NVIDIA’S UCX POSITION

New long-term commitment
Addressing ‘Challenges’ integrating GPU communication
Memory consistency evolution
UCX DISCUSSION

NVIDIA

NVIDIA Objectives

• UCX as first class middleware
• Enable GPU-focused libraries to leverage UCX
• Support for newest GPU features
• Future interconnect flexibility

GPU optimized transport

• Good runtime support for GPUDirect technologies
• NVLINK-aware optimizations
• HMM-aware optimizations
NVIDIA’S UCX CHALLENGES

‘Challenges’ integrating GPU communication
Our “thread” is not your “thread”
Context state, connection persistency and scope
Memory consistency model (models)
  Global consistency vs scoped consistency, scoped barriers
UCX DISCUSSION

NVIDIA

- Targets of Interest, in coordination with partners
  - OpenSHMEM
  - OpenMPI
  - focus on HMM and Unified Memory

- Long term questions
  - Is UCX sufficient for GPU programming needs
  - Multi-GPU optimization
  - GPU-initiated APIs
Applications

UCX

UCP (Protocols) - High Level API
Transport selection, cross-transport multi-rail, fragmentation, software protocols for operations that are not supported by hardware

UCX

UCT (Transports) - Low Level API
Operations supported by hardware: RMA, Atomic, Tag-matching, Send/Recv, Active Message

UCS (Services)
Common utilities

Transport for Accelerator Memory communication
NUCLEUS

CUDA

Hardware/Driver (Interconnects, PCIe, NVLink, etc.)

MPICH, Open-MPI, etc.
OpenSHMEM, UPC, CAF, X10, Chapel, etc.
Perseco, OCR, Legions, etc.
Burst buffer, ADIOS, etc.
QUESTIONS ASKED

- Expand on scoped consistency