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## cosFileTransfer

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cosFileTransfer 1.2.1  
December 2, 2017

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**December 2, 2017**

# 1 cosFileTransfer User's Guide

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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.

#### Purpose and Dependencies

If a Virtual File System is started as 'FTP', the inets-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* 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:

**Figure 4.1: Figure 1: The File Transfer Service Components.**

- **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:

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

## 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.



## 1.5 cosFileTransfer Examples

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```
%% 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,
    ["/", "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),
```

## 2 Reference Manual

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

## cosFileTransferApp

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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, and an operation named `open(Host, Port)`, which shall return {`ok, Pid`} or {`error, Reason`}.

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`.

# CosFileTransfer\_File

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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\_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*
- *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\_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\_VirtualFileSystem

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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.

## 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()]
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()]
Return = Directory | {'EXCEPTION, E}
Directory = #objref
```

This operation creates a new directory in the target objects associated file systems domain. If fail to do so an exception is raised but, if successful, 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.

**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.

## **CosFileTransfer\_FileTransferSession**

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`logout(FTS) -> ok`

Types:

`FTS = #objref`

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