Swedish National Infrastructure for Computing (SNIC)

Status Report and Future Plans

Sverker Holmgren

SNIC Director

SNIC 2010, - 1

- 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



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

+ OptoSUNET, 10 Gbit

- 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 funding



. . .

- SNIC funding from VR 2010: 98 MSEK
- SNIC coordinates additional funding
 - KAW: 45 MSEK 2007-2009
 - LHCK (RFI): 27,4 MSEK 2007-2009
 - Other foundations, research groups,
- Significant co-funding also by hosting institutions



SNIC computational resources



Requests for SNAC resources

During 2008-2009: **103** applications for large-scale allocations 2008:

• 14500 core-years requested, 9980 allocated

2009:

• 19500 core-years requested, 12020 allocated

During 2008-2009: 355 applications for medium-scale allocations

• On average: Continuous use of 6450 cores requested

In 2010: Continued increase in the total number of applications to SNAC and rapid increase in the amount of resources requested

Users of SNIC resources



Utilization of SNIC resources





Ada: Jul 2008 - Dec 2009 100 90 80 70 _}%60 € 50 50 50 50 50 50 30 20 10 0 Jul Aug Sep Oct Nov Dec 31 31 30 31 30 31 Aug Sep Oct Nov Dec 31 30 31 30 31 Feb 28 Jul 31 Jan 31 Mar 31 Apr 30 May 30 Jun 30 🗖 2008/2nd half 📮 2009/1st half 📕 2009/2nd half cores: 🗖 1000 📮 1000 📕 1000





Swedish Landscape for Computing

European-level resources

Grand-scale resources provided by e.g. PRACE and EGI.

Special resources

- A few large-scale computational resources
- A few other special-purpose computational resources
- The national data storage system (SweStore)
- Collaborative efforts with other partners, e.g. KAW.

Foundation-level resources

 Computing and data storage at all SNIC centers

- Now about 62000 cores (16 systems)
 - 35000 cores one year ago, 1700 cores five years ago
- 2,6 PB disk
- Three tape storage facilities
- Lindgren (PDC) : CRAY XT6m (11050 cores, 92 Tflop)
- Ekman (PDC) : Dell cluster (10144 cores, 86 Tflop)
- Neolith (NSC): HP cluster (6440 cores, 60 Tflop)
- Akka (HPC2N): IBM cluster (5376 cores, 54 Tflop)
- Kappa (NSC): HP cluster (2912 cores, 26,3 Tflop)
- Kalkyl (UPPMAX): HP cluster (2784 cores, 25,5 Tflop)
- Beda (C3SE): HP cluster (2144 cores, 19,4 Tflop)
- Platon (Lunarc): HP cluster (1728 cores, 15,6 Tflop)

New resources coming in:

- Upgrade of CRAY system at PDC (to 305 Tflop)
- Specific system for material science consortium at NSC
- Fat-node cluster at HPC2N
- Foundation-level systems at UPPMAX, C3SE, Lunarc
- Upgrade of Swegrid resources
- Continued build-up of Swestore national storage

Major effort on advanced user support – Application experts 2010-2012

Materials (2,5 FTE)

 Modeling of materials – physics and chemistry, materials science, electron structure computations

Bioscience (2 FTE):

• Bioinformatics, Biomolecular simulations

Competence group GRID (1,8 FTE)

Fluid mechanics (1 FTE)

• Fluid mechanics and turbulence

National entry point to major international collaborations

- PRACE
 - Prototype system (4320-core cluster, energy efficiency)
 - "PRACE Tier-1 system": 305 Tflop CRAY XE6 during autumn
 - Participation in the PRACE projects
 - SNIC representation in PRACE BoD
- EGI
 - Swegrid resources (1/3 dedicated to WLCG Tier-1/2)
 - Participation in EGI-InSPIRE
 - SNIC representation in EGI.eu EB and EGI-InSPIRE PMB



Proposed budget:

168 MSEK/year + univ. contribution

Roadmap for 2010

- Computing resources
 - Ensure sufficient foundation-level capacity at all sites
 - Collaborative process and joint procurements
 - Install a 160-200 Tflop system for demanding applications
 - Install a pilot system with hardware accelerators
 - Participate in procurement of a pilot system at Nordic level
 - Continuation of KAW/SNIC collaboration?
- Data storage
 - Ensure unified center storage at all sites
 - Build first version of distributed, national storage
 - Cross-site backup
- User support
 - Application experts coordinated with Strategic Area Efforts
 - Application experts for massive-scale parallelization

Also in the roadmaps

- Computing resources
 - Regular updates of foundation-level systems in 2011-2013
 - Two systems at each site, each system renewed every 4th year
 - Possibly one large-scale system in 2011
 - Depending on user needs
 - A Pflop system for demanding applications in 2012
 - After further evaluation of user need
- Data storage
 - Continued build-up according to plan produced by the SNIC Data Storage Task Force
- User support
 - Extended effort. Includes also code development.
- Access modes
 - Harmonization with EGI and PRACE
 - Simplified/unified sign-on to SNIC resources

Also in the roadmaps

- Allocation process
 - New SNAC Policy Document
 - Performance evaluation of applications for special resources
 - Allocation procedures for storage and user support
 - Improved user/project management and reporting procedures/tools
- Collaborative projects
 - PRACE and EGI
 - Future Nordic collaboration on grid, HPC and data storage
 - DISC/SND and SUNET
 - ESFRI projects etc
- Possible external facilities and service providers
 - Investigate housing options for SNIC systems
 - A possible large-scale joint Nordic resource
 - Investigate feasibility of commercial cloud services

Challenges

- Increased needs and new structures
 - Strategic Research Area efforts (eScience and others)
 - New, large-scale national projects
 - New, very large projects funded and coordinated at EU-level (ESFRI etc)
- Cost for facilities and electricity is growing

Challenges



Blue areas = eInfrastructure.

Challenges



The Swedish eInfrastructure ecosystem

Opportunities

SNIC is well-positioned to cater for the rapidly increasing needs of computing resources and data storage for Swedish research!

- Foundation-level and special resources
- National coordination
- Participation in international initiatives
- Collaborative efforts