Agenda for Today

• Introduction to NIC interfaces
• Enso discussion
NIC Interfaces
Network Stacks

Linux's Network Stack

Transmit (TX)
- App
  - write()
  - socket
  - TCP/IP
  - Queuing Discipline
  - network driver TX

Receive (RX)
- App
  - read()
  - socket
  - TCP/IP

Kernel-Bypass Network Stack (DPDK)

Transmit (TX)
- App
  - rte_eth_tx_burst()
  - network driver TX

Receive (RX)
- App
  - rte_eth_rx_burst()
  - network driver RX

NIC interfaces

Interrupt

DPDK

user space
kernel space

polling
NIC Interface: Queues

- Logically organized as pairs of queues
  - Receive queues (RX)
  - Transmit queues (TX)
- Often one pair of queues per core
- Each queue is implemented as a ring buffer
Packetized NIC Interface

- Each entry in the ring is a descriptor.
- Descriptors contain pointers to packet buffers:
  - Packet buffers are scattered in memory.
- Descriptors also contain a flag indicating if the buffer has data.
NIC Offloads

- NICs today support various offloads
  - Simpler offloads:
    - Checksum computation
    - TCP segmentation offload (TSO)
    - Large receive offload (LRO)
  - More complex offloads:
    - Entire transport protocols (e.g., TCP)
    - Data serialization
Enso Discussion