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1. Introduction

NBA3.5 (.5 Release of Third Generation Network Boot Agent) is a reliable OS and Application delivery system that addresses the problems in the administration of a traditional network of PCs. Utilizing the server hard disk drive (HDD) as the virtual HDD for OS and application storage for client stations, no local persistent storage is required in client workstations.

NBA client workstations boot up by downloading and launching the Windows 98SE image from the the corresponding virtual drive in the NBA server. After booting, applications software can be transferred from the NBA server on a demand basis. In addition to OS and application storage, the virtual drive can also serve as the temporary storage for the users.

Machine configuration and software installation is done once and can be used in a number of workstations, saving an enormous amount of IT staff efforts.

Deployment of new applications is as simple as updating an architecture database. New workstations can be added in minutes by creating additional virtual drives and copying the required new client images. As software can be tested vigorously for reliability and compatibility before installation, system crashes due to incompatible software are reduced sharply.

With the optional AMS server, a Broadband Storage Server from ALD, individual users can store their data permanently. Data backup can be done centrally. This scheme practically eliminates the number one failure source in PCs - the breakdown of local hard disk drives and forges systematic data backup and protection at a level not possible with individual PCs.

In the minimum configuration, one NBA server and a number of NBA client stations, together with a Fast Ethernet switch, can form a reliable and robust Intranet. The addition of a gateway (such as the AMS server with integrated gateway enabled) and the Internet connection will bring the world of Internet to the NBA network. Since there is no local execution in the server hard disk drive, virus infection is virtually impossible. In the rare case of virus infection, a simple reboot will restore the virus-free condition.

2. Hardware Specifications

2.1 NBA 9800 Server System

- Intel 370 CPU
- Intel 810 core logic
- Intel 82559 10/100 Ethernet NIC
- 256/512 MB RAM
- drive bay for one ATA 66 IDE disk drive

2.2 NBA 1200 Client Workstation

- Intel 370 P3/Celeron CPU
- VIA C3 socket 370 CPU
- Intel 810 core logic with integrated AGP
- Realtek 8139 10/100 Ethernet NIC
- 128/256 MB RAM
- AC 97 audio (Mic-in, headphone)
- Dual USB 1.1 ports
- Serial/parallel ports
- PS/2 keyboard and mouse ports

2.3 NBA1200M (client stations with built-in MIDI interface)

- Intel 370 P3/Celeron or VIA C3 socket 370 CPU
- Intel 810 core logic with integrated AGP
- MIDI-IN, MIDI-OUT and MIDI-THRU
- Realtek 8139 10/100 Ethernet NIC
- 128/256 MB RAM
- AC 97 audio (Mic-in, Line-in, headphone)
- Dual USB 1.1 ports
- Serial/parallel ports
- PS/2 keyboard and mouse ports

2.4 NBA Installer Station (NBA client station dedicated for software installation)

- Intel 370 P3/Celeron CPU
- Intel 810 core logic with integrated AGP
- Realtek 8139 10/100 Ethernet NIC
- 64/128/256 MB RAM
- AC 97 audio (Mic-in, headphone)
- Serial/parallel ports
- PS/2 keyboard and mouse ports
- Internal 3.5 inch hard disk drive mount
- Rear panel IDE interface board for connecting to an external IDE DVD or CD ROM drive

2.5 NBA server and client can also be implemented with Intel P4 to deliver even higher system performance,

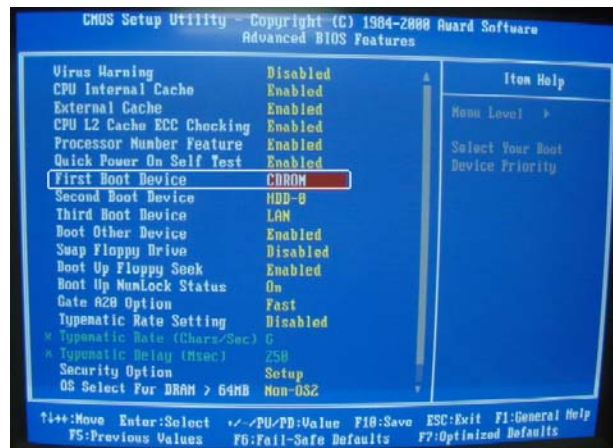
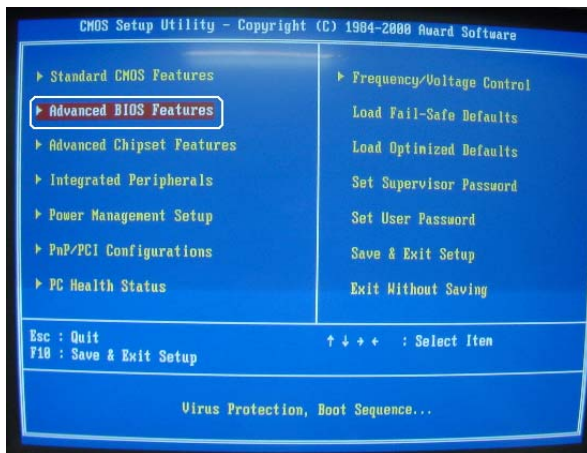
please contact your vendor for details.

3. System Setup

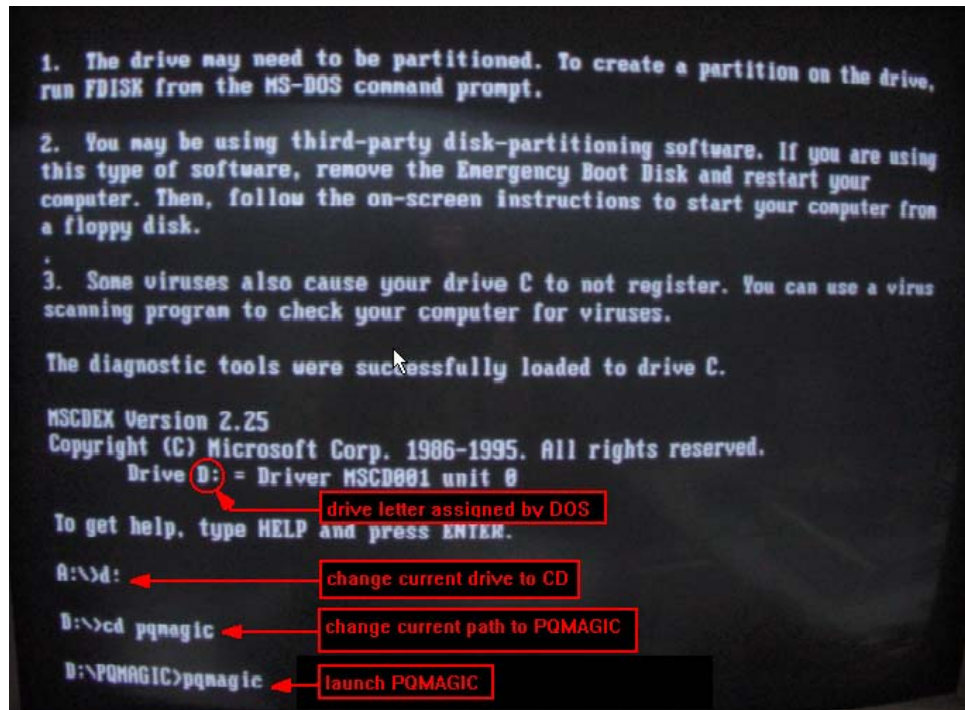
- 3.1 An ordinary NBA network comprises:
- NBA server
 - NBA installer station
 - a number of NBA client stations
- 3.2 Summary of system setup
- preparation of NBA installer station
 - preparation of NBA server
 - preparation of virtual drives for client stations
- 3.3 Throughout this document, it is assumed that an NBA server, an NBA installer station and a number of NBA client stations are connected in a 100 Mbps switched LAN environment.

4. NBA Installer Preparation

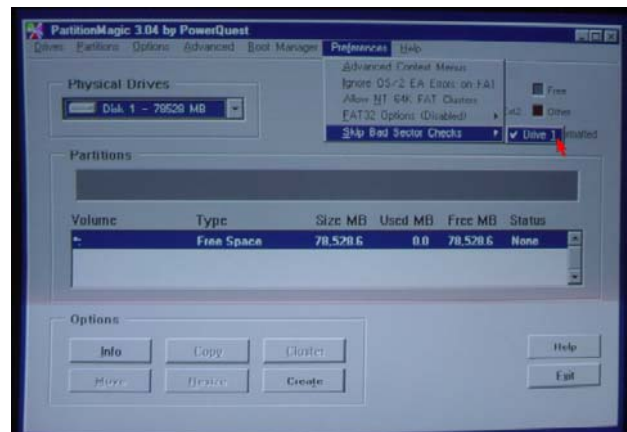
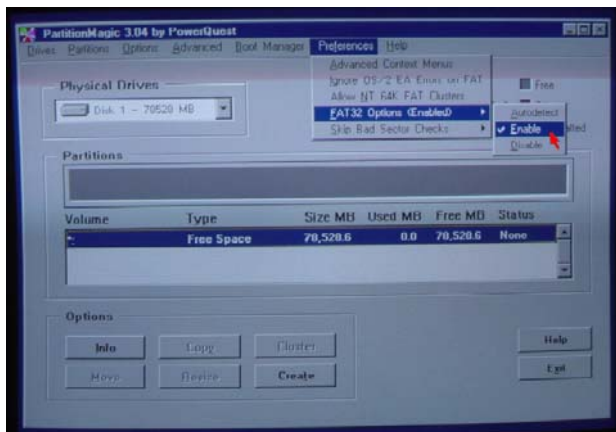
- 4.1 The NBA1200 Installer Station with the Reference Hard Disk Drive installed is the base station for software installation. Software installed in the Installer will be copied to the Golden Image in the NBA1200 Server for sharing by all the NBA clients.
- 4.2 Please follow below steps to prepare the NBA 1200 installer system:
- 4.2.1 open the NBA1200 Installer Station and attach an IDE interface hard disk drive
 - 4.2.2 close the case
 - 4.2.3 attach an IDE interface CD ROM/DVD ROM through the rear panel
 - 4.2.4 go to BIOS setup by pressing "DEL" when the machine is powering up
 - 4.2.5 go to the "Advanced BIOS Feature" page and select "CD ROM" in "First Boot Device" option



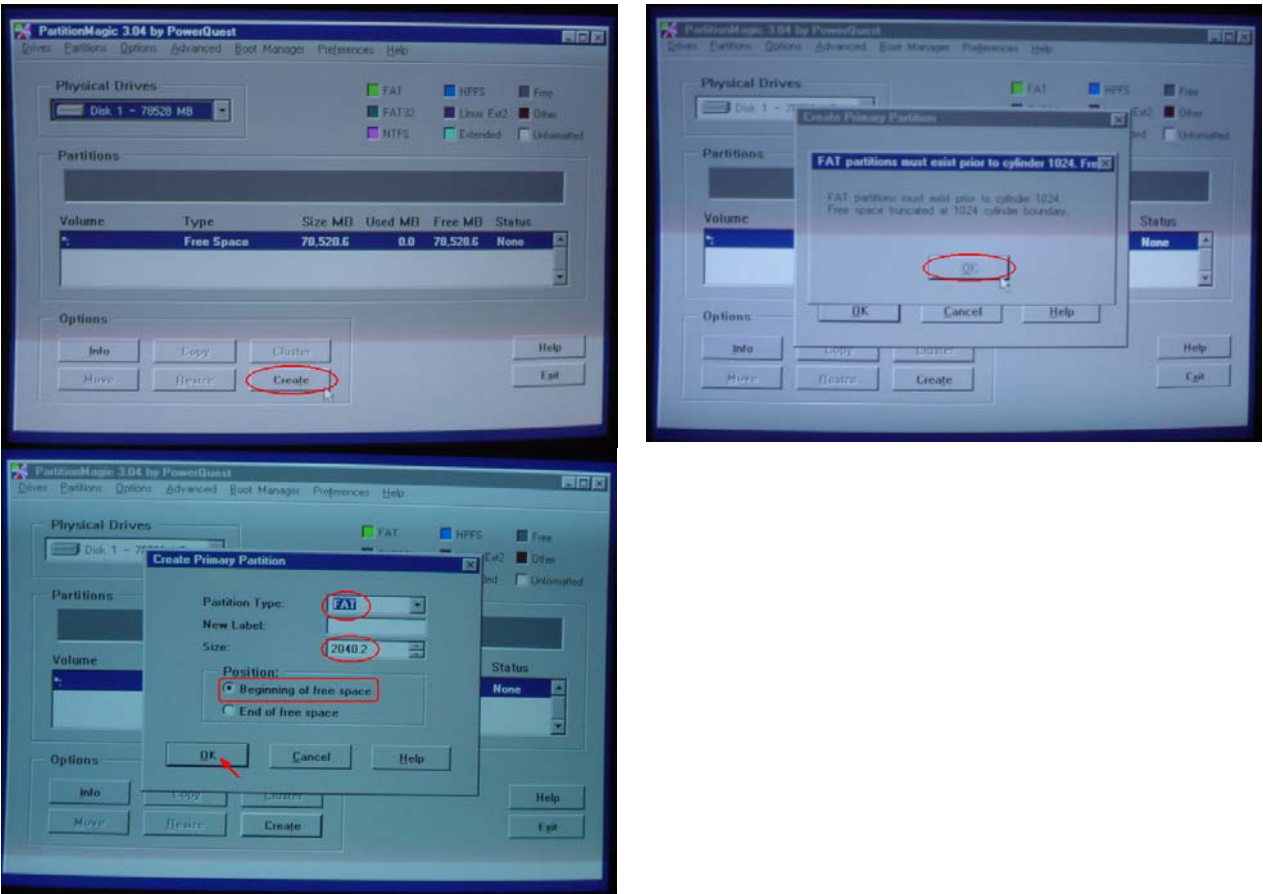
- 4.2.6 insert the NBA System CD to boot up the machine
- 4.2.7 restore Windows 98SE to the hard disk drive (hereafter called the "Reference Harddisk") with the NBA System **WIN98** CD:
- 4.2.8 launch "PQMAGIC.EXE" from the NBA System **WIN98** CD , assuming a new hard drive attached as primary master device



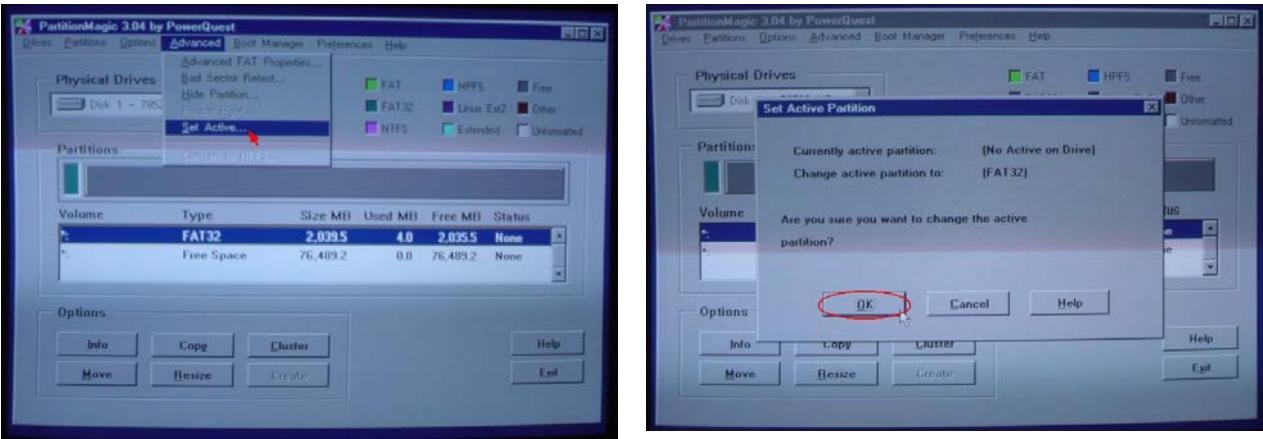
4.2.9 enable (check) FAT32 Option and Skip Bad Sector Checks



4.2.10 Create a FAT partition at the beginning of free space on harddisk

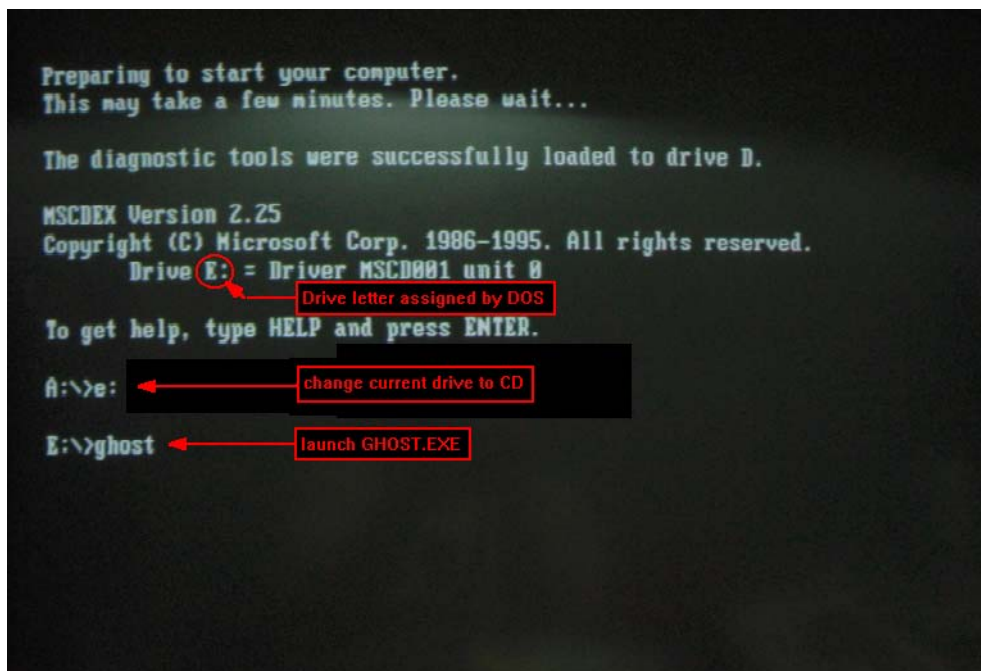


4.2.11 Set new created partition to 'Active' and reboot system





4.2.12 launch "GHOST.EXE" from the same CD



4.2.13 select "Local", "Partition", "From Image"



4.2.14 choose the pre-installed Windows 98 image ".GHO" file

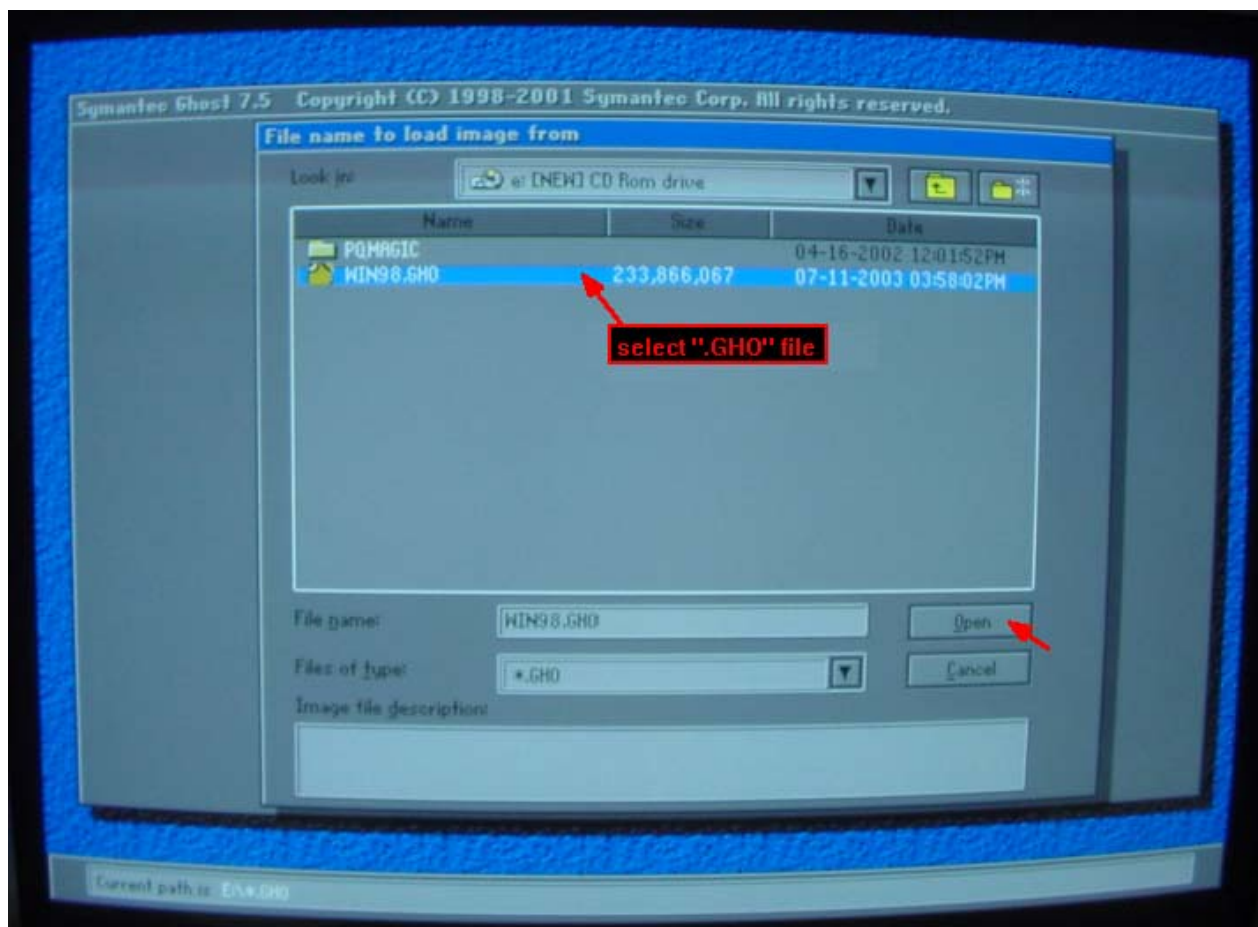


Figure. Load GHO image

4.2.15 complete the procedure with the dialog boxes

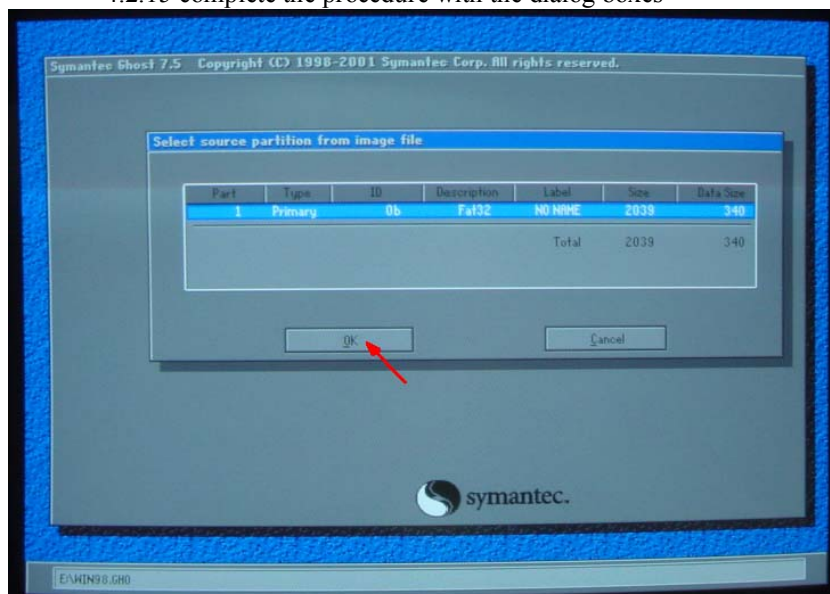


Figure. Select source partition

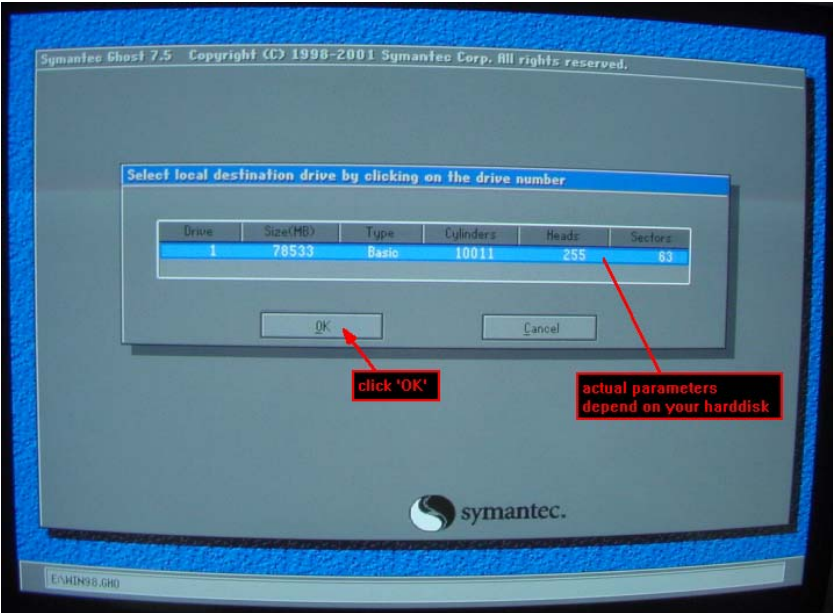


Figure. Select local destination drive

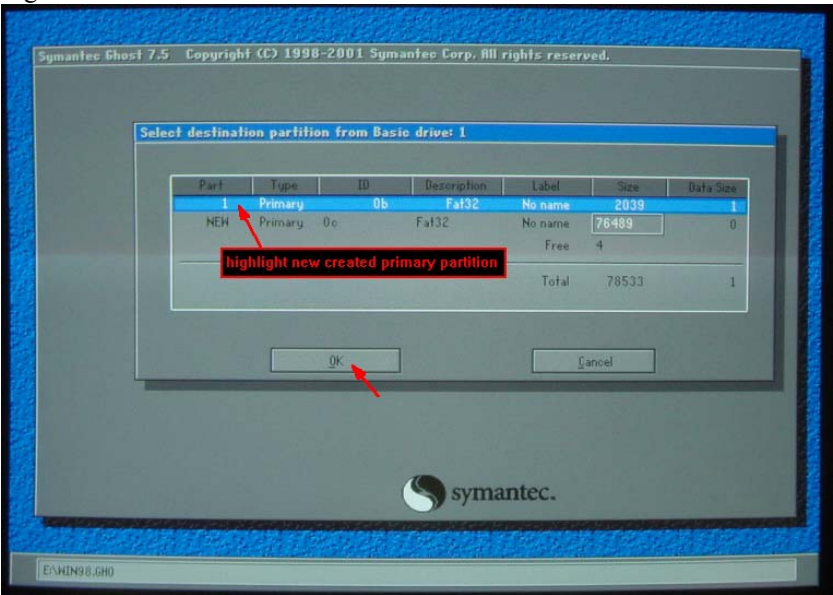


Figure. Select destination partition – select primary partition

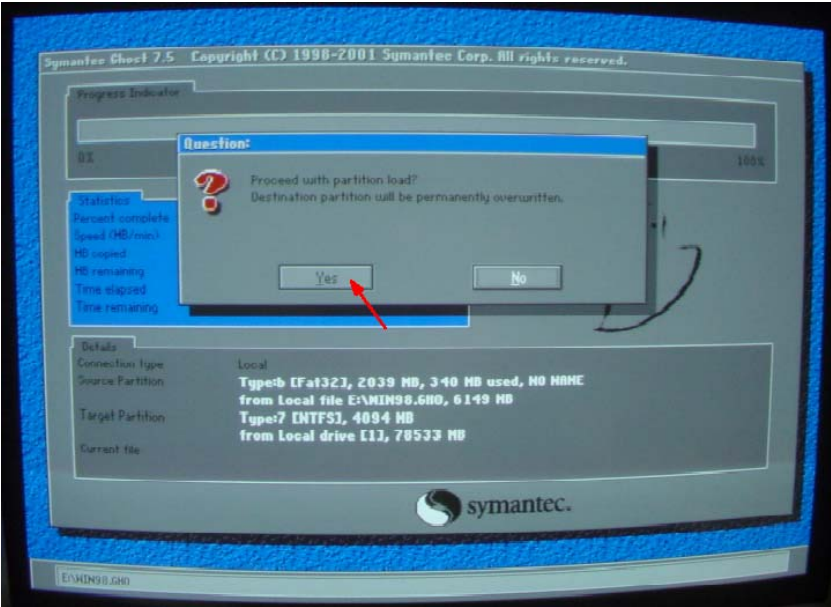


Figure. Question – overwrite destination partition warning (last chance to abort)

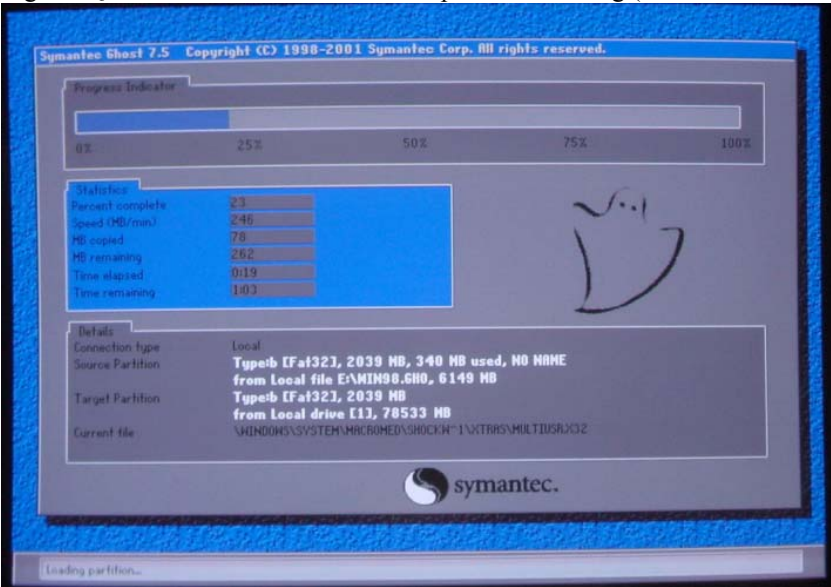


Figure. Restoring from GHO image

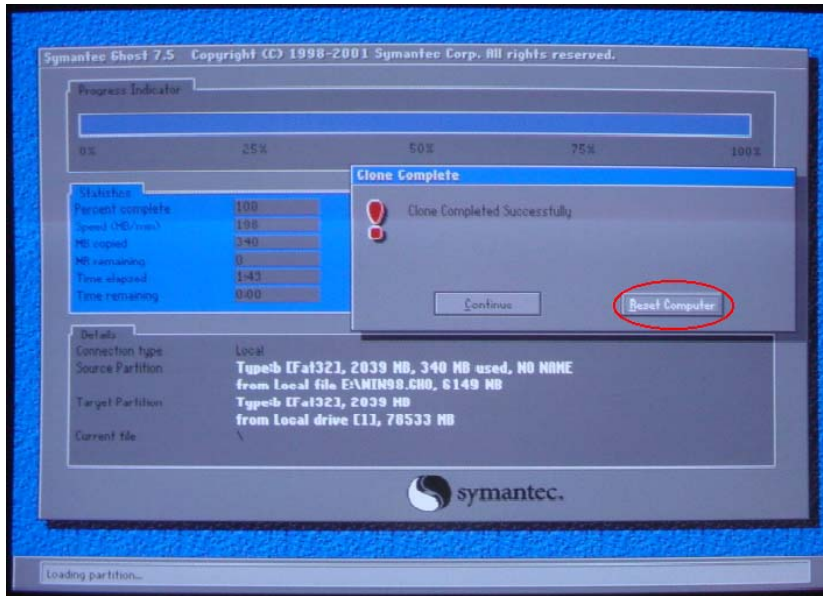


Figure. Clone Complete – restart computer (turn off)

4.3 Installation of applications software

Follow the guidelines provided by the respective software vendor to install the applications software.

4.4 Upload Golden Image from NBA1200 installer station

Follow 5.5 to use “UPLOAD” in the ALD NBA3 Update Utility to transfer all the files in the reference hard disk drive of the installer station to the NBA server. These will be the Golden Image to be shared by all the NBA clients.

Figure. (Please refer to section 5.5)

5. NBA server preparation

5.1 NBA server is built on Windows 2000 server.

5.2 Details:

Computer Name	Windows2000
Network Interface	LAN2
IP Address	192.168.1.171-192.168.1.200
Admin Password	nba3 (case sensitive)

5.3 Restore Windows 2000 Server to the hard disk drive with the NBA System WIN2K CD

5.3.1 Make a NTFS primary partition and a NTFS extended logical partition on a new harddisk.

Please refer to section 4.2 for PQMAGIC.EXE launching and figures below.

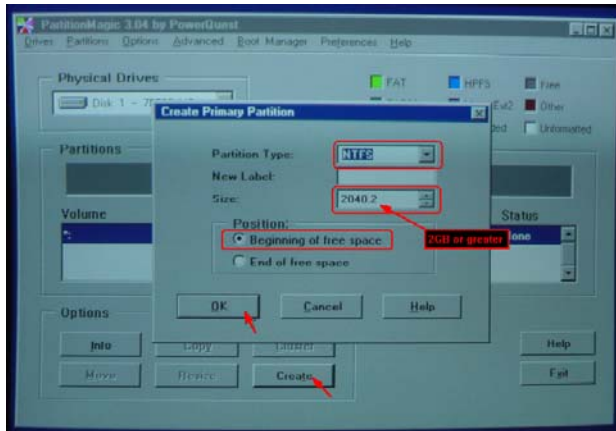


Figure. Create NTFS primary partition

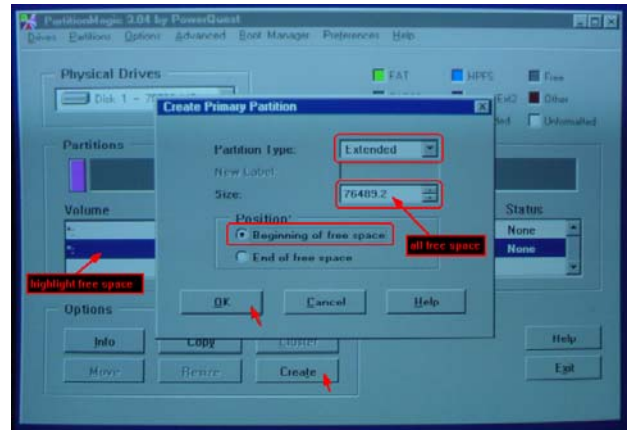


Figure. Create extended partition

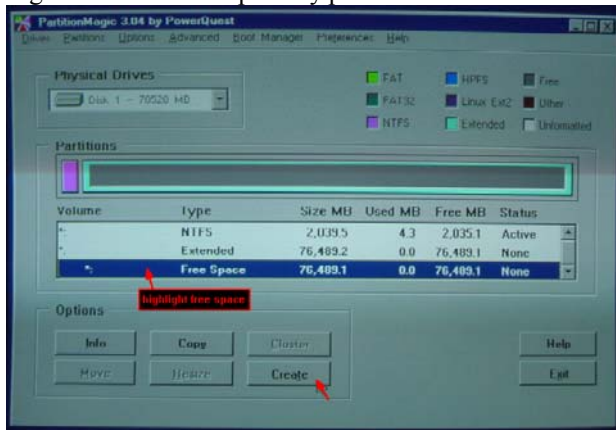


Figure. Create NTFS logical partition (a)

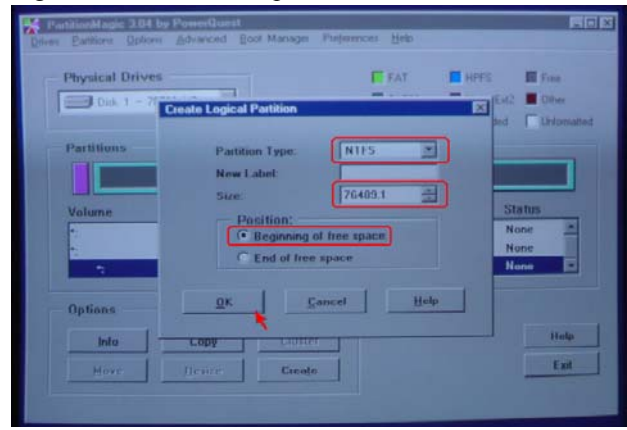


Figure. Create NTFS logical partition (b)

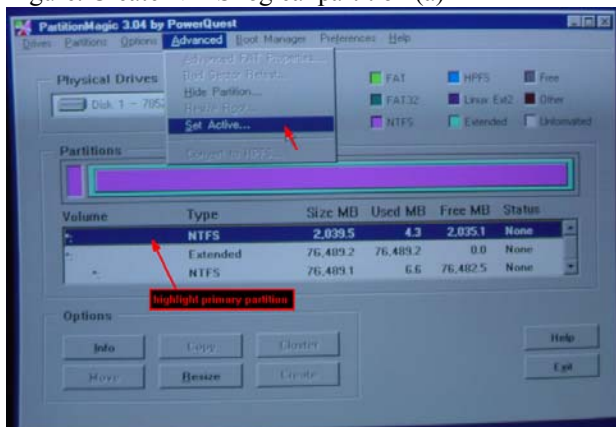


Figure. Set primary partition to 'Active'

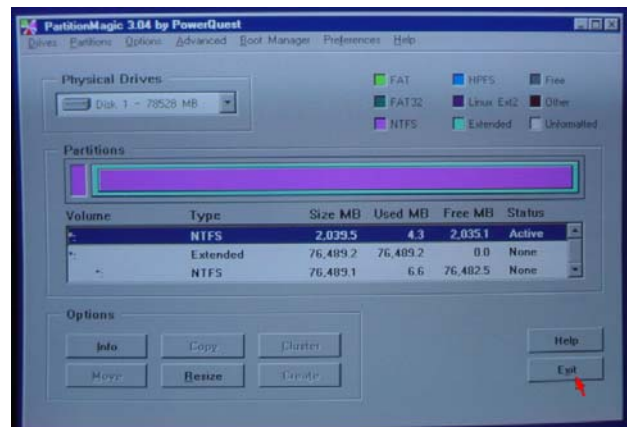
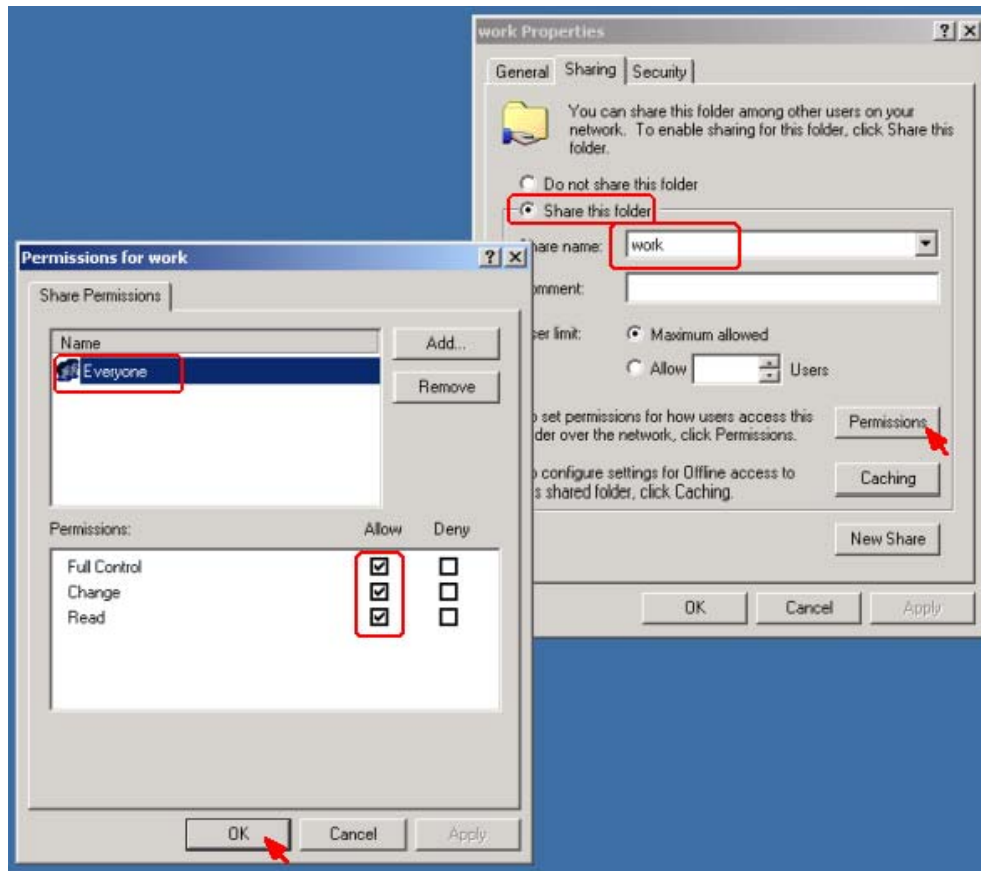


Figure. Exit GHOST and restart system

- 5.3.2 reboot system and launch "GHOST.EXE" from the same CD
- 5.3.3 restore pre-installed Windows 2000 Server image ".GHO" file to primary partition
(Please refer to section 4.2.12)
- 5.3.4 reboot system to Windows 2000 Server
- 5.3.5 make a "WORK" directory on logical drive D: and share it to 'Everyone' with 'Full Control'



5.4 To start the NBA Server, just power it up and the server will boot up and be ready in about 2 minutes.

5.5 From the Windows 2000 server start menu of the NBA server, launch "ALD NBA3 Update Utility" and click "UPLOAD" to transfer all files from the Reference Harddisk to the NBA server.

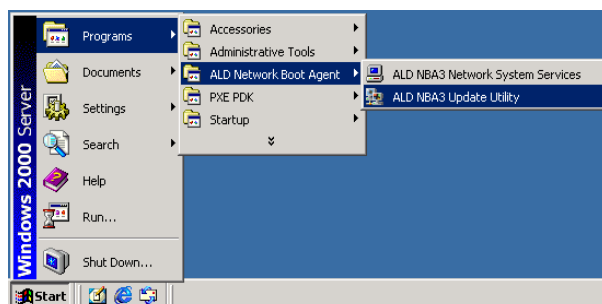


Figure. Launch "ALD NBA3 Update Utility"

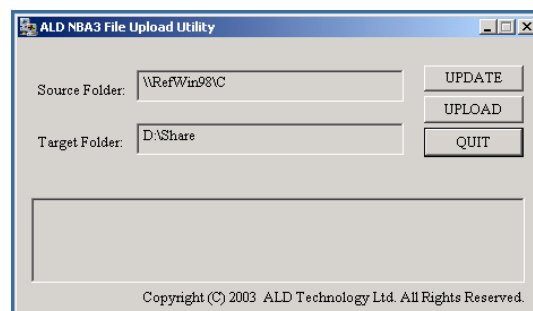


Figure. "ALD NBA3 Update Utility"

6. NBA Client Preparation

- 6.1 New clients can be added by plugging new NBA client machines to the network. The intelligent server will detect new clients, create the virtual drive and make a copy of the OS and application for the newly added client. This completely automatic process will take about 15 seconds per attached client. During this process, the client display will appear as: (Clients' image will be created one by one.)



Figure. Virtual drive and Golden Image preparation

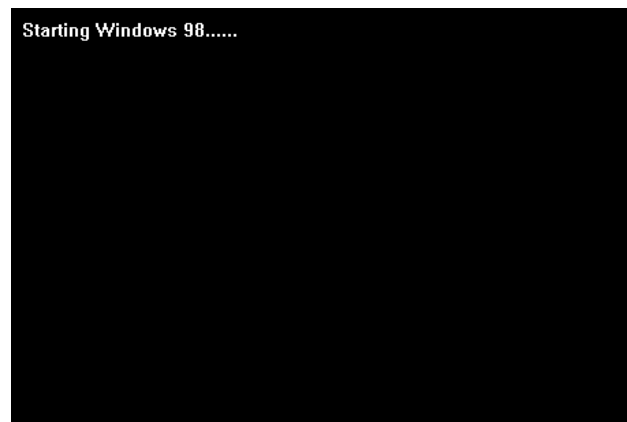
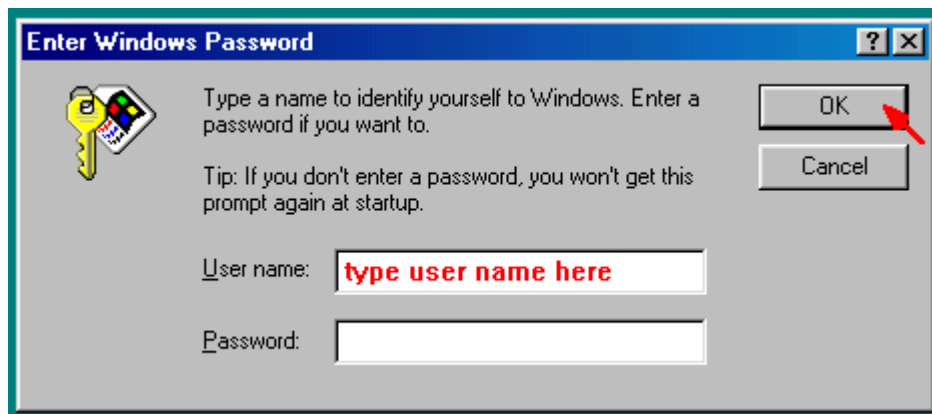


Figure. Client starts to load Windows 98

- 6.2 When the virtual drive and Golden Image have been prepared, the client will start to load the Windows 98 from its virtual drive in the NBA server.
- 6.3 To enable the user to use the network capabilities, he needs to log-in by typing a valid user name. When prompted for the “password”, simply click “OK” without any input.



- 6.4 When Windows 98 is up and running, the user can freely start any applications software from its virtual drive as though he has a local disk drive loaded with the applications software.
- 6.5 To allow client machines to surf Internet, change the Windows 2000 server's DHCP Server Scope Options '003 Router' and '006 DNS Servers' to the true DNS and Gateway IP address.

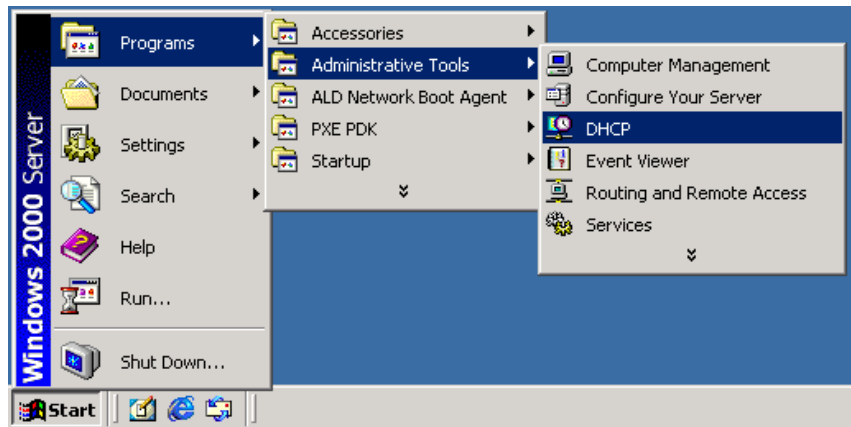


Figure. Launch DHCP Manager

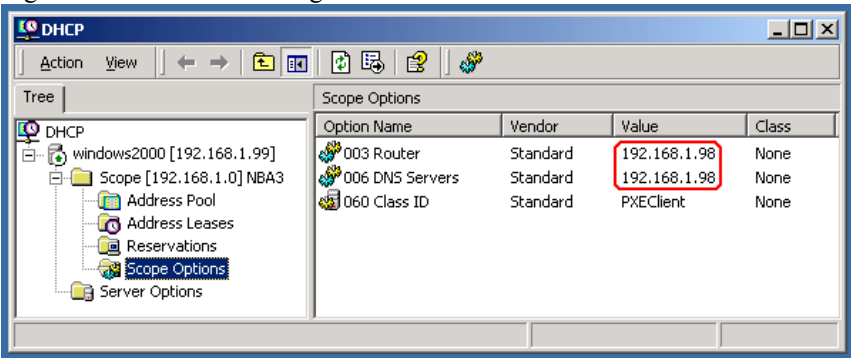


Figure. '003 Router' and '006 DNS Servers' setting

7. Network System Service Centre (v2.2)

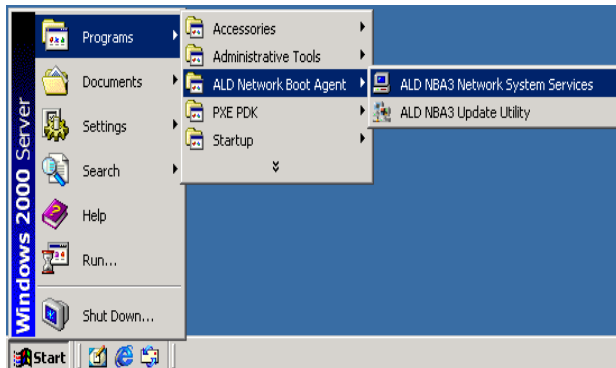
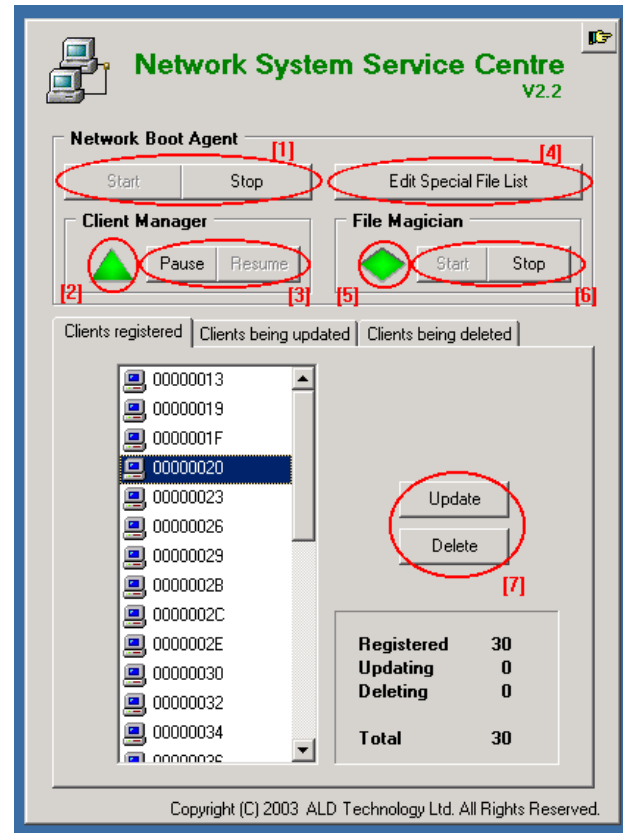


Figure. Launch "ALD Network System Service Centre"



- 7.1 The Network System Service Centre provides the user interface for the NBA system administrator to view the status of and control the client registration and uploading of the golden images for OS and applications.
- 7.2 The Centre comprises two components, the Client Manager and the File Magician. The Centre can be started/stopped with the master control button set Marked [1].
- 7.3 The Client Manager is responsible for Client Image update or deletion. It can be Paused/Resumed by button set [3], with an LED [2] showing its status. A red, green or black LED represents the manager is stopped, running or not available respectively. **UNLESS THE CLIENT MANAGER IS RUNNING, NO CLIENT IMAGE CAN BE UPDATED OR DELETED FROM THE CENTRE, OR REQUESTED BY CLIENT STATIONS.**
- 7.4 The File Magician is responsible for Client image mapping to the Golden Images. It can be started/stopped by button set [6]. Its status is indicated by LED [5]. A red, Green or black LED represents the magician is stopped, running or not available respectively. **UNLESS THE MAGICIAN IS RUNNING, NO CLIENT STATION CAN WORK PROPERLY.**
- 7.5 Update/deletion of the client images is done with button set [7]. Updating a Client image restores it to the default Golden Image. Deleting a permanent detached client image will reclaim valuable hard disk drive space.
- 7.6 Clicking button [4] launches the "Edit Special File List" editor. Add or "drag and drop" files in the list if the file is required individually by the clients.

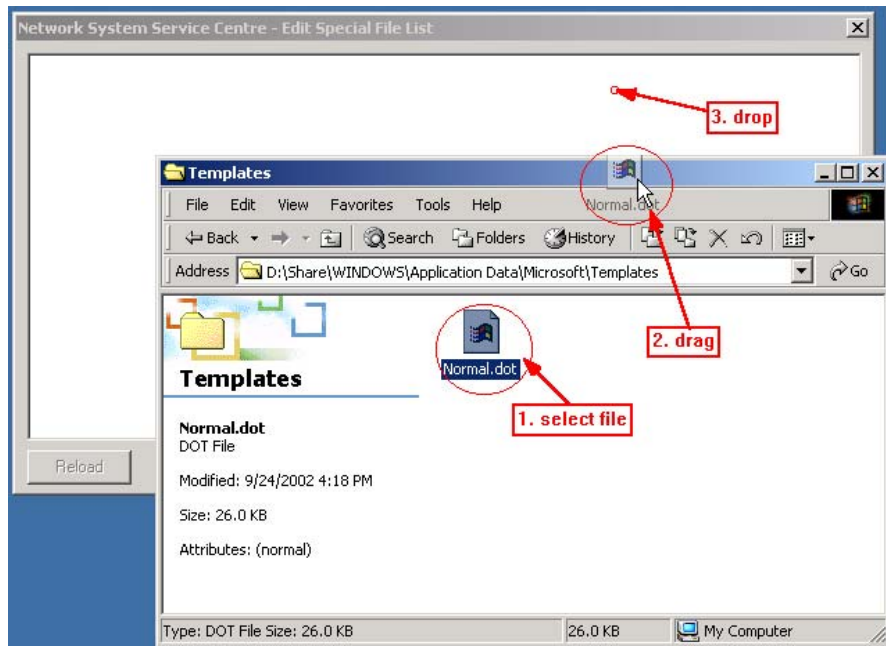


Figure. Drag-and-drop selected file(s) in Windows Explorer

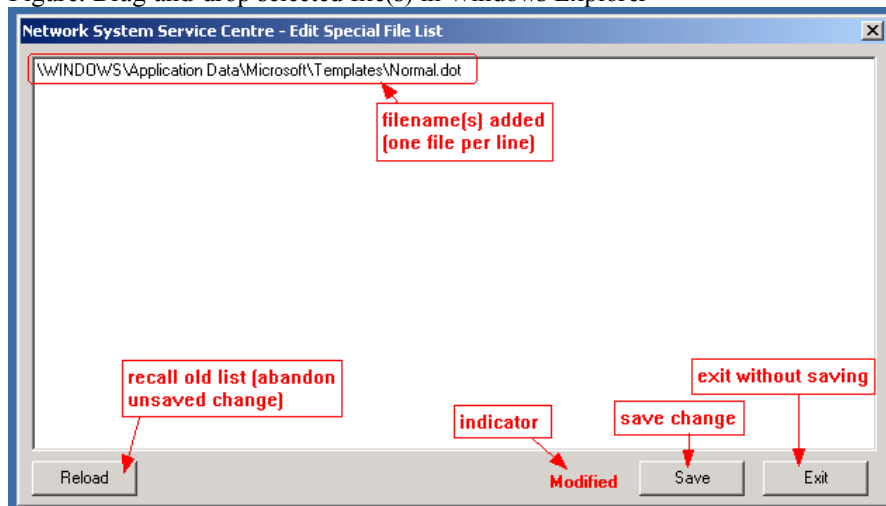


Figure. Edit Special File List

NBA 3.5 introduces the concept of Universal Shared Golden Image for OS and applications. Only one copy of the OS and applications will be required to be present in the NBA server and will be shared by all the NBA clients. This saves valuable disk storage space, reduces the boot up time for a fleet of NBA clients, reduces the rollout time when the NBA network is set up and the required NBA server resources (CPU power, system memory and housekeeping work).

The underlying working requires that the OS and the applications images will not be changed by any client. This requirement will not allow users to change and save OS and applications default settings. In other words, they can change the settings during their work but cannot make the changes the default setting. The next time the user starts the application, the default setting is still the same as the Golden Image. This ensures the integrity of the Golden Images.

Some software applications might report failure to save certain setting changes the user has made during the current session when the user quits. This will not affect the operation of the applications. The only impact is, the default setting of the Golden Image will be used when the next time the user launches the application. An alternative is to have a copy of the settings for each user. Such personality copies will multiply as the number of users.

For example, there is a file normal.dot in Microsoft Word, whose function is to store the personal default settings. When put on the Edit Special File List, will make available to each user a copy of it. This will enable the users to save their own default settings for Word.

8. New Software Installation in NBA System

8.1 Install any new applications software to the NBA installer station (see Section 4.3).

8.2 Launch "ALD NBA3 Update Utility" (see Section 5.5).

8.3 Click "Update" (applications that are newly installed will be added to the Golden Image in the NBA server).

8.4 Clients will be able to use the newly installed applications in the next boot up.

9. FAQ

1. Should I use a new harddisk for the Reference Harddisk?

Yes, we strongly recommend to use a new harddisk because all data on the harddisk will be overwritten. The harddisk should be 20 GB or larger.

2. Should I restore the image everytime before installing new applications?

No, you should use the harddisk to accumulate new installation or un-installation.

3. I have created multiple partitions on my Reference Harddisk, can I install applications in logical drives other than C:?

No, ALD NBA3 update utility copies files from C: of Reference Harddisk only.

4. What is the difference between "update" and "upload" in "ALD NBA update utility" ?

"update" copies files that are different from or new to Reference Harddisk.

"upload" copies all files from Reference Harddisk to NBA server.

5. Although I have executed the update utility, client machines do not the new application (s) I have just installed. What is wrong?

Each NBA client remembers its environment (e.g. start menu, desktop, etc.). Follow all the procedures in (8) such that the old client record (not user data) is removed. Client machines will awake new applications next boot.

6. Can I send a document from an NBA station to be printed from a printer attached to a PC that plugs into the same Ethernet switch as the NBA network?

If you can find the PC in NBA station's "Network Neighborhood", you can print to the printer attached to it from the NBA station.

6.1 Enable the Reference Harddisk in NBA Super-station

6.2 Go to My Computer --- Printers

6.3 Select the target printer

6.4 Install the necessary drivers

6.5 Try print a document from the Reference Harddisk

6.6 Upload the Reference Harddisk to the NBA server

6.7 Remove all clients in the "ALD NBA3 Network System Service"

When the clients boot up next time, they will be able to print from the above said printer.

7. Can I send a document from an NBA station to be printed from a printer attached to a PC that belongs to another network that plugs into the same Ethernet switch as the NBA network?

You need a gateway to connect the two networks. The built-in Gateway of the ALD AMS server can be used for this purpose.

8. Will the clients be able to corrupt the NBA server's code?

The harddisk of the NBA server is divided into 2 partitions, with the C: drive containing Windows 2000 server code and D: drive containing Win98 image, application codes and user data. The C: cannot be written to by the clients and is therefore safe from inadvertent corruption by clients.

Each NBA user has his own Win 98 and application image (different copy of the same image). In case of damage of this image, the recovery can be done automatically. When the Win 98 SE fails to boot up twice, the NBA Server will create a new image of Win 98 SE and applications. This process will take about one to two minutes, depending on the prevailing NBA Server loading. After that, the Win 98 SE will boot up like ordinary stations.

9. The NBA Installation Station cannot do the network boot like other NBA stations, what is wrong?

Go to BIOS Setup, disable "On-Chip Primary/Secondary PCI IDE" in "Integrated Peripherals". The system will be able to perform network boot in the next power-up. However, we do not recommend the use of the NBA installer for Client application for possible damage of the referenced HDD.

10. What is the difference between NBA3.0 and NBA3.5?

In NBA3.0, each client station has its own virtual drive that contains a copy of the OS and the applications software. This gives absolute separation among NBA stations, at the expense of hard disk drive space and boot up time when there is a large number of NBA stations in the NBA network.

NBA3.5 introduces the File Magician capability, which allows a single copy of OS and application software to be shared by all NBA stations. The advantages include much reduced hard disk drive space and system memory requirement in NBA server, faster boot up and application launch of NBA clients.

11. What is the difference between the Update in NBA3 Update Utility and Update in Network System Service Centre?

The Update in NBA3 Update Utility updates the Golden Image in the NBA Server with the newly added software from the Reference HDD of the NBA installer station. The time required for each client will depend on the changes (newly added software) from the last image of the Referenced HDD.

The Update in Network System Service Centre restores the Client Image (the Client's running copy of the OS and applications) to the default Golden Image. The time to update one client is about 5 seconds.