

# Enabling HPC for CFD Applications in HELYX<sup>®</sup>

Improving High Performance  
Computing (HPC) Adoption in  
Engineering Simulation

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# ENGYS | Who are we?

- Founded in the UK 2009
- CAE products and services
  - CFD
  - MDO / Adjoint
- Leverage open-source solutions
- OpenFOAM developers since 1999
- 6 Offices worldwide
  - UK, Germany, Italy, USA, Australia, ZA
- Multiple resellers
  - Japan (2), Benelux, Korea, China, USA



# ENGYS | What do we do?

## PRODUCTS



HELYX



HELYX-OS



ELEMENTS

## SERVICES

Analysis, Design,  
Consultancy

HELYX-SaaS  
HPC on-demand  
(e.g. OCF-enCore)

HELYX &  
OpenFOAM  
Support &  
Training

HELYX &  
OpenFOAM  
Development &  
Customisation

HELYX-Adjoint  
CFD Optimisation  
Development &  
Consultancy

DAKOTA  
Optimisation  
Support &  
Training

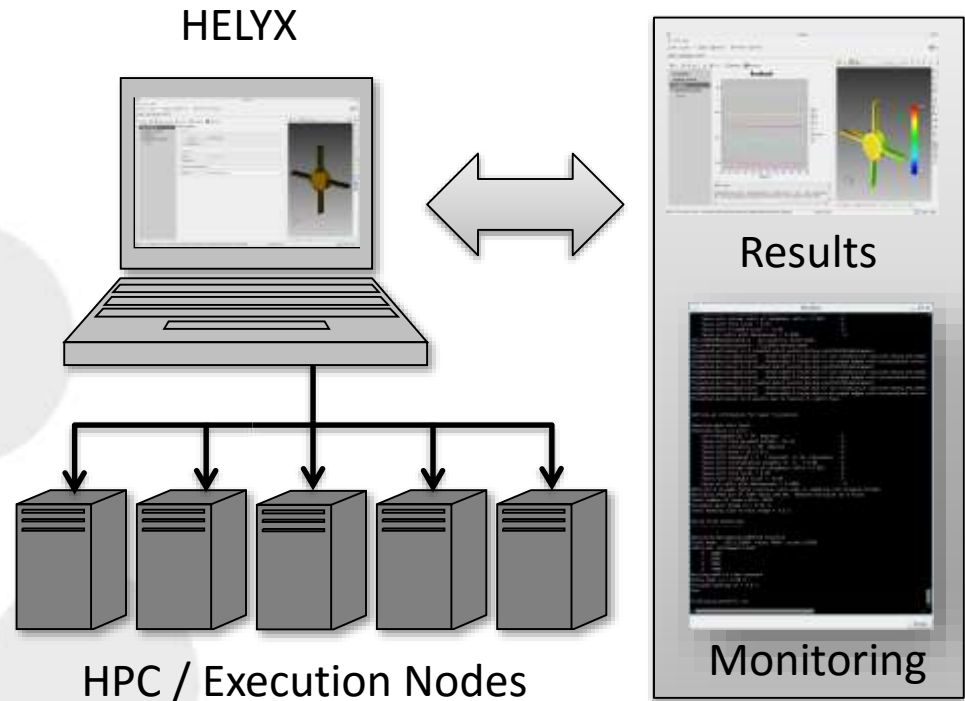
# What is **Helyx**?

- Comprehensive general purpose open-source based CFD software solution for industry
- Similar capabilities as traditional closed-source CFD products in the market



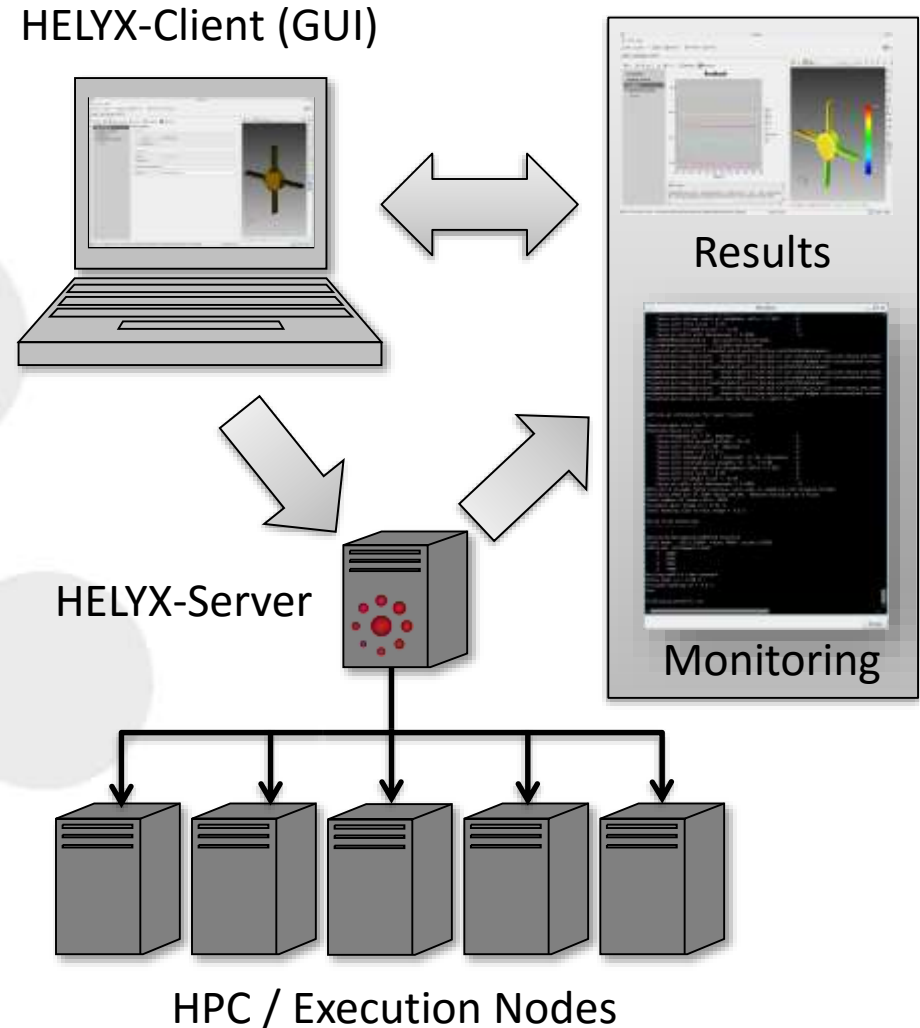
# Helyx | Traditional Software Architecture

- Single unified installation in local machine
- All data accessed locally
- All operations performed within local network
- Interactive graphical display only from local data
- All simulations limited to local hardware resources



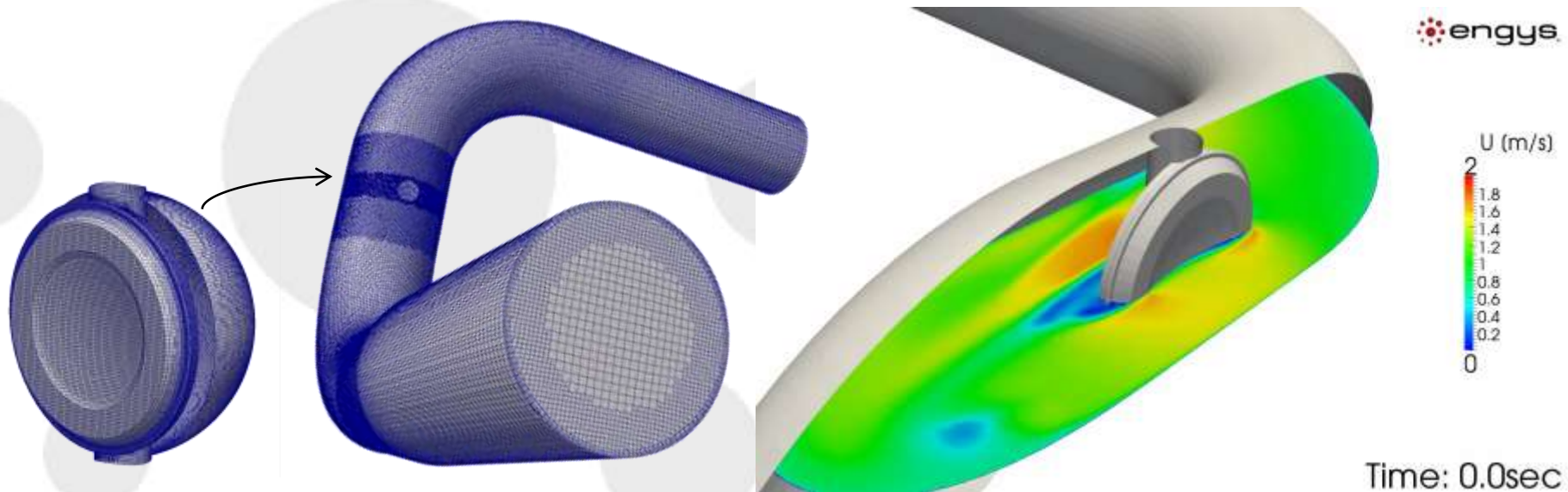
# Helyx | New Client-Server Architecture

- Split HELYX-Client and Server applications
- Communication via SSH tunnelled TCP/IP agents
- Fully-synchronous remote execution
- Interactive graphical displaying directly from server
- Ideal for enabling HPC (in-house or remote)



## Example: Oil & Gas Closing Valve

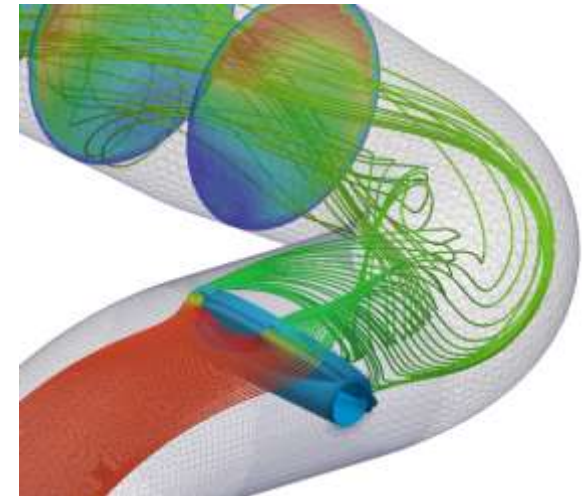
- Fortissimo EU FP7 Project experiment
- URANS, incompressible flow
- Simulated time  $T=20s \equiv 90^\circ$  valve rotation
- Estimated HPC resources  $\rightarrow$  20,000 core-hours





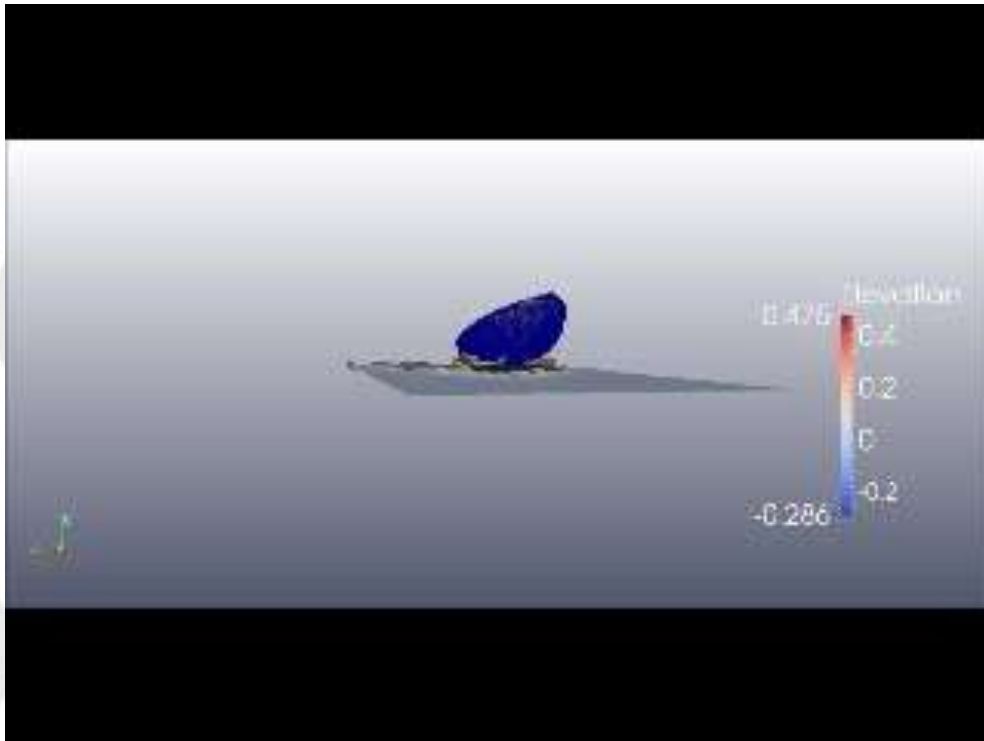
# Client-Server HPC Benefits

- Leverage HPC services (in particular on-demand)
- Easy access to HPC capabilities beyond in-house hardware resources (key for SMEs!)
- Multi-platform client GUI (Linux, Windows, Android...)
- Handle larger CFD models and grids
- Improve accuracy with extended physics (DES/LES, moving parts, etc)
- Take full advantage of open-source solvers and utilities
- Reduce turnaround times and running costs





# Questions?



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