Alex Fuerst

(440) - 669 - 5865
fuersta.2013@gmail.com | linkedin.com/in/alex-fuerst | github.com/aFuerst

OBJECTIVE

Tackling the inefficiencies of systems computing at any scale, and looking to enable new computing opportunities with systems. The tech stack at all levels, from Virtualization and OS, to Distributed Systems, are prime for accelerating clouding computing.

EDUCATION

Computer Engineering, PhD — Expected May 2024
Indiana University, Intelligent Systems Engineering — Major GPA 3.9

Computer Engineering, MS — Dec 2023
Indiana University, Intelligent Systems Engineering — Major GPA 3.9

Computer Science, Bachelor of Science — May 2017
Xavier University — Major GPA 3.6

Diploma with Honors — May 2013
Medina High School — Major GPA 3.6

PUBLICATIONS

Alexander Fuerst, Abdul Rehman, and Prateek Sharma. Ilúvatar: A Fast Control Plane for Serverless Computing. *HPDC 2023.*

Abdul Rehman, **Alexander Fuerst**, and Prateek Sharma. FaasMeter: Energy-First Serverless Computing. *Submitted, NSDI 2024.*

Alexander Fuerst, and Prateek Sharma. Locality-aware Load-Balancing For Serverless Clusters. *HPDC 2022.*

Alexander Fuerst, Stanko Novakovic, Inigo Goiri, Gohar Irfan Chaudhry, Prateek Sharma, Kapil Arya, Kevin Broas, Eugene Bak, Mehmet Iyigun, and Ricardo Bianchini. Memory-Harvesting VMs in Cloud Platforms. *ASPLOS 2022.*

Alexander Fuerst, and Prateek Sharma. FaasCache: Keeping Serverless Computing Alive With Greedy-Dual Caching. *ASPLOS 2021.*

Alexander Fuerst, Ahmed Ali-Eldin, Prashant Shenoy, and Prateek Sharma. Cloud-scale VM-deflation for Running Interactive Applications On Transient Servers. *HPDC 2020.*

EXPERIENCE

Google, Inc. — *Mountain View, California*
Software Engineering Intern — Summer 2023

- Worked on advanced KVM-based virtualization technologies
- Explored techniques to seamlessly upgrade VMMs and hypervisors
- Created proof-of-concept to examine feasibility of these

Microsoft Research — *Redmond, Washington*
Research Intern — Summer 2021

- Analyzed modern hypervisors performance under various runtime conditions
- Modified hypervisor and guest OS to improve guest VM memory resizing
- Designed and ran experiments that prioritized project focus

Indiana University *Bloomington, Indiana*
Research Assistant 2021-Present

- Identify opportunities for enhancing existing cloud computing systems
- Developed cutting-edge techniques and algorithms to improve systems
- Design experiments and analyzed results into useable data
- First author on several published papers

Indiana University *Bloomington, Indiana*
Associate Instructor 2019-2020

- Assisted with Engineering Cloud Computing & Distributed Computing Engineering course work
- Create assignments and exams given to students
- Host lab and office hours to discuss project design and assist with student questions

Hyland Software *Westlake, Ohio*
Developer 1 2017-2018
Developer 2 2018-2019

- Develop a cloud application capable of handling thousands of daily users
- Troubleshoot complex issues of multiservice SaaS application running in production
- Upgrade application to run cross-platform on Windows and Linux
- Modernize application CI/CD pipeline to improve time-to-deployment and rollback

Xavier University *Cincinnati, Ohio*
Teaching Assistant 2016

- Work with students during class exercises
- Host office hours answering questions and giving guidance on assignments

Xavier University *Cincinnati, Ohio*
Student Technician Tier II 2013-2016

- Troubleshoot complex technology issues and provide onsite service and repair for faculty, staff and public computing
- Provide software, hardware and network problem resolution
- Handle tickets escalated from Tier I

Salisbury University *Salisbury, Maryland*
NSF REU Researcher Summer 2016

- Applied emerging parallel computing models using GPU and CPU parallelism with NVIDIA's CUDA
- Tackled data and compute-intensive problems in geographic information systems
- Presented findings to GIS professionals and Salisbury Faculty

Critchfield, Critchfield & Johnston, Ltd. *Medina, Ohio*
Paralegal Intern August 2012-June 2013

- Prepared and delivered documents to county offices
- Finalized legal binders for delivery to clients

PRESENTATIONS

Ilúvatar: A Fast Control Plane for Serverless Computing. HPDC 2023. Slides

Locality-aware Load-Balancing For Serverless Clusters. HPDC 2022. Slides Video

Memory-Harvesting VMs in Cloud Platforms. ASPLOS 2022. Slides Video

FaasCache: Keeping Serverless Computing Alive With Greedy-Dual Caching. ASPLOS 2021. Slides Video

Cloud-scale VM-deflation for Running Interactive Applications On Transient Servers. HPDC 2020. Slides Video

PROJECTS

Ilúvatar FaaS Control Plane

An open-source, fast, jitter-free control plane for Serverless function execution written in Rust. Ilúvatar provides a significant reduction in overhead compared to popular open-sourced examples. Additionally, it enables unique usability and extensibility, to accelerate FaaS research.

FaasCache

Introduced caching insights into the Function-As-A-Service paradigm. Enhanced the open source FaaS application OpenWhisk using Greedy-Dual caching. Reduced cold-start overhead for functions by up to 3x and can reduce constrained system resources by up to 30%.

Dynamically Typed Racket Compiler

A scratch built compiler supporting a subset of statically typed and dynamically typed Racket.

Tensorflow NanoParticle Simulator

Implementation of the Lennard-Jones potential in a simulated cube and electrostatic forces of colliding ions in a confined nano-channel. THe simulator Achieved performance similar to MPI/C++ code performing the same simulation.

Jae OS

Just Another Educational Operating System. A port of the Kaya OS project to the new μARM emulator. Wrote the student guide and the canonical implementation of Jae OS.

Kaya OS

Wrote a complete operating system from scratch. The final product, in addition to support a multitude of peripheral devices, successfully ran eight concurrent processes, each running in their own virtual address space.

Parallel GIS Raster Calculator

Developed a tool combining CPU based parallelism and NVIDIA's CUDA technology for GPU calculation for performing GIS raster calculations. Achieved 2 - 5 times performance increase over traditional analysis tools due to GPU performance.

Eagle Scout Project

Installed commemorative plaques on veterans' graves at local cemetery. Led a group of 15 scouts to plan and accomplish this project.

COURSE WORK

- Engineering Cloud Computing
- Engineering Distributed Systems
- Graph Analytics
- Deep Learning Systems
- Engineering Compilers
- Engineering Operating System
- Simulating Nanoscale Systems
- High Performance Computing
- Computational Modeling Methods for Virtual Tissues

SKILLS

Languages	Rust, Python, C, C++, Bash, PowerShell, Java, Scheme, C#, SQL, LaTeX
Programming	Debugging, Problem Solving, Code Optimization, Git, Agile
Infrastructure	Kubernetes, Docker, Octopus Deploy, Ansible, OpenWhisk
Technologies	Linux, KVM, GDB, OpenMP, MPI, Tensorflow, SQL Server

AWARDS

Reserve Champion, Baked Goods Division	Monroe County Fair 2023
HPDC Travel Grant	Travel grant to HPDC 2023
ACM Travel Grant	Travel grant to ASPLOS 2022
Boy Scouts of America	Eagle Scout
National Honors Society	
National Technical Honors Society	
Xavier University	John F. Niehaus Scholarship
Xavier University	John F. Niehaus Award

ACTIVITIES

Young Adult Ministry, St. Paul's Catholic Center	Member, 2022-2023
	Vice Chair, 2023-2024
Computer Science Club, Xavier University	Treasurer, 2015-2017
	Vice President, 2016-2017
Dean's Advisory Council, Xavier University	Member, 2015 – 2017