

OOKAMI PROJECT APPLICATION

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Project Title: Porting and Evaluating the Performance Engineering Tools OSACA and LIKWID on OOKAMI

Usage:

- Testbed

Principal Investigator:

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Usage Description:

In this project, we want to install and test the tools we developed at NHR@FAU on the OOKAMI cluster. All tools were ported to A64FX and are tested on other A64FX based systems. These tools are:

- LIKWID: Tool suite for performance engineering that provides system topology, control of process and thread affinity, micro-benchmarking and access to hardware performance events. The LIKWID suite is developed publicly as an open-source project on Github and available for download at <https://ftp.uni-erlangen.de/pub/likwid/>. LIKWID is installed on many HPC systems worldwide to help users analyze and optimize their codes.
- OSACA: Tool for static in-core runtime prediction. It allows automatic parsing and runtime prediction of assembly code, including throughput analysis and detection of the critical path and loop-carried dependencies. OSACA is developed publicly as an open-source project on Github at <https://github.com/RRZE-HPC/OSACA/>. It is also available as a package on PyPI (<https://pypi.org/project/osaca/>).

Our group conducted and published extensive research on an FX700 system [1] and the Fugaku supercomputer [2]. We were invited by Eva Siegmann (eva.siegmann@stonybrook.edu) to introduce our tools and provide our insights into performance modeling and engineering in hackathons for the user group of OOKAMI.

Computational Resources:

- Total node hours per year: 15,000
- Size (nodes) and duration (hours) for a typical batch job: single-node to a few nodes for up to 12 hours
- Disk space (home, project, scratch): 200 GByte in total

Personnel Resources:

Required software:

- Python 3.x
- C/C++/Fortran compilers suitable for A64FX
- make, perl and some other basic Linux tools

If your research is supported by US federal agencies:

- Agency: N/A
- Grant number(s): N/A

Production projects:

References

- [1] Christie L. Alappat, Jan Laukemann, Thomas Gruber, Georg Hager, Gerhard Wellein, Nils Meyer, and Tilo Wettig: *Performance Modeling of Streaming Kernels and Sparse Matrix-Vector Multiplication on A64FX*, Proc. 11th IEEE International Workshop on Performance Modeling, Benchmarking and Simulation of High Performance Computer Systems (PMBS20), November 12, 2020. **PMBS20 Best Short Paper Award**. <https://doi.org/10.1109/PMBS51919.2020.00006>
- [2] Christie Alappat, Nils Meyer, Jan Laukemann, Thomas Gruber, Georg Hager, Gerhard Wellein, and Tilo Wettig: *ECM modeling and performance tuning of SpMV and Lattice QCD on A64FX*, submitted. <https://arxiv.org/abs/2103.03013>