Introduction

- Grid & Visualization research @ CCT/LSU
- Enlightened project, vertical integration
- Integrated approach for distributed application (not layered, component-based)
  - Take networks into account (DCN)
  - Compute resources
  - Storage, Graphics
- Goal: build distributed applications that have better performance, increased capacity over non-distributed. Provide a path for future scaling
Application

- Distributed volume rendering/large data
- Improved I/O (distributed + networks faster than local)
- Increased rendering capacity + HQ video & interaction
Scheduling requirements

• Application-centric view of system. Want to optimize applications, not system. System will also benefit

• Coordinated scheduling of network and other resources(compute, storage, ..)

• Atomic allocation of multiple resources at the same time(needed for interactive application)

• Need to allocate multiple network links(switched network – multiple data servers, video streaming, multiple users)
Scheduling requirements

- Guaranteed, dedicated in-advance reservation for a given time period. Guaranteed topology desired
- Open to fair policies of handling priorities
- Application optimized for DCN
  - will not work on regular networks
  - good enough quality of video for remote visualization
  - remote I/O faster than local using aggressive UDP
Information service requirements

- Timetable for availability of resources (allocating multiple resources)
- Bandwidth, latency of circuits for time period $T$ (tuning of transport protocols)
- Topology information (used for network flow optimization of data transfer, overlay multicast)
- Information about connected resources (compute, graphics)
Information service requirements

- Using all the info, application-level optimization of resource selection
  - maximize data size while
- Keeping the visualization system interactive (minimum 5fps)
- High resolution (at least 1 megapixel)
- Multiple remote users (collaborative visualization using video)
- low response time
- >5Gbps I/O rate
- HQ video (no artifacts, low latency)
Is application middleware?

• Ideally it should be/use middleware, not quite there yet, quite far actually. Need testbed

• Scenario
  
  • User describes priorities for one or more visualization session parameters: data size, resolution, frame rate, interactiveness(latency), responsiveness(data I/O), start time. Can also have templates.
  
  • Application, using information about DCN and other resources computes and optimizes a set of options with associated parameters, user selects
  
  • Application uses middleware to allocate all required resources