Bridging Grid and Cloud Storage Resources

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Agenda

- Common feature of Cloud storage products

- Comparison of security aspects

- Extension of Grid storage using the Cloud

- Solution

Need for Storage Resource

- Choice between:
  - Extension of in-house system
  - Outsourcing to Cloud storage providers

- Critical mass for operation of in-house storage systems

Cloud storage products

- Amazon S3 (Simple Storage Service)

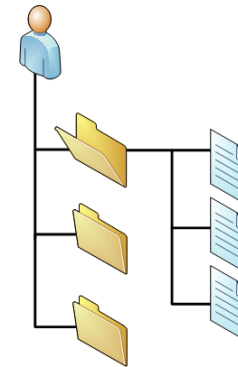- Nirvanix SDN (Storage Delivery Network)

- Rackspace Cloud Files

Common features

- Simple file system structure

- Remote access via SOAP and REST

- Cost model based on usage:
  - 0,15 – 0,25 $ for GB/month of storage used
  - 0,08 – 0,20 $ for GB/month of data transfer (in/out)

Security comparison (1)

	Amazon S3	Nirvanix SDN	Rackspace Cloud Files
Transport confidentiality / integrity	SSL / TLS MD5 hash	SSL / TLS MD5 hash	SSL / TLS MD5 hash
Storage confidentiality	Optional user encryption	Server side if requested	Optional user encryption
Storage integrity	Optional user signature	Optional user signature	Optional user signature

Security comparison (2)

	Amazon S3	Nirvanix SDN	Rackspace Cloud Files
Authentication of users	Username + password	Username + password	Username + password
Authentication of operations	HMAC: message digest with secret key	Session token bound to IP address	Session token
Authorization of operations	4 types of users • Owner • Specific S3 user • Any S3 user • Non-auth.	2 type of users • Owner • Non-auth.	2 type of users • Owner • Non-auth.

Security comparison (3)

	Amazon S3	Nirvanix SDN	Rackspace Cloud Files
Session validity	One-time: timestamp	Until logout or 20 min inactivity	24 hours (no revocation)
Backup	Redundant copies but no backup	Redundant copies but no backup	Redundant copies but no backup

Evaluation summary

Pro:

- Simple API available for Java, Perl, Phyton, PHP, C#, Ruby
- Simple transfer protocols (based on HTTP)
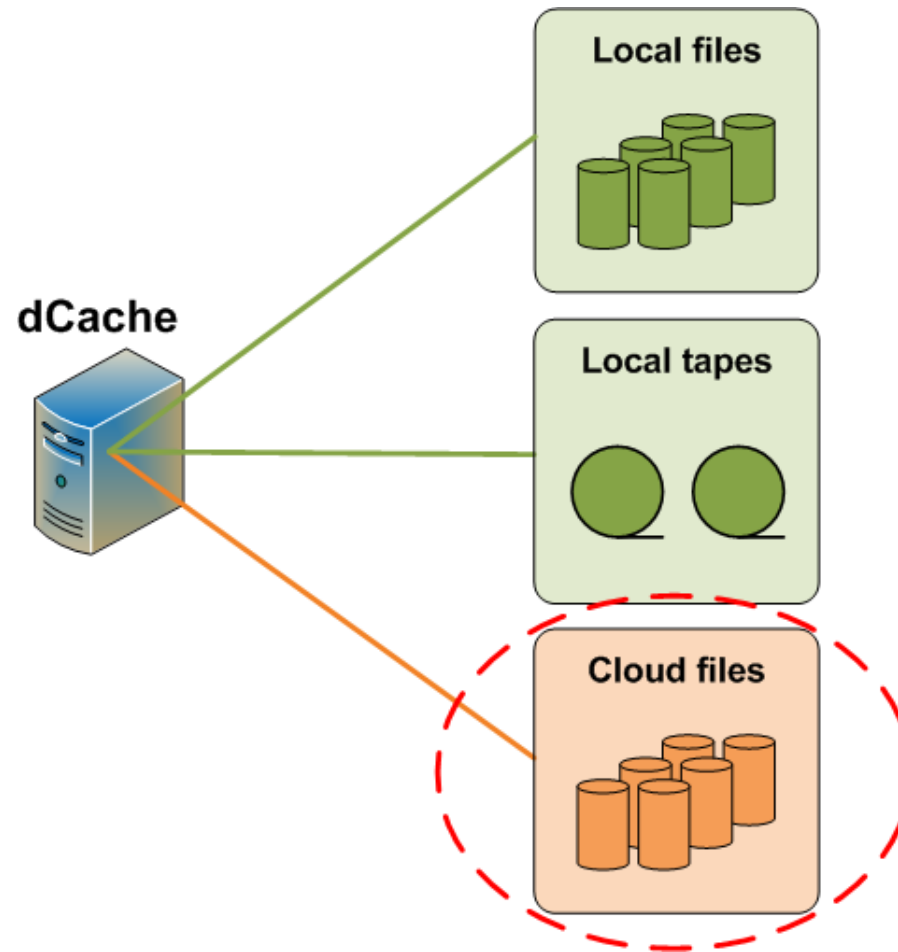
Cons:

- Weak authentication of users
- Limited flexibility in access control
- Limited VO support for multiple user accounts

Extending Grid storage using the Cloud

Requirements:

- Transparent access to Cloud storage space from Grid

- Maintaining security level of Grid storage solutions

- Minimizing development effort

Using dCache to extend Grid storage

dCache extension

- dCache already provides a *pool manager*
    - File on disk
    - File on tape library
    - *File in the Cloud*

- Benefits:
    - One single Cloud user account
    - Authorization either with grid-mapfile or attribute-based
    - Reuse dCache internal mechanism for managing access control

Summary

- Extension of Grid storage resources using the Cloud

- Matching Grid and Cloud security

- Extension of dCache pool manager

Thanks for your attention!

Questions?