Interface Requirements

This page describes a subset of the Linux kernel interfaces on which Android relies to function properly. The presence and correctness of these interfaces is tested as part of the Vendor Test Suite (VTS) (https://source.android.com/devices/tech/vts/index.html). This subset will grow over time to contain a larger portion of Android kernel interfaces.

System calls

System calls are expected to provide the same signatures and semantics as in the upstream Linux kernel.

ARM64 system calls required by bionic per **`bionic/libc/SYSCALLS.txt`**:

accept4, acct, adjtimex, bind, brk, capget, capset, chdir, chroot, clock_adjtime, clock_getres, clock_gettime, clock_nanosleep, clock_settime, close, connect, delete_module, dup3, dup, epoll_create1, epoll_ctl, epoll_pwait, eventfd2, execve, exit, exit_group, faccessat, fadvise64, fallocate, fchdir, fchmodat, fchmod, fchownat, fchown, fcntl, fdatasync, fgetxattr, flistxattr, flock, fremovexattr, fsetxattr, fstat, newfstatat, fstatfs, fsync, ftruncate, getcpu, getcwd, getdents64, getegid, geteuid, getgid, getgroups, getitimer, getpeername, getpgid, getpid, getppid, getpriority, getresgid, getresuid, getrlimit, getrusage, getsid, getsockname, getsockopt, gettimeofday, getuid, getxattr, init_module, inotify_add_watch, inotify_init1, inotify_rm_watch, ioctl, kill, syslog, lgetxattr, linkat, listen, listxattr, llistxattr, lremovexattr, lseek, lsetxattr, madvise, mincore, mkdirat, mknodat, mlockall, mlock, mmap, mount, mprotect, mremap, msync, munlockall, munlock, munmap, nanosleep, openat, personality, pipe2, ppoll, prctl, pread64, preadv, prlimit64, process_vm_readv, process_vm_writev, pselect6, ptrace, pwrite64, pwritev, quotactl, readahead, readlinkat, read, readv, reboot, recvfrom, recvmmsg, recvmsg, removexattr, renameat, rt_sigaction, rt_sigpending, rt_sigprocmask, rt_sigqueueinfo, rt_sigsuspend, rt_sigtimedwait, sched_getaffinity, sched_getparam, sched_get_priority_max, sched_get_priority_min, sched_getscheduler, sched_rr_get_interval, sched_setaffinity, sched_setparam, sched_setscheduler, sched_yield, sendfile, sendmmsg, sendmsg, sendto, setdomainname, setfsgid, setfsuid, setgid, setgroups, sethostname, setitimer, setns, setpgid, setpriority, setregid, setresgid, setresuid, setreuid, setrlimit, setsid, setsockopt, set_tid_address, settimeofday, setuid, setxattr, shutdown, sigaltstack, signalfd4, socketpair, socket, splice, statfs, swapoff, swapon, symlinkat, sync_file_range, sync, sysinfo, tee, tgkill, timer_create, timer_delete, timerfd_create, timerfd_gettime, timerfd_settime, timer_getoverrun, timer_gettime, timer_settime, times, truncate, umask, umount2, uname, unlinkat, unshare, utimensat, vmsplice, wait4, waitid, write, writev

ARM32 system calls required by bionic per **`bionic/libc/SYSCALLS.txt`**:

accept4, acct, adjtimex, arm_fadvise64_64, bind, brk, cacheflush, capget, capset, chdir, chroot, clock_adjtime, clock_getres, clock_gettime, clock_nanosleep, clock_settime, close, connect, delete_module, dup3, dup, epoll_create1, epoll_ctl, epoll_pwait, eventfd2, execve, exit, exit_group, faccessat, fallocate, fchdir, fchmodat, fchmod, fchownat, fchown32, fcntl64, fdatasync, fgetxattr, flistxattr, flock, fremovexattr, fsetxattr, fstat64, fstatat64, fstatfs64, fsync, ftruncate64, getcpu, getcwd, getdents64, getegid32, geteuid32, getgid32, getgroups32, getitimer, getpeername, getpgid, getpid, getppid, getpriority, getresgid32, getresuid32, ugetrlimit, getrusage, getsid, getsockname, getsockopt, gettimeofday, getuid32, getxattr, init_module, inotify_add_watch, inotify_init1, inotify_rm_watch, ioctl, kill, syslog, lgetxattr, linkat, listen, listxattr, llistxattr, _llseek, lremovexattr, lseek, lsetxattr, madvise, mincore, mkdirat, mknodat, mlockall, mlock, mmap2, mount, mprotect, mremap, msync, munlockall, munlock, munmap, nanosleep, openat, personality, pipe2, ppoll, prctl, pread64, preadv, prlimit64, process_vm_readv, process_vm_writev, pselect6, ptrace, pwrite64, pwritev, quotactl, readahead, readlinkat, read, readv, reboot, recvfrom, recvmmsg, recvmsg, removexattr, renameat, rt_sigaction, rt_sigpending, rt_sigprocmask, rt_sigqueueinfo, rt_sigsuspend, rt_sigtimedwait, sched_getaffinity, sched_getparam, sched_get_priority_max, sched_get_priority_min, sched_getscheduler, sched_rr_get_interval, sched_setaffinity, sched_setparam, sched_setscheduler, sched_yield, sendfile64, sendfile, sendmmsg, sendmsg, sendto, setdomainname, setfsgid, setfsuid, setgid32, setgroups32, sethostname, setitimer, setns, setpgid, setpriority, setregid32, setresgid32, setresuid32, setreuid32, setrlimit, setsid, setsockopt, set_tid_address, settimeofday, set_tls, setuid32, setxattr, shutdown, sigaction, sigaltstack, signalfd4, socketpair, socket, splice, statfs64, swapoff, swapon, symlinkat, sync_file_range2, sync, sysinfo, tee, tgkill, timer_create, timer_delete, timerfd_create, timerfd_gettime, timerfd_settime, timer_getoverrun, timer_gettime, timer_settime, times, truncate64, truncate, umask, umount2, uname, unlinkat, unshare, utimensat, vmsplice, wait4, waitid, write, writev

The system calls listed below are made by bypassing bionic:

All Architectures	gettid, futex, clone, rt_sigreturn, rt_tgsigqueueinfo, restart_syscall, getrandom, perf_event_open, syncfs, tkill, seccomp
arm	vfork, sigreturn, pipe, access, stat64, lstat64, open, getdents, eventfd, epoll_wait, readlink, epoll_create, creat, unlink
arm64	pivot_root, ioprio_get, ioprio_set

Note: x86 and x86_64 system calls will be added in a future release.

prctl

In addition to the upstream **`prctl`** operations for supported kernel versions, Android relies on additional **`prctl`** operations, the implementation of which can be found in the android-common kernel.

```
PR_SET_TIMERSLACK_PID
PR_SET_VMA
```

Filesystems

The Linux kernel exports interfaces via several filesystems. Android expects these interfaces to communicate the same information, in the same format, and provide the same semantics as in the upstream Linux kernel. For interfaces that do not exist upstream, the appropriate behavior is dictated by the corresponding branch of the Android common kernel.

procfs

Path	Description
`/proc/cmdline`	Read-only file containing command line arguments passed to the kernel.
`/proc/config.gz`	Read-only file containing kernel build configuration.
`/proc/cpuinfo`	Read-only file containing architecture-specific CPU details.
`/proc/kmsg`	Read-only file showing kernel messages in real time.
`/proc/meminfo`	Read-only file showing memory subsystem details.
`/proc/modules`	Read-only file containing information about loaded kernel modules.
`/proc/mounts`	Symlink to `/proc/self/mounts`, which is a read-only file listing information about the mounted filesystems.
`/proc/net/xt_qtaguid/ctrl`	Read-write file providing information about tagged sockets.
`/proc/self/maps`	Read-only file containing the currently mapped memory regions and permissions.
`/proc/stat`	Read-only file containing various kernel and system statistics.
`/proc/sys/kernel/kptr_restrict`	Read-write file that determines whether kernel pointers are printed in `proc` files and other interfaces.
`/proc/sys/kernel /randomize_va_space`	Read-write file that determines the address layout randomization policy for the system.
`/proc/sys/vm/mmap_min_addr`	Read-write file that determines the minimum address than can be `mmap`'d.
`/proc/sys/vm/mmap_rnd_bits`	Read-write file that specifies the amount of randomness in `mmap`'d addresses.
`/proc/sys/vm/mmap_rnd_compat_bits`	Read-write file that specifies the amount of randomness in `mmap`'d addresses.
`/proc/sys/vm/overcommit_memory`	Read-write file that determines the kernel virtual memory accounting mode.
`/proc/uid_cputime/remove_uid_range`	Write-only file that, when written, removes UIDs from being shown in `/proc/uid_cputime /show_uid_stat`.
`/proc/uid_cputime/show_uid_stat`	Read-only file containing the time a UID's processes spent in user and kernel space.
`/proc/version`	Read-only file containing a string describing the kernel version.
`/proc/vmallocinfo`	Read-only file containing `vmalloc`'d ranges.
`/proc/zoneinfo`	Read-only file containing information about memory zones.

dev

Path	Description
`/dev/ashmem`	Anonymous shared memory device file.
`/dev/binder`	Binder device file.
`/dev/hwbinder`	Hardware binder device file.
`/dev/tun`	Universal TUN/TAP device file.
`/dev/xt_qtaguid`	QTAGUID netfilter device file.

sysfs

Path	Description
/sys/devices/system/cpu/online	Read-only file showing ranges of CPUs that are currently online.
/sys/kernel/wakeup_reasons /last_resume_reason	Read-only file showing a textual description of why the system exited the last instance of suspend.
/sys/devices/system/cpu/kernel_max	Read-only file showing the maximum CPU index supported by the kernel.

selinuxfs

The framework mounts **selinuxfs** at **/sys/fs/selinux**.

Path	Description
/sys/fs/selinux /checkreqprot	Read/write file containing a binary flag that determines how selinux protections are checked on **mmap** and **mprotect** calls.
/sys/fs/selinux/null	Read/write null device for use by selinux.
/sys/fs/selinux/policy	Read-only file containing the selinux policy in binary form.

Note: For details on SELinux in Android 8.0, see SELinux for Android 8.0 (https://source.android.com/security/selinux/images/SELinux_Treble.pdf).

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