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Part I Introductory Information

Chapter 1: *Grid Computing in a Nutshell*

Chapter 2: *VO Alphabet Soup*

Chapter 3: *Grid Certificates*

Chapter 1: Grid Computing in a Nutshell

To satisfy emerging IT needs in the scientific, industrial, governmental and commercial arenas, grid computing has been conceived as an expansion of distributed computing. Grid computing involves the distribution of computing resources among geographically separated sites (creating a “grid” of resources), all of which are configured with specialized software for routing jobs, authenticating users, monitoring resources, and so on. Shared, site-based computing resources may include computing and/or storage nodes, software, data, a variety of scientific instruments, and so on.

Grids aim to provide reliable and secure access to these geographically separated resources for authorized users located virtually anywhere in the world. When a user submits a job, the grid software controls where the job gets sent for processing. Think of a grid as a utility, much like the electrical utility grid. A company may buy electric power from a variety of physically separate sources, pool it, and distribute it to all its customers with high reliability. The customers don’t need to know where their electricity originates, just that their wall sockets always work. In grid computing, the end user doesn’t need to know where particular resources reside, just that they are available with high reliability¹.

1. Text taken from <http://computing.fnal.gov/cd/physics/gridoverview.html>.

Chapter 2: VO Alphabet Soup

2.1 What is a VO?

Current grid development projects are being designed such that they require end users to be authenticated under the auspices of a “recognized” organization, called a Virtual Organization, or VO. Individuals with no recognized affiliation are not generally allowed to use grid resources. Members of a VO may come from many different home institutions, may have in common only a general interest or goal (e.g., CMS physics analysis), and may communicate and coordinate their work solely through information technology (hence the term *virtual*)¹. In addition, individual members and/or institutions may join and leave the organization over time; sometimes VOs are called *dynamic virtual organizations* for this reason. Any (traditional) organization that aspires to authorize its members to use grid resources must create a VO for itself.

A VO must establish resource-usage agreements with grid resource providers; in fact from the authorization point of view (i.e., ignoring the technology involved), a grid is essentially the result of enforcing agreements between distributed computing resource providers and VOs.

Maintaining security within a grid is very important. Each VO must control which individuals join it, and be able to verify their identities and institutional affiliations (i.e., it must enforce authentication). The VO is responsible for authorizing its members for grid computing privileges, and it must make its list of authorized members available to the software that controls and monitors the grid resources. The individual sites and resources typically enforce additional layers of authorization.

A VO may implement a complex structure of groups and subgroups in order to organize and manage its members according to their tasks and responsibilities. As far as the VOMRS system is concerned (see section 2.3 *VOMRS as a Component of VOX*), a VO member may be a member of any number of these groups. For more about groups and how group assignment affects local resource access privileges, see 10.1 *About Groups*.

1. Definition adapted from the Journal of Computer-Mediated Communication, www.ascusc.org.

2.2 VOMS and VOX

The Virtual Organization Membership Service (VOMS), developed jointly for DataTAG by INFN and for DataGrid by CERN, is a system that manages real-time user authorization information for a VO. VOMS is designed to maintain only general information regarding the relationship of the user with his VO, e.g., groups he belongs to, certificate-related information (see Chapter 3: *Grid Certificates*), and capabilities he should present to resource providers for special processing needs. It maintains no personal identifying information besides the certificate. When a user submits a job, assuming the user is in good standing, VOMS also creates the necessary short-term credentials (called an extended proxy), required by grid resources before allowing the job to run. A user who loses his or her authorization to use grid resources is deleted from the VOMS database and must be re-entered when the authorization is restored.

The VOMS project is being further developed at Fermilab in collaboration with USCMS, and as such is known as the VOMS eXtension, or VOX project. It is an extension in the sense that it maintains additional information on each VO member as required by individual grid resource providers, and some institution- and site-specific information. VOMS and VOX maintain separate databases; VOX provides an interface for entering VO registration information (the VOM Registration Client), stores it in its database (in the VOM Registration Server), and populates the VOMS database via the VOMS administration package. VOX relies on the VOMS system to generate extended proxies for users as needed. There is a diagram of the VOX architecture in Appendix C: *VOMRS Architecture Diagram*.

2.3 VOMRS as a Component of VOX

The VOM Registration Service (VOMRS) is the major component of VOX. VOMRS is a server that provides the means for registering members of a VO, and coordination of this process among the various VO and grid resource administrators. It consists of a database to maintain user registration and institutional information, and a web user interface (web UI) for input of data into the database and manipulation of that data.

Chapter 3: Grid Certificates

3.1 About Grid Certificates

Grid user authentication (discussed in section 2.1 *What is a VO?*) is based on grid certificates, which are analogous to Kerberos principals (familiar to Fermilab researchers!) in that they are unique identifiers for individuals. A certificate is a long-term electronic credential, remaining valid for a year, typically. A public-key X.509¹ certificate (the kind the grid community recognizes) is nothing more than a digitally signed statement from some entity (a Certificate Authority, described below), saying that some particular identifier belonging to another entity (e.g., a VO member) has some specific value.

The principal identifier that is used for this purpose is called a Distinguished Name, or DN (which adheres to the X.500 standard, in case you come across that term). It is a string that includes the individual's Common Name (CN), Organizational Unit (OU), Organization (O), Domain Component (DC), and sometimes other information, e.g.,

```
/DC=org/DC=doegrids/OU=People/CN=Joe Smith 999999
```

A Certificate Authority is a trusted third-party organization or company that issues digital certificates used to create digital signatures and public-private key pairs. The role of the CA is to guarantee that the individual granted the unique certificate is, in fact, who he or she claims to be.

There are a number of Certificate Authorities. A VO must choose which CAs it will recognize, and establish an agreement with each. An agreement is required between these parties because the CA needs to know where to go or who to contact to verify the identity of each certificate applicant.

Software tools commonly in use for implementing grids (e.g., Globus tools) require that individuals submitting jobs be authenticated with a short-term authentication Grid proxy. The VOMS system creates these automatically from the users' long-term certificates (see section 2.2 *VOMS and VOX*).

1. You may hear the terms PKI, public keys, private keys, X.509 Distinguished Name, digital signatures and so on, associated with these certificates. Defining these terms is beyond the scope of this document.

3.2 Grid Certificates and VOMRS

A single machine may host multiple instances of VOMRS, each of which services a single VO. The VOMRS instances access a centralized list of CAs on the host. Each VO may elect to “trust” all the CAs in the list or to pick from among them, and the list of trusted CAs is maintained in the VOMRS.

You can access your VO’s VOMRS user interface on the host as long as you have a certificate from a CA in the centralized list. From there you can browse the list of CAs trusted by your VO. You will only be able to register with your VO through VOMRS and interact with the VOMRS database if you possess a certificate from a CA trusted by your VO.

3.3 Obtaining and Loading a Grid Certificate

You must request a long-term PKI X.509 credential from a certificate authority, e.g., the DOEGrids Certificate Service at <http://www.doegrids.org/index.html>. Instructions are provided at <http://security.fnal.gov/pki/>; or go to the DOEGrids website. You can request certificates from multiple CAs, if you like, as long as the VO you wish to join (or have joined) has agreements with them.

X.509 Grid proxies can be issued automatically for Fermilab users authenticated to Kerberos. Again see <http://security.fnal.gov/pki/> for instructions. This involves downloading a KX.509¹ certificate. KX.509 can be used in place of permanent, long-term certificates. It works by creating X.509 credentials (certificate and private key) using your existing Kerberos ticket. These credentials are then used to generate the Globus proxy certificate.

You will need to load your certificate into the browser from which you intend to use the VOMRS, and on the same machine. Instructions for a variety of browsers can be found at <http://security.fnal.gov/pki/> and https://lcg-registrar.cern.ch/load_certificates.html.

1. KX.509 is described at <http://www.ncsa.uiuc.edu/~alof-tus/NMI/kx509.html>.

Part II Registering with your VO Using VOMRS

Chapter 4: *The Registration Procedure*

Chapter 5: *The VOMRS Web User Interface*

Chapter 6: *Introduction to Roles, Statuses and Rights in VOMRS*

Chapter 4: The Registration Procedure

Many of the terms used in the instructions presented here are explained in following chapters. We chose to position this chapter ahead of the explanatory text because you probably won't need to read those chapters start-to-finish. Read about the user interface in Chapter 5: *The VOMRS Web User Interface*. As you go through the registration procedure, browse sections in Chapter 5: *The VOMRS Web User Interface*, Chapter 6: *Introduction to Roles, Statuses and Rights in VOMRS*, and Chapter 7: *Functions Available to Visitors, Candidates and Applicants* as needed.

4.1 The Initial Steps

- To join a VO, you must first be affiliated with an institution that participates in the VO in question, and be working on the project associated with the VO.
- A grid certificate is required in order to access the VOMRS web UI. See section 3.2 *Grid Certificates and VOMRS*. Some certificates may let you access the web UI but not register with the VO. If necessary, contact a representative of the VO, find out which CAs are recognized by the VO, and pick one. For U.S.-based VOs, typically DOEGrids (<http://www.doegrids.org/>) is acceptable.
- Go ahead and obtain your grid certificate.
- Load the certificate into the browser you plan to use on the machine you plan to use. Instructions, for a variety of browsers, can be found at https://lcg-registrar.cern.ch/load_certificates.html

4.2 Registration: Phase I

- Go to the appropriate URL as instructed by your VO administrator to find the home page of the VOMRS web UI. VOMRS initially considers you a visitor to the VO. Visitor is defined in section 6.1 *Roles*.
- Once you get into the system, browse as you like, according to the limitations of your role as visitor. See section 7.1 *Visitor Functions*. You can browse the welcome page, the member institutions and sites, the list of CAs trusted by the VO, the groups defined in the organization, and the required personal information.
- Go to the Registration (Phase I) page when you're ready to fill out the registration form. See section 4.5 *The Registration Form* for more information.
- After you fill out the form, click the Submit button. If you possess a grid certificate from a CA trusted by your VO, your phase I registration should be successful, and you should see this screen:

Registration (Phase I)

You have successfully submitted phase I of USCMS VO registration!

You now have candidate status in the USCMS VO. You will receive an email providing further instructions about second phase of registration.

Click on the Registration (Phase I) link to update the left hand menu.

- Await an automatically-generated email message from the VOMRS Service which asks you to confirm your email address by clicking on a link. Click on the link within the timeframe specified in the message, or your registration entry will be discarded.

```
Dear Candidate,  
Please confirm your email address  
<your_email_address> within 10 days by clicking on this  
<link>. In addition to confirming your email, this  
brings you to the registration screen for phase II  
where you can complete your registration. After 10  
days your registration will be discarded and you will  
have to re-register.  
<VOMRS VO_NAME Service>
```

- After confirming your email address, you become a candidate to your VO. Candidate is defined in section 6.1 *Roles*. The link takes you directly to the phase II registration screen. If you don't proceed with phase II registration immediately, just remember that you may have a set period of time in which to do so before your phase I registration is discarded.

4.3 Registration: Phase II

Phase II is the VO-specific portion of the registration procedure. You'll be required to agree to a set of usage rules. The VO may or may not provide additional fields requesting further personal information. At this time you can select the groups and group roles you would like to be affiliated with. As a Candidate you are already belong to root group of your VO. If this all you need you can proceed with signing Usage Rules. If you would like to belong to other groups and group roles within the group you can do so at this time. It is up to VO Administrator, Group Manager or Owner to approve your group and group role selection.

Before completing this portion, you may browse the personal information, certificate information and email address that you entered in phase I. See section 7.2 *Candidate Functions*. You may change your email address if you like, but if you do, you will receive another message asking you to confirm it, which you must do before you're allowed to proceed with phase II.

- Go to the Registration (Phase II) page before the time period for completing your phase II registration expires.
- Click the appropriate link to view the usage rules adopted by your VO (link text varies by implementation). Read the rules carefully. You will be expected to comply with them. See section 4.4 *The Usage Policy* for more information.
- If you agree to abide by the usage rules, fill out the additional phase II registration form fields, if any.

- Submit the form by clicking on the registration button



(shown here). **Submission of**

this form implies your agreement to abide by the rules of the policy, and is regarded as your signature to this agreement. After submission, you will see the screen below. You will be registered in the VOMRS database as an applicant to the VO Applicant is defined in section 6.1 *Roles*. See Chapter 7: *Functions Available to Visitors, Candidates and Applicants*.

I have read and agree to LCG Usage Rules.
Click to register

Registration (Phase II)

You have successfully submitted phase II of USCMS VO registration!

You will receive an email notice from the VOMRS USCMS Service indicating that you've been approved (or denied) as a VO member. This could take up to a few days; it depends on how soon your representative completes this task. You now have applicant status in the USCMS VO, and as such can access more screens. Click on the USCMS VO Registration Home link in the left hand menu to update the menu.

Applicant to USCMS VO may:

- Change your groups and group roles selection
- Browse groups
- Browse institutions and sites
- Browse required personal information
- Browse CAs recognized by USCMS VO
- Browse your own personal information
- Resign usage rules
- Browse your own authorization status
- Browse required personal information
- Browse CAs recognized by USCMS VO
- Unsubscribe and resubscribe to personal event notification

- Wait until you receive an email notice from your representative or the VO Administrator indicating that you've been approved (or denied) as a VO member. The term “member” is defined in section 6.1 *Roles*. This could take up to a few days; it depends on how soon your representative completes this task. Assuming the message comes back saying you're approved, you'll be a member! See Chapter 8: *VO Member Functions*.

4.4 The Usage Policy

Typically VOs and grid resources have usage policies to which resource users must agree. The VO phase II registration form in VOMRS supports linking to an external policy document of your VO's choice, allowing candidates to read the rules as part of the registration process. Submission of this registration form by a candidate implies his or her agreement to abide by this policy, and for legal purposes is regarded as his or her signature to it.

4.5 The Registration Form

4.5.1 Phase I

The phase I registration screen is shown below:

Registration (Phase I)

Welcome to the USCMS VO user registration phase I page.

All fields on this page are required. After submitting this form, a confirmation email will be sent within 24 hours with further instructions. If you fail to follow the instructions within 10 days, your registration will be discarded and you will have to re-register.

If you don't receive the confirmation email, please check your email address in VOMRS and change it if necessary. If it was correct, contact [the VO administrator](#).

Email address :

Select institution :

Select representative :

Grid job submission rights :

Personal Information

First name:

Last name:

Phone:

The fields on this screen are configurable and therefore may differ from one VO's implementation of VOMRS to the next. There are always at least four required fields: email address, last name, first name, and phone.

The entry fields are described below:

Email Address Enter the email address to which you want VOMRS communications sent. You will receive automatically generated subscription notifications and possibly person-to-person messages at this address. Read about notification in section 7.3.3 *Subscribing to Event Notification*.

Select institution From the list, select the institution with which you are affiliated.

Select representative From the list, select the DN of a representative to whom you are personally known, or as otherwise instructed by your institution. The representative is responsible for approving your request for VO membership.

Grid job submission rights

If you plan to submit jobs to the grid, select "full" as "Grid job submission rights". If you will not be running grid jobs, but rather only performing administrative tasks in VOMRS, select "none". If you will be doing both, select "full".



Be aware that individual grid resource providers maintain their own, additional layer of authorization (according to the security policies in effect at their sites), and for reasons beyond your control, you may be denied access to some sites.

First Name Enter your first (given) name.
 Last Name Enter your last (family) name.
 Phone Enter your work phone number.

4.5.2 Phase II

Notice that you have a couple more left-hand menu options than on the phase I form. You may browse your personal information, your certificate information and browse/change your email address (see section 4.3 *Registration: Phase II*).

This form is configured by individual VOs. The form contains the selection of groups and group roles. You can choose the groups and group roles affiliation at this time or do it later on. In addition the form may include extra fields for you to fill out, or it may only contain a link to the usage rules and a button to submit the form.

Registration (Phase II)

Welcome to the USCMS VO user registration phase II page!

You are now a candidate to the USCMS VO. To proceed, you required to read Rules for Use of [the OSG](#) and fill out the additional fields, if any. At this time you can also select groups and group roles you would like to be assigned. Submission of this phase II registration form implies your agreement to abide by these rules, and for legal purposes is regarded as your signature to this agreement. In addition to the visitor functions, as a candidate to the USCMS VO, you may:

- Change your groups and group roles selection
- Browse your own personal information
- Browse your certificate information

Upon submission of this form you become an applicant to the USCMS VO. The representative you selected in phase I will be required to verify both the correctness of the information you have provided and your USCMS VO affiliation prior to approving you for membership. You will receive an email notification indicating approval or denial of membership.

Groups and Group Roles:

Groups	Group Roles	Select
/uscms	admin <input type="checkbox"/>	<input checked="" type="checkbox"/>
/uscms/development	admin <input type="checkbox"/>	<input type="checkbox"/>
/uscms/production	admin <input type="checkbox"/>	<input type="checkbox"/>
/uscms/test	admin <input type="checkbox"/>	<input type="checkbox"/>

I have read and agree to OSG Usage Rules.
 Click to register

Chapter 5: The VOMRS Web User Interface

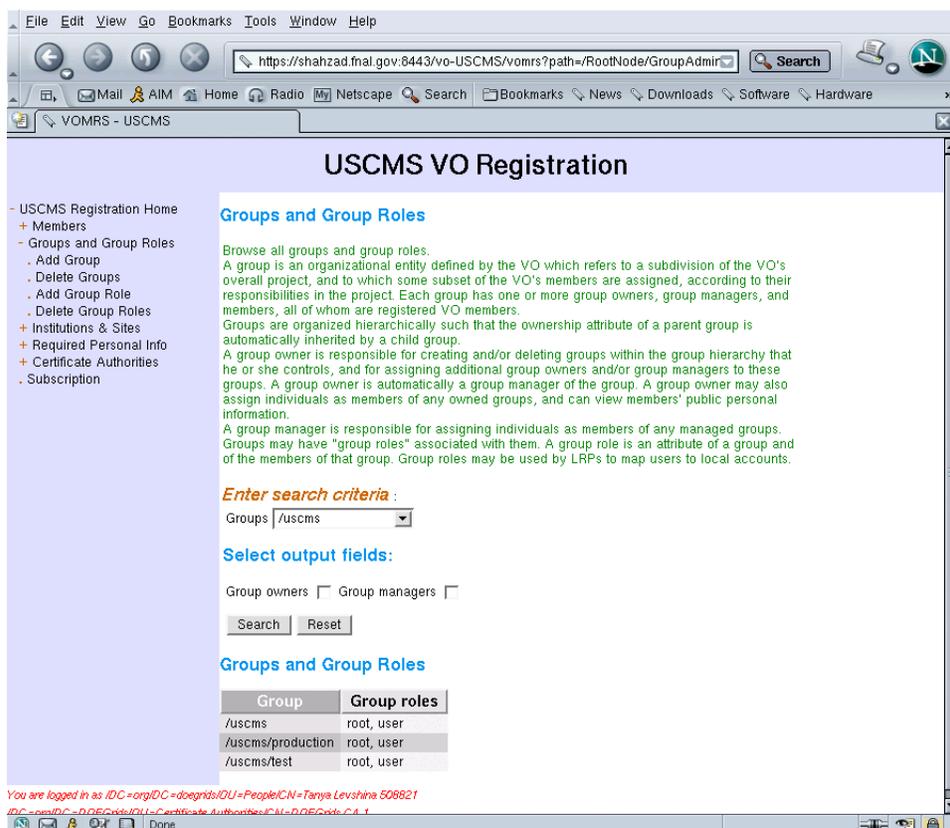
The client portion of VOMRS is a web user interface (web UI) to a database, and as such, the majority of its screens allow you to enter query criteria, select output fields and submit your query. After a query is processed, its result is appended to the bottom of the screen. Some of the screens are informational only. Many of the screens include help text in green. All the terms used to identify database fields and menu options are defined via pop-up help text upon mouseover. Your VO administrator may customize some features of the screens, e.g., VO-specific screen headings, via a configuration file.



The sample screens included in this manual come from the development and test systems. They refer to the USCMS VO and display test data.

5.1 The VOMRS Window Components

At the center top of all screens is the VO-Specific VOMRS service identifier, e.g., **My VO Registration**. Down the left-hand side is an explorer-style, expandable menu of operations the user can perform. The length and contents of this menu varies according to the user's status and roles in the VO. At the very bottom of the screen, in red, is the user's DN and CA. In the main, white area of the screen the main content of the screen is displayed. The content may consist of informational text, help text, data entry and/or query fields, and/or query results.



The items on the left-hand menu consist of two clickable portions: the text of the menu option, and the plus (+), minus (-) or period (.) sign preceding it. When you click the text, you are brought to the option's corresponding screen. As for the sign in front of it:

- USCMS Registration Home
- + Members
- + Groups and Group Roles
- + Institutions & Sites
- + Required Personal Info
- + Certificate Authorities
- . Subscription

- A plus sign (+) indicates that there is a submenu for the corresponding menu item; click the plus sign to expand it.
- A minus sign (-) indicates that the submenu for the corresponding item is expanded; click the minus sign to retract it.
- A period (.) indicates that there is no submenu for the corresponding menu item.

5.2 Screen Types and their Functions

There are four basic types of screens in the VOMRS web UI:

- informational
- query-only
- query and edit data
- data entry

In this section we describe the features and functionality that all applicants and members will need to understand. Additional features found in pages that can only be accessed by members with administrative roles are deferred to Chapter 11: *Administrative Query and “Select Attribute” Screens*.

5.2.1 Informational Screens

An example of a strictly informational page is the **Welcome** page. The menu option **Registration Home** points to it. This page describes what the service is used for and familiarizes new users with the process of registering with the VO.

To perform any operation, you must choose a different option from the menu at the left of the screen (not shown here).

USCMS VO Registration

Registration Home
ation (Phase I)
and Group Roles
ions & Sites
ed Personal Info
ate Authorities

Welcome to the USCMS VO Registration Service!

This site is used for registering USCMS VO grid resource users and for managing information about their affiliation with the USCMS VO and their permissions regarding use of the grid resources.

Registration consists of two phases. In phase I, a visitor completes the registration form labelled "Registration (Phase I)". Next, the visitor becomes a "candidate" for VO membership. After an initial confirmation of identity, the candidate moves to phase II. In phase II, the candidate completes the registration form labelled "Registration (Phase II)" and confirms intent to comply with [the OSG Usage Rule document](#). At this point the candidate becomes an "applicant". Once the applicant is approved, he or she becomes a "member". The [VO administrator](#) may grant you administrator rights, as appropriate.

Below we list the VOMRS functions available to users at each stage:

Visitors to the USCMS VO may:

- Browse groups
- Browse institutions and sites
- Browse required personal information
- Browse CAs recognized by USCMS VO
- Complete Registration Phase I

In addition to the visitor functions, **candidates** to the USCMS VO may:

- Browse their personal information
- Browse their certificate information

In addition to the candidate functions, **applicants** to the USCMS VO may:

- Select group and group role assignments
- Re-sign usage rules
- Browse their own authorization
- Unsubscribe and resubscribe to personal event notification

In addition to the applicant functions, **members** to the USCMS VO may:

- Enter/delete additional certificates
- Select a different primary certificate
- Change their own personal information

Additional functions reserved for approved USCMS VO **Administrators** :

- Add, change, delete information for members, groups, institutions, sites, CAs

[Help about the site can be found here](#)

ad in as /DC=gov/DC=fnal/O=Fermilab/OU=People/CN=Tanya Levshina/UID=tlevshin
:=fnal/O=Fermilab/OU=Certificate Authorities/CN=Kerberized CA

The **Required Personal Info** screen is another example of an informational page (for most users, that is). A member with the role of VO administrator (see section 12.2 *VO Administrator*) can change information in the database via this screen; everyone else can only browse it.

Required personal information

This is a list of the personal information that USCMS VO requires for registration.

This screen displays:

- the name of the field (e.g., First Name, Phone, etc.)
- whether this information is stored in the VOMRS database (Persistent=Y); Non-persistent information (Persistent=N) is not stored, and is collected only to access the individual's information stored elsewhere.
- whether this information is private, i.e., accessible only to authorized administrators and not transmitted out of this database via the subscription service (Private=Y); or not private, i.e., gets transmitted out (Private=N)
- if the information is collected from a Visitor or Candidate (External=Y) or obtained from some third party source, e.g., a site's Human Resources database (External=N)
- the registration phase in which this information is collected (Phase=I or II)
- list of default values pertinent for this information (if any)

The *VO administrator* is responsible for maintaining the list of personal information (public and private) required for membership in the VO. The items on this list should be negotiated with participating sites; ideally the list should include all items required by any of these sites.

Name	Private	Persistent	External	Phase	Defaults
First Name	N	Y	Y	I	
Last	N	Y	Y	I	
Phone	N	Y	Y	I	
Building	N	Y	Y	I	WH,FCC

5.2.2 Query-Only Screens

There are screens on which users can query the database to browse information, but on which they cannot add, delete or edit any information. An example of this type of screen is **Institutions & Sites**.

Institutions & Sites

Search the institutions registered in USCMS. Some subset of the institutions may also be grid sites, meaning they provide grid computing resources. These institutions are marked as "yes" in the "Is site" output field.

If you search on a particular institution and you check "Search on sites only", you will get output only if the institution is a site. It's better to leave the institution field blank when trying to get information about sites only.

For an institution which is not a site (marked as "no" in the "Is site" output field), the only information displayed is the institution name. A site may require extra personal information (in addition to that required for USCMS membership) before allowing an individual's grid jobs to be processed by the local computing resources. You can choose to display the site-specific required personal information, the site administrators, and/or the local resource providers in the output.

Enter search criteria :

Institution

Search on sites only

Select output fields:

Site administrators Local resource providers Is site? Required personal info

If you leave the **Institution** field left blank and **Search on sites** checked, you are requesting information on all the member institutions that are grid sites. Given that all the output fields are selected, the sample results look like the following:

Enter search criteria :

Institution

Search on sites only

Select output fields:

Site administrators Local resource providers Is site? Required personal info

Results

Site administrators	Local resource providers	Is site?	Required personal info	Institution
/DC=org/DC=doegrids/OU=People/CN=Leigh Grundhoefer 952831, /DC=org/DC=DOEGrids/OU=Certificate Authorities/CN=DOEGrids CA 1;		Yes	Email, Phone	Boston University
/O=Grid/O=Globus/OU=fnal.gov/CN=Tanya Levshina, /C=US/O=Globus/CN=Globus Certification Authority;		Yes	First name, Last name, Email, Phone	Fermi National Accelerator Laboratory

5.2.3 Query-and-Edit Data Screens

A query-and-edit page allows you to do just that: query the database to retrieve the information of interest, then edit the information as necessary. It does not allow you to add new database records, you may only change values in existing fields. A commonly used example of this type of page is the **Edit Personal Info** page.

Edit Personal Info

As a USCMS VO member, you may view and edit your own information only. Select the fields you wish to display, click Search, then edit them as necessary. VO administrators may query personal information on members for whom they have permissions to do so. Enter your search criteria, select the fields you wish to display, click Search, then edit them as necessary.

Enter search criteria :

DN

CA

First name

Last name

Email

Phone

Status

Roles

Rights

Institutions

Representative DN

Representative CA

Select output fields:

First name Last name Email Phone Member DN
Member CA Institution Status Roles Rights
Rep DN Rep CA

In this example we input enough information to uniquely identify an individual (a member with no administrative roles can see only his own information, and can thus leave the selection criteria blank), accept the default output fields as checked, submit the query, and a result like the following displays:

Members

Select output fields:

First name Last name Phone Member DN Member CA
 Institution Status Status Reason Roles Rights
 Rep DN Rep CA Aliases Groups [Roles] VO Exp Date
 Inst Exp Date Usage Rule Vsn

Results

First name	Institution	Status	Roles
Anne	Fermilab	New	Candidate

Notice that the output fields are editable. When you're finished with your edits, submit the changes to update the database.

5.2.4 Data Entry Screens

A data entry page has no querying feature, the only fields that appear are data entry fields. These pages are intended for adding new information to the database, not for retrieving records to browse or edit.

One of the most commonly used data entry pages is the **Registration (Phase I)** page, used for submitting an application for VO membership by an individual associated with the VO's project.

Registration (Phase I)

Welcome to the USCMS VO user registration phase I page.

All fields on this page are required. After submitting this form, a confirmation email will be sent within 24 hours with further instructions. If you fail to follow the instructions within 10 days, your registration will be discarded and you will have to re-register.

If you don't receive the confirmation email, please check your email address in VOMRS and change it if necessary. If it was correct, contact [the VO administrator](#).

Email address :

Select institution :

Select representative :

Grid job submission rights :

Personal Information

First name:

Last name:

Phone:

There is a button for submitting the application (called **Click to register**), but there is no feature for submitting a query.

Chapter 6: Introduction to Roles, Statuses and Rights in VOMRS

6.1 Roles

VOMRS has adopted a technique of role-to-functions mapping in which the permissions for performing particular functions in the VOMRS are grouped into a role, and individuals are assigned to a particular role. The roles defined in VOMRS include:¹

Visitor

An individual who possesses a valid certificate from a trusted CA (a CA trusted by the VO), automatically has the role of “visitor” with respect to the VO.

Candidate

Once a visitor has applied for VO membership but has not yet been approved, he or she is first assigned the role of “candidate”.

Applicant

After an identity confirmation, the candidate becomes an “applicant” (VO registration is a two-stage process).

Member

Once an applicant has been approved, his or her role is changed to “member”. VO membership is granted with a validity period, at the end of which membership must be renewed or it expires. The length of this period is set by the VO administrator².

The functions associated with these roles are discussed in Chapter 7: *Functions Available to Visitors, Candidates and Applicants* and Chapter 8: *VO Member Functions*.

1. The administrative roles are discussed in section 9.1 *Member-to-Functions Mapping via Roles*.

2. By default in the application the validity period is one year, but the VO administrator may choose to set it differently.

6.2 Membership Status

Each VO candidate, applicant and member has a status which indicates his or her current membership standing. This is referred to as “membership status” (as distinct from “authorization status”, see section 6.4 *Authorization Status*)¹. Members will be automatically notified, by default, when their membership status changes. The person making the change is required to provide an explanation; the explanation is stored in VOMRS. The defined statuses are:

New	This status is given to candidates and applicants to the VO; it remains in effect until the applicant’s request is processed and either approved or denied.
Approved	This status is given to members in good standing; this status is granted automatically upon obtaining an authorization status of “approved” (see section 6.4 <i>Authorization Status</i>) by your representative (or by your VO administrator on behalf of your representative).
Denied	This status is given to applicants who do not meet membership requirements for any reason. They do not become VO members. Individuals with this status can access the web UI the same as applicants can, but cannot perform any operations in the VOMRS, and cannot use grid resources.
Suspended	This status indicates that the VO member is currently not in good standing in the VO. Members with this status can access the web UI, but cannot perform any operations in the VOMRS, and cannot use grid resources. The VOMRS stores the text indicating the reason why this status was assigned to a member so that the member or an administrator can reference it.
Expired	The status indicates that the membership has expired. Members with this status can access the web UI, but cannot perform any operations in the VOMRS, and cannot use grid resources. A Member will be notified several days in advance about upcoming membership expiration. Expiration can occur for any of three reasons: <ul style="list-style-type: none">• A new Usage Rules document must be signed (see section 4.4 <i>The Usage Policy</i>).• Member’s validity period has expired (see section 6.1 <i>Roles</i>).• Member’s institutional affiliation has expired.

1. For advanced users, also see section 9.2 *Authorization Status (Advanced)*.

To prevent expiration or to restore the “approved” status in the first two cases, a member should simply sign or re-sign the Usage Rule document. In the third case, an institutional Representative or VO Admin must extend the date of member’s institution affiliation.

6.3 Certificate Status

Every certificate that gets entered into VOMRS must be approved before it can be used. This level of control was implemented to guard against the entry of third-party certificates. Each certificate is given a status which indicates its standing with respect to the VOMRS. Members will be automatically notified, by default, when their certificate status changes within the VOMRS system.



Note that this is separate from the certificate’s status with respect to the issuing CA. Certificate revocation is handled by the CA’s CRL, and this information gets downloaded periodically to the VOMRS host. The holder of a revoked certificate will not be able to access the VOMRS web UI.

The certificate used by a member during registration is considered the “primary” certificate. The defined statuses are:

New

This status is given to certificates of candidates and applicants during registration, and also to a member’s new (secondary) certificate when requesting addition of same. This status remains in effect until the request is processed and either approved or denied.

Approved

This status is given to a member’s certificate in good standing. It is granted automatically to a member’s primary certificate when the member obtains an authorization status of approved (see section 6.4 *Authorization Status*).

Denied

This status is given to a certificate that does not meet the VO’s requirements for some reason. The member cannot use this certificate to access grid resources.

Suspended

This status indicates that a certificate is currently not in good standing in the VO. A member cannot use this certificate to access grid resources. The VOMRS provides a field for the administrator to describe why this status was assigned.

Expired

The status indicates that the CA who issued this certificate is no longer valid.

6.4 Authorization Status

Authorization Status, as contrasted with membership status (see section 6.2 *Membership Status*), refers to a VO member's authorization to use grid resources. There are three possible authorization statuses:

New This authorization status is given to candidates and applicants to the VO; it remains in effect until the applicant's authorization status is changed to "Approved" or "Denied".

Approved

This authorization status indicates that the member is approved for access to grid resources.

Denied This status is given to applicants or VO members who are not eligible to access grid resources.

6.5 Membership Rights

Membership rights represent the permissions granted by a VO to a member regarding general use of grid resources.

Full grants the member job processing rights on grid resources (as allowed by the member's authorization status) in addition to access to the VOMRS interface.

None grants the user access to the VOMRS interface only; the member will not be authorized to run grid jobs.

VOMRS proceeds with member authorization for access to grid sites only for members with **full rights**.

Part III User Functions

Chapter 7: *Functions Available to Visitors, Candidates and Applicants*

Chapter 8: *VO Member Functions*

Chapter 7: Functions Available to Visitors, Candidates and Applicants

At the beginning of Chapter 4: *The Registration Procedure* we defined the terms visitor, candidate, applicant and member, as regards the process of VOMRS registration. Each of these roles is associated with a different set of available functions in the web UI, as mentioned in section 6.1 *Roles*.

7.1 Visitor Functions

A visitor is an individual who has not yet completed phase I of VO registration. The following functions in VOMRS are available to Visitors:

- Browse the VOMRS Home Page
- Browse groups and group roles
- Browse institutions and sites
- Browse required personal information
- Browse CAs recognized by USCMS VO
- Complete Registration Phase I



7.1.1 Browse VOMRS Home Page

Here we show the top portion of the page with the left-hand menu bar as it appears for visitors. Farther down the page and not shown here is information about members and administrators. There is also a link to help text.

USCMS VO Registration

- USCMS Registration Home
- Registration (Phase I)
- Groups and Group Roles
- Institutions & Sites
- Required Personal Info
- Certificate Authorities

Welcome to the USCMS VO Registration Service!

This site is used for registering USCMS VO grid resource users and for managing information about their affiliation with USCMS VO and their permissions regarding use of the grid resources.

Registration consists of two phases. In phase I, a visitor completes the registration form labelled "Registration (Phase I)". Next, the visitor becomes a "candidate" for VO membership. After an initial confirmation of identity, the candidate moves to phase II. In phase II, the candidate completes the registration form labelled "Registration (Phase II)" and confirms intent to comply with [the LCG Usage Rule document](#). At this point the candidate becomes an "applicant". Once an applicant is approved, he or she becomes a "member". [VO administrator](#) may grant you administrator rights, as appropriate.

Visitor to USCMS VO may:

- Browse groups
- Browse institutions and sites
- Browse required personal information
- Browse CAs recognized by USCMS VO
- Complete Registration Phase I

Candidates to USCMS VO may:

- Browse your personal information
- Change your personal information
- Change email address to receive subscription notifications
- Browse groups
- Browse institutions and sites
- Browse required personal information
- Browse CAs recognized by USCMS VO

Applicants to USCMS VO may:

- Browse your personal information
- Resign usage rules
- Browse your authorization status
- Browse groups
- Browse institutions and sites
- Browse required personal information
- Browse CAs recognized by USCMS VO
- Unsubscribe and resubscribe to personal event notification

7.1.2 Browse Certificate Authorities

You may browse the list of the Certificate Authorities (CAs). The displayed list may be a superset of those trusted by your VO; only those CAs shown with status "Approved" are trusted. Use this screen to verify that your certificate is from a trusted CA; if it is, you can proceed to phase I registration. Applicants and members are required to possess a valid certificate issued by one of these organizations.

Click the **Certificate Authorities** menu item to arrive at the screen. You'll see a table with the following headings:

- **Name** gives the Distinguished Name (DN) of the Certificate Authority (CA).
- **Description** provides a brief description of the CA.
- **Status** indicates whether the CA is trusted by your VO (Approved) or not (Denied).
- **Exp. Date** is the date on which the CA's Approved status will expire, if not renewed before then.

By clicking on the table headers, you can reorder the records.

List Certificate Authorities

This is a list of the Certificate Authorities registered with USCMS. Applicants and members are required to possess a valid certificate issued by one of these organizations.

Name	Description	Status	Exp. Date
/C=UK/O=eScience/OU=Authority/CN=CA/Email=ca-operator@grid-support.ac.uk	CA/Email=ca-operator@grid-support.ac.uk	Approved	2007-8-4 5:36:41
/C=CH/O=CERN/OU=GRID/CN=CERN CA	CERN CA	Approved	2008-8-19 4:50:0
/C=CZ/O=CESNET/CN=CESNET CA	CESNET CA	Approved	2006-6-27 8:15:12
/C=FR/O=CNRS/CN=CNRS	CNRS	Approved	2021-4-22 0:44:36
/C=FR/O=CNRS/CN=CNRS-Projets	CNRS-Projets	Approved	2011-4-25 0:48:26
/O=DOE Science Grid/OU=Certificate Authorities/CN=Certificate Manager	Certificate Manager	Approved	2010-1-26 2:0:0
/C=CY/O=CyGrid/CN=CyGrid CA	CyGrid CA	Approved	2005-12-22 6:43:47
/DC=org/DC=DOEGrids/OU=Certificate Authorities/CN=DOEGrids CA 1	DOEGrids CA 1	Approved	2008-1-10 2:0:0

7.1.3 Browse Required Personal Information

Personal information is the set of personal data that an individual must provide during registration in order to identify himself or herself to the VO and to be eligible for membership and access to grid resources. Some data is always collected during phase I of registration, additional data may be collected in phase II. The list of required data is maintained by the VO site admin (see section 12.2 *VO Administrator*).

Personal information is stored for the duration of an individual's VO membership. Each information field is designated as public or private. Private fields do not get transmitted out of the VOMRS system; only certain administrators¹ may access the information in these fields. Public information may be seen by VO members with other administrative roles, e.g., representatives and group managers, and may be transmitted out of the system via notification email messages.

Click the **Required Personal Info** menu item to arrive at the screen. You'll see a table with the following headings:

- **Name** gives the name of the piece of information (e.g., Last Name).
- **Persistent** indicates whether this information is stored in the VOMRS database (Persistent=Y); Non-persistent information (Persistent=N) is not stored, and is collected only to access the individual's information stored elsewhere, e.g., in a site's Human Resources database.
- **Private** indicates whether this information is private (Private=Y), or public (Private=N), as discussed above.

1. These administrators would be assigned one of the roles: VO Admin, Site Admin or Representative roles (see Chapter 12: *VO Administration Roles and Functions*).

- **External** indicates whether the information is collected from a Visitor or Candidate (External=Y), or obtained from some third party source, (External=N) e.g., from a site's Human Resources database.
- **Phase** indicates the registration phase in which this information is collected (Phase=I or II).
- **Defaults** indicates: the selection list for a particular personal information token.

By clicking on the table headers, you can reorder the records.

Required personal information

This is a list of the personal information that USCMS VO requires for registration.

This screen displays:

- the name of the field (e.g., First Name, Phone, etc.)
- whether this information is stored in the VOMRS database (Persistent=Y); Non-persistent information (P) is not stored, and is collected only to access the individual's information stored elsewhere.
- whether this information is private, i.e., accessible only to authorized administrators and not transmitted via the subscription service (Private=Y); or not private, i.e., gets transmitted out (Private=N)
- if the information is collected from a Visitor or Candidate (External=Y) or obtained from some third party a site's Human Resources database (External=N)
- the registration phase in which this information is collected (Phase=I or II)
- list of default values pertinent for this information (if any)

The **VO administrator** is responsible for maintaining the list of personal information (public and private) require membership in the VO. The items on this list should be negotiated with participating sites; ideally the list should items required by any of these sites.

Name	Private	Persistent	External	Phase	Defaults
First Name	N	Y	Y	I	
Last	N	Y	Y	I	
Phone	N	Y	Y	I	
Building	N	Y	Y	I	WH,FCC

7.1.4 Browse the VO's Groups and Group Roles

The VO is organized into a hierarchical tree of groups, much like a directory structure. Typically the group definitions reflect the structure of the VO's project management. You can chose to be assigned to one or more groups and group roles after you become a VO candidate. You can change your groups and group roles selection at any time. If VO Administrator, Group Owner or Manager do not approve your selection she/he can de-assign you from any of the group/group role you have selected. Once you have been de-assigned from the group/group role you would not be able to select it again. Groups are described in section 10.1 *About Groups*.

Group roles pertain to user permissions at local resources. Group roles are assigned to VO members in VOMRS, transmitted to VOMS, and attached to extended proxy requests¹. This allows the LRPs to map users appropriately to local accounts as jobs get submitted. Group roles are described in section 10.2 *About Group Roles*.

1. Extended proxies can only be generated using the VOMS' voms-proxy-init script. This script appends attributes related to your group and role within the VO to the proxy.

The defined group roles (which are not actually attributes of groups, but rather of group members), are also shown. Click the **Groups and Group Roles** menu item to arrive at the screen.

Search Criteria

In the Groups field, use the pull-down menu to select the group of interest. The results will display a record for the selected group and all its child groups.

Output Fields

Optionally select the “Group owners” and/or “Group managers” output fields, then click Search.

By default, the fields “Group” and “Group roles” are displayed (at right); the other two fields are displayed only if they were checked. The field “Group” displays the name and hierarchy of the group. The “Group roles” field displays all defined group roles. Group roles are described in section 10.2 *About Group Roles*.

By clicking on the table headers, you can reorder the records.

Select output fields:

Group owners Group managers

Groups and Group Roles

Group	Group roles	Group owners	Group managers
/uscms	admin, root, usr, VO-Admin	/DC=org/DC=DOEGrids/OU=People/CN=Jane Doe 123, /DC=org/DC=DOEGrids/OU=Certificate Authorities/CN=DOEGrids CA 1;	/DC=org/DC=DOEGrids/OU=People/CN=Jane Doe 123, /DC=org/DC=DOEGrids/OU=Certificate Authorities/CN=DOEGrids CA 1;
/uscms/development	admin, root, usr, VO-Admin		
/uscms/production	admin, root, usr, VO-Admin		Dummy_3, /DC=org/DC=DOEGrids/OU=Certificate Authorities/CN=DOEGrids CA 1;
/uscms/test	admin, root, usr, VO-Admin		
/uscms/test/prod	admin, root, usr, VO-Admin		

7.1.5 Browse Sites and Institutions

You may search on the list of institutions registered in your VO. Some subset of the institutions may also be grid sites, meaning they maintain and provide grid computing resources.

Click the **Institutions & Sites** menu item to arrive at the screen.

Search Criteria

If you search on a particular institution, output is returned for that institution only. If you click “Search on sites only”, output is returned only for the selected institutions that are sites. If you select a particular institution and you check “Search on sites only”, you will get output only if the institution is a site. If you want to see the list of institutions or sites, leave the institution field blank, and check the “Search on sites only” as desired.

Output Fields

The selectable output fields are meaningful only for institutions that are also sites. These institutions are marked as “yes” in the **Is site** output field. For sites, you can choose to display the site-specific required personal information, the site administrators, and/or the local resource providers (LRPs) in the output.

The reason for including the site-specific required personal information is that sites, given their local computer security policies, may require different sets of personal data to be collected in order to authorize users to use their local computing resources. Here you can find out what each site requires.

For an institution which is not a site (marked as “no” in the **Is site** output field), the only information displayed is the institution name. In this case any output fields you select will be ignored.

By clicking on the table headers, you can reorder the records.

Enter search criteria :

Institution

Search on sites only

Select output fields:

Site administrators Local resource providers Is site? Required personal info

Results

Site administrators	Local resource providers	Is site?	Required personal info	Institution
/DC=org/DC=doegrids/OU=People/CN=Leigh Grundhoefer 952831, /DC=org/DC=DOEGrids/OU=Certificate Authorities/CN=DOEGrids CA 1;		Yes	Email, Phone	Boston University
/O=Grid/O=Globus/OU=fnal.gov/CN=Tanya Levshina, /C=US/O=Globus/CN=Globus Certification Authority;		Yes	First name, Last name, Email, Phone	Fermi National Accelerator Laboratory

7.1.6 Complete Registration Phase I

This process is described in section 4.2 *Registration: Phase I*. The screen is describe in section 4.5 *The Registration Form*.

7.2 Candidate Functions

Candidates may perform all the same functions that visitors may (see section 7.1 *Visitor Functions*). In addition, candidates may:

- Browse the personal information they entered in phase I of registration.
- Select groups and group roles affiliation after confirming your email address.
- Browse the certificate information stored by the VO.
- Browse and change their email address.
- Complete phase II of registration.

The fully-expanded menu for candidates displays the following items:



7.2.1 Browse Personal Information

As a candidate, you may view your own information only, both the private and public information. Click the **Members** menu item to reach the Members screen. Select the fields you wish to display, and click Search. To verify your role (e.g., Candidate) select the Roles field.

Members

Select output fields:

First name Last name Phone Member DN Member CA
Institution Status Status Reason Roles Rights
Rep DN Rep CA Aliases Groups [Roles] VO Exp Date
Inst Exp Date Usage Rule Vsn

Results

First name	Institution	Status	Roles
Anne	Fermilab	New	Candidate

7.2.2 Browse Certificate Information

Under the **Member** menu item, find **Certificates**, and click it to arrive at the Certificates screen. Here you can get detailed information about your certificate. Select the fields you wish to display, and click Search.

7.2.3 Browse/Change Email Address

Under the **Member** menu item, find **Email Address**, and click it to arrive at the Email Address screen. Here you can verify and/or change your email address. Select the fields you wish to display, and click Search.

If you change your email address, you will receive another email message asking you to confirm the change before you can proceed to phase II of registration.

Select output fields:

First name Last name Phone Member DN Member CA
Institution Status Status Reason Roles Rights
Rep DN Rep CA VO Exp Date Inst Exp Date Usage Rule Vsn

Results

Choose/modify desired result:

First name	Institution	Status	Roles	Rights	E-mail address
Anne	Fermilab	New	Candidate	full	aheavey@fnal.gov

7.2.4 Complete your Phase II Registration

Under the **Member** menu item, find **Registration (Phase II)**, and click it to arrive at the Registration (Phase II) screen. This screen is described in section 4.5 *The Registration Form*.

Registration (Phase II)

You have successfully submitted phase II of USCMS VO registration!

You will receive an email notice from the VOMRS USCMS Service indicating that you've been approved (or denied) as a VO member. This could take up to a few days; it depends on how soon your representative completes this task. You now have applicant status in the USCMS VO, and as such can access more screens. Click on the USCMS VO Registration Home link in the left hand menu to update the menu.

Applicant to USCMS VO may:

- Change your groups and group roles selection
- Browse groups
- Browse institutions and sites
- Browse required personal information
- Browse CAs recognized by USCMS VO
- Browse your own personal information
- Resign usage rules
- Browse your own authorization status
- Browse required personal information
- Browse CAs recognized by USCMS VO
- Unsubscribe and resubscribe to personal event notification



Submission of this form implies your agreement to abide by the rules of the policy, and is regarded as your signature to this agreement.

Once you've read the rules carefully, click the button to submit.

After submission, you will see a "Success" message, and an email will be sent to your representative and VO Administrator requesting approval of your membership request. Upon approval, you will receive an email notification advising you of your membership in the VO. You will then be able to access VOMRS as a Member, and will have access to grid resources according to your rights.

7.3 Applicant Functions

Applicants may not browse or change their email address (because they are awaiting an approval or denial email message), but with that exception, they may perform all the same functions as a candidate may (see section 7.2

Candidate Functions). In addition, applicants may:

- Re-sign the usage rules, if necessary.
- Select groups and group roles affiliation.
- Browse their authorization status (it should say "new").
- Unsubscribe and resubscribe to email notification of events.

- USCMS Registration Home
- Member Info
 - Resign Usage Rules
 - Select Groups & Group Roles
 - Certificates
 - Check Authorization Status
 - Groups and Group Roles
 - Institutions & Sites
 - Required Personal Info
 - Certificate Authorities
 - Subscription

7.3.1 Sign the Usage Rules Again

Under the **Member** menu item, find **Re-sign Usage Rules**, and click it to arrive at the Re-sign Usage Rules screen. There are two cases in which you'll need to do this:

- Your VO membership is about to expire or has expired and you wish to renew. Prior to expiration, the VOMRS will send you a reminder email message.
- The VO has changed the usage agreement, and all members must reread and re-sign it. The VOMRS will also send a message in this case.



Submission of this form implies your agreement to abide by the rules of the policy, and is regarded as your signature to this agreement.

Once you've read the rules carefully, click the button to submit.

Resign Usage Rules

You have to read and sign Rules for Use of **the LCG** if your VO membership is about to expire or has expired. If this is the case you should have received the notification email from a **VO administrator**.

Your current VO membership expiration date is 2006-2-18

I have read and agree to LCG Usage Rules.

After submission, you will see a "Success" message. You can now continue as you did before, based on your role(s), status and rights.

7.3.2 Verify your Authorization Status

Authorization Status refers to a VO member's authorization to use particular grid resources. The various statuses and their meanings are described at a user level in section 6.4 *Authorization Status*, and at an administrator level in section 9.2 *Authorization Status (Advanced)*.

Under the **Member** menu item, find **Authorization Status**, and click it to arrive at the Authorization Status screen. Select the fields you wish to display, and click Search. (Notice none were selected in the example below.)

Select output fields:

First name Last name Phone Member DN Member CA
Institution Status Status Reason Roles Rights
Rep DN Rep CA VO Exp Date Inst Exp Date Usage Rule Vsn

Results

Phase	Admin DN	Admin CA	Authorization status
Representative	/DC=org/DC=doegrids/OU=People/CN=Tanya Levshina 508821	/DC=org/DC=DOEGrids/OU=Certificate Authorities/CN=DOEGrids CA 1	New

Notice the “Phase” column in the results. This does not refer to phase of registration, but rather phase of authorization, as described in section 9.2 *Authorization Status (Advanced)*.

The only authorization status that allows access to grid resources is “Approved”. The status “New”, shown above, is given to candidates and applicants to the VO. The status “Denied” indicates you have not been approved for membership in the VO.

7.3.3 Subscribing to Event Notification

An applicant, as well as a member with a given set of roles and responsibilities within the VO, needs to keep abreast of certain changes that occur in the VOMRS database. For example, the representative you selected on your registration form needs to be notified of your application so that he or she can approve (or deny) your membership. You, the applicant, will surely want to know when you’ve been approved for membership. And so on.

The mechanism VOMRS uses for notifying VO applicants and members of changes in the database is an email subscription service. VOMRS lets you choose the events that you wish to monitor (we call this “subscribing” to events), and then sends out email messages to you as corresponding events occur. On the registration form, you were asked to enter an email address; notifications will go to this address.

Click the **Subscription** menu item to arrive at the screen. You’ll see a table with two headings, **Event** and **Select**:

- **Event** describes an action that can take place in VOMRS, and to which an applicant or member may wish to subscribe. E.g., for a member, the event “You have been assigned to a group” is useful to know, and the member may therefore want to subscribe to this event.
- **Select** provides a checkbox which you should check for each event to which you wish to subscribe.

By clicking on the Event header, you can reorder the records in the output.

As an applicant, you are automatically subscribed to the several events available to you (shown in the image below); you may unsubscribe (and subsequently resubscribe) to them, each independently, as you wish. You can choose to Select/Deselect all events by checking the checkbox near “Select” header. If you make a change, click the Submit button.

The screenshot shows a web interface for event subscriptions. On the left is a navigation menu with items like 'USCMS Registration Home', 'Members', 'Groups and Group Roles', 'Institutions & Sites', 'Required Personal Info', 'Certificate Authorities', and 'Subscription'. The main content area is titled 'Subscribe to receive notification of events'. Below the title is a paragraph explaining that users can elect to receive email notifications for database changes called 'events', and that the events they can subscribe to depend on their role. A table with two columns, 'Event' and 'Select', lists two events: 'Your authorization status has changed' and 'Your membership status has changed', both with checked checkboxes. At the bottom of the table are 'Submit' and 'Cancel' buttons.

Event	Select
Your authorization status has changed	<input checked="" type="checkbox"/>
Your membership status has changed	<input checked="" type="checkbox"/>

If you leave these items checked, you’ll receive an email message from the system when you’re approved:

Dear VO Member,
Your status with the VO has been changed to **Approved** from **New**.
VO Administrator

Chapter 8: VO Member Functions

8.1 Overview of Member Functions

Once an applicant's request has been approved, the applicant becomes a VO member. As a VO member, having only the role "Member", you may do everything a visitor, candidate, or applicant can do in the VOMRS, as listed in Chapter 7: *Functions Available to Visitors, Candidates and Applicants*, plus:

- Enter/delete additional certificates
- Select groups and group roles affiliation.
- Select a different primary certificate
- Change their personal information
- Change their email address

To have access to additional functions in VOMRS, you must be assigned one or more additional roles within the VO, as discussed in section 9.1 *Member-to-Functions Mapping via Roles*, and discussed in detail in later chapters.

- 
- USCMS Registration Home
 - Member Info
 - Resign Usage Rules
 - Select Groups & Group Roles
 - Certificates
 - Add Certificate
 - Change Primary Certificate
 - Delete Certificate
 - Edit Personal Info
 - Change Email Address
 - Check Authorization Status
 - Groups and Group Roles
 - Institutions & Sites
 - Required Personal Info
 - Certificate Authorities
 - Subscription

8.2 Edit Your Personal Information

As a VO member (with no administrative roles), you may view and edit your own information only, both the private and public information.

Select the fields you wish to display, click Search, then edit them as necessary.

From this screen you may display up to five fields, and you are allowed to edit any of them.

Select output fields:

First name Last name Phone Institution Rights

Results

Choose/modify desired result:

First name	Institution	Rights
Anne	Fermilab	full
<input type="button" value="Submit"/>	<input type="button" value="Cancel"/>	

8.3 Add Secondary Certificates

If you have registered with multiple certificate authorities (CA) and thus have multiple certificates (and thus multiple Distinguished Names (DNs)), and if the CAs are recognized by your VO (check under the menu item Certificate Authorities), you may enter your additional certificates here, one at a time. You don't need extra certificates, strictly speaking, but if you already have more than one, you're free to include them in the system. VOMRS uses the term "alias" to refer to a secondary DN that belongs to you.

Each certificate addition is subject to approval by the VO administrator. The VO admin should provide an explanation as to why he or she approves or denies any certificate. As soon as a secondary certificate is approved, it can be used for grid job submission.

Having secondary certificates can be handy if your primary expires, and another is still valid, for example. The certificate you provided during registration is your primary certificate by default, any others are considered secondary. You may switch your primary certificate to one of your secondary certificates.

Select the fields you wish to display and click Search. On the resulting screen the fields New DN, New SN, New CA, Primary and Reason will be displayed along with any selected fields. These five fields are the only ones available for data entry/edit; all the others are read-only. We show the first four of these editable fields below (the fifth, “Reason”, not shown below due to page width, is a text box that allows you to type in a brief explanation):

Select output fields:

First name Last name Phone Member DN Member CA
 Member Email Institution Status Status Reason Roles
 Rights Rep DN Rep CA VO Exp Date Inst Exp Date
 Usage Rule Vsn

Results

Choose/modify desired result:

New DN	New SN	New CA	Primary
		/DC=org/DC=DOEGrids/OU=Certificate Authorities/CN=DOEGrids CA 1	<input type="checkbox"/>

With other selected fields, the screen gets very wide!

To add a secondary certificate:

- Type or paste in your new DN in the **New DN** field.
- Enter the new SN (certificate serial number). This is optional and you can leave this field blank if you do not know the serial number of your certificate
- Select the issuing CA from the pull-down list in the **New CA** field.
- If you wish this new certificate to be your primary certificate for the VOMRS service, check the box under **Primary**. If not, leave the box unchecked. If you check Primary, your previously primary certificate automatically becomes a secondary.
- Enter a brief explanation for your entry of a new certificate, or for your decision to make this one primary.

Upon submission, a request is sent to the VO Administrator for approval. Upon approval, if you’re subscribed to this event (as you are by default, see section 8.6 *Subscribe to Event Notification*), you’ll receive an automated email message from the VO administrator:

```
Dear VO Member,
New Distinguished Name /my/new/phony/dn/from/cern issued by
Certificate Authority /C=CH/O=CERN/OU=GRID/CN=CERN CA is added
as your new alias by /DC=org/DC=doegrids/OU=People/
CN=Anne H. 88888, /DC=org/DC=DOEGrids/OU=Certificate Authorities/
CN=DOEGrids CA 1.
VO Administrator
```

8.4 Change your Primary Certificate

If you've added any secondary certificates, you may switch your primary certificate to one of them if you wish. To change your primary certificate:

- Select the desired output fields.
- Click Search to bring up your personal record. In addition to the selected output fields, the results includes the field **Select**.
- In the **Select** field, check the box corresponding to the certificate you want to set as primary.

Select output fields:

Member DN Member CA is Primary Status Serial Number
CA Status Reason Status Reason Status Mod Date Creation Date
First name Last name Phone

Results

Choose/modify desired result:

Member CA	is Primary	First name	Select
/C=CH/O=CERN/OU=GRID/CN=CERN CA	N	Anne	<input type="checkbox"/>
/DC=org/DC=DOEGrids/OU=Certificate Authorities/CN=DOEGrids CA 1	Y	Anne	<input type="checkbox"/>

If subscribed to this event (as you are by default, see section 8.6 *Subscribe to Event Notification*) you'll receive an automated email message from the VO administrator after submission (not shown here).

8.5 Delete a Secondary Certificate

If you've added any secondary certificates, you may delete any of them if you wish. You are not allowed to delete the primary certificate. Select the desired output fields, and click Search to bring up your personal record. In the **Select** field of the results, check the box corresponding to the certificate you want to delete.

Select output fields:

Member DN Member CA is Primary Status Serial Number
CA Status Reason Status Reason Status Mod Date Creation Date
First name Last name Phone

Results

Choose/modify desired result:

Member CA	is Primary	First name	Select
/C=CH/O=CERN/OU=GRID/CN=CERN CA	N	Anne	<input checked="" type="checkbox"/>
/DC=org/DC=DOEGrids/OU=Certificate Authorities/CN=DOEGrids CA 1	Y	Anne	-

If subscribed to this event (as you are by default, see section 8.6 *Subscribe to Event Notification*) you'll receive an automated email message from the VO administrator after submission:

```
Dear VO Member,  
Your alias with Distinguished Name /my/new/phony/dn/from/cern issued by  
Certificate Authority /C=CH/O=CERN/OU=GRID/CN=CERN CA has been  
deleted by /DC=org/DC=doegrids/OU=People/  
CN=Anne H 888888, /DC=org/DC=DOEGrids/OU=Certificate Authorities/  
CN=DOEGrids CA 1.  
VO Administrator
```

8.6 Subscribe to Event Notification

In the image below you'll find the list of events to which all members can subscribe. More explanation of the subscription service is provided in section 7.3.3 *Subscribing to Event Notification*.

Event	<input type="checkbox"/> Select
A certificate has been removed from your certificate list	<input checked="" type="checkbox"/>
Institutional membership will expire	<input checked="" type="checkbox"/>
Member has been assigned a new institutional expiration date	<input checked="" type="checkbox"/>
Member's membership status has changed: no email confirmation	<input checked="" type="checkbox"/>
Member's membership status has changed: vo membership expired	<input checked="" type="checkbox"/>
The membership status of the VO has changed: institutional membership expired	<input checked="" type="checkbox"/>
VO membership will expire	<input checked="" type="checkbox"/>
You have a request to add a new certificate	<input checked="" type="checkbox"/>
You have been assigned to a Group Administrator role	<input checked="" type="checkbox"/>
You have been assigned to a LRP role	<input checked="" type="checkbox"/>
You have been assigned to a Representative role	<input checked="" type="checkbox"/>
You have been assigned to a Site Administrator role	<input checked="" type="checkbox"/>
You have been assigned to a VO Administrator role	<input checked="" type="checkbox"/>
You have been assigned to a group	<input checked="" type="checkbox"/>
You have been assigned to a group role	<input checked="" type="checkbox"/>
You have been de-assigned from Group Administrator role	<input checked="" type="checkbox"/>
You have been de-assigned from a LRP role	<input checked="" type="checkbox"/>
You have been de-assigned from a Representative role	<input checked="" type="checkbox"/>
You have been de-assigned from a Site Administrator role	<input checked="" type="checkbox"/>
You have been de-assigned from a VO Administrator role	<input checked="" type="checkbox"/>
You have been de-assigned from a group role	<input checked="" type="checkbox"/>
You have been removed from a group	<input checked="" type="checkbox"/>
You have to confirm e-mail address	<input checked="" type="checkbox"/>
Your authorization status has changed	<input checked="" type="checkbox"/>
Your certificate status has changed	<input checked="" type="checkbox"/>
Your institution has been changed	<input checked="" type="checkbox"/>
Your institutional expiration date has been changed	<input checked="" type="checkbox"/>
Your membership status has changed	<input checked="" type="checkbox"/>
Your primary certificate has changed	<input checked="" type="checkbox"/>
Your vo membership expiration date has been changed	<input checked="" type="checkbox"/>

By default, members are subscribed to all these events. You can deselect any individual events, if you like, and thereby unsubscribe yourself to them.

Part IV VOMRS Administration

Chapter 9: *Administrative Roles, Functions, Statuses and Rights in VOMRS*

Chapter 10: *Groups and Group Roles*

Chapter 11: *Administrative Screens in VOMRS*

Chapter 12: *VO Administration Roles and Functions*

Chapter 13: *Grid Administration Roles and Functions*

Chapter 14: *Group Administration Roles and Functions*

Chapter 9: Administrative Roles, Functions, Statuses and Rights in VOMRS

9.1 Member-to-Functions Mapping via Roles

VOMRS has adopted a technique of member-to-functions mapping in which the permissions for performing particular functions in the VOMRS are grouped into a role, as discussed in section 6.1 *Roles*. The functions associated with the non-administrative roles, which are listed in section 6.1, are described in Chapter 7: *Functions Available to Visitors, Candidates and Applicants* and Chapter 8: *VO Member Functions*.

In addition to the member role, VO members may be assigned one or more administrative roles, granting them greater permissions that go along with greater responsibilities within the VOMRS system. There are three categories of administrative roles:

VO Admin	This category includes the roles VO Administrator and Representative.
Grid Admin	This category includes the roles Site Administrator and Local Resource Provider (LRP).
Group Admin	This category includes the roles Group Owner and Group Manager.

These roles are discussed in Chapter 12: *VO Administration Roles and Functions*, Chapter 13: *Grid Administration Roles and Functions*, and Chapter 14: *Group Administration Roles and Functions*, respectively.

9.2 Authorization Status (Advanced)

Authorization Status, as contrasted with membership status (see section 6.2 *Membership Status*), refers to a VO member's authorization to use particular grid resources. In principle, there are three levels of authorization. At the highest level, a representative has the authority to grant or deny, on an individual basis, authorization to use any grid resources at any site recognized by the VO¹ (this is considered a "global" authorization; it is a necessary though not always sufficient condition for grid access). Down one level, a site

administrator has the authority to grant or deny, on an individual basis, authorization to use any resources located at his or her site. Ultimately, each local resource provider (LRP) has the authority to grant or deny, on an individual basis, authorization to use the resource(s) he or she controls.

Authorization status as a concept thus has three “phases”: *Representative*, *SiteAdmin*, and *LRP*. Depending on agreements between your VO and the individual sites and resource providers, the VOMRS may or may not implement or enforce all three phases¹. The *Representative* (“global”) phase of authorization is the only one that’s always required by the VOMRS software prior to granting any grid resource access. VOMRS transmits this authorization to VOMS, if configured for VOMS synchronization. If either or both of the other phases are implemented (*SiteAdmin* and *LRP*), members will have a set of individual authorization statuses for each site and/or resource; at this time, this information is not shared with VOMS.

New This authorization status is given to applicants to the VO (for all three phases); it remains in effect for the *Representative* phase until the representative changes the applicant’s authorization status to “approved” or “denied”. After this, if the other phases are implemented, they would be handled similarly.

Approved

This authorization status indicates that the member is approved for access to grid resources. Details follow:

- *Representative phase*:
 - Initial assignment of authorization status “approved” to an applicant by his or her representative triggers a change in the applicant’s membership status to “approved”, thus making the applicant a VO member.
 - This is a prerequisite to obtaining authorization from a site administrator to use grid resources at his or her site.
 - At this stage the VOMS database is populated with member’s information, if the synchronization with VOMS is turned on.
- *SiteAdmin phase*: Assignment of authorization status “approved” to a member by a site administrator indicates that the member is authorized to access grid resources at the corresponding grid site. This is a prerequisite to obtaining authorization from an LRP to use a particular grid resource at the site.

1. A VO administrator also has this authority.

1. As of the current writing, no agreements of this type have been established, therefore VOMRS has not implemented any functionality in connection with the *SiteAdmin* or *LRP* phases.

- *LRP phase*: Assignment of authorization status “approved” to a member by an LRP indicates that the member is authorized to access the corresponding grid resource.
- Denied This status is given to applicants or VO members who are not eligible to access grid resources, for any reason. Details follow:
- *Representative phase*:
 - This triggers changes in membership status. Membership status becomes “Denied” as well.
 - This effectively cuts off the access to all grid resources because VOMRS will not proceed with member authorization at a grid site or resource, and will not populate the VOMS database (when synchronization with VOMS is turned on).
 - *SiteAdmin phase*: Assignment of authorization status “denied” to a member by a site administrator indicates that the member is not authorized to access grid resources at the corresponding grid site.
 - *LRP phase*: Assignment of authorization status “denied” to a member by an LRP indicates that the member is not authorized to access the corresponding grid resource.

9.3 Membership Rights

Membership rights represent the permissions granted by a VO to a member regarding general use of grid resources. “Full” rights grant the member job processing rights on grid resources (as allowed by the member’s authorization status) in addition to access to the VOMRS interface; no rights (“none”) grant the user access to the VOMRS interface only. VOMRS will populate the VOMS database (when synchronization with VOMS is turned on) and will proceed with member authorization on grid sites only for members with full rights.

When applying for membership, an applicant requests the rights he or she will need. Full versus no rights are also discussed in section 4.5 *The Registration Form*.

The subscription service (see section 7.3.3 *Subscribing to Event Notification*) is primarily designed to disseminate information about grid resource users (i.e., members with full rights). Therefore, VOMRS database changes regarding members with full rights are included in notifications to other members, according to the latter’s roles and subscriptions; whereas changes regarding members with rights “none” are not included.

Chapter 10: Groups and Group Roles

10.1 About Groups

A group is an organizational entity defined by the VO which refers to a subdivision of the VO's overall project, and to which some subset of the VO's members are assigned, according to their responsibilities in the project. Each group has one or more group owners, group managers, and members, all of whom are VO members.

Groups may be organized hierarchically such that the ownership attribute of a parent group is automatically inherited by a child group. The hierarchy starts with a single VO-wide root group, owned by a VO administrator, to which all members get automatically assigned. A VO administrator is responsible for assigning ownership to next-level-down parent groups for each group hierarchy. A member assigned to a given group (somewhere down in the hierarchy) is automatically granted membership in the group's top parent group, although not in any intermediate parent groups. A VO member can select her/his own groups and group roles assignment. A VO or Group administrator can assign/de-assign groups and group roles at any time. Once a member is de-assigned from a particular group or group role she/he can not re-select this given group or group role. This can be done only by a VO or Group administrator

A given LRP may enforce different resource access privileges for different groups within the VO. This is done via a mapping between the VO groups and local resource privileges. This mapping is expected to implement default behavior for any VO/group/subgroup not known to the LRP. For example, say a user is a member of groups MYVO:generic and MYVO:x. If the group MYVO:x is not recognized by this particular LRP, the mapping should ensure that the user get the access privileges for the group MYVO:generic.

10.2 About Group Roles

LRPs need to be able to differentiate between classes of users in order to appropriately map users to accounts on their local resources. Some users will inevitably require greater privileges than others. This differentiation is accomplished via a mechanism called “group roles”, which are roles that correspond to particular computing privileges at a site and to which VO members may be assigned.

Group roles are defined VO-wide, not by group. In fact, group roles have nothing to do with groups, described in section 10.1 *About Groups*, except that the assignment of group roles to members in VOMRS takes place within the context of groups. Group roles get assigned to members via the same VOMRS screen as groups, and a member must be assigned to at least one group in order to be assigned a group role. Members may be assigned to multiple group roles.

In VOMRS, a group role is nothing more than an attribute of a VO member that gets transmitted to VOMS; it has no meaning within VOMRS, per se. In VOMS, however, group roles are attached to requests for extended proxies.

Chapter 11: Administrative Screens in VOMRS

Users with administrative roles have access to additional VOMRS screens with features beyond those described in Chapter 5: *The VOMRS Web User Interface*.

In this chapter, we describe the additional features found on many administrative screens, we describe the somewhat unique **Authorization Status** screen, and we discuss database query syntax.

11.1 Administrative Query and “Select Attribute” Screens

Several of the administrative pages allow you to add or remove some attribute to or from a VO member, e.g., add a role to a member, or remove membership in a group from a VO member. These pages use a common type of interface which includes:

- An area for entering search criteria
- A set of output fields from which to choose
- A Search button to submit and run the query

similar to the pages accessible by all users. After the search completes, the results area includes:

- one or more pull-down menus to select the attribute(s) you want to set
- the query results in rows, with a **Select** field on each containing a check box
- A Submit button, to save any changes you’ve made

Below we show an example, the **Assign to Group** screen. The query criteria and selected output fields are shown so that you can see how they correspond to the results. The fields **Groups [Roles]** and **Select** appear regardless of the selected output fields.

To assign a member to a group and/or a group role, you need to select a group from the left-hand pull-down menu and/or a group role from the right-hand pull-down menu. Then, for any member listed in the results area to whom you

wish to assign to this group (and/or group role), click in his or her **Select** box to put a check in it. You may check any number of **Select** check boxes, in general. Once you've made your selection, click Submit.

Enter search criteria :

DN

CA

First name

Last name

Phone

Status

Roles

Rights

Institutions

Representative DN

Representative CA

Select output fields:

First name Last name Phone Member DN Member CA

Member Email Institution Status Status Reason Roles

Rights Rep DN Rep CA VO Exp Date Inst Exp Date

Usage Rule Vsn

Max output records

Results

Choose/modify desired result:

Please, choose all required parameters

Groups Group roles

First name	Roles	Groups [Roles]	Select
John	Member, Representative	/uscms	<input checked="" type="checkbox"/>
Tanya	Member, Representative, SiteAdmin, VOAdmin	/uscms, /uscms/test/prod[admin, usr]	<input type="checkbox"/>
Tatyana	Member, Representative	/uscms	<input type="checkbox"/>

Requery, if you like, to see the results of your changes.

11.2 Authorization Status Screen

The **Authorization Status** screen, shown below after querying on a single individual, doesn't have additional features with respect to the screen type discussed in section 11.1 *Administrative Query and "Select Attribute" Screens*, but its use and the results it returns require some explanation.

Authorization Status, and the associated term "phase" are described in section 9.2 *Authorization Status (Advanced)*.

Phase	Admin DN	Admin CA	Authorization status	Status Reason	Select
Representative	/DC=org/DC=doegrids/OU=People/CN=Tanya Levshina 508821	/DC=org/DC=DOEGrids/OU=Certificate Authorities/CN=DOEGrids CA 1	Approved	-	-
LRP	/DC=org/DC=doegrids/OU=People/CN=Anne Heavey 830711	/DC=org/DC=DOEGrids/OU=Certificate Authorities/CN=DOEGrids CA 1	New	<div style="border: 1px solid gray; padding: 2px;"> please, provide the reason here! </div>	<input type="checkbox"/>
SiteAdmin	/DC=org/DC=doegrids/OU=People/CN=Tanya Levshina 508821	/DC=org/DC=DOEGrids/OU=Certificate Authorities/CN=DOEGrids CA 1	New	-	-

In the screen shot above, we show the results for a single VO member (name and other selectable query info not shown due to width limitations), as it appears to an LRP (notice which row contains the select box). Displayed are the **Phase** for the authorization status, the **Admin DN** and **Admin CA** corresponding to the member responsible for the phase, the **Authorization Status**, the **Status Reason** and **Select**.

For each individual member, there is always one row for the **Phase Representative**, showing the **Authorization Status** that the representative (identified by the DN shown) has granted the member. **Authorization Status** of “Approved” for this phase is required by the VOMRS software in order for the VO member to access any grid resources at all.

The other phases of authorization may be maintained here in VOMRS as authorization status, or they may be maintained externally to this system, according to the agreement between your VO and the sites. If additional phases are implemented in VOMRS, then you’ll see additional rows in the output:

- Some rows will display the **Phase SiteAdmin**, one site per row, showing the **Authorization Status** accorded the member by the site administrator (identified by the DN shown) for the corresponding site.
- Some rows would display the **Phase LRP**, one resource per row, showing the **Authorization Status** accorded the member by the LRP (identified by the DN shown) for the corresponding resource.

A **Select** box will appear and be checkable only for the rows which correspond to your role vis-a-vis the given member. (Notice the select box on the *LRP* line in the image above.) Select the status you wish to give the person (Approved or Denied), then check the appropriate **Select** box. Click Submit to save your changes.

11.3 Syntax for Querying the Database

Currently the database implements a very simple syntax. You need to supply the correct string (upper and lower case are ignored), or you can replace any number of characters with a percent sign (%). For example,

- j% returns all strings that start with j or J.
- j%n or J%n returns John and Joann, but not Joe or Joanne.

%0%

returns all names on the previous line, plus Todd, but not James.

Chapter 12: VO Administration Roles and Functions

VO Administrator roles include representative and VO administrator. People with these roles are responsible for the integrity of the VO, as maintained in VOMRS. In general, the representatives are responsible for verifying members' qualifications, and the VO admins are responsible for maintaining the institutional and other organizational information, and for assigning different roles to VO members.

12.1 Representative

12.1.1 Responsibilities

A representative is a VO member responsible for approving/denying applicants' requests for VO membership based on personal knowledge about each individual applicant's identity and institutional affiliation. To do so, the representative sets the authorization status of the member (for the *representative* phase) from "New" to either "Approved" or "Denied"; see section 9.2 *Authorization Status (Advanced)*. The representative may not change this status afterwards; that is the responsibility of the VO administrator.

Typically, a VO member from a given institution will act as representative for other members from the same institution, although being affiliated with the same institution is not a requirement in VOMRS. The representative is responsible for maintaining the institutional expiration date for each member he or she represents; i.e., on what date should grid authorization be removed based on the individual's affiliation with the institution.

A representative may change the representative of any VO member.

A representative can view the public and private personal information of the applicants and members for whom he or she is the representative (see section 7.1.3 *Browse Required Personal Information*).

12.1.2 Functions in VOMRS

Above and beyond the functions available to all members (see section 8.1 *Overview of Member Functions* and Chapter 7: *Functions Available to Visitors, Candidates and Applicants*), the functions available to a representative include:

- USCMS Registration Home
- Members
 - . Resign Usage Rules
- Certificates
 - . Add Certificate
 - . Change Primary Certificate
 - . Delete Certificate
 - . Edit Personal Info
 - . Change Email Address
 - . Assign Representative
 - . Change Expiration Date
 - . Authorization Status
- . Groups and Group Roles
- . Institutions & Sites
- . Required Personal Info
- . Certificate Authorities
- . Subscription

Assign Representative

Change the representative of any member to any representative.

Select output fields:

First name Last name Phone Member DN Member CA
Member Email Institution Status Status Reason Roles
Rights Rep DN Rep CA VO Exp Date Inst Exp Date
Usage Rule Vsn
Max output records:

Results

Choose/modify desired result:

Please, choose all required parameters

Representative:

First name	Select
Anne	<input type="checkbox"/>
Dummy_1	<input type="checkbox"/>
Dummy_2	<input type="checkbox"/>
Dummy_3	<input checked="" type="checkbox"/>
Jane	<input type="checkbox"/>
John	<input type="checkbox"/>
Tanya	<input type="checkbox"/>
Tatyana	<input type="checkbox"/>

Change Expiration Date

A representative can change the institutional membership expiration date of any VO member he represents. A representative will see only his or her people in the search results. The date can be manually entered in the format YYYY-MM-DD, or you can click on the calendar icon and select a date from the popup calendar.

Select output fields:

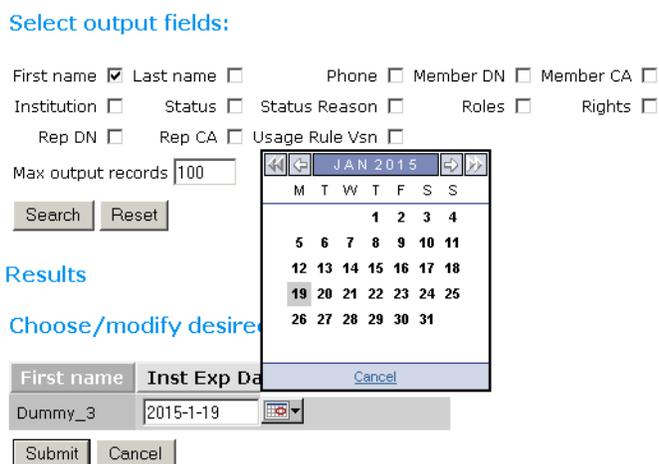
First name Last name Phone Member DN Member CA
Institution Status Status Reason Roles Rights
Rep DN Rep CA Usage Rule Vsn

Max output records:

Results

Choose/modify desired

First name	Inst Exp Da
Dummy_3	2015-1-19



Authorization Status Browse authorization status for all members (or you can choose to browse only members for whom you're the representative).

Change the authorization status of applicants for whom you're the representative (Phase = *representative*) to either "Approved" or "Denied". If you initially set it to "Denied", you may later change it to "Approved".

Setting the applicant's authorization status to "Approved" sets the applicant's membership status to "Approved", as well. The authorization status gets transmitted to VOMS, if synchronization with VOMS is turned on.

You cannot reset the authorization status from "Approved" to something else. If you approve someone by mistake, ask the VO administrator to change it.

Subscription

Subscribe or unsubscribe yourself to an event. The events to which a representative can subscribe, in addition to the member events listed in section 8.6 *Subscribe to Event Notification*, are listed below (by default you are not subscribed to any of these additional events):

- Authorization status of member has changed
- Member has been removed from VO
- Member 's institution has been changed
- Member has been assigned a new institutional expiration date
- Member's certificate status has changed
- Member's membership status has changed
- New Member has registered - representative approval is required
- Representative has been changed for member

12.2 VO Administrator

12.2.1 Responsibilities

A VO administrator is responsible for maintaining the VOMRS. There may be more than one person per VO with this role. A VO admin can add and delete institutions, sites, CAs, can modify the personal information required by the VO for each member (private and public), and can assign/deassign roles to/from members (e.g., group owner, site administrator, VO admin, and so on).

- USCMS Registration Home
- Members
 - . Registration
 - . Resign Usage Rules
- Certificates
 - . Add Certificate
 - . Change Primary Certificate
 - . Delete Certificate
 - . Set Certificate Status
 - . Edit Personal Info
 - . Change Email Address
 - . Assign Representative
 - . Change Expiration Date
 - . Authorization Status
 - . Set Status
 - . Assign to Group
 - . Remove from Groups
 - . Manage VO Admin Roles
- Groups and Group Roles
 - . Add Group
 - . Delete Groups
 - . Add Group Role
 - . Delete Group Roles
- Institutions & Sites
 - . Add Institution/Site
 - . Delete Institution/Site
 - . Site Personal Info
- Required Personal Info
 - . Add/Modify Personal Info
 - . Delete Personal Info
- . Certificate Authorities
- . Subscription

12.2.2 Member-Related Functions

The VO admin may view and change all public and private member-related information for any member. This includes:

Register Fill out and submit the registration form on behalf of a new applicant. Notice that the form includes fields for manual input of the member's certificate information: DN (distinguished name), SN (serial number) and CA, as shown below.

If you will require the new user to confirm his or her email address prior to approval, set that field to "Y".

There is no check for the user having read and signed the rules; the VO admin must verify this person-to-person.

If this user plans to submit jobs to the grid, select "full" as "Grid job submission rights". If he or she will not be running grid jobs, but rather only performing administrative tasks in VOMRS, select "none". If both, select "full".

Select what groups and group roles this user should be assigned. A user is always assigned to a top group. This assignment can be done later on as well

Register

Welcome to the US CMS VO user registration page!

As a VO administrator you can register any new user to the US CMS VO. After you fill out the form a new user will become an applicant to US CMS VO. If a new user should confirm her/his e-mail address select "Y" as "Request e-mail confirmation". If a new user plans to submit jobs to the grid, select "full" as "Grid job submission rights". If she/he will not be running grid jobs, but rather performing administrative tasks, select "none". If a new user will be doing both, select "full". After you fill out the registration form click Submit.

You can approved the applicant by visiting [Set Status](#) link or wait when selected representative approves the correctness of the information you provide here. Once an applicant is approved, she/he becomes a member of the US CMS VO.

DN :

SN :

CA :

Request e-mail confirmation :

Email address :

Grid job submission rights :

Personal Information

First Name:

Last:

Phone:

Groups and Group Roles:

Groups	Group Roles	Select
/uscms		<input checked="" type="checkbox"/>
/uscms/production		<input type="checkbox"/>
/uscms/production/stream1		<input type="checkbox"/>
/uscms/production/stream2		<input type="checkbox"/>

Remove	A VO administrator can remove candidate, applicant or member from a VO. A member who is assigned any administrative role can not be removed from a VO. All administrative roles should be de-assign from this member first. This function should be used with caution only when a mistake has been made while register a user. A user removed from a VO will have to start registration process from scratch.
Certificates	Browse certificate information for any VO member or applicant.
Add Certificate	Add a new certificate for any member.
Change Primary Certificate	Change the primary certificate for any member.
Delete Certificate	Delete a secondary certificate for any member.
Set Certificate Status	Change the status of any certificate of any VO member.
Edit Personal Info	Edit the private and/or public personal information on any VO member.
Change Email Address	Change the email address of any VO member. You can check the Confirmation box if you want the member to confirm the new email address.
Change Representative	Assign a different representative to any member.
Change Expiration Date	A VO admin can change the VO membership and/or institutional membership expiration date of any VO member. The date can be manually entered in the format YYYY-MM-DD, or you can click on the calendar icon and select a date from the popup calendar.

Select output fields:

First name Last name Phone Member DN Member CA
Institution Status Status Reason Roles Rights
Rep DN Rep CA Usage Rule Vsn

Max output records

Results

Choose/modify desired result:

First name	VO Exp Date (YYYY-MM-DD)	Inst Exp Da	
Anne	<input type="text" value="2006-2-18"/> <input type="button" value="Calendar"/>	<input type="text" value="2015-2-18"/> <input type="button" value="Calendar"/>	<input type="button" value="Cancel"/>



Set Authorization StatusView or change the authorization status of any member, for any phase. See section 11.2 *Authorization Status Screen*.

Set Status Change the membership status of any member.

Assign to Group & Group Role

Assign any member to any group and/or group role. First select the group and/or group role from the pull down menu(s), then click the Select box for the individual(s) you want to assign.

Remove from Groups & Group Role

Remove any member from any group of which he or she is already a member (member will automatically be removed from all child groups down the hierarchy). First select the group and/or group role from the pull down menu(s), then click the Select box for the individual(s) you want to deassign. If the individual is not a member of the selected group, the operation will fail.

Manage VO Admin Roles

Use this screen to assign individuals as group managers, group owners, LRPs, site admins, representatives, and/or VO admins, or to remove any of these administrative responsibilities from them. For all roles but group-related ones, check or uncheck the appropriate box.

Regarding groups: A VO admin must assign ownership to the root level group of any group hierarchy. The groups for which individuals are owner or manager are

highlighted in blue. For a given individual and group admin role, use the up/down arrows on the corresponding select box to locate the group of interest, then click to select the group to which you want to assign the individual, or de-select (using control-click) a previously assigned group. In the image below, we see Jane as the group owner and manager of /uscms, and Dummy_3 as manager of /uscms/production.

Select output fields:

First name
 Last name
 Phone
 Member DN
 Member CA
 Member Email
 Institution
 Status
 Status Reason
 Rights
 Rep DN
 Rep CA
 VO Exp Date
 Inst Exp Date
 Usage Rule Vsn
 Max output records:

Results

In the returned results, on each row select or deselect the appropriate role you want to assign to or remove from member's administrative roles list. Click Submit to make the change(s).

Choose/modify desired result:

First name	Roles	GroupManager	GroupOwner	LRP	SiteAdmin	Representative	VOAdmin
Anne	Member, VOAdmin	/uscms /uscms/development	/uscms /uscms/development	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Dummy_1	Member, VOAdmin	/uscms /uscms/development	/uscms /uscms/development	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Dummy_2	Member	/uscms /uscms/development	/uscms /uscms/development	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Dummy_3	GroupManager, Member	/uscms/production /uscms/test	/uscms /uscms/development	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Jane	GroupManager, GroupOwner, Member	/uscms /uscms/development	/uscms /uscms/development	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
John	Member, Representative	/uscms /uscms/development	/uscms /uscms/development	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Tanya	Member, Representative, SiteAdmin, VOAdmin	/uscms /uscms/development	/uscms /uscms/development	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Tatyana	Member, Representative	/uscms /uscms/development	/uscms /uscms/development	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>

12.2.3 Group-Related Functions

The VO admin may view and change all group-related information in the VO. This includes:

Groups and Group Roles

Browse all groups (the group roles also appear in the output).

Add Group

Add a new group under the main VO group (e.g., for US CMS all groups are under /uscms) or under a subgroup.

Delete Groups	Delete any group at any level under and including the main VO group; deleting a group deletes all its subgroups as well.
Add Group Role	Add a group role to the VO.
Delete Group Roles	Delete a group role from the VO; this role gets removed from all members having it, but leaves the members and groups otherwise unchanged.

12.2.4 Institution- and Site-Related Functions

The VO admin is responsible for including new institutions and sites as they join and for removing them as they leave the VO. The VO admin must also keep track of the personal information each site requires.

Institutions & Sites Browse all the institutions and/or sites that participate in the VO.

Add Institution/Site Add an institution (and designate it as a site, or not); or select an existing institution which is not a site, and designate it as a site.

Delete Institution/Site

Delete an institution (that may or may not be a site), or delete the designation of “site” from an institution that should stay in the list.

Site Personal Info For a given site, select or deselect items in the list of personal information required by that site (see section 7.1.3 *Browse Required Personal Information*).

12.2.5 Required Personal Information-Related Functions

The VO admin is responsible for maintaining the list of personal information (public and private) required for membership in the VO. The items on this list should be negotiated with participating sites; ideally the list should include all items required by any of these sites.

The functions include:

Required Personal Info

Browse the list of personal information.

Add/Modify Personal Info

Add a new item to the list of personal information, either from the pull-down list, or by typing text in the box provided. As necessary or desired, designate it as private and/or as phase II.

Any item not marked as private is considered public personal information. See section 7.1.3 *Browse Required Personal Information*.

By default this item will be collected as part of phase I registration. If set to phase II, it will be collected during phase II. See Chapter 4: *The Registration Procedure*.

Or select an existing item and change its designation of private/public.

Add/Modify Personal Info

Add a new item to the list of personal information, and designate it as private or public, as necessary. Or select an existing item and change its designation of private.

New Personal Info Name	<input type="text" value="Enter new personal info name or select one from menu"/>
is Private	<input type="checkbox"/>
is Persistent	<input type="checkbox"/>
is External	<input type="checkbox"/>
is PhaseII	<input type="checkbox"/>
Defaults(item1,item2,..)	<input type="text"/>
<input type="button" value="Submit"/>	<input type="button" value="Cancel"/>

Delete Personal Info Delete an item of personal information (its private/public designation makes no difference for deletion). If an item is deleted here, the corresponding information in the VOMRS database records for all members is also deleted.

Delete personal information.

Delete an item of personal information (its private/public designation makes no difference for deletion). If an item is deleted here, the corresponding information in the VO USCMS database records for all members is also deleted.

Name	Select
First name	<input type="checkbox"/>
Last name	<input type="checkbox"/>
Phone	<input type="checkbox"/>
shoe size	<input checked="" type="checkbox"/>
<input type="button" value="Submit"/>	<input type="button" value="Cancel"/>

12.2.6 CA-Related Functions

Certificate Authorities

Browse the Certificate Authorities. This list is maintained in a file external to the VOMRS application. All instances of VOMRS on the host access this same file to populate this screen. Your VO may only trust a subset of the list; set the trusted CAs to the status “Approved”.

12.2.7 Subscription-Related Functions

Subscription

Subscribe or unsubscribe yourself to an event. The events to which a VO admin can subscribe include all possible events. In addition to the member events listed in section 8.6 *Subscribe to Event Notification*, this list includes the following (by default you are not Member Member has been de-assigned from a group role

- New Member has registered, phase I
- Candidate has been assigned to a group
- Candidate has been de-assigned from a group
- Candidate has been assigned to a group role
- Candidate has been de-assigned from a group role
- Applicant has been assigned to a group
- Applicant has been de-assigned from a group
- Applicant has been assigned to a group role
- Applicant has been de-assigned from a group role
- New Member has registered - waiting for representative approval
- Member's institution has been changed
- Member's membership status has changed
- Authorization status of member has changed
- Member requested the addition of a new certificate - approval required
- Member has removed a certificate from member's certificate list
- Member has changed primary certificate
- Representative has been changed for member
- Member has been de-assigned from a group
- Member has been assigned to a group
- Member has been de-assigned from a group role
- Member has been assigned to a group role

- Member has been assigned a new institutional expiration date
- Member has been assigned a new vo membership expiration date
- Member has signed a new usage rules version
- Member's certificate status has changed
- Member has been removed from VO
- Member has been assigned to a Group Administrator role
- Member has been de-assigned from a Group Administrator role
- Member has been assigned to a VO Administrator role
- Member has been de-assigned from a VOAdmin role
- Member has been assigned to a Site Administrator role
- Member has been de-assigned from a Site Administrator role
- Member has been assigned to a Representative role
- Member has been de-assigned from a Representative role
- Member has been assigned to a LRP role
- Member has been de-assigned from a LRP role
- New Certificate Authority has been added
- Certificate Authority has been removed
- Certificate Authority status has been changed
- Certificate Authority expiration date has been changed
- New group has been added
- Group has been removed
- New institution has been added
- Institution has been removed
- New site has been added
- Site has been removed
- New group role has been added
- Group role has been removed

Chapter 13: Grid Administration Roles and Functions

13.1 About Grid Administration Roles

Depending upon the agreement reached between the VO and the grid administrators, site-specific and resource-specific authorization for use of computing resources may be maintained in VOMRS, or not. In either case, site-specific procedures must be followed.

If this information is to be maintained in VOMRS, the VO administrator (see section 12.2 *VO Administrator*) must assign the corresponding roles in VOMRS (Site Administrator and LRP) to these people, as appropriate, so that they can access and maintain the authorization information. This information is stored in VOMRS as the Site Admin and LRP phases of a member's authorization status (see section 9.2 *Authorization Status (Advanced)*).

13.2 Local Resource Provider

13.2.1 Responsibilities

A local resource provider (LRP) is a VO member responsible for managing the authorization of VO members for a particular grid resource at a site. This authorization, which may be done using the VOMRS authorization status screen (see section 11.2 *Authorization Status Screen*) or done outside of VOMRS, is one level finer than the site-level authorization managed by the site administrator (see section 13.3 *Site Administrator*).

Within VOMRS, an LRP has access to all the VO members' public personal information, group assignments, authorization status, roles and grid job submission rights.

13.2.2 Functions in VOMRS

Within VOMRS, the only function available to LRPs above and beyond the functions available to all members (see section 8.1 *Overview of Member Functions* and Chapter 7: *Functions Available to Visitors, Candidates and Applicants*) is the assignment of authorization status for the phase LRP.



Authorization Status Resource-specific VO member authorization may be done within the VOMRS system, or outside of VOMRS. If implemented within VOMRS, set a member's authorization status for the phase "LRP" to "approved" or "denied". See section 11.2 *Authorization Status Screen*.

Subscription Subscribe or unsubscribe yourself to an event. The events to which you can subscribe, in addition to the member events listed in section 8.6 *Subscribe to Event Notification*, are listed below (by default you are not subscribed to any of these additional events):

- Authorization status of member has changed
- Certificate Authority expiration date has been changed
- Certificate Authority has been removed
- Certificate Authority status has been changed
- Group has been removed
- Group role has been removed
- Member has been assigned to a group
- Member has been assigned to a group role
- Member has been assigned to a LRP role
- Member has been assigned to a Representative role
- Member has been assigned to a Site Administrator role
- Member has been assigned to a VO Administrator role
- Member has been de-assigned from a group

- Member has been de-assigned from a group role
- Member has been de-assigned from a LRP role
- Member has been de-assigned from a Representative role
- Member has been de-assigned from a Site Administrator role
- Member has been de-assigned from a VO Administrator role
- Member has been removed from VO
- Member has changed primary certificate
- Member has removed a certificate from member's certificate list
- Member has requested to add a certificate to member's certificate list
- Member's certificate status has changed
- Member's membership status has changed
- New Certificate Authority has been added
- New group has been added
- New group role has been added
- New site has been added
- Site has been removed

13.3 Site Administrator

13.3.1 Responsibilities

A site administrator is associated with a particular grid site, and is responsible for VO members' general site-wide authorization to use site resources. This authorization, which may be done using the VOMRS authorization status page (see section 11.2 *Authorization Status Screen*) or done outside of VOMRS, is one level higher than the per-resource authorization managed by the LRP.

Within VOMRS, a site administrator has access to VO members' public and private personal information, group assignments, membership and authorization status, roles, aliases, and grid job submission rights. The site administrator may assign/deassign same-site VO members as LRPs or as additional site administrators for the site, and is responsible for maintaining the required site-specific personal information in VOMRS.

13.3.2 Functions in VOMRS

Above and beyond the functions available to all members (see section 8.1 *Overview of Member Functions* and Chapter 7: *Functions Available to Visitors, Candidates and Applicants*), the functions available to a site administrator include:

- USCMS Registration Home
- Members
 - Resign Usage Rules
- Certificates
 - Add Certificate
 - Change Primary Certificate
 - Delete Certificate
 - Edit Personal Info
 - Change Email Address
 - Authorization Status
 - Manage VO Admin Roles
- Groups and Group Roles
- Institutions & Sites
 - Site Personal Info
 - Required Personal Info
 - Certificate Authorities
 - Subscription

Manage VO Admin Roles

Assign or remove the role of Site Administrator or LRP to a VO member for your site. If you attempt to assign one of these roles to someone who's not from your site, an error will be generated and the transaction will not complete.

In the following image, Anne or Tanya of Fermilab could set any of the shown members as Site Administrator or LRP of Fermilab.

Select output fields:

First name Last name Phone Member DN Member CA
Member Email Institution Status Status Reason Rights
Rep DN Rep CA VO Exp Date Inst Exp Date Usage Rule Vsn
Max output records

Results

In the returned results, on each row select or deselect the appropriate role you want to assign to or remove from member's administrative roles list. Click Submit to make the change(s).

Choose/modify desired result:

First name	Institution	Roles	LRP	SiteAdmin
Anne	Fermilab	Member, SiteAdmin	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Dummy_1	Fermilab	Member, VOAdmin	<input type="checkbox"/>	<input type="checkbox"/>
Dummy_2	Fermilab	Member	<input type="checkbox"/>	<input type="checkbox"/>
Dummy_3	Fermilab	GroupManager, Member	<input type="checkbox"/>	<input type="checkbox"/>
Jane	Fermilab	Member	<input type="checkbox"/>	<input type="checkbox"/>
John	Fermilab	Member, Representative	<input type="checkbox"/>	<input type="checkbox"/>
Tanya	Fermilab	Member, Representative, SiteAdmin, VOAdmin	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Tatyana	Fermilab	Member, Representative	<input type="checkbox"/>	<input type="checkbox"/>

Authorization Status Site-specific VO member authorization may be done within the VOMRS system, or outside of VOMRS. If implemented within VOMRS, set a member's authorization status for the phase "SiteAdmin" to "approved" or "denied". See section 11.2 *Authorization Status Screen*.

Site Personal Info Modify the list of personal information required by your site. The interface does not ask you for a site; it changes the information for the site to which your record in VOMRS says you belong. You cannot add or remove personal information fields; you can only select among the ones that appear.

Subscription Subscribe or unsubscribe yourself to an event. The events to which you can subscribe, in addition to the member events listed in section 8.6 *Subscribe to Event Notification*, are listed below (by default you are not subscribed to any of these additional events):

- Authorization status of member has changed
- Certificate Authority expiration date has been changed
- Certificate Authority has been removed
- Certificate Authority status has been changed
- Institution has been removed

- Member changed institution
- Member has been assigned to a LRP role
- Member has been assigned to a Representative role
- Member has been assigned to a Site Administrator role
- Member has been assigned to a VO Administrator role
- Member has been de-assigned from a Grid Administrator role
- Member has been de-assigned from a LRP role
- Member has been de-assigned from a Representative role
- Member has been de-assigned from a Site Administrator role
- Member has been de-assigned from a VO Administrator role
- Member has changed primary certificate
- Member has removed a certificate from member's certificate list
- Member has requested to add a certificate to member's certificate list
- Member's certificate status has changed
- Member's membership status has changed
- New Certificate Authority has been added
- New institution has been added
- New site has been added
- Representative has been changed for member
- Site has been removed

Chapter 14: Group Administration Roles and Functions

14.1 Group Manager Role

14.1.1 Responsibilities

A group manager shares the responsibility with the group's owner of managing the group's membership. He or she may assign or deassign members to/from groups and group roles. A group manager may view members' public personal information and certificate information. A group may have multiple group managers.

14.1.2 Functions in VOMRS

Within VOMRS, the functions available to Group Managers above and beyond those available to all members (see section 8.1 *Overview of Member Functions* and Chapter 7: *Functions Available to Visitors, Candidates and Applicants*) are:

- USCMS Registration Home
- Members
 - . Resign Usage Rules
- Certificates
 - . Add Certificate
 - . Change Primary Certificate
 - . Delete Certificate
 - . Edit Personal Info
 - . Change Email Address
 - . Authorization Status
 - . Assign to Group
 - . Remove from Groups
- . Groups and Group Roles
- . Institutions & Sites
- . Required Personal Info
- . Certificate Authorities
- . Subscription

Members	View VO members' public personal information.
Certificates	View VO members' certificate information.
Authorization Status	View VO members' authorization status (see section 9.2 <i>Authorization Status (Advanced)</i>).

Assign to Group

Assign VO members to any group you manage. Here you can also assign group roles to members. In the image below, we assign both a group and a group role to user Dummy_3. (Note that if you assign the member to a lower-level group, he or she also becomes a member of the group's parent group.):

Select output fields:

First name Last name Phone Member DN Member CA
Member Email Institution Status Status Reason Roles
Rights Rep DN Rep CA VO Exp Date Inst Exp Date
Usage Rule Vsn
Max output records

Results

Choose/modify desired result:

Please, choose all required parameters

Groups Group roles

First name	Groups [Roles]	Select
Anne	/uscms	<input type="checkbox"/>
Dummy_1	/uscms	<input type="checkbox"/>
Dummy_2	/uscms	<input type="checkbox"/>
Dummy_3	/uscms	<input checked="" type="checkbox"/>
Jane	/uscms, /uscms/test/prod[admin, usr]	<input type="checkbox"/>
John	/uscms	<input type="checkbox"/>
Tanya	/uscms, /uscms/test/prod[admin, usr]	<input type="checkbox"/>
Tatyana	/uscms	<input type="checkbox"/>

Remove from Groups

Remove group members from any group you manage. If you de-assign a member from a group/group role she/he will not be able to select this give group/group role again. Here you can also de-assign group roles from members. In the image below, we've queried on Dummy_3, and now will remove group role we just assigned:

Results

Choose/modify desired result:

Please, choose all required parameters

Groups Group roles

First name	Groups [Roles]	Select
Dummy_3	/uscms, /uscms/production[admin]	<input checked="" type="checkbox"/>

Now we remove him from the uscms/production group (notice the group role no longer appears):

Results

Choose/modify desired result:

Please, choose all required parameters

Groups Group roles

First name	Groups [Roles]	Select
Dummy_3	/uscms, /uscms/production	<input checked="" type="checkbox"/>

and he ends up only a member of the (parent) /uscms group (from which we could delete him, as well):

Results

Choose/modify desired result:

Please, choose all required parameters

Groups Group roles

First name	Groups [Roles]	Select
Dummy_3	/uscms	<input type="checkbox"/>

Subscription

Subscribe or unsubscribe yourself to an event. The events to which you can subscribe, in addition to the member events listed in section 8.6 *Subscribe to Event Notification*, are listed below (by default you are not subscribed to any of these additional events):

- Group has been removed
- Group role has been removed
- Member has been assigned to a group
- Member has been assigned to a Group Administrator role
- Member has been assigned to a group role

- Member has been de-assigned from a group
- Member has been de-assigned from a Group Administrator role
- Member has been de-assigned from a group role
- New group has been added
- New group role has been added

14.2 Group Owner Role

14.2.1 Responsibilities

A group owner is responsible for creating and/or deleting groups within the group hierarchy that he or she controls, and for assigning additional group owners and/or group managers to these groups. A group owner is also responsible for creating and/or deleting group roles. A group owner may perform all the same functions as a group manager.

14.2.2 Functions in VOMRS

In addition to the group manager functions (see section 14.1.2 *Functions in VOMRS*), a group owner may (a) add a new child group, (b) delete the group or any child group, (c) assign/deassign group owners to the group or any child group (d) assign/deassign group managers to the group or any child group.

- USCMS Registration Home
- Members
 - . Resign Usage Rules
- Certificates
 - . Add Certificate
 - . Change Primary Certificate
 - . Delete Certificate
 - . Edit Personal Info
 - . Change Email Address
 - . Authorization Status
 - . Assign to Group
 - . Remove from Groups
 - . Manage VO Admin Roles
- Groups and Group Roles
 - . Add Group
 - . Delete Groups
 - . Add Group Role
 - . Delete Group Roles
- . Institutions & Sites
- . Required Personal Info
- . Certificate Authorities
- . Subscription

Manage VO Admin Roles

Use this screen to assign individuals as group managers or owners, or to remove either of these administrative responsibilities from them. You can assign/deassign only for the group(s) you own. The assigned groups are highlighted in blue. For a given individual and role, use the up/down arrows on the corresponding select box to locate the group of interest, then click to select the group to which you want to assign the individual, or de-select (using control-click) a previously assigned group. In the image below, it shows Anne as the only group owner; she owns /uscms, and all its child groups.

Select output fields:

First name
 Last name
 Phone
 Member DN
 Member CA
 Member Email
 Institution
 Status
 Status Reason
 Rights
 Rep DN
 Rep CA
 VO Exp Date
 Inst Exp Date
 Usage Rule Vsn

Max output records

Results

Choose/modify desired result:

First name	Roles	GroupManager	GroupOwner
Anne	GroupOwner, Member	/uscms /uscms/development	/uscms /uscms/development
Dummy_1	Member, VOAdmin	/uscms /uscms/development	/uscms /uscms/development
Dummy_2	Member	/uscms /uscms/development	/uscms /uscms/development
Dummy_3	Member	/uscms /uscms/development	/uscms /uscms/development
Jane	Member	/uscms /uscms/development	/uscms /uscms/development
John	Member, Representative	/uscms /uscms/development	/uscms /uscms/development
Tanya	Member, Representative, SiteAdmin, VOAdmin	/uscms /uscms/development	/uscms /uscms/development
Tatyana	Member, Representative	/uscms /uscms/development	/uscms /uscms/development

Let's add Dummy_3 as group manager of /uscms/production, then query on him:

Choose/modify desired result:

First name	Roles	GroupManager	GroupOwner
Dummy_3	GroupManager, Member	/uscms/development /uscms/production	/uscms /uscms/development

Groups and Group Roles

	View the groups and group roles.
Add Group	Add a new group; it must be a child group of a group you already own.
Delete Groups	Delete an existing group; you may only delete a group you own. Members' records get the group membership removed automatically.
Add Group Role	Add a new group role.
Delete Group Roles	Delete an existing group role; it will be automatically deleted from any members to which it was assigned.

Delete Group Roles

Group roles	Select
VO-Admin	<input type="checkbox"/>
admin	<input type="checkbox"/>
root	<input type="checkbox"/>
usr	<input type="checkbox"/>

Subscription	Subscribe or unsubscribe yourself to an event. The events to which you can subscribe, in addition to the member events listed in section 8.6 <i>Subscribe to Event Notification</i> , are the same as for group managers; they are listed in section 14.1.2 <i>Functions in VOMRS</i> . By default you are not subscribed to any of these additional events.
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Part V Appendices

Appendix A: *VOMRS Workflow*

Appendix B: *Troubleshooting Guide*

Appendix C: *VOMRS Architecture Diagram*

Appendix D: *The VOMRS Configuration File*

Appendix A. VOMRS Workflow

A.1 Status Transition Workflows

The workflows in this section assume that the VO has established procedures that require representatives, site administrators, and LRPs to maintain members' authorization status, each for the appropriate phase, in the VOMRS system. However, the VOMRS software requires only the *Representative* phase to be set; the other two are optional. The workflows also assume that synchronization with VOMS is turned "on".

A.1.1 Normal Registration Approval Process (with Full Rights)

1) User obtains grid certificate

2) User (as role "Visitor") registers with VO (phase I)

Status values:

Role	Membership	Authorization (<i>Representative</i> phase)	Authorization (<i>SiteAdmin</i> phase)	Authorization (<i>LRP</i> phase)
visitor -> candidate	New	New	New	New

3) VOMRS sends message to candidate requesting confirmation of email address. Candidate confirms, then completes registration phase II. Candidate becomes applicant.

Status values:

Role	Membership	Authorization (<i>Representative</i> phase)	Authorization (<i>SiteAdmin</i> phase)	Authorization (<i>LRP</i> phase)
candidate -> applicant	New	New	New	New

4) Representative is notified of new application, and approves applicant (VO admin may approve on behalf of representative). This signifies only that the representative knows the applicant and considers his or her registration request valid. Applicant becomes member; authorization is

set to “Approved”; member gets entered into VOMS database.

Status values:

Role	Membership	Authorization (<i>Representative</i> phase)	Authorization (<i>SiteAdmin</i> phase)	Authorization (<i>LRP</i> phase)
applicant -> member	Approved	Approved	New	New

5) Site administrator is notified when representative sets member’s authorization status to “approved”; approves member for access to site resources

Status values:

Membership	Authorization (<i>Representative</i> phase)	Authorization (<i>SiteAdmin</i> phase)	Authorization (<i>LRP</i> phase)
Approved	Approved	Approved	New

6) LRP is notified when representative sets member’s authorization status to “approved”; LRP approves member for access to a particular resource

Status values:

Membership	Authorization (<i>Representative</i> phase)	Authorization (<i>SiteAdmin</i> phase)	Authorization (<i>LRP</i> phase)
Approved	Approved	Approved	Approved

A.1.2 Registration Denial Process

1) Visitor obtains grid certificate

2) Visitor registers with VO (phase I) and becomes Candidate.

Status values:

Role	Membership	Authorization (<i>Representative</i> phase)	Authorization (<i>SiteAdmin</i> phase)	Authorization (<i>LRP</i> phase)
visitor -> candidate	New	New	New	New

3) VOMRS sends message to candidate requesting confirmation of email address. Candidate confirms, then completes registration phase II. Candidate becomes applicant.

Status values:

Role	Membership	Authorization (<i>Representative</i> phase)	Authorization (<i>SiteAdmin</i> phase)	Authorization (<i>LRP</i> phase)
candidate -> applicant	New	New	New	New

- 4) Representative is notified of new application, and denies membership to applicant; applicant's record remains in VOMRS (do not confuse with VOMS). The representative is obliged to provide an explanation for the denial, which is also stored in VOMRS.

Status values:

Role	Membership	Authorization (<i>Representative</i> phase)	Authorization (<i>SiteAdmin</i> phase)	Authorization (<i>LRP</i> phase)
applicant	Denied	Denied	New	New

- 5) It is up to the applicant and the representative to communicate to resolve the issues causing the denial. Once the applicant is eligible for approval, the representative resets authorization status to Approved and the VO administrator resets membership status to Approved.

A.1.3 Suspension Process

- 1) Member has approved status (membership and authorization)

Status values:

Membership	Authorization (<i>Representative</i> phase)	Authorization (<i>SiteAdmin</i> phase)	Authorization (<i>LRP</i> phase)
Approved	Approved	Approved	Approved

- 2) VO administrator suspends membership status. Member is notified of suspended status, as are all administrators who subscribe to this event. VO admin is obliged to provide an explanation for the suspension, which is sent in notification emails and stored in VOMRS. It is up to the member and the VO administrator to communicate to resolve the issues causing the suspension.
- 3) If synchronization is set "on", the member's records (for all aliases) get deleted from the VOMS database. In this way authorization is denied for all grid resources. Status values do not change.
- 4) Site Administrator and LRP are notified of suspended status and they set

authorization status to denied (optional).

Status values:

Membership	Authorization (<i>Representative</i> phase)	Authorization (<i>SiteAdmin</i> phase)	Authorization (<i>LRP</i> phase)
Suspended	Approved	Denied	Denied

A.1.4 Expiration Process

1) Member has approved status (membership and authorization)

Status values:

Membership	Authorization (<i>Representative</i> phase)	Authorization (<i>SiteAdmin</i> phase)	Authorization (<i>LRP</i> phase)
Approved	Approved	Approved	Approved

2) The closer of the two expiration dates (institutional or VO) is N days in future (where N is set in configuration). VOMRS sends a warning email to member. If no action is taken, member's membership status is set to Expired.

Status values:

Membership	Authorization (<i>Representative</i> phase)	Authorization (<i>SiteAdmin</i> phase)	Authorization (<i>LRP</i> phase)
Expired	Approved	Approved	Approved

3) If synchronization is set "on", the member's records (for all aliases) get removed from the VOMS database. In this way, authorization is denied for all grid resources.

Status values do not change.

4) Site Administrator and LRP are notified of suspended status and they set authorization status to denied (optional).

Status values:

Membership	Authorization (<i>Representative</i> phase)	Authorization (<i>SiteAdmin</i> phase)	Authorization (<i>LRP</i> phase)
Expired	Approved	Denied	Denied

A.1.5 Re-approval After Expiration

1) Membership status is set to expired.

Status values:

Membership	Authorization (<i>Representative</i> phase)	Authorization (<i>SiteAdmin</i> phase)	Authorization (<i>LRP</i> phase)
Expired	Approved	Denied (optional)	Denied (optional)

2) It is up to the member to take the appropriate actions, depending on cause of expiration. If membership status expired due to failure to sign usage rules, expired member must sign them. If due to institutional affiliation (which is to be renewed), representative will have to ask VO admin to reset the institutional expiration date. This will automatically reset membership status to Approved.

3) Member is notified of approved status.

Status values:

Membership	Authorization (<i>Representative</i> phase)	Authorization (<i>SiteAdmin</i> phase)	Authorization (<i>LRP</i> phase)
Approved	Approved	Denied (optional)	Denied (optional)

4) Site Administrator and LRP are notified of approved membership status, and reset authorization status to approved (optional).

Status values:

Membership	Authorization (<i>Representative</i> phase)	Authorization (<i>SiteAdmin</i> phase)	Authorization (<i>LRP</i> phase)
Approved	Approved	Approved	Approved

A.1.6 Re-approval After Suspension

1) Membership status is set to suspended. The member must communicate with the VO administrator to resolve the reason for the suspension.

Status values:

Membership	Authorization (<i>Representative</i> phase)	Authorization (<i>SiteAdmin</i> phase)	Authorization (<i>LRP</i> phase)
Suspended	Approved	Denied (optional)	Denied (optional)

2) Upon resolution of the problem, VO administrator resets membership status to approved. Member (and admin subscribers) is/are notified of approved status.

Status values:

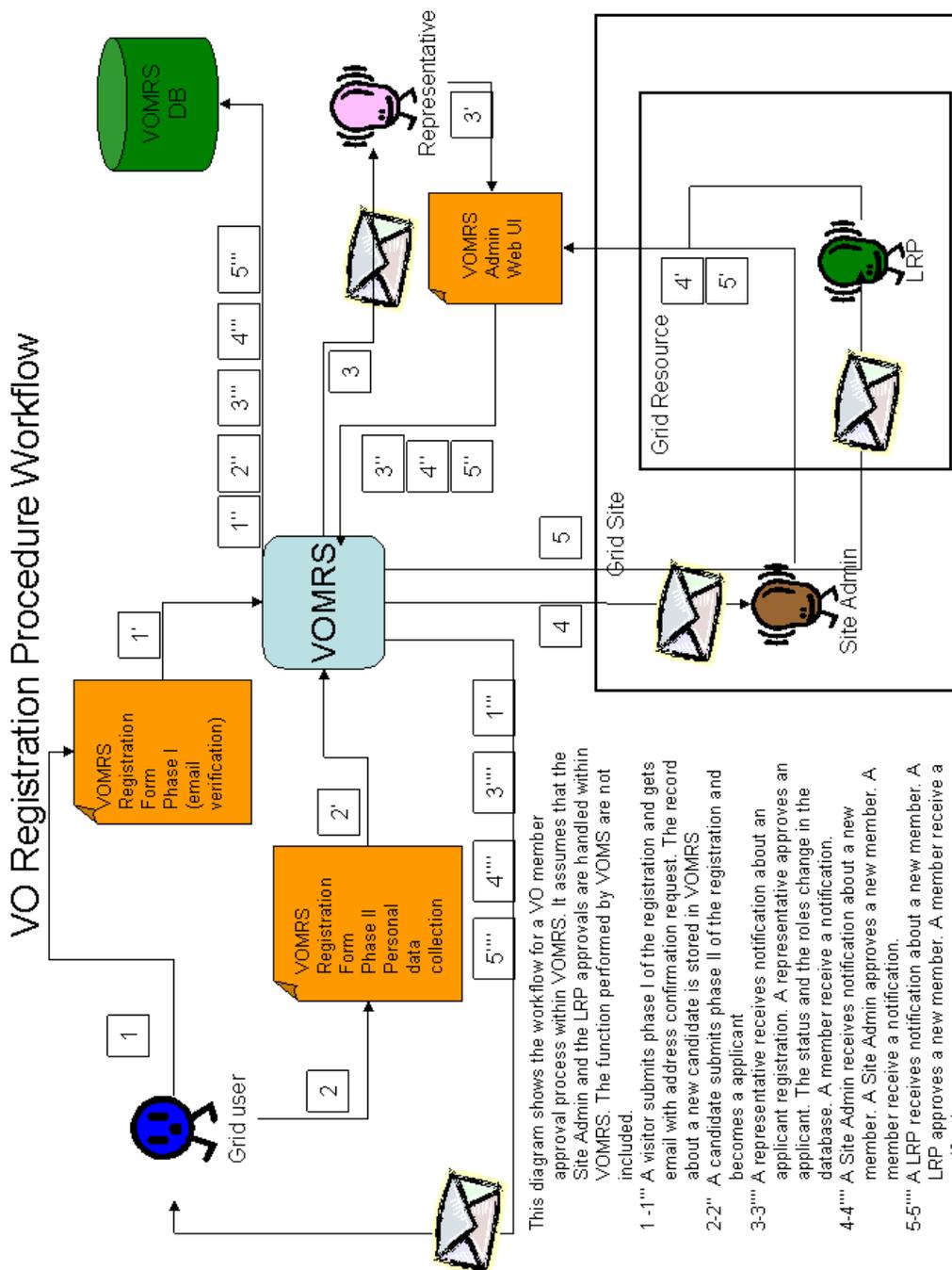
Membership	Authorization (<i>Rep- representative</i> phase)	Authorization (<i>SiteAdmin</i> phase)	Authorization (<i>LRP</i> phase)
Approved	Approved	Denied (optional)	Denied (optional)

3) Site Administrator and LRP are notified of approved membership status, and reset authorization status to approved (optional).

Status values:

Membership	Authorization (<i>Rep- representative</i> phase)	Authorization (<i>SiteAdmin</i> phase)	Authorization (<i>LRP</i> phase)
Approved	Approved	Approved	Approved

A.2 Registration Workflow Diagram



Appendix B. Troubleshooting Guide



In this appendix, we list some areas that could potentially present problems, and we offer some guidelines on finding the solution to your problem.

The information here is merely a start! We will continue to update this appendix as we get more experience and feedback regarding the software. Please report any VOMRS problems you have to vo-project@fnal.gov.

Can't access VOMRS web UI; check for:

- Valid certificate from recognized CA (not expired, not in CRL).

- Certificate loaded into browser.

- Appropriate URL for web UI.

Can access VOMRS web UI, but can't get submitted jobs to run; check for:

- Membership status must be "approved".

- Authorization status (*Representative* phase, at least) must be "approved".

- Membership rights must be "full".

Not receiving any notification email; check for:

- Appropriate notification events are checked.

- Your email address is correct.

Can't complete an operation in VOMRS (this will depend upon the operation); check for:

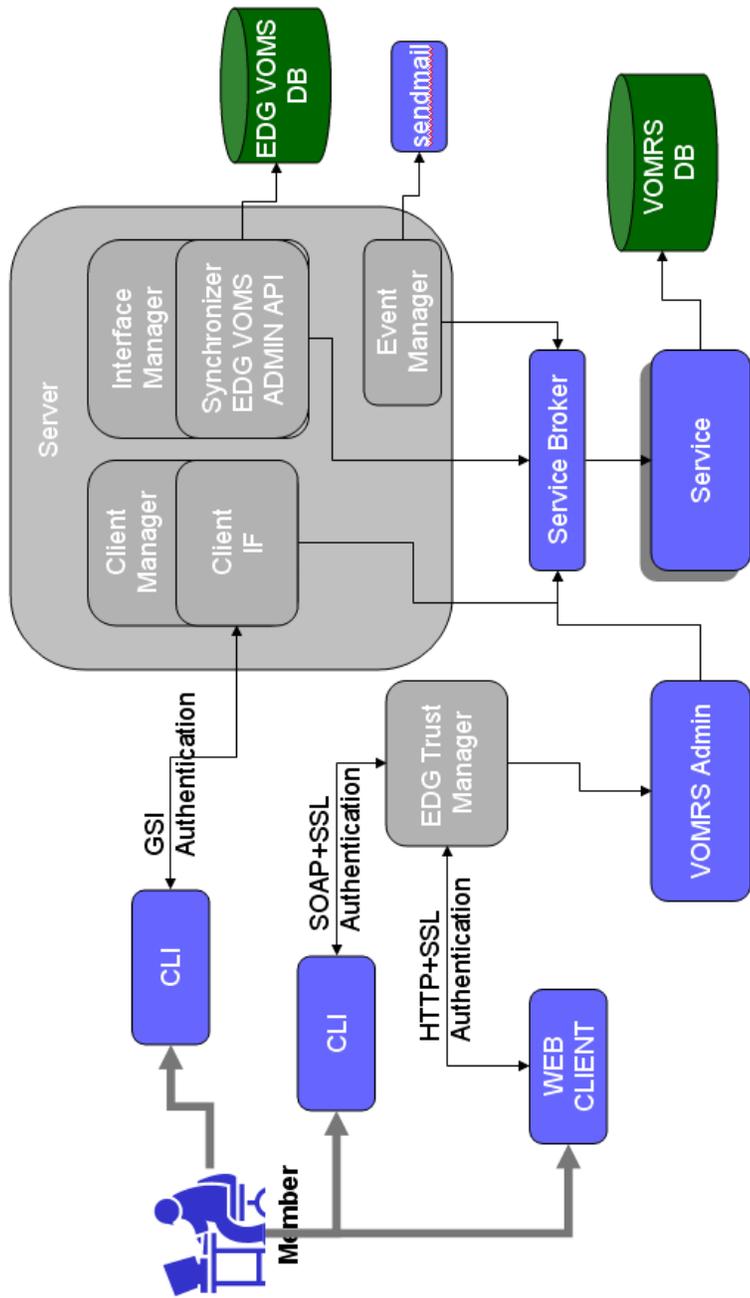
- You selected data that you have permission to edit; e.g., the right institution, the right members, etc.

Querying doesn't bring up expected data; check for:

- Error message text on the page (in red); this should appear for all user errors.

- If you suspect a software error, please contact your VO administrator.

Appendix C. VOMRS Architecture Diagram



Appendix D. The VOMRS Configuration File

The configuration file is written in XML. XML is a configurable, extensible language with syntax similar to HTML. XML is case-sensitive. XML can be used for documentation, but it is more versatile than just that. In particular, the VOMRS code, written in Java, is designed to read in a configuration file supplied in XML format. Elements in XML are analogous to tags in HTML; they represent structures or desired behavior. Attributes define properties of elements. Elements are used with attributes in XML the same way as tags are in HTML:

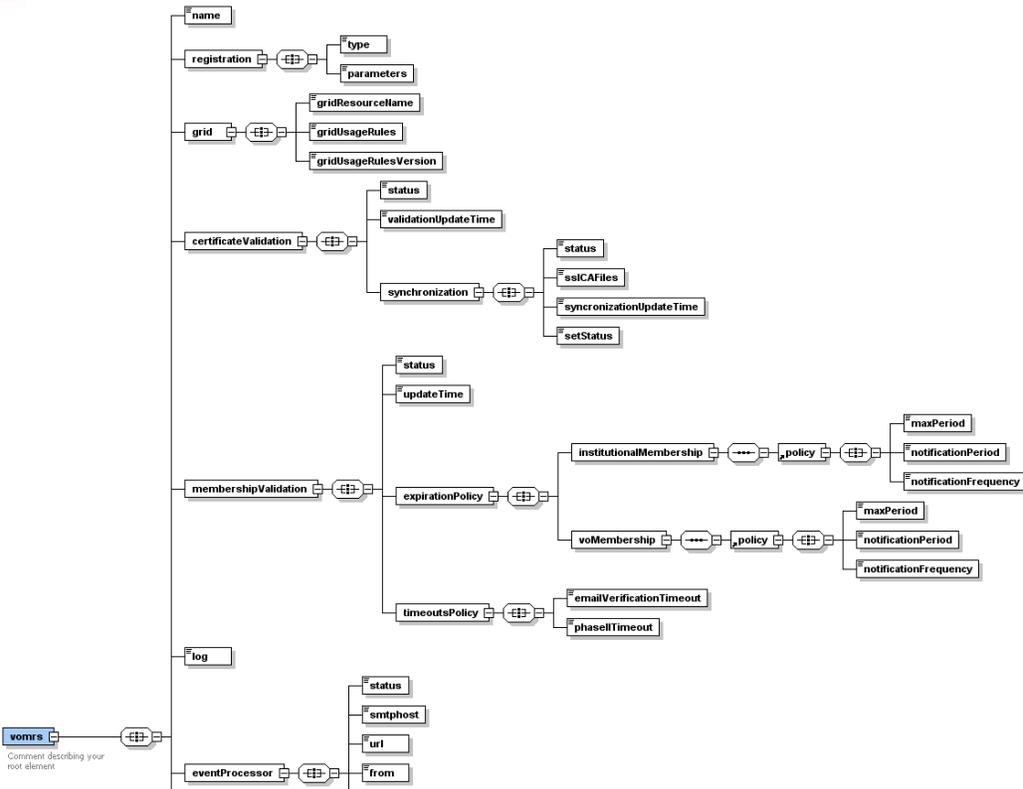
```
<ELEMENT ATTRIBUTE="value">data</ELEMENT>
```

The configuration file for VOMRS is provided in valid XML (as opposed to well formed XML). A file written in valid XML is based upon XML Schema (a specification that defines the structure of the associated XML documents and the datatypes for attribute values and element content). More information on XML and XML Schema files is available at <http://www.w3.org/XML>.

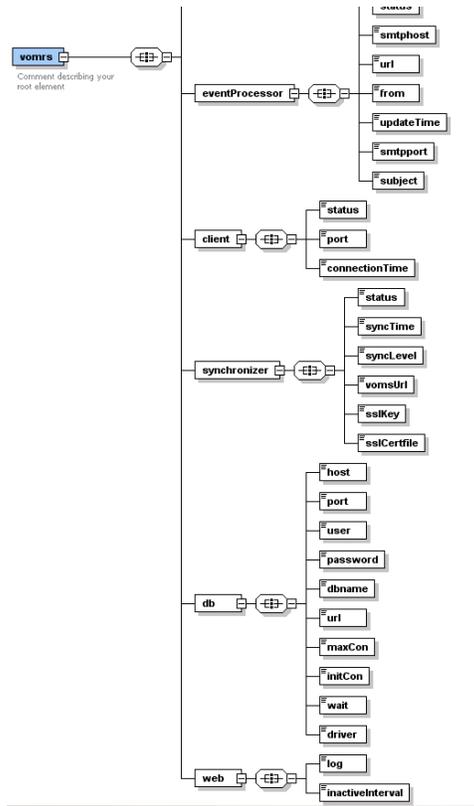
D.1 VOMRS XML Schema File (vomrs.xsd)

In order to ensure the proper working of VOMRS, never edit this file! The schema is shown here as a graphic in two parts, top and bottom. The blue VOMRS tab at the left is common to both; use it as a visual aid to connect the two halves.

The top:



and the bottom:



D.2 A Sample Configuration File

The configuration file shown here is an example, written for the USCMS VO during the development and testing phases of the VOMRS product.

```
<?xml version='1.0'?>
<!-- All the parameters that are ${...} will be replaced by actual values by
vomrs_configure script -->
<!-- the one that are "hardcoded should be changed manually then tomcat and
corresponding VOMRS server
should be restarted-->
<vomrs xmlns:xsi='http://www.w3.org/2001/XMLSchema-instance'>
  <name>${VO_NAME}</name>
  <!-- Registration related information-->
  <registration>
    <!-- type could either General, LCG or SAM for now-->
    <type>${REG_TYPE}</type>
    <!--if type is LCG -->
    <!--
      <experiment>CMS</experiment>
      the other experiments can be ATLAS, ALICE, LHCb
      <updateTime>12</updateTime>
      time to contact CERN Orgdb for update (hours)
    -->
    <!--if type is SAM -->
    <!--
      <experiment>DZERO</experiment>
      the other experiment can be CDF
```

```

        <updateTime>12</updateTime>
time to contact SAM db for update (hours)

-->

</registration>

<!-- Grid related information -->
<grid>
    <!-- name of organization that oversees all grid resources
for this VO -->
    <gridResourceName>${GRID_ORG}</gridResourceName>
    <!-- url location of usage rules for this organization -->
    <gridUsageRules>${GRID_RULES_URL}</gridUsageRules>
    <gridUsageRulesVersion>${GRID_RULES_VSN}</gridUsageRulesVersion
>
</grid>
<!--CA certificate validation and synchronization setting-->
<certificateValidation>
    <status>${CERT_STATUS}</status>
    <!-- this will enable process that checks CA certificate
expiration date
and changes status of a CA certificate and member certificates
signed by this CA
if status set to "off" no expiration check will be performed
-->
    <validationUpdateTime>10</validationUpdateTime>
    <!-- check period in minutes -->
    <synchronization>
        <status>${CERT_SYNC_STATUS}</status>
        <!-- if set to "on" synchronizes list of CA with
certificate specified by location -->
        <!-- if sslCAFiles is not defined assumes this -->
        <sslCAFiles>${SSL_CA_DIR}/*.0</sslCAFiles>
        <!-- check period in hours -->
        <synchronizationUpdateTime>${CERT_UPDATE}</synchronizatio
nUpdateTime>
        <!-- if setStatus is set to "off" vo administrator
accepts all CA certificates
that appear in TRUSTED_CA diretoory and can not change
the status of a CA certificate
if setStatus is set to "on", each new certificate
requires VO administrator approvals
and can be set to "Approve" or "Denied" -->
        <setStatus>${CERT_SET_STATUS}</setStatus>
    </synchronization>
</certificateValidation>
<!-- Membership validation setting -->
<membershipValidation>
    <status>${MEM_STATUS}</status>
    <!--check period in minutes -->
    <updateTime>${MEM_UPDATE}</updateTime>
    <!-- membership expiration policy -->
    <expirationPolicy>
        <institutionalMembership>
            <!-- max years before institutional
membership is expired (years)-->
            <maxPeriod>${INST_MAX_EXP}</maxPeriod>
            <!-- the number of days before expiration day
a user should be notified -->
            <notificationPeriod>
                <!-- how often we want to notify the user
within notification period -->
                <notificationFrequency>

```

```

${INST_NOT_FREQ}</notificationFrequency>
    </institutionalMembership>
    <voMembership>
        <!-- max years before vo membership is expired
(years) -->
        <maxPeriod>${VO_MAX_EXP}</maxPeriod>
        <!-- the number of days before expiration day
a user should be notified -->
        <notificationPeriod>
${VO_NOT_DAYS}</notificationPeriod>
        <!-- how often we want to notify the user
within notification period -->
        <notificationFrequency>
${VO_NOT_FREQ}</notificationFrequency>
    </voMembership>
</expirationPolicy>
<!-- email confirmation policy and usage signing policy -->
<timeoutsPolicy>
    <!-- wait period in days for email verification -->
    <emailVerificationTimeout>${EMAIL_DAYS}</emailVerificat
ionTimeout>
    <!-- wait period in days between email verification
and signing the Usage Rules -->
    <phaseIITimeout>${RULE_SIGN_DAYS}</phaseIITimeout>
    </timeoutsPolicy>
</membershipValidation>
<!-- log configuration for vomrs server -->
<!-- full path to the log properties file should be specified-->
<log>log4j.properties</log>
<!-- event processor configuration -->
<eventProcessor>
    <status>on</status>

    <!-- web services url -->
    <url>https://localhost:8443/vo-${VO_NAME}</url>
    <mailFrom>${MAIL_FROM}</mailFrom>
    <mailSubject>${MAIL_SUBJECT}</mailSubject>
        <mailHost>${MAIL_HOST}</mailHost>
    <mailPort>${MAIL_PORT}</mailPort>
    <updateTime>2</updateTime>
</eventProcessor>
<!--client is used for testing purposes -->
<client>
    <status>off</status>
    <port>14000</port>
    <connectionTime>10</connectionTime>
</client>
<!-- Synchronization with VOMS database -->
<synchronizer>
    <status>${VOMS_SYNC_STATUS}</status>
    <!-- the synchronization interval in minutes -->
    <syncTime>${VOMS_SYNC_TIME}</syncTime>

    <!-- the synchronization level
default is 0 -"Add Members", 1- "Add/Delete Banned Members",2
- "Synchronize Members", 3- "Synchronize", 4- "Event Driven Synchronization"
-->
    <syncLevel>${VOMS_SYNC_LEVEL}</syncLevel>
    <vomsUrl>https://localhost:8443/edg-voms-admin/${VO_ROOT_GROUP}
/services/VOMSAdmin</vomsUrl>
    <!-- if axis.socketSecureFactory is not defined assumes this
    <socketSecureFactory>org.edg.security.trustmanager.axis.AXISSoc
ketFactory</socketSecureFactory>
-->

```

```

        <!-- if running as root assume this as a default-->
        <sslKey>${HOST_CERT_DIR}/hostkey.pem</sslKey>
        <sslCertfile>${HOST_CERT_DIR}/hostcert.pem</sslCertfile>
    </synchronizer>
<!-- database configuration -->
<db>
    <!-- if host is not defined assumes localhost -->
    <host>localhost</host>

    <!-- if port is not defined assumes 3306 -->
    <port>3306</port>

    <!-- if user is not defined assumes uid that started server-->
    <user>${DB_USER}</user>
    <!-- if password is not defined assumes that the database is
not protected -->
    <password>${DB_PASSWORD}</password>
    <!-- if dbname is not defined assumes "test" -->
    <dbname>${DB_NAME}</dbname>
    <!-- if url is not defined assumes "jdbc:mysql://" -->
    <url>jdbc:mysql://</url>

    <!-- if drivers is not defined assumes
"org.gjt.mm.mysql.Driver" -->
    <driver>org.gjt.mm.mysql.Driver</driver>

    <!-- any of the parameters are below are related to connection
pool -->
    <maxCon>10</maxCon>
    <initCon>4</initCon>
    <wait>true</wait>
</db>
<!-- web ui configuration -->
<web>
    <!-- full path to the log properties file should be
specified-->
    <log>log4j_webui.properties</log>
    <!-- full path to on line help file
    <help>online_help.xml</help>
    -->
    <!-- time in seconds until session expires
    <inactiveInterval>600</inactiveInterval>
    -->

</web>
</vomrs>

```

VOMRS Glossary

Alias

A secondary Distinguished Name (DN) is considered an “alias” for the primary DN of a VO member. See Distinguished Name.

Applicant

An applicant to a VO is a person who has submitted a request to join the VO, whose identity has been confirmed and has thus completed the “candidate” stage of application (see Candidate), but for whom the request has not yet been approved. The applicant must start as a visitor (see Visitor). Once approval is granted, the applicant becomes a member (see Member).

Application Form

(See Registration Form)

Approved (membership status)

This membership status is given to approved VO members in good standing; this status is required in order for a member to perform any operations in the VOMRS.

Approved (authorization status)

This authorization status is initially granted, by a representative, to a VO applicant who is approved for membership (it triggers the applicant’s membership status to change to “approved”). See Approved (membership status). This authorization status is required for accessing grid resources, and may be set for three separate phases: global (*Representative* phase), site-specific (*SiteAdmin* phase), resource-specific (*LRP* phase)).

Authentication

Authentication is the process of identifying an individual, and ensuring that the individual is who he or she claims to be. Authentication says nothing about the access rights of the individual; see Authorization.

Authorization

Authorization, in contrast to authentication, is the process of giving individuals access to system objects and resources based on their identity.

Authorization Status

Authorization status, as contrasted with membership status, refers to a VO member’s authorization to use particular grid resources. There may be up to three levels of authorization status implemented in VOMRS; these levels are called “phases”: (1) A representative has the authority to grant or deny, on an individual basis, authorization to use any grid resources recognized by the VO. (2) Once phase 1 is granted, a site administrator may

grant authorization to use any resources located at his or her site. (3) Once phase 2 is granted, each local resource provider (LRP) may grant authorization to use his or her resource. In VOMRS, only phase 1, the global authorization, is required by the software; the other two phases may be implemented via external procedures. The authorization statuses are New, Approved, and Denied. See Phase, Membership Status, Local Resource Provider, Site Administrator and Representative.

Candidate

A visitor (see Visitor) who has applied for membership to a VO, but whose identity has not yet been confirmed by the VO, is assigned the role of “candidate” with respect to the VO. After identity confirmation, the candidate is assigned the role of applicant (see Applicant).

CA (Certificate Authority)

See Certificate Authority.

Certificate Authority

A trusted third-party organization or company that issues digital certificates used to create digital signatures and public-private key pairs. The role of the CA is to guarantee that the individual granted the unique certificate is, in fact, who he or she claims to be.

Certificate Status

Each VO member’s X.509 certificate is given a status which indicates its standing with respect to the VOMRS. A certificate in good standing is a prerequisite for its holder to access grid resources.

CRL

(Certificate Revocation List) A CRL is a list of no-longer-valid certificates maintained by a CA (see CA) for the certificates it has issued. This list is used to determine the validity of a certificate at the time of a transaction. Certificates issued by a CA are considered valid unless they appear on the certificate revocation list.

Denied (membership status)

This status is given to applicants who do not meet membership requirements for any reason. Members with this status cannot perform any operations in the VOMRS beyond those available for applicants.

Denied (authorization status)

This status is given to applicants or VO members who are not eligible to access grid resources, for any reason. This authorization status, in the *representative* phase, effectively cuts off the access because it triggers the removal of the member’s record in VOMS.

Distinguished Name (DN)

In a certificate issued by a CA, the DN is the string that uniquely identifies the individual.

DN

See Distinguished Name.

Email Address

This field on the registration form is for the email address to which the applicant or member wants VOMRS correspondence sent. This includes both person-to-person messages and automatic notifications via the subscription service.

Event

An event in the VOMRS is a change to the database. Some events require actions to be taken by particular VO members. Based on role, members can request to be notified when certain events occur. See Notification and Subscription.

Expired (certificate status)

The status indicates that the CA who issued this certificate is no longer valid.

Expired (institutional affiliation status)

This status indicates that the member's institutional affiliation is no longer valid.

Expired (membership status)

The status indicates that the member's VO membership has expired

Full Rights

Full rights refer to full membership rights (the alternative is "none"). See membership rights. A member who requests full rights at registration gets entered into the VOMS database upon membership approval; having a record in VOMS is prerequisite to accessing grid resources.

Grid Admin roles

Grid Admin roles include LRP and Site Administrator. VO members with these roles control user access to grid computing resources at a site. See LRP and Site Administrator.

Grid Proxy

Globus.org defines grid proxies as certificates signed by the user, or by another proxy, that do not require a password to submit a job. They are intended for short-term use, when the user is submitting many jobs and cannot be troubled to repeat his password for every job. VOMS creates proxies automatically for VO members from their grid certificates on an as-needed basis. See VOMS.

Grid Resource

A computing or storage node at a grid site that accepts and runs jobs (or stores output) for authorized VO members.

Grid Site

(see Site)

Group

An organizational entity, defined by the VO, which refers to a subdivision of the VO's overall project, and to which some subset of the VO's members are assigned. Each group has one or more group managers, group administrators, and members, all of whom are registered VO members. Groups are organized hierarchically.

Group Admin role

Group Admin roles include Group Owner and Group Manager. See Group Owner and Group Manager. This is distinct from a Group Role.

Group Manager

A group manager may (a) access a group member's public personal information, and (b) assign and remove members to/from the group, and (c) assign and remove members to/from a group role within the group. A group may have multiple group managers. A group manager of a parent group is automatically a group manager of all its children groups.

Group Member

A group member is a VO member who has been assigned to a group.

Group Owner

A group owner owns a group. A group owner is automatically a group manager of the group. (See Group Manager.) In addition to the group manager functions, a group owner may (a) add a new child group, (b) delete the group or any child group, (c) assign/deassign group owners to the group or any child group, and (d) assign/deassign group managers to the group or any child group. A group may have multiple group owners. A group owner of a parent group is automatically a group owner of all its children groups.

Group Role

A group role is an attribute of a group (and of the members of that group) that gets transmitted to VOMS; it has no meaning within the VO or VOMRS, per se. Group roles are attached to requests for extended proxies, which is one of the VOMS functions. Group roles may be used by LRPs to map users to local accounts. A Group Role is distinct from a Group Admin Role.

Institution

A university, laboratory or other body which participates in the VO's project and with which some of the VO's members are affiliated.

Institutional Expiration Date

The date on which a member's institutional affiliation expires.

KX.509

KX.509 is a client-side tool, developed at the University of Michigan, that extends the Kerberos authentication mechanism for use in Grids.

Local Resource Provider (LRP)

An LRP is a VO member associated with a particular grid site, who manages the authorization of VO members for a grid resource at the site. This authorization is one level finer than the site-level authorization managed by the site administrator.

LRP

See Local Resource Provider.

Member

Once an applicant's (see Applicant) request has been approved, the applicant becomes a VO member. At this point the member may be given additional roles in the VO and/or be assigned to groups. A member with full rights and appropriate authorization can use grid resources.

Member CA

The CA that issued a VO member's certificate (and DN).

Member DN

The DN of a VO member.

Membership Application

See Registration Form.

Membership Expiration Date

The date on which a member's VO membership expires.

Membership Rights

Membership rights represent the permissions granted to a VO member regarding use of grid resources. "Full" rights grant the member job processing rights (assuming authorization status permits) in addition to access to the VOMRS web UI; "limited" rights grant the user access to the VOMRS web UI only.

Membership Status

A field in the VOMRS indicating the standing a member has in the VO. (See New, Approved, Denied, Revoked, and Suspended.)

New (membership status and authorization status)

This status is given to applicants to the VO; it remains in effect until the applicant's request is processed and either approved or denied.

Notification

All VO members and applicants may elect to receive email notification automatically when particular fields change in the database. These changes are called "events", this feature is called "subscribing to events", and the emails sent are the "notification". The events to which you can subscribe depend upon your role and membership status. See Event and Subscription.

Phase

Authorization status as a concept thus has three "phases", meaning three levels of authorization for using grid resources. Each phase is tied to the role responsible for the corresponding level of authorization: (1) representative grants a general, or global, authorization, (2) site administrator grants authorization for a particular site, and (3) local resource provider grants authorization for a given resource at a site. See Authorization Status, Local Resource Provider, Site Administrator and Representative.

Phone

A phone number where a VO applicant or member can be reached, usually a work phone number.

Primary DN

The DN under which a member has registered with the VO.

Private Personal Information

Private personal information fields are not visible to other VO members and do not get transmitted out of the VOMRS system; only authorized VO Administrators and site administrators may access the information in these fields.

Proxy

See Grid Proxy.

Public Personal Information

Public personal information fields may get transmitted out of the VOMRS system; they may be viewed by VO members with appropriate roles, and may be sent out in notification email.

Registration

The process of requesting membership in the VO via the VOMRS system. This is done using the Registration form. (See Registration Form.)

Registration Form

The form used by VO applicants to register with the VO. VO administrators may use this form to register a third party.

Representative (role)

A representative is a VO member responsible for approving/denying applicants' requests for VO membership based on personal knowledge about each individual applicant's identity and institutional affiliation. In VOMRS a representative is not constrained to be affiliated with the same institution as the individual he or she represents.

Representative CA

The CA that issued the DN of a VO member's representative.

Representative DN

The DN of a VO member's representative.

Required Personal Information

Information that an applicant to the VO must provide in order to identify himself or herself to the VO. This information is stored for the duration of an individual's VO membership. Each individual information field is designated as public or private. (See Private Personal Information and Public Personal Information.)

Resource

See Grid Resource.

Revoked (membership status)

This status indicates that the VO member is in the CRL (certificate revocation list) of the CA that issued the member's certificate. Members with this status cannot perform any operations in the VOMRS and will be denied access to any grid resources.

Rights

See Membership Rights.

Role

A technique of member-to-functions mapping in which the permissions for performing particular functions in the VOMRS are grouped into a role. Each role gets assigned to designated VO members, thereby allowing them to perform the associated functions. In addition to the basic roles of Candidate, Applicant and Member, there are three categories of administrative roles: Group Admin, Grid Admin and VO Admin.

Role (pertaining to Group)

(See Group Role.)

Rules

(See Usage Rules.)

Secondary DN

A DN other than the DN you used to register with the VOMRS. (See Primary DN.) A secondary DN would be issued by a different CA than your primary, and to enter it into the VOMRS, the CA would need to be listed under Certificate Authorities. A secondary DN is also referred to as an alias.

Site (Grid Site)

Set of grid computing resources (compute and/or storage nodes) owned and managed by the same institution and by a single VO. There may be multiple computing resources within a site, and there may be multiple sites at a single institution.

Site Administrator

A site administrator, like an LRP, is associated with a particular grid site, and is responsible for granting VO members access to site resources (this authorization is one level higher than per-resource authorization, managed by the LRP). A site admin is responsible for maintaining the required site-specific personal information in VOMRS and may assign/deassign members as LRPs or as additional site administrators.

SN (certificate Serial Number)

The serial number associated with an X.509 certificate.

Status

See Membership Status and Authorization Status.

Subscription

“Subscription to events” is the mechanism VOMRS uses for notifying VO members of changes in the database. Members choose the events that they wish to monitor (they “subscribe” to these events), and then notification emails get sent to them as corresponding changes occur. Notifications go only to the notification email address. (See Event and Notification Email.)

Suspended (membership status)

This status indicates that the VO member is currently not in good standing in the VO. Members with this status cannot perform any operations in the VOMRS are denied access to any grid resources.

Usage Rules

A set of grid usage rules that make up a computing resources use policy. VO members are required to agree to these rules.

Virtual Organization (VO)

A Virtual Organization consists of members that may come from many different home institutions, may have in common only a general interest or goal (e.g., CMS physics analysis), and may communicate and coordinate their work solely through information technology (hence the term *virtual*). In addition, individual members and/or institutions may join and leave the organization over time; sometimes VOs are called *dynamic virtual organizations* for this reason.

Virtual Organization Membership Service (VOMS)

The Virtual Organization Membership Service (VOMS) is a system that manages user authorization information for a VO. VOMS is designed to maintain only general information regarding the relationship of the user with his VO, e.g., groups he belongs to, roles he has been assigned, and certificate-related information. It maintains no personal identifying information. VOMS is part of VOX, but separate from the VOMRS.

Visitor

An individual who is not a member of a VO (nor candidate, nor applicant; see Candidate and Applicant), but who possesses a valid certificate from a CA trusted by the VO, automatically has the role of “visitor” with respect to the VO. A visitor may browse certain screens in VOMRS, and can access the application form.

VO

See Virtual Organization.

VO Administrator (role)

The VO administrator is responsible for maintaining the VOMRS, and as such may view and change all member-related information. This person can add and delete institutions, sites, CAs, can modify the personal information required by the VO for each member, and can assign/deassign roles to/from members (e.g., root group owner, site administrator). The VO administrator can assign/deassign this same role to/from other VO members.

VO Administrator Roles

VO Administrator roles include representative and VO administrator. People with these roles are responsible for the integrity of the VO, as maintained in the VOMRS. See Representative and VO Administrator.

VOM Registration Service (VOMRS)

The VOM Registration Service (VOMRS) is the major component of VOX. VOMRS is a server that provides the means for registering members of a VO, and coordination of this process among the various VO and grid resource administrators. It consists of a database to maintain user registration and institutional information, and a web UI for input of data into the database and manipulation of that data.

VOMRS

See VOM Registration Service.

VOMS

See Virtual Organization Membership Service.

VOMS eXtension (VOX)

The VOX project is an extension of the VOMS project. VOX maintains additional information (relative to VOMS) on each VO member as required by individual grid resource providers. VOX provides an interface for entering information, stores it in its database, and populates the VOMS database via the VOMS administration package.

VOX

See VOMS eXtension.

X.509

X.509 is a standard for public key certificates, the type of certificate generally used for authentication in the grid world. The X.509 standard defines what information can go into a certificate, and describes how to write it down (the data format).

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