

# **f90\_unix\_file: Unix File Operations Module**

July 31, 2012

## **1 Name**

`f90_unix_file` — Module of Unix file operations

## **2 Usage**

### **USE F90\_UNIX\_FILE**

This module contains part of a Fortran API to functions detailed in ISO/IEC 9945-1:1990 Portable Operating System Interface (POSIX) - Part 1: System Application Program Interface (API) [C Language].

The functions in this module are from Section 5.6 File Characteristics.

Error handling is described in `F90_UNIX_ERRNO`. Note that for procedures with an optional `ERRNO` argument, if an error occurs and `ERRNO` is not present, the program will be terminated.

All the procedures in this module are generic; some may be specific but this is subject to change in a future release.

## **3 Synopsis**

### **Parameters**

`F_OK`, `ID_KIND` (from `F90_UNIX_ENV`), `MODE_KIND` (from `F90_UNIX_DIR`), `R_OK`, `S_IRGRP`, `S_IROTH`, `S_IRUSR`, `S_IRWXG`, `S_IRWXO`, `S_IRWXU`, `S_ISGID`, `S_ISUID`, `S_IWGRP`, `S_IWOTH`, `S_IWUSR`, `S_IXGRP`, `S_IXOTH`, `S_IXUSR`, `TIME_KIND` (from `F90_UNIX_ENV`), `W_OK`, `X_OK`.

### **Derived Types**

`STAT_T`, `UTIMBUF`.

### **Generic Procedures**

`ACCESS`, `CHMOD`, `CHOWN`, `FSTAT`, `STAT`, `S_ISBLK`, `S_ISCHR`, `S_ISDIR`, `S_ISFIFO`, `S_ISREG`, `UTIME`.

Note that some of these generic procedures might also be specific; these characteristics could change in a future release.

## **4 Parameter Description**

`INTEGER(int32),PARAMETER :: F_OK`

Flag for requesting file existence check (see `ACCESS`).

`USE F90_UNIX_ENV, ONLY: ID_KIND`

See `F90_UNIX_ENV` for a description of this parameter.

USE F90\_UNIX\_DIR,ONLY:MODE\_KIND

See F90\_UNIX\_DIR for a description of this parameter.

INTEGER(int32),PARAMETER :: R\_OK

Flag for requesting file readability check (see ACCESS).

INTEGER(MODE\_KIND),PARAMETER :: S\_IRGRP

File mode bit indicating group read permission (see STAT\_T).

INTEGER(MODE\_KIND),PARAMETER :: S\_IROTH

File mode bit indicating other read permission (see STAT\_T).

INTEGER(MODE\_KIND),PARAMETER :: S\_IRUSR

File mode bit indicating user read permission (see STAT\_T).

INTEGER(MODE\_KIND),PARAMETER :: S\_IRWXG

Mask to select the group accessibility bits from a file mode (see STAT\_T).

INTEGER(MODE\_KIND),PARAMETER :: S\_IRWXO

Mask to select the other accessibility bits from a file mode (see STAT\_T).

INTEGER(MODE\_KIND),PARAMETER :: S\_IRWXU

Mask to select the user accessibility bits from a file mode (see STAT\_T).

INTEGER(MODE\_KIND),PARAMETER :: S\_ISGID

File mode bit indicating that the file is set-group-ID (see STAT\_T).

INTEGER(MODE\_KIND),PARAMETER :: S\_ISUID

File mode bit indicating that the file is set-user-ID (see STAT\_T).

INTEGER(MODE\_KIND),PARAMETER :: S\_IWGRP

File mode bit indicating group write permission (see STAT\_T).

INTEGER(MODE\_KIND),PARAMETER :: S\_IWOTH

File mode bit indicating other write permission (see `STAT_T`).

```
INTEGER(MODE_KIND),PARAMETER :: S_IWUSR
```

File mode bit indicating user write permission (see `STAT_T`).

```
INTEGER(MODE_KIND),PARAMETER :: S_IXGRP
```

File mode bit indicating group execute permission (see `STAT_T`).

```
INTEGER(MODE_KIND),PARAMETER :: S_IXOTH
```

File mode bit indicating other execute permission (see `STAT_T`).

```
INTEGER(MODE_KIND),PARAMETER :: S_IXUSR
```

File mode bit indicating user execute permission (see `STAT_T`).

```
USE F90_UNIX_ENV,ONLY :: TIME_KIND
```

See `F90_UNIX_ENV` for a description of this parameter.

```
INTEGER(int32),PARAMETER :: W_OK
```

Flag for requesting file writability check (see `ACCESS`).

```
INTEGER(int32),PARAMETER :: X_OK
```

Flag for requesting file executability check (see `ACCESS`).

## 5 Derived-Type Description

```
TYPE stat_t
  INTEGER(MODE_KIND) st_mode
  INTEGER(...) st_ino
  INTEGER(...) st_dev
  INTEGER(...) st_nlink
  INTEGER(id_kind) st_uid
  INTEGER(id_kind) st_gid
  INTEGER(...) st_size
  INTEGER(TIME_KIND) st_atime, st_mtime, st_ctime
END TYPE
```

Derived type holding file characteristics.

ST\_MODE File mode (read/write/execute permission for user/group/other, plus set-group-ID and set-user-ID bits).

ST\_INO File serial number.

ST\_DEV ID for the device on which the file resides.

ST\_NLINK  
The number of links (see F90\_UNIX\_DIR, LINK operation) to the file.

ST\_UID User number of the file's owner.

ST\_GID Group number of the file.

ST\_SIZE File size in bytes (regular files only).

ST\_ATIME  
Time of last access.

ST\_MTIME  
Time of last modification.

ST\_CTIME  
Time of last file status change.

```
TYPE UTIMBUF
  INTEGER(time_kind) actime, modtime
END TYPE
```

Data type holding time values for communication to UTIME. ACTIME is the new value for ST\_ATIME, MODTIME is the new value for ST\_MTIME.

## 6 Procedure Description

```
PURE SUBROUTINE access(path,amode,errno)
  CHARACTER(*),INTENT(IN) :: path
  INTEGER(*),INTENT(IN) :: amode
  INTEGER(error_kind),INTENT(OUT) :: errno
```

Checks file accessibility according to the value of AMODE; this should be F\_OK or a combination of R\_OK, W\_OK and X\_OK. In the latter case the values may be combined by addition or the intrinsic function IOR.

The result of the accessibility check is returned in ERRNO, which receives zero for success (i.e. the file exists for F\_OK, or all the accesses requested by the R\_OK et al combination are allowed) or an error code indicating the reason for access rejection. Possible rejection codes include EACCES, ENAMETOOLONG, ENOENT, ENOTDIR and EROFS (see F90\_UNIX\_ERRNO).

If the value of AMODE is invalid, error EINVAL is returned.

Note that most ACCESS enquiries are equivalent to an INQUIRE statement, in particular:

```
CALL ACCESS(PATH,F_OK,ERRNO)
  returns success (ERRNO==0) if and only if
  INQUIRE(FILE=PATH,EXIST=LVAR) would set LVAR to .TRUE.;

CALL ACCESS(PATH,R_OK,ERRNO)
  returns success (ERRNO==0) if and only if
  INQUIRE(FILE=PATH,READ=CHVAR) would set CHVAR to 'YES';
```

```
CALL ACCESS(PATH,W_OK,ERRNO)
    returns success (ERRNO==0) if and only if
    INQUIRE(FILE=PATH,WRITE=CHVAR) would set CHVAR to 'YES';

CALL ACCESS(PATH,IOR(W_OK,R_OK),ERRNO)
    returns success (ERRNO==0) if and only if
    INQUIRE(FILE=PATH,READWRITE=CHVAR) would set CHVAR to 'YES'.
```

The only differences being that ACCESS returns a reason for rejection, and can test file executability.

```
SUBROUTINE CHMOD(PATH,MODE,ERRNO)
    CHARACTER(*),INTENT(IN) :: PATH
    INTEGER(*),INTENT(IN) :: MODE
    INTEGER(error_kind),OPTIONAL,INTENT(OUT) :: ERRNO
```

Sets the file mode (ST\_MODE) to MODE.

Possible errors include EACCES, ENAMETOOLONG, ENOTDIR, EPERM and EROFS (see F90\_UNIX\_ERRNO).

```
SUBROUTINE CHOWN(PATH,OWNER,GROUP,ERRNO)
    CHARACTER(*),INTENT(IN) :: PATH
    INTEGER(id_kind),INTENT(IN) :: OWNER, GROUP
    INTEGER(error_kind),OPTIONAL,INTENT(OUT) :: ERRNO
```

Changes the owner (ST\_UID) of file PATH to OWNER, and the group number (ST\_GID) of the file to GROUP.

Possible errors include EACCES, EINVAL, ENAMETOOLONG, ENOTDIR, ENOENT, EPERM and EROFS (see F90\_UNIX\_ERRNO).

```
SUBROUTINE FSTAT(LUNIT,BUF,ERRNO)
    INTEGER(*),INTENT(IN) :: LUNIT
    TYPE(stat_t),INTENT(OUT) :: BUF
    INTEGER(error_kind),OPTIONAL,INTENT(OUT) :: ERRNO
```

BUF receives the characteristics of the file connected to logical unit LUNIT.

If LUNIT is not a valid logical unit number or is not connected to a file, error EBADF is raised (see F90\_UNIX\_ERRNO).

```
PURE LOGICAL(word) FUNCTION s_isblk(mode)
    INTEGER(mode_kind),INTENT(IN) :: mode
```

Returns .TRUE. if and only if the MODE value indicates that the file is a “block device”.

```
PURE LOGICAL(word) FUNCTION s_ischr(mode)
    INTEGER(mode_kind),INTENT(IN) :: mode
```

Returns .TRUE. if and only if the MODE value indicates that the file is a “character device”.

```
PURE LOGICAL(word) FUNCTION s_isdir(mode)
  INTEGER(mode_kind),INTENT(IN) :: mode
```

Returns `.TRUE.` if and only if the `MODE` value indicates that the file is a directory (or folder).

```
PURE LOGICAL(word) FUNCTION s_isfifo(mode)
  INTEGER(mode_kind),INTENT(IN) :: mode
```

Returns `.TRUE.` if and only if the `MODE` value indicates that the file is a “FIFO” (named or unnamed pipe).

```
PURE LOGICAL(word) FUNCTION s_isreg(mode)
  INTEGER(mode_kind),INTENT(IN) :: mode
```

Returns `.TRUE.` if and only if the `MODE` value indicates that the file is a “regular” (i.e. normal) file.

```
SUBROUTINE STAT(PATH,BUF,ERRNO)
  CHARACTER(*),INTENT(IN) :: PATH
  TYPE(stat_t),INTENT(OUT) :: BUF
  INTEGER(error_kind),OPTIONAL,INTENT(OUT) :: ERRNO
```

`BUF` receives the characteristics of the file `PATH`.

Possible errors include `EACCES`, `ENAMETOOLONG`, `ENOENT` and `ENOTDIR` (see `F90_UNIX_ERRNO`).

```
SUBROUTINE utime(path,times,errno)
  CHARACTER(*),INTENT(IN) :: path
  TYPE(utimbuf),OPTIONAL,INTENT(IN) :: times
  INTEGER(error_kind),OPTIONAL,INTENT(OUT) :: errno
```

Set the access and modification times of the file named by `PATH` to those specified by the `ACTIME` and `MODTIME` components of `TIMES` respectively.

Possible errors include `EACCES`, `ENAMETOOLONG`, `ENOENT`, `ENOTDIR`, `EPERM` and `EROFS` (see `F90_UNIX_ERRNO`).

## 7 See Also

`f90_unix_dir(3)`, `f90_unix_env(3)`, `f90_unix_errno(3)`, `intro(3)`, `nag_modules(3)`, `nagfor(1)`.

## 8 Bugs

Please report any bugs found to ‘support@nag.co.uk’ or ‘support@nag.com’, along with any suggestions for improvements.