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Interests

Networked systems, distributed systems, network security and operating systems.

Education

Korea Advanced Institute of Science & Technology (KAIST), Republic of Korea

PhD, Electrical Engineering (Expected: Spring 2017)

- Advisor: KyoungSoo Park

University of Pittsburgh, Pittsburgh, Pennsylvania, USA

MS, Computer Science (Apr 2010)

- Advisors: KyoungSoo Park & Daniel Mossé

Lahore University of Management Sciences, Lahore, Pakistan

BSc (Hons), Computer Science, (May 2005)

- Minor in Mathematics

Employment Experience

Networked & Distributed Computing Systems Lab **Fall '10-onwards**
Graduate Researcher, EE Dept., KAIST
(i) Smart resource management in heterogeneous systems: See [4] in Projects section for details.
(ii) High performance networked systems: See [1, 3] in Projects section for details.
(iii) Highly scalable intrusion detection systems: See [4] in Projects section for details.
(iv) Human (& spam) detection in the Internet: See [5] in Projects section for details.

International Computer Science Institute, Berkeley, CA, US Summer '14 & **Fall '15**
Research Intern, Bro team
(i) Developed a packet acquisition & filter framework for 10 Gbps network applications.

Palmchip Corporation, Lahore, Pakistan **May 2005-July 2006**

- Software Engineer, Embedded Systems Group: Optimized bootloader & filesystem performances for an in-house System-on-Chip Network-Attached Storage device series.

Syed Murad Ali, Toronto, Canada **Summer 2004**

- Intern, Web Development (PHP & HTML)

Projects/ Software

1. **mOS Stack** (https://github.com/ndsl-kaist/mOS-networking-stack) May 2016-

   mOS networking stack provides elegant abstractions for stateful flow processing tailored for middlebox applications. Our API allows developers to focus on the core application logic instead of dealing with low-level packet/flow processing themselves. Under the hood, the stack implements an efficient event system derived from mTCP, a high-performance user-level TCP/IP stack. The mOS project will soon move to **DPDK.org**. <*Role:* **Lead author** & **maintainer**, *Pub:* **CCR 2015**, *URL:* http://mos.kaist.edu/>

2. **Packet Bricks** (https://github.com/bro/packet-bricks) Sept 2014-

   A netmap-based packet layer for distributing and filtering traffic.
   <*Role:* **Lead author** & **maintainer**>

3. mTCP (https://github.com/eunyoung14/mtcp/) Sept 2013-

mTCP is a high-performance user-level TCP stack for multi-core systems that addresses the inefficiency from the ground up - from packet I/O and TCP connection management to the application interface. mTCP (1) allows efficient flow-level event aggregation, and (2) performs batch processing of RX/TX packets for high I/O efficiency. mTCP improves the performance of small message transactions by a factor 25 and 3 than that of latest Linux TCP stack and the best-performing prototype we know. It also improves the performance of various popular applications by 33% to 320% compared with those on the Linux stack. mTCP won the **NSDI Community Award 2014** and was declared runner-up in the **Samsung HumanTech Paper Award 2014**. The mTCP project will soon move to **DPDK.org**. <*Role:* **Co-author** & **co-lead maintainer**, *Pub:* **NSDI 2014**, *URL:* http://shader.kaist.edu/mtcp/>

4. KARGUS Oct 2012

Kargus is a highly-scalable software-based IDS that runs on commodity PCs and its performance is comparable to hardware-based IDSes. It effectively exploits the potentials of modern hardware innovations such as multi-core CPUs, heterogeneous GPUs and multi-queue interface of NICs that drives its monitoring rate by up to 33 Gbps in real time. Kargus was mentioned in the **"10 Achievements of 2012 that put KAIST on the Spotlight."** <*Role:* **Lead author**, *Pub:* **CCS 2012**, *URL:* http://shader.kaist.edu/kargus/>

5. HUMANSIGN Sept 2010

A device framework under development in which input keystroke events are securely coupled with actual textual content typed by humans for reliable network payload delivery. This scheme is based on trusted computing principles that places the root of trust on a customized input device running a trusted platform module (TPM) chip and a small attester daemon within it. Each input event generates a cryptographic hash that attests to human activity and the combined message attestation (derived from such events) gets a third-party verifiable digital signature. These human attestations are then attached to the actual messages which ultimately assist in reducing false positive rates in the recipients' filter modules.
<*Role:* **Lead author**, *Pub:* **APSYS 2010**>

SELECTED PUBLICATIONS

[1] **Jamshed, M.**, Moon, Y., Kim, D., Han, D., Park, K. "mOS: A Reusable Networking Stack for Flow Monitoring Middleboxes." 14^{th} USENIX Symposium on Networked Systems Design and Implementation (NSDI 2017)

[2] Go, Y., **Jamshed, M.**, Moon, Y., Hwang, C., Park, K. "APUNet: Revitalizing GPU as Packet Processing Accelerator." 14^{th} USENIX Symposium on Networked Systems Design and Implementation (NSDI 2017)

[3] Choi, B., Chae, J., **Jamshed, M.**, Park, K., Han, D. "DFC: Accelerating String Pattern Matching for Network Applications." 13^{th} USENIX Symposium on Networked Systems Design and Implementation (NSDI 2016)

[4] Nam, J., **Jamshed, M.**, Choi, B., Han, D., Park, K. "Haetae: Scaling the Performance of Network Intrusion Detection with Many-core Processors." 18^{th} International Symposium on Research in Attacks, Intrusions and Defenses (RAID 2015)

[5] **Jamshed, M.**, Kim, D., Moon, Y., Han, D., Park, K. "A Case for a Stateful Middlebox Networking Stack." SIGCOMM Computer Communication Review, Rev. 45, Pg 355-356, August, 2015

[6] Jeong, E., Woo, S., **Jamshed, M.**, Jeong, H., Ihm, S., Han, D., Park, K. "mTCP: a Highly Scalable User-level TCP Stack for Multicore Systems." 11^{th} USENIX Symposium on Networked Systems Design and Implementation (NSDI 2014) - **NSDI Community Award**

[7] **Jamshed, M.**, Lee, J., Moon, S., Yun, I., Kim, D., Lee, S., Yi, Y., Park, K. "Kargus: a Highly-scalable Software-based Intrusion Detection System." 19^{th} ACM Conference on Computer and Communications Security (CCS 2012)

[8] **Jamshed, M.**, Go, Y., Park, K. "Suppressing Malicious Bot Traffic using an Accurate Human Attester." 8^{th} USENIX Symposium on Networked Systems Design and Implementation (NSDI 2011) (Poster)

[9] **Jamshed, M.**, Kim, W., Park, K. "Suppressing Bot Traffic with Accurate Human Attestations." 1^{st} ACM Asia-Pacific Workshop on Systems (ApSys 2010) held in conjunction with SIGCOMM 2010

[10] Djalaliev, P., **Jamshed, M.**, Farnan, N., Brustoloni, J.C. "Sentinel: Hardware-Accelerated Mitigation of Bot-Based DDoS Attacks." 17^{th} IEEE International Conference on Computer Communications and Networks (ICCCN 2008) Network Security Track.

[11] **Jamshed, M.**, Brustoloni, J. "In-Network Server-Directed Client Authentication and Packet Classification." 35^{th} Annual IEEE Conference on Local Computer Networks (LCN) 2010

Relevant Coursework (Selected)

Computer Operating Systems†, Computer Architecture†, Design & Analysis of Algorithms†, Wide Area Networks, Computer & Network Security, Principles of Database Systems, Foundations of Artificial Intelligence†, Advanced Topics in Operating Systems, Secure Software Systems, Advanced Topics in Computer Networks, Network Security, Performance Analysis of Communication Networks, Software-defined Networked Computing

† *passed preliminary PhD qualifier for the course*

Honors

2^{nd} Runner-up Samsung Humantech Paper Award 2016 for DFC
NSDI Community Award 2014 for mTCP
Runner-up Samsung Humantech Paper Award 2014 for mTCP
"10 Achievements of 2012 that put KAIST on the Spotlight" for Kargus
ACM SIGCOMM Travel Grant 2010
Graduate Fellowship Spring 2006
Undergraduate Dean's Honor List 2001-03

Skills

C/C++, Java, C#, Python, CUDA, Lua, Awk, Javascript, Linux shell scripting, HTML, XML, Unix/GNU Linux, x86 Assembly, TILE-Gx programming, LaTeX

References

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