NDGF Site Report

Mattias Wadenstein
System Integrator, NDGF
HEPiX Spring 2008 at CERN

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NORDIC DATAGRID FACILITY

- The NDGF Project
- Status of the infrastructure
  - Resources
  - Services
  - Operation
- e-Science Projects
- Example sites
  - CSC
  - HPC2N

NDGF
NORDIC DATAGRID FACILITY

- A Co-operative Nordic Data and Computing Grid facility
  - Nordic production grid, leveraging national grid resources
  - Common policy framework for Nordic production grid
  - Joint Nordic planning and coordination
  - Operate Nordic storage facility for major projects
  - Co-ordinate & host major eScience projects (i.e., Nordic WLGC Tier-1)
  - Develop grid middleware and services
- NDGF 2006-2010
  - Funded (2 M€/year) by National Research Councils of the Nordic Countries
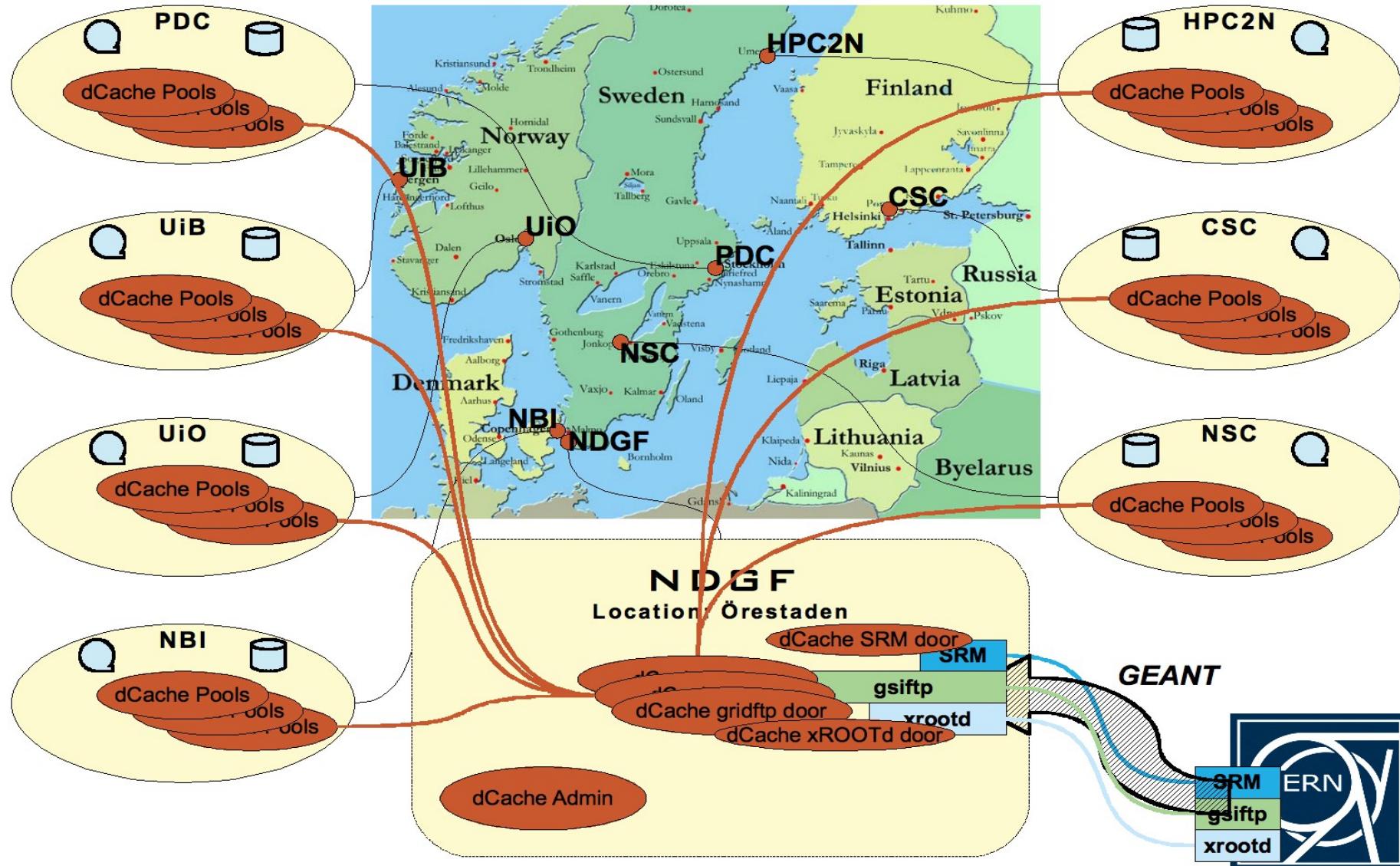
NDGF Facility - 2008H1

- 10 Production sites
- 2-3 MSI2k CPU equivalents
- 344 TB of Disk storage
- 60 TB of Tape storage
- Running Ubuntu 6.06/8.04, RHEL/CentOS 3,4,5, fedora, gentoo...
- Plenty of more disk and tape coming online in the next month

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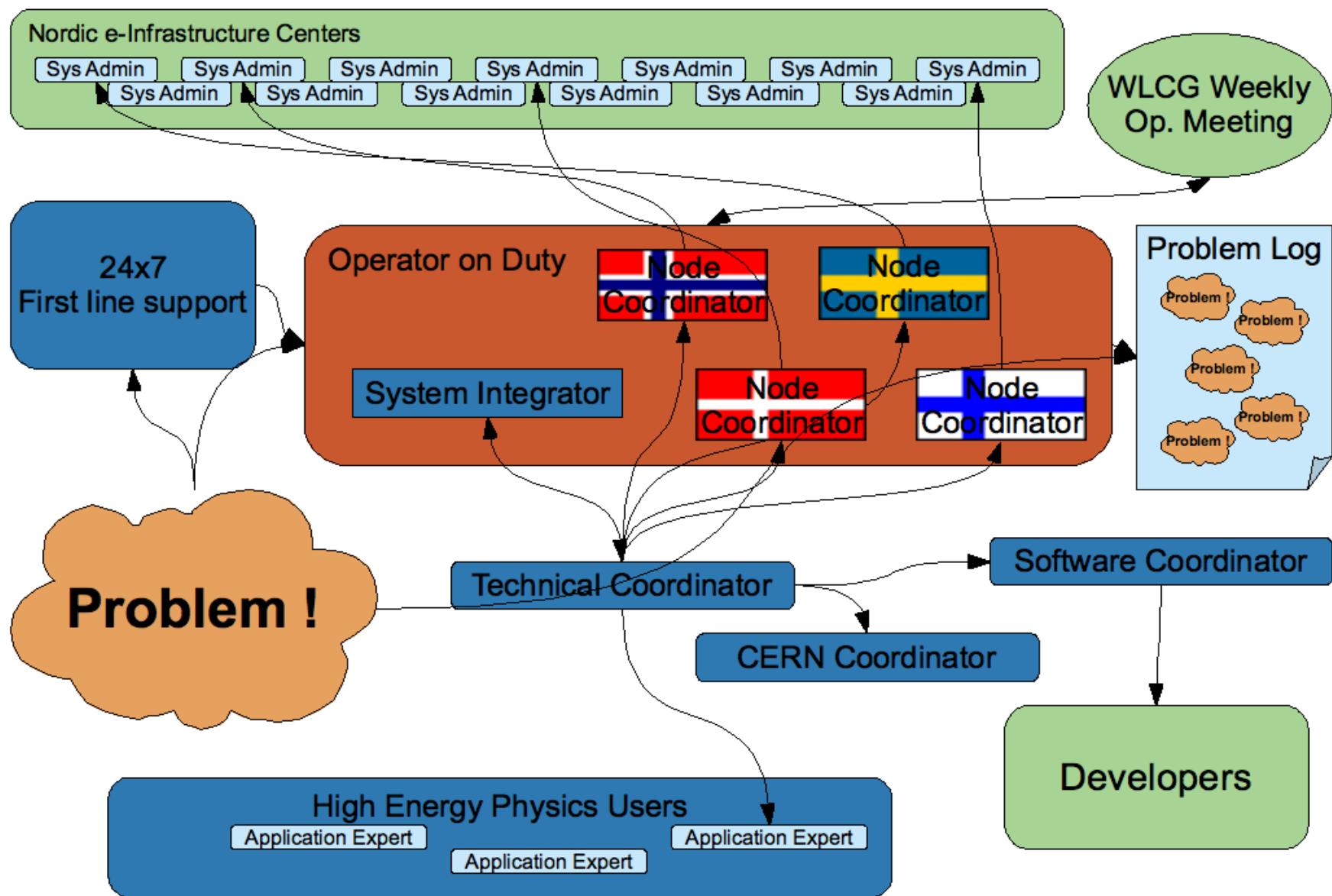
NDGF Storage

- Central Installation:
  - 7 Dell 1950 2xDual Core 2GHz Xeon, 4GB RAM, 2 x 73GB 15k SAS disks (mirrored) (one forspare)
  - 2 x Dell PowerVault MD-1000 direct attached storage enclosures with 7 x 143GB 15k SAS RAID-10 each
- Running:
  - 2 Postgress for PNFS running in HA mode (master-slave) DB on MD-1000
  - 1 PNFS Manager and Pool Manager
  - 1 SRM, location manager, statistics, billing, etc.
  - 1 GridFTP and xrootd door on one machine
  - 1 Monitoring and intrusion detection on one machine

Storage

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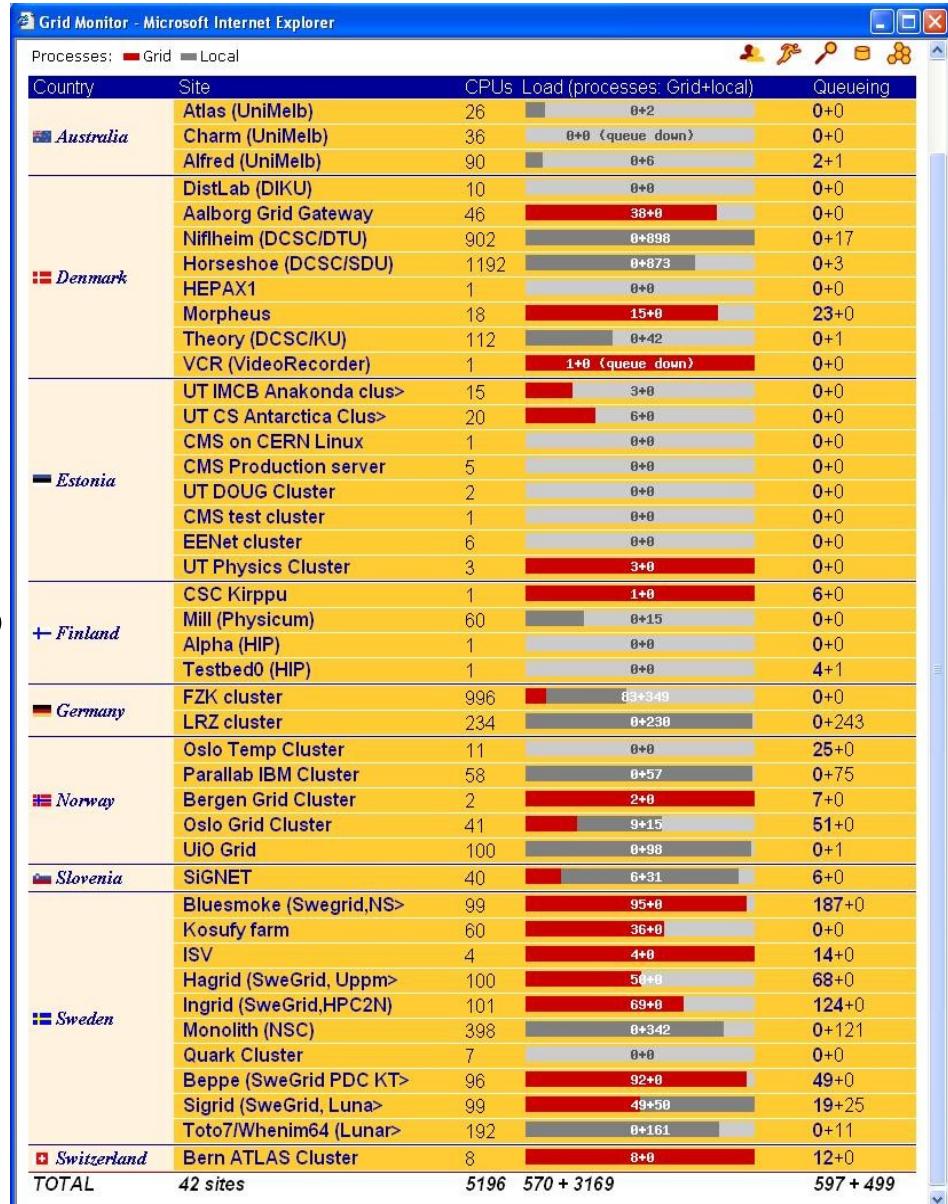
- 1st line support – (ready for operation)
  - NORDUnet NOC – 24x7
- 2nd line support – (in operation)
  - Operator on Duty – 8x365
- 3rd line support – (in operation)
  - NDGF Operation Staff
  - Sys Admins at sites
- Shared tickets with NUNOC
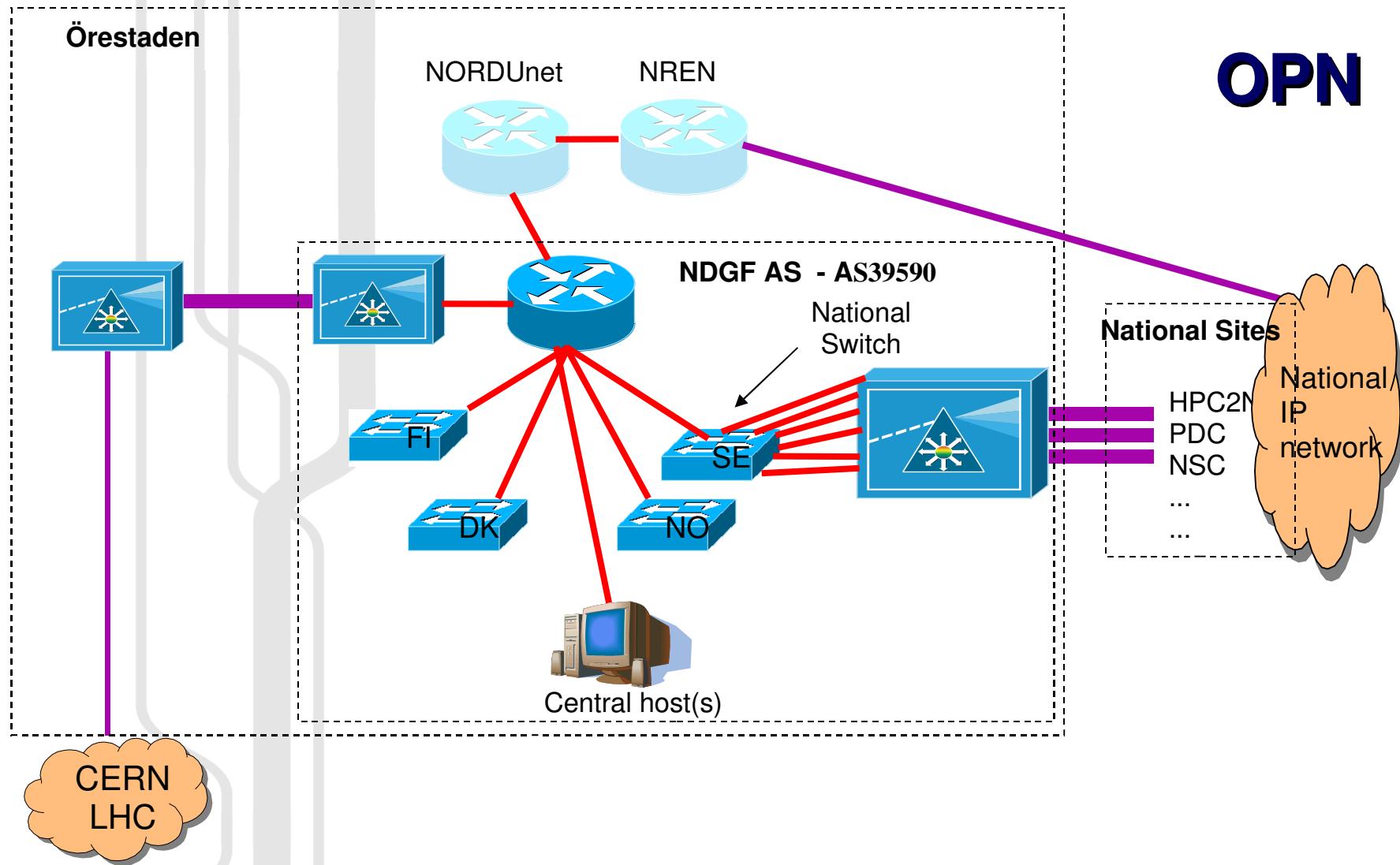
- CERN
  - Build up of Tier-1: Completed
  - Running the Tier-1: Ongoing
  - Integrating Tier-2s: Ongoing
- BIO (A Nordic Biogrid)
  - Pilot user very happy – gets bioinformatics work done with a nice grid interface
- CO2 (CO2 sequestration)
  - Pilot user gridifying software

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- NorduGrid / ARC middleware for Computing
- Used routinely since 2002 for e.g. ATLAS data challenges
- Deployed at all the dTier-1 sites

Grid Monitor - Microsoft Internet Explorer

Processes: ■ Grid ■ Local

Country	Site	CPUs	Load (processes: Grid+local)	Queueing
Australia	Atlas (UniMelb)	26	0+2	0+0
	Charm (UniMelb)	36	0+0 (queue down)	0+0
	Alfred (UniMelb)	90	0+6	2+1
Denmark	DistLab (DIKU)	10	0+0	0+0
	Aalborg Grid Gateway	46	38+0	0+0
	Niflheim (DCSC/DTU)	902	0+898	0+17
	Horseshoe (DCSC/SDU)	1192	0+873	0+3
	HEPAX1	1	0+0	0+0
	Morpheus	18	15+0	23+0
	Theory (DCSC/KU)	112	0+42	0+1
	VCR (VideoRecorder)	1	1+0 (queue down)	0+0
Estonia	UT IMCB Anakonda clus>	15	3+0	0+0
	UT CS Antarctica Clus>	20	6+0	0+0
	CMS on CERN Linux	1	0+0	0+0
	CMS Production server	5	0+0	0+0
	UT DOUG Cluster	2	0+0	0+0
	CMS test cluster	1	0+0	0+0
	EENet cluster	6	0+0	0+0
	UT Physics Cluster	3	3+0	0+0
Finland	CSC Kirppu	1	1+0	6+0
	Mill (Physicum)	60	0+15	0+0
	Alpha (HIP)	1	0+0	0+0
	Testbed0 (HIP)	1	0+0	4+1
Germany	FZK cluster	996	83+349	0+0
	LRZ cluster	234	0+230	0+243
Norway	Oslo Temp Cluster	11	0+0	25+0
	Parallab IBM Cluster	58	0+57	0+75
	Bergen Grid Cluster	2	2+0	7+0
	Oslo Grid Cluster	41	9+15	51+0
	UiO Grid	100	0+98	0+1
Slovenia	SiGNET	40	6+31	6+0
Sweden	Bluesmoke (Swegrid,NS>	99	95+0	187+0
	Kosufy farm	60	36+0	0+0
	ISV	4	4+0	14+0
	Hagrid (SweGrid, Uppm>	100	50+0	68+0
	Ingrid (SweGrid,HPC2N)	101	69+0	124+0
	Monolith (NSC)	398	0+342	0+121
	Quark Cluster	7	0+0	0+0
	Beppe (SweGrid PDC KT>	96	92+0	49+0
	Sigrid (SweGrid, Luna>	99	49+50	19+25
	Toto7/Whenim64 (Lunar>	192	0+161	0+11
Switzerland	Bern ATLAS Cluster	8	8+0	12+0
TOTAL	42 sites	5196	570 + 3169	597 + 499

The Infrastructure: Networking

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- CSC, Finland
  - As part of the Finnish national research structure develops and offers high-quality information technology services
  - 3000 researchers use CSC's computing capacity
  - FUNET connects 85 organizations to the global research networking infrastructure
  - CSC participates in most major European Grid infrastructures, including EGEE, DEISA, EGI, EMBRACE, PRACE, GÉANT2, the LHC Computing Grid and NDGF.

- ## New and interesting in 2008
  - FUNET network being upgraded with 10 Gbit/s optical fiber links
  - Cray XT4 supercomputer will be upgraded to 70 Tflop/s (currently 10.5 Tflop/s)
  - Agreement with National Audiovisual Archive for long term archival of Finnish television and radio programs
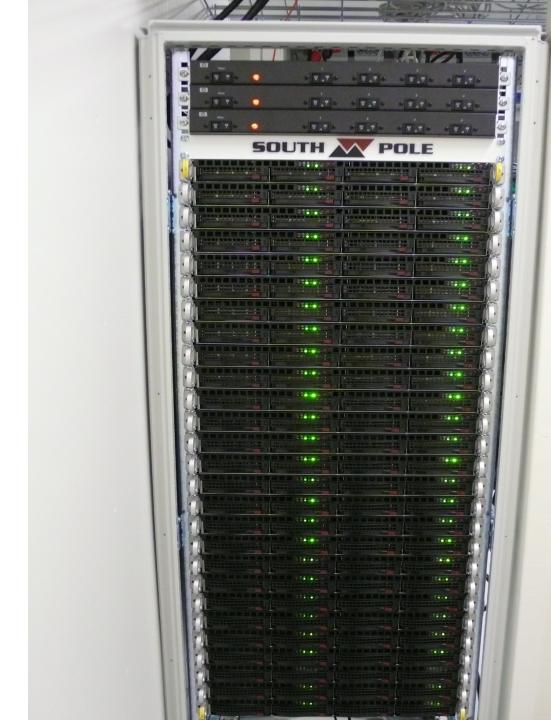
- HPC2N in Umeå, Sweden
  - provides computational resources for swedish academic researches
  - National allocation
  - Mostly MPI jobs
- Also participates in various grid projects
  - Swegrid, NDGF, EGEE, GIRD, ETC

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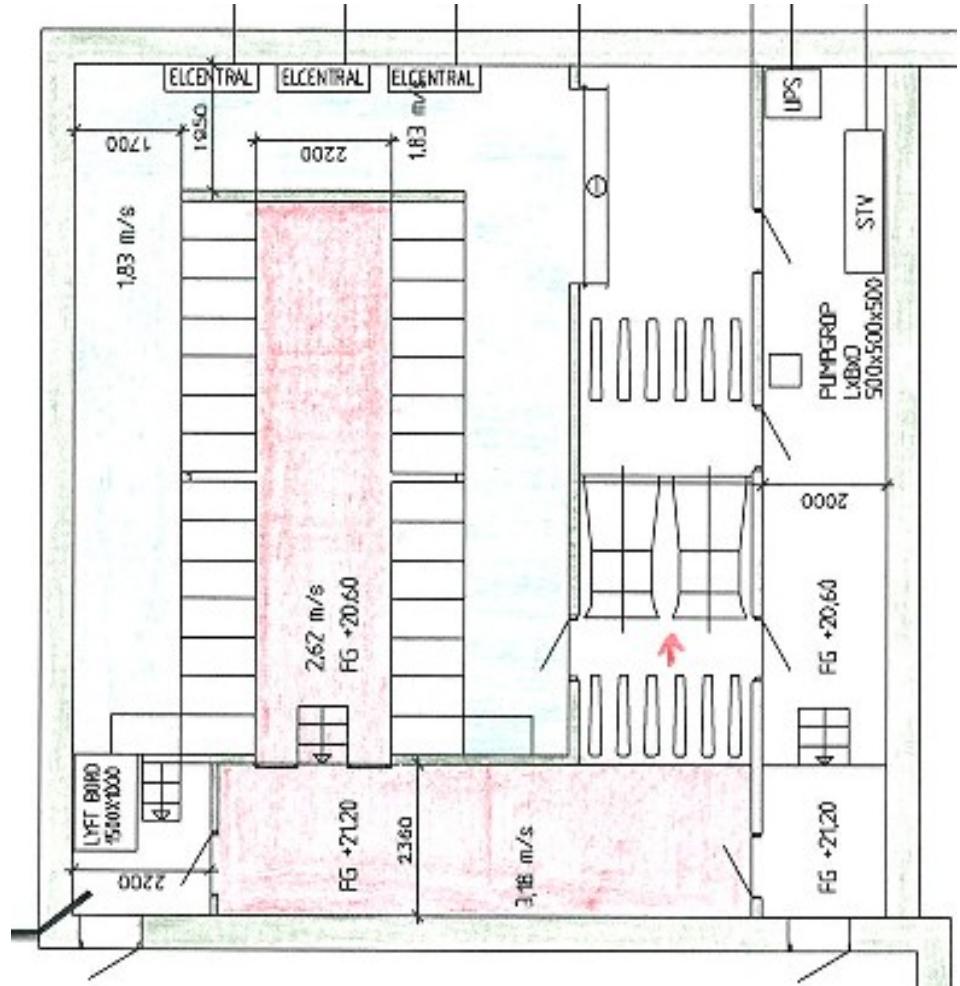
- New resources
  - 5376-core IBM blade system with infiniband for general usage
  - 432-core supermicro twin nodes dedicated for grid

NDGF — Nordic DataGrid Facility

- ## New machine room
  - strict hot/cold aisle
  - 28 racks
  - 25 kW front to back aircooling per rack
  - total ~400kW
  - no redundant power
  - Only for computing, storage&servers in old machine room
  - no raised floor
  - 3.5m high

- Working almost as well as imagined
  - Slight issue with back-draft where the air does a right angle turn
  - Some minor regulating issues (ventilation fans running faster than needed)
  - Cools 20kW at 0.5kW overhead
  - Cools 250kW at 3-4kW overhead
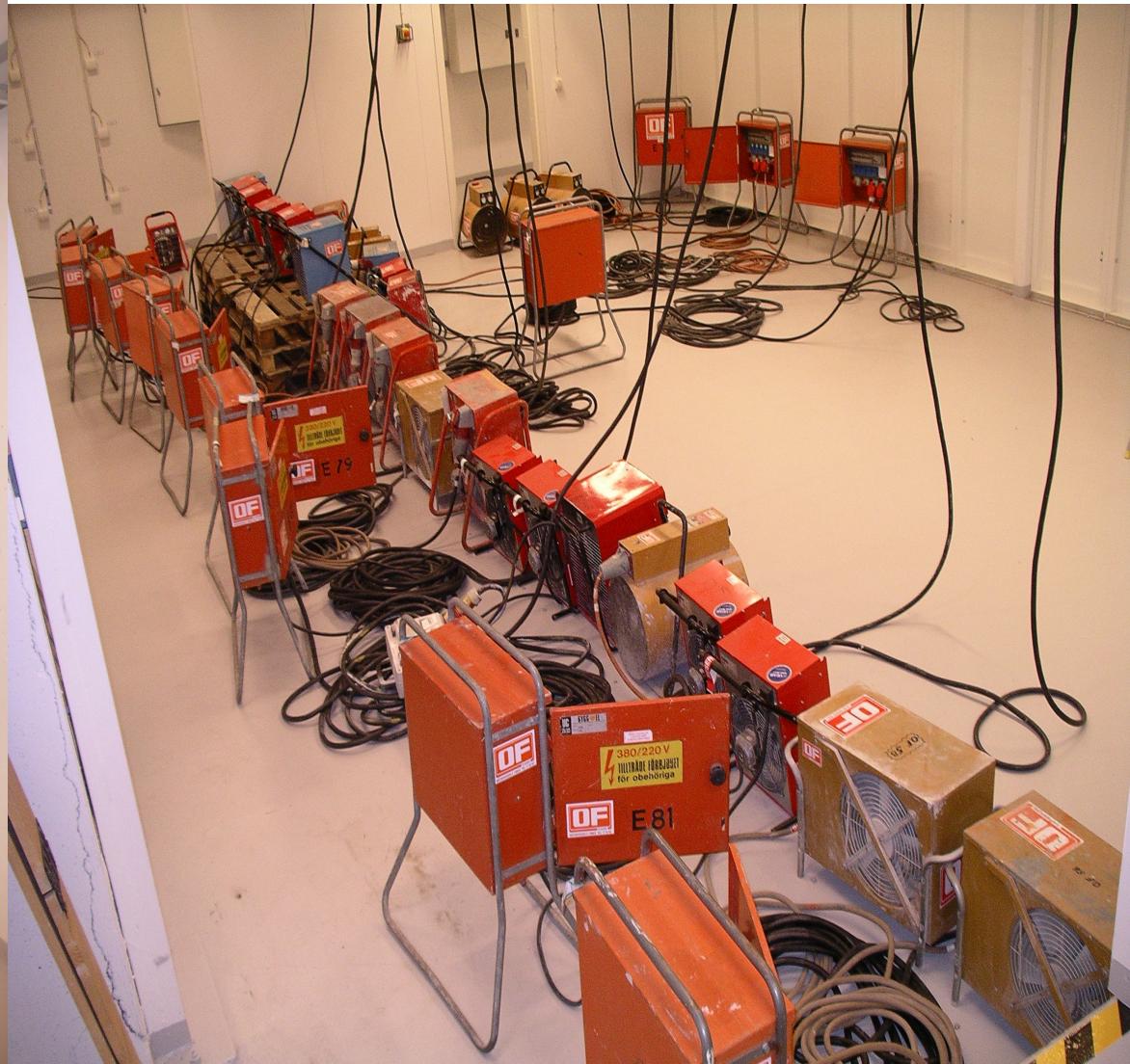
- Per rack:

- 1 x 32A 400V 3-phase

- Or 3 x 32A 230V 1-phase

- Separate cabling ladders for:

- HPC interconnect (infiniband, myrinet, etc)

- Ethernet

- Power