



**Whamcloud**

# **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

- ▶ 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: e18.6 x86\_64
  - clients: e17.9, e18.6, e19.0, sles15sp4, ubuntu2004; x86\_64, aarch64, ppc1e64
- ▶ 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](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](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

```
Test-Parameters: testlist=sanity env=ONLY=16,HONOR_EXCEPT=y
Test-Parameters: serverversion=2.14 testlist=sanity 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>


# 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

Reply... Code-Review+2


Owner Feng Lei

Assignee 

Reviewers Andreas Dilger x Autotest x Feng Lei x Li Xi x  
Lustre Gerrit Janitor x Maloo x WC Checkpatch x jenkins x 

Project fs/lustre-release 

Branch master

Topic 

Strategy Cherry Pick

Updated 10 days ago

Cherry Pick Move Change Rebase Abandon Delete Change

**Follow-Up** Mark Private Ignore Mark Reviewed WIP

```
LU-15748 tests: extra testing

Test-Parameters: testlist=racer env=DURATION=900
Test-Parameters: testlist=racer env=DURATION=900
Test-Parameters: testlist=racer env=DURATION=900
Test-Parameters: testlist=racer env=DURATION=900
Test-Parameters: testlist=racer env=DURATION=900
```

Follow-Up



# Gerrit Patch Status



jenkins	Patch Set 14: Verified+1 Build Successful <a href="https://build.whamcloud.com/job/lustre-reviews/89569/">https://build.whamcloud.com/job/lustre-reviews/89569/</a> : SUCCESS	09-15 02:15
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-...	09-15 02:15
Maloo	Patch Set 14: Passed enforced test custom-101 on CentOS 8.5/x86_64 uploaded by Travis Autotest from trevis-60vm1: <a href="https://testing.whamcloud.com/test_sessio...">https://testing.whamcloud.com/test_sessio...</a>	09-15 02:44
Maloo	Patch Set 14: Passed enforced test custom-102 on CentOS 8.3/x86_64, CentOS 8.5/x86_64 uploaded by Onyx Autotest from onyx-120vm1: <a href="https://testing.whamcl...">https://testing.whamcl...</a>	09-15 02:44
Lustre G... Janitor	Patch Set 14: Initial testing succeeded. Succeeded: - runtests@ldiskfs+DNE runtests-ssk@ldiskfs+SharedKey runtests@zfs sanityn@ldiskfs+DNE sanityn@ldiskfs...	09-15 02:58
Maloo	Patch Set 14: Passed enforced test review-dne-part-7 on CentOS 8.5/x86_64 uploaded by Travis Autotest from trevis-85vm1: <a href="https://testing.whamcloud.com/test_s...">https://testing.whamcloud.com/test_s...</a>	09-15 03:13
Maloo	Patch Set 14: Passed enforced test review-dne-zfs-part-7 on CentOS 8.5/x86_64 uploaded by Onyx Autotest from onyx-70vm6: <a href="https://testing.whamcloud.com/test...">https://testing.whamcloud.com/test...</a>	09-15 03:34
Maloo	Patch Set 14: Failed optional test review-ldiskfs on CentOS 8.5/x86_64, SLES 15.3/x86_64 uploaded by Travis Autotest from trevis-76vm1: <a href="https://testing.whamclo...">https://testing.whamclo...</a>	09-15 05:40
Lustre G... Janitor	Patch Set 14: Testing has completed with errors! IMPORTANT: these tests appear to be new failures unique to this patch - replay-vbr@ldiskfs+DNE:test_5b(Seen i...	09-15 05:50
Maloo	Patch Set 14: Passed enforced test review-ldiskfs on CentOS 8.5/x86_64 uploaded by Onyx Autotest from onyx-130vm1: <a href="https://testing.whamcloud.com/test_sessi...">https://testing.whamcloud.com/test_sessi...</a>	09-15 06:07
Maloo	Patch Set 14: Passed enforced test review-dne-zfs-part-2 on CentOS 8.5/x86_64 uploaded by Travis Autotest from trevis-83vm1: <a href="https://testing.whamcloud.com/te...">https://testing.whamcloud.com/te...</a>	09-15 06:17

# Monitoring Test Results in Maloo



## 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

- ▶ Permanently keeps *results* for all patches
- ▶ Logs are kept as long as possible (months), longer for test failures if space available

Maloo Test Queue: [https://testing.whamcloud.com/test\\_queue?jobs=lustre-reviews&builds=89713&commit=Apply+Filter](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](https://testing.whamcloud.com/test_sessions?jobs=lustre-reviews&builds=89713&start_date=2022-09-25#redirect)

Job	Build/Patch	Seq/Idx	Test Group	Distros	Review	Suite/Test	Started
lustre-reviews	<a href="#">89713:9</a>	1:28	review-ldiskfs-dne	server: el8.5-x86_64/ldiskfs clients: el8.5-x86_64/ldiskfs	<a href="#">73232604d</a>	sanity test_31j	2022-09-25 21:24 (~1 hour)
lustre-reviews	<a href="#">89713:9</a>	1:29	review-ldiskfs-dne-arm	server: el8.5-x86_64/ldiskfs clients: el8.5-aarch64/ldiskfs	<a href="#">73232604d</a>	sanity test_24u	2022-09-25 21:24 (~1 hour)
lustre-reviews	<a href="#">89713:9</a>	1:101	custom	server: el8.5-x86_64/ldiskfs clients: el8.5-x86_64/ldiskfs	<a href="#">73232604d</a>	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	<a href="#">2022-09-25 02:15:36</a>	2022-09-25 08:12:27	3/3
onyx-26vm1	review-ldiskfs-dne	Onyx Autotest	master	47131	89712	<a href="#">2022-09-25 02:15:16</a>	2022-09-25 07:18:11	5/5
trevis-108vm17	review-ldiskfs-dne-arm	Trevis Autotest	master	47131	89712	<a href="#">2022-09-25 02:15:21</a>	2022-09-25 05:52:59	6/7



# Reviewing Test Failures in Maloo

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 failures to existing bugs
- ▶ Raise bug for new failure
- ▶ Track common failures
  
- ▶ Easy search for subtest

# Search Test Results in Maloo



**LUSTRE** Sessions Results Reports & Stats Queues Requests And

Search Test sets | Sub Search s

Upload

Test set script:

Sub test script:

Status:

Bug(s): e.g. LU-1234, DCO-777

Code review: Commit id (SHA)

Code review: Change number (12345)

Trigger job(s):

Trigger build(s): e.g. 123, 456

Host(s): e.g. travis\*, onyx-33vm\*

Group(s):

User(s):

Within:

or

From:  To:

Client: Distribution type, Architecture type, File system type, Branch type, Network type

[Download results as CSV](#)  
16 records found

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



# Associate Failures with Multiple Patches

Search

Reset form

Associate bugs...

Disassociate bugs...

ID:

Add

Cancel

[Download results as CSV](#)

16 records found

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

# 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 will timeout, limit to specific subtest and state
- ▶ Limit branch, architecture, filesystem to isolate effects
- ▶ "git log --oneline --after YYYY-MM-DD --before YYYY-MM-DD" to find related patches

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. travis*, onyx-33vm*	Architecture type	aarch64 <input checked="" type="checkbox"/>	Architecture type	<input type="checkbox"/>
Bug(s)	e.g. LU-1234, DCO-777	Group(s)	Any group	File system type	<input type="checkbox"/>	File system type	zfs <input type="checkbox"/>
Code review	Commit id (SHA)	User(s)	All users	Branch type	b2_12 <input type="checkbox"/>	Branch type	<input type="checkbox"/>
Code review	Change number (12345)	Within		Network type	<input type="checkbox"/>	Network type	<input type="checkbox"/>
		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



***Whamcloud***

**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)
- `git diff --cached` # show "git add" changes only
- `git grep -p {regex}` # show all files *in repository* with regular expression
- `git log [branch|path]` # show commits (branch/dir/file)
- `git log -S {string}` # search commits in **code** that add/remove specific string
- `git log --grep {regex}` # search commit **messages** 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 is possible

- A few basic keywords, many more options
- 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

- ▶ 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 this 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.
```

# (Re)basing Another Patch onto an Existing Change



	Patch Sets (1/1) ▼	Download ▼	1
Checkout	git fetch "ssh://adilger@review.whamcloud.com:29418/tools/e2fsprogs"	refs/changes/...	3
Cherry Pick	git fetch "ssh://adilger@review.whamcloud.com:29418/tools/e2fsprogs"	refs/changes/...	3
Format Patch	git fetch "ssh://adilger@review.whamcloud.com:29418/tools/e2fsprogs"	refs/changes/...	3
Pull	git pull "ssh://adilger@review.whamcloud.com:29418/tools/e2fsprogs"	refs/changes/2...	3
Patch-File	<a href="#">20cbd75.diff.base64</a>   <a href="#">20cbd75.</a>		4
Archive	<a href="#">tgz</a>   <a href="#">tar</a>   <a href="#">tbz2</a>   <a href="#">txz</a>		

anonymous http  
http  
✓ ssh

```
# 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

# 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
```

```
# 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
```