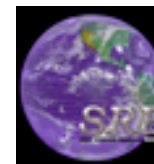


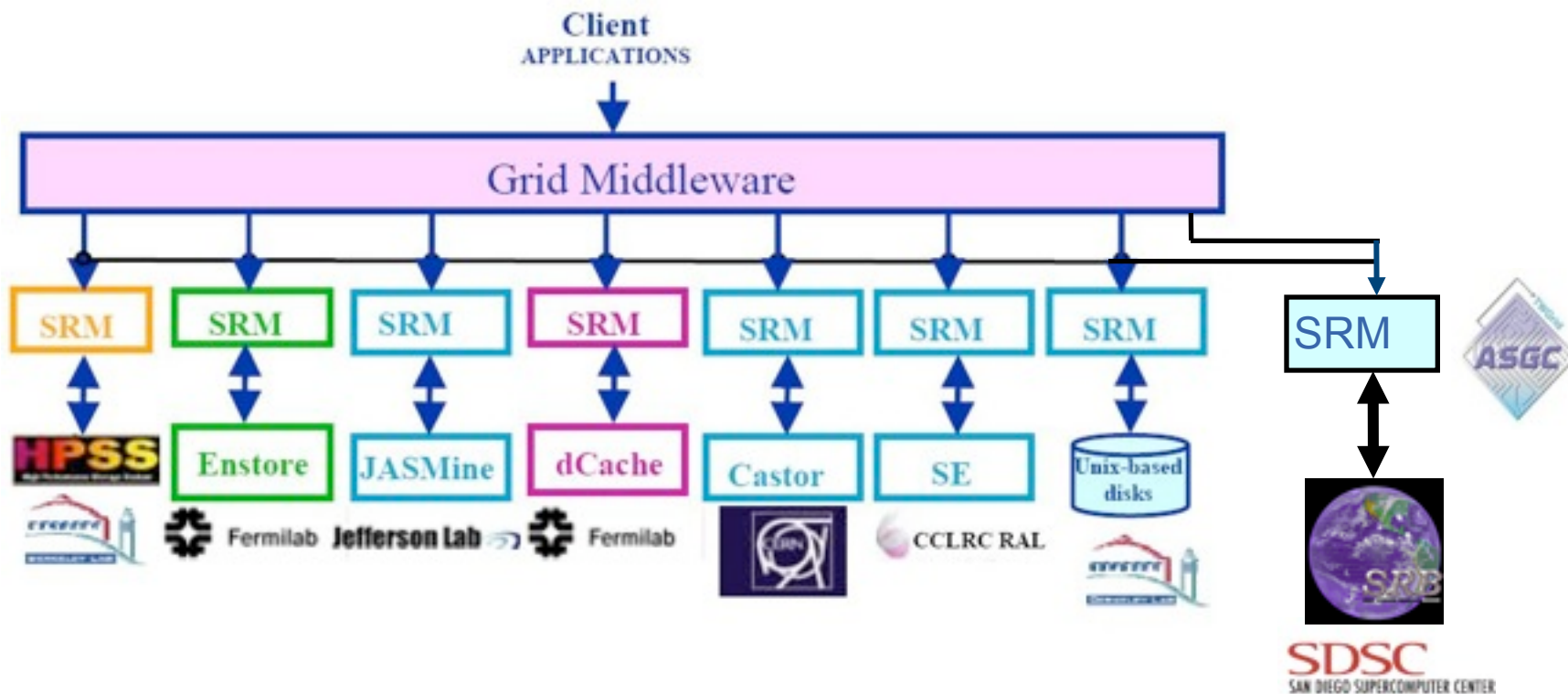
Grid Interoperation: SRM-SRB Development



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- **Overview**
- **Architecture**
- **Progress**
- **Future Plan**
- **Conclusions**

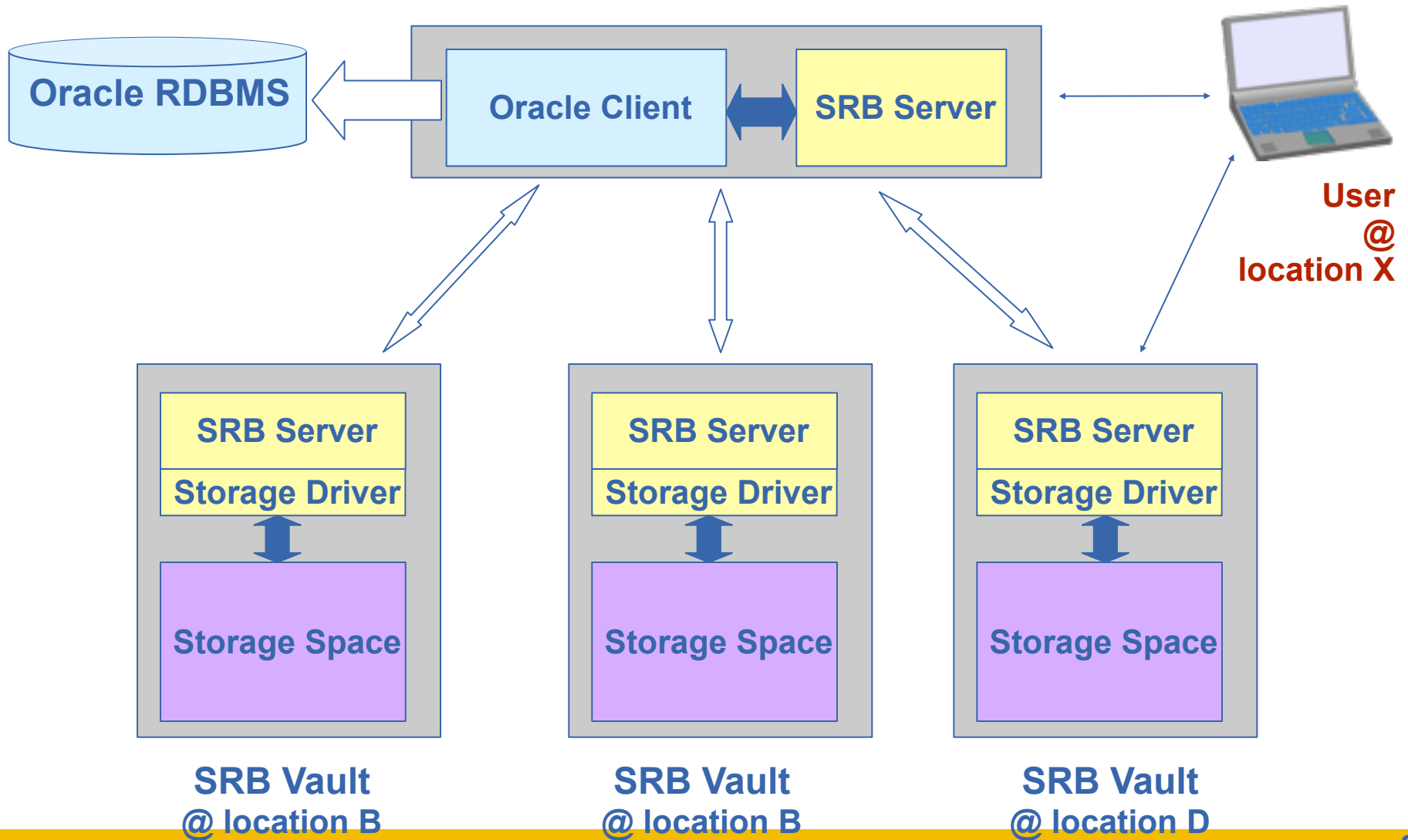


- **SRM is an unique interface for accessing different backend storages for different middleware.**
- **Easy to develop applications to adapt different backend storages.**
- **Provide space and file management on the storage system.**
- **SRM is the web service interface and the implementation usually depends on the backend storage technology.**

- **Storage Elements (SE) can use different type of technologies**
 - **CASTOR, dCache, DPM, BeStMan,...,etc.**
 - **DRM (Disk Resource Manager)/TRM (Tape Resource Manager) /HRM (Hierarchical Resource Manager)**
- **Grid middleware needs to access files with an uniform interface**
 - **Manage storage resources**
 - **Not a file transfer protocol**

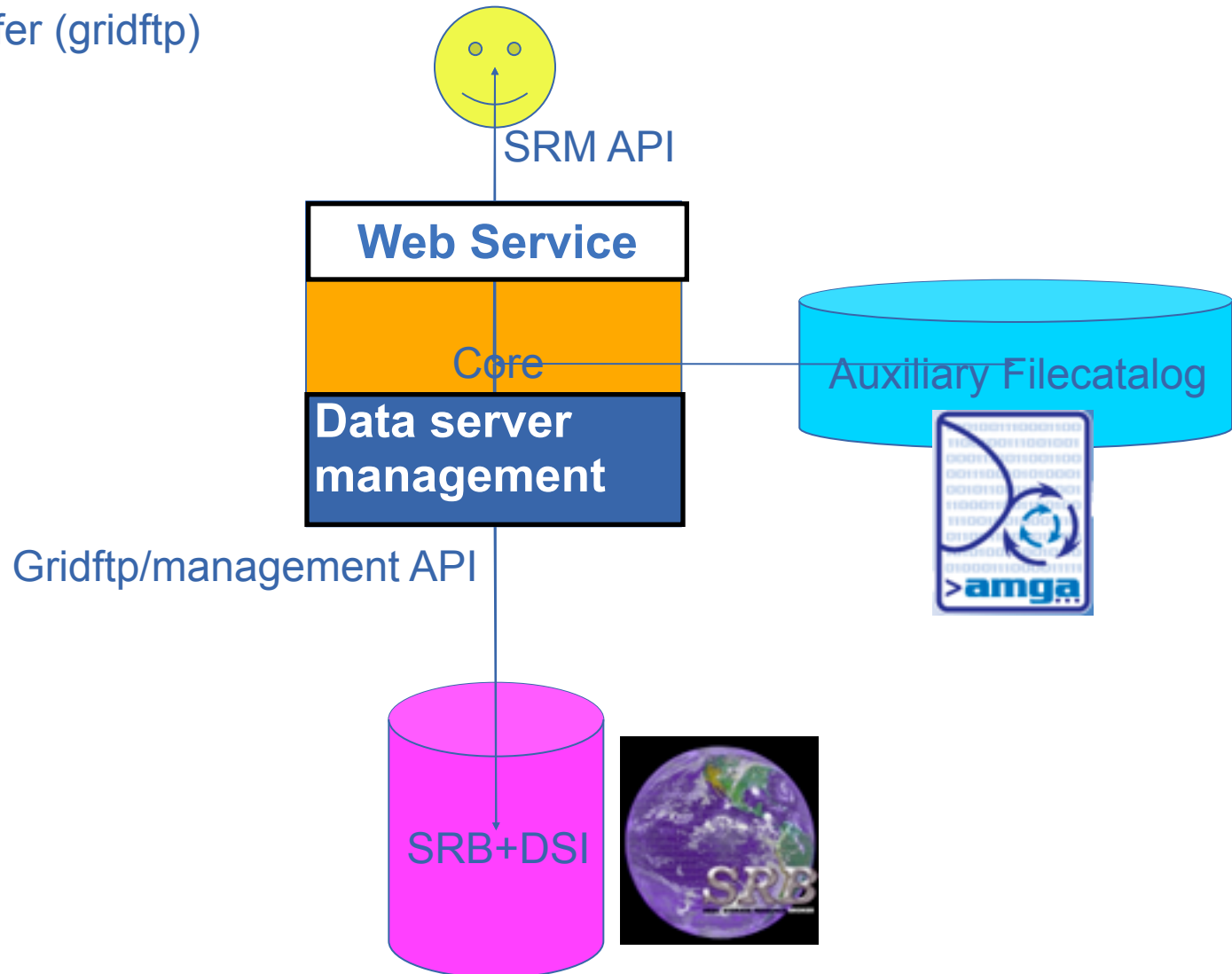
- **Provides space management**
- **Provides an uniform access interface**
- **Manages DRM/Tape/HRM**
- **Does not transfer files itself.**
- **Manage the life time of file**

- **Developed by San Diego Supercomputer Center**
- **A distributed file management system (Data Grid), based on a client-server architecture.**
- **Allows users to access files seamlessly across a distributed environment, based upon their attributes rather than just their names or physical locations.**
- **It replicates, syncs, archives, and connects heterogeneous resources in a logical and abstracted manner.**



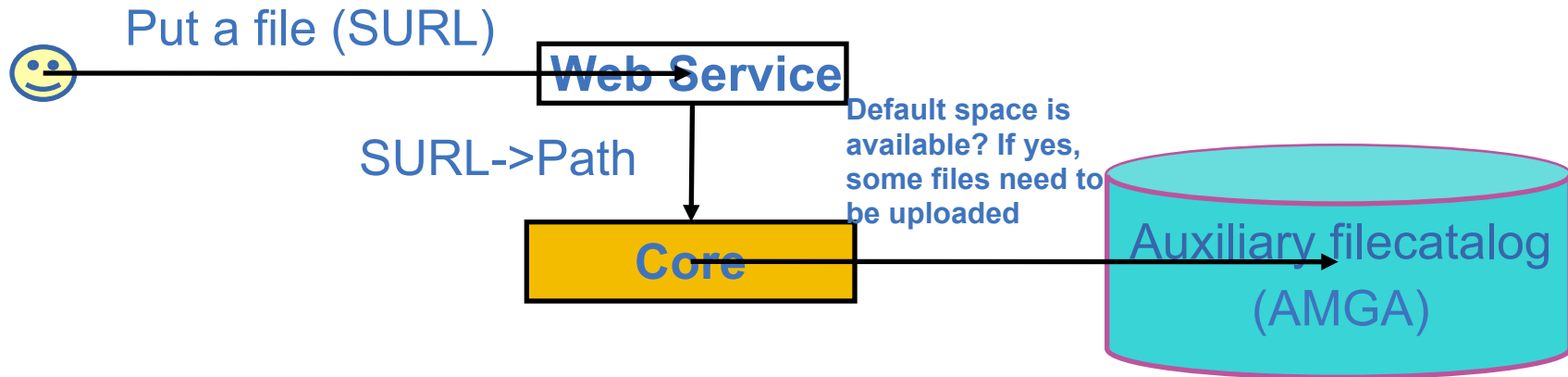
Users/applications

File transfer (gridftp)



- **AMGA server, it stores partial filecatalog, resource and SRB host information...**
 - **Users Information**
 - **Resources Information**
 - **Files Information**
 - **Space Metadata**
 - **Resource States**
 - ...





Data server management

MES Server
(GSI enabled)

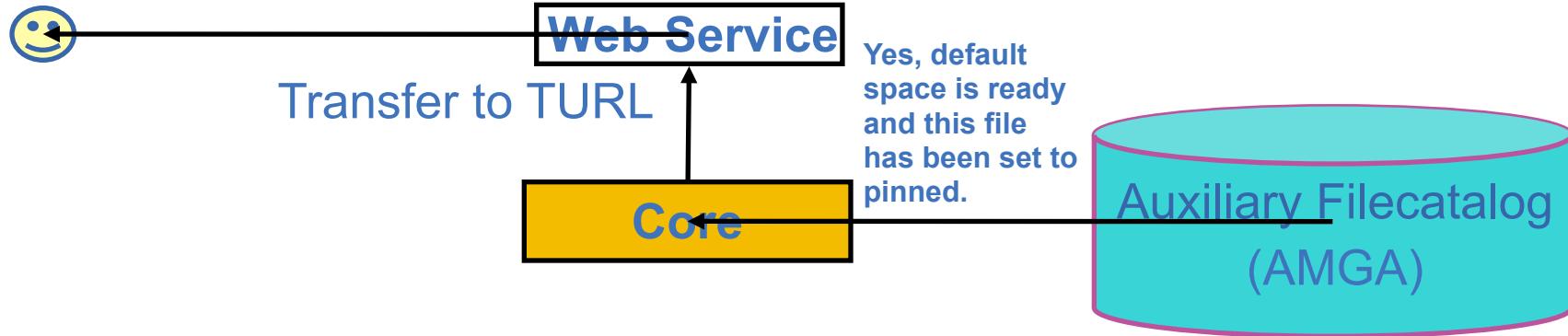
Non MES
(+DSI)

Non MES
(+DSI)

Non MES+DSI

SRB storage space

Return TURL

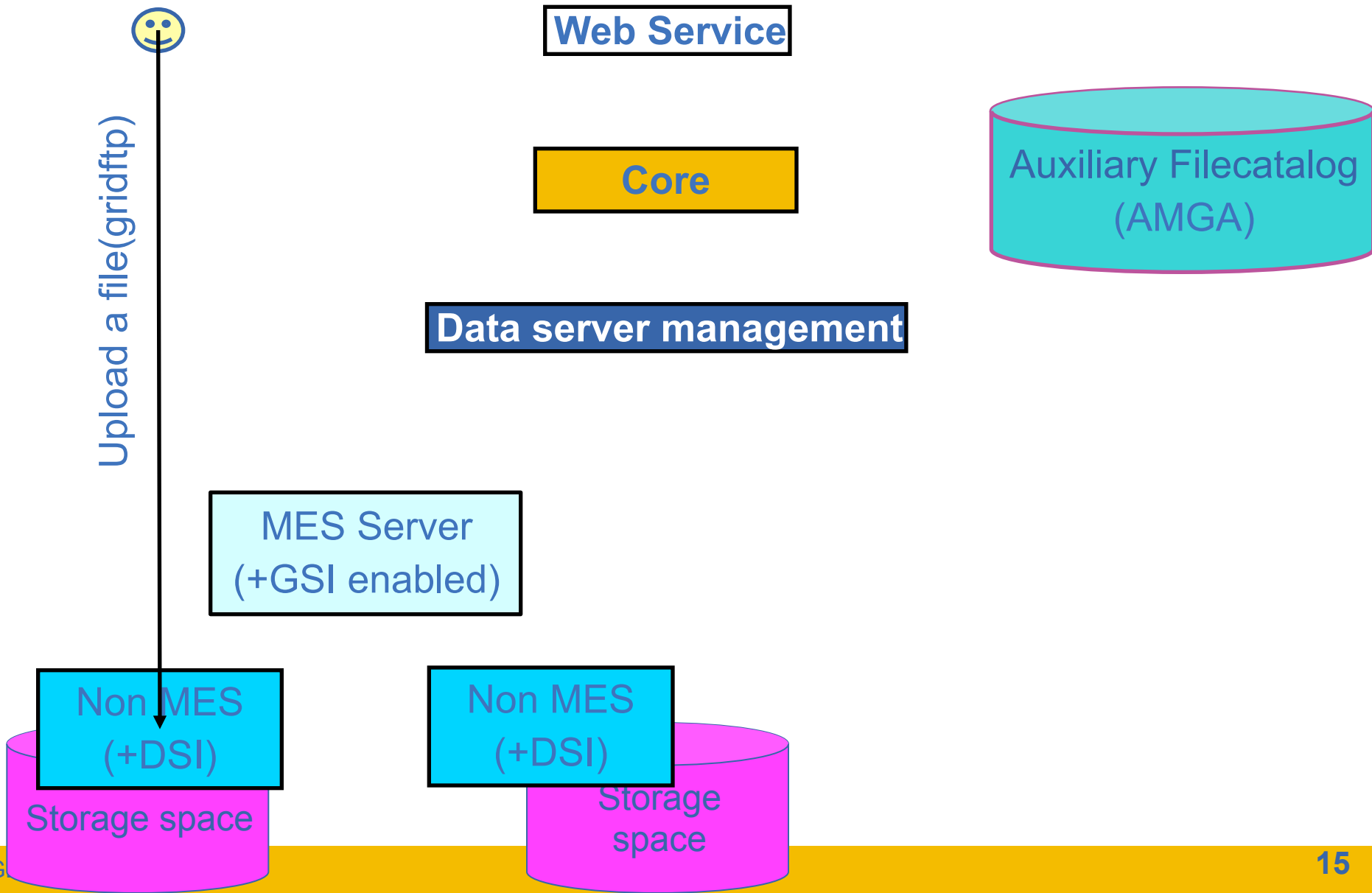


Data server management

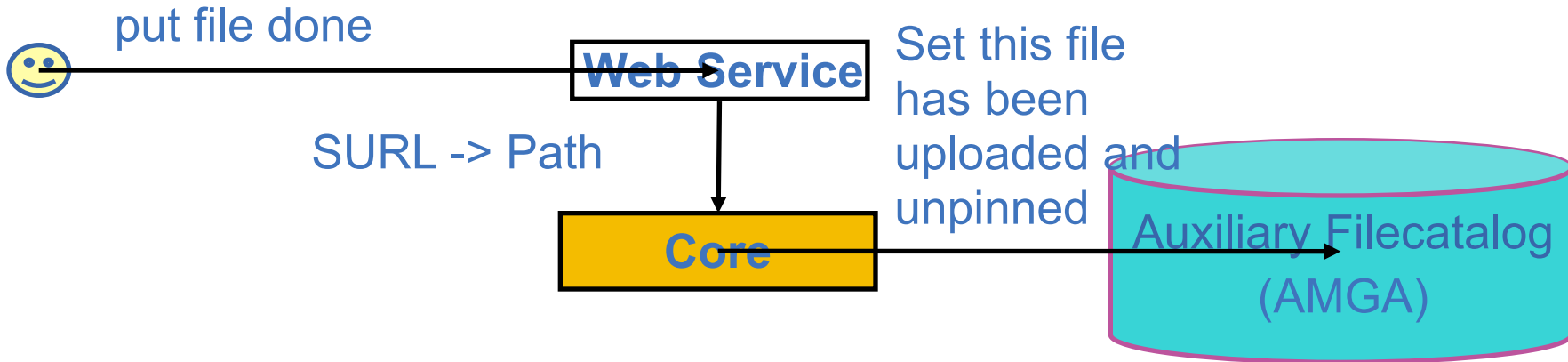
MES Server
(GSI enabled)

Non MES (+DSI)
Non MES+DSI

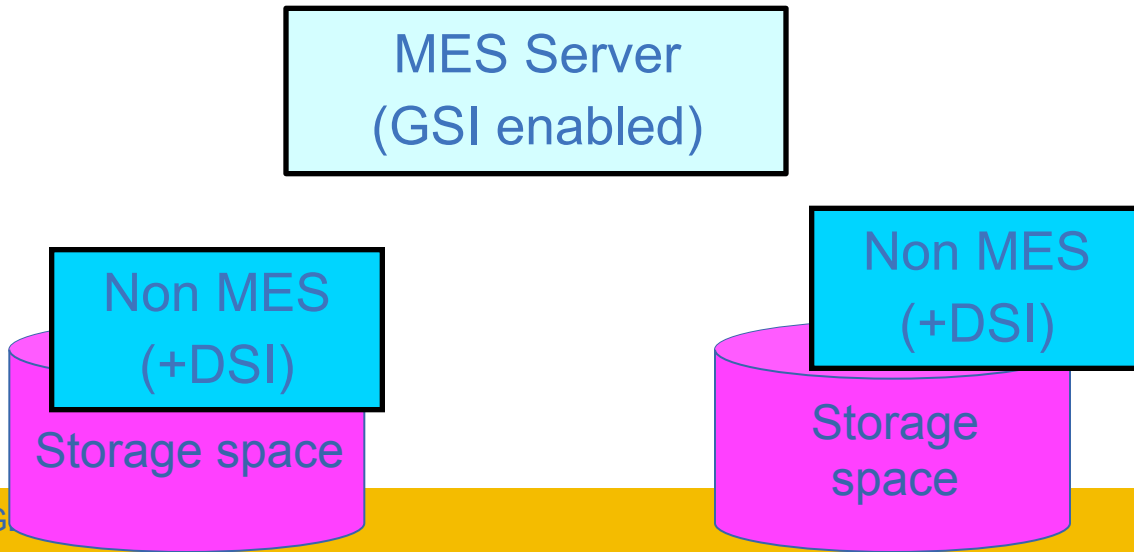
Non MES (+DSI)
SRB storage space

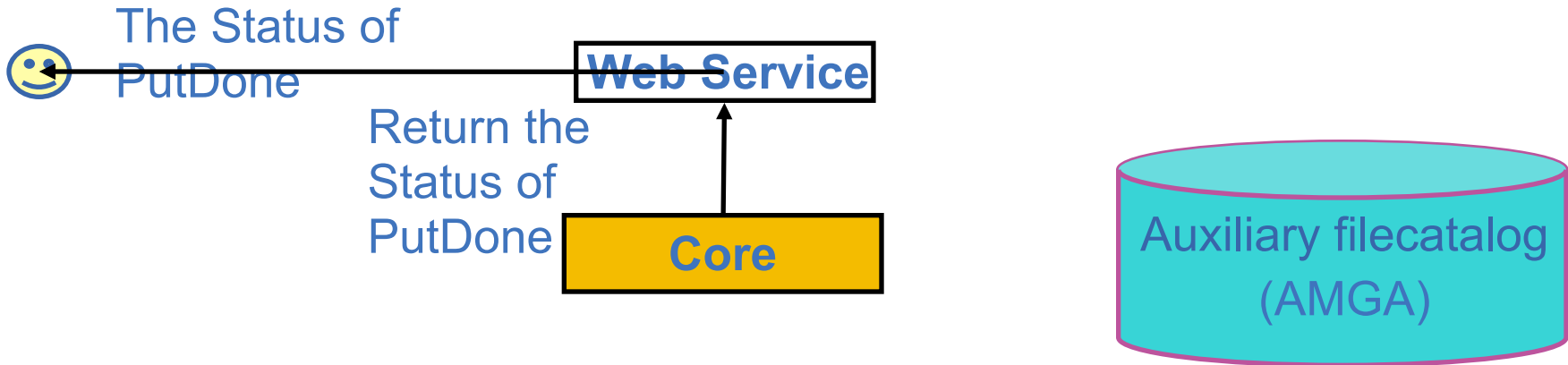


Architecture Overview (cont.)

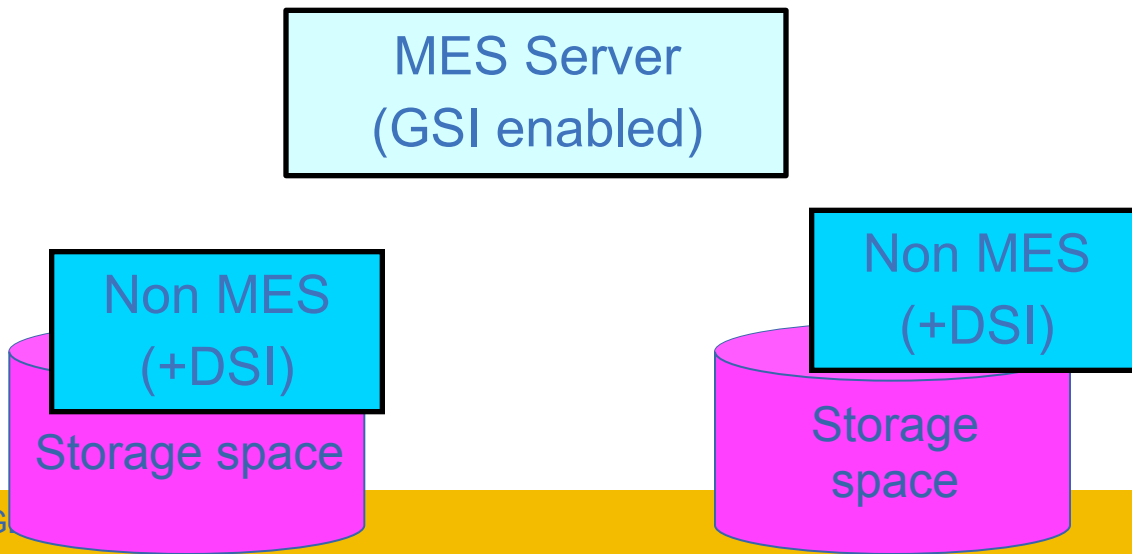


Data server management



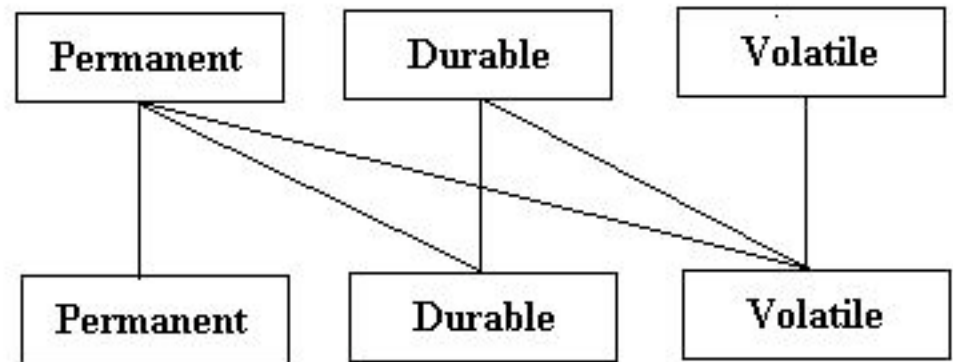


Data server management



- SRM system has a caching mechanism and has to take care of SRM issues like file lifetime, space management, ..., etc.

- Volatile space
- Durable space
- Permanent space



- In our implementation

- Use AMGA as auxiliary catalog and record all space usage, space type, and some file metadata inside.

- **How to get the disk usage of the space?**
 - Need to know the free and used space on SRB server
 - SRB does not provide the mechanism to monitor resource usage
 - We need to know the usage
 - Space management
- **In our implementation**
 - **InfoServer:**
 - Deployed on non-MCAT enabled SRB server
 - **SRBInfoServer:**
 - Deployed on MCAT-enabled SRB server



Web Service

Core



Update all resource information

Data server management

Query SRBInfoServer

SRBInfoServer

Query InfoServer

Query InfoServer

MES Server
(GSI enabled)

InfoServer

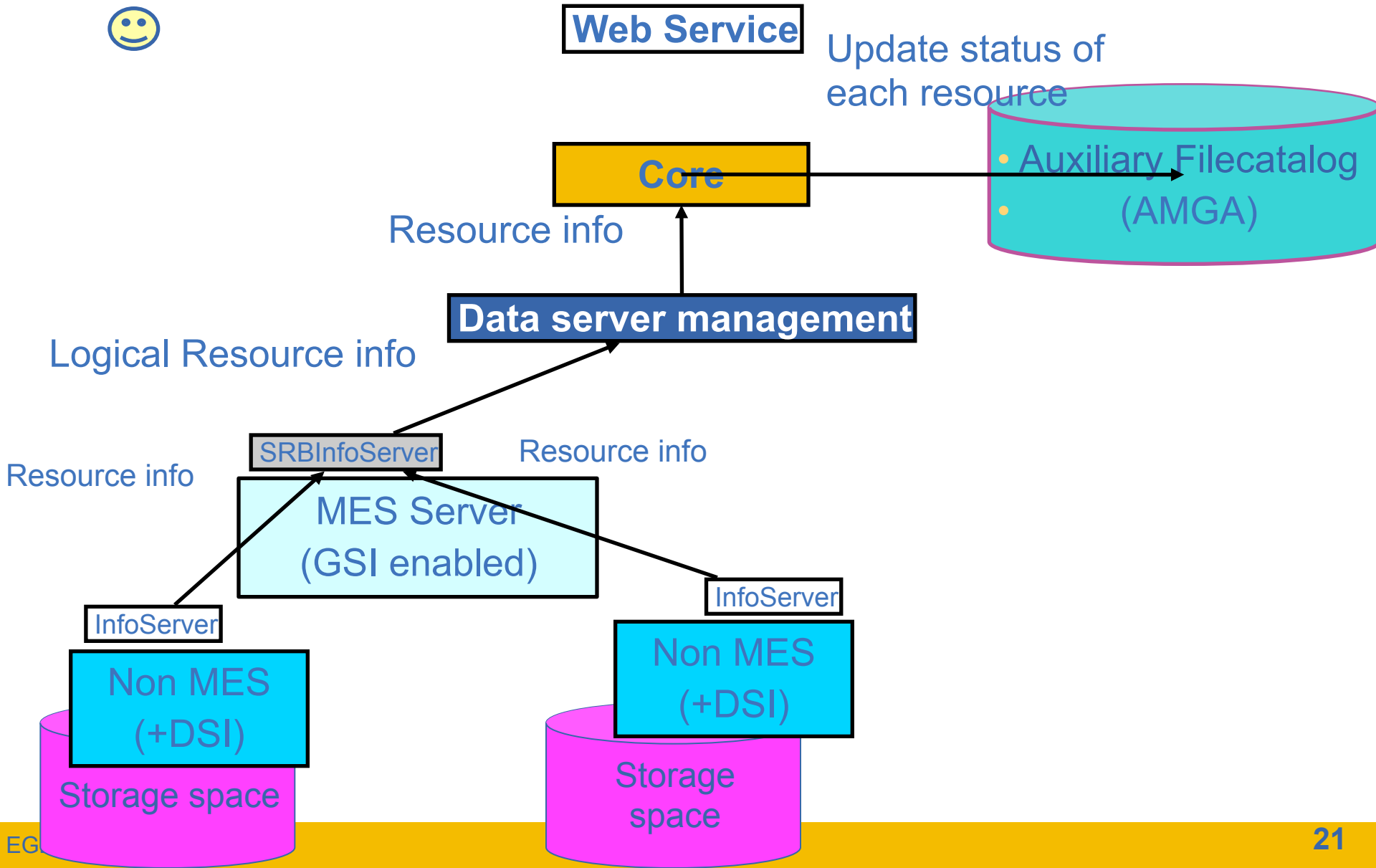
InfoServer

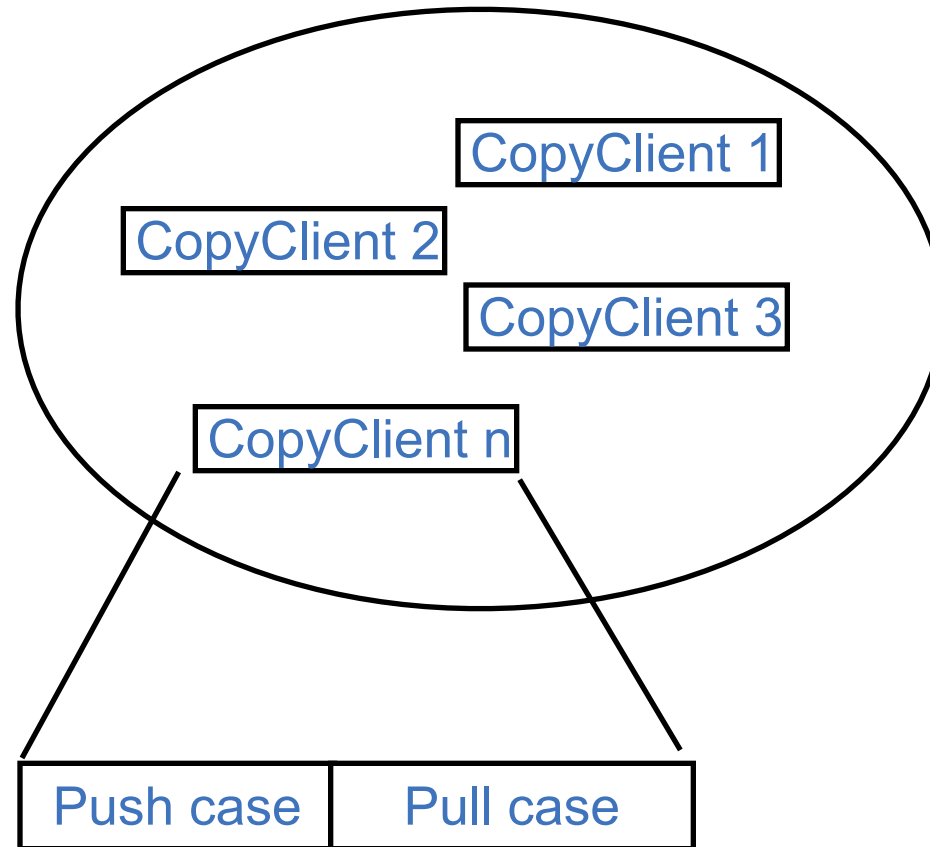
Non MES
(+DSI)

Non MES
(+DSI)

Storage space

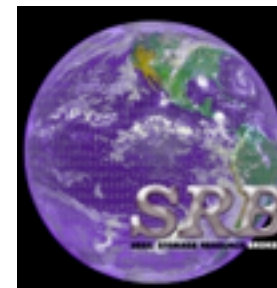
Storage space





- **Space Management Functions**
 - **srmReserveSpace**
 - **srmReleaseSpace**
 - **srmUpdateSpace**
 - **srmGetSpaceMetaData**
 - **srmChangeSpaceForFiles**
 - **srmGetSpaceTokens**
- **Permission Functions**
 - **srmSetPermission**
 - **srmCheckPermission**
 - **srmGetPermission**
- **Directory Functions.**
 - **srmMkdir**
 - **srmRmdir**
 - **srmRm**
 - **srmLs**
 - **srmMv**
- **Data Transfer Functions**
 - **srmPrepareToGet**
 - **srmBringOnline**
 - **srmPrepareToPut**
 - **srmCopy**
 - **srmStatusOfCopyRequest**
 - **srmReleaseFiles**
 - **srmPutDone**
 - **srmAbortRequest**
 - **srmSuspendRequest**
 - **srmResumeRequest**
 - **srmGetRequestSummary**
 - **srmGetRequestTokens**
- **Discovery Functions**
 - **srmGetTransferProtocols**
 - **srmPing**

- **Internal space management functions**
 - Use a thread to recycle expired space
- **More async operation**
 - **Space functions**
 - srmReserveSpace, srmStatusOfReserveSpaceRequest
 - srmUpdateSpace, srmStatusOfUpdateSpaceRequest
 - srmChangeSpaceForFiles, srmStatusOfChangeSpaceForFilesRequest
 - **Transfer functions**
 - srmBringOnline, srmStatusOfBringOnlineRequest
 - srmPrepareToGet, srmStatusOfGetRequest
 - srmPrepareToPut, srmStatusOfPutRequest
 - srmAbortRequest, srmAbortFiles, srmResumeRequest, srmSuspendRequest, srmGetRequestSummary, srmGetRequestToken
- **Transfer to SRM-IRODS Interface**



- **Implement the SRM functions for SRB based on SRM v2.2**
- **Built on a GridFTP server, an AMGA Server developed for SRB, to make an SRB look like a Classic Storage Element.**
- **Allowed the gLite tools to transfer files between SRMs and SRBs**
- **Next, the interoperation between SRB and DPM, dCache, Castor, etc. would be realized.**

Thank you