Public Storage on the Open Science Grid

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Purpose

- Provide managed storage for non-owner VOs on Storage Elements

- Public: "Maintained for or used by the people or community"

  - *Community = OSG VOs*

- Plan to develop and/or integrate software

  - Requirements have been reviewed.

  - Backend database and its operations have been defined.

Previous Users

- D0: Tevatron Experiment Monte Carlo production

- Fly's Eye: Highly Energetic Dispersed Radio Transients

- SCEC: Probabilistic Seismic Hazard Assessments

- Human Microbiome Project: Correlate microbiome/health

- LIGO: Einstein @ Home

- LIGO: Binary Inspiral

- LSST: Simulated images.

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Current Procedure

- Contact OSG

- Discuss of Storage requirements

- Arrange space with sites

- Do test transfers

- Troubleshoot authorization or BDII info

- Upload files, notify by email

- Track uploaded files

- Run jobs

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New Services

- Space Management needed for

    – Coordinate use of space in public storage areas by VOs

    – Track accessibility and use of public storage

- Transfer Management needed for

    – Enforcement of space management

    – Track files, cleanup

    – Storage resource selection

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Constraints on the Design

- No alteration of Storage Elements

    - Access continues to be through current clients.

- No centralized OSG service

    - Software to be operated by VO

- Accommodate usage outside the service

   - Use of traditional means will not have an adverse effect

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Public Storage Space Management

- Site administrator deploys a storage area and authorizes VOs

    – Puts storage area discovery info on OSG-central BDII.

- VO Administrator discovers and checks access to storage areas.

    – Requests an allocation

- OSG Production Coordinator allocates space on a storage area.

    – Allocation = Storage Area, Size, Max number of files, Expiration.

- User accesses a storage resource through its allocation.

    – Allocation parameters are enforced and updated.

- VO Administrator cleans up expired allocations.

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Storage Management Process
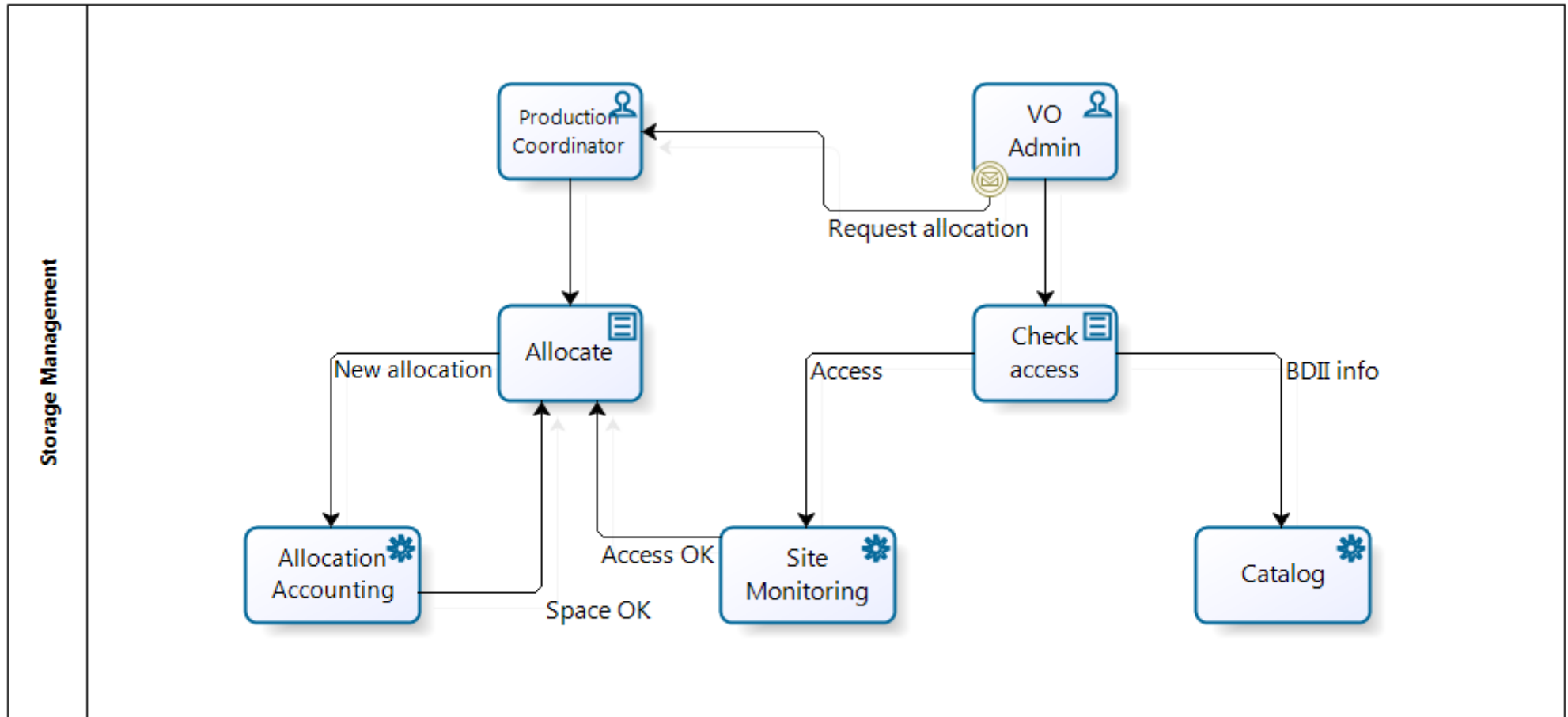
Transfer Management Process
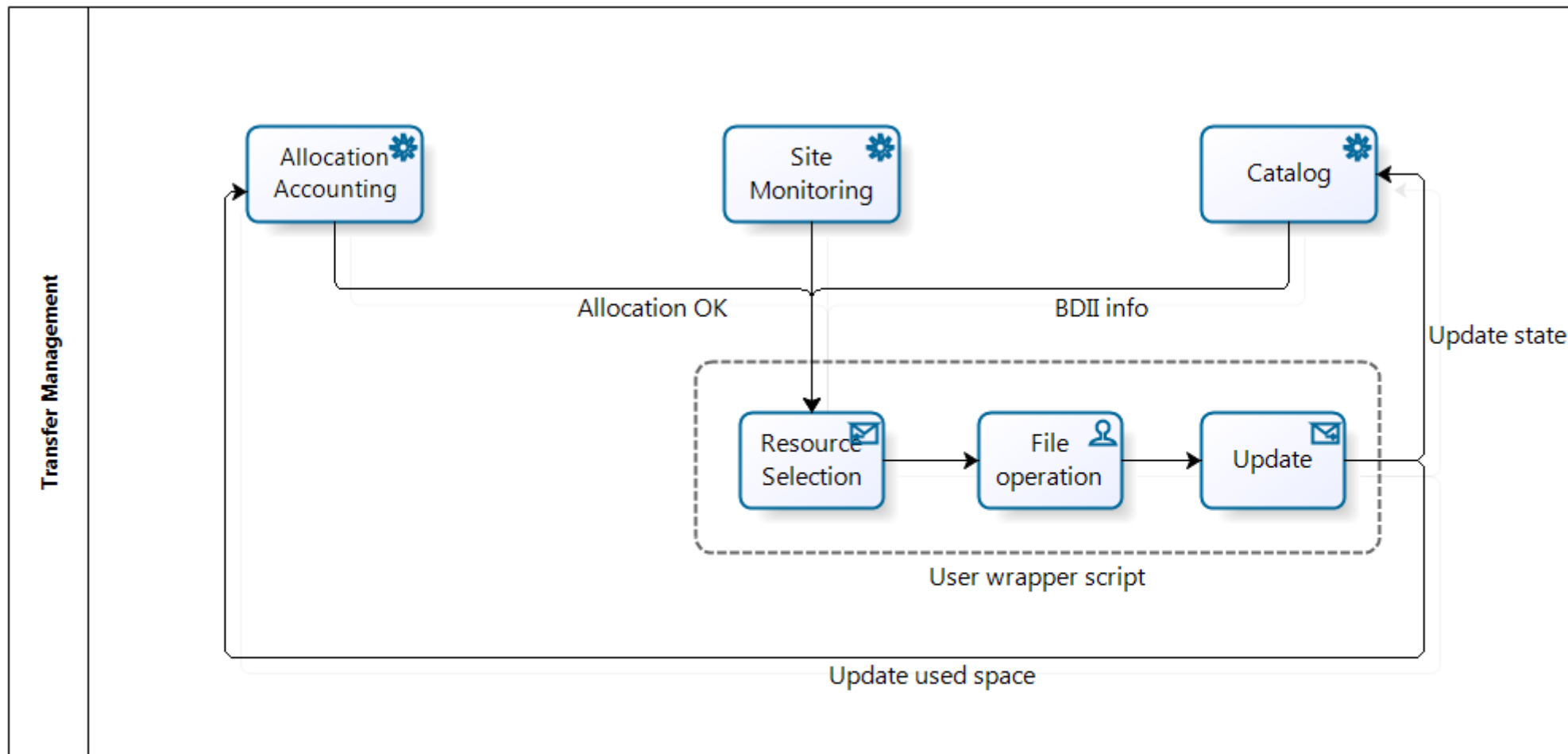
Components of the Public Storage Service

- **Allocation Accounting Service**

  – Used to grant an allocation to a VO.

  – Tracks space used in allocations.

- **Site Monitoring Service**

  – Saves records of access check tools.

- **Public Storage Catalog**

  – Maps logical file name to location on storage resource.

  – Tracks replicas for access and cleanup.

 – Saves dataset definitions.

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Support for Dataset Operations

- User defines a dataset.

    - By ancestor directory or metadata entry

- VO Administrator optionally makes suballocations for the dataset.

    - Same parameter types as for allocations.

- User uploads the dataset files.

    - All files to the same destination storage resource.

- User replicates the dataset files to another resource.

- User runs jobs on the dataset.

- User deletes expired datasets.

Cleanup Policy

- Ensure availability of unused space over the long term.

- Expiration times for allocations and datasets.

- In order of preference

  - Users clean up datasets (delete files in them)

  - VO Administrators clean up allocations

  - Site administrators clean up allocations

    - At the request of the OSG Production Coordinator

    - Using a provided tool and input list

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The Actual Schema
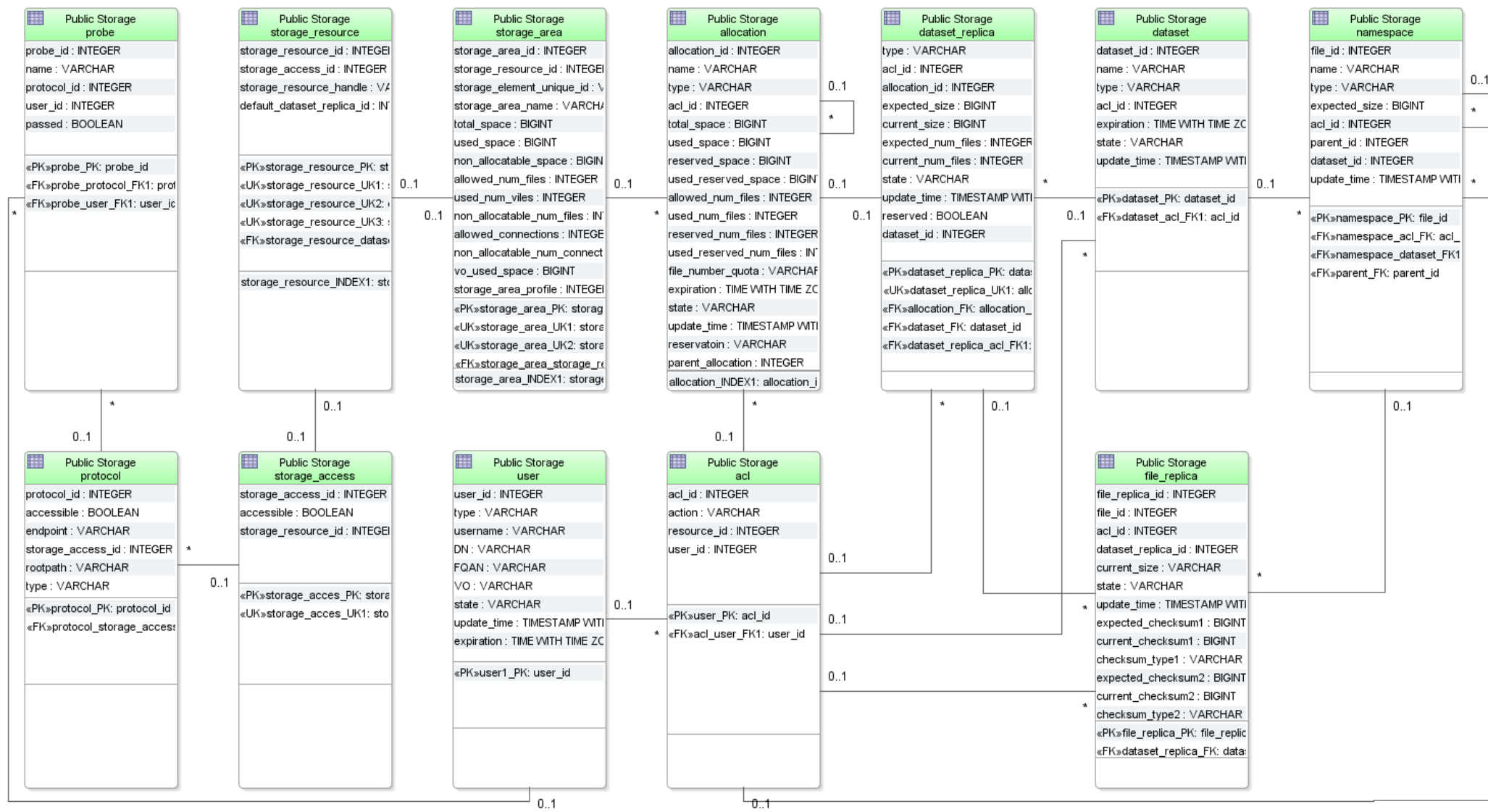
The Pigeon Access Checker

- Discover Servers

  - The test "generator" calls Discovery Tools on a daily basis to get a list of servers from BDII that advertise support for the VO.

- Create Tests

  - Using this list, create a custom suite of tests to verify the SRM/gridftp functionality of each site.

- Execute Tests

  - Execute the tests to verify the site's storage functionality.

- Show Results

  - Publish the results on a web page and in a XML.

Pigeon Screenshot

Mozilla Firefox

File Edit View History Bookmarks Tools Help

fnal.gov https://gw014k0.fnal.gov:8443/gip/ Google

https://gw014k0....l.gov:8443/gip/

				Create Link

GLOW

1ping GLOW	2010-08-27 09:18:01.767522	Success	Command finished.	Archive Create Link
2srmcp GLOW	2010-08-27 09:23:02.252111	Failure	Authorization Error	Archive GOC TICKET 8799
3srmkfile GLOW		Not Run	Dependent test 2srmcp_GLOW has failed.	Archive Create Link
4srmmkdir GLOW		Not Run	Dependent test 2srmcp_GLOW has failed.	Archive Create Link
5srmksdir GLOW		Not Run	Dependent test 4srmmkdir_GLOW has not run yet due to dependencies.	Archive Create Link
6srmrmdir GLOW		Not Run	Dependent test 4srmmkdir_GLOW has not run yet due to dependencies.	Archive Create Link
7srmrm GLOW		Not Run	Dependent test 2srmcp_GLOW has failed.	Archive Create Link
globus url copy GLOW	2010-08-27 09:15:01.433599	Success	Command finished.	Archive Create Link
globus url run GLOW	2010-08-27 09:20:02.205427	Success	Command finished.	Archive Create Link

GRASE-CSE-MAGIC

globus url copy GRASE-CSE-MAGIC	2010-08-27 09:34:01.356264	Success	Command finished.	Archive Create Link
globus url run GRASE-CSE-MAGIC	2010-08-27 09:59:04.892010	Success	Command finished.	Archive Create Link

GridUNESP CENTRAL

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The OSG Discovery Tool

- Reads BDII information

- Can search using XPath and XQuery

  – XML representation more future-proof than LDAP

  – Composition of complex queries is easier than with ldapsearch

- Prewritten Compute Element Searches

  – OS Version, Runtime Version, SE mount point

- Prewritten Storage Element Searches

  – SRM and gridftp URLs. Client command templates.

  – Storage Area available space and authorization info.

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get_runtime_versions

- Finds software version with matching string

```
[discovery-1.0.6]$ get_runtime_versions --vo engage --match "OSG 1.2."
```

Site Name	Compute Element ID	Software Version
BNL-ATLAS	gridgk01.racf.bnl.gov:2119/jobmanager-condor-default	OSG 1.2.9
BNL-ATLAS	gridgk02.racf.bnl.gov:2119/jobmanager-condor-default	OSG 1.2.9
CIT_CMS_T2	cit-gatekeeper.ultralight.org:2119/jobmanager-condor-default	OSG 1.2.8
CIT_CMS_T2	cit-gatekeeper.ultralight.org:2119/jobmanager-condor-osg_user	OSG 1.2.8
CIT_CMS_T2	cit-gatekeeper2.ultralight.org:2119/jobmanager-condor-default	OSG 1.2.8
CIT_CMS_T2	cit-gatekeeper2.ultralight.org:2119/jobmanager-condor-osg_user	OSG 1.2.8
GridUNESP_CENTRAL	ce.grid.unesp.br:2119/jobmanager-condor-default	OSG 1.2.11
MIT_CMS	ce01.cmsaf.mit.edu:2119/jobmanager-condor-default	OSG 1.2.3
USCMS-FNAL-WC1	cmsosgce3.fnal.gov:2119/jobmanager-condor-default	OSG 1.2.8
FNAL_FERMIGRID	d0cabosg2.fnal.gov:2119/jobmanager-pbs-osg	OSG 1.2.11
FNAL_FERMIGRID	fermigridosg1.fnal.gov:2119/jobmanager-condor-default	OSG 1.2.11
Firefly	ff-grid.unl.edu:2119/jobmanager-pbs-default	OSG 1.2.4
Firefly	ff-grid2.unl.edu:2119/jobmanager-pbs-default	OSG 1.2.4
Firefly	ff-grid3.unl.edu:2119/jobmanager-pbs-default	OSG 1.2.4

…

get_mount_path

- Finds the mount point of the Storage Element on worker nodes

```
[discovery-1.0.6]$ get_mount_path --vo ligo

COMPUTE ELEMENT ID                                                      MOUNT POINT

osg-gw-2.t2.ucsd.edu:2119/jobmanager-condor-default                     /hadoop/ligo
osg-gw-2.t2.ucsd.edu:2119/jobmanager-condor-group_ligo                  /hadoop/ligo
cit-gatekeeper.ultralight.org:2119/jobmanager-condor-cms_monitor        /mnt/hadoop/osg/LIGO
cit-gatekeeper.ultralight.org:2119/jobmanager-condor-default            /mnt/hadoop/osg/LIGO
cit-gatekeeper2.ultralight.org:2119/jobmanager-condor-default           /mnt/hadoop/osg/LIGO
cit-gatekeeper2.ultralight.org:2119/jobmanager-condor-osg_user          /mnt/hadoop/osg/LIGO
ce.grid.unesp.br:2119/jobmanager-condor-default                         /store/ligo
…
```

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get_storage_area

- Finds total and free space, authorized VOs

- Can be used to find public storage areas

```
[discovery-1.0.6]$ get_storage_area

STORAGE ELEMENT ID          STORAGE AREA NAME                TOTAL      FREE       VOs
atlas.bu.edu                Default Storage Area             122984     26264      atlas,cdf,mis,ops,osg
atlas07.cs.wisc.edu         Default Storage Area             0          0          atlas
bsrm-1.t2.ucsd.edu          Default Storage Area             1010185    100463     accelerator,astro,atlas,…
charm.ucr.edu               Default Storage Area             6730       1388       atlas,cdf,cms,engage,…
cit-se.ultralight.org       Default Storage Area             526869     109617     DOSAR,LIGO,alice,atlas,…
cmssrm.fnal.gov             flushPools:replica:online        6984011    1870180    cms,mis
cmssrm.fnal.gov             LFSOnlyPools:replica:online      529440     377902     cms,mis
cmssrm.fnal.gov             ResilientPools:replica:online    428079     195002     cms,mis
cmssrm.fnal.gov             stagePools:custodial:nearline    161695     37560      cms,mis
cmssrm.hep.wisc.edu         black-pools:replica:online       20186      11618      LIGO,atlas,cdf,cms,…
…
```

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Further Info

- OSG Twiki

  - OSG Public Storage

  - Opportunistic Storage

  - OSG Storage Discovery Tool

- Pigeon: http://home.fnal.gov/~dstrain/pigeon

- OSG docdb

  - OSG Public Storage Requirements

  - OSG Public Storage Design

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