Storage Quality-of-Service in Cloud-based Scientific Environments: a Standardization Approach

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QoS: expectations and promises

Users
Storage behaves how I expect

Storage providers
Promises on how storage behaves
QoS: why bother?

“We have a finite budget”

“None of the available storage meets all requirements”
“Chose any two” toy model
Existing QoS in HEP

- Cheap & Fast
- Cheap & Reliable
- Desired QoS

- Fast & Reliable
- Disk
- TAPE

Cheap & Fast

Fast

Reliable

Cheap

Desired QoS

Cheap

Cheap & Fast

stage/recall

Fast & Reliable

Disk

Fast

Reliable

Tape
Possible directions

(Example set)

- **SCRATCH**
  - FAST (the need for speed)
  - OUTPUT (external redundant copies)
  - OUTPUT (not yet redundant)
  - LOW-COST (latency not an issue)
  - ARCHIVAL (expensive to recreate)

**Why?**

- “We have a finite budget”
- “None of the available storage meets all requirements”
Choosing QoS

"SCRATCH" (latency)

"ARCHIVAL" DURABILITY

"FAST" LATENCY & BANDWIDTH

User expectations

QoS #1: SCRATCH

QoS #2: SCRACH, FAST

QoS #3: ARCHIVAL

QoS #4: ...

latency: .... bandwidth: .... durability: .... cost-model: ...

User expectations
Controlling QoS with CDMI

With some extensions:
- Modifying QoS (from SNIA)
- Discovering allowed QoS transitions
- Monitoring QoS transition progress
CDMI Reference implementation

- **Query** available QoS options.
- **Control** QoS of files and directories
  
  Does not support ingress/egress

- **Uses** **plugin architecture** to support different backends:
  
  Support for dCache, S3/CEPH, HPSS, StoRM/TSM, GPFS.

- **Discover** alternative protocols for data ingress/egress
Defining QoS attributes

- latency: ....
- bandwidth: ...
- durability: ...
- cost-model: ...

ands

AUSTRALIAN NATIONAL DATA SERVICE

RESEARCH DATA ALLIANCE

poolparty

W3C

SKOS
Next steps...

- Building up **test bed**
  
  Demo in November for EU review

- Complete **integration** with OneData.

- Add support for **custom attributes**.

- **Delegate authorisation** to INDIGO-DataCloud SLA.

- Roll out into **production**.
Backup slides
Toy model to more realistic view

Cheap & Fast

Cheap

Cheap & Reliable

Fast

Reliable

Cost

Speed

Reliability
Example ARCHIVAL criteria