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Chapter 1

cosFileTransfer User’s Guide

The cosFileTransfer Application is an Erlang implementation of the OMG CORBA FileTransfer Service.

1.1 The cosFileTransfer Application

1.1.1 Content Overview

The cosFileTransfer documentation is divided into three sections:

- PART ONE - The User’s Guide
  Description of the cosFileTransfer Application including services and a small tutorial demonstrating the development of a simple service.

- PART TWO - Release Notes
  A concise history of cosFileTransfer.

- PART THREE - The Reference Manual
  A quick reference guide, including a brief description, to all the functions available in cosFileTransfer.

1.1.2 Brief description of the User’s Guide

The User’s Guide contains the following parts:

- cosFileTransfer overview
- cosFileTransfer installation
- A tutorial example

1.2 Introduction to cosFileTransfer

1.2.1 Overview

The cosFileTransfer application is a FileTransfer Service compliant with the OMG Service CosFileTransfer.

\(^1\text{URL: http://www.omg.org}\)
Purpose and Dependencies

If a Virtual File System is started as 'FTP', the intes-2.5.4 application, or later, must be installed. cosFileTransfer is dependent on Orber, which provides CORBA functionality in an Erlang environment, and cosProperty.

Prerequisites

To fully understand the concepts presented in the documentation, it is recommended that the user is familiar with distributed programming, CORBA, the Orber and cosProperty applications. Recommended reading includes CORBA, Fundamentals and Programming - Jon Siegel and Open Telecom Platform Documentation Set. It is also helpful to have read Concurrent Programming in Erlang.

1.3 Installing cosFileTransfer

1.3.1 Installation Process

This chapter describes how to install cosFileTransferApp [page 17] in an Erlang Environment.

Preparation

Before starting the installation process for cosFileTransfer, the application Orber must be running and cosProperty installed by using cosProperty:install(). Please note that it is NOT necessary to use cosProperty:install_db() for running the cosFileTransfer application.

Configuration

When starting the cosFileTransfer application the following configuration parameters can be used:

- buffert_size - default is 64000. This option determine how many bytes will be read at a time when transferring files.

1.4 Using the File Transfer Service

1.4.1 Overview

This chapter describes how two File Transfer Service applications interact.
There are several ways the OMG File Transfer Service can be used. Below one scenario is visualized:

- **Source ORB**: this is the ORB we want to transfer a file from/via and it holds an object reference to a Virtual File System (VFS) which, in this example, represents an FTP server.
- **Target ORB**: the goal may be, for example, to transfer a new file or append to an existing file placed at the location that this ORB's VFS represents. In this scenario it is the local disk or the NFS.
- **Transport Protocol**: initially the ORB's, i.e., target and source, communicate via normal CORBA requests to determine whether or not they can communicate. If the File Transfer Service's have one, or more, Transport Protocol in common the data will be streamed using this protocol. The cosFileTransfer application currently supports TCP/IP and SSL.

Which type of file system the VFS is supposed to represent is determined by the options given when creating it, which is also how one determine which Transport Protocol to use. Hence, the source and target VFS described above can be started by invoking, respectively, the following operations:
1> SVFS = cosFileTransferApp:create_VFS('FTP', [], Host, 21, [{protocol, tcp}]),
2> TVFS = cosFileTransferApp:create_VFS({'NATIVE', 'cosFileTransferNATIVE_file'}, [], OtherHost, 0, [{protocol, tcp}]),

Naturally can any combination of VFS-types be used and it is also possible to use own drivers, i.e.,
{'NATIVE', 'MyDriver'}.

After creating necessary VFS’s we can login in and perform operations on files and directories residing
on each file system.

How To Use SSL

To be able to use SSL as transport protocol a few configuration parameters must be set. The required
parameters depend on if Orber is the target or/and the source ORB. However, the SSL_CERT_FILE variable must be defined in both cases.

Setting of a CA certificate file with an option does not work due to weaknesses in the SSLeay package. A work-around in the ssl application is to set the OS environment variable SSL_CERT_FILE before SSL is started. However, then the CA certificate file will be global for all connections (both incoming and outgoing calls).

Configurations when cosFileTransfer is Used as Target. The following three configuration
variables can be used to configure cosFileTransfer’s SSL target behavior.

- ssl_server_certfile which is a path to a file containing a chain of PEM encoded certificates for
cosFileTransfer as target.
- ssl_server_verify which specifies type of verification: 0 = do not verify peer; 1 = verify peer, verify
client once, 2 = verify peer, verify client once, fail if no peer certificate. The default value is 0.
- ssl_server_depth which specifies verification depth, i.e. how far in a chain of certificates the
verification process shall proceed before the verification is considered successful. The default
value is 1.

There also exist a number of API functions for accessing the values of these variables:

- cosFileTransferApp:ssl_server_certfile/0
- cosFileTransferApp:ssl_server_verify/0
- cosFileTransferApp:ssl_server_depth/0

Configurations when cosFileTransfer is used as Source. Below is the list of configuration variables
used when cosFileTransfer act as the source application.

- ssl_client_certfile which is a path to a file containing a chain of PEM encoded certificates used in
outgoing calls.
- ssl_client_verify which specifies type of verification: 0 = do not verify peer; 1 = verify peer, verify
client once, 2 = verify peer, verify client once, fail if no peer certificate. The default value is 0.
- ssl_client_depth which specifies verification depth, i.e. how far in a chain of certificates the
verification process shall proceed before the verification is considered successful. The default
value is 1.

There also exist a number of API functions for accessing the values of these variables in the client processes:
1.5 cosFileTransfer Examples

1.5.1 A tutorial on how to create a simple service

Initiate the application

To use the complete cosFileTransfer application cosProperty must be installed.

How to run everything

Below is a short transcript on how to run cosFileTransfer.

%% Start Mnnesia and Orber
mnesia:delete_schema([node()]),
mnesia:create_schema([node()]),
orber:install([node()]),
mnesia:start(),
orber:start(),

%% The File Transfer Service depends on the cosProperty
%% application. Hence, we must install cosProperty first.
%% It's NOT necessary to invoke cosProperty:install_db().
cosProperty:install(),

%% Install File Transfer Service in the IFR.
cosFileTransfer:install(),

%% Now start the application and necessary services.
cosFileTransfer:start(),

%% Create two Virtual File Systems respectively representing an FTP-
%% and the local NFS file system.
VFSFTP = cosFileTransferApp:create_VFS('FTP', [], FTPHost, 21),
VFSNATIVE = cosFileTransferApp:
create_VFS({'NATIVE', 'cosFileTransferNATIVE_file'},
[] , MyLocalHost, 0),

%% Login to each system.
{FSFTP, DirFTP} = 'CosFileTransfer_VirtualFileSystem':
login(VFSFTP, "myId", "myPwd", "myAccount"),
{FSNATIVE, DirNATIVE} = 'CosFileTransfer_VirtualFileSystem':
login(VFSNATIVE, "myId", "myPwd", "myAccount"),

%% If we want to copy a file from the NFS to the FTP we must first
%% create a File object which contains its attributes.
Target = 'CosFileTransfer_FileTransferSession':create_file(FSFTP,
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["/", "ftp", "incoming", "targetFile"])],

#'CosFileTransfer_FileWrapper'{the_file = Dir} =
%% Lookup the file we want to copy.
FileWrapper = 'CosFileTransfer_FileTransferSession':get_file(FSNATIVE,
["/", "home", "myId", "sourceFile"]),
Source = FileWrapper#'CosFileTransfer_FileWrapper'.the_file,

%% Now we are ready to transfer the file. Please note that we most
%% call the source Session object.
'CosFileTransfer_FileTransferSession':transfer(FSNATIVE, Source, Target),
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Short Summaries

- Erlang Module CosFileTransfer_Directory [page 10] - This module implements the OMG CosFileTransfer::Directory interface.
- Erlang Module CosFileTransfer_File [page 11] - This module implements the OMG CosFileTransfer::File interface.
- Erlang Module CosFileTransfer_FileIterator [page 12] - This module implements the OMG CosFileTransfer::FileIterator interface.
- Erlang Module CosFileTransfer_FileTransferSession [page 13] - This module implements the OMG CosFileTransfer::FileTransferSession interface.
- Erlang Module CosFileTransfer_VirtualFileSystem [page 16] - This module implements the OMG CosFileTransfer::VirtualFileSystem interface.
- Erlang Module cosFileTransferApp [page 17] - The main module of the cosFileTransfer application.

CosFileTransfer_Directory

The following functions are exported:

- list(Directory, Max) -> Return [page 10] Return a list, of length Max or less, containing Object References representing files or directories contained within the target Directory and a FileIterator or a NIL object.

CosFileTransfer_File

The following functions are exported:

- 'get_name'(File) -> string() [page 11] Return the target object's associated name
- 'get_complete_file_name'(File) -> string() [page 11] Return the target object's associated absolute name.
CosFileTransfer FileIterator

The following functions are exported:

- `next_one(Iterator) -> ok`
  [page 12] Return the next FileWrapper and a boolean which indicate whether the FileWrapper is valid or not.
- `next_n(Iterator, Max) -> ok`
  [page 12] Return a list, of length Max or less, containing FileWrappers and a boolean which indicates if more FileWrappers exists.
- `destroy(Iterator) -> ok`
  [page 12] Terminate the target object

CosFileTransfer FileTransferSession

The following functions are exported:

- `
  ^get protocols supported'(FTS) -> ok`
  [page 13] Return the protocols supported by the target object.
- `set_directory(FTS, Directory) -> ok`
  [page 13] Change the current working directory of the target object’s associated file system.
- `create_file(FTS, FileNameList) -> ok`
  [page 13] Create a File object representing a file which may or may not exist.
- `create_directory(FTS, FileNameList) -> ok`
  [page 13] Create a new directory in the target objects associated file systems domain.
- `get_file(FTS, FileNameList) -> ok`
  [page 14] Create a FileWrapper which represents a file or directory.
- `delete(FTS, File) -> ok`
  [page 14] Delete the file or directory, represented by the File object, from the target objects associated file system.
- `transfer(FTS, SourceFile, DestinationFile) -> ok`
  [page 14] Copy the file represented by the SourceFile from the target object’s file system to a file in the destination FileTransferSession’s file system.
- `append(FTS, SourceFile, DestinationFile) -> ok`
  [page 14] Append the file represented by the SourceFile from the target object’s file system to a file in the destination FileTransferSession’s file system.
- `insert(FTS, SourceFile, DestinationFile, Offset) -> ok`
  [page 15] Insert the SourceFile into the DestinationFile Offset bytes from the start of the file.
- `logout(FTS) -> ok`
  [page 15] Terminate the target object and close the connection to the file system it represents.
CosFileTransfer_VirtualFileSystem

The following functions are exported:

- `get_filesystem_type(VFS)` -> Return [page 16] Return the target object's associated file system
- `get_supported_content_types(VFS)` -> Return [page 16] Return the target object's supported content types
- `login(VFS, User, Password, Account)` -> Return [page 16] Create a new instance of a FileTransferSession and a Directory

CosFileTransferApp

The following functions are exported:

- `install()` -> Return [page 17] Install the cosFileTransfer application
- `uninstall()` -> Return [page 17] Uninstall the cosFileTransfer application
- `start()` -> Return [page 17] Start the cosFileTransfer application
- `stop()` -> Return [page 17] Stop the cosFileTransfer application
- `create_VFS(Type, Content, Host, Port [,Options])` -> Return [page 17] Create a new instance of a Virtual File System
- `ssl_server_certfile()` -> string() [page 18] Display the path to the target certificate
- `ssl_client_certfile()` -> string() [page 18] Display the path to the client certificate
- `ssl_server_verify()` -> 0 | 1 | 2 [page 18] Display the SSL verification type for incoming calls
- `ssl_client_verify()` -> 0 | 1 | 2 [page 18] Display the SSL verification type for outgoing calls
- `ssl_server_depth()` -> int() [page 18] Display the SSL verification depth for incoming calls
- `ssl_client_depth()` -> int() [page 18] Display the SSL verification depth for outgoing calls
CosFileTransfer Directory

Erlang Module

To get access to the record definitions for the structures use:
-include_lib("cosFileTransfer/include/*.hrl").

This module also exports the functions described in:
- CosFileTransfer_File [page 11]
- CosPropertyService_PropertySetDef in the cosProperty application.

Exports

list(Directory, Max) -> Return

Types:
- Directory = #objref
- Return = {ok, FileList, FileIterator}
- FileList = [File]
- File = FileIterator = #objref

This operation returns a list, of length Max or less, containing Object References representing files or directories contained within the target Directory. If the amount of objects found is less than Max the returned Iterator will be a NIL object.
CosFileTransfer_File

Erlang Module

To get access to the record definitions for the structures use:
-include_lib("cosFileTransfer/include/*.hrl").
This module also exports the functions described in:

- CosPropertyService:PropertySetDef in the cosProperty application.

Exports

- 'get_name'(File) -> string()
  Types:
  - File = #objref
  This read only attribute represents the target object’s associated name.

- 'get_complete_file_name'(File) -> string()
  Types:
  - File = #objref
  This read only attribute represents the target object’s associated absolute name.

- 'get_parent'(File) -> Directory
  Types:
  - File = Directory = #objref
  This read only attribute represents the target object’s container. In some cases a NIL object will be returned.

- 'get_associated_session'(File) -> FileTransferSession
  Types:
  - File = FileTransferSession = #objref
  This read only attribute represents the target object’s associated FileTransferSession.
CosFileTransfer_FileIterator

Erlang Module

To get access to the record definitions for the structures use:
-include_lib("cosFileTransfer/include/*.hrl").

Exports

next_one(Iterator) -> Return

Types:
- Iterator = #objref
- Return = {boolean(), #CosFileTransfer_FileWrapper'(the_file = File file_type = Type)}
- File = #objref
- Type = nfile \ directory

This operation returns true if a FileWrapper exists at the current position and the out parameter contains a valid File reference. If false is returned the out parameter is a non-valid FileWrapper.

next_n(Iterator, Max) -> Return

Types:
- Iterator = #objref
- Max = unsigned long()
- Return = {boolean(), FileList}
- FileList = [#CosFileTransfer_FileWrapper'(the_file = File file_type = Type)]
- File = #objref
- Type = nfile \ directory

This operation returns true if the requested number of FileWrappers can be delivered and there are additional FileWrappers. If false is returned a list, of length Max or less, containing the last valid FileWrappers associated with the target object.

destroy(Iterator) -> ok

Types:
- Iterator = #objref

This operation terminates the target object.
Exports

'get_protocols_supported'(FTS) -> Return

Types:
  • FTS = #objref
  • Return = [#CosFileTransfer_ProtocolSupport'{protocol_name=Type,
    addresses=[Address]}]
  • Type = Address = string()

This read only attribute returns the protocols supported by the target object.

set_directory(FTS, Directory) -> Return

Types:
  • FTS = Directory = #objref
  • Return = ok | {EXCEPTION, E}

Invoking this operation will change the current working directory of the target object’s associated file system. If fail to do so the appropriate exception is raised.

create_file(FTS, FileNameList) -> Return

Types:
  • FTS = #objref
  • FileNameList = [string()]
  • Return = File | {EXCEPTION, E}
  • File = #objref

This operation creates a File Object representing a file which may or may not exist. For this operation to be independent of the working directory the supplied FileNameList must represent the absolute name.

create_directory(FTS, FileNameList) -> Return

Types:
  • FTS = #objref
  • FileNameList = [string()]

To get access to the record definitions for the structures use:
-include_lib("cosFileTransfer/include/*.hrl").
get_file(FTS, FileNameList) -> Return
Types:
- FTS = #objref
- FileNameList = [string()]
- Return = FileWrapper | {'EXCEPTION', E}
- FileWrapper = '#CosFileTransfer_FileWrapper'(the_file = File, file_type = Type)
- File = #objref
- Type = nfile | ndirectory
This operation creates a FileWrapper which represents a file or directory, and should be independent of the working Directory, i.e., a full path name must be supplied. Furthermore, the file or directory represented by the FileNameList must exist.

delete(FTS, File) -> Return
Types:
- FTS = File = #objref
- Return = ok | {'EXCEPTION', E}
This operation removes the file or directory, represented by the File object, from the target objects associated file system. If it is a non-empty directory or non-existing file or directory an exception is raised.

transfer(FTS, SourceFile, DestinationFile) -> Return
Types:
- FTS = SourceFile = DestinationFile = #objref
- Return = ok | {'EXCEPTION', E}
If the target object’s and the DestinationFile’s associated FileTransferSession’s support the same protocol(s) this operation will copy the file represented by the SourceFile from the target object’s file system to a file in the destination FileTransferSession’s file system. The file is represented by the DestinationFile object and may not exist. This operation must be invoked on the FileTransferSession associated with the SourceFile object.

append(FTS, SourceFile, DestinationFile) -> Return
Types:
- FTS = SourceFile = DestinationFile = #objref
- Return = ok | {'EXCEPTION', E}
This operation behaves almost like the transfer/3 operation. The difference is that the DestinationFile must exist since the SourceFile will be appended to the DestinationFile.
Currently, it is not possible to use this operation when the target object represents FTP.
insert(FTS, SourceFile, DestinationFile, Offset) -> Return

Types:
- FTS = SourceFile = DestinationFile = #objref
- Offset = long()
- Return = ok | {'EXCEPTION', E}

This operation behaves almost like the append/3 operation. The difference is that the SourceFile will be inserted into the DestinationFile Offset bytes from the start of the file.

Currently, it is not possible to use this operation when the target object represents FTP.

logout(FTS) -> ok

Types:
- FTS = #objref

This operation terminates the target object and closes the connection to the file system it represents.
CosFileTransfer_VirtualFileSystem

Erlang Module

To get access to the record definitions for the structures use:
-include_lib("cosFileTransfer/include/*.hrl").

Exports

`get_file_system_type'(VFS) -> Return

Types:
  • VFS = #objref
  • Return = 'FTP' | 'NATIVE'
This read only attribute represents the target object’s associated file system.

`get_supported_content_types'(VFS) -> Return

Types:
  • VFS = #objref
  • Return =
This read only attribute represents the target object’s supported content types.

login(VFS, User, Password, Account) -> Return

Types:
  • VFS = #objref
  • User = Password = Account = string()
  • Return = {FileTransferSession, Directory} | {'EXCEPTION', E}
  • FileTransferSession = Directory = #objref
This operation creates a new instance of a FileTransferSession and a Directory. The later represents the current working directory of the returned FileTransferSession.
To get access to the record definitions for the structures use:
#include_lib("cosFileTransfer/include/*.hrl").
This module contains the functions for starting and stopping the application.

Exports

install() -> Return
Types:
  • Return = ok | {'EXIT', Reason}
This operation installs the cosFileTransfer application. Note, the cosProperty
application must be installed prior to invoking this operation.

uninstall() -> Return
Types:
  • Return = ok | {'EXIT', Reason}
This operation uninstalls the cosFileTransfer application.

start() -> Return
Types:
  • Return = ok | {error, Reason}
This operation starts the cosFileTransfer application.

stop() -> Return
Types:
  • Return = ok | {error, Reason}
This operation stops the cosFileTransfer application.

createVFS(Type, Content, Host, Port [,Options]) -> Return
Types:
  • Type = 'FTP' | {'NATIVE', 'cosFileTransferNATIVE_file'} | {'NATIVE', MyModule}
  • Content = []
  • Host = string(), e.g. "myHost@myServer" or "012.345.678.910"
  • Port = integer()
This operation creates a new instance of a Virtual File System. The `Type` parameter determines which type we want the VFS to represent. 'FTP' maps to the INETS ftp implementation, while {'NATIVE', 'cosFileTransferNATIVE_file'} uses the file module. It is also possible to implement own mappings which are activated by supplying {'NATIVE', MyModule}. The MyModule module must export the same functions and behave in the same way as the INETS ftp module.

If no `Options` are supplied the default setting will be used, i.e., tcp and 60 seconds. The `Content` parameter is currently ignored by must be supplied as an empty list.

```plaintext
ssl_server_certfile() -> string()
This function returns a path to a file containing a chain of PEM encoded certificates for the cosFileTransfer as target. This is configured by setting the application variable ssl_server_certfile.

ssl_client_certfile() -> string()
This function returns a path to a file containing a chain of PEM encoded certificates used in outgoing calls. The default value is configured by setting the application variable ssl_client_certfile.

ssl_server_verify() -> 0 | 1 | 2
This function returns the type of verification used by SSL during authentication of the other peer for incoming calls. It is configured by setting the application variable ssl_server_verify.

ssl_client_verify() -> 0 | 1 | 2
This function returns the type of verification used by SSL during authentication of the other peer for outgoing calls. The default value is configured by setting the application variable ssl_client_verify.

ssl_server_depth() -> int()
This function returns the SSL verification depth for incoming calls. It is configured by setting the application variable ssl_server_depth.

ssl_client_depth() -> int()
This function returns the SSL verification depth for outgoing calls. The default value is configured by setting the application variable ssl_client_depth.
```
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