Storage Grid Backup & NDMP

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NetApp®

Simplifying Data Management

▸ **Grid Computing**

▸ **Who cares?**

▸ **New problems.**

▸ **Some ideas.**

▶ **"Too Short" Version**

– **1000s of cheap computers**

– **Similar production done by many.**

– **"High point" demands can shift daily.**

▶ **Longer Version**

– **Everything is a computer and we have more and more of them!**

– **Different "rush hours" for different things.**

– **New tricks done to solve old problems.**

– **Can't afford schedule downtime**

– **Everything done in "bulk"**

Storage Grid Picture

IP Network/SAN
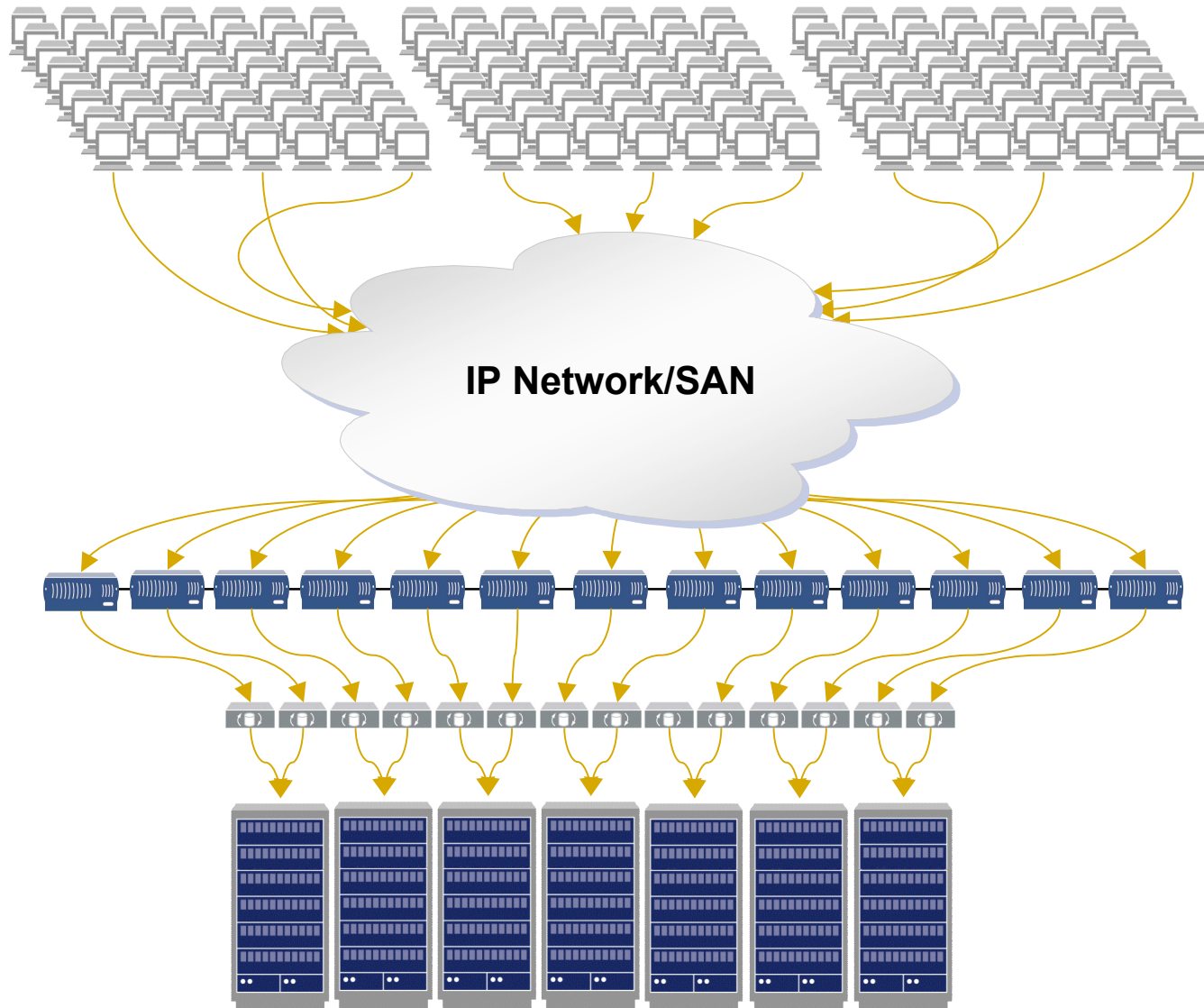
▶ **Replace "Grid" with "Farm"**

▶ **"Product" with hundreds of disks together**

▶ **Examples**

- **Andrew File System (Carnegie Mellon University)**
- **Spinnaker Networks**
- **Panasas**
- **Network Appliance (based on Spinnaker)**

▶ **Storage Grooming**

- **Volumes separated from disks**
- **Lots of volumes not 1 or 2**
- **Oversubscribing disk space**
- **Non-Disruptive Volume movement**

▶ **Non-Disruptive Head Replacement**

- **Add a new head, move volumes**

▶ **Single System Image**

- **One "command" to bind them all!**

▶ **Add CPU, Network, Disks & Bandwidth Easily**

▸ **Instead of backing up /vol/vol0 and /vol/vol1**

▸ **We now have 400 to 1000 or more volumes**

  – **Do users really want to specify them all?**

  – **What happens with the 1 or 2 that fail out of the 1000? Do all 1000 get retried?**

  – **How does different backup service get implemented?**

  – **If a storage pool (aggregate) must be restored, are the volumes required spread out through out the tape set or collated together in the smallest number of tapes?**

▸ **Why does a volume move?**
  – **The ethernet connection fails.**
  – **The NAS head fails.**
  – **The SAN connection fails.**
  – **The administrator moves hot volumes off of hot disks.**
  – **The adminstrator moves small volumes off of low space disks.**

▸ **Backup sees a volume disappear on host A and a volume appear on host B**
  – **Middle of the week full backup?**

- ▸ **20,000 volumes on 20 NAS heads**

- ▸ **Administrator talks about volumes like "vol0"**

- ▸ **Users talk about paths like "/user/ern"**

- ▸ **How do you find where to look in the DMA for "/user/ern/space/work/p4/src/fred.cc"?**

root (/)

user (user/)

u.ern (ern/)

s.ern (space/)

root

s.ern

u.ern

user
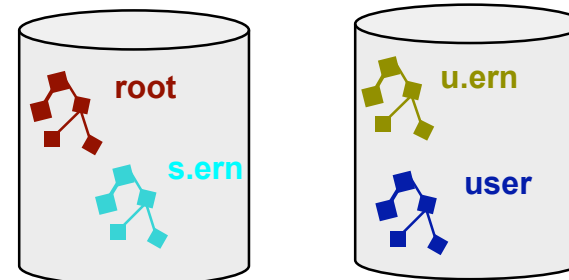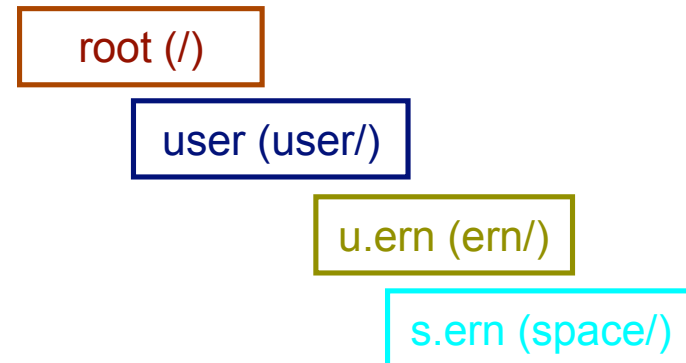
- **NDMP support of Unix-like "mount table"**
  – DMAs can use associate pathnames with volumes?

- **Add signature to volumes to detect volume moves.**

- **Augment NDMP_GET_FS_INFO to provide standard attributes for disk storage location and others to aid in sorting.**

- **Augment DMA file system selection for backups.**

- **Other ideas?**