WLCG Information System Use Cases

Editor: Flavia Donno

Date: 1/31/2011

Version: 0.4

Contributors/Authors:

Julia Andreeva (IT-ES), Fernando H. Barreiro Megino (IT-ES/ATLAS), Jean-Philippe Baud (IT-ES), Wolf Behrenhoff (CMS), Simone Campana (IT-ES/ATLAS), Mattia Cinquilli (IT-ES/CMS), Joel Closier (LHCb), Alessandro Di Girolamo (IT-ES/ATLAS), Flavia Donno (IT-ES), Vincent Garonne (ATLAS), Joanna H. Huang (GSTAT2), Alexey Klimentov (ATLAS), Nicolo' Magini (IT-ES/CMS), Patricia Mendez Lorenzo (IT-ES/ALICE), Zsolt Molnar (IT-GT/FTS), Pablo Saiz (IT-ES), Roberto Santinelli (IT-ES/LHCb), Andrea Sciaba' (IT-ES/CMS), Daniele Spiga (IT-ES/CMS), Graeme Stewart (ATLAS), Alden Stradling (ATLAS), Rodney Walker (ATLAS), Christoph Wissing (CMS).

Purpose of this document

The goal of this document is to detail the way the WLCG Information System is used by the WLCG experiments and by all dependent WLCG services. The document is addressed to WLCG Information System developers, operations managers and experts interested in specific usage patterns.

Document organization

This document is organized into sections each one dedicated to a specific consumer of WLCG published information. This document will evolve with time, following the evolution of the usage patterns. Therefore, please make sure you consult the latest version of the document.

The Glue attributes mentioned in this document refer to the Glue Schema version 1.3 described in detail in [1].

1. ALICE

Alice relies only on the resource BDII for the WLCG CREAM-CE. The information published by this BDII is used to regulate the flow of Alice jobs to a particular site. Furthermore, the status information is also used to identify CEs that are in production mode. In what follows we list the Glue objects and attributes used by Alice.

1.1 Alice Glue Classes and Attributes

Glue Class: GlueCE
GlueCE Attributes: GlueCEUniqueID, GlueForeignKey
Query used :
ldapsearch -x -h $LCG_GFAL_INFOSYS -b "o=grid"
'(&(ObjectClass=GlueCE)(GlueCEUniqueID=<CEUniqueID>))' GlueForeignKey

The GlueForeignKey attribute of the GlueCE gives the GlueClusterUniqueID.

Glue Class: GlueCEState
GlueCEState Attributes: GlueCEStateStatus, GlueInformationServiceURL
Query used :
ldapsearch -x -h $LCG_GFAL_INFOSYS -b "o=grid"
'(&(ObjectClass=GlueCEState)(GlueInformationServiceURL=<ResourceBDIIURL>))'
GlueCEStateStatus

Glue Class: GlueVOView
GlueVOView Attributes: GlueCEStateRunningJobs, GlueCEStateWaitingJobs, GlueChunkKey
Query used :
ldapsearch -x -h $LCG_GFAL_INFOSYS -b "o=grid"
'(&(ObjectClass=GlueVOView)(GlueChunkKey=GlueCEUniqueID=<CEUniqueID>))'
GlueCEStateRunningJobs GlueCEStateWaitingJobs

Glue Class: GlueSubCluster
GlueSubCluster Attributes: GlueChunkKey, GlueHostMainMemoryRAMSize,
GlueHostMainMemoryVirtualSize
Query used :
ldapsearch -x -h $LCG_GFAL_INFOSYS -b "o=grid" '(&(ObjectClass=GlueSubCluster)(
GlueChunkKey= GlueClusterUniqueID=<ClusterUniqueID>))' GlueHostMainMemoryRAMSize
GlueHostMainMemoryVirtualSize

2. ATLAS

Many of the ATLAS services rely on the WLCG Information System either at bootstrap time to get self-configured as in the case of Panda, or to monitor the resource usage as in the case of DDM. In the case of Panda the information is quasi-static, the most dynamic part being the GlueHostApplicationSoftwareRunTimeEnvironment and the GlueCEStateStatus.

2.1 ATLAS Glue Classes and Attributes

2.1.1 ATLAS Panda

Glue Class: GlueCE
GlueCE Attributes: GlueCEUniqueID, GlueCEAccessControlBaseRule, GlueForeignKey
Query used :
ldapsearch -x -h $LCG_GFAL_INFOSYS -b "o=grid" '(&(ObjectClass=GlueCE)(|(
GlueCEAccessControlBaseRule=atlas)(
GlueCEAccessControlBaseRule=VOMS:/atlas/Role=production))' GlueCEUniqueID
GlueForeignKey

The GlueForeignKey attribute of the GlueCE gives the GlueClusterUniqueID.

Glue Class: GlueSubCluster
GlueSubCluster Attributes: GlueChunkKey, GlueHostApplicationSoftwareRunTimeEnvironment
Query used :
ldapsearch -x -h $LCG_GFAL_INFOSYS -b "o=grid" '(&(ObjectClass=GlueSubCluster)(
GlueChunkKey= GlueClusterUniqueID=<ClusterUniqueID>))'
GlueHostApplicationSoftwareRunTimeEnvironment

2.1.2 ATLAS DDM

Glue Class: GlueSA
GlueSA Attributes: GlueSATotalOnlineSize, GlueSAReservedOnlineSize, GlueSAFreeOnlineSize, GlueSAUsedOnlineSize, GlueSACapability
Query used :
ldapsearch -x -h $LCG_GFAL_INFOSYS -b "o=grid"
'(&(ObjectClass=GlueSA)(GlueSAAccessControlBaseRule=*atlas*))' GlueSATotalOnlineSize
GlueSAReservedOnlineSize GlueSAFreeOnlineSize GlueSAUsedOnlineSize GlueSACapability

2.1.3 ATLAS Software Installation

???

2.1.4 ATLAS Frontier-Squid monitoring through SSB and SLS

Glue Class: GlueSite
GlueSite Attributes: GlueSiteName, GlueSiteSysAdminContact
Query used :
ldapsearch -x -h $LCG_GFAL_INFOSYS -b "o=grid"
'(&(ObjectClass=GlueSite)(GlueSiteName=<SiteName>))' GlueSiteSysAdminContact

The <SiteName> is extracted from the TierOfAtlas. These are sites hosting Frontier-Squid services.

2.1.5 ATLAS SAM tests and monitoring systems

???

2.1.5 ATLAS Other implicit usage of the WLCG Information System

ATLAS relies on services such as FTS and LFC. Therefore, all queries performed by such middleware are considered fundamental by ATLAS and must work reliably.

3. CMS

Many CMS services rely on information provided by the WLCG Information System. Such information is mostly semi-static.

3.1 CMS Glue Classes and Attributes

3.1.1 CMS CRAB and ProdAgent/PA

The queries are executed through the *glite-wms-job-list-match* command in the JDL. The typical attributes queried are the following.

Glue Class: GlueCE
GlueCE Attributes: GlueCEUniqueID, GlueCEStateStatus, GlueCEPolicyMaxCPUTime, GlueForeignKey
Query used :
ldapsearch -x -h $LCG_GFAL_INFOSYS -b "o=grid" '(&(ObjectClass=GlueCE)(GlueCEStateStatus=Production)(GlueCEUniqueId=<CEUniqueID>)(GlueCEPolicyMaxCPUTime>=130))' GlueForeignKey

Glue Class: GlueSubcluster
GlueSubCluster Attributes: GlueHostApplicationSoftwareRunTimeEnvironment, GlueHostNetworkAdapterOutboundIP, GlueChunkKey
Query used :
ldapsearch -x -h $LCG_GFAL_INFOSYS -b "o=grid" '(&(ObjectClass=GlueSubCluster)(GlueHostApplicationSoftwareRunTimeEnvironment =<SoftwareTag>)(GlueHostNetworkAdapterOutboundIP)(GlueChunkKey=GlueClusterUniqueID=<ClusterUniqueID>))'

Glue Class: GlueCESEBindGroup
GlueSubCluster Attributes: GlueCESEBindGroupSEUniqueID
Query used :
ldapsearch -x -h $LCG_GFAL_INFOSYS -b "o=grid" '(&(ObjectClass=GlueCESEBindGroup)(GlueCESEBindGroupSEUniqueID=<SEUniqueID>))'

The actual JDL expression looks like the following:

Requirements = Member("VO-cms-CMSSW_3_5_4", other.GlueHostApplicationSoftwareRunTimeEnvironment) && Member("VO-cms-slc5_ia32_gcc434", other.GlueHostApplicationSoftwareRunTimeEnvironment) && (other.GlueHostNetworkAdapterOutboundIP) && other.GlueCEStateStatus == "Production" && other.GlueCEPolicyMaxCPUTime>=130 && (Member("polgrid4.in2p3.fr" , other.GlueCESEBindGroupSEUniqueID)) && ((!RegExp("ce127.cern.ch", other.GlueCEUniqueId))&&(!RegExp("ce126.cern.ch", other.GlueCEUniqueId))&&(!RegExp("ce132.cern.ch", other.GlueCEUniqueId))...

3.1.2 CMSSW Grid installation tool

The CMSSW Grid installation tool is used for automatic software installation at sites. The following queries are performed against the WLCG information system.

Glue Class: GlueCE
GlueCE Attributes: GlueCEUniqueID, GlueCEAccessControlBaseRule, GlueForeignKey
Query used :
ldapsearch -x -h $LCG_GFAL_INFOSYS -b "o=grid" '(&(ObjectClass=GlueCE)(|(
GlueCEAccessControlBaseRule=VO:cms)(
GlueCEAccessControlBaseRule=VOMS:/cms/Role=production)
(GlueCEAccessControlBaseRule=VOMS:/cms/Role=lcgadmin))' GlueCEUniqueID GlueForeignKey

The GlueForeignKey attribute of the GlueCE gives the GlueClusterUniqueID.

Glue Class: GlueSubCluster
GlueSubCluster Attributes: GlueChunkKey, GlueHostApplicationSoftwareRunTimeEnvironment
Query used :
ldapsearch -x -h $LCG_GFAL_INFOSYS -b "o=grid" '(&(ObjectClass=GlueSubCluster)(
GlueChunkKey= GlueClusterUniqueID=<ClusterUniqueID>))'
GlueHostApplicationSoftwareRunTimeEnvironment

3.1.3 CMS Site Status Dashboard

In order to display the information about CMS sites that are available and the the disk and tape storage resource usage for CMS the CMS Site Status Dashboard uses the WLCG Information system. In particular, the following attributes are queried.

3.1.4 CMS SAM tests

???

3.1.5 CMS other implicit usage of the WLCG Information System

The CMS PhEDEx service relies on services such as FTS. Therefore, all queries performed by such middleware are considered fundamental by CMS and must work reliably.

4. LHCb

Only 2 LHCb services rely on information provided by the WLCG Information System.

4.1 LHCb Glue Classes and Attributes

4.1.1 LHCb Pilot Job delivery through DIRAC

???

4.1.2 LHCb CS

???

5. WLCG Middleware

6.1 FTS

6.2 LFC

6.3 GFAL and lcg-util

6.4 SAM tests

6.5 Dashboard

The Dashboard system uses the WLCG Information System to find out the Latitude and Longitude of sites.

Glue Class: GlueSite
GlueSite Attributes: GlueSiteUniqueID, GlueSiteLatitude, GlueSiteLongitude
Query used :
ldapsearch -x -h $LCG_GFAL_INFOSYS -b "o=grid" '(ObjectClass=GlueSite)' GlueSiteUniqueID GlueSiteLatitude GlueSiteLongitude

6. WLCG Management

Various accounting tools (APEL, GSTAT, etc.) used by the WLCG Management to monitor the resource usage and status are based on information provided by the WLCG Information System. The attributes that have relevance for this are described in [2].

In what follows we provide the list of the important Glue Attributes and relative classes.

6.6 Installed Capacity Glue Classes and Attributes

Glue Class: GlueSite
GlueSite Attributes: GlueSiteName, GlueSiteUniqueID

Glue Class: GlueCluster
GlueCluster Attributes: GlueClusterUniqueID, GlueForeignKey

Glue Class: GlueSubCluster
GlueSubCluster Attributes: GlueChunkKey, GlueSubClusterPhysicalCPUs, GlueSubClusterLogicalCPUs, GlueHostBenchmarkSI00, GlueHostProcessorOtherDescription: Benchmark=<value>-HEP-SPEC06, Cores=<typical number of cores per CPU> , GlueHostProcessorModel, GlueHostProcessorSpeed, GlueHostSMPSize, GlueHostRamSize, GlueHostVirtualSize

Glue Class: GlueCE
GlueCE Attributes: GlueCEUniqueID, GlueForeignKey, GlueCEAccessControlBaseRule, GlueCEAssignedJobSlots, GlueCECapability: CPUScalingReferenceSI00=<referenceCPU SI00>, Share=<VO>:<share>

Glue Class: GlueVoView
GlueVoView Attributes: GlueCEAssignedJobSlots

Glue Class: GlueSE
GlueSE Attributes: GlueSEUniqueID, GlueSEName, GlueSizeTotal, GlueSizeFree, GlueTotalOnlineSize, GlueUsedOnlineSize, GlueSEStatus, GlueSEArchitecture, GlueSEImplementationName, GlueSEImplementationVersion

Glue Class: GlueAccessProtocol
GlueAccessProtocol Attributes: GlueAccessProtocolLocalID, GlueAccessProtocolType, GlueAccessProtocolVersion, GlueAccessProtocolSupportedSecurity

Glue Class: GlueControlProtocol
GlueControlProtocol Attributes: GlueControlProtocolUniqueID, GlueControlProtocolEndopoint, GlueControlProtocolType, GlueControlProtocolVersion

Glue Class: GlueService
GlueService Attributes: GlueServiceUniqueID, GlueServiceType, GlueServiceEndopoint

Glue Class: GlueSA
GlueSA Attributes: GlueSALocalID, GlueChunkKey, GlueSAPath, GlueSAAccessControlBaseRule, GlueReserved[Online|Nearline]Size, GlueTotal[Online|Nearline]Size, GlueUsed[Online|Nearline]Size, GlueFree[Online|Nearline]Size, GlueSACapability: Installed[Online|Nearline]Capacity=<size>, [scratch,stage]

Glue Class: GlueVoInfo
GlueVoInfo Attributes: GlueVOInfoLocalID, GlueVoInfoTag, GlueVoInfoAccessControlBaseRule, GlueVoInfoPath

6.7 GSTAT2 Glue Classes and Attributes

7. Summary and conclusions

REFERENCES

[1] Glue Schema Specification version 1.3, Final – 16 Jan 2007, http://forge.cnaf.infn.it/plugins/scmsvn/viewcvs.php/*checkout*/v_1_3/spec/pdf/GLUESchema.pdf?rev=48&root=glueschema

[2] Usage of Glue Schema v1.3 for WLCG Installed Resource Capacity information – Version 1.9, 3 February 2009 edited by F. Donno https://twiki.cern.ch/twiki/pub/LCG/WLCGCommonComputingReadinessChallenges/WLCG_GlueSchemaUsage-1.8.pdf