

# StoRM: a flexible solution for storage resource management in Grid.

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- The StoRM project
- StoRM features and architecture
- Deployment configuration
- Conclusions

## Disks based storage and cluster file systems

From CERN IT presentation on Data Management evolution by Dirk Dullmann ([link](#)) during the last HEPIX conference:

- *"Experiment focus will soon move to efficient analysis and extraction of physics results"*
- *"Storage performance need to be kept for high rate data ingestion"*
- *"Several technology shifts are coming up; New file systems (eg Lustre, ZFS, NFS 4.1)"*
- *"Jim Gray et al: tape is dead, disk is tape, flash is disk, flash is cool"*

Also in WLCG the **attention is on cluster and parallel file systems.**

# The StoRM project

StoRM provides a Storage Resource Manager (SRM) solution to leverage the advantages of **cluster file systems** and **standard POSIX file systems** in a Grid environment.

- Made by the INFN-CNAF in collaboration with the ICTP-EGRID project.
- Designed to work both on Tier1 and Tier2 centre.
- Adopted in WLCG as an official SRM solution.
- Included in the INFN-GRID release.
- Evaluating the gLite integration.

# StoRM key concepts

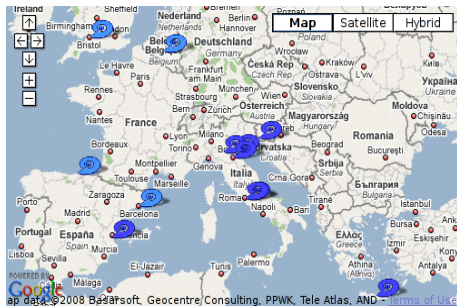
- **One SRM service for different storage systems.**  
Sites can change storage system without care about the SRM layer.
- **Simple, configurable and highly scalable.**  
Easy enough to be the best substitute for a classicSE and scalable enough to satisfy a Tier1-scaled centre.
- **Efficient.**  
High performance on SRM requests execution.
- **Secure.**  
Layered security mechanism, VOMS based and highly configurable.

## The StoRM project

## StoRM in the world 1/2

## Sites using StoRM in production:

- **INFN Tier1 with GPFS 3.2**
- IFIC Valencia Tier2 with **Lustre**
- ESA-ESRIN Roma2 with **GPFS 3.2**
- SISSA Trieste with **xf�**
- INFN Ferrara with **xf�**
- INFN Parma with **ext3**
- INFN Roma3 with **ext3**

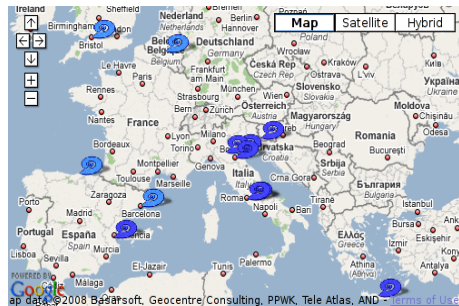


## The StoRM project

## StoRM in the world 2/2

## Sites testing and evaluating StoRM:

- ICS FORTH with GPFS
- Bristol HPC center with GPFS
- IFAE Barcelona Tier2 with GPFS
- IFCA Santander Tier2 with GPFS
- BelGrid-UCL Tier2 with NFSv3/FUSE ext3



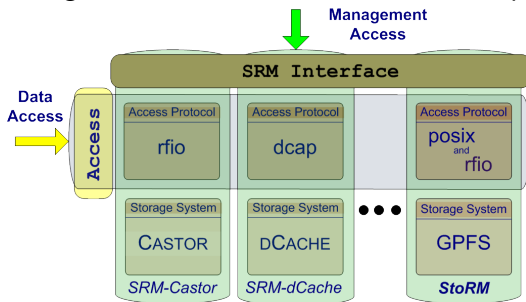
# Getting StoRM

- StoRM is integrated in the **INFNGRID release**.
- Installation and configuration procedure can be done by **YAIM using the standard procedure**.
- Really easy procedure (no script, no DB patch) to migrate **from a ClassicSE to StoRM**.
- Available for SL4 and gLite 3.1
- The SLC3 support is going to be dismissed.



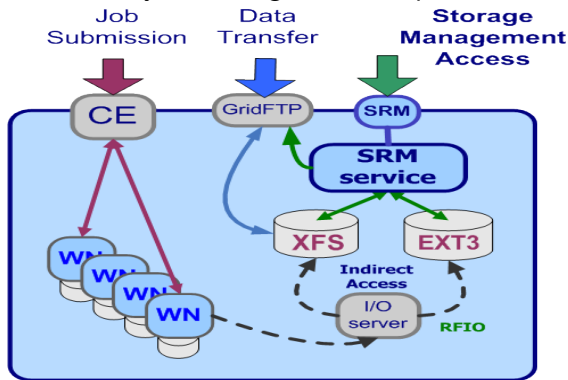
# The SRM interface

SRM services agree on a standard interface (**the SRM interface**) to hide storage characteristics and to allow interoperability.



# SRM role in a site

In a **Grid Storage Element**, the SRM service provides the functionality to manage file and spaces.

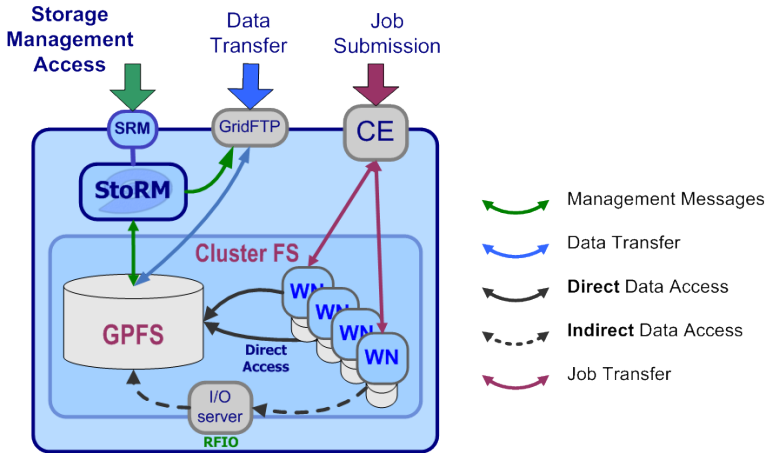


# StoRM overview

StoRM is a storage resource manager for disk based storage systems, implementing the SRM interface v2.2.

- It is designed to take advantage from **high performing cluster file system**, as GPFS or Lustre, but it supports also every standard POSIX FS.
- It allows **direct access** (through the protocol *file://*) to the storage resource, as well as other standard grid protocol as *gsiftp* and *rfio*.
- Authentication and authorization are based on the **VOMS** credential.
- Permission enforcing are based on setting **physical ACLs** on files and directories.

# StoRM role in a site



# StoRM features

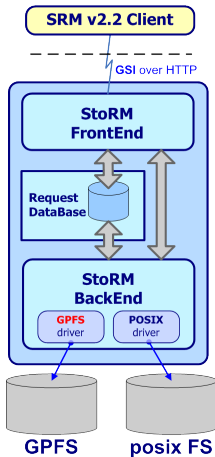
- Support for different file system provided by a **driver** mechanism. Easy to expands.
- Capability to work on different file system type **at the same time**.
- Support for **file** protocol.
- As well as for other standard protocol as **rfile** and **gridftp**.
- Guaranteed dynamic space reservation (using underlying file system functionalities)
- Support for Storage Area as required by WLCG experiments.
- **Quota**, relying on the underlying file system capabilities (as GPFS).
- Space and file garbage collector.

## StoRM architecture 1/2

StoRM has a multilayer architecture.

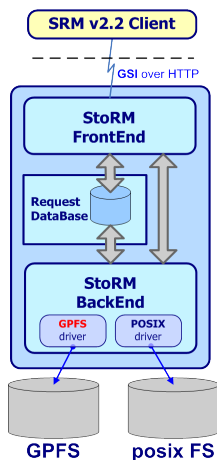
The **Frontend (FE)** component:

- exposes the web service interface.
- manages user authentication.
- manages connection with clients.
- store asynchronous request into data base
- direct communication with Backend for synchronous request.
- retrieve request status.



## StoRM architecture 2/2

- **Database** is used to store SRM request data and the internal StoRM metadata.
- The **Backend (BE)** is the core of StoRM.
- it executes all synchronous and asynchronous SRM request
- manages user authorization
- enforces permissions
- interacts with other grid services
- provides support to file systems through a **driver mechanism**

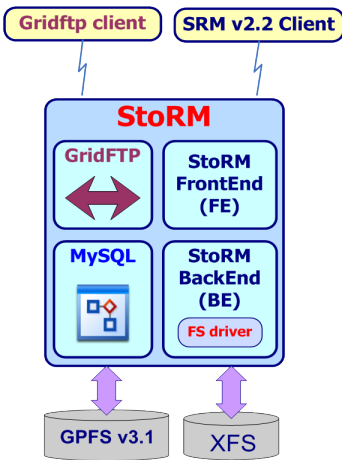


# Deployment on single host

All the component:

- StoRM Frontend
- StoRM Backend
- MySQL
- GridFTP

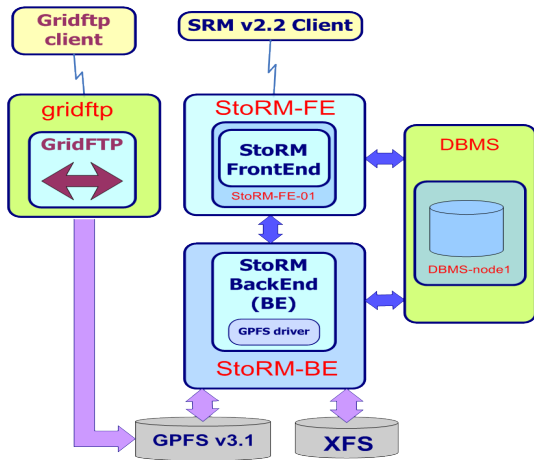
are **deployed on the same host**. Typical for classicSE migration.





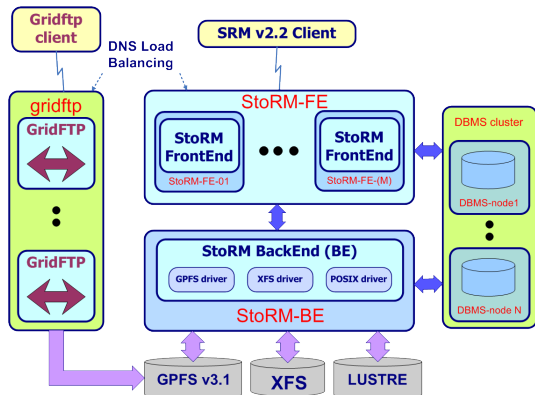
# Deployment on different hosts

- StoRM architecture allow to **exchange information** over network .
- Each component can be deployed on a dedicated host.



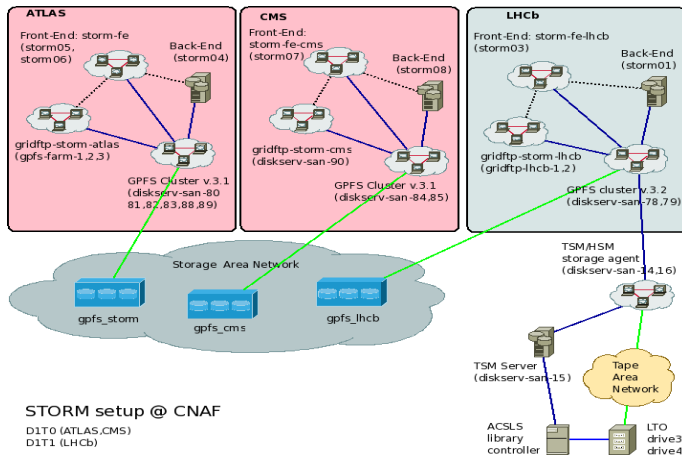
# Deployment on cluster

- StoRM supports **component replication**
- This allow to satisfy the **high availability and scalability** requirements.



## Deployment schema

## StoRM layout at the INFN CNAF Tier 1



# StoRM support

StoRM is integrated in the INFN GRID release from 3\_0\_0 update 35. The support includes:

- Installation, configuration guides and FAQ on StoRM site.
- INFN GRID release guides.
- Ticketing system (GGUS).
- **storm-user@cnafe.infn.it**: Mailing list for the StoRM user community.
- **storm-support@cnafe.infn.it**: the official low level support for StoRM.

# Conclusion

## StoRM:

- leverages on cluster and parallel file system advantages in a Grid environment.
- support direct access on data.
- support Storage Area, Token and Description concepts.
- is easy to install and configure.
- is highly configurable, to satisfy the different site requirements
- is not only for T1, many other (11) sites with different size are currently using/testing StoRM.
- support is already been validated by this sites.

## StoRM



<http://storm.forge.cnaf.infn.it>



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