Draft Strategic Plan for Server Consolidation and Improvement

Our current systems are stable, dependable, and backed up, however we can improve the availability of our databases.

Needs *(Prioritized):*

1. Redundancy for databases in case of hardware failure.
Strength: Current structure has redundant hard drives (RAID 1 mirror), daily and weekly backups.
Hardware redundancy includes dual CPU's, redundant power supplies, dual ethernet NICs
Weakness: Failure of server components including mainboard/backplane could cause 12-hr. outage.

2. Speed improvements for data delivery.
Data reads are quicker with a RAID 10 far configuration (4 hard drives).

3. Replace old equipment by consolidating hardware and automating backup.

Solutions:

1. Redundancy insures that database delivery is only interrupted if there is a sustained power failure.

Option 1: Clustering Active/Active MS Servers, which is an expensive solution that provides no complimentary improvements. Our current Microsoft data servers are licensed for clustering.

Option 2: Clustering with Vmware's vSphere 5 is cost-effective, provides additional speed, backup and consolidation benefits. License covers 3 hosts.

Recommended solution: Option 2
Purchase of Vmware vSphere 5 with shared Storage Appliance or Network-Attached Storage.

Vmware vSphere 5	$4,495	3 hosts x 2 processors each, One-year of support
Netgear ReadyNAS	$1,295	4 x 2Tb drives, RAID 10 capable

Benefits of the vSphere approach:

Backup: vMotion allows virtual servers to be transported, vSphere 5 allows transfer over TCP/IP.

Availability: High-Availability option for immediate failover may add some I/O overhead.

Consolidation: Several servers can be consolidated onto one hardware base using vSphere.

Hardware costs: VLANs and Virtual switching can reduce hardware costs.

Scalability: Simple upgrade path from NAS to SAN.

Solutions *(continued):*

This item expands on the Network-Attached Storage assessment in Solution #1.

2. Speed improvements fo data delivery can be generated in three areas of the network

A. Switching - We are already strong in this area, but may see improvements with VLAN's.

B. Adapters - Upgrading network cards (NICs), where necessary, to use Gigabit speeds.

C. RAID structure – Databases save time when data is striped, and reads are faster than writes.

Option 1: Migrate to a Fibre-channel SAN.
Limitless scalability is excessive for our size organization, costs outweigh benefits.
Speeds are fast to server, but speed improvements are minimized by network latency.

Option 2: Migrate to Network-Attached Storage
RAID 10 structure improves speed while maintaining reliability. Cost is reasonable.
Supports vSphere for redundancy and availability.

Option 3: Create new RAID for current server
Lowest price for RAID 10 improvements, but does not leverage vSphere for redundancy.

Recommended Solution: Option 2

Purchase Network-Attached Storage device, leverage vSphere's data redundancy features.

NAS vs SAN: NAS is more appropriate for our size and our scalability needs.

Netgear ReadyNAS 4420	$1,295	*(see previous page)*	8 Tb of storage, TCP/IP

Benefits of Network-Attached Storage (NAS):

Dependability: Hardware architecture reduces maintenance.

Sharing storage: NAS consolidates virtual servers and virtual machine backup.

Configuration: NAS is much easier to configure than SAN, Windows domain compatible.

vSphere integration: vMotion and High Availability can be implemented with NAS.

Integrated RAID controller: Native RAID 10 available, hot-swappable drives.

Solutions *(continued):*

This item expands on the vSphere assessment in Solution #1.

3. Old equipment can be replace with minimal hardware purchasing, by repurposing current equipment that is underutilized or aging.

Recommendation: Server consolidation eliminates multiple physical servers by combining the servers as virtual machines on one physical server and makes the servers easier to manage by providing one management interface for all of the virtual servers.

Consolidate domain controllers, and virtualize net functions like Nagios and Envisionware, possibly utilizing one of the current domain controllers, reconfigured with VMWare ESXi.

Assess and improve storage capacity and RAM on consolidated VMWare servers.

Reconfigure RAID on old Koha server for four hard drives, migrate critical VM's.

Designate three hosts for vSphere consolidation. Establish backup and availability plans.

Designate virtual networks (VLANs) where there are transmission speed advantages.

Designate virtual switching in vSphere where there are transmission speed advantages.

Overall Network Assessment and Recommendations

The current state of the network is excellent. We have two highly-capable rack servers, and multiple other high-performance servers running our critical network functions. All of our servers have existing backup, although not all backups are current. Critical systems are backed up daily and weekly. Switches are smart, meshed, robust and straightforward. Network architecture is sensible and redundant.

Recommendations: Hardware redundancy and backups can be improved by moving to vSphere 5. Ethernet trunking (port bonding) can speed up transmission for specific, critical interfaces. Network-Attached Storage will enable advanced vSphere functions. Improving hard drive arrays (RAIDs) will speed up data delivery.