Naftaly Avadiaev | www.github.com/naftalyava | naftaly.avadiaev@gmail.com | +972503222189

ABSTRACT

I am a software engineer with 7 years of total professional experience: 5.5 years in low level software engineering, 0.5 years in a reverse engineering research-oriented role and 1 year in innovation / use-case definition / architecture role around DPU [a smarter smart-NIC] in container orchestration solutions.
My biggest strengths are creativity, ability to see and understand the bigger picture and deep diving into new technology.
My main area of interest involves around accelerating and securing the data center, especially when it meets virtualization, software defined networking and operating systems internals.

EXPERIENCE

Marvell | Senior Staff Software Engineer, January 2022 – Present
Working on building the vision and software ecosystem around the DPU [data processing unit].
The DPU is essentially a sum of three main blocks: compute [general purpose], networking [including HW acceleration for tunneling, switching etc.] and specific workload accelerators [AI, Crypto etc.].
Main contributions:

- Identification and definition of use-cases that allow unlocking the value of the DPU in container orchestration solutions [Kubernetes, OpenShift etc.].
  This included researching, playing with and understanding how K8s/OpenShift solutions work [including peripheral technologies like: OVS, OVN, SRIOV Device Plugin, SRIOV CNI, OVN-Kubernetes] and suggesting ideas how to utilize the DPU to achieve better perf/power.
- Definition of vision and roadmap.
- Conveying technical topics to upper management [AVP level].
- Producing proof of concepts.
  The main PoC I was working on included running a single K8s control-plane controlling regular x86 K8s data-plane nodes together with K8s data-plane nodes running on the DPU. OVN-Kubernetes was utilized in DPU mode, which means OVS was offloaded from x86 data-plane nodes and was only running on the DPU nodes. Pods running on the x86 host utilized VF [attached to OVS running on the DPU] for networking. In this PoC I demonstrated how Ingress Controller [NGINX] could be offloaded [and in next step accelerated using crypto HW accelerators] to the DPU. To speed up development in the initial stages I have utilized KVM/QEMU with virtio to emulate DPU with a virtual machine.
- Participation in cross organizational architecture meetings [RedHat, OPI etc].

Tech stack and skills: Kubernetes/OpenShift, OVS, OVN, OVN-Kubernetes, Go.

Qualcomm | Senior Software Engineer, May 2020 – January 2022
Working on the Secure Processor Unit [SPU] solution. SPU is a crypto co-processor inside the Snapdragon SoC which provides security related services and features like secure boot, cryptographic acceleration, key provisioning, anti-replay protection etc.
The focus of my work was designing and developing [C/C++] features for our proprietary kernel running on SPU.
Main contributions:

- Designed and implemented virtual memory support for our proprietary kernel.
- Studied kernel IPC [inter process communication] and RPC [remote process communication] mechanisms, designed and delivered RPC loop-back functionality. This allowed verification of RPC code in pre-silicon stage while running SPU in standalone mode [without any other subsystems].
- Improved performance of software-based encryption algorithms by 500%.
- Improved performance of NVM commit operations by 30%.
- Debugging and maintenance of complex system wide features spanning boot loaders, Linux kernel drivers [platform and character] and SPU kernel.
- Mentoring junior engineers.

Tech stack and skills: C, C++, lauterbach trace32, DMA, Linux kernel.

Cisco Systems | Software Engineer, July 2018 – April 2020
Worked on Application Visibility and Control [AVC] solution. The AVC solution allows to recognize, analyze and optimize network traffic as well as help with anomaly detection, network troubleshooting etc.
The focus of my work was designing and developing [C/C++] code for Deep Packet Inspection [DPI] engines running on proprietary Network Processing Unit [NPU].
Main contributions:

- Deep dived into SIP protocol, designed and developed SIP Parser Engine which allows recognition of SIP traffic with minimal latency hit. The feature involved end to end understanding and implementation of data and control plane with hard memory and runtime constraints.
- Designed and developed Dynamic Flow Attributes, the feature allows marking [decision on what traffic to mark was received from network controller] of traffic and performing QoS [quality of service].

Tech stack and skills: C, C++, gdb, T-Rex traffic generator, low level performance aware code [cache coherency and performance], high concurrency.

The Technion Research & Development Foundation | Researcher, February 2018 – July 2018
Research of kernel level Windows vulnerabilities and develop a method to detect double fetch vulnerabilities by means of static analysis of compiled drivers.
During this research, most of my time was invested in learning reverse engineering [using IDA Pro].
Tech stack and skills: C/C++, WinDBG, IDA Pro, KMDF.

Q Core Medical | Embedded Software Engineer, July 2016 – February 2018
Bare-metal firmware development in C.
Tech stack and skills: DMA, SPI, complex hardware debugging using Oscilloscope.

PERSONAL PROJECTS

Anti-Ransomware Windows Kernel Mode Solution
The goal of this project was to gain understanding on how to write Windows kernel drivers. The main component of this project is a mini-filter driver [running in kernel mode] which tracks all IO operations and tries to identify malicious processes.

Tech stack and skills: C++, WinDbg, Windows kernel [mini-filter driver], KMDF.

EDUCATION

Technion – Israel Institute of Technology | Bachelor of Science, Computer Engineering
Specialization in operating systems and computer security.