

# SystemTap Tapset Reference Manual

SystemTap

---

# SystemTap Tapset Reference Manual

by SystemTap

Copyright © 2008-2011 Red Hat, Inc. and others

This documentation is free software; you can redistribute it and/or modify it under the terms of the GNU General Public License version 2 as published by the Free Software Foundation.

This program is distributed in the hope that it will be useful, but WITHOUT ANY WARRANTY; without even the implied warranty of MERCHANTABILITY or FITNESS FOR A PARTICULAR PURPOSE. See the GNU General Public License for more details.

You should have received a copy of the GNU General Public License along with this program; if not, write to the Free Software Foundation, Inc., 51 Franklin Street, Fifth Floor, Boston, MA 02110-1301 USA.

For more details see the file COPYING in the source distribution of Linux.

---

# Table of Contents

1. Introduction .....	1
2. Context Functions .....	2
function::addr .....	3
function::backtrace .....	4
function::caller .....	5
function::caller_addr .....	6
function::cmdline_arg .....	7
function::cmdline_args .....	8
function::cmdline_str .....	9
function::cpu .....	10
function::cpuid .....	11
function::egid .....	12
function::env_var .....	13
function::euid .....	14
function::execname .....	15
function::gid .....	16
function::is_myproc .....	17
function::is_return .....	18
function::modname .....	19
function::module_name .....	20
function::pexecname .....	21
function::pgrp .....	22
function::pid .....	23
function::pid2execname .....	24
function::pid2task .....	25
function::pn .....	26
function::pp .....	27
function::ppid .....	28
function::print_backtrace .....	29
function::print_regs .....	30
function::print_stack .....	31
function::print_ubacktrace .....	32
function::print_ubacktrace_brief .....	33
function::print_ustack .....	34
function::probe_type .....	35
function::probefunc .....	36
function::probemod .....	37
function::pstrace .....	38
function::registers_valid .....	39
function::remote_id .....	40
function::remote_uri .....	41
function::sid .....	42
function::sprint_backtrace .....	43
function::sprint_stack .....	44
function::sprint_ubacktrace .....	45
function::sprint_ustack .....	46
function::stack_size .....	47
function::stack_unused .....	48
function::stack_used .....	49
function::stp_pid .....	50
function::syndata .....	51
function::symname .....	52
function::target .....	53
function::task_backtrace .....	54
function::task_cpu .....	55
function::task_current .....	56

SystemTap	
Tapset	
Ref- erence	
Man- ual	
function::task_egid	57
function::task_euid	58
function::task_execname	59
function::task_gid	60
function::task_max_file_handles	61
function::task_nice	62
function::task_open_file_handles	63
function::task_parent	64
function::task_pid	65
function::task_prio	66
function::task_state	67
function::task_tid	68
function::task_uid	69
function::tid	70
function::uaddr	71
function::ubacktrace	72
function::uid	73
function::umodname	74
function::user_mode	75
function::usymdata	76
function::usymname	77
3. Timestamp Functions	78
function::HZ	79
function::cpu_clock_ms	80
function::cpu_clock_ns	81
function::cpu_clock_s	82
function::cpu_clock_us	83
function::delete_stopwatch	84
function::get_cycles	85
function::gettimeofday_ms	86
function::gettimeofday_ns	87
function::gettimeofday_s	88
function::gettimeofday_us	89
function::jiffies	90
function::local_clock_ms	91
function::local_clock_ns	92
function::local_clock_s	93
function::local_clock_us	94
function::read_stopwatch_ms	95
function::read_stopwatch_ns	96
function::read_stopwatch_s	97
function::read_stopwatch_us	98
function::start_stopwatch	99
function::stop_stopwatch	100
4. Time utility functions	101
function::ctime	102
function::tz_ctime	103
function::tz_gmtoff	104
function::tz_name	105
5. Shell command functions	106
function::system	107
6. Memory Tapset	108
function::addr_to_node	109
function::bytes_to_string	110
function::mem_page_size	111
function::pages_to_string	112
function::proc_mem_data	113
function::proc_mem_data_pid	114

function::proc_mem_rss	115
function::proc_mem_rss_pid	116
function::proc_mem_shr	117
function::proc_mem_shr_pid	118
function::proc_mem_size	119
function::proc_mem_size_pid	120
function::proc_mem_string	121
function::proc_mem_string_pid	122
function::proc_mem_txt	123
function::proc_mem_txt_pid	124
function::vm_fault_contains	125
probe::vm.brk	126
probe::vm.kfree	127
probe::vm.kmalloc	128
probe::vm.kmalloc_node	129
probe::vm.kmem_cache_alloc	130
probe::vm.kmem_cache_alloc_node	131
probe::vm.kmem_cache_free	132
probe::vm.mmap	133
probe::vm.munmap	134
probe::vm.oom_kill	135
probe::vm.pagefault	136
probe::vm.pagefault.return	137
probe::vm.write_shared	138
probe::vm.write_shared_copy	139
7. Task Time Tapset	140
function::cputime_to_msecs	141
function::cputime_to_string	142
function::msecs_to_string	143
function::task_stime	144
function::task_stime_tid	145
function::task_time_string	146
function::task_time_string_tid	147
function::task_utime	148
function::task_utime_tid	149
8. Scheduler Tapset	150
probe::scheduler.balance	151
probe::scheduler.cpu_off	152
probe::scheduler.cpu_on	153
probe::scheduler.ctxswitch	154
probe::scheduler.kthread_stop	155
probe::scheduler.kthread_stop.return	156
probe::scheduler.migrate	157
probe::scheduler.process_exit	158
probe::scheduler.process_fork	159
probe::scheduler.process_free	160
probe::scheduler.process_wait	161
probe::scheduler.signal_send	162
probe::scheduler.tick	163
probe::scheduler.wait_task	164
probe::scheduler.wakeup	165
probe::scheduler.wakeup_new	166
9. IO Scheduler and block IO Tapset	167
probe::ioblock.end	168
probe::ioblock.request	169
probe::ioblock_trace.bounce	170
probe::ioblock_trace.end	171
probe::ioblock_trace.request	172

SystemTap	
Tapset	
Ref- erence	
Man- ual	
probe::ioscheduler.elv_add_request	173
probe::ioscheduler.elv_add_request.kp	174
probe::ioscheduler.elv_add_request.tp	175
probe::ioscheduler.elv_completed_request	176
probe::ioscheduler.elv_next_request	177
probe::ioscheduler.elv_next_request.return	178
probe::ioscheduler_trace.elv_abort_request	179
probe::ioscheduler_trace.elv_completed_request	180
probe::ioscheduler_trace.elv_issue_request	181
probe::ioscheduler_trace.elv_requeue_request	182
probe::ioscheduler_trace.plugin	183
probe::ioscheduler_trace.unplug_io	184
probe::ioscheduler_trace.unplug_timer	185
10. SCSI Tapset	186
probe::scsi.iocompleted	187
probe::scsi.iodispatching	188
probe::scsi.iodone	189
probe::scsi.ioentry	190
probe::scsi.ioexecute	191
probe::scsi.set_state	192
11. TTY Tapset	193
probe::tty.init	194
probe::tty.ioctl	195
probe::tty.open	196
probe::tty.poll	197
probe::tty.read	198
probe::tty.receive	199
probe::tty.register	200
probe::tty.release	201
probe::tty.resize	202
probe::tty.unregister	203
probe::tty.write	204
12. Interrupt Request (IRQ) Tapset	205
probe::irq_handler.entry	206
probe::irq_handler.exit	207
probe::softirq.entry	208
probe::softirq.exit	209
probe::workqueue.create	210
probe::workqueue.destroy	211
probe::workqueue.execute	212
probe::workqueue.insert	213
13. Networking Tapset	214
function::htonl	215
function::htonll	216
function::htons	217
function::ip_ntop	218
function::ntohl	219
function::ntohl1	220
function::ntohs	221
probe::netdev.change_mac	222
probe::netdev.change_mtu	223
probe::netdev.change_rx_flag	224
probe::netdev.close	225
probe::netdev.get_stats	226
probe::netdev.hard_transmit	227
probe::netdev.ioctl	228
probe::netdev.open	229
probe::netdev.receive	230

probe::netdev.register	231
probe::netdev.rx	232
probe::netdev.set_promiscuity	233
probe::netdev.transmit	234
probe::netdev.unregister	235
probe::sunrpc.clnt.bind_new_program	236
probe::sunrpc.clnt.call_async	237
probe::sunrpc.clnt.call_sync	238
probe::sunrpc.clnt.clone_client	239
probe::sunrpc.clnt.create_client	240
probe::sunrpc.clnt.restart_call	241
probe::sunrpc.clnt.shutdown_client	242
probe::sunrpc.sched.delay	243
probe::sunrpc.sched.execute	244
probe::sunrpc.sched.new_task	245
probe::sunrpc.sched.release_task	246
probe::sunrpc.svc.create	247
probe::sunrpc.svc.destroy	248
probe::sunrpc.svc.drop	249
probe::sunrpc.svc.process	250
probe::sunrpc.svc.recv	251
probe::sunrpc.svc.register	252
probe::sunrpc.svc.send	253
probe::tcp.disconnect	254
probe::tcp.disconnect.return	255
probe::tcp.receive	256
probe::tcp.recvmsg	257
probe::tcp.recvmsg.return	258
probe::tcp.sendmsg	259
probe::tcp.sendmsg.return	260
probe::tcp.setsockopt	261
probe::tcp.setsockopt.return	262
probe::udp.disconnect	263
probe::udp.disconnect.return	264
probe::udp.recvmsg	265
probe::udp.recvmsg.return	266
probe::udp.sendmsg	267
probe::udp.sendmsg.return	268
14. Socket Tapset	269
function::inet_get_ip_source	270
function::inet_get_local_port	271
function::sock_fam_num2str	272
function::sock_fam_str2num	273
function::sock_prot_num2str	274
function::sock_prot_str2num	275
function::sock_state_num2str	276
function::sock_state_str2num	277
probe::socket.aio_read	278
probe::socket.aio_read.return	279
probe::socket.aio_write	280
probe::socket.aio_write.return	281
probe::socket.close	282
probe::socket.close.return	283
probe::socket.create	284
probe::socket.create.return	285
probe::socket.readv	286
probe::socket.readv.return	287
probe::socket.receive	288

SystemTap	
Tapset	
Ref- erence	
Man- ual	
probe::socket.recvmsg	289
probe::socket.recvmsg.return	290
probe::socket.send	291
probe::socket.sendmsg	292
probe::socket.sendmsg.return	293
probe::socket.writev	294
probe::socket.writev.return	295
15. SNMP Information Tapset	296
function::ipmib_filter_key	297
function::ipmib_get_proto	298
function::ipmib_local_addr	299
function::ipmib_remote_addr	300
function::ipmib_tcp_local_port	301
function::ipmib_tcp_remote_port	302
function::linuxmib_filter_key	303
function::tcpmib_filter_key	304
function::tcpmib_get_state	305
function::tcpmib_local_addr	306
function::tcpmib_local_port	307
function::tcpmib_remote_addr	308
function::tcpmib_remote_port	309
probe::ipmib.ForwDatagrams	310
probe::ipmib.FragFails	311
probe::ipmib.FragOKs	312
probe::ipmib.InAddrErrors	313
probe::ipmib.InDiscards	314
probe::ipmib.InNoRoutes	315
probe::ipmib.InReceives	316
probe::ipmib.InUnknownProtos	317
probe::ipmib.OutRequests	318
probe::ipmib.ReasmReqds	319
probe::ipmib.ReasmTimeout	320
probe::linuxmib.DelayedACKs	321
probe::linuxmib.ListenDrops	322
probe::linuxmib.ListenOverflows	323
probe::linuxmib.TCPMemoryPressures	324
probe::tcpmib.ActiveOpens	325
probe::tcpmib.AttemptFails	326
probe::tcpmib.CurrEstab	327
probe::tcpmib.EstabResets	328
probe::tcpmib.InSegs	329
probe::tcpmib.OutRsts	330
probe::tcpmib.OutSegs	331
probe::tcpmib.PassiveOpens	332
probe::tcpmib.RetransSegs	333
16. Kernel Process Tapset	334
probe::kprocess.create	335
probe::kprocess.exec	336
probe::kprocess.exec_complete	337
probe::kprocess.exit	338
probe::kprocess.release	339
probe::kprocess.start	340
17. Signal Tapset	341
probe::signal.check_ignored	342
probe::signal.check_ignored.return	343
probe::signal.checkperm	344
probe::signal.checkperm.return	345
probe::signal.do_action	346



SystemTap	
Tapset	
Ref- erence	
Man- ual	
probe::signal.do_action.return	347
probe::signal.flush	348
probe::signal.force_segv	349
probe::signal.force_segv.return	350
probe::signal.handle	351
probe::signal.handle.return	352
probe::signal.pending	353
probe::signal.pending.return	354
probe::signal.procmask	355
probe::signal.procmask.return	356
probe::signal.send	357
probe::signal.send.return	358
probe::signal.send_sig_queue	359
probe::signal.send_sig_queue.return	360
probe::signal.sys_tgkill	361
probe::signal.sys_tgkill.return	362
probe::signal.sys_tkill	363
probe::signal.syskill	364
probe::signal.syskill.return	365
probe::signal.systkill.return	366
probe::signal.wakeup	367
18. Errno Tapset	368
function::errno_str	369
function::return_str	370
function::returnstr	371
function::returnval	372
19. Directory-entry (dentry) Tapset	373
function::d_name	374
function::d_path	375
function::inode_name	376
function::reverse_path_walk	377
function::task_dentry_path	378
20. Logging Tapset	379
function::error	380
function::exit	381
function::ftrace	382
function::log	383
function::printk	384
function::warn	385
21. Queue Statistics Tapset	386
function::qs_done	387
function::qs_run	388
function::qs_wait	389
function::qsq_blocked	390
function::qsq_print	391
function::qsq_service_time	392
function::qsq_start	393
function::qsq_throughput	394
function::qsq_utilization	395
function::qsq_wait_queue_length	396
function::qsq_wait_time	397
22. Random functions Tapset	398
function::randint	399
23. String and data retrieving functions Tapset	400
function::atomic_long_read	401
function::atomic_read	402
function::kernel_char	403
function::kernel_int	404

SystemTap	
Tapset	
Ref- erence	
Man- ual	
function::kernel_long	405
function::kernel_pointer	406
function::kernel_short	407
function::kernel_string	408
function::kernel_string2	409
function::kernel_string_n	410
function::user_char	411
function::user_char_warn	412
function::user_int	413
function::user_int16	414
function::user_int32	415
function::user_int64	416
function::user_int8	417
function::user_int_warn	418
function::user_long	419
function::user_long_warn	420
function::user_short	421
function::user_short_warn	422
function::user_string	423
function::user_string2	424
function::user_string_n	425
function::user_string_n2	426
function::user_string_n_quoted	427
function::user_string_n_warn	428
function::user_string_quoted	429
function::user_string_warn	430
function::user_uint16	431
function::user_uint32	432
function::user_uint64	433
function::user_uint8	434
function::user_ushort	435
function::user_ushort_warn	436
24. String and data writing functions Tapset	437
function::set_kernel_char	438
function::set_kernel_int	439
function::set_kernel_long	440
function::set_kernel_pointer	441
function::set_kernel_short	442
function::set_kernel_string	443
function::set_kernel_string_n	444
25. A collection of standard string functions	445
function::isdigit	446
function::isinstr	447
function::str_replace	448
function::stringat	449
function::strlen	450
function::strtol	451
function::substr	452
function::text_str	453
function::text_strn	454
function::tokenize	455
26. Utility functions for using ansi control chars in logs	456
function::ansi_clear_screen	457
function::ansi_cursor_hide	458
function::ansi_cursor_move	459
function::ansi_cursor_restore	460
function::ansi_cursor_save	461
function::ansi_cursor_show	462

SystemTap	
Tapset	
Ref- erence	
Man- ual	
function::ansi_new_line	463
function::ansi_reset_color	464
function::ansi_set_color	465
function::ansi_set_color2	466
function::ansi_set_color3	467
function::indent	468
function::thread_indent	469
27. SystemTap Translator Tapset	470
probe::stap.cache_add_mod	471
probe::stap.cache_add_nss	472
probe::stap.cache_add_src	473
probe::stap.cache_clean	474
probe::stap.cache_get	475
probe::stap.pass0	476
probe::stap.pass0.end	477
probe::stap.pass1.end	478
probe::stap.pass1a	479
probe::stap.pass1b	480
probe::stap.pass2	481
probe::stap.pass2.end	482
probe::stap.pass3	483
probe::stap.pass3.end	484
probe::stap.pass4	485
probe::stap.pass4.end	486
probe::stap.pass5	487
probe::stap.pass5.end	488
probe::stap.pass6	489
probe::stap.pass6.end	490
probe::stap.system	491
probe::stap.system.return	492
probe::stap.system.spawn	493
probe::stapio.receive_control_message	494
probe::staprun.insert_module	495
probe::staprun.remove_module	496
probe::staprun.send_control_message	497
28. Network File Storage Tapsets	498
function::nfsderror	499
probe::nfs.aop.readpage	500
probe::nfs.aop.readpages	501
probe::nfs.aop.release_page	502
probe::nfs.aop.set_page_dirty	503
probe::nfs.aop.write_begin	504
probe::nfs.aop.write_end	505
probe::nfs.aop.writepage	506
probe::nfs.aop.writepages	507
probe::nfs.fop.aio_read	508
probe::nfs.fop.aio_write	509
probe::nfs.fop.check_flags	510
probe::nfs.fop.flush	511
probe::nfs.fop.fsync	512
probe::nfs.fop.llseek	513
probe::nfs.fop.lock	514
probe::nfs.fop.mmap	515
probe::nfs.fop.open	516
probe::nfs.fop.read	517
probe::nfs.fop.release	518
probe::nfs.fop.sendfile	519
probe::nfs.fop.write	520

probe::nfs.proc.commit	521
probe::nfs.proc.commit_done	522
probe::nfs.proc.commit_setup	523
probe::nfs.proc.create	524
probe::nfs.proc.handle_exception	525
probe::nfs.proc.lookup	526
probe::nfs.proc.open	527
probe::nfs.proc.read	528
probe::nfs.proc.read_done	529
probe::nfs.proc.read_setup	530
probe::nfs.proc.release	531
probe::nfs.proc.remove	532
probe::nfs.proc.rename	533
probe::nfs.proc.write	534
probe::nfs.proc.write_done	535
probe::nfs.proc.write_setup	536
probe::nfsd.close	537
probe::nfsd.commit	538
probe::nfsd.create	539
probe::nfsd.createv3	540
probe::nfsd.dispatch	541
probe::nfsd.lookup	542
probe::nfsd.open	543
probe::nfsd.proc.commit	544
probe::nfsd.proc.create	545
probe::nfsd.proc.lookup	546
probe::nfsd.proc.read	547
probe::nfsd.proc.remove	548
probe::nfsd.proc.rename	549
probe::nfsd.proc.write	550
probe::nfsd.read	551
probe::nfsd.rename	552
probe::nfsd.unlink	553
probe::nfsd.write	554
29. Speculation	555
function::commit	556
function::discard	557
function::speculate	558
function::speculation	559

---

# Chapter 1. Introduction

SystemTap provides free software (GPL) infrastructure to simplify the gathering of information about the running Linux system. This assists diagnosis of a performance or functional problem. SystemTap eliminates the need for the developer to go through the tedious and disruptive instrument, recompile, install, and reboot sequence that may be otherwise required to collect data.

SystemTap provides a simple command line interface and scripting language for writing instrumentation for a live running kernel. The instrumentation makes extensive use of the probe points and functions provided in the *tapset* library. This document describes the various probe points and functions.

---

# Chapter 2. Context Functions

The context functions provide additional information about where an event occurred. These functions can provide information such as a backtrace to where the event occurred and the current register values for the processor.

## Name

function::addr — Address of the current probe point.

## Synopsis

```
addr:long()
```

## Arguments

None

## Description

Returns the instruction pointer from the current probe's register state. Not all probe types have registers though, in which case zero is returned. The returned address is suitable for use with functions like `symname` and `symdata`.

## Name

function::backtrace — Hex backtrace of current stack

## Synopsis

```
backtrace:string()
```

## Arguments

None

## Description

This function returns a string of hex addresses that are a backtrace of the stack. Output may be truncated as as per maximum string length (MAXSTRINGLEN).



## Name

function::caller — Return name and address of calling function

## Synopsis

```
caller:string()
```

## Arguments

None

## Description

This function returns the address and name of the calling function. This is equivalent to calling: `sprintf("s 0xx", symname(caller_addr, caller_addr))` Works only for return probes at this time.

## Name

function::caller\_addr — Return caller address

## Synopsis

```
caller_addr:long()
```

## Arguments

None

## Description

This function returns the address of the calling function. Works only for return probes at this time.

## Name

function::cmdline\_arg — Fetch a command line argument

## Synopsis

```
cmdline_arg:string(n:long)
```

## Arguments

*n*

Argument to get (zero is the command itself)

## Description

Returns argument the requested argument from the current process or the empty string when there are not that many arguments or there is a problem retrieving the argument. Argument zero is traditionally the command itself.

## Name

function::cmdline\_args — Fetch command line arguments from current process

## Synopsis

```
cmdline_args:string(n:long,m:long,delim:string)
```

## Arguments

<i>n</i>	First argument to get (zero is the command itself)
<i>m</i>	Last argument to get (or minus one for all arguments after n)
<i>delim</i>	String to use to delimit arguments when more than one.

## Description

Returns arguments from the current process starting with argument number *n*, up to argument *m*. If there are less than *n* arguments, or the arguments cannot be retrieved from the current process, the empty string is returned. If *m* is smaller than *n* then all arguments starting from argument *n* are returned. Argument zero is traditionally the command itself.

## Name

function::cmdline\_str — Fetch all command line arguments from current process

## Synopsis

```
cmdline_str:string()
```

## Arguments

None

## Description

Returns all arguments from the current process delimited by spaces. Returns the empty string when the arguments cannot be retrieved.

## Name

function::cpu — Returns the current cpu number

## Synopsis

```
cpu:long()
```

## Arguments

None

## Description

This function returns the current cpu number.

## Name

function::cpuid — Returns the current cpu number

## Synopsis

```
cpuid:long()
```

## Arguments

None

## Description

This function returns the current cpu number. Deprecated in SystemTap 1.4 and removed in SystemTap 1.5.

## Name

function::egid — Returns the effective gid of a target process

## Synopsis

```
egid:long()
```

## Arguments

None

## Description

This function returns the effective gid of a target process



## Name

function::env\_var — Fetch environment variable from current process

## Synopsis

```
env_var:string(name:string)
```

## Arguments

*name*

Name of the environment variable to fetch

## Description

Returns the contents of the specified environment value for the current process. If the variable isn't set an empty string is returned.

## Name

function::euid — Return the effective uid of a target process

## Synopsis

```
euid:long()
```

## Arguments

None

## Description

Returns the effective user ID of the target process.

## Name

function::execname — Returns the execname of a target process (or group of processes)

## Synopsis

```
execname:string()
```

## Arguments

None

## Description

Returns the execname of a target process (or group of processes).

## Name

function::gid — Returns the group ID of a target process

## Synopsis

```
gid:long()
```

## Arguments

None

## Description

This function returns the group ID of a target process.

## Name

function::is\_myproc — Determines if the current probe point has occurred in the user's own process

## Synopsis

```
is_myproc:long()
```

## Arguments

None

## Description

This function returns 1 if the current probe point has occurred in the user's own process.

## Name

function::is\_return — Whether the current probe context is a return probe

## Synopsis

```
is_return:long()
```

## Arguments

None

## Description

Returns 1 if the current probe context is a return probe, returns 0 otherwise.

## Name

function::modname — Return the kernel module name loaded at the address

## Synopsis

```
modname:string(addr:long)
```

## Arguments

*addr*

The address to map to a kernel module name

## Description

Returns the module name associated with the given address if known. If not known it will return the string “<unknown>”. If the address was not in a kernel module, but in the kernel itself, then the string “kernel” will be returned.

## Name

function::module\_name — The module name of the current script

## Synopsis

```
module_name:string()
```

## Arguments

None

## Description

This function returns the name of the stap module. Either generated randomly (stap\_[0-9a-f]+\_[0-9a-f]+) or set by stap -m <module\_name>.



## Name

function::pexecname — Returns the execname of a target process's parent process

## Synopsis

```
pexecname:string()
```

## Arguments

None

## Description

This function returns the execname of a target process's parent process.

## Name

function::pgrp — Returns the process group ID of the current process

## Synopsis

```
pgrp:long()
```

## Arguments

None

## Description

This function returns the process group ID of the current process.

## Name

function::pid — Returns the ID of a target process

## Synopsis

```
pid:long()
```

## Arguments

None

## Description

This function returns the ID of a target process.

## Name

function::pid2execname — The name of the given process identifier

## Synopsis

```
pid2execname:string(pid:long)
```

## Arguments

*pid*

process identifier

## Description

Return the name of the given process id.

## Name

function::pid2task — The task\_struct of the given process identifier

## Synopsis

```
pid2task:long(pid:long)
```

## Arguments

*pid*

process identifier

## Description

Return the task struct of the given process id.

## Name

function::pn — Returns the active probe name

## Synopsis

```
pn:string()
```

## Arguments

None

## Description

This function returns the script-level probe point associated with a currently running probe handler, including wild-card expansion effects. Context: The current probe point.

## Name

function::pp — Returns the active probe point

## Synopsis

```
pp:string()
```

## Arguments

None

## Description

This function returns the fully-resolved probe point associated with a currently running probe handler, including alias and wild-card expansion effects. Context: The current probe point.

## Name

function::ppid — Returns the process ID of a target process's parent process

## Synopsis

```
ppid:long()
```

## Arguments

None

## Description

This function return the process ID of the target proccess's parent process.



## Name

function::print\_backtrace — Print stack back trace

## Synopsis

```
print_backtrace()
```

## Arguments

None

## Description

This function is equivalent to `print_stack(backtrace)`, except that deeper stack nesting may be supported. The function does not return a value.

## Name

function::print\_regs — Print a register dump

## Synopsis

```
print_regs()
```

## Arguments

None

## Description

This function prints a register dump. Does nothing if no registers are available for the probe point.

## Name

function::print\_stack — Print out kernel stack from string

## Synopsis

```
print_stack(stk:string)
```

## Arguments

*stk*

String with list of hexadecimal addresses

## Description

This function performs a symbolic lookup of the addresses in the given `string`, which is assumed to be the result of a prior call to `backtrace`.

Print one line per address, including the address, the name of the function containing the address, and an estimate of its position within that function. Return nothing.

## Name

function::print\_ubacktrace — Print stack back trace for current task. EXPERIMENTAL!

## Synopsis

```
print_ubacktrace()
```

## Arguments

None

## Description

Equivalent to `print_ustack(ubacktrace)`, except that deeper stack nesting may be supported. Returns nothing.

## Note

To get (full) backtraces for user space applications and shared libraries not mentioned in the current script run stap with `-d /path/to/exe-or-so` and/or add `--ldd` to load all needed unwind data.

## Name

function::print\_ubacktrace\_brief — Print stack back trace for current task. EXPERIMENTAL!

## Synopsis

```
print_ubacktrace_brief()
```

## Arguments

None

## Description

Equivalent to `print_ubacktrace`, but output for each symbol is shorter (just name and offset, or just the hex address of no symbol could be found).

## Note

To get (full) backtraces for user space applications and shared libraries not mentioned in the current script run `stap` with `-d /path/to/exe-or-so` and/or add `--ldd` to load all needed unwind data.

## Name

function::print\_ustack — Print out stack for the current task from string. EXPERIMENTAL!

## Synopsis

```
print_ustack(stk:string)
```

## Arguments

*stk*

String with list of hexadecimal addresses for the current task.

## Description

Perform a symbolic lookup of the addresses in the given string, which is assumed to be the result of a prior call to `ubacktrace` for the current task.

Print one line per address, including the address, the name of the function containing the address, and an estimate of its position within that function. Return nothing.

## Name

function::probe\_type — The low level probe handler type of the current probe.

## Synopsis

```
probe_type:string()
```

## Arguments

None

## Description

Returns a short string describing the low level probe handler type for the current probe point. This is for informational purposes only. Depending on the low level probe handler different context functions can or cannot provide information about the current event (for example some probe handlers only trigger in user space and have no associated kernel context). High-level probes might map to the same or different low-level probes (depending on systemtap version and/or kernel used).

## Name

function::probefunc — Return the probe point's function name, if known

## Synopsis

```
probefunc:string()
```

## Arguments

None

## Description

This function returns the name of the function being probed. It will do this based on the probe point string as returned by `pp`.

## Please note

this function is deprecated, please use `symname` and/or `usymname`. This function might return a function name based on the current address if the probe point context couldn't be parsed.



## Name

function::probemod — Return the probe point's kernel module name

## Synopsis

```
probemod:string()
```

## Arguments

None

## Description

This function returns the name of the kernel module containing the probe point, if known.

## Name

function::pstrace — Chain of processes and pids back to init(1)

## Synopsis

```
pstrace:string(task:long)
```

## Arguments

*task*

Pointer to task struct of process

## Description

This function returns a string listing execname and pid for each process starting from *task* back to the process ancestor that init(1) spawned.

## Name

function::registers\_valid — Determines validity of `register` and `u_register` in current context

## Synopsis

```
registers_valid:long()
```

## Arguments

None

## Description

This function returns 1 if `register` and `u_register` can be used in the current context, or 0 otherwise. For example, `registers_valid` returns 0 when called from a `begin` or `end` probe.

## Name

function::remote\_id — The index of this instance in a remote execution.

## Synopsis

```
remote_id:long()
```

## Arguments

None

## Description

This function returns a number 0..N, which is the unique index of this particular script execution from a swarm of “stap --remote A --remote B ...” runs, and is the same number “stap --remote-prefix” would print. The function returns -1 if the script was not launched with “stap --remote”, or if the remote staprun/stapsh are older than version 1.7.

## Name

function::remote\_uri — The name of this instance in a remote execution.

## Synopsis

```
remote_uri:string()
```

## Arguments

None

## Description

This function returns the remote host used to invoke this particular script execution from a swarm of “stap --remote” runs. It may not be unique among the swarm. The function returns an empty string if the script was not launched with “stap --remote”.

## Name

function::sid — Returns the session ID of the current process

## Synopsis

```
sid:long()
```

## Arguments

None

## Description

The session ID of a process is the process group ID of the session leader. Session ID is stored in the `signal_struct` since Kernel 2.6.0.

## Name

function::sprint\_backtrace — Return stack back trace as string (EXPERIMENTAL)

## Synopsis

```
sprint_backtrace:string()
```

## Arguments

None

## Description

Returns a simple (kernel) backtrace. One line per address. Includes the symbol name (or hex address if symbol couldn't be resolved) and module name (if found). Includes the offset from the start of the function if found, otherwise the offset will be added to the module (if found, between brackets). Returns the backtrace as string (each line terminated by a newline character). Note that the returned stack will be truncated to MAXSTRINGLEN, to print fuller and richer stacks use `print_backtrace`. Equivalent to `sprint_stack(backtrace)`, but more efficient (no need to translate between hex strings and final backtrace string).

## Name

function::sprint\_stack — Return stack for kernel addresses from string (EXPERIMENTAL)

## Synopsis

```
sprint_stack:string(stk:string)
```

## Arguments

*stk*

String with list of hexadecimal (kernel) addresses

## Description

Perform a symbolic lookup of the addresses in the given string, which is assumed to be the result of a prior call to `backtrace`.

Returns a simple backtrace from the given hex string. One line per address. Includes the symbol name (or hex address if symbol couldn't be resolved) and module name (if found). Includes the offset from the start of the function if found, otherwise the offset will be added to the module (if found, between brackets). Returns the backtrace as string (each line terminated by a newline character). Note that the returned stack will be truncated to `MAXSTRINGLEN`, to print fuller and richer stacks use `print_stack`.



## Name

function::sprint\_ubacktrace — Return stack back trace for current task as string. EXPERIMENTAL!

## Synopsis

```
sprint_ubacktrace:string()
```

## Arguments

None

## Description

Returns a simple backtrace for the current task. One line per address. Includes the symbol name (or hex address if symbol couldn't be resolved) and module name (if found). Includes the offset from the start of the function if found, otherwise the offset will be added to the module (if found, between brackets). Returns the backtrace as string (each line terminated by a newline character). Note that the returned stack will be truncated to MAXSTRINGLEN, to print fuller and richer stacks use `print_ubacktrace`. Equivalent to `sprint_ustack(ubacktrace)`, but more efficient (no need to translate between hex strings and final backtrace string).

## Note

To get (full) backtraces for user space applications and shared libraries not mentioned in the current script run stap with `-d /path/to/exe-or-so` and/or add `--ldd` to load all needed unwind data.

## Name

function::sprint\_ustack — Return stack for the current task from string. EXPERIMENTAL!

## Synopsis

```
sprint_ustack:string(stk:string)
```

## Arguments

*stk*

String with list of hexadecimal addresses for the current task.

## Description

Perform a symbolic lookup of the addresses in the given string, which is assumed to be the result of a prior call to `ubacktrace` for the current task.

Returns a simple backtrace from the given hex string. One line per address. Includes the symbol name (or hex address if symbol couldn't be resolved) and module name (if found). Includes the offset from the start of the function if found, otherwise the offset will be added to the module (if found, between brackets). Returns the backtrace as string (each line terminated by a newline character). Note that the returned stack will be truncated to `MAXSTRINGLEN`, to print fuller and richer stacks use `print_ustack`.

## Name

`function::stack_size` — Return the size of the kernel stack

## Synopsis

```
stack_size:long()
```

## Arguments

None

## Description

This function returns the size of the kernel stack.

## Name

`function::stack_unused` — Returns the amount of kernel stack currently available

## Synopsis

```
stack_unused:long()
```

## Arguments

None

## Description

This function determines how many bytes are currently available in the kernel stack.

## Name

function::stack\_used — Returns the amount of kernel stack used

## Synopsis

```
stack_used:long()
```

## Arguments

None

## Description

This function determines how many bytes are currently used in the kernel stack.

## Name

function::stp\_pid — The process id of the stapio process

## Synopsis

```
stp_pid:long()
```

## Arguments

None

## Description

This function returns the process id of the stapio process that launched this script. There could be other SystemTap scripts and stapio processes running on the system.

## Name

function::symdata — Return the kernel symbol and module offset for the address

## Synopsis

```
symdata:string(addr:long)
```

## Arguments

*addr*

The address to translate

## Description

Returns the (function) symbol name associated with the given address if known, the offset from the start and size of the symbol, plus module name (between brackets). If symbol is unknown, but module is known, the offset inside the module, plus the size of the module is added. If any element is not known it will be omitted and if the symbol name is unknown it will return the hex string for the given address.

## Name

`function::symname` — Return the kernel symbol associated with the given address

## Synopsis

```
symname:string(addr:long)
```

## Arguments

*addr*

The address to translate

## Description

Returns the (function) symbol name associated with the given address if known. If not known it will return the hex string representation of `addr`.



## Name

function::target — Return the process ID of the target process

## Synopsis

```
target:long()
```

## Arguments

None

## Description

This function returns the process ID of the target process. This is useful in conjunction with the -x PID or -c CMD command-line options to stap. An example of its use is to create scripts that filter on a specific process.

-x <pid> target returns the pid specified by -x

-c <command> target returns the pid for the executed command specified by -c

## Name

function::task\_backtrace — Hex backtrace of an arbitrary task

## Synopsis

```
task_backtrace:string(task:long)
```

## Arguments

*task*

pointer to task\_struct

## Description

This function returns a string of hex addresses that are a backtrace of the stack of a particular task. Output may be truncated as per maximum string length. Deprecated in SystemTap 1.6.

## Name

function::task\_cpu — The scheduled cpu of the task

## Synopsis

```
task_cpu:long(task:long)
```

## Arguments

*task*

task\_struct pointer

## Description

This function returns the scheduled cpu for the given task.

## Name

function::task\_current — The current task\_struct of the current task

## Synopsis

```
task_current:long()
```

## Arguments

None

## Description

This function returns the task\_struct representing the current process. This address can be passed to the various task\_\*( ) functions to extract more task-specific data.

## Name

function::task\_egid — The effective group identifier of the task

## Synopsis

```
task_egid:long(task:long)
```

## Arguments

*task*

task\_struct pointer

## Description

This function returns the effective group id of the given task.

## Name

function::task\_euid — The effective user identifier of the task

## Synopsis

```
task_euid:long(task:long)
```

## Arguments

*task*

task\_struct pointer

## Description

This function returns the effective user id of the given task.

## Name

function::task\_execname — The name of the task

## Synopsis

```
task_execname:string(task:long)
```

## Arguments

*task*

task\_struct pointer

## Description

Return the name of the given task.

## Name

function::task\_gid — The group identifier of the task

## Synopsis

```
task_gid:long(task:long)
```

## Arguments

*task*

task\_struct pointer

## Description

This function returns the group id of the given task.



## Name

function::task\_max\_file\_handles — The max number of open files for the task

## Synopsis

```
task_max_file_handles:long(task:long)
```

## Arguments

*task*

task\_struct pointer

## Description

This function returns the maximum number of file handlers for the given task.

## Name

function::task\_nice — The nice value of the task

## Synopsis

```
task_nice:long(task:long)
```

## Arguments

*task*

task\_struct pointer

## Description

This function returns the nice value of the given task.

## Name

function::task\_open\_file\_handles — The number of open files of the task

## Synopsis

```
task_open_file_handles:long(task:long)
```

## Arguments

*task*

task\_struct pointer

## Description

This function returns the number of open file handlers for the given task.

## Name

function::task\_parent — The task\_struct of the parent task

## Synopsis

```
task_parent:long(task:long)
```

## Arguments

*task*

task\_struct pointer

## Description

This function returns the parent task\_struct of the given task. This address can be passed to the various task\_\*( ) functions to extract more task-specific data.

## Name

function::task\_pid — The process identifier of the task

## Synopsis

```
task_pid:long(task:long)
```

## Arguments

*task*

task\_struct pointer

## Description

This fuction returns the process id of the given task.

## Name

function::task\_prio — The priority value of the task

## Synopsis

```
task_prio:long(task:long)
```

## Arguments

*task*

task\_struct pointer

## Description

This function returns the priority value of the given task.

## Name

function::task\_state — The state of the task

## Synopsis

```
task_state:long(task:long)
```

## Arguments

*task*

task\_struct pointer

## Description

Return the state of the given task, one of: TASK\_RUNNING (0), TASK\_INTERRUPTIBLE (1), TASK\_UNINTERRUPTIBLE (2), TASK\_STOPPED (4), TASK\_TRACED (8), EXIT\_ZOMBIE (16), or EXIT\_DEAD (32).

## Name

function::task\_tid — The thread identifier of the task

## Synopsis

```
task_tid:long(task:long)
```

## Arguments

*task*

task\_struct pointer

## Description

This function returns the thread id of the given task.



## Name

function::task\_uid — The user identifier of the task

## Synopsis

```
task_uid:long(task:long)
```

## Arguments

*task*

task\_struct pointer

## Description

This function returns the user id of the given task.

## Name

function::tid — Returns the thread ID of a target process

## Synopsis

```
tid:long()
```

## Arguments

None

## Description

This function returns the thread ID of the target process.

## Name

function::uaddr — User space address of current running task (EXPERIMENTAL)

## Synopsis

```
uaddr:long()
```

## Arguments

None

## Description

Returns the address in userspace that the current task was at when the probe occurred. When the current running task isn't a user space thread, or the address cannot be found, zero is returned. Can be used to see where the current task is combined with `usymname` or `usymdata`. Often the task will be in the VDSO where it entered the kernel.

## Name

function::ubacktrace — Hex backtrace of current task stack. EXPERIMENTAL!

## Synopsis

```
ubacktrace:string()
```

## Arguments

None

## Description

Return a string of hex addresses that are a backtrace of the stack of the current task. Output may be truncated as per maximum string length. Returns empty string when current probe point cannot determine user backtrace.

## Note

To get (full) backtraces for user space applications and shared shared libraries not mentioned in the current script run stap with `-d /path/to/exe-or-so` and/or add `--ldd` to load all needed unwind data.

## Name

function::uid — Returns the user ID of a target process

## Synopsis

```
uid:long()
```

## Arguments

None

## Description

This function returns the user ID of the target process.

## Name

function::umodname — Returns the (short) name of the user module. EXPERIMENTAL!

## Synopsis

```
umodname:string(addr:long)
```

## Arguments

*addr*

User-space address

## Description

Returns the short name of the user space module for the current task that that the given address is part of. Returns “<unknown>” when the address isn’t in a (mapped in) module, or the module cannot be found for some reason.

## Name

function::user\_mode — Determines if probe point occurs in user-mode

## Synopsis

```
user_mode:long()
```

## Arguments

None

## Description

Return 1 if the probe point occurred in user-mode.

## Name

function::usymdata — Return the symbol and module offset of an address. EXPERIMENTAL!

## Synopsis

```
usymdata:string(addr:long)
```

## Arguments

*addr*

The address to translate.

## Description

Returns the (function) symbol name associated with the given address in the current task if known, the offset from the start and the size of the symbol, plus the module name (between brackets). If symbol is unknown, but module is known, the offset inside the module, plus the size of the module is added. If any element is not known it will be omitted and if the symbol name is unknown it will return the hex string for the given address.



## Name

function::usymname — Return the symbol of an address in the current task. EXPERIMENTAL!

## Synopsis

```
usymname:string(addr:long)
```

## Arguments

*addr*

The address to translate.

## Description

Returns the (function) symbol name associated with the given address if known. If not known it will return the hex string representation of *addr*.

---

# Chapter 3. Timestamp Functions

Each timestamp function returns a value to indicate when a function is executed. These returned values can then be used to indicate when an event occurred, provide an ordering for events, or compute the amount of time elapsed between two time stamps.

## Name

function::HZ — Kernel HZ

## Synopsis

```
HZ:long()
```

## Arguments

None

## Description

This function returns the value of the kernel HZ macro, which corresponds to the rate of increase of the jiffies value.

## Name

function::cpu\_clock\_ms — Number of milliseconds on the given cpu's clock

## Synopsis

```
cpu_clock_ms:long(cpu:long)
```

## Arguments

*cpu*

Which processor's clock to read

## Description

This function returns the number of milliseconds on the given cpu's clock. This is always monotonic comparing on the same cpu, but may have some drift between cpus (within about a jiffy).

## Name

function::cpu\_clock\_ns — Number of nanoseconds on the given cpu's clock

## Synopsis

```
cpu_clock_ns:long(cpu:long)
```

## Arguments

*cpu*

Which processor's clock to read

## Description

This function returns the number of nanoseconds on the given cpu's clock. This is always monotonic comparing on the same cpu, but may have some drift between cpus (within about a jiffy).

## Name

function::cpu\_clock\_s — Number of seconds on the given cpu's clock

## Synopsis

```
cpu_clock_s:long (cpu:long)
```

## Arguments

*cpu*

Which processor's clock to read

## Description

This function returns the number of seconds on the given cpu's clock. This is always monotonic comparing on the same cpu, but may have some drift between cpus (within about a jiffy).

## Name

function::cpu\_clock\_us — Number of microseconds on the given cpu's clock

## Synopsis

```
cpu_clock_us:long(cpu:long)
```

## Arguments

*cpu*

Which processor's clock to read

## Description

This function returns the number of microseconds on the given cpu's clock. This is always monotonic comparing on the same cpu, but may have some drift between cpus (within about a jiffy).

## Name

function::delete\_stopwatch — Remove an existing stopwatch

## Synopsis

```
delete_stopwatch (name:string)
```

## Arguments

*name*

the stopwatch name

## Description

Remove stopwatch *name*.



## Name

function::get\_cycles — Processor cycle count

## Synopsis

```
get_cycles:long()
```

## Arguments

None

## Description

This function returns the processor cycle counter value if available, else it returns zero. The cycle counter is free running and unsynchronized on each processor. Thus, the order of events cannot be determined by comparing the results of the `get_cycles` function on different processors.

## Name

function::gettimeofday\_ms — Number of milliseconds since UNIX epoch

## Synopsis

```
gettimeofday_ms:long()
```

## Arguments

None

## Description

This function returns the number of milliseconds since the UNIX epoch.

## Name

function::gettimeofday\_ns — Number of nanoseconds since UNIX epoch

## Synopsis

```
gettimeofday_ns:long()
```

## Arguments

None

## Description

This function returns the number of nanoseconds since the UNIX epoch.

## Name

function::gettimeofday\_s — Number of seconds since UNIX epoch

## Synopsis

```
gettimeofday_s:long()
```

## Arguments

None

## Description

This function returns the number of seconds since the UNIX epoch.

## Name

function::gettimeofday\_us — Number of microseconds since UNIX epoch

## Synopsis

```
gettimeofday_us:long()
```

## Arguments

None

## Description

This function returns the number of microseconds since the UNIX epoch.

## Name

function::jiffies — Kernel jiffies count

## Synopsis

```
jiffies:long()
```

## Arguments

None

## Description

This function returns the value of the kernel `jiffies` variable. This value is incremented periodically by timer interrupts, and may wrap around a 32-bit or 64-bit boundary. See `HZ`.

## Name

function::local\_clock\_ms — Number of milliseconds on the local cpu's clock

## Synopsis

```
local_clock_ms:long()
```

## Arguments

None

## Description

This function returns the number of milliseconds on the local cpu's clock. This is always monotonic comparing on the same cpu, but may have some drift between cpus (within about a jiffy).

## Name

function::local\_clock\_ns — Number of nanoseconds on the local cpu's clock

## Synopsis

```
local_clock_ns:long()
```

## Arguments

None

## Description

This function returns the number of nanoseconds on the local cpu's clock. This is always monotonic comparing on the same cpu, but may have some drift between cpus (within about a jiffy).



## Name

function::local\_clock\_s — Number of seconds on the local cpu's clock

## Synopsis

```
local_clock_s:long()
```

## Arguments

None

## Description

This function returns the number of seconds on the local cpu's clock. This is always monotonic comparing on the same cpu, but may have some drift between cpus (within about a jiffy).

## Name

function::local\_clock\_us — Number of microseconds on the local cpu's clock

## Synopsis

```
local_clock_us:long()
```

## Arguments

None

## Description

This function returns the number of microseconds on the local cpu's clock. This is always monotonic comparing on the same cpu, but may have some drift between cpus (within about a jiffy).

## Name

function::read\_stopwatch\_ms — Reads the time in milliseconds for a stopwatch

## Synopsis

```
read_stopwatch_ms:long (name:string)
```

## Arguments

*name*

stopwatch name

## Description

Returns time in milliseconds for stopwatch *name*. Creates stopwatch *name* if it does not currently exist.

## Name

function::read\_stopwatch\_ns — Reads the time in nanoseconds for a stopwatch

## Synopsis

```
read_stopwatch_ns:long (name:string)
```

## Arguments

*name*

stopwatch name

## Description

Returns time in nanoseconds for stopwatch *name*. Creates stopwatch *name* if it does not currently exist.

## Name

function::read\_stopwatch\_s — Reads the time in seconds for a stopwatch

## Synopsis

```
read_stopwatch_s:long (name:string)
```

## Arguments

*name*

stopwatch name

## Description

Returns time in seconds for stopwatch *name*. Creates stopwatch *name* if it does not currently exist.

## Name

function::read\_stopwatch\_us — Reads the time in microseconds for a stopwatch

## Synopsis

```
read_stopwatch_us:long (name:string)
```

## Arguments

*name*

stopwatch name

## Description

Returns time in microseconds for stopwatch *name*. Creates stopwatch *name* if it does not currently exist.

## Name

function::start\_stopwatch — Start a stopwatch

## Synopsis

```
start_stopwatch (name:string)
```

## Arguments

*name*

the stopwatch name

## Description

Start stopwatch *name*. Creates stopwatch *name* if it does not currently exist.

## Name

function::stop\_stopwatch — Stop a stopwatch

## Synopsis

```
stop_stopwatch(name:string)
```

## Arguments

*name*

the stopwatch name

## Description

Stop stopwatch *name*. Creates stopwatch *name* if it does not currently exist.



---

# Chapter 4. Time utility functions

Utility functions to turn seconds since the epoch (as returned by the timestamp function `gettimeofday_s()`) into a human readable date/time strings.

## Name

function::ctime — Convert seconds since epoch into human readable date/time string

## Synopsis

```
ctime:string(epochsecs:long)
```

## Arguments

*epochsecs*

Number of seconds since epoch (as returned by `gettimeofday_s`)

## Description

Takes an argument of seconds since the epoch as returned by `gettimeofday_s`. Returns a string of the form

“Wed Jun 30 21:49:08 1993”

The string will always be exactly 24 characters. If the time would be unreasonable far in the past (before what can be represented with a 32 bit offset in seconds from the epoch) the returned string will be “a long, long time ago...”. If the time would be unreasonable far in the future the returned string will be “far far in the future...” (both these strings are also 24 characters wide).

Note that the epoch (zero) corresponds to

“Thu Jan 1 00:00:00 1970”

The earliest full date given by `ctime`, corresponding to `epochsecs -2147483648` is “Fri Dec 13 20:45:52 1901”. The latest full date given by `ctime`, corresponding to `epochsecs 2147483647` is “Tue Jan 19 03:14:07 2038”.

The abbreviations for the days of the week are ‘Sun’, ‘Mon’, ‘Tue’, ‘Wed’, ‘Thu’, ‘Fri’, and ‘Sat’. The abbreviations for the months are ‘Jan’, ‘Feb’, ‘Mar’, ‘Apr’, ‘May’, ‘Jun’, ‘Jul’, ‘Aug’, ‘Sep’, ‘Oct’, ‘Nov’, and ‘Dec’.

Note that the real C library `ctime` function puts a newline (‘\n’) character at the end of the string that this function does not. Also note that since the kernel has no concept of timezones, the returned time is always in GMT.

## Name

function::tz\_ctime — Convert seconds since epoch into human readable date/time string, with local time zone

## Synopsis

```
tz_ctime(epochsecs:)
```

## Arguments

*epochsecs*

number of seconds since epoch (as returned by  
`gettimeofday_s`)

## Description

Takes an argument of seconds since the epoch as returned by `gettimeofday_s`. Returns a string of the same form as `ctime`, but offsets the epoch time for the local time zone, and appends the name of the local time zone. The string length may vary. The time zone information is passed by `staprun` at script startup only.

## Name

function::tz\_gmtoff — Return local time zone offset

## Synopsis

```
tz_gmtoff()
```

## Arguments

None

## Description

Returns the local time zone offset (seconds west of UTC), as passed by staprun at script startup only.

## Name

function::tz\_name — Return local time zone name

## Synopsis

```
tz_name()
```

## Arguments

None

## Description

Returns the local time zone name, as passed by staprun at script startup only.

---

# Chapter 5. Shell command functions

Utility functions to enqueue shell commands.

## Name

function::system — Issue a command to the system

## Synopsis

```
system(cmd:string)
```

## Arguments

*cmd*

the command to issue to the system

## Description

This function runs a command on the system. The command is started in the background some time after the current probe completes. The command is run with the same UID as the user running the stap or staprun command.

---

# Chapter 6. Memory Tapset

This family of probe points is used to probe memory-related events or query the memory usage of the current process. It contains the following probe points:



## Name

function::addr\_to\_node — Returns which node a given address belongs to within a NUMA system

## Synopsis

```
addr_to_node:long(addr:long)
```

## Arguments

*addr*

the address of the faulting memory access

## Description

This function accepts an address, and returns the node that the given address belongs to in a NUMA system.

## Name

function::bytes\_to\_string — Human readable string for given bytes

## Synopsis

```
bytes_to_string:string(bytes:long)
```

## Arguments

*bytes*

Number of bytes to translate.

## Description

Returns a string representing the number of bytes (up to 1024 bytes), the number of kilobytes (when less than 1024K) postfixed by 'K', the number of megabytes (when less than 1024M) postfixed by 'M' or the number of gigabytes postfixed by 'G'. If representing K, M or G, and the number is amount is less than 100, it includes a '.' plus the remainder. The returned string will be 5 characters wide (padding with whitespace at the front) unless negative or representing more than 9999G bytes.

## Name

function::mem\_page\_size — Number of bytes in a page for this architecture

## Synopsis

```
mem_page_size:long()
```

## Arguments

None

## Name

function::pages\_to\_string — Turns pages into a human readable string

## Synopsis

```
pages_to_string:string(pages:long)
```

## Arguments

<i>pages</i>	Number of pages to translate.
--------------	-------------------------------

## Description

Multiplies pages by `page_size` to get the number of bytes and returns the result of `bytes_to_string`.

## Name

function::proc\_mem\_data — Program data size (data + stack) in pages

## Synopsis

```
proc_mem_data:long()
```

## Arguments

None

## Description

Returns the current process data size (data + stack) in pages, or zero when there is no current process or the number of pages couldn't be retrieved.

## Name

function::proc\_mem\_data\_pid — Program data size (data + stack) in pages

## Synopsis

```
proc_mem_data_pid:long(pid:long)
```

## Arguments

*pid*

The pid of process to examine

## Description

Returns the given process data size (data + stack) in pages, or zero when the process doesn't exist or the number of pages couldn't be retrieved.

## Name

function::proc\_mem\_rss — Program resident set size in pages

## Synopsis

```
proc_mem_rss:long()
```

## Arguments

None

## Description

Returns the resident set size in pages of the current process, or zero when there is no current process or the number of pages couldn't be retrieved.

## Name

function::proc\_mem\_rss\_pid — Program resident set size in pages

## Synopsis

```
proc_mem_rss_pid:long(pid:long)
```

## Arguments

*pid*

The pid of process to examine

## Description

Returns the resident set size in pages of the given process, or zero when the process doesn't exist or the number of pages couldn't be retrieved.



## Name

function::proc\_mem\_shr — Program shared pages (from shared mappings)

## Synopsis

```
proc_mem_shr:long()
```

## Arguments

None

## Description

Returns the shared pages (from shared mappings) of the current process, or zero when there is no current process or the number of pages couldn't be retrieved.

## Name

function::proc\_mem\_shr\_pid — Program shared pages (from shared mappings)

## Synopsis

```
proc_mem_shr_pid:long(pid:long)
```

## Arguments

*pid*

The pid of process to examine

## Description

Returns the shared pages (from shared mappings) of the given process, or zero when the process doesn't exist or the number of pages couldn't be retrieved.

## Name

function::proc\_mem\_size — Total program virtual memory size in pages

## Synopsis

```
proc_mem_size:long()
```

## Arguments

None

## Description

Returns the total virtual memory size in pages of the current process, or zero when there is no current process or the number of pages couldn't be retrieved.

## Name

function::proc\_mem\_size\_pid — Total program virtual memory size in pages

## Synopsis

```
proc_mem_size_pid:long(pid:long)
```

## Arguments

*pid*

The pid of process to examine

## Description

Returns the total virtual memory size in pages of the given process, or zero when that process doesn't exist or the number of pages couldn't be retrieved.

## Name

function::proc\_mem\_string — Human readable string of current proc memory usage

## Synopsis

```
proc_mem_string:string()
```

## Arguments

None

## Description

Returns a human readable string showing the size, rss, shr, txt and data of the memory used by the current process. For example “size: 301m, rss: 11m, shr: 8m, txt: 52k, data: 2248k”.

## Name

function::proc\_mem\_string\_pid — Human readable string of process memory usage

## Synopsis

```
proc_mem_string_pid:string(pid:long)
```

## Arguments

*pid*

The pid of process to examine

## Description

Returns a human readable string showing the size, rss, shr, txt and data of the memory used by the given process. For example “size: 301m, rss: 11m, shr: 8m, txt: 52k, data: 2248k”.

## Name

function::proc\_mem\_txt — Program text (code) size in pages

## Synopsis

```
proc_mem_txt:long()
```

## Arguments

None

## Description

Returns the current process text (code) size in pages, or zero when there is no current process or the number of pages couldn't be retrieved.

## Name

function::proc\_mem\_txt\_pid — Program text (code) size in pages

## Synopsis

```
proc_mem_txt_pid:long(pid:long)
```

## Arguments

*pid*

The pid of process to examine

## Description

Returns the given process text (code) size in pages, or zero when the process doesn't exist or the number of pages couldn't be retrieved.



## Name

function::vm\_fault\_contains — Test return value for page fault reason

## Synopsis

```
vm_fault_contains:long (value:long, test:long)
```

## Arguments

*value*

the `fault_type` returned by `vm.page_fault.return`

*test*

the type of fault to test for (VM\_FAULT\_OOM or similar)

## Name

probe::vm.brk — Fires when a brk is requested (i.e. the heap will be resized)

## Synopsis

vm.brk

## Values

<i>length</i>	the length of the memory segment
<i>name</i>	name of the probe point
<i>address</i>	the requested address

## Context

The process calling brk.

## Name

probe::vm.kfree — Fires when kfree is requested

## Synopsis

```
vm.kfree
```

## Values

*ptr*

pointer to the kmemory allocated which is returned by kmalloc

*caller\_function*

name of the caller function.

*call\_site*

address of the function calling this kmemory function

*name*

name of the probe point

## Name

probe::vm.kmalloc — Fires when kmalloc is requested

## Synopsis

```
vm.kmalloc
```

## Values

<i>ptr</i>	pointer to the kmemory allocated
<i>caller_function</i>	name of the caller function
<i>call_site</i>	address of the kmemory function
<i>gfp_flag_name</i>	type of kmemory to allocate (in String format)
<i>name</i>	name of the probe point
<i>bytes_req</i>	requested Bytes
<i>bytes_alloc</i>	allocated Bytes
<i>gfp_flags</i>	type of kmemory to allocate

## Name

probe::vm.kmalloc\_node — Fires when kmalloc\_node is requested

## Synopsis

vm.kmalloc\_node

## Values

<i>ptr</i>	pointer to the kmemory allocated
<i>caller_function</i>	name of the caller function
<i>call_site</i>	address of the function caling this kmemory function
<i>gfp_flag_name</i>	type of kmemory to allocate(in string format)
<i>name</i>	name of the probe point
<i>bytes_req</i>	requested Bytes
<i>bytes_alloc</i>	allocated Bytes
<i>gfp_flags</i>	type of kmemory to allocate

## Name

probe::vm.kmem\_cache\_alloc — Fires when kmem\_cache\_alloc is requested

## Synopsis

```
vm.kmem_cache_alloc
```

## Values

<i>ptr</i>	pointer to the kmemory allocated
<i>caller_function</i>	name of the caller function.
<i>call_site</i>	address of the function calling this kmemory function.
<i>gfp_flag_name</i>	type of kmemory to allocate(in string format)
<i>name</i>	name of the probe point
<i>bytes_req</i>	requested Bytes
<i>bytes_alloc</i>	allocated Bytes
<i>gfp_flags</i>	type of kmemory to allocate

## Name

probe::vm.kmem\_cache\_alloc\_node — Fires when kmem\_cache\_alloc\_node is requested

## Synopsis

vm.kmem\_cache\_alloc\_node

## Values

<i>ptr</i>	pointer to the kmemory allocated
<i>caller_function</i>	name of the caller function
<i>call_site</i>	address of the function calling this kmemory function
<i>gfp_flag_name</i>	type of kmemory to allocate(in string format)
<i>name</i>	name of the probe point
<i>bytes_req</i>	requested Bytes
<i>bytes_alloc</i>	allocated Bytes
<i>gfp_flags</i>	type of kmemory to allocate

## Name

probe::vm.kmem\_cache\_free — Fires when kmem\_cache\_free is requested

## Synopsis

```
vm.kmem_cache_free
```

## Values

<i>ptr</i>	Pointer to the kmemory allocated which is returned by kmem_cache
<i>caller_function</i>	Name of the caller function.
<i>call_site</i>	Address of the function calling this kmemory function
<i>name</i>	Name of the probe point



## Name

probe::vm.mmap — Fires when an mmap is requested

## Synopsis

`vm.mmap`

## Values

<i>length</i>	the length of the memory segment
<i>name</i>	name of the probe point
<i>address</i>	the requested address

## Context

The process calling mmap.

## Name

probe::vm.munmap — Fires when an munmap is requested

## Synopsis

vm.munmap

## Values

<i>length</i>	the length of the memory segment
<i>name</i>	name of the probe point
<i>address</i>	the requested address

## Context

The process calling munmap.

## Name

probe::vm.oom\_kill — Fires when a thread is selected for termination by the OOM killer

## Synopsis

```
vm.oom_kill
```

## Values

*name*

name of the probe point

*task*

the task being killed

## Context

The process that tried to consume excessive memory, and thus triggered the OOM.

## Name

probe::vm.pagefault — Records that a page fault occurred

## Synopsis

vm.pagefault

## Values

*write\_access*

indicates whether this was a write or read access; 1 indicates a write, while 0 indicates a read

*name*

name of the probe point

*address*

the address of the faulting memory access; i.e. the address that caused the page fault

## Context

The process which triggered the fault

## Name

probe::vm.pagefault.return — Indicates what type of fault occurred

## Synopsis

```
vm.pagefault.return
```

## Values

*name*

name of the probe point

*fault\_type*

returns either 0 (VM\_FAULT\_OOM) for out of memory faults, 2 (VM\_FAULT\_MINOR) for minor faults, 3 (VM\_FAULT\_MAJOR) for major faults, or 1 (VM\_FAULT\_SIGBUS) if the fault was neither OOM, minor fault, nor major fault.

## Name

probe::vm.write\_shared — Attempts at writing to a shared page

## Synopsis

vm.write\_shared

## Values

*name*

name of the probe point

*address*

the address of the shared write

## Context

The context is the process attempting the write.

## Description

Fires when a process attempts to write to a shared page. If a copy is necessary, this will be followed by a vm.write\_shared\_copy.

## Name

probe::vm.write\_shared\_copy — Page copy for shared page write

## Synopsis

```
vm.write_shared_copy
```

## Values

<i>name</i>	Name of the probe point
<i>zero</i>	boolean indicating whether it is a zero page (can do a clear instead of a copy)
<i>address</i>	The address of the shared write

## Context

The process attempting the write.

## Description

Fires when a write to a shared page requires a page copy. This is always preceded by a vm.shared\_write.

---

# Chapter 7. Task Time Tapset

This tapset defines utility functions to query time related properties of the current tasks, translate those in milliseconds and human readable strings.



## Name

function::cputime\_to\_msecs — Translates the given cputime into milliseconds

## Synopsis

```
cputime_to_msecs:long(cputime:long)
```

## Arguments

*cputime*

Time to convert to milliseconds.

## Name

function::cputime\_to\_string — Human readable string for given cputime

## Synopsis

```
cputime_to_string:string(cputime:long)
```

## Arguments

*cputime*

Time to translate.

## Description

Equivalent to calling: msec\_to\_string (cputime\_to\_msecs (cputime)).

## Name

function::msecs\_to\_string — Human readable string for given milliseconds

## Synopsis

```
msecs_to_string:string(msecs:long)
```

## Arguments

*msecs*

Number of milliseconds to translate.

## Description

Returns a string representing the number of milliseconds as a human readable string consisting of “XmY.ZZZs”, where X is the number of minutes, Y is the number of seconds and ZZZ is the number of milliseconds.

## Name

function::task\_time — System time of the current task

## Synopsis

```
task_time:long()
```

## Arguments

None

## Description

Returns the system time of the current task in cputime. Does not include any time used by other tasks in this process, nor does it include any time of the children of this task.

## Name

function::task\_time\_tid — System time of the given task

## Synopsis

```
task_time_tid:long (tid:long)
```

## Arguments

*tid*

Thread id of the given task

## Description

Returns the system time of the given task in cputime, or zero if the task doesn't exist. Does not include any time used by other tasks in this process, nor does it include any time of the children of this task.

## Name

function::task\_time\_string — Human readable string of task time usage

## Synopsis

```
task_time_string:string()
```

## Arguments

None

## Description

Returns a human readable string showing the user and system time the current task has used up to now. For example “usr: 0m12.908s, sys: 1m6.851s”.

## Name

function::task\_time\_string\_tid — Human readable string of task time usage

## Synopsis

```
task_time_string_tid:string(tid:long)
```

## Arguments

*tid*

Thread id of the given task

## Description

Returns a human readable string showing the user and system time the given task has used up to now. For example “usr: 0m12.908s, sys: 1m6.851s”.

## Name

function::task\_etime — User time of the current task

## Synopsis

```
task_etime:long()
```

## Arguments

None

## Description

Returns the user time of the current task in cputime. Does not include any time used by other tasks in this process, nor does it include any time of the children of this task.



## Name

function::task\_utime\_tid — User time of the given task

## Synopsis

```
task_utime_tid:long(tid:long)
```

## Arguments

*tid*

Thread id of the given task

## Description

Returns the user time of the given task in cputime, or zero if the task doesn't exist. Does not include any time used by other tasks in this process, nor does it include any time of the children of this task.

---

# Chapter 8. Scheduler Tapset

This family of probe points is used to probe the task scheduler activities. It contains the following probe points:

## Name

probe::scheduler.balance — A cpu attempting to find more work.

## Synopsis

`scheduler.balance`

## Values

*name*

name of the probe point

## Context

The cpu looking for more work.

## Name

probe::scheduler.cpu\_off — Process is about to stop running on a cpu

## Synopsis

```
scheduler.cpu_off
```

## Values

<i>task_prev</i>	the process leaving the cpu (same as current)
<i>name</i>	name of the probe point
<i>idle</i>	boolean indicating whether current is the idle process
<i>task_next</i>	the process replacing current

## Context

The process leaving the cpu.

## Name

probe::scheduler.cpu\_on — Process is beginning execution on a cpu

## Synopsis

```
scheduler.cpu_on
```

## Values

*task\_prev*

the process that was previously running on this cpu

*name*

name of the probe point

*idle*

- boolean indicating whether current is the idle process

## Context

The resuming process.

## Name

probe::scheduler.ctxswitch — A context switch is occurring.

## Synopsis

`scheduler.ctxswitch`

## Values

<i>prev_pid</i>	The PID of the process to be switched out
<i>name</i>	name of the probe point
<i>next_task_name</i>	The name of the process to be switched in
<i>nexttsk_state</i>	the state of the process to be switched in
<i>prev_priority</i>	The priority of the process to be switched out
<i>next_pid</i>	The PID of the process to be switched in
<i>next_priority</i>	The priority of the process to be switched in
<i>prevtsk_state</i>	the state of the process to be switched out
<i>next_tid</i>	The TID of the process to be switched in
<i>prev_task_name</i>	The name of the process to be switched out
<i>prev_tid</i>	The TID of the process to be switched out

## Name

probe::scheduler.kthread\_stop — A thread created by kthread\_create is being stopped

## Synopsis

```
scheduler.kthread_stop
```

## Values

*thread\_priority*

priority of the thread

*thread\_pid*

PID of the thread being stopped

## Name

probe::scheduler.kthread\_stop.return — A kthread is stopped and gets the return value

## Synopsis

```
scheduler.kthread_stop.return
```

## Values

*return\_value*

return value after stopping the thread

*name*

name of the probe point



## Name

probe::scheduler.migrate — Task migrating across cpus

## Synopsis

`scheduler.migrate`

## Values

<i>priority</i>	priority of the task being migrated
<i>cpu_from</i>	the original cpu
<i>name</i>	name of the probe point
<i>task</i>	the process that is being migrated
<i>cpu_to</i>	the destination cpu
<i>pid</i>	PID of the task being migrated

## Name

probe::scheduler.process\_exit — Process exiting

## Synopsis

```
scheduler.process_exit
```

## Values

*priority*

priority of the process exiting

*name*

name of the probe point

*pid*

PID of the process exiting

## Name

probe::scheduler.process\_fork — Process forked

## Synopsis

```
scheduler.process_fork
```

## Values

*name*

name of the probe point

*parent\_pid*

PID of the parent process

*child\_pid*

PID of the child process

## Name

probe::scheduler.process\_free — Scheduler freeing a data structure for a process

## Synopsis

```
scheduler.process_free
```

## Values

*priority*

priority of the process getting freed

*name*

name of the probe point

*pid*

PID of the process getting freed

## Name

probe::scheduler.process\_wait — Scheduler starting to wait on a process

## Synopsis

```
scheduler.process_wait
```

## Values

*name*

name of the probe point

*pid*

PID of the process scheduler is waiting on

## Name

probe::scheduler.signal\_send — Sending a signal

## Synopsis

```
scheduler.signal_send
```

## Values

*signal\_number*

signal number

*name*

name of the probe point

*pid*

pid of the process sending signal

## Name

probe::scheduler.tick — Schedulers internal tick, a processes timeslice accounting is updated

## Synopsis

```
scheduler.tick
```

## Values

*name*

name of the probe point

*idle*

boolean indicating whether current is the idle process

## Context

The process whose accounting will be updated.

## Name

probe::scheduler.wait\_task — Waiting on a task to unschedule (become inactive)

## Synopsis

```
scheduler.wait_task
```

## Values

*name*

name of the probe point

*task\_pid*

PID of the task the scheduler is waiting on

*task\_priority*

priority of the task



## Name

probe::scheduler.wakeup — Task is woken up

## Synopsis

`scheduler.wakeup`

## Values

<i>task_cpu</i>	cpu of the task being woken up
<i>name</i>	name of the probe point
<i>task_pid</i>	PID of the task being woken up
<i>task_priority</i>	priority of the task being woken up
<i>task_state</i>	state of the task being woken up
<i>task_tid</i>	tid of the task being woken up

## Name

probe::scheduler.wakeup\_new — Newly created task is woken up for the first time

## Synopsis

`scheduler.wakeup_new`

## Values

<i>task_cpu</i>	cpu of the task woken up
<i>name</i>	name of the probe point
<i>task_pid</i>	PID of the new task woken up
<i>task_priority</i>	priority of the new task
<i>task_state</i>	state of the task woken up
<i>task_tid</i>	TID of the new task woken up

---

# Chapter 9. IO Scheduler and block IO Tapset

This family of probe points is used to probe block IO layer and IO scheduler activities. It contains the following probe points:

## Name

probe::ioblock.end — Fires whenever a block I/O transfer is complete.

## Synopsis

```
ioblock.end
```

## Values

None

## Description

*name* - name of the probe point *devname* - block device name *ino* - i-node number of the mapped file  
*bytes\_done* - number of bytes transferred *sector* - beginning sector for the entire bio *flags* - see below  
BIO\_UPTODATE 0 ok after I/O completion BIO\_RW\_BLOCK 1 RW\_AHEAD set, and read/write  
would block BIO\_EOF 2 out-out-bounds error BIO\_SEG\_VALID 3 nr\_hw\_seg valid BIO\_CLONED  
4 doesn't own data BIO\_BOUNCED 5 bio is a bounce bio BIO\_USER\_MAPPED 6 contains user  
pages BIO\_EOPNOTSUPP 7 not supported *error* - 0 on success *rw* - binary trace for read/write  
request *vcnt* - bio vector count which represents number of array element (page, offset, length) which makes  
up this I/O request *idx* - offset into the bio vector array *phys\_segments* - number of segments in this bio  
after physical address coalescing is performed. *hw\_segments* - number of segments after physical and DMA  
remapping hardware coalescing is performed *size* - total size in bytes

## Context

The process signals the transfer is done.

probe::ioblock.request — Fires whenever making a generic block I/O request.

## Synopsis

`ioblock.request`

## Values

None

## Description

*name* - name of the probe point *devname* - block device name *ino* - i-node number of the mapped file *sector* - beginning sector for the entire bio *flags* - see below BIO\_UPTODATE 0 ok after I/O completion BIO\_RW\_BLOCK 1 RW\_AHEAD set, and read/write would block BIO\_EOF 2 out-out-bounds error BIO\_SEG\_VALID 3 nr\_hw\_seg valid BIO\_CLONED 4 doesn't own data BIO\_BOUNCED 5 bio is a bounce bio BIO\_USER\_MAPPED 6 contains user pages BIO\_EOPNOTSUPP 7 not supported

*rw* - binary trace for read/write request *vcnt* - bio vector count which represents number of array element (page, offset, length) which make up this I/O request *idx* - offset into the bio vector array *phys\_segments* - number of segments in this bio after physical address coalescing is performed *hw\_segments* - number of segments after physical and DMA remapping hardware coalescing is performed *size* - total size in bytes *bdev* - target block device *bdev\_contains* - points to the device object which contains the partition (when bio structure represents a partition) *p\_start\_sect* - points to the start sector of the partition structure of the device

## Context

The process makes block I/O request

probe::ioblock\_trace.bounce — Fires whenever a buffer bounce is needed for at least one page of a block IO request.

## Synopsis

`ioblock_trace.bounce`

## Values

None

## Description

*name* - name of the probe point *q* - request queue on which this bio was queued. *devname* - device for which a buffer bounce was needed. *ino* - i-node number of the mapped file *bytes\_done* - number of bytes transferred *sector* - beginning sector for the entire bio *flags* - see below BIO\_UPTODATE 0 ok after I/O completion BIO\_RW\_BLOCK 1 RW\_AHEAD set, and read/write would block BIO\_EOF 2 out-of-bounds error BIO\_SEG\_VALID 3 nr\_hw\_seg valid BIO\_CLONED 4 doesn't own data BIO\_BOUNCED 5 bio is a bounce bio BIO\_USER\_MAPPED 6 contains user pages BIO\_EOPNOTSUPP 7 not supported *rw* - binary trace for read/write request *vcnt* - bio vector count which represents number of array element (page, offset, length) which makes up this I/O request *idx* - offset into the bio vector array *phys\_segments* - number of segments in this bio after physical address coalescing is performed. *size* - total size in bytes *bdev* - target block device *bdev\_contains* - points to the device object which contains the partition (when bio structure represents a partition) *p\_start\_sect* - points to the start sector of the partition structure of the device

## Context

The process creating a block IO request.

## Name

probe::ioblock\_trace.end — Fires whenever a block I/O transfer is complete.

## Synopsis

```
ioblock_trace.end
```

## Values

None

## Description

*name* - name of the probe point *q* - request queue on which this bio was queued. *devname* - block device name *ino* - i-node number of the mapped file *bytes\_done* - number of bytes transferred *sector* - beginning sector for the entire bio *flags* - see below BIO\_UPTODATE 0 ok after I/O completion BIO\_RW\_BLOCK 1 RW\_AHEAD set, and read/write would block BIO\_EOF 2 out-out-bounds error BIO\_SEG\_VALID 3 nr\_hw\_seg valid BIO\_CLONED 4 doesn't own data BIO\_BOUNCED 5 bio is a bounce bio BIO\_USER\_MAPPED 6 contains user pages BIO\_EOPNOTSUPP 7 not supported

*rw* - binary trace for read/write request *vcnt* - bio vector count which represents number of array element (page, offset, length) which makes up this I/O request *idx* - offset into the bio vector array *phys\_segments* - number of segments in this bio after physical address coalescing is performed. *size* - total size in bytes *bdev* - target block device *bdev\_contains* - points to the device object which contains the partition (when bio structure represents a partition) *p\_start\_sect* - points to the start sector of the partition structure of the device

## Context

The process signals the transfer is done.

## Name

probe::ioblock\_trace.request — Fires just as a generic block I/O request is created for a bio.

## Synopsis

`ioblock_trace.request`

## Values

None

## Description

*name* - name of the probe point *q* - request queue on which this bio was queued. *devname* - block device name *ino* - i-node number of the mapped file *bytes\_done* - number of bytes transferred *sector* - beginning sector for the entire bio *flags* - see below BIO\_UPTODATE 0 ok after I/O completion BIO\_RW\_BLOCK 1 RW\_AHEAD set, and read/write would block BIO\_EOF 2 out-out-bounds error BIO\_SEG\_VALID 3 nr\_hw\_seg valid BIO\_CLONED 4 doesn't own data BIO\_BOUNCED 5 bio is a bounce bio BIO\_USER\_MAPPED 6 contains user pages BIO\_EOPNOTSUPP 7 not supported

*rw* - binary trace for read/write request *vcnt* - bio vector count which represents number of array element (page, offset, length) which make up this I/O request *idx* - offset into the bio vector array *phys\_segments* - number of segments in this bio after physical address coalescing is performed. *size* - total size in bytes *bdev* - target block device *bdev\_contains* - points to the device object which contains the partition (when bio structure represents a partition) *p\_start\_sect* - points to the start sector of the partition structure of the device

## Context

The process makes block I/O request



probe::ioscheduler.elv\_add\_request — probe to indicate request is added to the request queue.

## Synopsis

```
ioscheduler.elv_add_request
```

## Values

<i>disk_major</i>	Disk major no of request.
<i>rq</i>	Address of request.
<i>q</i>	Pointer to request queue.
<i>elevator_name</i>	The type of I/O elevator currently enabled.
<i>disk_minor</i>	Disk minor number of request.
<i>rq_flags</i>	Request flags.

probe::ioscheduler.elv\_add\_request.kp — kprobe based probe to indicate that a request was added to the request queue

## Synopsis

```
ioscheduler.elv_add_request.kp
```

## Values

<i>disk_major</i>	Disk major number of the request
<i>rq</i>	Address of the request
<i>q</i>	pointer to request queue
<i>name</i>	Name of the probe point
<i>elevator_name</i>	The type of I/O elevator currently enabled
<i>disk_minor</i>	Disk minor number of the request
<i>rq_flags</i>	Request flags

probe::ioscheduler.elv\_add\_request.tp — tracepoint based probe to indicate a request is added to the request queue.

## Synopsis

```
ioscheduler.elv_add_request.tp
```

## Values

<i>disk_major</i>	Disk major no of request.
<i>rq</i>	Address of request.
<i>q</i>	Pointer to request queue.
<i>name</i>	Name of the probe point
<i>elevator_name</i>	The type of I/O elevator currently enabled.
<i>disk_minor</i>	Disk minor number of request.
<i>rq_flags</i>	Request flags.

probe::ioscheduler.elv\_completed\_request — Fires when a request is completed

## Synopsis

```
ioscheduler.elv_completed_request
```

## Values

<i>disk_major</i>	Disk major number of the request
<i>rq</i>	Address of the request
<i>name</i>	Name of the probe point
<i>elevator_name</i>	The type of I/O elevator currently enabled
<i>disk_minor</i>	Disk minor number of the request
<i>rq_flags</i>	Request flags

## Name

probe::ioscheduler.elv\_next\_request — Fires when a request is retrieved from the request queue

## Synopsis

```
ioscheduler.elv_next_request
```

## Values

*name*

Name of the probe point

*elevator\_name*

The type of I/O elevator currently enabled

probe::ioscheduler.elv\_next\_request.return — Fires when a request retrieval issues a return signal

## Synopsis

```
ioscheduler.elv_next_request.return
```

## Values

<i>disk_major</i>	Disk major number of the request
<i>rq</i>	Address of the request
<i>name</i>	Name of the probe point
<i>disk_minor</i>	Disk minor number of the request
<i>rq_flags</i>	Request flags

probe::ioscheduler\_trace.elv\_abort\_request — Fires when a request is aborted.

## Synopsis

```
ioscheduler_trace.elv_abort_request
```

## Values

<i>disk_major</i>	Disk major no of request.
<i>rq</i>	Address of request.
<i>name</i>	Name of the probe point
<i>elevator_name</i>	The type of I/O elevator currently enabled.
<i>disk_minor</i>	Disk minor number of request.
<i>rq_flags</i>	Request flags.

## Name

probe::ioscheduler\_trace.elv\_completed\_request — Fires when a request is

## Synopsis

```
ioscheduler_trace.elv_completed_request
```

## Values

<i>disk_major</i>	Disk major no of request.
<i>rq</i>	Address of request.
<i>name</i>	Name of the probe point
<i>elevator_name</i>	The type of I/O elevator currently enabled.
<i>disk_minor</i>	Disk minor number of request.
<i>rq_flags</i>	Request flags.

## Description

completed.



## Name

probe::ioscheduler\_trace.elv\_issue\_request — Fires when a request is

## Synopsis

```
ioscheduler_trace.elv_issue_request
```

## Values

<i>disk_major</i>	Disk major no of request.
<i>rq</i>	Address of request.
<i>name</i>	Name of the probe point
<i>elevator_name</i>	The type of I/O elevator currently enabled.
<i>disk_minor</i>	Disk minor number of request.
<i>rq_flags</i>	Request flags.

## Description

scheduled.

## Name

probe::ioscheduler\_trace.elv\_requeue\_request — Fires when a request is

## Synopsis

`ioscheduler_trace.elv_requeue_request`

## Values

<i>disk_major</i>	Disk major no of request.
<i>rq</i>	Address of request.
<i>name</i>	Name of the probe point
<i>elevator_name</i>	The type of I/O elevator currently enabled.
<i>disk_minor</i>	Disk minor number of request.
<i>rq_flags</i>	Request flags.

## Description

put back on the queue, when the hardware cannot accept more requests.

## Name

probe::ioscheduler\_trace.plugin — Fires when a request queue is plugged;

## Synopsis

```
ioscheduler_trace.plugin
```

## Values

*name*

Name of the probe point

*rq\_queue*

request queue

## Description

ie, requests in the queue cannot be serviced by block driver.

## Name

probe::ioscheduler\_trace.unplug\_io — Fires when a request queue is unplugged;

## Synopsis

```
ioscheduler_trace.unplug_io
```

## Values

*name*

Name of the probe point

*rq\_queue*

request queue

## Description

Either, when number of pending requests in the queue exceeds threshold or, upon expiration of timer that was activated when queue was plugged.

## Name

probe::ioscheduler\_trace.unplug\_timer — Fires when unplug timer associated

## Synopsis

```
ioscheduler_trace.unplug_timer
```

## Values

*name*

Name of the probe point

*rq\_queue*

request queue

## Description

with a request queue expires.

---

# Chapter 10. SCSI Tapset

This family of probe points is used to probe SCSI activities. It contains the following probe points:

## Name

probe::scsi.iocompleted — SCSI mid-layer running the completion processing for block device I/O requests

## Synopsis

```
scsi.iocompleted
```

## Values

<i>device_state_str</i>	The current state of the device, as a string
<i>dev_id</i>	The scsi device id
<i>channel</i>	The channel number
<i>data_direction</i>	The <i>data_direction</i> specifies whether this command is from/to the device
<i>lun</i>	The lun number
<i>host_no</i>	The host number
<i>data_direction_str</i>	Data direction, as a string
<i>device_state</i>	The current state of the device
<i>req_addr</i>	The current struct request pointer, as a number
<i>goodbytes</i>	The bytes completed

## Name

probe::scsi.iodispatching — SCSI mid-layer dispatched low-level SCSI command

## Synopsis

```
scsi.iodispatching
```

## Values

<i>device_state_str</i>	The current state of the device, as a string
<i>dev_id</i>	The scsi device id
<i>channel</i>	The channel number
<i>data_direction</i>	The <i>data_direction</i> specifies whether this command is from/to the device 0 (DMA_BIDIRECTIONAL), 1 (DMA_TO_DEVICE), 2 (DMA_FROM_DEVICE), 3 (DMA_NONE)
<i>lun</i>	The lun number
<i>request_bufflen</i>	The request buffer length
<i>host_no</i>	The host number
<i>device_state</i>	The current state of the device
<i>data_direction_str</i>	Data direction, as a string
<i>req_addr</i>	The current struct request pointer, as a number
<i>request_buffer</i>	The request buffer address



## Name

probe::scsi.iodone — SCSI command completed by low level driver and enqueued into the done queue.

## Synopsis

```
scsi.iodone
```

## Values

<i>device_state_str</i>	The current state of the device, as a string
<i>dev_id</i>	The scsi device id
<i>channel</i>	The channel number
<i>data_direction</i>	The <i>data_direction</i> specifies whether this command is from/to the device.
<i>lun</i>	The lun number
<i>host_no</i>	The host number
<i>data_direction_str</i>	Data direction, as a string
<i>device_state</i>	The current state of the device
<i>scsi_timer_pending</i>	1 if a timer is pending on this request
<i>req_addr</i>	The current struct request pointer, as a number

## Name

probe::scsi.ioentry — Prepares a SCSI mid-layer request

## Synopsis

```
scsi.ioentry
```

## Values

<i>disk_major</i>	The major number of the disk (-1 if no information)
<i>device_state_str</i>	The current state of the device, as a string
<i>device_state</i>	The current state of the device
<i>req_addr</i>	The current struct request pointer, as a number
<i>disk_minor</i>	The minor number of the disk (-1 if no information)

## Name

probe::scsi.ioexecute — Create mid-layer SCSI request and wait for the result

## Synopsis

```
scsi.ioexecute
```

## Values

<i>retries</i>	Number of times to retry request
<i>device_state_str</i>	The current state of the device, as a string
<i>dev_id</i>	The scsi device id
<i>channel</i>	The channel number
<i>data_direction</i>	The <i>data_direction</i> specifies whether this command is from/to the device.
<i>lun</i>	The lun number
<i>timeout</i>	Request timeout in seconds
<i>request_bufflen</i>	The data buffer buffer length
<i>host_no</i>	The host number
<i>data_direction_str</i>	Data direction, as a string
<i>device_state</i>	The current state of the device
<i>request_buffer</i>	The data buffer address

## Name

probe::scsi.set\_state — Order SCSI device state change

## Synopsis

```
scsi.set_state
```

## Values

<i>state_str</i>	The new state of the device, as a string
<i>dev_id</i>	The scsi device id
<i>channel</i>	The channel number
<i>state</i>	The new state of the device
<i>old_state_str</i>	The current state of the device, as a string
<i>lun</i>	The lun number
<i>old_state</i>	The current state of the device
<i>host_no</i>	The host number

---

# Chapter 11. TTY Tapset

This family of probe points is used to probe TTY (Teletype) activities. It contains the following probe points:

## Name

probe::tty.init — Called when a tty is being initialized

## Synopsis

```
tty.init
```

## Values

*driver\_name*

the driver name

*name*

the driver `.dev_name` name

*module*

the module name

## Name

probe::tty.ioctl — called when a ioctl is request to the tty

## Synopsis

```
tty.ioctl
```

## Values

*cmd*

the ioctl command

*arg*

the ioctl argument

*name*

the file name

## Name

probe::tty.open — Called when a tty is opened

## Synopsis

`tty.open`

## Values

<i>inode_state</i>	the inode state
<i>file_name</i>	the file name
<i>file_mode</i>	the file mode
<i>file_flags</i>	the file flags
<i>inode_number</i>	the inode number
<i>inode_flags</i>	the inode flags



## Name

probe::tty.poll — Called when a tty device is being polled

## Synopsis

```
tty.poll
```

## Values

*file\_name*

the tty file name

*wait\_key*

the wait queue key

## Name

probe::tty.read — called when a tty line will be read

## Synopsis

```
tty.read
```

## Values

*driver\_name*

the driver name

*buffer*

the buffer that will receive the characters

*file\_name*

the file name lreated to the tty

*nr*

The amount of characters to be read

## Name

probe::tty.receive — called when a tty receives a message

## Synopsis

```
tty.receive
```

## Values

<i>driver_name</i>	the driver name
<i>count</i>	The amount of characters received
<i>name</i>	the name of the module file
<i>fp</i>	The flag buffer
<i>cp</i>	the buffer that was received
<i>index</i>	The tty Index
<i>id</i>	the tty id

## Name

probe::tty.register — Called when a tty device is registred

## Synopsis

```
tty.register
```

## Values

*driver\_name*

the driver name

*name*

the driver `.dev_name` name

*index*

the tty index requested

*module*

the module name

## Name

probe::tty.release — Called when the tty is closed

## Synopsis

```
tty.release
```

## Values

<i>inode_state</i>	the inode state
<i>file_name</i>	the file name
<i>file_mode</i>	the file mode
<i>file_flags</i>	the file flags
<i>inode_number</i>	the inode number
<i>inode_flags</i>	the inode flags

## Name

probe::tty.resize — Called when a terminal resize happens

## Synopsis

```
tty.resize
```

## Values

<i>new_ypixel</i>	the new ypixel value
<i>old_col</i>	the old col value
<i>old_xpixel</i>	the old xpixel
<i>old_ypixel</i>	the old ypixel
<i>name</i>	the tty name
<i>old_row</i>	the old row value
<i>new_row</i>	the new row value
<i>new_xpixel</i>	the new xpixel value
<i>new_col</i>	the new col value

## Name

probe::tty.unregister — Called when a tty device is being unregistered

## Synopsis

```
tty.unregister
```

## Values

<i>driver_name</i>	the driver name
<i>name</i>	the driver <code>.dev_name</code> name
<i>index</i>	the tty index requested
<i>module</i>	the module name

## Name

probe::tty.write — write to the tty line

## Synopsis

```
tty.write
```

## Values

*driver\_name*

the driver name

*buffer*

the buffer that will be written

*file\_name*

the file name lreated to the tty

*nr*

The amount of characters



---

# Chapter 12. Interrupt Request (IRQ) Tapset

This family of probe points is used to probe interrupt request (IRQ) activities. It contains the following probe points:

probe::irq\_handler.entry — Execution of interrupt handler starting

## Synopsis

`irq_handler.entry`

## Values

<i>dev_name</i>	name of device
<i>flags</i>	Flags for IRQ handler
<i>dev_id</i>	Cookie to identify device
<i>dir</i>	pointer to the <code>proc/irq/NN/name</code> entry
<i>irq</i>	irq number
<i>next_irqaction</i>	pointer to next <code>irqaction</code> for shared interrupts
<i>thread_flags</i>	Flags related to thread
<i>thread</i>	thread pointer for threaded interrupts
<i>thread_fn</i>	interrupt handler function for threaded interrupts
<i>handler</i>	interrupt handler function
<i>flags_str</i>	symbolic string representation of IRQ flags
<i>action</i>	<code>struct irqaction*</code> for this interrupt num

## Name

probe::irq\_handler.exit — Execution of interrupt handler completed

## Synopsis

`irq_handler.exit`

## Values

<i>dev_name</i>	name of device
<i>ret</i>	return value of the handler
<i>flags</i>	flags for IRQ handler
<i>dev_id</i>	Cookie to identify device
<i>dir</i>	pointer to the <code>proc/irq/NN/name</code> entry
<i>next_irqaction</i>	pointer to next <code>irqaction</code> for shared interrupts
<i>irq</i>	interrupt number
<i>thread_flags</i>	Flags related to thread
<i>thread</i>	thread pointer for threaded interrupts
<i>thread_fn</i>	interrupt handler function for threaded interrupts
<i>flags_str</i>	symbolic string representation of IRQ flags
<i>handler</i>	interrupt handler function that was executed
<i>action</i>	struct <code>irqaction</code> *

# Name

probe::softirq.entry — Execution of handler for a pending softirq starting

## Synopsis

softirq.entry

## Values

<i>vec</i>	softirq_action vector
<i>h</i>	struct softirq_action* for current pending softirq
<i>vec_nr</i>	softirq vector number
<i>action</i>	pointer to softirq handler just about to execute

## Name

probe::softirq.exit — Execution of handler for a pending softirq completed

## Synopsis

softirq.exit

## Values

<i>vec</i>	softirq_action vector
<i>h</i>	struct softirq_action* for just executed softirq
<i>vec_nr</i>	softirq vector number
<i>action</i>	pointer to softirq handler that just finished execution

## Name

probe::workqueue.create — Creating a new workqueue

## Synopsis

```
workqueue.create
```

## Values

*wq\_thread*

task\_struct of the workqueue thread

*cpu*

cpu for which the worker thread is created

## Name

probe::workqueue.destroy — Destroying workqueue

## Synopsis

`workqueue.destroy`

## Values

*wq\_thread*

task\_struct of the workqueue thread

## Name

probe::workqueue.execute — Executing deferred work

## Synopsis

`workqueue.execute`

## Values

<i>wq_thread</i>	task_struct of the workqueue thread
<i>work_func</i>	pointer to handler function
<i>work</i>	work_struct* being executed



## Name

probe::workqueue.insert — Queuing work on a workqueue

## Synopsis

`workqueue.insert`

## Values

<i>wq_thread</i>	task_struct of the workqueue thread
<i>work_func</i>	pointer to handler function
<i>work</i>	work_struct* being queued

---

# Chapter 13. Networking Tapset

This family of probe points is used to probe the activities of the network device and protocol layers.

## Name

function::htonl — Convert 32-bit long from host to network order

## Synopsis

```
htonl:long(x:long)
```

## Arguments

`x`

Value to convert

## Name

function::htonll — Convert 64-bit long long from host to network order

## Synopsis

```
htonll:long(x:long)
```

## Arguments

x

Value to convert

## Name

function::htons — Convert 16-bit short from host to network order

## Synopsis

```
htons:long(x:long)
```

## Arguments

`x`

Value to convert

## Name

function::ip\_ntop — Returns a string representation from an integer IP number

## Synopsis

```
ip_ntop:string(addr:long)
```

## Arguments

*addr*

the IP represented as an integer

## Name

function::ntohl — Convert 32-bit long from network to host order

## Synopsis

```
ntohl:long(x:long)
```

## Arguments

`x`

Value to convert

## Name

function::ntohl — Convert 64-bit long long from network to host order

## Synopsis

```
ntohl:long(x:long)
```

## Arguments

x

Value to convert



## Name

function::ntohs — Convert 16-bit short from network to host order

## Synopsis

```
ntohs:long(x:long)
```

## Arguments

`x`

Value to convert

## Name

probe::netdev.change\_mac — Called when the netdev\_name has the MAC changed

## Synopsis

```
netdev.change_mac
```

## Values

<i>dev_name</i>	The device that will have the MAC changed
<i>new_mac</i>	The new MAC address
<i>mac_len</i>	The MAC length
<i>old_mac</i>	The current MAC address

## Name

probe::netdev.change\_mtu — Called when the netdev MTU is changed

## Synopsis

```
netdev.change_mtu
```

## Values

<i>dev_name</i>	The device that will have the MTU changed
<i>new_mtu</i>	The new MTU
<i>old_mtu</i>	The current MTU

## Name

probe::netdev.change\_rx\_flag — Called when the device RX flag will be changed

## Synopsis

```
netdev.change_rx_flag
```

## Values

*dev\_name*

The device that will be changed

*flags*

The new flags

## Name

probe::netdev.close — Called when the device is closed

## Synopsis

```
netdev.close
```

## Values

*dev\_name*

The device that is going to be closed

## Name

probe::netdev.get\_stats — Called when someone asks the device statistics

## Synopsis

```
netdev.get_stats
```

## Values

*dev\_name*

The device that is going to provide the statistics

## Name

probe::netdev.hard\_transmit — Called when the devices is going to TX (hard)

## Synopsis

```
netdev.hard_transmit
```

## Values

<i>protocol</i>	The protocol used in the transmission
<i>dev_name</i>	The device scheduled to transmit
<i>length</i>	The length of the transmit buffer.
<i>true_size</i>	The size of the data to be transmitted.

## Name

probe::netdev.ioctl — Called when the device suffers an IOCTL

## Synopsis

```
netdev.ioctl
```

## Values

*cmd*

The IOCTL request

*arg*

The IOCTL argument (usually the netdev interface)



## Name

probe::netdev.open — Called when the device is opened

## Synopsis

```
netdev.open
```

## Values

*dev\_name*

The device that is going to be opened

## Name

probe::netdev.receive — Data received from network device.

## Synopsis

```
netdev.receive
```

## Values

*protocol*

Protocol of received packet.

*dev\_name*

The name of the device. e.g: eth0, ath1.

*length*

The length of the receiving buffer.

## Name

probe::netdev.register — Called when the device is registered

## Synopsis

```
netdev.register
```

## Values

*dev\_name*

The device that is going to be registered

## Name

probe::netdev.rx — Called when the device is going to receive a packet

## Synopsis

```
netdev.rx
```

## Values

*protocol*

The packet protocol

*dev\_name*

The device received the packet

## Name

probe::netdev.set\_promiscuity — Called when the device enters/leaves promiscuity

## Synopsis

```
netdev.set_promiscuity
```

## Values

<i>dev_name</i>	The device that is entering/leaving promiscuity mode
<i>enable</i>	If the device is entering promiscuity mode
<i>inc</i>	Count the number of promiscuity openers
<i>disable</i>	If the device is leaving promiscuity mode

## Name

probe::netdev.transmit — Network device transmitting buffer

## Synopsis

```
netdev.transmit
```

## Values

<i>protocol</i>	The protocol of this packet(defined in include/linux/if_ether.h).
<i>dev_name</i>	The name of the device. e.g: eth0, ath1.
<i>length</i>	The length of the transmit buffer.
<i>truesize</i>	The size of the data to be transmitted.

## Name

probe::netdev.unregister — Called when the device is being unregistered

## Synopsis

```
netdev.unregister
```

## Values

*dev\_name*

The device that is going to be unregistered

## Name

probe::sunrpc.clnt.bind\_new\_program — Bind a new RPC program to an existing client

## Synopsis

```
sunrpc.clnt.bind_new_program
```

## Values

<i>prog</i>	the number of new RPC program
<i>progname</i>	the name of new RPC program
<i>old_vers</i>	the version of old RPC program
<i>old_progname</i>	the name of old RPC program
<i>vers</i>	the version of new RPC program
<i>servername</i>	the server machine name
<i>old_prog</i>	the number of old RPC program



## Name

probe::sunrpc.clnt.call\_async — Make an asynchronous RPC call

## Synopsis

```
sunrpc.clnt.call_async
```

## Values

<i>prog</i>	the RPC program number
<i>progrname</i>	the RPC program name
<i>procname</i>	the procedure name in this RPC call
<i>proc</i>	the procedure number in this RPC call
<i>dead</i>	whether this client is abandoned
<i>flags</i>	flags
<i>vers</i>	the RPC program version number
<i>port</i>	the port number
<i>prot</i>	the IP protocol number
<i>servername</i>	the server machine name
<i>xid</i>	current transmission id

## Name

probe::sunrpc.clnt.call\_sync — Make a synchronous RPC call

## Synopsis

```
sunrpc.clnt.call_sync
```

## Values

<i>prog</i>	the RPC program number
<i>progrname</i>	the RPC program name
<i>procname</i>	the procedure name in this RPC call
<i>proc</i>	the procedure number in this RPC call
<i>dead</i>	whether this client is abandoned
<i>flags</i>	flags
<i>vers</i>	the RPC program version number
<i>port</i>	the port number
<i>prot</i>	the IP protocol number
<i>servername</i>	the server machine name
<i>xid</i>	current transmission id

## Name

probe::sunrpc.clnt.clone\_client — Clone an RPC client structure

## Synopsis

```
sunrpc.clnt.clone_client
```

## Values

<i>servername</i>	the server machine name
<i>vers</i>	the RPC program version number
<i>prog</i>	the RPC program number
<i>authflavor</i>	the authentication flavor
<i>progrname</i>	the RPC program name
<i>port</i>	the port number
<i>prot</i>	the IP protocol number

## Name

probe::sunrpc.clnt.create\_client — Create an RPC client

## Synopsis

```
sunrpc.clnt.create_client
```

## Values

<i>servername</i>	the server machine name
<i>vers</i>	the RPC program version number
<i>prog</i>	the RPC program number
<i>authflavor</i>	the authentication flavor
<i>progrname</i>	the RPC program name
<i>port</i>	the port number
<i>prot</i>	the IP protocol number

## Name

probe::sunrpc.clnt.restart\_call — Restart an asynchronous RPC call

## Synopsis

```
sunrpc.clnt.restart_call
```

## Values

<i>tk_priority</i>	the task priority
<i>prog</i>	the RPC program number
<i>tk_pid</i>	the debugging aid of task
<i>tk_flags</i>	the task flags
<i>servername</i>	the server machine name
<i>tk_runstate</i>	the task run status
<i>xid</i>	the transmission id

## Name

probe::sunrpc.clnt.shutdown\_client — Shutdown an RPC client

## Synopsis

`sunrpc.clnt.shutdown_client`

## Values

<i>om_ops</i>	the count of operations
<i>om_bytes_sent</i>	the count of bytes out
<i>prog</i>	the RPC program number
<i>authflavor</i>	the authentication flavor
<i>progrname</i>	the RPC program name
<i>om_queue</i>	the jiffies queued for xmit
<i>om_rtt</i>	the RPC RTT jiffies
<i>om_bytes_recv</i>	the count of bytes in
<i>tasks</i>	the number of references
<i>netreconn</i>	the count of reconnections
<i>vers</i>	the RPC program version number
<i>om_execute</i>	the RPC execution jiffies
<i>prot</i>	the IP protocol number
<i>port</i>	the port number
<i>clones</i>	the number of clones
<i>servername</i>	the server machine name
<i>rpccnt</i>	the count of RPC calls
<i>om_ntrans</i>	the count of RPC transmissions

## Name

probe::sunrpc.sched.delay — Delay an RPC task

## Synopsis

```
sunrpc.sched.delay
```

## Values

<i>prog</i>	the program number in the RPC call
<i>delay</i>	the time delayed
<i>tk_pid</i>	the debugging id of the task
<i>tk_flags</i>	the flags of the task
<i>vers</i>	the program version in the RPC call
<i>prot</i>	the IP protocol in the RPC call
<i>xid</i>	the transmission id in the RPC call

## Name

probe::sunrpc.sched.execute — Execute the RPC ‘scheduler’

## Synopsis

```
sunrpc.sched.execute
```

## Values

<i>prog</i>	the program number in the RPC call
<i>tk_pid</i>	the debugging id of the task
<i>tk_flags</i>	the flags of the task
<i>vers</i>	the program version in the RPC call
<i>prot</i>	the IP protocol in the RPC call
<i>xid</i>	the transmission id in the RPC call



## Name

probe::sunrpc.sched.new\_task — Create new task for the specified client

## Synopsis

```
sunrpc.sched.new_task
```

## Values

<i>prog</i>	the program number in the RPC call
<i>tk_flags</i>	the flags of the task
<i>vers</i>	the program version in the RPC call
<i>prot</i>	the IP protocol in the RPC call
<i>xid</i>	the transmission id in the RPC call

## Name

probe::sunrpc.sched.release\_task — Release all resources associated with a task

## Synopsis

```
sunrpc.sched.release_task
```

## Values

<i>prog</i>	the program number in the RPC call
<i>tk_flags</i>	the flags of the task
<i>vers</i>	the program version in the RPC call
<i>prot</i>	the IP protocol in the RPC call
<i>xid</i>	the transmission id in the RPC call

## Description

`rpc_release_task` function might not be found for a particular kernel. So, if we can't find it, just return '-1' for everything.

## Name

probe::sunrpc.svc.create — Create an RPC service

## Synopsis

```
sunrpc.svc.create
```

## Values

<i>prog</i>	the number of the program
<i>progrname</i>	the name of the program
<i>pg_nvers</i>	the number of supported versions
<i>bufsize</i>	the buffer size

## Name

probe::sunrpc.svc.destroy — Destroy an RPC service

## Synopsis

```
sunrpc.svc.destroy
```

## Values

<i>sv_name</i>	the service name
<i>sv_prog</i>	the number of the program
<i>nettcpconn</i>	the count of accepted TCP connections
<i>netcnt</i>	the count of received RPC requests
<i>rpcbadauth</i>	the count of requests drooped for authentication failure
<i>sv_nrthreads</i>	the number of concurrent threads
<i>sv_progname</i>	the name of the program
<i>rpcbadfmt</i>	the count of requests dropped for bad formats
<i>rpccnt</i>	the count of valid RPC requests

## Name

probe::sunrpc.svc.drop — Drop RPC request

## Synopsis

`sunrpc.svc.drop`

## Values

<i>rq_prot</i>	the IP protocol of the request
<i>rq_proc</i>	the procedure number in the request
<i>rq_vers</i>	the program version in the request
<i>sv_name</i>	the service name
<i>rq_xid</i>	the transmission id in the request
<i>peer_ip</i>	the peer address where the request is from
<i>rq_prog</i>	the program number in the request

## Name

probe::sunrpc.svc.process — Process an RPC request

## Synopsis

`sunrpc.svc.process`

## Values

<i>rq_prot</i>	the IP protocol of the request
<i>rq_proc</i>	the procedure number in the request
<i>rq_vers</i>	the program version in the request
<i>sv_name</i>	the service name
<i>sv_prog</i>	the number of the program
<i>sv_nrthreads</i>	the number of concurrent threads
<i>rq_xid</i>	the transmission id in the request
<i>peer_ip</i>	the peer address where the request is from
<i>rq_prog</i>	the program number in the request

## Name

probe::sunrpc.svc.recv — Listen for the next RPC request on any socket

## Synopsis

```
sunrpc.svc.recv
```

## Values

<i>sv_name</i>	the service name
<i>sv_prog</i>	the number of the program
<i>timeout</i>	the timeout of waiting for data
<i>sv_nrthreads</i>	the number of concurrent threads

## Name

probe::sunrpc.svc.register — Register an RPC service with the local portmapper

## Synopsis

```
sunrpc.svc.register
```

## Values

<i>prog</i>	the number of the program
<i>progrname</i>	the name of the program
<i>sv_name</i>	the service name
<i>port</i>	the port number
<i>prot</i>	the IP protocol number

## Description

If *proto* and *port* are both 0, then unregister a service.



## Name

probe::sunrpc.svc.send — Return reply to RPC client

## Synopsis

`sunrpc.svc.send`

## Values

<i>rq_prot</i>	the IP protocol of the request
<i>rq_proc</i>	the procedure number in the request
<i>rq_vers</i>	the program version in the request
<i>sv_name</i>	the service name
<i>rq_xid</i>	the transmission id in the request
<i>peer_ip</i>	the peer address where the request is from
<i>rq_prog</i>	the program number in the request

## Name

probe::tcp.disconnect — TCP socket disconnection

## Synopsis

`tcp.disconnect`

## Values

<i>saddr</i>	A string representing the source IP address
<i>daddr</i>	A string representing the destination IP address
<i>flags</i>	TCP flags (e.g. FIN, etc)
<i>name</i>	Name of this probe
<i>sport</i>	TCP source port
<i>dport</i>	TCP destination port
<i>sock</i>	Network socket

## Context

The process which disconnects tcp

## Name

probe::tcp.disconnect.return — TCP socket disconnection complete

## Synopsis

```
tcp.disconnect.return
```

## Values

*ret*

Error code (0: no error)

*name*

Name of this probe

## Context

The process which disconnects tcp

## Name

probe::tcp.receive — Called when a TCP packet is received

## Synopsis

tcp.receive

## Values

<i>urg</i>	TCP URG flag
<i>protocol</i>	Packet protocol from driver
<i>psh</i>	TCP PSH flag
<i>name</i>	Name of the probe point
<i>rst</i>	TCP RST flag
<i>dport</i>	TCP destination port
<i>saddr</i>	A string representing the source IP address
<i>daddr</i>	A string representing the destination IP address
<i>ack</i>	TCP ACK flag
<i>fin</i>	TCP FIN flag
<i>syn</i>	TCP SYN flag
<i>sport</i>	TCP source port
<i>iphdr</i>	IP header address

## Name

probe::tcp.recvmsg — Receiving TCP message

## Synopsis

tcp.recvmsg

## Values

<i>saddr</i>	A string representing the source IP address
<i>daddr</i>	A string representing the destination IP address
<i>name</i>	Name of this probe
<i>sport</i>	TCP source port
<i>dport</i>	TCP destination port
<i>size</i>	Number of bytes to be received
<i>sock</i>	Network socket

## Context

The process which receives a tcp message

## Name

probe::tcp.recvmsg.return — Receiving TCP message complete

## Synopsis

```
tcp.recvmsg.return
```

## Values

<i>saddr</i>	A string representing the source IP address
<i>daddr</i>	A string representing the destination IP address
<i>name</i>	Name of this probe
<i>sport</i>	TCP source port
<i>dport</i>	TCP destination port
<i>size</i>	Number of bytes received or error code if an error occurred.

## Context

The process which receives a tcp message

## Name

probe::tcp.sendmsg — Sending a tcp message

## Synopsis

```
tcp.sendmsg
```

## Values

*name*

Name of this probe

*size*

Number of bytes to send

*sock*

Network socket

## Context

The process which sends a tcp message

## Name

probe::tcp.sendmsg.return — Sending TCP message is done

## Synopsis

```
tcp.sendmsg.return
```

## Values

*name*

Name of this probe

*size*

Number of bytes sent or error code if an error occurred.

## Context

The process which sends a tcp message



## Name

probe::tcp.setsockopt — Call to setsockopt

## Synopsis

tcp.setsockopt

## Values

<i>optstr</i>	Resolves optname to a human-readable format
<i>level</i>	The level at which the socket options will be manipulated
<i>optlen</i>	Used to access values for setsockopt
<i>name</i>	Name of this probe
<i>optname</i>	TCP socket options (e.g. TCP_NODELAY, TCP_MAXSEG, etc)
<i>sock</i>	Network socket

## Context

The process which calls setsockopt

## Name

probe::tcp.setsockopt.return — Return from setsockopt

## Synopsis

tcp.setsockopt.return

## Values

*ret*

Error code (0: no error)

*name*

Name of this probe

## Context

The process which calls setsockopt

## Name

probe::udp.disconnect — Fires when a process requests for a UDP disconnection

## Synopsis

udp.disconnect

## Values

*flags*

Flags (e.g. FIN, etc)

*name*

The name of this probe

*sock*

Network socket used by the process

## Context

The process which requests a UDP disconnection

## Name

probe::udp.disconnect.return — UDP has been disconnected successfully

## Synopsis

```
udp.disconnect.return
```

## Values

*ret*

Error code (0: no error)

*name*

The name of this probe

## Context

The process which requested a UDP disconnection

## Name

probe::udp.recvmsg — Fires whenever a UDP message is received

## Synopsis

udp.recvmsg

## Values

*name*

The name of this probe

*size*

Number of bytes received by the process

*sock*

Network socket used by the process

## Context

The process which received a UDP message

## Name

probe::udp.recvmsg.return — Fires whenever an attempt to receive a UDP message received is completed

## Synopsis

```
udp.recvmsg.return
```

## Values

*name*

The name of this probe

*size*

Number of bytes received by the process

## Context

The process which received a UDP message

## Name

probe::udp.sendmsg — Fires whenever a process sends a UDP message

## Synopsis

udp.sendmsg

## Values

*name*

The name of this probe

*size*

Number of bytes sent by the process

*sock*

Network socket used by the process

## Context

The process which sent a UDP message

## Name

probe::udp.sendmsg.return — Fires whenever an attempt to send a UDP message is completed

## Synopsis

```
udp.sendmsg.return
```

## Values

*name*

The name of this probe

*size*

Number of bytes sent by the process

## Context

The process which sent a UDP message



---

# Chapter 14. Socket Tapset

This family of probe points is used to probe socket activities. It contains the following probe points:

## Name

function::inet\_get\_ip\_source — Provide IP source address string for a kernel socket

## Synopsis

```
inet_get_ip_source:string(sock:long)
```

## Arguments

*sock*

pointer to the kernel socket

## Name

function::inet\_get\_local\_port — Provide local port number for a kernel socket

## Synopsis

```
inet_get_local_port:long(sock:long)
```

## Arguments

*sock*

pointer to the kernel socket

## Name

function::sock\_fam\_num2str — Given a protocol family number, return a string representation

## Synopsis

```
sock_fam_num2str:string(family:long)
```

## Arguments

*family*

The family number

## Name

function::sock\_fam\_str2num — Given a protocol family name (string), return the corresponding protocol family number

## Synopsis

```
sock_fam_str2num:long(family:string)
```

## Arguments

*family*

The family name

## Name

function::sock\_prot\_num2str — Given a protocol number, return a string representation

## Synopsis

```
sock_prot_num2str:string(proto:long)
```

## Arguments

*proto*

The protocol number

## Name

function::sock\_prot\_str2num — Given a protocol name (string), return the corresponding protocol number

## Synopsis

```
sock_prot_str2num:long(proto:string)
```

## Arguments

*proto*

The protocol name

## Name

function::sock\_state\_num2str — Given a socket state number, return a string representation

## Synopsis

```
sock_state_num2str:string(state:long)
```

## Arguments

*state*

The state number



## Name

function::sock\_state\_str2num — Given a socket state string, return the corresponding state number

## Synopsis

```
sock_state_str2num:long(state:string)
```

## Arguments

*state*

The state name

## Name

probe::socket.aio\_read — Receiving message via `sock_aio_read`

## Synopsis

```
socket.aio_read
```

## Values

<i>protocol</i>	Protocol value
<i>flags</i>	Socket flags value
<i>name</i>	Name of this probe
<i>state</i>	Socket state value
<i>size</i>	Message size in bytes
<i>type</i>	Socket type value
<i>family</i>	Protocol family value

## Context

The message sender

## Description

Fires at the beginning of receiving a message on a socket via the `sock_aio_read` function

## Name

probe::socket.aio\_read.return — Conclusion of message received via `sock_aio_read`

## Synopsis

```
socket.aio_read.return
```

## Values

<i>success</i>	Was receive successful? (1 = yes, 0 = no)
<i>protocol</i>	Protocol value
<i>flags</i>	Socket flags value
<i>name</i>	Name of this probe
<i>state</i>	Socket state value
<i>size</i>	Size of message received (in bytes) or error code if success = 0
<i>type</i>	Socket type value
<i>family</i>	Protocol family value

## Context

The message receiver.

## Description

Fires at the conclusion of receiving a message on a socket via the `sock_aio_read` function

## Name

probe::socket.aio\_write — Message send via `sock_aio_write`

## Synopsis

```
socket.aio_write
```

## Values

<i>protocol</i>	Protocol value
<i>flags</i>	Socket flags value
<i>name</i>	Name of this probe
<i>state</i>	Socket state value
<i>size</i>	Message size in bytes
<i>type</i>	Socket type value
<i>family</i>	Protocol family value

## Context

The message sender

## Description

Fires at the beginning of sending a message on a socket via the `sock_aio_write` function

## Name

probe::socket.aio\_write.return — Conclusion of message send via `sock_aio_write`

## Synopsis

```
socket.aio_write.return
```

## Values

<i>success</i>	Was receive successful? (1 = yes, 0 = no)
<i>protocol</i>	Protocol value
<i>flags</i>	Socket flags value
<i>name</i>	Name of this probe
<i>state</i>	Socket state value
<i>size</i>	Size of message received (in bytes) or error code if success = 0
<i>type</i>	Socket type value
<i>family</i>	Protocol family value

## Context

The message receiver.

## Description

Fires at the conclusion of sending a message on a socket via the `sock_aio_write` function

## Name

probe::socket.close — Close a socket

## Synopsis

```
socket.close
```

## Values

*protocol*

Protocol value

*flags*

Socket flags value

*name*

Name of this probe

*state*

Socket state value

*type*

Socket type value

*family*

Protocol family value

## Context

The requester (user process or kernel)

## Description

Fires at the beginning of closing a socket.

## Name

probe::socket.close.return — Return from closing a socket

## Synopsis

```
socket.close.return
```

## Values

*name*

Name of this probe

## Context

The requester (user process or kernel)

## Description

Fires at the conclusion of closing a socket.

## Name

probe::socket.create — Creation of a socket

## Synopsis

```
socket.create
```

## Values

*protocol*

Protocol value

*name*

Name of this probe

*requester*

Requested by user process or the kernel (1 = kernel, 0 = user)

*type*

Socket type value

*family*

Protocol family value

## Context

The requester (see requester variable)

## Description

Fires at the beginning of creating a socket.



## Name

probe::socket.create.return — Return from Creation of a socket

## Synopsis

```
socket.create.return
```

## Values

<i>success</i>	Was socket creation successful? (1 = yes, 0 = no)
<i>protocol</i>	Protocol value
<i>err</i>	Error code if success == 0
<i>name</i>	Name of this probe
<i>requester</i>	Requested by user process or the kernel (1 = kernel, 0 = user)
<i>type</i>	Socket type value
<i>family</i>	Protocol family value

## Context

The requester (user process or kernel)

## Description

Fires at the conclusion of creating a socket.

## Name

probe::socket.readv — Receiving a message via `sock_readv`

## Synopsis

```
socket.readv
```

## Values

<i>protocol</i>	Protocol value
<i>flags</i>	Socket flags value
<i>name</i>	Name of this probe
<i>state</i>	Socket state value
<i>size</i>	Message size in bytes
<i>type</i>	Socket type value
<i>family</i>	Protocol family value

## Context

The message sender

## Description

Fires at the beginning of receiving a message on a socket via the `sock_readv` function

## Name

probe::socket.readv.return — Conclusion of receiving a message via `sock_readv`

## Synopsis

`socket.readv.return`

## Values

<i>success</i>	Was receive successful? (1 = yes, 0 = no)
<i>protocol</i>	Protocol value
<i>flags</i>	Socket flags value
<i>name</i>	Name of this probe
<i>state</i>	Socket state value
<i>size</i>	Size of message received (in bytes) or error code if success = 0
<i>type</i>	Socket type value
<i>family</i>	Protocol family value

## Context

The message receiver.

## Description

Fires at the conclusion of receiving a message on a socket via the `sock_readv` function

## Name

probe::socket.receive — Message received on a socket.

## Synopsis

```
socket.receive
```

## Values

<i>success</i>	Was send successful? (1 = yes, 0 = no)
<i>protocol</i>	Protocol value
<i>flags</i>	Socket flags value
<i>name</i>	Name of this probe
<i>state</i>	Socket state value
<i>size</i>	Size of message received (in bytes) or error code if success = 0
<i>type</i>	Socket type value
<i>family</i>	Protocol family value

## Context

The message receiver

## Name

probe::socket.recvmsg — Message being received on socket

## Synopsis

```
socket.recvmsg
```

## Values

<i>protocol</i>	Protocol value
<i>flags</i>	Socket flags value
<i>name</i>	Name of this probe
<i>state</i>	Socket state value
<i>size</i>	Message size in bytes
<i>type</i>	Socket type value
<i>family</i>	Protocol family value

## Context

The message receiver.

## Description

Fires at the beginning of receiving a message on a socket via the `sock_recvmsg` function

## Name

probe::socket.recvmsg.return — Return from Message being received on socket

## Synopsis

```
socket.recvmsg.return
```

## Values

<i>success</i>	Was receive successful? (1 = yes, 0 = no)
<i>protocol</i>	Protocol value
<i>flags</i>	Socket flags value
<i>name</i>	Name of this probe
<i>state</i>	Socket state value
<i>size</i>	Size of message received (in bytes) or error code if success = 0
<i>type</i>	Socket type value
<i>family</i>	Protocol family value

## Context

The message receiver.

## Description

Fires at the conclusion of receiving a message on a socket via the `sock_recvmsg` function.

## Name

probe::socket.send — Message sent on a socket.

## Synopsis

```
socket.send
```

## Values

<i>success</i>	Was send successful? (1 = yes, 0 = no)
<i>protocol</i>	Protocol value
<i>flags</i>	Socket flags value
<i>name</i>	Name of this probe
<i>state</i>	Socket state value
<i>size</i>	Size of message sent (in bytes) or error code if success = 0
<i>type</i>	Socket type value
<i>family</i>	Protocol family value

## Context

The message sender

## Name

probe::socket.sendmsg — Message is currently being sent on a socket.

## Synopsis

```
socket.sendmsg
```

## Values

<i>protocol</i>	Protocol value
<i>flags</i>	Socket flags value
<i>name</i>	Name of this probe
<i>state</i>	Socket state value
<i>size</i>	Message size in bytes
<i>type</i>	Socket type value
<i>family</i>	Protocol family value

## Context

The message sender

## Description

Fires at the beginning of sending a message on a socket via the `sock_sendmsg` function



## Name

probe::socket.sendmsg.return — Return from socket.sendmsg.

## Synopsis

```
socket.sendmsg.return
```

## Values

<i>success</i>	Was send successful? (1 = yes, 0 = no)
<i>protocol</i>	Protocol value
<i>flags</i>	Socket flags value
<i>name</i>	Name of this probe
<i>state</i>	Socket state value
<i>size</i>	Size of message sent (in bytes) or error code if success = 0
<i>type</i>	Socket type value
<i>family</i>	Protocol family value

## Context

The message sender.

## Description

Fires at the conclusion of sending a message on a socket via the `sock_sendmsg` function

## Name

probe::socket.writev — Message sent via `socket_writev`

## Synopsis

```
socket.writev
```

## Values

<i>protocol</i>	Protocol value
<i>flags</i>	Socket flags value
<i>name</i>	Name of this probe
<i>state</i>	Socket state value
<i>size</i>	Message size in bytes
<i>type</i>	Socket type value
<i>family</i>	Protocol family value

## Context

The message sender

## Description

Fires at the beginning of sending a message on a socket via the `sock_writev` function

## Name

probe::socket.writev.return — Conclusion of message sent via `socket_writev`

## Synopsis

```
socket.writev.return
```

## Values

<i>success</i>	Was send successful? (1 = yes, 0 = no)
<i>protocol</i>	Protocol value
<i>flags</i>	Socket flags value
<i>name</i>	Name of this probe
<i>state</i>	Socket state value
<i>size</i>	Size of message sent (in bytes) or error code if success = 0
<i>type</i>	Socket type value
<i>family</i>	Protocol family value

## Context

The message receiver.

## Description

Fires at the conclusion of sending a message on a socket via the `sock_writev` function

---

# Chapter 15. SNMP Information Tapset

This family of probe points is used to probe socket activities to provide SNMP type information. It contains the following functions and probe points:

## Name

function::ipmib\_filter\_key — Default filter function for ipmib.\* probes

## Synopsis

```
ipmib_filter_key:long(skb:long,op:long,SourceIsLocal:long)
```

## Arguments

<i>skb</i>	pointer to the struct sk_buff
<i>op</i>	value to be counted if <i>skb</i> passes the filter
<i>SourceIsLocal</i>	1 is local operation and 0 is non-local operation

## Description

This function is a default filter function. The user can replace this function with their own. The user-supplied filter function returns an index key based on the values in *skb*. A return value of 0 means this particular *skb* should be not be counted.

## Name

function::ipmib\_get\_proto — Get the protocol value

## Synopsis

```
ipmib_get_proto:long(skb:long)
```

## Arguments

*skb*

pointer to a struct sk\_buff

## Description

Returns the protocol value from *skb*.

## Name

function::ipmib\_local\_addr — Get the local ip address

## Synopsis

```
ipmib_local_addr:long(skb:long,SourceIsLocal:long)
```

## Arguments

*skb*

pointer to a struct sk\_buff

*SourceIsLocal*

flag to indicate whether local operation

## Description

Returns the local ip address *skb*.

## Name

function::ipmib\_remote\_addr — Get the remote ip address

## Synopsis

```
ipmib_remote_addr:long(skb:long,SourceIsLocal:long)
```

## Arguments

*skb*

pointer to a struct sk\_buff

*SourceIsLocal*

flag to indicate whether local operation

## Description

Returns the remote ip address from *skb*.



## Name

function::ipmib\_tcp\_local\_port — Get the local tcp port

## Synopsis

```
ipmib_tcp_local_port:long(skb:long,SourceIsLocal:long)
```

## Arguments

*skb*

pointer to a struct sk\_buff

*SourceIsLocal*

flag to indicate whether local operation

## Description

Returns the local tcp port from *skb*.

## Name

function::ipmib\_tcp\_remote\_port — Get the remote tcp port

## Synopsis

```
ipmib_tcp_remote_port:long(skb:long,SourceIsLocal:long)
```

## Arguments

*skb*

pointer to a struct sk\_buff

*SourceIsLocal*

flag to indicate whether local operation

## Description

Returns the remote tcp port from *skb*.

## Name

function::linuxmib\_filter\_key — Default filter function for linuxmib.\* probes

## Synopsis

```
linuxmib_filter_key:long(sk:long,op:long)
```

## Arguments

<i>sk</i>	pointer to the struct sock
<i>op</i>	value to be counted if <i>sk</i> passes the filter

## Description

This function is a default filter function. The user can replace this function with their own. The user-supplied filter function returns an index key based on the values in *sk*. A return value of 0 means this particular *sk* should be not be counted.

## Name

function::tcpmib\_filter\_key — Default filter function for tcpmib.\* probes

## Synopsis

```
tcpmib_filter_key:long(sk:long,op:long)
```

## Arguments

<i>sk</i>	pointer to the struct sock being acted on
<i>op</i>	value to be counted if <i>sk</i> passes the filter

## Description

This function is a default filter function. The user can replace this function with their own. The user-supplied filter function returns an index key based on the values in *sk*. A return value of 0 means this particular *sk* should be not be counted.

## Name

function::tcpmib\_get\_state — Get a socket's state

## Synopsis

```
tcpmib_get_state:long(sk:long)
```

## Arguments

*sk*

pointer to a struct sock

## Description

Returns the sk\_state from a struct sock.

## Name

function::tcpmib\_local\_addr — Get the source address

## Synopsis

```
tcpmib_local_addr:long(sk:long)
```

## Arguments

*sk*

pointer to a struct inet\_sock

## Description

Returns the saddr from a struct inet\_sock in host order.

## Name

function::tcpmib\_local\_port — Get the local port

## Synopsis

```
tcpmib_local_port:long(sk:long)
```

## Arguments

*sk*

pointer to a struct inet\_sock

## Description

Returns the sport from a struct inet\_sock in host order.

## Name

function::tcpmib\_remote\_addr — Get the remote address

## Synopsis

```
tcpmib_remote_addr:long(sk:long)
```

## Arguments

<i>sk</i>	pointer to a struct <code>inet_sock</code>
-----------	--

## Description

Returns the `daddr` from a struct `inet_sock` in host order.



## Name

function::tcpmib\_remote\_port — Get the remote port

## Synopsis

```
tcpmib_remote_port:long(sk:long)
```

## Arguments

<i>sk</i>	pointer to a struct inet_sock
-----------	-------------------------------

## Description

Returns the dport from a struct inet\_sock in host order.

## Name

probe::ipmib.ForwDatagrams — Count forwarded packet

## Synopsis

`ipmib.ForwDatagrams`

## Values

<i>skb</i>	pointer to the struct <code>sk_buff</code> being acted on
<i>op</i>	value to be added to the counter (default value of 1)

## Description

The packet pointed to by *skb* is filtered by the function `ipmib_filter_key`. If the packet passes the filter is is counted in the global *ForwDatagrams* (equivalent to SNMP's MIB IP-STATS\_MIB\_OUTFORWDATAGRAMS)

# Name

probe::ipmib.FragFails — Count datagram fragmented unsuccessfully

## Synopsis

ipmib.FragFails

## Values

<i>skb</i>	pointer to the struct sk_buff being acted on
<i>op</i>	Value to be added to the counter (default value of 1)

## Description

The packet pointed to by *skb* is filtered by the function `ipmib_filter_key`. If the packet passes the filter is counted in the global *FragFails* (equivalent to SNMP's MIB IPSTATS\_MIB\_FRAGFAILS)

# Name

probe::ipmib.FragOKs — Count datagram fragmented successfully

## Synopsis

ipmib.FragOKs

## Values

<i>skb</i>	pointer to the struct sk_buff being acted on
<i>op</i>	value to be added to the counter (default value of 1)

## Description

The packet pointed to by *skb* is filtered by the function `ipmib_filter_key`. If the packet passes the filter is counted in the global *FragOKs* (equivalent to SNMP's MIB IPSTATS\_MIB\_FRAGOKS)

## Name

probe::ipmib.InAddrErrors — Count arriving packets with an incorrect address

## Synopsis

`ipmib.InAddrErrors`

## Values

<i>skb</i>	pointer to the struct <code>sk_buff</code> being acted on
<i>op</i>	value to be added to the counter (default value of 1)

## Description

The packet pointed to by *skb* is filtered by the function `ipmib_filter_key`. If the packet passes the filter is counted in the global *InAddrErrors* (equivalent to SNMP's MIB `IPSTATS_MIB_INADDRERRORS`)

probe::ipmib.InDiscards — Count discarded inbound packets

## Synopsis

```
ipmib.InDiscards
```

## Values

*skb*

pointer to the struct `sk_buff` being acted on

*op*

value to be added to the counter (default value of 1)

## Description

The packet pointed to by *skb* is filtered by the function `ipmib_filter_key`. If the packet passes the filter is counted in the global *InDiscards* (equivalent to SNMP's MIB `STATS_MIB_INDISCARDS`)

# Name

probe::ipmib.InNoRoutes — Count an arriving packet with no matching socket

## Synopsis

ipmib.InNoRoutes

## Values

<i>skb</i>	pointer to the struct sk_buff being acted on
<i>op</i>	value to be added to the counter (default value of 1)

## Description

The packet pointed to by *skb* is filtered by the function `ipmib_filter_key`. If the packet passes the filter is counted in the global *InNoRoutes* (equivalent to SNMP's MIB IPSTATS\_MIB\_INNOROUTES)

probe::ipmib.InReceives — Count an arriving packet

## Synopsis

```
ipmib.InReceives
```

## Values

<i>skb</i>	pointer to the struct <code>sk_buff</code> being acted on
<i>op</i>	value to be added to the counter (default value of 1)

## Description

The packet pointed to by *skb* is filtered by the function `ipmib_filter_key`. If the packet passes the filter is counted in the global *InReceives* (equivalent to SNMP's MIB `IPSTATS_MIB_INRECEIVES`)



SNMP  
In-  
for-  
ma-  
tion  
lapset

## Name

probe::ipmib.InUnknownProtos — Count arriving packets with an unbound proto

## Synopsis

```
ipmib.InUnknownProtos
```

## Values

*skb*

pointer to the struct `sk_buff` being acted on

*op*

value to be added to the counter (default value of 1)

## Description

The packet pointed to by *skb* is filtered by the function `ipmib_filter_key`. If the packet passes the filter is counted in the global *InUnknownProtos* (equivalent to SNMP's MIB IP-STATS\_MIB\_INUNKNOWNPROTOS)

## Name

probe::ipmib.OutRequests — Count a request to send a packet

## Synopsis

```
ipmib.OutRequests
```

## Values

*skb*

pointer to the struct `sk_buff` being acted on

*op*

value to be added to the counter (default value of 1)

## Description

The packet pointed to by *skb* is filtered by the function `ipmib_filter_key`. If the packet passes the filter is counted in the global *OutRequests* (equivalent to SNMP's MIB IPSTATS\_MIB\_OUTREQUESTS)

# Name

probe::ipmib.ReasmReqds — Count number of packet fragments reassembly requests

## Synopsis

ipmib.ReasmReqds

## Values

<i>skb</i>	pointer to the struct sk_buff being acted on
<i>op</i>	value to be added to the counter (default value of 1)

## Description

The packet pointed to by *skb* is filtered by the function `ipmib_filter_key`. If the packet passes the filter is counted in the global *ReasmReqds* (equivalent to SNMP's MIB IPSTATS\_MIB\_REASMREQDS)

# Name

probe::ipmib.ReasmTimeout — Count Reassembly Timeouts

## Synopsis

ipmib.ReasmTimeout

## Values

<i>skb</i>	pointer to the struct sk_buff being acted on
<i>op</i>	value to be added to the counter (default value of 1)

## Description

The packet pointed to by *skb* is filtered by the function `ipmib_filter_key`. If the packet passes the filter is counted in the global *ReasmTimeout* (equivalent to SNMP's MIB IPSTATS\_MIB\_REASMTIMEOUT)

## Name

probe::linuxmib.DelayedACKs — Count of delayed acks

## Synopsis

linuxmib.DelayedACKs

## Values

<i>skb</i>	Pointer to the struct sock being acted on
<i>op</i>	Value to be added to the counter (default value of 1)

## Description

The packet pointed to by *skb* is filtered by the function `linuxmib_filter_key`. If the packet passes the filter is is counted in the global *DelayedACKs* (equivalent to SNMP's MIB LINUX\_MIB\_DELAYEDACKS)

# Name

probe::linuxmib.ListenDrops — Count of times conn request that were dropped

## Synopsis

```
linuxmib.ListenDrops
```

## Values

<i>sk</i>	Pointer to the struct sock being acted on
<i>op</i>	Value to be added to the counter (default value of 1)

## Description

The packet pointed to by *skb* is filtered by the function `linuxmib_filter_key`. If the packet passes the filter is is counted in the global *ListenDrops* (equivalent to SNMP's MIB LINUX\_MIB\_LISTENDROPS)

# Name

probe::linuxmib.ListenOverflows — Count of times a listen queue overflowed

## Synopsis

```
linuxmib.ListenOverflows
```

## Values

<i>sk</i>	Pointer to the struct sock being acted on
<i>op</i>	Value to be added to the counter (default value of 1)

## Description

The packet pointed to by *skb* is filtered by the function `linuxmib_filter_key`. If the packet passes the filter is is counted in the global *ListenOverflows* (equivalent to SNMP's MIB LINUX\_MIB\_LISTENOVERFLOWS)

# Name

probe::linuxmib.TCPMemoryPressures — Count of times memory pressure was used

## Synopsis

linuxmib.TCPMemoryPressures

## Values

<i>sk</i>	Pointer to the struct sock being acted on
<i>op</i>	Value to be added to the counter (default value of 1)

## Description

The packet pointed to by *skb* is filtered by the function `linuxmib_filter_key`. If the packet passes the filter is is counted in the global *TCPMemoryPressures* (equivalent to SNMP's MIB LINUX\_MIB\_TCPMEMORYPRESSURES)



# Name

probe::tcpmib.ActiveOpens — Count an active opening of a socket

## Synopsis

```
tcpmib.ActiveOpens
```

## Values

<i>sk</i>	pointer to the struct sock being acted on
<i>op</i>	value to be added to the counter (default value of 1)

## Description

The packet pointed to by *skb* is filtered by the function `tcpmib_filter_key`. If the packet passes the filter is is counted in the global *ActiveOpens* (equivalent to SNMP's MIB TCP\_MIB\_ACTIVEOPENS)

# Name

probe::tcpmib.AttemptFails — Count a failed attempt to open a socket

## Synopsis

tcpmib.AttemptFails

## Values

<i>sk</i>	pointer to the struct sock being acted on
<i>op</i>	value to be added to the counter (default value of 1)

## Description

The packet pointed to by *skb* is filtered by the function `tcpmib_filter_key`. If the packet passes the filter is is counted in the global *AttemptFails* (equivalent to SNMP's MIB TCP\_MIB\_ATTEMPTFAILS)

# Name

probe::tcpmib.CurrEstab — Update the count of open sockets

## Synopsis

tcpmib.CurrEstab

## Values

<i>sk</i>	pointer to the struct sock being acted on
<i>op</i>	value to be added to the counter (default value of 1)

## Description

The packet pointed to by *skb* is filtered by the function `tcpmib_filter_key`. If the packet passes the filter is is counted in the global *CurrEstab* (equivalent to SNMP's MIB TCP\_MIB\_CURRESTAB)

# Name

probe::tcpmib.EstabResets — Count the reset of a socket

## Synopsis

tcpmib.EstabResets

## Values

<i>sk</i>	pointer to the struct sock being acted on
<i>op</i>	value to be added to the counter (default value of 1)

## Description

The packet pointed to by *skb* is filtered by the function `tcpmib_filter_key`. If the packet passes the filter is is counted in the global *EstabResets* (equivalent to SNMP's MIB TCP\_MIB\_ESTABRESETS)

SNMP  
In-  
for-  
ma-  
tion  
lapset

## Name

probe::tcpmib.InSegs — Count an incoming tcp segment

## Synopsis

```
tcpmib.InSegs
```

## Values

<i>skb</i>	pointer to the struct sock being acted on
<i>op</i>	value to be added to the counter (default value of 1)

## Description

The packet pointed to by *skb* is filtered by the function `tcpmib_filter_key` (or `ipmib_filter_key` for tcp v4). If the packet passes the filter is is counted in the global *InSegs* (equivalent to SNMP's MIB TCP\_MIB\_INSEGS)

# Name

probe::tcpmib.OutRsts — Count the sending of a reset packet

## Synopsis

tcpmib.OutRsts

## Values

<i>skb</i>	pointer to the struct sock being acted on
<i>op</i>	value to be added to the counter (default value of 1)

## Description

The packet pointed to by *skb* is filtered by the function `tcpmib_filter_key`. If the packet passes the filter is is counted in the global *OutRsts* (equivalent to SNMP's MIB TCP\_MIB\_OUTRSTS)

# Name

probe::tcpmib.OutSegs — Count the sending of a TCP segment

## Synopsis

```
tcpmib.OutSegs
```

## Values

<i>sk</i>	pointer to the struct sock being acted on
<i>op</i>	value to be added to the counter (default value of 1)

## Description

The packet pointed to by *skb* is filtered by the function `tcpmib_filter_key`. If the packet passes the filter is is counted in the global *OutSegs* (equivalent to SNMP's MIB TCP\_MIB\_OUTSEGS)

# Name

probe::tcpmib.PassiveOpens — Count the passive creation of a socket

## Synopsis

tcpmib.PassiveOpens

## Values

<i>sk</i>	pointer to the struct sock being acted on
<i>op</i>	value to be added to the counter (default value of 1)

## Description

The packet pointed to by *skb* is filtered by the function `tcpmib_filter_key`. If the packet passes the filter is is counted in the global *PassiveOpens* (equivalent to SNMP's MIB TCP\_MIB\_PASSIVEOPENS)



# Name

probe::tcpmib.RetransSegs — Count the retransmission of a TCP segment

## Synopsis

tcpmib.RetransSegs

## Values

<i>sk</i>	pointer to the struct sock being acted on
<i>op</i>	value to be added to the counter (default value of 1)

## Description

The packet pointed to by *skb* is filtered by the function `tcpmib_filter_key`. If the packet passes the filter is is counted in the global *RetransSegs* (equivalent to SNMP's MIB TCP\_MIB\_RETRANSSEGS)

---

# Chapter 16. Kernel Process Tapset

This family of probe points is used to probe process-related activities. It contains the following probe points:

## Name

probe::kprocess.create — Fires whenever a new process or thread is successfully created

## Synopsis

kprocess.create

## Values

*new\_tid*

The TID of the newly created task

*new\_pid*

The PID of the newly created process

## Context

Parent of the created process.

## Description

Fires whenever a new process is successfully created, either as a result of fork (or one of its syscall variants), or a new kernel thread.

## Name

probe::kprocess.exec — Attempt to exec to a new program

## Synopsis

```
kprocess.exec
```

## Values

*filename*

The path to the new executable

## Context

The caller of exec.

## Description

Fires whenever a process attempts to exec to a new program.

## Name

probe::kprocess.exec\_complete — Return from exec to a new program

## Synopsis

```
kprocess.exec_complete
```

## Values

*success*

A boolean indicating whether the exec was successful

*errno*

The error number resulting from the exec

## Context

On success, the context of the new executable. On failure, remains in the context of the caller.

## Description

Fires at the completion of an exec call.

## Name

probe::kprocess.exit — Exit from process

## Synopsis

```
kprocess.exit
```

## Values

*code*

The exit code of the process

## Context

The process which is terminating.

## Description

Fires when a process terminates. This will always be followed by a `kprocess.release`, though the latter may be delayed if the process waits in a zombie state.

## Name

probe::kprocess.release — Process released

## Synopsis

kprocess.release

## Values

<i>pid</i>	Same as <i>released_pid</i> for compatibility (deprecated)
<i>released_pid</i>	PID of the process being released
<i>released_tid</i>	TID of the task being released
<i>task</i>	A task handle to the process being released

## Context

The context of the parent, if it wanted notification of this process' termination, else the context of the process itself.

## Description

Fires when a process is released from the kernel. This always follows a kprocess.exit, though it may be delayed somewhat if the process waits in a zombie state.

## Name

probe::kprocess.start — Starting new process

## Synopsis

```
kprocess.start
```

## Values

None

## Context

Newly created process.

## Description

Fires immediately before a new process begins execution.



---

# Chapter 17. Signal Tapset

This family of probe points is used to probe signal activities. It contains the following probe points:

## Name

probe::signal.check\_ignored — Checking to see signal is ignored

## Synopsis

```
signal.check_ignored
```

## Values

<i>sig_name</i>	A string representation of the signal
<i>sig</i>	The number of the signal
<i>pid_name</i>	Name of the process receiving the signal
<i>sig_pid</i>	The PID of the process receiving the signal

## Name

probe::signal.check\_ignored.return — Check to see signal is ignored completed

## Synopsis

```
signal.check_ignored.return
```

## Values

*retstr*

Return value as a string

*name*

Name of the probe point

## Name

probe::signal.checkperm — Check being performed on a sent signal

## Synopsis

```
signal.checkperm
```

## Values

<i>name</i>	Name of the probe point
<i>task</i>	A task handle to the signal recipient
<i>sinfo</i>	The address of the sinfo structure
<i>si_code</i>	Indicates the signal type
<i>sig_name</i>	A string representation of the signal
<i>sig</i>	The number of the signal
<i>pid_name</i>	Name of the process receiving the signal
<i>sig_pid</i>	The PID of the process receiving the signal

## Name

probe::signal.checkperm.return — Check performed on a sent signal completed

## Synopsis

```
signal.checkperm.return
```

## Values

*retstr*

Return value as a string

*name*

Name of the probe point

## Name

probe::signal.do\_action — Examining or changing a signal action

## Synopsis

```
signal.do_action
```

## Values

<i>sa_mask</i>	The new mask of the signal
<i>name</i>	Name of the probe point
<i>sig_name</i>	A string representation of the signal
<i>oldsigact_addr</i>	The address of the old sigaction struct associated with the signal
<i>sig</i>	The signal to be examined/changed
<i>sa_handler</i>	The new handler of the signal
<i>sigact_addr</i>	The address of the new sigaction struct associated with the signal

## Name

probe::signal.do\_action.return — Examining or changing a signal action completed

## Synopsis

```
signal.do_action.return
```

## Values

*retstr*

Return value as a string

*name*

Name of the probe point

## Name

probe::signal.flush — Flushing all pending signals for a task

## Synopsis

```
signal.flush
```

## Values

<i>name</i>	Name of the probe point
<i>task</i>	The task handler of the process performing the flush
<i>pid_name</i>	The name of the process associated with the task performing the flush
<i>sig_pid</i>	The PID of the process associated with the task performing the flush



## Name

probe::signal.force\_segv — Forcing send of SIGSEGV

## Synopsis

```
signal.force_segv
```

## Values

<i>name</i>	Name of the probe point
<i>sig_name</i>	A string representation of the signal
<i>sig</i>	The number of the signal
<i>pid_name</i>	Name of the process receiving the signal
<i>sig_pid</i>	The PID of the process receiving the signal

## Name

probe::signal.force\_segv.return — Forcing send of SIGSEGV complete

## Synopsis

```
signal.force_segv.return
```

## Values

*retstr*

Return value as a string

*name*

Name of the probe point

## Name

probe::signal.handle — Signal handler being invoked

## Synopsis

```
signal.handle
```

## Values

<i>regs</i>	The address of the kernel-mode stack area
<i>sig_code</i>	The si_code value of the siginfo signal
<i>name</i>	Name of the probe point
<i>sig_mode</i>	Indicates whether the signal was a user-mode or kernel-mode signal
<i>sinfo</i>	The address of the siginfo table
<i>sig_name</i>	A string representation of the signal
<i>oldset_addr</i>	The address of the bitmask array of blocked signals
<i>sig</i>	The signal number that invoked the signal handler
<i>ka_addr</i>	The address of the k_sigaction table associated with the signal

## Name

probe::signal.handle.return — Signal handler invocation completed

## Synopsis

```
signal.handle.return
```

## Values

*retstr*

Return value as a string

*name*

Name of the probe point

## Name

probe::signal.pending — Examining pending signal

## Synopsis

```
signal.pending
```

## Values

<i>name</i>	Name of the probe point
<i>sigset_size</i>	The size of the user-space signal set
<i>sigset_add</i>	The address of the user-space signal set (sigset_t)

## Description

This probe is used to examine a set of signals pending for delivery to a specific thread. This normally occurs when the `do_sigpending` kernel function is executed.

## Name

probe::signal.pending.return — Examination of pending signal completed

## Synopsis

```
signal.pending.return
```

## Values

*retstr*

Return value as a string

*name*

Name of the probe point

## Name

probe::signal.procmask — Examining or changing blocked signals

## Synopsis

signal.procmask

## Values

*how*

Indicates how to change the blocked signals; possible values are SIG\_BLOCK=0 (for blocking signals), SIG\_UNBLOCK=1 (for unblocking signals), and SIG\_SETMASK=2 for setting the signal mask.

*name*

Name of the probe point

*oldsigset\_addr*

The old address of the signal set (sigset\_t)

*sigset*

The actual value to be set for sigset\_t (correct?)

*sigset\_addr*

The address of the signal set (sigset\_t) to be implemented

## Name

probe::signal.procmask.return — Examining or changing blocked signals completed

## Synopsis

```
signal.procmask.return
```

## Values

*retstr*

Return value as a string

*name*

Name of the probe point



## Name

probe::signal.send — Signal being sent to a process

## Synopsis

```
signal.send
```

## Values

<i>send2queue</i>	Indicates whether the signal is sent to an existing sigqueue
<i>name</i>	The name of the function used to send out the signal
<i>task</i>	A task handle to the signal recipient
<i>sinfo</i>	The address of siginfo struct
<i>si_code</i>	Indicates the signal type
<i>sig_name</i>	A string representation of the signal
<i>sig</i>	The number of the signal
<i>shared</i>	Indicates whether the signal is shared by the thread group
<i>sig_pid</i>	The PID of the process receiving the signal
<i>pid_name</i>	The name of the signal recipient

## Context

The signal's sender.

## Name

probe::signal.send.return — Signal being sent to a process completed

## Synopsis

signal.send.return

## Values

<i>retstr</i>	The return value to either <code>__group_send_sig_info</code> , <code>specific_send_sig_info</code> , or <code>send_sigqueue</code>
<i>send2queue</i>	Indicates whether the sent signal was sent to an existing sigqueue
<i>name</i>	The name of the function used to send out the signal
<i>shared</i>	Indicates whether the sent signal is shared by the thread group.

## Context

The signal's sender. (correct?)

## Description

Possible `__group_send_sig_info` and `specific_send_sig_info` return values are as follows;

0 -- The signal is successfully sent to a process,

## which means that

(1) the signal was ignored by the receiving process, (2) this is a non-RT signal and the system already has one queued, and (3) the signal was successfully added to the sigqueue of the receiving process.

-EAGAIN -- The sigqueue of the receiving process is overflowing, the signal was RT, and the signal was sent by a user using something other than `kill`.

Possible `send_group_sigqueue` and `send_sigqueue` return values are as follows;

0 -- The signal was either successfully added into the sigqueue of the receiving process, or a `SI_TIMER` entry is already queued (in which case, the overrun count will be simply incremented).

1 -- The signal was ignored by the receiving process.

-1 -- (`send_sigqueue` only) The task was marked exiting, allowing `*posix_timer_event` to redirect it to the group leader.

## Name

probe::signal.send\_sig\_queue — Queuing a signal to a process

## Synopsis

```
signal.send_sig_queue
```

## Values

<i>sigqueue_addr</i>	The address of the signal queue
<i>name</i>	Name of the probe point
<i>sig_name</i>	A string representation of the signal
<i>sig</i>	The queued signal
<i>pid_name</i>	Name of the process to which the signal is queued
<i>sig_pid</i>	The PID of the process to which the signal is queued

## Name

probe::signal.send\_sig\_queue.return — Queuing a signal to a process completed

## Synopsis

```
signal.send_sig_queue.return
```

## Values

*retstr*

Return value as a string

*name*

Name of the probe point

## Name

probe::signal.sys\_tgkill — Sending kill signal to a thread group

## Synopsis

```
signal.sys_tgkill
```

## Values

<i>name</i>	Name of the probe point
<i>sig_name</i>	A string representation of the signal
<i>sig</i>	The specific kill signal sent to the process
<i>tgid</i>	The thread group ID of the thread receiving the kill signal
<i>pid_name</i>	The name of the signal recipient
<i>sig_pid</i>	The PID of the thread receiving the kill signal

## Description

The tgkill call is similar to tkill, except that it also allows the caller to specify the thread group ID of the thread to be signalled. This protects against TID reuse.

Sig-  
nal  
\_\_tapset

## Name

probe::signal.sys\_tgkill.return — Sending kill signal to a thread group completed

## Synopsis

```
signal.sys_tgkill.return
```

## Values

*retstr*

The return value to either `__group_send_sig_info`,

*name*

Name of the probe point

## Name

probe::signal.sys\_tkill — Sending a kill signal to a thread

## Synopsis

```
signal.sys_tkill
```

## Values

<i>name</i>	Name of the probe point
<i>sig_name</i>	A string representation of the signal
<i>sig</i>	The specific signal sent to the process
<i>pid_name</i>	The name of the signal recipient
<i>sig_pid</i>	The PID of the process receiving the kill signal

## Description

The tkill call is analogous to kill(2), except that it also allows a process within a specific thread group to be targeted. Such processes are targeted through their unique thread IDs (TID).

## Name

probe::signal.syskill — Sending kill signal to a process

## Synopsis

```
signal.syskill
```

## Values

<i>name</i>	Name of the probe point
<i>sig_name</i>	A string representation of the signal
<i>sig</i>	The specific signal sent to the process
<i>pid_name</i>	The name of the signal recipient
<i>sig_pid</i>	The PID of the process receiving the signal



## Name

probe::signal.syskill.return — Sending kill signal completed

## Synopsis

```
signal.syskill.return
```

## Values

None

## Name

probe::signal.systkill.return — Sending kill signal to a thread completed

## Synopsis

```
signal.systkill.return
```

## Values

*retstr*

The return value to either `__group_send_sig_info`,

*name*

Name of the probe point

## Name

probe::signal.wakeup — Sleeping process being wakened for signal

## Synopsis

signal.wakeup

## Values

*resume*

Indicates whether to wake up a task in a STOPPED or TRACED state

*state\_mask*

A string representation indicating the mask of task states to wake. Possible values are TASK\_INTERRUPTIBLE, TASK\_STOPPED, TASK\_TRACED, and TASK\_INTERRUPTIBLE.

*pid\_name*

Name of the process to wake

*sig\_pid*

The PID of the process to wake

---

# Chapter 18. Errno Tapset

This set of functions is used to handle errno number values. It contains the following function:

## Name

function::errno\_str — Symbolic string associated with error code

## Synopsis

```
errno_str:string(err:long)
```

## Arguments

*err*

The error number recieved

## Description

This function returns the symbolic string associated with the giver error code, such as ENOENT for the number 2, or E#3333 for an out-of-range value such as 3333.

## Name

function::return\_str — Formats the return value as a string

## Synopsis

```
return_str:string(format:long,ret:long)
```

## Arguments

*format*

Variable to determine return type base value

*ret*

Return value (typically \$return)

## Description

This function is used by the syscall tapset, and returns a string. Set format equal to 1 for a decimal, 2 for hex, 3 for octal.

Note that this function is preferred over `returnstr`.

## Name

function::returnstr — Formats the return value as a string

## Synopsis

```
returnstr:string(format:long)
```

## Arguments

*format*

Variable to determine return type base value

## Description

This function is used by the `nd_syscall` tapset, and returns a string. Set `format` equal to 1 for a decimal, 2 for hex, 3 for octal.

Note that this function should only be used in dwarfless probes (i.e. `'kprobe.function("foo")'`). Other probes should use `return_str`.

## Name

function::returnval — Possible return value of probed function

## Synopsis

```
returnval:long()
```

## Arguments

None

## Description

Return the value of the register in which function values are typically returned. Can be used in probes where `$return` isn't available. This is only a guess of the actual return value and can be totally wrong. Normally only used in dwarfless probes.



---

# Chapter 19. Directory-entry (dentry) Tapset

This family of functions is used to map kernel VFS directory entry pointers to file or full path names.

Directory-  
entry  
(den-  
try)  
Thrsset

## Name

function::d\_name — get the dirent name

## Synopsis

```
d_name:string(dentry:long)
```

## Arguments

*dentry*

Pointer to dentry.

## Description

Returns the dirent name (path basename).

Directory-  
entry  
(den-  
try)  
Thrsset

## Name

function::d\_path — get the full nameidata path

## Synopsis

```
d_path:string(nd:long)
```

## Arguments

*nd*

Pointer to nameidata.

## Description

Returns the full dirent name (full path to the root), like the kernel d\_path function.

Directory-  
entry  
(den-  
try)  
Thrsset

## Name

function::inode\_name — get the inode name

## Synopsis

```
inode_name:string(inode:long)
```

## Arguments

*inode*

Pointer to inode.

## Description

Returns the first path basename associated with the given inode.

Directory-  
entry  
(den-  
try)  
Thrsset

## Name

function::reverse\_path\_walk — get the full dirent path

## Synopsis

```
reverse_path_walk:string(dentry:long)
```

## Arguments

*dentry*

Pointer to dentry.

## Description

Returns the path name (partial path to mount point).

Directory-  
entry  
(den-  
try)  
Thrsset

## Name

function::task\_dentry\_path — get the full dentry path

## Synopsis

```
task_dentry_path:string(task:long,dentry:long,vfsmnt:long)
```

## Arguments

<i>task</i>	task_struct pointer.
<i>dentry</i>	dirent pointer.
<i>vfsmnt</i>	vfsmnt pointer.

## Description

Returns the full dirent name (full path to the root), like the kernel d\_path function.

---

# Chapter 20. Logging Tapset

This family of functions is used to send simple message strings to various destinations.

## Name

function::error — Send an error message

## Synopsis

```
error(msg:string)
```

## Arguments

*msg*

The formatted message string

## Description

An implicit end-of-line is added. `staprun` prepends the string “ERROR:”. Sending an error message aborts the currently running probe. Depending on the `MAXERRORS` parameter, it may trigger an `exit`.



## Name

function::exit — Start shutting down probing script.

## Synopsis

```
exit()
```

## Arguments

None

## Description

This only enqueues a request to start shutting down the script. New probes will not fire (except “end” probes), but all currently running ones may complete their work.

## Name

function::ftrace — Send a message to the ftrace ring-buffer

## Synopsis

```
ftrace(msg:string)
```

## Arguments

*msg*

The formatted message string

## Description

If the ftrace ring-buffer is configured & available, see `/debugfs/tracing/trace` for the message. Otherwise, the message may be quietly dropped. An implicit end-of-line is added.

## Name

function::log — Send a line to the common trace buffer

## Synopsis

```
log(msg:string)
```

## Arguments

*msg*

The formatted message string

## Description

This function logs data. `log` sends the message immediately to `staprun` and to the bulk transport (`relayfs`) if it is being used. If the last character given is not a newline, then one is added. This function is not as effecient as `printf` and should be used only for urgent messages.

## Name

function::printk — Send a message to the kernel trace buffer

## Synopsis

```
printk(level:long,msg:string)
```

## Arguments

*level*

an integer for the severity level (0=KERN\_EMERG  
... 7=KERN\_DEBUG)

*msg*

The formatted message string

## Description

Print a line of text to the kernel dmesg/console with the given severity. An implicit end-of-line is added. This function may not be safely called from all kernel probe contexts, so is restricted to guru mode only.

## Name

function::warn — Send a line to the warning stream

## Synopsis

```
warn(msg:string)
```

## Arguments

*msg*

The formatted message string

## Description

This function sends a warning message immediately to staprun. It is also sent over the bulk transport (relayfs) if it is being used. If the last character is not a newline, the one is added.

---

# Chapter 21. Queue Statistics Tapset

This family of functions is used to track performance of queuing systems.

## Name

function::qs\_done — Function to record finishing request

## Synopsis

```
qs_done(qname:string)
```

## Arguments

*qname*

the name of the service that finished

## Description

This function records that a request originally from the given queue has completed being serviced.

## Name

function::qs\_run — Function to record being moved from wait queue to being serviced

## Synopsis

```
qs_run(qname:string)
```

## Arguments

*qname*

the name of the service being moved and started

## Description

This function records that the previous enqueued request was removed from the given wait queue and is now being serviced.



## Name

function::qs\_wait — Function to record enqueue requests

## Synopsis

```
qs_wait(qname:string)
```

## Arguments

*qname*

the name of the queue requesting enqueue

## Description

This function records that a new request was enqueued for the given queue name.

## Name

function::qsq\_blocked — Returns the time request was on the wait queue

## Synopsis

```
qsq_blocked:long(qname:string, scale:long)
```

## Arguments

*qname*

queue name

*scale*

scale variable to take account for interval fraction

## Description

This function returns the fraction of elapsed time during which one or more requests were on the wait queue.

## Name

function::qsq\_print — Returns a line of statistics for the given queue

## Synopsis

```
qsq_print(qname:string)
```

## Arguments

*qname*

queue name

## Description

This function prints a line containing the following

### statistics for the given queue

the queue name, the average rate of requests per second, the average wait queue length, the average time on the wait queue, the average time to service a request, the percentage of time the wait queue was used, and the percentage of time request was being serviced.

## Name

function::qsq\_service\_time — Amount of time per request service

## Synopsis

```
qsq_service_time:long(qname:string,scale:long)
```

## Arguments

*qname*

queue name

*scale*

scale variable to take account for interval fraction

## Description

This function returns the average time in microseconds required to service a request once it is removed from the wait queue.

## Name

function::qsq\_start — Function to reset the stats for a queue

## Synopsis

```
qsq_start(qname:string)
```

## Arguments

*qname*

the name of the service that finished

## Description

This function resets the statistics counters for the given queue, and restarts tracking from the moment the function was called. This function is also used to create initialize a queue.

## Name

function::qsq\_throughput — Number of requests served per unit time

## Synopsis

```
qsq_throughput:long(qname:string, scale:long)
```

## Arguments

*qname*

queue name

*scale*

scale variable to take account for interval fraction

## Description

This function returns the average number of requests served per microsecond.

## Name

function::qsq\_utilization — Fraction of time that any request was being serviced

## Synopsis

```
qsq_utilization:long(qname:string, scale:long)
```

## Arguments

*qname*

queue name

*scale*

scale variable to take account for interval fraction

## Description

This function returns the average time in microseconds that at least one request was being serviced.

## Name

function::qsq\_wait\_queue\_length — length of wait queue

## Synopsis

```
qsq_wait_queue_length:long(qname:string,scale:long)
```

## Arguments

*qname*

queue name

*scale*

scale variable to take account for interval fraction

## Description

This function returns the average length of the wait queue



## Name

function::qsq\_wait\_time — Amount of time in queue + service per request

## Synopsis

```
qsq_wait_time:long(qname:string,scale:long)
```

## Arguments

*qname*

queue name

*scale*

scale variable to take account for interval fraction

## Description

This function returns the average time in microseconds that it took for a request to be serviced (qs\_wait to qa\_done).

---

# Chapter 22. Random functions Tapset

These functions deal with random number generation.

## Name

function::randint — Return a random number between [0,n)

## Synopsis

```
randint:long(n:long)
```

## Arguments

*n*

Number past upper limit of range, not larger than  $2^{*}20$ .

---

# Chapter 23. String and data retrieving functions Tapset

Functions to retrieve strings and other primitive types from the kernel or a user space programs based on addresses. All strings are of a maximum length given by MAXSTRINGLEN.

String  
and  
data  
re-  
triev-  
ing  
**Name**  
function::atomic\_long\_read — Retrieves an atomic long variable from kernel memory  
\_\_tapset

## Synopsis

```
atomic_long_read:long(addr:long)
```

## Arguments

*addr* pointer to atomic long variable

## Description

Safely perform the read of an atomic long variable. This will be a NOP on kernels that do not have ATOMIC\_LONG\_INIT set on the kernel config.

String  
and  
data  
re-  
triev-  
ing  
Name  
functions  
\_\_apset

`function::atomic_read` — Retrieves an atomic variable from kernel memory

## Synopsis

```
atomic_read:long(addr:long)
```

## Arguments

*addr* pointer to atomic variable

## Description

Safely perform the read of an atomic variable.

Name

functions  
lapset

## Synopsis

```
kernel_char:long(addr:long)
```

## Arguments

*addr*

The kernel address to retrieve the char from

## Description

Returns the char value from a given kernel memory address. Reports an error when reading from the given address fails.

String  
and  
data  
re-  
triev-  
ing  
Name  
function::kernel\_int — Retrieves an int value stored in kernel memory  
\_\_tapset

## Synopsis

```
kernel_int:long(addr:long)
```

## Arguments

*addr* The kernel address to retrieve the int from

## Description

Returns the int value from a given kernel memory address. Reports an error when reading from the given address fails.



# Name

functions  
function  
lapset

## Synopsis

```
kernel_long:long(addr:long)
```

## Arguments

$$addr$$

The kernel address to retrieve the long from

## Description

Returns the long value from a given kernel memory address. Reports an error when reading from the given address fails.

String  
and  
data  
re-  
triev-  
ing  
Name  
functions  
\_\_tapset

`function::kernel_pointer` — Retrieves a pointer value stored in kernel memory

## Synopsis

```
kernel_pointer:long(addr:long)
```

## Arguments

*addr* The kernel address to retrieve the pointer from

## Description

Returns the pointer value from a given kernel memory address. Reports an error when reading from the given address fails.

String  
and  
data  
re-  
triev-  
ing  
**Name**  
function::kernel\_short — Retrieves a short value stored in kernel memory  
\_\_tapset

## Synopsis

```
kernel_short:long(addr:long)
```

## Arguments

*addr* The kernel address to retrieve the short from

## Description

Returns the short value from a given kernel memory address. Reports an error when reading from the given address fails.

String  
and  
data  
re-  
triev-  
ing  
**Name**  
function::kernel\_string — Retrieves string from kernel memory  
\_\_tapset

## Synopsis

```
kernel_string:string(addr:long)
```

## Arguments

*addr* The kernel address to retrieve the string from

## Description

This function returns the null terminated C string from a given kernel memory address. Reports an error on string copy fault.

String  
and  
data  
re-  
triev-  
ing  
Name  
functions  
\_\_tapset

## Name

function::kernel\_string2 — Retrieves string from kernel memory with alternative error string

## Synopsis

```
kernel_string2:string(addr:long,err_msg:string)
```

## Arguments

*addr*

The kernel address to retrieve the string from

*err\_msg*

The error message to return when data isn't available

## Description

This function returns the null terminated C string from a given kernel memory address. Reports the given error message on string copy fault.

String  
and  
data  
re-  
triev-  
ing  
**Name**  
function: `kernel_string_n` — Retrieves string of given length from kernel memory  
\_\_tapset

## Synopsis

```
kernel_string_n:string(addr:long,n:long)
```

## Arguments

<i>addr</i>	The kernel address to retrieve the string from
<i>n</i>	The maximum length of the string (if not null terminated)

## Description

Returns the C string of a maximum given length from a given kernel memory address. Reports an error on string copy fault.

String  
and  
data  
re-  
triev-  
ing  
**Name**  
function: user\_char — Retrieves a char value stored in user space  
\_\_tapset

## Synopsis

```
user_char:long(addr:long)
```

## Arguments

*addr* the user space address to retrieve the char from

## Description

Returns the char value from a given user space address. Returns zero when user space data is not accessible.

String  
and  
data  
re-  
triev-  
ing  
Name  
function::user\_char\_warn — Retrieves a char value stored in user space  
\_\_tapset

## Synopsis

```
user_char_warn:long(addr:long)
```

## Arguments

*addr* the user space address to retrieve the char from

## Description

Returns the char value from a given user space address. Returns zero when user space and warns (but does not abort) about the failure.



String  
and  
data  
re-  
triev-  
ing  
**Name**  
function::user\_int — Retrieves an int value stored in user space  
\_\_tapset

## Synopsis

```
user_int:long(addr:long)
```

## Arguments

*addr* the user space address to retrieve the int from

## Description

Returns the int value from a given user space address. Returns zero when user space data is not accessible.

String  
and  
data  
re-  
triev-  
ing  
the  
function  
\_\_tapset

## Name

function::user\_int16 — Retrieves a 16-bit integer value stored in user space

## Synopsis

```
user_int16:long(addr:long)
```

## Arguments

<i>addr</i>	the user space address to retrieve the 16-bit integer from
-------------	--

## Description

Returns the 16-bit integer value from a given user space address. Returns zero when user space data is not accessible.

String  
and  
data  
re-  
triev-  
ing  
**Name**  
function::user\_int32 — Retrieves a 32-bit integer value stored in user space  
\_\_tapset

## Synopsis

```
user_int32:long(addr:long)
```

## Arguments

*addr* the user space address to retrieve the 32-bit integer from

## Description

Returns the 32-bit integer value from a given user space address. Returns zero when user space data is not accessible.

String  
and  
data  
re-  
triev-  
ing  
**Name**  
function::user\_int64 — Retrieves a 64-bit integer value stored in user space  
\_\_tapset

## Synopsis

```
user_int64:long(addr:long)
```

## Arguments

*addr* the user space address to retrieve the 64-bit integer from

## Description

Returns the 64-bit integer value from a given user space address. Returns zero when user space data is not accessible.

String  
and  
data  
re-  
triev-  
ing  
the  
functions  
\_\_tapset

## Name

function::user\_int8 — Retrieves a 8-bit integer value stored in user space

## Synopsis

```
user_int8:long(addr:long)
```

## Arguments

*addr* the user space address to retrieve the 8-bit integer from

## Description

Returns the 8-bit integer value from a given user space address. Returns zero when user space data is not accessible.

String  
and  
data  
re-  
triev-  
ing  
**Name**  
function::user\_int\_warn — Retrieves an int value stored in user space  
\_\_tapset

## Synopsis

```
user_int_warn:long(addr:long)
```

## Arguments

*addr* the user space address to retrieve the int from

## Description

Returns the int value from a given user space address. Returns zero when user space and warns (but does not abort) about the failure.

String  
and  
data  
re-  
triev-  
ing  
**Name**  
function::user\_long — Retrieves a long value stored in user space  
\_\_apset

## Synopsis

```
user_long:long(addr:long)
```

## Arguments

*addr* the user space address to retrieve the long from

## Description

Returns the long value from a given user space address. Returns zero when user space data is not accessible. Note that the size of the long depends on the architecture of the current user space task (for those architectures that support both 64/32 bit compat tasks).

String  
and  
data  
re-  
triev-  
ing  
**Name**  
function::user\_long\_warn — Retrieves a long value stored in user space  
\_\_apset

## Synopsis

```
user_long_warn:long(addr:long)
```

## Arguments

*addr* the user space address to retrieve the long from

## Description

Returns the long value from a given user space address. Returns zero when user space and warns (but does not abort) about the failure. Note that the size of the long depends on the architecture of the current user space task (for those architectures that support both 64/32 bit compat tasks).



String  
and  
data  
re-  
triev-  
ing  
Name  
functions  
\_\_tapset

`function::user_short` — Retrieves a short value stored in user space

## Synopsis

```
user_short:long(addr:long)
```

## Arguments

*addr* the user space address to retrieve the short from

## Description

Returns the short value from a given user space address. Returns zero when user space data is not accessible.

String  
and  
data  
re-  
triev-  
ing  
Name  
functions  
\_\_tapset

`function::user_short_warn` — Retrieves a short value stored in user space

## Synopsis

```
user_short_warn:long(addr:long)
```

## Arguments

*addr* the user space address to retrieve the short from

## Description

Returns the short value from a given user space address. Returns zero when user space and warns (but does not abort) about the failure.

String  
and  
data  
re-  
triev-  
ing  
**Name**  
function::user\_string — Retrieves string from user space

## Synopsis

```
user_string:string(addr:long)
```

## Arguments

*addr* the user space address to retrieve the string from

## Description

Returns the null terminated C string from a given user space memory address. Reports “<unknown>” on the rare cases when userspace data is not accessible.

String  
and  
data  
re-  
triev-  
ing  
**Name**  
functions  
\_\_tapset  
function::user\_string2 — Retrieves string from user space with alternative error string

## Synopsis

```
user_string2:string(addr:long,err_msg:string)
```

## Arguments

<i>addr</i>	the user space address to retrieve the string from
<i>err_msg</i>	the error message to return when data isn't available

## Description

Returns the null terminated C string from a given user space memory address. Reports the given error message on the rare cases when userspace data is not accessible.

String  
and  
data  
re-  
triev-  
ing  
**Name**  
function::user\_string\_n — Retrieves string of given length from user space  
\_\_apset

## Synopsis

```
user_string_n:string(addr:long,n:long)
```

## Arguments

<i>addr</i>	the user space address to retrieve the string from
<i>n</i>	the maximum length of the string (if not null terminated)

## Description

Returns the C string of a maximum given length from a given user space address. Returns “<unknown>” on the rare cases when userspace data is not accessible at the given address.

String  
and  
data  
re-  
triev-  
ing  
**Name**  
function::user\_string\_n2 — Retrieves string of given length from user space  
\_\_tapset

## Synopsis

```
user_string_n2:string(addr:long,n:long,err_msg:string)
```

## Arguments

<i>addr</i>	the user space address to retrieve the string from
<i>n</i>	the maximum length of the string (if not null terminated)
<i>err_msg</i>	the error message to return when data isn't available

## Description

Returns the C string of a maximum given length from a given user space address. Returns the given error message string on the rare cases when userspace data is not accessible at the given address.

String  
and  
data  
re-  
triev-  
ing  
Name  
function::user\_string\_n\_quoted — Retrieves and quotes string from user space  
\_\_tapset

## Synopsis

```
user_string_n_quoted:string(addr:long,n:long)
```

## Arguments

<i>addr</i>	the user space address to retrieve the string from
<i>n</i>	the maximum length of the string (if not null terminated)

## Description

Returns up to *n* characters of a C string from the given user space memory address where any ASCII characters that are not printable are replaced by the corresponding escape sequence in the returned string. Reports “NULL” for address zero. Returns “<unknown>” on the rare cases when userspace data is not accessible at the given address.

String  
and  
data  
re-  
triev-  
ing  
**Name**  
function::user\_string\_n\_warn — Retrieves string from user space  
\_\_tapset

## Synopsis

```
user_string_n_warn:string(addr:long,n:long)
```

## Arguments

<i>addr</i>	the user space address to retrieve the string from
<i>n</i>	the maximum length of the string (if not null terminated)

## Description

Returns up to *n* characters of a C string from a given user space memory address. Reports “<unknown>” on the rare cases when userspace data is not accessible and warns (but does not abort) about the failure.



String  
and  
data  
re-  
triev-  
ing  
**Name**  
function::user\_string\_quoted — Retrieves and quotes string from user space  
\_\_apset

## Synopsis

```
user_string_quoted:string(addr:long)
```

## Arguments

*addr* the user space address to retrieve the string from

## Description

Returns the null terminated C string from a given user space memory address where any ASCII characters that are not printable are replaced by the corresponding escape sequence in the returned string. Reports “NULL” for address zero. Returns “<unknown>” on the rare cases when userspace data is not accessible at the given address.

String  
and  
data  
re-  
triev-  
ing  
**Name**  
function::user\_string\_warn — Retrieves string from user space

## Synopsis

```
user_string_warn:string(addr:long)
```

## Arguments

*addr* the user space address to retrieve the string from

## Description

Returns the null terminated C string from a given user space memory address. Reports “<unknown>” on the rare cases when userspace data is not accessible and warns (but does not abort) about the failure.

String  
and  
data  
re-  
triev-  
ing  
Name  
function::user\_uint16 — Retrieves an unsigned 16-bit integer value stored in user space  
\_\_tapset

## Synopsis

```
user_uint16:long(addr:long)
```

## Arguments

<i>addr</i>	the user space address to retrieve the unsigned 16-bit integer from
-------------	---

## Description

Returns the unsigned 16-bit integer value from a given user space address. Returns zero when user space data is not accessible.

String  
and  
data  
re-  
triev-  
ing  
Name  
functions  
\_\_tapset

## Name

function::user\_uint32 — Retrieves an unsigned 32-bit integer value stored in user space

## Synopsis

```
user_uint32:long(addr:long)
```

## Arguments

<i>addr</i>	the user space address to retrieve the unsigned 32-bit integer from
-------------	---

## Description

Returns the unsigned 32-bit integer value from a given user space address. Returns zero when user space data is not accessible.

String  
and  
data  
re-  
triev-  
ing  
**Name**  
function::user\_uint64 — Retrieves an unsigned 64-bit integer value stored in user space  
\_\_tapset

## Synopsis

```
user_uint64:long(addr:long)
```

## Arguments

<i>addr</i>	the user space address to retrieve the unsigned 64-bit integer from
-------------	---

## Description

Returns the unsigned 64-bit integer value from a given user space address. Returns zero when user space data is not accessible.

String  
and  
data  
re-  
triev-  
ing  
**Name**  
function::user\_uint8 — Retrieves an unsigned 8-bit integer value stored in user space

## Synopsis

```
user_uint8:long(addr:long)
```

## Arguments

<i>addr</i>	the user space address to retrieve the unsigned 8-bit integer from
-------------	--

## Description

Returns the unsigned 8-bit integer value from a given user space address. Returns zero when user space data is not accessible.

String  
and  
data  
re-  
triev-  
ing  
**Name**  
function::user\_ushort — Retrieves an unsigned short value stored in user space  
\_\_apset

## Synopsis

```
user_ushort:long(addr:long)
```

## Arguments

*addr* the user space address to retrieve the unsigned short from

## Description

Returns the unsigned short value from a given user space address. Returns zero when user space data is not accessible.

String  
and  
data  
re-  
triev-  
ing  
**Name**  
functions  
\_\_tapset  
function::user\_ushort\_warn — Retrieves an unsigned short value stored in user space

## Synopsis

```
user_ushort_warn:long(addr:long)
```

## Arguments

<i>addr</i>	the user space address to retrieve the unsigned short from
-------------	--

## Description

Returns the unsigned short value from a given user space address. Returns zero when user space and warns (but does not abort) about the failure.



---

# Chapter 24. String and data writing functions Tapset

The SystemTap guru mode can be used to test error handling in kernel code by simulating faults. The functions in the this tapset provide standard methods of writing to primitive types in the kernel's memory. All the functions in this tapset require the use of guru mode (**-g**).

String  
and  
data  
writ-  
ing  
Name

function::set\_kernel\_char — Writes a char value to kernel memory

## Synopsis

```
set_kernel_char(addr:long, val:long)
```

## Arguments

*addr*

The kernel address to write the char to

*val*

The char which is to be written

## Description

Writes the char value to a given kernel memory address. Reports an error when writing to the given address fails. Requires the use of guru mode (-g).

String  
and  
data  
writ-  
ing  
Name

function::set\_kernel\_int — Writes an int value to kernel memory

## Synopsis

```
set_kernel_int(addr:long, val:long)
```

## Arguments

*addr*

The kernel address to write the int to

*val*

The int which is to be written

## Description

Writes the int value to a given kernel memory address. Reports an error when writing to the given address fails. Requires the use of guru mode (-g).

String  
and  
data  
writ-  
ing  
Name  
functions

`function::set_kernel_long` — Writes a long value to kernel memory

## Synopsis

```
set_kernel_long(addr:long, val:long)
```

## Arguments

*addr*

The kernel address to write the long to

*val*

The long which is to be written

## Description

Writes the long value to a given kernel memory address. Reports an error when writing to the given address fails. Requires the use of guru mode (-g).

String  
and  
data  
writ-  
ing  
Name  
functions

`function::set_kernel_pointer` — Writes a pointer value to kernel memory.

## Synopsis

```
set_kernel_pointer(addr:long, val:long)
```

## Arguments

*addr*

The kernel address to write the pointer to

*val*

The pointer which is to be written

## Description

Writes the pointer value to a given kernel memory address. Reports an error when writing to the given address fails. Requires the use of guru mode (-g).

String  
and  
data  
writ-  
ing  
Name  
functions

`function::set_kernel_short` — Writes a short value to kernel memory

## Synopsis

```
set_kernel_short (addr:long, val:long)
```

## Arguments

*addr*

The kernel address to write the short to

*val*

The short which is to be written

## Description

Writes the short value to a given kernel memory address. Reports an error when writing to the given address fails. Requires the use of guru mode (-g).

String  
and  
data  
writ-  
ing  
Name

function::set\_kernel\_string — Writes a string to kernel memory

## Synopsis

```
set_kernel_string(addr:long, val:string)
```

## Arguments

*addr*

The kernel address to write the string to

*val*

The string which is to be written

## Description

Writes the given string to a given kernel memory address. Reports an error on string copy fault. Requires the use of guru mode (-g).

String  
and  
data  
writ-  
ing  
functions

## Name

`function::set_kernel_string_n` — Writes a string of given length to kernel memory

## Synopsis

```
set_kernel_string_n(addr:long,n:long,val:string)
```

## Arguments

<i>addr</i>	The kernel address to write the string to
<i>n</i>	The maximum length of the string
<i>val</i>	The string which is to be written

## Description

Writes the given string up to a maximum given length to a given kernel memory address. Reports an error on string copy fault. Requires the use of guru mode (-g).



---

# Chapter 25. A collection of standard string functions

Functions to get the length, a substring, getting at individual characters, string searching, escaping, tokenizing, and converting strings to longs.

A  
col-  
lec-  
tion  
of  
stan-  
dard  
string  
func-  
tions

**Name**

`function::isdigit` — Checks for a digit

## Synopsis

```
isdigit:long(str:string)
```

## Arguments

<i>str</i>	string to check
------------	-----------------

## Description

Checks for a digit (0 through 9) as the first character of a string. Returns non-zero if true, and a zero if false.

A  
col-  
lec-  
tion  
of  
stan-  
dard  
string  
func-  
tions

# Name

function::isinstr — Returns whether a string is a substring of another string

## Synopsis

```
isinstr:long(s1:string,s2:string)
```

## Arguments

<i>s1</i>	string to search in
<i>s2</i>	substring to find

## Description

This function returns 1 if string *s1* contains *s2*, otherwise zero.

## Name

`function::str_replace` — `str_replace` Replaces all instances of a substring with another

## Synopsis

```
str_replace:string(prnt_str:string, srch_str:string, rplc_str:string)
```

## Arguments

*prnt\_str*

the string to search and replace in

*srch\_str*

the substring which is used to search in *prnt\_str*  
string

*rplc\_str*

the substring which is used to replace *srch\_str*

## Description

This function returns the given string with substrings replaced.

A  
col-  
lec-  
tion  
of  
stan-  
dard  
string  
func-  
tions

## Name

`function::stringat` — Returns the char at a given position in the string

## Synopsis

```
stringat:long(str:string,pos:long)
```

## Arguments

*str*

the string to fetch the character from

*pos*

the position to get the character from (first character is 0)

## Description

This function returns the character at a given position in the string or zero if the string doesn't have as many characters.

A  
col-  
lec-  
tion  
of  
stan-  
dard  
string  
func-  
tions

# Name

`function::strlen` — Returns the length of a string

## Synopsis

```
strlen:long(s:string)
```

## Arguments

*s* the string

## Description

This function returns the length of the string, which can be zero up to MAXSTRINGLEN.

A  
col-  
lec-  
tion  
of  
stan-  
dard  
string  
func-  
tions

**Name**

function::strtol — strtol - Convert a string to a long

## Synopsis

```
strtol:long(str:string,base:long)
```

## Arguments

<i>str</i>	string to convert
<i>base</i>	the base to use

## Description

This function converts the string representation of a number to an integer. The *base* parameter indicates the number base to assume for the string (eg. 16 for hex, 8 for octal, 2 for binary).

A  
col-  
lec-  
tion  
of  
Name  
string  
function::substr — Returns a substring  
func-  
tions

## Synopsis

```
substr:string(str:string, start:long, length:long)
```

## Arguments

<i>str</i>	the string to take a substring from
<i>start</i>	starting position of the extracted string (first character is 0)
<i>length</i>	length of string to return

## Description

Returns the substring of the given string at the given start position with the given length (or smaller if the length of the original string is less than start + length, or length is bigger than MAXSTRINGLEN).



A  
col-  
lec-  
tion  
of  
stan-  
dard  
string  
func-  
tions

## Name

`function::text_str` — Escape any non-printable chars in a string

## Synopsis

```
text_str:string(input:string)
```

## Arguments

*input*

the string to escape

## Description

This function accepts a string argument, and any ASCII characters that are not printable are replaced by the corresponding escape sequence in the returned string.

A  
col-  
lec-  
tion  
of  
Name  
string  
func-  
tions

**Name**

`function::text_strn` — Escape any non-printable chars in a string

## Synopsis

```
text_strn:string(input:string, len:long, quoted:long)
```

## Arguments

<i>input</i>	the string to escape
<i>len</i>	maximum length of string to return (0 implies MAXSTRINGLEN)
<i>quoted</i>	put double quotes around the string. If input string is truncated it will have “...” after the second quote

## Description

This function accepts a string of designated length, and any ASCII characters that are not printable are replaced by the corresponding escape sequence in the returned string.

A  
col-  
lec-  
tion  
of  
Name  
string  
functions  
function::tokenize — Return the next non-empty token in a string

## Synopsis

```
tokenize:string(input:string, delim:string)
```

## Arguments

<i>input</i>	string to tokenize. If NULL, returns the next non-empty token in the string passed in the previous call to <code>tokenize</code> .
<i>delim</i>	set of characters that delimit the tokens

## Description

This function returns the next non-empty token in the given input string, where the tokens are delimited by characters in the `delim` string. If the input string is non-NULL, it returns the first token. If the input string is NULL, it returns the next token in the string passed in the previous call to `tokenize`. If no delimiter is found, the entire remaining input string is returned. It returns NULL when no more tokens are available.

---

## Chapter 26. Utility functions for using ansi control chars in logs

Utility functions for logging using ansi control characters. This lets you manipulate the cursor position and character color output and attributes of log messages.

## Name

function::ansi\_clear\_screen — Move cursor to top left and clear screen.

## Synopsis

```
ansi_clear_screen()
```

## Arguments

None

## Description

Sends ansi code for moving cursor to top left and then the ansi code for clearing the screen from the cursor position to the end.

Util-  
ity  
func-  
tions  
for  
**Name**  
ansi-  
control  
chars  
in  
logs

function::ansi\_cursor\_hide — Hides the cursor.

## Synopsis

```
ansi_cursor_hide()
```

## Arguments

None

## Description

Sends ansi code for hiding the cursor.

Utility  
functions  
for  
**Name**  
ansi\_cursor\_move — Move cursor to new coordinates.  
Control  
chars  
in  
logs  
**Synopsis**

```
ansi_cursor_move(x:long,y:long)
```

## Arguments

<i>x</i>	Row to move the cursor to.
<i>y</i>	Column to move the cursor to.

## Description

Sends ansi code for positioning the cursor at row *x* and column *y*. Coordinates start at one, (1,1) is the top-left corner.

## Name

function::ansi\_cursor\_restore — Restores a previously saved cursor position.

## Synopsis

```
ansi_cursor_restore()
```

## Arguments

None

## Description

Sends ansi code for restoring the current cursor position previously saved with `ansi_cursor_save`.



Util-  
ity  
func-  
tions  
for  
**Name**  
ansi-  
control  
chars  
in  
logs  
function::ansi\_cursor\_save — Saves the cursor position.

## Synopsis

```
ansi_cursor_save()
```

## Arguments

None

## Description

Sends ansi code for saving the current cursor position.

Util-  
ity  
func-  
tions  
for  
**Name**  
ansi-  
control  
chars  
in  
logs

function::ansi\_cursor\_show — Shows the cursor.

## Synopsis

```
ansi_cursor_show()
```

## Arguments

None

## Description

Sends ansi code for showing the cursor.

Util-  
ity  
func-  
tions  
for  
**Name**  
ansi\_ansi\_new\_line — Move cursor to new line.  
ctrl  
chars  
in  
logs  
**Synopsis**

```
ansi_new_line()
```

## Arguments

None

## Description

Sends ansi code new line.

Util-  
ity  
func-  
tions  
for  
**Name**  
ansi::ansi\_reset\_color — Resets Select Graphic Rendition mode.  
control  
chars  
in  
logs

## Synopsis

```
ansi_reset_color()
```

## Arguments

None

## Description

Sends ansi code to reset foreground, background and color attribute to default values.

Util-  
ity  
func-  
tions  
for  
Name  
ansi-  
ctrl  
chars  
in  
logs

## Name

function::ansi\_set\_color — Set the ansi Select Graphic Rendition mode.

## Synopsis

```
ansi_set_color (fg:long)
```

## Arguments

*fg*

Foreground color to set.

## Description

Sends ansi code for Select Graphic Rendition mode for the given foreground color. Black (30), Blue (34), Green (32), Cyan (36), Red (31), Purple (35), Brown (33), Light Gray (37).

Util-  
ity  
func-  
tions  
for  
ansi-  
control  
chars  
in  
logs

## Name

function::ansi\_set\_color2 — Set the ansi Select Graphic Rendition mode.

## Synopsis

```
ansi_set_color2 (fg:long, bg:long)
```

## Arguments

<i>fg</i>	Foreground color to set.
<i>bg</i>	Background color to set.

## Description

Sends ansi code for Select Graphic Rendition mode for the given foreground color, Black (30), Blue (34), Green (32), Cyan (36), Red (31), Purple (35), Brown (33), Light Gray (37) and the given background color, Black (40), Red (41), Green (42), Yellow (43), Blue (44), Magenta (45), Cyan (46), White (47).

Util-  
ity  
func-  
tions  
for  
ansi-  
control  
chars  
in  
logs

## Name

function::ansi\_set\_color3 — Set the ansi Select Graphic Rendition mode.

## Synopsis

```
ansi_set_color3 (fg:long,bg:long,attr:long)
```

## Arguments

<i>fg</i>	Foreground color to set.
<i>bg</i>	Background color to set.
<i>attr</i>	Color attribute to set.

## Description

Sends ansi code for Select Graphic Rendition mode for the given foreground color, Black (30), Blue (34), Green (32), Cyan (36), Red (31), Purple (35), Brown (33), Light Gray (37), the given background color, Black (40), Red (41), Green (42), Yellow (43), Blue (44), Magenta (45), Cyan (46), White (47) and the color attribute All attributes off (0), Intensity Bold (1), Underline Single (4), Blink Slow (5), Blink Rapid (6), Image Negative (7).

Utility  
functions  
for  
**Name**  
ansi-  
control  
chars  
in  
logs  
function::indent — returns an amount of space to indent

## Synopsis

```
indent:string(delta:long)
```

## Arguments

*delta* the amount of space added/removed for each call

## Description

This function returns a string with appropriate indentation. Call it with a small positive or matching negative delta. Unlike the `thread_indent` function, the `indent` does not track individual indent values on a per thread basis.



Util-  
ity  
func-  
tions  
for  
ansi-  
trol  
chars  
in  
logs

# Name

function::thread\_indent — returns an amount of space with the current task information

# Synopsis

```
thread_indent:string(delta:long)
```

# Arguments

*delta* the amount of space added/removed for each call

# Description

This function returns a string with appropriate indentation for a thread. Call it with a small positive or matching negative delta. If this is the real outermost, initial level of indentation, then the function resets the relative timestamp base to zero. An example is shown at the end of this file.

---

# Chapter 27. SystemTap Translator Tapset

This family of user-space probe points is used to probe the operation of the SystemTap translator (**stap**) and run command (**staprun**). The tapset includes probes to watch the various phases of SystemTap and SystemTap's management of instrumentation cache. It contains the following probe points:

## Name

probe::stap.cache\_add\_mod — Adding kernel instrumentation module to cache

## Synopsis

```
stap.cache_add_mod
```

## Values

*dest\_path*

the path the .ko file is going to (incl filename)

*source\_path*

the path the .ko file is coming from (incl filename)

## Description

Fires just before the file is actually moved. Note: if moving fails, cache\_add\_src and cache\_add\_nss will not fire.

## Name

probe::stap.cache\_add\_nss — Add NSS (Network Security Services) information to cache

## Synopsis

stap.cache\_add\_nss

## Values

<i>dest_path</i>	the path the .sgn file is coming from (incl filename)
<i>source_path</i>	the path the .sgn file is coming from (incl filename)

## Description

Fires just before the file is actually moved. Note: stap must compiled with NSS support; if moving the kernel module fails, this probe will not fire.

## Name

probe::stap.cache\_add\_src — Adding C code translation to cache

## Synopsis

```
stap.cache_add_src
```

## Values

*dest\_path*

the path the .c file is going to (incl filename)

*source\_path*

the path the .c file is coming from (incl filename)

## Description

Fires just before the file is actually moved. Note: if moving the kernel module fails, this probe will not fire.

## Name

probe::stap.cache\_clean — Removing file from stap cache

## Synopsis

```
stap.cache_clean
```

## Values

<i>path</i>	the path to the .ko/.c file being removed
-------------	---

## Description

Fires just before the call to unlink the module/source file.

## Name

probe::stap.cache\_get — Found item in stap cache

## Synopsis

stap.cache\_get

## Values

*source\_path*

the path of the .c source file

*module\_path*

the path of the .ko kernel module file

## Description

Fires just before the return of get\_from\_cache, when the cache grab is successful.

## Name

probe::stap.pass0 — Starting stap pass0 (parsing command line arguments)

## Synopsis

stap.pass0

## Values

*session*

the systemtap\_session variable s

## Description

pass0 fires after command line arguments have been parsed.



## Name

probe::stap.pass0.end — Finished stap pass0 (parsing command line arguments)

## Synopsis

```
stap.pass0.end
```

## Values

*session*

the systemtap\_session variable s

## Description

pass0.end fires just before the `gettimeofday` call for pass1.

## Name

probe::stap.pass1.end — Finished stap pass1 (parsing scripts)

## Synopsis

```
stap.pass1.end
```

## Values

*session*

the systemtap\_session variable s

## Description

pass1.end fires just before the jump to cleanup if s.last\_pass = 1.

## Name

probe::stap.pass1a — Starting stap pass1 (parsing user script)

## Synopsis

stap.pass1a

## Values

*session*

the systemtap\_session variable s

## Description

pass1a fires just after the call to `gettimeofday`, before the user script is parsed.

## Name

probe::stap.pass1b — Starting stap pass1 (parsing library scripts)

## Synopsis

```
stap.pass1b
```

## Values

*session*

the systemtap\_session variable s

## Description

pass1b fires just before the library scripts are parsed.

## Name

probe::stap.pass2 — Starting stap pass2 (elaboration)

## Synopsis

stap.pass2

## Values

*session*

the systemtap\_session variable s

## Description

pass2 fires just after the call to `gettimeofday`, just before the call to `semantic_pass`.

## Name

probe::stap.pass2.end — Finished stap pass2 (elaboration)

## Synopsis

```
stap.pass2.end
```

## Values

*session*

the systemtap\_session variable s

## Description

pass2.end fires just before the jump to cleanup if s.last\_pass = 2

## Name

probe::stap.pass3 — Starting stap pass3 (translation to C)

## Synopsis

```
stap.pass3
```

## Values

*session*

the systemtap\_session variable s

## Description

pass3 fires just after the call to `gettimeofday`, just before the call to `translate_pass`.

## Name

probe::stap.pass3.end — Finished stap pass3 (translation to C)

## Synopsis

```
stap.pass3.end
```

## Values

*session*

the systemtap\_session variable *s*

## Description

pass3.end fires just before the jump to cleanup if s.last\_pass = 3



## Name

probe::stap.pass4 — Starting stap pass4 (compile C code into kernel module)

## Synopsis

stap.pass4

## Values

*session*

the systemtap\_session variable s

## Description

pass4 fires just after the call to `gettimeofday`, just before the call to `compile_pass`.

## Name

probe::stap.pass4.end — Finished stap pass4 (compile C code into kernel module)

## Synopsis

```
stap.pass4.end
```

## Values

*session*

the systemtap\_session variable s

## Description

pass4.end fires just before the jump to cleanup if s.last\_pass = 4

## Name

probe::stap.pass5 — Starting stap pass5 (running the instrumentation)

## Synopsis

stap.pass5

## Values

*session*

the systemtap\_session variable s

## Description

pass5 fires just after the call to `gettimeofday`, just before the call to `run_pass`.

## Name

probe::stap.pass5.end — Finished stap pass5 (running the instrumentation)

## Synopsis

```
stap.pass5.end
```

## Values

*session*

the systemtap\_session variable s

## Description

pass5.end fires just before the cleanup label

## Name

probe::stap.pass6 — Starting stap pass6 (cleanup)

## Synopsis

stap.pass6

## Values

*session*

the systemtap\_session variable s

## Description

pass6 fires just after the cleanup label, essentially the same spot as pass5.end

probe::stap.pass6.end — Finished stap pass6 (cleanup)

## Synopsis

```
stap.pass6.end
```

## Values

*session*

the systemtap\_session variable s

## Description

pass6.end fires just before main's return.

## Name

probe::stap.system — Starting a command from stap

## Synopsis

```
stap.system
```

## Values

*command*

the command string to be run by posix\_spawn (as sh  
-c <str>)

## Description

Fires at the entry of the stap\_system command.

## Name

probe::stap.system.return — Finished a command from stap

## Synopsis

```
stap.system.return
```

## Values

*ret*

a return code associated with running waitpid on the spawned process; a non-zero value indicates error

## Description

Fires just before the return of the stap\_system function, after waitpid.



probe::stap.system.spawn — stap spawned new process

## Synopsis

```
stap.system.spawn
```

## Values

*ret*

the return value from `posix_spawn`

*pid*

the pid of the spawned process

## Description

Fires just after the call to `posix_spawn`.

## Name

probe::stapio.receive\_control\_message — Recieved a control message

## Synopsis

```
stapio.receive_control_message
```

## Values

<i>len</i>	the length (in bytes) of the data blob
<i>data</i>	a ptr to a binary blob of data sent as the control message
<i>type</i>	type of message being send; defined in run-time/transport/transport_msgs.h

## Description

Fires just after a message was receieved and before it's processed.

## Name

probe::staprun.insert\_module — Inserting SystemTap instrumentation module

## Synopsis

```
staprun.insert_module
```

## Values

*path*

the full path to the .ko kernel module about to be inserted

## Description

Fires just before the call to insert the module.

## Name

probe::staprun.remove\_module — Removing SystemTap instrumentation module

## Synopsis

```
staprun.remove_module
```

## Values

*name*

the stap module name to be removed (without the .ko extension)

## Description

Fires just before the call to remove the module.

## Name

probe::staprun.send\_control\_message — Sending a control message

## Synopsis

```
staprun.send_control_message
```

## Values

<i>len</i>	the length (in bytes) of the data blob
<i>data</i>	a ptr to a binary blob of data sent as the control message
<i>type</i>	type of message being send; defined in run-time/transport/transport_msgs.h

## Description

Fires at the beginning of the send\_request function.

---

# Chapter 28. Network File Storage Tapsets

This family of probe points is used to probe network file storage functions and operations.

## Name

function::nfsderror — Convert nfsd error number into string

## Synopsis

```
nfsderror:string(err:long)
```

## Arguments

*err*

errnum

## Description

This function returns a string for the error number passed into the function.

# Name

probe::nfs.aop.readpage — NFS client synchronously reading a page

## Synopsis

nfs.aop.readpage

## Values

<i>i_size</i>	file length in bytes
<i>dev</i>	device identifier
<i>rsize</i>	read size (in bytes)
<i>sb_flag</i>	super block flags
<i>file</i>	file argument
<i>page_index</i>	offset within mapping, can used a page identifier and position identifier in the page frame
<i>__page</i>	the address of page
<i>size</i>	number of pages to be read in this execution
<i>i_flag</i>	file flags
<i>ino</i>	inode number

## Description

Read the page over, only fires when a previous async read operation failed



## Name

probe::nfs.aop.readpages — NFS client reading multiple pages

## Synopsis

`nfs.aop.readpages`

## Values

<i>dev</i>	device identifier
<i>rsize</i>	read size (in bytes)
<i>file</i>	filp argument
<i>size</i>	number of pages attempted to read in this execution
<i>nr_pages</i>	number of pages attempted to read in this execution
<i>rpages</i>	read size (in pages)
<i>ino</i>	inode number

## Description

Fires when in readahead way, read several pages once

## Name

probe::nfs.aop.release\_page — NFS client releasing page

## Synopsis

`nfs.aop.release_page`

## Values

*dev*

device identifier

*page\_index*

offset within mapping, can used a page identifier and position identifier in the page frame

*\_\_page*

the address of page

*size*

release pages

*ino*

inode number

## Description

Fires when do a release operation on NFS.

## Name

probe::nfs.aop.set\_page\_dirty — NFS client marking page as dirty

## Synopsis

```
nfs.aop.set_page_dirty
```

## Values

<i>__page</i>	the address of page
<i>page_flag</i>	page flags

## Description

This probe attaches to the generic `__set_page_dirty_nobuffers` function. Thus, this probe is going to fire on many other file systems in addition to the NFS client.

## Name

probe::nfs.aop.write\_begin — NFS client begin to write data

## Synopsis

```
nfs.aop.write_begin
```

## Values

<i>dev</i>	device identifier
<i>page_index</i>	offset within mapping, can used a page identifier and position identifier in the page frame
<i>__page</i>	the address of page
<i>size</i>	write bytes
<i>to</i>	end address of this write operation
<i>ino</i>	inode number
<i>offset</i>	start address of this write operation

## Description

Occurs when write operation occurs on nfs. It prepare a page for writing, look for a request corresponding to the page. If there is one, and it belongs to another file, it flush it out before it tries to copy anything into the page. Also do the same if it finds a request from an existing dropped page

probe::nfs.aop.write\_end — NFS client complete writing data

## Synopsis

`nfs.aop.write_end`

## Values

<i>i_size</i>	file length in bytes
<i>dev</i>	device identifier
<i>sb_flag</i>	super block flags
<i>page_index</i>	offset within mapping, can used a page identifier and position identifier in the page frame
<i>__page</i>	the address of page
<i>size</i>	write bytes
<i>i_flag</i>	file flags
<i>to</i>	end address of this write operation
<i>ino</i>	inode number
<i>offset</i>	start address of this write operation

## Description

Fires when do a write operation on nfs, often after `prepare_write`

Update and possibly write a cached page of an NFS file.

## Name

probe::nfs.aop.writepage — NFS client writing a mapped page to the NFS server

## Synopsis

```
nfs.aop.writepage
```

## Values

<i>for_reclaim</i>	a flag of <code>writeback_control</code> , indicates if it's invoked from the page allocator
<i>i_size</i>	file length in bytes
<i>dev</i>	device identifier
<i>sb_flag</i>	super block flags
<i>page_index</i>	offset within mapping, can used a page identifier and position identifier in the page frame
<i>__page</i>	the address of page
<i>size</i>	number of pages to be written in this execution
<i>for_kupdate</i>	a flag of <code>writeback_control</code> , indicates if it's a kupdate writeback
<i>wsiz</i>	write size
<i>i_flag</i>	file flags
<i>i_state</i>	inode state flags
<i>ino</i>	inode number

## Description

The priority of wb is decided by the flags *for\_reclaim* and *for\_kupdate*.

# Name

probe::nfs.aop.writepages — NFS client writing several dirty pages to the NFS server

## Synopsis

nfs.aop.writepages

## Values

<i>for_reclaim</i>	a flag of writeback_control, indicates if it's invoked from the page allocator
<i>dev</i>	device identifier
<i>wpages</i>	write size (in pages)
<i>size</i>	number of pages attempted to be written in this execution
<i>for_kupdate</i>	a flag of writeback_control, indicates if it's a kupdate writeback
<i>wsiz</i>	write size
<i>nr_to_write</i>	number of pages attempted to be written in this execution
<i>ino</i>	inode number

## Description

The priority of wb is decided by the flags *for\_reclaim* and *for\_kupdate*.

# Name

probe::nfs.fop.aio\_read — NFS client aio\_read file operation

## Synopsis

nfs.fop.aio\_read

## Values

<i>attrtimeo</i>	how long the cached information is assumed to be valid. We need to revalidate the cached attrs for this inode if <code>jiffies - read_cache_jiffies &gt; attrtimeo</code> .
<i>cache_valid</i>	cache related bit mask flag
<i>count</i>	read bytes
<i>parent_name</i>	parent dir name
<i>dev</i>	device identifier
<i>buf</i>	the address of buf in user space
<i>cache_time</i>	when we started read-caching this inode
<i>file_name</i>	file name
<i>pos</i>	current position of file
<i>ino</i>	inode number



# Name

probe::nfs.fop.aio\_write — NFS client aio\_write file operation

## Synopsis

nfs.fop.aio\_write

## Values

<i>count</i>	read bytes
<i>parent_name</i>	parent dir name
<i>dev</i>	device identifier
<i>buf</i>	the address of buf in user space
<i>file_name</i>	file name
<i>pos</i>	offset of the file
<i>ino</i>	inode number

## Name

probe::nfs.fop.check\_flags — NFS client checking flag operation

## Synopsis

```
nfs.fop.check_flags
```

## Values

*flag*

file flag

probe::nfs.fop.flush — NFS client flush file operation

## Synopsis

`nfs.fop.flush`

## Values

<i>dev</i>	device identifier
<i>mode</i>	file mode
<i>ndirty</i>	number of dirty page
<i>ino</i>	inode number

probe::nfs.fop.fsync — NFS client fsync operation

## Synopsis

`nfs.fop.fsync`

## Values

*dev*

device identifier

*ndirty*

number of dirty pages

*ino*

inode number

# Name

probe::nfs.fop.llseek — NFS client llseek operation

## Synopsis

`nfs.fop.llseek`

## Values

*dev*

device identifier

*origin*

the original position. The possible value could be: SEEK\_SET (offset set to offset bytes), SEEK\_CUR (offset set to its current location plus offset bytes), or SEEK\_END (offset set to the size of the file plus offset bytes).

*ino*

inode number

*offset*

the offset of the file will be repositioned

## Name

probe::nfs.fop.lock — NFS client file lock operation

## Synopsis

`nfs.fop.lock`

## Values

*cmd*

cmd arguments

*dev*

device identifier

*fl\_type*

lock type

*fl\_end*

ending offset of locked region

*fl\_flag*

lock flags

*i\_mode*

file type and access rights

*fl\_start*

starting offset of locked region

*ino*

inode number

probe::nfs.fop.mmap — NFS client mmap operation

## Synopsis

`nfs.fop.mmap`

## Values

<i>attrtimeo</i>	how long the cached information is assumed to be valid. We need to revalidate the cached attrs for this inode if <code>jiffies - read_cache_jiffies &gt; attrtimeo</code> .
<i>cache_valid</i>	cache related bit mask flag
<i>parent_name</i>	parent dir name
<i>vm_flag</i>	vm flags
<i>vm_start</i>	start address within <code>vm_mm</code>
<i>dev</i>	device identifier
<i>buf</i>	the address of buf in user space
<i>vm_end</i>	the first byte after end address within <code>vm_mm</code>
<i>cache_time</i>	when we started read-caching this inode
<i>file_name</i>	file name
<i>ino</i>	inode number

probe::nfs.fop.open — NFS client file open operation

## Synopsis

`nfs.fop.open`

## Values

<i>i_size</i>	file length in bytes
<i>dev</i>	device identifier
<i>flag</i>	file flag
<i>file_name</i>	file name
<i>ino</i>	inode number



## Name

probe::nfs.fop.read — NFS client read operation

## Synopsis

`nfs.fop.read`

## Values

*devname*

block device name

## Description

SystemTap uses the `vfs.do_sync_read` probe to implement this probe and as a result will get operations other than the NFS client read operations.

probe::nfs.fop.release — NFS client release page operation

## Synopsis

`nfs.fop.release`

## Values

<i>dev</i>	device identifier
<i>mode</i>	file mode
<i>ino</i>	inode number

# Name

probe::nfs.fop.sendfile — NFS client send file operation

## Synopsis

`nfs.fop.sendfile`

## Values

<i>attrtimeo</i>	how long the cached information is assumed to be valid. We need to revalidate the cached attrs for this inode if <code>jiffies - read_cache_jiffies &gt; attrtimeo</code> .
<i>cache_valid</i>	cache related bit mask flag
<i>count</i>	read bytes
<i>ppos</i>	current position of file
<i>dev</i>	device identifier
<i>cache_time</i>	when we started read-caching this inode
<i>ino</i>	inode number

## Name

probe::nfs.fop.write — NFS client write operation

## Synopsis

`nfs.fop.write`

## Values

*devname*

block device name

## Description

SystemTap uses the `vfs.do_sync_write` probe to implement this probe and as a result will get operations other than the NFS client write operations.

## Name

probe::nfs.proc.commit — NFS client committing data on server

## Synopsis

nfs.proc.commit

## Values

<i>bitmask1</i>	V4 bitmask representing the set of attributes supported on this filesystem
<i>version</i>	NFS version
<i>bitmask0</i>	V4 bitmask representing the set of attributes supported on this filesystem
<i>prot</i>	transfer protocol
<i>size</i>	read bytes in this execution
<i>offset</i>	the file offset
<i>server_ip</i>	IP address of server

## Description

All the nfs.proc.commit kernel functions were removed in kernel commit 200baa in December 2006, so these probes do not exist on Linux 2.6.21 and newer kernels.

Fires when client writes the buffered data to disk. The buffered data is asynchronously written by client earlier. The commit function works in sync way. This probe point does not exist in NFSv2.

## Name

probe::nfs.proc.commit\_done — NFS client response to a commit RPC task

## Synopsis

nfs.proc.commit\_done

## Values

<i>count</i>	number of bytes committed
<i>status</i>	result of last operation
<i>version</i>	NFS version
<i>prot</i>	transfer protocol
<i>valid</i>	fattr->valid ,indicates which fields are valid
<i>timestamp</i>	V4 timestamp, which is used for lease renewal
<i>server_ip</i>	IP address of server

## Description

Fires when a reply to a commit RPC task is received or some commit operation error occur (timeout or socket shutdown).

## Name

probe::nfs.proc.commit\_setup — NFS client setting up a commit RPC task

## Synopsis

```
nfs.proc.commit_setup
```

## Values

<i>count</i>	bytes in this commit
<i>bitmask1</i>	V4 bitmask representing the set of attributes supported on this filesystem
<i>version</i>	NFS version
<i>bitmask0</i>	V4 bitmask representing the set of attributes supported on this filesystem
<i>prot</i>	transfer protocol
<i>size</i>	bytes in this commit
<i>offset</i>	the file offset
<i>server_ip</i>	IP address of server

## Description

The commit\_setup function is used to setup a commit RPC task. Is is not doing the actual commit operation. It is does not exist in NFSv2.

# Name

probe::nfs.proc.create — NFS client creating file on server

## Synopsis

nfs.proc.create

## Values

<i>version</i>	NFS version (the function is used for all NFS version)
<i>flag</i>	indicates create mode (only for NFSv3 and NFSv4)
<i>prot</i>	transfer protocol
<i>filelen</i>	length of file name
<i>filename</i>	file name
<i>fh</i>	file handler of parent dir
<i>server_ip</i>	IP address of server



## Name

probe::nfs.proc.handle\_exception — NFS client handling an NFSv4 exception

## Synopsis

```
nfs.proc.handle_exception
```

## Values

*errorcode*

indicates the type of error

## Description

This is the error handling routine for processes for NFSv4.

## Name

probe::nfs.proc.lookup — NFS client opens/searches a file on server

## Synopsis

`nfs.proc.lookup`

## Values

<i>name_len</i>	the length of file name
<i>filename</i>	the name of file which client opens/searches on server
<i>bitmask1</i>	V4 bitmask representing the set of attributes supported on this filesystem
<i>version</i>	NFS version
<i>bitmask0</i>	V4 bitmask representing the set of attributes supported on this filesystem
<i>prot</i>	transfer protocol
<i>server_ip</i>	IP address of server

# Name

probe::nfs.proc.open — NFS client allocates file read/write context information

## Synopsis

`nfs.proc.open`

## Values

<i>mode</i>	file mode
<i>version</i>	NFS version (the function is used for all NFS version)
<i>flag</i>	file flag
<i>prot</i>	transfer protocol
<i>filename</i>	file name
<i>server_ip</i>	IP address of server

## Description

Allocate file read/write context information

## Name

probe::nfs.proc.read — NFS client synchronously reads file from server

## Synopsis

```
nfs.proc.read
```

## Values

<i>count</i>	read bytes in this execution
<i>flags</i>	used to set task->tk_flags in rpc_init_task function
<i>version</i>	NFS version
<i>prot</i>	transfer protocol
<i>offset</i>	the file offset
<i>server_ip</i>	IP address of server

## Description

All the nfs.proc.read kernel functions were removed in kernel commit 8e0969 in December 2006, so these probes do not exist on Linux 2.6.21 and newer kernels.

## Name

probe::nfs.proc.read\_done — NFS client response to a read RPC task

## Synopsis

`nfs.proc.read_done`

## Values

<i>count</i>	number of bytes read
<i>status</i>	result of last operation
<i>version</i>	NFS version
<i>prot</i>	transfer protocol
<i>timestamp</i>	V4 timestamp, which is used for lease renewal
<i>server_ip</i>	IP address of server

## Description

Fires when a reply to a read RPC task is received or some read error occurs (timeout or socket shutdown).

# Name

probe::nfs.proc.read\_setup — NFS client setting up a read RPC task

## Synopsis

nfs.proc.read\_setup

## Values

<i>count</i>	read bytes in this execution
<i>version</i>	NFS version
<i>prot</i>	transfer protocol
<i>size</i>	read bytes in this execution
<i>offset</i>	the file offset
<i>server_ip</i>	IP address of server

## Description

The read\_setup function is used to setup a read RPC task. It is not doing the actual read operation.

# Name

probe::nfs.proc.release — NFS client releases file read/write context information

## Synopsis

nfs.proc.release

## Values

<i>mode</i>	file mode
<i>version</i>	NFS version (the function is used for all NFS version)
<i>flag</i>	file flag
<i>prot</i>	transfer protocol
<i>filename</i>	file name
<i>server_ip</i>	IP address of server

## Description

Release file read/write context information

## Name

probe::nfs.proc.remove — NFS client removes a file on server

## Synopsis

```
nfs.proc.remove
```

## Values

<i>version</i>	NFS version (the function is used for all NFS version)
<i>prot</i>	transfer protocol
<i>filelen</i>	length of file name
<i>filename</i>	file name
<i>fh</i>	file handler of parent dir
<i>server_ip</i>	IP address of server



# Name

probe::nfs.proc.rename — NFS client renames a file on server

## Synopsis

`nfs.proc.rename`

## Values

<i>new_fh</i>	file handler of new parent dir
<i>old_filelen</i>	length of old file name
<i>version</i>	NFS version (the function is used for all NFS version)
<i>prot</i>	transfer protocol
<i>new_filelen</i>	length of new file name
<i>old_fh</i>	file handler of old parent dir
<i>new_name</i>	new file name
<i>old_name</i>	old file name
<i>server_ip</i>	IP address of server

## Name

probe::nfs.proc.write — NFS client synchronously writes file to server

## Synopsis

nfs.proc.write

## Values

<i>flags</i>	used to set task->tk_flags in rpc_init_task function
<i>bitmask1</i>	V4 bitmask representing the set of attributes supported on this filesystem
<i>version</i>	NFS version
<i>bitmask0</i>	V4 bitmask representing the set of attributes supported on this filesystem
<i>prot</i>	transfer protocol
<i>size</i>	read bytes in this execution
<i>server_ip</i>	IP address of server
<i>offset</i>	the file offset

## Description

All the nfs.proc.write kernel functions were removed in kernel commit 200baa in December 2006, so these probes do not exist on Linux 2.6.21 and newer kernels.

## Name

probe::nfs.proc.write\_done — NFS client response to a write RPC task

## Synopsis

nfs.proc.write\_done

## Values

<i>count</i>	number of bytes written
<i>status</i>	result of last operation
<i>version</i>	NFS version
<i>prot</i>	transfer protocol
<i>valid</i>	fattr->valid ,indicates which fields are valid
<i>timestamp</i>	V4 timestamp, which is used for lease renewal
<i>server_ip</i>	IP address of server

## Description

Fires when a reply to a write RPC task is received or some write error occurs (timeout or socket shutdown).

# Name

probe::nfs.proc.write\_setup — NFS client setting up a write RPC task

## Synopsis

nfs.proc.write\_setup

## Values

<i>count</i>	bytes written in this execution
<i>bitmask1</i>	V4 bitmask representing the set of attributes supported on this filesystem
<i>how</i>	used to set args.stable. The stable value could be: NFS_UNSTABLE,NFS_DATA_SYNC,NFS_FILE_SYNC (in nfs.proc3.write_setup and nfs.proc4.write_setup)
<i>version</i>	NFS version
<i>bitmask0</i>	V4 bitmask representing the set of attributes supported on this filesystem
<i>prot</i>	transfer protocol
<i>size</i>	bytes written in this execution
<i>offset</i>	the file offset
<i>server_ip</i>	IP address of server

## Description

The write\_setup function is used to setup a write RPC task. It is not doing the actual write operation.

probe::nfsd.close — NFS server closing a file for client

## Synopsis

`nfsd.close`

## Values

*filename*

file name

# Name

probe::nfsd.commit — NFS server committing all pending writes to stable storage

## Synopsis

```
nfsd.commit
```

## Values

<i>count</i>	read bytes
<i>flag</i>	indicates whether this execution is a sync operation
<i>size</i>	read bytes
<i>fh</i>	file handle (the first part is the length of the file handle)
<i>client_ip</i>	the ip address of client
<i>offset</i>	the offset of file

# Name

probe::nfsd.create — NFS server creating a file(regular,dir,device,fifo) for client

## Synopsis

nfsd.create

## Values

<i>iap_mode</i>	file access mode
<i>iap_valid</i>	Attribute flags
<i>filelen</i>	the length of file name
<i>filename</i>	file name
<i>fh</i>	file handle (the first part is the length of the file handle)
<i>client_ip</i>	the ip address of client
<i>type</i>	file type(regular,dir,device,fifo ...)

## Description

Sometimes nfsd will call nfsd\_create\_v3 instead of this this probe point.

# Name

probe::nfsd.createv3 — NFS server creating a regular file or set file attributes for client

## Synopsis

nfsd.createv3

## Values

*iap\_mode*

file access mode

*createmode*

create mode .The possible values could be: NFS3\_CREATE\_EXCLUSIVE, NFS3\_CREATE\_UNCHECKED, or NFS3\_CREATE\_GUARDED

*verifier*

file attributes (atime,mtime,mode). It's used to reset file attributes for CREATE\_EXCLUSIVE

*iap\_valid*

Attribute flags

*truncp*

trunc arguments, indicates if the file shouldbe truncate

*filelen*

the length of file name

*filename*

file name

*fh*

file handle (the first part is the length of the file handle)

*client\_ip*

the ip address of client

## Description

This probepoints is only called by nfsd3\_proc\_create and nfsd4\_open when op\_claim\_type is NFS4\_OPEN\_CLAIM\_NULL.



# Name

probe::nfsd.dispatch — NFS server receives an operation from client

## Synopsis

nfsd.dispatch

## Values

<i>proto</i>	transfer protocol
<i>proc</i>	procedure number
<i>prog</i>	program number
<i>version</i>	nfs version
<i>client_ip</i>	the ip address of client
<i>xid</i>	transmission id

## Name

probe::nfsd.lookup — NFS server opening or searching file for a file for client

## Synopsis

nfsd.lookup

## Values

<i>filelen</i>	the length of file name
<i>filename</i>	file name
<i>fh</i>	file handle of parent dir(the first part is the length of the file handle)
<i>client_ip</i>	the ip address of client

## Name

probe::nfsd.open — NFS server opening a file for client

## Synopsis

`nfsd.open`

## Values

*access*

indicates the type of open (read/write/commit/readdir...)

*fh*

file handle (the first part is the length of the file handle)

*client\_ip*

the ip address of client

*type*

type of file (regular file or dir)

# Name

probe::nfsd.proc.commit — NFS server performing a commit operation for client

## Synopsis

nfsd.proc.commit

## Values

<i>count</i>	read bytes
<i>proto</i>	transfer protocol
<i>version</i>	nfs version
<i>size</i>	read bytes
<i>fh</i>	file handle (the first part is the length of the file handle)
<i>client_ip</i>	the ip address of client
<i>offset</i>	the offset of file

# Name

probe::nfsd.proc.create — NFS server creating a file for client

## Synopsis

nfsd.proc.create

## Values

<i>proto</i>	transfer protocol
<i>version</i>	nfs version
<i>filelen</i>	length of file name
<i>filename</i>	file name
<i>fh</i>	file handle (the first part is the length of the file handle)
<i>client_ip</i>	the ip address of client

## Name

probe::nfsd.proc.lookup — NFS server opening or searching for a file for client

## Synopsis

`nfsd.proc.lookup`

## Values

<i>proto</i>	transfer protocol
<i>filelen</i>	the length of file name
<i>filename</i>	file name
<i>fh</i>	file handle of parent dir (the first part is the length of the file handle)
<i>version</i>	nfs version
<i>client_ip</i>	the ip address of client

# Name

probe::nfsd.proc.read — NFS server reading file for client

## Synopsis

`nfsd.proc.read`

## Values

<i>vec</i>	struct kvec, includes buf address in kernel address and length of each buffer
<i>count</i>	read bytes
<i>proto</i>	transfer protocol
<i>fh</i>	file handle (the first part is the length of the file handle)
<i>version</i>	nfs version
<i>client_ip</i>	the ip address of client
<i>vlen</i>	read blocks
<i>offset</i>	the offset of file
<i>size</i>	read bytes

## Name

probe::nfsd.proc.remove — NFS server removing a file for client

## Synopsis

`nfsd.proc.remove`

## Values

<i>proto</i>	transfer protocol
<i>version</i>	nfs version
<i>filelen</i>	length of file name
<i>filename</i>	file name
<i>fh</i>	file handle (the first part is the length of the file handle)
<i>client_ip</i>	the ip address of client



## Name

probe::nfsd.proc.rename — NFS Server renaming a file for client

## Synopsis

`nfsd.proc.rename`

## Values

<i>tlen</i>	length of new file name
<i>flen</i>	length of old file name
<i>tfh</i>	file handler of new path
<i>filename</i>	old file name
<i>fh</i>	file handler of old path
<i>client_ip</i>	the ip address of client
<i>tname</i>	new file name

# Name

probe::nfsd.proc.write — NFS server writing data to file for client

## Synopsis

nfsd.proc.write

## Values

<i>count</i>	read bytes
<i>proto</i>	transfer protocol
<i>version</i>	nfs version
<i>size</i>	read bytes
<i>vec</i>	struct kvec, includes buf address in kernel address and length of each buffer
<i>client_ip</i>	the ip address of client
<i>fh</i>	file handle (the first part is the length of the file handle)
<i>vlen</i>	read blocks
<i>offset</i>	the offset of file
<i>stable</i>	argp->stable

probe::nfsd.read — NFS server reading data from a file for client

## Synopsis

nfsd.read

## Values

<i>count</i>	read bytes
<i>file</i>	argument file, indicates if the file has been opened.
<i>size</i>	read bytes
<i>vec</i>	struct kvec, includes buf address in kernel address and length of each buffer
<i>fh</i>	file handle (the first part is the length of the file handle)
<i>client_ip</i>	the ip address of client
<i>vlen</i>	read blocks
<i>offset</i>	the offset of file

# Name

probe::nfsd.rename — NFS server renaming a file for client

## Synopsis

`nfsd.rename`

## Values

<i>tlen</i>	length of new file name
<i>flen</i>	length of old file name
<i>tfh</i>	file handler of new path
<i>filename</i>	old file name
<i>fh</i>	file handler of old path
<i>client_ip</i>	the ip address of client
<i>tname</i>	new file name

# Name

probe::nfsd.unlink — NFS server removing a file or a directory for client

## Synopsis

nfsd.unlink

## Values

<i>filelen</i>	the length of file name
<i>filename</i>	file name
<i>fh</i>	file handle (the first part is the length of the file handle)
<i>client_ip</i>	the ip address of client
<i>type</i>	file type (file or dir)

probe::nfsd.write — NFS server writing data to a file for client

## Synopsis

nfsd.write

## Values

<i>count</i>	read bytes
<i>file</i>	argument file, indicates if the file has been opened.
<i>size</i>	read bytes
<i>vec</i>	struct kvec, includes buf address in kernel address and length of each buffer
<i>fh</i>	file handle (the first part is the length of the file handle)
<i>client_ip</i>	the ip address of client
<i>vlen</i>	read blocks
<i>offset</i>	the offset of file

---

# Chapter 29. Speculation

This family of functions provides the ability to speculative record information and then at a later point in the SystemTap script either commit the information or discard it.

## Name

function::commit — Write out all output related to a speculation buffer

## Synopsis

```
commit (id:long)
```

## Arguments

*id* of the buffer to store the information in

## Description

Output all the output for *id* in the order that it was entered into the speculative buffer by `speculative`.



Spec-  
u-  
la-  
tion

## Name

function::discard — Discard all output related to a speculation buffer

## Synopsis

```
discard(id:long)
```

## Arguments

*id*

of the buffer to store the information in

## Name

function::speculate — Store a string for possible output later

## Synopsis

```
speculate(id:long,output:string)
```

## Arguments

*id*

buffer id to store the information in

*output*

string to write out when commit occurs

## Description

Add a string to the speculaive buffer for id.

Spec-  
u-  
la-  
tion

## Name

function::speculation — Allocate a new id for speculative output

## Synopsis

```
speculation:long()
```

## Arguments

None

## Description

The `speculation` function is called when a new speculation buffer is needed. It returns an id for the speculative output. There can be multiple threads being speculated on concurrently. This id is used by other speculation fuctions to keep the threads separate.