

Background:

Idaho Housing and Finance Association (IHFA) computer systems and data center servers consisted of 12 tower computers configured with direct attached storage and Microsoft operating systems. Separate servers were dedicated for each of the main processes of IHFA which include Microsoft Exchange, Onbase Imaging, HDS PBCA contract management, and GFI mail archive. The main computer system consisted of an IBM iSeries minicomputer that runs the accounting, rental assistance, and loan servicing software. The IBM iSeries added a high level of security and stability to already decent computer data center. A “warm site” disaster recovery solution was located in one of the branch offices and connected to the corporate office through an MPLS line. In addition, IHFA contracted to a company to oversee all IBM iSeries disaster recovery needs. IHFA’s IT Department regularly upgraded its servers on the three year cycle to stay current with technology. The server systems provided IHFA with all the tools to conduct its business well.

However, IHFA is an organization that prides itself on its innovation and desire to be the best. Instead of just upgrading the server systems as usual, IHFA decided to build a state-of-the-art data center. Paint a picture with a wide brush and redesign the data center with the latest technology. In order to tackle this project, IHFA convened the IT planning committee, made up of IHFA leadership and they collectively decided to make this project the highest priority for IT. Along with the Executive Director they gave full support and endorsed the project by giving it its full backing.

Summary

Taking a holistic look at the data center, IHFA embarked on a project to convert the server room to a state-of-the-art data center at a tier 4 level. Tier 4 means:

- Facilities guaranteed at 99.995% availability with fault-tolerant site infrastructure and servers.
- Multiple independent distribution paths for IT equipment.
- Dual-powered and fully capable with the topology of the site’s architecture.

The project was initiated to implement best practices for its mission-critical servers. IHFA decided it could achieve great improvement by adapting core infrastructure best practices for its mission critical workloads. Practices such as:

- Server virtualization,
- implementing storage area network (SAN) technology,
- building redundant and fail safe systems,
- implementing 64-bit technology,
- upgrading software to current levels,
- reducing power consumption (green technology),
- creating a “Hot Site” for disaster recovery and replications,
- and implementing scalable disk space capacities to cover the ever increasing demand.

Challenges and Excitement

IHFA had a few challenges on the project. IHFA servers were constantly busy with daily operations and nightly processes, including backup, which effectively made IHFA a 24 X 7 shop. How do you replace all computer systems with minimal downtime? A lot of work had to be done but, excitement was everywhere because it’s every computer persons dream to build the best computer systems with today’s technology.

Getting Started

A three person project team was formed to begin planning and implementation. The team was made up of a newly employed IT Manager to be the project manager. He would plan the data center and purchase the equipment. A network administrator was assigned to install and configure the Microsoft Servers and software. And a PC support specialist was assigned to upgrade the IBM iSeries computer and backup systems.

The first step was to design a network system that would exceed all of IHFA's current needs for at least five years. First, IHFA wanted to increase disk space and processing power by a factor of ten. Second, IHFA wanted a disaster recovery "hot site" with replication and a detailed disaster recovery plan. And finally, IHFA wanted to increase bandwidth, add redundancy, and maintain the highest level of security.

Step 1: Disaster Recovery "Hot Site"

The team decided to start with the disaster recovery hot site to begin the project because this would give the team a chance to design an exact duplicate of the future data center prior to taking on the main site.

IHFA contracted with a level 5, secure, environmentally controlled, carrier-class co-location facility to be their disaster recovery "hot site." The new facility was connected directly to a large West Coast interconnect and had the ability connect to IHFA's corporate site. Secure Cabinets were purchased and configured with new rack-mounted servers utilizing virtualization and redundancy. An IBM iSeries was upgraded with the latest operating system, setup with replication, and installed at the hot site facility. An additional MPLS circuit was setup and connected to corporate for data transfer and replication. Remote desktop virtualization was configured to allow remote access to all employees in the event of a disaster. A certified continuance of operations plan (COOP) was developed along with a disaster recovery plan.

Step 2: Local and Wide Area Network

The next step was to completely change out the local and wide area network to increase bandwidth, increase throughput, and put in logical segments. By tackling this project, the project team found huge savings by moving to a new telecom provider. The cost savings alone was so significant that it paid for the disaster recovery "hot site" and telecom charges. New HP layer 3 switches were purchased and virtual LANs (VLANS) were configured to open up and expand the network segment.

Step 3: Replace the main computer

Most of the IHFA systems were custom applications developed over the years. The IBM iSeries applications are the core systems for IHFA's accounting, housing rental assistance, and mortgage services. The IBM iSeries was replaced with the latest rack mounted model, increasing performance and disk capacity by a factor of seven.

Step 4: Upgrade all systems

Step four was to upgrade all network appliances by centralizing them in the new, secure, data cabinet installed in the data center. The latest rack mounted models were purchased for the firewall, spam filter, web filter, and SSL VPN connectivity. Next, three Dell servers were purchased to act as a three way redundant virtual array to house all twelve current servers. The Dell PowerEdge R610 servers were IHFA's optimal server for virtualization. The servers have built-in hypervisor technology, which allows for virtualization. VMWare was IHFA's initial choice, but the cost prohibited any future expansion, so the organization decided upon Microsoft Hyper-V solution. Three servers were purchased with dual 6-core processors and 96 gigabyte of memory each. These blazing fast servers give IHFA 25 to 35 time's faster speed than the older servers. The new servers were upgraded to Microsoft 2008 Enterprise 64-bit and Exchange 2010. As a result, servers speed ratios went from 600 to 15,000.

For storage, IHFA looked at many intelligent Storage Area Networks (SANs) and decided on the Dell EqualLogic series with 15K SAS drives. For cost considerations IHFA configured iSCSI adapters instead of fiber channel and increased throughput to 8 Mbps. A high availability storage cluster was configured to span across the servers and act as a three way failover.

A new disk to disk backup solution was purchased and configured with a Dell PowerVault DL system utilizing de-duplication and a LTO 4 tapes drives. The data center is protected by Eaton's whole room uninterruptable power systems (UPS) Ferrups giving 20 hours of protection.

An environmentally friendly Inergen fire suppression gas system protects the data center. Inergen is blend of Nitrogen, Carbon Dioxide, and Argon and is stored in cylinders outside of the data center. The Inergen system is like no other modern fire suppression system in use today. In the event of a fire, Inergen lowers the oxygen content in the data center to the point to stop combustion, but not to suffocate human life.

Why should this entry deserve merit?

This remarkable feat to convert a good server room to a state-of-the-art level 4 data center was accomplished in the short time frame of six months and was handled by only three IHFA IT team members who still completed their daily responsibilities. The total cost of the project was estimated at \$200K. This project was handled like a major project with assessments, recommendations, project scope, objectives and approvals. The project had complete buy-in and support by the Executive Director, IHFA Executive leadership, and the IT Planning Committee. The end result is a data center and "hot site" that is not only state-of-the-art, but allows the IT staff to be proud of going above and beyond the norm.

Idaho Housing and Finance Data Center

Before



After

