LLNL's Data Center and Interoperable Services

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http://aims.llnl.gov

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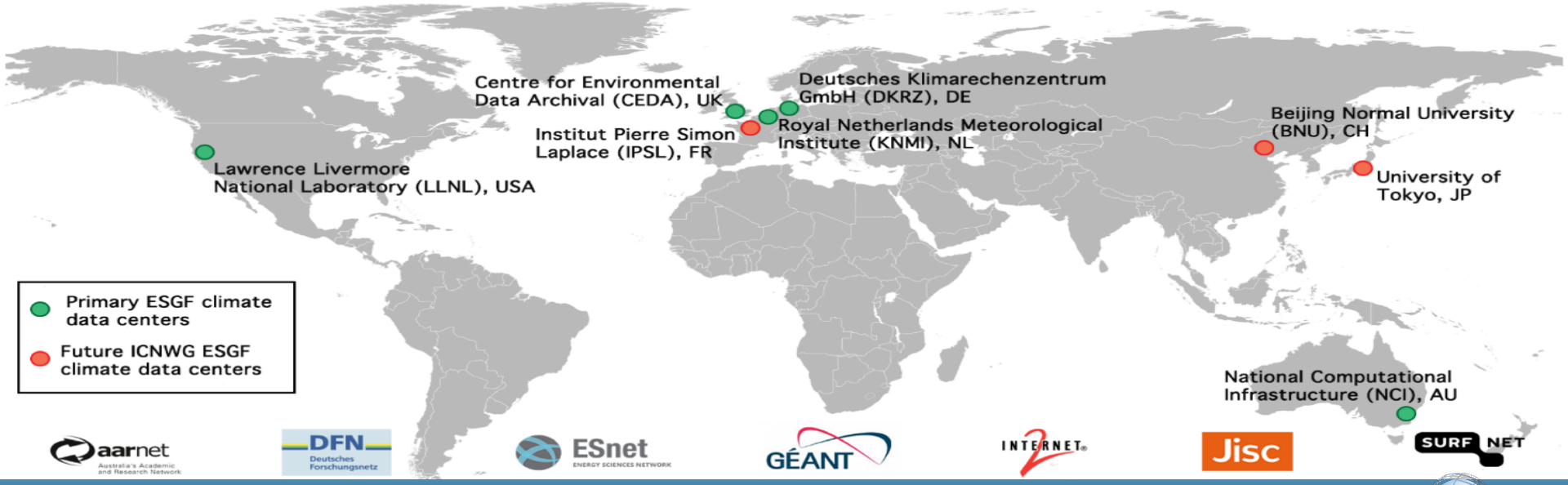
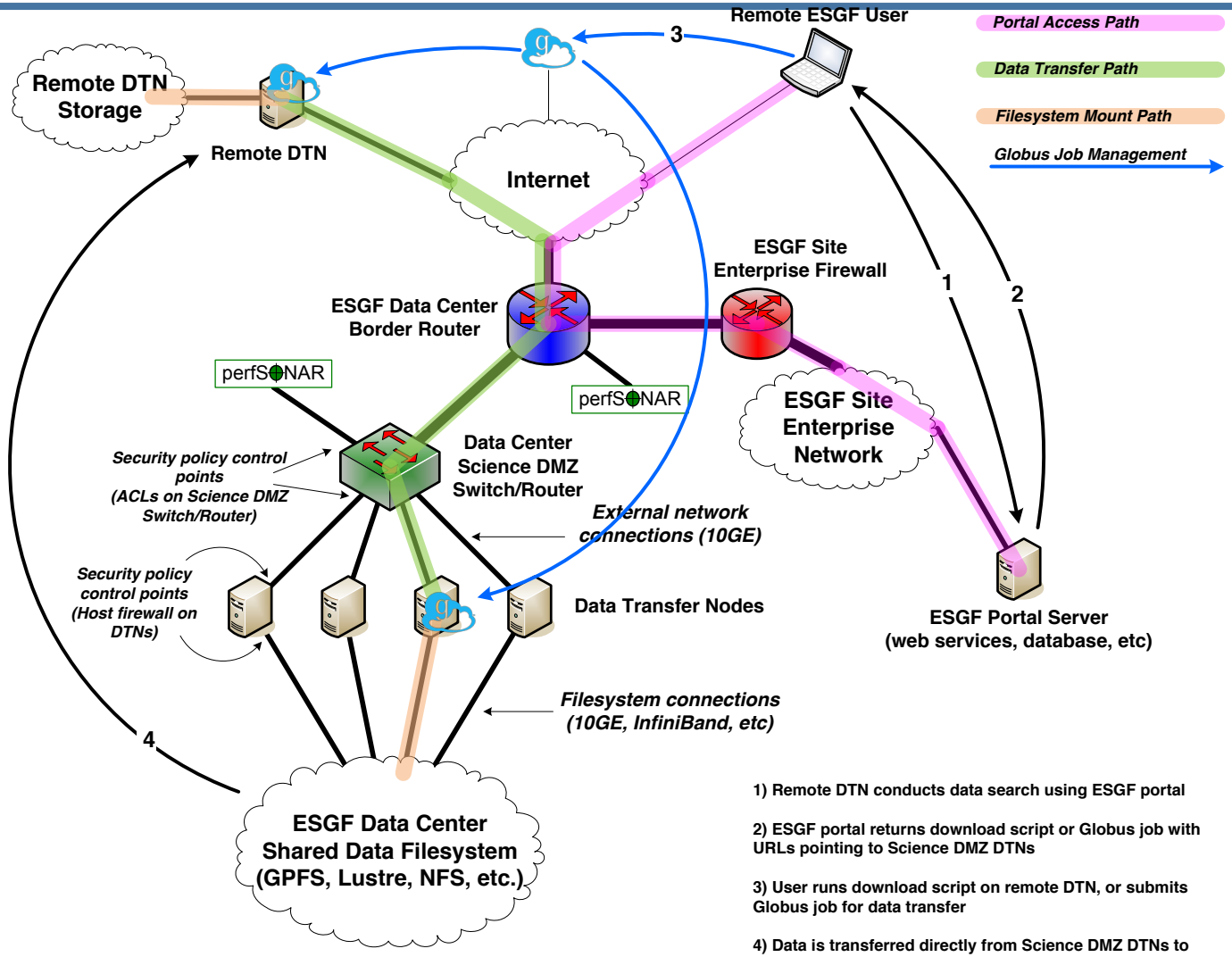


ESGF Earth System Grid Federation

LLNL ESGF Data Network



1) Remote DTN conducts data search using ESGF portal

2) ESGF portal returns download script or Globus job with URLs pointing to Science DMZ DTNs

3) User runs download script on remote DTN, or submits Globus job for data transfer

4) Data is transferred directly from Science DMZ DTNs to remote DTN without further portal involvement

AIMS/ESGF Computing Resources

Machine	Memory (GB)	Processors	OS Version	Purpose
aims1	256	64x 2.6 GHz	RHEL 6.5	ACME Dev/CDATWeb Dev/ESGF Install mirror
aims2	256	64x 2.6 GHz	RHEL 6.5	Master node for cluster/SLURM controller node
aims3	256	64x 2.6 GHz	RHEL 6.5	Production data node for LLNL-ESGF site
aims4	256	64x 2.6 GHz	RHEL 6.5	ACME UV-CDAT compute node/askbots
pcmdi9	64	64x 2.9 GHz	RHEL 6.6	ESGF Idp/Index production node (no data)
pcmdi10	16	8x 2.0 GHz	RHEL 7.0	Obs4Mips
pcmdi11	64	64x 2.6 GHz	RHEL 6.5	ESGF-test installation upgrade node
pcmdi6	36	4x 1.6 GHz	RHEL 6.5	CF convention trac
pcmdi7	36	4x 1.6 GHz	RHEL 6.5	ESGF test node for fresh installations
pcmdi8	36	4x 1.6 GHz	RHEL 5.x	RHEL 5 test node (ready for repurpose)
esgcet	4	4x 2.8 GHz	RHEL 6.5	CMIP3 front-end web server
helene	2	4x 2.8 GHz	RHEL 6.5	CF-PCMDI web server
rainbow	32	4x 1.6 GHz	RHEL 6.5	Climate/CMIP/PCMDI web server
rainbow1	64	4x 1.6 GHz	RHEL 6.5	ICNWG/CSSEF/ESGF/IWT web server

AIMS Experimental Compute Cluster

System Type	Memory (GBs)	CPUs	OS Version
Master node	128	64x 2.6GHz	RHEL 6.5
Slave nodes 1-8	128	8x 1.2GHz	RHEL 6.5

- AIMS compute cluster software
- UV-CDAT
- SLURM daemon (with munged)
- Previous test installations:
  - Ceph OSD / MDS (single node used)
  - Cloudera packages – HDFS, YARN (for hadoop, spark), hive

AIMS/ESGF Data Transfer Nodes (DTNs)

Machine	Memory (GB)	Processors	OS Version	Purpose
aimsdtn1	64	16x 3.2 GHz	TOSS 2.4-3	DTN Master
aimsdtn2	64	16x 3.2 GHz	TOSS 2.4-3	Public DTN
aimsdtn3	64	16x 3.2 GHz	TOSS 2.4-3	Public DTN
aimsdtn4	64	16x 3.2 GHz	TOSS 2.4-3	Public DTN
aimsdtn5	*64*	*16x 3.2 GHz*	*TOSS 2.4-3*	*Ingest Node (not configured)*
aimsdtn6	*64*	*16x 3.2 GHz*	*TOSS 2.4-3*	*Ingest Node (not configured)*

- Data transfer nodes run Globus Connect and GridFTP software to allow files to be transferred between DTNs globally.
  - Globus Connect allows for a user-friendly web-browser based search and file transfer
  - GridFTP is the command-line data transfer agent
  - Files are available to users with ESGF certificate/ID
- Ingest-only nodes are purposed for bulk transfer of new data to LLNL AIMS repository
  - Delivered mid-November and awaiting integration

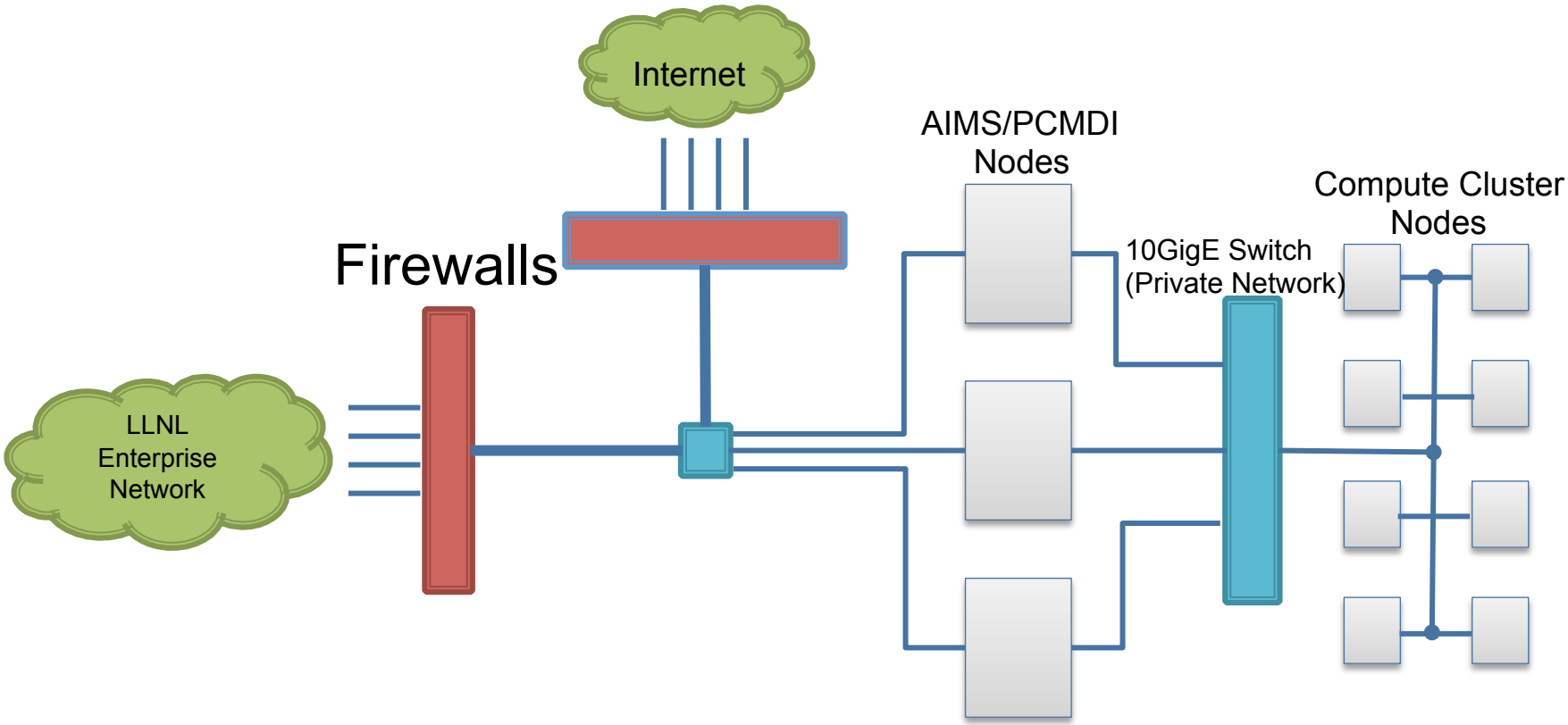
Climate Storage System Information

System Type	CPUs	Memory (GBs)	OS	DDN Luns	~LUN Size	LUN SFC (active/fail-over)	ZFS Raid Type	ZFS Raid Set Size	ZFS Raid Sets	Usable Space
Dell910	32	128	Solaris 11	48	24TB	4/4	RaidZ2	12	4	960TB
Dell910	32	128	TOSS	36	24TB	4/4	RaidZ2	9	4	670TB
Sunx4440	32	128	Solaris10	60	16TB	4/4	RaidZ2	10	6	768TB

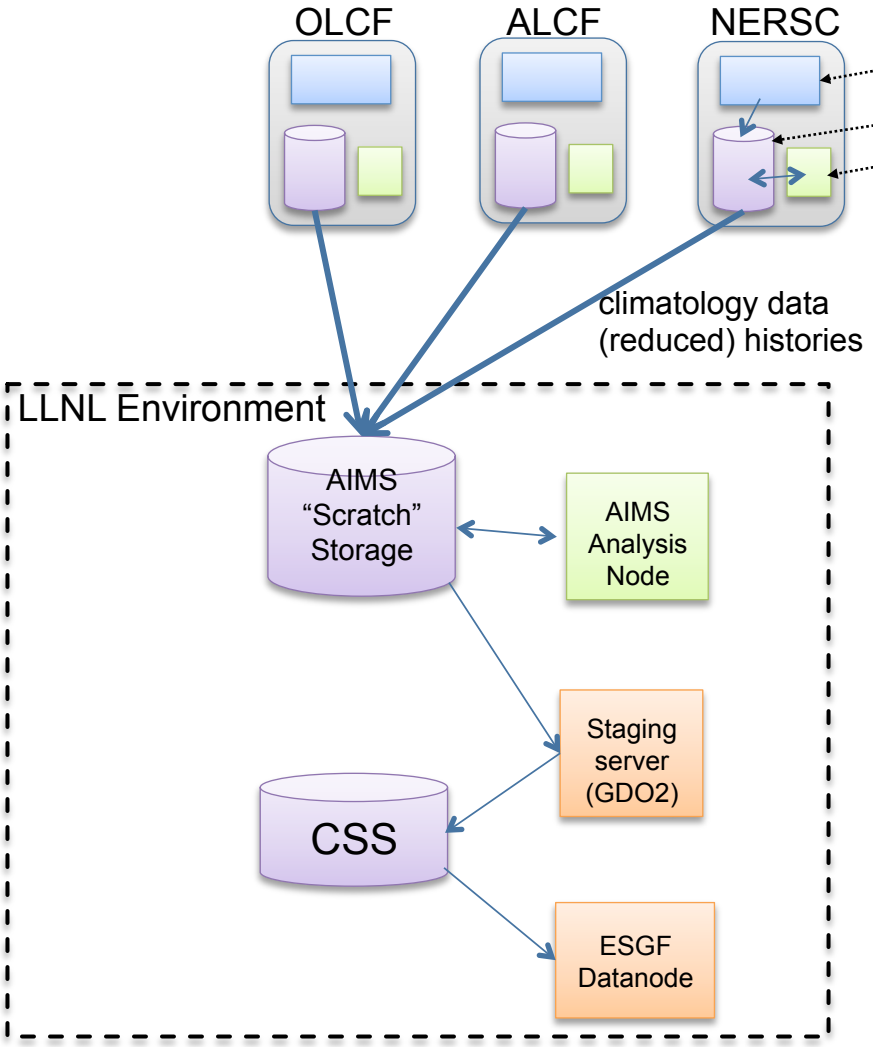
- The climate storage system environment consists of two Dell 910 servers each with 4 sockets (x 8 cores per socket) and 128 GB of memory.
- Each of the systems is connected via fiber channel (FC) to a DDN 9900 storage array. Currently there are eight 8 Gbps FC connections to the DDN 9900 unit of which 4 are active and 4 are passive (or used as fail-over). These systems are used as NFS servers and provide a storage archive for the PCMDI front-end servers.
- The initial CSS system (cssfen1) was installed using Solaris 11 and ZFS. Its file system is composed of 48 LUNs from one of the DDN 9900 units. The second system (cssfen2) was installed using TOSS and ZFS. Its file system is composed of 36 LUNs from a DDN 9900 unit.
- Other storage used by the Climate environment is allocated from the Green Data Oasis (GDO) environment. This storage is used via the PCMDI GDO zone called "gdo2". Storage space is allocated to the gdo2 zone from the gdofen1 system. The storage space on the gdofen1 system is around 768 TB, however that space is shared with GDO zones running in the GDO environment.


AIMS
Analytics and Informatics
Management Systems

AIMS cluster network



ACME Data Management Workflow @ LLNL



ACME Scientists

1) Run models
2) Post-processing
3) Transfer data

4) Analysis (at AIMS)

AIMS Data Manager

5) Stage to CSS
6) Publish to ESGF

AIMS/ESGF Storage Resources

Data storage resources accessible by all team members.

Storage device	Capacity
GDO2	200 TB
CSS (Climate Storage System)	960 TB & 670 TB