Chelonia

A lightweight self-healing distributed storage

Introduction:

Chelonia is a user-friendly, grid-enabled storage system from the developers of the ARC middleware. Chelonia talks fluently with ARC and users can easily upload and download files and collections to the storage cloud, it also allow users to map third party storage elements into the storage cloud managed by Chelonia. Chelonia has a distributed, non-intrusive architecture that allows for flexible setup and the elimination of single points of failure.

Architecture:

- ☑ SOAP based web services.
- ☑ Objects and services identified by GUID.
- ☑ Hierarchical global namespace makes the system easy to use.
- ☑ Replication of services eliminate single point of failure.

Security:

- ☑ X.509 based authentication.
- ☑ Three authorization levels.
  - ☑ Inter-service level.
  - ☑ Transfer level.
  - ☑ Higher level.

Librarian:

- ☑ Manages the hierarchy and metadata of files and collections.
- ☑ Gets the health information of the Shepherd services.

A-Hash:

- ☑ A hash table for consistently storing metadata.
- ☑ Two types of configurations available
  - ☑ Centralized
  - ☑ Replicated

Bartender:

- ☑ A high-level interface for the storage system.
- ☑ Clients connect to the Bartender to create/remove files, collections and mount-points.
- ☑ Communicates with Librarian and Shepherd to execute the clients' requests.

Replicated A-Hash:

- ☑ Replicates the data amongst available A-Hashes.
- ☑ Uses a single master, multiple clients setup.
- ☑ When the master is down, system will still be available for reading metadata.
- ☑ Paxos algorithm is used to elect new master.

Shepherd:

- ☑ Runs as front-ends on storage nodes.
- ☑ Reports to the Librarian about the node's health state in terms of replicas.
- ☑ Generates one time URL for file transfer.
- ☑ Actual transfers go directly between the storage node and the clients.

Client Tools:

- ☑ System can be accessed from Command-line-Interface (CLI).
- ☑ By using the FUSE module, users can mount the storage namespace into the local namespace.

Storage Gateway:

- ☑ Designed to communicate with external store,keeping the transparency of the global namespace.
- ☑ Supports GridFTP, HTTP(s) and SRM.

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