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Title:	Institutional Storage at LANL; Re-Architecting an Organically Grown Storage Infrastructure into a Sustainable, Scalable, Attractive Solution.
Author(s):	Don Byington
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Abstract

Consumer desktop hard drives continue to grow in size and shrink in price which promotes the misunderstood value of enterprise storage, raising questions of why it costs so much more per unit of space and why the customer should buy into enterprise storage instead.

As the IT storage service provider, to compete with the price point and attract customers, we need to increase the perception that enterprise storage truly is a value added service and go beyond the support role to become pre-sales and sales for the service offering, marketing a product that is more than a hard drive on the desktop.

Offering a low price base storage unit with cost options for backup policies, redundancy, monitoring and reporting, much like one may order a coffee, empowers the customer and gives them something they cannot get from a desktop hard drive purchased from a big box retailer.

This holistic approach to Storage as a Service tailors the service to the customer's actual needs; though it may not exactly fit their requirements it will be better than a "one size fits all" offering.

We plan on going above and beyond to stand up a Vending Server where a customer can select and potentially change their storage options, then have it automatically allocated to them, making it easier to order storage.

By binding storage, SQL, Web and monitoring services together with innovative programming we'll create templates for our base storage unit and each of the value added options helping create "custom" storage allocation in a quick and easy way. We expect increased customer interest and lower administrative overhead when this Storage as a Service is a shipping product.

Though not near completion we are on our way, having already received favorable feedback on the few changes that have been announced we look forward to the arduous task of delivering our planned Storage Vending Service.

Institutional Storage at LANL

Re-architecting an organically grown storage infrastructure into a sustainable, scalable, attractive solution

Don Byington

Solutions Architect, LANL

Institutional Storage at LANL

- **Inception**
  - Where did I come from?
  - How did I get here?
- **Service**
  - Can you juggle chain saws?
  - Do you want fries with that?
- **Monitoring**
  - What's going on in here?
  - What happened?
  - All your data are belong to us.
- **Reporting**
  - Did I do that?
  - Can you tell me later?

Storage Service Inception

- **Ad Hoc Birth**
  - Need for single point of storage
  - Home directories
  - Few users
- **Storage Adolescence**
  - Bourne scripts wrapped around awk and sed for management
  - Projects
  - Scope changes without a clear change in definition
  - Charging for space to keep up
  - 7000+ 10Gig home directories
  - 200+ Projects between 50Gig and 5+Tbytes

Service

- **Challenges**
  - The Customer
  - The Hard drive
    - *The base building block*
    - *Consumer vs. Enterprise*
      - *Use profile*
      - *What do you really get for ~5.5 cents per gig?*
  - *Security*
    - *User Access*
    - *Administrator Access*
  - Keeping the lights on
    - *Selling the service*

Service

- **Challenges (more challenges)**
  - Need for vendor agnosticism
    - *Minimum capabilities*
      - NAS (NFS & CIFS)
      - Snapshots
      - Quotas (*File system & User)*
      - Backups
      - Replication (*Data [DR] & Server [HA/DR])*
      - Programming interface
  - *Everyday scripts for any hole; round or dodecagon*
    - Universal set of function for the front-end
      - *Create: Home directory or Project space*
      - `mkHomeResult = makeHome(forUser);`
    - Complexity is in the middleware
      - *Create… on Vendor du jour*
      - `int makeHome(user) { return vendorDuJour::makeHome(user); }`

Service

- **Have it your way (Value added options)**
  - Base storage unit
    - *The hard drive*
  - Add-on for
    - *Snapshot custom schedule*
    - *Backups*
    - *Replication*
  - *Establish preferred option groups*
  - *Discounts*
    - *For using option groups*
    - *For buying lots of space*

Monitoring

- **Checking status**
  - Of what?
    - Server
    - Disks
    - Raid groups
    - Volumes
    - File systems
  - To notify or not to notify
    - On what?
    - Who?
    - How?
- **Use monitoring to collect statistics**
  - While you're up…

More Monitoring

- **Storing statistics**
  - *SQL is your friend*
    - Just throw the data at the DB
    - Update only on change of state
      - *Triggers and stored procedures*
      - *Cut down on duplicate rows*
- **Retrieval**
  - *The need for views and functions*
    - Speedup standard reports
- **Access**
  - *Who sees what?*

Reporting

- **Hello User**
  - Greeting page
    - Home directory
    - Access to projects
  - Drill downs
    - Files
      - Owned
      - Aged

Reporting

- **Scheduled and customizable reports**
  - Personal Use
  - Subordinates Use
  - Projects
    - *Space Use*
    - *Access*
- **Historical data**
  - How much space was used?
  - Who accessed what from where?*

Institutional Storage at LANL

- **Questions?**