SIEMENS

Siemens PLM Software

NX Nastran on the Rescale cloud simulation platform

Providing a cost-effective, scalable, on-demand finite element solution

Benefits

- Bring products to market sooner by scaling up simulation usage
- Increase innovation and product quality with more thorough design studies
- Optimize the mix between capital cost and operational expense for HPC needs
- Achieve faster time-to-value with rapid deployment using minimal effort
- Deliver scalable access to the premium finite element solver

Summary

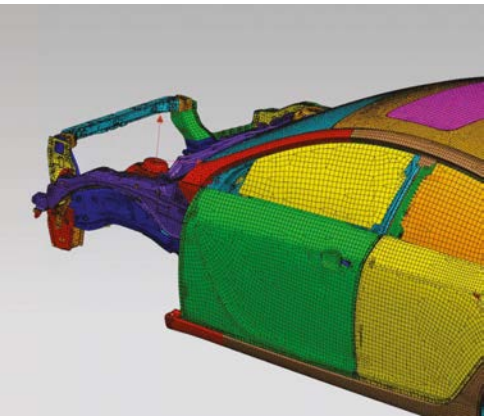
Siemens PLM Software's NX™ Nastran® software, a leading finite element (FE) solver used across the globe by manufacturers and engineering service providers in automotive, aerospace, machinery, electronics, energy and other industries, is now available on Rescale, an on-demand, dynamically scalable cloud-simulation platform. The solution integrates on-demand, high-performance computing (HPC) hardware with the industry's leading finite element analysis (FEA) software. Engineers can seamlessly customize compute capacity based on individual simulation requirements so they can perform virtual product simulations.

NX Nastran on the Rescale platform

Nastran has been an industry-standard FE solver for over 40 years, known and trusted for its strength in stress, vibration, dynamics and other types of analyses. NX Nastran is used extensively by manufacturers and engineering suppliers in a wide range of industries. Siemens PLM Software has partnered with Rescale to make NX Nastran available in a cloud environment so users around the globe now have easier access to this simulation solution.

Rescale was founded in 2011 and has grown rapidly to become a leading cloud-simulation provider, offering an integrated solution that combines simulation software with customizable hardware infrastructure

NX Nastran in the Rescale cloud environment



Shown is an automotive NVH model prepared for solving on the Rescale platform.

for companies to perform scientific and engineering simulations. Rescale serves both large enterprises and small-to-medium-sized businesses in a diverse range of industries, including aerospace, automotive, life sciences and energy.

Using NX Nastran on Rescale is very straightforward and intuitive. The user has to simply login to the Rescale platform using a standard web browser, select the desired hardware configuration, upload the input deck and specify the solver. Input decks may be prepared using NX™ CAE software, Femap™ software or any other preprocessor that can be used to write NX Nastran decks. Rescale performs a check on the input parameters and then provisions the cluster for the computation step. During the course of the simulation, users are able to monitor the status of the job in real time and view output files on the platform while the job is running. After the job has been completed, the user downloads the output files to their local machine for postprocessing.

NX Nastran solutions on Rescale

Customers that are using Rescale can pick between two NX Nastran license bundles. The basic bundle provides the most common workflows for linear static and normal modes analyses as well as steady state and transient heat transfer and basic nonlinear analysis. Shared-memory processing can be enabled to speed up runs.

An advanced bundle adds certain capabilities over and beyond the basic bundle, including: dynamic response, customization with Direct Matrix Abstraction Program (DMAP), superelement support, aeroelasticity and multi-step nonlinear solutions. Additionally, users can benefit from distributed memory processing, which provides a high degree of scalability; for example, scalability up to 512 processors for modal solutions.

Flexible licensing models

NX Nastran on the Rescale platform introduces new licensing and deployment models for customers wishing to access the power of NX Nastran. NX Nastran is available on the Rescale platform under two different licensing models: customers can choose between a platform-as-a-service (PaaS) option or a software-as-a-service (SaaS) option.

Under the PaaS model, also known as bring-your-own-license (BYOL), customers can purchase a license from Siemens PLM Software as they would with a traditional software license model, and then use that license in conjunction with the NX Nastran software that has been deployed on the Rescale platform. Companies may opt for the BYOL model when they wish to own the licenses, but not the hardware to run simulations. They could also use this model with licenses that exist on the premises to augment in-house hardware with high-powered machines that are used only as needed.

Under the SaaS model, a company can purchase usage via a subscription or a per-run per-hour usage model. Both the license and the software are provided by Rescale along with a choice of hardware configurations to run the simulations. The SaaS model may be preferred by companies that wish to minimize upfront costs associated with purchasing software and hardware. This offering enables companies to treat their investment in NX Nastran as an operational expense, which may offer some business benefits. This model is also attractive when companies have varying demand since they can easily scale usage up or down.

The described purchase options for the PaaS and SaaS models refer to software usage. In addition, Rescale charges for hardware usage on a price per-core per-hour basis.

Platform scalability

NX Nastran on the cloud provides companies with on-demand scalability for its FE solutions. Customers can quickly scale up compute capacity to fulfill short-term needs for more licenses; for example, to investigate an urgent warranty issue. So a company can size its in-house

infrastructure and license counts for a normal workload and then augment those resources with on-demand, cloud-based resources. Some companies may choose to perform only the most urgent or demanding computations in the cloud. In other cases, if usage patterns do not justify internal infrastructure investments, companies may choose to run all their NX Nastran simulations in a cloud environment.

To support these different needs, Rescale has tiered levels of hardware, including very high-end machines with large memory and large disk space. At the high end of the spectrum, customers can access over 10,000 cores that enable even the largest of models to be solved efficiently. Rescale's file transfer system can also be used to efficiently upload or download files larger than 100 gigabytes (GB), and has been tested on files as large as 2 terabytes (TB).

Platform security
Maintaining data security is an important consideration for every company that is contemplating investing in a cloud-based solution. Rescale has built proprietary, best-in-class security features into its platform. Customer data is encrypted end-to-end and jobs are run on private, closed clusters. Information technology (IT) administrators can manage access and security controls at every level of the organization. In addition, Rescale is compliant end-to-end with the International Traffic in Arms Regulations (ITAR) and Service Organization Controls (SOC 2) compliance requirements.

Design of experiments
Design of experiments (DOE) simulations are a very useful methodology for understanding product performance when there is variability so you can design products to be more robust to parameter variations. Traditional licensing models often make it challenging to run DOE simulations due to the large number of licenses that are needed for parallel runs to be executed. On Rescale, NX Nastran runs used as part of a DOE solution are solved using parallel pricing, but are volume discounted so that the cost per-run per-hour decreases as more runs are executed.

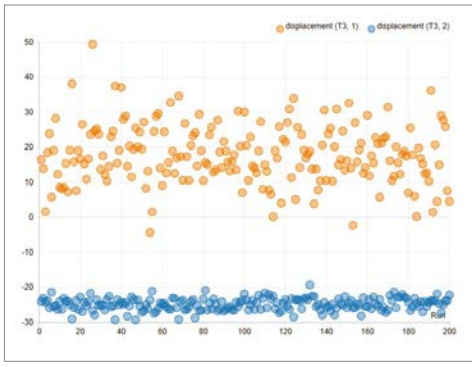
The Rescale DOE option automates the process of running a model with many property variations so engineering teams can develop more robust designs. Rescale automates the submittal process of varying the input files and launching the multiple runs. Once the DOE runs are complete, the user can preview and plot the results in the browser window prior to downloading the output data for further postprocessing.

DOE results can be previewed in the browser prior to downloading result files.

Getting started
If you want to use NX Nastran with the SaaS model, you can start today by going to the Rescale website at www.rescale.com and signing up for an account. Rescale offers a free trial set of hours to test its platform so you can find the workflow that's best for you before using it in production mode.

If you want to use NX Nastran with the PaaS model, you can contact your Siemens PLM Software account executive to purchase the NX Nastran licenses. If you already have licenses that you want to use, you can work with Rescale to enable access to those licenses.

Regardless of which option you choose, we recommend that you inform your Siemens PLM Software account manager so that we can provide any needed support.



Monte Carlo DOE results for a satellite dish showing large variation in displacement response at one location indicated by the yellow circles.

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