**strace** is a diagnostic, [debugging](https://en.wikipedia.org/wiki/Debugging) and instructional [userspace](https://en.wikipedia.org/wiki/Userspace) utility for [Linux](https://en.wikipedia.org/wiki/Linux). It is used to monitor and tamper with interactions between [processes](https://en.wikipedia.org/wiki/Process_(computing)) and the [Linux kernel](https://en.wikipedia.org/wiki/Linux_kernel), which include [system calls](https://en.wikipedia.org/wiki/System_call), [signal](https://en.wikipedia.org/wiki/Unix_signal) deliveries, and changes of process state. The operation of strace is made possible by the kernel feature known as [ptrace](https://en.wikipedia.org/wiki/Ptrace).

Some [Unix-like](https://en.wikipedia.org/wiki/Unix-like) systems provide other diagnostic tools similar to strace, such as [truss](https://en.wikipedia.org/wiki/Truss_(Unix)).



**Contents**

* [1History](https://en.wikipedia.org/wiki/Strace#History)
  + [1.1Version history](https://en.wikipedia.org/wiki/Strace#Version_history)
* [2Usage and features](https://en.wikipedia.org/wiki/Strace#Usage_and_features)
* [3Examples](https://en.wikipedia.org/wiki/Strace#Examples)
* [4Similar tools](https://en.wikipedia.org/wiki/Strace#Similar_tools)
* [5See also](https://en.wikipedia.org/wiki/Strace#See_also)
* [6References](https://en.wikipedia.org/wiki/Strace#References)
* [7External links](https://en.wikipedia.org/wiki/Strace#External_links)

History[[edit](https://en.wikipedia.org/w/index.php?title=Strace&action=edit&section=1)]

Strace was originally written for [SunOS](https://en.wikipedia.org/wiki/SunOS) by Paul Kranenburg in 1991, according to its copyright notice, and published early in 1992, in the volume three of comp.sources.sun. The initial [README](https://en.wikipedia.org/wiki/README) file contained the following:[[3]](https://en.wikipedia.org/wiki/Strace#cite_note-3)

strace(1) is a system call tracer for Sun(tm) systems much like the Sun supplied program trace(1). strace(1) is a useful utility to sort of debug programs for which no source is available which unfortunately includes almost all of the Sun supplied system software.

Later, Branko Lankester ported this version to [Linux](https://en.wikipedia.org/wiki/Linux), releasing his version in November 1992 with the second release following in 1993.[[4]](https://en.wikipedia.org/wiki/Strace#cite_note-4)[[5]](https://en.wikipedia.org/wiki/Strace#cite_note-5) Richard Sladkey combined these separate versions of strace in 1993, and ported the program to [SVR4](https://en.wikipedia.org/wiki/SVR4) and [Solaris](https://en.wikipedia.org/wiki/Solaris_(operating_system)) in 1994,[[6]](https://en.wikipedia.org/wiki/Strace#cite_note-6) resulting in strace 3.0 that was announced in comp.sources.misc in mid-1994.[[7]](https://en.wikipedia.org/wiki/Strace#cite_note-7)

Beginning in 1996, strace was maintained by Wichert Akkerman. During his tenure, strace development migrated to [CVS](https://en.wikipedia.org/wiki/Concurrent_Versions_System); ports to [FreeBSD](https://en.wikipedia.org/wiki/FreeBSD) and many architectures on Linux (including ARM, IA-64, MIPS, PA-RISC, PowerPC, s390, SPARC) were introduced. In 2002, the burden of strace maintainership was transferred to Roland McGrath. Since then, strace gained support for several new Linux architectures (AMD64, s390x, SuperH), bi-architecture support for some of them, and received numerous additions and improvements in syscalls decoders on Linux; strace development migrated to [git](https://en.wikipedia.org/wiki/Git) during that period. Since 2009, strace is actively maintained by Dmitry Levin. strace gained support for AArch64, ARC, AVR32, Blackfin, Meta, Nios II, OpenSISC 1000, RISC-V, Tile/TileGx, Xtensa architectures since that time.

The last version of strace that had some (evidently dead)[[8]](https://en.wikipedia.org/wiki/Strace#cite_note-8) code for non-[Linux](https://en.wikipedia.org/wiki/Linux) operating systems was 4.6, released in March 2011.[[9]](https://en.wikipedia.org/wiki/Strace#cite_note-9) In strace version 4.7, released in May 2012,[[10]](https://en.wikipedia.org/wiki/Strace#cite_note-10) all non-Linux code had been removed;[[11]](https://en.wikipedia.org/wiki/Strace#cite_note-11) since strace 4.13,[[12]](https://en.wikipedia.org/wiki/Strace#cite_note-12) the project follows Linux kernel's release schedule, and with the version 5.0,[[13]](https://en.wikipedia.org/wiki/Strace#cite_note-13) it follows Linux's versioning scheme as well.

In 2012 strace also gained support for path tracing and file descriptor path decoding.[[14]](https://en.wikipedia.org/wiki/Strace#cite_note-14) In August 2014, strace 4.9 was released[[15]](https://en.wikipedia.org/wiki/Strace#cite_note-15)[[16]](https://en.wikipedia.org/wiki/Strace#cite_note-16), where support for stack traces printing was added. In December 2016[[17]](https://en.wikipedia.org/wiki/Strace#cite_note-17)[[18]](https://en.wikipedia.org/wiki/Strace#cite_note-18), syscall [fault injection](https://en.wikipedia.org/wiki/Fault_injection) feature was implemented.

**Version history**[[edit](https://en.wikipedia.org/w/index.php?title=Strace&action=edit&section=2)]

|  |  |
| --- | --- |
| **Version** | show**Release date** |

Usage and features[[edit](https://en.wikipedia.org/w/index.php?title=Strace&action=edit&section=3)]

The most common use is to start a program using strace, which prints a list of system calls made by the program. This is useful if the program continually crashes, or does not behave as expected; for example using strace may reveal that the program is attempting to access a file which does not exist or cannot be read.

An alternative application is to use the -p flag to attach to a running process. This is useful if a process has stopped responding, and might reveal, for example, that the process is blocking whilst attempting to make a network connection.

Among other features, strace allows the following:

* Specifying a filter of syscall names that should be traced (via the -e trace= option): by name, like clone,fork,vfork; using one of the predefined groups, like %ipc or %file; or (since strace 4.17) using regular expression syntax, like -e trace=/clock\_.\*.
* Specifying a list of paths to be traced (-P /etc/ld.so.cache, for example).
* Specifying a list of file descriptors whose I/O should be dumped (-e read= and -e write= options).
* Counting syscall execution time and count (-T, -c, -C, and -w options).
* Printing relative or absolute time stamps (-t and -r options).
* Modifying return and error code of the specified syscalls, and inject signals upon their execution (since strace 4.15, -e inject= option).
* Extracting information about file descriptors (including sockets, -y option).
* Printing stack traces, including (since strace 4.21) symbol demangling (-k option).
* Filtering by syscall return status (-e status= option; since strace 5.2[[50]](https://en.wikipedia.org/wiki/Strace#cite_note-50)).

strace supports decoding of arguments of some classes of [ioctl](https://en.wikipedia.org/wiki/Ioctl) commands, such as [BTRFS\_\*](https://en.wikipedia.org/wiki/Btrfs), [V4L2\_\*](https://en.wikipedia.org/wiki/Video4Linux), [DM\_\*](https://en.wikipedia.org/wiki/Device_mapper), [NSFS\_\*](https://en.wikipedia.org/wiki/Linux_namespaces), [MEM\*](https://en.wikipedia.org/wiki/Memory_Technology_Device), [EVIO\*](https://en.wikipedia.org/wiki/Evdev), [KVM\_\*](https://en.wikipedia.org/wiki/Kernel-based_Virtual_Machine), and several others.

As strace only details system calls, it cannot be used to detect as many problems as a code debugger such as [GNU Debugger](https://en.wikipedia.org/wiki/GNU_Debugger) (gdb). It is, however, easier to use than a code debugger, and is a very useful tool for system administrators. It is also used by researchers to generate system call traces for later *system call replay*.[[51]](https://en.wikipedia.org/wiki/Strace#cite_note-Horky13-51)[[52]](https://en.wikipedia.org/wiki/Strace#cite_note-Waterland07-52)[[53]](https://en.wikipedia.org/wiki/Strace#cite_note-Burton98-53)

Examples[[edit](https://en.wikipedia.org/w/index.php?title=Strace&action=edit&section=4)]

The following is an example of typical output of the strace command:

user@server:~$ strace ls

...

open(".", O\_RDONLY|O\_NONBLOCK|O\_LARGEFILE|O\_DIRECTORY|O\_CLOEXEC) = 3

fstat64(3, {st\_mode=S\_IFDIR|0755, st\_size=4096, ...}) = 0

fcntl64(3, F\_GETFD) = 0x1 (flags FD\_CLOEXEC)

getdents64(3, */\* 18 entries \*/*, 4096) = 496

getdents64(3, */\* 0 entries \*/*, 4096) = 0

close(3) = 0

fstat64(1, {st\_mode=S\_IFIFO|0600, st\_size=0, ...}) = 0

mmap2(NULL, 4096, PROT\_READ|PROT\_WRITE, MAP\_PRIVATE|MAP\_ANONYMOUS, -1, 0) = 0xb7f2c000

write(1, "autofs**\n**backups**\n**cache**\n**flexlm**\n**games"..., 86autofsA

The above fragment is only a small part of the output of strace when run on the '[ls](https://en.wikipedia.org/wiki/Ls)' command. It shows that the current working directory is opened, inspected and its contents retrieved. The resulting list of file names is written to standard output.

Similar tools[[edit](https://en.wikipedia.org/w/index.php?title=Strace&action=edit&section=5)]

Different operating systems feature other similar or related [instrumentation](https://en.wikipedia.org/wiki/Instrumentation_(computer_programming)) tools, offering similar or more advanced features; some of the tools (although using the same or a similar name) may use completely different work mechanisms, resulting in different feature sets or results. Such tools include the following:

* [Linux](https://en.wikipedia.org/wiki/Linux) has [ltrace](https://en.wikipedia.org/wiki/Ltrace) that can trace library and system calls, *xtrace* that can trace [X Window](https://en.wikipedia.org/wiki/X_Window) programs,[[54]](https://en.wikipedia.org/wiki/Strace#cite_note-54) [SystemTap](https://en.wikipedia.org/wiki/SystemTap), [perf](https://en.wikipedia.org/wiki/Perf_(Linux)), and [trace-cmd](https://en.wikipedia.org/wiki/Trace-cmd) and [KernelShark](https://en.wikipedia.org/wiki/KernelShark) that extend [ftrace](https://en.wikipedia.org/wiki/Ftrace).
* [AIX](https://en.wikipedia.org/wiki/AIX) provides the [truss](https://en.wikipedia.org/wiki/Truss_(Unix)) command
* [HP-UX](https://en.wikipedia.org/wiki/HP-UX) offers the [Tusc](https://en.wikipedia.org/w/index.php?title=Tusc_(Unix)&action=edit&redlink=1) command
* [Solaris](https://en.wikipedia.org/wiki/Solaris_(operating_system)) / [Illumos](https://en.wikipedia.org/wiki/Illumos) has truss and [DTrace](https://en.wikipedia.org/wiki/DTrace)
* [UnixWare](https://en.wikipedia.org/wiki/UnixWare) provides the truss command
* [FreeBSD](https://en.wikipedia.org/wiki/FreeBSD) provides the truss command, [ktrace](https://en.wikipedia.org/wiki/Ktrace) and [DTrace](https://en.wikipedia.org/wiki/DTrace)
* [NetBSD](https://en.wikipedia.org/wiki/NetBSD) provides [ktrace](https://en.wikipedia.org/wiki/Ktrace) and DTrace
* [OpenBSD](https://en.wikipedia.org/wiki/OpenBSD) uses [ktrace](https://en.wikipedia.org/wiki/Ktrace) and kdump
* [macOS](https://en.wikipedia.org/wiki/MacOS) provides [ktrace](https://en.wikipedia.org/wiki/Ktrace) (10.4 and earlier), DTrace (from Solaris) and associated dtruss in 10.5 and later.[[55]](https://en.wikipedia.org/wiki/Strace#cite_note-55)
* [MS Windows](https://en.wikipedia.org/wiki/Microsoft_Windows) has a similar utility called StraceNT, written by Pankaj Garg,[[56]](https://en.wikipedia.org/wiki/Strace#cite_note-56) and a similar [GUI](https://en.wikipedia.org/wiki/GUI)-based utility called [Process Monitor](https://en.wikipedia.org/wiki/Process_Monitor), developed by [Sysinternals](https://en.wikipedia.org/wiki/Sysinternals).

See also[[edit](https://en.wikipedia.org/w/index.php?title=Strace&action=edit&section=6)]

* ******[***Free and open-source software portal***](https://en.wikipedia.org/wiki/Portal:Free_and_open-source_software)
* ***[icon](https://en.wikipedia.org/wiki/File:Octicons-terminal.svg)***[***Computer programming portal***](https://en.wikipedia.org/wiki/Portal:Computer_programming)
* [gdb](https://en.wikipedia.org/wiki/Gdb)
* [List of Unix commands](https://en.wikipedia.org/wiki/List_of_Unix_commands)
* [lsof](https://en.wikipedia.org/wiki/Lsof)

References[[edit](https://en.wikipedia.org/w/index.php?title=Strace&action=edit&section=7)]

* 1. [**^**](https://en.wikipedia.org/wiki/Strace#cite_ref-1) [*"strace 5.8 released"*](https://lists.strace.io/pipermail/strace-devel/2020-August/010057.html)*(Mailing list). 2020-08-06. Retrieved 2020-08-06.*
  2. [**^**](https://en.wikipedia.org/wiki/Strace#cite_ref-2) <https://openhub.net/p/strace>
  3. [**^**](https://en.wikipedia.org/wiki/Strace#cite_ref-3) *Paul Kranenburg (March 2, 1992).*[*"Strace - an alternative syscall tracer"*](https://stuff.mit.edu/afs/sipb/project/eichin/cruft/machine/sun/sun-Strace)*.*[*Newsgroup*](https://en.wikipedia.org/wiki/Usenet_newsgroup)*:*[*comp.sources.sun*](news:comp.sources.sun)*.*
  4. [**^**](https://en.wikipedia.org/wiki/Strace#cite_ref-4) *Branko Lankester (November 5, 1992).*[*"first Linux release of strace"*](ftp://ftp.funet.fi/pub/Linux/tools/strace.tar.Z)*.*
  5. [**^**](https://en.wikipedia.org/wiki/Strace#cite_ref-5) *Branko Lankester (June 18, 1993).*[*"second Linux release of strace"*](ftp://ftp.funet.fi/pub/Linux/tools/strace-2.tgz)*.*
  6. [**^**](https://en.wikipedia.org/wiki/Strace#cite_ref-6) [*"strace"*](http://manned.org/strace/e47b83b9)*. manned.org. June 21, 1994.*
  7. [**^**](https://en.wikipedia.org/wiki/Strace#cite_ref-7) [*"SUNET's Index of /pub/usenet/ftp.uu.net/comp.sources.misc/volume43/strace"*](http://ftp.sunet.se/pub/usenet/ftp.uu.net/comp.sources.misc/index)*. Retrieved January 14, 2015.*
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  9. [**^**](https://en.wikipedia.org/wiki/Strace#cite_ref-9) *Dmitry V. Levin (March 16, 2011).*[*"strace 4.6 released"*](http://sourceforge.net/p/strace/mailman/message/27209257/)*.*
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  13. [**^**](https://en.wikipedia.org/wiki/Strace#cite_ref-13) *Dmitry V. Levin (March 19, 2019).*[*"strace 5.0 released"*](https://lists.strace.io/pipermail/strace-devel/2019-March/008672.html)*.*
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  15. [**^**](https://en.wikipedia.org/wiki/Strace#cite_ref-15) *Dmitry V. Levin (August 15, 2014).*[*"strace 4.9 released"*](https://lists.strace.io/pipermail/strace-devel/2014-August/003500.html)*.*
  16. [**^**](https://en.wikipedia.org/wiki/Strace#cite_ref-16) *Dmitry V. Levin (August 15, 2014).*[*"Noteworthy changes in release 4.9"*](https://github.com/strace/strace/blob/v4.9/NEWS)*.*
  17. [**^**](https://en.wikipedia.org/wiki/Strace#cite_ref-17) *Dmitry V. Levin (December 14, 2016).*[*"strace 4.15 released"*](https://lists.strace.io/pipermail/strace-devel/2016-December/005841.html)*.*
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  20. [**^**](https://en.wikipedia.org/wiki/Strace#cite_ref-20) *Dmitry V. Levin (2020-06-01).*[*"strace 5.7 released"*](https://lists.strace.io/pipermail/strace-devel/2020-June/009783.html)*.*
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  50. [**^**](https://en.wikipedia.org/wiki/Strace#cite_ref-50) Its shorthand for showing only successful calls, -z option, was originally added in strace 4.5, but was never documented as it did not work properly.
  51. [**^**](https://en.wikipedia.org/wiki/Strace#cite_ref-Horky13_51-0) *Horky, Jiri (2013).*[*"The ioapps IO profiler and IO traces replayer"*](https://code.google.com/p/ioapps/)*. Retrieved 2013-09-16.*
  52. [**^**](https://en.wikipedia.org/wiki/Strace#cite_ref-Waterland07_52-0) *Waterland, Amos (2007).*[*"The sreplay system call replayer"*](http://people.seas.harvard.edu/~apw/sreplay/)*. Retrieved 2013-09-16.*
  53. [**^**](https://en.wikipedia.org/wiki/Strace#cite_ref-Burton98_53-0) *Burton, Ariel (1998).*[*"Workload characterization using lightweight system call tracing and reexecution"*](http://www.doc.ic.ac.uk/~phjk/Publications/WkldChctrsnUsngTracesReex.pdf)*(PDF). Retrieved 2013-09-16.*
  54. [**^**](https://en.wikipedia.org/wiki/Strace#cite_ref-54) [*"XTrace - trace X protocol connections"*](http://xtrace.alioth.debian.org/)*. xtrace.alioth.debian.org. Retrieved 2014-08-12.*
  55. [**^**](https://en.wikipedia.org/wiki/Strace#cite_ref-55) [*"dtrace(1) Mac OS X Manual Page"*](https://developer.apple.com/library/mac/documentation/Darwin/Reference/ManPages/man1/dtrace.1.html)*. Developer.apple.com. Retrieved 2014-07-23.*
  56. [**^**](https://en.wikipedia.org/wiki/Strace#cite_ref-56) [*"IntellectualHeaven - Strace For Windows"*](http://intellectualheaven.com/default.asp?BH=StraceNT)*. intellectualheaven.com. Retrieved 29 January 2015.*

External links[[edit](https://en.wikipedia.org/w/index.php?title=Strace&action=edit&section=8)]

* [strace project page](https://strace.io/)
* [Manual page](http://man7.org/linux/man-pages/man1/strace.1.html)
* [OS Reviews article on strace](http://www.osreviews.net/reviews/admin/strace)
* ["System Call Tracing with strace"](http://man7.org/conf/ndctechtown2018/system_call_tracing_with_strace-NDC-TechTown-Kerrisk.pdf), a talk with an overview of strace features and usage, given by [Michael Kerrisk](https://en.wikipedia.org/wiki/Michael_Kerrisk) at [NDC TechTown](https://ndctechtown.com/) 2018
* ["Modern strace"](https://static.sched.com/hosted_files/devconfcz2019/a8/devconfcz_2019-slides-modern_strace.pdf) ([source](https://gitlab.com/strace/strace-talks/tree/master/2019-devconf.cz-brno-modern_strace)), a talk with an overview of strace features, given by Dmitry Levin at [DevConf.cz](https://en.wikipedia.org/wiki/DevConf.cz) 2019