

VOMS CC API Reference Manual

1.5.0

Generated by Doxygen 1.5.1

Mon Oct 4 21:13:47 2010

Contents

1	VOMS CC API Data Structure Index	1
1.1	VOMS CC API Data Structures	1
2	VOMS CC API File Index	3
2.1	VOMS CC API File List	3
3	VOMS CC API Data Structure Documentation	5
3.1	attribute Struct Reference	5
3.2	attributelist Struct Reference	7
3.3	contactdata Struct Reference	8
3.4	data Struct Reference	10
3.5	voms Struct Reference	11
3.6	vomsdata Struct Reference	15
4	VOMS CC API File Documentation	25
4.1	voms_api.h File Reference	25

Chapter 1

VOMS CC API Data Structure Index

1.1 VOMS CC API Data Structures

Here are the data structures with brief descriptions:

attribute	5
attributelist	7
contactdata	8
data (User's characteristics: can be repeated)	10
voms	11
vomsdata	15

Chapter 2

VOMS CC API File Index

2.1 VOMS CC API File List

Here is a list of all files with brief descriptions:

voms_api.h	25
--------------------------------------	----

Chapter 3

VOMS CC API Data Structure Documentation

3.1 attribute Struct Reference

```
#include <voms_api.h>
```

Data Fields

- std::string [name](#)
- std::string [qualifier](#)
- std::string [value](#)

3.1.1 Detailed Description

Definition at line 60 of file voms_api.h.

3.1.2 Field Documentation

3.1.2.1 std::string [attribute::name](#)

attribute's group

Definition at line 61 of file voms_api.h.

3.1.2.2 std::string [attribute::qualifier](#)

attribute's qualifier

Definition at line 62 of file voms_api.h.

3.1.2.3 std::string [attribute::value](#)

attribute's value

Definition at line 63 of file voms_api.h.

The documentation for this struct was generated from the following file:

- [voms_api.h](#)

3.2 attributelist Struct Reference

```
#include <voms_api.h>
```

Data Fields

- std::string [grantor](#)
- std::vector< [attribute](#) > [attributes](#)

3.2.1 Detailed Description

Definition at line 66 of file voms_api.h.

3.2.2 Field Documentation

3.2.2.1 std::string [attributelist::grantor](#)

Who granted these attributes.

Definition at line 67 of file voms_api.h.

3.2.2.2 std::vector<[attribute](#)> [attributelist::attributes](#)

The attributes themselves.

Definition at line 68 of file voms_api.h.

The documentation for this struct was generated from the following file:

- [voms_api.h](#)

3.3 contactdata Struct Reference

```
#include <voms_api.h>
```

Data Fields

- std::string [nick](#)
- std::string [host](#)
- std::string [contact](#)
- std::string [vo](#)
- int [port](#)
- int [version](#)

3.3.1 Detailed Description

Definition at line 80 of file voms_api.h.

3.3.2 Field Documentation

3.3.2.1 std::string [contactdata::nick](#)

< You must never allocate directly this structure. Its sizeof() is subject to change without notice. The only supported way to obtain it is via the FindBy* functions. The alias of the server

Definition at line 84 of file voms_api.h.

3.3.2.2 std::string [contactdata::host](#)

The hostname of the server

Definition at line 85 of file voms_api.h.

3.3.2.3 std::string [contactdata::contact](#)

The subject of the server's certificate

Definition at line 86 of file voms_api.h.

3.3.2.4 std::string [contactdata::vo](#)

The VO served by this server

Definition at line 87 of file voms_api.h.

3.3.2.5 int [contactdata::port](#)

The port on which the server is listening

Definition at line 88 of file voms_api.h.

3.3.2.6 int [contactdata::version](#)

The version of globus under which the server is running

Definition at line 90 of file voms_api.h.

The documentation for this struct was generated from the following file:

- [voms_api.h](#)

3.4 data Struct Reference

User's characteristics: can be repeated.

```
#include <voms_api.h>
```

Data Fields

- `std::string` [group](#)
- `std::string` [role](#)
- `std::string` [cap](#)

3.4.1 Detailed Description

User's characteristics: can be repeated.

Definition at line 52 of file `voms_api.h`.

3.4.2 Field Documentation

3.4.2.1 `std::string` [data::group](#)

user's group

Definition at line 53 of file `voms_api.h`.

3.4.2.2 `std::string` [data::role](#)

user's role

Definition at line 54 of file `voms_api.h`.

3.4.2.3 `std::string` [data::cap](#)

user's capability

Definition at line 55 of file `voms_api.h`.

The documentation for this struct was generated from the following file:

- [voms_api.h](#)

3.5 voms Struct Reference

```
#include <voms_api.h>
```

Public Member Functions

- [voms](#) (const [voms](#) &)
- [voms](#) ()
- [voms](#) & [operator=](#) (const [voms](#) &)
- [~voms](#) ()
- AC * [GetAC](#) ()
- std::vector< [attributelist](#) > & [GetAttributes](#) ()
- std::vector< std::string > [GetTargets](#) ()

Data Fields

- int [version](#)
- int [siglen](#)
- std::string [signature](#)
- std::string [user](#)
- std::string [userca](#)
- std::string [server](#)
- std::string [serverca](#)
- std::string [voname](#)
- std::string [uri](#)
- std::string [date1](#)
- std::string [date2](#)
- [data_type](#) type
- std::vector< [data](#) > [std](#)
- std::string [custom](#)
- std::vector< std::string > [fqan](#)
- std::string [serial](#)

Friends

- class [vomsdata](#)
- int [TranslateVOMS](#) (struct vomsdata *vd, std::vector< [voms](#) > &v, int *error)

3.5.1 Detailed Description

Definition at line 93 of file voms_api.h.

3.5.2 Constructor & Destructor Documentation

3.5.2.1 `voms::voms (const voms &)`

3.5.2.2 `voms::voms ()`

3.5.2.3 `voms::~~voms ()`

3.5.3 Member Function Documentation

3.5.3.1 `voms& voms::operator= (const voms &)`

3.5.3.2 `AC* voms::GetAC ()`

3.5.3.3 `std::vector<attributelist>& voms::GetAttributes ()`

Generic attributes

3.5.3.4 `std::vector<std::string> voms::GetTargets ()`

3.5.4 Friends And Related Function Documentation

3.5.4.1 `friend class vomsdata [friend]`

Definition at line 94 of file `voms_api.h`.

3.5.4.2 `int TranslateVOMS (struct vomsdatar * vd, std::vector< voms > & v, int * error)`
[[friend](#)]

3.5.5 Field Documentation

3.5.5.1 `int voms::version`

0 means data didn't originate from an AC

Definition at line 95 of file `voms_api.h`.

3.5.5.2 `int voms::siglen`

The length of the VOMS server signature

Definition at line 96 of file `voms_api.h`.

3.5.5.3 `std::string voms::signature`

The VOMS server signature

Definition at line 97 of file `voms_api.h`.

3.5.5.4 std::string voms::user

The user's DN, as from his certificate

Definition at line 98 of file voms_api.h.

3.5.5.5 std::string voms::userca

The CA which signed the user's certificate

Definition at line 99 of file voms_api.h.

3.5.5.6 std::string voms::server

The VOMS server DN, as from its certificate

Definition at line 100 of file voms_api.h.

3.5.5.7 std::string voms::serverca

The CA which signed the VOMS certificate

Definition at line 101 of file voms_api.h.

3.5.5.8 std::string voms::voname

The name of the VO to which the VOMS belongs

Definition at line 102 of file voms_api.h.

3.5.5.9 std::string voms::uri

The URI of the VOMS server

Definition at line 103 of file voms_api.h.

3.5.5.10 std::string voms::date1

Beginning of validity of the user info

Definition at line 104 of file voms_api.h.

3.5.5.11 std::string voms::date2

End of validity of the user info

Definition at line 105 of file voms_api.h.

3.5.5.12 data_type voms::type

The type of data returned

Definition at line 106 of file voms_api.h.

3.5.5.13 `std::vector<data>` [voms::std](#)

User's characteristics

Definition at line 107 of file `voms_api.h`.

3.5.5.14 `std::string` [voms::custom](#)

The data returned by an S command

Definition at line 108 of file `voms_api.h`.

3.5.5.15 `std::vector<std::string>` [voms::fqan](#)

Keeps the data in the compact format

Definition at line 110 of file `voms_api.h`.

3.5.5.16 `std::string` [voms::serial](#)

Serial number. "0" if coming from non-ac

Definition at line 111 of file `voms_api.h`.

The documentation for this struct was generated from the following file:

- [voms_api.h](#)

3.6 vomsdata Struct Reference

```
#include <voms_api.h>
```

Public Member Functions

- [vomsdata](#) (std::string voms_dir="", std::string cert_dir="")
- bool [LoadSystemContacts](#) (std::string dir="")
- bool [LoadUserContacts](#) (std::string dir="")
- std::vector< [contactdata](#) > [FindByAlias](#) (std::string alias)
- std::vector< [contactdata](#) > [FindByVO](#) (std::string vo)
- void [Order](#) (std::string att)
- void [ResetOrder](#) (void)
- void [AddTarget](#) (std::string target)
- std::vector< std::string > [ListTargets](#) (void)
- void [ResetTargets](#) (void)
- std::string [ServerErrors](#) (void)
- bool [Retrieve](#) (X509 *cert, STACK_OF(X509)*chain, [recurse_type](#) how=RECURSE_CHAIN)
- bool [Contact](#) (std::string hostname, int port, std::string servsubject, std::string command)
- bool [Contact](#) (std::string hostname, int port, std::string servsubject, std::string command, int timeout)
- bool [ContactRaw](#) (std::string hostname, int port, std::string servsubject, std::string command, std::string &raw, int &version)
- bool [ContactRaw](#) (std::string hostname, int port, std::string servsubject, std::string command, std::string &raw, int &version, int timeout)
- void [SetVerificationType](#) ([verify_type](#) how)
- void [SetLifetime](#) (int lifetime)
- bool [Import](#) (std::string buffer)
- bool [Export](#) (std::string &data)
- bool [DefaultData](#) ([voms](#) &)
- std::string [ErrorMessage](#) (void)
- bool [RetrieveFromCtx](#) (void *context, [recurse_type](#) how)
- bool [RetrieveFromCred](#) (void *credential, [recurse_type](#) how)
- bool [RetrieveFromCtx](#) (gss_ctx_id_t context, [recurse_type](#) how)
- bool [RetrieveFromCred](#) (gss_cred_id_t credential, [recurse_type](#) how)
- bool [Retrieve](#) (X509_EXTENSION *ext)
- bool [RetrieveFromProxy](#) ([recurse_type](#) how)
- bool [Retrieve](#) (FILE *file, [recurse_type](#) how)
- [~vomsdata](#) ()
- [vomsdata](#) (const [vomsdata](#) &)
- void [SetRetryCount](#) (int retryCount)
- void [SetVerificationTime](#) (time_t)
- bool [LoadCredentials](#) (X509 *, EVP_PKEY *, STACK_OF(X509)*)

Data Fields

- [verror_type](#) error
- std::vector< [voms](#) > data
- std::string workvo
- std::string extra_data

Data Structures

- class **Initializer**

3.6.1 Detailed Description

Definition at line 184 of file voms_api.h.

3.6.2 Constructor & Destructor Documentation

3.6.2.1 vomsdata::vomsdata (std::string voms_dir = " ", std::string cert_dir = " ")

Parameters:

voms_dir The directory which contains the certificate of the VOMS server

cert_dir The directory which contains the certificate of the CA

If voms_dir is empty, the value of the environment variable X509_VOMS_DIR is taken.

If cert_dir is empty, the value of the environment variable X509_CERT_DIR is taken.

3.6.2.2 vomsdata::~vomsdata ()

3.6.2.3 vomsdata::vomsdata (const vomsdata &)

3.6.3 Member Function Documentation

3.6.3.1 bool vomsdata::LoadSystemContacts (std::string dir = " ")

Loads the system wide configuration files.

Parameters:

dir The directory in which the files are stored.

If dir is empty, defaults to /opt/edg/etc/vomses.

Returns:

True if all went OK, false otherwise.

3.6.3.2 bool vomsdata::LoadUserContacts (std::string dir = " ")

Loads the user-specific configuration files.

Parameters:

dir The directory in which the files are stored.

If dir is empty, defaults to \$VOMS_USERCONF. If this is empty too, defaults to \$HOME/.edg/vomses, or to ~/.edg/vomses as a last resort.

Returns:

True if all went OK, false otherwise.

3.6.3.3 `std::vector<contactdata> vomldata::FindByAlias (std::string alias)`

Finds servers which share a common alias.

Parameters:

alias The alias to look for.

Returns:

The servers found. The order in which they are returned is unspecified.

3.6.3.4 `std::vector<contactdata> vomldata::FindByVO (std::string vo)`

Finds servers which serve a common VO

Parameters:

vo The VO name to look for.

Returns:

The servers found. The order in which they are returned is unspecified.

3.6.3.5 `void vomldata::Order (std::string att)`

Sets up the ordering of the results.

Defines the ordering of the data returned by [Contact\(\)](#). Results are ordered in the same order as the calls to this function.

Parameters:

att The attribute to be ordered.

3.6.3.6 `void vomldata::ResetOrder (void)`

Resets the ordering.

3.6.3.7 `void vomldata::AddTarget (std::string target)`

Adds a target to the AC.

Parameters:

target The target to be added. it should be a FQDN.

3.6.3.8 std::vector<std::string> vomsdata::ListTargets (void)

Returns the list of targets.

3.6.3.9 void vomsdata::ResetTargets (void)

Resets the target list.

3.6.3.10 std::string vomsdata::ServerErrors (void)

Gets the error message returned by the server

3.6.3.11 bool vomsdata::Retrieve (X509 * *cert*, STACK_OF(X509)* *chain*, recurse_type *how* = RECURSE_CHAIN)

Extracts the VOMS extension from an X.509 certificate. The function doesn't check the validity of the certificates, but it does check the content of the user data.

Parameters:

- cert* The certificate with the VOMS extensions
- chain* The chain of the validation certificates (only the intermediate ones)
- how* Recursion type

Returns:

failure (F) or success (T)

3.6.3.12 bool vomsdata::Contact (std::string *hostname*, int *port*, std::string *servsubject*, std::string *command*)

Contacts a VOMS server to get a certificate

It is the equivalent of the voms_proxy_init command, but without the --include functionality.

Parameters:

- hostname* FQDN of the VOMS server
- port* the port on which the VOMS server is listening
- servsubject* the subject of the server's certificate
- command* the command sent to the server

Returns:

failure (F) or success (T)

3.6.3.13 **bool vomsdata::Contact** (std::string *hostname*, int *port*, std::string *servsubject*, std::string *command*, int *timeout*)

Contacts a VOMS server to get a certificate

It is the equivalent of the voms_proxy_init command, but without the --include functionality.

Parameters:

hostname FQDN of the VOMS server
port the port on which the VOMS server is listening
servsubject the subject of the server's certificate
command the command sent to the server

Returns:

failure (F) or success (T)

3.6.3.14 **bool vomsdata::ContactRaw** (std::string *hostname*, int *port*, std::string *servsubject*, std::string *command*, std::string & *raw*, int & *version*)

Same as Contact, however it does not start the verification process, and the message received from the server is not parsed.

Parameters:

hostname FQDN of the VOMS server
port the port on which the VOMS server is listening
servsubject the subject of the server's certificate
command the command sent to the server
raw OUTPUT PARAMETER the answer from the server
version OUTPUT PARAMETER the version of the answer

Returns:

failure (F) or success (T)

3.6.3.15 **bool vomsdata::ContactRaw** (std::string *hostname*, int *port*, std::string *servsubject*, std::string *command*, std::string & *raw*, int & *version*, int *timeout*)

Same as Contact, however it does not start the verification process, and the message received from the server is not parsed.

Parameters:

hostname FQDN of the VOMS server
port the port on which the VOMS server is listening
servsubject the subject of the server's certificate
command the command sent to the server
raw OUTPUT PARAMETER the answer from the server

version OUTPUT PARAMETER the version of the answer

Returns:

failure (F) or success (T)

3.6.3.16 void vomsdata::SetVerificationType (verify_type how)

Sets the type of verification done on the data.

Parameters:

how The type of verification.

3.6.3.17 void vomsdata::SetLifetime (int lifetime)

Set requested lifetime for the [Contact\(\)](#) call.

Parameters:

lifetime Requested lifetime, in seconds

3.6.3.18 bool vomsdata::Import (std::string buffer)

Converts data from the format used for inclusion into a certificate to the internal format

The function does verify the data.

Parameters:

buffer contains the data to be converted

Returns:

Failure (F) or Success (T)

3.6.3.19 bool vomsdata::Export (std::string & data)

Exports data from [vomsdata::data](#) to the format used for inclusion into a certificate.

The function doesn't verify the data

Parameters:

data The certificate extension

Returns:

Failure (F) or Success (T)

3.6.3.20 bool vomsdata::DefaultData (voms &)

Get the default data extension from those present in the pseudo certificate

3.6.3.21 std::string vomsdata::ErrorMessage (void)

Gets a textual description of the error.

Returns:

A string containg the error message.

3.6.3.22 bool vomsdata::RetrieveFromCtx (void * *context*, [recurse_type](#) *how*)

Gets VOMS information from the given globus context

Parameters:

context The context from which to retrieve the certificate.

how Recursion type

Returns:

failure (F) or success (T)

Referenced by RetrieveFromCtx().

3.6.3.23 bool vomsdata::RetrieveFromCred (void * *credential*, [recurse_type](#) *how*)

Gets VOMS information from the given globus credential

Parameters:

credential The credential from which to retrieve the certificate.

how Recursion type

Returns:

failure (F) or success (T)

Referenced by RetrieveFromCred().

3.6.3.24 bool vomsdata::RetrieveFromCtx (gss_ctx_id_t *context*, [recurse_type](#) *how*) [inline]

Gets VOMS information from the given globus context

Parameters:

context The context from which to retrieve the certificate.

how Recursion type

Returns:

failure (F) or success (T)

Definition at line 432 of file voms_api.h.

References RetrieveFromCtx().

3.6.3.25 `bool vomsdata::RetrieveFromCred (gss_cred_id_t credential, recurse_type how)`
[inline]

Gets VOMS information from the given globus credential

Parameters:

credential The credential from which to retrieve the certificate.
how Recursion type

Returns:

failure (F) or success (T)

Definition at line 439 of file voms_api.h.

References `RetrieveFromCred()`.

3.6.3.26 `bool vomsdata::Retrieve (X509_EXTENSION * ext)`

Gets VOMS information from the given extension

Parameters:

ext The extension to parse.

Returns:

failure (F) or success (T)

3.6.3.27 `bool vomsdata::RetrieveFromProxy (recurse_type how)`

Gets VOMS information from an existing globus proxy

Parameters:

how Recursion type

Returns:

failure (F) or success (T)

3.6.3.28 `bool vomsdata::Retrieve (FILE * file, recurse_type how)`

Gets VOMS information from a proxy saved as a file.

Parameters:

the file
how Recursion type

Returns:

failure (F) or success (T)

Note: Does NOT verify that the proxy is valid. Such verification must be obtained through other means.

3.6.3.29 void vomsdata::SetRetryCount (int *retryCount*)

3.6.3.30 void vomsdata::SetVerificationTime (time_t)

3.6.3.31 bool vomsdata::LoadCredentials (X509 *, EVP_PKEY *, STACK_OF(X509)*)

3.6.4 Field Documentation

3.6.4.1 [verror_type](#) vomsdata::error

Error code

Definition at line 203 of file voms_api.h.

3.6.4.2 [std::vector<voms>](#) vomsdata::data

User's info, as in the certificate extension. It may contain data gathered from more than one VOMS server,

Definition at line 358 of file voms_api.h.

3.6.4.3 [std::string](#) vomsdata::workvo

The value of the -vo option of the voms-proxy-init command

Definition at line 361 of file voms_api.h.

3.6.4.4 [std::string](#) vomsdata::extra_data

The data specified by the user with the `--include` switch.

Note that this field doesn't contain the result of a request to the VOMS server, but instead data specified by the user.

The reason for the introduction of this extension is to let a user include important data into his proxy certificate, like, for example, a kerberos ticket

Definition at line 362 of file voms_api.h.

The documentation for this struct was generated from the following file:

- [voms_api.h](#)

Chapter 4

VOMS CC API File Documentation

4.1 voms_api.h File Reference

```
#include <fstream>
#include <string>
#include <vector>
#include "gssapi.h"
#include <openssl/x509.h>
#include <openssl/bio.h>
#include <sys/types.h>
#include "newformat.h"
```

Data Structures

- struct [data](#)
User's characteristics: can be repeated.
- struct [attribute](#)
- struct [attributelist](#)
- struct [contactdata](#)
- struct [voms](#)
- struct [vomsdata](#)
- class [vomsdata::Initializer](#)

Typedefs

- typedef bool(*) [check_sig](#) (X509 *, void *, [verror_type](#) &)

Enumerations

- enum [data_type](#) { [TYPE_NODATA](#), [TYPE_STD](#), [TYPE_CUSTOM](#) }

The type of data returned.

- enum `recurse_type` { `RECURSE_CHAIN`, `RECURSE_NONE`, `RECURSE_DEEP` }
- enum `verify_type` {
`VERIFY_FULL` = 0xffffffff, `VERIFY_NONE` = 0x00000000, `VERIFY_DATE` = 0x00000001,
`VERIFY_TARGET` = 0x00000002,
`VERIFY_KEY` = 0x00000004, `VERIFY_SIGN` = 0x00000008, `VERIFY_ORDER` = 0x00000010,
`VERIFY_ID` = 0x00000020,
`VERIFY_CERTLIST` = 0x00000040 }
- enum `verror_type` {
`VERR_NONE`, `VERR_NOCKET`, `VERR_NOIDENT`, `VERR_COMM`,
`VERR_PARAM`, `VERR_NOEXT`, `VERR_NOINIT`, `VERR_TIME`,
`VERR_IDCHECK`, `VERR_EXTRAIINFO`, `VERR_FORMAT`, `VERR_NODATA`,
`VERR_PARSE`, `VERR_DIR`, `VERR_SIGN`, `VERR_SERVER`,
`VERR_MEM`, `VERR_VERIFY`, `VERR_TYPE`, `VERR_ORDER`,
`VERR_SERVERCODE`, `VERR_NOTAVAIL`, `VERR_FILE` }

Error codes.

Functions

- int `getMajorVersionNumber` (void)
- int `getMinorVersionNumber` (void)
- int `getPatchVersionNumber` (void)

4.1.1 Typedef Documentation

4.1.1.1 typedef bool(*) `check_sig`(X509 *, void *, `verror_type` &)

Definition at line 182 of file voms_api.h.

4.1.2 Enumeration Type Documentation

4.1.2.1 enum `data_type`

The type of data returned.

Enumerator:

`TYPE_NODATA` no data
`TYPE_STD` group, role, capability triplet
`TYPE_CUSTOM` result of an S command

Definition at line 74 of file voms_api.h.

4.1.2.2 enum [recurse_type](#)

Enumerator:

RECURSE_CHAIN
RECURSE_NONE
RECURSE_DEEP

Definition at line 135 of file voms_api.h.

4.1.2.3 enum [verify_type](#)

Enumerator:

VERIFY_FULL
VERIFY_NONE
VERIFY_DATE
VERIFY_TARGET
VERIFY_KEY
VERIFY_SIGN
VERIFY_ORDER
VERIFY_ID
VERIFY_CERTLIST

Definition at line 141 of file voms_api.h.

4.1.2.4 enum [verror_type](#)

Error codes.

Enumerator:

VERR_NONE
VERR_NOSOCKET Socket problem
VERR_NOIDENT Cannot identify itself (certificate problem)
VERR_COMM Server problem
VERR_PARAM Wrong parameters
VERR_NOEXT VOMS extension missing
VERR_NOINIT Initialization error
VERR_TIME Error in time checking
VERR_IDCHECK User data in extension different from the real ones
VERR_EXTRAINFO VO name and URI missing
VERR_FORMAT Wrong data format
VERR_NODATA Empty extension
VERR_PARSE Parse error
VERR_DIR Directory error

VERR_SIGN Signature error
VERR_SERVER Unidentifiable VOMS server
VERR_MEM Memory problems
VERR_VERIFY Generic verification error
VERR_TYPE Returned data of unknown type
VERR_ORDER Ordering different than required
VERR_SERVERCODE Error message from the server
VERR_NOTAVAIL Method not available
VERR_FILE Error reading data from file

Definition at line 155 of file voms_api.h.

4.1.3 Function Documentation

4.1.3.1 **int** getMajorVersionNumber (void)

4.1.3.2 **int** getMinorVersionNumber (void)

4.1.3.3 **int** getPatchVersionNumber (void)

Index

- ~voms
 - voms, [12](#)
- ~vomsdata
 - vomsdata, [16](#)
- AddTarget
 - vomsdata, [17](#)
- attribute, [5](#)
 - name, [5](#)
 - qualifier, [5](#)
 - value, [5](#)
- attributelist, [7](#)
 - attributes, [7](#)
 - grantor, [7](#)
- attributes
 - attributelist, [7](#)
- cap
 - data, [10](#)
- check_sig
 - voms_api.h, [26](#)
- Contact
 - vomsdata, [18](#)
- contact
 - contactdata, [8](#)
- contactdata, [8](#)
 - contact, [8](#)
 - host, [8](#)
 - nick, [8](#)
 - port, [8](#)
 - version, [8](#)
 - vo, [8](#)
- ContactRaw
 - vomsdata, [19](#)
- custom
 - voms, [14](#)
- data, [10](#)
 - cap, [10](#)
 - group, [10](#)
 - role, [10](#)
 - vomsdata, [23](#)
- data_type
 - voms_api.h, [26](#)
- date1
 - voms, [13](#)
- date2
 - voms, [13](#)
- DefaultData
 - vomsdata, [20](#)
- error
 - vomsdata, [23](#)
- ErrorMessage
 - vomsdata, [20](#)
- Export
 - vomsdata, [20](#)
- extra_data
 - vomsdata, [23](#)
- FindByAlias
 - vomsdata, [17](#)
- FindByVO
 - vomsdata, [17](#)
- fqan
 - voms, [14](#)
- GetAC
 - voms, [12](#)
- GetAttributes
 - voms, [12](#)
- getMajorVersionNumber
 - voms_api.h, [28](#)
- getMinorVersionNumber
 - voms_api.h, [28](#)
- getPatchVersionNumber
 - voms_api.h, [28](#)
- GetTargets
 - voms, [12](#)
- grantor
 - attributelist, [7](#)
- group
 - data, [10](#)
- host
 - contactdata, [8](#)
- Import
 - vomsdata, [20](#)
- ListTargets

- vomsdata, [17](#)
- LoadCredentials
 - vomsdata, [23](#)
- LoadSystemContacts
 - vomsdata, [16](#)
- LoadUserContacts
 - vomsdata, [16](#)
- name
 - attribute, [5](#)
- nick
 - contactdata, [8](#)
- operator=
 - voms, [12](#)
- Order
 - vomsdata, [17](#)
- port
 - contactdata, [8](#)
- qualifier
 - attribute, [5](#)
- RECURSE_CHAIN
 - voms_api.h, [27](#)
- RECURSE_DEEP
 - voms_api.h, [27](#)
- RECURSE_NONE
 - voms_api.h, [27](#)
- recurse_type
 - voms_api.h, [26](#)
- ResetOrder
 - vomsdata, [17](#)
- ResetTargets
 - vomsdata, [18](#)
- Retrieve
 - vomsdata, [18](#), [22](#)
- RetrieveFromCred
 - vomsdata, [21](#)
- RetrieveFromCtx
 - vomsdata, [21](#)
- RetrieveFromProxy
 - vomsdata, [22](#)
- role
 - data, [10](#)
- serial
 - voms, [14](#)
- server
 - voms, [13](#)
- serverca
 - voms, [13](#)
- ServerErrors
 - vomsdata, [18](#)
- SetLifetime
 - vomsdata, [20](#)
- SetRetryCount
 - vomsdata, [22](#)
- SetVerificationTime
 - vomsdata, [23](#)
- SetVerificationType
 - vomsdata, [20](#)
- siglen
 - voms, [12](#)
- signature
 - voms, [12](#)
- std
 - voms, [13](#)
- TranslateVOMS
 - voms, [12](#)
- type
 - voms, [13](#)
- TYPE_CUSTOM
 - voms_api.h, [26](#)
- TYPE_NODATA
 - voms_api.h, [26](#)
- TYPE_STD
 - voms_api.h, [26](#)
- uri
 - voms, [13](#)
- user
 - voms, [12](#)
- userca
 - voms, [13](#)
- value
 - attribute, [5](#)
- VERIFY_CERTLIST
 - voms_api.h, [27](#)
- VERIFY_DATE
 - voms_api.h, [27](#)
- VERIFY_FULL
 - voms_api.h, [27](#)
- VERIFY_ID
 - voms_api.h, [27](#)
- VERIFY_KEY
 - voms_api.h, [27](#)
- VERIFY_NONE
 - voms_api.h, [27](#)
- VERIFY_ORDER
 - voms_api.h, [27](#)
- VERIFY_SIGN
 - voms_api.h, [27](#)
- VERIFY_TARGET
 - voms_api.h, [27](#)
- verify_type

- voms_api.h, 27
- VERR_COMM
 - voms_api.h, 27
- VERR_DIR
 - voms_api.h, 27
- VERR_EXTRAINFO
 - voms_api.h, 27
- VERR_FILE
 - voms_api.h, 28
- VERR_FORMAT
 - voms_api.h, 27
- VERR_IDCHECK
 - voms_api.h, 27
- VERR_MEM
 - voms_api.h, 28
- VERR_NODATA
 - voms_api.h, 27
- VERR_NOEXT
 - voms_api.h, 27
- VERR_NOIDENT
 - voms_api.h, 27
- VERR_NOINIT
 - voms_api.h, 27
- VERR_NONE
 - voms_api.h, 27
- VERR_NOSOCKET
 - voms_api.h, 27
- VERR_NOTAVAIL
 - voms_api.h, 28
- VERR_ORDER
 - voms_api.h, 28
- VERR_PARAM
 - voms_api.h, 27
- VERR_PARSE
 - voms_api.h, 27
- VERR_SERVER
 - voms_api.h, 28
- VERR_SERVERCODE
 - voms_api.h, 28
- VERR_SIGN
 - voms_api.h, 27
- VERR_TIME
 - voms_api.h, 27
- VERR_TYPE
 - voms_api.h, 28
- VERR_VERIFY
 - voms_api.h, 28
- verror_type
 - voms_api.h, 27
- version
 - contactdata, 8
 - voms, 12
- vo
 - contactdata, 8
- voms, 11
 - ~voms, 12
 - custom, 14
 - date1, 13
 - date2, 13
 - fqan, 14
 - GetAC, 12
 - GetAttributes, 12
 - GetTargets, 12
 - operator=, 12
 - serial, 14
 - server, 13
 - serverca, 13
 - siglen, 12
 - signature, 12
 - std, 13
 - TranslateVOMS, 12
 - type, 13
 - uri, 13
 - user, 12
 - userca, 13
 - version, 12
 - voms, 12
 - vomsdata, 12
 - voname, 13
- voms_api.h
 - RECURSE_CHAIN, 27
 - RECURSE_DEEP, 27
 - RECURSE_NONE, 27
 - TYPE_CUSTOM, 26
 - TYPE_NODATA, 26
 - TYPE_STD, 26
 - VERIFY_CERTLIST, 27
 - VERIFY_DATE, 27
 - VERIFY_FULL, 27
 - VERIFY_ID, 27
 - VERIFY_KEY, 27
 - VERIFY_NONE, 27
 - VERIFY_ORDER, 27
 - VERIFY_SIGN, 27
 - VERIFY_TARGET, 27
 - VERR_COMM, 27
 - VERR_DIR, 27
 - VERR_EXTRAINFO, 27
 - VERR_FILE, 28
 - VERR_FORMAT, 27
 - VERR_IDCHECK, 27
 - VERR_MEM, 28
 - VERR_NODATA, 27
 - VERR_NOEXT, 27
 - VERR_NOIDENT, 27
 - VERR_NOINIT, 27
 - VERR_NONE, 27
 - VERR_NOSOCKET, 27

- VERR_NOTAVAIL, [28](#)
- VERR_ORDER, [28](#)
- VERR_PARAM, [27](#)
- VERR_PARSE, [27](#)
- VERR_SERVER, [28](#)
- VERR_SERVERCODE, [28](#)
- VERR_SIGN, [27](#)
- VERR_TIME, [27](#)
- VERR_TYPE, [28](#)
- VERR_VERIFY, [28](#)
- voms_api.h, [25](#)
 - check_sig, [26](#)
 - data_type, [26](#)
 - getMajorVersionNumber, [28](#)
 - getMinorVersionNumber, [28](#)
 - getPatchVersionNumber, [28](#)
 - recurse_type, [26](#)
 - verify_type, [27](#)
 - verror_type, [27](#)
- vomsdata, [15](#)
 - ~vomsdata, [16](#)
 - AddTarget, [17](#)
 - Contact, [18](#)
 - ContactRaw, [19](#)
 - data, [23](#)
 - DefaultData, [20](#)
 - error, [23](#)
 - ErrorMessage, [20](#)
 - Export, [20](#)
 - extra_data, [23](#)
 - FindByAlias, [17](#)
 - FindByVO, [17](#)
 - Import, [20](#)
 - ListTargets, [17](#)
 - LoadCredentials, [23](#)
 - LoadSystemContacts, [16](#)
 - LoadUserContacts, [16](#)
 - Order, [17](#)
 - ResetOrder, [17](#)
 - ResetTargets, [18](#)
 - Retrieve, [18](#), [22](#)
 - RetrieveFromCred, [21](#)
 - RetrieveFromCtx, [21](#)
 - RetrieveFromProxy, [22](#)
 - ServerErrors, [18](#)
 - SetLifetime, [20](#)
 - SetRetryCount, [22](#)
 - SetVerificationTime, [23](#)
 - SetVerificationType, [20](#)
 - voms, [12](#)
 - vomsdata, [16](#)
 - workvo, [23](#)
- voname
 - voms, [13](#)
- workvo
 - vomsdata, [23](#)