



PDC's Mission

Research

Conduct world-class research and education in parallel and distributed computing methodologies and tools

Infrastructure (PDC-HPC)

Operation of a world-class ICT infrastructure for Swedish research as part of SNIC, including HPC and data services, with associated user support and training



PDC Center for
High Performance Computing

SNIC

- The Swedish meta-center for large-scale computing and data storage. Formed 2003.
- Organized within the Swedish Research Council
- Mission:
 - Provide funding for computing resources in Sweden
 - Coordinate investments and competence
 - Allocate resources to users (SNAC committee)
 - Fund and coordinate development projects
 - Host the Swedish National Graduate School in Scientific Computing (NGSSC)
- Means:
 - Work by the six SNIC centers
 - A board and a very small executive organization
 - Strategic plan: The SNIC Landscape Document

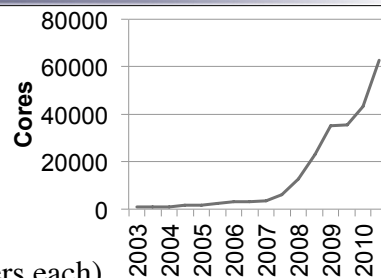
SNIC

SNIC 2010, - 3

SNIC



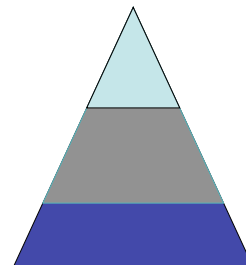
- HPC2N (Umeå)
- UPPMAX (Uppsala)
- PDC (Stockholm)
- NSC (Linköping)
- C3SE (Göteborg)
- LUNARC (Lund)



- About **300** user groups (**1-50** researchers each)

- Services:

- A few large-scale computing systems
- Foundation-level computer systems, storage and user support at all centers
- Coordinated access to European-level initiatives
- SweGrid initiated 2003
- SweStore initiated 2008
- Advanced user support effort initiated 2010



SNIC

SNIC 2010, - 4

SweGrid

- The Swedish National Grid Initiative (NGI)
 - Established 2003
 - Fully integrated in SNIC
 - Tight collaboration with the Swedish LHC consortium (LHCK) (contributes to funding for hardware and operations)
- Core hardware:
 - Computational resources at all six SNIC centers,
 - Moving away from dedicated clusters - now grid access to foundation level systems
 - 1,1 PB disc, modern tape storage systems at three sites
- Use:
 - 1/3 of computational resources dedicated to LHCK
 - 12 other SNAC allocations 2008-2009
 - ARC and gLite middlewares
- Core hardware for Nordic WLCG Tier-1 and Swedish Tier-2
- The base for Swedish participation in EGI

SNIC

SNIC Resources at PDC

- **Ekman**

KAW-funded system for Climate and Flow research
10,144 cores (1268 nodes, 2 quad core AMD)
89 TF theoretical peak performance
20 TByte memory

- **Ferlin**

SNIC Throughput System
6,120 cores (765 nodes, 2 quad core Intel)
7 TByte memory
Will be decommissioned end of 2011 – application for replacement system filed with SNIC

- **Zorn**

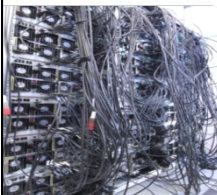
GPU cluster for VIC-Stockholm
14 GPUs, 14 TF SP, 6.25 TF DP
Currently being upgraded to 38 GPUs thanks to SNIC co-funding

- **Povel**

Prototype system for PRACE
4320 cores (180 4x6core AMD nodes)
36 TF theoretical peak performance
5.76 TByte memory



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Lindgren - PDC's latest HPC system



- Cray XE6
- 2 12core AMD Opteron CPUs 2.1 GHz, 32 GB RAM per node
- 1516 compute nodes (36,384 cores), 305 TF TPP, 237 TF sustained
- Gemini 3D torus network
- SNIC PRACE system
- Nr. 9 in Europe and Nr. 31 worldwide on the June 2011 Top500 list



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PDC's Computational Resources



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System	Cores	TPP
Lindgren	36,384	305 TF
Ekman	10,144	89 TF
Ferlin	5,360	58 TF
SweGrid	744	8 TF
Hebb	2,048	6 TF
Povel	4,320	36 TF
Total	59,000	502 TF

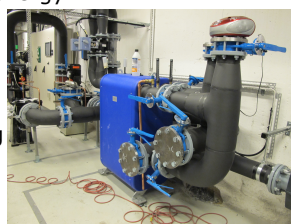
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Heat Reuse Project



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- Background: today around 1.3 MW used at PDC
- Project started 2009 to re-use this energy
- Goals:
 - Save cooling water for PDC
 - Save heating costs for KTH
 - Save the environment
- Use district cooling pipes for heating when no cooling is required
- No heat pumps
- Starting with Cray
- First phase of Cray will heat the KTH Chemistry building



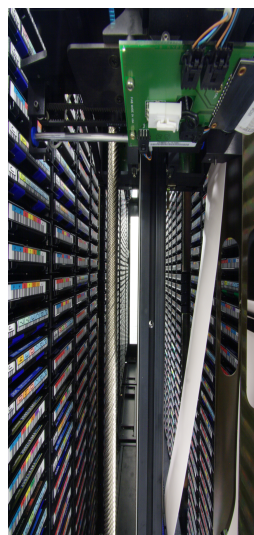
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Storage



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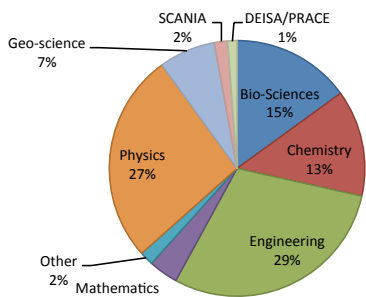
- ~20 TB disk
 - Accessible via AFS
- ~900 TB disk
 - Currently attached to individual systems
 - Lustre parallel file system
 - Site wide configuration planned
- ~450 TB LCG disk
- IBM tape robot (~2900 slots, ~2.3 PB)
 - Accessible via HSM, TSM, and dCache



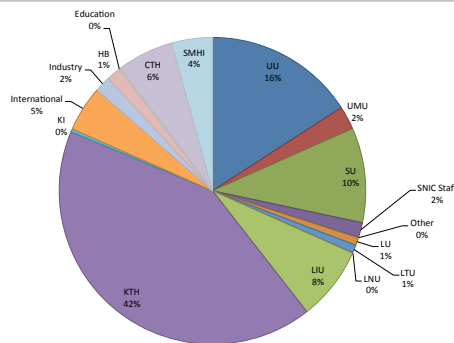
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PDC Supporting Swedish Research (Data from 2011)

- About 2/3 of the total SNIC computational resources are operated by PDC
- In 2011 some 380 Million core hours have been used on PDC's SNIC machines, that equals to a usage of over 90% of the nominally available compute power



PDC Usage per Science
01/2011-11/2011



PDC Usage per Affiliation
01/2011-11/2011

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Projects at PDC





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Wish you a successful meeting
and a nice stay in Stockholm