Report On Project TCP Message Parser using DPDK

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TCP Message Parser using Data Plane Development Kit (DPDK)

Overview:

The Data Plane Development Kit is an open-source software project that is primarily created for improving packet processing performance of the usual processors. Initially a project driven by Intel, it is now supported by the Linux Foundation. This consortium's the DPDK consists of a series of libraries and drivers for fast packet processing and provides an environment where applications running on COTS hardware can be performed with high-speed packet processing. It has extensive usage in telecommunications, cloud, and enterprise network applications since it can handle network traffic at a considerable rate or usually at line speed.

DPDK Architecture

The key contribution of the DPDK core was the design around a modular architecture, providing the following parts:

Environment Abstraction Layer - EAL: This is an abstraction layer above the hardware and the operating system, which makes it easy to port on various architectures.

Memory Manager: This manages memory for allowing high-speed access to packet information.

Buffer Manager: It provides an efficient way for memory pools to handle packets.

PMD-Poll Mode Drivers: These enable high-speed transfer because the driver keeps the device polling instead of depending on interrupts.

Why DPDK?

1. The key features are: high performance, flexibility, and portability. High Performance: DPDK optimizes packet processing by bypassing the kernel networking stack. The reason for that is simple: by directly interacting with network interface cards, it can handle millions of packets per second per core on commodity hardware.
2. Flexibility and Portability: DPDK supports hardware platforms such as x86, ARM, and PowerPC architectures. It works on multiple NICs by different vendors, hence increasing its adaptability.
3. Open Source and Community-Driven: DPDK is open-source, distributed under the BSD license, which makes it highly cost-effective and adaptable. There's a huge community keeping it updated, fixing bugs, and optimizing very frequently.
4. Enhanced Networking Solutions: For NFV applications, DPDK provided fast deployment of virtual network functions with minimum degradation in performance.

Applications of DPDK

The main use of DPDK in industry pertains to segments that require very high-speed packet processing and low-latency networking. These include:

1. Telecommunications and NFV: The telecom providers make use of DPDK to build software-based network functions that replace traditional hardware solutions.
2. Cloud and Data Centers: DPDK optimizes virtual networking in cloud environments, thus enabling network functions virtualization infrastructure.
3. Financial Domain: DPDK is utilized in high-frequency trading applications to hasten the processing of data and orders, hence reducing latency.
4. Network Security: Applications can range from IDS(Intrusion Detection Systems) and firewalls to security gateways, which depend on packet filtering or high processing speeds.

How to Utilize DPDK

Basic knowledge about network protocols and system programming is required to work with DPDK. The following section describes the generic setup, configuration, and usage of DPDK.

References:

<https://core.dpdk.org/doc/>

<https://github.com/DPDK/dpdk>

<https://doc.dpdk.org/guides/linux_gsg/index.html>

<https://doc.dpdk.org/guides/prog_guide/overview.html>

Accelerating Suricata with DPDK Prefilters: 386 Days Later www.youtube.com › watch