

FSI❄ce for Fluid-Structure Interactions on Cartesian Grids

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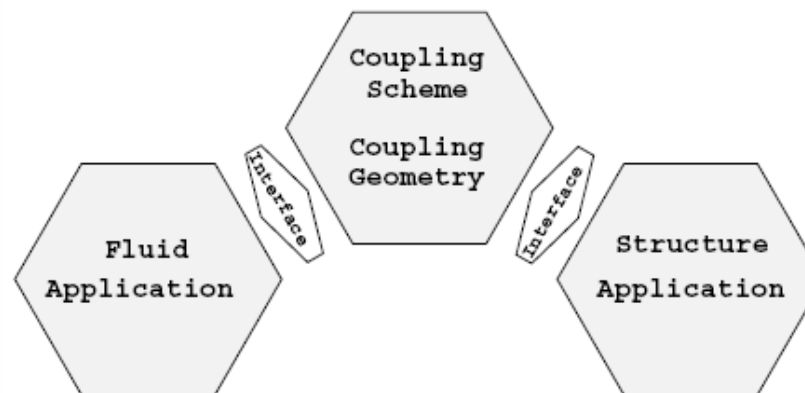


Outline

- Design of FSI*ce
- Usage of FSI*ce
- Outlook

Design of FSI[❄]ce

- “plug-in” mechanism for the CFD/CSD programs
- coupling scheme (explicit/implicit) outside CFD/CSD simulation programs
- client-server approach
- developed together with group Prof. Rank

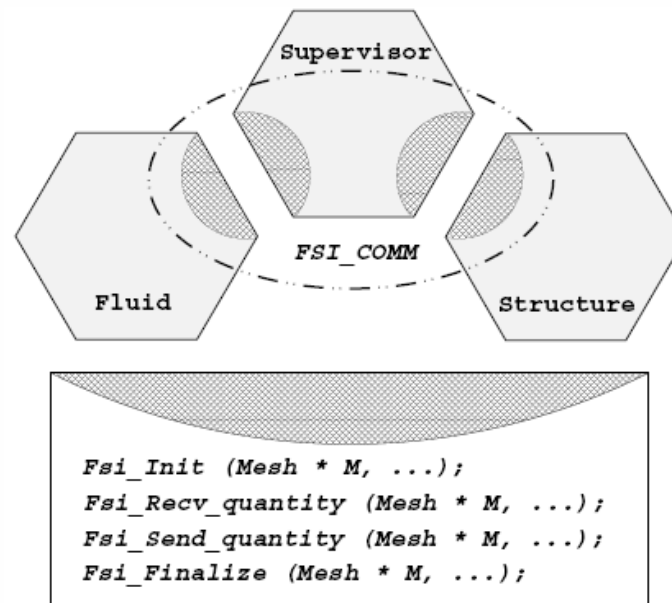
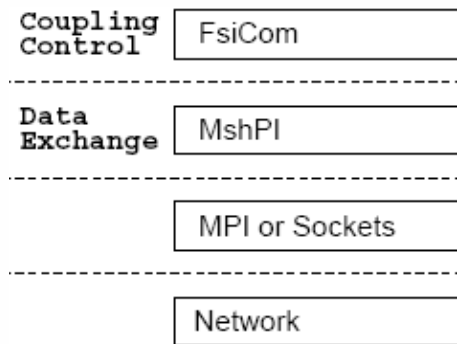


Design of FSI*ce – coupling geometry

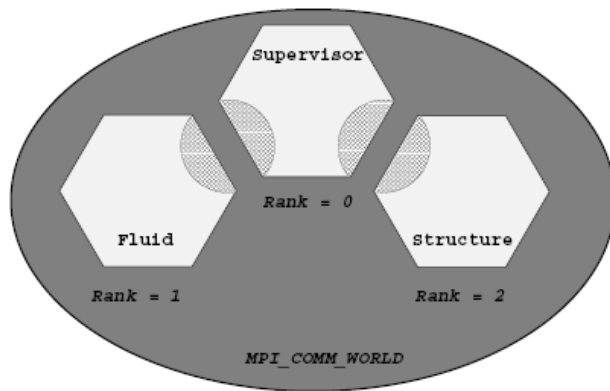
independent representation of the coupling geometry

- Vertex-edge-face representation (vef-graph)
- Data structure *FSI_Mesh*
 - coordinates
 - data associated with vertices or faces (e.g. forces)
 - access methods

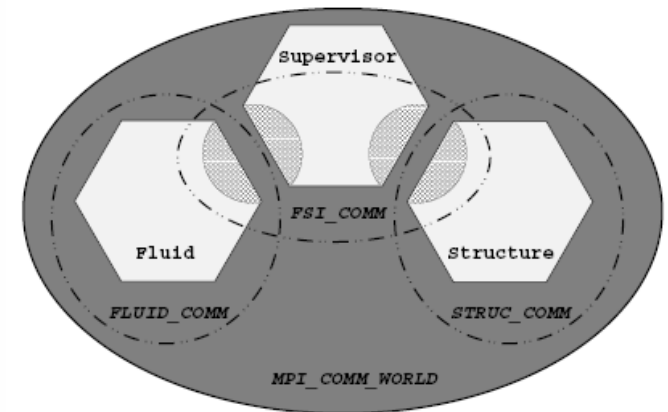
Design of FSI[❄]ce – communication



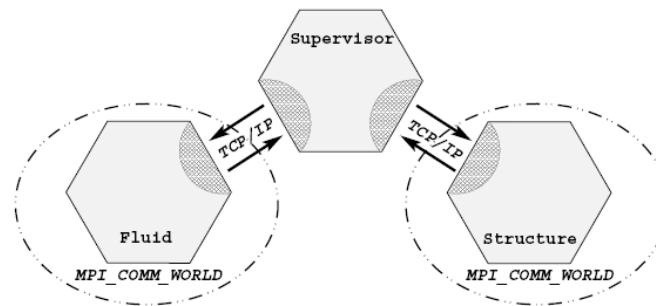
Design of FSI^{ce} – communication



Server programs are serial



MPI Communicators



Communication with Sockets / distributed application

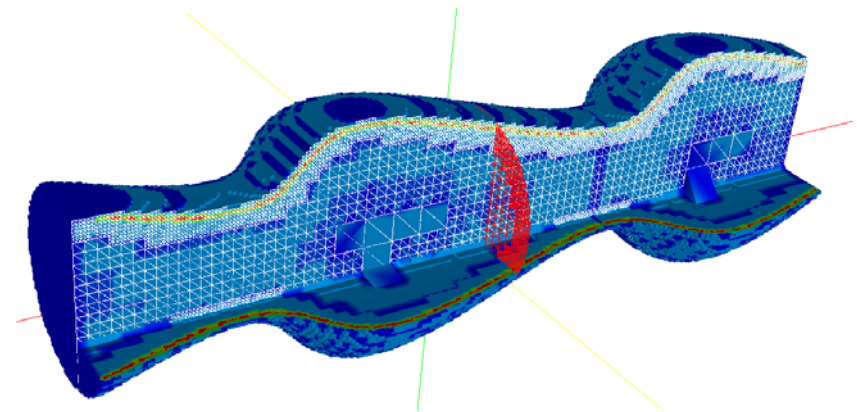
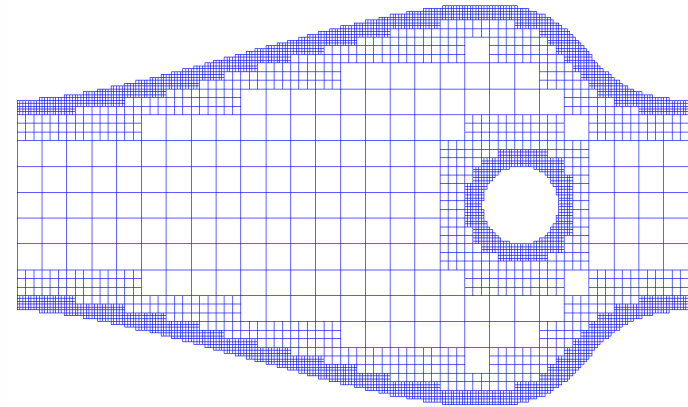
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Usage of FSI[❄]ce

CFD: Cartesian grids (no restriction!)

- **F3F**
 - 3D
 - FV
 - regular Cartesian grids
- **Peano**
 - 2D, 3D
 - FEM
 - adaptive/regular Cartesian grids
 - SFC (cache-optimisation)
 - grid hierarchy (multigrid)
 - SE aspects -> maintainability!

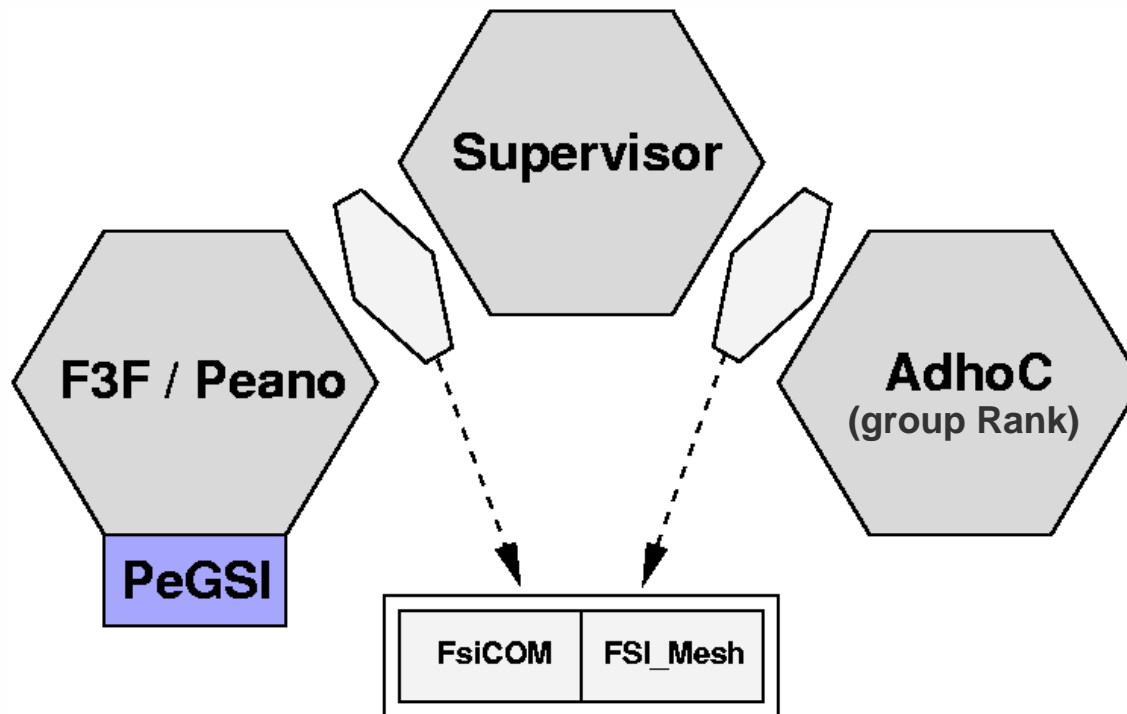


Usage of FSI❄ce

PeGSI (add-on)

- Recent BGCE student project
- 2D, 3D
- data format reader
- spacetree for coupling surface
 - dynamic creation / modification
 - key data structure for geometry queries
 - fast geometry access
- modular interpolation scheme

Usage of FSI^{*}ce

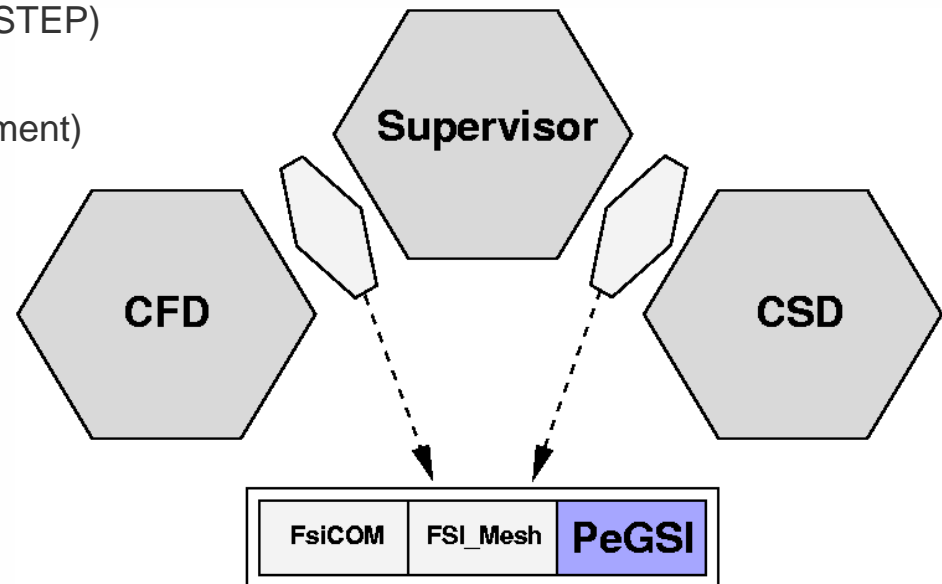


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Outlook

- integration of PeGSI :
 - triang. data format reader (IGES,STEP)
 - central definition of interpolation
 - fast geometry access (grid movement)
 - collision detection



- preparation for usage in Grid infrastructures

Thanks for your attention!

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