

# Alex Fuerst

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## RESEARCH INTERESTS

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- I am focused on systems research, specifically Cloud Computing, Virtualization, Distributed Systems, and Operating Systems. After finishing my degree I intend on creating and working on such systems in industry.

## EDUCATION

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### Computer Engineering, PhD

*Indiana University, Intelligent Systems Engineering*

Expected May 2024

GPA 3.9

### Computer Science, Bachelor of Science

*Xavier University*

May 2017

Major GPA 3.6

## PUBLICATIONS

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**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

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*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*

### Assistant Instructor

2019-Present

- Engineering Cloud Computing & Engineering Distributed Systems
- Create assignments and exams

- 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 multi-service application running in production
- Transition system from internally hosted cloud to hybrid public-private cloud
- Upgrade application to run cross-platform on Windows and Linux

## PRESENTATIONS

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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

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### 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%.

### 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.

## COURSE WORK

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

## SKILLS

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<i>Languages</i>	Rust, Python, C, C++, Scheme, C#, SQL, $\text{\LaTeX}$
<i>Programming</i>	Debugging, Problem-Solving, Code Optimization, Git, Agile
<i>Technologies</i>	Linux, KVM, GDB, Tensorflow, OpenWhisk, MPI