High Speed DAQ with DPDK

## Saiyida Noor Fatima

Supervisor: Niko Neufeld

Project Objective

DAQ Protocol-Independent Performance Evaluator (DAQPIPE) is a benchmark application to test network fabrics for the future LHCb upgrade.

Increase throughput between Readout Units and Builder Units used by DAQPIPE.

➔   40 Tb/s for LHCb in 2020

➔   ~500 readout nodes

➔   40 Tb / 500 = **80 Gb/s**

Handle 80 Gb/s communication load between the RU/BU

29/01/2016

2
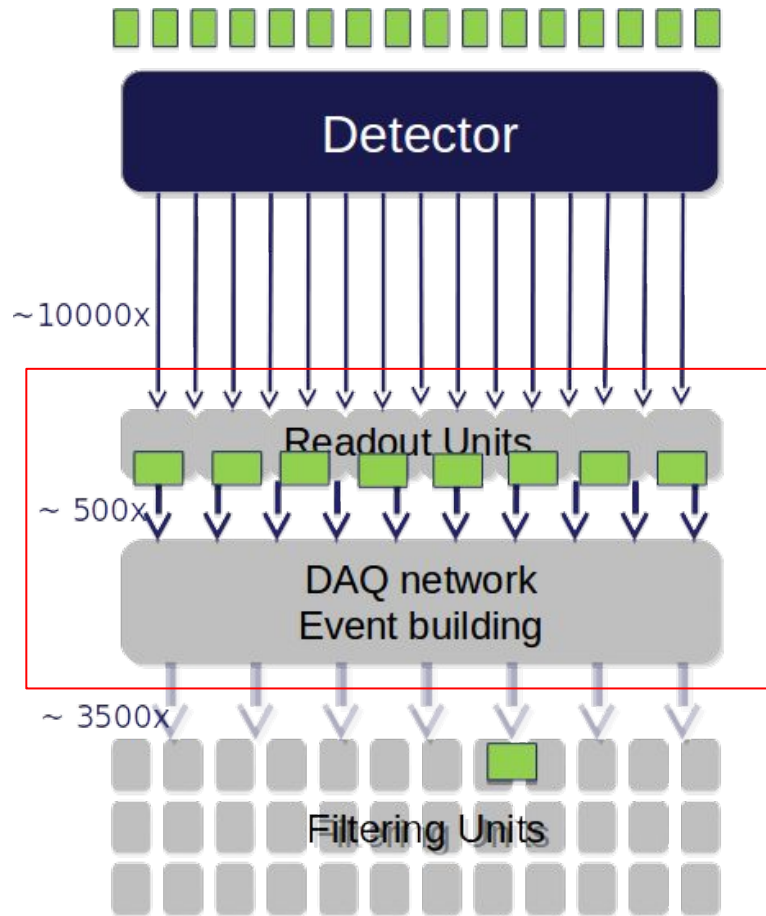
Supported Networks

→ MPI
  ◆ Supports all networks
  ◆ Optimized for Infiniband/Omni-path

→ Infiniband VERBS

→ TCP/IP

→ LibFabric
  ◆ Omni-path

What we want to explore?

DPDK

(Data Plane Development Kit)

DPDK

- ★ Data Plane Development Kit
- ★ Set of libraries and drivers for fast packet processing
- ★ Works with ethernet
- ★ Aimed to be used for switch implementation
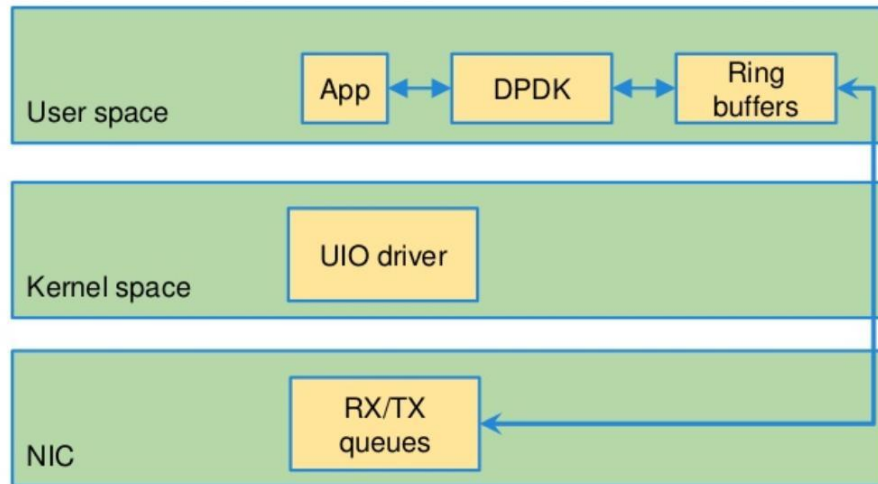- ★ Requires special hardware support

Why?
- ➔ Linux kernel limitations
- ➔ Attempts to address performance limitations
- ➔ Kernel bypass

Packet processing in Linux
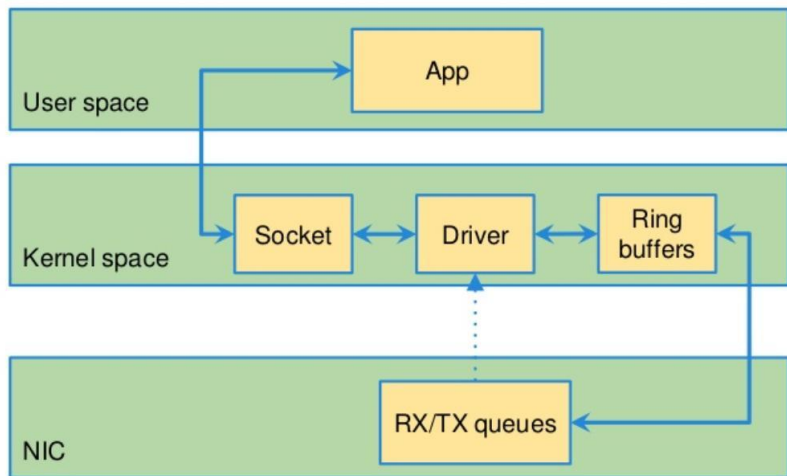
Packet processing with DPDK

API Example

```
4   /* creating a memory pool for communication */
5   packet_pool = rte_pktmbuf_pool_create("packet_pool", NB_PKT_MBUF, 32,
6                       0, PKT_MBUF_DATA_SIZE, rte_socket_id());
7
8   /* creating a packet in the existing memory pool */
9   packet = rte_pktmbuf_alloc(packet_pool);
10
11  /* processing or modifying packet*/
12  packet->data_len = 64;
13  struct ether_hdr eth = rte_pktmbuf_mtod(packet, struct ether_hdr *);
14  rte_eth_macddr_get(port, &eth_hdr->s_addr);
15  rte_eth_macddr_get(port+1, &eth_hdr->d_addr);
16
17  /* transmitting packet */
18  int num_transmit = rte_eth_tx_burst(port, queue_id, packet, n);
19
```

Progress

➔ DPDK setup
➔ Tests for DPDK
➔ Currently evaluating results

Packet Transfer using DPDK
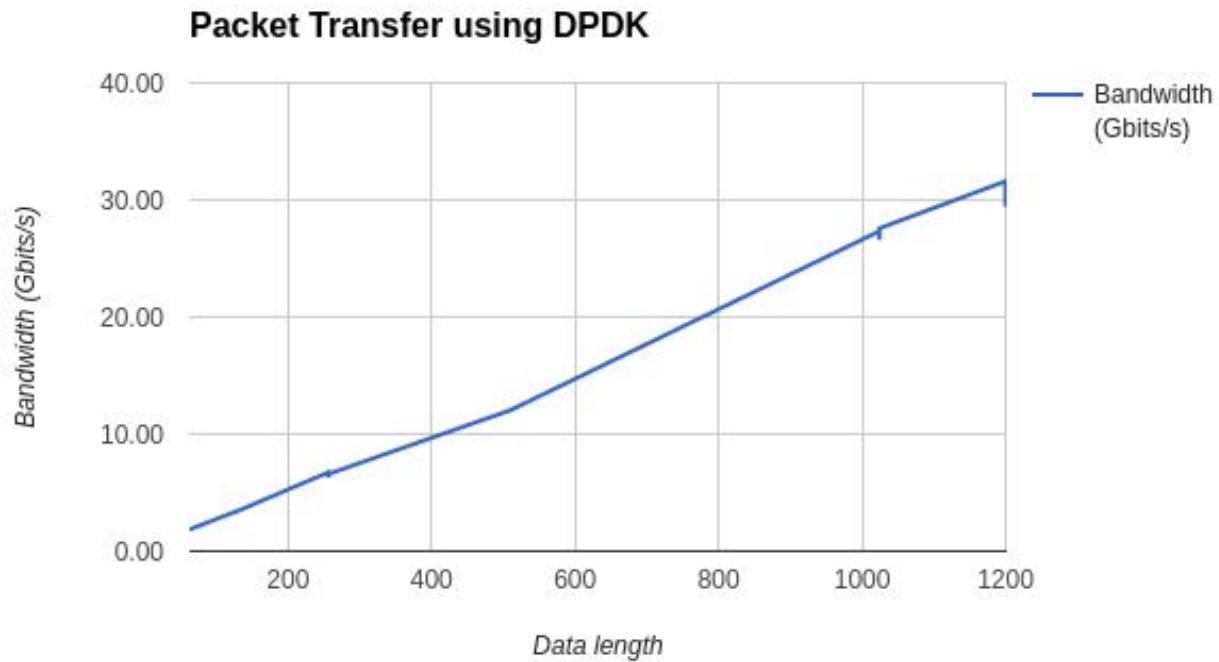
Issues

- ★ Compatibility constraints
- ★ Specialized hardware
- ★ Aimed for switch implementation
- ★ Community still growing
- ★ No experts in the vicinity

Future Work

- ★ Exploring DPDK further
- ★ Implementation of driver for DAQPIPE

Thank you.