MATLAB licensing and access control on EGEE

Introduction

The objective of this activity is to provide MATLAB MDCS (Distributed Computing Server) from Resource Centers federated within the EGEE project using the gLite Grid middleware stack. RCs are installing MDCS on their CEs (Compute Elements, i.e. cluster head nodes) and configure it to use the local WNs (Worker Nodes, i.e. machines within a cluster). Grid users can run MATLAB applications from their desktops, using MATLAB PCT (Parallel Computing Toolkit) exploiting these RCs, virtually using a site's gLite WNs as MATLAB MDCS Worker Nodes.

From the technical point of view, the integration of gLite and MATLAB has been completed and during the trials we have already demonstrated a couple of success stories of users taking advantage of the combined EGEE/MATLAB solution. The next step of the integration is to devise an appropriate licensing scheme and a way to technically implemented.

The two parallel computing products, MATLAB Distributed Computing Server (MDCS) and Parallel Computing Toolbox (PCT), are sold at different commercial and academic prices, where commercial prices are higher than academic ones.

Resource Providers

From the Resource Providers (Resource Centers) point of view there are two issues to tackle:

- Who will be the licensee?
- How the RCs will technically enforce the license and restrict access to eligible users?

Who is the licensee

We can think of various different scenarios:

- The licensee is the Resource Center (Grid Site). The license in this case covers the specific site (computing cluster). The RC can support academic, commercial or both usages. The RC may choose to provide the software to multiple VOs that it supports. The RC license covers only the provision of MATLAB through the grid middleware. The license does not support access from local users (i.e. only regular gLite job submission and management tools should be used)
- The licensee is the VO. A VO may encompass on or more Resource Centers. Since an RC can support multiple VOs we have to make sure that only eligible users from a certain VO can access MATLAB MDCS. Note that also some of the other VOs may have licenses for MATLAB thus the local installation must be shared among many VOs.

- The licensee is a National Grid Initiative (NGI). A NGI may acquire a license in order to facilitate the work of various local users and VOs.
- The licensee is a Specialized Support Center (SSC). An SSC typical provides support services to a specific scientific communities (e.g. Astronomy). An SSC might have established various different VOS. Thus an SSC may acquire a license in order to facilitate the work of various local users and VOs.

In all the above scenarios there has to be a legal entity responsible for paying and acquiring the license. This entity will be accountable for any misusage of the license agreement. Depending on the licensing scheme the legal entity can be:

- The "owner" of the grid site (organization/laboratory in charge of the site)
- The VO manager
- The NGI's legal representative
- The SSC's legal representative

Pricing should be applied on site basis e.g.

- A site pays for a single MDCS license.
- A VO pays for all supporting sites that it will install and provide the software. If a site already provides MDCS for another VO no additional fees will be charged.
- A NGI or SSC will need $\sum_{i=1}^{VO} RC_i$ licenses where VO is the number of VOs supported and RC the number of RCs per VO per NGI/SSC.

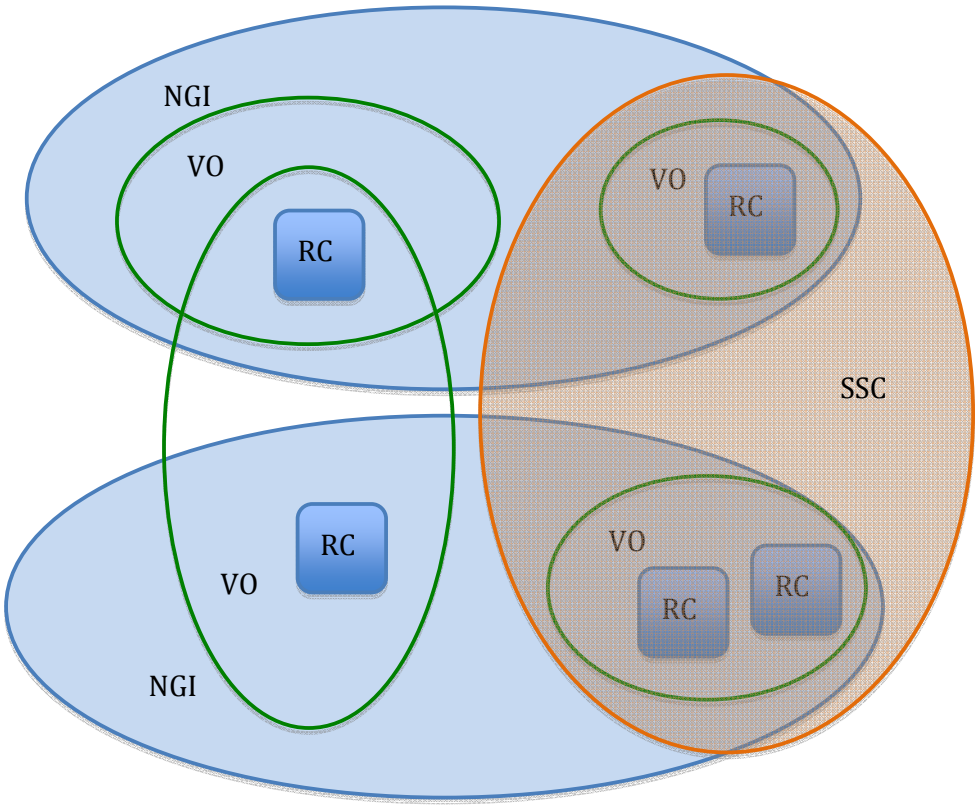

Figure 1 - Potential licensees and their relationship

Access Restriction

We can think of the following approaches for enforcing access control on a MDCS installation.

- Use of dedicated MATLAB VO. This is a straightforward approach with well known disadvantages. Users wishing to run MATLAB jobs have to enroll in this VO. The VO manager will be responsible for ensuring that the requestor is an eligible EGEE/MATLAB user.
- Use of VO subgroups. A given VO that wishes to install and provide access to MDCS installation will create a VO.MATLAB subgroup. Existing VO members will have to request enrollment to this subgroup in order to gain access to the software. The VO admin has to make sure that the users accepted to the subgroup adhere to the license restrictions. E.g. only users within Europe can run MATLAB jobs. This fits very well the existing VOMS architecture but it is not very well supported from the rest of gLite middleware. Will require manual intervention and setup from local admins.
- DN based access control. This is a fine grained approach. The local admin provides an ACL of the users that can access the software. Wildcards can be potentially used to restrict access to specific users coming from a given country or organization. This is not a very safe approach. Also it is difficult to enforce from the RC point of view since it requires manual intervention from the local admins.

Implementation

EGEE will create two parallel computing "Configurations", each containing a string with a PCT license type: PCT-COMMERCIAL or PCT-ACADEMIC. The two above "Configurations" will be available for download from the users.

Resource Centers will

- Install MDCS on their cluster.
- Advertise MDCS and its license type: either MDCS-COMMERCIAL or MDCS-ACADEMIC. The advertisement will be done by using a gLite *GlueHostApplicationSoftwareRunTimeEnvironment* variable.

MATLAB PCT will automatically generate a Job Description Language (JDL) file before submitting a job to gLite. The Requirements section of the file will reflect where the user's code can run.

A commercial user's JDL file will contain

```
Requirements = Member("MDCS-COMMERCIAL",
other.GlueHostApplicationSoftwareRunTimeEnvironment);
```

An academic user's JDL file will contain

```
Requirements = Member("MDCS-ACADEMIC",
other.GlueHostApplicationSoftwareRunTimeEnvironment) ||
Member("MDCS-COMMERCIAL",
other.GlueHostApplicationSoftwareRunTimeEnvironment);
```

Grid users perspective

For the end user it is sufficient to have a PCT license either for academic or commercial usage. User with commercial license can only submit jobs to an RC with commercial license. Users with academic license can submit jobs to RCs with either commercial or academic license.

Users will

i) Install PCT on his/her desktop.
ii) Download either the Academic or the Commercial "Configuration"
iii) Create and submit a job in MATLAB:

```
j = createJob(…);

…

submit(j);
```

Depending on the licensing approach to be used, the user will either have to login to the VOMS server of the MATLAB VO or initiate the credentials on any VO providing MATLAB, using the VOMS attribute parameter to define the request for accessing the MATLAB specific subgroup.