Novel Applications

NSFCloud Workshop
December 12, 2014
This was brainstorming.

Further evaluation is appropriate.
Killer Apps (differentiation with commercial services)

• Anything geospatial
  • Example: Vehicles
  • Example: Traffic management
  • Above also real-time, critical, federated, global/distributed, hierarchical)

• NAS Benchmark

• Anything that requires security
  • 5G Mobile to cloud

• Healthcare (real-time, secure, critical, federated)

• Publishable systems research (reproducibility)
Differentiation with traditional HPC

- Numbers of simultaneous end users
- User interaction
- Real-time
- Continuous / process vs. pre-determined
- Geospatial optimization
- Tiers / hierarchies of clouds (e.g. traffic management)
  - Global
  - Regional
  - Local
Desires (page 1)

- Rapid provisioning
  - Accommodate events, CPS
  - Utilizing scavenger cycles
- Dynamic provisioning
  - Demand fluctuations, algorithm changes
Desires (page 2)

• **Reproducibility** (and support for)
  • Logs of exact configurations (down to Bios settings and disk models) used
  • Logs of external interactions including network delays (meta analysis)
  • Archive “profiles”
  • Deterministic introduced faults / delays
  • Capability of re-instantiating the exact same configuration
  • Goes beyond the NSFCloud to the networks to end users and federations, data provenance, routing tables, etc.

• **Variation**
  • Test new cloud architectures / applications against variations in
    • Parallelism, Processor speed, Disk speed, Network speed and configuration, etc.

• **Predictability**
Desires (page 3)

• Support for real-time issues
  • Help us determine detailed sources of delay / latency (queuing, etc.)
  • Provide logs (see previous page)
  • Shadow production applications (use real data)

• Help apps optimize themselves for their environment
  • Feed us (cross-layer) information about the cloud environment

• Explore tradeoffs in app-infrastructure interactions
  • Application adapts (to infrastructure)
  • Infrastructure adapts (to application)

• Performance knobs
  • Change infrastructure performance to see impact on clouds / apps
Desires (page 4)

• Radical hardware
  • New
  • Cutting edge
  • Research

• Enterprise datacenter hardware (for research on datacenter clouds)
  • WAN optimizers
  • Load balancers
Desires (page 5)

• Pre-packaged or curated libraries
  • Help users stay about the infrastructure
  • AAA
  • Toolboxes
  • Canonical use cases
  • Vetted libraries (Technology Insertion Service)