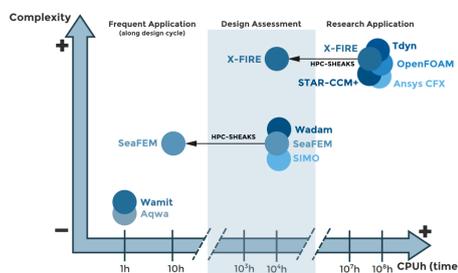


HPC Cloud-based seakeeping design

Fortissimo Experiment Facts:

- Segment: Maritime
- Application Domain: CFD
- Application: SeaFEM and in house code Xfire

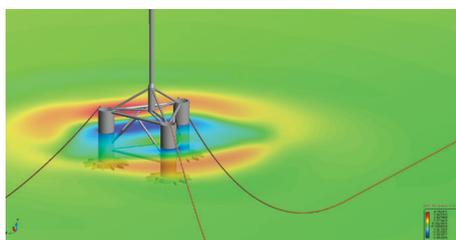
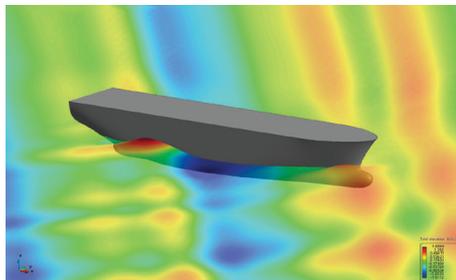


The Company

Seakeeping is the study of a ship or a marine structure subjected to the action of waves. The objective of this experiment is to develop an HPC-Cloud service for seakeeping assessment for the end-users WAVEC and VICUSDT. WAVEC is a private non-profit association active in applied research and consulting. HPC-Cloud-based simulation of marine structures has the potential to expand WAVEC's activities as a consulting company specialized in services for the offshore renewable industry and other related industries (aquaculture, oil and gas). VICUSDT operates in the shipbuilding and shipping industries. It provides hydrodynamic engineering services including hydrodynamic optimization for the complete ship. VICUSDT also provides hydrodynamic analysis capabilities to the offshore and marine energy sector, carrying out advanced simulations of structures for the oil and gas industry. COMPASSIS is an SME ISV which provides simulation software for a variety of different engineering fields including multiphysics simulations and structural and seakeeping analysis. In this experiment COMPASSIS will enable and evaluate simulations that require intense computational and data storage resources. CIMNE, a research organisation, will also provide some of the software components required for this simulation.

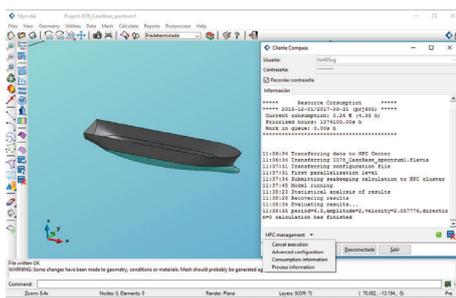
The Challenge

The challenge addressed in this experiment was to demonstrate the use of advanced simulation in seakeeping design. Such simulations require large amounts of computing power to realise viable calculation times. This requires the use of computing resources from an HPC provider. The objective of this experiment was to adapt seakeeping software to run on remote HPC resources, to demonstrate the benefits of advanced simulation using Cloud-based HPC, to study the resultant performance of the simulations and to demonstrate their potential economic impact. A further aim was to develop a service for seakeeping studies available within the Fortissimo Marketplace. Realising such aims would give WAVEC and VICUSDT a powerful design tool and a significant competitive advantage.



The Solution

The relevant software packages have been ported to the HPC-Cloud-based system and integrated into an overall simulation package. An effective interface between the end-user and the HPC resources has been implemented which integrates the various software components and the HPC system. This enables the simulations to be run from a familiar desktop system whilst using the full capabilities of the HPC system. The simulations running on the HPC system have been benchmarked using a model of an off-shore floating wind platform and a model of a stern trawler. These demonstrated a significant speed-up by a factor of 45 through the use of an HPC system. This makes previously infeasible simulations now feasible and paves the way for new services to be offered by the end-users WAVEC and VICUSDT.



The Benefits

The use of Cloud-based-HPC simulations enables cases to be analysed more quickly. It also allows previously infeasible cases to be analysed.

Over the next four years, from 2017 to 2020, WAVEC expects an increase in its total profit

Fortissimo Experiment Partners:

- WAVEC and VICUSDT (End-user)
- COMPASSIS (ISV)
- CIMNE (Domain Expert)
- CESGA (HPC Provider)

More Information:

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of ~€550K, based on a revenue of €1.8M, due to an increase in its consultancy activities. Over the same four-year period, VICUSDT expects an increase in its total profit of €480K, based on a revenue of €1.4M, due to an increase in its consultancy activities. Over the same four year period, COMPASSIS expects an increase in profit of €2M based on an increase in its licence sales of €4.5M.

A service for seakeeping assessments based on the results of this experiment is planned to be available in the Fortissimo Marketplace offering a pay-per-use model. Furthermore, CESGA proposes to offer a service in the Marketplace bases on the benchmarking of key applications and their performance and scalability.

The Fortissimo Project

Fortissimo is a collaborative project that enables European SMEs to be more competitive globally through the use of simulation services running on a High Performance Computing cloud infrastructure. The project is coordinated by the University of Edinburgh and involves 123 partners including Manufacturing Companies, Application Developers, Domain Experts, IT Solution Providers and HPC Cloud Service Providers from 14 countries. These partners are engaged in 53 experiments (case studies) where business relevant simulations of industrial processes are implemented and evaluated. The project is funded by the European Commission within the 7th Framework Programme and is part of the I4MS Initiative.

I4MS Fortissimo is part of I4MS ICT Innovation for Manufacturing SMEs: www.i4ms.eu



This project has received funding from the European Union's Seventh Framework Programme for research, technological development and demonstration under grant agreement no 609029.