

# VOMS CC API

## 1.5.0

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# Chapter 1

# Data Structure Index

## 1.1 Data Structures

Here are the data structures with brief descriptions:

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# Chapter 2

## File Index

### 2.1 File List

Here is a list of all files with brief descriptions:

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## Chapter 3

# 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::vector<attribute> attributelist::attributes

The attributes themselves.

Definition at line 68 of file voms\_api.h.

#### 3.2.2.2 std::string attributelist::grantor

Who granted these attributes.

Definition at line 67 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::contact

The subject of the server's certificate

Definition at line 86 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::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.

#### 3.3.2.4 int contactdata::port

The port on which the server is listening

Definition at line 88 of file voms\_api.h.

#### 3.3.2.5 int contactdata::version

The version of globus under which the server is running

Definition at line 90 of file voms\_api.h.

#### 3.3.2.6 std::string contactdata::vo

The VO served by this server

Definition at line 87 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::cap`

user's capability

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

#### 3.4.2.2 `std::string data::group`

user's group

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

#### 3.4.2.3 `std::string data::role`

user's role

Definition at line 54 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** `AC* voms::GetAC ()`

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

Generic attributes

**3.5.3.3** `std::vector<std::string> voms::GetTargets ()`

**3.5.3.4** `voms& voms::operator= (const voms &)`

## 3.5.4 Friends And Related Function Documentation

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

**3.5.4.2** `friend class vomsdata` [friend]

Definition at line 94 of file voms\_api.h.

## 3.5.5 Field Documentation

**3.5.5.1** `std::string voms::custom`

The [data](#) returned by an S command

Definition at line 108 of file voms\_api.h.

**3.5.5.2** `std::string voms::date1`

Beginning of validity of the user info

Definition at line 104 of file voms\_api.h.

**3.5.5.3** `std::string voms::date2`

End of validity of the user info

Definition at line 105 of file voms\_api.h.

**3.5.5.4 std::vector<std::string> voms::fqan**

Keeps the [data](#) in the compact format

Definition at line 110 of file voms\_api.h.

**3.5.5.5 std::string voms::serial**

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

Definition at line 111 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 int voms::siglen**

The length of the VOMS server signature

Definition at line 96 of file voms\_api.h.

**3.5.5.9 std::string voms::signature**

The VOMS server signature

Definition at line 97 of file voms\_api.h.

**3.5.5.10 std::vector<data> voms::std**

User's characteristics

Definition at line 107 of file voms\_api.h.

**3.5.5.11 data\_type voms::type**

The type of [data](#) returned

Definition at line 106 of file voms\_api.h.

**3.5.5.12 std::string voms::uri**

The URI of the VOMS server

Definition at line 103 of file voms\_api.h.

**3.5.5.13 std::string voms::user**

The user's DN, as from his certificate

Definition at line 98 of file voms\_api.h.

**3.5.5.14 std::string voms::userca**

The CA which signed the user's certificate

Definition at line 99 of file voms\_api.h.

**3.5.5.15 int voms::version**

0 means [data](#) didn't originate from an AC

Definition at line 95 of file voms\_api.h.

**3.5.5.16 std::string voms::voname**

The name of the VO to which the VOMS belongs

Definition at line 102 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>
```

### Data Structures

- class **Initializer**

### 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`

### 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 `void vomsdata::AddTarget (std::string target)`

Adds a target to the AC.

##### Parameters:

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

#### 3.6.3.2 `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)

**3.6.3.3 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)

**3.6.3.4 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)

**3.6.3.5 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)

**3.6.3.6 bool vomsdata::DefaultData (voms &)**

Get the default [data](#) extension from those present in the pseudo certificate

**3.6.3.7 std::string vomsdata::ErrorMessage (void)**

Gets a textual description of the error.

**Returns:**

A string containing the error message.

**3.6.3.8 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)

**3.6.3.9 std::vector<contactdata> vomsdata::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.



**3.6.3.10** `std::vector<contactdata> vomsdata::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.

**3.6.3.11** `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)

**3.6.3.12** `std::vector<std::string> vomsdata::ListTargets (void)`

Returns the list of targets.

**3.6.3.13** `bool vomsdata::LoadCredentials (X509 *, EVP_PKEY *, STACK_OF(X509)*)`**3.6.3.14** `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.

**3.6.3.15** `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.

**3.6.3.16 void vomsdata::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.

**3.6.3.17 void vomsdata::ResetOrder (void)**

Resets the ordering.

**3.6.3.18 void vomsdata::ResetTargets (void)**

Resets the target list.

**3.6.3.19 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.

**3.6.3.20 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)

**3.6.3.21 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)

**3.6.3.22 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.

**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)

**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.

**3.6.3.25 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)

**3.6.3.26 bool vomsdata::RetrieveFromProxy (recurse\_type *how*)**

Gets VOMS information from an existing globus proxy

**Parameters:**

*how* Recursion type

**Returns:**

failure (F) or success (T)

**3.6.3.27 std::string vomsdata::ServerErrors (void)**

Gets the error message returned by the server

**3.6.3.28 void vomsdata::SetLifetime (int *lifetime*)**

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

**Parameters:**

*lifetime* Requested lifetime, in seconds

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

**3.6.3.30 void vomsdata::SetVerificationTime (time\_t)**

**3.6.3.31 void vomsdata::SetVerificationType (verify\_type *how*)**

Sets the type of verification done on the [data](#).

**Parameters:**

*how* The type of verification.

### 3.6.4 Field Documentation

#### 3.6.4.1 `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.

#### 3.6.4.2 `error_type vomsdata::error`

Error code

Definition at line 203 of file voms\_api.h.

#### 3.6.4.3 `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.

#### 3.6.4.4 `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.

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

- [voms\\_api.h](#)



# Chapter 4

## 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_NOSOCKET`, `VERR_NOIDENT`, `VERR_COMM`,  
`VERR_PARAM`, `VERR_NOEXT`, `VERR_NOINIT`, `VERR_TIME`,  
`VERR_IDCHECK`, `VERR_EXTRAINFO`, `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)`

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