

DSS for FDM in HPC

LRZ Data Science Storage for Research Data Management

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Data Silos



```
1 1 0 1 0 0 0 1 1 0 1 1 1 0 1 0 0 1 1 0  
1 0 1 1 0 1 0 0 0 1 1 0 1 1 1 0 1 0 0 1 1 0  
0 0 1 1 0 1 1 1 0 1 0 0 1 1 0
```



Motivation

I need to share a 400TB dataset with someone in Canada!

My experiment will generate multiple PBs, that have to be analysed and backed up! How?

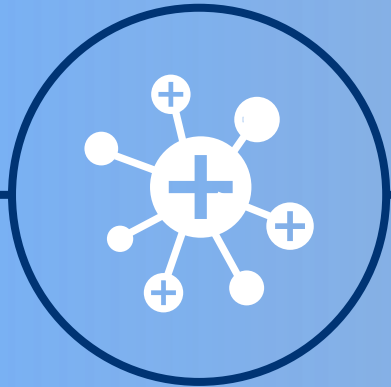
I need to share some data on SuperMUC between multiple projects!

I want to analyse a large dataset, generated on SuperMUC, using some special OS image on the LRZ Cloud!

I want to build a WebApp that allows users to interactively analyse my 500TB SuperMUC simulation data!



So basically we need to provide ...



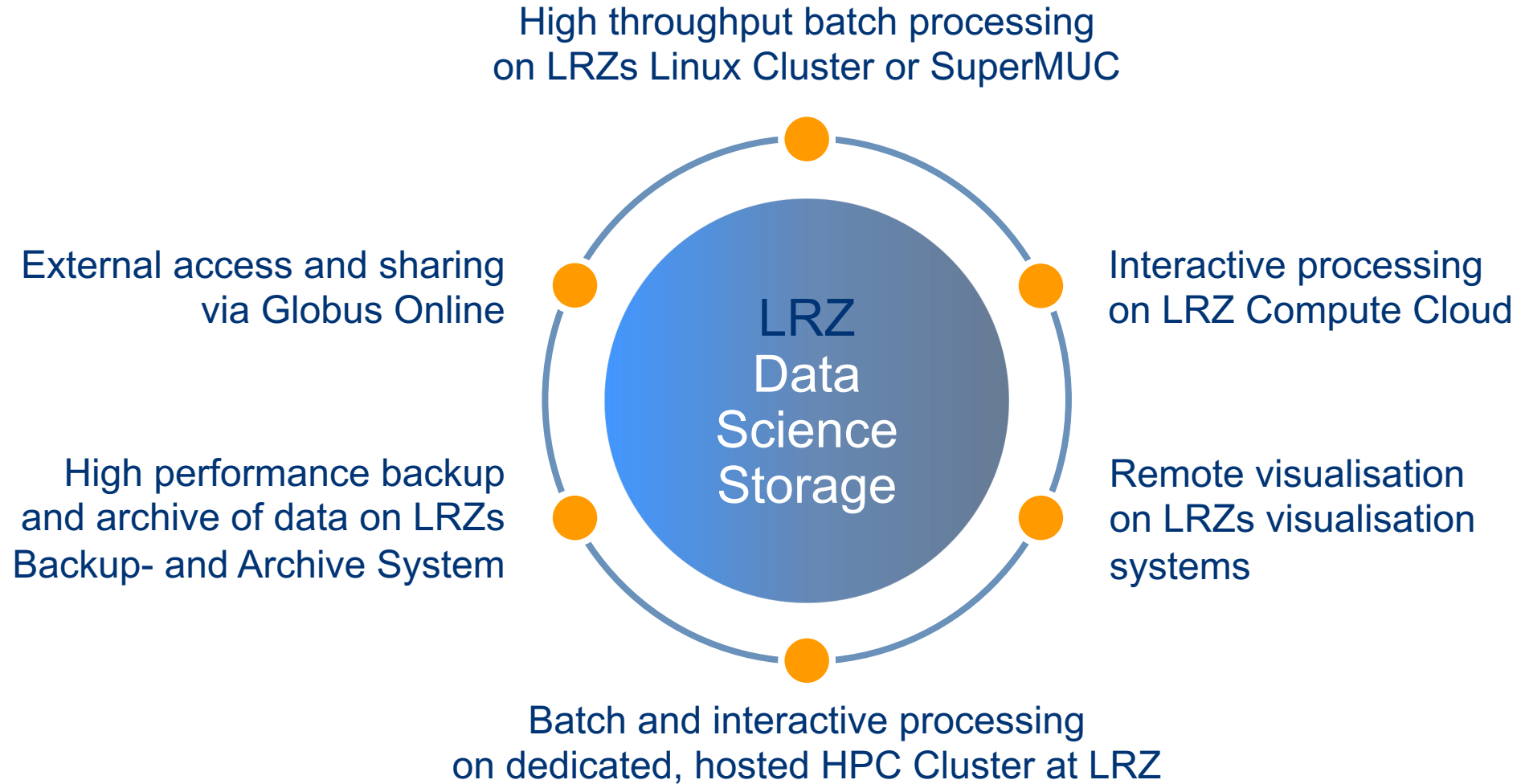
A file system that can be shared amongst the complete LRZ HPC Ecosystem

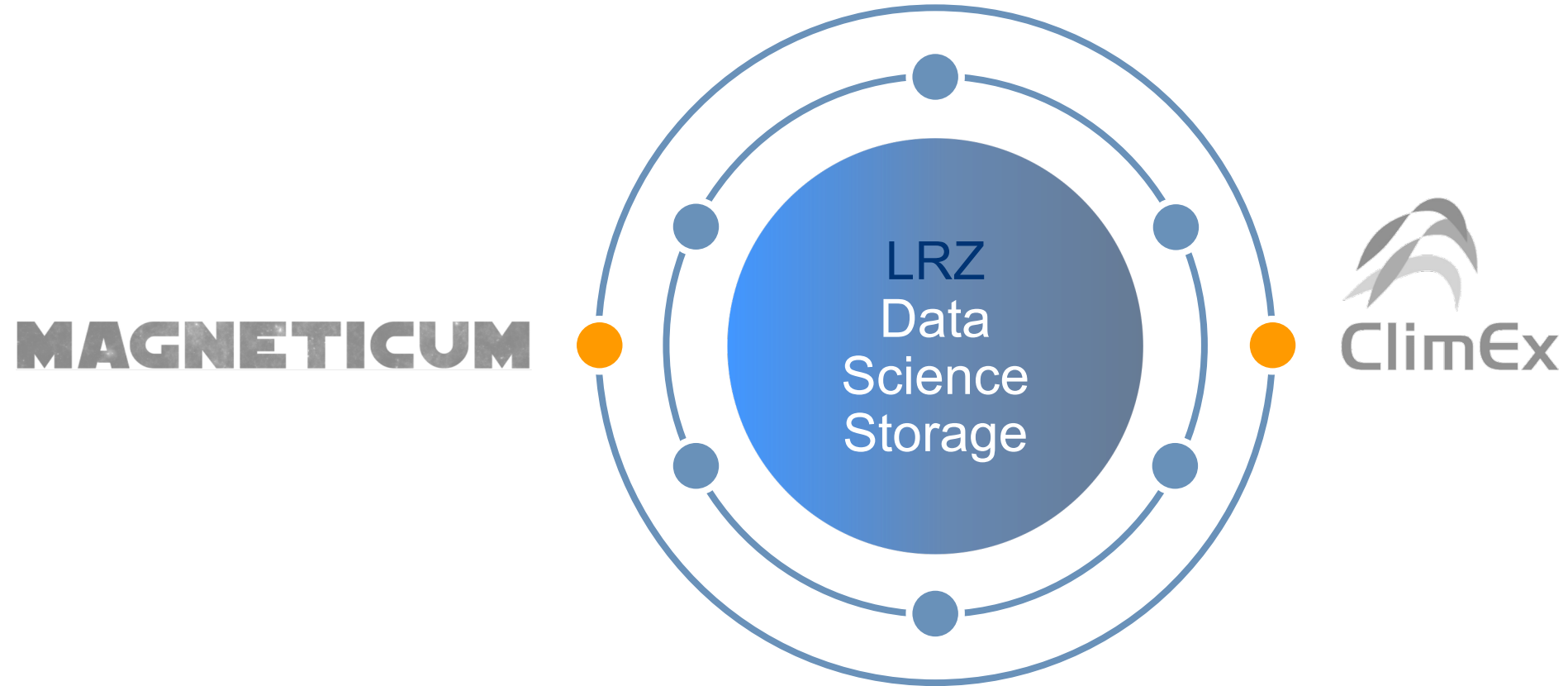


Some kind of external access mechanism for arbitrary entities

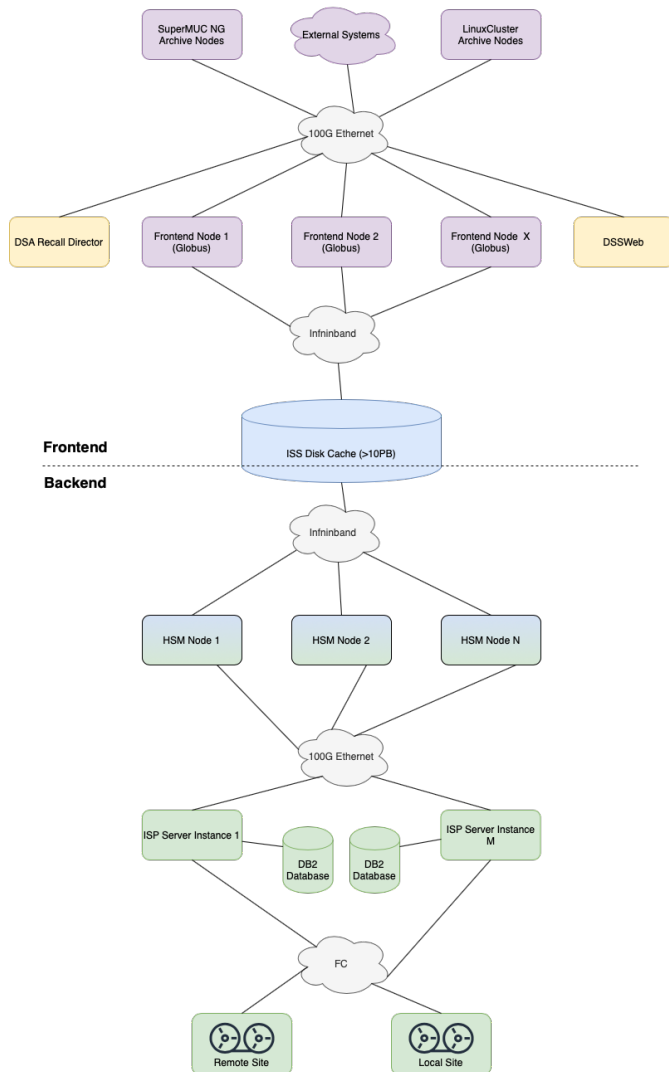


A **Dropbox** like data management approach





Introducing Data Science Archive (DSA)



- **Retain scientific data generated on SuperMUC-NG for at least 10 years**
- **Design Goals:**
 - $\geq 10\text{GB/s}$ throughput full duplex
 - $\geq 200\text{PB}$ usable tape capacity
 - Improved Usability
 - Allow world wide access
 - Allow data sharing and publication
- **Specifications:**
 - Spectrum Scale File System
 - $\sim 10\text{PB}$ usable capacity
 - ~ 1 billion file inodes
 - $\sim 60\text{GB/s}$ throughput to/from disk
 - Spectrum Protect for Space Management
 - $\sim 2 \times 260\text{PB}$ mirrored tape capacity (native)
 - $\sim 25\text{GB/s}$ total native throughput to/from tape
- **Management via DSSWeb**
 - Borrow collaborative DSS Container concept with some tape/archive “tweaks”
- **Access via:**
 - Globus Online
 - FS mount on SNG Login Nodes + DSA Recall Director
- **DSA is NOT your normal file system!**
 - File systems are built for random access but tape is made for sequential access.
 - To achieve good performance, avg. file size needs to be large (est. 5-10GB but tbd)
 - DSA relates to DSS like AWS Glacier relates to AWS S3:
 - Data you put in will freeze eventually
 - Frozen data must be thawed explicitly via DSA Recall Director
 - When using Globus Online, this will be done automatically for you
 - When directly accessing the FS via the Login Nodes, you’ll need to use ‘*dsacli stage job create*’ cmd
- DSA, the A is for Archive
 - Data you put in will be made immutable for 10 years, which means you cannot modify, delete, rename, chown data

Moving Data Fast and Reliable with Globus Online

- What is Globus Online?
 - Platform as a Service for **moving, sharing, publishing and discovering** data
 - Non-profit organization within The University of Chicago
- Why do we use it?
 - Its fast, reliable and easy to use
 - It can be used to make data publicly available and linked
 - Data movement via WebUI, CLI or API
- Which LRZ Systems can be accessed via Globus Online?
 - LRZ Data Science Storage (Unrestricted World Wide Access)
 - SuperMUC-NG (Access restricted to IPs allowed to access SNG)
- Who funds it?
 - 50% NSF + 50% Globus Premium Subscribers
- Who can use it?
 - Everyone! Basic Service is free of charge.

File Manager

Collection: SPEs Mac LRZ SuperMUC-NG Globus DTN

Path: /~/Public/ /~/

Start [play icon] Transfer & Timer Options [dropdown] Start [back icon]

view [gear icon] view [gear icon]

| NAME | LAST MODIFIED | SIZE |
|--|---------------------|----------|
| Drop Box | 8/6/2019, 3:29 P | |
| <input checked="" type="checkbox"/> 10G.dat | 2/10/2021, 12:1... | 10 GB |
| <input type="checkbox"/> 20161229-0755-88064,077,724-clie... | 2/18/2019, 2:06... | 63.49 MB |
| <input type="checkbox"/> 31476.tar.gz | 5/23/2019, 2:58... | 83.55 KB |
| <input type="checkbox"/> 48588_smuc_i9_i4.act.txt | 2/18/2019, 2:06... | 60.06 KB |
| <input type="checkbox"/> 48588_smuc_i9_i4.trc.txt | 2/18/2019, 2:06... | 6.60 KB |
| <input type="checkbox"/> 4tsmsupp | 2/18/2019, 1:37 ... | - |
| <input type="checkbox"/> 6_4_compat_test | 2/18/2019, 1:37 | - |

Share [share icon]
Transfer or Sync to... [transfer icon]
New Folder [folder icon]
Rename [pencil icon]
Delete Selected [trash icon]
Download [download icon]
Open [open icon]
Upload [upload icon]
Get Link [link icon]
Show Hidden Items [eye icon]
Manage Activation [power icon]

Transfer request submitted successfully [close icon]
[View details](#) >

File Manager

Collection:

Path:

Start Transfer & Timer Options **Start**

Label This Transfer

Transfer Settings NOTE: These settings will persist during this session unless changed.

- sync - only transfer new or changed files ⓘ
- delete files on destination that do not exist on source ⓘ
- preserve source file modification times ⓘ
- do NOT verify file integrity after transfer ⓘ
- encrypt transfer ⓘ
- Skip files on source with errors ⓘ
- Fail on quota errors ⓘ

Schedule Start

Repeat

Transfer request submitted successfully [View details](#)

