Lustre Autotest and Maloo

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Whamcloud Development Infrastructure

► JIRA Issue Tracking   https://jira.whamcloud.com/

► Git   https://git.whamcloud.com/

► Gerrit Change Review   https://review.whamcloud.com/

► Jenkins Build Server   https://build.whamcloud.com/

► Maloo Test Results Repo   https://testing.whamcloud.com/

► Q & A

Multiple Separate Lustre Development Systems

Whamcloud

► JIRA for issue tracking (bugs, features, improvements) for code and docs
  • Gerrit posts initial patch submission, landing automatically to JIRA
► Gerrit tracks patches and reviews for all Lustre projects
  • Whamcloud developers have an internal OpenID provider
  • Community developers use Google OAuth2 or other OpenID provider
  • Use `Settings->Link Another Identity` to add new identity to account
► Jenkins for automated build
  • servers: `el8.6 x86_64`
  • clients: `el7.9`, `el8.6`, `el9.0`, `sles15sp4`, `ubuntu2004`; `x86_64`, `aarch64`, `ppcle64`
► Multiple Autotest test sessions launched for successful patch build
  • All *enforced* sessions must pass
  • The *optional sessions do not need to pass*
► Maloo tracks test results from Autotest
  • Posts into Gerrit when all sessions are started
  • Posts into Gerrit when session is complete
  • Marks patch `Verified: -1` if *any enforced session* fails

Autotest Test Sessions

Maloo

Patch Set 14:

The following sessions will be run for build 89569 patch 14

Enforced:

- review-ldiskfs on el8.5-x86_64/ldiskfs servers and clients
- review-zfs on el8.5-x86_64/zfs servers and clients
- review-dne-part-1 on el8.5-x86_64/ldiskfs servers and clients
- review-dne-part-2 on el8.5-x86_64/ldiskfs servers and clients
- review-dne-part-3 on el8.5-x86_64/ldiskfs servers and clients
- review-dne-part-4 on el8.5-x86_64/ldiskfs servers and clients
- review-dne-part-5 on el8.5-x86_64/ldiskfs servers and clients
- review-dne-part-6 on el8.5-x86_64/ldiskfs servers and clients
- review-dne-part-7 on el8.5-x86_64/ldiskfs servers and clients
- review-dne-zfs-part-1 on el8.5-x86_64/zfs servers and clients
- review-dne-zfs-part-2 on el8.5-x86_64/zfs servers and clients
- review-dne-zfs-part-3 on el8.5-x86_64/zfs servers and clients
- review-dne-zfs-part-4 on el8.5-x86_64/zfs servers and clients
- review-dne-zfs-part-5 on el8.5-x86_64/zfs servers and clients
- review-dne-zfs-part-6 on el8.5-x86_64/zfs servers and clients
- review-dne-zfs-part-7 on el8.5-x86_64/zfs servers and clients
- review-ldiskfs-arm on el8.6-x86_64/ldiskfs servers and el8.6-aarch64/ldiskfs clients
- review-dne-selinux-ssk-part-1 on el8.5-x86_64/ldiskfs servers and clients
- review-dne-selinux-ssk-part-2 on el8.5-x86_64/ldiskfs servers and clients
- review-ldiskfs-ubuntu on el8.5-x86_64/ldiskfs servers and ubuntu2004-x86_64/ldiskfs clients
- custom on el8.5-x86_64/ldiskfs servers and clients
- custom on el8.3-x86_64/ldiskfs servers and el8.5-x86_64/ldiskfs clients

Optional:

- review-dne-part-8 on el8.5-x86_64/ldiskfs servers and clients
- review-dne-part-9 on el8.5-x86_64/ldiskfs servers and clients
- review-ldiskfs on el8.6-x86_64/ldiskfs servers and clients
- review-ldiskfs on el8.5-x86_64/ldiskfs servers and sles15sp3-x86_64/ldiskfs clients

Maloo Test Queue: https://testing.whamcloud.com/test_queue?jobs=lustre-reviews&builds=89569&commit=Apply+Filter
Maloo Results: https://testing.whamcloud.com/test_sessions?jobs=lustre-reviews&builds=89569&start_date=2022-09-15#redirect

▶ **20 or more test sessions per patch!**

- Multiple sessions *enforced* for master patches
- Multiple sessions *optional* for arches, distros

▶ **Enforced test sessions must pass**

- Custom `Test-Parameters:` runs are *enforced*

▶ **Optional sessions *are optional***

- Run to improve coverage before all tests pass
- Working toward passing and enforcement
- Do not resubmit optional sessions

▶ **Janitor only -1 for failures in modified tests**

▶ **Please use test resources wisely**

- 170 tests, 13500 subtests, 152h *per patch*

Control Autotest Sessions with Test-Parameters

Whamcloud

```
Test-Parameters: testlist=sanityn env=ONLY=16,HONOR_EXCEPT=y
Test-Parameters: serverversion=2.14 testlist=sanityn env=ONLY=16,HONOR_EXCEPT=
Fixes: 7905359296 ("LU-15748 osc: fallocate interop for 2.14 clients")
Signed-off-by: Andreas Dilger <adilger@whamcloud.com>
Change-Id: I327183025a8de6fd814a7c2929365497153ebbe5
```

▶ Use the `Test-Parameters:` tag in a commit message:

- `Test-Parameters: testlist=sanity,racer`   # run *additional* test scripts, *one session per line*
- `... env=ONLY=32,ONLY_REPEAT=50`   # set env vars (run specific subtest many times)
- `... ostfilesystemtype=zfs`   # use specific backing fstype
- `... clientversion=2.12.9`   # old client new server interop
- `... serverversion=2.14`   # new client old server interop
- `... mdscount=4 mdtcount=8 ostcount=8`   # change server counts for DNE testing

▶ Use `trivial` keyword *only* for limited testing test scripts, man pages, build, etc.

- `... trivial`   # runs only sanity, lnet-selftest, **now also aarch64**
- `... testlist=recovery-small,replay-single`   # supplement with sessions, configs as needed

https://wiki.whamcloud.com/display/PUB/Changing+Test+Parameters+with+Gerrit+Commit+Messages

whamcloud.com

Adding Follow-Up Test Sessions Easily (New)

► [Follow-Up] creates a new empty patch

► Add Test-Parameters as needed

► Good to **add** test sessions to existing patches

► Useful when patch already finished testing

► Merge Test-Parameters into patch if refresh

► Patch marked "Work-In-Progress", cannot land

Gerrit Patch Status

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jenkins	Patch Set 14: Verified+1 Build Successful https://build.whamcloud.com/job/lustre-reviews/89569/ : SUCCESS
Maloo	Patch Set 14: The following sessions will be run for build 89569 patch 14 Enforced: - review-ldiskfs on el8.5-x86_64
Maloo	Patch Set 14: Passed enforced test custom-101 on CentOS 8.5/x86_64 uploaded by Trevis Autotest from trevis-60
Maloo	Patch Set 14: Passed enforced test custom-102 on CentOS 8.3/x86_64, CentOS 8.5/x86_64 uploaded by Onyx Au
Lustre G... Janitor	Patch Set 14: Initial testing succeeded. Succeeded: - runtests@ldiskfs+DNE runtests-ssk@ldiskfs+SharedKey runt
Maloo	Patch Set 14: Passed enforced test review-dne-part-7 on CentOS 8.5/x86_64 uploaded by Trevis Autotest from tre
Maloo	Patch Set 14: Passed enforced test review-dne-zfs-part-7 on CentOS 8.5/x86_64 uploaded by Onyx Autotest from
Maloo	Patch Set 14: Failed optional test review-ldiskfs on CentOS 8.5/x86_64, SLES 15.3/x86_64 uploaded by Trevis Aut
Lustre G... Janitor	Patch Set 14: Testing has completed with errors! IMPORTANT: these tests appear to be new failures unique to this
Maloo	Patch Set 14: Passed enforced test review-ldiskfs on CentOS 8.5/x86_64 uploaded by Onyx Autotest from onyx-13
Maloo	Patch Set 14: Passed enforced test review-dne-zfs-part-2 on CentOS 8.5/x86_64 uploaded by Trevis Autotest from

▶ Custom tests are numbered in order starting at custom-101

▶ Lustre Gerrit Janitor is a separate test system that runs under loads that provoke race conditions

▶ Janitor test sessions may finish quickly and supply early feedback

▶ Janitor only adds Verified -1 for failures on tests added/modified in a patch, but failures should still be reviewed for correctness

▶ Optional test sessions are not required to pass for a test to land

Monitoring Test Results in Maloo

Whamcloud

Maloo

Patch Set 9:

The following sessions will be run for build 89713 patch 9

Enforced:

- review-ldiskfs-dne on el8.5-x86_64/ldiskfs servers and clients
- review-ldiskfs-dne-arm on el8.5-x86_64/ldiskfs servers and el8.5-aarch64/ldiskfs clients
- custom on el8.5-x86_64/ldiskfs servers and clients

Maloo Test Queue: https://testing.whamcloud.com/test_queue?jobs=lustre-reviews&builds=89713&commit=Apply+Filter
Maloo Results: https://testing.whamcloud.com/test_sessions?jobs=lustre-reviews&builds=89713&start_date=2022-09-25#redirect

► Permanently keeps *results* for all patches

► Logs are kept as long as possible (months), longer for test failures if space available

Job	Build/Patch	Seq/Idx	Test Group	Distros	Review	Suite/Test	Started
lustre-reviews	89713:9	1:28	review-ldiskfs-dne	server: el8.5-x86_64/ldiskfs clients: el8.5-x86_64/ldiskfs	73232604d	sanity test_31j	2022-09-25 21:24 (~1 hour)
lustre-reviews	89713:9	1:29	review-ldiskfs-dne-arm	server: el8.5-x86_64/ldiskfs clients: el8.5-aarch64/ldiskfs	73232604d	sanity test_24u	2022-09-25 21:24 (~1 hour)
lustre-reviews	89713:9	1:101	custom	server: el8.5-x86_64/ldiskfs clients: el8.5-x86_64/ldiskfs	73232604d	conf-sanity test_20	2022-09-25 21:24 (~1 hour)

Host	Group	User	Branches	Change	Builds	Run at (UTC)	Created at (UTC)	Test Sets
onyx-36vm1	custom	Onyx Autotest	master	47131	89712	2022-09-25 02:15:36	2022-09-25 08:12:27	3/3
onyx-26vm1	review-ldiskfs-dne	Onyx Autotest	master	47131	89712	2022-09-25 02:15:16	2022-09-25 07:18:11	5/5
trevis-108vm17	review-ldiskfs-dne-arm	Trevis Autotest	master	47131	89712	2022-09-25 02:15:21	2022-09-25 05:52:59	6/7

Reviewing Test Failures in Maloo

Whamcloud

test_64f

Error: 'buffered io, not write rpc: grants mismatch: 12656640, expected 4218880'

Failure Rate: 1.05% of most recent 95 runs, 5 skipped (all branches)

OST 1, OST 2, OST 3, OST 4, OST 5, OST 6, OST 7, OST 8 (trevis-100vm9)

- sanity.test_64f.debug.trevis-100vm9.log [Download | Show | Preview 50]
- sanity.test_64f.debug_log.trevis-100vm9.1664078772.log [Download | Show | Preview 50]

MDS 1, MDS 3 (trevis-100vm10)

- sanity.test_64f.debug.trevis-100vm10.log [Download | Show | Preview 50]
- sanity.test_64f.debug_log.trevis-100vm10.1664078772.log [Download | Show | Preview 50]
- sanity.test_64f.dmesg.trevis-100vm10.1664078772.log [Download | Show | Preview 50]
- sanity.test_64f.dmesg.trevis-100vm10.log [Download | Show | Preview 50]
- sanity.test_64f.journal.trevis-100vm10.log [Download | Show | Preview 50]
- sanity.test_64f.stack_trace.trevis-100vm10.log [Download | Show | Preview 50]

Bugs

No bugs

Associate bug...   Raise bug...   Retest...

► Review test failures
► Associate known failures to existing bugs
► Raise new bug for new test failures
► Help track common failures/rates/trends

► Quick search for subtest failures by clicking on failed subtest name

Search Test Results in Maloo

► Start search from Results menu
  • Select `Test` or `Subtest` search
► May need to increase date range to find occasional failures for subtest
► Check for other similar failures with associated LU ticket to speed up failure analysis
► Some failures are caused by prior errors (eg. `'mount failed'`)
► Repeated failures for same patch or ticket indicate patch regression

LUSTRE	Sessions	Results	Reports & Stats	Queues	Requests

Search   Test sets | Sub   s
                        Search
                        Upload

Test set script	sanity ▼		Trigger job(s)	All jobs
Sub test script	test_64f ▼		Trigger build(s)	e.g. 123, 456
Status	FAIL ✖		Host(s)	e.g. trevis*, onyx-33vm*
Bug(s)	e.g. LU-1234, DCO-777		Group(s)	Any group
Code review	Commit id (SHA)		User(s)	All users
Code review	Change number (12345)		Within	Last 4 weeks
			or	
			From	To

Search   Reset form   Associate bugs...   Disassociate bugs...

Download results as CSV
16 records found

	Name	Status	Date	Duration	Code	Error	Bugs	Links	Test log
☐	test_64f	FAIL	2022-09-25	3604	1	buffered io, not write rpc: grants mi:		gerrit:47131, jira:LU-8151	Preview 50
☐	test_64f	FAIL	2022-09-20	3602	1	buffered io, not write rpc: grants mi:		gerrit:47121, jira:LU-15777	Preview 50
☐	test_64f	FAIL	2022-09-19	10	1	direct io with grant allocation: grant	LU-13847	gerrit:48579, jira:LU-16165	Preview 50
☐	test_64f	FAIL	2022-09-13	14	1	direct io with grant allocation: grant		gerrit:43707, jira:LU-14139	Preview 50
☐	test_64f	FAIL	2022-09-13	3602	1	buffered io, not write rpc: grants mi:	LU-13847	gerrit:48278, jira:LU-16087	Preview 50
☐	test_64f	FAIL	2022-09-07	3601	1	buffered io, not write rpc: grants mi:	LU-13847	gerrit:48445, jira:EX-5398	Preview 50
☐	test_64f	FAIL	2022-09-05	3601	1	buffered io, not write rpc: grants mi:		gerrit:45890, jira:LU-15058	Preview 50
☐	test_64f	FAIL	2022-09-02	3	1	mount failed		gerrit:46334, jira:EX-4567	Preview 50
☐	test_64f	FAIL	2022-09-01	3	1	mount failed		gerrit:46334, jira:EX-4567	Preview 50
☐	test_64f	FAIL	2022-08-29	3	1	mount failed		gerrit:46334, jira:EX-4567	Preview 50
☐	test_64f	FAIL	2022-08-29	3603	1	buffered io, not write rpc: grants mi:	LU-13847	gerrit:48278, jira:LU-16087	Preview 50

Associate Failures with Multiple Patches

Search   Reset form   Associate bugs...   Disassociate bugs...

► While reviewing your own patch, also associate the same LU ticket for other similar test failures

ID: LU-13847

Add   Cancel

- Helps other developers
- Improves failure analysis

Download results as CSV
16 records found

	Name	Status	Date	Duration	Code	Error	Bugs	Links	Test log
☑	test_64f	FAIL	2022-09-25	3604	1	buffered io, not write rpc: grants mi:		gerrit:47131, jira:LU-8151	Preview 50
☑	test_64f	FAIL	2022-09-20	3602	1	buffered io, not write rpc: grants mi:		gerrit:47121, jira:LU-15777	Preview 50
☐	test_64f	FAIL	2022-09-19	10	1	direct io with grant allocation: grant	LU-13847	gerrit:48579, jira:LU-16165	Preview 50
☑	test_64f	FAIL	2022-09-13	14	1	direct io with grant allocation: grant		gerrit:43707, jira:LU-14139	Preview 50
☐	test_64f	FAIL	2022-09-13	3602	1	buffered io, not write rpc: grants mi:	LU-13847	gerrit:48278, jira:LU-16087	Preview 50
☐	test_64f	FAIL	2022-09-07	3601	1	buffered io, not write rpc: grants mi:	LU-13847	gerrit:48445, jira:EX-5398	Preview 50
☑	test_64f	FAIL	2022-09-05	3601	1	buffered io, not write rpc: grants mi:		gerrit:45890, jira:LU-15058	Preview 50
☐	test_64f	FAIL	2022-09-02	3	1	mount failed		gerrit:46334, jira:EX-4567	Preview 50
☐	test_64f	FAIL	2022-09-01	3	1	mount failed		gerrit:46334, jira:EX-4567	Preview 50
☐	test_64f	FAIL	2022-08-29	3	1	mount failed		gerrit:46334, jira:EX-4567	Preview 50
☐	test_64f	FAIL	2022-08-29	3603	1	buffered io, not write rpc: grants mi:	LU-13847	gerrit:48278, jira:LU-16087	Preview 50
☐	test_64f	FAIL	2022-08-29	2	1	mount failed		gerrit:45122, jira:LU-14958	Preview 50

Limit Maloo Search Incrementally

▶ Very useful when looking for test regressions

▶ Limit or increase search dates to find when failure started

• Broad searches with large date ranges/many results will timeout, limit searches to specific subtest and status

▶ Limit branch, architecture, filesystem to isolate effects

▶ "git log --oneline --after YYYY-MM-DD --before YYYY-MM-DD" to find related patch landings

Search Test sets | Sub tests | Bug links

Test set script	sanity	Trigger job(s)	All jobs	Client		not	Server		not
Sub test script	test_64f	Trigger build(s)	e.g. 123, 456	Distribution type			Distribution type		
Status	FAIL ✕	Host(s)	e.g. trevis*, onyx-33vm*	Architecture type	aarch64	☑	Architecture type		☐
Bug(s)	e.g. LU-1234, DCO-777	Group(s)	Any group	File system type		☐	File system type	zfs	☐
Code review	Commit id (SHA)	User(s)	All users	Branch type	b2_12	☐	Branch type		☐
Code review	Change number (12345)	Within		Network type		☐	Network type		☐

or

From 2022-06-01   To 2022-08-31

Search   Reset form   Associate bugs...   Disassociate bugs...

Keep Patches Moving Forward

▶ Developers are responsible for their own patches

- Update patches based on inspections
- Keep inspections and testing moving forward

▶ Provide inspection feedback for others in a timely manner

▶ After inspection, help move patch to next state

- Two or more inspectors on the patch?
- Tests have passed or triaged and retested as needed?

▶ Good inspections avoid more effort finding defects later

- Chance to find and fix latent bugs, cleanup code

Autotest Failures Affect Everyone

▶ Need to identify all test failures on a patch before resubmitting

- Patch may otherwise be adding new intermittent bugs

▶ *Associate* or *Raise* bugs in Maloo for all test failures

▶ Search for and triage similar failures via Maloo, JIRA

- Can be done more efficiently in batches

▶ Data needed to prioritize bugs causing the most failures

- This speeds up fixing the most frequent failures
- This in turn speeds up every other patch testing and landing

Using Git and Gerrit

Managing Branches

- Keep patches for independent changes on separate branches

- A git "branch" is just a pointer to some series of commits

- Each `commit` or `rebase` moves pointer to new tip of the branch

- All of the old commits/branches stay in repository, unreferenced
  - `git checkout branch`   # check out specific branch
  - `git branch {new_branch}`   # create new, keep current branch
  - `git checkout -b {new_branch}`   # create new branch and move there
  - `git status`   # show modified/staged/untracked

Finding Branches

▶ **Show local branches**

```
# git branch -lv
b_test5       5fefbd1078 LU-15548 tests: skip conf-sanity/131 for older servers
b_def_mask    5efdbeab24 LU-9859 libcfs: add "default" keyword for debug mask
b_comma_list  76cffe0f2c LU-12597 tests: remove need for comma_list
master        1b09fb2296 LU-16062 ldlm: improve bl_timeout for prolong
```

▶ **Show all remote branches**

```
# git branch –alv
[as above, plus]
remotes/origin/HEAD-> origin/master
remotes/prime/b2_13  a298f8c137 New release 2.13.0
remotes/prime/b2_14  e1635c6afb New release 2.14.0
```

Searching in Git

- `git diff [-w]`   # show current change (no whitespace changes)
- `git diff --cached`   # show "`git add`" changes that are staged for commit
- `git log [branch|path]`   # show commits (branch/dir/file)
- `git log -S {string}`   # search commits in *patches* that add/remove specific string
- `git log --grep {regexp}`   # search commit *messages* with regular expression
- `git grep {regexp}`   # show all *files in repository* with regular expression
- `git log --patch`   # print patch/diff with each log message
- `git show [-w] [commit]`   # show specific `commit` (no whitespace)
- `git describe [commit]`   # name [of `commit`] relative to tag (e.g. `v2_14_57-26-g54d4cca6`)

Finding Change History of Code

▶ Shows history of commits that modified some line number

```
# git blame lustre/obdclass/class_obd.c
52257a67e4d (Liu Xuezhao              2012-07-10 21:13:26 +0800  96)
829dd8b39a8 (Nathan Rutman           2009-05-28 00:00:48 +0000  97)
7817e4c785d (John L. Hammond         2015-01-11 11:56:32 -0500  98)
5707f919e41 (James Simmons           2013-09-27 10:24:42 -0400  99)
5707f919e41 (James Simmons           2013-09-27 10:24:42 -0400 100)
54d4cca6cb0 (Arshad Hussain          2021-03-21 06:32:07 +0530 101)
```

▶ Show history of commits *before* a specific commit

```
# git blame lustre/obdclass/class_obd.c {commit}~1
```

▶ Show patches landed between specific dates

```
# git log --after 2022-09-10 --before 2022-09-12
```

Gerrit Searching

▶ Search shortcut/bookmark in Firefox

Edit bookmark

Name

Patch Review

URL

https://review.whamcloud.com/#/q/%s

Tags

Separate tags with commas

Use tags to organize and search for bookmarks from the address bar

Keyword

review

Use a single keyword to open bookmarks directly from the address bar

Cancel   Save

▶ Searching for patches is very flexible

• A few basic keywords are useful to know

• Many options available (state, content, age, reviews)

• Default to search for word in commit message

• open change #12345

   `review 12345`

• find commit messages for specific text

   `review LU-12250`

• find merged patches owned by specific user

   `review owner:bzzz  is:merged`

• find open patches modifying specific file

   `review file:lustre_idl.h is:open`

https://review.whamcloud.com/Documentation/user-search.html

Commit Message Should Describe Patch Well

▶ **Patch summary line should be useful by itself**

  • Appears in many patch summaries ("`git log --oneline`", "`git reflog`", etc.)

▶ **What should be in the commit message?**

  • What problem/feature does this patch address?

  • Usage/test that triggered problem, with error messages/stack

  • Performance improvements resulting from patch

  • How it is being fixed, clear description of tricky code

▶ **`Fixes:` label finds related patches when searching**

▶ **Why is the commit message content important?**

  • Initial inspectors understand the patch more quickly

  • Gatekeeper understands importance of the patch

  • Anyone dealing with the patch later has some guidance

https://wiki.whamcloud.com/display/PUB/Commit+Comments

Committing Changes

► Install Git commit hooks for patch verification before push to Gerrit

```
# ln -sf ../../contrib/git-hooks/commit-msg .git/hooks
# ln -sf ../../contrib/git-hooks/prepare-commit-msg .git/hooks
```

► Read the comments provided by `prepare-commit-msg` hook!

```
# git add [path ...]                    # stage specified file(s) or dirs for commit
# git add [–u]                          # stage all changes for commit
# git commit -av                        # stage and commit all changes, show diff
# git commit -av --amend                # add current changes to previous commit
# git reset --hard {branch|HEAD~n}      # revert to branch, or last n commits
# git cherry-pick {branch|commit}       # copy specific patch to current branch
```

Committing Partial Changes

► Add individual patch hunks

```
# git add -p
diff --git a/obd_support.h b/obd_support.h
@@ -482,6 +482,8 @@ int obd_alloc_fail(const void *ptr,
 #define OBD_FAIL_LFSCK_NO_AUTO                       0x160b
 #define OBD_FAIL_LFSCK_NO_DOUBLESCAN    0x160c

+#define OBD_FAIL_FID_MAPPING                         0x1500
+
 /* Assign references to moved code to reduce code changes */
 #define OBD_FAIL_PRECHECK(id)        CFS_FAIL_PRECHECK(id)
 #define OBD_FAIL_CHECK(id)                CFS_FAIL_CHECK(id)
Stage this hunk [y,n,q,a,d,/,e,?]?
```

Rebasing Patches

- Patches should be kept up-to-date with master

- WC Checkpatch marks patches `Verified: -1` that don't apply

- Multiple dependent patches in a single series

  `# git rebase [-i] {master|b2_15}`   # edit/reorder patches (interactively)

  `# git add –u`   # add updated file(s) to commit

  `# git rebase {--continue|--abort}`   # apply or discard changes

  `# git rebase --skip`   # drop current patch entirely

  `# git rebase --onto {branch}`   # rebase onto a new branch

Rebasing a Patch or Series

► Rebase last two patches
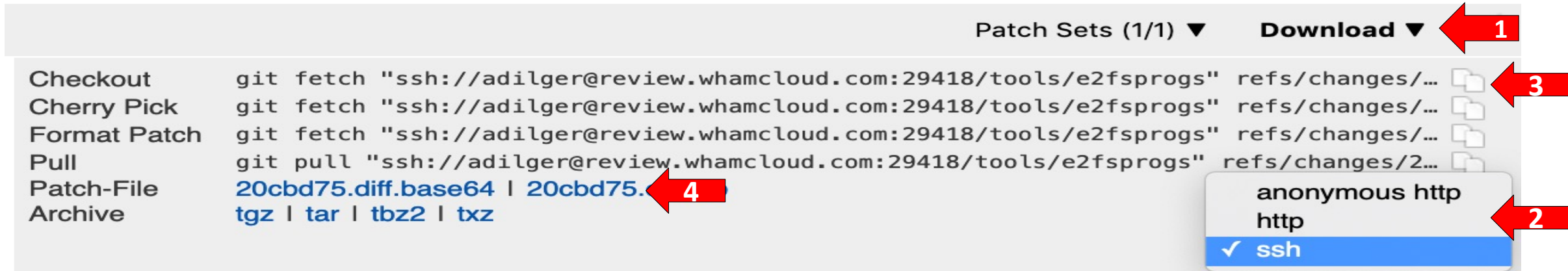
```
# git rebase -i {master|HEAD~2}
pick   4043c3c3bd LU-12885 llite: add enum ll_file_flags for clarity
fixup  fc350ac3f4 LU-12885 mds: add enums for MDS_OPEN flags
reword 27723374a3 LU-16073 utils: double snapshot_mount fix

# Rebase fc350ac3f4.. 4043c3c3bd onto 27723374a3
# Commands:
#  p, pick = use commit
#  r, reword = use commit, but edit the commit message
#  e, edit = use commit, but stop for amending
#  s, squash = use commit, but meld into previous commit
#  f, fixup = like "squash", but discard this commit's log message
#  x, exec = run command (the rest of the line) using shell
# These lines can be re-ordered; they are executed top to bottom.
```

► Can also change patch ordering in this way

(Re)basing Another Patch onto an Existing Change
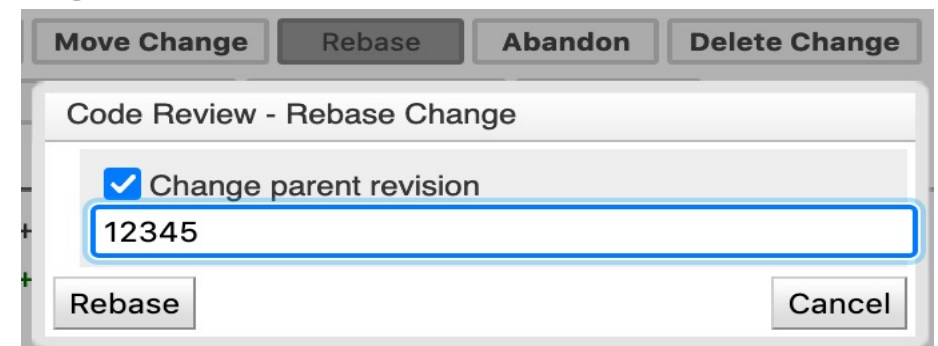


```
# git fetch … && git checkout -b b_new_patch FETCH_HEAD  # checkout patch (#1, #2, #3)
# git cherry-pick {my patch}                              # apply new patch on top
# git log                                                 # verify old commit hash is same (#4)
# git push … HEAD:refs/for/master                         # push new patch to Gerrit
```

► **Do not** rebase new branch onto latest master before submitting
- Original developer should rebase or land their patch first

► Can also do simple rebase in Gerrit with [Rebase] button
- "Change parent revision" and specify patch number
- Cannot resolve patch conflicts directly in Gerrit

What To Do When Things Go Wrong

- All old commits/branches remain in the repository

```
# git reflog
3c96fb63e9 HEAD@{49}: rebase: LU-11721 tests: enable full debugging for sanity
da6cf33 HEAD@{1}: commit: LU-2468 libcfs: quiet debug messages
0b3e852 HEAD@{2}: checkout: moving from b_cleanup9 to b_cleanup7
5ea4d20 HEAD@{3}: rebase finished: returning to refs/heads/b_cleanup9
5ea4d20 HEAD@{4}: rebase: LU-1798 tests: don't set jobid if not changing
0b3e852 HEAD@{5}: checkout: moving from b_cleanup9 to 0b3e852a58^0
```

- If things go really badly, you can abort rebase and start again

```
# git rebase --abort
```

Extracting and Sharing Changes

►Default values in `$HOME/.gitconfig` or `.git/config` in local repository

```
[user]
    name = Andreas Dilger
    email = andreas.dilger@whamcloud.com
[sendemail]
    smtpserver = shawmail.cg.shawcable.net
    smtpserverport = 25
    confirm = compose
[core]
    abbrev=12
[pretty]
    fixes=Fixes: %h (\"%s\")
[format]
    pretty=fuller
```

Whamcloud

Thank You