

# Dutch National Supercomputer



## Why the Dutch National Supercomputer?

For access to a high-performance and well-balanced, multi-purpose compute system. The Dutch National Supercomputer, named Cartesius, is a centrally managed Linux system designed for compute and data intensive applications. You can upscale your computations to a higher level, or use it to handle jobs requiring more advanced features like accelerators.

## What is the Dutch National Supercomputer?

The Dutch National Supercomputer consists of a large number of batch nodes and a small number of special purpose nodes. For the batch nodes we differentiate between so-called thin nodes, fat nodes, GPU nodes, and Xeon Phi nodes. Thin nodes constitute the majority of the available batch nodes. GPU nodes use GPGPUs to accelerate the computations. Fat nodes have more memory (256 GB) than the thin nodes and more physical cores (32) than most thin nodes. Users are given a login, which enables immediate, 24/7 access to the service.

The Dutch National Supercomputer offers:

- A large collection of utilities, compilers and libraries
- Virtually unlimited data transfers for up- and downloads
- Sharing data and analyses with other users
- Fast InfiniBand interconnect for inter-node communication and I/O
- Own workspace with 200 GB default home directory
- Scratch file systems with default quota of 8 TB, and project file systems for projects with large storage demands

- Installation of specific software packages and high-level support concerning the optimal use of the service.

## Additional services

The following additional services are available on request.

### Accelerators

The Dutch National Supercomputer contains GPU nodes that can be used separately to execute specific functions much faster than normal CPUs.

### Consultancy

SURFsara's advisors provides you with independent advice for optimizing or parallelizing applications for performance improvements.

### Visualization

Calculations often result in large amounts of data. Visualization can be of use in the interpretation of the result. We can support you on those visualizations for demonstrations and presentations or for easier research interpretation.

### Storage, Backup & Data Archive

Additional storage exceeding 200 GB is available upon request. The Dutch National Supercomputer is connected to SURFsara's Data Archive, for long-term and secure storage of your data which is also available upon request.

## Contact & Support

We are pleased to help you in gaining access to the Dutch National Supercomputer, answer your questions or assist you with specific requests you may have about the service and SURFsara in general. Please just contact us by email via [info@surfsara.nl](mailto:info@surfsara.nl).

Specific details on obtaining accounts by affiliates of one of the Dutch Universities or Grand Technology Institutes can be found on our website. Detailed information on the Dutch National Supercomputer is provided in the Service Level Specification.

Support for Dutch National Supercomputer users may be requested via email: [helpdesk@surfsara.nl](mailto:helpdesk@surfsara.nl) or phone 020 - 800 1400. Support is available during office hours, i.e. weekdays between 9 a.m. and 5 p.m.

more information  
[www.surf.nl/surfsara](http://www.surf.nl/surfsara)

visit us  
Science Park 140  
1098 XG Amsterdam

contact us  
020-8001300  
[info@surfsara.nl](mailto:info@surfsara.nl)



## Use Cases

Here are a few examples to illustrate what the Dutch National Supercomputer is used for. More references can be found on the SURFsara website.

### Leiden University: Computational Astrophysics



Prof. dr. Wim Nieuwpoort and Prof. dr. Simon Portegies Zwart during the ceremony of the 2013 Wim Nieuwpoort Award.

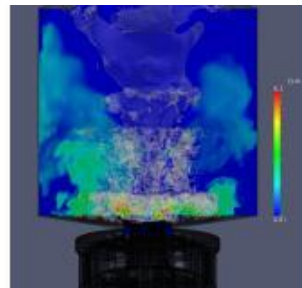
#### How to simulate an entire solar system?

Professor of computational astrophysics Prof. Simon Portegies Zwart and his PhD students had to simulate the entire solar system as well as its constituent planets and planetoids. This project won the 2013 Wim Nieuwpoort Award. The annual award is presented to the team of researchers deemed to have made most effective use of the Dutch National Supercomputer at SURFsara. The researchers aim to carry out the necessary calculations as efficiently as possible using the supercomputer's computing power. "We managed to scale the code and run it on the Dutch National Supercomputer with a high degree of efficiency", Portegies Zwart explains. "With that problem out of the way, we can now focus on the astronomical questions. It's a long-term project: we're currently working on a calculation that's been ongoing for close to a year now."

### Dacolt: Cleaner Engines

#### Modelling combustion processes

Since 2013 Dacolt has been using the computing power offered by the Dutch National Supercomputer at SURFsara, as a part of the PRACE (Partnership for Advanced Computing in Europe) initiative.



"We study combustion processes in gas turbines", director Dr. ir. Ferry Tap explains. "Our research focuses on the detailed modelling of gas turbulence. This requires the kind of computing power only a supercomputer can offer." Tap has become familiar with all the resulting benefits: "We can now conduct a simulation that would have taken us three months in a few days' time. As a result, we can now do the type of significant research we've been aiming for."

### Dutch National Supercomputer technical specifications

Below is a summary of the technical specifications (December 2016). It illustrates the computing capacity, quality and quantity of the Dutch National Supercomputer.

System Name	Cartesius
Operating System	bullx Linux (Red Hat Enterprise compatible)
Full system	47,776 cores + 132 GPUs; 1.843 Pflop/s (peak performance); 130 TB memory
Thin nodes (Haswell)	25,920 cores: 1.078 Pflop/s
Thin nodes (Ivy Bridge)	12,960 cores: 249 Tflop/s
Thin nodes (Broadwell)	5,664 cores: 236 Tflop/s
GPU nodes (K40m)	1,056 cores + 132 GPUs: 210 Tflop/s
Xeon Phi nodes (KNL)	1,152 cores: 48 Tflop/s
Fat nodes (Sandy Bridge)	1,024 cores: 22 Tflop/s
Memory	64 to 256 GB memory per node
Disk space	Default home directory: 200 GB 180 TB home file systems 7.7 PB scratch and project Lustre (parallel) file systems

more information  
[www.surf.nl/surfsara](http://www.surf.nl/surfsara)

visit us  
Science Park 140  
1098 XG Amsterdam

contact us  
020-8001300  
[info@surfsara.nl](mailto:info@surfsara.nl)

