

Wireshark for Lustre*

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* Other names and brands may be claimed as the property of others.

What is Wireshark?

- Protocol analyzer
- Website: www.wireshark.org
- Powerful filtering capabilities
- Powerful analytics/ statistics



2



Build and Install

Wireshark:

- Latest Stable: 1.8.6 (recommended). Dev: 1.9.2
- Requires: gtk2-devel and libpcap-devel (CentOS 6.x)
- Usual: ./configure, make, make install
- Application: /usr/local/bin/ wireshark

LNet/Lustre* Dissectors:

- Need Wireshark source tree
- Go to: lustre/contrib/ wireshark (2.4 and up)
- Update Makefile if not using package manager
- Just run "make install" ("make clean" first if previously built)
- Plugins: Inet.so and lustre.so



Checking for LNet and Lustre* Plugins

		Abou	t Wireshark _ 🗆 ×
Wireshark Aut	hors Fold	ders Plugins	License
Name	Version	Туре	Path
profinet.so	0.2.4	dissector	/usr/local/lib/wireshark/plugins/1.8.6/profinet.so
docsis.so	0.0.5	dissector	/usr/local/lib/wireshark/plugins/1.8.6/docsis.so
m2m.so	1.1.0	dissector	/usr/local/lib/wireshark/plugins/1.8.6/m2m.so
stats_tree.so	0.0.1	tap	/usr/local/lib/wireshark/plugins/1.8.6/stats_tree.so
wimaxasncp.so	0.0.1	dissector	/usr/local/lib/wireshark/plugins/1.8.6/wimaxasncp.so
mate.so	1.0.0a	dissector	/usr/local/lib/wireshark/plugins/1.8.6/mate.so
opcua.so	1.0.0	dissector	/usr/local/lib/wireshark/plugins/1.8.6/opcua.so
wimax.so	1.1.0	dissector	/usr/local/lib/wireshark/plugins/1.8.6/wimax.so
ethercat.so	0.1.1	dissector	/usr/local/lib/wireshark/plugins/1.8.6/ethercat.so
lustre.so	1.8.6	dissector	/usr/local/lib/wireshark/plugins/1.8.6/lustre.so
irda.so	0.0.6	dissector	/usr/local/lib/wireshark/plugins/1.8.6/irda.so
Inet.so	1.8.6	dissector	/usr/local/lib/wireshark/plugins/1.8.6/lnet.so
gryphon.so	0.0.4	dissector	/usr/local/lib/wireshark/plugins/1.8.6/gryphon.so
asn1.so	0.5.0	dissector	/usr/local/lib/wireshark/plugins/1.8.6/asn1.so
unistim.so	0.0.2	dissector	/usr/local/lib/wireshark/plugins/1.8.6/unistim.so
<			III >
			<u>O</u> K



4

Capturing Packets

- Capture->Interfaces
- Click "Start" on interface to capture
- Resource intensive

Use "tcpdump" or "ibdump"

	Wireshark: Capture Interfaces	5		_ = ×
Device	Description	IP	Packets	Packets/s
🔲 🛃 virbr0		192.168.122.1	0	0
🗆 📠 nflog	Linux netfilter log (NFLOG) interface	none	0	0
🗆 🔊 eth1		10.211.55.9	13	0
🗆 🍯 usbmon1	USB bus number 1	none	123	0
🗌 🍯 usbmon2	USB bus number 2	none	3	0
🗆 📠 any	Pseudo-device that captures on all interfaces	none	25	0
🗆 🗾 lo		127.0.0.1	12	0
Help	Start	Stop	otions	<u>C</u> lose

 (Go to: <u>http://www.mellanox.com/content/pages.php?</u> <u>pg=products_dyn&product_family=110&menu_section=34</u>)



Wireshark Interface

				iues.pcap	2 LAAII	Contar K	1.0.0 (3	SVN KEV U	nknown	slides.pcap [Wireshark 1.8.6 (SVN Rev Unknown from unknown)] _ 🗆 🛪									
<u>F</u> ile <u>E</u>	dit <u>V</u> ie	ew <u>G</u> o	<u>C</u> apture	<u>A</u> nalyze	<u>S</u> tatisti	cs Telep	hon <u>y</u> <u>T</u> a	ools <u>I</u> ntern	als <u>H</u> elp										
	h Qi) E	3 🕹 🗙			Ma 🔶	* *	▲		0, 0,	۹. ד	- 🏹	¥ ~					
Filter:							~	Expression.	Clear	Apply Save									
No.	Time	2	Source			Destinati	on	Pro	otocol	Length Info									
16	51 26.3	82871	Client		1	1GS		Lus	stre	746 LDLM	ENQUEUE r	equest	[Concur	rent Rea					
16	52 26.3	83517	MGS		(Client		Lus	stre	698 LDLM	_ENQUEUE r	eply [MINMODE]						
16	53 26.3	83798	Client		1	1GS		Lus	stre	746 LDLM	_ENQUEUE r	equest	[Concur	rent Rea					
16	54 26.3	84367	MGS		(Client		Lus	stre	698 LDLM	ENQUEUE r	eply [MINMODE]						
16	5 26.3	84696	Client			1GS		Lus	stre	746 LDLM	ENQUEUE r	equest	[Concur	rent Wri					
16	20.3	85630	PIG5 055		(155		LUS	bure	380 UST_	> 088 [AC	uest Kl Sog	-753 Ack	-020 Win					
10	58 26 3	85961	055			465		Luc	tre	498 057	STATES ren	n seq	-733 ACK	-929 WIN					
16	59 26.3	86507	MGS		(lient		Lus	stre	762 LDLM	ENOUEUE r	eplv [MINMODE 1						
17	70 26.3	86652	Client			1GS		Lne	et	162 LNET	ACK								
17	71 26.3	86929	Client		(DSS		Lus	stre	490 LDLM	ENQUEUE r	equest	[Protec	ted Writ					
17	72 26.3	87542	055		(Client		Lus	stre	514 LDLM	ENQUEUE r	eply [Protecte	d Write]					
Fram Ethe	ne 162: ernet I	698 b I, Src	tes on v Paralle	wire (558 el_84:52:	4 bits) 29 (00:	, 698 b 1c:42:8	ytes ca 4:52:29	ptured (55), Dst: Cl	84 bits) ient (00):1c:42:04:01	:c0)								
 Fram Ethe Inte Tran Lnet Lust 	ne 162: ernet I ernet P nsmissi E PUT, 1 ere V2	698 b I, Src rotoco on Con MDC_REI LDLM_E	ytes on i Paralle L Version trol Pro PLY_PORT, NQUEUE re	wire (558 el_84:52: h 4, Src: tocol, Sr AL eply [MIN	4 bits) 29 (00: MGS (1 c Port: MODE]	, 698 b lc:42:8 0.211.5 988 (9	ytes ca 4:52:29 5.7), D: 88), Ds	ptured (55), Dst: Cl st: Client t Port: 10	84 bits) ient (00 : (10.211 23 (1023):1c:42:04:01 [.55.9] (), Seq: 1484	:c0) 9, Ack: 16	513, L	en: 632						



With Infiniband Packets

		slides.p	ap [Wireshark 1.8.	6 (SVN	Rev Unknown f	from unknown)]	>
<u>F</u> ile	<u>E</u> dit <u>V</u> iew <u>G</u>	o <u>C</u> apture <u>A</u> naly:	e <u>S</u> tatistics Telephon	<u>y</u> <u>T</u> ools	Internals <u>H</u> elp		
	M ()		X 😂 🚖 🛤	•	Դ ₹ ±		Image: A state of the state
Filte	r:			✓ Exp	pression Clear	Apply Save	
No.	Time	Source	Destination		Protocol	Length Info	
	19 9.423698	LID: 59	LID: 32		InfiniBand	30 RC Acknowledge	
	20 9.854091	LID: 59	LID: 32		Lustre	362 SEQ_QUERY reply	-
	21 9.854282	LID: 59	LID: 32		InfiniBand	30 RC Acknowledge	
	22 9.854772	LID: 59	LID: 32		Lustre	746 LDLM_ENQUEUE reply	[Concurrent Read]
	23 9.854841	LID: 59	LID: 32		InfiniBand	30 RC Acknowledge	
	24 9.854950	LID: 59	LID: 32		IntiniBand	30 RC ACKNOWLEdge	[Desterated Deed]
	25 9.855162	LID: 59	LID: 32		Lustre	30 BC Acknowledge	[Protected Read]
	20 9.000407	LID: 59	LID: 32			50 KC ACKNOWLEDge	
<			Ш				>
⊳ Fr	ame 22: 746 b	oytes on wire (59	68 bits), 746 bytes	captur	ed (5968 bits)	on interface 0	
Þ Ex	tensible Reco	ord Format					
√ In	finiBand						
Þ	Local Route H	Header					
Þ	Base Transpor	rt Header					
Þ	Lnet PUT, MD	C_REPLY_PORTAL					
₽	Lustre V2 LDI	LM_ENQUEUE reply	[Concurrent Read]				
	Invariant CR	C: 0x04e5b9ac					
	Variant CRC:	0x3234					
0000	00 02 00 20	00 ba 00 3b 04	40 ff ff 00 04 00 4	a	; .@J		
9010	80 3d b4 53	91 1b e9 0b 12	00 d1 01 d0 02 00 0	Θ.=.	S		
9020	00 00 00 00	91 02 a8 c0 01	00 05 00 12 25 37 1	a	%7.		-
9030	20 da 04 00	88 02 38 C0 01	00 05 00 De 11 05 3	а, А			
- V	File: "/media/r	of/Home/Download	D Drofile: Defau	, +			



Filtering Packets

Filter	: Inet		✓ Exp	ression Clear	Apply Save	
No.	Time	Source	Destination	Protocol Le	ength Info	^
	162 0.000646	MGS	Client	Lustre	698 LDLM_ENQUEUE reply [MINMODE]	
	163 0.000281	Client	MGS	Lustre	746 LDLM_ENQUEUE request [Concurrent Read][intent : getattr] filename : test3.txt	
	164 0.000569	MGS	Client	Lustre	698 LDLM_ENQUEUE reply [MINMODE]	=
	165 0.000329	Client	MGS	Lustre	746 LDLM_ENQUEUE request [Concurrent Write][intent : open create][REINT_OPEN] filename : test3.txt	
	166 0.000648	MGS	055	Lustre	386 OST_STATFS request	
	168 0.000322	0SS	MGS	Lustre	498 OST_STATFS reply	
	169 0.000546	MGS	Client	Lustre	762 LDLM_ENQUEUE reply [MINMODE]	
	170 0.000145	Client	MGS	Lnet	162 LNET_ACK	
	171 0.000277	Client	055	Lustre	490 LDLM_ENQUEUE request [Protected Write]	
	172 0.000613	0SS	Client	Lustre	514 LDLM_ENQUEUE reply [Protected Write]	
	174 0.000394	Client	055	Lustre	650 OST_WRITE request	
	175 0.000575	0SS	Client	Lnet	162 LNET_GET, OST_BULK_PORTAL	
	176 0.000088	Client	055	Lnet	211 LNET REPLY	~

Filter	: Inet		✓ Expres	sion Clea	r Apply Save	
No.	Time	Source	Destination	Protocol	Length Info	^
	68 15.299502	LID: 49	LID: 32	Lustre	442 LDLM_BL_CALLBACK request [Protected Write]	
	71 15.299981	LID: 49	LID: 32	Lustre	338 LDLM_CANCEL reply	=
	72 15.300201	LID: 49	LID: 32	Lustre	442 LDLM_BL_CALLBACK request [Protected Write]	
	75 15.300617	LID: 49	LID: 32	Lustre	338 LDLM_CANCEL reply	
	77 16.871368	LID: 59	LID: 32	Lustre	682 LDLM_ENQUEUE reply [MINMODE]	
	79 16.871742	LID: 59	LID: 32	Lustre	682 LDLM_ENQUEUE reply [MINMODE]	
	81 16.872137	LID: 59	LID: 32	Lustre	682 LDLM_ENQUEUE reply [MINMODE]	
	83 16.872750	LID: 59	LID: 32	Lustre	746 LDLM ENQUEUE reply [Concurrent Read]	
	86 16.873245	LID: 49	LID: 32	Lustre	514 LDLM_ENQUEUE reply [Protected Write]	~



Changing Time Scale

View Go Capture Analyze Statistics Telep	hon <u>y T</u> ools <u>I</u> nternals <u>H</u> elp			-		Destination	Destand	1
✓ <u>M</u> ain Toolbar			NO.	Time	Source	Destination	Protocol	Length Into
✓ Filter Toolbar				0.000000	OSS	MGS	LustreBUG	354 OBD_PING request
✓ Statusbar	Expression Clear Apply			3 0.004041	MGS	055	LustreBUG	354 OBD_PING reply
	- Expression Creat Appry		2	4 2.901399	Client	MGS	LustreBUG	530 MGS_CONNECT request
✓ Packet List	Protocol Length Info		3	2 2.902412	MGS	Client	LustreBUG	426 MGS_CONNECT reply
✓ Packet <u>D</u> etails	LustreBUG 354 OBD_PING request		3	2.902601	Client	MGS	LustreBUG	458 LDLM_ENQUEUE request [MINMODE]
✓ Packet Bytes	LustreBUG 354 OBD_PING reply		4	1 2.903503	MGS	Client	LustreBUG	514 LDLM_ENQUEUE reply [MINMODE]
	LustreBUG 530 MGS_CONNECT request		4	5 2.904624	Client	MGS	LustreBUG	426 LLOG_ORIGIN_HANDLE_CREATE request filename :
Time Display Format	Date and Time of Day: 1970-01-01 01:02:03.123456	Ctrl+Alt+1	4	6 2.904734	MGS	Client	LustreBUG	402 LLOG_ORIGIN_HANDLE_CREATE reply
Name Resolution	 Time of Day: 01:02:03.123456 	Ctrl+Alt+2					1	
✓ Colorize Packet List	O Seconds Since Epoch (1970-01-01): 1234567890.123456	Ctrl+Alt+3						
✓ Auto Scroll in Live Capture	Seconds Since Beginning of Capture: 123.123456	Ctrl+Alt+4	t					
	Seconds Since Previous Captured Packet: 1.123456	Ctrl+Alt+5						
Zoom In Ctrl++	Seconds Since Previous Displayed Packet: 1.123456	Ctrl+Alt+6						
Zoom Out Ctrl+-	X							
Normal Size Ctrl+=	 Automatic (File Format Precision) 							
Resize All Columns Shift+Ctrl+R	○ Seconds: 0							
Displayed Columns	 Deciseconds: 0.1 						4	
	Centiseconds: 0.12						V	
Expand Subtrees Shift+Right	○ Milliseconds: 0.123		No.	Time	Source	Destination	Protocol	Length Info
Expand All Ctrl+Right	○ Microseconds: 0.123456			10.000000	055	MGS	LustreBUG	354 OBD_PING request
Collapse <u>A</u> ll Ctrl+Left	Naposoconds: 0.122456789			30.004041	MGS	OSS	LustreBUG	354 OBD_PING reply
			2	4 2.897358	Client	MGS	LustreBUG	530 MGS_CONNECT request
Colorize Conversation	Display Seconds with hours and minutes	Ctrl+Alt+0	3	20.001013	MGS	Client	LustreBUG	426 MGS_CONNECT reply
Reset Coloring 1-10 Ctrl+Space			3	50.000189	Client	MGS	LustreBUG	458 LDLM_ENQUEUE request [MINMODE]
Coloring Rules			4	10.000902	MGS	Client	LustreBUG	514 LDLM_ENQUEUE reply [MINMODE]
Show Packet in New Window			4	50.001121	Client	MGS	LustreBUG	426 LLOG_ORIGIN_HANDLE_CREATE request filename :
Belead Ctd in New William			4	60.000110	MGS	Client	LustreBUG	402 LLOG_ORIGIN_HANDLE_CREATE reply
			1					



LNet Header

Frame 1: 354 bytes on wire (2832 bits), 354 bytes captured (2832 bits) Ethernet II, Src: Parallel 2a:de:5c (00:1c:42:2a:de:5c), Dst: Parallel 8e:1a:f5 (00:1c:42:8e:1a:f5) Internet Protocol Version 4, Src: OSS (10.211.55.9), Dst: MGS (10.211.55.7) Transmission Control Protocol, Src Port: 988 (988), Dst Port: 1023 (1023), Seq: 1, Ack: 1, Len: 288 Type of socklnd message: KSOCK MSG LNET (0x000000c1) checksum disabled ack not required not ack ∀ dest nid = 10.211.55.7@tcp0 Destination nid: MGS (10.211.55.7) lnd network interface: 0 lnd network type: SOCKLND (2) Src nid: OSS (10.211.55.9) lnd network interface: 0 lnd network type: SOCKLND (2) Src pid: 12345 (0x00003039) Dest pid: 12345 (0x00003039) Message type: PUT (1) Payload length: 192 Match bits: 0x0004fadac7204803 (1401717457438723) hdr data: 0x0000000000000000 (0) ptl index: MGS REQUEST PORTAL (26) offset: 0 msg filler (padding) Payload Lustre V2 OBD PING request



Lustre* Header

Frame 68: 442 bytes on wire (3536 bits), 442 bytes captured (3536 bits) on interface 0	
Extensible Record Format	
▼ InfiniBand	
▷ Local Route Header	
▷ Base Transport Header	
Inet PUT, LDLM_CB_REQUEST_PORTAL	
¬ Lustre V2 LDLM_BL_CALLBACK request [Protected Write]	
Lm Bufcount: 2	
Lm Secflvr: 0	
Lm Magic: 0x0bd00bd3	
Lm Repsize: 224	
Lm Cksum: 0	
Lm Flags: 3	
Lm Padding 2: 0	=
Lm Padding 3: 0	
Lm Buflens: 152	
Lm Buflens: 104	
▷ Pb Handle	
Pb Type: request (4711)	
0000 0000 0000 0011 = Pb Version: 3	
Pb Opc: LDLM_BL_CALLBACK (104)	
Pb Status: 35176	
Pb Last Xid: 0	
Pb Last Seen: 0	
Pb Last Committed: 0	
Pb Transno: 0	
Pb Flags: 0	
Pb Op Flags: 0	
Pb Conn Cnt: 0	
Pb Timeout: 11	
Pb Service Time: 0	
Pb Limit: 0	
Pb Slv: 0	
Pb Pre-Version: 0	~

11



Interacting with Fields

- Clicking on field triggers hex to highlight
- Also shows generated name for field (if any)

	Dest pid: 12345 (0x00003039)															
	Mess	sage	e ty	/pe:	PL	JT ((1)									
	Payl	oad	l le	engt	:h:	192	2									
	DST	MD	ind	lex	int	erf	face	e: 0	xfff	fff	fff	fff	fff	f	(184	467
	DST MD index object: 0xffffffffffffffffffffffffffffffffffff															
	Mato	:h b	oits	: 0)x00	041	fada	ac72	0480)3 (140)171	745	5743	3872	23)
	hdr	dat	a	0x6	000	0000	0000	0000	000	(0)						,
	nt1	inc	lev.	MG	is F		IEST	, D000	RTAI	17	6)					
	offe	- to	6	ric.		LQU.				- (2	.07					
	UTTS	set.	0													
0070	00	00	01	00	00	00	сØ	00	00	00	ff	ff	ff	ff	ff	ff
0080	ff	ff	ff	ff	ff	ff	ff	ff	ff	ff	03	48	20	c7	da	fa
0090	04	00	00	00	00	00	00	00	00	00	1a	00	00	00	00	00
00a0	00	00	01	00	00	00	00	00	00	03	d3	٥b	d٥	٥b	c0	00
00b0	00	00	00	00	00	00	03	00	00	00	00	00	00	00	00	00
00c0	00	00	98	00	00	00	00	00	00	00	5c	53	d8	3d	10	c5
00d0	dd	90	67	12	00	00	03	00	01	00	90	01	00	00	13	09
00e0	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00
00f0	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00
0100	00	00	00	00	00	00	00	00	00	00	1e	29	00	00	06	00
🔵 m	isg ty	pe (Ine	t.ms	sg_t	ype), 4	byte	es						P	ack

(2)

lnd network type: SOCKLND

Src pid: 12345 (0x00003039)



Filter Tricks – Being Lazy

- Right-Click on field
- Use "Apply as Filter" to fill in filter field for you
- Even works on text fields...which is what "dest_nid" is

✓ Lnet PUT, MGS_REQUEST_PORTAL			
Type of socklnd message: KSOCK_MSG_LN	ET (0x00000c1)		
checksum disabled			
ack not required			
not ack			
	Expand Subtrees		
Destination nid: MGS (10.211.55.7)	Expand All	- 1	
lnd network interface: 0	Expand All	- 1	
lnd network type: SOCKLND (2)	Collapse All		
<pre> src_nid = 10.211.55.9@tcp0 </pre>	Apply as Column		
Src n1d: 0SS (10.211.55.9)	Apply of Silter	_	Colortad
Ind network interface: 0	Apply as Filter	>	Selected
LING NETWORK TYPE: SUCKLIND (2)	Prepare a Filter	>	Not Selected
Src pid: 12345 (0x000003039)	Colorize with Filter	>	and Selected
Dest pid: 12345 (0x00003039)	Follow TCP Stream		or Selected
Peyload longth, 102	Follow UDP Stream		and not Selected
Paylodu lengin: 192	Follow SSL Stream		or not Selected
DST MD index object. 0xfffffffffffffffffffffffffffffffff		.1	-
Match bits: 0x0004fadac7204803 (1401)	Сору	~	
hdr data: 0x0000000000000000 (0)	Export Selected Packet Bytes		
ptl index: MGS REQUEST PORTAL (26)	Wiki Protocol Page		
offset: 0	Filter Field Reference		
0050 <u>00 00</u> 00 00 00 00 00 00 00 00 00 07 3	Protocol Help		
0060 02 00 09 37 d3 0a 00 00 02 00 39 3 0070 00 00 01 00 00 00 00 00 00 00 ff f	Protocol Preferences	- 1	
0080 ff a3 4	Decode As		
0090 04 00 00 00 00 00 00 00 00 00 1a 0	Disable Protocol	- 1	
2020 00 00 00 00 00 00 03 00 00 03 03 01	Resolve Name	- 1	
00c0 00 00 98 00 00 00 00 00 00 00 5c 5.	Go to Corresponding Packet	- 1	
0040 44 00 67 12 00 00 02 00 01 00 00 0			



Protocol Hierarchy Window

Wireshark: Protocol Hierarchy Statistics _										
Display filter: n	one									
Protocol	% Packets	Packets	% Bytes	Bytes	Mbit/s					
▼ Frame	100.00 %	685	100.00 %	271497	0.024					
マ Ethernet	100.00 %	685	100.00 %	271497	0.024					
Internet Protocol Version 4	99.42 %	681	99.92 %	271293	0.024					
	96.79 %	663	99.16 %	269213	0.024					
⊽ Lnet	58.10 <mark>) %</mark>	398	87.70 %	238095	0.021					
マ Lustre	52.7 <mark>0 %</mark>	361	82.97 %	225266	0.020					
⊽ Lnet	0.73 %	5	1.89 %	5130	0.000					
Lustre	0.73 %	5	1.89 %	5130	0.000					
Malformed Packet	0.58 %	4	0.76 %	2056	0.000					
Short Frame	0.73 %	5	2.79 %	7570	0.001					
	2.63 %	18	0.77 %	2080	0.000					
Dropbox LAN sync Discovery Protocol	0.44 %	3	0.24 %	642	0.000					
Domain Name Service	1.75 %	12	0.43 %	1162	0.000					
NetBIOS Name Service	0.44 %	3	0.10 %	276	0.000					
Address Resolution Protocol	0.58 %	4	0.08 %	204	0.000					
 III 					>					
<u>H</u> elp				<u><u>c</u></u>	lose					



Packet Lengths

Packet Leng	ths wi	th filter: l	net	- 0	×
Topic / Item	Count	Rate (ms)	Percent		
	398	0.004854			
0-19	0	0.000000	0.00%		
20-39	0	0.000000	0.00%		
40-79	0	0.000000	0.00%		
80-159	0	0.000000	0.00%		
160-319	32	0.000390	8.04%		
320-639	177	0.002159	44.47%		
640-1279	182	0.002219	45.73%		
1280-2559	7	0.000085	1.76%		
2560-5119	0	0.000000	0.00%		
5120-	0	0.000000	0.00%		
	<u>_</u> [c	ose			



Current: Flow Graph





Future: Flow Graph

eth1 - Graph Analysis _ 🗆								
Time	Client MGS OSS	Comment	10					
9.277	(1023) LDLM_ENQUEUE reques	LustreBUG: LDLM_ENQUEUE request [MINMODE][intent : open readdir getattr][Unknown cr_opc]						
9.277	(1023) LDLM_ENQUEUE reply	LustreBUG: LDLM_ENQUEUE reply [MINMODE]						
9.278	(1023) LDLM_ENQUEUE reques	LustreBUG: LDLM_ENQUEUE request [MINMODE][intent : open readdir getattr][Unknown cr_opc]						
9.279	OST_STATES request	LustreBUG: OST_STATFS request						
9.279	OST_STATFS reply (1023) STATFS reply	LustreBUG: OST_STATFS reply						
9.281	(1023) LDLM_ENQUEUE reply (988)	LustreBUG: LDLM_ENQUEUE reply [MINMODE]						
9.281	(1023) LNET ACK (988)	LNet: LNET_ACK						
9.281	(1023) LDLM_ENQUEUE reques	LustreBUG: LDLM_ENQUEUE request [MINMODE][intent : open readdir getattr][Unknown cr_opc]						
9.281	(1023) LDLM_ENQUEUE reply (988)	LustreBUG: LDLM_ENQUEUE reply [MINMODE]						
9.282	(1023) LDLM_ENQUEUE reques	LustreBUG: LDLM_ENQUEUE request [MINMODE][intent : open readdir getattr][Unknown cr_opc]						
9.282	(1023) LDLM_ENQUEUE reply (988)	LustreBUG: LDLM_ENQUEUE reply [MINMODE]						
9.282	(1023) LNET ACK (988)	LNet: LNET_ACK						
9.282	(1023) LDLM_ENQUEUE reques	LustreBUG: LDLM_ENQUEUE request [MINMODE][intent : open readdir getattr][Unknown cr_opc]						
9.283	(1023) LDLM_ENQUEUE reply (988)	LustreBUG: LDLM_ENQUEUE reply [MINMODE]						
9.283	LDLM_ENQUEUE reques	LustreBUG: LDLM_ENQUEUE request [MINMODE]						
9.283	LDLM_ENQUEUE reply (1023)/M_ENQUEUE reply	LustreBUG: LDLM_ENQUEUE reply [MINMODE]						
9.284	(1023) LDLM_ENQUEUE reques	LustreBUG: LDLM_ENQUEUE request [MINMODE][intent : open readdir getattr][Unknown cr_opc]						
9.284	(1023) LDLM_ENQUEUE reply (988)	LustreBUG: LDLM_ENQUEUE reply [MINMODE]						
9.284	LDLM_ENQUEUE reques	LustreBUG: LDLM_ENQUEUE request [MINMODE]						
9.285	LDLM_ENQUEUE reply (1023) (1023)	LustreBUG: LDLM_ENQUEUE reply [MINMODE]						
9.285	(1023) MDS_CLOSE request (988)	LustreBUG: MDS_CLOSE request						
9.285	(1023) MDS_CLOSE reply (988)	LustreBUG: MDS_CLOSE reply						
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I/O Graph





I/O Graph - Advanced

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Graph 2 Color Filter: Ca	alc: SUM(*) 🛛 🗘	St	tyle: Line 🛛 😂	Pixels per tick: 5 🗘
Graph 3 Color Filter: Ca	alc: SUM(*) 🗘	st	tyle: Line 😂	□ <u>V</u> iew as time of day
Graph 4 Color Filter: Ca	alc: SUM(*) 🗘	St	tyle: Line 🔷 🗘	Y Axis
Graph 5 Color Filter: Ca	alc: SUM(*) COUNT(*)	St	tyle: Line 😂	Scale: Auto
Help Copy	MAX(*)			<u>C</u> lose <u>S</u> ave
	MIN(*)			
	AVG(*)			
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