

Novel Applications

NSFCloud Workshop
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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)