

Babak Salamat

SUMMARY

A result oriented software engineer with over 15 years of industry experience and in-depth knowledge of cluster management, and system software.

EXPERIENCE

Google, Mountain View — *Staff Software Engineer/Manager*

NOVEMBER 2014 – PRESENT

Lead of Software Development and Manager at Advanced Technologies and Projects: Aug. 2019 To Present

- **Manages** a team of developers that build firmware, applications, and services for future Google products.

Lead of GKE/Kubernetes Scheduler and Chair of **Kubernetes** SIG Scheduling: February 2017 to August 2019

- **Led** the open source scheduling community by setting goals, planning quarterly projects, and creating a **roadmap**.
- **Revitalized** the open source community. Contributions to the SIG increased **7x** during my leadership.
- **Architected** a new pluggable design for Kubernetes scheduler and led the efforts of building it.
- Designed and implemented **Pod Priority and Preemption** for Kubernetes.
- **Led** the efforts of building and improving many features of the open source Kubernetes Scheduler, such as inter-pod affinity/anti-affinity, and even pod spreading.
- Improved Scheduler's **throughput** by a factor of **3**. This was a major milestone to improve the scalability of Kubernetes.
- Worked with contributing companies to reach consensus on design of features. Examples are resource quota, and gang scheduling.
- Worked with multiple Kubernetes teams to design their features and reviewed implementations.
- Met with GKE customers to provide solutions for their requirements and issues.
- Many of the open source contributions can be found at: <https://github.com/bsalamat>.

Borg Master Developer: November 2014 to February 2017

- Designed and built major features in **Borg**, such as **Sole Tenancy** and **Raw SSD Scheduling**.
- Built a new mechanism in Borg-master to authenticate machines in Borg clusters.
- Improved a number of features, such as maintenance events, package management, and Auth support.

Cisco, San Jose — *Technical Leader*

JULY 2012 – OCTOBER 2014

- Worked on security and infrastructure of Cisco Intercloud Fabric. Cisco Intercloud was a hybrid cloud solution with the aim of enabling enterprise customers to move their workloads seamlessly to public clouds and manage them.
- Designed and built a Xen virtual machine life-cycle manager for the Intercloud.
- Designed and built a client-server module for the Cisco Intercloud to transfer large amounts of data efficiently between VMs in the cloud.

- Designed and led the efforts of building an automation framework to deploy and certify the Intercloud Fabric infrastructure.

Virtuata (Acquired by Cisco), Milpitas — *Research Lead*

SEPTEMBER 2011 - JULY 2012

- Invented and implemented a hypervisor-level mechanism to mitigate JIT spraying attacks. The mechanism rewrites JITed code pages without any modifications to the JIT compiler and has been successfully tested with Firefox JavaScript, Adobe Flash, and Oracle Java Hotspot JIT compilers (Patent issued).

Qualcomm, Bay Area R&D (BARD), Santa Clara — *Staff Software Engineer*

MARCH 2010 - SEPTEMBER 2011

- Built a JavaScript compiler and DOM binding layer of a web browser prototype for smartphones with the aim of improving power consumption and performance (Patent issued).
- Led a security project to detect malware on smartphones using behavioral analysis and machine learning. The prototype detected malware with +95% accuracy (Patent issued).

Yahoo!, Sunnyvale — *Senior Software Engineer*

AUGUST 2009 - FEBRUARY 2010

- Improved start-up time of the search engine nodes by over a factor of two using caching, I/O coalescing, and parallelization techniques.
- Developed an adaptive optimization technique to reduce network bandwidth usage of the search engine back-end significantly.

UC Irvine, Irvine — *PhD Student Researcher*

SEPTEMBER 2005 - JULY 2009

- Developed a Multi-Variant Execution Environment that runs multiple variants of a single application, synchronizes and monitors them at the granularity of system-calls to prevent exploitation of vulnerabilities. (Patent issued)
- Modified GCC and also LLVM-GCC to generate executables which write stack in the reverse direction. These executables are used as variants in the multi-variant execution environment to prevent exploitation of buffer overflow vulnerabilities.
- Developed the middle- and back-end for an optimizing compiler prototype.
- Wrote custom static analysis checkers using Coverity Extend as a part of a summer internship at VMware.

Fara Rayaneh, Tehran — *Co-founder and Director*

MAY 1999 - AUGUST 2004

- February 2001 - August 2004: Director of the Software Department. Developed a very successful user management and accounting software package with unique features for ISPs and VoIP service providers.
- May 1999 - February 2001: Director of the Network Department. Expanded the internet service capacity of the company to 20 times of its starting point.
- May 1999: Co-founded Fara Rayaneh, which later acquired Morva Net and became one of the largest Internet Service Providers in Iran at the time.

EDUCATION

UC Irvine — *PhD in Computer Science (System Software)*

SEPTEMBER 2005 - JULY 2009, IRVINE

Sharif University of Technology — *MSc in Computer Engineering*

SEPTEMBER 1998 - JANUARY 2001, TEHRAN

Sharif University of Technology — *BSc in Computer Engineering*

SEPTEMBER 1994 - SEPTEMBER 1998, TEHRAN

PATENTS

- Mitigating just-in-time spraying attacks in a network environment, US Patent 9015834, 2015
- Computing device to detect malware, US Patent 9832211, 2017
- Method and apparatus for optimized execution using resource utilization maps, US Patent 9804893, 2017
- Multi-variant parallel program execution to detect malicious code injection, US Patent 8239836, 2012

SELECTED PUBLICATIONS

- Book Chapter: "Compiler-Generated Software Diversity,"
T. Jackson, B. Salamat, A. Homescu, K. Manivannan, G. Wagner, A. Gal, S. Brunthaler, Ch. Wimmer, and M. Franz; In "Moving Target Defense: Creating Asymmetric Uncertainty for Cyber Threats," S. Jajodia, A.K. Ghosh, V. Swarup, C. Wang, and X.S. Wang (Editors), Springer, ISBN-10: 1461409764 — ISBN-13: 978-1461409762, August 2011
- "Run-Time Defense against Code Injection Attacks using Replicated Execution,"
Babak Salamat, Todd Jackson, Gregor Wagner, Christian Wimmer, Michael Franz. IEEE Transactions on Dependable and Secure Computing, IEEE Computer Society, 2011
- "Orchestra: Intrusion Detection Using Parallel Execution and Monitoring of Program Variants in User-Space,"
Babak Salamat, Todd Jackson, Andreas Gal, and Michael Franz. The European Conference in Computer Systems (EuroSys'09), March 2009
- "Multi-Variant Program Execution: Using Multi-Core Systems to Defuse Buffer-Overflow Vulnerabilities,"
Babak Salamat, Andreas Gal, Todd Jackson, Karthikeyan Manivannan, Gregor Wagner, and Michael Franz. International Conference on Complex, Intelligent and Software Intensive Systems (CISIS'08), March 2008

Please refer to <https://www.babaks.com> for the list of all publications.