

## **UCB Windows 2000 Domain Controller Hardware Plan**

Many factors were taken into consideration in the development of this plan including: domain controller load from authentication and replication, networking requirements, storage requirements, physical security, disaster situations (loss of power, data, hardware, and physical site), the distributed domain controller model, and administration requirements.

We have decided on using three smaller servers. This is because of an expected low demand during the first two years. These machines would be replaced with larger servers in two years and then most likely placed on a three-year replacement cycle. The server load and network traffic should be monitored to determine if this plan meets the campus needs. This plan should be reevaluated in two years upon the purchasing of the first replacement upgrade.

### **Networking Requirements**

Based on information regarding replication from Microsoft and our experience with authentication requests to our existing KDC, we are able to judge our DC networking needs. Based on our existing kerberos principles and the size and complexity of our campus, we can estimate the AD will contain about 35,000 user objects, 3,000 computer objects, 200 OUs, and 500 groups during the first two years. AD replication only occurs when changes are made to objects. The majority of our objects (user objects) will remain static once created. When each incoming class is added (~5,000 students) 19Mbytes of replication will occur. Each individual object created by administrators (computers, groups, etc.) requires 11Kbytes of replication. Replicating the entire AD (in the case of a new, or rebuilt, DC) would require about 300Mbytes of replication data.

We believe that the most appropriate network connection for these DCs is a switched, full-duplex, copper 100Mbit connection. This connection should be located as directly to central networking components as possible to best serve the distributed clients.

### **Storage Requirements**

The storage requirements of the DCs will be relatively minimal. The storage space required will be about 1Gbyte (600Mbytes for OS, 300Mbytes for AD, 50Mbytes logs). The speed of the storage will be fairly important. For this reason we have selected 10,000RPM Ultra160 SCSI drives in a RAID 5 array with a PERC2/3 RAID controller with 64Mbytes cache. This should supply us with the required disk speed and failure recovery.

## **Placement of Domain Controllers**

There are several factors in the placement of domain controllers including: security, network connectivity, and accessibility for maintenance. It is important to have at least two separate buildings with DCs for redundancy during a building disaster. We have identified three primary locations for placement of the domain controllers on the UCB campus. First, is the Telecommunications building. This is a centrally located building directly on the campus network backbone. It houses ITS support staff and contains a secure environment to house the server. Second, is the Computing Center on east campus, a building also directly on the campus network backbone. This facility houses ITS support staff (including the NDOS group) and has a secure environment to house the server. Third, is the networking closet located in Engineering OT-02. This area is a secure sight directly on the campus networking backbone.

## **Hardware and Budget Outlines**

We have chosen Dell PowerEdge servers for our domain controllers based on numerous positive experiences with the hardware in the past. These servers are well priced, reliable, and familiar to ITS staff. Below is the configurations and cost of the servers.

Rackmount server (for Eng OT-02) – Dell PowerEdge 2450 ~ \$6,300

- 1x 667MHz Pentium IIIe processor
- 512MB RAM – SDRAM (2DIMMs)
- PERC 3si RAID controller w/ 64MB cache
- 4 bay HD backplane
- 3x 9GB 10,000RPM LVD SCSI hard drives (RAID 5)
- Intel Pro 100 Plus NIC
- Redundant power supply
- Keyboard, mouse, 15” monitor, floppy, CD-ROM
- Three year, next day on-site warranty

Tower servers (for T-Comm and the CC) – Dell PowerEdge 2400 ~ 2x \$6,000

- 1x 667MHz Pentium IIIe processor
- 512MB RAM – SDRAM (2DIMMs)
- PERC 2 RAID controller w/ 64MB cache
- 6 bay HD backplane
- 3x 9GB 10,000RPM LVD SCSI hard drives (RAID 5)
- Intel Pro 100 Plus NIC
- Redundant power supply
- Keyboard, mouse, 15” monitor, floppy, CD-ROM
- Three year, next day on-site warranty

**Additional Initial Costs:**

Operating System for DCs

Windows 2000 Server licenses= 3x \$100

UPS units for each server

APC Smart UPS 1400RM = 1x \$650

APC Smart UPS 1400= 2x \$650

Tape backup hardware and software (including backup WS and drive)

Hardware and software needs included in MSG backup project

Networking installations (100Mbit jack for each server)

Jack installs = 3x \$750

**Continuing Costs:**

Networking monthly fees

Monthly jack fees = 3x \$5/month

Periodic hardware replacement/upgrades (see proposed 5year plan below)

Software upgrades (ie. backup and management software)

OS upgrades

General supplies (backup tapes)

**Five Year Plan**

**12 Months:**

Evaluate the need for upgrades to existing hardware (second processor, more memory, more drive space). Possible upgrades totaling \$1500 per server.

**24 Months:**

Full replacement of DC server hardware. Estimated cost of \$10,000 per server.

Evaluate DC model – is there need for more distribution of servers?

Evaluate next replacement cycle timing based on usage and projected growth.

Possible networking upgrade (gigabit copper or fiber?). Estimated cost \$1000 per server.

Possible OS upgrade. Estimated cost \$200 per server.

**36 Months:**

Upgrade of backup system, possibly in conjunction with MSG backup system.

**48 Months:**

Possible OS upgrade. Estimated cost \$200 per server.

**60 Months:**

Full replacement of DC server hardware. Estimated cost of \$10,000 per server.