only returning the last path component instead of the entire path component following refs/heads/.

5.71.5 Repo

- Modified the gzip archive creation to use the python gzip module.
- Corrected `commits_between` always returning None instead of the reversed list.

5.72 0.1.5

5.72.1 General

- upgraded to Mock 0.4 dependency.
- Replace GitPython with git in repr() outputs.
- Fixed packaging issue caused by ez_setup.py.

5.72.2 Blob

- No longer strip newlines from Blob data.

5.72.3 Commit

- Corrected problem with git-rev-list –bisect-all. See http://groups.google.com/group/git-python/browse_thread/thread/aed1d5c4b31d5027

5.72.4 Repo

- Corrected problems with creating bare repositories.
- Repo.tree no longer accepts a path argument. Use:

```python
>>> dict(k, o for k, o in tree.items() if k in paths)
```

- Made daemon export a property of Repo. Now you can do this:

```python
>>> exported = repo.daemon_export
>>> repo.daemon_export = True
```

- Allows modifying the project description. Do this:
• Added a read-only property Repo.is_dirty which reflects the status of the working directory.
• Added a read-only Repo.active_branch property which returns the name of the currently active branch.

5.72.5 Tree

• Switched to using a dictionary for Tree contents since you will usually want to access them by name and order is unimportant.
• Implemented a dictionary protocol for Tree objects. The following:
  
  ```python
  child = tree.contents['grit']
  ```

  becomes:
  
  ```python
  child = tree['grit']
  ```
• Made Tree.content_from_string a static method.

5.73 0.1.4.1

• removed method_missing stuff and replaced with a __getattr__ override in Git.

5.74 0.1.4

• renamed git_python to git. Be sure to delete all pyc files before testing.

5.74.1 Commit

• Fixed problem with commit stats not working under all conditions.

5.74.2 Git

• Renamed module to cmd.
• Removed shell escaping completely.
• Added support for stderr, stdin, and with_status.
• git_dir is now optional in the constructor for git.Git. Git now falls back to os.getcwd() when git_dir is not specified.
• add a with_exceptions keyword argument to git commands. GitCommandError is raised when the exit status is non-zero.
• add support for a GIT_PYTHON_TRACE environment variable. GIT_PYTHON_TRACE allows us to debug GitPython’s usage of git through the use of an environment variable.
5.74.3 Tree

- Fixed up problem where `name` doesn’t exist on root of tree.

5.74.4 Repo

- Corrected problem with creating bare repo. Added `Repo.create` alias.

5.75 0.1.2

5.75.1 Tree

- Corrected problem with `Tree.__div__` not working with zero length files. Removed `__len__` override and replaced with `size` instead. Also made `size` cache properly. This is a breaking change.

5.76 0.1.1

Fixed up some urls because I’m a moron

5.77 0.1.0

initial release
CHAPTER 6

Indices and tables

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