



EGEE Grid Hands On Training for MI-SASA Researchers
Mathematical Institute of Serbian Academy of Sciences and Arts

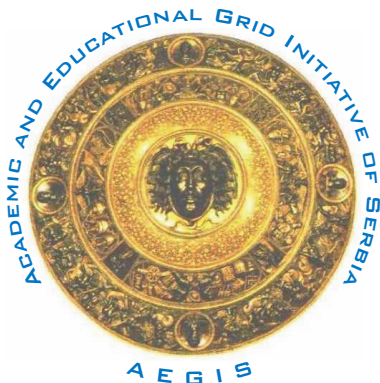
Data Management

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- **Storage elements types**
- **Grid file names**
- **LFC Concept**
- **Data management client tools**
 - File catalogue interaction
 - Replica tools

- **Classic SE (obsolete)**
 - **LCG Disk pool manager**
 - **CASTOR**
 - **dCache**
-
- **Resource management is done through Storage Resource Manager (SRM) interface**
 - Hides the complexity of the resources

- **Grid Unique Identifier (GUID)**
 - Identifies a file uniquely, is of the form:
 - `guid:<36_bytes_unique_string>`
 - `guid:38ed3f60-c402-11d7-a6b0-f53ee5a37e1d`
- **Logical File Name (LFN) or User Alias**
 - Used to refer to a file in human readable form
 - `lfn:/grid/<MyVO>/<MyDirs>/<MyFile>`
 - `lfn:/grid/aegis/vlada/outputs/output1.txt`

- **Storage URL (SURL)**

- Identifies a replica in a SE

- `<sfn | srm>://<SE_hostname>/<some_string>`
 - `srm://se.ipb.ac.rs/dpm/ipb.ac.rs/home/aegis/generated/2010-04-08/fileb3469b96-d956-4062-9662-4da7e203557d`

- **Transport URL (TURL)**

- Valid URI with the necessary information to access a file in a SE

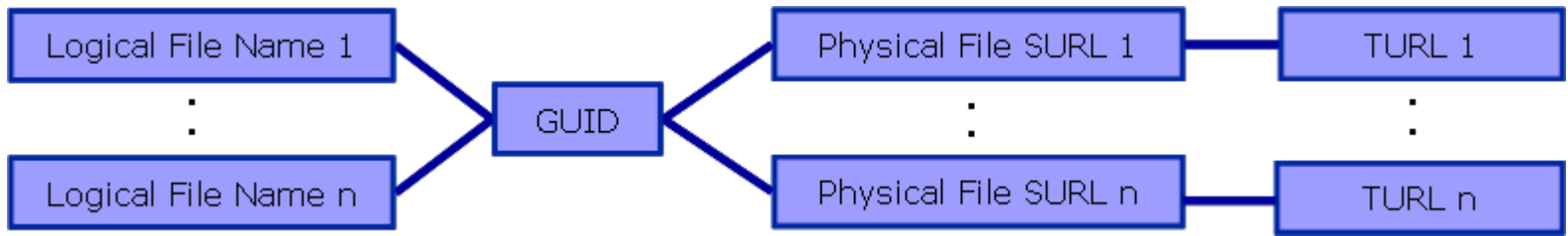
- `<protocol>://<some_string>`
 - `gsiftp://se2.ipb.ac.rs/se2.ipb.ac.rs:/storage8/aegis/2010-04-08/fileb3469b96-d956-4062-9662-4da7e203557d.2015029.0`

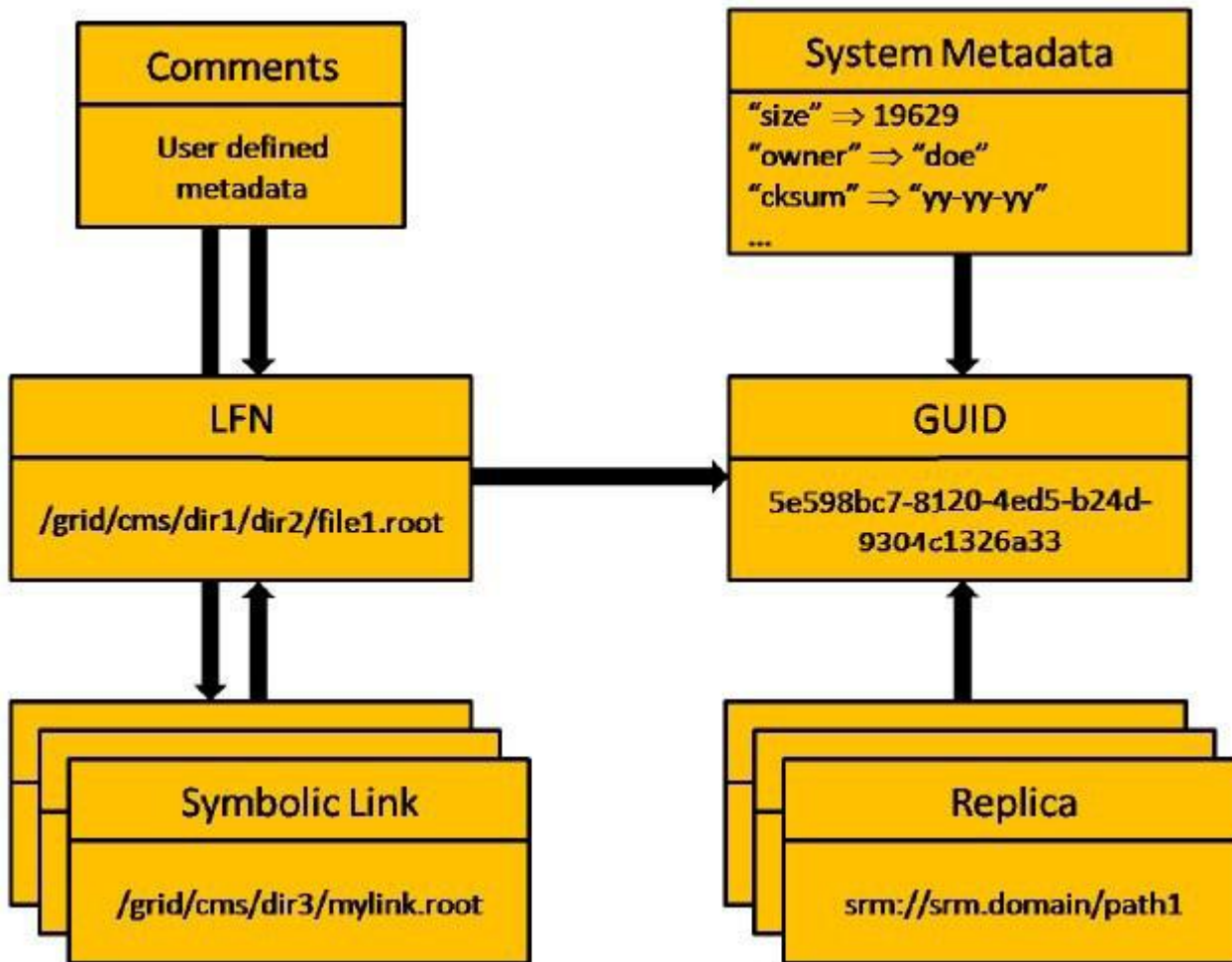
- **LCG File Catalogue (LFC)**

- Maintains mappings between LFN(s), GUID and SURL(s)
- Provides System metadata
- Provides single string user metadata

- **GRID file**

- Both physically present in a SE and registered in the file catalogue
- Files are write-once, read-many
- Files cannot be changed unless remove or replaced





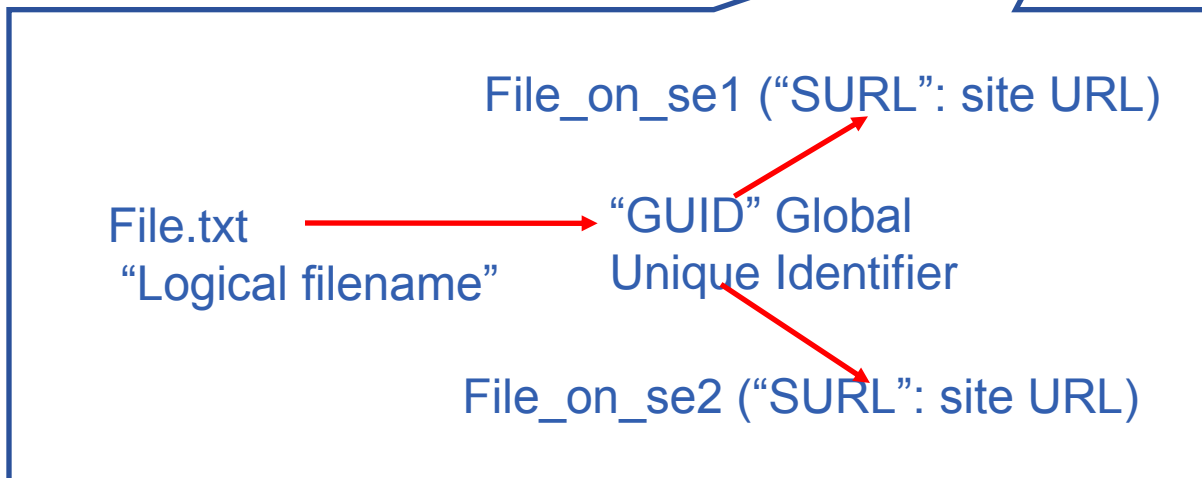
- **Directory structure**
 - /grid/<vo>/<you_create_it>
 - /grid/aegis/vlada
- **All members of given VO have rw permissions in their directory**

“User interface”

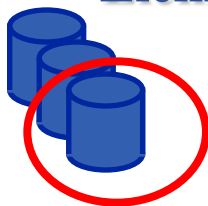


“File.txt”

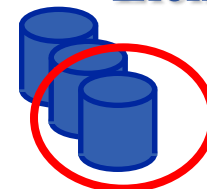
LCG FileCatalogue (LFC)



Storage Element2



Storage Element1



- **Unix like LFC commands:**
 - `echo $LFC_HOST`
 - `lfc-ls` List file/directory entries in a directory
 - `lfc-mkdir` Create directory
 - `lfc-ln` Make a symbolic link to a file/directory
 - `lfc-ls` List file/directory entries in a directory
 - `lfc-chmod` Change access mode of a LFC file/directory
 - `lfc-chown` Change owner and group of a LFC file/directory
 - `lfc-getacl` Get file/directory access control lists
 - `lfc-setacl` Set file/directory access control lists

- **User needs a valid proxy for using these commands**

- **Listing the entries of a LFC directory**

- \$ lfc-ls /grid/aegis/vlada/misanu
result1
result2

- **Creating directories in the LFC**

- \$ lfc-mkdir /grid/aegis/vlada/misanu/new_dir

- \$ lfc-ls -l /grid/aegis/vlada

```
drwxrwxr-x  0 165   101           0 Apr 08 15:53 new_dir
-rw-rw-r--  1 165   101          12 Apr 08 15:51 result1
-rw-rw-r--  1 165   101          18 Apr 08 15:52 result2
```

- **Creation of symbolic links**

- `$ lfc-ln -s /grid/aegis/vlada/misanu/result1 \`
`/grid/aegis/vlada/misanu/result1_link`
- `$ lfc-ls -l /grid/aegis/vlada/misanu/result1_link`

```

rwxrwxrwx 1 165 101 0 Apr 08 16:05
grid/aegis/vlada/misanu/result1_link ->
/grid/aegis/vlada/misanu/result1

```

- **Adding metadata information to LFC entries**

- `$ lfc-setcomment /grid/aegis/vlada/misanu/result2 "best result"`
- `$ lfc-ls --comment /grid/aegis/vlada/misanu/result2`
`/grid/aegis/vlada/misanu/result2 best result`

- **Removing LFNs from the LFC**
 - `$ lfc-rm -r /grid/aegis/vlada/misanu/novi_dir`
- **Print the ACL of a directory**
 - `$ lfc-getacl /grid/aegis/vlada/misanu`
 - `# file: /grid/aegis/vlada/misanu`
 - `# owner: /C=RS/O=AEGIS/OU=Institute of Physics`
`Belgrade/CN=Vladimir Slavnic`
 - `# group: aegis`
 - `user::rwx`
 - `group::rwx #effective:rwx`
 - `other::r-x`
 - `default:user::rwx`
 - `default:group::rwx`
 - `default:other::r-x`

- **LCG Data Management tools (lcg_util)**
- **High level tools**
- **Hide the complexities of catalogue and SEs interaction**
- **CLI, API**

- **Check environment**

- `echo $LCG_GFAL_INFOSYS`
- `echo VO_<VO>_DEFAULT_SE`

- `lcg-cp` Copies a Grid file to a local destination (download)
- `lcg-cr` Copies a file to a SE and registers the file in the catalogue (upload)
- `lcg-del` Deletes one file (either one replica or all replicas)
- `lcg-rep` Copies a file from one SE to another SE and registers it in the catalogue (replicate)
- `lcg-gt` Gets the TURL for a given SURL and transfer protocol

- lcg-aa Adds an alias in the catalogue for a given GUID
- lcg-ra Removes an alias in the catalogue for a given GUID
- lcg-rf Registers in the catalogue a file residing on an SE
- lcg-uf Unregisters in the catalogue a file residing on an SE
- lcg-la Lists the aliases for a given LFN, GUID or SURL
- lcg-lr Lists the replicas for a given LFN, GUID or SURL
- lcg-ls Lists file information for given SURLs or LFNs

- **Upload a file**

- `$ lcg-cr file:/home/vlada/misanu/mpi.jdl`
`guid:830e7a82-f9fb-4c04-aafd-e24a5f25acdb`

- **Specify lfn:**

- `$ lcg-cr -l lfn:/grid/aegis/vlada/misanu/mpi \`
`file:/home/vlada/misanu/mpi.jdl`
`guid:25fdcd16-bc76-4458-9c1a-8c597fb33194`

- **Replicate a file (one replica per SE)**

- `$ lcg-rep -d grid15.rcub.bg.ac.rs lfn:/grid/aegis/vlada/misanu/mpi`

- **List replicas**

- \$ lcg-lr lfn:/grid/aegis/vlada/misanu/mpi

```
srm://grid15.rcub.bg.ac.rs/dpm/rcub.bg.ac.rs/home/aegis/generated/2010-04-08/file531a6e7f-ab4a-4a9b-bb9f-a2d9a693e615
```

```
srm://se.ipb.ac.rs/dpm/ipb.ac.rs/home/aegis/generated/2010-04-08/fileb3469b96-d956-4062-9662-4da7e203557d
```

- **Copying files out of the Grid (download)**

```
$ lcg-cp lfn:/grid/aegis/vlada/misanu/mpi \
file:/home/vlada/misanu/mpi
```

- **Deleting replicas**

- lcg-del \

```
srm://grid15.rcub.bg.ac.rs/dpm/rcub.bg.ac.rs/home/aegis/generated/2010-04-08/file531a6e7f-ab4a-4a9b-bb9f-a2d9a693e615
```

- \$ lcg-del -a lfn:/grid/aegis/vlada/misanu/mpi

- **List guid**

- `$ lcg-lg lfn:/grid/aegis/vlada/misanu/mpi`
`guid:25fdcd16-bc76-4458-9c1a-8c597fb33194`

- **Listing files and directories**

- `$ lcg-ls -l lfn:/grid/aegis/vlada/misanu/`

```
-rw-rw-r-- 1 165 101 606 mpi
-rw-rw-r-- 1 165 101 12 result1
-rw-rw-r-- 1 165 101 12 result1_link
-rw-rw-r-- 1 165 101 18 result2
```

- <https://edms.cern.ch/file/722398/1.3/gLite-3-UserGuide.pdf>
- http://wiki.egee-see.org/index.php/SEE-GRID_Wiki