

# **SystemTap Tapset Reference Manual**

**SystemTap**

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# SystemTap Tapset Reference Manual

by SystemTap

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# 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.

# function::addr

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`.

# function::asmlinkage

function::asmlinkage — Mark function as declared asmlinkage

## Synopsis

```
asmlinkage( )
```

## Arguments

None

## Description

Call this function before accessing arguments using the \*\_arg functions if the probed kernel function was declared asmlinkage in the source.

# function::backtrace

function::backtrace — Hex backtrace of current kernel stack

## Synopsis

```
backtrace:string()
```

## Arguments

None

## Description

This function returns a string of hex addresses that are a backtrace of the kernel stack. Output may be truncated as per maximum string length (MAXSTRINGLEN). See `ubacktrace` for user-space backtrace.

# function::caller

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)`

# function::caller\_addr

function::caller\_addr — Return caller address

## Synopsis

```
caller_addr:long()
```

## Arguments

None

## Description

This function returns the address of the calling function.

# function::callers

function::callers — Return first *n* elements of kernel stack backtrace

## Synopsis

```
callers:string(n:long)
```

## Arguments

*n* number of levels to descend in the stack (not counting the top level). If *n* is -1, print the entire stack.

## Description

This function returns a string of the first *n* hex addresses from the backtrace of the kernel stack. Output may be truncated as per maximum string length (MAXSTRINGLEN).



# function::cmdline\_arg

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

## Synopsis

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

## Arguments

*n* Argument to get (zero is the program 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.

# function::cmdline\_args

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 normally the program itself)
<i>m</i>	Last argument to get (or minus one for all arguments after n)
<i>delim</i>	String to use to separate 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.

# function::cmdline\_str

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.

# function::cpu

function::cpu — Returns the current cpu number

## Synopsis

```
cpu:long()
```

## Arguments

None

## Description

This function returns the current cpu number.

# function::cpuid

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.

# function::current\_exe\_file

function::current\_exe\_file — get the file struct pointer for the current task's executable file

## Synopsis

```
current_exe_file:long()
```

## Arguments

None

## Description

This function returns the file struct pointer for the current task's executable file. Note that the file struct pointer isn't locked on return. The return value of this function can be passed to `fullpath_struct_file` to get the path from the file struct.

# function::egid

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

# function::env\_var

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.



# function::euid

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.

# function::execname

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).

# function::fastcall

function::fastcall — Mark function as declared fastcall

## Synopsis

```
fastcall()
```

## Arguments

None

## Description

Call this function before accessing arguments using the \*\_arg functions if the probed kernel function was declared fastcall in the source.

# function::gid

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.

# function::int\_arg

function::int\_arg — Return function argument as signed int

## Synopsis

```
int_arg:long(n:long)
```

## Arguments

*n* index of argument to return

## Description

Return the value of argument *n* as a signed int (i.e., a 32-bit integer sign-extended to 64 bits).

# function::is\_myproc

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.

# function::is\_return

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.

# function::long\_arg

function::long\_arg — Return function argument as signed long

## Synopsis

```
long_arg:long(n:long)
```

## Arguments

*n* index of argument to return

## Description

Return the value of argument *n* as a signed long. On architectures where a long is 32 bits, the value is sign-extended to 64 bits.



# function::longlong\_arg

function::longlong\_arg — Return function argument as 64-bit value

## Synopsis

```
longlong_arg:long(n:long)
```

## Arguments

*n* index of argument to return

## Description

Return the value of argument *n* as a 64-bit value.

# function::modname

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 raise an error. If the address was not in a kernel module, but in the kernel itself, then the string “kernel” will be returned.

# function::module\_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>.

# function::module\_size

function::module\_size — The module size of the current script

## Synopsis

```
module_size:string()
```

## Arguments

None

## Description

This function returns the sizes of various sections of the stap module.

# function::ns\_egid

function::ns\_egid — Returns the effective gid of a target process as seen in a user namespace

## Synopsis

```
ns_egid:long()
```

## Arguments

None

## Description

This function returns the effective gid of a target process as seen in the target user namespace if provided, or the stap process namespace

## function::ns\_euid

function::ns\_euid — Returns the effective user ID of a target process as seen in a user namespace

### Synopsis

```
ns_euid:long()
```

### Arguments

None

### Description

This function returns the effective user ID of the target process as seen in the target user namespace if provided, or the stap process namespace.

# function::ns\_gid

function::ns\_gid — Returns the group ID of a target process as seen in a user namespace

## Synopsis

```
ns_gid:long()
```

## Arguments

None

## Description

This function returns the group ID of a target process as seen in the target user namespace if provided, or the stap process namespace.

# function::ns\_pgrp

function::ns\_pgrp — Returns the process group ID of the current process as seen in a pid namespace

## Synopsis

```
ns_pgrp:long()
```

## Arguments

None

## Description

This function returns the process group ID of the current process as seen in the target pid namespace if provided, or the stap process namespace.



## function::ns\_pid

function::ns\_pid — Returns the ID of a target process as seen in a pid namespace

### Synopsis

```
ns_pid:long()
```

### Arguments

None

### Description

This function returns the ID of a target process as seen in the target pid namespace.

# function::ns\_ppid

function::ns\_ppid — Returns the process ID of a target process's parent process as seen in a pid namespace

## Synopsis

```
ns_ppid:long()
```

## Arguments

None

## Description

This function return the process ID of the target proccess's parent process as seen in the target pid namespace if provided, or the stap process namespace.

# function::ns\_sid

function::ns\_sid — Returns the session ID of the current process as seen in a pid namespace

## Synopsis

```
ns_sid:long()
```

## Arguments

None

## Description

The namespace-aware session ID of a process is the process group ID of the session leader as seen in the target pid namespace if provided, or the stap process namespace. Session ID is stored in the `signal_struct` since Kernel 2.6.0.

## function::ns\_tid

function::ns\_tid — Returns the thread ID of a target process as seen in a pid namespace

### Synopsis

```
ns_tid:long()
```

### Arguments

None

### Description

This function returns the thread ID of a target process as seen in the target pid namespace if provided, or the stap process namespace.

## function::ns\_uid

function::ns\_uid — Returns the user ID of a target process as seen in a user namespace

### Synopsis

```
ns_uid:long()
```

### Arguments

None

### Description

This function returns the user ID of the target process as seen in the target user namespace if provided, or the stap process namespace.

# function::pexecname

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.

# function::pgrp

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.

# function::pid

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

## Synopsis

```
pid:long()
```

## Arguments

None

## Description

This function returns the ID of a target process.



# function::pid2execname

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.

# function::pid2task

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.

# function::pn

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.

# function::pnlabel

function::pnlabel — Returns the label name parsed from the probe name

## Synopsis

```
pnlabel:string()
```

## Arguments

None

## Description

This returns the label name as parsed from the script-level probe point. This function will only work if called directly from the body of a '.label' probe point (i.e. no aliases).

## Context

The current probe point.

# function::pointer\_arg

function::pointer\_arg — Return function argument as pointer value

## Synopsis

```
pointer_arg:long(n:long)
```

## Arguments

*n* index of argument to return

## Description

Return the unsigned value of argument *n*, same as `ulong_arg`. Can be used with any type of pointer.

# function::pp

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.

# **function::ppfunc**

function::ppfunc — Returns the function name parsed from pp

## **Synopsis**

```
ppfunc:string()
```

## **Arguments**

None

## **Description**

This returns the function name from the current pp. Not all pp have functions in them, in which case "" is returned.

# function::ppid

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.



# function::print\_backtrace

function::print\_backtrace — Print kernel 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. See `print_ubacktrace` for user-space backtrace. The function does not return a value.

# function::print\_backtrace\_fileline

function::print\_backtrace\_fileline — Print kernel stack back trace

## Synopsis

```
print_backtrace_fileline()
```

## Arguments

None

## Description

This function is equivalent to `print_backtrace`, but output for each symbol is longer including file names and line numbers. The function does not return a value.

# function::print\_regs

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.

# function::print\_stack

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.

## NOTE

it is recommended to use `print_syms` instead of this function.

# function::print\_syms

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

## Synopsis

```
print_syms(callers:string)
```

## Arguments

*callers*      String with list of hexadecimal (kernel) addresses

## Description

This function performs a symbolic lookup of the addresses in the given string, which are assumed to be the result of prior calls to `stack`, `callers`, and similar functions.

Prints one line per address, including the address, the name of the function containing the address, and an estimate of its position within that function, as obtained by `symdata`. Returns nothing.

# function::print\_ubacktrace

function::print\_ubacktrace — Print stack back trace for current user-space task.

## Synopsis

- 1) `print_ubacktrace()`
- 2) `print_ubacktrace(pc:long, sp:long, fp:long)`

## Arguments

*pc* override PC

*sp* override SP

*fp* override FP

## Description

1)

2) Equivalent to `print_ustack(ubacktrace)`, except that deeper stack nesting may be supported. Returns nothing. See `print_backtrace` for kernel backtrace.

Equivalent to `print_ubacktrace`, but it performs the backtrace using the `pc`, `sp`, and `fp` provided. Useful

## 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.

# function::print\_ubacktrace\_brief

function::print\_ubacktrace\_brief — Print stack back trace for current user-space task.

## 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 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.

# function::print\_ubacktrace\_fileline

function::print\_ubacktrace\_fileline — Print stack back trace for current user-space task.

## Synopsis

- 1) `print_ubacktrace_fileline()`
- 2) `print_ubacktrace_fileline(pc:long, sp:long, fp:long)`

## Arguments

*pc* override PC

*sp* override SP

*fp* override FP

## Description

1)

2) Equivalent to `print_ubacktrace`, but output for each symbol is longer including file names and line numbers.

Equivalent to `print_ubacktrace_fileline`, but it performs the backtrace using the `pc`, `sp`, and `fp` passed in.

## 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.



# function::print\_ustack

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

## 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.

## NOTE

it is recommended to use `print_usyms` instead of this function.

# function::print\_usyms

function::print\_usyms — Print out user stack from string

## Synopsis

```
print_usyms(callers:string)
```

## Arguments

*callers*      String with list of hexadecimal (user) addresses

## Description

This function performs a symbolic lookup of the addresses in the given string, which are assumed to be the result of prior calls to `ustack`, `ucallers`, and similar functions.

Prints one line per address, including the address, the name of the function containing the address, and an estimate of its position within that function, as obtained by `usymdata`. Returns nothing.

# function::probe\_type

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).

# function::probefunc

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 based on the current address, as computed by `symname(addr)` or `usymname(uaddr)` depending on probe context (whether the probe is a user probe or a kernel probe).

## Please note

this function's behaviour differs between SystemTap 2.0 and earlier versions. Prior to 2.0, `probefunc` obtained the function name from the probe point string as returned by `pp`, and used the current address as a fallback.

Consider using `ppfunc` instead.

# function::probemod

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.

# function::pstrace

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.

# function::register

function::register — Return the signed value of the named CPU register

## Synopsis

```
register:long(name:string)
```

## Arguments

*name*     Name of the register to return

## Description

Return the value of the named CPU register, as it was saved when the current probe point was hit. If the register is 32 bits, it is sign-extended to 64 bits.

For the i386 architecture, the following names are recognized. (name1/name2 indicates that name1 and name2 are alternative names for the same register.) eax/ax, ebp/bp, ebx/bx, ecx/cx, edi/di, edx/dx, eflags/flags, eip/ip, esi/si, esp/sp, orig\_eax/orig\_ax, xcs/cs, xds/ds, xes/es, xfs/fs, xss/ss.

For the x86\_64 architecture, the following names are recognized: 64-bit registers: r8, r9, r10, r11, r12, r13, r14, r15, rax/ax, rbp/bp, rbx/bx, rcx/cx, rdi/di, rdx/dx, rip/ip, rsi/si, rsp/sp; 32-bit registers: eax, ebp, ebx, ecx, edx, edi, edx, eip, esi, esp, flags/eflags, orig\_eax; segment registers: xcs/cs, xss/ss.

For powerpc, the following names are recognized: r0, r1, ... r31, nip, msr, orig\_gpr3, ctr, link, xer, ccr, softe, trap, dar, dsisr, result.

For s390x, the following names are recognized: r0, r1, ... r15, args, psw.mask, psw.addr, orig\_gpr2, ilc, trap.

For AArch64, the following names are recognized: x0, x1, ... x30, fp, lr, sp, pc, and orig\_x0.

# function::registers\_valid

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.



# function::regparm

function::regparm — Specify regparm value used to compile function

## Synopsis

```
regparm(n:long)
```

## Arguments

*n* original regparm value

## Description

Call this function with argument *n* before accessing function arguments using the \*\_arg function is the function was build with the gcc -mregparm=*n* option.

(The i386 kernel is built with \-mregparm=3, so systemtap considers regparm(3) the default for kernel functions on that architecture.) Only valid on i386 and x86\_64 (when probing 32bit applications). Produces an error on other architectures.

# function::remote\_id

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.

# function::remote\_uri

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”.

# function::s32\_arg

function::s32\_arg — Return function argument as signed 32-bit value

## Synopsis

```
s32_arg:long(n:long)
```

## Arguments

*n* index of argument to return

## Description

Return the signed 32-bit value of argument *n*, same as `int_arg`.

# function::s64\_arg

function::s64\_arg — Return function argument as signed 64-bit value

## Synopsis

```
s64_arg:long(n:long)
```

## Arguments

*n* index of argument to return

## Description

Return the signed 64-bit value of argument *n*, same as `longlong_arg`.

# function::sid

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.

# function::sprint\_backtrace

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

## 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).

# function::sprint\_stack

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

## 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`.

## NOTE

it is recommended to use `sprint_syms` instead of this function.



# function::sprint\_syms

function::sprint\_syms — Return stack for kernel addresses from string

## Synopsis

```
sprint_syms(callers:string)
```

## Arguments

*callers*      String with list of hexadecimal (kernel) addresses

## Description

Perform a symbolic lookup of the addresses in the given string, which are assumed to be the result of a prior calls to `stack`, `callers`, and similar functions.

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), as obtained from `symdata`. 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_syms`.

# function::sprint\_ubacktrace

function::sprint\_ubacktrace — Return stack back trace for current user-space task as string.

## 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 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.

# function::sprint\_ustack

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

## 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`.

## NOTE

it is recommended to use `sprint_usyms` instead of this function.

# function::sprint\_usyms

function::sprint\_usyms — Return stack for user addresses from string

## Synopsis

```
sprint_usyms(callers:string)
```

## Arguments

*callers*      String with list of hexadecimal (user) addresses

## Description

Perform a symbolic lookup of the addresses in the given string, which are assumed to be the result of a prior calls to `ustack`, `ucallers`, and similar functions.

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), as obtained from `usymdata`. 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_usyms`.

# function::stack

function::stack — Return address at given depth of kernel stack backtrace

## Synopsis

```
stack:long(n:long)
```

## Arguments

*n* number of levels to descend in the stack.

## Description

Performs a simple (kernel) backtrace, and returns the element at the specified position. The results of the backtrace itself are cached, so that the backtrace computation is performed at most once no matter how many times `stack` is called, or in what order.

# function::stack\_size

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.

# function::stack\_unused

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.

# function::stack\_used

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.



# function::stp\_pid

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.

# function::symdata

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.

# function::symfile

function::symfile — Return the file name of a given address.

## Synopsis

```
symfile:string(addr:long)
```

## Arguments

*addr*     The address to translate.

## Description

Returns the file name of the given address, if known. If the file name cannot be found, the hex string representation of the address will be returned.

# function::symfileline

function::symfileline — Return the file name and line number of an address.

## Synopsis

```
symfileline:string(addr:long)
```

## Arguments

*addr*     The address to translate.

## Description

Returns the file name and the (approximate) line number of the given address, if known. If the file name or the line number cannot be found, the hex string representation of the address will be returned.

# function::symline

function::symline — Return the line number of an address.

## Synopsis

```
symline:string(addr:long)
```

## Arguments

*addr*    The address to translate.

## Description

Returns the (approximate) line number of the given address, if known. If the line number cannot be found, the hex string representation of the address will be returned.

# function::symname

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*.

# function::target

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

# function::task\_ancestry

function::task\_ancestry — The ancestry of the given task

## Synopsis

```
task_ancestry:string(task:long,with_time:long)
```

## Arguments

<i>task</i>	task_struct pointer
<i>with_time</i>	set to 1 to also print the start time of processes (given as a delta from boot time)

## Description

Return the ancestry of the given task in the form of “grandparent\_process=>parent\_process=>process”.



# function::task\_backtrace

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.

# function::task\_cpu

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.

# function::task\_current

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.

## function::task\_cwd\_path

function::task\_cwd\_path — get the path struct pointer for a task's current working directory

### Synopsis

```
task_cwd_path:long(task:long)
```

### Arguments

*task*     task\_struct pointer.

# function::task\_egid

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.

# function::task\_euid

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.

## function::task\_exe\_file

function::task\_exe\_file — get the file struct pointer for a task's executable file

### Synopsis

```
task_exe_file:long(task:long)
```

### Arguments

*task*     task\_struct pointer.

# function::task\_execname

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.



# function::task\_fd\_lookup

function::task\_fd\_lookup — get the file struct for a task's fd

## Synopsis

```
task_fd_lookup:long(task:long,fd:long)
```

## Arguments

*task*     task\_struct pointer.

*fd*       file descriptor number.

## Description

Returns the file struct pointer for a task's file descriptor.

# function::task\_gid

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.

# function::task\_max\_file\_handles

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.

# function::task\_nice

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.

# function::task\_ns\_egid

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

## Synopsis

```
task_ns_egid:long(task:long)
```

## Arguments

*task*    task\_struct pointer

## Description

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

# function::task\_ns\_euid

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

## Synopsis

```
task_ns_euid:long(task:long)
```

## Arguments

*task*     task\_struct pointer

## Description

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

# function::task\_ns\_gid

function::task\_ns\_gid — The group identifier of the task as seen in a namespace

## Synopsis

```
task_ns_gid:long(task:long)
```

## Arguments

*task*     task\_struct pointer

## Description

This function returns the group id of the given task as seen in in the given user namespace.

# function::task\_ns\_pid

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

## Synopsis

```
task_ns_pid:long(task:long)
```

## Arguments

*task*     task\_struct pointer

## Description

This function returns the process id of the given task based on the specified pid namespace..



# function::task\_ns\_tid

function::task\_ns\_tid — The thread identifier of the task as seen in a namespace

## Synopsis

```
task_ns_tid:long(task:long)
```

## Arguments

*task*     task\_struct pointer

## Description

This function returns the thread id of the given task as seen in the pid namespace.

# function::task\_ns\_uid

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

## Synopsis

```
task_ns_uid:long(task:long)
```

## Arguments

*task*    task\_struct pointer

## Description

This function returns the user id of the given task.

# function::task\_open\_file\_handles

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.

# function::task\_parent

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.

# function::task\_pid

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

## Synopsis

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

## Arguments

*task*     task\_struct pointer

## Description

This function returns the process id of the given task.

# function::task\_prio

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.

# function::task\_state

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).

# function::task\_tid

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.



# function::task\_uid

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.

# function::tid

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.

## function::u32\_arg

function::u32\_arg — Return function argument as unsigned 32-bit value

### Synopsis

```
u32_arg:long(n:long)
```

### Arguments

*n* index of argument to return

### Description

Return the unsigned 32-bit value of argument *n*, same as `uint_arg`.

## function::u64\_arg

function::u64\_arg — Return function argument as unsigned 64-bit value

### Synopsis

```
u64_arg:long(n:long)
```

### Arguments

*n* index of argument to return

### Description

Return the unsigned 64-bit value of argument *n*, same as `ulonglong_arg`.

# function::u\_register

function::u\_register — Return the unsigned value of the named CPU register

## Synopsis

```
u_register:long(name:string)
```

## Arguments

*name*     Name of the register to return

## Description

Same as `register(name)`, except that if the register is 32 bits wide, it is zero-extended to 64 bits.

# function::uaddr

function::uaddr — User space address of current running task

## 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.

# function::ubacktrace

function::ubacktrace — Hex backtrace of current user-space task stack.

## 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. See `backtrace` for kernel traceback.

## 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.

# function::ucallers

function::ucallers — Return first *n* elements of user stack backtrace

## Synopsis

```
ucallers:string(n:long)
```

## Arguments

*n* number of levels to descend in the stack (not counting the top level). If *n* is -1, print the entire stack.

## Description

This function returns a string of the first *n* hex addresses from the backtrace of the user stack. Output may be truncated as per maximum string length (MAXSTRINGLEN).

## 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.



# function::uid

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.

# function::uint\_arg

function::uint\_arg — Return function argument as unsigned int

## Synopsis

```
uint_arg:long(n:long)
```

## Arguments

*n* index of argument to return

## Description

Return the value of argument *n* as an unsigned int (i.e., a 32-bit integer zero-extended to 64 bits).

# function::ulong\_arg

function::ulong\_arg — Return function argument as unsigned long

## Synopsis

```
ulong_arg:long(n:long)
```

## Arguments

*n* index of argument to return

## Description

Return the value of argument *n* as an unsigned long. On architectures where a long is 32 bits, the value is zero-extended to 64 bits.

# function::ulonglong\_arg

function::ulonglong\_arg — Return function argument as 64-bit value

## Synopsis

```
ulonglong_arg:long(n:long)
```

## Arguments

*n* index of argument to return

## Description

Return the value of argument *n* as a 64-bit value. (Same as `longlong_arg`.)

# function::umodname

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

## 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. Reports an error when the address isn't in a (mapped in) module, or the module cannot be found for some reason.

## function::user\_mode

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.

# function::ustack

function::ustack — Return address at given depth of user stack backtrace

## Synopsis

```
ustack:long(n:long)
```

## Arguments

*n* number of levels to descend in the stack.

## Description

Performs a simple (user space) backtrace, and returns the element at the specified position. The results of the backtrace itself are cached, so that the backtrace computation is performed at most once no matter how many times `ustack` is called, or in what order.

# function::usymdata

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

## 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.



# function::usymfile

function::usymfile — Return the file name of a given address.

## Synopsis

```
usymfile:string(addr:long)
```

## Arguments

*addr*    The address to translate.

## Description

Returns the file name of the given address, if known. If the file name cannot be found, the hex string representation of the address will be returned.

# function::usymfileline

function::usymfileline — Return the file name and line number of an address.

## Synopsis

```
usymfileline:string(addr:long)
```

## Arguments

*addr*     The address to translate.

## Description

Returns the file name and the (approximate) line number of the given address, if known. If the file name or the line number cannot be found, the hex string representation of the address will be returned.

# function::usymline

function::usymline — Return the line number of an address.

## Synopsis

```
usymline:string(addr:long)
```

## Arguments

*addr*     The address to translate.

## Description

Returns the (approximate) line number of the given address, if known. If the line number cannot be found, the hex string representation of the address will be returned.

# function::usymname

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

## 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.

# function::HZ

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.

## function::cpu\_clock\_ms

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).

## function::cpu\_clock\_ns

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).



## function::cpu\_clock\_s

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).

## function::cpu\_clock\_us

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).

# function::delete\_stopwatch

function::delete\_stopwatch — Remove an existing stopwatch

## Synopsis

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

## Arguments

*name*     the stopwatch name

## Description

Remove stopwatch *name*.

# function::get\_cycles

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.

# function::gettimeofday\_ms

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.

# function::gettimeofday\_ns

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.

# function::gettimeofday\_s

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.

# function::gettimeofday\_us

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.



# function::jiffies

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.

# function::ktime\_get\_ns

function::ktime\_get\_ns — Number of nanoseconds since boot

## Synopsis

```
ktime_get_ns:long()
```

## Arguments

None

## Description

This function returns the system ktime.

## function::local\_clock\_ms

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).

## function::local\_clock\_ns

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).

# function::local\_clock\_s

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).

## function::local\_clock\_us

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).

## function::read\_stopwatch\_ms

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.

# function::read\_stopwatch\_ns

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.



# function::read\_stopwatch\_s

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.

## function::read\_stopwatch\_us

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.

# function::start\_stopwatch

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.

# function::stop\_stopwatch

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.

# function::ctime

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

## Synopsis

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

## Arguments

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

## Description

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

2) “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) an error will occur (which can be avoided with `try/catch`). If the time would be unreasonable far in the future, an error will also occur.

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.

## function::tz\_ctime

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.

## function::tz\_gmtoff

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.



## function::tz\_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.

# function::system

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. The runtime may impose a relatively short length limit on the command string. Exceeding it may print a warning.

---

# 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:

## function::addr\_to\_node

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.

# function::bytes\_to\_string

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.

# function::mem\_page\_size

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

## Synopsis

```
mem_page_size:long()
```

## Arguments

None

# function::pages\_to\_string

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

## Synopsis

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

## Arguments

*pages*      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`.



# function::proc\_mem\_data

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

## Synopsis

- 1) `proc_mem_data:long()`
- 2) `proc_mem_data:long(pid:long)`

## Arguments

*pid* The pid of process to examine

## Description

- 1) 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.
- 2) 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.

# function::proc\_mem\_rss

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

## Synopsis

- 1) `proc_mem_rss:long()`
- 2) `proc_mem_rss:long(pid:long)`

## Arguments

*pid* The pid of process to examine

## Description

- 1) 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.
- 2) 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.

# function::proc\_mem\_shr

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

## Synopsis

- 1) `proc_mem_shr:long()`
- 2) `proc_mem_shr:long(pid:long)`

## Arguments

*pid* The pid of process to examine

## Description

- 1) 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.
- 2) 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.

# function::proc\_mem\_size

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

## Synopsis

- 1) `proc_mem_size:long()`
- 2) `proc_mem_size:long(pid:long)`

## Arguments

*pid* The pid of process to examine

## Description

- 1) 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.
- 2) 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.

# function::proc\_mem\_string

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

## Synopsis

- 1) `proc_mem_string:string()`
- 2) `proc_mem_string:string(pid:long)`

## Arguments

*pid* The pid of process to examine

## Description

- 1) 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”.
- 2) 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”.

# function::proc\_mem\_txt

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

## Synopsis

- 1) `proc_mem_txt:long()`
- 2) `proc_mem_txt:long(pid:long)`

## Arguments

*pid* The pid of process to examine

## Description

- 1) 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.
- 2) 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.

## function::vm\_fault\_contains

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

### Synopsis

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

### Arguments

<i>value</i>	the fault_type returned by vm.page_fault.return
<i>test</i>	the type of fault to test for (VM_FAULT_OOM or similar)

# probe::vm.brk

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>address</i>	the requested address
<i>name</i>	name of the probe point

## Context

The process calling brk.



# probe::vm.kfree

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

## Synopsis

vm.kfree

## Values

<i>ptr</i>	pointer to the kmemory allocated which is returned by kmalloc
<i>name</i>	name of the probe point
<i>caller_function</i>	name of the caller function.
<i>call_site</i>	address of the function calling this kmemory function

# probe::vm.kmalloc

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

## Synopsis

`vm.kmalloc`

## Values

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

# probe::vm.kmalloc\_node

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

## Synopsis

vm.kmalloc\_node

## Values

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

# probe::vm.kmem\_cache\_alloc

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

## Synopsis

vm.kmem\_cache\_alloc

## Values

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

# probe::vm.kmem\_cache\_alloc\_node

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

## Synopsis

vm.kmem\_cache\_alloc\_node

## Values

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

# probe::vm.kmem\_cache\_free

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>name</i>	Name of the probe point
<i>call_site</i>	Address of the function calling this kmemory function

# probe::vm.mmap

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

## Synopsis

`vm.mmap`

## Values

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

## Context

The process calling mmap.

# probe::vm.munmap

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

## Synopsis

`vm.munmap`

## Values

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

## Context

The process calling munmap.



# probe::vm.oom\_kill

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.

# probe::vm.pagefault

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

## Synopsis

`vm.pagefault`

## Values

<i>write_access</i>	indicates whether this was a write or read access; 1 indicates a write, while 0 indicates a read
<i>address</i>	the address of the faulting memory access; i.e. the address that caused the page fault
<i>name</i>	name of the probe point

## Context

The process which triggered the fault

# probe::vm.pagefault.return

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

## Synopsis

```
vm.pagefault.return
```

## Values

<i>name</i>	name of the probe point
<i>fault_type</i>	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.

# probe::vm.write\_shared

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

## Synopsis

```
vm.write_shared
```

## Values

<i>name</i>	name of the probe point
<i>address</i>	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.

# probe::vm.write\_shared\_copy

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.write\_shared.

---

# 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.

## function::cputime\_to\_msecs

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

### Synopsis

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

### Arguments

*cputime*      Time to convert to milliseconds.

# function::cputime\_to\_string

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)).



## function::cputime\_to\_usecs

function::cputime\_to\_usecs — Translates the given cputime into microseconds

### Synopsis

```
cputime_to_usecs:long(cputime:long)
```

### Arguments

*cputime*      Time to convert to microseconds.

# function::msecs\_to\_string

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.

# function::nsecs\_to\_string

function::nsecs\_to\_string — Human readable string for given nanoseconds

## Synopsis

```
nsecs_to_string:string(nsecs:long)
```

## Arguments

*nsecs*      Number of nanoseconds to translate.

## Description

Returns a string representing the number of nanoseconds as a human readable string consisting of “XmY.ZZZZZZs”, where X is the number of minutes, Y is the number of seconds and ZZZZZZZZ is the number of nanoseconds.

# function::task\_start\_time

function::task\_start\_time — Start time of the given task

## Synopsis

```
task_start_time:long(tid:long)
```

## Arguments

*tid* Thread id of the given task

## Description

Returns the start time of the given task in nanoseconds since boot time or 0 if the task does not exist.

# function::task\_stime

function::task\_stime — System time of the task

## Synopsis

- 1) `task_stime:long()`
- 2) `task_stime:long(tid:long)`

## Arguments

*tid* Thread id of the given task

## Description

- 1) 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.
- 2) 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.

# function::task\_time\_string

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”.

# function::task\_time\_string\_tid

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”.

# function::task\_etime

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

## Synopsis

- 1) task\_etime:long()
- 2) task\_etime:long(tid:long)

## Arguments

*tid* Thread id of the given task

## Description

- 1) 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.
- 2) 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.



# function::usecs\_to\_string

function::usecs\_to\_string — Human readable string for given microseconds

## Synopsis

```
usecs_to_string:string(usecs:long)
```

## Arguments

*usecs*      Number of microseconds to translate.

## Description

Returns a string representing the number of microseconds as a human readable string consisting of “XmY.ZZZZZZs”, where X is the number of minutes, Y is the number of seconds and ZZZZZZ is the number of microseconds.

---

# Chapter 8. Scheduler Tapset

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

# probe::scheduler.balance

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.

# probe::scheduler.cpu\_off

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>task_next</i>	the process replacing current
<i>idle</i>	boolean indicating whether current is the idle process
<i>name</i>	name of the probe point

## Context

The process leaving the cpu.

# probe::scheduler.cpu\_on

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

## Synopsis

`scheduler.cpu_on`

## Values

<i>idle</i>	- boolean indicating whether current is the idle process
<i>name</i>	name of the probe point
<i>task_prev</i>	the process that was previously running on this cpu

## Context

The resuming process.

# probe::scheduler.ctxswitch

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

## Synopsis

`scheduler.ctxswitch`

## Values

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

# probe::scheduler.kthread\_stop

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

## Synopsis

```
scheduler.kthread_stop
```

## Values

<i>thread_pid</i>	PID of the thread being stopped
<i>thread_priority</i>	priority of the thread

# probe::scheduler.kthread\_stop.return

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

## Synopsis

```
scheduler.kthread_stop.return
```

## Values

<i>name</i>	name of the probe point
<i>return_value</i>	return value after stopping the thread



# probe::scheduler.migrate

probe::scheduler.migrate — Task migrating across cpus

## Synopsis

```
scheduler.migrate
```

## Values

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

# probe::scheduler.process\_exit

probe::scheduler.process\_exit — Process exiting

## Synopsis

`scheduler.process_exit`

## Values

<i>pid</i>	PID of the process exiting
<i>name</i>	name of the probe point
<i>priority</i>	priority of the process exiting

# probe::scheduler.process\_fork

probe::scheduler.process\_fork — Process forked

## Synopsis

```
scheduler.process_fork
```

## Values

<i>name</i>	name of the probe point
<i>parent_pid</i>	PID of the parent process
<i>child_pid</i>	PID of the child process

# probe::scheduler.process\_free

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

## Synopsis

```
scheduler.process_free
```

## Values

<i>priority</i>	priority of the process getting freed
<i>name</i>	name of the probe point
<i>pid</i>	PID of the process getting freed

# probe::scheduler.process\_wait

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

## Synopsis

```
scheduler.process_wait
```

## Values

*pid*      PID of the process scheduler is waiting on

*name*     name of the probe point

# probe::scheduler.signal\_send

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

## Synopsis

```
scheduler.signal_send
```

## Values

<i>pid</i>	pid of the process sending signal
<i>name</i>	name of the probe point
<i>signal_number</i>	signal number

# probe::scheduler.tick

probe::scheduler.tick — Scheduler's internal tick, a process's timeslice accounting is updated

## Synopsis

```
scheduler.tick
```

## Values

*idle*    boolean indicating whether current is the idle process

*name*    name of the probe point

## Context

The process whose accounting will be updated.

# probe::scheduler.wait\_task

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

## Synopsis

```
scheduler.wait_task
```

## Values

<i>task_pid</i>	PID of the task the scheduler is waiting on
<i>name</i>	name of the probe point
<i>task_priority</i>	priority of the task



# probe::scheduler.wakeup

probe::scheduler.wakeup — Task is woken up

## Synopsis

`scheduler.wakeup`

## Values

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

# probe::scheduler.wakeup\_new

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

## Synopsis

`scheduler.wakeup_new`

## Values

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

---

# 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:

# probe::ioblock.end

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

## Synopsis

ioblock.end

## Values

<i>sector</i>	beginning sector for the entire bio
<i>idx</i>	offset into the bio vector array
<i>error</i>	0 on success
<i>hw_segments</i>	number of segments after physical and DMA remapping hardware coalescing is performed
<i>bytes_done</i>	number of bytes transferred
<i>rw</i>	binary trace for read/write request
<i>name</i>	name of the probe point
<i>opf</i>	operations and flags
<i>phys_segments</i>	number of segments in this bio after physical address coalescing is performed.
<i>size</i>	total size in bytes
<i>flags</i>	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
<i>vcnt</i>	bio vector count which represents number of array element (page, offset, length) which makes up this I/O request
<i>ino</i>	i-node number of the mapped file
<i>devname</i>	block device name

## Context

The process signals the transfer is done.

# probe::ioblock.request

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

## Synopsis

ioblock.request

## Values

<i>size</i>	total size in bytes
<i>bdev</i>	target block device
<i>flags</i>	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
<i>vcnt</i>	bio vector count which represents number of array element (page, offset, length) which make up this I/O request
<i>ino</i>	i-node number of the mapped file
<i>devname</i>	block device name
<i>opf</i>	operations and flags
<i>phys_segments</i>	number of segments in this bio after physical address coalescing is performed
<i>hw_segments</i>	number of segments after physical and DMA remapping hardware coalescing is performed
<i>name</i>	name of the probe point
<i>rw</i>	binary trace for read/write request
<i>p_start_sect</i>	points to the start sector of the partition structure of the device
<i>bdev_contains</i>	points to the device object which contains the partition (when bio structure represents a partition)
<i>sector</i>	beginning sector for the entire bio
<i>idx</i>	offset into the bio vector array

## Context

The process makes block I/O request

# probe::ioblock\_trace.bounce

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

<i>idx</i>	offset into the bio vector array <i>phys_segments</i> - number of segments in this bio after physical address coalescing is performed.
<i>sector</i>	beginning sector for the entire bio
<i>q</i>	request queue on which this bio was queued.
<i>bytes_done</i>	number of bytes transferred
<i>p_start_sect</i>	points to the start sector of the partition structure of the device
<i>bdev_contains</i>	points to the device object which contains the partition (when bio structure represents a partition)
<i>rw</i>	binary trace for read/write request
<i>name</i>	name of the probe point
<i>opf</i>	operations and flags
<i>bdev</i>	target block device
<i>flags</i>	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
<i>size</i>	total size in bytes
<i>ino</i>	i-node number of the mapped file
<i>vcnt</i>	bio vector count which represents number of array element (page, offset, length) which makes up this I/O request
<i>devname</i>	device for which a buffer bounce was needed.

## Context

The process creating a block IO request.

# probe::ioblock\_trace.end

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

## Synopsis

```
ioblock_trace.end
```

## Values

<i>vcnt</i>	bio vector count which represents number of array element (page, offset, length) which makes up this I/O request
<i>ino</i>	i-node number of the mapped file
<i>devname</i>	block device name
<i>bdev</i>	target block device
<i>flags</i>	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
<i>size</i>	total size in bytes
<i>opf</i>	operations and flags
<i>p_start_sect</i>	points to the start sector of the partition structure of the device
<i>bdev_contains</i>	points to the device object which contains the partition (when bio structure represents a partition)
<i>name</i>	name of the probe point
<i>rw</i>	binary trace for read/write request
<i>bytes_done</i>	number of bytes transferred
<i>idx</i>	offset into the bio vector array <i>phys_segments</i> - number of segments in this bio after physical address coalescing is performed.
<i>q</i>	request queue on which this bio was queued.
<i>sector</i>	beginning sector for the entire bio

## Context

The process signals the transfer is done.

# probe::ioblock\_trace.request

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

## Synopsis

ioblock\_trace.request

## Values

<i>flags</i>	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
<i>bdev</i>	target block device
<i>size</i>	total size in bytes
<i>devname</i>	block device name
<i>ino</i>	i-node number of the mapped file
<i>vcnt</i>	bio vector count which represents number of array element (page, offset, length) which make up this I/O request
<i>opf</i>	operations and flags
<i>bytes_done</i>	number of bytes transferred
<i>p_start_sect</i>	points to the start sector of the partition structure of the device
<i>bdev_contains</i>	points to the device object which contains the partition (when bio structure represents a partition)
<i>rw</i>	binary trace for read/write request
<i>name</i>	name of the probe point
<i>idx</i>	offset into the bio vector array <i>phys_segments</i> - number of segments in this bio after physical address coalescing is performed.
<i>sector</i>	beginning sector for the entire bio
<i>q</i>	request queue on which this bio was queued.

## Context

The process makes block I/O request



# probe::ioscheduler.elv\_add\_request

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

## Synopsis

```
ioscheduler.elv_add_request
```

## Values

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

# probe::ioscheduler.elv\_add\_request.kp

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

# probe::ioscheduler.elv\_add\_request.tp

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

# probe::ioscheduler.elv\_completed\_request

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

## Synopsis

```
ioscheduler.elv_completed_request
```

## Values

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

# probe::ioscheduler.elv\_next\_request

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

## Synopsis

```
ioscheduler.elv_next_request
```

## Values

<i>name</i>	Name of the probe point
<i>elevator_name</i>	The type of I/O elevator currently enabled

# probe::ioscheduler.elv\_next\_request.return

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

## Synopsis

```
ioscheduler.elv_next_request.return
```

## Values

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

# probe::ioscheduler\_trace.elv\_abort\_request

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

## Synopsis

```
ioscheduler_trace.elv_abort_request
```

## Values

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

# probe::ioscheduler\_trace.elv\_completed\_request

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

## Synopsis

```
ioscheduler_trace.elv_completed_request
```

## Values

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

## Description

completed.



# probe::ioscheduler\_trace.elv\_issue\_request

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

## Synopsis

```
ioscheduler_trace.elv_issue_request
```

## Values

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

## Description

scheduled.

# probe::ioscheduler\_trace.elv\_requeue\_request

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

## Synopsis

```
ioscheduler_trace.elv_requeue_request
```

## Values

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

## Description

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

# probe::ioscheduler\_trace.plugin

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

## Synopsis

```
ioscheduler_trace.plugin
```

## Values

<i>rq_queue</i>	request queue
<i>name</i>	Name of the probe point

## Description

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

# probe::ioscheduler\_trace.unplug\_io

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

## Synopsis

```
ioscheduler_trace.unplug_io
```

## Values

<i>name</i>	Name of the probe point
<i>rq_queue</i>	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.

# probe::ioscheduler\_trace.unplug\_timer

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

## Synopsis

```
ioscheduler_trace.unplug_timer
```

## Values

<i>name</i>	Name of the probe point
-------------	-------------------------

<i>rq_queue</i>	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:

# probe::scsi.iocompleted

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

## Synopsis

`scsi.iocompleted`

## Values

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

# probe::scsi.iodispatching

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

## Synopsis

`scsi.iodispatching`

## Values

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



# probe::scsi.iodone

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

## Synopsis

`scsi.iodone`

## Values

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

# probe::scsi.ioentry

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

## Synopsis

`scsi.ioentry`

## Values

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

# probe::scsi.ioexecute

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

## Synopsis

`scsi.ioexecute`

## Values

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

# probe::scsi.set\_state

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

## Synopsis

```
scsi.set_state
```

## Values

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

---

# Chapter 11. TTY Tapset

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

# probe::tty.init

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

## Synopsis

```
tty.init
```

## Values

<i>name</i>	the driver .dev_name name
<i>module</i>	the module name
<i>driver_name</i>	the driver name

# probe::tty.ioctl

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

## Synopsis

```
tty.ioctl
```

## Values

<i>name</i>	the file name
<i>cmd</i>	the ioctl command
<i>arg</i>	the ioctl argument

# probe::tty.open

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

## Synopsis

`tty.open`

## Values

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



# probe::tty.poll

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

## Synopsis

```
tty.poll
```

## Values

*wait\_key*            the wait queue key

*file\_name*           the tty file name

# probe::tty.read

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

## Synopsis

```
tty.read
```

## Values

<i>driver_name</i>	the driver name
<i>buffer</i>	the buffer that will receive the characters
<i>file_name</i>	the file name created to the tty
<i>nr</i>	The amount of characters to be read

# probe::tty.receive

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

## Synopsis

```
tty.receive
```

## Values

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

# probe::tty.register

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

## Synopsis

```
tty.register
```

## Values

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

# probe::tty.release

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

## Synopsis

```
tty.release
```

## Values

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

# probe::tty.resize

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

## Synopsis

```
tty.resize
```

## Values

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

# probe::tty.unregister

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

## Synopsis

```
tty.unregister
```

## Values

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

# probe::tty.write

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

## Synopsis

```
tty.write
```

## Values

<i>nr</i>	The amount of characters
<i>file_name</i>	the file name lreated to the tty
<i>buffer</i>	the buffer that will be written
<i>driver_name</i>	the driver name



---

# 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

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

## Synopsis

```
irq_handler.entry
```

## Values

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

# probe::irq\_handler.exit

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

## Synopsis

`irq_handler.exit`

## Values

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

# probe::softirq.entry

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

## Synopsis

```
softirq.entry
```

## Values

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

# probe::softirq.exit

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

## Synopsis

```
softirq.exit
```

## Values

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

# probe::workqueue.create

probe::workqueue.create — Creating a new workqueue

## Synopsis

```
workqueue.create
```

## Values

<i>cpu</i>	cpu for which the worker thread is created
<i>wq_thread</i>	task_struct of the workqueue thread

# probe::workqueue.destroy

probe::workqueue.destroy — Destroying workqueue

## Synopsis

```
workqueue.destroy
```

## Values

*wq\_thread*            task\_struct of the workqueue thread

# probe::workqueue.execute

probe::workqueue.execute — Executing deferred work

## Synopsis

```
workqueue.execute
```

## Values

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



# probe::workqueue.insert

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

## Synopsis

```
workqueue.insert
```

## Values

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

---

# Chapter 13. Networking Tapset

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

# function::format\_ipaddr

function::format\_ipaddr — Returns a string representation for an IP address

## Synopsis

```
format_ipaddr:string(addr:long,family:long)
```

## Arguments

<i>addr</i>	the IP address
<i>family</i>	the IP address family (either AF_INET or AF_INET6)

# function::htonl

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

## Synopsis

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

## Arguments

*x* Value to convert

# function::htonll

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

## Synopsis

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

## Arguments

*x* Value to convert

# function::htons

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

## Synopsis

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

## Arguments

*x* Value to convert

## function::ip\_ntop

function::ip\_ntop — Returns a string representation for an IPv4 address

### Synopsis

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

### Arguments

*addr*     the IPv4 address represented as an integer

# function::ntohl

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

## Synopsis

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

## Arguments

*x* Value to convert



# function::ntohl

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

## Synopsis

```
ntohl1:long(x:long)
```

## Arguments

*x* Value to convert

# function::ntohs

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

## Synopsis

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

## Arguments

*x* Value to convert

# probe::netdev.change\_mac

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

## Synopsis

netdev.change\_mac

## Values

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

# probe::netdev.change\_mtu

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

## Synopsis

`netdev.change_mtu`

## Values

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

# probe::netdev.change\_rx\_flag

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

## Synopsis

```
netdev.change_rx_flag
```

## Values

<i>flags</i>	The new flags
<i>dev_name</i>	The device that will be changed

# probe::netdev.close

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

## Synopsis

```
netdev.close
```

## Values

<i>dev_name</i>	The device that is going to be closed
-----------------	---------------------------------------

# probe::netdev.get\_stats

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

## Synopsis

```
netdev.get_stats
```

## Values

<i>dev_name</i>	The device that is going to provide the statistics
-----------------	--

# probe::netdev.hard\_transmit

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>truesize</i>	The size of the data to be transmitted.
<i>length</i>	The length of the transmit buffer.



# probe::netdev.ioctl

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)

# probe::netdev.open

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

## Synopsis

`netdev.open`

## Values

*dev\_name*      The device that is going to be opened

# probe::netdev.receive

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

## Synopsis

```
netdev.receive
```

## Values

<i>dev_name</i>	The name of the device. e.g: eth0, ath1.
<i>protocol</i>	Protocol of received packet.
<i>length</i>	The length of the receiving buffer.

# probe::netdev.register

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

## Synopsis

```
netdev.register
```

## Values

<i>dev_name</i>	The device that is going to be registered
-----------------	---

# probe::netdev.rx

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

## Synopsis

```
netdev.rx
```

## Values

<i>dev_name</i>	The device received the packet
<i>protocol</i>	The packet protocol

# probe::netdev.set\_promiscuity

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

## Synopsis

```
netdev.set_promiscuity
```

## Values

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

# probe::netdev.transmit

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>truesize</i>	The size of the data to be transmitted.
<i>length</i>	The length of the transmit buffer.

# probe::netdev.unregister

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

## Synopsis

```
netdev.unregister
```

## Values

<i>dev_name</i>	The device that is going to be unregistered
-----------------	---



# probe::netfilter.arp.forward

probe::netfilter.arp.forward — - Called for each ARP packet to be forwarded

## Synopsis

netfilter.arp.forward

## Values

<i>indev_name</i>	Name of network device packet was received on (if known)
<i>ar_pln</i>	Length of protocol address
<i>outdev_name</i>	Name of network device packet will be routed to (if known)
<i>arphdr</i>	Address of ARP header
<i>ar_sip</i>	Ethernet+IP only (ar_pro==0x800): source IP address
<i>outdev</i>	Address of net_device representing output device, 0 if unknown
<i>nf_stolen</i>	Constant used to signify a 'stolen' verdict
<i>data_str</i>	A string representing the packet buffer contents
<i>nf_drop</i>	Constant used to signify a 'drop' verdict
<i>data_hex</i>	A hexadecimal string representing the packet buffer contents
<i>ar_op</i>	ARP opcode (command)
<i>length</i>	The length of the packet buffer contents, in bytes
<i>ar_tip</i>	Ethernet+IP only (ar_pro==0x800): target IP address
<i>ar_pro</i>	Format of protocol address
<i>nf_stop</i>	Constant used to signify a 'stop' verdict
<i>nf_repeat</i>	Constant used to signify a 'repeat' verdict
<i>ar_tha</i>	Ethernet+IP only (ar_pro==0x800): target hardware (MAC) address
<i>ar_data</i>	Address of ARP packet data region (after the header)
<i>ar_hrd</i>	Format of hardware address
<i>pf</i>	Protocol family -- always "arp"
<i>ar_hln</i>	Length of hardware address
<i>indev</i>	Address of net_device representing input device, 0 if unknown
<i>ar_sha</i>	Ethernet+IP only (ar_pro==0x800): source hardware (MAC) address
<i>nf_accept</i>	Constant used to signify an 'accept' verdict

<i>nf_queue</i>	Constant used to signify a 'queue' verdict
-----------------	--

# probe::netfilter.arp.in

probe::netfilter.arp.in — - Called for each incoming ARP packet

## Synopsis

netfilter.arp.in

## Values

<i>pf</i>	Protocol family -- always “arp”
<i>ar_hln</i>	Length of hardware address
<i>nf_queue</i>	Constant used to signify a 'queue' verdict
<i>indev</i>	Address of net_device representing input device, 0 if unknown
<i>ar_sha</i>	Ethernet+IP only (ar_pro==0x800): source hardware (MAC) address
<i>nf_accept</i>	Constant used to signify an 'accept' verdict
<i>ar_pro</i>	Format of protocol address
<i>nf_stop</i>	Constant used to signify a 'stop' verdict
<i>ar_tha</i>	Ethernet+IP only (ar_pro==0x800): target hardware (MAC) address
<i>ar_data</i>	Address of ARP packet data region (after the header)
<i>ar_hrd</i>	Format of hardware address
<i>nf_repeat</i>	Constant used to signify a 'repeat' verdict
<i>data_hex</i>	A hexadecimal string representing the packet buffer contents
<i>data_str</i>	A string representing the packet buffer contents
<i>nf_drop</i>	Constant used to signify a 'drop' verdict
<i>ar_tip</i>	Ethernet+IP only (ar_pro==0x800): target IP address
<i>ar_op</i>	ARP opcode (command)
<i>length</i>	The length of the packet buffer contents, in bytes
<i>outdev_name</i>	Name of network device packet will be routed to (if known)
<i>arphdr</i>	Address of ARP header
<i>indev_name</i>	Name of network device packet was received on (if known)
<i>ar_pln</i>	Length of protocol address
<i>outdev</i>	Address of net_device representing output device, 0 if unknown
<i>nf_stolen</i>	Constant used to signify a 'stolen' verdict

*ar\_sip*

Ethernet+IP only (ar\_pro==0x800): source IP address

# probe::netfilter.arp.out

probe::netfilter.arp.out — - Called for each outgoing ARP packet

## Synopsis

netfilter.arp.out

## Values

<i>indev_name</i>	Name of network device packet was received on (if known)
<i>ar_pln</i>	Length of protocol address
<i>outdev_name</i>	Name of network device packet will be routed to (if known)
<i>arphdr</i>	Address of ARP header
<i>ar_sip</i>	Ethernet+IP only (ar_pro==0x800): source IP address
<i>outdev</i>	Address of net_device representing output device, 0 if unknown
<i>nf_stolen</i>	Constant used to signify a 'stolen' verdict
<i>data_str</i>	A string representing the packet buffer contents
<i>nf_drop</i>	Constant used to signify a 'drop' verdict
<i>data_hex</i>	A hexadecimal string representing the packet buffer contents
<i>ar_op</i>	ARP opcode (command)
<i>length</i>	The length of the packet buffer contents, in bytes
<i>ar_tip</i>	Ethernet+IP only (ar_pro==0x800): target IP address
<i>ar_pro</i>	Format of protocol address
<i>nf_stop</i>	Constant used to signify a 'stop' verdict
<i>nf_repeat</i>	Constant used to signify a 'repeat' verdict
<i>ar_data</i>	Address of ARP packet data region (after the header)
<i>ar_tha</i>	Ethernet+IP only (ar_pro==0x800): target hardware (MAC) address
<i>ar_hrd</i>	Format of hardware address
<i>ar_hln</i>	Length of hardware address
<i>pf</i>	Protocol family -- always "arp"
<i>indev</i>	Address of net_device representing input device, 0 if unknown
<i>nf_accept</i>	Constant used to signify an 'accept' verdict
<i>ar_sha</i>	Ethernet+IP only (ar_pro==0x800): source hardware (MAC) address

*nf\_queue*

Constant used to signify a 'queue' verdict

# probe::netfilter.bridge.forward

probe::netfilter.bridge.forward — Called on an incoming bridging packet destined for some other computer

## Synopsis

netfilter.bridge.forward

## Values

<i>pf</i>	Protocol family -- always “bridge”
<i>br_poid</i>	Port identifier
<i>br_flags</i>	BPDU flags
<i>protocol</i>	Packet protocol
<i>nf_accept</i>	Constant used to signify an 'accept' verdict
<i>br_max</i>	Max age in 1/256 secs
<i>br_bid</i>	Identity of bridge
<i>indev</i>	Address of net_device representing input device, 0 if unknown
<i>br_type</i>	BPDU type
<i>br_msg</i>	Message age in 1/256 secs
<i>nf_queue</i>	Constant used to signify a 'queue' verdict
<i>nf_stop</i>	Constant used to signify a 'stop' verdict
<i>br_rid</i>	Identity of root bridge
<i>nf_repeat</i>	Constant used to signify a 'repeat' verdict
<i>br_vid</i>	Protocol version identifier
<i>nf_drop</i>	Constant used to signify a 'drop' verdict
<i>llcpdu</i>	Address of LLC Protocol Data Unit
<i>data_str</i>	A string representing the packet buffer contents
<i>br_fd</i>	Forward delay in 1/256 secs
<i>data_hex</i>	A hexadecimal string representing the packet buffer contents
<i>brhdr</i>	Address of bridge header
<i>length</i>	The length of the packet buffer contents, in bytes
<i>br_rmac</i>	Root bridge MAC address
<i>llcproto_stp</i>	Constant used to signify Bridge Spanning Tree Protocol packet

<i>indev_name</i>	Name of network device packet was received on (if known)
<i>br_cost</i>	Total cost from transmitting bridge to root
<i>outdev_name</i>	Name of network device packet will be routed to (if known)
<i>br_mac</i>	Bridge MAC address
<i>br_prid</i>	Protocol identifier
<i>br_hptime</i>	Hello time in 1/256 secs
<i>nf_stolen</i>	Constant used to signify a 'stolen' verdict
<i>outdev</i>	Address of net_device representing output device, 0 if unknown



# probe::netfilter.bridge.local\_in

probe::netfilter.bridge.local\_in — Called on a bridging packet destined for the local computer

## Synopsis

netfilter.bridge.local\_in

## Values

<i>br_rid</i>	Identity of root bridge
<i>nf_stop</i>	Constant used to signify a 'stop' verdict
<i>nf_repeat</i>	Constant used to signify a 'repeat' verdict
<i>br_poid</i>	Port identifier
<i>br_flags</i>	BPDU flags
<i>pf</i>	Protocol family -- always “bridge”
<i>protocol</i>	Packet protocol
<i>br_msg</i>	Message age in 1/256 secs
<i>nf_queue</i>	Constant used to signify a 'queue' verdict
<i>br_bid</i>	Identity of bridge
<i>nf_accept</i>	Constant used to signify an 'accept' verdict
<i>br_max</i>	Max age in 1/256 secs
<i>indev</i>	Address of net_device representing input device, 0 if unknown
<i>br_type</i>	BPDU type
<i>outdev_name</i>	Name of network device packet will be routed to (if known)
<i>indev_name</i>	Name of network device packet was received on (if known)
<i>br_cost</i>	Total cost from transmitting bridge to root
<i>br_prid</i>	Protocol identifier
<i>br_hitime</i>	Hello time in 1/256 secs
<i>nf_stolen</i>	Constant used to signify a 'stolen' verdict
<i>outdev</i>	Address of net_device representing output device, 0 if unknown
<i>br_mac</i>	Bridge MAC address
<i>data_hex</i>	A hexadecimal string representing the packet buffer contents
<i>br_fd</i>	Forward delay in 1/256 secs

<i>brhdr</i>	Address of bridge header
<i>br_vid</i>	Protocol version identifier
<i>nf_drop</i>	Constant used to signify a 'drop' verdict
<i>llcpdu</i>	Address of LLC Protocol Data Unit
<i>data_str</i>	A string representing the packet buffer contents
<i>length</i>	The length of the packet buffer contents, in bytes
<i>br_rmac</i>	Root bridge MAC address
<i>llcproto_stp</i>	Constant used to signify Bridge Spanning Tree Protocol packet

# probe::netfilter.bridge.local\_out

probe::netfilter.bridge.local\_out — Called on a bridging packet coming from a local process

## Synopsis

netfilter.bridge.local\_out

## Values

<i>br_vid</i>	Protocol version identifier
<i>nf_drop</i>	Constant used to signify a 'drop' verdict
<i>llcpdu</i>	Address of LLC Protocol Data Unit
<i>data_str</i>	A string representing the packet buffer contents
<i>br_fd</i>	Forward delay in 1/256 secs
<i>data_hex</i>	A hexadecimal string representing the packet buffer contents
<i>brhdr</i>	Address of bridge header
<i>length</i>	The length of the packet buffer contents, in bytes
<i>br_rmac</i>	Root bridge MAC address
<i>llcproto_stp</i>	Constant used to signify Bridge Spanning Tree Protocol packet
<i>br_cost</i>	Total cost from transmitting bridge to root
<i>indev_name</i>	Name of network device packet was received on (if known)
<i>outdev_name</i>	Name of network device packet will be routed to (if known)
<i>br_mac</i>	Bridge MAC address
<i>br_prid</i>	Protocol identifier
<i>br_hitime</i>	Hello time in 1/256 secs
<i>nf_stolen</i>	Constant used to signify a 'stolen' verdict
<i>outdev</i>	Address of net_device representing output device, 0 if unknown
<i>br_poid</i>	Port identifier
<i>pf</i>	Protocol family -- always "bridge"
<i>br_flags</i>	BPDU flags
<i>protocol</i>	Packet protocol
<i>nf_accept</i>	Constant used to signify an 'accept' verdict
<i>br_bid</i>	Identity of bridge

<i>br_max</i>	Max age in 1/256 secs
<i>indev</i>	Address of net_device representing input device, 0 if unknown
<i>br_type</i>	BPDU type
<i>br_msg</i>	Message age in 1/256 secs
<i>nf_queue</i>	Constant used to signify a 'queue' verdict
<i>nf_stop</i>	Constant used to signify a 'stop' verdict
<i>br_rid</i>	Identity of root bridge
<i>nf_repeat</i>	Constant used to signify a 'repeat' verdict

# probe::netfilter.bridge.post\_routing

probe::netfilter.bridge.post\_routing — - Called before a bridging packet hits the wire

## Synopsis

netfilter.bridge.post\_routing

## Values

<i>nf_accept</i>	Constant used to signify an 'accept' verdict
<i>br_max</i>	Max age in 1/256 secs
<i>br_bid</i>	Identity of bridge
<i>br_type</i>	BPDU type
<i>indev</i>	Address of net_device representing input device, 0 if unknown
<i>br_msg</i>	Message age in 1/256 secs
<i>nf_queue</i>	Constant used to signify a 'queue' verdict
<i>protocol</i>	Packet protocol
<i>br_flags</i>	BPDU flags
<i>br_poid</i>	Port identifier
<i>pf</i>	Protocol family -- always “bridge”
<i>nf_repeat</i>	Constant used to signify a 'repeat' verdict
<i>nf_stop</i>	Constant used to signify a 'stop' verdict
<i>br_rid</i>	Identity of root bridge
<i>length</i>	The length of the packet buffer contents, in bytes
<i>llcproto_stp</i>	Constant used to signify Bridge Spanning Tree Protocol packet
<i>br_rmac</i>	Root bridge MAC address
<i>br_vid</i>	Protocol version identifier
<i>nf_drop</i>	Constant used to signify a 'drop' verdict
<i>data_str</i>	A string representing the packet buffer contents
<i>llcpdu</i>	Address of LLC Protocol Data Unit
<i>brhdr</i>	Address of bridge header
<i>data_hex</i>	A hexadecimal string representing the packet buffer contents
<i>br_fd</i>	Forward delay in 1/256 secs

<i>br_mac</i>	Bridge MAC address
<i>nf_stolen</i>	Constant used to signify a 'stolen' verdict
<i>br_hptime</i>	Hello time in 1/256 secs
<i>br_prid</i>	Protocol identifier
<i>outdev</i>	Address of net_device representing output device, 0 if unknown
<i>br_cost</i>	Total cost from transmitting bridge to root
<i>indev_name</i>	Name of network device packet was received on (if known)
<i>outdev_name</i>	Name of network device packet will be routed to (if known)

# probe::netfilter.bridge.pre\_routing

probe::netfilter.bridge.pre\_routing — - Called before a bridging packet is routed

## Synopsis

netfilter.bridge.pre\_routing

## Values

<i>length</i>	The length of the packet buffer contents, in bytes
<i>llcproto_stp</i>	Constant used to signify Bridge Spanning Tree Protocol packet
<i>br_rmac</i>	Root bridge MAC address
<i>br_vid</i>	Protocol version identifier
<i>nf_drop</i>	Constant used to signify a 'drop' verdict
<i>data_str</i>	A string representing the packet buffer contents
<i>llcpdu</i>	Address of LLC Protocol Data Unit
<i>brhdr</i>	Address of bridge header
<i>br_fd</i>	Forward delay in 1/256 secs
<i>data_hex</i>	A hexadecimal string representing the packet buffer contents
<i>br_mac</i>	Bridge MAC address
<i>nf_stolen</i>	Constant used to signify a 'stolen' verdict
<i>br_prid</i>	Protocol identifier
<i>br_hitime</i>	Hello time in 1/256 secs
<i>outdev</i>	Address of net_device representing output device, 0 if unknown
<i>indev_name</i>	Name of network device packet was received on (if known)
<i>br_cost</i>	Total cost from transmitting bridge to root
<i>outdev_name</i>	Name of network device packet will be routed to (if known)
<i>br_max</i>	Max age in 1/256 secs
<i>nf_accept</i>	Constant used to signify an 'accept' verdict
<i>br_bid</i>	Identity of bridge
<i>br_type</i>	BPDU type
<i>indev</i>	Address of net_device representing input device, 0 if unknown
<i>br_msg</i>	Message age in 1/256 secs

<i>nf_queue</i>	Constant used to signify a 'queue' verdict
<i>protocol</i>	Packet protocol
<i>br_flags</i>	BPDU flags
<i>br_poid</i>	Port identifier
<i>pf</i>	Protocol family -- always “bridge”
<i>nf_repeat</i>	Constant used to signify a 'repeat' verdict
<i>nf_stop</i>	Constant used to signify a 'stop' verdict
<i>br_rid</i>	Identity of root bridge



# probe::netfilter.ip.forward

probe::netfilter.ip.forward — Called on an incoming IP packet addressed to some other computer

## Synopsis

netfilter.ip.forward

## Values

<i>outdev_name</i>	Name of network device packet will be routed to (if known)
<i>syn</i>	TCP SYN flag (if protocol is TCP; ipv4 only)
<i>indev_name</i>	Name of network device packet was received on (if known)
<i>daddr</i>	A string representing the destination IP address
<i>outdev</i>	Address of net_device representing output device, 0 if unknown
<i>nf_stolen</i>	Constant used to signify a 'stolen' verdict
<i>dport</i>	TCP or UDP destination port (ipv4 only)
<i>data_hex</i>	A hexadecimal string representing the packet buffer contents
<i>data_str</i>	A string representing the packet buffer contents
<i>family</i>	IP address family
<i>rst</i>	TCP RST flag (if protocol is TCP; ipv4 only)
<i>nf_drop</i>	Constant used to signify a 'drop' verdict
<i>length</i>	The length of the packet buffer contents, in bytes
<i>ipproto_tcp</i>	Constant used to signify that the packet protocol is TCP
<i>psb</i>	TCP PSB flag (if protocol is TCP; ipv4 only)
<i>nf_stop</i>	Constant used to signify a 'stop' verdict
<i>nf_repeat</i>	Constant used to signify a 'repeat' verdict
<i>protocol</i>	Packet protocol from driver (ipv4 only)
<i>pf</i>	Protocol family -- either "ipv4" or "ipv6"
<i>ipproto_udp</i>	Constant used to signify that the packet protocol is UDP
<i>ack</i>	TCP ACK flag (if protocol is TCP; ipv4 only)
<i>saddr</i>	A string representing the source IP address
<i>nf_queue</i>	Constant used to signify a 'queue' verdict
<i>iphdr</i>	Address of IP header

<i>indev</i>	Address of net_device representing input device, 0 if unknown
<i>sport</i>	TCP or UDP source port (ipv4 only)
<i>nf_accept</i>	Constant used to signify an 'accept' verdict
<i>fin</i>	TCP FIN flag (if protocol is TCP; ipv4 only)
<i>urg</i>	TCP URG flag (if protocol is TCP; ipv4 only)

# probe::netfilter.ip.local\_in

probe::netfilter.ip.local\_in — Called on an incoming IP packet addressed to the local computer

## Synopsis

netfilter.ip.local\_in

## Values

<i>length</i>	The length of the packet buffer contents, in bytes
<i>data_hex</i>	A hexadecimal string representing the packet buffer contents
<i>nf_drop</i>	Constant used to signify a 'drop' verdict
<i>family</i>	IP address family
<i>rst</i>	TCP RST flag (if protocol is TCP; ipv4 only)
<i>data_str</i>	A string representing the packet buffer contents
<i>nf_stolen</i>	Constant used to signify a 'stolen' verdict
<i>outdev</i>	Address of net_device representing output device, 0 if unknown
<i>dport</i>	TCP or UDP destination port (ipv4 only)
<i>outdev_name</i>	Name of network device packet will be routed to (if known)
<i>daddr</i>	A string representing the destination IP address
<i>syn</i>	TCP SYN flag (if protocol is TCP; ipv4 only)
<i>indev_name</i>	Name of network device packet was received on (if known)
<i>iphdr</i>	Address of IP header
<i>nf_queue</i>	Constant used to signify a 'queue' verdict
<i>urg</i>	TCP URG flag (if protocol is TCP; ipv4 only)
<i>fin</i>	TCP FIN flag (if protocol is TCP; ipv4 only)
<i>nf_accept</i>	Constant used to signify an 'accept' verdict
<i>indev</i>	Address of net_device representing input device, 0 if unknown
<i>sport</i>	TCP or UDP source port (ipv4 only)
<i>pf</i>	Protocol family -- either “ipv4” or “ipv6”
<i>protocol</i>	Packet protocol from driver (ipv4 only)
<i>saddr</i>	A string representing the source IP address
<i>ack</i>	TCP ACK flag (if protocol is TCP; ipv4 only)

<i>ipproto_udp</i>	Constant used to signify that the packet protocol is UDP
<i>nf_repeat</i>	Constant used to signify a 'repeat' verdict
<i>psh</i>	TCP PSH flag (if protocol is TCP; ipv4 only)
<i>ipproto_tcp</i>	Constant used to signify that the packet protocol is TCP
<i>nf_stop</i>	Constant used to signify a 'stop' verdict

# probe::netfilter.ip.local\_out

probe::netfilter.ip.local\_out — Called on an outgoing IP packet

## Synopsis

netfilter.ip.local\_out

## Values

<i>saddr</i>	A string representing the source IP address
<i>ack</i>	TCP ACK flag (if protocol is TCP; ipv4 only)
<i>ipproto_udp</i>	Constant used to signify that the packet protocol is UDP
<i>pf</i>	Protocol family -- either “ipv4” or “ipv6”
<i>protocol</i>	Packet protocol from driver (ipv4 only)
<i>urg</i>	TCP URG flag (if protocol is TCP; ipv4 only)
<i>fin</i>	TCP FIN flag (if protocol is TCP; ipv4 only)
<i>nf_accept</i>	Constant used to signify an 'accept' verdict
<i>sport</i>	TCP or UDP source port (ipv4 only)
<i>indev</i>	Address of net_device representing input device, 0 if unknown
<i>iphdr</i>	Address of IP header
<i>nf_queue</i>	Constant used to signify a 'queue' verdict
<i>nf_stop</i>	Constant used to signify a 'stop' verdict
<i>psb</i>	TCP PSB flag (if protocol is TCP; ipv4 only)
<i>ipproto_tcp</i>	Constant used to signify that the packet protocol is TCP
<i>nf_repeat</i>	Constant used to signify a 'repeat' verdict
<i>nf_drop</i>	Constant used to signify a 'drop' verdict
<i>rst</i>	TCP RST flag (if protocol is TCP; ipv4 only)
<i>family</i>	IP address family
<i>data_str</i>	A string representing the packet buffer contents
<i>data_hex</i>	A hexadecimal string representing the packet buffer contents
<i>length</i>	The length of the packet buffer contents, in bytes
<i>daddr</i>	A string representing the destination IP address
<i>indev_name</i>	Name of network device packet was received on (if known)

<i>syn</i>	TCP SYN flag (if protocol is TCP; ipv4 only)
<i>outdev_name</i>	Name of network device packet will be routed to (if known)
<i>dport</i>	TCP or UDP destination port (ipv4 only)
<i>nf_stolen</i>	Constant used to signify a 'stolen' verdict
<i>outdev</i>	Address of net_device representing output device, 0 if unknown

# probe::netfilter.ip.post\_routing

probe::netfilter.ip.post\_routing — Called immediately before an outgoing IP packet leaves the computer

## Synopsis

netfilter.ip.post\_routing

## Values

<i>nf_repeat</i>	Constant used to signify a 'repeat' verdict
<i>nf_stop</i>	Constant used to signify a 'stop' verdict
<i>ipproto_tcp</i>	Constant used to signify that the packet protocol is TCP
<i>psh</i>	TCP PSH flag (if protocol is TCP; ipv4 only)
<i>indev</i>	Address of net_device representing input device, 0 if unknown
<i>sport</i>	TCP or UDP source port (ipv4 only)
<i>nf_accept</i>	Constant used to signify an 'accept' verdict
<i>fin</i>	TCP FIN flag (if protocol is TCP; ipv4 only)
<i>urg</i>	TCP URG flag (if protocol is TCP; ipv4 only)
<i>nf_queue</i>	Constant used to signify a 'queue' verdict
<i>iphdr</i>	Address of IP header
<i>ipproto_udp</i>	Constant used to signify that the packet protocol is UDP
<i>ack</i>	TCP ACK flag (if protocol is TCP; ipv4 only)
<i>saddr</i>	A string representing the source IP address
<i>protocol</i>	Packet protocol from driver (ipv4 only)
<i>pf</i>	Protocol family -- either "ipv4" or "ipv6"
<i>dport</i>	TCP or UDP destination port (ipv4 only)
<i>outdev</i>	Address of net_device representing output device, 0 if unknown
<i>nf_stolen</i>	Constant used to signify a 'stolen' verdict
<i>syn</i>	TCP SYN flag (if protocol is TCP; ipv4 only)
<i>indev_name</i>	Name of network device packet was received on (if known)
<i>daddr</i>	A string representing the destination IP address
<i>outdev_name</i>	Name of network device packet will be routed to (if known)
<i>length</i>	The length of the packet buffer contents, in bytes

<i>data_str</i>	A string representing the packet buffer contents
<i>rst</i>	TCP RST flag (if protocol is TCP; ipv4 only)
<i>family</i>	IP address family
<i>nf_drop</i>	Constant used to signify a 'drop' verdict
<i>data_hex</i>	A hexadecimal string representing the packet buffer contents



# probe::netfilter.ip.pre\_routing

probe::netfilter.ip.pre\_routing — Called before an IP packet is routed

## Synopsis

netfilter.ip.pre\_routing

## Values

<i>iphdr</i>	Address of IP header
<i>nf_queue</i>	Constant used to signify a 'queue' verdict
<i>urg</i>	TCP URG flag (if protocol is TCP; ipv4 only)
<i>fin</i>	TCP FIN flag (if protocol is TCP; ipv4 only)
<i>nf_accept</i>	Constant used to signify an 'accept' verdict
<i>sport</i>	TCP or UDP source port (ipv4 only)
<i>indev</i>	Address of net_device representing input device, 0 if unknown
<i>pf</i>	Protocol family - either 'ipv4' or 'ipv6'
<i>protocol</i>	Packet protocol from driver (ipv4 only)
<i>saddr</i>	A string representing the source IP address
<i>ack</i>	TCP ACK flag (if protocol is TCP; ipv4 only)
<i>ipproto_udp</i>	Constant used to signify that the packet protocol is UDP
<i>nf_repeat</i>	Constant used to signify a 'repeat' verdict
<i>psb</i>	TCP PSB flag (if protocol is TCP; ipv4 only)
<i>ipproto_tcp</i>	Constant used to signify that the packet protocol is TCP
<i>nf_stop</i>	Constant used to signify a 'stop' verdict
<i>length</i>	The length of the packet buffer contents, in bytes
<i>data_hex</i>	A hexadecimal string representing the packet buffer contents
<i>nf_drop</i>	Constant used to signify a 'drop' verdict
<i>family</i>	IP address family
<i>rst</i>	TCP RST flag (if protocol is TCP; ipv4 only)
<i>data_str</i>	A string representing the packet buffer contents
<i>nf_stolen</i>	Constant used to signify a 'stolen' verdict
<i>outdev</i>	Address of net_device representing output device, 0 if unknown

<i>dport</i>	TCP or UDP destination port (ipv4 only)
<i>outdev_name</i>	Name of network device packet will be routed to (if known)
<i>daddr</i>	A string representing the destination IP address
<i>indev_name</i>	Name of network device packet was received on (if known)
<i>syn</i>	TCP SYN flag (if protocol is TCP; ipv4 only)

# probe::sunrpc.clnt.bind\_new\_program

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

## Synopsis

`sunrpc.clnt.bind_new_program`

## Values

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

# probe::sunrpc.clnt.call\_async

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

## Synopsis

`sunrpc.clnt.call_async`

## Values

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

# probe::sunrpc.clnt.call\_sync

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

## Synopsis

`sunrpc.clnt.call_sync`

## Values

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

# probe::sunrpc.clnt.clone\_client

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

## Synopsis

```
sunrpc.clnt.clone_client
```

## Values

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

# probe::sunrpc.clnt.create\_client

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

## Synopsis

`sunrpc.clnt.create_client`

## Values

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

# probe::sunrpc.clnt.restart\_call

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

## Synopsis

```
sunrpc.clnt.restart_call
```

## Values

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



# probe::sunrpc.clnt.shutdown\_client

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

## Synopsis

`sunrpc.clnt.shutdown_client`

## Values

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

# probe::sunrpc.sched.delay

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

## Synopsis

`sunrpc.sched.delay`

## Values

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

# probe::sunrpc.sched.execute

probe::sunrpc.sched.execute — Execute the RPC `scheduler'

## Synopsis

`sunrpc.sched.execute`

## Values

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

# probe::sunrpc.sched.new\_task

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

## Synopsis

`sunrpc.sched.new_task`

## Values

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

# probe::sunrpc.sched.release\_task

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

## Synopsis

`sunrpc.sched.release_task`

## Values

<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
<i>prog</i>	the program number 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.

# probe::sunrpc.svc.create

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

## Synopsis

```
sunrpc.svc.create
```

## Values

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

# probe::sunrpc.svc.destroy

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

## Synopsis

`sunrpc.svc.destroy`

## Values

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

# probe::sunrpc.svc.drop

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

## Synopsis

`sunrpc.svc.drop`

## Values

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



# probe::sunrpc.svc.process

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

## Synopsis

`sunrpc.svc.process`

## Values

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

# probe::sunrpc.svc.recv

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>sv_nrthreads</i>	the number of concurrent threads
<i>timeout</i>	the timeout of waiting for data

# probe::sunrpc.svc.register

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

## Synopsis

```
sunrpc.svc.register
```

## Values

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

## Description

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

# probe::sunrpc.svc.send

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

## Synopsis

`sunrpc.svc.send`

## Values

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

# probe::tcp.disconnect

probe::tcp.disconnect — TCP socket disconnection

## Synopsis

`tcp.disconnect`

## Values

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

## Context

The process which disconnects tcp

# probe::tcp.disconnect.return

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

# probe::tcp.receive

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

## Synopsis

tcp.receive

## Values

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

# probe::tcp.recvmsg

probe::tcp.recvmsg — Receiving TCP message

## Synopsis

`tcp.recvmsg`

## Values

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

## Context

The process which receives a tcp message



# probe::tcp.recvmsg.return

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

## Synopsis

`tcp.recvmsg.return`

## Values

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

## Context

The process which receives a tcp message

# probe::tcp.sendmsg

probe::tcp.sendmsg — Sending a tcp message

## Synopsis

`tcp.sendmsg`

## Values

<i>family</i>	IP address family
<i>sock</i>	Network socket
<i>name</i>	Name of this probe
<i>size</i>	Number of bytes to send

## Context

The process which sends a tcp message

# probe::tcp.sendmsg.return

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

## Synopsis

```
tcp.sendmsg.return
```

## Values

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

*name*    Name of this probe

## Context

The process which sends a tcp message

# probe::tcp.setsockopt

probe::tcp.setsockopt — Call to `setsockopt`

## Synopsis

`tcp.setsockopt`

## Values

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

## Context

The process which calls `setsockopt`

# probe::tcp.setsockopt.return

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

# probe::udp.disconnect

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

## Synopsis

udp.disconnect

## Values

<i>daddr</i>	A string representing the destination IP address
<i>flags</i>	Flags (e.g. FIN, etc)
<i>sock</i>	Network socket used by the process
<i>saddr</i>	A string representing the source IP address
<i>family</i>	IP address family
<i>sport</i>	UDP source port
<i>name</i>	The name of this probe
<i>dport</i>	UDP destination port

## Context

The process which requests a UDP disconnection

# probe::udp.disconnect.return

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

## Synopsis

```
udp.disconnect.return
```

## Values

<i>dport</i>	UDP destination port
<i>sport</i>	UDP source port
<i>name</i>	The name of this probe
<i>ret</i>	Error code (0: no error)
<i>family</i>	IP address family
<i>saddr</i>	A string representing the source IP address
<i>daddr</i>	A string representing the destination IP address

## Context

The process which requested a UDP disconnection

# probe::udp.recvmsg

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

## Synopsis

`udp.recvmsg`

## Values

<i>daddr</i>	A string representing the destination IP address
<i>sock</i>	Network socket used by the process
<i>size</i>	Number of bytes received by the process
<i>saddr</i>	A string representing the source IP address
<i>family</i>	IP address family
<i>sport</i>	UDP source port
<i>name</i>	The name of this probe
<i>dport</i>	UDP destination port

## Context

The process which received a UDP message



# probe::udp.recvmsg.return

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

## Synopsis

`udp.recvmsg.return`

## Values

<i>name</i>	The name of this probe
<i>sport</i>	UDP source port
<i>dport</i>	UDP destination port
<i>daddr</i>	A string representing the destination IP address
<i>family</i>	IP address family
<i>saddr</i>	A string representing the source IP address
<i>size</i>	Number of bytes received by the process

## Context

The process which received a UDP message

# probe::udp.sendmsg

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

## Synopsis

`udp.sendmsg`

## Values

<i>sport</i>	UDP source port
<i>name</i>	The name of this probe
<i>dport</i>	UDP destination port
<i>daddr</i>	A string representing the destination IP address
<i>sock</i>	Network socket used by the process
<i>size</i>	Number of bytes sent by the process
<i>family</i>	IP address family
<i>saddr</i>	A string representing the source IP address

## Context

The process which sent a UDP message

# probe::udp.sendmsg.return

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

## Synopsis

```
udp.sendmsg.return
```

## Values

*size*     Number of bytes sent by the process

*name*     The name of this probe

## 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:

## function::inet\_get\_ip\_source

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

# function::inet\_get\_local\_port

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

# function::sock\_fam\_num2str

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

# function::sock\_fam\_str2num

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



# function::sock\_prot\_num2str

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

## Synopsis

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

## Arguments

*proto*     The protocol number

# function::sock\_prot\_str2num

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

## function::sock\_state\_num2str

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

## function::sock\_state\_str2num

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

# probe::socket.aio\_read

probe::socket.aio\_read — Receiving message via sock\_aio\_read

## Synopsis

```
socket.aio_read
```

## Values

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

## Context

The message sender

## Description

Fires at the beginning of receiving a message on a socket via the sock\_aio\_read function

# probe::socket.aio\_read.return

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

## Synopsis

`socket.aio_read.return`

## Values

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

# probe::socket.aio\_write

probe::socket.aio\_write — Message send via sock\_aio\_write

## Synopsis

```
socket.aio_write
```

## Values

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

## Context

The message sender

## Description

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

# probe::socket.aio\_write.return

probe::socket.aio\_write.return — Conclusion of message send via sock\_aio\_write

## Synopsis

```
socket.aio_write.return
```

## Values

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

## Context

The message receiver.

## Description

Fires at the conclusion of sending a message on a socket via the sock\_aio\_write function



# probe::socket.close

probe::socket.close — Close a socket

## Synopsis

`socket.close`

## Values

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

## Context

The requester (user process or kernel)

## Description

Fires at the beginning of closing a socket.

# probe::socket.close.return

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.

# probe::socket.create

probe::socket.create — Creation of a socket

## Synopsis

```
socket.create
```

## Values

<i>type</i>	Socket type value
<i>protocol</i>	Protocol value
<i>requester</i>	Requested by user process or the kernel (1 = kernel, 0 = user)
<i>name</i>	Name of this probe
<i>family</i>	Protocol family value

## Context

The requester (see requester variable)

## Description

Fires at the beginning of creating a socket.

# probe::socket.create.return

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

## Synopsis

`socket.create.return`

## Values

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

## Context

The requester (user process or kernel)

## Description

Fires at the conclusion of creating a socket.

# probe::socket.read\_iter

probe::socket.read\_iter — Receiving message via `sock_read_iter`

## Synopsis

```
socket.read_iter
```

## Values

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

## Context

The message sender

## Description

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

# probe::socket.read\_iter.return

probe::socket.read\_iter.return — Conclusion of message received via `sock_read_iter`

## Synopsis

```
socket.read_iter.return
```

## Values

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

## Context

The message receiver.

## Description

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

# probe::socket.readv

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

## Context

The message sender

## Description

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

# probe::socket.readv.return

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

## Synopsis

`socket.readv.return`

## Values

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

## Context

The message receiver.

## Description

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



# probe::socket.receive

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

## Synopsis

```
socket.receive
```

## Values

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

## Context

The message receiver

# probe::socket.recvmsg

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

## Synopsis

`socket.recvmsg`

## Values

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

## Context

The message receiver.

## Description

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

# probe::socket.recvmsg.return

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

## Synopsis

`socket.recvmsg.return`

## Values

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

## Context

The message receiver.

## Description

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

# probe::socket.send

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

## Synopsis

```
socket.send
```

## Values

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

## Context

The message sender

# probe::socket.sendmsg

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

## Synopsis

```
socket.sendmsg
```

## Values

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

# probe::socket.sendmsg.return

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

## Synopsis

`socket.sendmsg.return`

## Values

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

## Context

The message sender.

## Description

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

# probe::socket.write\_iter

probe::socket.write\_iter — Message send via sock\_write\_iter

## Synopsis

```
socket.write_iter
```

## Values

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

## Context

The message sender

## Description

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

# probe::socket.write\_iter.return

probe::socket.write\_iter.return — Conclusion of message send via `sock_write_iter`

## Synopsis

```
socket.write_iter.return
```

## Values

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



# probe::socket.writev

probe::socket.writev — Message sent via socket\_writev

## Synopsis

```
socket.writev
```

## Values

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

## Context

The message sender

## Description

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

# probe::socket.writev.return

probe::socket.writev.return — Conclusion of message sent via socket\_writev

## Synopsis

```
socket.writev.return
```

## Values

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

# function::ipmib\_filter\_key

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 <i>sk_buff</i>
<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.

## function::ipmib\_get\_proto

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*.

## function::ipmib\_local\_addr

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

### Synopsis

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

### Arguments

<i>skb</i>	pointer to a struct <code>sk_buff</code>
<i>SourceIsLocal</i>	flag to indicate whether local operation

### Description

Returns the local ip address *skb*.

## function::ipmib\_remote\_addr

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

### Synopsis

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

### Arguments

<i>skb</i>	pointer to a struct <i>sk_buff</i>
<i>SourceIsLocal</i>	flag to indicate whether local operation

### Description

Returns the remote ip address from *skb*.

## function::ipmib\_tcp\_local\_port

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

### Synopsis

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

### Arguments

<i>skb</i>	pointer to a struct sk_buff
<i>SourceIsLocal</i>	flag to indicate whether local operation

### Description

Returns the local tcp port from *skb*.



## function::ipmib\_tcp\_remote\_port

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

### Synopsis

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

### Arguments

<i>skb</i>	pointer to a struct sk_buff
<i>SourceIsLocal</i>	flag to indicate whether local operation

### Description

Returns the remote tcp port from *skb*.

## function::linuxmib\_filter\_key

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

### Synopsis

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

### Arguments

*sk* pointer to the struct sock

*op* value to be counted if *sk* 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.

## function::tcpmib\_filter\_key

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

### Synopsis

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

### Arguments

*sk* pointer to the struct sock being acted on

*op* value to be counted if *sk* 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.

## function::tcpmib\_get\_state

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.

## function::tcpmib\_local\_addr

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.

## function::tcpmib\_local\_port

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.

## function::tcpmib\_remote\_addr

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

### Synopsis

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

### Arguments

*sk* pointer to a struct `inet_sock`

### Description

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

## function::tcpmib\_remote\_port

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

### Synopsis

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

### Arguments

*sk* pointer to a struct `inet_sock`

### Description

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



# probe::ipmib.ForwDatagrams

probe::ipmib.ForwDatagrams — Count forwarded packet

## Synopsis

```
ipmib.ForwDatagrams
```

## Values

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

*skb* pointer to the struct `sk_buff` being acted on

## 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 *ForwDatagrams* (equivalent to SNMP's MIB `IPSTATS_MIB_OUTFORWDATAGRAMS`)

# probe::ipmib.FragFails

probe::ipmib.FragFails — Count datagram fragmented unsuccessfully

## Synopsis

```
ipmib.FragFails
```

## Values

*op*     Value to be added to the counter (default value of 1)

*skb*   pointer to the struct `sk_buff` being acted on

## 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)

# probe::ipmib.FragOKs

probe::ipmib.FragOKs — Count datagram fragmented successfully

## Synopsis

`ipmib.FragOKs`

## 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 *FragOKs* (equivalent to SNMP's MIB `IPSTATS_MIB_FRAGOKS`)

## probe::ipmib.InAddrErrors

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

### Synopsis

```
ipmib.InAddrErrors
```

### Values

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

*skb* pointer to the struct `sk_buff` being acted on

### 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 *InAddrErrors* (equivalent to SNMP's MIB `IPSTATS_MIB_INADDRERRORS`)

# probe::ipmib.InDiscards

probe::ipmib.InDiscards — Count discarded inbound packets

## Synopsis

```
ipmib.InDiscards
```

## Values

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

*skb* pointer to the struct `sk_buff` being acted on

## 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`)

# probe::ipmib.InNoRoutes

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

## Synopsis

`ipmib.InNoRoutes`

## Values

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

*skb* pointer to the struct `sk_buff` being acted on

## 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

probe::ipmib.InReceives — Count an arriving packet

## Synopsis

```
ipmib.InReceives
```

## Values

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

*skb* pointer to the struct `sk_buff` being acted on

## 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`)

# probe::ipmib.InUnknownProtos

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

## Synopsis

```
ipmib.InUnknownProtos
```

## Values

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

*skb* pointer to the struct `sk_buff` being acted on

## 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 IPSTATS\_MIB\_INUNKNOWNPROTOS)



# probe::ipmib.OutRequests

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

## Synopsis

```
ipmib.OutRequests
```

## Values

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

*skb* pointer to the struct `sk_buff` being acted on

## 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`)

# probe::ipmib.ReasmReqds

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

## Synopsis

```
ipmib.ReasmReqds
```

## 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 *ReasmReqds* (equivalent to SNMP's MIB `IPSTATS_MIB_REASMREQDS`)

# probe::ipmib.ReasmTimeout

probe::ipmib.ReasmTimeout — Count Reassembly Timeouts

## Synopsis

```
ipmib.ReasmTimeout
```

## Values

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

*skb* pointer to the struct `sk_buff` being acted on

## 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 *ReasmTimeout* (equivalent to SNMP's MIB `IPSTATS_MIB_REASMTIMEOUT`)

# probe::linuxmib.DelayedACKs

probe::linuxmib.DelayedACKs — Count of delayed acks

## Synopsis

linuxmib.DelayedACKs

## Values

*sk* Pointer to the struct sock 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 `linuxmib_filter_key`. If the packet passes the filter is counted in the global *DelayedACKs* (equivalent to SNMP's MIB LINUX\_MIB\_DELAYEDACKS)

# probe::linuxmib.ListenDrops

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

## Synopsis

```
linuxmib.ListenDrops
```

## Values

*op* Value to be added to the counter (default value of 1)

*sk* Pointer to the struct sock being acted on

## Description

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

# probe::linuxmib.ListenOverflows

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

## Synopsis

```
linuxmib.ListenOverflows
```

## Values

*op* Value to be added to the counter (default value of 1)

*sk* Pointer to the struct sock being acted on

## Description

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

# probe::linuxmib.TCPMemoryPressures

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

## Synopsis

`linuxmib.TCPMemoryPressures`

## Values

*skb* Pointer to the struct sock 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 `linuxmib_filter_key`. If the packet passes the filter is counted in the global *TCPMemoryPressures* (equivalent to SNMP's MIB `LINUX_MIB_TCPMEMORYPRESSURES`)

# probe::tcpmib.ActiveOpens

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

## Synopsis

```
tcpmib.ActiveOpens
```

## Values

*sk* pointer to the struct sock 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 `tcpmib_filter_key`. If the packet passes the filter is counted in the global *ActiveOpens* (equivalent to SNMP's MIB TCP\_MIB\_ACTIVEOPENS)



# probe::tcpmib.AttemptFails

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

## Synopsis

`tcpmib.AttemptFails`

## Values

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

*sk* pointer to the struct sock being acted on

## Description

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

## probe::tcpmib.CurrEstab

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

### Synopsis

`tcpmib.CurrEstab`

### Values

*sk* pointer to the struct sock 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 `tcpmib_filter_key`. If the packet passes the filter is counted in the global *CurrEstab* (equivalent to SNMP's MIB TCP\_MIB\_CURRESTAB)

## probe::tcpmib.EstabResets

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

### Synopsis

```
tcpmib.EstabResets
```

### Values

*sk* pointer to the struct sock 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 `tcpmib_filter_key`. If the packet passes the filter is counted in the global *EstabResets* (equivalent to SNMP's MIB TCP\_MIB\_ESTABRESETS)

# probe::tcpmib.InSegs

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

## Synopsis

`tcpmib.InSegs`

## Values

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

*sk* pointer to the struct sock being acted on

## 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)

# probe::tcpmib.OutRsts

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

## Synopsis

`tcpmib.OutRsts`

## Values

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

*skb* pointer to the struct sock being acted on

## Description

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

# probe::tcpmib.OutSegs

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

## Synopsis

`tcpmib.OutSegs`

## Values

*sk* pointer to the struct sock 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 `tcpmib_filter_key`. If the packet passes the filter is counted in the global *OutSegs* (equivalent to SNMP's MIB TCP\_MIB\_OUTSEGS)

## probe::tcpmib.PassiveOpens

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

### Synopsis

```
tcpmib.PassiveOpens
```

### Values

*sk* pointer to the struct sock 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 `tcpmib_filter_key`. If the packet passes the filter is counted in the global *PassiveOpens* (equivalent to SNMP's MIB TCP\_MIB\_PASSIVEOPENS)

# probe::tcpmib.RetransSegs

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

## Synopsis

```
tcpmib.RetransSegs
```

## Values

*sk* pointer to the struct sock 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 `tcpmib_filter_key`. If the packet passes the filter 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:

# function::get\_loadavg\_index

function::get\_loadavg\_index — Get the load average for a specified interval

## Synopsis

```
get_loadavg_index:long(indx:long)
```

## Arguments

*indx*    The load average interval to capture.

## Description

This function returns the load average at a specified interval. The three load average values 1, 5 and 15 minute average corresponds to indexes 0, 1 and 2 of the avenrun array - see linux/sched.h. Please note that the truncated-integer portion of the load average is returned. If the specified index is out-of-bounds, then an error message and exception is thrown.

## function::sprint\_loadavg

function::sprint\_loadavg — Report a pretty-printed load average

### Synopsis

```
sprint_loadavg:string()
```

### Arguments

None

### Description

Returns the a string with three decimal numbers in the usual format for 1-, 5- and 15-minute load averages.

# function::target\_set\_pid

function::target\_set\_pid — Does pid descend from target process?

## Synopsis

```
target_set_pid(pid:)
```

## Arguments

*pid*    The pid of the process to query

## Description

This function returns whether the given process-id is within the “target set”, that is whether it is a descendant of the top-level `target` process.

# function::target\_set\_report

function::target\_set\_report — Print a report about the target set

## Synopsis

```
target_set_report()
```

## Arguments

None

## Description

This function prints a report about the processes in the target set, and their ancestry.

# probe::kprocess.create

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

## Synopsis

`kprocess.create`

## Values

<i>new_tid</i>	The TID of the newly created task
<i>new_pid</i>	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.

# probe::kprocess.exec

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

## Synopsis

`kprocess.exec`

## Values

<i>filename</i>	The path to the new executable
<i>argstr</i>	A string containing the filename followed by the arguments to pass, excluding 0th arg (SystemTap v2.5+)
<i>args</i>	The arguments to pass to the new executable, including the 0th arg (SystemTap v2.5+)
<i>name</i>	Name of the system call (“execve”) (SystemTap v2.5+)

## Context

The caller of `exec`.

## Description

Fires whenever a process attempts to `exec` to a new program. Aliased to the `syscall.execve` probe in SystemTap v2.5+.

# probe::kprocess.exec\_complete

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

## Synopsis

```
kprocess.exec_complete
```

## Values

<i>success</i>	A boolean indicating whether the exec was successful
<i>errno</i>	The error number resulting from the exec
<i>retstr</i>	A string representation of errno (SystemTap v2.5+)
<i>name</i>	Name of the system call (“execve”) (SystemTap v2.5+)

## 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. Aliased to the syscall.execve.return probe in SystemTap v2.5+.



# probe::kprocess.exit

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.

# probe::kprocess.release

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.

# probe::kprocess.start

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:

## function::get\_sa\_flags

function::get\_sa\_flags — Returns the numeric value of sa\_flags

### Synopsis

```
get_sa_flags:long(act:long)
```

### Arguments

*act*    address of the sigaction to query.

## function::get\_sa\_handler

function::get\_sa\_handler — Returns the numeric value of sa\_handler

### Synopsis

```
get_sa_handler:long(act:long)
```

### Arguments

*act* address of the sigaction to query.

# function::is\_sig\_blocked

function::is\_sig\_blocked — Returns 1 if the signal is currently blocked, or 0 if it is not

## Synopsis

```
is_sig_blocked:long(task:long,sig:long)
```

## Arguments

*task*     address of the task\_struct to query.

*sig*     the signal number to test.

## function::sa\_flags\_str

function::sa\_flags\_str — Returns the string representation of sa\_flags

### Synopsis

```
sa_flags_str:string(sa_flags:long)
```

### Arguments

*sa\_flags*      the set of flags to convert to string.



## function::sa\_handler\_str

function::sa\_handler\_str — Returns the string representation of an sa\_handler

### Synopsis

```
sa_handler_str(handler:)
```

### Arguments

*handler*      the sa\_handler to convert to string.

### Description

Returns the string representation of an sa\_handler. If it is not SIG\_DFL, SIG\_IGN or SIG\_ERR, it will return the address of the handler.

# function::signal\_str

function::signal\_str — Returns the string representation of a signal number

## Synopsis

```
signal_str(num:)
```

## Arguments

*num* the signal number to convert to string.

## function::sigset\_mask\_str

function::sigset\_mask\_str — Returns the string representation of a sigset

### Synopsis

```
sigset_mask_str:string(mask:long)
```

### Arguments

*mask*     the sigset to convert to string.

# probe::signal.check\_ignored

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

# probe::signal.check\_ignored.return

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

## Synopsis

```
signal.check_ignored.return
```

## Values

<i>name</i>	Name of the probe point
<i>retstr</i>	Return value as a string

# probe::signal.checkperm

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

## Synopsis

```
signal.checkperm
```

## Values

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

# probe::signal.checkperm.return

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

## Synopsis

```
signal.checkperm.return
```

## Values

<i>name</i>	Name of the probe point
<i>retstr</i>	Return value as a string

# probe::signal.do\_action

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

## Synopsis

```
signal.do_action
```

## Values

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



# probe::signal.do\_action.return

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

## Synopsis

```
signal.do_action.return
```

## Values

<i>retstr</i>	Return value as a string
<i>name</i>	Name of the probe point

# probe::signal.flush

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

## Synopsis

```
signal.flush
```

## Values

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

# probe::signal.force\_segv

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

## Synopsis

```
signal.force_segv
```

## Values

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

# probe::signal.force\_segv.return

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

## Synopsis

```
signal.force_segv.return
```

## Values

<i>retstr</i>	Return value as a string
<i>name</i>	Name of the probe point

# probe::signal.handle

probe::signal.handle — Signal handler being invoked

## Synopsis

`signal.handle`

## Values

<i>ka_addr</i>	The address of the k_sigaction table associated with the signal
<i>sig_mode</i>	Indicates whether the signal was a user-mode or kernel-mode signal
<i>oldset_addr</i>	The address of the bitmask array of blocked signals (deprecated in SystemTap 2.1)
<i>sinfo</i>	The address of the sinfo table
<i>sig</i>	The signal number that invoked the signal handler
<i>sig_name</i>	A string representation of the signal
<i>regs</i>	The address of the kernel-mode stack area (deprecated in SystemTap 2.1)
<i>name</i>	Name of the probe point
<i>sig_code</i>	The si_code value of the sinfo signal

# probe::signal.handle.return

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

## Synopsis

```
signal.handle.return
```

## Values

<i>name</i>	Name of the probe point
<i>retstr</i>	Return value as a string

## Description

(deprecated in SystemTap 2.1)

# probe::signal.pending

probe::signal.pending — Examining pending signal

## Synopsis

```
signal.pending
```

## Values

<i>sigset_size</i>	The size of the user-space signal set
<i>name</i>	Name of the probe point
<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.

# probe::signal.pending.return

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

## Synopsis

```
signal.pending.return
```

## Values

<i>name</i>	Name of the probe point
<i>retstr</i>	Return value as a string



# probe::signal.procmask

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

## Synopsis

```
signal.procmask
```

## Values

<i>name</i>	Name of the probe point
<i>sigset</i>	The actual value to be set for sigset_t (correct?)
<i>sigset_addr</i>	The address of the signal set (sigset_t) to be implemented
<i>oldsigset_addr</i>	The old address of the signal set (sigset_t)
<i>how</i>	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.

# probe::signal.procmask.return

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

## Synopsis

```
signal.procmask.return
```

## Values

<i>retstr</i>	Return value as a string
<i>name</i>	Name of the probe point

# probe::signal.send

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

## Synopsis

```
signal.send
```

## Values

<i>shared</i>	Indicates whether the signal is shared by the thread group
<i>name</i>	The name of the function used to send out the signal
<i>pid_name</i>	The name of the signal recipient
<i>sig_name</i>	A string representation of the signal
<i>send2queue</i>	Indicates whether the signal is sent to an existing sigqueue (deprecated in SystemTap 2.1)
<i>sig</i>	The number of the signal
<i>sinfo</i>	The address of siginfo struct
<i>si_code</i>	Indicates the signal type
<i>sig_pid</i>	The PID of the process receiving the signal
<i>task</i>	A task handle to the signal recipient

## Context

The signal's sender.

# probe::signal.send.return

probe::signal.send.return — Signal being sent to a process completed (deprecated in SystemTap 2.1)

## 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>shared</i>	Indicates whether the sent signal is shared by the thread group.
<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

## 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.

# probe::signal.send\_sig\_queue

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>pid_name</i>	Name of the process to which the signal is queued
<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>sig_pid</i>	The PID of the process to which the signal is queued

# probe::signal.send\_sig\_queue.return

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

## Synopsis

```
signal.send_sig_queue.return
```

## Values

<i>retstr</i>	Return value as a string
<i>name</i>	Name of the probe point

# probe::signal.sys\_tgkill

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

## Synopsis

```
signal.sys_tgkill
```

## Values

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

# probe::signal.sys\_tgkill.return

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

## Synopsis

```
signal.sys_tgkill.return
```

## Values

<i>retstr</i>	The return value to either <code>__group_send_sig_info</code> ,
<i>name</i>	Name of the probe point



# probe::signal.sys\_tkill

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

## Synopsis

```
signal.sys_tkill
```

## Values

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

# probe::signal.syskill

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

## Synopsis

```
signal.syskill
```

## Values

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

# probe::signal.syskill.return

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

## Synopsis

```
signal.syskill.return
```

## Values

None

# probe::signal.systkill.return

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

## Synopsis

```
signal.systkill.return
```

## Values

<i>name</i>	Name of the probe point
<i>retstr</i>	The return value to either <code>__group_send_sig_info</code> ,

# probe::signal.wakeup

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

## Synopsis

`signal.wakeup`

## Values

<i>pid_name</i>	Name of the process to wake
<i>state_mask</i>	A string representation indicating the mask of task states to wake. Possible values are <code>TASK_INTERRUPTIBLE</code> , <code>TASK_STOPPED</code> , <code>TASK_TRACED</code> , <code>TASK_WAKEKILL</code> , and <code>TASK_INTERRUPTIBLE</code> .
<i>resume</i>	Indicates whether to wake up a task in a <code>STOPPED</code> or <code>TRACED</code> state
<i>sig_pid</i>	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 functions:

# function::errno\_str

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

## Synopsis

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

## Arguments

*err*    The error number received

## Description

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

# function::return\_str

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

## Synopsis

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

## Arguments

<i>format</i>	Variable to determine return type base value
<i>ret</i>	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`.



# function::returnstr

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`.

# function::returnval

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. RLIMIT Tapset

This set of functions is used to handle string which defines resource limits (RLIMIT\_\*) and returns corresponding number of resource limit. It contains the following functions:

## function::rlimit\_from\_str

function::rlimit\_from\_str — Symbolic string associated with resource limit code

### Synopsis

```
rlimit_from_str:long(lim_str:string)
```

### Arguments

*lim\_str*      The string representation of limit

### Description

This function returns the number associated with the given string, such as 0 for the string `RLIMIT_CPU`, or -1 for an out-of-range value.

---

# Chapter 20. Device Tapset

This set of functions is used to handle kernel and userspace device numbers. It contains the following functions:

# function::MAJOR

function::MAJOR — Extract major device number from a kernel device number (kdev\_t)

## Synopsis

```
MAJOR:long(dev:long)
```

## Arguments

*dev*    Kernel device number to query.

# function::MINOR

function::MINOR — Extract minor device number from a kernel device number (kdev\_t)

## Synopsis

```
MINOR:long(dev:long)
```

## Arguments

*dev*    Kernel device number to query.

# function::MKDEV

function::MKDEV — Creates a value that can be compared to a kernel device number (kdev\_t)

## Synopsis

```
MKDEV:long(major:long,minor:long)
```

## Arguments

*major*     Intended major device number.

*minor*     Intended minor device number.



# function::usrdev2kerndev

function::usrdev2kerndev — Converts a user-space device number into the format used in the kernel

## Synopsis

```
usrdev2kerndev:long(dev:long)
```

## Arguments

*dev* Device number in user-space format.

---

# Chapter 21. Directory-entry (dentry) Tapset

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

# function::d\_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).

# function::d\_path

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.

# function::fullpath\_struct\_file

function::fullpath\_struct\_file — get the full path

## Synopsis

```
fullpath_struct_file:string(task:long,file:long)
```

## Arguments

*task*    task\_struct pointer.

*file*    Pointer to “struct file”.

## Description

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

# function::fullpath\_struct\_nameidata

function::fullpath\_struct\_nameidata — get the full nameidata path

## Synopsis

```
fullpath_struct_nameidata(nd:)
```

## Arguments

*nd* Pointer to “struct nameidata”.

## Description

Returns the full dirent name (full path to the root), like the kernel (and systemtap-tapset) `d_path` function, with a “/”.

# function::fullpath\_struct\_path

function::fullpath\_struct\_path — get the full path

## Synopsis

```
fullpath_struct_path:string(path:long)
```

## Arguments

*path*     Pointer to “struct path”.

## Description

Returns the full dirent name (full path to the root), like the kernel `d_path` function.

# function::inode\_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.



# function::inode\_path

function::inode\_path — get the path to an inode

## Synopsis

```
inode_path:string(inode:long)
```

## Arguments

*inode*      Pointer to inode.

## Description

Returns the full path associated with the given inode.

# function::real\_mount

function::real\_mount — get the 'struct mount' pointer

## Synopsis

```
real_mount:long(vfsmnt:long)
```

## Arguments

*vfsmnt*      Pointer to 'struct vfsmount'

## Description

Returns the 'struct mount' pointer value for a 'struct vfsmount' pointer.

# function::reverse\_path\_walk

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).

# function::task\_dentry\_path

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 22. Logging Tapset

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

# function::abort

function::abort — Immediately shutting down probing script.

## Synopsis

```
abort()
```

## Arguments

None

## Description

This is similar to `exit` but immediately aborts the current probe handler instead of waiting for its completion. Probe handlers already running on *other* CPU cores, however, will still continue to their completion. Unlike `error`, this function call cannot be caught by `'try ... catch'`.

# function::assert

function::assert — evaluate assertion

## Synopsis

- 1) `assert(expression:long)`
- 2) `assert(expression:long,msg:string)`

## Arguments

<i>expression</i>	The expression to evaluate
<i>msg</i>	The formatted message string

## Description

- 1) This function checks the expression and aborts the current running probe if expression evaluates to zero. `Useserror` and may be caught by `try{ } catch{ }`. A default message will be displayed.
- 2) This function checks the expression and aborts the current running probe if expression evaluates to zero. `Useserror` and may be caught by `try{ } catch{ }`. The specified message will be displayed.

# function::dump\_stack

function::dump\_stack — Send the kernel backtrace to the kernel trace buffer

## Synopsis

```
dump_stack()
```

## Arguments

None

## Description

Print the current kernel backtrace to the kernel trace buffer. not be safely called from all kernel probe contexts, so is restricted to guru mode only. Under the hood, it calls the kernel C API function `dump_stack` directly.



# function::error

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`.

# function::exit

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.

# function::ftrace

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.

# function::log

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 efficient as printf and should be used only for urgent messages.

# function::printk

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.

# function::warn

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 23. Queue Statistics Tapset

This family of functions is used to track performance of queuing systems.

# function::qs\_done

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.



# function::qs\_run

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.

# function::qs\_wait

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.

# function::qsq\_blocked

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.

# function::qsq\_print

function::qsq\_print — Prints 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.

# function::qsq\_service\_time

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.

# function::qsq\_start

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.

# function::qsq\_throughput

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.

# function::qsq\_utilization

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.



# function::qsq\_wait\_queue\_length

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

# function::qsq\_wait\_time

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 24. Random functions Tapset

These functions deal with random number generation.

# function::randint

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 25. 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.

## function::atomic\_long\_read

function::atomic\_long\_read — Retrieves an atomic long variable from kernel memory

### 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.

## function::atomic\_read

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.

# function::kernel\_buffer\_quoted

function::kernel\_buffer\_quoted — Retrieves and quotes buffer from kernel space

## Synopsis

- 1) `kernel_buffer_quoted:string(addr:long,inlen:long)`
- 2) `kernel_buffer_quoted:string(addr:long,inlen:long,outlen:long)`

## Arguments

- |               |  |
|---------------|--|
| <i>addr</i>   | the kernel space address to retrieve the buffer from |
| <i>inlen</i>  | the exact length of the buffer to read               |
| <i>outlen</i> | the maximum length of the output string              |

## Description

1) Reads *inlen* characters of a buffer from the given kernel space memory address, and returns up to `MAXSTRINGLEN` characters, where any ASCII characters that are not printable are replaced by the corresponding escape sequence in the returned string. Note that the string will be surrounded by double quotes. On the rare cases when kernel space data is not accessible at the given address, the address itself is returned as a string, without double quotes.

2) Reads *inlen* characters of a buffer from the given kernel space memory address, and returns up to *outlen* characters, where any ASCII characters that are not printable are replaced by the corresponding escape sequence in the returned string. Note that the string will be surrounded by double quotes. On the rare cases when kernel space data is not accessible at the given address, the address itself is returned as a string, without double quotes.



## function::kernel\_buffer\_quoted\_error

function::kernel\_buffer\_quoted\_error — Retrieves and quotes buffer from kernel space

### Synopsis

```
kernel_buffer_quoted_error:string(addr:long,inlen:long,outlen:long)
```

### Arguments

<i>addr</i>	the kernel space address to retrieve the buffer from
<i>inlen</i>	the exact length of the buffer to read
<i>outlen</i>	the maximum length of the output string

### Description

Reads *inlen* characters of a buffer from the given kernel space memory address, and returns up to *outlen* characters, where any ASCII characters that are not printable are replaced by the corresponding escape sequence in the returned string. Note that the string will be surrounded by double quotes. On the rare cases when kernel space data is not accessible at the given address, an error is thrown.

## function::kernel\_char

function::kernel\_char — Retrieves a char value stored in kernel memory

### 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.

## function::kernel\_int

function::kernel\_int — Retrieves an int value stored in kernel memory

### 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.

## function::kernel\_long

function::kernel\_long — Retrieves a long value stored in kernel memory

### 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.

## function::kernel\_pointer

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.

## function::kernel\_short

function::kernel\_short — Retrieves a short value stored in kernel memory

### 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.

# function::kernel\_string

function::kernel\_string — Retrieves string from kernel memory

## Synopsis

- 1) `kernel_string:string(addr:long)`
- 2) `kernel_string:string(addr:long,err_msg:string)`

## Arguments

- |                |   |
|----------------|---|
| <i>addr</i>    | The kernel address to retrieve the string from        |
| <i>err_msg</i> | The error message to return when data isn't available |

## Description

- 1) This function returns the null terminated C string from a given kernel memory address. Reports an error on string copy fault.
- 2) This function returns the null terminated C string from a given kernel memory address. Reports the given error message on string copy fault.

## function::kernel\_string\_n

function::kernel\_string\_n — Retrieves string of given length from kernel memory

### Synopsis

```
kernel_string_n:string(addr:long,n:long)
```

### Arguments

*addr*     The kernel address to retrieve the string from

*n*        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.



## function::kernel\_string\_quoted

function::kernel\_string\_quoted — Retrieves and quotes string from kernel memory

### Synopsis

```
kernel_string_quoted:string(addr:long)
```

### Arguments

*addr*     the kernel memory address to retrieve the string from

### Description

Returns the null terminated C string from a given kernel memory address where any ASCII characters that are not printable are replaced by the corresponding escape sequence in the returned string. Note that the string will be surrounded by double quotes. If the kernel memory data is not accessible at the given address, the address itself is returned as a string, without double quotes.

## function::kernel\_string\_quoted\_utf16

function::kernel\_string\_quoted\_utf16 — Quote given kernel UTF-16 string.

### Synopsis

```
kernel_string_quoted_utf16:string(addr:long)
```

### Arguments

*addr*     The kernel address to retrieve the string from

### Description

This function combines quoting as per *string\_quoted* and UTF-16 decoding as per *kernel\_string\_utf16*.

## function::kernel\_string\_quoted\_utf32

function::kernel\_string\_quoted\_utf32 — Quote given UTF-32 kernel string.

### Synopsis

```
kernel_string_quoted_utf32:string(addr:long)
```

### Arguments

*addr*     The kernel address to retrieve the string from

### Description

This function combines quoting as per *string\_quoted* and UTF-32 decoding as per *kernel\_string\_utf32*.

# function::kernel\_string\_utf16

function::kernel\_string\_utf16 — Retrieves UTF-16 string from kernel memory

## Synopsis

- 1) `kernel_string_utf16:string(addr:long)`
- 2) `kernel_string_utf16:string(addr:long,err_msg:string)`

## Arguments

- |                |   |
|----------------|---|
| <i>addr</i>    | The kernel address to retrieve the string from        |
| <i>err_msg</i> | The error message to return when data isn't available |

## Description

- 1) This function returns a null terminated UTF-8 string converted from the UTF-16 string at a given kernel memory address. Reports an error on string copy fault or conversion error.
- 2) This function returns a null terminated UTF-8 string converted from the UTF-16 string at a given kernel memory address. Reports the given error message on string copy fault or conversion error.

# function::kernel\_string\_utf32

function::kernel\_string\_utf32 — Retrieves UTF-32 string from kernel memory

## Synopsis

- 1) `kernel_string_utf32:string(addr:long)`
- 2) `kernel_string_utf32:string(addr:long,err_msg:string)`

## Arguments

- |                |   |
|----------------|---|
| <i>addr</i>    | The kernel address to retrieve the string from        |
| <i>err_msg</i> | The error message to return when data isn't available |

## Description

- 1) This function returns a null terminated UTF-8 string converted from the UTF-32 string at a given kernel memory address. Reports an error on string copy fault or conversion error.
- 2) This function returns a null terminated UTF-8 string converted from the UTF-32 string at a given kernel memory address. Reports the given error message on string copy fault or conversion error.

# function::user\_buffer\_quoted

function::user\_buffer\_quoted — Retrieves and quotes buffer from user space

## Synopsis

```
user_buffer_quoted:string(addr:long,inlen:long,outlen:long)
```

## Arguments

<i>addr</i>	the user space address to retrieve the buffer from
<i>inlen</i>	the exact length of the buffer to read
<i>outlen</i>	the maximum length of the output string

## Description

Reads *inlen* characters of a buffer from the given user space memory address, and returns up to *outlen* characters, where any ASCII characters that are not printable are replaced by the corresponding escape sequence in the returned string. Note that the string will be surrounded by double quotes. On the rare cases when user space data is not accessible at the given address, the address itself is returned as a string, without double quotes.

## function::user\_buffer\_quoted\_error

function::user\_buffer\_quoted\_error — Retrieves and quotes buffer from user space

### Synopsis

```
user_buffer_quoted_error:string(addr:long,inlen:long,outlen:long)
```

### Arguments

<i>addr</i>	the user space address to retrieve the buffer from
<i>inlen</i>	the exact length of the buffer to read
<i>outlen</i>	the maximum length of the output string

### Description

Reads *inlen* characters of a buffer from the given user space memory address, and returns up to *outlen* characters, where any ASCII characters that are not printable are replaced by the corresponding escape sequence in the returned string. Note that the string will be surrounded by double quotes. On the rare cases when user space data is not accessible at the given address, an error is thrown.

## function::user\_char

function::user\_char — Retrieves a char value stored in user space

### 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.



## function::user\_char\_error

function::user\_char\_error — Retrieves a char value stored in user space

### Synopsis

```
user_char_error: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. If the user space data is not accessible, an error will occur.

## function::user\_char\_warn

function::user\_char\_warn — Retrieves a char value stored in user space

### 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 data is not accessible and warns about the failure (but does not error).

## function::user\_int

function::user\_int — Retrieves an int value stored in user space

### 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.

## function::user\_int16

function::user\_int16 — Retrieves a 16-bit integer value stored in user space

### Synopsis

```
user_int16:long(addr:long)
```

### Arguments

*addr*     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.

## function::user\_int16\_error

function::user\_int16\_error — Retrieves a 16-bit integer value stored in user space

### Synopsis

```
user_int16_error:long(addr:long)
```

### Arguments

*addr*     the user space address to retrieve the 16-bit integer from

### Description

Returns the 16-bit integer value from a given user space address. If the user space data is not accessible, an error will occur.

## function::user\_int32

function::user\_int32 — Retrieves a 32-bit integer value stored in user space

### 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.

## function::user\_int32\_error

function::user\_int32\_error — Retrieves a 32-bit integer value stored in user space

### Synopsis

```
user_int32_error: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. If the user space data is not accessible, an error will occur.

## function::user\_int64

function::user\_int64 — Retrieves a 64-bit integer value stored in user space

### 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.



## function::user\_int64\_error

function::user\_int64\_error — Retrieves a 64-bit integer value stored in user space

### Synopsis

```
user_int64_error: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. If the user space data is not accessible, an error will occur.

## function::user\_int8

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.

## function::user\_int8\_error

function::user\_int8\_error — Retrieves a 8-bit integer value stored in user space

### Synopsis

```
user_int8_error: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. If the user space data is not accessible, an error will occur.

## function::user\_int\_error

function::user\_int\_error — Retrieves an int value stored in user space

### Synopsis

```
user_int_error: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. If the user space data is not accessible, an error will occur.

## function::user\_int\_warn

function::user\_int\_warn — Retrieves an int value stored in user space

### 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 data is not accessible and warns about the failure (but does not error).

## function::user\_long

function::user\_long — Retrieves a long value stored in user space

### 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).

## function::user\_long\_error

function::user\_long\_error — Retrieves a long value stored in user space

### Synopsis

```
user_long_error: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. If the user space data is not accessible, an error will occur. 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).

## function::user\_long\_warn

function::user\_long\_warn — Retrieves a long value stored in user space

### 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 data is not accessible and warns about the failure (but does not error). 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).



## function::user\_short

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.

## function::user\_short\_error

function::user\_short\_error — Retrieves a short value stored in user space

### Synopsis

```
user_short_error: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. If the user space data is not accessible, an error will occur.

## function::user\_short\_warn

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 data is not accessible and warns about the failure (but does not error).

# function::user\_string

function::user\_string — Retrieves string from user space

## Synopsis

- 1) `user_string:string(addr:long)`
- 2) `user_string: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

- 1) Returns the null terminated C string from a given user space memory address. Reports an error on the rare cases when userspace data is not accessible.
- 2) 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.

## function::user\_string\_n

function::user\_string\_n — Retrieves string of given length from user space

### Synopsis

- 1) `user_string_n:string(addr:long,n:long)`
- 2) `user_string_n: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

- 1) Returns the C string of a maximum given length from a given user space address. Reports an error on the rare cases when userspace data is not accessible at the given address.
- 2) 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.

# function::user\_string\_n\_quoted

function::user\_string\_n\_quoted — Retrieves and quotes string from user space

## Synopsis

- 1) `user_string_n_quoted:string(addr:long,n:long)`
- 2) `user_string_n_quoted:string(addr:long,inlen:long,outlen: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)         |
| <i>inlen</i>  | the maximum length of the string to read (if not null terminated) |
| <i>outlen</i> | the maximum length of the output string                           |

## Description

1) 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. Note that the string will be surrounded by double quotes. On the rare cases when userspace data is not accessible at the given address, the address itself is returned as a string, without double quotes.

2) Reads up to *inlen* characters of a C string from the given user space memory address, and returns up to *outlen* characters, where any ASCII characters that are not printable are replaced by the corresponding escape sequence in the returned string. Note that the string will be surrounded by double quotes. On the rare cases when userspace data is not accessible at the given address, the address itself is returned as a string, without double quotes.

# function::user\_string\_n\_warn

function::user\_string\_n\_warn — Retrieves string from user space

## Synopsis

- 1) `user_string_n_warn:string(addr:long,n:long)`
- 2) `user_string_n_warn:string(addr:long,n:long,warn_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>warn_msg</i>	the warning message to return when data isn't available

## Description

- 1) 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.
- 2) Returns up to *n* characters of a C string from a given user space memory address. Reports the given warning message on the rare cases when userspace data is not accessible and warns (but does not abort) about the failure.

# function::user\_string\_quoted

function::user\_string\_quoted — Retrieves and quotes string from user space

## 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. Note that the string will be surrounded by double quotes. On the rare cases when userspace data is not accessible at the given address, the address itself is returned as a string, without double quotes.



## function::user\_string\_quoted\_utf16

function::user\_string\_quoted\_utf16 — Quote given user UTF-16 string.

### Synopsis

```
user_string_quoted_utf16:string(addr:long)
```

### Arguments

*addr*     The user address to retrieve the string from

### Description

This function combines quoting as per *string\_quoted* and UTF-16 decoding as per *user\_string\_utf16*.

## function::user\_string\_quoted\_utf32

function::user\_string\_quoted\_utf32 — Quote given user UTF-32 string.

### Synopsis

```
user_string_quoted_utf32:string(addr:long)
```

### Arguments

*addr*     The user address to retrieve the string from

### Description

This function combines quoting as per *string\_quoted* and UTF-32 decoding as per *user\_string\_utf32*.

## function::user\_string\_utf16

function::user\_string\_utf16 — Retrieves UTF-16 string from user memory

### Synopsis

- 1) `user_string_utf16:string(addr:long)`
- 2) `user_string_utf16:string(addr:long,err_msg:string)`

### Arguments

- |                |   |
|----------------|---|
| <i>addr</i>    | The user address to retrieve the string from          |
| <i>err_msg</i> | The error message to return when data isn't available |

### Description

- 1) This function returns a null terminated UTF-8 string converted from the UTF-16 string at a given user memory address. Reports an error on string copy fault or conversion error.
- 2) This function returns a null terminated UTF-8 string converted from the UTF-16 string at a given user memory address. Reports the given error message on string copy fault or conversion error.

## function::user\_string\_utf32

function::user\_string\_utf32 — Retrieves UTF-32 string from user memory

### Synopsis

- 1) `user_string_utf32:string(addr:long)`
- 2) `user_string_utf32:string(addr:long,err_msg:string)`

### Arguments

- |                |   |
|----------------|---|
| <i>addr</i>    | The user address to retrieve the string from          |
| <i>err_msg</i> | The error message to return when data isn't available |

### Description

- 1) This function returns a null terminated UTF-8 string converted from the UTF-32 string at a given user memory address. Reports an error on string copy fault or conversion error.
- 2) This function returns a null terminated UTF-8 string converted from the UTF-32 string at a given user memory address. Reports the given error message on string copy fault or conversion error.

## function::user\_string\_warn

function::user\_string\_warn — Retrieves string from user space

### Synopsis

- 1) `user_string_warn:string(addr:long)`
- 2) `user_string_warn:string(addr:long, warn_msg:string)`

### Arguments

- |                 |   |
|-----------------|---|
| <i>addr</i>     | the user space address to retrieve the string from      |
| <i>warn_msg</i> | the warning message to return when data isn't available |

### Description

- 1) Returns the null terminated C string from a given user space memory address. Reports "" on the rare cases when userspace data is not accessible and warns (but does not abort) about the failure.
- 2) Returns the null terminated C string from a given user space memory address. Reports the given warning message on the rare cases when userspace data is not accessible and warns (but does not abort) about the failure.

## function::user\_uint16

function::user\_uint16 — Retrieves an unsigned 16-bit integer value stored in user space

### Synopsis

```
user_uint16:long(addr:long)
```

### Arguments

*addr*     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.

## function::user\_uint16\_error

function::user\_uint16\_error — Retrieves an unsigned 16-bit integer value stored in user space

### Synopsis

```
user_uint16_error:long(addr:long)
```

### Arguments

*addr*     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. If the user space data is not accessible, an error will occur.

## function::user\_uint32

function::user\_uint32 — Retrieves an unsigned 32-bit integer value stored in user space

### Synopsis

```
user_uint32:long(addr:long)
```

### Arguments

*addr*     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.



## function::user\_uint32\_error

function::user\_uint32\_error — Retrieves an unsigned 32-bit integer value stored in user space

### Synopsis

```
user_uint32_error:long(addr:long)
```

### Arguments

*addr*     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. If the user space data is not accessible, an error will occur.

## function::user\_uint64

function::user\_uint64 — Retrieves an unsigned 64-bit integer value stored in user space

### Synopsis

```
user_uint64:long(addr:long)
```

### Arguments

*addr*     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.

## function::user\_uint64\_error

function::user\_uint64\_error — Retrieves an unsigned 64-bit integer value stored in user space

### Synopsis

```
user_uint64_error:long(addr:long)
```

### Arguments

*addr*     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. If the user space data is not accessible, an error will occur.

## function::user\_uint8

function::user\_uint8 — Retrieves a unsigned 8-bit integer value stored in user space

### Synopsis

```
user_uint8:long(addr:long)
```

### Arguments

*addr*     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.

## function::user\_uint8\_error

function::user\_uint8\_error — Retrieves a unsigned 8-bit integer value stored in user space

### Synopsis

```
user_uint8_error:long(addr:long)
```

### Arguments

*addr*     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. If the user space data is not accessible, an error will occur.

# function::user\_ulong

function::user\_ulong — Retrieves an unsigned long value stored in user space

## Synopsis

```
user_ulong:long(addr:long)
```

## Arguments

*addr*     the user space address to retrieve the unsigned long from

## Description

Returns the unsigned long value from a given user space address. Returns zero when user space data is not accessible. Note that the size of the unsigned long depends on the architecture of the current user space task (for those architectures that support both 64/32 bit compat tasks).

# function::user\_ulong\_error

function::user\_ulong\_error — Retrieves a unsigned long value stored in user space

## Synopsis

```
user_ulong_error:long(addr:long)
```

## Arguments

*addr*     the user space address to retrieve the unsigned long from

## Description

Returns the unsigned long value from a given user space address. If the user space data is not accessible, an error will occur. Note that the size of the unsigned long depends on the architecture of the current user space task (for those architectures that support both 64/32 bit compat tasks).

# function::user\_ulong\_warn

function::user\_ulong\_warn — Retrieves an unsigned long value stored in user space

## Synopsis

```
user_ulong_warn:long(addr:long)
```

## Arguments

*addr*     the user space address to retrieve the unsigned long from

## Description

Returns the unsigned long value from a given user space address. Returns zero when user space data is not accessible and warns about the failure (but does not error). Note that the size of the unsigned long depends on the architecture of the current user space task (for those architectures that support both 64/32 bit compat tasks).



## function::user\_ushort

function::user\_ushort — Retrieves an unsigned short value stored in user space

### 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.

## function::user\_ushort\_error

function::user\_ushort\_error — Retrieves an unsigned short value stored in user space

### Synopsis

```
user_ushort_error: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. If the user space data is not accessible, an error will occur.

## function::user\_ushort\_warn

function::user\_ushort\_warn — Retrieves an unsigned short value stored in user space

### Synopsis

```
user_ushort_warn: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 and warns about the failure (but does not error).

---

## Chapter 26. 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**).

## function::set\_kernel\_char

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).

# function::set\_kernel\_int

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).

## function::set\_kernel\_long

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).

## function::set\_kernel\_pointer

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).



## function::set\_kernel\_short

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).

# function::set\_kernel\_string

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).

## function::set\_kernel\_string\_n

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).

# function::set\_user\_char

function::set\_user\_char — Writes a char value to user memory

## Synopsis

```
set_user_char(addr:long, val:long)
```

## Arguments

*addr*     The user address to write the char to

*val*     The char which is to be written

## Description

Writes the char value to a given user memory address. Reports an error when writing to the given address fails. Requires the use of guru mode (-g).

# function::set\_user\_int

function::set\_user\_int — Writes an int value to user memory

## Synopsis

```
set_user_int(addr:long, val:long)
```

## Arguments

*addr*     The user address to write the int to

*val*     The int which is to be written

## Description

Writes the int value to a given user memory address. Reports an error when writing to the given address fails. Requires the use of guru mode (-g).

## function::set\_user\_long

function::set\_user\_long — Writes a long value to user memory

### Synopsis

```
set_user_long(addr:long, val:long)
```

### Arguments

*addr*     The user address to write the long to

*val*     The long which is to be written

### Description

Writes the long value to a given user memory address. Reports an error when writing to the given address fails. Requires the use of guru mode (-g).

## function::set\_user\_pointer

function::set\_user\_pointer — Writes a pointer value to user memory.

### Synopsis

```
set_user_pointer(addr:long, val:long)
```

### Arguments

*addr*     The user address to write the pointer to

*val*     The pointer which is to be written

### Description

Writes the pointer value to a given user memory address. Reports an error when writing to the given address fails. Requires the use of guru mode (-g).

## function::set\_user\_short

function::set\_user\_short — Writes a short value to user memory

### Synopsis

```
set_user_short(addr:long, val:long)
```

### Arguments

*addr*     The user address to write the short to

*val*     The short which is to be written

### Description

Writes the short value to a given user memory address. Reports an error when writing to the given address fails. Requires the use of guru mode (-g).



# function::set\_user\_string

function::set\_user\_string — Writes a string to user memory

## Synopsis

```
set_user_string(addr:long, val:string)
```

## Arguments

*addr*     The user address to write the string to

*val*     The string which is to be written

## Description

Writes the given string to a given user memory address. Reports an error when writing to the given address fails. Requires the use of guru mode (-g).

## function::set\_user\_string\_n

function::set\_user\_string\_n — Writes a string of given length to user memory

### Synopsis

```
set_user_string_n(addr:long,n:long,val:string)
```

### Arguments

<i>addr</i>	The user 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 user memory address. Reports an error on string copy fault. Requires the use of guru mode (-g).

---

# Chapter 27. Guru tapsets

Functions to deliberately interfere with the system's behavior, in order to inject faults or improve observability. All the functions in this tapset require the use of guru mode (**-g**).

# function::mdelay

function::mdelay — millisecond delay

## Synopsis

```
mdelay(ms:long)
```

## Arguments

*ms* Number of milliseconds to delay.

## Description

This function inserts a multi-millisecond busy-delay into a probe handler. It requires guru mode.

# function::panic

function::panic — trigger a panic

## Synopsis

```
panic(msg:string)
```

## Arguments

*msg*    message to pass to kernel's `panic` function

## Description

This function triggers an immediate panic of the running kernel with a user-specified panic message. It requires guru mode.

# function::raise

function::raise — raise a signal in the current thread

## Synopsis

```
raise(signo:long)
```

## Arguments

*signo*     signal number

## Description

This function calls the kernel `send_sig` routine on the current thread, with the given raw unchecked signal number. It may raise an error if `send_sig` failed. It requires guru mode.

# function::udelay

function::udelay — microsecond delay

## Synopsis

```
udelay(us:long)
```

## Arguments

*us* Number of microseconds to delay.

## Description

This function inserts a multi-microsecond busy-delay into a probe handler. It requires guru mode.

---

# Chapter 28. 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.



# function::isdigit

function::isdigit — Checks for a digit

## Synopsis

```
isdigit:long(str:string)
```

## Arguments

*str*    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.

# function::isinstr

function::isinstr — Returns whether a string is a substring of another string

## Synopsis

```
isinstr:long(s1:string,s2:string)
```

## Arguments

*s1* string to search in

*s2* substring to find

## Description

This function returns 1 if string *s1* contains *s2*, otherwise zero.

## function::matched

function::matched — Return a given matched subexpression.

### Synopsis

```
matched:string(n:long)
```

### Arguments

*n* index to the subexpression to return. 0 corresponds to the entire regular expression.

### Description

returns the content of the *n*'th subexpression of the last successful use of the `=~` regex matching operator. Returns an empty string if the *n*'th subexpression was not matched (e.g. due to alternation). Throws an error if the last use of `=~` was a failed match, or if fewer than *n* subexpressions are present in the original regexp.

## function::matched\_str

function::matched\_str — Return the last matched string.

### Synopsis

```
matched_str:string()
```

### Arguments

None

### Description

returns the string matched by the last successful use of the `=~` regex matching operator. Returns an error if the last use of `=~` led to a failed match.

# function::ngroups

function::ngroups — Number of subexpressions in the last match.

## Synopsis

```
ngroups:long( )
```

## Arguments

None

## Description

returns the number of subexpressions from the last successful use of the `=~` regex matching operator.

Note that this number includes subexpressions which are present in the regex but did not match any string; for example, given the regex `"a|(b)"`, the subexpressions will count the group for (b) regardless of whether it matched a string or not. Throws an error if the last use of `=~` was a failed match.

# function::str\_replace

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

<i>prnt_str</i>	the string to search and replace in
<i>srch_str</i>	the substring which is used to search in <i>prnt_str</i> string
<i>rplc_str</i>	the substring which is used to replace <i>srch_str</i>

## Description

This function returns the given string with substrings replaced.

# function::string\_quoted

function::string\_quoted — Quotes a given string

## Synopsis

```
string_quoted:string(str:string)
```

## Arguments

*str*    The kernel address to retrieve the string from

## Description

Returns the quoted string version of the given string, with characters where any ASCII characters that are not printable are replaced by the corresponding escape sequence in the returned string. Note that the string will be surrounded by double quotes.

# function::stringat

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. Reports an error if *pos* is out of bounds.



# function::strlen

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.

# function::strpos

function::strpos — Returns location of a substring within another string

## Synopsis

```
strpos:long(s1:string,s2:string)
```

## Arguments

*s1* string to search in

*s2* substring to find

## Description

This function returns location of the first occurrence of string *s2* within *s1*, namely the return value is 0 in case *s2* is a prefix of *s1*. If *s2* is not a substring of *s1*, then the return value is -1.

# function::strtol

function::strtol — strtol - Convert a string to a long

## Synopsis

```
strtol:long(str:string,base:long)
```

## Arguments

*str*      string to convert

*base*    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).

# function::substr

function::substr — Returns a substring

## 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).

## function::text\_str

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.

## function::text\_strn

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.

# function::tokenize

function::tokenize — Return the next non-empty token in a string

## Synopsis

- 1) `tokenize:string(delim:string)`
- 2) `tokenize:string(input:string,delim:string)`

## Arguments

- delim*     set of characters that delimit the tokens
- input*     string to tokenize. If empty, returns the next non-empty token in the string passed in the previous call to `tokenize`.

## Description

- 1) This function 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 empty when no more tokens are available.
- 2) 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-empty, it returns the first token. If the input string is empty, 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 empty when no more tokens are available.

---

# Chapter 29. 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.



## function::ansi\_clear\_screen

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.

## function::ansi\_cursor\_hide

function::ansi\_cursor\_hide — Hides the cursor.

### Synopsis

```
ansi_cursor_hide()
```

### Arguments

None

### Description

Sends ansi code for hiding the cursor.

## function::ansi\_cursor\_move

function::ansi\_cursor\_move — Move cursor to new coordinates.

### Synopsis

```
ansi_cursor_move(x:long,y:long)
```

### Arguments

*x* Row to move the cursor to.

*y* 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.

## function::ansi\_cursor\_restore

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`.

## **function::ansi\_cursor\_save**

function::ansi\_cursor\_save — Saves the cursor position.

### **Synopsis**

```
ansi_cursor_save( )
```

### **Arguments**

None

### **Description**

Sends ansi code for saving the current cursor position.

## function::ansi\_cursor\_show

function::ansi\_cursor\_show — Shows the cursor.

### Synopsis

```
ansi_cursor_show( )
```

### Arguments

None

### Description

Sends ansi code for showing the cursor.

## function::ansi\_new\_line

function::ansi\_new\_line — Move cursor to new line.

### Synopsis

```
ansi_new_line()
```

### Arguments

None

### Description

Sends ansi code new line.

## function::ansi\_reset\_color

function::ansi\_reset\_color — Resets Select Graphic Rendition mode.

### Synopsis

```
ansi_reset_color()
```

### Arguments

None

### Description

Sends ansi code to reset foreground, background and color attribute to default values.



# function::ansi\_set\_color

function::ansi\_set\_color — Set the ansi Select Graphic Rendition mode.

## Synopsis

- 1) `ansi_set_color(fg:long)`
- 2) `ansi_set_color(fg:long,bg:long)`
- 3) `ansi_set_color(fg:long,bg:long,attr:long)`

## Arguments

- fg*      Foreground color to set.
- bg*      Background color to set.
- attr*    Color attribute to set.

## Description

- 1) 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).
- 2) 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).
- 3) 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).

# function::indent

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.

## function::indent\_depth

function::indent\_depth — returns the global nested-depth

### Synopsis

```
indent_depth:long(delta:long)
```

### Arguments

*delta*      the amount of depth added/removed for each call

### Description

This function returns a number for appropriate indentation, similar to `indent`. Call it with a small positive or matching negative delta. Unlike the `thread_indent_depth` function, the `indent` does not track individual indent values on a per thread basis.

# function::thread\_indent

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. The timestamp is as per provided by the `__indent_timestamp` function, which by default measures microseconds.

## function::thread\_indent\_depth

function::thread\_indent\_depth — returns the nested-depth of the current task

### Synopsis

```
thread_indent_depth:long(delta:long)
```

### Arguments

*delta*      the amount of depth added/removed for each call

### Description

This function returns an integer equal to the nested function-call depth starting from the outermost initial level. This function is useful for saving space (consumed by whitespace) in traces with long nested function calls. Use this function in a similar fashion to `thread_indent`, i.e., in call-probe, use `thread_indent_depth(1)` and in return-probe, use `thread_indent_depth(-1)`

---

# Chapter 30. 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:

# probe::stap.cache\_add\_mod

probe::stap.cache\_add\_mod — Adding kernel instrumentation module to cache

## Synopsis

```
stap.cache_add_mod
```

## Values

<i>dest_path</i>	the path the .ko file is going to (incl filename)
<i>source_path</i>	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.

# probe::stap.cache\_add\_nss

probe::stap.cache\_add\_nss — Add NSS (Network Security Services) information to cache

## Synopsis

```
stap.cache_add_nss
```

## Values

<i>source_path</i>	the path the .sgn file is coming from (incl filename)
<i>dest_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.



# probe::stap.cache\_add\_src

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.

# probe::stap.cache\_clean

probe::stap.cache\_clean — Removing file from stap cache

## Synopsis

```
stap.cache_clean
```

## Values

*path*    the path to the .ko/.c file being removed

## Description

Fires just before the call to unlink the module/source file.

# probe::stap.cache\_get

probe::stap.cache\_get — Found item in stap cache

## Synopsis

`stap.cache_get`

## Values

<i>source_path</i>	the path of the .c source file
<i>module_path</i>	the path of the .ko kernel module file

## Description

Fires just before the return of `get_from_cache`, when the cache grab is successful.

# probe::stap.pass0

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.

# probe::stap.pass0.end

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.

# probe::stap.pass1.end

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.

# probe::stap.pass1a

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.

# probe::stap.pass1b

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.



# probe::stap.pass2

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`.

# probe::stap.pass2.end

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

# probe::stap.pass3

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`.

# probe::stap.pass3.end

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

# probe::stap.pass4

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`.

# probe::stap.pass4.end

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

# probe::stap.pass5

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`.

# probe::stap.pass5.end

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



# probe::stap.pass6

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

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.

# probe::stap.system

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.

# probe::stap.system.return

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

probe::stap.system.spawn — stap spawned new process

## Synopsis

```
stap.system.spawn
```

## Values

*pid* the pid of the spawned process

*ret* the return value from `posix_spawn`

## Description

Fires just after the call to `posix_spawn`.

# probe::stapio.receive\_control\_message

probe::stapio.receive\_control\_message — Received a control message

## Synopsis

```
stapio.receive_control_message
```

## Values

*data*     a ptr to a binary blob of data sent as the control message

*len*     the length (in bytes) of the data blob

*type*     type of message being send; defined in runtime/transport/transport\_msgs.h

## Description

Fires just after a message was received and before it's processed.

# probe::staprun.insert\_module

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.

# probe::staprun.remove\_module

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.



# probe::staprun.send\_control\_message

probe::staprun.send\_control\_message — Sending a control message

## Synopsis

```
staprun.send_control_message
```

## Values

*len*      the length (in bytes) of the data blob

*type*     type of message being send; defined in runtime/transport/transport\_msgs.h

*data*     a ptr to a binary blob of data sent as the control message

## Description

Fires at the beginning of the send\_request function.

---

# Chapter 31. Network File Storage Tapsets

This family of probe points is used to probe network file storage functions and operations.

# function::nfsderror

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.

# probe::nfs.aop.readpage

probe::nfs.aop.readpage — NFS client synchronously reading a page

## Synopsis

`nfs.aop.readpage`

## Values

<i>rsize</i>	read size (in bytes)
<i>dev</i>	device identifier
<i>i_flag</i>	file flags
<i>file</i>	file argument
<i>__page</i>	the address of page
<i>size</i>	number of pages to be read in this execution
<i>page_index</i>	offset within mapping, can used a page identifier and position identifier in the page frame
<i>i_size</i>	file length in bytes
<i>sb_flag</i>	super block flags
<i>ino</i>	inode number

## Description

Read the page over, only fires when a previous async read operation failed

# probe::nfs.aop.readpages

probe::nfs.aop.readpages — NFS client reading multiple pages

## Synopsis

`nfs.aop.readpages`

## Values

<i>nr_pages</i>	number of pages attempted to read in this execution
<i>ino</i>	inode number
<i>file</i>	filp argument
<i>size</i>	number of pages attempted to read in this execution
<i>dev</i>	device identifier
<i>rpages</i>	read size (in pages)
<i>rsize</i>	read size (in bytes)

## Description

Fires when in readahead way, read several pages once

# probe::nfs.aop.release\_page

probe::nfs.aop.release\_page — NFS client releasing page

## Synopsis

`nfs.aop.release_page`

## Values

<i>dev</i>	device identifier
<i>__page</i>	the address of page
<i>ino</i>	inode number
<i>page_index</i>	offset within mapping, can used a page identifier and position identifier in the page frame
<i>size</i>	release pages

## Description

Fires when do a release operation on NFS.

# probe::nfs.aop.set\_page\_dirty

probe::nfs.aop.set\_page\_dirty — NFS client marking page as dirty

## Synopsis

```
nfs.aop.set_page_dirty
```

## Values

<i>page_flag</i>	page flags
<i>__page</i>	the address of page

## 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.

# probe::nfs.aop.write\_begin

probe::nfs.aop.write\_begin — NFS client begin to write data

## Synopsis

```
nfs.aop.write_begin
```

## Values

<i>offset</i>	start address of this write operation
<i>to</i>	end address of this write operation
<i>dev</i>	device identifier
<i>__page</i>	the address of page
<i>ino</i>	inode number
<i>page_index</i>	offset within mapping, can used a page identifier and position identifier in the page frame
<i>size</i>	write bytes

## 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

probe::nfs.aop.write\_end — NFS client complete writing data

## Synopsis

```
nfs.aop.write_end
```

## Values

<i>dev</i>	device identifier
<i>to</i>	end address of this write operation
<i>offset</i>	start address of this write operation
<i>i_size</i>	file length in bytes
<i>ino</i>	inode number
<i>sb_flag</i>	super block flags
<i>i_flag</i>	file flags
<i>__page</i>	the address of page
<i>page_index</i>	offset within mapping, can used a page identifier and position identifier in the page frame
<i>size</i>	write bytes

## Description

Fires when do a write operation on nfs, often after prepare\_write

Update and possibly write a cached page of an NFS file.

# probe::nfs.aop.writepage

probe::nfs.aop.writepage — NFS client writing a mapped page to the NFS server

## Synopsis

`nfs.aop.writepage`

## Values

<i>i_flag</i>	file flags
<i>__page</i>	the address of page
<i>i_size</i>	file length in bytes
<i>sb_flag</i>	super block flags
<i>ino</i>	inode number
<i>i_state</i>	inode state flags
<i>for_reclaim</i>	a flag of <code>writeback_control</code> , indicates if it's invoked from the page allocator
<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>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

## Description

The priority of wb is decided by the flags *for\_reclaim* and *for\_kupdate*.

# probe::nfs.aop.writepages

probe::nfs.aop.writepages — NFS client writing several dirty pages to the NFS server

## Synopsis

`nfs.aop.writepages`

## Values

<i>wsiz</i>	write size
<i>for_kupdate</i>	a flag of <code>writeback_control</code> , indicates if it's a kupdate writeback
<i>size</i>	number of pages attempted to be written in this execution
<i>wpages</i>	write size (in pages)
<i>dev</i>	device identifier
<i>for_reclaim</i>	a flag of <code>writeback_control</code> , indicates if it's invoked from the page allocator
<i>ino</i>	inode number
<i>nr_to_write</i>	number of pages attempted to be written in this execution

## Description

The priority of wb is decided by the flags *for\_reclaim* and *for\_kupdate*.

# probe::nfs.fop.aio\_read

probe::nfs.fop.aio\_read — NFS client aio\_read file operation

## Synopsis

`nfs.fop.aio_read`

## Values

<i>file_name</i>	file name
<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_time</i>	when we started read-caching this inode
<i>ino</i>	inode number
<i>parent_name</i>	parent dir name
<i>buf</i>	the address of buf in user space
<i>pos</i>	current position of file
<i>count</i>	read bytes
<i>dev</i>	device identifier
<i>cache_valid</i>	cache related bit mask flag

# probe::nfs.fop.aio\_write

probe::nfs.fop.aio\_write — NFS client aio\_write file operation

## Synopsis

```
nfs.fop.aio_write
```

## Values

<i>dev</i>	device identifier
<i>pos</i>	offset of the file
<i>buf</i>	the address of buf in user space
<i>count</i>	read bytes
<i>ino</i>	inode number
<i>parent_name</i>	parent dir name
<i>file_name</i>	file name

# probe::nfs.fop.check\_flags

probe::nfs.fop.check\_flags — NFS client checking flag operation

## Synopsis

`nfs.fop.check_flags`

## Values

*flag*    file flag

# probe::nfs.fop.flush

probe::nfs.fop.flush — NFS client flush file operation

## Synopsis

```
nfs.fop.flush
```

## Values

<i>ndirty</i>	number of dirty page
<i>ino</i>	inode number
<i>mode</i>	file mode
<i>dev</i>	device identifier

# probe::nfs.fop.fsync

probe::nfs.fop.fsync — NFS client fsync operation

## Synopsis

`nfs.fop.fsync`

## Values

<i>dev</i>	device identifier
<i>ino</i>	inode number
<i>ndirty</i>	number of dirty pages



# probe::nfs.fop.llseek

probe::nfs.fop.llseek — NFS client llseek operation

## Synopsis

`nfs.fop.llseek`

## Values

<i>offset</i>	the offset of the file will be repositioned
<i>whence_str</i>	symbolic string representation of the position to seek from
<i>dev</i>	device identifier
<i>whence</i>	the position to seek from
<i>ino</i>	inode number

# probe::nfs.fop.lock

probe::nfs.fop.lock — NFS client file lock operation

## Synopsis

`nfs.fop.lock`

## Values

<i>dev</i>	device identifier
<i>fl_start</i>	starting offset of locked region
<i>fl_type</i>	lock type
<i>fl_flag</i>	lock flags
<i>ino</i>	inode number
<i>fl_end</i>	ending offset of locked region
<i>i_mode</i>	file type and access rights
<i>cmd</i>	cmd arguments

# probe::nfs.fop.mmap

probe::nfs.fop.mmap — NFS client mmap operation

## Synopsis

`nfs.fop.mmap`

## Values

<i>file_name</i>	file name
<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>vm_start</i>	start address within <code>vm_mm</code>
<i>parent_name</i>	parent dir name
<i>cache_time</i>	when we started read-caching this inode
<i>vm_flag</i>	vm flags
<i>ino</i>	inode number
<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_valid</i>	cache related bit mask flag
<i>dev</i>	device identifier

# probe::nfs.fop.open

probe::nfs.fop.open — NFS client file open operation

## Synopsis

`nfs.fop.open`

## Values

<i>file_name</i>	file name
<i>ino</i>	inode number
<i>flag</i>	file flag
<i>i_size</i>	file length in bytes
<i>dev</i>	device identifier

# probe::nfs.fop.read

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.read\_iter

probe::nfs.fop.read\_iter — NFS client read\_iter file operation

## Synopsis

`nfs.fop.read_iter`

## Values

<i>file_name</i>	file name
<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_time</i>	when we started read-caching this inode
<i>ino</i>	inode number
<i>parent_name</i>	parent dir name
<i>pos</i>	current position of file
<i>count</i>	read bytes
<i>cache_valid</i>	cache related bit mask flag
<i>dev</i>	device identifier

# probe::nfs.fop.release

probe::nfs.fop.release — NFS client release page operation

## Synopsis

```
nfs.fop.release
```

## Values

*dev*     device identifier

*mode*    file mode

*ino*     inode number

# probe::nfs.fop.sendfile

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>ino</i>	inode number
<i>cache_time</i>	when we started read-caching this inode
<i>count</i>	read bytes
<i>ppos</i>	current position of file
<i>cache_valid</i>	cache related bit mask flag
<i>dev</i>	device identifier



# probe::nfs.fop.write

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.

# probe::nfs.fop.write\_iter

probe::nfs.fop.write\_iter — NFS client write\_iter file operation

## Synopsis

```
nfs.fop.write_iter
```

## Values

<i>count</i>	read bytes
<i>pos</i>	offset of the file
<i>dev</i>	device identifier
<i>file_name</i>	file name
<i>ino</i>	inode number
<i>parent_name</i>	parent dir name

# probe::nfs.proc.commit

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>offset</i>	the file offset
<i>prot</i>	transfer protocol
<i>bitmask0</i>	V4 bitmask representing the set of attributes supported on this filesystem
<i>version</i>	NFS version
<i>server_ip</i>	IP address of server
<i>size</i>	read bytes in this execution

## 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.

# probe::nfs.proc.commit\_done

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>valid</i>	fattr->valid, indicates which fields are valid
<i>prot</i>	transfer protocol
<i>timestamp</i>	V4 timestamp, which is used for lease renewal
<i>version</i>	NFS version
<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).

# probe::nfs.proc.commit\_setup

probe::nfs.proc.commit\_setup — NFS client setting up a commit RPC task

## Synopsis

`nfs.proc.commit_setup`

## Values

<i>bitmask0</i>	V4 bitmask representing the set of attributes supported on this filesystem
<i>offset</i>	the file offset
<i>prot</i>	transfer protocol
<i>version</i>	NFS version
<i>server_ip</i>	IP address of server
<i>size</i>	bytes in this commit
<i>count</i>	bytes in this commit
<i>bitmask1</i>	V4 bitmask representing the set of attributes supported on this filesystem

## Description

The `commit_setup` function is used to setup a commit RPC task. It is not doing the actual commit operation. It does not exist in NFSv2.

# probe::nfs.proc.create

probe::nfs.proc.create — NFS client creating file on server

## Synopsis

`nfs.proc.create`

## Values

<i>filelen</i>	length of file name
<i>prot</i>	transfer protocol
<i>fh</i>	file handle of parent dir
<i>filename</i>	file name
<i>flag</i>	indicates create mode (only for NFSv3 and NFSv4)
<i>version</i>	NFS version (the function is used for all NFS version)
<i>server_ip</i>	IP address of server

# probe::nfs.proc.handle\_exception

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.

# probe::nfs.proc.lookup

probe::nfs.proc.lookup — NFS client opens/searches a file on server

## Synopsis

`nfs.proc.lookup`

## Values

<i>bitmask1</i>	V4 bitmask representing the set of attributes supported on this filesystem
<i>name_len</i>	the length of file name
<i>version</i>	NFS version
<i>server_ip</i>	IP address of server
<i>filename</i>	the name of file which client opens/searches on server
<i>bitmask0</i>	V4 bitmask representing the set of attributes supported on this filesystem
<i>prot</i>	transfer protocol



# probe::nfs.proc.open

probe::nfs.proc.open — NFS client allocates file read/write context information

## Synopsis

```
nfs.proc.open
```

## Values

<i>mode</i>	file mode
<i>filename</i>	file name
<i>flag</i>	file flag
<i>version</i>	NFS version (the function is used for all NFS version)
<i>server_ip</i>	IP address of server
<i>prot</i>	transfer protocol

## Description

Allocate file read/write context information

# probe::nfs.proc.read

probe::nfs.proc.read — NFS client synchronously reads file from server

## Synopsis

`nfs.proc.read`

## Values

<i>version</i>	NFS version
<i>server_ip</i>	IP address of server
<i>flags</i>	used to set task->tk_flags in rpc_init_task function
<i>offset</i>	the file offset
<i>prot</i>	transfer protocol
<i>count</i>	read bytes in this execution

## 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.

# probe::nfs.proc.read\_done

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>timestamp</i>	V4 timestamp, which is used for lease renewal
<i>server_ip</i>	IP address of server
<i>prot</i>	transfer protocol

## Description

Fires when a reply to a read RPC task is received or some read error occurs (timeout or socket shutdown).

# probe::nfs.proc.read\_setup

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>prot</i>	transfer protocol
<i>offset</i>	the file offset
<i>size</i>	read bytes in this execution
<i>server_ip</i>	IP address of server
<i>version</i>	NFS version

## Description

The `read_setup` function is used to setup a read RPC task. It is not doing the actual read operation.

# probe::nfs.proc.release

probe::nfs.proc.release — NFS client releases file read/write context information

## Synopsis

```
nfs.proc.release
```

## Values

<i>mode</i>	file mode
<i>server_ip</i>	IP address of server
<i>version</i>	NFS version (the function is used for all NFS version)
<i>flag</i>	file flag
<i>filename</i>	file name
<i>prot</i>	transfer protocol

## Description

Release file read/write context information

# probe::nfs.proc.remove

probe::nfs.proc.remove — NFS client removes a file on server

## Synopsis

```
nfs.proc.remove
```

## Values

<i>filelen</i>	length of file name
<i>prot</i>	transfer protocol
<i>fh</i>	file handle of parent dir
<i>filename</i>	file name
<i>server_ip</i>	IP address of server
<i>version</i>	NFS version (the function is used for all NFS version)

# probe::nfs.proc.rename

probe::nfs.proc.rename — NFS client renames a file on server

## Synopsis

`nfs.proc.rename`

## Values

<i>prot</i>	transfer protocol
<i>server_ip</i>	IP address of server
<i>version</i>	NFS version (the function is used for all NFS version)
<i>old_name</i>	old file name
<i>new_name</i>	new file name
<i>old_fh</i>	file handle of old parent dir
<i>new_fh</i>	file handle of new parent dir
<i>new_filelen</i>	length of new file name
<i>old_filelen</i>	length of old file name

# probe::nfs.proc.rename\_done

probe::nfs.proc.rename\_done — NFS client response to a rename RPC task

## Synopsis

`nfs.proc.rename_done`

## Values

<i>server_ip</i>	IP address of server
<i>version</i>	NFS version
<i>timestamp</i>	V4 timestamp, which is used for lease renewal
<i>prot</i>	transfer protocol
<i>old_fh</i>	file handle of old parent dir
<i>status</i>	result of last operation
<i>new_fh</i>	file handle of new parent dir

## Description

Fires when a reply to a rename RPC task is received or some rename error occurs (timeout or socket shutdown).



# probe::nfs.proc.rename\_setup

probe::nfs.proc.rename\_setup — NFS client setting up a rename RPC task

## Synopsis

```
nfs.proc.rename_setup
```

## Values

<i>fh</i>	file handle of parent dir
<i>prot</i>	transfer protocol
<i>version</i>	NFS version
<i>server_ip</i>	IP address of server

## Description

The `rename_setup` function is used to setup a rename RPC task. It is not doing the actual rename operation.

# probe::nfs.proc.write

probe::nfs.proc.write — NFS client synchronously writes file to server

## Synopsis

`nfs.proc.write`

## Values

<i>bitmask1</i>	V4 bitmask representing the set of attributes supported on this filesystem
<i>flags</i>	used to set task->tk_flags in rpc_init_task function
<i>size</i>	read bytes in this execution
<i>server_ip</i>	IP address of server
<i>version</i>	NFS version
<i>prot</i>	transfer protocol
<i>offset</i>	the file offset
<i>bitmask0</i>	V4 bitmask representing the set of attributes supported on this filesystem

## 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.

# probe::nfs.proc.write\_done

probe::nfs.proc.write\_done — NFS client response to a write RPC task

## Synopsis

```
nfs.proc.write_done
```

## Values

<i>prot</i>	transfer protocol
<i>server_ip</i>	IP address of server
<i>version</i>	NFS version
<i>timestamp</i>	V4 timestamp, which is used for lease renewal
<i>valid</i>	fattr->valid, indicates which fields are valid
<i>status</i>	result of last operation
<i>count</i>	number of bytes written

## Description

Fires when a reply to a write RPC task is received or some write error occurs (timeout or socket shutdown).

# probe::nfs.proc.write\_setup

probe::nfs.proc.write\_setup — NFS client setting up a write RPC task

## Synopsis

nfs.proc.write\_setup

## Values

<i>bitmask1</i>	V4 bitmask representing the set of attributes supported on this filesystem
<i>count</i>	bytes written in this execution
<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>offset</i>	the file offset
<i>prot</i>	transfer protocol
<i>bitmask0</i>	V4 bitmask representing the set of attributes supported on this filesystem
<i>version</i>	NFS version
<i>size</i>	bytes written in this execution
<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

probe::nfsd.close — NFS server closing a file for client

## Synopsis

```
nfsd.close
```

## Values

<i>filename</i>	file name
-----------------	-----------

## Description

This probe point does not exist in kernels starting with 4.2.

# probe::nfsd.commit

probe::nfsd.commit — NFS server committing all pending writes to stable storage

## Synopsis

```
nfsd.commit
```

## Values

<i>count</i>	read bytes
<i>offset</i>	the offset of file
<i>flag</i>	indicates whether this execution is a sync operation
<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>size</i>	read bytes

# probe::nfsd.create

probe::nfsd.create — NFS server creating a file(regular,dir,device,fifo) for client

## Synopsis

`nfsd.create`

## Values

<i>type</i>	file type(regular,dir,device,fifo ...)
<i>iap_mode</i>	file access mode
<i>filelen</i>	the length of file name
<i>iap_valid</i>	Attribute flags
<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>filename</i>	file name

## Description

Sometimes nfsd will call `nfsd_create_v3` instead of this this probe point.

# probe::nfsd.createv3

probe::nfsd.createv3 — NFS server creating a regular file or set file attributes for client

## Synopsis

`nfsd.createv3`

## Values

<i>filename</i>	file name
<i>createmode</i>	create mode .The possible values could be: NFS3_CREATE_EXCLUSIVE, NFS3_CREATE_UNCHECKED, or NFS3_CREATE_GUARDED
<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>iap_valid</i>	Attribute flags
<i>filelen</i>	the length of file name
<i>iap_mode</i>	file access mode
<i>truncp</i>	trunc arguments, indicates if the file shouldbe truncate
<i>verifier</i>	file attributes (atime,mtime,mode). It's used to reset file attributes for CREATE_EXCLUSIVE

## Description

This probepoints is only called by `nfsd3_proc_create` and `nfsd4_open` when `op_claim_type` is `NFS4_OPEN_CLAIM_NULL`.



# probe::nfsd.dispatch

probe::nfsd.dispatch — NFS server receives an operation from client

## Synopsis

`nfsd.dispatch`

## Values

<i>client_ip</i>	the ip address of client
<i>proc</i>	procedure number
<i>proto</i>	transfer protocol
<i>xid</i>	transmission id
<i>prog</i>	program number
<i>version</i>	nfs version

# probe::nfsd.lookup

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>fh</i>	file handle of parent dir(the first part is the length of the file handle)
<i>filename</i>	file name
<i>client_ip</i>	the ip address of client

# probe::nfsd.open

probe::nfsd.open — NFS server opening a file for client

## Synopsis

`nfsd.open`

## Values

<i>type</i>	type of file (regular file or dir)
<i>fh</i>	file handle (the first part is the length of the file handle)
<i>access</i>	indicates the type of open (read/write/commit/readdir...)
<i>client_ip</i>	the ip address of client

# probe::nfsd.proc.commit

probe::nfsd.proc.commit — NFS server performing a commit operation for client

## Synopsis

`nfsd.proc.commit`

## Values

<i>offset</i>	the offset of file
<i>count</i>	read bytes
<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>proto</i>	transfer protocol
<i>version</i>	nfs version
<i>size</i>	read bytes
<i>gid</i>	requester's group id
<i>uid</i>	requester's user id

# probe::nfsd.proc.create

probe::nfsd.proc.create — NFS server creating a file for client

## Synopsis

`nfsd.proc.create`

## Values

<i>version</i>	nfs version
<i>uid</i>	requester's user id
<i>gid</i>	requester's group id
<i>filelen</i>	length of file name
<i>fh</i>	file handle (the first part is the length of the file handle)
<i>proto</i>	transfer protocol
<i>client_ip</i>	the ip address of client
<i>filename</i>	file name

# probe::nfsd.proc.lookup

probe::nfsd.proc.lookup — NFS server opening or searching for a file for client

## Synopsis

`nfsd.proc.lookup`

## Values

<i>filename</i>	file name
<i>gid</i>	requester's group id
<i>client_ip</i>	the ip address of client
<i>proto</i>	transfer protocol
<i>fh</i>	file handle of parent dir (the first part is the length of the file handle)
<i>uid</i>	requester's user id
<i>filelen</i>	the length of file name
<i>version</i>	nfs version

# probe::nfsd.proc.read

probe::nfsd.proc.read — NFS server reading file for client

## Synopsis

`nfsd.proc.read`

## Values

<i>proto</i>	transfer protocol
<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>uid</i>	requester's user id
<i>gid</i>	requester's group id
<i>client_ip</i>	the ip address of client
<i>count</i>	read bytes
<i>version</i>	nfs version
<i>size</i>	read bytes
<i>vlen</i>	read blocks
<i>offset</i>	the offset of file

# probe::nfsd.proc.remove

probe::nfsd.proc.remove — NFS server removing a file for client

## Synopsis

`nfsd.proc.remove`

## Values

<i>filename</i>	file name
<i>client_ip</i>	the ip address of client
<i>proto</i>	transfer protocol
<i>fh</i>	file handle (the first part is the length of the file handle)
<i>filelen</i>	length of file name
<i>gid</i>	requester's group id
<i>uid</i>	requester's user id
<i>version</i>	nfs version



# probe::nfsd.proc.rename

probe::nfsd.proc.rename — NFS Server renaming a file for client

## Synopsis

`nfsd.proc.rename`

## Values

<i>tname</i>	new file name
<i>gid</i>	requester's group id
<i>flen</i>	length of old file name
<i>uid</i>	requester's user id
<i>filename</i>	old file name
<i>client_ip</i>	the ip address of client
<i>tfh</i>	file handler of new path
<i>fh</i>	file handler of old path
<i>tlen</i>	length of new file name

# probe::nfsd.proc.write

probe::nfsd.proc.write — NFS server writing data to file for client

## Synopsis

`nfsd.proc.write`

## Values

<i>count</i>	read bytes
<i>offset</i>	the offset of file
<i>fh</i>	file handle (the first part is the length of the file handle)
<i>proto</i>	transfer protocol
<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>version</i>	nfs version
<i>size</i>	read bytes
<i>vlen</i>	read blocks
<i>uid</i>	requester's user id
<i>stable</i>	argp->stable
<i>gid</i>	requester's group id

# probe::nfsd.read

probe::nfsd.read — NFS server reading data from a file for client

## Synopsis

`nfsd.read`

## Values

<i>vlen</i>	read blocks
<i>size</i>	read bytes
<i>file</i>	argument file, indicates if the file has been opened.
<i>offset</i>	the offset of file
<i>count</i>	read bytes
<i>client_ip</i>	the ip address of client
<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)

# probe::nfsd.rename

probe::nfsd.rename — NFS server renaming a file for client

## Synopsis

`nfsd.rename`

## Values

<i>flen</i>	length of old file name
<i>tname</i>	new file name
<i>fh</i>	file handler of old path
<i>tfh</i>	file handler of new path
<i>client_ip</i>	the ip address of client
<i>filename</i>	old file name
<i>tlen</i>	length of new file name

# probe::nfsd.unlink

probe::nfsd.unlink — NFS server removing a file or a directory for client

## Synopsis

```
nfsd.unlink
```

## Values

<i>type</i>	file type (file or dir)
<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>filename</i>	file name
<i>filelen</i>	the length of file name

# probe::nfsd.write

probe::nfsd.write — NFS server writing data to a file for client

## Synopsis

```
nfsd.write
```

## Values

<i>size</i>	read bytes
<i>vlen</i>	read blocks
<i>file</i>	argument file, indicates if the file has been opened.
<i>count</i>	read bytes
<i>offset</i>	the offset of file
<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

---

# Chapter 32. 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.

# function::commit

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*.



## function::discard

function::discard — Discard all output related to a speculation buffer

### Synopsis

```
discard(id:long)
```

### Arguments

*id* of the buffer to store the information in

# function::speculate

function::speculate — Store a string for possible output later

## Synopsis

```
speculate(id:long,output:string)
```

## Arguments

<i>id</i>	buffer id to store the information in
<i>output</i>	string to write out when commit occurs

## Description

Add a string to the speculaive buffer for id.

# function::speculation

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 functions to keep the threads separate.

---

## Chapter 33. JSON Tapset

This family of probe points, functions, and macros is used to output data in JSON format. It contains the following probe points, functions, and macros:

# function::json\_add\_array

function::json\_add\_array — Add an array

## Synopsis

```
json_add_array:long(name:string,description:string)
```

## Arguments

<i>name</i>	The name of the array.
<i>description</i>	Array description. An empty string can be used.

## Description

This function adds a array, setting up everything needed. Arrays contain other metrics, added with `json_add_array_numeric_metric` or `json_add_array_string_metric`.

# function::json\_add\_array\_numeric\_metric

function::json\_add\_array\_numeric\_metric — Add a numeric metric to an array

## Synopsis

```
json_add_array_numeric_metric:long(array_name:string,metric_name:string,metric
```

## Arguments

<i>array_name</i>	The name of the array the numeric metric should be added to.
<i>metric_name</i>	The name of the numeric metric.
<i>metric_description</i>	Metric description. An empty string can be used.
<i>metric_units</i>	Metic units. An empty string can be used.

## Description

This function adds a numeric metric to an array, setting up everything needed.

# function::json\_add\_array\_string\_metric

function::json\_add\_array\_string\_metric — Add a string metric to an array

## Synopsis

```
json_add_array_string_metric:long(array_name:string,metric_name:string,metric_
```

## Arguments

<i>array_name</i>	The name of the array the string metric should be added to.
<i>metric_name</i>	The name of the string metric.
<i>metric_description</i>	Metric description. An empty string can be used.

## Description

This function adds a string metric to an array, setting up everything needed.

# function::json\_add\_numeric\_metric

function::json\_add\_numeric\_metric — Add a numeric metric

## Synopsis

```
json_add_numeric_metric:long(name:string,description:string,units:string)
```

## Arguments

<i>name</i>	The name of the numeric metric.
<i>description</i>	Metric description. An empty string can be used.
<i>units</i>	Metric units. An empty string can be used.

## Description

This function adds a numeric metric, setting up everything needed.



# function::json\_add\_string\_metric

function::json\_add\_string\_metric — Add a string metric

## Synopsis

```
json_add_string_metric:long(name:string,description:string)
```

## Arguments

<i>name</i>	The name of the string metric.
<i>description</i>	Metric description. An empty string can be used.

## Description

This function adds a string metric, setting up everything needed.

# function::json\_set\_prefix

function::json\_set\_prefix — Set the metric prefix.

## Synopsis

```
json_set_prefix:long(prefix:string)
```

## Arguments

*prefix*      The prefix name to be used.

## Description

This function sets the “prefix”, which is the name of the base of the metric hierarchy. Calling this function is optional, by default the name of the systemtap module is used.

# macro::json\_output\_array\_numeric\_value

macro::json\_output\_array\_numeric\_value — Output a numeric value for metric in an array.

## Synopsis

```
@json_output_array_numeric_value(array_name,array_index,metric_name,value)
```

## Arguments

<i>array_name</i>	The name of the array.
<i>array_index</i>	The array index (as a string) indicating where to store the numeric value.
<i>metric_name</i>	The name of the numeric metric.
<i>value</i>	The numeric value to output.

## Description

The `json_output_array_numeric_value` macro is designed to be called from the 'json\_data' probe in the user's script to output a metric's numeric value that is in an array. This metric should have been added with `json_add_array_numeric_metric`.

# macro::json\_output\_array\_string\_value

macro::json\_output\_array\_string\_value — Output a string value for metric in an array.

## Synopsis

```
@json_output_array_string_value(array_name,array_index,metric_name,value)
```

## Arguments

<i>array_name</i>	The name of the array.
<i>array_index</i>	The array index (as a string) indicating where to store the string value.
<i>metric_name</i>	The name of the string metric.
<i>value</i>	The string value to output.

## Description

The `json_output_array_string_value` macro is designed to be called from the 'json\_data' probe in the user's script to output a metric's string value that is in an array. This metric should have been added with `json_add_array_string_metric`.

# macro::json\_output\_data\_end

macro::json\_output\_data\_end — End the json output.

## Synopsis

```
@json_output_data_end()
```

## Arguments

None

## Description

The `json_output_data_end` macro is designed to be called from the 'json\_data' probe from the user's script. It marks the end of the JSON output.

# macro::json\_output\_data\_start

macro::json\_output\_data\_start — Start the json output.

## Synopsis

```
@json_output_data_start()
```

## Arguments

None

## Description

The `json_output_data_start` macro is designed to be called from the 'json\_data' probe from the user's script. It marks the start of the JSON output.

# macro::json\_output\_numeric\_value

macro::json\_output\_numeric\_value — Output a numeric value.

## Synopsis

```
@json_output_numeric_value(name,value)
```

## Arguments

*name*        The name of the numeric metric.

*value*      The numeric value to output.

## Description

The `json_output_numeric_value` macro is designed to be called from the 'json\_data' probe in the user's script to output a metric's numeric value. This metric should have been added with `json_add_numeric_metric`.

# macro::json\_output\_string\_value

macro::json\_output\_string\_value — Output a string value.

## Synopsis

```
@json_output_string_value(name,value)
```

## Arguments

*name*        The name of the string metric.

*value*      The string value to output.

## Description

The `json_output_string_value` macro is designed to be called from the 'json\_data' probe in the user's script to output a metric's string value. This metric should have been added with `json_add_string_metric`.



# probe::json\_data

probe::json\_data — Fires whenever JSON data is wanted by a reader.

## Synopsis

```
json_data
```

## Values

None

## Context

This probe fires when the JSON data is about to be read. This probe must gather up data and then call the following macros to output the data in JSON format. First, `@json_output_data_start` must be called. That call is followed by one or more of the following (one call for each data item): `@json_output_string_value`, `@json_output_numeric_value`, `@json_output_array_string_value`, and `@json_output_array_numeric_value`. Finally `@json_output_data_end` must be called.

---

# Chapter 34. Output file switching Tapset

Utility function to allow switching of output files.

# function::switch\_file

function::switch\_file — switch to the next output file

## Synopsis

```
switch_file()
```

## Arguments

None

## Description

This function sends a signal to the stapio process, commanding it to rotate to the next output file when output is sent to file(s).

---

## Chapter 35. Syscall Any Tapset

This family of probe points is designed to provide low cost instrumentation for cases where only the syscall name (or number) and return value are required and there is no need for the detailed syscall argument values. They are restricted versions of `syscall.*` and `syscall.*.return`.

# probe::syscall\_any

probe::syscall\_any — Record entry into a syscall

## Synopsis

```
syscall_any
```

## Values

<i>syscall_nr</i>	number of the syscall
<i>name</i>	name of the syscall

## Context

The process performing the syscall

## Description

The `syscall_any` probe point is designed to be a low overhead that monitors all the syscalls entered via a kernel tracepoint. Because of the breadth of syscalls it monitors it provides no information about the syscall arguments or argstr string representation of those arguments.

This requires kernel 3.5+ and newer which have the `kernel.trace("sys_enter")` probe point.

# probe::syscall\_any.return

probe::syscall\_any.return — Record exit from a syscall

## Synopsis

```
syscall_any.return
```

## Values

<i>retval</i>	return value of the syscall
<i>name</i>	name of the syscall
<i>syscall_nr</i>	number of the syscall

## Context

The process performing the syscall

## Description

The `syscall_any.return` probe point is designed to be a low overhead that monitors all the syscalls returns via a kernel tracepoint. Because of the breadth of syscalls it monitors it provides no information about the syscall arguments, `argstr` string representation of those arguments, or a string interpretation of the return value (`retval`).

This requires kernel 3.5+ and newer which have the `kernel.trace("sys_exit")` probe point.