

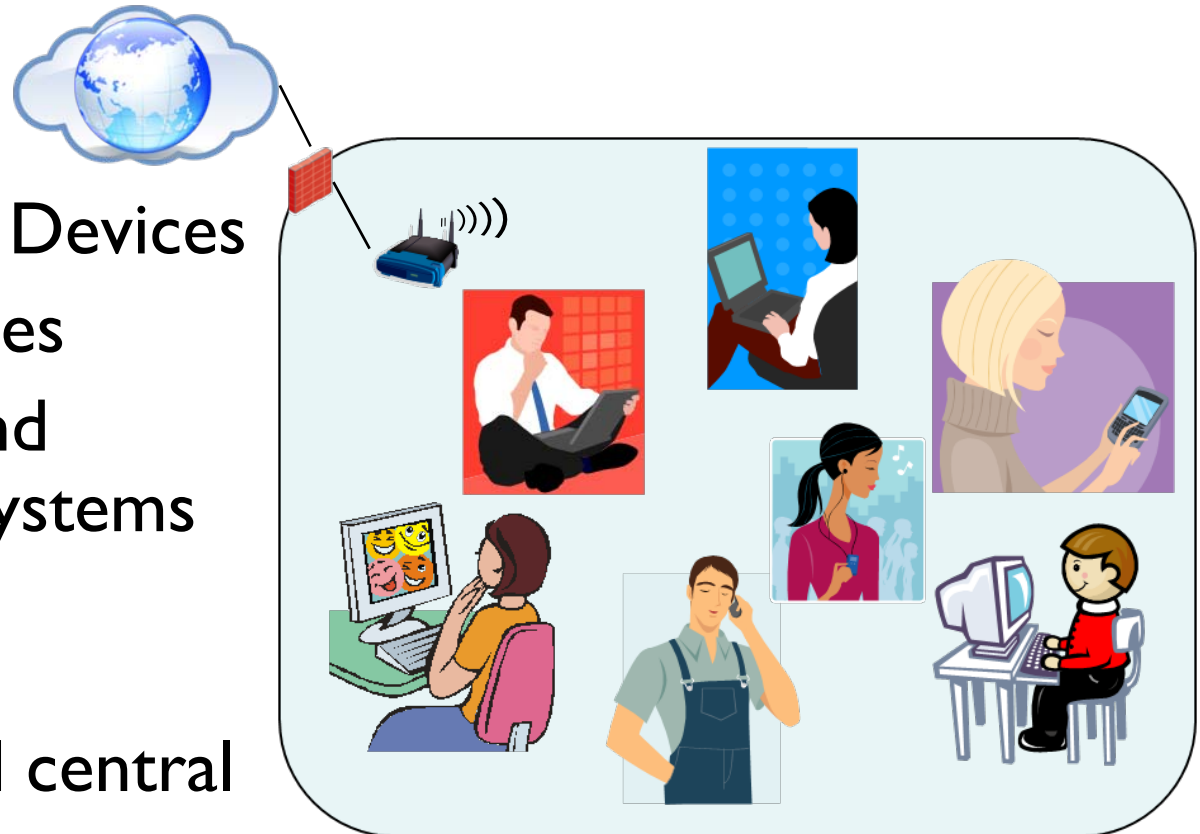
Orchestrating Open Source Components for Home SANs

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- ❑ Networked Storage Requirements for Home
- ❑ Options and Approaches
- ❑ Open Source Components
- ❑ Orchestration Considerations
- ❑ Challenges

Home Compute and Communication Environment

- ❑ Desktop PCs
- ❑ Laptop PCs
- ❑ Netbook PCs
- ❑ Handheld Mobile Devices
- ❑ Multimedia Devices
- ❑ Many compute and communication systems with a lot of data
- ❑ Huge need for consolidation and central management



- ❑ Share data among compute and communication devices
- ❑ Share storage devices among compute and communication devices
 - ❑ USB disks (pen drives, USB hard disks)
 - ❑ CD/DVD drives
 - ❑ Device attached hard disks
- ❑ Access management
- ❑ Connectivity

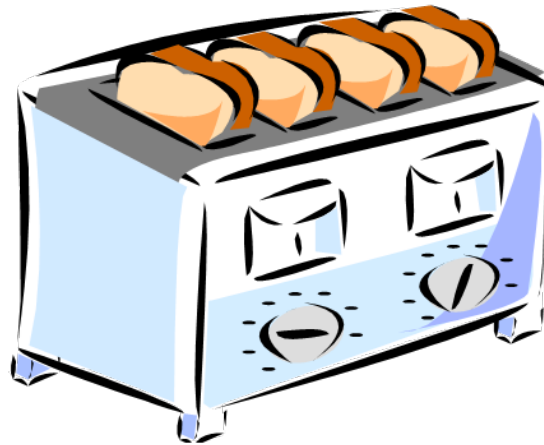


Features

- ❑ Data Repository
 - ❑ Compute and communication device backup
- ❑ Storage Tiers
 - ❑ Solid state disk
 - ❑ High capacity hard disk
 - ❑ Cloud storage
- ❑ Data protection, backup to secondary device and cloud
- ❑ Expandability
- ❑ Recovery Point more important than Recovery Time
 - ❑ High Availability NOT a requirement
- ❑ Performance only moderately important



- ❑ Easy to understand and intuitive to use
- ❑ Default options should suffice common usage
- ❑ Should work well with removable devices



Network Attached Storage

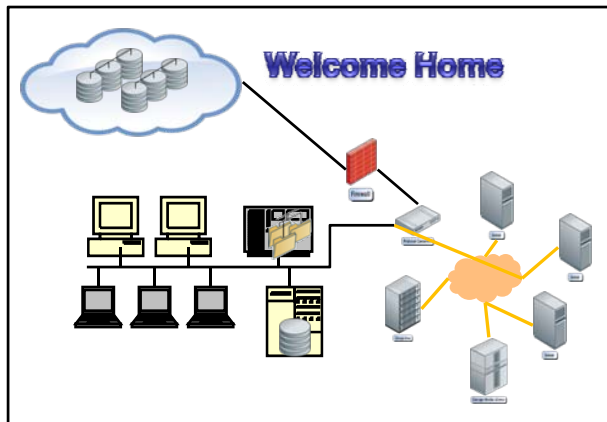
- ❑ File and underlying storage infrastructure sharing
- ❑ File (folder/share) level access control
- ❑ IP based file sharing protocols

Cloud Storage

- ❑ Backup + much more
- ❑ Data/file sharing over internet
- ❑ High capacity data repository
- ❑ Internet APIs

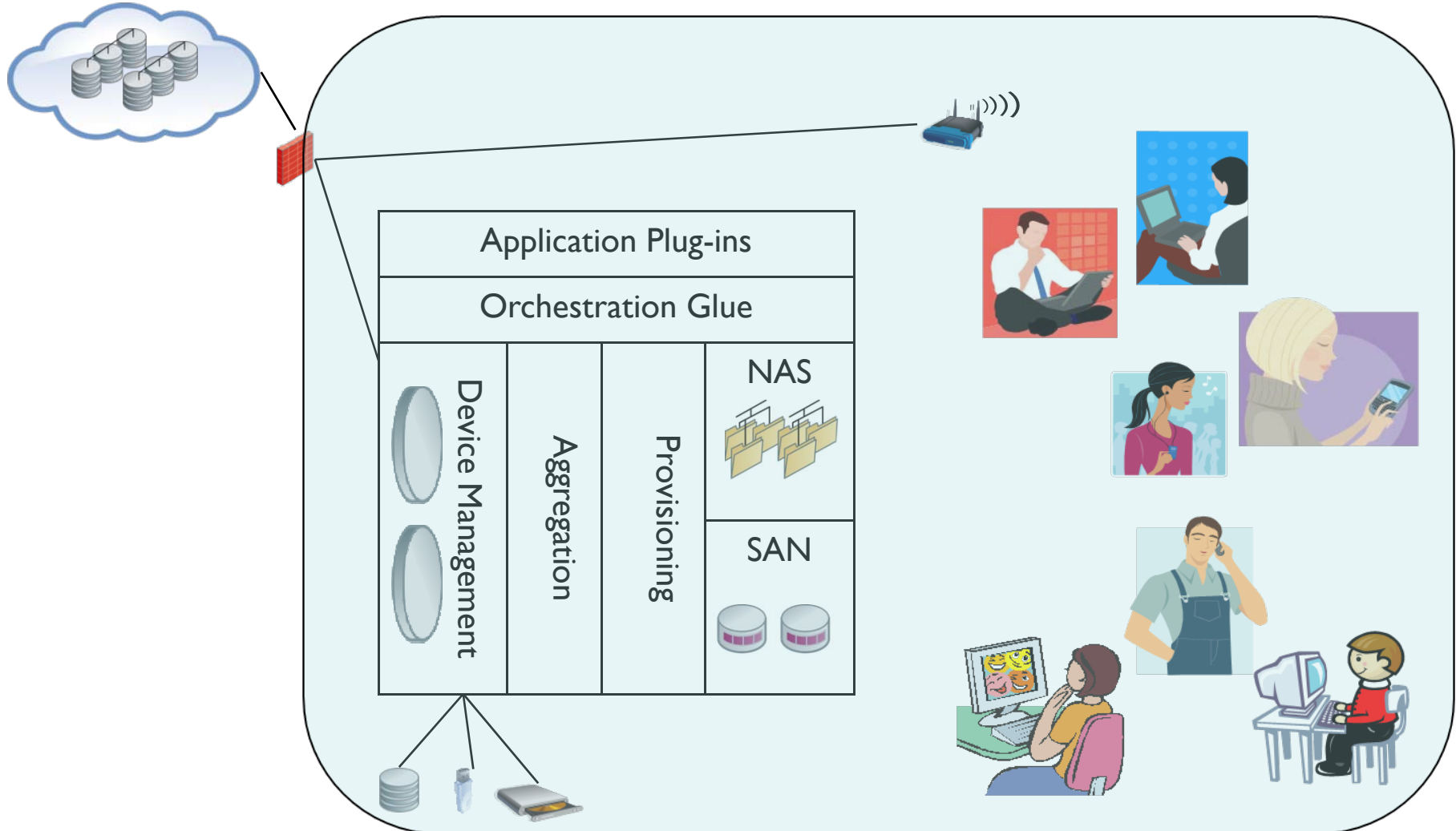
Storage Area Network

- ❑ Raw device (block) access
- ❑ Storage infrastructure sharing
- ❑ Pass-through access to external devices such as USB drives, CD/DVD drives etc.
- ❑ Device level access control based on computer system
- ❑ Enabled by iSCSI technology



SAN, NAS and Cloud storage – A Home needs it all!

Home Networked Storage Environment



Network Based

- ❑ Network router as the intelligence and gatekeeper of the home IT infrastructure
- ❑ May or may not have native storage
- ❑ Device interfaces such as USB
- ❑ Ideal for home and low end SMBs



Storage Appliance

- ❑ A low-end storage array based on industry standard server
- ❑ Has native storage
- ❑ Device interfaces such as USB
- ❑ Suitable for SMBs and high-end tech savvy homes



- ❑ Linux raw device access
 - ❑ /dev/sd_x
- ❑ Software RAID – MD
 - ❑ Disk redundancy
- ❑ Logical Volume Manager - LVM
 - ❑ Aggregation
 - ❑ Provisioning
- ❑ iSCSI Enterprise Target – iET
 - ❑ Device and storage presentation



Orchestration considerations: Software RAID - MD

Relevant Features

- ❑ Disk redundancy with RAID levels 1, 4, 5, 6, 10 etc.
- ❑ Dynamic resizing, hot replacement, hot spares – many sophisticated and complex features

Network Based

- ❑ Focus on Mirroring or RAID – 1
- ❑ Easy to understand
- ❑ More granular redundancy not required
- ❑ Ability to move disks easily is crucial

Storage Appliance

- ❑ All RAID levels provided by MD
- ❑ Features such as hot spares, remove and replace drives
- ❑ Dynamic expansion and changes



Orchestration considerations: Logical Volume Manager - LVM

Relevant Features

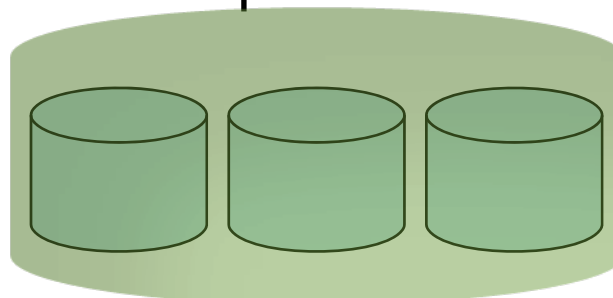
- ❑ Aggregate raw disk devices as well as md devices
- ❑ Provision required sizes of logical volumes
- ❑ Striping, mirroring and concatenation
- ❑ Dynamic expansion, snapshots etc.

Network Based

- ❑ Tight coupling with md for simplicity with either raw or value added shared disks
- ❑ Only concatenation
- ❑ Dynamic expansion
- ❑ Snapshots only for applications such as backup

Storage Appliance

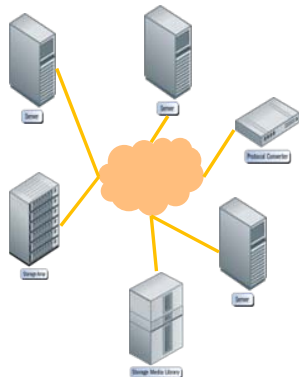
- ❑ Allowing user the choice of coupling with md
- ❑ Concatenation and striping
- ❑ Dynamic expansion
- ❑ Snapshots



Orchestration considerations: iSCSI Enterprise Target - iET

Relevant Features

- ❑ Present block devices and file based raw data as iSCSI LUs
- ❑ Target level access control
- ❑ CHAP Authentication
- ❑ Dynamic Target and LUN creation



Network Based

- ❑ Block device (pass through or LV) presentation
- ❑ Only one LUN (0) per target to ensure simplicity
- ❑ Integration with DHCP/DNS to know potential hosts
- ❑ Target level access control
- ❑ Dynamic Target creation

Storage Appliance

- ❑ Block device (pass through or LV) presentation
- ❑ Target and LUN hierarchy
- ❑ Integration with DHCP/DNS to know potential hosts
- ❑ Target level access control
- ❑ CHAP Authentication
- ❑ Dynamic Target and LUN creation

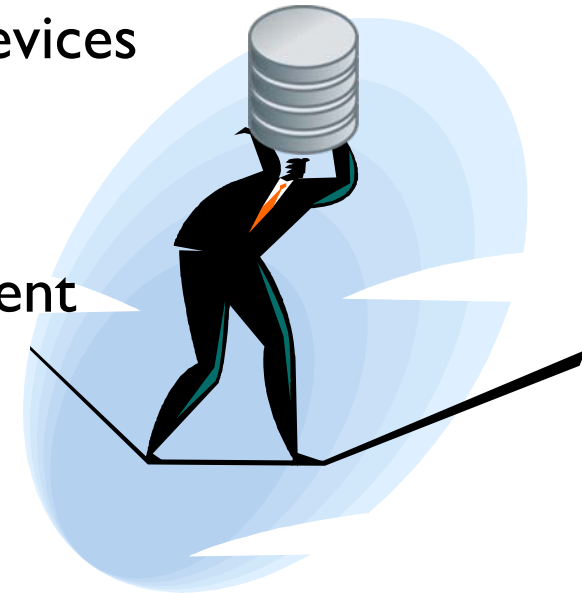
Orchestration Glue and User Interface

- ❑ Essential but missing parts
- ❑ Orchestration Glue
 - ❑ Programmatic logic required for systematic coordination of raw devices, MD, LVM and iET
- ❑ Web UI
 - ❑ Simple and Intuitive
 - ❑ Must provide easy to understand big picture
 - ❑ Should differentiate between Network Based and Storage Approaches in terms of details and sophistication



Challenges and TBDs

- ❑ Simple language that is appropriate for intended audience
- ❑ iSCSI Initiators for hand held and mobile devices
- ❑ More thought to iSCSI based plug-n-play
- ❑ Better pass-through device support
- ❑ Plug-ins requiring no direct client involvement
 - ❑ Cloud backup
 - ❑ Cloud storage applications
 - ❑ Storage Tier applications
- ❑ Glue logic to coordinate among SAN, NAS and Cloud application



Technology Options

- ❑ FreeNAS
- ❑ OpenSolaris



- ❑ Homes need SAN, NAS and Cloud Storage
- ❑ IP based protocols and open source software components provide the vehicle and functionality
- ❑ Orchestrating glue, an intuitive Web UI and most importantly simple language that can be easily understood by a layperson are the main challenges



Thanks!

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