Hybrid Optical/Electrical Networks for Datacenters

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Impact

• Jeff Kash (IBM) et al have already demonstrated datacenter rack-to-rack optical connections
• Cost savings could be substantial
  • Avoid paying for unused equipment
  • Power savings as well: avoid large monolithic packet switches
• Goal is the same performance, but small performance hit may be acceptable

Goals

• Several current proposals for future datacenter networks
• Fat-tree interconnect cost rises superlinearly with number of nodes
• Insight: all-to-all connection is not necessary for most?/many? datacenter applications
  • But no guarantee nearest-neighbor connectivity is enough!
• Use optical circuit crossbar to provision exact network needed: can alter at any time

Timeline

• Mid Oct: Evaluate Omnet++ simulation framework
• 1st week Nov: Simulation environment underway
• Mid Nov: Map/Reduce trace generation, gather other candidate traces
• End Nov: Simulation environment finished
• End Sem: Simulation of Map/Reduce applications, possible simulation of other datacenter communication