Network awareness for HTCondor’s High Throughput Computing approach
Lark

- Project started October 1st, 2012
- NSF funding for expected two year project lifetime (CC-NIE Integration: Bringing Distributed High Throughput Computing to the Network with Lark)
- Joint project between UNL and UW
• Advanced Network Testbed (ANT)
• Network Monitoring
• Network Management
• Advanced Network Testbed (ANT)
  
• Currently two HTCondor pools, one at Wisconsin and one at HCC
  
• Each pool has a submission node and worker node(s) which are IPv6 only
  
• Designed to simulate ‘real world’ HTCondor usage between sites for testing purposes
• Network Monitoring

• Bring network state information into HTCondor from tools such as Internet2’s perfSONAR (http://www.perfsonar.net/)

• Scheduling decisions can be made based on network state and link conditions
• Network Management

• Allow HTCondor to actively alter the network layer based on internal policies

• Per job / workflow network accounting

• Network prioritization

• Dynamic topologies with Internet2’s DYNES http://www.internet2.edu/ion/dynes.html
• What we’re currently doing ...

Normal IPv4 internet

• can have strange topologies,
• be congested
• firewalled beyond recognition
• What we *could* be doing ...  

DYNES Layer 2 Allocation  

• jobs live in ‘containers’  
• same VLAN as HCC resources  
• bandwidth/latency guarantees
• What we’re currently doing ...

No network awareness

• Quantity of jobs sent to Purdue based only on available cores
• Purdue network overloaded, poor CPU utilization while waiting for I/O
• What we *could* be doing ...

With network awareness

• Lark + HTCondor balances job scheduling to Purdue with available network capacity
• Jobs run more efficiently and Purdue network remains stable
• Other benefits ...

• Network layer privacy/protection: jobs can run in restricted VLANs (HIPAA)

• Network accounting: end users, funding agencies can measure actual resource consumption for a given workflow

• Automatic balancing of resources, avoid sudden floods of jobs interfering with normal network usage