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# Simcenter 3D Acoustics High Performance Computing

## Scaling-up acoustic computations in parallel

### Benefits

- Accelerates acoustic finite element method or boundary element method computations by using high-performance computing systems
- Optimizes your high-performance computing system based on the number of cores and memory available
- Offers distributed memory parallelization and shared memory parallelization support

### Summary

Simcenter™ 3D Acoustics High Performance Computing software enables you to execute multiprocessor acoustic finite element method (FEM) or boundary element method (BEM) computations on parallel hardware of various configurations.

### Speeding up acoustics simulation

Simcenter 3D Acoustics High Performance Computing (HPC) speeds up acoustic simulations by enabling solvers to run on HPC systems such as clusters, multinode machines, multi-core personal computers (PCs), etc. As such, you can exploit the full capability of available hardware through parallel processing for both FEM- and BEM-based simulations.

In the case of FEM vibro-acoustics, this product embeds the distributed memory parallelization (DMP) capability of NX™ Nastran® software. For BEM vibro-acoustics, this product can be used to speed up computations using either the standard or accelerated BEM solvers (Fast Multipole BEM and H-Matrix BEM).

For FEM- and BEM-based analyses, with standard solvers you can run acoustic simulations with four parallel processes, equivalent to DMP=4 in the case of NX Nastran. Beyond four processes, the Simcenter 3D Acoustics HPC license provides support for running computations from five to any number of processes (cores, nodes) in both shared memory parallelism (SMP) and distributed memory parallelism (DMP) mode.

### Similar workflows for serial and parallel simulations

The acoustic FEM or BEM model setup, including the setting of instructions for DMP and SMP solving, is fully supported in Simcenter 3D. One can also launch the solver run in conjunction with the Simcenter 3D Acoustics HPC extensions from within the Simcenter 3D environment. The resulting parallel computation files are similar to those from the single central processing unit (CPU) solvers and can be postprocessed in Simcenter 3D.

### Methodology

Parallel calculation sequences are implemented using the message passing interface (MPI) communication standard. They can be launched on both parallel servers as well as on clusters of workstations or PCs. The frequency level parallel strategy is targeted at calculating medium-sized problems for a large amount of frequency lines. An automatic scheduler distributes the different frequencies amongst the processors, enabling near-linear parallel speed up.

# Simcenter 3D

## Acoustics High Performance Computing

### Solution process management

Simcenter 3D enables the solving of an acoustic FEM or BEM model with parallel processing.

### Prerequisites

Simcenter 3D Acoustics HPC extensions are available as options on:

- Simcenter 3D Acoustics Boundary Element Method Solver
- Simcenter 3D Acoustics Accelerated Boundary Element Method Solver
- NX Nastran Basic
- NX Nastran Dynamic response



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