English

FUJITSU

openFT V12.0 for Unix Systems and Windows Systems

C Program Interface

Programmer’s Guide

Edition September 2012

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Contents

1 Introduction to the C program interface

You can use the C program interface to incorporate the functionality of openFT in your own C programs:

- synchronous file transmission
- asynchronous file transfer
- managing and deleting asynchronous file transfer requests
- determining file attributes in the remote system
- deleting files or directories in the remote system
- creating directories in the remote system
- executing commands in the remote system

These functions which are available to the openFT user can be used in C programs to automate sequences. The program interface naturally also provides monitoring and error handling mechanisms.
In addition, the program interface has a function call which you can use determine the properties of the program interface. You can use this call to check the properties and thus render your programs insensitive to changes in later versions.

Under Windows, the program interface supports **multithreading**, i.e. all program interface calls are threadsafe.

1.1 Changes compared to the predecessor version

The C program interface to openFT V12 provides the following new functions:

- Function group *ft_sd*()* to determine the attributes of all the files in a directory in the remote system.
  ft_sd()* comprises the individual functions *ft_sdopen()*, *ft_sdinfo()* and *ft_sdclose()*.
- Function group *ft_xc*()* to execute commands in the remote system.
  ft_xc()* comprises the individual functions *ft_xcopen()*, *ft_xcinfo()* and *ft_xcclose()*.

The *ft_prop* structure in the function *ft_properties()* has been extended:

- new field: *maxcmdlen*
- additional value: `FT_PROPV2` for the field *ftpropvers*

New sample programs

- Remote command execution
- Memory-efficient listing of remote directory

1.2 Overview

The following overview is useful for quick orientation with respect to which C program calls are available for which tasks. The corresponding FT commands which the user can work with on the shell level are indicated in brackets (see openFT User Manual).

File transfer function

ft_transfer	Transfer file (*ft* or *ncopy*)

Functions for managing asynchronous file transfer requests

ft_open	Open session
ft_close	Close session
ft_reqlist	Determine requests that have not been completed
ft_reqstat	Determine request status
ft_reqterm	Terminate request
ft_cancel	Abort request (*ftcanr*)

File management functions

ft_show	Determine the attributes of a file or directory in the remote system (ftshw)
ft_showdir	Determine all file attributes of a directory in the remote system (*ftshw -d*)
ft_delete	Delete a file or directory in the remote system (delete file: *ftdel*; delete directory: *ftdeldir*)
ft_credir	Create a directory in the remote system (*ftcredir*)
*ft_sd**	Function group used to determine the attributes of all the files in a directory in the remote system. Comprises the following individual functions: *ft_sdopen* Start identification of attributes of all the files in a directory in the remote system *ft_sdinfo* Read out file attributes *ft_sdclose* End identification of file attributes

Function for querying properties of the program interface

ft_properties	Determine properties of the program interface

Functions for remote command execution

*ft_xc**	Function group for the synchronous execution of a command in the remote system. Comprises the following individual functions: *ft_xcopen* Execute command in the remote system *ft_xcinfo* Read the data generated by the command *ft_xcclose* Terminate command execution

1.3 Programming rules

This section describes the points which you must observe when creating programs for the program interface of openFT.

1.3.1 File transfer

Synchronous transfer

For synchronous file transfer, use the function *ft_transfer()*. In the parameter list, the parameter *synchron* **must** contain the value `FT_SYNC`. The control is not returned to the program until file transfer is completed. You can use the return values to determine whether file transfer has been successful.

Asynchronous file transfer

Several functions are necessary in order to perform synchronous file transfer. They result from the fact that, with asynchronous file transfer requests are issued, stored in the request queue and possibly not executed until later. The requests must be administered, and monitored for successful completion. It is therefore only possible to transfer files asynchronously within „sessions“.

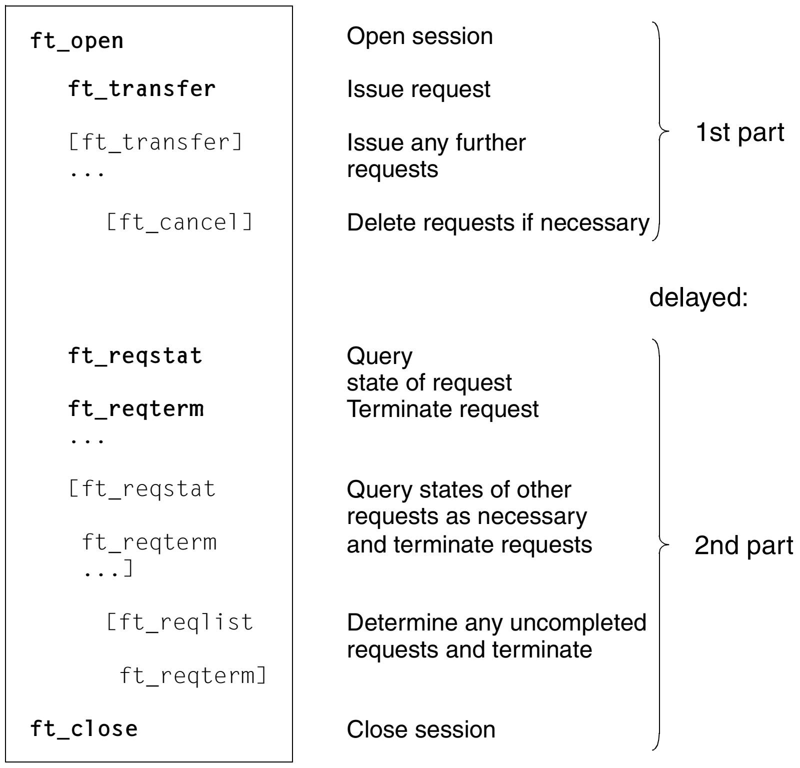
A program for asynchronous file transfer is made of two parts:

– In the first part, you open a session. Further, you issue one or more file transfer requests. If necessary, you can delete file transfer requests.

  openFT executes the request itself at the next possible opportunity.

– In the second part, you query the status of the request later and terminate the request on successful completion. If necessary, you can determine which requests have not been completed and terminate these as appropriate. Then you can close the session.

Schematic of the program structure:



The following function calls are absolutely necessary for asynchronous file transfer:

1. *ft_open()*

   The function *ft_open()* opens a session. The result of *ft_open()* is a session number (session identification) which uniquely identifies the session. This session number must be specified as parameter for function calls within the same session.

   When you open a session, you must assign an existing directory as working directory. In this working directory, the files are stored with management information about the existing file transfer requests.
   You may assign the same working directory to several different **consecutive sessions** sessions. This brings the advantage that you can administer requests from various sessions together.

   You can conduct several sessions in parallel in one program. With *ft_open()*, however, you can only open more than one session simultaneously if each of the parallel sessions is assigned a different working directory.

2. *ft_transfer()*

   The *ft_transfer()* is used to issued an asynchronous file transfer request. The parameter *synchron* in the parameter list **must** contain the value `FT_ASYNC`. You may issue several asynchronous requests in succession in one session.

   When the request has been successfully entered in the request queue, you are returned a request ID as the result of *ft_transfer()*. The request ID uniquely identifies the request. This request ID is valid, even beyond the session, until the request is terminated with the function *ft_reqterm()*.

   When the request is present in the request queue, you do not have to take care of the request execution. openFT executes the asynchronous request at the earliest possible time. If, for example, a partner is not available at the moment, openFT keeps trying to execute the request. The request is thus held in the request queue until it has been completed or any deletion date that has been specified is reached.

3. *ft_reqstat()*

   You can use the function *ft_reqstat()* to determine whether or not the file transfer has been successfully completed. As asynchronous file transfer is not carried out immediately, you should delay the use of the function *ft_reqstat()* and repeat the status query. When the request is completed, the parameter *status* is assigned the value `FT_STATT`, if terminated, it is assigned the value `FT_STATA`.

4. *ft_reqterm()*

   You **must** terminate the request using the function *ft_reqterm()*. This function deletes the request ID of the request and also the file in which the relevant information about the file transfer request is stored. Resources which are no longer required are released.

   The management file has the name `mf.`*`Request-ID`* and is located in the directory indicated as *workdir* parameter with the function call *ft_open()*.

   The request IDs of requests which have not been completed are retained, even after the session in which the requests were issued has been closed These requests can be completed at a later time by referencing the associated request ID, if the current session is assigned to the same working directory as the session in which the request was originally issued.

5. *ft_close()*

   You can use the function *ft_close()* to close the session.

HOME directory

If absolute file or directory names were not specified in the remote Unix or Windows systems then the user's HOME directory in the remote system is of importance. Relative path names always refer to the HOME directory of the corresponding user unless a definition to the contrary has been made by an FTAC profile.

The following applies to the HOME directory:

- In Unix systems, the HOME directory is the directory which is opened for the user after login.
- In Windows systems, a user's HOME directory for openFT requests is the directory entered in user administration for this user.

  If no directory is entered for the user in user administration then the user's profile path is used as the HOME directory. The profile path is *\Users\User* where *User* does not have to be identical to the name of the user.

  If it is also not possible to determine the user's profile path, then the openFT home directory is created in the *\Users* directory and access rights are granted in full to SYSTEM, administrators and the corresponding user.
  In this case, the name of the home directory created by openFT is determined as follows:
  – Local user ID: *UserID.Computer-name*
  – Global user ID (domain\user ID): *UserID.Domain*

Managing asynchronous requests

Further functions are available for managing asynchronous requests:

– *ft_cancel()*

  You can use the function *ft_cancel()* to cancel asynchronous requests which are in the course of being processed or which are waiting to be processed in the request queue request queue.

  This function is expedient only when the program to be created has a user interface and the user has options for intervening. For example, you could imaging a program which displays waiting file transfer requests to the user (ft_reqstat (status=FT_STATW)) and allow him or her to abort these requests.

  Another application is when file transfer request have issued by mistake and should now be deleted.

  With the function *ft_cancel()*, you can only cancel requests which are present in the request queue and which have a request ID. If the request was issued in another session, the current session must be assigned the same working directory as for the session in which the request was issued. If the *ft_transfer()* function returns the value 0, the request could not be entered into the request queue. These unsuccessful attempts to enter requests terminate with an error message.

  Requests which you cancel with *ft_cancel()*, **must** be terminated with *ft_reqterm()* in order for the associated request ID to be deleted.

– *ft_reqlist()*

  All transfer requests must be completed so that associated request IDs and management files can be deleted and resources that are not required released.

  With the function *ft_reqlist(),* you determine uncompleted requests from all sessions which have been assigned the same working directory as the current session. Please note that not all request which have not be completed are determined, but only those from sessions with the same working directory.

1.3.2 File management

The following functions are available for determining the file attributes in the remote system:

- With the function *ft_show()*, you can list the attributes of **one** file.
- With the function *ft_showdir()*, you can list the attributes of **multiple** files in a directory.
- The function group *ft_sd*()* determines the attributes of **all** the files in a directory in the remote system. Unlike in the case of *ft_showdir()*, it is not necessary to know the number of files before calling the command. The function group comprises the following individual functions:
  - The function *ft_sdopen()* initiates the identification of the attributes of all the files in a directory in the remote system.
  - The function *ft_sdinfo()* reads the file attributes.
  - The function *ft_sdclose()* terminates identification of the file attributes.
- You can use the function *ft_delete()* to delete a file or a directory in the remote system.

1.3.3 Remote command execution

A command is executed synchronously in the remote system. The data output by the command at *stdout* and *stderr* can be called up separately.

You can do this using the function group *ft_xc*()*. This comprises the following individual functions:

ft_xcopen()
: The function *ft_xcopen()* is used for the synchronous execution of the command in the remote system.

ft_xcinfo()
: The function *ft_xcinfo()* reads the data generated by the command.

ft_xcclose()
: The function *ft_xcclose()* terminates command execution.

1.3.4 Specifications concerning the remote system

All functions that access a remote system must identify the remote system and make the transfer admission known. The file structure *ft_admission* is used.

In Windows, the *ft_admission* structure is defined in the header file *...\openFT\include\ftapi.h*.

In Unix systems, the *ft_admission* structure is defined in the header file */usr/include/ftapi.h*.

ft_admission

The structure *ft_admission* is set up as follows:

```
struct ft_admission
{
   char  *remsys;          /* input */
   char  *remadmis;        /* input */
   char  *remaccount;      /* input */
   char  *rempasswd;       /* input */
};
```

The fields of the structure *ft_admission* have the following meaning.

remsys

Name of the partner system in the partner list or address of the partner system.

The address of the partner system is specified in the following form:

[protocol://]host[:[port].[tsel].[ssel].[psel]]

protocol
: Protocol stack via which the partner is addressed.
Possible values:

openft (openFT protocol), default value

ftam (FTAM protocol)

ftp (ftp protocol)

host
: Internet host name, IP address or GLOBAL NAME from the TNS, mandatory parameter. Format of the IP addresses (example):
`%ip111.222.123.234` (IPv4) or
`%ip6[FEDC:BA98:7654:3210:FEDC:BA98:7654:3210]` (IPv6)
The square brackets [..] must be specified with IPv6.

port
: Port number for TCP/IP connection, optional.

tsel
: Transport selector (only openFT and FTAM protocol), optional.

ssel Session selector for FTAM connection, optional.

psel Presentation selector for FTAM connection, optional.

For further details on addressing partner systems see the online help system or the openFT User Manual.

remadmis
Either a login name or an FTAC transfer admission in the remote system.

remaccount
Account number in the remote system

rempasswd
Password in the remote system

Depending on the particular type of openFT partner system, the following entries are necessary:

With BS2000:
remadmis, if the remote system uses the FTAC transfer admission; otherwise: *remadmis*, *remaccount* and, if a password is assigned, *rempasswd*

With Unix systems:
remadmis, if the remote system uses the FTAC transfer admission; otherwise: *remadmis* and, if a password is assigned, *rempasswd*

With Windows systems:
remadmis, if the remote system uses the FTAC transfer admission; otherwise: *remadmis*, if a login name is assigned, and *rempasswd*, if a password is assigned

With OS/390 and z/OS:
remadmis, *remaccount* and, if a password is assigned, *rempasswd*

With FTAM partner systems, for which no product of the openFT product range is in use:
remadmis, if an account number is assigned, *remaccount* and, if a password is assigned, *rempasswd*

For other partner systems:
corresponding to the conventions of the particular partner system

All fields not specified must contain the value NULL.

1.3.5 Error handling

All function calls end with a return message. The return value indicates successful completion or informs the user globally that an error has occurred. You can obtain detailed information by calling the a function with optional parameter *errorinfo*. Immediately after an error has occurred, the structure *ft_err* contains error messages with which you can program corresponding error handling procedures.

In Windows, the *ft_err* structure is defined in the header file *...\openFT\include\ftapi.h*.

In Unix systems, the *ft_err* structure is defined in the header file */usr/include/ftapi.h*.

ft_err

The structure *ft_err* is set up as follows:

```
struct ft_err
{
   long  main;           /* output */
   long  detail;         /* output */
   long  additional;     /* output */
};
```

The fields of the structure *ft_err* have the following meanings:

main
: contains the error class, e.g. parameter error, internal error

detail
: describes the error, e.g. invalid parameter value

additional
: contains additional error information, e.g. which parameter is invalid

The error codes are described in the chapter “Error codes” on page 77.

1.3.6 Version of the program interface

You can use the function call *ft_properties()* to determine the version of the openFT program interface, as well as important version-specific system values. With this function, you ensure the executability of future versions of openFT - even without recompilation. This function call is above all important when you use programs that are to run with different versions of the program interface.

ft_options

The *ft_credir()* function introduced in version 2 of the openFT program interface and the extended file structures can only be used if the *options* parameter is specified for the corresponding functions.

The functions *ft_sdopen()* and *ft_xcopen()* introduced in version 3 of the openFT program interface can only be used if the *options* parameter is specified in the associated functions.

The *ft_options* structure is constructed as follows:

```
struct ft_options
{
   int ftoptsvers;   /* input */
   int ftapivers;    /* input */
};
```

The fields in the structure have the following meaning:

ftoptsvers

Version of the data structure.
The value `FT_OPTSV1` must be entered for *ftoptsvers*.

ftapivers

Specifies the version of the program interface:

`FT_APIV2`

The openFT message number (*ft_err.detail*=`FTED_FTMSG`) specified in the *additional* parameter adheres to the new message number schema which was introduced in openFT V10.

`FT_APIV3`

This is required in order to use the functions *ft_sdopen()* and *ft_xcopen()*. The openFT message number (*ft_err.detail*=`FTED_FTMSG)` specified in the *additional* parameter has the new message number scheme that was introduced in openFT V10.

2 Creating and using programs

Include file

All C programs which use the program interface of openFT must contain the following line:

– in Windows: `#include <ftapi.h>`
– in Unix systems: `#include "ftapi.h"`

The data types and function prototypes are defined in this include file.

In Windows, this include file is located in in the *openFT\include* sub-directory of the openFT installation directory.

2.1 Translating and linking under Windows systems

A program that wants to use the openFT program interface must be linked with the import library *ftapi.lib*. This library is located in the *openFT\lib* directory of the openFT installation directory.

i During runtime, the library *ftapi.dll* is also dynamically loaded from the directory *..\openFT\bin*.

ftapi.lib and *ftapi.dll* were created using Microsoft Visual Studio 2010.

64-bit support in Windows systems

A 64-bit DLL with the name *ftapi64.dll* for the Windows x64 systems as well as for the Windows Itanium systems is also provided.

During openFT installation, the *ftapi64.dll* variant corresponding to the employed operating system is automatically installed in the directory *..\openFT\bin*.

The associated import library *ftapi64.lib* is located in the directory *..\openFT\lib\x64* in the case of Windows x64 systems and the directory *..\openFT\lib\ia64* in the case of Windows Itanium systems.

2.2 Translating and linking under Unix systems

In a program that wants to use the openFT program interface, the openFT functions must be linked from the openFT library. Call the C compiler with the *-lftapi* option.

The following options must also be specified on some systems:

AIX	-Wl,-brtl
HP (Itanium 64bit)	+DD64
Solaris (SPARC)[1]	-xarch=v9

[1] A 64-bit library is also supplied on the Solaris (SPARC) platform.

Note that under HP-UX, the C compiler must always be called in ANSI mode.

2.3 Notes for program use

Information relating to asynchronous file transfer requests are stored in files with the name `mf`.*Request-ID* in the directory indicated in the *workdir* parameter of the *ft_open()* function call. These data are deleted when you terminate requests with the function call *ft_reqterm()*.

3 Description of the C functions

Representation

The following conventions are used to represent the functions:

`stenographic`
for shell commands, function calls, programs and subprograms, as well as for constant values in plain text.

italics
for function names and parameters

In the syntactic representation, the comment “Input“ stands for input parameter and the comment “Output“ for output parameter. These comments are no present at the structures, but on the lowest level at the parameters.

3.1 ft_cancel - Cancel asynchronous request

ft_cancel() cancels asynchronous requests which are in the course of being processed or which are waiting to be processed in the queue.

Syntax

```
#include <ftapi.h>

int ft_cancel(const void *session,          /* input */
                long rid,                     /* input */
                struct ft_err *errorinfo,
                void *options);              /* input */
```

Parameters

session
: Session number in which the request is to be canceled.

rid
: ID of the request to be canceled.

  If the request to be canceled was issued in a different session, the current session must be assigned the same working directory as the one in which the request was issued.
  Furthermore, the program in which the asynchronous request is cancelled must be running under the same login name as the one in which the request was issued.

errorinfo
: Area in which detailed information is stored if an error is encountered (see section "ft_err" on page 17).
  The specification of this parameter is optional. If you do not require any more precise error information then you can specify the value NULL for *errorinfo*.

options
: The specification of the *options* parameter is optional. If the value NULL is specified then message activity at the program interface is compatible with that of the program interface of openFT < V10.
  Alternatively, it is possible to specify the *ft_options* structure (see section "ft_options" on page 18) to activate the openFT message number scheme as of openFT V10 and the extensions to the function.

Return value

0	No error
-1	Error. The error type is stored in *errorinfo*.

3.2 ft_close - Close session

You can use *ft_close()* to close a session opened with *ft_open()*. This function must be the last one called in a session. *ft_close()* releases resources that are no longer required. The session number is deleted and no subsequent reference to this session is possible.

Syntax

```
#include <ftapi.h>

int ft_close(const void *session,          /* input */
               struct ft_err *errorinfo,
               void *options);              /* input */
```

Parameter

session
: Number of the session which is to be closed.

errorinfo
: Area in which detailed information is stored if an error is encountered (see section "ft_err" on page 17).
The specification of this parameter is optional. If you do not require any more precise error information then you can specify the value NULL for *errorinfo*.

options
: The specification of the *options* parameter is optional. If the value NULL is specified then message activity at the program interface is compatible with that of the program interface of openFT < V10.
Alternatively, it is possible to specify the *ft_options* structure (see section "ft_options" on page 18) to activate the openFT message number scheme as of openFT V10 and the extensions to the function.

Return value

0	No error
-1	Error. The error type is stored in *errorinfo*.

3.3 ft_credir - Create directory in remote system

ft_credir() creates a directory in the remote system.

Directory names must not exceed the length specified in the *maxrfnsize* field of the *ft_prop* structure, see section “ft_properties - Determine properties of the program interface” on page 31.

Syntax

```
#include <ftapi.h>

int ft_credir(const struct ft_admission *admis,  /* input */
                const struct ft_crepar *par,       /* input */
                struct ft_err *errorinfo,
                void *options);                    /* input */
```

Parameters

admis Specifications for the remote system (see section “ft_admission” on page 15).

par Specifications for the request which you declare with the structure *ft_crepar*:

```
struct ft_crepar
{
   int   creparvers;             /* input */
   char  *dn;                    /* input */
   char  *mgmtpasswd;            /* input */
   char  *fud;                   /* input */
   int   fudlen;                 /* input */
};
```

The fields of the *ft_crepar* structure have the following meanings:

creparvers
: Version of the data structure.
The value `FT_CPARV1` must be entered for *creparvers*.

dn
: Name of the directory that is to be created in the remote system.

Absolute and relative path specifications are permitted. Relative path specifications refer to the user ID defined in the admission profile if the FTAC function is used, otherwise to the HOME directory.

mgmtpasswd
: Password for the directory if it is password-protected.

fud
Address of a data area for the so-called “Further Details“ which can indicate a more detailed cause of error if errors occur.
If NULL is specified then no more detailed error cause is output. The *fud* parameter is only available if *creparvers* is set to the value `FT_CPARV1` and the *options* parameter is specified when *ft_credir* is called.

fudlen
Length of the data area for *fud*.
The *fudlen* parameter is only available if *creparvers* is set to the value `FT_CPARV1` and the *options* parameter is specified when *ft_credir* is called.

errorinfo
Area in which detailed information is stored if an error is encountered (see section “ft_err” on page 17).
The specification of this parameter is optional. If you do not require any more precise error information then you can specify the value NULL for *errorinfo*.

options
The specification of the *options* parameter is mandatory. The construction of the *ft_options* structure is described in section “Version of the program interface” on page 18.

Return value

0	No error. The directory was created.
-1	Error. The directory was not created. The error type is stored in *errorinfo*.

3.4 ft_delete - Delete file or directory in the remote system

You can use *ft_delete()* to delete a file or a directory in the remote system. File directories that are to be deleted must be empty.

In order to delete a **file**, the *filetype* parameter in the *par* structure must contain the value `FT_FILE`.

To delete a **directory**, the *filetype* parameter in the *par* structure must contain the value `FT_DIRECTORY`.

File names and directory names must not exceed the length specified in the *maxrfnsize* field of the *ft_prop* structure (see section "ft_properties - Determine properties of the program interface" on page 31).

Syntax

```
#include <ftapi.h>

int ft_delete(const struct ft_admission *admis,  /* input */
                const struct ft_delpar *par,       /* input */
                struct ft_err *errorinfo,
                void *options);                   /* input */
```

Parameter

admis Transfer admission for the remote system (see section "ft_admission" on page 15).

par Entries for delete request which you specify with the structure *ft_delpar*:

```
struct ft_delpar
{
   int   delparvers;             /* input */
   char  *fn;                    /* input */
   char  *mgmtpasswd;            /* input */
   enum  ft_filedir filetype;    /* input */
   char  *fud;                   /* input */
   int   fudlen;                 /* input */
};
```

The fields of the structure *ft_delpar* have the following meanings:

delparvers
: Version of the data structure.
delparvers must be supplied the value `FT_DPARV1` or `FT_DPARV2`.

fn
: Name of the file or directory to be deleted in the remote system.

Absolute and relative path names are permissible. Relative path names refer to the login name specified in the FT profile, when the FTAC function is used, otherwise to the HOME directory, see page 12.

mgmtpasswd
: Password of the file/directory, if protected by a password.

filetype
: specifies what is to be deleted:

`FT_FILE`	File (Default value after initialization of the parameter list *ft_delpar* with binary 0)
`FT_DIRECTORY`	Directory (not for FTAM partners)

fud
: Address of a data area for the so-called “Further Details“ which can indicate a more detailed cause of error if errors occur.
If NULL is specified then no more detailed error cause is output. The *fud* parameter is only available if *delparvers* is set to the value `FT_DPARV2` and the *options* parameter is specified when *ft_delete* is called.

fudlen
: Length of the data area for *fud*.
The *fudlen* parameter is only available if *delparvers* is set to the value `FT_DPARV2` and the *options* parameter is specified when *ft_delete* is called.

errorinfo
: Area in which detailed information is stored if an error is encountered (see section “ft_err” on page 17).
The specification of this parameter is optional. If you do not require any more precise error information then you can specify the value NULL for *errorinfo*.

options

The specification of the *options* parameter is optional. If the value NULL is specified then message activity at the program interface is compatible with that of the program interface of openFT < V10.
Alternatively, it is possible to specify the *ft_options* structure (see section "ft_options" on page 18) to activate the openFT message number scheme as of openFT V10 and the extensions to the function.

Return value

0	No error. The file or directory has been deleted.
-1	Error. The file or directory has not been deleted. The error type is stored in *errorinfo*.

3.5 ft_open - Open session

You can use *ft_open()* to open a session. You can only transfer files asynchronously (function *ft_transfer()*) and manage asynchronous file transfer requests (functions *ft_reqlist()*, *ft_reqstat()*, *ft_cancel()* and *ft_reqterm()*) within a session.

ft_open() returns a session number which uniquely identifies the session. This session number must be specified for function calls issued in the same session.

You can open several session simultaneously in one program, provided that different working directories are assigned.

Syntax

```
#include <ftapi.h>

void *ft_open(const char *workdir,          /* input */
                struct ft_err *errorinfo,
                void *options);              /* input */
```

Parameter

workdir

Name of the working directory assigned to the session.

Files containing management information are stored in this directory.

Please note that the password used to call the program interface must have authorization to store files in this directory.

errorinfo

Area in which detailed information is stored if an error is encountered (see section "ft_err" on page 17).
The specification of this parameter is optional. If you do not require any more precise error information then you can specify the value NULL for *errorinfo*.

options

The specification of the *options* parameter is optional. If the value NULL is specified then message activity at the program interface is compatible with that of the program interface of openFT < V10.
Alternatively, it is possible to specify the *ft_options* structure (see section "ft_options" on page 18) to activate the openFT message number scheme as of openFT V10 and the extensions to the function.

Return value

n	Session ID ($n \neq 0$). This value must be specified for function calls issued in the same session.
NULL	Error. The error type is stored in *errorinfo*.

3.6 ft_properties - Determine properties of the program interface

You can use *ft_properties()* to determine the version of the program interface of openFT, and version-specific system values. The values returned by the *ft_properties()* function allow to check whether your program has been created with the same or with a different version of the program interface.

Syntax

```
#include <ftapi.h>

int ft_properties(struct ft_prop *prop,
                    struct ft_err *errorinfo);
```

Parameter

prop

Area in which the version of the openFT program interface used is stored, along with the valid system values. For this purpose, the structure *ft_prop* is used:

```
struct ft_prop
{
   int   ftpropvers;        /* input */
   int   ftvers;            /* output */
   long  optfunct;          /* output */
   int   maxlfnsize;        /* output */
   int   maxrfnsize;        /* output */
   int   maxsyssize;        /* output */
   int   maxadmissize;      /* output */
   int   maxaccsize;        /* output */
   int   maxpwdsize;        /* output */
   int   maxfpwdsize;       /* output */
   int   maxrecord;         /* output */
   int   maxacntsize;       /* output */
   int   maxlegalqsize;     /* output */
   int   maxcpwdsize;       /* output */
   int   maxlprocsize;      /* output */
   int   maxrprocsize;      /* output */
   int   maxcmdlen;         /* output */
};
```

The fields of the structure *ft_prop* have the following meanings:

ftpropvers
: Version of the data structure.
ftpropvers must be supplied the value `FT_PROPV1` or `FT_PROPV2`.

ftvers
: version of openFT
(e.g. for Version 8.1: `810`, for Version 10.0: `1000`, for Version 12.0: `1200`)

optfunct
: (reserved for later use.)

maxlfnsize
: maximum length for the local file name

maxrfnsize
: maximum length for the file name in the remote system

maxsyssize
: maximum length for the name of the remote system

maxadmissize
: maximum length for the login name or transfer admission in the remote system

maxaccsize
: maximum length for the account number in the remote system

maxpwdsize
: maximum length for the password in the remote system

maxfpwdsize
: maximum length for the file password in the remote system

maxrecord
: maximum record length

maxacntsize
: maximum length for the account at the FTAM partner

maxlegalqsize
: maximum length for the copyright

maxcpwdsize
: maximum length for the password for creating a file in the remote system

maxlprocsize
: maximum overall length for local follow-up processing

maxrprocsize
: maximum overall length for remote follow-up processing

maxcmdlen
: Maximum length of the command that is to be executed in the remote system with *ft_xcopen()*.
The *maxcmdlen* parameter is only available if *ftpropvers* is set to the value `FT_PROPV2`.

errorinfo
: Area in which detailed information is stored if an error is encountered (see section "ft_err" on page 17).
The specification of this parameter is optional. If you do not require any more precise error information then you can specify the value NULL for *errorinfo*.

Return value

0	No error
-1	Error. The error type is stored in *errorinfo*.

3.7 ft_reqlist - Determine request not yet terminated

ft_reqlist() determines the request IDs of requests for asynchronous file transfer which have not yet been terminated with the function *ft_reqterm()*.
IF the *list* parameter has the value NULL or if the *listlen* parameter has the value 0, you only receive the number of requests that have not yet been completed when you use *ft_reqterm()*.

The request from all sessions assigned with the function *ft_open* to the same working directory that applies as the current session are listed.

Syntax

```
#include <ftapi.h>

int ft_reqlist(const void *session,          /* input */
                 long *list,
                 int listlen,                  /* input */
                 struct ft_err *errorinfo,
                 void *options);              /* input */
```

Parameter

session
: Session ID of the session for which non-terminated asynchronous file transfer request is to be determined.

list
: Area in which the request IDs of non-terminated requests for asynchronous file transfer are stored. The length of this area (number of entries) must be stored in *listlen*.

  If *list* is NULL, only the number (not the request IDs) of non-terminated requests is determined.

listlen
: Number of entries in *list*.

  If *listlen* is 0, only the number (not the request IDs) of non-terminated requests is determined.

errorinfo
: Area in which detailed information is stored if an error is encountered (see section "ft_err" on page 17).
  The specification of this parameter is optional. If you do not require any more precise error information then you can specify the value NULL for *errorinfo*.

options

The specification of the *options* parameter is optional. If the value NULL is specified then message activity at the program interface is compatible with that of the program interface of openFT < V10.
Alternatively, it is possible to specify the *ft_options* structure (see section "ft_options" on page 18) to activate the openFT message number scheme as of openFT V10 and the extensions to the function.

Return value

n	Number of entries found ($n \geq 0$). If *n* is greater than *listlen*, the first *listlen* entries are stored in *list*.
-1	Error. The error type is stored in *errorinfo*.

3.8 ft_reqstat - Determine the status of a request

You can use *ft_reqstat()* to determine the status of an asynchronous file transfer request.

Syntax

```
#include <ftapi.h>

int ft_reqstat(const void *session,          /* input */
                 long rid,                     /* input */
                 struct ft_status *stat,
                 struct ft_err *errorinfo,
                 void *options);              /* input */
```

Parameter

session
Session ID of the session in which the status of the transfer request is to be determined.

rid
ID of the request for which the status is to be determined.

If the request was issued in a different session, the current session must be assigned the same working directory as the one in which the request was issued.

stat
Area in which the status information is written. The structure *ft_status* is used:

```
#define STAT_FUD_LEN    65
#define STAT_FN_LEN    128

struct ft_status
{
   int   ftstatvers;         /* input */
   enum  ft_stat status;     /* output */
   char  fn[STAT_FN_         /* output */
   long  tid;                /* output */
   int   msg;                /* output */
   char  fud[STAT_FUD_LEN];  /* output */
};
```

ftstatvers
Version of the data structure.
ftstatvers must be supplied the value `FT_STATV1` or `FT_STATV2`.

status
: Status of the request:

  `FT_STATW`
  : The request is waiting for execution.

  `FT_STATR`
  : The request is being run.

  `FT_STATA`
  : The request was aborted.

  `FT_STATT`
  : The request is terminated.

fn
: local file name terminating with '\0'. If the file name is longer than 128 characters, it is truncated.

tid
: Transfer ID

msg
: Message number of aborted or terminated requests (see the online help).

  The *ft_apivers* field in the *ft_options* structure can be used to define the message number scheme that is to be used.

fud
: "Further Details" terminated with '\0' which can indicate a more detailed cause of error if errors occur.
  The *fud* parameter is only available if *ftstatvers* is set to the value `FT_STATV2` and the *options* parameter is specified when *ft_reqstat* is called.

errorinfo
: Area in which detailed information is stored if an error is encountered (see section "ft_err" on page 17).
  The specification of this parameter is optional. If you do not require any more precise error information then you can specify the value NULL for *errorinfo*.

options
: The specification of the *options* parameter is optional. If the value NULL is specified then message activity at the program interface is compatible with that of the program interface of openFT < V10.
  Alternatively, it is possible to specify the *ft_options* structure (see section "ft_options" on page 18) to activate the openFT message number scheme as of openFT V10 and the extensions to the function.

Return value

0	No error
-1	Error. The error type is stored in *errorinfo*.

3.9 ft_reqterm - Terminate request

You can use t*ft_reqterm()* to terminate an asynchronous file transfer request. This is possible only if the request has the status „aborted“ or „completed“ . *ft_reqterm()* deletes the associated file containing the management information. Then the request ID is deleted and can no longer be addressed.

Syntax

```
#include <ftapi.h>

int ft_reqterm(const void *session,          /* input */
                 long rid,                     /* input */
                 struct ft_err *errorinfo,
                 void *options);              /* input */
```

Parameter

session
: Session ID of the session in which the transfer request is to be terminated.

rid
: ID of the request to be terminated.

  If the request was issued in a different session, the current session must be assigned the same working directory as the one in which the request was issued.

errorinfo
: Area in which detailed information is stored if an error is encountered (see section “ft_err” on page 17).
  The specification of this parameter is optional. If you do not require any more precise error information then you can specify the value NULL for *errorinfo*.

options
: The specification of the *options* parameter is optional. If the value NULL is specified then message activity at the program interface is compatible with that of the program interface of openFT < V10.
  Alternatively, it is possible to specify the *ft_options* structure (see section “ft_options” on page 18) to activate the openFT message number scheme as of openFT V10 and the extensions to the function.

Return value

0	No error
-1	Error. The error type is stored in *errorinfo*.

3.10 ft_sdopen - Start identification of attributes of all files in a directory

ft_sdopen() starts the identification of the attributes of all the files in a directory in the remote system.

Directory names must not exceed the length specified in the field *maxrfnsize* of the *ft_prop* structure (see section “ft_properties - Determine properties of the program interface” on page 31).

Syntax

```
#include <ftapi.h>

void *ft_sdopen(const struct ft_admission *admis,        /* input */
                struct ft_shwpar *par,
                struct ft_err *errorinfo
                void *options);                          /* input */
```

Parameters

admis Specifications for the remote system (see section “ft_admission” on page 15).

par Specifications for the request which you declare in the structure *ft_shwpar*:

```
struct ft_shwpar
{
   int  shwparvers;      /* input */
   char *fn;             /* input */
   char *mgmtpasswd;     /* input */
   char *fud;            /* input */
   int  fudlen;          /* input */
};
```

The fields of the *ft_shwpar* structure have the following meaning:

shwparvers
Version of the data structure.
The value `FT_SPARV1` or `FT_SPARV2` must be entered for *shwparvers*.

fn Name of the directory containing the files whose attributes are to be determined.

Absolute and relative path specifications are permitted. Relative path specifications refer to the user ID defined in the admission profile if the FTAC function is used, otherwise to the HOME directory, see page 12.

mgmtpasswd
Password for the directory if it is password-protected.

fud
Address of a data area for the so-called "Further Details" which can indicate a more detailed cause of error if errors occur.
If NULL is specified then no more detailed error cause is output. The *fud* parameter is only available if *shwparvers* is set to the value `FT_SPARV2` and the *options* parameter is specified when *ft_showdir* is called.

fudlen
Length of the data area for *fud*.
The *fudlen* parameter is only available if *shwparvers* is set to the value `FT_SPARV2` and the *options* parameter is specified when *ft_showdir* is called.

errorinfo
Area in which detailed information is stored if an error is encountered (see section "ft_err" on page 17). The specification of this parameter is optional.

If you do not require any more precise error information then you can specify the value `NULL` for *errorinfo*.

options
The specification of the *options* parameter is mandatory. The construction of the *ft_options* structure is described in section "Version of the program interface" on page 18.

Return value

id	ID of the request. This must be specified for both *ft_sdinfo()* and *ft_sdclose()*.
NULL	Error. The error type is stored in *errorinfo*. If an error occurs then it is not necessary to call *ft_sdclose()*.

3.11 ft_sdinfo - Read out file attributes

ft_sdinfo() reads the file attributes of a directory in the remote system that were determined using *ft_sdopen()*. You can call *ft_sdinfo* more than once. On each call, the next data that has not yet been read is written to the buffer *buf*. If all the data has been read, the return value is 0.

Syntax

```
#include <ftapi.h>

int ft_sdinfo(void *id,                                /* input */
              struct ft_fileinfo *buf,
              int bufsize,                             /* input */
              struct ft_err *errorinfo);
```

Parameters

id ID of the request (return value from *ft_sdopen*)

buf Area in which the file attributes are written. This area comprises elements with the structure *ft_fileinfo*:

```
#define ACC_LEN       65
#define INFO_FN_LEN  257
#define LQ_LEN        81
#define USER_LEN      68

struct ft_fileinfo
{
   int   ftshowivers;                  /* input */
   char  fn[INFO_FN_LEN];              /* output */
   enum  ft_ftype filetype;            /* output */
   enum  ft_charset charset;           /* output */
   enum  ft_rform recordform;          /* output */
   long  recsize;                      /* output */
   enum  ft_available availability;    /* output */
   int   access;                      /* output */
   char  accout[ACC_LEN];              /* output */
   long  size;                         /* output */
   long  maxsize;                      /* output */
   char  legalqual[LQ_LEN];            /* output */
   char  cre_user[USER_LEN];           /* output */
   long  cre_date;                     /* output */
   char  mod_user[USER_LEN];           /* output */
   long  mod_date;                     /* output */
   char  rea_user[USER_LEN];           /* output */
   long  rea_date;                     /* output */
   char  atm_user[USER_LEN];           /* output */
   long  atm_date;                     /* output */
   long  long fsize;                   /* output */
   long  long fmaxsize;                /* output */
};
```

The fields of the *ft_fileinfo* structure have the following meaning:

ftshowivers
: Version of the data structure.
ftshowivers must have the value `FT_SHOWIV2`. *ftshowivers* need only be set in the first passed data structure.

fn
: File name or directory name

filetype
: File type:

  `FT_TYPEUNKN`
  : Unknown file type

  `FT_BIN`
  : Binary file

  `FT_DIR`
  : Directory

  `FT_TXT`
  : Text file

charset
: Character set (only for text files):

  `FT_NOSET`
  : Unknown character set

  `FT_VISIBLE`
  : The file can contain characters from the ISO646 G0 set.

  `FT_IA5`
  : The file can contain characters from the ISO646 C0 set and G0 set.

  `FT_GRAPHIC`
  : The file can contain characters from the ISO646 G0 set or from the ISO8859-1 G0 set and the ISO8859-1 G1 set.

  `FT_GENERAL`
  : The file can contain characters from the ISO646 C0 set, the ISO646 or ISO8859-1 G0 set and the ISO8859-1 G1 set.

recordform
: Record format:

`FT_NOFORM`
: Unknown record format

`FT_VARIABLE`
: Variable length records

`FT_FIXED`
: Fixed length records

`FT_UNDEF`
: Undefined record length

recsize
: Maximum record length or 0 if the maximum record length is unknown.

availability
: Availability of the file:

`FT_NOAVAIL`
: The availability is not defined.

`FT_AVAILIMM`
: The file is available immediately.

`FT_AVAILNIMM`
: The file is not available immediately.

access
: Access rights. The right is present if the bit is set.
The following bits are defined:

`FT_ACCR`
: The file may be read.

`FT_ACCI`
: File units may be added to the file.

`FT_ACCP`
: The file may be overwritten.

`FT_ACCX`
: The file may be extended, i.e. data can be added to the file.

`FT_ACCE`
: File units may be deleted from the file.

`FT_ACCA`
: File attributes may be read.

`FT_ACCC`
: File attributes may be modified.

`FT_ACCD`
: The file may be deleted.

account
: Account number used to charge costs in the remote system

size
: Current file size in bytes, or -1 if file size unknown. In systems in which variables of type `long` have a size of 32 bits, the value for the file size is truncated if it no longer fits in the field. The complete value for the file size can be found in the *fsize* field.

maxsize
: Permissible file size in bytes, or -1 if file size unknown. In systems in which variables of type `long` have a size of 32 bits, the value for the file size is truncated if it no longer fits in the field. The complete value for the file size can be found in the *fmaxsize* field.

legalqual
: Legal qualification

cre_user
: User who created the file

cre_date
: Time at which file was created, or 0 if time unknown.
The time is specified in internal format (seconds since 1.1.1970 00:00:00).

mod_user
: User who last modified the file content

mod_date
: Time at which the file contents were last modified, or 0 if time unknown.
The time is specified in internal format (seconds since 1.1.1970 00:00:00).

rea_user
: User who read the file last

rea_date
: Time at which file was last read, or 0 if time unknown.
The time is specified in internal format (seconds since 1.1.1970 00:00:00).

atm_user
: User who last modified the file attributes

atm_date
: Time at which file attributes were last modified or 0 if time unknown.
The time is specified in internal format (seconds since 1.1.1970 00:00:00).

fsize
: Current file size in bytes, or -1 if file size unknown. The *fsize* parameter is only available if *ftshowivers* is set to the value `FT_SHOWIV2` and the *options* parameter is specified when *ft_showdir* is called.

fmaxsize

Permissible file size in bytes, or -1 if file size unknown. The *fmaxsize* parameter is only available if *ftshowivers* is set to the value `FT_SHOWIV2` and the *options* parameter is specified when *ft_showdir* is called.

bufsize

Size of *buf*, i.e. maximum number of elements with the structure *ft_fileinfo*, that can fit in *buf*.

errorinfo

Area in which detailed information is stored if an error is encountered (see section "ft_err" on page 17). The specification of this parameter is optional.
If you do not require any more precise error information then you can specify the value `NULL` for *errorinfo*.

Return value

n	Number of elements written to the buffer *buf*.
0	No further data is available.
-1	Error. The error type is stored in *errorinfo*.

3.12 ft_sdclose - End identification of file attributes

ft_sdclose() terminates the read-out of the file attributes whose identification was initiated with *ft_sdopen()*. This function must be called as the final operation following a successful call of *ft_sdopen()*. *ft_sdclose()* releases resources that are no longer required. You cannot subsequently reference this ID again.

Syntax

```
#include <ftapi.h>

int ft_sdclose(void *id,                                 /* input/
               struct ft_err *errorinfo);
```

Parameters

id ID of the request (return value from *ft_sdopen*)

errorinfo
Area in which detailed information is stored if an error is encountered (see section “ft_err” on page 17). The specification of this parameter is optional.
If you do not require any more precise error information then you can specify the value `NULL` for *errorinfo*.

Return value

0	No error
-1	Error. The error type is stored in *errorinfo*.

3.13 ft_show - Determine attributes of a file or directory

You can use *ft_show()* to determine the attributes of an individual file or directory in the remote system. Use the function *ft_showdir()* to determine the attributes of several files.

File names and directory names must not exceed the length specified in the *maxrfnsize* field of the *ft_prop* structure (see section “ft_properties - Determine properties of the program interface” on page 31).

Syntax

```
#include <ftapi.h>

int ft_show(const struct ft_admission *admis,    /* input */
              const struct ft_shwpar *par,          /* input */
              struct ft_fileinfo *info,
              struct ft_err *errorinfo,
              void *options);                      /* input */
```

Parameter

admis Transfer admission for the remote system (see section “ft_admission” on page 15).

par Entries for the request which you specify with the structure *ft_shwpar*:

```
struct ft_shwpar
{
   int  shwparvers;       /* input */
   char *fn;              /* input */
   char *mgmtpasswd;      /* input */
   char *fud;             /* input */
   int  fudlen;           /* input */
};
```

The fields of the structure *ft_shwpar* have the following meanings:

shwparvers
Version of the data structure.
shwparvers must be supplied the value `FT_SPARV1` or `FT_SPARV2`.

fn Name of the file or directory for which the attributes are to be determined.

Absolute and relative path names are permissible. Relative path names refer to the login name specified in the FT profile, when the FTAC function is used, otherwise to the HOME directory, see page 12.

mgmtpasswd
Password of the file or directory if protected by a password.

fud Address of a data area for the so-called “Further Details“ which can indicate a more detailed cause of error if errors occur.
If NULL is specified then no more detailed error cause is output. The *fud* parameter is only available if *shwparvers* is set to the value `FT_SPARV2` and the *options* parameter is specified when *ft_show* is called.

fudlen
Length of the data area for *fud*.
The *fudlen* parameter is only available if *shwparvers* is set to the value `FT_SPARV2` and the *options* parameter is specified when *ft_show* is called.

info Area in which the file attributes are written. The structure *ft_fileinfo* is used:

```
#define ACC_LEN       65
#define INFO_FN_LEN  257
#define LQ_LEN        81
#define USER_LEN      68

struct ft_fileinfo
{
   int   ftshowivers;                  /* input */
   char  fn[INFO_FN_LEN];              /* output */
   enum  ft_ftype filetype;            /* output */
   enum  ft_charset charset;           /* output */
   enum  ft_rform recordform;          /* output */
   long  recsize;                      /* output */
   enum  ft_available availability;    /* output */
   int   access;                      /* output */
   char  accout[ACC_LEN];              /* output */
   long  size;                         /* output */
   long  maxsize;                      /* output */
   char  legalqual[LQ_LEN];            /* output */
   char  cre_user[USER_LEN];           /* output */
   long  cre_date;                     /* output */
   char  mod_user[USER_LEN];           /* output */
   long  mod_date;                     /* output */
   char  rea_user[USER_LEN];           /* output */
   long  rea_date;                     /* output */
   char  atm_user[USER_LEN];           /* output */
   long  atm_date;                     /* output */
   long  long fsize;                   /* output */
   long  long fmaxsize;                /* output */
};
```

The fields of the structure *ft_fileinfo* have the following meanings:

ftshowivers
: Version of the data structure.
ftshowivers must be supplied the value `FT_SHOWIV1` or `FT_SHOWIV2`.

fn
: file name or directory name

filetype
: file type:

  `FT_TYPEUNKN`
  : File type unknown

  `FT_BIN`
  : Binary file

  `FT_DIR`
  : Directory

  `FT_TXT`
  : Text file

charset
: Character set (only for text files):

  `FT_NOSET`
  : Character set unknown

  `FT_VISIBLE`
  : The file may contain characters from the G0 set of ISO646.

  `FT_IA5`
  : The file may contain characters from the C0 set and the G0 set of ISO646.

  `FT_GRAPHIC`
  : The file may contain characters from the ISO646 or from the G0 set of ISO8859-1 and the G1-Set of ISO8859-1.

  `FT_GENERAL`
  : The file may contain characters from the C0 set of ISO646, from the G0 set of ISO646 or ISO8859-1 and from the G1 set of ISO8859-1.

recordform
: Record format:

  `FT_NOFORM`
  : Record format unknown

  `FT_VARIABLE`
  : variable-length records

  `FT_FIXED`
  : fixed-length records

  `FT_UNDEF`
  : undefined record length

recsize
: maximum record length or 0, if record length unknown

availability
: Availability of file:

  `FT_NOAVAIL`
  : The availability is not specified.

  `FT_AVAILIMM`
  : The file is immediately available.

  `FT_AVAILNIMM`
  : The file is not immediately available.

access
: Access rights. The right is available if the bit is set.
  The following bits are defined:

  `FT_ACCR`
  : The file may be read.

  `FT_ACCI`
  : ile units may be added to the file.

  `FT_ACCP`
  : The file may be overwritten.

  `FT_ACCX`
  : The file may be extended, i.e. data can be added to the file.

  `FT_ACCE`
  : File units may be deleted from the file.

  `FT_ACCA`
  : File attributes may be read.

  `FT_ACCC`
  : File attributes may be modified.

  `FT_ACCD`
  : The file may be deleted.

account
: account number used to charge costs in the remote system

size
: current file size in bytes, or -1 if file size unknown. In systems in which variables of type `long` have a size of 32 bits, the value for the file size is truncated if it no longer fits in the field. The complete value for the file size can be found in the *fsize* field.

maxsize
: permissible file size, or -1 if file size unknown. In systems in which variables of type `long` have a size of 32 bits, the value for the file size is truncated if it no longer fits in the field. The complete value for the file size can be found in the *fmaxsize* field.

legalqual
: legal qualification

cre_user
: user who created the file

cre_date
: time at which file was created, or 0 if time unknown.
The time is specified in internal format (seconds since 1.1.1970 00:00:00).

mod_user
: user who last modified the file contents

mod_date
: time at which the file contents were last modified, or 0 if time unknown.
The time is specified in internal format (seconds since 1.1.1970 00:00:00).

rea_user
: user who read the file last

rea_date
: time at which the file was last read, or 0 if time unknown.
The time is specified in internal format (seconds since 1.1.1970 00:00:00).

atm_user
: User who last modified the file attributes

atm_date
: time at which the file attributes were last modified, or 0 if time unknown.
The time is specified in internal format (seconds since 1.1.1970 00:00:00).

fsize
: Current file size in bytes or -1 if the file size is unknown. The *fsize* parameter is only available if *ftshowivers* is set to the value `FT_SHOWIV2` and the *options* parameter is specified when *ft_show* is called.

fmaxsize
: Current file size in bytes or -1 if the permitted file size is unknown. The *fmaxsize* parameter is only available if *ftshowivers* is set to the value `FT_SHOWIV2` and the *options* parameter is specified when *ft_show* is called.

errorinfo

Area in which detailed information is stored if an error is encountered (see section “ft_err” on page 17).
The specification of this parameter is optional. If you do not require any more precise error information then you can specify the value NULL for *errorinfo*.

options

The specification of the *options* parameter is optional. If the value NULL is specified then message activity at the program interface is compatible with that of the program interface of openFT < V10.
Alternatively, it is possible to specify the *ft_options* structure (see section “ft_options” on page 18) to activate the openFT message number scheme as of openFT V10 and the extensions to the function.

Return value

0	No error.
-1	Error. No information supplied about the file. The error type is stored in *errorinfo*.

3.14 ft_showdir - Determine the attributes of all files in a directory

You can use *ft_showdir()* to determine the attributes of the files in a directory in the remote system. Each call determines as many attribute records as you have specified in the *bufsize* parameter. If the volume of data in the directory on the remote system is greater then you have to call *ft_showdir()* more than once. Please note that you cannot select files within a directory.

Use the function *ft_show()* to determine the attributes of an individual file/directory.

Directory names must not exceed the length specified in the *maxrfnsize* field of the *ft_prop* structure (see section “ft_properties - Determine properties of the program interface” on page 31).

Syntax

```
#include <ftapi.h>

long ft_showdir(const struct ft_admission *admis,/* input */
                  const struct ft_shwpar *par,     /* input */
                  struct ft_fileinfo *buf,
                  int bufsize,                     /* input */
                  struct ft_err *errorinfo,
                  void *options);                 /* input */
```

Parameter

admis

Transfer admission of the remote system (see section “ft_admission” on page 15).

par

Parameters for the request, which you specify with the structure *ft_shwpar*:

```
struct ft_shwpar
{
   int  shwparvers;       /* input */
   char *fn;              /* input */
   char *mgmtpasswd;      /* input */
   char *fud;             /* input */
   int  fudlen;           /* input */
};
```

The fields of the structure *ft_shwpar* have the following meanings:

shwparvers
: Version of the data structure.
shwparvers must be supplied the value `FT_SPARV1` or `FT_SPARV2`.

fn
: Name of the directory for which the attributes are to be determined.

Absolute and relative path names are permissible. Relative path names refer to the login name specified in the FT profile, when the FTAC function is used, otherwise to the HOME directory, see page 12.

mgmtpasswd
: Password of the directory if it is password-protected.

fud
: Address of a data area for the so-called “Further Details“ which can indicate a more detailed cause of error if errors occur.
If NULL is specified then no more detailed error cause is output. The *fud* parameter is only available if *shwparvers* is set to the value `FT_SPARV2` and the *options* parameter is specified when *ft_showdir* is called.

fudlen
: Length of the data area for *fud*.
The *fudlen* parameter is only available if *shwparvers* is set to the value `FT_SPARV2` and the *options* parameter is specified when *ft_showdir* is called.

buf

Area in which the file attributes are written. The area comprises elements with the structure *ft_fileinfo*:

```
#define ACC_LEN       65
#define INFO_FN_LEN  257
#define LQ_LEN        81
#define USER_LEN      68

struct ft_fileinfo
{
   int   ftshowivers;                 /* input  */
   char  fn[INFO_FN_LEN];             /* output */
   enum  ft_ftype filetype;           /* output */
   enum  ft_charset charset;          /* output */
   enum  ft_rform recordform;         /* output */
   long  recsize;                     /* output */
   enum  ft_available availability;   /* output */
   int   access;                     /* output */
   char  accout[ACC_LEN];             /* output */
   long  size;                        /* output */
   long  maxsize;                     /* output */
   char  legalqual[LQ_LEN];           /* output */
   char  cre_user[USER_LEN];          /* output */
   long  cre_date;                     /* output */
   char  mod_user[USER_LEN];           /* output */
   long  mod_date;                     /* output */
   char  rea_user[USER_LEN];           /* output */
   long  rea_date;                     /* output */
   char  atm_user[USER_LEN];           /* output */
   long  atm_date;                     /* output */
   long  long fsize;                   /* output */
   long  long fmaxsize;                /* output */
};
```

The fields of the structure *ft_fileinfo* have the following meanings:

ftshowivers
: Version of the data structure.
ftshowivers must be supplied the value `FT_SHOWIV1` or `FT_SHOWIV2`. *ftshowivers* need only be set in the first passed data structure.

fn
: file name or directory name

filetype
: file type:

`FT_TYPEUNKN`
: File type unknown

`FT_BIN`
: Binary file

`FT_DIR`
: Directory

`FT_TXT`
: Text file

charset
: Character set (only for text files):

`FT_NOSET`
: Unknown character set

`FT_VISIBLE`
: The file can contain characters from the ISO646 G0 set.

`FT_IA5`
: The file can contain characters from the ISO646 C0 set and G0 set.

`FT_GRAPHIC`
: The file can contain characters from the ISO646 G0 set or from the ISO8859-1 G0 set and the ISO8859-1 G1 set.

`FT_GENERAL`
: The file can contain characters from the ISO646 C0 set, the ISO646 or ISO8859-1 G0 set and the ISO8859-1 G1 set.

recordform
: Record format:

  `FT_NOFORM`
  : Unknown record format

  `FT_VARIABLE`
  : Variable length records

  `FT_FIXED`
  : Fixed length records

  `FT_UNDEF`
  : Undefined record length

recsize
: Maximum record length or 0 if the maximum record length is unknown.

availability
: Availability of the file:

  `FT_NOAVAIL`
  : The availability is not defined.

  `FT_AVAILIMM`
  : The file is available immediately.

  `FT_AVAILNIMM`
  : The file is not available immediately.

access
: Access rights. The right is present if the bit is set. The following bits are defined:

  `FT_ACCR`
  : The file may be read.

  `FT_ACCI`
  : File units may be added to the file.

  `FT_ACCP`
  : The file may be overwritten.

  `FT_ACCX`
  : The file may be extended, i.e. data can be added to the file.

  `FT_ACCE`
  : File units may be deleted from the file.

  `FT_ACCA`
  : File attributes may be read.

  `FT_ACCC`
  : File attributes may be modified.

  `FT_ACCD`
  : The file may be deleted.

account
: account number used to charge costs in the remote system

size
: current file size in bytes, or -1 if file size unknown. In systems in which variables of type `long` have a size of 32 bits, the value for the file size is truncated if it no longer fits in the field. The complete value for the file size can be found in the *fsize* field.

maxsize
: permissible file size, or -1 if file size unknown. In systems in which variables of type `long` have a size of 32 bits, the value for the file size is truncated if it no longer fits in the field. The complete value for the file size can be found in the *fmaxsize* field.

legalqual
: legal qualification

cre_user
: user who created the file

cre_date
: time at which file was created, or 0 if time unknown.
The time is specified in internal format (seconds since 1.1.1970 00:00:00).

mod_user
: user who last modified the file contents

mod_date
: time at which the file contents were last modified, or 0 if time unknown.
The time is specified in internal format (seconds since 1.1.1970 00:00:00).

rea_user
: user who read the file last

rea_date
: time at which the file was last read, or 0 if time unknown.
The time is specified in internal format (seconds since 1.1.1970 00:00:00).

atm_user
: file user who last modified the file attributes

atm_date
: time at which the file attributes were last modified, or 0 if time unknown.
The time is specified in internal format (seconds since 1.1.1970 00:00:00).

fsize
: Current file size in bytes or -1 if the file size is unknown. The *fsize* parameter is only available if *ftshowivers* is set to the value `FT_SHOWIV2` and the *options* parameter is specified when *ft_showdir* is called.

fmaxsize

Current file size in bytes or -1 if the permitted file size is unknown. The *fmaxsize* parameter is only available if *ftshowivers* is set to the value `FT_SHOWIV2` and the *options* parameter is specified when *ft_showdir* is called.

bufsize

Size of *buf*, i.e. maximum number of elements with the structure *ft_fileinfo* that will fit in *buf*.

errorinfo

Area in which detailed information is stored if an error is encountered (see section “ft_err” on page 17).
The specification of this parameter is optional. If you do not require any more precise error information then you can specify the value NULL for *errorinfo*.

options

The specification of the *options* parameter is optional. If the value NULL is specified then message activity at the program interface is compatible with that of the program interface of openFT < V10.
Alternatively, it is possible to specify the *ft_options* structure (see section “ft_options” on page 18) to activate the openFT message number scheme as of openFT V10 and the extensions to the function.

Return value

n	Number of files found in the remote directory ($n \geq 0$). If *n* is greater than *bufsize*, the first *bufsize* entries are stored in *buf*. If *buf* has the value NULL, the function call behaves as though *bufsize* had the value 0.
-1	Error. No information was returned for the directory. The error type is stored in *errorinfo*.

3.15 ft_transfer - Transfer file

ft_transfer() sends a file to the remote system or fetches a file from the remote system.

In order to transfer files **synchronously**, the parameter *synchron* must contain the value `FT_SYNC`.

In order to transfer files **asynchronously**, the parameter *synchron* must contain the value `FT_ASYNC`.
For asynchronous file transfer, the function *ft_transfer()* returns a request ID which you must specify when you refer to this request.

File names must not exceed the length specified in the *maxlfnsize* or *maxrfnsize* fields of the *ft_prop* structure (see section "ft_properties - Determine properties of the program interface" on page 31.

Syntax

```
#include <ftapi.h>

long ft_transfer(const void *session,            /* input */
                   const struct ft_admission *admis,
                                                   /* input */
                   const struct ft_transpar *par,  /* input */
                   struct ft_err *errorinfo,
                   void *options);                /* input */
```

Parameter

session

For asynchronous transfer:
Number of the session in which the transfer request is to be performed.

For synchronous transfer:
session must have the value NULL.

admis

Transfer admission for the remote system (see section "ft_admission" on page 15).

par Entries for the request which you specify with the structure *ft_transpar*:

```
struct ft_transpar
{
   int    ftparvers;                   /* input */
   enum   ft_direction direction;      /* input */
   enum   ft_sync synchron;            /* input */
   char   *locfn;                      /* input */
   char   *remfn;                      /* input */
   enum   ft_filetype filetype;        /* input */
   enum   ft_writemode writemode;      /* input */
   enum   ft_compress compress;        /* input */
   char   *filepasswd;                 /* input */
   char   *locsuccproc;                /* input */
   char   *locfailproc;                /* input */
   char   *remsuccproc;                /* input */
   char   *remfailproc;                /* input */
   long   maxrecsize;                  /* input */
   long   cantime;                     /* input */
   long   starttime;                   /* input */
   enum   ft_prio priority;            /* input */
   enum   ft_transpar transparent;     /* input */
   enum   ft_encrypt encryption;       /* input */
   struct ft_transftam *ftamext;       /* input */
   char   *locccsn;                    /* input */
   char   *remccsn;                    /* input */
   enum   ft_tabexp tabexp;            /* input */
   char   *fud;                        /* input */
   int    fudlen;                      /* input */
   enum   ft_rform rform;              /* input */
};
```

Note

Default values apply to certain parameters (see below) if you initialize this parameter list with the entries for the file transfer request with binary 0.

To initialize the parameter list with binary 0, use the command:

```
memset (transpar, '\0', sizeof(struct ft_transpar));
```

The fields of the structure *ft_transpar* have the following meanings:

ftparvers
: Version of the data structure.
ftparvers must be supplied the value `FT_TPARV1` or `FT_TPARV2`.

direction
: Direction of file transfer:

`FT_SEND`
: Send file to the remote system

`FT_RECEIVE`
: Fetch file from remote system. You cannot use wildcards when fetching a file.

synchron
: specifies how the file is to be transferred:

`FT_ASYNC`
: asynchronous transfer (default value after initialization with binary 0)

`FT_SYNC`
: synchronous transfer

locfn
: File name in local system or preprocessing/postprocessing command.

In the case of local file names, it is now also possible to specify a preprocessing (when sending data) or postprocessing (when receiving data) command.

Absolute and relative path names are permissible. Relative path names refer to the directory in which the program is started.

remfn
: File name in the remote system or preprocessing/postprocessing command.

In the case of remote file names, it is now also possible to specify a preprocessing (when sending data) or postprocessing (when receiving data) command.

Absolute and relative path names are permissible. Relative path names refer to the login name specified in the FT profile when the FTAC function is used, otherwise to the HOME directory, see page 12. As in the command ncopy, a preprocessing command may be specified next to it instead of a file name by using a preceding pipe (|) character (see also the command description of ncopy).

filetype

File type in local system:

`FT_NOTYPE`
: No specification of file type. The default values apply (see openFT User Manual, *ft* command). (default value after installation with binary 0)

`FT_TEXT`
: The file contains text with variable record lengths. Records are delimited in Windows by CRLF (X'0D0A') and in Unix systems by the linefeed character \n.

`FT_USER`
: The file contains binary data with variable record length structured by the user. Each record starts with two bytes which indicate the length of the record.

`FT_BINARY`
: The file contains an unstructured sequence of binary data.

writemode

specifies whether a new destination file is to be created or extended:

`FT_NOMODE`
: No syntax is specified. The default values apply (see openFT User Manual, *ft* command). (default value after initialization with binary 0)

`FT_OVERWR`
: An existing destination file is overwritten. If the destination does not already exist, a new one is created.

`FT_EXTEND`
: The file transferred is added at the end of the existing destination file.If the destination does not already exist, a new one is created.

`FT_NEW`
: A new destination file is created and written. IF the destination file already exists, the request is rejected.

compress

specifies whether data compression is to be used in transfer:

`FT_NOCOMPR`

No compression (default value after initialization with binary 0)

`FT_COMPRESS`

Several identical characters in succession are transferred in compressed form (byte compression).

`FT_COMPRESSZIP`

Zip compression. In the case of connections to partners which do not support this compression, operation automatically switches to byte compression or no compression. Zip compression is only available if *ftparvers* is set to the value `FT_TPARV2` and the *options* parameter is specified when *ft_transfer* is called.

filepasswd

Password of the file in the remote system, if protected by password.

locsuccproc

Command executed in the local system following successful asynchronous file transfer.

locsuccproc must not be specified for synchronous file transfer requests.

Variables can be specified within a command or sequence of commands for follow-up processing. Further information is given in section “Commands for the follow-up processing” on page 64.

locfailproc

command executed in the local system when an asynchronous file transfer is aborted due an error.

With synchronous file transfer request, *locfailproc* must not be specified.

Variables can be specified within a command or sequence of commands for follow-up processing. Further information is given below in section “Commands for the follow-up processing” on page 64.

remsuccproc

Command executed in the remote system following successful asynchronous file transfer.

Several partner systems(e.g. openFT for BS2000/OSD) even support sequence of commands. Following successful transfer, these commands are executed in the remote system under the specified login.

Variables can be specified within a command or sequence of commands for follow-up processing. Further information is given below in section "Commands for the follow-up processing" on page 64".

remfailproc

Command executed in the remote system following unsuccessful asynchronous file transfer.

Several partner systems(e.g. openFT for BS2000/OSD) even support sequence of commands. These commands are executed in the remote system under the specified login when file transfer that has been started is aborted due to an error.

Variables can be specified within a command or sequence of commands for follow-up processing. Further information is given below in section "Commands for the follow-up processing" on page 64.

Commands for the follow-up processing

– The total number of entries for local follow-up processing, i.e. for *locsuccproc* and *locfailproc*, may not exceed 1000 characters.

– The total number of entries for remote follow-up processing, i.e. for *remssuccproc* and *remfailproc*, may not exceed 1000 characters.

– When starting follow-up processing in the local system, the variables are substituted with the values supplied by the *ft_transfer()* function.

  The variable %FILENAME is provided for the file name, %PARTNER for the partner name, %RESULT for the result of the request and %RID for the request ID.

  %RID is only allowed for local follow-up processing.

  After follow-up processing is started, the variables in the particular system are replaced and the commands in the follow-up processing are executed. The following variable substitutions are permitted:

  – %FILENAME
    by the file name as specified for the corresponding system in the request

- %PARTNER
  for local follow-up processing the partner name specified in the call is used.
  For follow-up processing in the remote system, %PARTNER is substituted by the name of the initiator system (with the name as known in the partner system).
- %RESULT
  by the message number of the request as specified for the relevant system. Thus, for example, if a request is executed successfully, %RESULT is assigned the value 0 (if the value NULL is specified for *options* then the messages output at the program interface are compatible with those of the program interface in openFT < V10).
- %RID
  by the request ID of the request in the local system (only local follow-up processing)

If the partners partner is an openFT for BS2000/OSD system, you may also use the variables %ELEMNAME, %ELEMVERS and %ELEMTYPE.

- During follow-up processing in the local Windows system, only the system environment variables are available.
- Follow-up processing in the local Unix system and follow-up processing in a remote Unix does not involve execution of the sequence of commands stored in the *.profile* file. Only the default values of the $HOME, $LOGNAME, $PATH, and $USER shell variables are available, as well as the values of the $LANG and $TZ variables set by *root*.
- When specifying BS2000 commands, remember to insert a slash (/) at the beginning of the command
- With requests for FTAM and FTP partners, only the “local follow-up processing” function is available. If FTAC is used in the remote system, this restriction can be avoided by creating an FT profile in the remote system and defining follow-up processing for it.

maxrecsize

maximum permissible record length for files of type „text file“ and „structured binary file“. Thus, it is also possible to transfer and store records which are larger than the default value. However, you must observe that not all record lengths can be preprocessed in every partner system.

The maximum value must not exceed the length specified in the field *maxrecord* of the *ft_prop* structure (see section “ft_properties - Determine properties of the program interface” on page 31).

If you have selected the file type „binary“, *maxrecsize* id the value for all records in the send file.

With FTAM partners, specification of the maximum record length is only effective when the file type `FT_TEXT`, `FT_USER` or `FT_BINARY` is specified for *filetype*.

cantime

Time at which a file transfer request is to be canceled. This time must be specified in internal format (seconds since 1.1.1970 00:00:00).

The value 0 means that no time cancellation is performed.

With synchronous requests, *cantime* is ignored.

starttime

specifies the earliest time at which file transfer is to be started. This time must be specified in internal format (seconds since 1.1.1970 00:00:00).

The value 0 means that the file transfer is started as soon as possible.

For synchronous requests, *starttime* is ignored.

priority

specifies the priority of the request:

`FT_PRIONORM`
Normal priority (default value after initialization with binary 0)

`FT_PRIOLOW`
Low priority (is ignored for synchronous requests)

transparent

specifies whether the file transfer is to be transparent:

`FT_NOTRANSPAR`
normal transfer (default value after initialization with binary 0)

`FT_TRANSPARENT`
Transparent file transfer

encryption

specifies whether the user data are to be encrypted or whether a data integrity check is to be performed:

`FT_NOENCRYPT`

User data are not encrypted and no data integrity check is performed (default value after initialization with binary 0)

`FT_ENCRYPT`

User data are encrypted and data integrity is checked automatically. openFT-CR must be installed to enable this.

`FT_ONLYDICHECK`

A data integrity check is performed for the transferred file contents. The data integrity check is only available if *ftparvers* is set to the value `FT_TPARV2` and the *options* parameter is specified when *ft_transfer* is called.

ftamext

FTAM-specific parameter made known with the structure *ft_transftam* (see also the commands *ft* and *ncopy*, options *-av*, *-ac*, *-am*, *-lq* and *-cp*):

```
struct ft_transftam
{
   enum ft_available available;     /* input */
   char  *account;                  /* input */
   int   accessmode;                /* input */
   char  *legalq;                   /* input */
   char  *crpasswd;                 /* input */
};
```

The fields of the structure *ft_transftam* have the following meanings:

available

specifies the availability of the destination file:

`FT_NOAVAIL`:

No specification of availability (default value after initialization with binary 0)

`FT_AVAILIMM`:

The destination file contains the attribute “immediately available“.

`FT_AVAILNIMM`:

The destination file contains the attribute “not immediately available“.

account

account number for FTAM partners

accessmode

specifies the access rights for the destination file. The access rights are created by logical ORing of the individual rights:

`FT_ACCR`:
The file may be read.

`FT_ACCI`:
File units may be inserted into the file.

`FT_ACCP`:
The file may be overwritten.

`FT_ACCX`:
The file may be extended, i.e. data can be appended to the file.

`FT_ACCE`:
File units may be deleted from the file.

`FT_ACCA`:
File attributes may be read.

`FT_ACCC`:
File attributes may be modified.

`FT_ACCD`:
The file may be deleted.

legalq

stipulates the copyright for the destination file.

crpasswd

Password required to create a file in the remote system.

locccsn

Specifies the name of the coding (CCS name) used to read or write the local file. *CCS-name* must be known in the local system.

If no coding is specified then the default coding value set for openFT via the operating parameters is used.

Support for “Coded Character Sets“ (CCS) is only available if *ftparvers* is set to the value `FT_TPARV2` and the *options* parameter is set when *ft_transfer* is called.

remccsn

Specifies the name of the coding (CCS name) used to read or write the remote file. *CCS-name* must be known in the remote system. If no coding is specified then character set defined via XHCS (BS2000/OSD) or via the openFT operating parameters (other platforms) is used for coding.

Support for “Coded Character Sets“ (CCS) is only supported for the openFT protocol and for partners with openFT V10.0 or higher and is only available if *ftparvers* is set to the value `FT_TPARV2` and the *options* parameter is set when *ft_transfer* is called.

tabexp

In the case of an outbound send request, specifies whether tabulator expansion and the conversion of blank lines into lines with a character for non-FTAM partners are to be performed. Tabulator expansion is only available if *ftparvers* has the value `FT_TPARV2` and the *options* parameter is specified when *ft_transfer* is called.

`FT_TABAUTO`

Tabulator expansion and the conversion of blank lines are activated when a file is sent to a BS2000, OS/390 or z/OS system (default value after initialization with binary 0).

`FT_TABON`

Tabulator expansion and the conversion of blank lines are activated.

`FT_TABOFF`

Tabulator expansion and the conversion of blank lines are deactivated.

fud

Address of a data area for the so-called “Further Details““ which can indicate a more detailed cause of error if errors occur.
If NULL is specified then no more detailed error cause is output. The *fud* parameter is only available if *ftparvers* is set to the value `FT_TPARV2` and the *options* parameter is specified when *ft_transfer* is called.

fudlen

Length of the data area for *fud*.
The *fudlen* parameter is only available if *ftparvers* is set to the value `FT_TPARV2` and the *options* parameter is specified when *ft_transfer* is called.

rform

Specifies the record format of the file that is to be transferred. The *rform* parameter is only available if *ftparvers* is set to the value `FT_TPARV2` and if the *options* parameter is specified when *ft_transfer* is specified.

`FT_NOFORM`

The record format of the file that is to be transferred is unknown (default value after initialization with binary 0).

`FT_VARIABLE`

The file to be transferred contains records with a variable record length.

`FT_FIXED`

The file to be transferred contains records with a standard, fixed record length.

`FT_UNDEF`

The file to be transferred contains records with an undefined record length.

errorinfo

Area in which detailed information is stored if an error is encountered (see section "ft_err" on page 17).
The specification of this parameter is optional. If you do not require any more precise error information then you can specify the value NULL for *errorinfo*.

options

The specification of the *options* parameter is optional. If the value NULL is specified then message activity at the program interface is compatible with that of the program interface of openFT < V10.
Alternatively, it is possible to specify the *ft_options* structure (see section "ft_options" on page 18) to activate the openFT message number scheme as of openFT V10 and the extensions to the function.

Return value

n For successful asynchronous requests: request ID ($n \neq 0$)

1 For successful synchronous requests

0 Error. File transfer was not initiated.
The error type is stored in *errorinfo*.

3.16 ft_xcopen - Execute command in the remote system

ft_xcopen() executes the command synchronously in the remote system.

Syntax

```
#include <ftapi.h>

void *ft_xcopen(const struct ft_admission *admis,      /* input */
                struct ft_xcpar *par,
                struct ft_err *errorinfo,
                void *options);                        /* input*/
```

Parameters

admis Specifications for the remote system (see section "ft_admission" on page 15).

par Specifications for the request which you declare in the structure *ft_xcpar*:

```
struct ft_xcpar
{
   int xcparvers;                      /* input */
   char *cmd;                          /* input */
   enum ft_filetype type;              /* input */
   enum ft_encrypt encryption;         /* input */
   char *locccsn;                      /* input */
   char *remccsn;                      /* input */
   int retcode;                        /* output */
   long long outlen;                   /* output */
   long long errlen;                   /* output */
   char *fud;                          /* input */
   int fudlen;                         /* input */
};
```

The fields of the *ft_xcpar* structure have the following meaning:

xcparvers
: Version of the data structure.
xcparvers must have the value `FT_XCPARV1`.

cmd
: The command that is to be executed on the partner system. The maximum value must not exceed the length specified in the field *maxcmdlen* of the *ft_prop* structure (see section "ft_properties - Determine properties of the program interface" on page 31).

type
: Data type of the transferred user data (in *stdout*). The following values are permitted:

  `FT_TEXT`
  : Specifies the transfer format as text. Tabulator expansion is deactivated (default value if a CCS name is specified for *locccsn* and/or *remccsn*).

  `FT_BINARY`
  : Specifies the transfer format as binary without conversion. (Default value if no CCS name is specified in *locccsn* and *remccsn*.

encryption
: Specifies whether the user data is to be encrypted. The following values are permitted:

  `FT_NOENCRYPT`
  : User data is not encrypted (default value following initialization with binary 0).

  `FT_ENCRYPT`
  : User data is encrypted. For this to be possible, openFT-CR must be installed. If the partner system cannot operate with encryption then the request is rejected.

locccsn
: Specifies the designation of the coding (CCS name) that is to be used when writing the data for the default output. *CCS name* must be known in the local system.

  If no coding is specified then the default value for coding set in the openFT operating parameters is used. The *locccsn* parameter must not be used in combination with `FT_BINARY`.

remccsn
: Specifies the designation of the coding (CCS-NAME) that is to be used when writing the data for the default output from the remote command. *CCS name* must be known in the remote system.

  If no coding is specified then the character set specified via XHCS (BS2000/OSD) or in the openFT operating parameters (other platforms) is used for coding. The *remccsn* parameter must not be used in combination with `FT_BINARY`.

  i Supported only for the openFT protocol and for partners with openFT as of V10.0. Please note that not all partner systems support all the character sets that are possible in the local system.

retcode
Return code from remote command execution

outlen Number of read data bytes for *stdout*.

errlen Number of read data bytes for *stderr*.

fud Address of a data area for the so-called "Further Details" which can indicate a more detailed cause of error if errors occur. If `NULL` is specified then no more detailed error cause is output.

fudlen
Length of the data area for *fud*.

errorinfo
Area in which detailed information is stored if an error is encountered (see section “ft_err” on page 17).
The specification of this parameter is optional. If you do not require any more precise error information then you can specify the value NULL for *errorinfo*.

options
options must have the value `FT_APIV3`. The specification of this parameter is mandatory. The construction of the *ft_options* structure is described in section “Version of the program interface” on page 18.

Return value

id ID of the request. This must be specified for both *ft_sdinfo()* and *ft_sdclose()*.

NULL Error. The error type is stored in *errorinfo*.
If an error occurs then it is not necessary to call *ft_sdclose()*.

3.17 ft_xcinfo - Read the data generated by the command

ft_xcinfo() reads the data output by the command that was executed in the remote system using *ft_xcopen()*.

ft_xcinfo can be called more than once for each output channel (*stdout*, *stderr*). On each call, the next data that has not yet been read is written to the buffer *buf*.

Syntax

```
#include <ftapi.h>

int ft_xcinfo(void *id,                             /* input */
              struct ft_xcipar *par,
              int buflen,                           /* input */
              char *buf,
              struct ft_err *errorinfo);
```

Parameters

id ID of the request (return value from *ft_xcopen*)

par Specifications for the request which you declare in the structure *ft_xcipar*:

```
struct ft_xcipar
{
   int xciparvers;                     /* input */
   enum ft_chn channel;                /* input */
   char *fud;                          /* input */
   int fudlen;                         /* input */
};
```

The fields of the *ft_xcipar* structure have the following meaning:

xciparvers
: Version of the data structure. *xciparvers* must have the value `FT_XCIPARV1`.

channel
: Channel selection. The following values are permitted:

  `FT_STDOUT`
  : stdout channel

  `FT_STDERR`)
  : stderr channel

fud Address of a data area for the so-called "Further Details" which can indicate a more detailed cause of error if errors occur. If `NULL` is specified then no more detailed error cause is output.

fudlen Length of the data area for *fud*.

buflen
Size of the data area for the output data

buf Address of the data area for the output data

errorinfo
Area in which detailed information is stored if an error is encountered (see section "ft_err" on page 17).
The specification of this parameter is optional. If you do not require any more precise error information then you can specify the value NULL for *errorinfo*.

Return value

n	Number of bytes written to the buffer *buf*.
0	All the data has already been read, the buffer is empty.
-1	Error. The error type is stored in *errorinfo*.

3.18 ft_xcclose - Terminate command execution

ft_xcclose() terminates the read-out of the data output by the command that was executed in the remote system using *ft_xcopen()*.

This function must be called as the final operation following a successful call of *ft_xcopen()*. *ft_xcclose()* releases resources that are no longer required. You cannot subsequently reference this ID again.

Syntax

```
#include <ftapi.h>

int ft_xcclose(void *id,                                /* input */
               struct ft_err *errorinfo);
```

Parameters

id ID of the request (return value from *ft_xcopen*)

errorinfo
Area in which detailed information is stored if an error is encountered (see section "ft_err" on page 17).
The specification of this parameter is optional. If you do not require any more precise error information then you can specify the value NULL for *errorinfo*.

Return value

0	No error
-1	Error. The error type is stored in *errorinfo*.

4 Error codes

Error codes entered in the structure *ft_err* (see section "ft_err" on page 17), are made up of the following fields:

– main (error class)
– detail (error)
– additional (additional error information)

The error messages are sorted according to error classes in the list below. The following error classes are used:

FTEM_INT	Internal error
FTEM_PAR	Parameter error
FTEM_LOCERR	Sequence error in the local system
FTEM_CONNERR	Sequence error in the connection to the partner
FTEM_REMERR	Sequence error in the remote system

Table 1:

In the list below, error messages classified as parameter errors are assigned to the function calls in cases where the errors are not general.

4.1 Internal errors

Error class	**Error**	**Additional error information**	**Meaning**
`FTEM_INT`	`FTED_MEM`	`0`	Error on request for memory
`FTEM_INT`	`FTED_CRFILE`	`0`	Error on creation of the file
`FTEM_INT`	`FTED_INIT`	`0`	The server cannot be initialized
`FTEM_INT`	`FTED_SIGNAL`	*`signal`*	Command interrupted by *signal* . *signal* designates the signal that caused the interruption.
`FTEM_INT`	*`function`*	*`errno`*	Error on system call. *function* designates the errored system call: `FTED_FORK` fork `FTED_OPEN` open `FTED_OPENDIR` opendir `FTED_PIPE` pipe `FTED_READ` read `FTED_RMFILE` rmfile `FTED_STAT` stat `FTED_SYSTEM` system `FTED_WRITE` write *errno* is the value of the errno variable set by the errored system call. If not all bytes could be written, *errno* has the value `-1`.
`FTEM_INT`	`FTED_INTERNAL`	*`reason`*	Other internal error. *reason* designates the cause of the error, if known: `FTEA_FN` function not supported by server `FTEA_VERS` Version of file structure not supported by server

4.2 Parameter errors

General errors

Error class	Error	Additional error information	Meaning
FTEM_PAR	FTED_INVSESS	0	The session number is invalid.
FTEM_PAR	FTED_LEN	*parameter*	*parameter* designates the parameter which is too long: FTEA_REMACC remaccount FTEA_REMADM remadmis FTEA_REMPWD rempasswd FTEA_REMSYS remsys
FTEM_PAR	FTED_MAND	FTEA_REMSYS	The remote system was not specified.
FTEM_PAR	FTED_VALUE	FTEA_APIVERS	The API version specified in *ft_options* is invalid.
FTEM_PAR	FTED_MAND	*parameter*	*parameter* designates the missing mandatory parameter: FTEA_REMSYS remsys or admis was not specified FTEA_OPTIONS options was not specified.
FTEM_PAR	FTED_VALUE	FTEA_RID	The request ID (rid) is invalid.
FTEM_PAR	FTED_VERS	0	The version of the file structure (parameter list or output range) is invalid.

Error for ft_cancel

Error class	Error	Additional error information	Meaning
FTEM_PAR	FTED_TERM	0	The request is already terminated.

Errors for ft_credir

Error class	Error	Additional error information	Meaning
FTEM_PAR	FTED_LEN	*parameter*	*parameter* designates the parameter, which is too long: FTEA_FPWD mgmtpasswd FTEA_REMFN dn
FTEM_PAR	FTED_MAND	0	The parameter list *par* was not specified.
FTEM_PAR	FTED_REMOTE	FTEA_NOACCESS	No authorization to create in remote system
FTEM_PAR	FTED_REMOTE	FTEA_EXIST	Directory already exists in remote system.
FTEM_PAR	FTED_VALUE	*parameter*	*parameter* designates the parameter which is invalid: 0 unknown parameter/parameters are incompatible FTEA_FPWD mgmtpasswd FTEA_REMACC remaccount FTEA_REMADM remadmis FTEA_REMFN remfn FTEA_REMPWD rempasswd FTEA_REMSYS remsys

Error for ft_delete

Error class	Error	Additional error information	Meaning
FTEM_PAR	FTED_LEN	*parameter*	*parameter* designates the parameter which is too long: FTEA_FPWD mgmtpasswd FTEA_REMFN fn
FTEM_PAR	FTED_MAND	0	The parameter list *par* was not specified.
FTEM_PAR	FTED_REMOTE	FTEA_NOACCESS	No authorization to delete in remote system
FTEM_PAR	FTED_REMOTE	FTEA_NOTEMPTY	The directory in the remote system is not empty.
FTEM_PAR	FTED_REMOTE	FTEA_NOTEXIST	File/directory does not exist in remote system.
FTEM_PAR	FTED_VALUE	*parameter*	*parameter* designates the parameter which is invalid: 0 unknown parameter/parameters are incompatible. FTEA_FPWD mgmtpasswd FTEA_FTYPE filetype FTEA_REMACC remaccount FTEA_REMADM remadmis FTEA_REMFN remfn FTEA_REMPWD rempasswd FTEA_REMSYS remsys

Error for ft_open

Error class	Error	Additional error information	Meaning
FTEM_PAR	FTED_DIRAC	*errno*	*errno* designates the value of the errno variable set by the stat() call. The errno variable has the value 0, if no write access is assigned to the directory.
FTEM_PAR	FTED_LEN	0	The name of the working directory (workdir) is too long.
FTEM_PAR	FTED_MAND	0	The name of the working directory (workdir) was not specified.
FTEM_PAR	FTED_NODIR	0	The specified name (workdir) is not a directory.
FTEM_PAR	FTED_OPEN	0	A session in a program has already been assigned this working directory (workdir).
FTEM_PAR	FTED_VALUE	0	The name for the working directory (workdir) is invalid.

Error for ft_reqstat

Error class	Error	Additional error information	Meaning
FTEM_PAR	FTED_MAND	0	The output range *stat* was not specified.

Error on ft_reqterm

Error class	Error	Additional error information	Meaning
FTEM_PAR	FTED_NOTERM	0	The request is still active.

Error for ft_show and ft_showdir

Error class	Error	Additional error information	Meaning
FTEM_PAR	FTED_LEN	*parameter*	*parameter* designates the parameter which is too long: FTEA_FPWD mgmtpasswd FTEA_REMFN fn
FTEM_PAR	FTED_MAND	0	The parameter list *par* was not specified. The output range *info* was not specified (only for *ft_show()*).
FTEM_PAR	FTED_REMOTE	FTEA_NOACCESS	No authorization to read attributes in the remote system
FTEM_PAR	FTED_REMOTE	FTEA_NOTEXIST	File/directory does not exist in the remote system.
FTEM_PAR	FTED_VALUE	*parameter*	*parameter* designates the parameter which is invalid: 0 unknown parameter/parameters are incompatible. FTEA_FPWD mgmtpasswd FTEA_REMACC remaccount FTEA_REMADM remadmis FTEA_REMFN remfn FTEA_REMPWD rempasswd FTEA_REMSYS remsys

Error for ft_transfer

Error class	Error	Additional error information	Meaning
FTEM_PAR	FTED_LEN	*parameter*	*parameter* designates the parameter which is too long: FTEA_ACCOUNT ftamext -> account FTEA_CRPWD ftamext -> crpasswd FTEA_FPWD filepasswd FTEA_LEGALQ ftamext -> legalq FTEA_LOCCCSN locccsn FTEA_LOCFN locfn FTEA_LOCPR Sum of the lengths of locsuccproc and locfailproc FTEA_REMCCSN remccsn FTEA_REMFN remfn FTEA_REMPR Sum of the lengths of remsuccproc and remfailproc
FTEM_PAR	FTED_MAND	*parameter*	*parameter* designates the parameter which was not specified: 0 The parameter list *par* was not specified. FTEA_LOCFN locfn

Error class	Error	Additional error information	Meaning
FTEM_PAR	FTED_VALUE	*parameter*	*parameter* designates the parameter which is invalid: FTEA_ACCESS ftamext -> accessmode FTEA_AVAIL ftamext -> available FTEA_CANTIME cantime FTEA_COMPR compress FTEA_DIR direction FTEA_ENCRYPT encryption FTEA_FTYPE file type FTEA_MAXREC maxrecsize FTEA_PRIO priority FTEA_REMADM remadm. The user ID/transfer admission in the remote system is invalid. FTEA_REMFN remfn. The specified file does not exist/ no access permitted. FTEA_REMSYS remsys. The specified remote system is unknown. FTEA_SYNC synchronous FTEA_RFORM rform FTEA_STARTTIME start time FTEA_TABEXP tabexp FTEA_TRANSP transparent FTEA_WMODE write mode

Error for ft_sdopen

Error class	Error	Additional error information	Meaning
FTEM_PAR	FTED_LEN	*parameter*	*parameter* designates the parameter which is too long: FTEA_TRANSP transparent FTEA_REMFN fn
FTEM_PAR	FTED_MAND	0	0 The parameter list *par* was not specified.
FTEM_PAR	FTED_REMOTE	FTEA_NOACCESS	No authorization to read attributes in the remote system.
FTEM_PAR	FTED_REMOTE	FTEA_NOTEXIST	File/directory does not exist in the remote system.

Error for ft_sdinfo

Error class	Error	Additional error information	Meaning
FTEM_PAR	FTED_MAND	FTEA_ID	The parameter *id* was not specified.
FTEM_PAR	FTED_VALUE	FTEA_BUFL	The buffer was not specified (buf=NULL or bufsize<=0).

Error for ft_xcopen

Error class	Error	Additional error information	Meaning
FTEM_PAR	FTED_MAND	0	The parameter list *par* was not specified.
FTEM_PAR	FTED_MAND	FTEA_CMD	The command *cmd* was not specified.
FTEM_PAR	FTED_LEN	FTEA_CMD	The command *cmd* is too long.

Error for ft_xcinfo

Error class	Error	Additional error information	Meaning
FTEM_PAR	FTED_MAND	FTEA_ID	The parameter *id* was not specified.
FTEM_PAR	FTED_MAND	FTEA_BUFL	The buffer was not specified (buf=NULL or bufsize<=0).
FTEM_PAR	FTED_LEN	FTEA_CHAN	The output channel was not specified (FT_STDOUT or FT_STDERR).

4.3 Sequence errors

General errors

Error class	Error	Additional error information	Meaning
`FTEM_PAR`	`FTED_FTMSG`	*code*	*code* designates the message number of the corresponding command (see the openFT User Manual). The associated message text can also be determined using the *fthelp code* command.

Error in the local system

Error class	Error	Additional error information	Meaning
`FTEM_LOCERR`	`FTED_EXIST`	0	The local file already exists.
`FTEM_LOCERR`	`FTED_FTAC`	0	The request was rejected by the local FTAC.
`FTEM_LOCERR`	`FTED_INCONS`	0	The local file is inconsistent.
`FTEM_LOCERR`	`FTED_MEM`	0	The local file has no memory.
`FTEM_LOCERR`	`FTED_NOACCESS`	0	The local file cannot be accessed.
`FTEM_LOCERR`	`FTED_NOCREAT`	0	The local file cannot be created.
`FTEM_LOCERR`	`FTED_NOTEXIST`	0	The local file cannot be found.

Error in connection to the remote system

Error class	Error	Additional error information	Meaning
`FTEM_CONNERR`	`FTED_NOCONN`	0	No free transport connection
`FTEM_CONNERR`	`FTED_NOTAVAIL`	0	The remote system is not available.
`FTEM_CONNERR`	`FTED_UNKNOWN`	0	The remote system is unknown.

Error in remote system

Error class	Error	Additional error information	Meaning
`FTEM_REMERR`	`FTED_EXIST`	0	The remote file does already exists.
`FTEM_REMERR`	`FTED_INCONS`	0	The remote file is inconsistent.
`FTEM_REMERR`	`FTED_MEM`	0	The remote file has no memory.

Error class	Error	Additional error information	Meaning
`FTEM_REMERR`	`FTED_NOACCESS`	`0`	The remote file cannot be accessed.
`FTEM_REMERR`	`FTED_NOCREAT`	`0`	The remote file cannot be created.
`FTEM_REMERR`	`FTED_NOTEXIST`	`0`	The remote file cannot be found.
`FTEM_REMERR`	`FTED_REMADM`	`0`	The remote transfer admission is invalid.

5 Sample programs

The sample programs that are supplied with openFT show you the various options for using the program interface. The source codes of these programs can be found in the following subdirectory of the openFT installation directory:

– Windows: *openFT\samples\ftapi*
– Unix systems: */opt/openFT/samples*

i In the sample programs, the transfer admission to the partner must be an FTAC admission, i.e. the sample programs do not support the specification of a user ID together with a password.

Sample 1: Asynchronous file transfer of a file

The program *sample1* is called in this way:

`sample1` *file1 file2*

Name and transfer admission to the remote system are then queried in a dialog. For the program to run, the following directory must exist:

– Windows: the working directory `%TMP%\ft`
– Unix systems: the working directory `$HOME/ft`

The program transfers the file *file1* asynchronously from the local system to remote system and stored it there under the name *file2* in the HOME directory of the user or under the login name specified in the T profile. The precondition for this is that the file to be sent, *file1,* is located in the same directory as the one in which the program is called. If a SIGINT signal is created by the user (e.g by entering CTRL+C under Windows), file transfer is aborted, provided that it has not yet been completed.

The program is structured as follows:

- Since the file is to be transferred asynchronously, a session is first opened with the function *ft_open()*, where `%TMP%\ft` (under Windows) resp. `$HOME/ft` (under Unix systems) is permanently assigned as working directory.
- *ft_open()* returns a session number, which identifies the session and must be specified with further function calls.
- The asynchronous file transfer is initiated with the *ft_transfer()* function, which returns the request ID for the request.
- From now on, the program queries whether a SIGINT signal was created by the user. If so, the request is aborted with the *ft_cancel()* function.
- As long as file transfer has not been terminated or aborted, the *ft_reqstat()* queries the status of the file transfer request.
- If file transfer is completed or has been aborted, the request is marked as terminated with the *ft_reqterm()* function and the session closed with the *ft_close()* function.

Sample 2: Several file transfer requests with follow-up processing

The program *sample2* is called in this way:

`sample2` *file1* `[`*file2*`] [`*file3*`] [`*file4*`]`

Name and transfer admission to the remote system are then queried in a dialog. For the program to run, the following directory must exist:

– Windows: the working directory `%TMP%\ft`.
– Unix systems: the working directory `$HOME/ft`

The program fetches each of the files specified asynchronously from the HOME directory of the user of from the login name specified in the FT profile in the remote system. In the local system, the file is stored in the directory with the same name as the one from which the program was called. If a file of this name already exists there then it is overwritten.

If file transfer has be completed successfully, the file is printed out in the local system. If the file was not transferred, the user is sent a message. If a SIGINT signal is created by the user (e.g by entering CTRL+C under Windows), while the file has not yet been transferred, the current file transfer request is aborted. No subsequent file transfer requests are initiated.

The program is structured as follows:

- First, a session is first opened with the function *ft_open()*, where `%TMP%\ft` (under Windows) resp. `$HOME/ft` (under Unix systems) is permanently assigned as working directory.
- *ft_open()* returns a session number, which identifies the session and must be specified with further function calls.
- The following procedure is repeated for all file to be transferred:
  - The asynchronous file transfer is initiated with the *ft_transfer()* function.
  - From now on, the program queries whether a SIGINT signal was created by the user. If so, the request is aborted with the *ft_cancel()* function, if the status is „Waiting“ or „Running“.
  - As long a the file transfer has not been completed, the *ft_reqstat()* function queries the status of the file transfer request.
  - If the status of the request is „Terminated“, follow-up processing is started, i.e.the file transferred to the local system is printed.
  - If the status of the request is aborted „Aborted“, a message is output.
  - In all cases, the file transfer request is marked as terminated with the *ft_reqterm()*.
- The session is closed with the *ft_close()* function when all the file specified have been processed.

Sample 3: Display contents of a directory in a remote system

The program *sample3* is called in this way:

```
sample3 dvz1
```

Name and transfer admission to the remote system are then queried in a dialog.

The program reads the entries in directory *dir1* of the remote system and outputs the list on screen. The directory must be specified as an absolute path name, or as relative to the HOME directory (see page 12) of the user or login name specified in the FT profile in the remote system. Up to 10 information entries are output in thi example, even if the directory specified contains more than 10 files/directories.

The program is structured as follows:

- The *ft_showdir()* function reads the information relating to the specified directory in the remote system.
- A buffer is provided for this purpose, which is capable of holding the information on a total of 10 files or directories.
- The number of entries is also supplied.

Sample 4: Remote command execution

The program *sample4* is called in this way:

```
sample4 <command>
```

The name and transfer admission to the remote system are then requested in the dialog box.

The program executes the command in the remote system and outputs the result (return code, *stdout*, *stderr*) on screen. The command must be specified in the same way as for *ftexec*. The admission profile in the remote system must permit command execution.

The program is structured as follows:

- The function *ft_xcopen()* executes the command in the remote system and the results are internally buffered.
- The calling system is informed of the exit code of the executed command and the number of data bytes present at *stdout* and *stderr*.
- The data for *stdout* and *stderr* are read sequentially in a loop using *ft_xcinfo()* and are displayed.
- Finally, *ft_xcclose()* is called to terminate command execution and release resources that are no longer required.

Sample 5: Memory-efficient listing of a remote directory

The program *sample5* is called in this way:

`sample5` *dvz1*

The name and transfer admission to the remote system are then requested in the dialog box.

The program determines the attributes of all the files in the directory*dvz1* in a remote system and outputs them on screen. The directory must be specified either as an absolute path, or relative to the user's HOME directory (see page 12) or relative to the user ID in the remote system as defined in the admission profile. In the example, information is output on all the located files.

The program is structured as follows:

- The function *ft_sdopen()* reads information about the content of the specified directory in the remote system and this is buffered internally.
- The buffer is then read in a loop (20 entries at a time) using *ft_sdinfo()* and is displayed.
- Finally, *t_sdclose()* is called to terminate the identification of the file attributes and release resources that are no longer required.

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