SOLUTION BRIEF

Communications Service Provide Data Plane Applications

(intel)

Northforge* Develops High Performance NFV Data Plane Applications

Software development company utilizes proven expertise with Data Plane Development Kit for high performance.





Introduction

The Data Plane Development Kit (DPDK) has emerged as the key enabler for building the high-performance data planes needed by network functions virtualization applications. DPDK is a set of software libraries and drivers that can be integrated with virtual network functions (VNFs) or into virtual switches (or both) for fast packet performance in a server powered by an Intel® architecture processor. DPDK was initially developed by Intel, and it is now a Linux Foundation open source project. Intel remains a gold member of the project and a significant code contributor.

Intel® Network Builders member Northforge Innovations (Northforge)* is an expert telecommunications and networking software consultancy that has spent the last three years building its DPDK expertise and is now a specialist in the technology with a significant number of successful projects in the field. Northforge works with its customers to get their DPDK-based products to market faster.

Challenge

DPDK's various software libraries and drivers work to eliminate the data-packet processing bottlenecks caused by Linux* and the use of general-purpose CPUs. The libraries and drivers include the following:

- multicore framework
- huge page memory
- ring buffers
- poll-mode drivers for networking, cryptography, and event drivers (evdev)

With DPDK, the polling threads, huge pages, non-uniform memory access (NUMA) locality, and multi-core processing can be independently incorporated into VNFs to achieve low latencies and lockless packet processing, resulting in very fast packet throughput.¹

Implementing DPDK takes training and real-world application development experience—in the individual libraries and drivers, but also with Linux and with Intel CPU technologies that affect DPDK. While many big VNF developers have invested in this expertise, smaller companies can utilize software consultancies like Northforge to develop VNFs with very high throughput levels.

Northforge develops NFV software to run primarily on servers that use Intel[®] Xeon[®] processors and Intel[®] Ethernet Controller X540 10 GbE controllers or Intel[®] Ethernet Converged Network Adapters XL710 10/40 GbE controllers because it can leverage additional Intel-developed performance enhancing technologies, including receive side scaling (RSS), to go along with DPDK.



DPDK and RSS in DPI Security Applications

The enhanced data plane performance delivered by DPDK and RSS is an ideal fit for deep packet inspection (DPI)based network security and data extraction applications. Intrusion detection systems are based on advanced DPI that uses rules to identify malware-based attacks or ratebased distributed denial of service (DDOS) attacks. DPI analyzes all the IP protocol stack layers of each packet to identify patterns by comparing and matching byte streams in packet flows against a set of pre-defined signatures. An expert DPDK implementation is important because inline DPI applications must accomplish all analysis and comparison at wire speed. Northforge has a well-established DPI expertise for applications that use network processors and has brought that expertise to NFV applications.

One successful project in this area that utilized DPDK and RSS is an intrusion detection system (IDS) VNF the company developed for enterprise security applications. One of the challenges was a limited number of processors' cores. Northforge successfully leveraged RSS to enable the distribution of different data flows to multiple CPU cores for processing. By spreading packet processing among multiple cores, RSS enables efficient memory utilization and reduces synchronization between cores. The packet distribution processing is offloaded when the application uses RSS running on an Intel[®] Ethernet Controller X540 or Intel[®] Ethernet Converged Network Adapters XL710 powered smart NIC. On another project, Northforge developed a software DPI server VNF that would receive packets from hardware DPI appliances for deeper analysis. One of the challenges to solve was that the packets coming into the VNF were encapsulated using generic routing protocol encapsulation (GRE), which meant RSS couldn't read the encapsulated information and thus couldn't be used to distribute the packets to different cores for processing. To keep efficiency and performance high, Northforge developed a packet distribution mechanism implemented in software based on DPDK. With this approach, the server's network controller forwards all GRE packets to the distributor processor core, which uses a hash algorithm to decide how to distribute packets to other cores for processing. A single 10 Gbps NIC card was used and a lockless mechanism based on DPDK ring buffers was developed for distributing packets to cores. DPDK's fast memory pool manager and Longest Prefix Match (LPM) libraries were also used.

Conclusion

Communications service providers are turning to NFV to help improve the agility and lower the costs of their network services. DPDK is one of the critical underlying technologies that improves data plane throughput so that VNFs deliver the deterministic response like the legacy, appliance-based applications they are replacing. With a long list of DPDK project implementations, combined with years of network software technology expertise, Northforge is becoming a trusted partner to companies seeking a performance edge for their NFV applications.

About Northforge

Northforge is an expert software consultancy with domain expertise and years of customer experience across a breadth of technologies, including security, embedded network infrastructure, and multimedia systems. Northforge's mission is to provide expertise in leading edge technologies to develop software products for original equipment manufacturers (OEMs) who are advancing cloud computing. Northforge's vision is to be the go-to partner for expertise in disruptive infrastructure technologies for the network communications industry. In the company's 11-year history, it has consistently delivered innovative, quality products, on time, to more than 60 companies. With offices in Ottawa and Montreal, Canada, and in Israel, the company's North America and Europe customers have a development partner they can connect with during their business day. More information is at www.gonorthforge.com.

About Intel Network Builders

Intel Network Builders is an ecosystem of independent software vendors (ISVs), operating system vendors (OSVs), original equipment manufacturers (OEMs), telecom equipment manufacturers (TEMs), system integrators (SIs), enterprises, and service providers coming together to accelerate the adoption of network functions virtualization (NFV)-based and software-defined networking (SDN)based solutions in telecom networks and in public, private, and hybrid clouds. The Intel Network Builders program connects service providers and enterprises with the infrastructure, software, and technology vendors that are driving new solutions to the market. Learn more at http:// networkbuilders.intel.com.



¹ For more information about DPDK, visit <u>www.dpdk.org</u> and <u>www.intel.com/content/www/us/en/communications/data-plane-development-kit.html</u>.

Intel technologies' features and benefits depend on system configuration and may require enabled hardware, software or service activation. Performance varies depending on system configuration. No computer system can be absolutely secure. Check with your system manufacturer or retailer or learn more at intel.com.

Cost reduction scenarios described are intended as examples of how a given Intel- based product, in the specified circumstances and configurations, may affect future costs and provide cost savings. Circumstances will vary. Intel does not guarantee any costs or cost reduction.

The DPDK logo is provided by Intel under a Creative Commons Attribution-NoDerivatives 4.0 License (CC BY-ND 4.0).

© 2017 Intel Corporation. Intel, the Intel logo, and Xeon trademarks of Intel Corporation or its subsidiaries in the U.S. and/or other countries.

*Other names and brands may be claimed as the property of others. 0617/DO/H09/PDF 👶 Please Recycle 336117-001US