OOKAMI PROJECT APPLICATION

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Project Title: Benchmarking the 3D FSI RIPPLE code on A64FX:

Usage: Testbed

Principal Investigator:

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Usage Description:

We will be using our in-house 3D multi-phase flow solver to test its performance on the A64FX system and make comparisons to our local cluster (Intel 622R Xeons) and SDSC Expanse (AMD EPYC 7742). Benchmarks will include a weak and strong scaling analysis of the code performance in simulations modeling Surfactant Replacement Therapy (SRT). SRT is the treatment procedure for prematurely born infants suffering from Respiratory Distress Syndrome. Our research aims to improve the current treatment procedure which has a 35% non-response rate [1]. Due to the sensitivity of SRT, there is a need to explore viable treatment options through CFD.

Computational Resources:

- Total node hours per year: 1000 (includes spinup, tuning, benchmarking)

- Size (nodes) and duration (hours) for a typical batch job: We will be exploring scalability across a range of a node counts. Maximum expected job size: 25 node-hours (50 nodes x 30 minutes).
- Disk space (home, project, scratch): We will not need more than 200GB for this project.

Personnel Resources (assistance in porting/tuning, or training for your users): None

If your research is supported by US federal agencies:

- Agency: National Science Foundation
- Grant number(s): CBET Grant No. 1904204

References

[1] N. Nouraeyan, A. Lambrinakos-Raymond, M. Leone, and G. Sant'Anna. Surfactant administration in neonates: A review of delivery methods. *Canadian Journal of Respiratory Therapy*, 50:91–95, 2014.