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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.

\[ ^1 \text{URL: http://www.omg.org} \]
Chapter 1: cosFileTransfer User's Guide

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 19] 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.
Components

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) [page 18] 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:
Chapter 1: cosFileTransfer User's Guide

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.

```erlang
%% Start Mnesia 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,
```

- cosFileTransferApp:ssl_client_certfile/0
- cosFileTransferApp:ssl_client_verify/0
- cosFileTransferApp:ssl_client_depth/0

**cosFileTransfer Application**
Chapter 1: cosFileTransfer User's Guide

['/", "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),

1.6 cosFileTransfer Release Notes

1.6.1 cosFileTransfer 1.1.2, Release Notes

Improvements and new features

- Due to changed behavior of the ftp client a few changes has been made.
  Own id: OTP-5135

Fixed bugs and malfunctions

- 

Incompatibilities

- 

Known bugs and problems

- 

1.6.2 cosFileTransfer 1.1.1, Release Notes

Improvements and new features

- 

Fixed bugs and malfunctions

- Depending on which ftp server is used, the operation CosFileTransfer::Directory::list could fail.
  Own id: OTP-4954

Incompatibilities

- 


Known bugs and problems
-

1.6.3 cosFileTransfer 1.1, Release Notes

Improvements and new features

- The stub/skeleton-files generated by IC have been improved, i.e., depending on the IDL-files, reduced the size of the erl- and beam-files and decreased dependencies off Orber's Interface Repository. It is necessary to re-compile all IDL-files and use COS-applications, including Orber, compiled with IC-4.2.
  Own id: OTP-4576

Fixed bugs and malfunctions
-

Incompatibilities
-

Known bugs and problems
-

1.6.4 cosFileTransfer 1.0.2, Release Notes

Improvements and new features

- First release of the cosFileTransfer application. Please note that the OMG specification was not finalized when this version was released. Hence, the API may be changed in way which is not compatible with this version. Contact support if you are in doubt.
  Own id: -

Fixed bugs and malfunctions
-

Incompatibilities
-

Known bugs and problems
-
Short Summaries

- Erlang Module **CosFileTransfer::Directory** [page 12] – This module implements the OMG CosFileTransfer::Directory interface.
- Erlang Module **CosFileTransfer::File** [page 13] – This module implements the OMG CosFileTransfer::File interface.
- Erlang Module **CosFileTransfer::FileIterator** [page 14] – This module implements the OMG CosFileTransfer::FileIterator interface.
- Erlang Module **CosFileTransfer::FileTransferSession** [page 15] – This module implements the OMG CosFileTransfer::FileTransferSession interface.
- Erlang Module **CosFileTransfer::VirtualFileSystem** [page 18] – This module implements the OMG CosFileTransfer::VirtualFileSystem interface.
- Erlang Module **cosFileTransferApp** [page 19] – The main module of the cosFileTransfer application.

**CosFileTransfer::Directory**

The following functions are exported:

- `list(Directory, Max) -> Return` [page 12] 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 13] Return the target object’s associated name.
- `'get_complete_file_name'(File) -> string()` [page 13] Return the target object’s associated absolute name.
CosFileTransfer_FileIterator

The following functions are exported:

- `next_one(Iterator)` -> Return
  
  [page 14] Return the next FileWrapper and a boolean which indicate whether the FileWrapper is valid or not.

- `next_n(Iterator, Max)` -> Return
  
  [page 14] Return a list, of length Max or less, containing FileWrappers and a boolean which indicates if more FileWrappers exists.

- `destroy(Iterator)` -> ok
  
  [page 14] Terminate the target object

CosFileTransfer_FileTransferSession

The following functions are exported:

- `_get_protocols_supported`(FTS) -> Return
  
  [page 15] Return the protocols supported by the target object.

- `set_directory(FTS, Directory)` -> Return
  
  [page 15] Change the current working directory of the target object's associated file system.

- `create_file(FTS, FileNameList)` -> Return
  
  [page 15] Create a File Object representing a file which may or may not exist.

- `create_directory(FTS, FileNameList)` -> Return
  
  [page 15] Create a new directory in the target objects associated file systems domain.

- `get_file(FTS, FileNameList)` -> Return
  
  [page 16] Create a FileWrapper which represents a file or directory.

- `delete(FTS, File)` -> Return
  
  [page 16] Delete the file or directory, represented by the File object, from the target objects associated file system.

- `transfer(FTS, SourceFile, DestinationFile)` -> Return
  
  [page 16] 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)` -> Return
  
  [page 16] 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)` -> Return
  
  [page 17] Insert the SourceFile into the DestinationFile Offset bytes from the start of the file.

- `logout(FTS)` -> ok
  
  [page 17] 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 18] Return the target object's associated file system
- `get_supported_content_types'(VFS) -> Return
  [page 18] Return the target object's supported content types
- `login(VFS, User, Password, Account) -> Return
  [page 18] Create a new instance of a FileTransferSession and a Directory

CosFileTransferApp

The following functions are exported:

- `install() -> Return
  [page 19] Install the cosFileTransfer application
- `uninstall() -> Return
  [page 19] Uninstall the cosFileTransfer application
- `start() -> Return
  [page 19] Start the cosFileTransfer application
- `stop() -> Return
  [page 19] Stop the cosFileTransfer application
- `create_VFS(Type, Content, Host, Port [,Options]) -> Return
  [page 19] Create a new instance of a Virtual File System
- `ssl_server_certfile() -> string()
  [page 20] Display the path to the target certificate
- `ssl_client_certfile() -> string()
  [page 20] Display the path to the client certificate
- `ssl_server_verify() -> 0 | 1 | 2
  [page 20] Display the SSL verification type for incoming calls
- `ssl_client_verify() -> 0 | 1 | 2
  [page 20] Display the SSL verification type for outgoing calls
- `ssl_server_depth() -> int()
  [page 20] Display the SSL verification depth for incoming calls
- `ssl_client_depth() -> int()
  [page 20] 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 13]
- 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 | ndirectory
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 | ndirectory
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.
CosFileTransfer_FileTransferSession

Erlang Module

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

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()]
- File = 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()]
The operation creates a new directory in the target objects associated file systems domain. If fail to do so an exception is raised but, if successfully, a Directory object representing the new directory is returned.

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.
**cosFileTransfer Reference Manual**  

**...FileTransferSession**

```prolog
insert(FTS, SourceFile, DestinationFile, Offset) -> Return

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

  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:
  - \( \text{FTS} = \#\text{objref} \)

  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.
cosFileTransferApp

Erlang Module

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.

create_VFS(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()
Options = [Option]
Option = {protocol, Protocol} | {connect_timeout, Seconds}
Protocol = tcp | ssl
Return = VFS | {EXCEPTION, E}
VFS = #objref

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.

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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