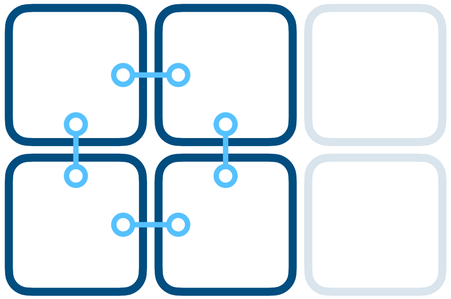
MPI Processes

A few facts

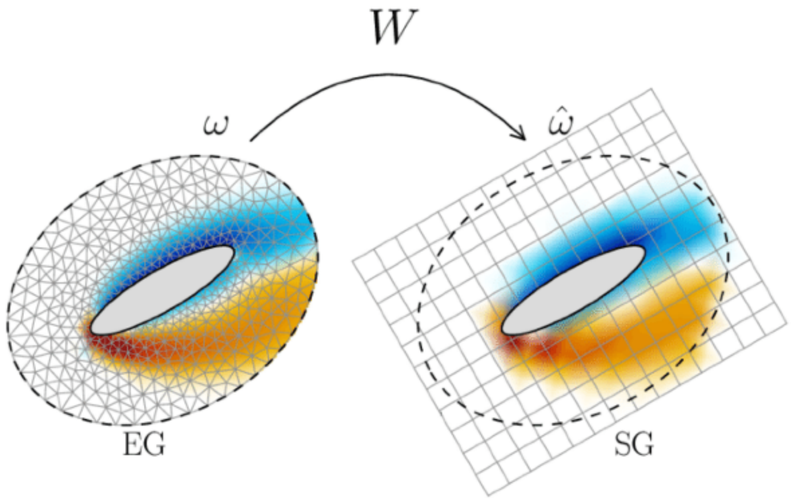


- MPI is an application program interface that defines a model of parallel computing where each process has its own resources and data must be explicitly shared by passing messages between processes. **It is the network backbone of an HPC cluster.**
- Processes that resolved adjacent areas must be physically placed nearby one another to limit network bottlenecks
- The same is true with NUMA placement

https://www.researchgate.net/figure/Interpolation-of-the-vorticity-o-from-the-unstructured-Eulerian-grid-into-a-fixed_fig6_276296330

CFD-specific Issues

Mesh interpolation



- CFD are usually solved on complex meshes, established with finer grain around critical region where most of the Physic happens.
- A 3D-domain can generally be reduced to a flat map by exploiting system symmetries.
- ConvNets are a flavor of FFNN that exploit spatial correlation by building abstract representation of the input data. To be taken advantage of, meshes needs to be regularized to a cartesian grid with interpolation.
- Interpolation leads to the loss of meaningful information, approximation, and requires time-consuming transformations

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