

Metadata Management with AMGA

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Workshop CCR e INFN Grid

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- **Why Metadata on the Grid**
- **AMGA Features**
- **Use cases**
- **gLibrary: digital libraries on the Grid**

Why Grid needs Metadata?

- Grids allow to save **millions of files** spread over several storage sites.
- Users and applications need an efficient mechanism
 - to **describe** files
 - to **locate** files based on their contents
- This is achieved by
 - associating descriptive attributes to files
 - Metadata is **data about data**
 - answering user queries against the associated information

Entry names

<i>Entry names</i>	Title	Ru	Cast	LFN
8c3315c1-811f-4823-a778-60a203439689	My Best Friend's	80	Julia Roberts	lfn:/grid/gilda/movies/mybfwed.avi
51a18b7a-fd21-4b2c-aa74-4c53ee64846a	Spider-man 2	120	Kirsten Dunst	lfn:/grid/gilda/movies/spiderman2.avi
401e6df4-c1be-4822-958c-ce3eb5c54fcb	The God Father	113	Al pacino	lfn:/grid/gilda/movies/godfather.avi

Attribute

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Collection /trailers

Entries

Metadata service on the Grid

- **Information about files -- but not only!**

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- metadata can **describe** any grid entity/object
 - ex: JobIDs - add logging information to your jobs

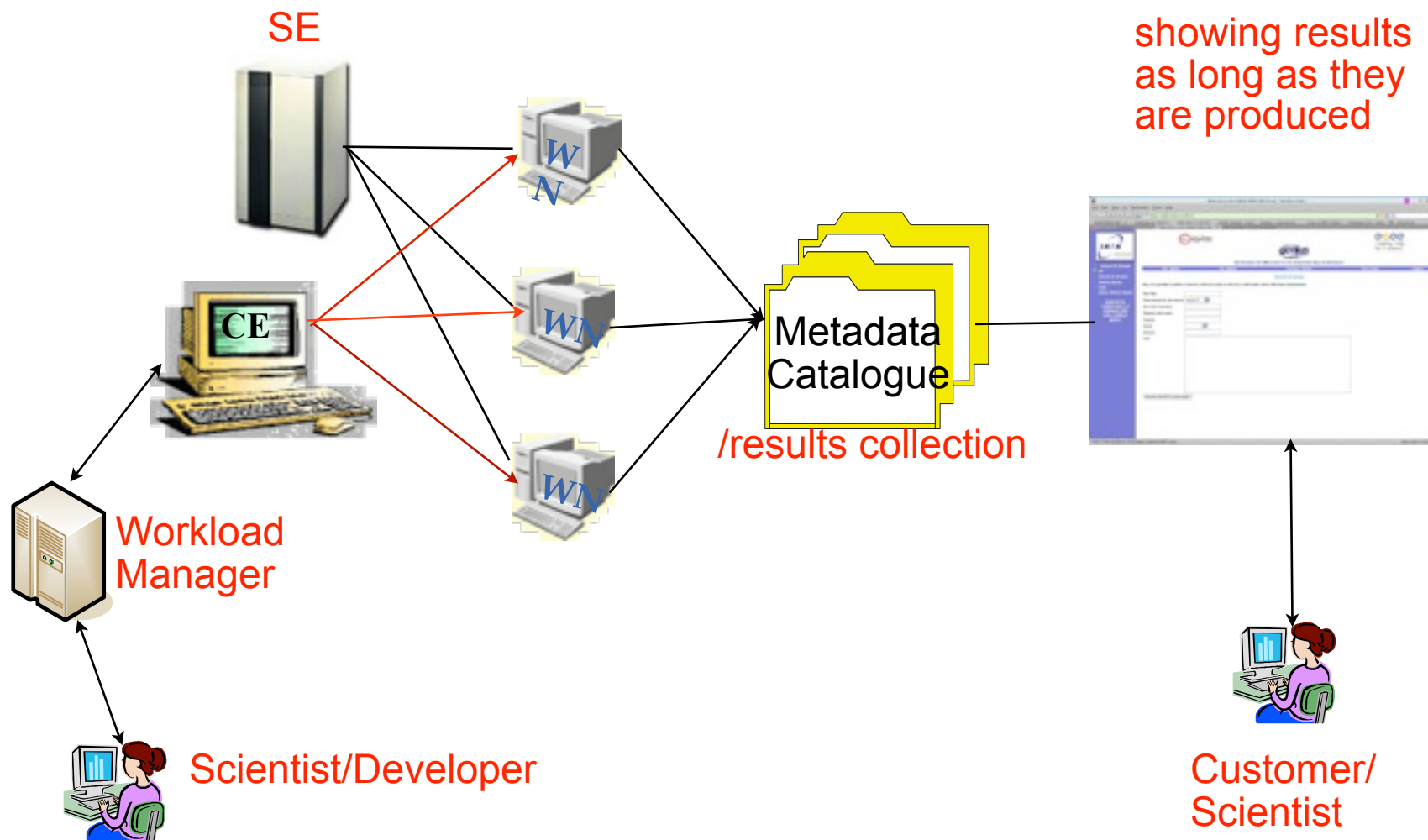
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- **Simplified DB access** on the grid
 - Grid applications that needs structured data can model their data schemas as metadata

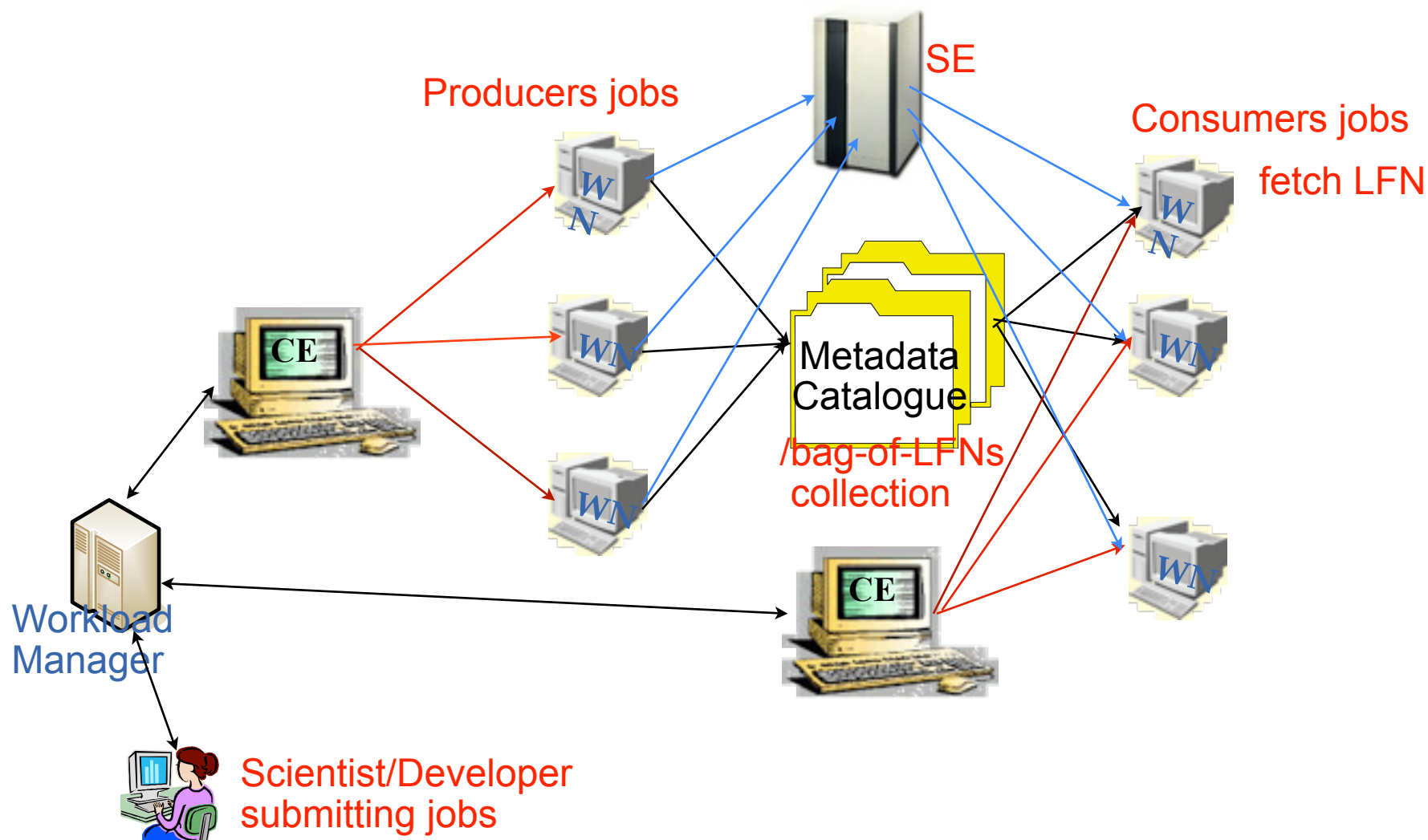
Monitoring of running application



- **/grid/my_simulation/input**

entry	x1	x2	y1	y2	step	isTaken	found	output
1	9453.1	9453.32	-439.93	-439.91	0.0006	JobID1234	No pillars	
2	9342.13	3435	3423	2343.2	0.003	No		
3	34254.3	342342	432.43	132	0.002	No		
..... and so on								

- **This collection lists all the parameter set to be run on the Grid**
- **On the WN, one of the inputset is selected and “isTaken” is set = JOB_ID of the job that has fetched it**
- **Results is also written in the “found” column to monitor the simulation**
 - so users can check the simulation from a UI, querying the metadata server, or from a WebPage (using APIs for ex)
- **StdOutput can be copied also into the “output” text column**



- **Official metadata service for the gLite middleware**
 - but no dependencies from gLite software
 - **it can be used with other grid technologies/other environments**
- **AMGA: Arda Metadata Grid Application**
- **Provide a complete but simple interface**, in order to make all users able to use it easily.
- **Designed with scalability** in mind in order to deal with **large number of entries**
 - based on a lightweight and streamed text-based protocol, like HTTP/SMTP
- **Grid security** is provided to grant **different access levels** to different users.
- **Flexible** with support to dynamic schemas in order to serve several application domains
- **Simple installation by tar source, RPMs or Yum/YAIM**

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- **VOMS support:**
 - VO attribute maps to defined AMGA user
 - VOMS Role maps to defined AMGA user
 - VOMS Group maps to defined AMGA group

- **C++ multiprocess server**

- **Backends**

- ☞ Oracle, MySQL 4/5, PostgreSQL, SQLite

- **Front Ends**

- ☞ **TCP text streaming**

- *High performance*
 - *Client API for C++, Java, Python, Perl, PHP*

- ☞ **SOAP (deprecated)**

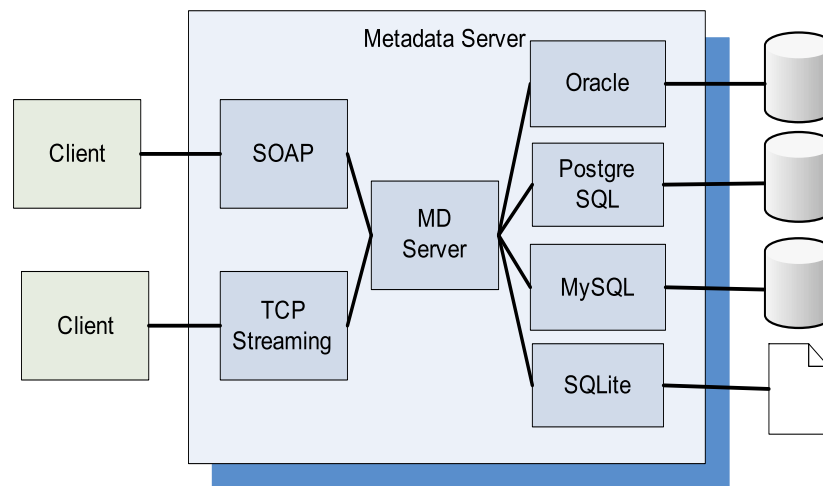
- *Interoperability*
 - *Scalability*

- ☞ **WS-DAIR Interface (new in AMGA 2.0)**

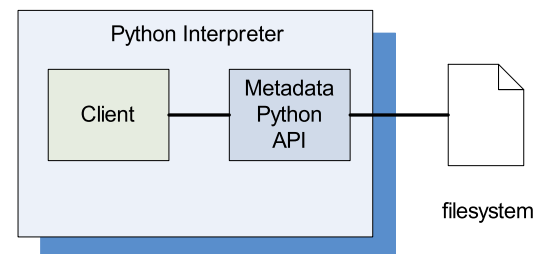
- *WS-enable environment*

- **Standalone Python Library implementation**

- Data stored on file system

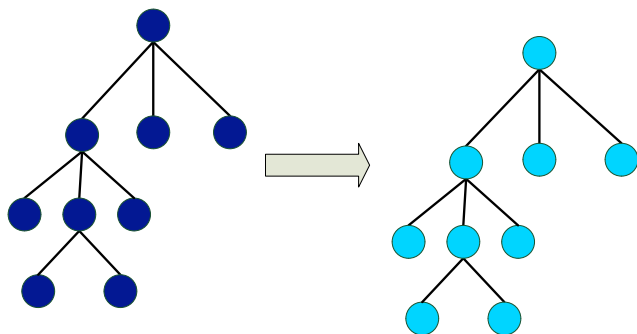


- AMGA server runs on SLC3/4, Fedora Core, Gentoo, Debian

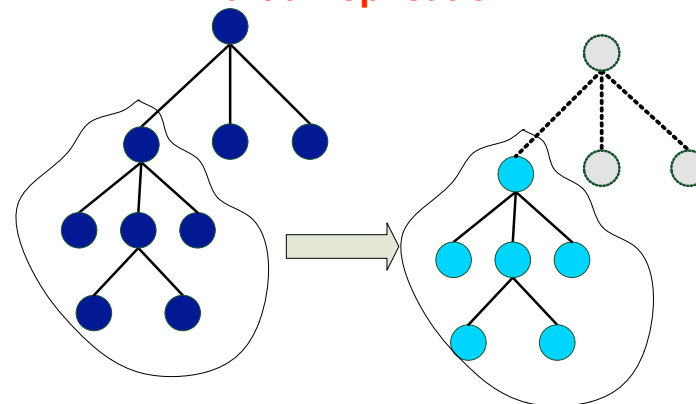


Metadata Replication: Use cases

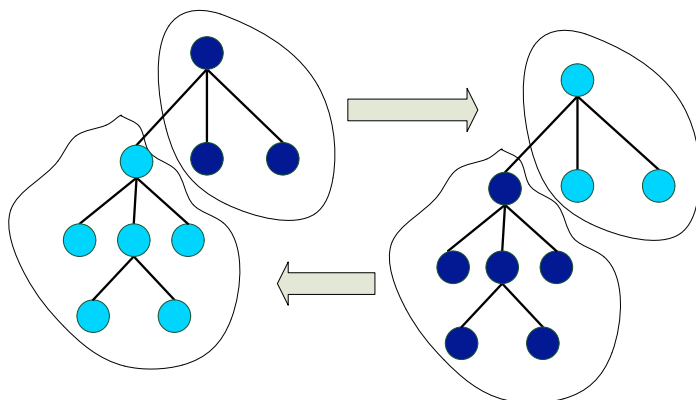
Full replication



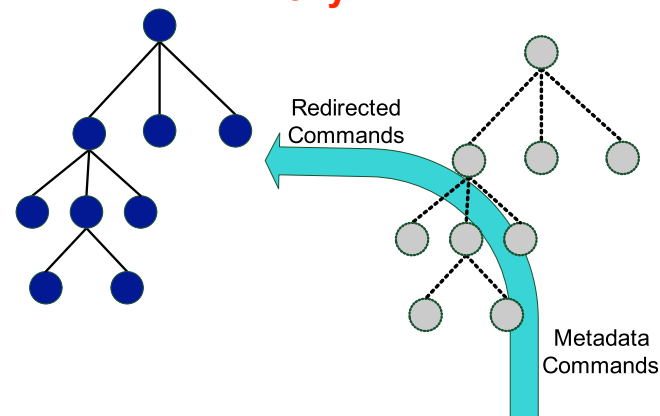
Partial replication



Federation



Proxy



- Since AMGA 1.2.10, a new **import** feature allow to access existing DB table
- Once imported into AMGA the tables from one or more DBs you want to access through AMGA, you can exploit many of the features brought to you by AMGA for your existing tables
- **Advantages:**
 - your db tables can be accessed by grid users/applications, using grid authentication (VOMS proxies)/authorization with ACLs
 - exploiting AMGA federation features you can access several databases together from the Grid

- **Objective:**
 - implement native SQL query processing functionality in AMGA
- **Current Status:**
 - direct SQL data statement in SQL92 Entry Level has been implemented in the 1.9 release
 - Including 4 statements: SELECT, DELETE, UPDATE and INSERT
 - ALL SQL commands should be issued in UPPERCASE
- **Entry name:**
 - when a new entry is created with addentry/addentries, a name has to be assigned (filling the “file” column in the AMGA db backend)
 - in the INSERT implementation, it's filled automatically with a random guid

Early adopters of AMGA

- **LHCb-bookkeeping**
 - Migrated bookkeeping metadata to ARDA prototype
 - 20M entries, 15 GB
 - Large amount of static metadata
 - Feedback valuable in improving interface and fixing bugs
 - AMGA showing good scalability

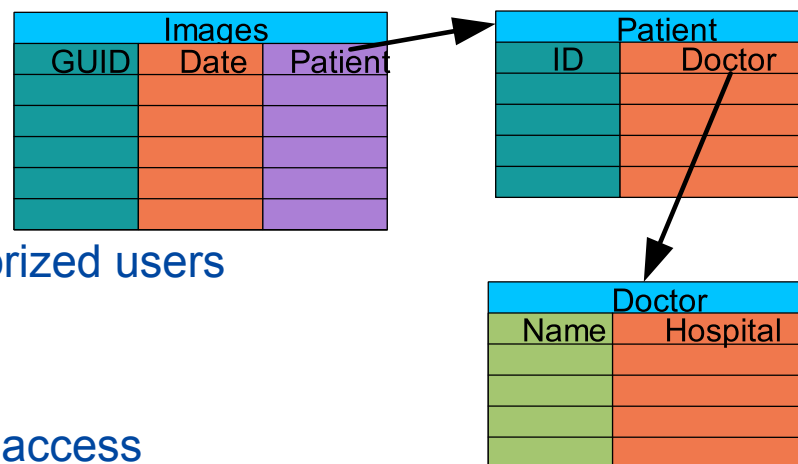
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- **Ganga**
 - Job management system
 - Developed jointly by Atlas and LHCb
 - Uses AMGA for storing information about job status
 - Small amount of highly dynamic metadata

- **Medical Data Manager – MDM**

- Store and access medical images and associated metadata on the Grid
- Built on top of gLite 1.5 data management system
- Demonstrated at last EGEE conference (October 05, Pisa)

- **Strong security requirements**

- Patient data is sensitive
- Data must be encrypted
- Metadata access must be restricted to authorized users



- **AMGA used as metadata server**

- Demonstrates authentication and encrypted access
- Used as a simplified DB

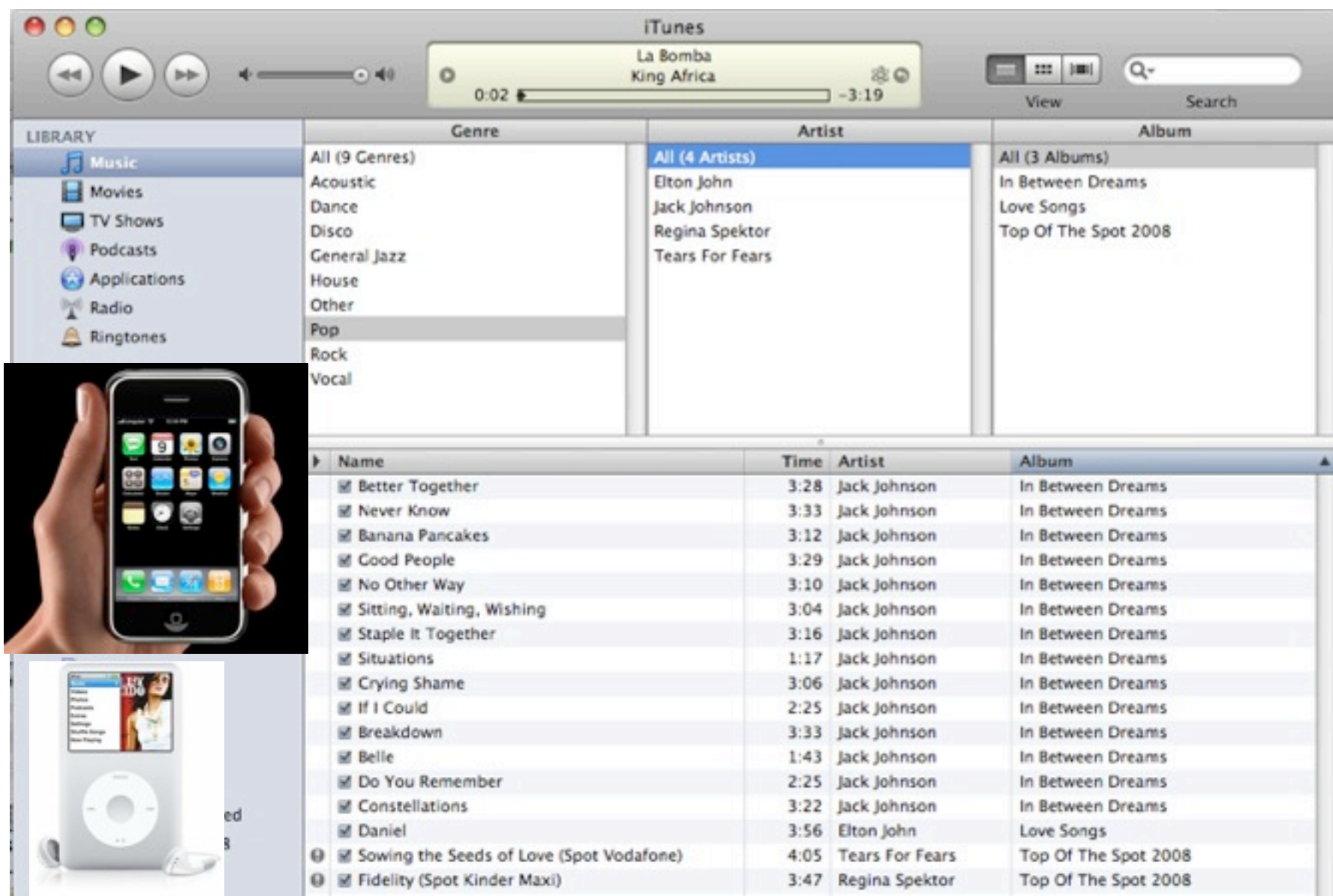
- **More details at**

- <https://uimon.cern.ch/twiki/bin/view/EGEE/DMEncryptedStorage>

- INFN-developed tool totally gLite based
- It allows to **store, organize, search** and **retrieve** digital assets on a Grid environment with an intuitive front-end
- What we mean by **Digital Assets**:



gLibrary as the iTunes for the Grid



Name	Time	Artist	Album
<input checked="" type="checkbox"/> Better Together	3:28	Jack Johnson	In Between Dreams
<input checked="" type="checkbox"/> Never Know	3:33	Jack Johnson	In Between Dreams
<input checked="" type="checkbox"/> Banana Pancakes	3:12	Jack Johnson	In Between Dreams
<input checked="" type="checkbox"/> Good People	3:29	Jack Johnson	In Between Dreams
<input checked="" type="checkbox"/> No Other Way	3:10	Jack Johnson	In Between Dreams
<input checked="" type="checkbox"/> Sitting, Waiting, Wishing	3:04	Jack Johnson	In Between Dreams
<input checked="" type="checkbox"/> Staple It Together	3:16	Jack Johnson	In Between Dreams
<input checked="" type="checkbox"/> Situations	1:17	Jack Johnson	In Between Dreams
<input checked="" type="checkbox"/> Crying Shame	3:06	Jack Johnson	In Between Dreams
<input checked="" type="checkbox"/> If I Could	2:25	Jack Johnson	In Between Dreams
<input checked="" type="checkbox"/> Breakdown	3:33	Jack Johnson	In Between Dreams
<input checked="" type="checkbox"/> Belle	1:43	Jack Johnson	In Between Dreams
<input checked="" type="checkbox"/> Do You Remember	2:25	Jack Johnson	In Between Dreams
<input checked="" type="checkbox"/> Constellations	3:22	Jack Johnson	In Between Dreams
<input checked="" type="checkbox"/> Daniel	3:56	Elton John	Love Songs
<input checked="" type="checkbox"/> Sowing the Seeds of Love (Spot Vodafone)	4:05	Tears For Fears	Top Of The Spot 2008
<input checked="" type="checkbox"/> Fidelity (Spot Kinder Maxi)	3:47	Regina Spektor	Top Of The Spot 2008

- Assets can be browsed selecting a type (or category) and selecting one or more **filters**:
 - attributes of the selected types, chosen from a defined list, used to narrow the result set
- Filter application is cascading and context-sensitive: the selection of a filter value dynamically influences subsequent filter values (*“à la iTunes”* browsing)
 - Classical search by description and keywords available too

The screenshot displays the INFN Browse & Search interface. On the left, a 'Repositories' panel shows a tree view with 'Current: EELA' and a list of categories: Presentation, Training (selected), Press Room, Bulletins, Sheets, Newsletters, Press Releases, and Brochures. The main panel is titled 'Filter attributs' and shows three filter categories: Speaker, Event, and Subject. Below these, 'Filter's values' are listed in three columns. The 'Speaker' column lists Giuseppe La Rocca, Giuseppe Platania, Tony Calanducci (selected), and Valeria Ardizzone. The 'Event' column lists gLite Tutorial for Health-e-Child, Tutorial per gli Insegnanti degli Istituti Tecnici Industriali (selected), Tutorial TriGrid su gLite 3, and -No available-. The 'Subject' column lists DMS, general presentation, gLite DMS (selected), and gLite DPM installation. At the bottom, a table shows the results of the filter application.

Title	Runtime	Speaker	Subject	Event
Architecture of the gLite Data Management System	45	Tony Calanducci	gLite DMS	Tutorial per gli Insegnanti degli Istituti Tecnici Industriali

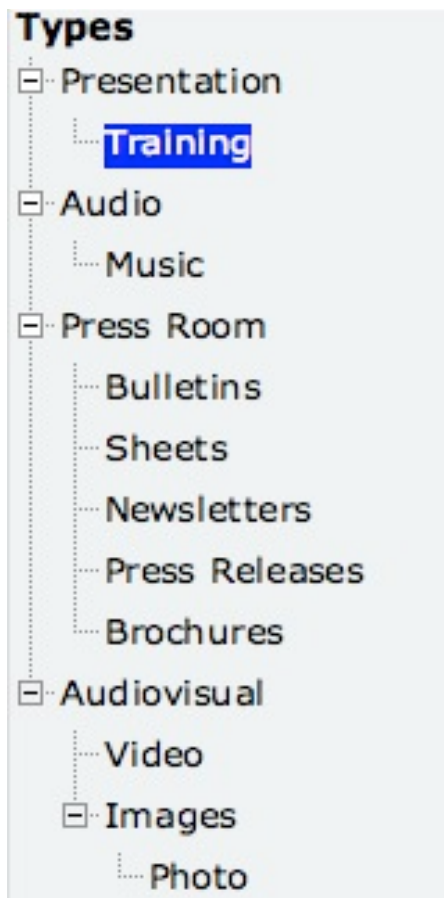
- “Types” and “Categories” definition by repository providers/admins:

- **Assets are organized by type:**

- a list of specific attributes to describe each kind of asset to be managed by the system
- hierarchical (a child type shares and extend parent’s attributes)
- queried during searches

EXAMPLE OF TYPES AND ATTRIBUTES’ LIST

Type	Attributes’ list
Audio	Format, Bitrate, Samplerate, Time
Music	(Format, Bitrate, Samplerate, Time), Name, Artist, Album, Genre, Tracknumber, Year, Artwork, Lyric, Rating
Presentation	Format, NumOfPages
Training	(Format, NumOfPages), Title, Runtime, Speaker, Author, Subject, Event, Date, Type
(Root)	FileName, SubmissionDate, Description, Keywords, LastModificationDate, Size



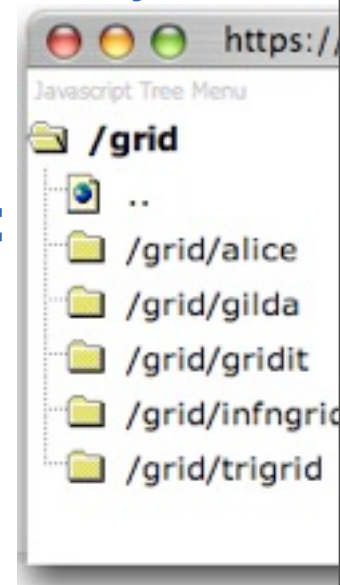
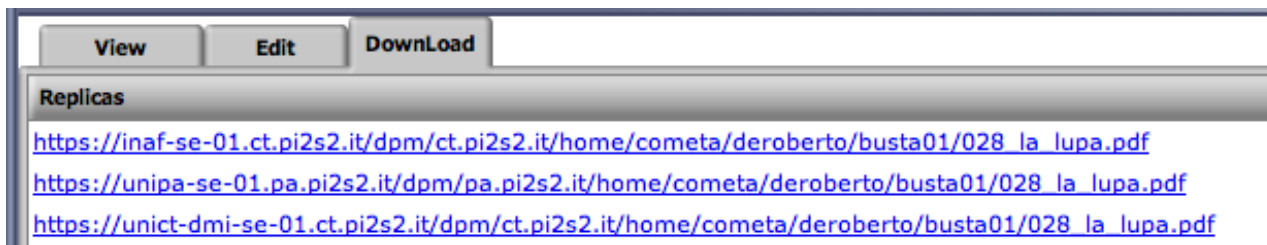
- and/or organized by **collection**:
- Group together related assets of different type;
- Useful also to define subsets of assets belonging to the same type
- Multiple category assignment per asset (tagging)

Collections

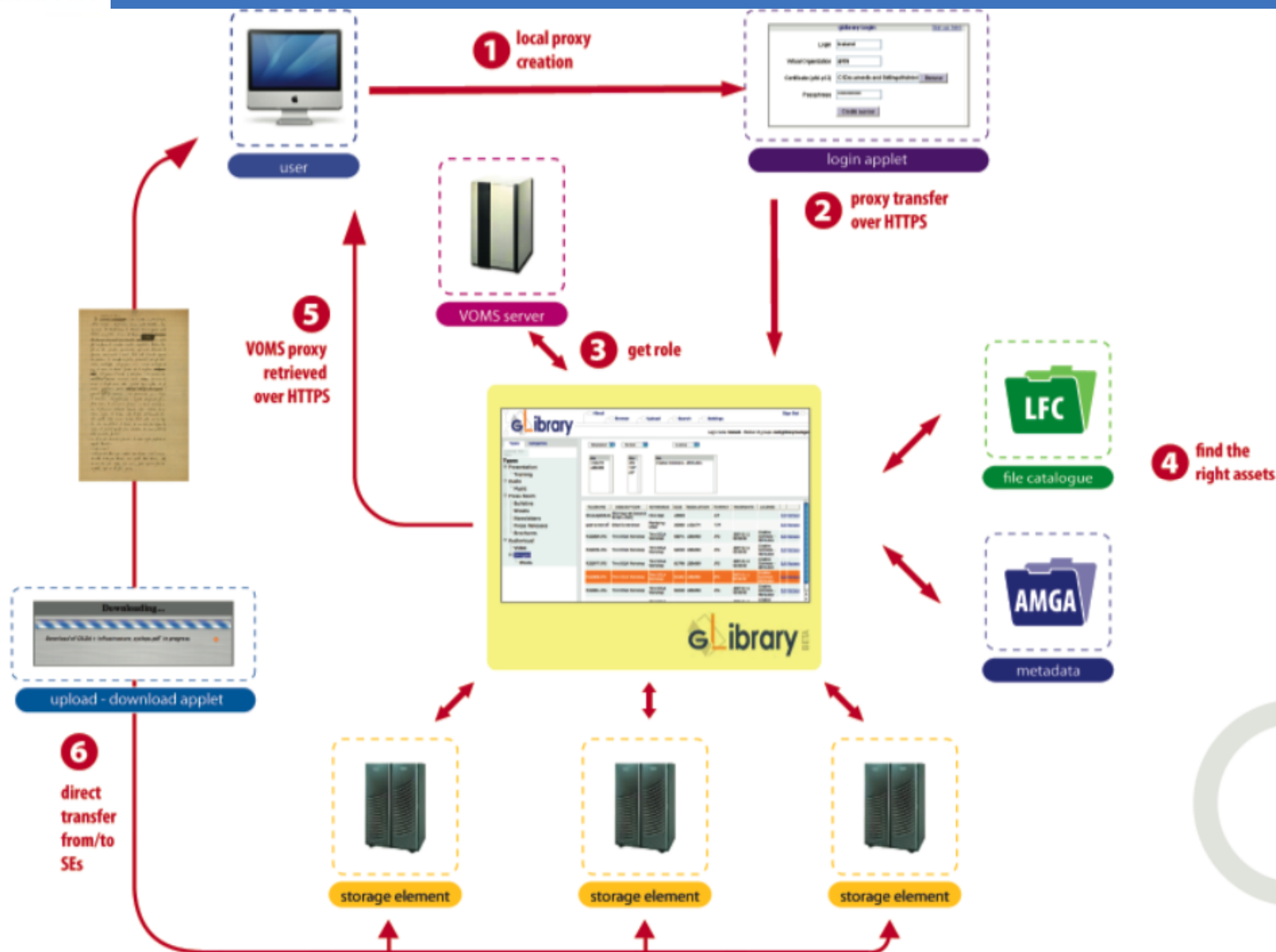


- Users can **upload** their local assets on one or more (creating replicas) Storage Elements of the Grid
 - Files already on grid SE can be registered in a gLibrary repository by the LFC File Catalogue browser

- **Download** from SEs to the users' laptop/desktop:
 - selection of a replica link from a list



- Transfers are handled from the browser over **HTTP/HTTPS** provided that users have their own X.509 Grid Certificate imported



- **De Roberto, an Italian writer of the XIX/XX century, born in Naples, but spending his life in Catania, has left to the humanistic community numerous works**
- **Those are made up of valuable and hard-to-manage pieces: manuscripts, typescripts, drafts with handwritten corrections, magazines, cuts, sketches, photos, etc.**



Il repository di De Roberto con gLibrary

Thumbnail	FILE	FileName	Title	Author	Description	Keywords
	313	004_3_Rifugio_fronte.pdf	il rifugio	Federico de Roberto	dattiloscritto di Federico de Roberto conservato presso la biblioteca di storia patria per la Sicilia orientale; dattiloscritto firmato con qualche correzione;	
	315	002_3_Rifugio_retro.pdf	il rifugio	Federico de Roberto	dattiloscritto di Federico de Roberto conservato presso la biblioteca di storia patria per la Sicilia orientale; dattiloscritto firmato con qualche correzione;	
	317	003_3_Rifugio.pdf	il rifugio	Federico de Roberto	dattiloscritto di Federico de Roberto conservato presso la biblioteca di storia patria per la Sicilia orientale; dattiloscritto firmato con qualche correzione;	

ATTO PRIMO


Nella palata dell'imbucino.




A destra la capanna dei mietitori, a sinistra una gran bica; mucchi ed attrezzi rurali sparsi qui e là. In fondo, l'ampia distesa delle carceri di massa, già velata dalla sera, e il corso sinuoso del fiume e i suoi palustri. S'odono passare in lontananza delle canzoni straziate, il tintinnio dei campanelli delle mandre che se abbasseranno e di tanto in tanto l'uggiolare dei cani sparsi per la salla quale scorrono delle folate di vento, con un fruscio larale malure. Negli intervalli di silenzio sembra sorgere e diffondersi delle acque e il trillare dei grilli, incesante. La luna incomincia accesa, sbiancandosi man mano, in un alone afoso.

SCENA I.

Bruno, Malerba, Neli, Grazia, contadini e contesse.

Handwritten notes in red ink:
Basta con i negati!
ed io?
Basta con i negati!
ed io?
Basta con i negati!
ed io?
Basta con i negati!
ed io?
Basta con i negati!
ed io?



[home](#)
[browse](#)
[search](#)
[upload](#)
[logout](#)

Repositories

Current : ESA Repo

Trees

Types Collections


ESA EO-Products


Filter attributes

var_short_name month FileType year









Values

ALL	ALL	ALL	ALL
A443	1	hdf	2009
A550	2	jpg	2010
	3	nc	

 Add Filter

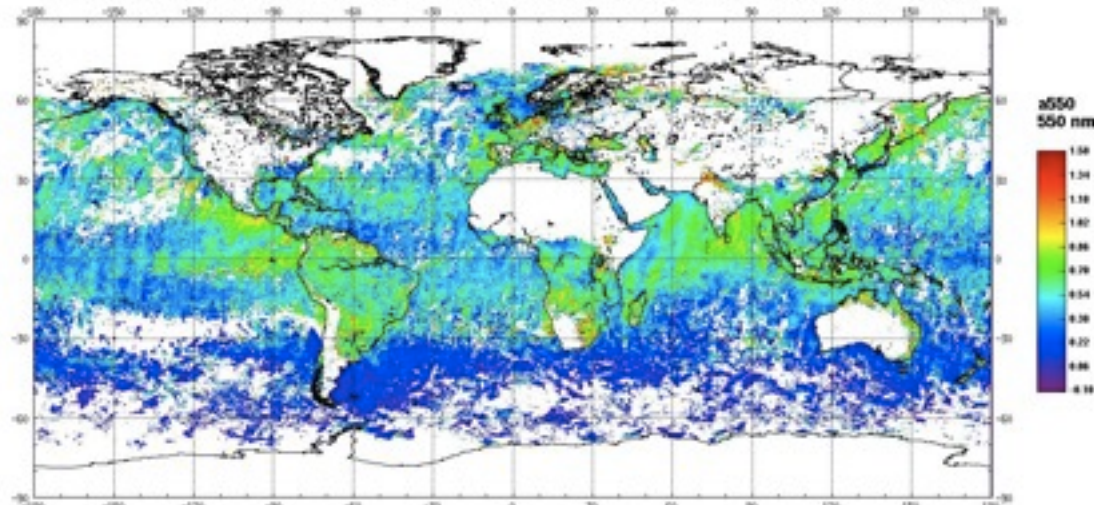
 Remove Filter

Save display

Thumb	Product	Period	Level	Day	Month	Year	File Type	Processing Centre	Processing Software	Code
	Aerosol angstrom coefficient over land and water	monthly	3	0	1	2009	jpg	ESRIN G-POD	MKL3	A550
	Aerosol angstrom coefficient over land and water	monthly	3	0	2	2009	jpg	ESRIN G-POD	MKL3	A550
	Aerosol angstrom coefficient over land and water	monthly								
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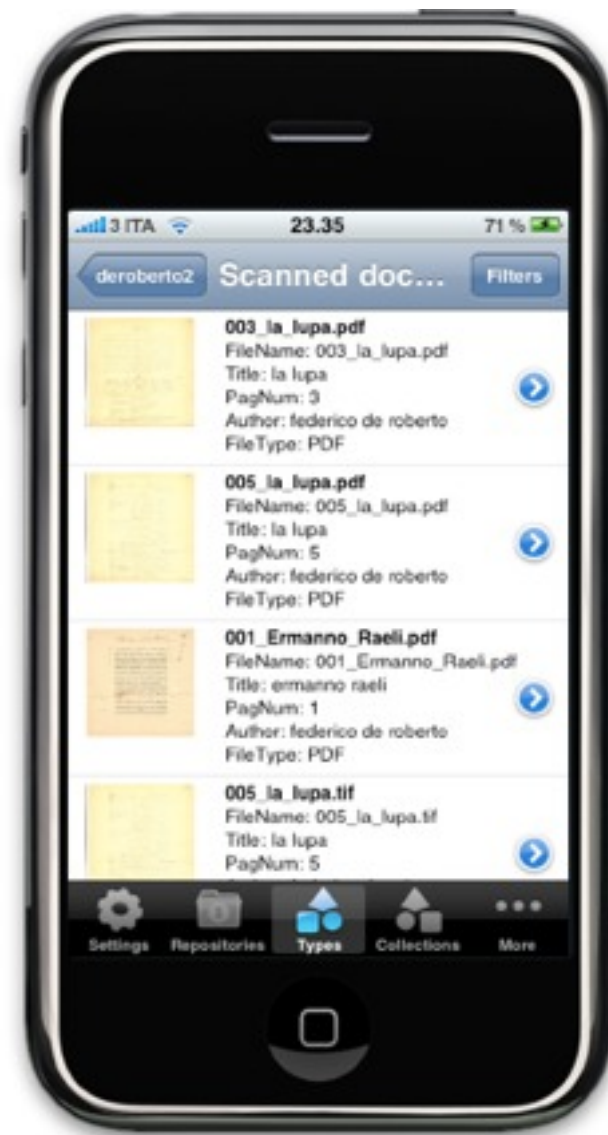
ENVISAT - MERIS

Angstrom alpha coefficient over land and water at 550 nm - Global coverage - 9 km Monthly average - March 2009



- Demo presented at the last EGEE UF5 in Uppsala:

- Some screenshots here:
 - https://glibrary.ct.infn.it/iphone/screenshots/glibrary_mobile_screenshots.pdf
- and a YouTube video here:
 - <http://www.youtube.com/watch?v=jl4c8ZjdER4>



- **Vantaggi:**

- fornisce un'interfaccia utente estremamente **intuitiva** e basata sul **tocco** per accedere ai metadati e allo storage distribuito
 - consente l'accesso a enormi capacità di storage a utenti non esperti di grid
- (to do) selezione automatica della replica più vicina, ottenendo la locazione corrente dal GPS
- permette la consultazione off-line degli assets precedentemente scaricati



- **AMGA Web Site**

<http://cern.ch/amga>

- **AMGA Manual**

http://amga.web.cern.ch/amga/downloads/amga-manual_1_3_0.pdf

- **AMGA API Javadoc**

<http://amga.web.cern.ch/amga/javadoc/index.html>

- **AMGA Web Frontend**

<http://gilda-forge.ct.infn.it/projects/amgawi/>

- **AMGA Basic Tutorial**

<https://grid.ct.infn.it/twiki/bin/view/GILDA/AMGAHandsOn>

- **More information on existing DB access @:**

- <http://amga.web.cern.ch/amga/importing.html>
- <https://grid.ct.infn.it/twiki/bin/view/GILDA/AMGADBaccess>

- **gLibray project homepage:**
 - <https://glibrary.ct.infn.it/>
- **gLibrary paper:**
 - https://glibrary.ct.infn.it/glibrary/downloads/gLibrary_paper_v2.pdf

