



Bazaar Integration Guide

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Bazaar Developers

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This document provides some general observations on integrating with Bazaar and some recipes for typical tasks. It is intended to be useful to someone developing either a plugin or some other piece of software that integrates with bazaar. If you want to know about a topic that's not covered here, just ask us.

1 Starting with bzrlib

1.1 Within bazaar

When using bzrlib within the bazaar program (for instance as a bazaar plugin), bzrlib's global state is already available for use.

1.2 From outside bazaar

To use bzrlib outside of bazaar some global state needs to be setup. bzrlib needs ways to handle user input, passwords, a place to emit progress bars, logging setup appropriately for your program. The easiest way to set all this up in the same fashion bazaar does is to call `bzrlib.initialize`.

This returns a context manager within which bzrlib functions will work correctly. See the pydoc for `bzrlib.initialize` for more information. (You can get away without entering the context manager, because the setup work happens directly from `initialize`.)

In Python 2.4 the `with` keyword is not supported and so you need to use the context manager manually:

```
# This sets up your ~/.bazaar.log, ui factory and so on and so forth. It is  
# not safe to use as a doctest.  
library_state = bzrlib.initialize()  
library_state.__enter__()  
try:  
    pass  
    # do stuff here  
finally:  
    library_state.__exit__(None, None, None)
```

2 Running bazaar commands

To run command-line commands in-process:

```
from bzrlib.commands import get_command  
  
cmd = get_command('version')  
cmd.run([])
```

This will send output through the current UIFactory; you can redirect this elsewhere through the parameters to `bzrlib.initialize`.

3 Manipulating the Working Tree

Most objects in Bazaar are in files, named after the class they contain. To manipulate the Working Tree we need a valid WorkingTree object, which is loaded from the `workingtree.py` file, eg:

```
from bzrlib import workingtree
wt = workingtree.WorkingTree.open('/home/jebw/bzrtest')
```

This gives us a WorkingTree object, which has various methods spread over itself, and its parent classes MutableTree and Tree - it's worth having a look through these three files (workingtree.py, mutabletree.py and tree.py) to see which methods are available.

3.1 Compare trees

There are two methods for comparing trees: `changes_from` and `iter_changes`. `iter_changes` is more regular and precise, but it is somewhat harder to work with. See the API documentation for more details.

`changes_from` creates a Delta object showing changes:

```
from bzrlib import delta
changes = wt.changes_from(wt.basis_tree())
```

This gives us a Delta object, which has several lists of files for each type of change, eg `changes.added` is a list of added files, `changes.removed` is list of removed files, `changes.modified` is a list of modified files. The contents of the lists aren't just filenames, but include other information as well. To grab just the filename we want the first value, eg:

```
print("list of newly added files")
for filename in changes.added:
    print("%s has been added" % filename[0])
```

The exception to this is `changes.renamed`, where the list returned for each renamed files contains both the old and new names – one or both may interest you, depending on what you're doing.

For example:

```
print("list of renamed files")
for filename in changes.renamed:
    print("%s has been renamed to %s" % (filename[0], filename[1]))
```

3.2 Adding Files

If you want to add files the same way `bzr add` does, you can use `MutableTree.smart_add`. By default, this is recursive. Paths can either be absolute or relative to the workingtree:

```
wt.smart_add(['dir1/filea.txt', 'fileb.txt',
             '/home/jebw/bzrtesttree/filec.txt'])
```

For more precise control over which files to add, use `MutableTree.add`:

```
wt.add(['dir1/filea.txt', 'fileb.txt', '/home/jebw/bzrtesttree/filec.txt'])
```

3.3 Removing Files

You can remove multiple files at once. The file paths need to be relative to the workingtree:

```
wt.remove(['filea.txt', 'fileb.txt', 'dir1'])
```

By default, the files are not deleted, just removed from the inventory. To delete them from the filesystem as well:

```
wt.remove(['filea.txt', 'fileb.txt', 'dir1'], keep_files=False)
```

3.4 Renaming a File

You can rename one file to a different name using `WorkingTree.rename_one`. You just provide the old and new names, eg:

```
wt.rename_one('oldfile.txt', 'newfile.txt')
```

3.5 Moving Files

You can move multiple files from one directory into another using `WorkingTree.move`:

```
wt.move(['olddir/file.txt'], 'newdir')
```

More complicated renames/moves can be done with `transform.TreeTransform`, which is outside the scope of this document.

3.6 Committing Changes

To commit all the changes to our working tree we can just call the `WorkingTree`'s `commit` method, giving it a commit message, eg:

```
wt.commit('this is my commit message')
```

To commit only certain files, we need to provide a list of filenames which we want committing, eg:

```
wt.commit(message='this is my commit message', specific_files=['fileA.txt',  
    'dir2/fileB.txt', 'fileD.txt'])
```

4 Generating a Log for a File

Generating a log is, in itself, simple. Grab a branch (see below) and pass it to `show_log` together with a log formatter, eg:

```
from bzrlib import log  
from bzrlib import branch  
  
b = branch.Branch.open('/path/to/bazaar/branch')  
lf = log.LongLogFormatter(to_file=sys.stdout)  
log.show_log(b, lf)
```

Three log formatters are included with `bzrlib`: `LongLogFormatter`, `ShortLogFormatter` and `LineLogFormatter`. These provide long, short and single-line log output formats. It's also possible to write your own in very little code.

5 Annotating a File

To annotate a file, we want to walk every line of a file, retrieving the revision which last modified/created that line and then retrieving the information for that revision.

First we get an annotation iterator for the file we are interested in:

```
tree, relpath = workingtree.WorkingTree.open_containing('/path/to/file.txt')
fileid = tree.path2id(relpath)
annotation = list(tree.annotate_iter(fileid))
```

To avoid repeatedly retrieving the same revisions we grab all revisions associated with the file at once and build up a map of id to revision information. We also build an map of revision numbers, again indexed by the revision id:

```
revision_ids = set(revision_id for revision_id, text in annotation)
revisions = tree.branch.repository.get_revisions(revision_ids)
revision_map = dict(izip(revision_ids, revisions))
revno_map = tree.branch.get_revision_id_to_revno_map()
```

Finally, we use our annotation iterator to walk the lines of the file, displaying the information from our revision maps as we go:

```
for revision_id, text in annotation :
    rev = revision_map[revision_id]
    revno = revno_map[revision_id]
    revno_string = '.'.join(str(i) for i in revno)
    print "%s, %s: %s" % (revno_string, rev.committer, text)
```

6 Working with branches

To work with a branch you need a branch object, created from your branch:

```
from bzrlib import branch

b = branch.Branch.open('/home/jebw/bzrtest')
```

6.1 Branching from an existing branch

To branch you create a branch object representing the branch you are branching from, and supply a path/url to the new branch location. The following code clones the `bzr.dev` branch (the latest copy of the Bazaar source code) - be warned it has to download 60meg so takes a while to run with no feedback:

```
from bzrlib import branch

b = branch.Branch.open('http://bazaar.launchpad.net/~bzd-pqm/bzr/bzr.dev')
nb = b.bzrdir.sprout('/tmp/newBzrBranch').open_branch()
```

This provides no feedback, since Bazaar automatically uses the 'silent' UI.

6.2 Pushing and pulling branches

To push a branch you need to open the source and destination branches, then just call push with the other branch as a parameter:

```
from bzrlib import branch

b1 = branch.Branch.open('file:///home/user/mybranch')
b2 = branch.Branch.open('http://bazaar.launchpad.net/~bzd-pqm/bzr/bzr.dev')
b1.push(b2)
```

Pulling is much the same:

```
b1.pull(b2)
```

If you have a working tree, as well as a branch, you should use `WorkingTree.pull`, not `Branch.pull`.

This won't handle conflicts automatically though, so any conflicts will be left in the working tree for the user to resolve.

7 Checkout from an existing branch

This performs a Lightweight checkout from an existing Branch:

```
from bzrlib import bzrdir

accelerator_tree, source = bzrdir.BzrDir.open_tree_or_branch('http:URL')
source.create_checkout('/tmp/newBzrCheckout', None, True, accelerator_tree)
```

To make a heavyweight checkout, change the last line to:

```
source.create_checkout('/tmp/newBzrCheckout', None, False, accelerator_tree)
```

8 History Operations

8.1 Finding the last revision number or id

To get the last revision number and id of a branch use:

```
revision_number, revision_id = branch.last_revision_info()
```

If all you care about is the `revision_id` there is also the method:

```
revision_id = branch.last_revision()
```

8.2 Getting the list of revision ids that make up a branch

IMPORTANT: This should be avoided wherever possible, as it scales with the length of history:

```
revisions = branch.revision_history()
```

now `revisions[0]` is the revision id of the first commit, and `revisions[-1]` is the revision id of the most recent. Note that if all you want is the last revision then you should use `branch.last_revision()` as described above, as it is vastly more efficient.

8.3 Getting a Revision object from a revision id

The Revision object has attributes like "message" to get the information about the revision:

```
repo = branch.repository
revision = repo.get_revision(rev_id)
```

8.4 Accessing the files from a revision

To get the file contents and tree shape for a specific revision you need a `RevisionTree`. These are supplied by the repository for a specific revision id:

```
revtree = repo.revision_tree(rev_id)
```

`RevisionTrees`, like all trees, can be compared as described in “Comparing Trees” above.

The most common way to list files in a tree is `Tree.iter_entries()`. The simplest way to get file content is `Tree.get_file()`. The best way to retrieve file content for large numbers of files `Tree.iter_files_bytes()`