

V-OpenCL: A method to use remote GPGPU



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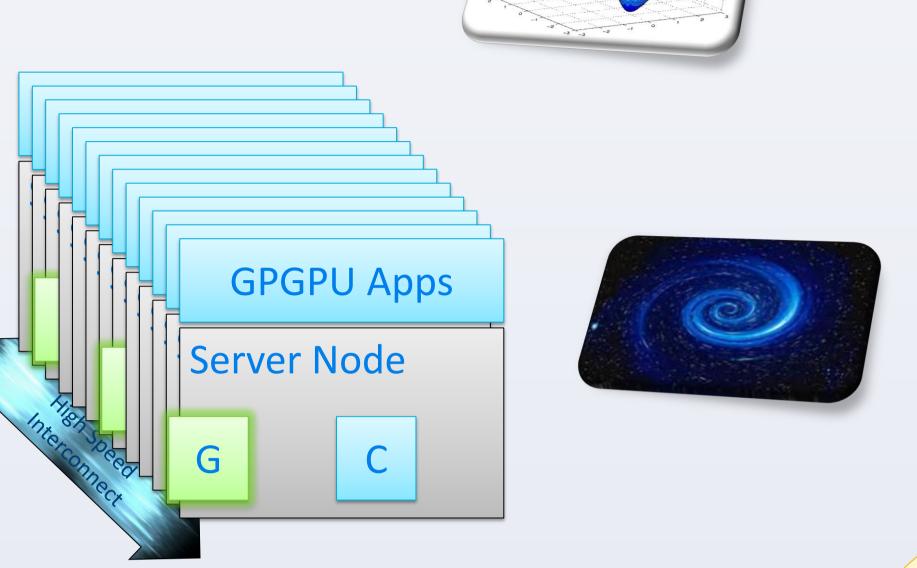
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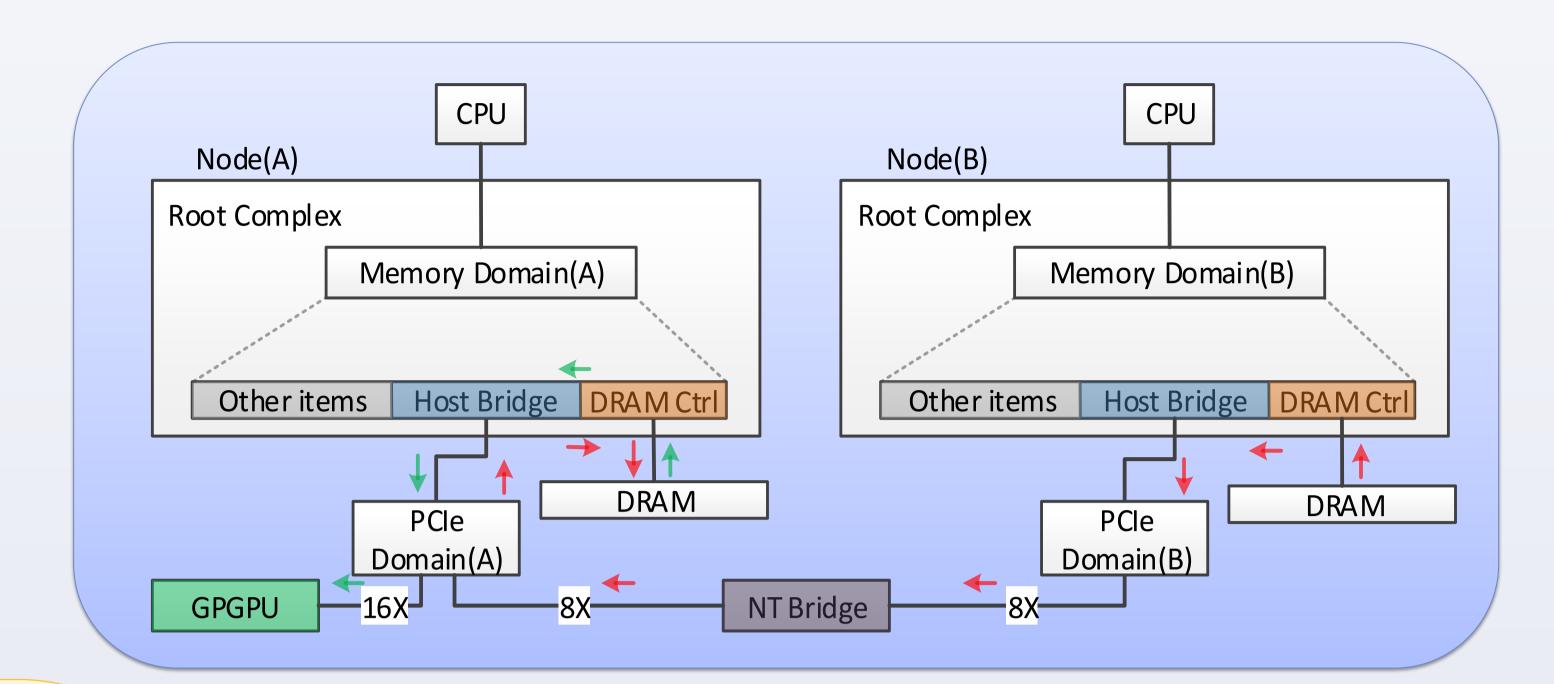
In datacenter **GPGPUs** are useful but not needed all the time.



Partially equip nodes with **GPGPU** and share them between nodes.



With PCle, memory can be mapped to different nodes. Data and binary are first copied from DRAM of Node B to Node A and then sent to GPGPU



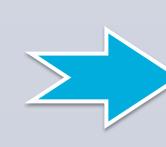
With All other interconnections IB, Ethernet or eliminated we SO... use PCIe Directly. PCle

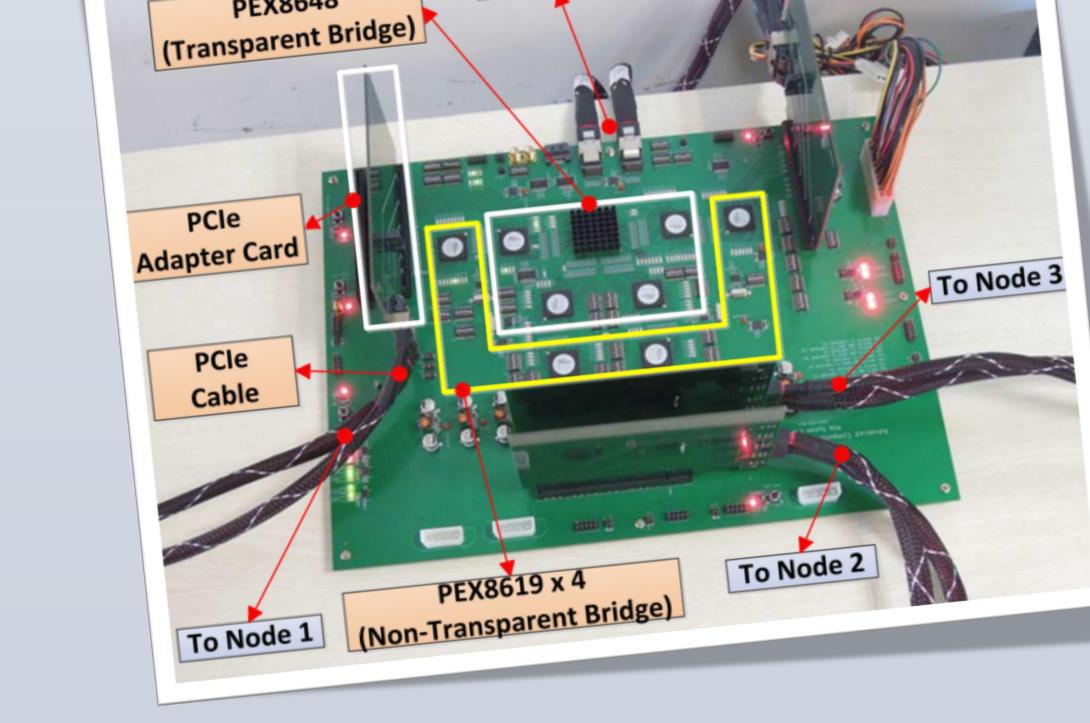
GPGPU equipped node GPGPU unequipped node (serves clients) (works as client) API Call Buffer OCL APPs GPGPU Provider Daemon APPs API Call Unpacker OCL Interposing API **GPGPU** Manager Contexts Manager GPGPU Assingment OCL API Context Management OCL Contexts Interposer Library OCL Runtime Library **GPGPU** Driver API Call Packer **GPGPU** Hardware High Speed Interconnection **GPGPU** Requester

- OpenCL API calls are packed up and redirected to GPGPU equipped node(s).
- An API call buffer is set for each GPGPU equipped node to hold the incoming call packets and sort them by context ID.
- A GPGPU manager software is set to track the states of GPGPUs and help nodes to find GPGPU(s).
- This mechanism is suitable for common interconnections, not only PCIe.

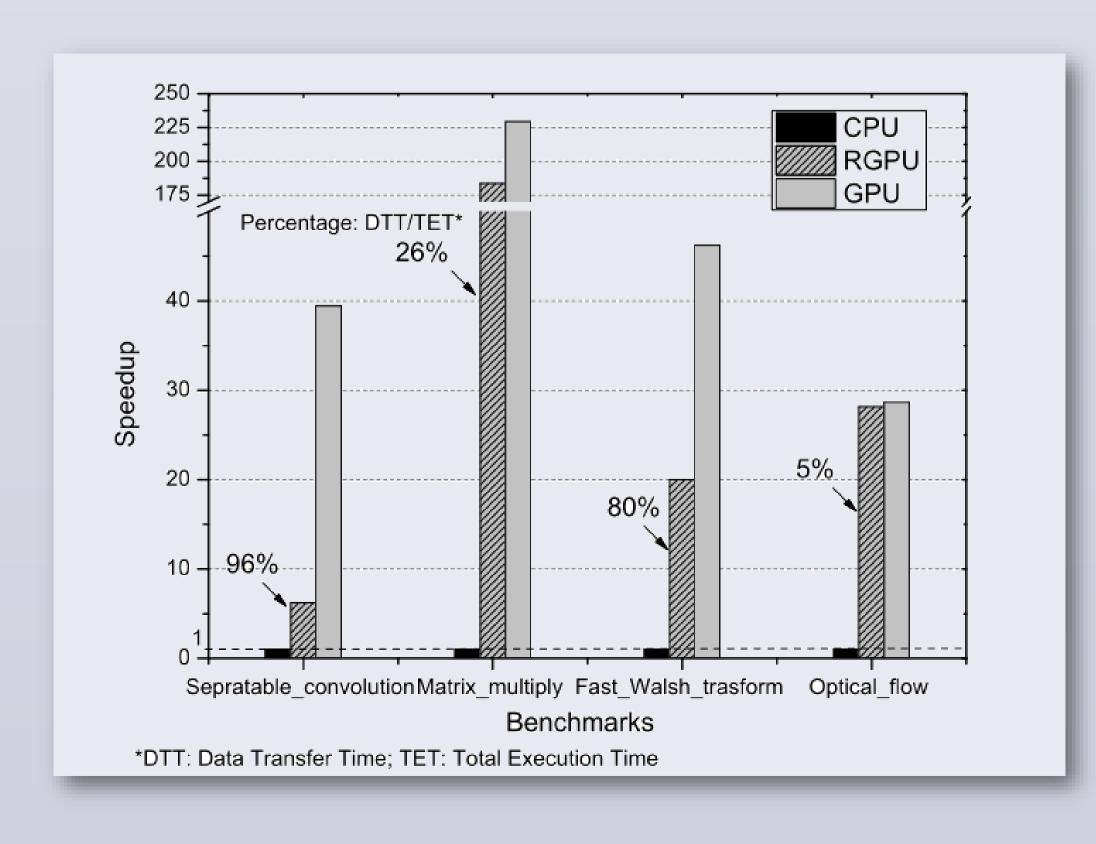


This is our primitive PCle switch board. Server nodes connect to it with PCIe cables.





To Node 0



Four sample programs are used for evaluation. All of them run much faster on remote GPGPU than on CPU although data transfer takes time. Of the over all run time, transfer time takes large portion in two of the programs while takes very little portion in the other two.

