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Isabella
Mazza^{11*}, Ahmet
Duran^{22&}, Yakup

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Hundur33#, Cristiano
Persi1, Andrea
Santoro1, Mehmet
Tuncel2,4 1Ergolines
Lab s.r.l., Area Science
Park, Padriciano 99,
34149, Trieste, Italy.

**Scalability of
OpenFOAM for
Simulations of a
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Compressible density-
based solvers are
widely used in
OpenFOAM, and the
parallel scalability of

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these solvers is crucial for large-scale simulations. In this paper, we report our experiences with the scalability of OpenFOAM's native rhoCentralFoam solver, and by making a small number of modifications to it, we show the degree to which the scalability of the solver can be improved.

Scalability of

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In other words, we find that the scalability improves as the problem size increases for this application. As the matrix size quadrupled, the speed-up improves at least 50% near speed-up saturation point.

**Scalability of
OpenFOAM for bio-
medical flow**

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simulations ...

1 Available online at

www.prace-ri.eu

Partnership for

Advanced Computing

in Europe Scalability of

OpenFOAM for Bio-

medical Flow

Simulations Ahmet

Durana,^{b*}, M. Serdar

Celebia,^c, Senol

Piskina,^c, and Mehmet

Tuncela,^c alstanbul

Technical University,

National Center for

High Performance

Computing of Turkey

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(UHeM), Istanbul
34469, Turkey
Istanbul Technical
University, Department
of Mathematics ...

**Scalability of
OpenFOAM for Bio-
medical Flow
Simulations**

We study a bio-medical
fluid flow simulation
using the
incompressible,
laminar OpenFOAM
solver icoFoam and
other direct solvers

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Scalability Of

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(kernel class) such as
SuperLU_DIST 3.3 and
SuperLU_MCDT (Many-
Core ...

**(PDF) Paper:
Scalability of
OpenFOAM for Bio-
medical Flow ...**

OpenFOAM

requirements for
runtime, virtual
memory and disk
space are considered
using small and
medium resolution

Digital Elevation

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Models (DEM) models for single-process and multi-process cases when running on local workstation and small parallel systems. Based on obtained data, extrapolation of requirements for relatively high resolution models are made and issues concerning the scalability are discussed.

Scalability Issues for

Page 11/27

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**Wind Simulation
Using OpenFOAM in**

Novel

Coupling OpenFOAM solvers and external solvers for Conjugate Heat Transfer, Fluid-Structure Interaction, and other problem types using the free/open-source coupling library preCICE. Because of the...

**(PDF) Scalable
coupled simulations**

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Scalability Of

Openfoam For

Simulations Of A

Novel

with OpenFOAM and other ...

FDR InfiniBand provides better scalability performance than Ethernet 544% better performance than 10GbE at 16 nodes / 256 processes 179% better performance than 1GbE at 16 nodes / 256 processes 1GbE does not scale at all OpenFOAM Performance - Interconnects Higher is

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Scalability Of

Openfoam For

better 16

Processes/Node Of A

544%179% 21

Novel

OpenFOAM

Performance

Optimizations for

Scalability

While you conducted small-scale tests, I tested OpenFOAM scalability with the number of CPU varies from 512 to 4096 using KNL nodes. The speedup from 512 to 4096 is supposed to be

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8, however the reality

is a little below 4. Thus,
the corresponding
efficiency is below

50%.

Scalability of OpenFOAM -- CFD Online Discussion Forums

Scalability study is
performed with High
Performance

Computing, which
suggests a range of
cell loads optimal for
parallelization. Abstract

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Numerical performance of rhoCentralFoam, a compressible solver in OpenFOAM, was studied by modeling round supersonic free jets with varying nozzle exit conditions through Reynolds-Averaged Navier-Stokes approach.

**An assessment of
OpenFOAM solver on
RANS simulations of**

...

rhoCentralFoam solver

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Scalability Of

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in OpenFOAM. Subsequently, the

simulated results will

be qualitatively and

quantitatively

validated against

experimental

measurements,

followed by a

scalability study on its

parallel computing

performance and lastly

a brief comparison

between results

obtained from

18-31 An

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**assessment of
OpenFOAM solver on
RANS simulations ...**

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71, No. 3 Scalability of
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simulations article

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medical flow

simulations ...

An assessment of the parallel scaling of OpenFOAM indicates that OpenFOAM scales very well for the CPUs from 8 to 512, but the intranode scalability is poor for less than 8 CPUs.

Direct numerical

simulation of

turbulent non-

Newtonian ...

OpenFOAM

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Scalability Of

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Coronavirus response
OpenFOAM simulations
around return-to-office
safe distancing

demonstrate the effect
of occupant proximity,
ventilation systems
and contamination
avoidance unique to
each office and plant
environment. May 28th
2020; ESI OpenCFD
releases OpenFOAM-
v1912

OpenFOAM® -
Official home of The

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Scalability Of

Openfoam For

Open Source

Computational ... A

Novel

OpenFOAM simulations

around return-to-office
safe distancing

demonstrate the effect
of occupant proximity,

ventilation systems
and contamination

avoidance unique to
each office and plant

environment. This

example in an enclosed
space demonstrates

that the ventilation air-
curtain can be

protective, or

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disturbed, by an extreme respiratory event.

OpenFOAM Coronavirus response

The most important challenges for parallel solvers implemented with OpenFOAM are scalability and efficiency on new hybrid and heterogeneous parallel computing systems. There are different attempts to reduce the MPI

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Scalability Of

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communication
overhead and increase

the scalability of

parallel solvers by

making use of threads

parallelism on

multicore cluster

systems (Liu, 2011).

On Efficiency

Analysis of the

OpenFOAM-Based

Parallel Solver ...

By modifying the

implementation of

OpenFOAM's inter-

processor

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communication the scalability limit could be increased by one order of magnitude (from below 512 to above 4096 processes) for a model with 61 million cells.

White Papers -

Application

Scalability - PRACE

- OpenFoam demonstrates good scaling capabilities
- Testing includes systems configuration

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blocking network
delivers higher

performance compared
to 2:1 blocking

configuration -27%

higher performance in

average •Commodity-

based InfiniBand QDR

demonstrates highest

scalability over

**Computational Fluid
Dynamics (CFD)**

Simulations at Scale

Running computational

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fluid dynamics (CFD)
simulations on Azure.
09/20/2018; 4 minutes
to read +5; In this
article. Computational
Fluid Dynamics (CFD)
simulations require
significant compute
time along with
specialized hardware.
As cluster usage
increases, simulation
times and overall grid
use grow, leading to
issues with spare
capacity and ...

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