Canadian Contribution:


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Initial Work Scope Summary
for updating
ADA POSIX Bindings IS 14519:2001
to
POSIX Draft IS 9945:2008
and
ADA 2005

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Ada POSIX Bindings Analysis

1. Introduction

This document summarizes a review of the Draft IS 9945:2008 document and the existing IS14519:2001 Ada Binding to POSIX to determine the scope of an amendment to IS14519 to accommodate revisions to POSIX in light of the 2005 amendments to IS8652:1995 Ada Programming Language.

The document was prepared by a careful review of the C-Ada cross reference in 14519:2001 matched against the draft of IS9945 which is currently being drafted. The process that was followed was as follows:

1. All POSIX calls were reviewed and divided by functional area, such as math, tasking (or thread), timer, directory, character handling, etc.

2. POSIX calls that were omitted in 14519:2001 because they were legacy calls, because they were not “thread safe”, because they were C-specific, because Ada already had adequate mechanisms (such as string functions, math functions) were marked as omitted in this document.

3. Other POSIX calls that were developed in intervening revisions to POSIX or which are proposed in the current draft that fall into Ada's domain were omitted. This includes Math, Character and String manipulation, Timer, Environment Variables, Directory. A large unknown is Stream functions and Real Time functions. We believe that most can be absorbed by Ada functionality but more study is required.

4. Other POSIX calls were added to the functional area as potentially required.

The results of this effort is summarized in the following sections.

2. LEGACY Functions

The LEGACY POSIX functions may be omitted from the Ada-POSIX bindings.

```
_longjmp
_setjmp
bcmp
bcopy
bzero
ecvt, fcvt, gcvt
fcvt
ftime
gcvt
getwd
index
mktemp
rindex
system
ualarm
utimes
wcswcs
```
Ada POSIX Bindings Analysis

3. Math Functions

These functions (rounding, elementary function, complex functions, random numbers) can be supported by the Ada language. They may be omitted from the Ada-POSIX bindings.

```plaintext
abs, cabs, cabsf, cabs1, labs, llabs
acos, acosf, acosl
acosh, acoshf, acoshl, acosl
asin, asinf, asinl
asinh, asinhf, asinhl
atan, atanf, atanl
atan2, atan2f, atan2l
atanh, atanhf, atanh1
acos, acosf, acosl
acosh, acoshf, acoshl
asin, asinf, asinl
asinh, asinhf, asinhl
atan, atanf, atanl
atan2, atan2f, atan2l
atanh, atanhf, atanh1
acos, acosf, acosl
acosh, acoshf, acoshl
carg, cargf, cargl
casin, casinf, casinl
casinh, casinhf, casinhl
catan, catanf, catanl
catanh, catanhf, catanhl
ccbrt, ccbrtf, ccbrtl
ccos, ccosf, ccosl
ccosh, ccoshf, ccoshl
cceil, cceilf, cceill
cexp, cexpf, cexpl
clmag, clmagf, clmagl
clog, clgof, clgol
conj, conjf, conjl
copysign, copysignf, copysignl
cos, cosf, cosl
cosh, coshf, coshl
cpow, cpowf, cpowl
cproj, cprojf, cprojl
creal, crealf, creall
csin, csinf, csinl
csinh, csinhf, csinhl
csqrt, csqrtf, csqrtl
ctan, ctanf, ctanl
catanh, ctanhf, ctanh1
div
exp, expf, exp1, frexp, frexpf, frexpl, ldexp, ldexpf, ldexpl
exp2, exp2f, exp2l
expm1, expm1f, expm1l
fabs, fabsf, fabsl
fdim, fdimf, fdiml
floor, floorf, floorl
fma, fmaf, fmal
```
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fmax, fmaxf, fmaxl
fmin, fminf, fminl
fmod, fmodf, fmodl
ilogb, ilogbf, ilogbl
imaxabs, imaxdiv
initstate
lcong48
log, logf, logl
log10, log10f, log10l
log1p, log1pf, log1pl
log2, log2f, log2l
logb, logbf, logbl
logf, log1modf, modff, modfl
nan
everyint, nearbyintf, nearbyintl
nextafter, nextafterf, nextafterl
nexttoward, nexttowardf, nexttowardl
pow
rand, random, srand48, srandom, erand48, drand48, jrand48, lrand48, nrand48, mrand48
remainder
remquo
rint, rintf, rintl, llrint, llrintf, llrintl, lrint, lrintf, lrintl
round, llround, llroundf, llroundl, lround, lroundf, lroundl
scalb, scalbln
seed48
setstate
sin, sinh, sinl
sqrt,
tan, tanh, tanl
These functions are C floating point related. They may be omitted from the Ada-POSIX bindings.

fpclassify
isfinite
isgreater
isgreaterequal
isinf
isless
islessequal
islessgreater
isnan
isnormal
isunordered
signbit

These functions are supported by Ada-POSIX 5c.
hypot, hypotf, hypotl
These functions may be included in the Ada-POSIX bindings.
Ada POSIX Bindings Analysis

\[ j_0, j_1, j_n \text{ (Bessel)} \]
\[ y_0, y_1, y_n \text{ (Bessel)} \]
\[ \text{erf, erff, erfl (Error)} \]
\[ \text{erfc, erfcf, erfcl (Error)} \]
\[ \text{ffs} \]
\[ \text{lgamma, lgammaf, lgammal (Gamma)} \]
\[ \text{tgamma} \]

4. Character and String Functions

These functions can be supported by the Ada language. They may be omitted from the Ada-POSIX bindings.

\[_tolower\]
\[_toupper\]
\[atof\]
\[atoi\]
\[atol, atoll\]
\[btowc\]
\[fmtmsg \text{ (C specific)}\]
\[isalnum\]
\[isalpha\]
\[isascii\]
\[isblank\]
\[iscntrl\]
\[isdigit\]
\[isgraph\]
\[islower\]
\[isprint\]
\[ispunct\]
\[isspace\]
\[isupper\]
\[iswalnum\]
\[iswalpha\]
\[iswblank\]
\[iswcntrl\]
\[iswdigit\]
\[iswgraph\]
\[iswlower\]
\[iswprint\]
\[iswpunct\]
\[iswspace\]
\[iswupper\]
\[iswxdigit\]
\[isxdigit\]
\[rindex\]
\[strcasecmp\]
\[strcat\]
\[strchr\]
\[strcmp\]
Ada POSIX Bindings Analysis

strcoll
strcpy
strcspn
strdup
strerror
strfmon
strftime
strlen
strndcoll
strncpy
strpbrk
strptime
strrchr
strspn
strstr
strtol
strtoimax
strtok
strtoll
strtol
strtol
strtol
strtoimx
strtoimx
swab
toascii
tolower
toupper
towctrans
towlower
towupper
trunc
truncf
unlink
wctomb
wcsat
wcschr
wcsbmp
wcsbmp
wcsbmp
wcsbmp
wcsbmp
wcsbmp
wcsbmp
wcsbmp
wcsbmp
wcsbmp
wcsbmp
Ada POSIX Bindings Analysis

wcspbrk
wcsrchr
wcsrtombs
wcsspn
wcsstr
wcstod
wcstoiimax
wcstok
wcstol
wcstold
wcstoll
wcstombs
wcstoul
wcstoumax
wcswcs
wcswidth
wcsxfrm
wctob
wctomb
wctrans
wctype
wcwidth
wmemchr, wmemcmp, wmemcpy, wmemmove, wmemset

5. Time and Timer Functions

These functions can be supported by the Ada language. They may be omitted from the Ada-POSIX bindings.

alarm
difftime
ctime, ctime_r
daylight
clock
clock_getres
getdate
getitimer
gmtimeofday
gmtime, gmtime_r
asctime, asctime_r
clock_gettime

clock_getcpu_clockid
clock_nanosleep
clock_gettime, clock_settime
localtime, localtime_r
mktime
setitimer
time, timezone, tzset
Ada POSIX Bindings Analysis

These functions are currently supported in the Ada-POSIX bindings.

```
times
```

These functions may be included in the Ada-POSIX bindings.

```
timer_create, timer_delete, timer_getoverrun
```

6. Directory Functions

These functions can be supported by the Ada language.

```
access
basename
chdir
closedir
dirname
fnmatch
ftw, nftw
mkdir
opendir
readdir
realpath
remove
rename
rewinddir
rmdir
```

However, Ada.Directories does not support `chmod` and `chown`. The Ada-POSIX 5c POSIX_Files package, which supports

```
mkdir, access, chdir, closedir, stat, sysconf
```

may be retained and expanded to included these functions.

```
lchown
lstat
fchdir
fchown
glob, globfree (path name generator)
seekdir
statvfs, sync, symlink, syslog, tmpnam
```

7. Environment Variable Functions

These functions can be supported by the Ada language. These may be considered for deprecation from the Ada-POSIX bindings.

```
environ
getenv
putenv
```
Ada POSIX Bindings Analysis

8. Containers Functions

The following functions perform services matched by the children of Ada.Containers, and as such should not require inclusion in a binding of Ada to POSIX.

bsearch
dbm_*
hcreate, hdestroy, hsearch
insque
lfind
lsearch, lfind
qsort

9. Stream I/O Functions

A further study of POSIX stream I/O functions is suggested to investigate how well the Ada Stream I/O model can be mapped to the POSIX Stream I/O model. These are:

fattach, fdetach
feof
ferror
fflush
fprintf, printf, snprintf, sprintf
fputc
fputs
fputwc
fputws
fscanf, scanf, sscanf
ftell, ftello
fwide
fwprintf, swprintf, wprintf
fwrite
fscanf, sscanf, wscanf
getc
getchar
getc_unlocked
getchar_unlocked
gets
getwc
getwchar
fgetc
fgetpos
fgets
fgetwc
fgets
fgetws
fclose
fopen

getmsg, getpmsg
Ada POSIX Bindings Analysis

getpmsg
ioctl
pclose
perror
pipe
popen
pread
printf
putc
putchar
putchar_unlocked
putc_unlocked
putmsg
puts
putwc
putwchar
pwrite
rewind
setvbuf
tmpfile
ugetc
ugetwc

10. Async I/O Functions

These functions are currently supported by Ada-POSIX 5c.

lio_listio
aio_cancel
aio_error
aio_fsync
aio_read
aio_return
aio_suspend
aio_write

11. File Functions

These functions are currently supported by Ada-POSIX 5c.

chmod
chown
close
creat
dup, dup2
fchmod
fcntl
fdatasync
fstat
fsync
ftruncate
Ada POSIX Bindings Analysis

link
lockf
lseek
mkfifo
open
pathconf, fpathconf
read, readv
stat
utime
write
writev

These may be expanded to include
fstatvfs
flockfile, ftrylockfile, funlockfile
readlink
stdin

12. POSIX Tasking and IPC Functions

These functions are supported by the Ada language. They may be omitted from the Ada-POSIX bindings.

    nanosleep
    pause

These functions are currently supported by Ada-POSIX 5c.

    bsd_signal
    exec
    fork
    kill
    getgid
    getgroups
    getpid
    getpgrp
    mlock
    mlockall
    mmap
    mprotect
    mq_close
    mq_getattr
    mq_notify
    mq_open
    mq_receive
    mq_send
    mq_setattr
    mq_unlink
    msync
    munlock
    munlockall
    munmap
Ada POSIX Bindings Analysis

pthread_condattr_destroy
pthread_condattr_getpshared
pthread_condattr_init
pthread_condattr_setpshared
pthread_cond_broadcast
pthread_cond_destroy
pthread_cond_signal
pthread_cond_timedwait
pthread_mutexattr_destroy
pthread_mutexattr_getprioceiling
pthread_mutexattr_getprotocol
pthread_mutexattr_getpshared
pthread_mutexattr_init
pthread_mutexattr_setprioceiling
pthread_mutexattr_setprotocol
pthread_mutexattr_setpshared
sched_getparam
sched_get_priority_max
sched_getscheduler
sched_rr_get_interval
sched_setparam
sched_setscheduler
sched_yield
sem_close
sem_destroy
sem_getvalue
sem_init
sem_open
sem_post
sem_trywait
sem_unlink
sem_wait
setcontext
wait

It may be expanded to include these functions.

getpgid
getsid
getrlimit (resource limit)
getusage (resource usage)
killpg
mq_timedreceive
mq_timedsend
nice
posix_spawn
posix_spawnattr_destroy
posix_spawnattr_getflags
posix_spawnattr_getpgroup
posix_spawnattr_getschedparam
Ada POSIX Bindings Analysis

posix_spawnattr_getschedpolicy
posix_spawnattr_getsigdefault
posix_spawnattr_getsigmask
posix_spawnattr_init
posix_spawnattr_setflags
posix_spawnattr_setpgroup
posix_spawnattr_setschedparam
posix_spawnattr_setschedpolicy
posix_spawnattr_setsigdefault
posix_spawnattr_setsigmask
posix_spawn_file_actions_addclose
posix_spawn_file_actions_adddup2
posix_spawn_file_actions_addopen
posix_spawn_file_actions_destroy
posix_spawnp
pthread_mutexattr_gettype
pthread_mutexattr_settype
pthread_mutex_lock
pthread_mutex_timedlock
pthread_mutex_trylock
pthread_rwlockattr_destroy
pthread_rwlockattr_getpshared
pthread_rwlockattr_init
pthread_rwlockattr_setpshared
pthread_rwlock_destroy
pthread_rwlock_rdlock
pthread_rwlock_timedrdlock
pthread_rwlock_timedwrlock
pthread_rwlock_tryrdlock
pthread_rwlock_trywrlock
pthread_rwlock_unlock
pthread_rwlock_wrlock
pthread_self
pthread_setcancelstate
pthread_setschedparam
pthread_setspecific
pthread_sigmask
pthread_spin_destroy
pthread_spin_lock
pthread_spin_unlock
semctl
semget
semop
sem_timedwait – Does not seem to be binding. One should be created.
setpriority
setrlimit
vfork
waitid
XSI message support is also possible. These are:

- ftok
- msgctl
- msgget
- msgrcv
- msgsnd

These functions are not supported by POSIX 5c, and likely do not need Ada bindings.

- abort, __Exit, __exit, exit, atexit
- pthread_atfork
- pthread_attr_destroy
- pthread_attr_getdetachstate
- pthread_attr_getguardsize
- pthread_attr_getinheritsched
- pthread_attr_getschedparam
- pthread_attr_getschedpolicy
- pthread_attr_getscope
- pthread_attr_getstack
- pthread_attr_getstackaddr
- pthread_attr_getstacksize
- pthread_attr_init
- pthread_attr_setdetachstate
- pthread_attr_setguardsize
- pthread_attr_setinheritsched
- pthread_attr_setschedparam
- pthread_attr_setschedpolicy
- pthread_attr_setscope
- pthread_attr_setstack
- pthread_attr_setstackaddr
- pthread_attr_setstacksize
- pthread_barrierattr_destroy
- pthread_barrierattr_getpshared
- pthread_barrierattr_init
- pthread_barrierattr_setpshared
- pthread_barrier_destroy
- pthread_barrier_wait
- pthread_cancel
- pthread_cleanup_pop
- pthread_condattr_getclock
- pthread_condattr_setclock
- pthread_create
- pthread_detach
- pthread_equal
- pthread_exit
- pthread_getconcurrency
- pthread_getcpuclockid
- pthread_getschedparam
Ada POSIX Bindings Analysis

pthread_getspecific
pthread_join
pthread_key_create
pthread_key_delete
pthread_kill
pthread_mutex_destroy
pthread_mutex_getprioceiling
pthread_mutex_init
pthread_mutex_setprioceiling
pthread_once
pthread_setconcurrency
pthread_setschedprio
pthread_testcancel

13. Network (Socket) Functions

These functions are currently supported by Ada-POSIX 5c.

accept
bind
connect
endprotoent
getaddrinfo
gethostbyaddr, gethostbyname
gethostname
getnetbyaddr
getpeername
getprotobynumber
getservbyname, getservbyport
getsockname
getsockopt
htonl, htons, ntohl, ntohs
inet_addr, inet_ntoa
listen
recv
recvfrom
recvmsg
select
send
sendmsg
sendto
setsockopt
shutdown
socketpair

It may be expanded to include these network interface functions.

getnameinfo
if_freenameindex
if_indextoname
if_nameindex
Ada POSIX Bindings Analysis

14. Terminal Functions

These functions are currently supported by Ada-POSIX 5c.

- cfgetispeed
- cfgetospeed
- cfsetispeed
- cfsetospeed
- ctermid
- tcdrain
- tcflow
- tcflush
- tcgetattr
- tcgetpgrp
- tcgetpgrp
- tcgetsid
- unlockpt

These functions may be included in the Ada-POSIX bindings.

- posix_openpt
- ptsname
- tcgetsid

15. User Accounting Functions

These functions are currently supported by Ada-POSIX 5c.

- getgrgid, getgrgid_r
- getgrnam, getgrnam_r
- endnetent
- getlogin, getlogin_r
- getcwd
- getprotoent
- getpwnam, getpwnam_r
- getpwuid, getpwuid_r
- getuid
- pututxline
- setgid
- setpgid
- setprotoent
- setnetent
- setsid
- setuid
- sysconf (some)
Ada POSIX Bindings Analysis

uname

It may be expanded to include these functions.

getegid
geteuid
getutxent, getutxid, getutxline
setegid
seteuid
setgrent
sethostent
setpgrp
setpwent
setregid
setreuid
setservent
setutxent

16. Shared Memory Functions

These functions are currently supported by Ada-POSIX 5c.

shmget
shm_open
shm_unlink

It may be expanded to include these functions.

shmat
shmctl
shmdt

17. Functions Considered And Rejected In Ada-POSIX 5C

assert
calloc
clearerr
_EXIT, _exit
exit
feclearexcept
fegetenv, fetenv
fegetexceptflag
fegetround
feholdexcept
feraiseexcept
fesetenv
fesetexceptflag
fesetround
fetestexcept
feupdateenv
fread
free
freopen
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fseek, fseeko
fsetpos
localeconv
longjmp
malloc
mblen
mbrlen
mbrtowc
mbsinit
mbsrtowcs
mbstowcs
mbtowc
memccpy
memchr
memcmp
memcpy
memmove
memset
raise
realloc
setbuf
setjmp
sighold
siginterrupt
siglongjmp
signal
sigpause
sigprocmask
sigqueue
sigrelse
sigsetjmp
sleep
snprintf
sprintf
sscanf
syslog
time
tzset
ulimit
unsetenv
usleep

18. Functions that may be Omitted

Some of these functions may be omitted from the Ada-POSIX bindings. They may be specific to C, or they can be supported by other means.

catclose
clearerr
dlclose
Ada POSIX Bindings Analysis

dlerror
dlopen
dlsym
denhostent
denpwent
denservent
dendutxent
dendgrent
fdopen
fileno
freeaddrinfo
gethostent
getopt
getpwent
getservopt
grantpt
getgrent
getpriority
getcontext
h_errno
iswctype
isastream
makecontext
mknod
mkstemp
optarg, opterr, optind, optopt
remque
swab
swapcontext
swprintf
va_arg vfprintf
vfscanf
vfawprintf
vfswprintf
vprintf
vscanf
vsnprintf
vsscanf
vswprintf
vsscanf
vswscanf
vwprintf
vwscanf
wscanf

19. Functions that may be Included

These new functions should be considered for possible inclusion in a binding of Ada to POSIX. We do not prejudge whether or not such a consideration would result in their inclusion..
Ada POSIX Bindings Analysis

Codeset Conversion
iconv
iconv_close
iconv_open

Encryption
a64l, l64a
crypt
encrypt
setkey

Files
posix_fadvise
posix_fallocate
posix_madvise
posix_memalign
posix_mem_offset
swscanf
simlink
sync

Locale
nl_langinfo
setlocale

Logging
openlog
closelog
setlogmask

Tracing
posix_trace_attr_destroy
posix_trace_attr_getclockres
posix_trace_attr_getinherited
posix_trace_attr_getlogsize
posix_trace_attr_getname
posix_trace_attr_getstreamfullpolicy
posix_trace_attr_getstreamsize
posix_trace_attr_init
posix_trace_attr_setinherited
posix_trace_attr_setlogsize
posix_trace_attr_setname
posix_trace_attr_setstreamfullpolicy
posix_trace_attr_setstreamsize
posix_trace_clear
posix_trace_close
posix_trace_create
posix_trace_event
posix_trace_eventid_equal
posix_trace_eventid_open
posix_trace_eventset_add
Ada POSIX Bindings Analysis

posix_trace_eventtypelist_getnext_id
posix_trace_flush
posix_trace_get_attr
posix_trace_get_filter
posix_trace_getnext_event
posix_trace_get_status
posix_trace_open
posix_trace_set_filter
posix_trace_shutdown
posix_trace_start
posix_trace_timedgetnext_event
posix_trace_trid_eventid_open
posix_trace_trygetnext_event

Other
posix_typed_mem_get_info – may be covered by Ada Storage pools
posix_typed_mem_open – may be covered by Ada Storage pools
regcomp
tdelete
telldir
tempnam
tfind
tsearch
twalk
umask

POSIX Signals in 5C
sigaction
sigaddset
sigdelset
sigemptyset
sigfillset
sigismember
sigpending
sigsuspend
sigwait
sigwaitinfo
sigtimedwait

20. Changes to Existing Bindings
The following is the analysis of the POSIX calls with Ada bindings in IS14519. The following functions had changes to the interfaces as described below. We also know some semantic changes and some significant description changes. It is our belief that the semantic changes will not change the Ada-POSIX bindings significantly, but may change expected behavior.

Based on this analysis, we conclude that there will not be significant rework of the existing binding.
## Ada POSIX Bindings Analysis

<table>
<thead>
<tr>
<th>POSIX Function</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>accept</td>
<td>Additional errno.</td>
</tr>
<tr>
<td>aio_read</td>
<td>Add EOVERFLOW</td>
</tr>
<tr>
<td>aio_return</td>
<td>EINVAL is optional</td>
</tr>
<tr>
<td>aio_suspend</td>
<td>Add Monotonic Clock support</td>
</tr>
<tr>
<td>aio_write</td>
<td>Add EFBIG</td>
</tr>
<tr>
<td>bind</td>
<td>Additional errno</td>
</tr>
<tr>
<td>cfsetispeed</td>
<td>Define EINVAL</td>
</tr>
<tr>
<td>cfsetospeed</td>
<td>Define EINVAL</td>
</tr>
<tr>
<td>chdir</td>
<td>Additional errno</td>
</tr>
<tr>
<td>chmod</td>
<td>Add S_ISVTX support. EIO, ELOOP</td>
</tr>
<tr>
<td>chown</td>
<td>EIO, ELOOP</td>
</tr>
<tr>
<td>clock_gettime,</td>
<td>Add Monotonic Clock support</td>
</tr>
<tr>
<td>clock_settime</td>
<td></td>
</tr>
<tr>
<td>close</td>
<td>Add STREAMS-based io. New errno</td>
</tr>
<tr>
<td>connect</td>
<td>Additional errno</td>
</tr>
<tr>
<td>exec</td>
<td>Description changed substantially. Requires further investigation.</td>
</tr>
<tr>
<td>fchmod</td>
<td>Add typed memory object, STREAM. Remove some errno.</td>
</tr>
<tr>
<td>fcnt1</td>
<td>New cmd F_GETOWN, F_SETOWN</td>
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<tr>
<td>fork</td>
<td>Description changed substantially. Requires further investigation.</td>
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<tr>
<td>fpathconf</td>
<td>Additional name values. Additional errno.</td>
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<tr>
<td>fstat</td>
<td>Add typed memory object. Remove some errno.</td>
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<tr>
<td>fsync</td>
<td>Additional errno</td>
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<tr>
<td>ftruncate</td>
<td>Description changed substantially. Requires further investigation.</td>
</tr>
<tr>
<td>getenv</td>
<td>Description is more complete, essentially remains the same.</td>
</tr>
<tr>
<td>getgrgid_r</td>
<td>Description is more complete, essentially remains the same.</td>
</tr>
<tr>
<td>getgrnam_r</td>
<td>Description is more complete, essentially remains the same.</td>
</tr>
<tr>
<td>gethostname</td>
<td>Add HOST_NAME_MAX reference, essentially remains the same.</td>
</tr>
<tr>
<td>getlogin, getlogin_r</td>
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<tr>
<td>getpeername</td>
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<tr>
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<tr>
<td>getsockopt</td>
<td>New sockopt SO_ACCEPT_CONN. Remove some errno.</td>
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<tr>
<td>kill</td>
<td>Add pis = -1 behavior</td>
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<td>link</td>
<td>Add ELOOP, EXDEV</td>
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<td>lio_listio</td>
<td>Add EFBIG</td>
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<tr>
<td>listen</td>
<td>Add implementation guidelines on listen queue. Add EDESTADDRREQ.</td>
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<tr>
<td>lseek</td>
<td>Add shared, typed mem object behavior. Add EOVERFLOW.</td>
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<tr>
<td>mkdir</td>
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</tr>
<tr>
<td>mlock</td>
<td>Remove addr alignment Note.</td>
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<tr>
<td>mmap</td>
<td>Add typed mem object support. Add EOVERFLOW</td>
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<td>mprotect</td>
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<tr>
<td>mq_notify</td>
<td>Add nq_timedreceive behavior. Add EINVAL.</td>
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<td>mq_receive</td>
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<td>mq_unlink</td>
<td>Refine ENAMETOOLONG definition.</td>
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<tr>
<td>msync</td>
<td>Add typed memory object behavior, which is undefined.</td>
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<tr>
<td>munmap</td>
<td>Add typed memory object support</td>
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<td>open</td>
<td>Additional errno, requires more investigation.</td>
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<tr>
<td>opendir</td>
<td>Additional errno ELOOP</td>
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<tr>
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<td>Significant changes, additional flags</td>
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<tr>
<td></td>
<td>FILESIZEBITS new variable</td>
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<td>POSIX2_SYMLINKS new variable</td>
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<td>POSIX_ALLOC_SIZE_MIN new variable</td>
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<td>POSIX_REC_INCR_XFER_SIZE new variable</td>
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<td></td>
<td>POSIX_REC_MAX_XFER_SIZE new variable</td>
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<tr>
<td></td>
<td>POSIX_REC_MIN_XFER_SIZE new variable</td>
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<td></td>
<td>POSIX_REC_XFER_ALIGN new variable</td>
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<td>SYMLINK_MAX new variable</td>
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<td>POSIX_ASYNC_IO new variable</td>
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<td></td>
<td>SOCK_MAXBUF seems to have gone away</td>
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<tr>
<td>poll</td>
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## Ada POSIX Bindings Analysis

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<tbody>
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<td>pthread_mutex_getprioceiling</td>
<td>Additional errno, EDEADLK</td>
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<tr>
<td>pthread_mutex_setprioceiling</td>
<td>Additional errno, EDEADLK</td>
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<td>recv</td>
<td>Additional errnos, ECONNRESET, ETIMEDOUT, EIO</td>
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<tr>
<td>recvfrom</td>
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<td>recvmsg</td>
<td>Additional errnos, ETIMEDOUT, EIO</td>
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<td>setsockopt</td>
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<tr>
<td>sigqueue</td>
<td>Parameter change – more restrictive types</td>
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<td>sigwaitinfo</td>
<td>Parameter change – more restrictive types</td>
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<td>socket</td>
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<td>socketpair</td>
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<td>stat</td>
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<tr>
<td>sysconf</td>
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<tr>
<td>tcdrain</td>
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<td>tcflow</td>
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<td>tcflush</td>
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<td>tcgetattr</td>
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<td>tcgetpgrp</td>
<td>Errorno ENOSYS removed</td>
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<tr>
<td>tcsendbreak</td>
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<td>tcsetattr</td>
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<td>tcsetpgrp</td>
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<tr>
<td>timer_create</td>
<td>Change errno, behavior change</td>
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<td>timer_delete</td>
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<tr>
<td>timer_gettime</td>
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<td>timer_getiovrun</td>
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<tr>
<td>timer_settime</td>
<td>Possible semantic changes</td>
</tr>
<tr>
<td>ttyname</td>
<td>Not thread safe, should use ttyname_r (may be reference problem only)</td>
</tr>
<tr>
<td>unlink</td>
<td>Add errno ELOOP, now applicable to streams.</td>
</tr>
<tr>
<td>utime</td>
<td>Add errno ELOOP</td>
</tr>
<tr>
<td>wait</td>
<td>Some semantic changes, probably does not affect interface</td>
</tr>
<tr>
<td>waitpid</td>
<td>Some semantic changes, probably does not affect interface</td>
</tr>
</tbody>
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**Ada POSIX Bindings Analysis**

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<tr>
<th>POSIX Function</th>
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<tr>
<td>write</td>
<td>Changed from process-orientation to thread orientation.</td>
</tr>
</tbody>
</table>