

ALI RAZA

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Boston, MA, USA

OVERVIEW

Interests: Operating Systems, Computer Networks, Unikernels and Kernel Optimizations, Cloud Computing, Distributed Systems, Performance Analysis and Tuning
Skills: Linux Kernel Programming, Systems Programming, C, Python, Bash, C++

EDUCATION

2017 - Fall 2022 (expected)	Ph.D. Computer Science BOSTON UNIVERSITY Research Interests: Operating Systems and Networks Advisor: Prof. Orran Krieger
2014 - 2016	M.S. Computer Science LAHORE UNIVERSITY OF MANAGEMENT SCIENCES, PAKISTAN
2008 - 2012	B.S. Electrical Engineering LAHORE UNIVERSITY OF MANAGEMENT SCIENCES, PAKISTAN

PUBLICATIONS

- **Unikernel Linux (UKL): Integrating Unikernel Optimizations in a General Purpose OS**

Ali Raza, Thomas Unger, Matthew Boyd, Eric Munson, Parul Sohal, Ulrich Drepper, Richard Jones, Daniel Bristot de Oliveira, Larry Woodman, Renato Mancuso, Jonathan Appavoo, Orran Krieger
arXiv preprint [arXiv:2206.00789](https://arxiv.org/abs/2206.00789)

Description: This work explores if unikernel techniques can be integrated into a general-purpose OS while preserving its battle-tested code, development community, and ecosystem of tools, applications, and hardware support. Our prototype demonstrates both a path to integrate unikernel techniques in Linux and that such techniques can result in performance advantages for unmodified applications. Expert developers can modify the application to call internal kernel functionality and optimize across the application/kernel boundary for more significant gains. The changes to the Linux kernel are modest (1250 LOC).

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- **Unikernels: The Next Stage of Linux's Dominance**

Ali Raza, Parul Sohal, James Cadden, Jonathan Appavoo, Ulrich Drepper, Richard Jones, Orran Krieger, Renato Mancuso and Larry Woodman
Workshop on Hot Topics in Operating Systems (**HotOS '19**), Bertinoro, Italy, May 2019.

Description: Unikernels have demonstrated advantages over Linux in many important domains, but have lagged in adoption and ease of use. They lack the battle-tested code base and large open source community which Linux has. In this paper, we explore

if Linux can be built into a unikernel, and would that give us any performance benefits. We build an early Linux unikernel prototype and demonstrate that some simple changes can bring dramatic performance advantages.

- **A Secure Cloud with Minimal Provider Trust**

*Amin Mosayyebzadeh, Gerardo Ravago, Apoorve Mohan, Ali Raza, Sahil Tikale, Nabil Sc-
hear, Trammell Hudson, Jason Hennessey, Naved Ansari, Kyle Hogan, Charles Munson, Larry
Rudolph, Gene Cooperman, Peter Desnoyers, Orran Krieger*
10th USENIX Workshop on Hot Topics in Cloud Computing (**HotCloud 18**), Boston, MA,
USA, July 2018.

Description: In this paper we propose Bolted which is a new architecture for a bare metal cloud with the goal of providing security-sensitive customers of a cloud the same level of security and control that they can obtain in their own private data centers. It allows tenants, rather than the provider, to control the trade-offs between security, price, and performance. A prototype demonstrates scalable end-to-end security with a small overhead compared to a less secure alternative.

- **It's All in the Name: Why Some URLs are More Vulnerable to Typosquatting**

*Rashid Tahir, Ali Raza, Faizan Ahmad, Jehangir Kazi, Fareed Zaffar, Chris Kanich, Matthew
Caesar*
IEEE International Conference on Computer Communications (**IEEE INFOCOM 2018**),
Honolulu, Hawaii, USA, April 2018.

Description: Typosquatting is a blackhat practice that relies on human error and low-cost domain registrations to hijack legitimate traffic from well-established websites. We explore the relationship between human hand anatomy, keyboard layouts and typing mistakes to understand why some URLs are more vulnerable to typing mistakes than others. Furthermore, we predict the most likely typos for each URL which can then be defensively registered.

- **An Anomaly Detection Fabric for Clouds Based on Collaborative VM Communities**

Rashid Tahir, Ali Raza, Mazhar Naqvi, Fareed Zaffar and Matthew Caesar
17th IEEE/ACM International Symposium on Cluster, Cloud and Grid Computing (**CCGrid**),
Spain, May 2017.

Description: To mitigate security threats in the cloud, we propose a hypervisor layer anomaly detection system based on system call monitoring, which compresses the stream of system calls at their source making the system scalable and near real-time. Not requiring modifications to the guest OS or the application make it ideal for the datacenter setting. Additionally, for robust and early detection of threats, we share information about attacks in their early stages to provide immunity to the entire deployment.

MS THESIS

- **Improving Wireless Network Performance Through Better Contextual Information**
Explored various sensor hints from mobile devices for better understanding of the contextual environment in order to improve Wi-Fi rate adaptation in real time. Built

an indoor-outdoor detection Android app for context analysis, and studied the effects on throughput of using different Wi-Fi bit rates in indoor and outdoor settings.
Advisor: [Prof. Ihsan Ayyub Qazi](#)

EXPERIENCE

<i>May 2018 - Present</i>	Research Intern RED HAT, BOSTON
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