

The Notur project provides the infrastructure for computational science in Norway. The infrastructure includes computational resources, services and support for education and research and serves individuals and groups at all Norwegian universities, university colleges and research institutes. The project also provides services for operational forecasting to the Meteorological Institute.

The partners in the project are UNINETT Sigma AS (coordinator), the Norwegian University of Science and Technology (NTNU), the University of Bergen (UiB), the University of Oslo (UiO), the University of Tromsø (UiT) and the Meteorological Institute (met.no). The Notur project is funded in part by the Research Council of Norway (through the eVITA programme) and in part by the consortium partners. The project has a 10-year duration (2005-2014).

The four university partners host and operate high-performance computing facilities. The partners also provide support and assist users with the installation, compilation and porting of software, the execution of applications, data management, and machine-specific issues.

The Notur project also provides advanced application support. Advanced support aims at helping scientists to improve or extend the performance and capabilities of their applications. This can be in a number of ways, e.g., by code parallelization, complex application enabling and software porting, tuning and optimization, benchmarking, improving user-interfaces, and software development. Advanced support targets scientists with compute- and data-intensive applications as well as scientists that have a (potential) need for high-end resources but who are unfamiliar with parallel computing architectures and paradigms. A main aim of the activity is also to optimize the utilization of the (expensive) compute facilities.

Researchers from a variety of scientific disciplines depend in their work on the availability of the Notur resources. Traditionally, computational chemistry, geosciences and physics make most use of the facilities, but also researchers from the biosciences, material sciences, computational fluid dynamics and medical sciences use the facilities. The total community consists of a few hundred (active) users.

Since a number of years, the demand for computing resources by the research community in Norway has been growing more rapidly than the total available resources. Figure 1 gives an overview of the allocation units requested and allocation units used in five successive allocation

periods. One can observe a clear increase in the demand for computing time in successive periods.

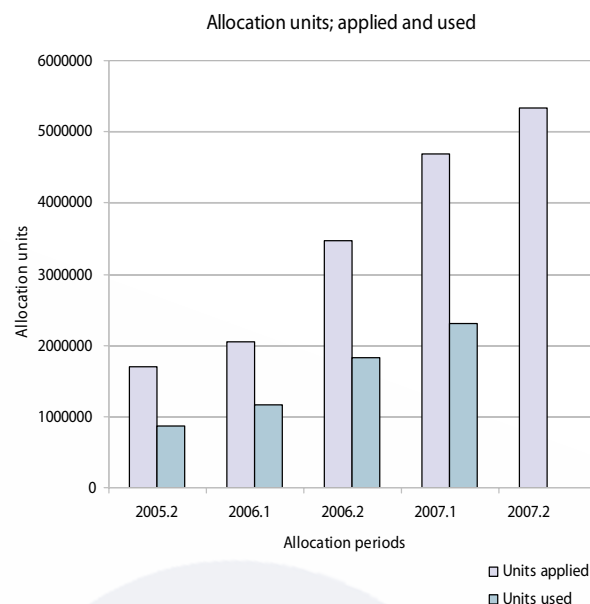


Figure 1: Allocation units requested and allocation units used in five successive allocation periods. The figure also shows that the gap between the total demand and total usage has been increasing. Also the amount of allocation units used increases per allocation period but at a lower rate. (The usage for period 2007.2 (October 2007 – March 2008) is not known yet).

Besides researchers from the universities, colleges and met.no, the resources are also used by research organizations such as SINTEF, the Institute for Marine Research, the Nansen Environmental and Remote Sensing Centre, the Simula Research Laboratory and the Norwegian Institute for Air Research. The resources are also heavily used by several of the Centres of Excellence that have been established by the Research Council of Norway.

THE NATIONAL COMPUTE RESOURCES (STATUS FEBRUARY 1, 2008).

1. njord.hpc.ntnu.no

Njord is an IBM p575 system that consists of 65 nodes of which 59 nodes are for computation, 2 nodes are for log-in and 4 nodes are for I/O. Each of the compute nodes has 16 power5+ 1.9 Ghz cores and 32 GB memory. Four nodes have 128 GB memory. The nodes are interconnected by IBM HPS technology. The total peak performance of the system is ca 7.2 Tflops/s. The central storage area has 120 TB disk capacity. The system is well-suited (and intended) for large scale parallel applications. The system is used in part by the Meteorological Institute for operational weather forecasting.

2. stallo.uit.no

Stallo is an HP compute cluster with 704 servers, each with two Xeon 2.66 Ghz quad-core processors (total 5632 cores), 16 GB RAM and 120 GB disk (50 nodes have 32 GB RAM). The system has 128 TB central storage. 384 nodes are interconnected with InfiniBand while the remainder has GigaBit Ethernet interconnect. The theoretical peak performance of the system is ca 60 Tflops/s. Stallo is well-suited for most MPI applications with moderate memory requirements per processor core, and for shared-memory OpenMP applications using up to eight processor cores. Stallo is also well-suited for embarrassingly parallel applications.

3. hexagon.bccs.uib.no

Hexagon is a Cray XT4 system with 1388 nodes interconnected with a high-bandwidth low-latency switch network (SeaStar2). Each of the nodes has a dual-core AMD Opteron processor and 4 GB memory (128 nodes have 8 GB memory). The facility is equipped with 288 TB central storage. The system is well-suited (and intended) for large scale parallel MPI applications. Access to hexagon is in principle only for projects that have parallel applications that use a large number of processors (> 128). The dual-core processors will be replaced by quad-core processors in March. The theoretical peak performance of the system after the upgrade will be 51 Tflops/s.

4. titan.uio.no

Titan is a compute cluster with 448 dual-cpu dual-core Sun X2200 AMD Opteron nodes (1792 cores), with 8-16 GB RAM and 500-1000 GB disk on each node. The majority of the nodes is connected by a high-speed InfiniBand interconnect. The cluster includes also three Sun X4600 nodes each with 8 dual-core processors and 128-256 GB memory. Titan is well-suited for most MPI applications with moderate memory requirements per processor core, and for shared-memory OpenMP applications using up to four processors. The dual-core processors will be replaced by quad-core processors early 2008. (The cluster includes also 180 Dell/Intel nodes, 360 processor cores.)

5. snowstorm.uit.no

Snowstorm is an HP cluster with 100 nodes each with four Itanium2 processors and 4-8 GB of memory and 144 GB internal disk. The system has 2 TB central storage. The nodes are interconnected with Infiniband and Gigabit Ethernet, and 25 nodes also have SCI/Dolphin interconnect. The theoretical peak performance of the system is ca 2.2 Tflops/s. Snowstorm is well-suited for most MPI applications with moderate memory requirements per processor, and for shared-memory OpenMP applications using up to four processors.



ACCESS TO THE RESOURCES

The following groups can apply for access to the national resources (and for advanced user support):

- Research groups from Norwegian universities and university colleges
- Research groups or projects financed by the Research Council of Norway (Norges forskningsråd) or by the Ministry of Education and Research (Kunnskapsdepartementet), e.g., the Meteorological Institute
- External parties that collaborate with the Notur project

The applicant must hold a permanent position at his/her organization. If you are uncertain whether you (or your organization) can apply, contact UNINETT Sigma.

The applications are evaluated by a Resource Allocation Committee that is appointed by the Research Council of Norway.

Up-to-date information on the Notur project, the resources and application forms can be found on www.notur.no.



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