The Open Fabrics
Verbs Working Group

Pavel Shamis and Liran Liss
Introduction

- Verbs is a high-performance mature and robust interface
  - Widely adopted
  - Stable
  - Scalable

- Open-source development
  - Peer-reviewed code patches
  - Peer tested

- Development rate and novelty constantly increasing
  - New applications and features
  - New systems and architectures

- The Open Fabrics Verbs Working Group (OFV-WG)
  - Enhancing the verbs interface to meet the needs of future systems and applications
OFV Mission

• Enhance the Verbs interface to meet the needs of future systems and applications
  – HPC, storage, cloud applications and more
  – CPUs, GPUs, and other compute elements
  – RDMA and other interconnect accelerated capabilities

• Guide the development of the Verbs eco-system
  – Forum to discuss approach for new features
  – Raise community awareness
  – Partner with collaborators for introducing new features
The Verbs Eco-System

- **Extended Verbs**
  - Enable new features

- **Infrastructure**
  - Common services
  - Common abstractions

- **Middleware and ULPs**
  - Application-facing APIs
The Verbs Eco-System: Extended Verbs

- HPC optimizations
  - Accelerated Verbs

- Raw Ethernet support
  - Rx flow steering
  - Tx flow anti-spoofing
  - Stateless offloads
  - VLAN stripping
  - RSS, TSS
  - Tunneling (VXLAN, NVGRE)

- Memory
  - Indirect Memory Regions

- Signature operations
- Extended atomics
- Name space operations
  - QPNs, CQNs, MRs, etc.

- QP control
  - Suspend/resume

- Time stamp operations
  - Read HCA clock
  - Time stamp completions
The Verbs Eco-System: Verbs Infrastructure

- RDMACM improvements
  - E.g., APM support
- Bulk address resolution for HPC
- Kernel-managed user-space QPs
  - Connection management
  - fork() support
- SoftRoCE
- Multi-rail bonding abstraction
- On-Demand-Paging
- Container support
- SELinux support
The Verbs Eco-System: Verbs Middleware

- Group communication
- Transaction-based IO
  - Efficient RPC
- Active messages
- RDMA sockets
- User-space TCP/IP
- Packet processing
- Java bindings
- RDMA accelerators
  - E.g., HPC, Hadoop, Ceph
Discuss New Approaches

- Solicit feedback from a larger community and users
  - Not all of our contributors track kernel mailing lists
  - Storage, Big-Data, HPC, etc.

- Discuss concepts before writing code or detailed [RFC] patches

- Converge faster by interactive feedback
  - Faster acceptance

- Tackle hard-to-crack concepts by focused discussions
  - Weekly increments
Community Awareness

• Raise the need for important features
  – Introduce new use-cases
  – Describe feature requests
  – Aid in prioritizing the focus of the development community

• Point out pain points and urgent issues
  – E.g., connection rate, “debugability”
Collaboration

• Raise issues that you would like to work on

• See if other community members are currently tackling the same issues

• Establish collaboration to speed up development and increase efficiency

• Cross-community collaboration
  – Discuss challenges with broader community
Summary

• The pace of Verbs development is increasing

• The user base of the Verbs Eco-system is expanding

• The OFV WG will facilitate
  – Agreement on approach for new fronts
    • Faster acceptance and convergence
  – Prioritize and focus OFA development efforts
  – Encourage collaboration
  – Broaden the use of the interface
  – Increase adoption of RDMA technology
Thank You