Cloud Computing?

- Is Cloud computing a viable option for LQCD?
- GRID – definitely "no"
  - LQCD very dependent upon high performance network (single node problems can be run, though)
  - Codes and libraries need to be built on any (new) GRID resource – significant overhead
  - Open Science GRID has struggled with how to support MPI users

- Clouds – an emerging "yes"?
  - Virtualization allows complete OS environment to be "flown in" to a provisioned cluster, including full LQCD build
  - Commercial clouds to my knowledge do not have suitable high performance networks (typically oversubscribed gigE)
  - Mellanox has demonstrated production on a Cloud with NAMD and CPMD, two real MPI applications
    - OFED stack will support virtualization
    - http://hpcadvisorycouncil.mellanox.com/advanced_topics.php
    - We will participate in an LQCD test of this concept
  - Probably not appropriate for lattice generation (LCF's really needed here) but perhaps viable for analysis

- Doubtful that commercial HPC clouds will be available soon
  - GP-GPU clouds, if available, could be very useful
- Government/Lab operated HPC clouds could be attractive
  - Based on LQCD history, this community would be happy to exploit any available cycles
  - We tend to buy leaner machines than used for general HPC clusters, but perhaps economies of scale and leveraging of support manpower could compensate

Site Contingency Planning

- How would the project cope with a significant outage at one of the three sites?

- All sites include contingency planning in their security plans

  – This doesn't really address the question, except maybe in the case of a building outage

  – Tests include using portable HVAC, portable power generators, cluster relocation

- Full site outage
  - A short outage (order of 1 week) would not likely merit action
  - For longer outages (order of 1 month):
    - Scientific Program Committee and LQCD Executive Committee would be consulted for relocation priorities
    - All applications (Chroma, MILC, CPS, SciDAC libraries) are portable and have run at all sites; users would need to recompile
    - Gauge configurations are stored at multiple sites, so if *e.g.* FNAL went offline, ILDG data would be fetched from NCSA, UCSD, NERSC
    - Campaigns that rely on temporary storage of propagators would have to rerun to regenerate such data products
  - We do not have a written plan