Ioannis Vardas

TU Wien - Faculty of Informatics - Institute of Computer Engineering

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Education

TU Wien — *Austria*

Doctoral programme in Engineering Sciences and Computer Sciences — *October 2021 - Present*

- **PhD Thesis**: TBD, Advisor: Prof. Jesper Larsson Träff
- **Coursework**: High Performance Computing; Scientific Programming with Python; Software Testing: From Basic Concepts to Advanced Topics; Fundamental research methods for doctoral students; Philosophy of Science; Research and Career Planning for doctoral students;

University of Crete — *Greece*

M.Sc. in Computer Science and Engineering, GPA: 8.79/10 — *November 2019*

- **MSc Thesis**: Process Placement Optimizations and Heterogeneity Extensions to the Slurm Resource Manager[6]. Advisor: Prof. Manolis G.H. Katevenis, Co-Advisor: Dr. Manolis Marazakis
- **Graduate Coursework**: Embedded Systems Lab; Principles of Distributed Computing; Internet Systems and Technologies; Computer Architecture; Parallel Computer Architecture; Managed Runtime Systems; Digital Circuits Design Lab Using EDA Tools;

University of Crete — *Greece*

B.Sc. in Computer Science, GPA: 7.03/10 — *March 2016*

- **Graduate Thesis**: Memory Testing through an FPGA with an embedded Processor

Research

TU Wien

- Performance Optimization of MPI applications in HPC systems via process mapping and Colocation [1, 2, 11].
- Communication algorithms and development of the MPI Library [8, 7].
- Performance profiling and analysis tools for MPI Applications [3, 10].
- Analysis and task scheduling optimization of LigandScout, an advanced molecular design software package, on HPC systems with SLURM to enhance HPC code performance [9].

ICS-FORTH

- Improving the resilience of parallel applications via fault-aware mappings [4], [5].
- Simulating the behavior of Accurate congestion control for RDMA Transfers [12].

Projects

- High Performance Molecular Screening at Massive Scale, Austrian Research Promotion Agency (FFG)
- Algorithm Engineering for Process Mapping, Austrian Science Fund (FWF)
- ExaNeSt - European Exascale System Interconnect and Storage, European Horizon 2020

Skills

Development and Design Skills	Parallel Programming, Performance Profiling, Machine Learning, Linux Device Drivers/Modules
Programming Languages	C, C++, Python, Bash, R, Java, Octave
Frameworks and Libraries	MPI, OpenMP, CUDA, NumPy, PySpark, Pytorch, Pandas
Operating Systems	Linux(RHEL, Debian, Gentoo, Arch), FreeBSD, MacOS, Microsoft Windows
Virtualization Platforms	Docker, Singularity Containers, QEMU
Languages besides native(Greek)	English, Proficient level (CEFR C2). German, Intermediate level.

Employment history

TU Wien - Faculty of Informatics — *Austria*
Pre-Doctoral Researcher — *June 2021 - Present*
- Pre-Doctoral Researcher, Institute of Computer Engineering, Parallel Computing Group

ICS-FORTH — *Greece*
Research Engineer — *Dec. 2019 - May 2021*
- Research staff, Computer Architecture and VLSI Systems (CARV) Laboratory

ICS-FORTH — *Greece*
Graduate Research Assistant — *Sept 2017 - Nov 2019*
- Master's degree Scholarship, Computer Architecture and VLSI Systems (CARV) Laboratory

Hellenic Army — *Greece*
Served in the Hellenic Armed Forces — *Dec. 2016 - Aug 2017*
- Served in the Hellenic Army, Research and Informatics Corps

ICS-FORTH — *Greece*
Research Scholarship — *Aug. 2016 - Nov. 2016*
- Research Scholarship, Computer Architecture and VLSI Systems (CARV) Laboratory

Teaching Experience

Teaching Assistant — *CSD, University of Crete, Greece*
Computer Organization (CS-225) — *Spring 2018, 2019*
- Developed YAC Simulator, a cache simulator written in C/C++ for a simple cache scheme

Digital Design (CS-120) — *Fall 2018, 2019*

Packet Switch Architecture (CS-534) — *Spring 2016*

Attended Summer Schools

ACM Europe Summer School on HPC Computer Architectures for AI and Dedicated Applications — *Barcelona, Spain*
Coursework — *August-September 2022*
- Program Schedule

HiPEAC Summer School - ACACES — *Fiuggi, Italy*
Coursework — *July 2018*
- Memory Systems and Memory-Centric Computing Systems: Challenges and Opportunities by Onur Mutlu
- Distributed memory programming and algorithms by Johannes Langguth
- GPU Architectures: From Basic to Advanced Concepts by Adwait Jog
- Architectural Support for Virtual Memory by Abhishek Bhattacharjee

Presented Poster
- Extending Slurm to support Running Workloads in Virtual Machines or VINO-Slurm: Virtual NOdes in Slurm

Side Project

Design of a RISC-V core in System Verilog
- Implementation of RV32IC standard with support for stream instructions
- Developed using Synopsys EDA tools for the purposes of Digital Circuits Design Lab Using EDA Tools

List of Publications

[1] Ioannis Vardas et al. “Improved Parallel Application Performance and Makespan by Colocation and Topology-aware Process Mapping”. In: *2024 IEEE/ACM 24th International Symposium on Cluster, Cloud and Internet Computing (CCGrid)*. 2024. DOI: 10.1109/CCGrid59990.2024.00023.

[2] Ioannis Vardas et al. “Exploring Mapping Strategies for Co-allocated HPC Applications”. In: *Euro-Par 2023: Parallel Processing Workshops*. Springer Nature Switzerland, 2024, pp. 271–276. DOI: 10.1007/978-3-031-48803-0_31.

[3] Ioannis Vardas et al. “mpisee: MPI Profiling for Communication and Communicator Structure”. In: *2022 IEEE International Parallel and Distributed Processing Symposium Workshops (IPDPSW)*. 2022, pp. 520–529. DOI: 10.1109/IPDPSW55747.2022.00092.

[4] Ioannis Vardas, Manolis Ploumidis, and Manolis Marazakis. “Towards Communication Profile, Topology and Node Failure Aware Process Placement”. In: *2020 IEEE 32nd International Symposium on Computer Architecture and High Performance Computing (SBAC-PAD)*. 2020, pp. 241–248. DOI: 10.1109/SBAC-PAD49847.2020.00041.

[5] Ioannis Vardas, Manolis Ploumidis, and Manolis Marazakis. “Exploring the Impact of Node Failures on the Resource Allocation for Parallel Jobs”. In: *Euro-Par 2021: Parallel Processing Workshops*. Springer International Publishing, 2022, pp. 298–309. DOI: 10.1007/978-3-031-06156-1_24.

[6] Ioannis Vardas. “Process Placement Optimizations and Heterogeneity Extensions to the Slurm Resource Manager”. 2019. URL: https://tinyurl.com/mwujn46s.

[7] Jesper Larsson Träff and Ioannis Vardas. “Library Development with MPI: Attributes, Request Objects, Group Communicator Creation, Local Reductions, and Datatypes”. In: *Proceedings of the 30th European MPI Users’ Group Meeting*. EuroMPI ’23. Association for Computing Machinery, 2023. DOI: 10.1145/3615318.3615323.

[8] Jesper Larsson Träff et al. “Uniform Algorithms for Reduce-scatter and (most) other Collectives for MPI”. In: *2023 IEEE International Conference on Cluster Computing (CLUSTER)*. 2023, pp. 284–294. DOI: 10.1109/CLUSTER52292.2023.00031.

[9] Sascha Hunold et al. “Massively Scaling Molecular Screening Workloads on EuroHPC Supercomputers”. In: *Austrian-Slovenian HPC Meeting 2023 - ASHPC23*. 2023, pp. 51–51. DOI: 10.25365/phaidra.423.

[10] Sascha Hunold et al. “An Overhead Analysis of MPI Profiling and Tracing Tools”. In: *Proceedings of the 2nd Workshop on Performance EngineeRing, Modelling, Analysis, and VisualizatiOn Strategy*. Association for Computing Machinery, 2022. DOI: 10.1145/3526063.3535353.

[11] Philippe Swartvagher et al. “Using Mixed-Radix Decomposition to Enumerate Computational Resources of Deeply Hierarchical Architectures”. In: *Proceedings of the SC ’23 Workshops of The International Conference on High Performance Computing, Network, Storage, and Analysis*. SC-W ’23. Association for Computing Machinery, 2023, pp. 405–415. DOI: 10.1145/3624062.3624109.

[12] Dimitris Giannopoulos et al. “Accurate Congestion Control for RDMA Transfers”. In: *Proceedings of the Twelfth IEEE/ACM International Symposium on Networks-on-Chip*. NOCS ’18. Torino, Italy, 2018. DOI: 10.1109/NOCS.2018.8512155.