globus ftp control

2.10

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Contents

1 Globus GSIFTP Control Connection API

The globus_ftp_control library provides low-level services needed to implement FTP client and servers. The API provided is protocol specific. See the GASS Transfer library for a protocol-independent transfer interface.

This data transfer portion of this API provides support for the standard data methods described in the FTP Specification as well as extensions for parallel, striped, and partial data transfer.

Any program that uses the GSIFTP Control Library must include "globus_ftp_control.h".

2 GridFTP: Protocol Extensions to FTP for the Grid

2.1 Introduction

This section defines extensions to the FTP specification STD 9, RFC 959, FILE TRANSFER PROTOCOL (FTP) (October 1985) These extensions provide striped data transfer, parallel data transfer, extended data transfer, data buffer size configuration, and data channel authentication.

The following new commands are introduced in this specification

- Striped Passive (SPAS)
- Striped Data Port (SPOR)
- Extended Retrieve (ERET)
- Extended Store (ESTO)
- Set Data Buffer Size (SBUF)
- Data Channel Authentication Mode (DCAU)

A new transfer mode (extended-block mode) is introduced for parallel and striped data transfers. Also, a set of extension options to RETR are added to control striped data layout and parallelism.

The following new feature names are to be included in the FTP server's response to FEAT if it implements the following sets of functionality

PARALLEL

The server supports the SPOR, SPAS, the RETR options mentioned above, and extended block mode.

ESTO

The server implements the ESTO command as described in this document.

ERET

The server implements the ERET command as described in this document.

SBUF

The server implements the SBUF command as described in this document.

DCAU

The server implements the DCAU command as described in this document, including the requirement that data channels are authenticated by default, if RFC 2228 authentication is used to establish the control channel.

2.2 Terminology

Parallel transfer

From a single data server, splitting file data for transfer over multiple data connections.

Striped transfer

Distributing a file's data over multiple independent data nodes, and transerring over multiple data connections.

Data Node

In a striped data transfer, a data node is one of the stripe destinations returned in the SPAS command, or one of the stripe destinations sent in the SPOR command.

DTP

The data transfer process establishes and manages the data connection. The DTP can be passive or active.

PI

The protocol interpreter. The user and server sides of the protocol have distinct roles implemented in a user-PI and a server-PI.

2.3 FTP Standards Used

- RFC 959, FILE TRANSFER PROTOCOL (FTP), J. Postel, R. Reynolds (October 1985)
  - Commands used by GridFTP
    - USER
    - PASS
    - ACCT
    - CWD
    - CDUP
    - QUIT
    - REIN
    - PORT
    - PASV
    - TYPE

        * MODE
        * RETR
        * STOR
        * STOU
        * APPE
        * ALLO
        * REST
        * RNFR
        * RNTO
        * ABOR
        * DELE
        * RMD
        * MKD
        * PWD
        * LIST
        * NLST
        * SITE
        * SYST
        * STAT
        * HELP
        * NOOP
    - Features used by GridFTP
        * ASCII and Image types
        * Stream mode
        * File structure

- RFC 2228, FTP Security Extensions, Horowitz, M. and S. Lunt (October 1997)
    - Commands used by GridFTP
        * AUTH
        * ADAT
        * MIC
        * CONF
        * ENC
    - Features used by GridFTP
        * GSSAPI authentication

- RFC 2389, Feature negotiation mechanism for the File Transfer Protocol, P. Hethmon , R. Elz (August 1998)
    - Commands used by GridFTP
        * FEAT
        * OPTS
    - Features used by GridFTP

- FTP Extensions, R. Elz, P. Hethmon (September 2000)
    - Commands used by GridFTP
        * SIZE
    - Features used by GridFTP
        * Restart of a stream mode transfer

2.4 Striped Passive (SPAS)

This extension is used to establish a vector of data socket listeners for for a server with one or more stripes. This command MUST be used in conjunction with the extended block mode. The response to this command includes a list of host and port addresses the server is listening on.

Due to the nature of the extended block mode protocol, SPAS must be used in conjunction with data transfer commands which receive data (such as STOR, ESTO, or APPE) and can not be used with commands which send data on the data channels.

Syntax

The syntax of the SPAS command is:

```
spas = "SPAS" <CRLF>
```

Responses

The server-PI will respond to the SPAS command with a 229 reply giving the list of host-port strings for the remote server-DTP or user-DTP to connect to.

```
spas-response = "229-Entering Striped Passive Mode" CRLF
                1*(<SP> host-port CRLF)
                229 End
```

Where the command is correctly parsed, but the server-DTP cannot process the SPAS request, it must return the same error responses as the PASV command.

OPTS for SPAS

There are no options in this SPAS specification, and hence there is no OPTS command defined.

2.5 Striped Data Port (SPOR)

This extension is to be used as a complement to the SPAS command to implement striped third-party transfers. This command MUST always be used in conjunction with the extended block mode. The argument to SPOR is a vector of host/TCP listener port pairs to which the server is to connect. This

Due to the nature of the extended block mode protocol, SPOR must be used in conjunction with data transfer commands which send data (such as RETR, ERET, LIST, or NLST) and can not be used with commands which receive data on the data channels.

Syntax

The syntax of the SPOR command is:

```
SPOR 1*(<SP> <host-port>) <CRLF>
```

The host-port sequence in the command structure MUST match the host-port replies to a SPAS command.

Responses

The server-PI will respond to the SPOR command with the same response set as the PORT command described in the ftp specification.

OPTS for SPOR

There are no options in this SPOR specification, and hence there is no OPTS command defined.

2.6 Extended Retrieve (ERET)

The extended retrieve extension is used to request that a retrieve be done with some additional processing on the server. This command an extensible way of providing server-side data reduction or other modifications to the RETR command. This command is used in place of OPTS to the RETR command to allow server side processing to be done with a single round trip (one command sent to the server instead of two) for latency-critical applications.

ERET may be used with either the data transports defined in RFC 959, or using extended block mode as defined in this document. Using an ERET creates a new virtual file which will be sent, with it's own size and byte range starting at zero. Restart markers generated while processing an ERET are relative to the beginning of this view of the file.

Syntax

The syntax of the ERET command is

```
ERET <SP> <retrieve-mode> <SP> <filename>

retrieve-mode ::= P <SP> <offset> <SP> <size>
offset ::= 64 bit integer
size ::= 64 bit integer
```

The **retrieve-mode** defines behavior of the extended-retrieve mode. There is one mode defined by this specification, but other general purpose or application-specific ones may be added later.

modes_ERET Extended Retrieve Modes

Partial Retrieve Mode (P)

A section of the file will be retrieved from the data server. The section is defined by the starting **offset** and extent **size** parameters. When used with extended block mode, the extended block headers sent along with data will send the data with offset of 0 meaning the beginning of the section of the file which was requested.

2.7 Extended Store (ESTO)

The extended store extension is used to request that a store be done with some additional processing on the server. Arbitrary data processing algorithms may be added by defining additional ESTO store-modes. Similar to the ERET, the ESTO command expects data sent to satisfy the request to be sent as if it were a new file with data block offset 0 being beginning the beginning of the new file.

The format of the ESTO command is

```
ESTO <SP> <store-mode> <filename>

store-mode ::= A <SP> <offset>
```

The store-mode defines the behavior of the extended store. There is one mode defined by this specification, but others may be added later.

Extended Store Modes

Adjusted store (A)

> The data in the file is to stored with **offset** added to the file pointer before storing the blocks of the file. In extended block mode, this value is added to the offset in the extended block header by the server when writing to disk. Extended block headers should therefore send the beginning of the byte range on the data channel with offset of zero. In stream mode, the offset is added to the implicit offset of 0 for the beginning of the data before writing. If a stream mode restart marker is used in conjunction with this ESTO mode, the restart marker's offset is added to the offset passed as the parameter to the adjusted store.

2.8 Set Buffer Size (SBUF)

This extension adds the capability of a client to set the TCP buffer size for subsequent data connections to a value. This replaces the server-specific commands SITE RBUFSIZE, SITE RETRBUFSIZE, SITE RBUFSZ, SITE SBUFSIZE, SITE SBUFSZ, and SITE BUFSIZE. Clients may wish to consider supporting these other commands to ensure wider compatibility.

Syntax

The syntax of the SBUF command is

```
sbuf = SBUF <SP> <buffer-size>

buffer-size ::= <number>
```

The **buffer-size** value is the TCP buffer size in bytes. The TCP window size should be set accordingly by the server.

Response Codes

If the server-PI is able to set the buffer size state to the requested **buffer-size**, then it will return a 200 reply.

Note:

> Even if the SBUF is accepted by the server, an error may occur later when the data connections are actually created, depending on how the server or client operating systems' TCP implementations.

2.9 Data Channel Authentication (DCAU)

This extension provides a method for specifying the type of authentication to be performed on FTP data channels. This extension may only be used when the control connection was authenticated using RFC 2228 Security extensions.

The format of the DCAU command is

```
DCAU <SP> <authentication-mode> <CRLF>

authentication-mode ::= <no-authentication>
                      | <authenticate-with-self>
                      | <authenticate-with-subject>

no-authentication ::= N
authenticate-with-self ::= A
authenticate-with-subject ::= S <subject-name>

subject-name ::= string
```

Authentication Modes

- No authentication (**N**)
  No authentication handshake will be done upon data connection establishment.
- Self authentication (**A**)
  A security-protocol specific authentication will be used on the data channel. The identity of the remote data connection will be the same as the identity of the user which authenticated to the control connection.
- Subject-name authentication (**S**)
  A security-protocol specific authentication will be used on the data channel. The identity of the remote data connection MUST match the supplied **subject-name** string.

The default data channel authentication mode is **A** for FTP sessions which are RFC 2228 authenticated—the client must explicitly send a DCAU N message to disable it if it does not implement data channel authentication.

If the security handshake fails, the server should return the error response 432 (Data channel authentication failed).

2.10 Extended Block Mode

The striped and parallel data transfer methods described above require an extended transfer mode to support out-of-sequence data delivery, and partial data transmission per data connection. The extended block mode described here extends the block mode header to provide support for these as well as large blocks, and end-of-data synchronization.

Clients indicate that they want to use extended block mode by sending the command

```
MODE <SP> E <CRLF>
```

on the control channel before a transfer command is sent.

The structure of the extended block header is

```
Extended Block Header

+---------------+-------/-----------+------/------------+
| Descriptor    |    Byte Count     |    Offset Count    |
|         8 bits |        64 bits    |          64 bits   |
+---------------+-------/-----------+------/------------+
```

The descriptor codes are indicated by bit flags in the descriptor byte. Six codes have been assigned, where each code number is the decimal value of the corresponding bit in the byte.

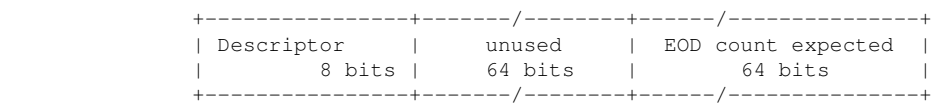
```
 Code     Meaning

  128     End of data block is EOR (Legacy)
   64     End of data block is EOF
   32     Suspected errors in data block
   16     Data block is a restart marker
    8     End of data block is EOD for a parallel/striped transfer
    4     Sender will close the data connection
```

With this encoding, more than one descriptor coded condition may exist for a particular block. As many bits as necessary may be flagged.

Some additional protocol is added to the extended block mode data channels, to properly handle end-of-file detection in the presence of an unknown number of data streams.

- When no more data is to be sent on the data channel, then the sender will mark the last block, or send a zero-length block after the last block with the EOD bit (8) set in the extended block header.
- After receiving an EOD the data connection can be cached for use in a subsequent transfer. To signifiy that the data connection will be closed the sender sets the close bit (4) in the header on the last message sent.
- The sender communicates end of file by sending an EOF message to all servers receiving data. The EOF message format follows.

Extended Block EOF Header



EOF Descriptor. The EOF header descriptor has the same definition as the regular data message header described above.

EOD Count Expected. This 64 bit field represents the total number of data connections that will be established with the server receiving the file. This number is used by the receiver to determine it has received all of the data. When the number of EOD messages received equals the number represented by the "EOD Count Expected" field the receiver has hit end of file.

Simply waiting for EOD on all open data connections is not sufficient. It is possible that the receiver reads an EOD message on all of its open data connects while an additional data connection is in flight. If the receiver were to assume it reached end of file it would fail to receive the data on the in flight connection.

To handle EOF in the multi-striped server case a 126 response has been introduced. When receiving data from a striped server a client makes a control connection to a single host, but several host may create several data connections back to the client. Each host can independently decide how many data connections it will use, but only a single EOF message may be sent to back to the client, therefore it must be possible to aggregate the total number of data connections used in the transfer across the stripes. The 126 response serves this purpose.

The 126 is an intermediate response to RETR command. It has the following format.

"126" <SP> 1*(count of data connections)

Several "Count of data connections" can be in a single reply. They correspond to the stripes returned in the response to the SPAS command.

Discussion of protocol change to enable bidirectional data channels brought up the following problem if doing bidirectional data channels

If the client is pasv, and sending to a multi-stripe server, then the server creates data connections connections; since the client didn't do SPAS, it cannot associate HOST/PORT pairs on the data connections with stripes on the server (it doesn't even know how many there are). it cannot reliably determine which nodes to send data to. (Becomes even more complex in the third-party transfer case, because the sender may have multiple stripes of data.) The basic problem is that we need to know logical stripe numbers to know where to send the data.

EOF Handling in Extended Block Mode

If you are in either striped or parallel mode, you will get exactly one EOF on each SPAS-specified ports (stripes). Hosts in extended block mode must be prepared to accept an arbitrary number of connections on each SPOR port before the EOF block is sent.

Restarting

In general, opaque restart markers passed via the block header should not be used in extended block mode. Instead, the destination server should send extended data marker responses over the control connection, in the following form:

```
extended-mark-response = "111" <SP> "Range Marker" <SP> <byte-ranges-list>

byte-ranges-list       = <byte-range> [ *("," <byte-range>) ]
byte-range             = <start-offset> "-" <end-offset>

start-offset         ::= <number>
end-offset           ::= <number>
```

The byte ranges in the marker are an incremental set of byte ranges which have been stored to disk by the data server. The complete restart marker is a concatenation of all byte ranges received by the client in 111 responses.

The client MAY combine adjacent ranges received over several range responses into any number of ranges when sending the REST command to the server to restart a transfer.

For example, the client, on receiving the responses:

```
111 Range Marker 0-29
111 Range Marker 30-89
```

may send, equivalently,

```
REST 0-29,30-89
REST 0-89
REST 30-59,0-29,60-89
```

to restart the transfer after those 90 bytes have been received.

The server MAY indicate that a given range of data has been received in multiple subsequent range markers. The client MUST be able to handle this. For example:

```
111 Range Marker 30-59
111 Range Marker 0-89
```

is equivalent to

```
111 Range Marker 30-59
111 Range Marker 0-29,60-89
```

Similarly, the client, if it is doing no processing of the restart markers, MAY send redundant information in a restart.

Should these be allowed as restart markers for stream mode?

Performance Monitoring

In order to monitor the performance of extended block mode transfer, an additional preliminary reply MAY be transmitted over the control channel. This reply is of the form:

```
extended-perf-response  = "112-Perf Marker" CRLF
                          <SP> "Timestamp:" <SP> <timestamp> CRLF
                          <SP> "Stripe Index:" <SP> <stripe-number> CRLF
                          <SP> "Stripe Bytes Transferred:" <SP> <byte count> CRLF
                          <SP> "Total Stripe Count:" <SP> <stripe count> CRLF
                          "112 End" CRLF

timestamp               = <number> [ "." <digit> ]
```

<timestamp> is seconds since the epoch

The performance marker can contain these or any other perf-line facts which provide useful information about the current performance.

All perf-line facts represent an instantaneous state of the transfer at the given timestamp. The meaning of the facts are

- Timestamp - The time at which the server computed the performance information. This is in seconds since the epoch (00:00:00 UTC, January 1, 1970).
- Stripe Index - the index (0-number of stripes on the STOR side of the transfer) which this marker pertains to.
- Stripe Bytes Transferred - The number of bytes which have been received on this stripe.

A transfer start time can be specified by a perf marker with 'Stripe Bytes Transferred' set to zero. Only the first marker per stripe can be used to specify the start time of that stripe. Any subsequent markers with 'Stripe Bytes Transferred' set to zero simply indicates no data transfer over the interval.

A server should send a 'start' marker for each stripe. A server should also send a final perf marker for each stripe. This is a marker with 'Stripe Bytes Transferred' set to the total transfer size for that stripe.

2.11 Options to RETR

The options described in this section provide a means to convey striping and transfer parallelism information to the server-DTP. For the RETR command, the Client-FTP may specify a parallelism and striping mode it wishes the server-DTP to use. These options are only used by the server-DTP if the retrieve operation is done in extended block mode. These options are implemented as RFC 2389 extensions.

The format of the RETR OPTS is specified by:

```
retr-opts     = "OPTS" <SP> "RETR" [<SP> option-list] CRLF
option-list   = [ layout-opts ";" ] [ parallel-opts ";" ]
layout-opts   = "StripeLayout=Partitioned"
              | "StripeLayout=Blocked;BlockSize=" <block-size>
parallel-opts = "Parallelism=" <starting-parallelism> ","
                               <minimum-parallelism>  ","
                               <maximum-parallelism>

block-size           ::= <number>
starting-parallelism ::= <number>
minimum-parallelism  ::= <number>
maximum-parallelism  ::= <number>
```

Layout Options

The layout option is used by the source data node to send sections of the data file to the appropriate destination stripe. The various StripeLayout parameters are to be implemented as follows:

Partitioned

A partitioned data layout is one where the data is distributed evenly on the destination data nodes. Only one contiguous section of data is stored on each data node. A data node is defined here a single host-port mentioned in the SPOR command

Blocked

A blocked data layout is one where the data is distributed in round-robin fashion over the destination data nodes. The data distribution is ordered by the order of the host-port specifications in the SPOR command. The **block-size** defines the size of blocks to be distributed.

PLVL Parallelism Options

The parallelism option is used by the source data node to control how many parallel data connections may be established to each destination data node. This extension option provides for both a fixed level of parallelism, and for adapting the parallelism to the host/network connection, within a range. If the **starting-parallelism** option is set, then the server-DTP will make **starting-parallelism** connections to each destination data node. If the **minimum-parallelism** option is set, then the server may reduce the number of parallel connections per destination data node to this value. If the **maximum-parallelism** option is set, then the server may increase the number of parallel connections to per destination data node to at most this value.

2.12 References

[1] Postel, J. and Reynolds, J., "FILE TRANSFER PROTOCOL (FTP)", STD 9, RFC 959, October 1985.

[2] Hethmon, P. and Elz, R., "Feature negotiation mechanism for the File Transfer Protocol", RFC 2389, August 1998.

[3] Horowitz, M. and Lunt, S., "FTP Security Extensions", RFC 2228, October 1997.

[4] Elz, R. and Hethom, P., "FTP Extensions", IETF Draft, May 2001.

2.13 Appendix I: Implementation under GSI

There are several security components in this document which are extensions to the behavior of RFC 2228. These appendix attempts to clarify the protocol how these extensions map to the OpenSSL-based implementation of the GSSAPI known as GSI (Grid Security Infrastructure).

A client implementation which communicates with a server which supports the DCAU extension should delegate a limited credential set (using the GSS_C_DELEG_FLAG and GSS_C_GLOBUS_LIMITED_DELEG_PROXY_-FLAG flags to gss_init_sec_context()). If delegation is not performed, the client MUST request that DCAU be disable by requesting DCAU N, or the server will be unable to perform the default of DCAU A as described by this document.

When DCAU mode "A" or "S" is used, a separate security context is established on each data channel. The context is established by performing the GSSAPI handshake with the active-DTP calling gss_init_sec_context() and the passive-DTP calling gss_accept_sec_context(). No delegation need be done on these data channels.

Data channel protection via the PROT command MUST always be used in conjunction with the DCAU A or DCAU S commands. If a PROT level is set, then messages will be wrapped according to RFC 2228 Appendix I using the contexts established on each data channel. Tokens transferred over the data channels when either PROT or DCAU is used are not framed in any way when using GSI. (When implementing this specification with other GSSAPI mechanisms, a 4 byte, big endian, binary token length should procede all tokens).

If the DCAU mode or the PROT mode is changed between file transfers when caching data channels in extended block mode, all open data channels must be closed. This is because the GSI implementation does not support changing levels of protection on an existing connection.

3 Data Structure Index

3.1 Data Structures

Here are the data structures with brief descriptions:

4 File Index

4.1 File List

Here is a list of all documented files with brief descriptions:

5 Data Structure Documentation

5.1 globus_ftp_control_auth_info_s Struct Reference

Authentication Values.

5.1.1 Detailed Description

Authentication Values.

This structure is populated and passed back to the user via the globus_ftp_control_auth_callback_t(). It contains the information needed to decide if a client may use the server.

5.2 globus_ftp_control_dcau_subject_s Struct Reference

control dcau subject authentication type

5.2.1 Detailed Description

control dcau subject authentication type

5.3 globus_ftp_control_dcau_u Union Reference

control dcau union

5.3.1 Detailed Description

control dcau union

5.4 globus_ftp_control_layout_u Union Reference

control striping attribute union

5.4.1 Detailed Description

control striping attribute union

5.5 globus_ftp_control_parallelism_u Union Reference

control parallelism attribute structure

5.5.1 Detailed Description

control parallelism attribute structure

5.6 globus_ftp_control_round_robin_s Struct Reference

control striping round robin attribute structure

5.6.1 Detailed Description

control striping round robin attribute structure

5.7 globus_ftp_control_tcpbuffer_automatic_s Struct Reference

Automatically set the TCP buffer/window size.

5.7.1 Detailed Description

Automatically set the TCP buffer/window size.

5.8 globus_ftp_control_tcpbuffer_default_t Struct Reference

Don't change the TCP buffer/window size from the system default.

5.8.1 Detailed Description

Don't change the TCP buffer/window size from the system default.

5.9 globus_ftp_control_tcpbuffer_fixed_t Struct Reference

Set the TCP buffer/window size to a fixed value.

5.9.1 Detailed Description

Set the TCP buffer/window size to a fixed value.

5.10 globus_ftp_control_tcpbuffer_t Union Reference

control tcpbuffer attribute structure

5.10.1 Detailed Description

control tcpbuffer attribute structure

6 File Documentation

6.1 globus_ftp_control.c File Reference

FTP Control API Activation/Deactivation and Global State.

Variables

- int globus_i_ftp_control_debug_level = 0

6.1.1 Detailed Description

FTP Control API Activation/Deactivation and Global State.

6.1.2 Variable Documentation

6.1.2.1 int globus_i_ftp_control_debug_level = 0

Debugging level.

1 thru 3 enable debug output for control channel 4 thru 6 enable debug output for control and data channel

6.2 globus_ftp_control.h File Reference

GSIFTP Control Connection API (Data structures and types).

Data Structures

- struct globus_ftp_control_dcau_subject_s
  control dcau subject authentication type
- struct globus_ftp_control_round_robin_s
  control striping round robin attribute structure
- union globus_ftp_control_dcau_u
  control dcau union
- union globus_ftp_control_layout_u
  control striping attribute union
- union globus_ftp_control_parallelism_u
  control parallelism attribute structure
- struct globus_ftp_control_tcpbuffer_default_t
  Don't change the TCP buffer/window size from the system default.
- struct globus_ftp_control_tcpbuffer_fixed_t
  Set the TCP buffer/window size to a fixed value.
- struct globus_ftp_control_tcpbuffer_automatic_s
  Automatically set the TCP buffer/window size.
- union globus_ftp_control_tcpbuffer_t
  control tcpbuffer attribute structure
- struct globus_ftp_control_auth_info_s
  Authentication Values.

Defines

- #define GLOBUS_FTP_CONTROL_MODULE (&globus_i_ftp_control_module)

Typedefs

- typedef void(* globus_ftp_control_response_callback_t)(void *callback_arg, struct globus_ftp_control_handle_s *handle, globus_object_t *error, globus_ftp_control_response_t *ftp_response)
- typedef void(* globus_ftp_control_callback_t)(void *callback_arg, struct globus_ftp_control_handle_s *handle, globus_object_t *error)
- typedef void(* globus_ftp_control_command_callback_t)(void *callback_arg, struct globus_ftp_control_handle_s *handle, globus_object_t *error, union globus_ftp_control_command_u *command)
- typedef void(* globus_ftp_control_auth_callback_t)(void *callback_arg, struct globus_ftp_control_handle_s *handle, globus_object_t *error, globus_ftp_control_auth_info_t *auth_result)
- typedef unsigned long globus_ftp_control_auth_requirements_t
- typedef void(* globus_ftp_control_data_callback_t)(void *callback_arg, globus_ftp_control_handle_t *handle, globus_object_t *error, globus_byte_t *buffer, globus_size_t length, globus_off_t offset, globus_bool_t eof)
- typedef void(* globus_ftp_control_server_callback_t)(void *callback_arg, struct globus_ftp_control_server_s *server_handle, globus_object_t *error)

Enumerations

- enum globus_ftp_control_type_e
- enum globus_ftp_control_mode_e
- enum globus_ftp_control_dcau_mode_e
- enum globus_ftp_control_striping_mode_e
- enum globus_ftp_control_protection_t
- enum globus_ftp_control_delay_passive_t
- enum globus_ftp_control_structure_e
- enum globus_ftp_control_parallelism_mode_e
- enum globus_ftp_control_tcpbuffer_mode_e {
  GLOBUS_FTP_CONTROL_TCPBUFFER_DEFAULT,
  GLOBUS_FTP_CONTROL_TCPBUFFER_FIXED,
  GLOBUS_FTP_CONTROL_TCPBUFFER_AUTOMATIC }

Functions

- globus_result_t globus_ftp_control_local_layout (globus_ftp_control_handle_t *handle, globus_ftp_control_layout_t *layout, globus_size_t data_size)
- globus_result_t globus_ftp_control_data_set_interface (globus_ftp_control_handle_t *handle, const char *interface_addr)
- globus_result_t globus_ftp_control_create_data_info (globus_ftp_control_handle_t *handle, globus_ftp_control_data_write_info_t *data_info, globus_byte_t *buffer, globus_size_t length, globus_off_t offset, globus_bool_t eof, globus_ftp_control_data_callback_t callback, void *callback_arg)
- globus_result_t globus_ftp_control_release_data_info (globus_ftp_control_handle_t *handle, globus_ftp_control_data_write_info_t *data_info)
- globus_result_t globus_ftp_control_data_write_stripe (globus_ftp_control_handle_t *handle, globus_byte_t *buffer, globus_size_t length, globus_off_t offset, globus_bool_t eof, int stripe_ndx, globus_ftp_control_data_callback_t callback, void *callback_arg)
- globus_result_t globus_X_ftp_control_data_write_stripe (globus_ftp_control_handle_t *handle, globus_byte_t *buffer, globus_size_t length, globus_off_t offset, globus_bool_t eof, int stripe_ndx, globus_ftp_control_data_write_info_t *data_info)

6.2.1 Detailed Description

GSIFTP Control Connection API (Data structures and types).

6.2.2 Define Documentation

6.2.2.1 #define GLOBUS_FTP_CONTROL_MODULE (&globus_i_ftp_control_module)

Module descriptor.

The Globus FTP Control library uses the standard module activation and deactivation API to initialize it's state. Before any GSIFTP functions are called, the module must be activated

```
globus_module_activate(GLOBUS_GSIFTP_CONTROL_MODULE);
```

This function returns GLOBUS_SUCCESS if the GSIFTP library was successfully initialized. This may be called multiple times.

To deactivate the GSIFTP library, the following must be called

```
globus_module_deactivate(GLOBUS_GSIFTP_CONTROL_MODULE);
```

6.2.3 Typedef Documentation

6.2.3.1 typedef void(* globus_ftp_control_response_callback_t)(void *callback_arg, struct globus_ftp_control_handle_s *handle, globus_object_t *error, globus_ftp_control_response_t *ftp_response)

Asynchronous operation completion callback.

This callback is called whenever a reply to command is received on the FTP control channel. It allows the user to handle the received reply or alternatively handle any errors that occurred during the interaction with the FTP server. This function will be called multiple times in the case when intermediate responses (1yz) are received.

Parameters:

callback_arg User supplied argument to the callback function

handle A pointer to the GSIFTP control handle. Used to identify which control connection the operation was applied to.

error Pointer to a globus error object containing information about any errors that occurred processing the operation

ftp_response Pointer to a response structure containing the FTP response to the command.

6.2.3.2 typedef void(* globus_ftp_control_callback_t)(void *callback_arg, struct globus_ftp_control_handle_s *handle, globus_object_t *error)

Asynchronous control callback.

This callback is used as a generic control operation callback.

Parameters:

callback_arg User supplied argument to the callback function

handle A pointer to the GSIFTP control handle. Used to identify which control connection the operation was applied to.

error Pointer to a globus error object containing information about any errors that occurred processing the operation

6.2.3.3 typedef void(* globus_ftp_control_command_callback_t)(void *callback_arg, struct globus_ftp_control_handle_s *handle, globus_object_t *error, union globus_ftp_control_command_u *command)

Server command callback.

When a command from a client is received on the control channel a user callback with this signature is called.

Parameters:

callback_arg The user argument passed to the callback function.

handle The control handle that the command was issued on.

error Indicates if a command was successful read or or if a failure occurred. This object will be freed once this callback returns. If the user wishes to have a copy of the error that persists past the life of this callback, they must make a copy using globus_object_copy(), and free it with globus_object_free().

command The command structure indicates what type of command the client issued. Based on the 'type' further information can be extracted. This command structure will be freed once this callback returns. If the user wishes to have a copy of the error that persists past the life of this callback, they must make a copy using globus_ftp_control_command_copy(), and free it with globus_ftp_control_command_free().

6.2.3.4 typedef void(* globus_ftp_control_auth_callback_t)(void *callback_arg, struct globus_ftp_control_handle_s *handle, globus_object_t *error, globus_ftp_control_auth_info_t *auth_result)

Server authentication complete callback.

A function with this signature is registered by calling globus_ftp_control_accept(). It is called when the authentication protocal has completed. Based on the auth_result, the server implementor should determine authorization and then send the appropriate response using globus_ftp_control_send_response(), indicating to the client whether authorization was successful or not.

Parameters:

handle This structure is populated when the callback is called and represents a control connection to the client.

auth_result A globus_ftp_control_auth_result_t containing the values the client sent for gss authentication, user name, password and account. If any of the values were not sent by the client they will be NULL. Based on that information the user can decide if the client will be authorized for use of the server.

callback_arg The user argument passed to the callback.

6.2.3.5 typedef unsigned long globus_ftp_control_auth_requirements_t

Authentication requirements.

The value of this should be a bitwise or of

- GLOBUS_FTP_CONTROL_AUTH_NONE
- GLOBUS_FTP_CONTROL_AUTH_GSSAPI
- GLOBUS_FTP_CONTROL_AUTH_USER
- GLOBUS_FTP_CONTROL_AUTH_PASS
- GLOBUS_FTP_CONTROL_AUTH_ACCT

6.2.3.6 typedef void(* globus_ftp_control_data_callback_t)(void *callback_arg, globus_ftp_control_handle_t *handle, globus_object_t *error, globus_byte_t *buffer, globus_size_t length, globus_off_t offset, globus_bool_t eof)

Asynchronous data transmission operation callback.

This callback is called in functions that send or receive data on the data channel(s).

In the case of a write, this function is invoked when the entire data buffer is sent. Depending on the data transfer properties set by the globus_ftp_control_local_*() functions, the data may actually be split into multiple buffers and sent to multiple data nodes.

In the case of a read, this function will return a single extent of the data. The order of the data returned is not defined in an extended block mode data transfer. It is up to the user of the API to re-construct the file order.

Parameters:

callback_arg User supplied argument to the callback function

handle A pointer to the GSIFTP control handle. Used to identify which control connection the operation was applied to.

error Pointer to a globus error object containing information about any errors that occurred processing the operation

buffer The user buffer passed as a parameter to globus_ftp_control_data_read() or globus_ftp_control_data_write().

length The amount of data in the buffer. In the case of an incoming data channel, this may be less than the buffer size.

offset The file offset of the data which is contained in the buffer.

eof This is set to GLOBUS_TRUE then all of the data associated with the transfer has arrived on the data connections associated with this handle. If multiple data callbacks are registered with this handle, there is no guaranteed order of the EOF callback with respect to other data callbacks. If multiple callbacks are registered when EOF is reached on the data connections, at least one callback function will be called with eof set to GLOBUS_TRUE.

6.2.3.7 typedef void(* globus_ftp_control_server_callback_t)(void *callback_arg, struct globus_ftp_control_server_s *server_handle, globus_object_t *error)

Server callback.

A functions with this signature can be used as general callbacks for the GSIFTP server API.

Parameters:

server_handle The server handle associated with callback.

result Indicates if the operation completed successfully or if a failure occurred.

callback_arg The user argument passed to the callback function.

6.2.4 Enumeration Type Documentation

6.2.4.1 enum globus_ftp_control_type_e

control structure types.

The enumeration values match the character value of the argument to TYPE.

6.2.4.2 enum globus_ftp_control_mode_e

control structure mode

6.2.4.3 enum globus_ftp_control_dcau_mode_e

control dcau types

6.2.4.4 enum globus_ftp_control_striping_mode_e

control striping Types

6.2.4.5 enum globus_ftp_control_protection_t

control protection levels

6.2.4.6 enum globus_ftp_control_delay_passive_t

delayed passive flags

6.2.4.7 enum globus_ftp_control_structure_e

control structure structure

6.2.4.8 enum globus_ftp_control_parallelism_mode_e

control parallelism Types

6.2.4.9 enum globus_ftp_control_tcpbuffer_mode_e

TCP Buffer Setting Modes.

Enumerator:

GLOBUS_FTP_CONTROL_TCPBUFFER_DEFAULT Don't change the TCP buffer/window size from the system default.

GLOBUS_FTP_CONTROL_TCPBUFFER_FIXED Set the TCP buffer/window size to a fixed value.

GLOBUS_FTP_CONTROL_TCPBUFFER_AUTOMATIC Automatically set the TCP buffer/window size.

6.2.5 Function Documentation

6.2.5.1 globus_result_t globus_ftp_control_local_layout (globus_ftp_control_handle_t * *handle*, globus_ftp_control_layout_t * *layout*, globus_size_t *data_size*)

Update the handle with the layout and the size of the data sent over the data channel.

This function is deprecated. The interface will be the changed to that of globus_X_ftp_control_local_layout()

Parameters:

handle A pointer to the FTP control handle into which to insert the layout information.

layout A variable containing the layout information

data_size The size of the data that is going to be sent. This may be needed to interpret the layout information.

References globus_ftp_control_round_robin_s::block_size, GLOBUS_FTP_CONTROL_MODULE, globus_ftp_control_layout_u::mode, globus_ftp_control_layout_u::partitioned, and globus_ftp_control_layout_u::round_robin.

6.2.5.2 globus_result_t globus_ftp_control_data_set_interface (globus_ftp_control_handle_t * *handle*, const char * *interface_addr*)

Create an outgoing FTP data connection.

This function sets the interface that will be used to send and receive information along the data channel.

Parameters:

handle A pointer to a FTP control handle which is configured to create an outgoing data connection.

interface_addr

References GLOBUS_FTP_CONTROL_MODULE.

6.2.5.3 globus_result_t globus_ftp_control_create_data_info (globus_ftp_control_handle_t * *handle*, globus_ftp_control_data_write_info_t * *data_info*, globus_byte_t * *buffer*, globus_size_t *length*, globus_off_t *offset*, globus_bool_t *eof*, globus_ftp_control_data_callback_t *callback*, void * *callback_arg*)

Create a globus_ftp_control_data_write_info_t structure.

This funciton populates a globus_ftp_control_data_callback_t structure with valid information. This structure provides the user a way to register several data writes with a single callback. This is quite useful to the writter of enqueue functions. It allows a single call to globus_ftp_control_data_write() to be broken up into many writes, potentially on different stripes, and for a single callback to be called when all are finished.

Parameters:

handle A pointer to a FTP control handle. The handle contains information about the current state of the control and data connections.

data_info The globus_ftp_control_data_write_info_t structure to be released.

buffer The pointer to the user buffer that will be passed to the callback argument when there are zero references to data_info. This is intended to be the start of all the data the user intends to write using globus_ftp_control_data_write_stripe(), but it does not have to be.

length The length of the memory segment pointed to by the argument buffer.

offset The file offset of the data segment specified.

eof This should be set to true if the user plans on registering eof on the data_info structure.

callback The user function to be called when all references to data_info are released. This occurs after all data registered for write from globus_ftp_control_data_write_stripe have occured and the user calls globus_ftp_control_release_data_info(). The callback is passed all of the arguments passed to this function with the exception of data_info.

callback_arg User supplied argument to the callback function

References GLOBUS_FTP_CONTROL_MODULE.

6.2.5.4 globus_result_t globus_ftp_control_release_data_info (globus_ftp_control_handle_t * *handle*, globus_ftp_control_data_write_info_t * *data_info*)

Release a data_info structure.

This function releases all memory and references created when a call to globus_ftp_control_create_data_info() was made. For every call to globus_ftp_control_create_data_info() a call to this function must be made.

Parameters:

handle A pointer to a FTP control handle. The handle contains information about the current state of the control and data connections.

data_info The globus_ftp_control_data_write_info_t structure to be released.

References GLOBUS_FTP_CONTROL_MODULE.

6.2.5.5 globus_result_t globus_ftp_control_data_write_stripe (globus_ftp_control_handle_t * *handle*, globus_byte_t * *buffer*, globus_size_t *length*, globus_off_t *offset*, globus_bool_t *eof*, int *stripe_ndx*, globus_ftp_control_data_callback_t *callback*, void * *callback_arg*)

Write FTP data to a particular stripe.

This function allows the user to write to a specified stripe. The stripe index relates to the order passsed into local_spor(). This function differs from globus_ftp_control_data_write() in that no enqueue function is needed since the user specifies the stripe on which data is written. In order to use this function the user must have a valid pointer to a globus_ftp_control_data_write_info_t structure. The data_info structure can be obtained by a call to globus_ftp_control_create_data_info(). Many calls to this function can be made, but only a single user callback occurs per creation of a globus_ftp_control_data_write_info_t structure.

Parameters:

handle A pointer to a FTP control handle. The handle contains information about the current state of the control and data connections.

buffer a pointer to the data the user wishes to send along the FTP data channels.

length the length of the data pointer to by the parameter buffer.

offset the offset into the file of the data.

eof A boolean stating that this will be the last chuck of data registered on the given stripe. In order to properly send an eof message the user must register an eof on every stripe.

stripe_ndx The index of the stripe on which the data will be sent. The index of each stripe is determined by the call to local_spas or local_spor.

callback The function to be called once the data has been sent

callback_arg User supplied argument to the callback function

References GLOBUS_FTP_CONTROL_MODULE.

6.2.5.6 globus_result_t globus_X_ftp_control_data_write_stripe (globus_ftp_control_handle_t * *handle*, globus_byte_t * *buffer*, globus_size_t *length*, globus_off_t *offset*, globus_bool_t *eof*, int *stripe_ndx*, globus_ftp_control_data_write_info_t * *data_info*)

Write data on a specific stripe from an enqueue callback function only.

This function allows the user to register the write of ftp data on a specfic stripe. This function can only be called fromed an enqueue function callback. This function should be used only by the implementor of an enqueue funciton. It should be viewed as unstable and used used only by advanced users. This is the only function in the library that the enqueue function implemtor is allowed from the enqueue callback.

Parameters:

handle A pointer to a FTP control handle. The handle contains information about the current state of the control and data connections.

buffer a pointer to the data the user wishes to send along the FTP data channels.

length the length of the data pointer to by the parameter buffer.

offset the offset into the file of the data.

eof a boolean stating that this is the last buffer to be registered. When using the _X_ version of this function the user does not need to register an eof on each stripe, the control library will take care of that internally.

stripe_ndx The index of the stripe on which the data will be sent. The index of each stripe is determined by the call to local_spas or local_spor.

data_info An opaque structure that is passed into the enqueue function and contains reference count and state information. The same data_info pointer that is passed into the enqueue function must be used for this parameter.

References GLOBUS_FTP_CONTROL_MODULE.

6.3 globus_ftp_control_client.c File Reference

Client-side FTP Control API.

Functions

- globus_result_t globus_ftp_control_handle_init (globus_ftp_control_handle_t *handle)
- globus_result_t globus_ftp_control_handle_destroy (globus_ftp_control_handle_t *handle)
- globus_result_t globus_ftp_control_connect (globus_ftp_control_handle_t *handle, char *host, unsigned short port, globus_ftp_control_response_callback_t callback, void *callback_arg)
- globus_result_t globus_ftp_control_response_destroy (globus_ftp_control_response_t *response)
- globus_result_t globus_ftp_control_response_copy (globus_ftp_control_response_t *src, globus_ftp_control_response_t *dest)
- globus_result_t globus_ftp_control_authenticate (globus_ftp_control_handle_t *handle, globus_ftp_control_auth_info_t *auth_info, globus_bool_t use_auth, globus_ftp_control_response_callback_t callback, void *callback_arg)
- globus_result_t globus_ftp_control_send_command (globus_ftp_control_handle_t *handle, const char *cmdspec, globus_ftp_control_response_callback_t callback, void *callback_arg,...)
- globus_result_t globus_ftp_control_abort (globus_ftp_control_handle_t *handle, globus_ftp_control_response_callback_t callback, void *callback_arg)
- globus_result_t globus_ftp_control_quit (globus_ftp_control_handle_t *handle, globus_ftp_control_response_callback_t callback, void *callback_arg)
- globus_result_t globus_ftp_control_force_close (globus_ftp_control_handle_t *handle, globus_ftp_control_response_callback_t callback, void *callback_arg)
- globus_result_t globus_ftp_control_auth_info_init (globus_ftp_control_auth_info_t *auth_info, gss_cred_id_t credential_handle, globus_bool_t encrypt, char *user, char *password, char *account, char *subject)
- int globus_ftp_control_auth_info_compare (globus_ftp_control_auth_info_t *auth_info_1, globus_ftp_control_auth_info_t *auth_info_2)

6.3.1 Detailed Description

Client-side FTP Control API.

6.3.2 Function Documentation

6.3.2.1 globus_result_t globus_ftp_control_handle_init (globus_ftp_control_handle_t * *handle*)

Initialize a globus ftp handle.

This function will set up (i.e. intialize all mutexes and variables) a globus ftp handle. It will also enter the handle in a list used by the module activation/deactivation functions.

Parameters:

handle The handle to initialize.

Returns:

- GLOBUS_SUCCESS
- error object

References globus_ftp_control_auth_info_init(), and GLOBUS_FTP_CONTROL_MODULE.

6.3.2.2 globus_result_t globus_ftp_control_handle_destroy (globus_ftp_control_handle_t * *handle*)

Destroy a globus ftp handle.

This function will free up all dynamicly allocated memory associated with a given globus ftp handle. It will also remove the handle from a list used by the module activation/deactivation functions. This function should only be called after a call to either globus_ftp_control_force_close or globus_ftp_control_quit.

Parameters:

handle The handle to destory.

Returns:

- success
- invalid handle
- handle is still in connected state

References GLOBUS_FTP_CONTROL_MODULE, and globus_ftp_control_response_destroy().

6.3.2.3 globus_result_t globus_ftp_control_connect (globus_ftp_control_handle_t * *handle*, char * *host*, unsigned short *port*, globus_ftp_control_response_callback_t *callback*, void * *callback_arg*)

Create a new control connection to an FTP server.

This function is used to initiate an FTP control connection. It creates the socket to the FTP server. When the connection is made to the server, and the server's identification string is received, the callback function will be invoked.

Parameters:

handle A pointer to a initialized FTP control handle. This handle will be used for all subsequent FTP control operations.

host The hostname of the FTP server.

port The TCP port number of the FTP server.

callback A function to be called once the connection to the server is established, and a response has been read.

callback_arg Parameter to the callback function.

Returns:

- success
- Null handle
- Null host
- Illegal port number
- Null callback
- Cannot resolve hostname
- Cannot create socket

Callback errors:

- success
- connection refused
- protocol error
- eof

Expected callback response values:

- 120 Service ready in nnn minutes.
- 220 Service ready for new user.
- 421 Service not available, closing control connection.
- 500 Syntax error, command unrecognized.

Note:

The server may send other responses.

References GLOBUS_FTP_CONTROL_MODULE.

6.3.2.4 globus_result_t globus_ftp_control_response_destroy (globus_ftp_control_response_t * *response*)

Helper function which frees the memory associated with a response structure.

This is a helper function which frees the memory associated with a response structure.

Parameters:

response This parameter indicates the response structure to destroy

Returns:

- Error object
- GLOBUS_SUCCESS

6.3.2.5 globus_result_t globus_ftp_control_response_copy (globus_ftp_control_response_t * *src*, globus_ftp_control_response_t * *dest*)

Helper function which copies one response structure to another.

This is a helper function which copies one response structure to another.

Parameters:

src This parameter indicates the response structure to copy

dest This parameter specifies the target response structure

Returns:

- Error object
- GLOBUS_SUCCESS

References GLOBUS_FTP_CONTROL_MODULE.

6.3.2.6 globus_result_t globus_ftp_control_authenticate (globus_ftp_control_handle_t * *handle*, globus_ftp_control_auth_info_t * *auth_info*, globus_bool_t *use_auth*, globus_ftp_control_response_callback_t *callback*, void * *callback_arg*)

Authenticate the user to the FTP server.

This will perform the authentication handshake with the FTP server. depending on which parameters are non-NULL, the authentication may involve GSSAPI credentials, a username, a password, and an account name.

Note:

Do we want to add attribute arguments for:

- specifying type of delegation
- gsswrap control messages for integrity or confidentiality

Parameters:

handle A pointer to a unauthenticated GSIFTP control handle. In the case of GSS authentication the GSS security context is stored in this structure.

auth_info This structure is used to pass the following information:

- user The user's name for login purposes. If this string is "anonymous", "ftp", GLOBUS_NULL or ":globus-mapping:" then the password argument is optional. If this string is GLOBUS_NULL or ":globus-mapping:" and gss_auth is true then the users login is looked by the FTP server host.
- password The password for the above user argument. If the user argument is "anonymous" or "ftp" or if gss_auth is true this string may be GLOBUS_NULL.
- account This parameter is optional. If not used it should be set to GLOBUS_NULL. It might be needed by firewalls.
- auth_gssapi_subject The GSSAPI subject name of the server you are connecting to. If this is GLOBUS_NULL, and the gss_auth parameter is set to GLOBUS_TRUE, then the name will default to the host name.

use_auth If set to GLOBUS_TRUE the above argument indicates that GSS authentication should be used, otherwise cleartext user/password authentication is used.

callback The function to be called once the authentication process is complete or when an error occurs.

callback_arg User supplied argument to the callback function

Returns:

- success
- Null handle
- Invalid handle
- Handle already authenticated

Callback errors:

- success
- authentication failed
- protocol error
- eof

Expected callback response values:

- 230 User logged in, proceed.
- 232 User logged in, authorized by security data exchange.
- 234 Security data exchange complete.
- 331 User name okay, need password.
- 332 Need account for login.
- 336 Username okay, need password. Challenge is "...."
- 431 Need some unavailable resource to process security.
- 500 Syntax error, command unrecognized.
- 530 Not logged in.

Note:

The server may send other responses.

References GLOBUS_FTP_CONTROL_MODULE, globus_ftp_control_send_command(), and globus_ftp_-control_auth_info_s::user.

6.3.2.7 globus_result_t globus_ftp_control_send_command (globus_ftp_control_handle_t * *handle*, const char * *cmdspec*, globus_ftp_control_response_callback_t *callback*, void * *callback_arg*, ...)

Send an FTP protocol command to the FTP server and register a response handler.

This function is used to send an FTP command, and register a handler to receive the FTP reply (or replies, if an intermediate one is sent). When the control channel is gss authenticated, the message and the reply will be automatically gss wrapped/unwrapped.

Parameters:

handle A pointer to a GSIFTP control handle. The command described by the cmdspec is issued to the server over the control channel associated with this handle.

cmdspec A printf-style format string containing the text of the command to send to the server. The optional parameters to the format string are passed after the callback_arg in the function invocation.

callback The function to be called once the authentication process is complete or when an error occurs.

callback_arg User supplied argument to the callback function

... Parameters which will be substituted into the % escapes in the cmdspec string.

Returns:

- Success
- Null handle
- Command already in progress

Callback errors:

- success
- protocol error
- eof

Expected callback response values:

Any defined in RFC 959, 2228, 2389, draft-ietf-ftpext-mlst-10, or the protocol extensions document.

References GLOBUS_FTP_CONTROL_MODULE.

6.3.2.8 globus_result_t globus_ftp_control_abort (globus_ftp_control_handle_t * *handle*, globus_ftp_-control_response_callback_t *callback*, void * *callback_arg*)

Send an ABORT to the FTP server and register a response handler.

This function is used to send the ABORT message to the FTP server. The ABORT message is sent out-of-band, and terminates any current data transfer in progress.

As a result of the ABORT, the data channels used by this control channel will be closed. The data command callback will be issued with either a completion reply, or a transfer aborted reply. The ABORT callback will also be invoked, with the server's response to the abort command.

Any attempts to register buffers for read or write after an ABORT has been sent will fail with a "no transfer in progress" error.

Parameters:

handle A pointer to a GSIFTP control handle. The ABORT command is issued to the server over the control channel associated with this handle.

callback The function to be called once the authentication process is complete or when an error occurs.

callback_arg User supplied argument to the callback function

Returns:

- Success
- Null handle
- No transfer in progress

Callback errors:

- success
- protocol error
- eof

Expected callback response values:

- 226 Abort successful.
- 500 Syntax error, command unrecognized.

Note:

The server may send other responses.

References GLOBUS_FTP_CONTROL_MODULE.

6.3.2.9 globus_result_t globus_ftp_control_quit (globus_ftp_control_handle_t * *handle*, globus_ftp_control_response_callback_t *callback*, void * *callback_arg*)

Send a QUIT message to the FTP server and register a response handler.

This function is used to close the control channel to the FTP server. There should be no transfer commands in progress when this is called. Once the final response callback passed to this function is invoked, the control handle can no longer be used for any gsiftp control operations.

Note:

Need to further define behavior for when a QUIT happens during a transfer or command is in progress.
Since this function waits until all other callbacks are completed before calling it's own callback it may not be called in a blocking fashion from another callback.

Parameters:

handle A pointer to a GSIFTP control handle. The quit message is issued to the server over the control channel associated with this handle.

callback The function to be called once the authentication process is complete or when an error occurs.

callback_arg User supplied argument to the callback function

Returns:

- Success
- Null handle

- Command in progress

Callback errors:

- success
- protocol error
- eof

Expected callback response values:

- 221 Service closing control connection.
- 500 Syntax error, command unrecognized.

Note:

The server may send other responses.

References GLOBUS_FTP_CONTROL_MODULE, and globus_ftp_control_send_command().

6.3.2.10 globus_result_t globus_ftp_control_force_close (globus_ftp_control_handle_t * *handle*, globus_ftp_control_response_callback_t *callback*, void * *callback_arg*)

Force a close of the control connection without waiting for outstanding commands to complete and without sending QUIT.

This function is used to close the control channel to the FTP server. Once the final response callback passed to this function is invoked, the control handle can no longer be used for any gsiftp control operations.

Note:

Since this function waits until all other callbacks are completed before calling it's own callback it may not be called in a blocking fashion from another callback.

Parameters:

handle A pointer to a GSIFTP control handle. The quit message is issued to the server over the control channel associated with this handle.

callback The function to be called once the authentication process is complete or when an error occurs.

callback_arg User supplied argument to the callback function

Returns:

- Success
- Null handle

Callback errors:

- success
- failure

Expected callback response values:

- GLOBUS_NULL

References globus_ftp_control_data_force_close(), and GLOBUS_FTP_CONTROL_MODULE.

6.3.2.11 globus_result_t globus_ftp_control_auth_info_init (globus_ftp_control_auth_info_t * *auth_info*, gss_cred_id_t *credential_handle*, globus_bool_t *encrypt*, char * *user*, char * *password*, char * *account*, char * *subject*)

Helper function which initializes a authentication information structure.

This is helper function initializes a authentication information structure with the values contained in the second to fifth arguments, which may be GLOBUS_NULL. No memory is allocated in this function.

Parameters:

auth_info The authentication structure to initialize.

credential_handle The credential to use for authentication. This may be GSS_C_NO_CREDENTIAL to use the user's default credential.

encrypt Boolean whether or not to encrypt the control channel for this handle.

user The user name

password The password for the user name

account The account for the user name/password

subject The gss api subject name

Returns:

- Error object
- GLOBUS_SUCCESS

References globus_ftp_control_auth_info_s::account, globus_ftp_control_auth_info_s::auth_gssapi_context, globus_ftp_control_auth_info_s::auth_gssapi_subject, globus_ftp_control_auth_info_s::authenticated, globus_ftp_control_auth_info_s::credential_handle, globus_ftp_control_auth_info_s::delegated_credential_handle, globus_ftp_control_auth_info_s::encrypt, GLOBUS_FTP_CONTROL_MODULE, globus_ftp_control_auth_info_s::locally_acquired_credential, globus_ftp_control_auth_info_s::password, globus_ftp_control_auth_info_s::prev_cmd, globus_ftp_control_auth_info_s::req_flags, globus_ftp_control_auth_info_s::target_name, and globus_ftp_control_auth_info_s::user.

6.3.2.12 int globus_ftp_control_auth_info_compare (globus_ftp_control_auth_info_t * *auth_info_1*, globus_ftp_control_auth_info_t * *auth_info_2*)

Helper function which compares two authentication information structures.

This is helper function compares two authentication information structures and return zero if the two structures are deemed equal and a non-zero value otherwise.

Parameters:

auth_info_1 The first authentication structure

auth_info_2 The second authentication structure

Returns:

- 0 if the structures are equal
- !0 if the structures differ or an error occured

References globus_ftp_control_auth_info_s::account, globus_ftp_control_auth_info_s::auth_gssapi_subject, globus_ftp_control_auth_info_s::credential_handle, globus_ftp_control_auth_info_s::locally_acquired_credential, globus_ftp_control_auth_info_s::password, and globus_ftp_control_auth_info_s::user.

6.4 globus_ftp_control_data.c File Reference

FTP Data Connection Configuration and Management.

Functions

- globus_result_t globus_ftp_control_data_connect_read (globus_ftp_control_handle_t *handle, globus_ftp_control_data_connect_callback_t callback, void *user_arg)
- globus_result_t globus_ftp_control_data_set_interface (globus_ftp_control_handle_t *handle, const char *interface_addr)
- globus_result_t globus_ftp_control_data_connect_write (globus_ftp_control_handle_t *handle, globus_ftp_control_data_connect_callback_t callback, void *user_arg)
- globus_result_t globus_ftp_control_data_add_channels (globus_ftp_control_handle_t *handle, unsigned int num_channels, unsigned int stripe_ndx)
- globus_result_t globus_ftp_control_data_send_eof (globus_ftp_control_handle_t *handle, int count[ ], int array_size, globus_bool_t eof_message, globus_ftp_control_callback_t cb, void *user_arg)
- globus_result_t globus_ftp_control_data_remove_channels (globus_ftp_control_handle_t *handle, unsigned int num_channels, unsigned int stripe_ndx)
- globus_result_t globus_ftp_control_data_query_channels (globus_ftp_control_handle_t *handle, unsigned int *num_channels, unsigned int stripe_ndx)
- globus_result_t globus_ftp_control_data_get_total_data_channels (globus_ftp_control_handle_t *handle, unsigned int *num_channels, unsigned int stripe_ndx)
- globus_result_t globus_ftp_control_local_send_eof (globus_ftp_control_handle_t *handle, globus_bool_t send_eof)
- globus_result_t globus_ftp_control_local_parallelism (globus_ftp_control_handle_t *handle, globus_ftp_control_parallelism_t *parallelism)
- globus_result_t globus_ftp_control_local_pasv (globus_ftp_control_handle_t *handle, globus_ftp_control_host_port_t *address)
- globus_result_t globus_ftp_control_local_spas (globus_ftp_control_handle_t *handle, globus_ftp_control_host_port_t addresses[ ], unsigned int num_addresses)
- globus_result_t globus_ftp_control_local_port (globus_ftp_control_handle_t *handle, globus_ftp_control_host_port_t *address)
- globus_result_t globus_ftp_control_local_spor (globus_ftp_control_handle_t *handle, globus_ftp_control_host_port_t addresses[ ], unsigned int num_addresses)
- globus_result_t globus_ftp_control_local_type (globus_ftp_control_handle_t *handle, globus_ftp_control_type_t type, int form_code)
- globus_result_t globus_ftp_control_local_mode (globus_ftp_control_handle_t *handle, globus_ftp_control_mode_t mode)
- globus_result_t globus_ftp_control_local_tcp_buffer (globus_ftp_control_handle_t *handle, globus_ftp_control_tcpbuffer_t *tcp_buffer)
- globus_result_t globus_ftp_control_local_dcau (globus_ftp_control_handle_t *handle, const globus_ftp_control_dcau_t *dcau, gss_cred_id_t delegated_credential_handle)
- globus_result_t globus_ftp_control_local_pbsz (globus_ftp_control_handle_t *handle, unsigned long bufsize)
- globus_result_t globus_ftp_control_get_pbsz (globus_ftp_control_handle_t *handle, unsigned long *bufsize)
- globus_result_t globus_ftp_control_local_stru (globus_ftp_control_handle_t *handle, globus_ftp_control_structure_t structure)
- globus_result_t globus_ftp_control_data_write (globus_ftp_control_handle_t *handle, globus_byte_t *buffer, globus_size_t length, globus_off_t offset, globus_bool_t eof, globus_ftp_control_data_callback_t callback, void *callback_arg)
- globus_result_t globus_ftp_control_data_read (globus_ftp_control_handle_t *handle, globus_byte_t *buffer, globus_size_t max_length, globus_ftp_control_data_callback_t callback, void *callback_arg)

- globus_result_t globus_ftp_control_local_layout (globus_ftp_control_handle_t *handle, globus_ftp_control_layout_t *layout, globus_size_t data_size)
- globus_result_t globus_ftp_control_create_data_info (globus_ftp_control_handle_t *handle, globus_ftp_control_data_write_info_t *data_info, globus_byte_t *buffer, globus_size_t length, globus_off_t offset, globus_bool_t eof, globus_ftp_control_data_callback_t callback, void *callback_arg)
- globus_result_t globus_ftp_control_release_data_info (globus_ftp_control_handle_t *handle, globus_ftp_control_data_write_info_t *data_info)
- globus_result_t globus_ftp_control_data_write_stripe (globus_ftp_control_handle_t *handle, globus_byte_t *buffer, globus_size_t length, globus_off_t offset, globus_bool_t eof, int stripe_ndx, globus_ftp_control_data_callback_t callback, void *callback_arg)
- globus_result_t globus_X_ftp_control_data_write_stripe (globus_ftp_control_handle_t *handle, globus_byte_t *buffer, globus_size_t length, globus_off_t offset, globus_bool_t eof, int stripe_ndx, globus_ftp_control_data_write_info_t *data_info)
- globus_result_t globus_ftp_control_data_force_close (globus_ftp_control_handle_t *control_handle, globus_ftp_control_callback_t close_callback_func, void *close_arg)

6.4.1 Detailed Description

FTP Data Connection Configuration and Management.

6.4.2 Function Documentation

6.4.2.1 globus_result_t globus_ftp_control_data_connect_read (globus_ftp_control_handle_t * *handle*, globus_ftp_control_data_connect_callback_t *callback*, void * *user_arg*)

Create an incoming FTP data connection.

This function will register a globus_io_{accept, connect}. Further accepts/connects are done by registering a new accept/connect in the current accept/connect callback. A call to either globus_ftp_control_local_pasv() or globus_ftp_control_local_port() needs to precede this calling this function. This function may be followed by a globus_ftp_data_read.

Parameters:

handle A pointer to a FTP control handle which is configured to create an incoming data connection.

callback This callback is called when the connection occurs. This parameter may be NULL.

user_arg The user argument passed to the connect callback.

References GLOBUS_FTP_CONTROL_MODULE.

6.4.2.2 globus_result_t globus_ftp_control_data_set_interface (globus_ftp_control_handle_t * *handle*, const char * *interface_addr*)

Create an outgoing FTP data connection.

This function sets the interface that will be used to send and receive information along the data channel.

Parameters:

handle A pointer to a FTP control handle which is configured to create an outgoing data connection.

interface_addr

References GLOBUS_FTP_CONTROL_MODULE.

6.4.2.3 globus_result_t globus_ftp_control_data_connect_write (globus_ftp_control_handle_t * *handle*, globus_ftp_control_data_connect_callback_t *callback*, void * *user_arg*)

Create an outgoing FTP data connection.

This function will register a globus_io_{accept, connect}. Further accepts/connects are done by registering a new accept/connect in the current accept/connect callback. A call to either globus_ftp_control_local_pasv() or globus_ftp_control_local_port() needs to precede this calling this function. This function may be followed by a globus_ftp_data_write.

Parameters:

handle A pointer to a FTP control handle which is configured to create an outgoing data connection.

callback This callback is called when the connection occurs. This parameter may be NULL.

user_arg The user argument passed to the connect callback.

References GLOBUS_FTP_CONTROL_MODULE.

6.4.2.4 globus_result_t globus_ftp_control_data_add_channels (globus_ftp_control_handle_t * *handle*, unsigned int *num_channels*, unsigned int *stripe_ndx*)

Opens additional data channels (connections) to the host identified by the stripe parameter.

Parameters:

handle A pointer to a FTP control handle. This handle is used to determine the host corresponding to the stripe number and to store information about any channels added by this function.

num_channels The number of additional channels to add.

stripe_ndx A integer identifying the stripe to add channels too. In the case of non-striped transfer this parameter will be ignored.

References GLOBUS_FTP_CONTROL_MODULE.

6.4.2.5 globus_result_t globus_ftp_control_data_send_eof (globus_ftp_control_handle_t * *handle*, int *count*[ ], int *array_size*, globus_bool_t *eof_message*, globus_ftp_control_callback_t *cb*, void * *user_arg*)

Sends an eof message to each stripe along an open data connection.

Parameters:

handle A pointer to a FTP control handle. This handle contains the the state for a conneciton.

count[ ] This array of integers should contain an integer that will be added to the current parallel data connection count on each stripe. The order of the integers corresponds to each stripe in the same order as what was returned from local_port().

An eof message must be sent to all receiving hosts in a transfer. The message contains the total number of data connections used by each stripe. Many stripes may be sending to a single receiver but only one eof message may be sent. The count parameter allows the user to pass in the total number of data connections used by all other hosts. The local values are added to the passed in values and then sent to the receiver.

Parameters:

array_size The number of elements in count[].

eof_message

cb The function to be called when the eof message has been called.

user_arg A user pointer that is threaded through to the user callback.

References GLOBUS_FTP_CONTROL_MODULE.

6.4.2.6 globus_result_t globus_ftp_control_data_remove_channels (globus_ftp_control_handle_t * *handle*, unsigned int *num_channels*, unsigned int *stripe_ndx*)

Removes data channels (connections) to the host identified by the stripe parameter.

Parameters:

handle A pointer to a FTP control handle. This handle is used to determine the host corresponding to the stripe number and to update information about any channels removed by this function.

num_channels The number of channels to remove.

stripe_ndx A integer identifying the stripe to remove channels from. In the case of non-striped transfer this parameter will be ignored.

References GLOBUS_FTP_CONTROL_MODULE.

6.4.2.7 globus_result_t globus_ftp_control_data_query_channels (globus_ftp_control_handle_t * *handle*, unsigned int * *num_channels*, unsigned int *stripe_ndx*)

Returns the number of currently open channels for the host identified by the stripe parameter.

This number may be less then the level of parallelism specified in local_parallelism, due to the possibility that some channels have not yet connected.

Parameters:

handle A pointer to a FTP control handle. This handle is used to determine the host corresponding to "stripe" and number of channels corresponding to that host.

num_channels

stripe_ndx A integer identifying the stripe for which to return the number of channels. In the case of non-striped transfer this parameter should be zero.

References GLOBUS_FTP_CONTROL_MODULE.

6.4.2.8 globus_result_t globus_ftp_control_data_get_total_data_channels (globus_ftp_control_handle_t * *handle*, unsigned int * *num_channels*, unsigned int *stripe_ndx*)

Returns the total number of data channels used so far in the current transfer on the given stripe.

Parameters:

handle A pointer to a FTP control handle. This handle is used to determine the host corresponding to "stripe" and number of channels corresponding to that host.

num_channels

stripe_ndx A integer identifying the stripe for which to return the number of channels. In the case of non-striped transfer this parameter should be zero.

References GLOBUS_FTP_CONTROL_MODULE.

6.4.2.9 globus_result_t globus_ftp_control_local_send_eof (globus_ftp_control_handle_t * *handle*, globus_bool_t *send_eof*)

Determines if the library will automatically send an EOF message in extended block mode, or if the user will have to explicitly do it by calling globus_ftp_control_data_send_eof().

Parameters:

handle The ftp handle you wish to sent the send_eof attribute on.

send_eof A boolean representing whether or not to automatically send an EOF message.

References GLOBUS_FTP_CONTROL_MODULE.

6.4.2.10 globus_result_t globus_ftp_control_local_parallelism (globus_ftp_control_handle_t * *handle*, globus_ftp_control_parallelism_t * *parallelism*)

Set the parallelism information in a FTP control handle.

Parameters:

handle A pointer to the FTP control handle for which the parallelism information is to be updated

parallelism A structure containing parallelism information

References GLOBUS_FTP_CONTROL_MODULE.

6.4.2.11 globus_result_t globus_ftp_control_local_pasv (globus_ftp_control_handle_t * *handle*, globus_ftp_control_host_port_t * *address*)

Create a local listening socket, bind it and return the address the socket is listening to.

If there is a existing data connection it is closed.

Parameters:

handle A pointer to a FTP control handle. Information about the listening socket is stored in the handle.

address The host IP address and port is returned through this parameter.

References GLOBUS_FTP_CONTROL_MODULE.

6.4.2.12 globus_result_t globus_ftp_control_local_spas (globus_ftp_control_handle_t * *handle*, globus_ftp_control_host_port_t *addresses*[ ], unsigned int *num_addresses*)

Create num_addresses local listening sockets, bind them and return the addresses the sockets are listening to.

If there is a existing data connection it is closed.

Parameters:

handle A pointer to a FTP control handle. Information about the listening sockets is stored in the handle.

addresses The host IP addresses and ports are returned through this parameter.

num_addresses The number of listening sockets to create

References GLOBUS_FTP_CONTROL_MODULE.

6.4.2.13 globus_result_t globus_ftp_control_local_port (globus_ftp_control_handle_t * *handle*, globus_ftp_control_host_port_t * *address*)

Insert the host/port information returned by a PASV on the remote host into the local FTP control handle.

(close any outstanding data con)

Parameters:

handle A pointer to the FTP control handle into which to insert the host/port information

address The host IP address and port

References GLOBUS_FTP_CONTROL_MODULE.

6.4.2.14 globus_result_t globus_ftp_control_local_spor (globus_ftp_control_handle_t * *handle*, globus_ftp_control_host_port_t *addresses*[ ], unsigned int *num_addresses*)

Insert the host/port addresses returned by a SPAS on the remote host into the local FTP control handle.

If there are any outstanding data connections at this point, they are closed.

Parameters:

handle A pointer to the FTP control handle into which to insert the host/port addresses

addresses The host IP addresses and port numbers

num_addresses The number of addresses

References GLOBUS_FTP_CONTROL_MODULE.

6.4.2.15 globus_result_t globus_ftp_control_local_type (globus_ftp_control_handle_t * *handle*, globus_ftp_control_type_t *type*, int *form_code*)

Update the FTP control handle with the given type information.

Parameters:

handle A pointer to the FTP control handle to be updated

type The type of the data connection. Possible values are: ASCII, EBCDIC, IMAGE and LOCAL. Currently only ASCII and IMAGE types are supported.

form_code The logical byte size parameter for the LOCAL type.

References GLOBUS_FTP_CONTROL_MODULE.

6.4.2.16 globus_result_t globus_ftp_control_local_mode (globus_ftp_control_handle_t * *handle*, globus_ftp_control_mode_t *mode*)

Update the FTP control handle with the given mode information.

Parameters:

handle A pointer to the FTP control handle to be updated

mode Specifies the mode of the data connection. Possible modes are STREAM, BLOCK, EXTENDED BLOCK and COMPRESSED. Out of these only STREAM and EXTENDED BLOCK are supported in this implementation. Also, EXTENDED BLOCK is only supported in combination with the IMAGE type.

References GLOBUS_FTP_CONTROL_MODULE.

6.4.2.17 globus_result_t globus_ftp_control_local_tcp_buffer (globus_ftp_control_handle_t * *handle*, globus_ftp_control_tcpbuffer_t * *tcp_buffer*)

Update the FTP control handle with the given socket buffer information.

Parameters:

handle A pointer to the FTP control handle to be updated

tcp_buffer A pointer to the socket buffer.

References globus_ftp_control_tcpbuffer_t::fixed, GLOBUS_FTP_CONTROL_MODULE, GLOBUS_FTP_CONTROL_TCPBUFFER_FIXED, globus_ftp_control_tcpbuffer_t::mode, and globus_ftp_control_tcpbuffer_fixed_t::size.

6.4.2.18 globus_result_t globus_ftp_control_local_dcau (globus_ftp_control_handle_t * *handle*, const globus_ftp_control_dcau_t * *dcau*, gss_cred_id_t *delegated_credential_handle*)

Update the FTP control handle with the given data channel authentication information.

If authentication is set to GLOBUS_FTP_CONTROL_DCAU_NONE, then protection will also be disabled for this control handle.

Parameters:

handle A pointer to the FTP control handle to be updated

dcau A parameter specifying the data channel authentication mode. Possible values are No Authentication, Self Authentication and Subject-name authentication.

delegated_credential_handle

References GLOBUS_FTP_CONTROL_MODULE, globus_ftp_control_dcau_u::mode, globus_ftp_control_dcau_subject_s::subject, and globus_ftp_control_dcau_u::subject.

6.4.2.19 globus_result_t globus_ftp_control_local_pbsz (globus_ftp_control_handle_t * *handle*, unsigned long *bufsize*)

Update the FTP control handle with the given protection buffer size information.

This function sets protection buffer size to be used by this handle. This value is used to determine how much data will be sent in each packet during a protected data transfer.

Parameters:

handle A pointer to the FTP control handle to be updated

bufsize A parameter specifying the protection buffer size value.

References GLOBUS_FTP_CONTROL_MODULE.

6.4.2.20 globus_result_t globus_ftp_control_get_pbsz (globus_ftp_control_handle_t * *handle*, unsigned long * *bufsize*)

Query the FTP control handle for the protection buffer size information.

This function queries the handle to determine the protection buffer size which is used by this handle. This value is used to determine how much data will be sent in each packet during a protected data transfer.

Parameters:

handle A pointer to the FTP control handle to be updated

bufsize A pointer to a parameter to store the value of the protection buffer size.

References GLOBUS_FTP_CONTROL_MODULE.

6.4.2.21 globus_result_t globus_ftp_control_local_stru (globus_ftp_control_handle_t * *handle*, globus_ftp_control_structure_t *structure*)

Updates the handle with information on the structure of the data being sent on the data channel.

This function updates the handle with the provided structure information. At this point the only structure type that is supported is the file type.

Parameters:

handle A pointer to a FTP control handle. The handle contains information about the current state of the control and data connections.

structure This parameter is used to pass the structure information. Possible values are file, record and page. Only the file type is supported

References GLOBUS_FTP_CONTROL_MODULE.

6.4.2.22 globus_result_t globus_ftp_control_data_write (globus_ftp_control_handle_t * *handle*, globus_byte_t * *buffer*, globus_size_t *length*, globus_off_t *offset*, globus_bool_t *eof*, globus_ftp_control_data_callback_t *callback*, void * *callback_arg*)

Writes data from the supplied buffer to data connection(s).

This function writes contained in the buffer to the data channel(s).

Parameters:

handle A pointer to a FTP control handle. The handle contains information about the current state of the control and data connections.

buffer A user supplied buffer from which data will written to the data connection(s)

length The length of the data contained in the buffer.

offset The offset in the file at which the data in the buffer starts

eof Indicates that the buffer is that last part of a file. In the striped case this will cause a EOF block to be send to every data node involved in the transfer.

callback The function to be called once the data has been sent

callback_arg User supplied argument to the callback function

References GLOBUS_FTP_CONTROL_MODULE.

6.4.2.23 globus_result_t globus_ftp_control_data_read (globus_ftp_control_handle_t * *handle*, globus_byte_t * *buffer*, globus_size_t *max_length*, globus_ftp_control_data_callback_t *callback*, void * *callback_arg*)

Reads data from data connection(s) and put them in the supplied buffer.

This function takes the given buffer and will try to read data from the data connection(s).

Parameters:

handle A pointer to a FTP control handle. The handle contains information about the current state of the control and data connections.

buffer A user supplied buffer into which data from the data connection(s) will be written

max_length The maximum length of the data that can be written to the buffer

callback The function to be called once the data has been read

callback_arg User supplied argument to the callback function

References GLOBUS_FTP_CONTROL_MODULE.

6.4.2.24 globus_result_t globus_ftp_control_local_layout (globus_ftp_control_handle_t * *handle*, globus_ftp_control_layout_t * *layout*, globus_size_t *data_size*)

Update the handle with the layout and the size of the data sent over the data channel.

This function is deprecated. The interface will be the changed to that of globus_X_ftp_control_local_layout()

Parameters:

handle A pointer to the FTP control handle into which to insert the layout information.

layout A variable containing the layout information

data_size The size of the data that is going to be sent. This may be needed to interpret the layout information.

References globus_ftp_control_round_robin_s::block_size, GLOBUS_FTP_CONTROL_MODULE, globus_ftp_control_layout_u::mode, globus_ftp_control_layout_u::partitioned, and globus_ftp_control_layout_u::round_robin.

6.4.2.25 globus_result_t globus_ftp_control_create_data_info (globus_ftp_control_handle_t * *handle*, globus_ftp_control_data_write_info_t * *data_info*, globus_byte_t * *buffer*, globus_size_t *length*, globus_off_t *offset*, globus_bool_t *eof*, globus_ftp_control_data_callback_t *callback*, void * *callback_arg*)

Create a globus_ftp_control_data_write_info_t structure.

This funciton populates a globus_ftp_control_data_callback_t structure with valid information. This structure provides the user a way to register several data writes with a single callback. This is quite useful to the writter of enqueue functions. It allows a single call to globus_ftp_control_data_write() to be broken up into many writes, potentially on different stripes, and for a single callback to be called when all are finished.

Parameters:

handle A pointer to a FTP control handle. The handle contains information about the current state of the control and data connections.

data_info The globus_ftp_control_data_write_info_t structure to be released.

buffer The pointer to the user buffer that will be passed to the callback argument when there are zero references to data_info. This is intended to be the start of all the data the user intends to write using globus_ftp_control_data_write_stripe(), but it does not have to be.

length The length of the memory segment pointed to by the argument buffer.

offset The file offset of the data segment specified.

eof This should be set to true if the user plans on registering eof on the data_info structure.

callback The user function to be called when all references to data_info are released. This occurs after all data registered for write from globus_ftp_control_data_write_stripe have occured and the user calls globus_ftp_control_release_data_info(). The callback is passed all of the arguments passed to this function with the exception of data_info.

callback_arg User supplied argument to the callback function

References GLOBUS_FTP_CONTROL_MODULE.

6.4.2.26 globus_result_t globus_ftp_control_release_data_info (globus_ftp_control_handle_t * *handle*, globus_ftp_control_data_write_info_t * *data_info*)

Release a data_info structure.

This function releases all memory and references created when a call to globus_ftp_control_create_data_info() was made. For every call to globus_ftp_control_create_data_info() a call to this function must be made.

Parameters:

handle A pointer to a FTP control handle. The handle contains information about the current state of the control and data connections.

data_info The globus_ftp_control_data_write_info_t structure to be released.

References GLOBUS_FTP_CONTROL_MODULE.

6.4.2.27 globus_result_t globus_ftp_control_data_write_stripe (globus_ftp_control_handle_t * *handle*, globus_byte_t * *buffer*, globus_size_t *length*, globus_off_t *offset*, globus_bool_t *eof*, int *stripe_ndx*, globus_ftp_control_data_callback_t *callback*, void * *callback_arg*)

Write FTP data to a particular stripe.

This function allows the user to write to a specified stripe. The stripe index relates to the order passsed into local_spor(). This function differs from globus_ftp_control_data_write() in that no enqueue function is needed since the user specifies the stripe on which data is written. In order to use this function the user must have a valid pointer to a globus_ftp_control_data_write_info_t structure. The data_info structure can be obtained by a call to globus_ftp_control_create_data_info(). Many calls to this function can be made, but only a single user callback occurs per creation of a globus_ftp_control_data_write_info_t structure.

Parameters:

handle A pointer to a FTP control handle. The handle contains information about the current state of the control and data connections.

buffer a pointer to the data the user wishes to send along the FTP data channels.

length the length of the data pointer to by the parameter buffer.

offset the offset into the file of the data.

eof A boolean stating that this will be the last chuck of data registered on the given stripe. In order to properly send an eof message the user must register an eof on every stripe.

stripe_ndx The index of the stripe on which the data will be sent. The index of each stripe is determined by the call to local_spas or local_spor.

callback The function to be called once the data has been sent

callback_arg User supplied argument to the callback function

References GLOBUS_FTP_CONTROL_MODULE.

6.4.2.28 globus_result_t globus_X_ftp_control_data_write_stripe (globus_ftp_control_handle_t * *handle*, globus_byte_t * *buffer*, globus_size_t *length*, globus_off_t *offset*, globus_bool_t *eof*, int *stripe_ndx*, globus_ftp_control_data_write_info_t * *data_info*)

Write data on a specific stripe from an enqueue callback function only.

This function allows the user to register the write of ftp data on a specfic stripe. This function can only be called fromed an enqueue function callback. This function should be used only by the implementor of an enqueue funciton. It should be viewed as unstable and used used only by advanced users. This is the only function in the library that the enqueue function implemtor is allowed from the enqueue callback.

Parameters:

handle A pointer to a FTP control handle. The handle contains information about the current state of the control and data connections.

buffer a pointer to the data the user wishes to send along the FTP data channels.

length the length of the data pointer to by the parameter buffer.

offset the offset into the file of the data.

eof a boolean stating that this is the last buffer to be registered. When using the _X_ version of this function the user does not need to register an eof on each stripe, the control library will take care of that internally.

stripe_ndx The index of the stripe on which the data will be sent. The index of each stripe is determined by the call to local_spas or local_spor.

data_info An opaque structure that is passed into the enqueue function and contains reference count and state information. The same data_info pointer that is passed into the enqueue function must be used for this parameter.

References GLOBUS_FTP_CONTROL_MODULE.

6.4.2.29 globus_result_t globus_ftp_control_data_force_close (globus_ftp_control_handle_t * *control_handle*, globus_ftp_control_callback_t *close_callback_func*, void * *close_arg*)

Forces an imediate close of all data connections.

Parameters:

control_handle The globus_ftp_control_handle that is have its data connections closed.

close_callback_func A user function that will be called when the data connections are closed.

close_arg The user argument that will be threaded through to close_callback_func.

References GLOBUS_FTP_CONTROL_MODULE.

6.5 globus_ftp_control_layout.c File Reference

6.5.1 Detailed Description

6.6 globus_ftp_control_server.c File Reference

FTP Server-side Control Connection Management.

Functions

- globus_result_t globus_ftp_control_server_handle_init (globus_ftp_control_server_t *handle)
- globus_result_t globus_ftp_control_server_handle_destroy (globus_ftp_control_server_t *handle)
- globus_result_t globus_ftp_control_server_listen (globus_ftp_control_server_t *server_handle, unsigned short *port, globus_ftp_control_server_callback_t callback, void *callback_arg)
- globus_result_t globus_ftp_control_command_init (globus_ftp_control_command_t *command, char *raw_command, globus_ftp_control_auth_info_t *auth_info)
- globus_result_t globus_ftp_control_command_destroy (globus_ftp_control_command_t *command)
- globus_result_t globus_ftp_control_command_copy (globus_ftp_control_command_t *dest, globus_ftp_control_command_t *src)
- globus_result_t globus_ftp_control_server_stop (globus_ftp_control_server_t *listener, globus_ftp_control_server_callback_t callback, void *callback_arg)
- globus_result_t globus_ftp_control_server_accept (globus_ftp_control_server_t *listener, globus_ftp_control_handle_t *handle, globus_ftp_control_callback_t callback, void *callback_arg)
- globus_result_t globus_ftp_control_server_authenticate (globus_ftp_control_handle_t *handle, globus_ftp_control_auth_requirements_t auth_requirements, globus_ftp_control_auth_callback_t callback, void *callback_arg)
- globus_result_t globus_ftp_control_read_commands (globus_ftp_control_handle_t *handle, globus_ftp_control_command_callback_t callback, void *callback_arg)
- globus_result_t globus_ftp_control_send_response (globus_ftp_control_handle_t *handle, const char *respspec, globus_ftp_control_callback_t callback, void *callback_arg,...)

6.6.1 Detailed Description

FTP Server-side Control Connection Management.

6.6.2 Function Documentation

6.6.2.1 globus_result_t globus_ftp_control_server_handle_init (globus_ftp_control_server_t * *handle*)

Initialize a globus ftp server handle.

This function will set up (i.e. intialize all mutexes and variables) a globus ftp server handle. It will also enter the handle in a list used by the module activation/deactivation functions.

Parameters:

handle The handle to initialize.

Returns:

- GLOBUS_SUCCESS
- invalid handle

References GLOBUS_FTP_CONTROL_MODULE.

6.6.2.2 globus_result_t globus_ftp_control_server_handle_destroy (globus_ftp_control_server_t * *handle*)

Destroy a globus ftp server handle.

This function will free up all dynamicly allocated memory associated with a given globus ftp server handle. It will also remove the handle from a list used by the module activation/deactivation functions. This function should only be called after a call to globus_ftp_control_server_stop.

Parameters:

handle The handle to destory.

Returns:

- success
- invalid handle
- handle is still in listening state

References GLOBUS_FTP_CONTROL_MODULE.

6.6.2.3 globus_result_t globus_ftp_control_server_listen (globus_ftp_control_server_t * *server_handle*, unsigned short * *port*, globus_ftp_control_server_callback_t *callback*, void * *callback_arg*)

Start listening on a given port for FTP client connections.

This function starts the listening on *port for connections from ftp clients. When a connection request is made callback is called and passed callback_arg. Upon return from this function the server_handle structure is initialized.

Parameters:

server_handle A pointer to a initialized server handle.

port A pointer to the port to listen on. If the initial value is zero it will be set to the default value.

callback The callback function called when connection requests are made.

callback_arg The user argument passed to the callback function when connection requests are made.

Note:

I'm not providing any mechanism for making sure that this function is only called once. Is this needed?

References GLOBUS_FTP_CONTROL_MODULE.

6.6.2.4 globus_result_t globus_ftp_control_command_init (globus_ftp_control_command_t * *command*, char * *raw_command*, globus_ftp_control_auth_info_t * *auth_info*)

Initialize a command structure.

This function initializes a command structure based on a null terminated string representing one line of input from the client. The command structure is used as a convience to determine what command the client issued. This function parses a command string sent by a client and populates the command argument appropriatly. In the GSSAPI case it will also decode and unwrap the command before parsing it.

Parameters:

command A pointer to the command structure to be initialized

raw_command A null terminated line of client input. Should contain one command.

auth_info Authentication information needed for unwrapping a command

References globus_ftp_control_auth_info_s::authenticated, and GLOBUS_FTP_CONTROL_MODULE.

6.6.2.5 globus_result_t globus_ftp_control_command_destroy (globus_ftp_control_command_t * *command*)

Destroy a command structure.

This function frees up the memory allocated to the command argument.

Parameters:

command The command structure whose associated memory is to be freed

References GLOBUS_FTP_CONTROL_MODULE.

6.6.2.6 globus_result_t globus_ftp_control_command_copy (globus_ftp_control_command_t * *dest*, globus_ftp_control_command_t * *src*)

Creates a copy of a command structure.

This function should be called when the user needs to make a copy of a command structure.

Parameters:

dest The area of memory that the command structure is copied to.

src The command structure to be copied.

References GLOBUS_FTP_CONTROL_MODULE.

6.6.2.7 globus_result_t globus_ftp_control_server_stop (globus_ftp_control_server_t * *listener*, globus_ftp_control_server_callback_t *callback*, void * *callback_arg*)

Stop the GSIFTP server from listening for client connections.

This function stops listening on the given listener object for client connections. All existing client connections are left open.

Parameters:

listener the globus_ftp_control_server_t object that should no longer listen for connections.

callback The user callback that will be called when the server structure is no longer listening.

callback_arg The user argument that is passed into callback.

References GLOBUS_FTP_CONTROL_MODULE.

6.6.2.8 globus_result_t globus_ftp_control_server_accept (globus_ftp_control_server_t * *listener*, globus_ftp_control_handle_t * *handle*, globus_ftp_control_callback_t *callback*, void * *callback_arg*)

Accept a client connection request.

This function is called to accept a connection request from a client.

When the listen callback is called (see globus_ftp_control_server_listen) a client has requested a connection. This function must be called to accept that user connection request. Once the connection is established or if a error occurs, the callback function is called.

Parameters:

listener The server object that received the connection request.

handle The control connection object. This structure will be populated and passed to the callback when the client is authorized. This structure represents the control connection between the server and client. It will be used to read commands from the client and send responses to the client.]

callback The function called when the client connection has been accepted.

callback_arg The user argument passed to the callback.

Note:

This functions assumes the the server and control handles have been initialized prior to calling this function.

References GLOBUS_FTP_CONTROL_MODULE.

6.6.2.9 globus_result_t globus_ftp_control_server_authenticate (globus_ftp_control_handle_t * *handle*, globus_ftp_control_auth_requirements_t *auth_requirements*, globus_ftp_control_auth_callback_t *callback*, void * *callback_arg*)

Authenticate a client connection.

This function is called to authenticate a connection from a client.

After a client connection has been accepted (using the globus_ftp_control_server_accept call), this function should be called to authenticate the client. The caller of this function may specify certain authentication requirements using the auth_requirements parameter.

Parameters:

handle The control connection object. This structure will be populated and passed to the callback when the client is authorized. This structure represents the control connection between the server and client. It will be used to read commands from the client and send responses to the client.]

auth_requirements This structure represents the authentication requirements that the user has for a given connection. For example GSIFTP user name, password, and account.

callback The function called when the client authentication has been accepted or rejected.

callback_arg The user argument passed to the callback.

Note:

It is up to the user of this function to send the reply to the last command of the authentication sequence. This functions assumes the the server and control handles have been initialized prior to calling this function.

References GLOBUS_FTP_CONTROL_MODULE.

6.6.2.10 globus_result_t globus_ftp_control_read_commands (globus_ftp_control_handle_t * *handle*, globus_ftp_control_command_callback_t *callback*, void * *callback_arg*)

Begin reading GSIFTP commands on a given control connection.

This function begins reading control commands on a globus_ftp_control_handle_t. When a command is read the callback function is called.

Parameters:

handle The control connection handle that commands will be read from. Prior to calling this the function globus_ftp_control_handle_t must be populated via a call to globus_ftp_control_accept().

callback The user callback that will be called when commands are read.

callback_arg The user argument passed to the callback.

References GLOBUS_FTP_CONTROL_MODULE.

6.6.2.11 globus_result_t globus_ftp_control_send_response (globus_ftp_control_handle_t * *handle*, const char * *respspec*, globus_ftp_control_callback_t *callback*, void * *callback_arg*, ...)

Send a response to the GSIFTP client.

This function sends a GSIFTP formatted response to the client. When a command callback is received the user calls this function to respond to the clients request.

Parameters:

handle The control connection to send the response across.

respspec A formated string representing the users response.

callback The user callback that will be called when the response has been sent.

callback_arg The user argument passed to the callback.

References GLOBUS_FTP_CONTROL_MODULE.

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