NASLite

Network Attached Storage Server Operating System

NASLite+ V1.x

User Manual

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What is NASLite+?

NASLite+ is a CD-ROM based Network Attached Storage (NAS) Server Operating System designed to transform a basic computer into a dedicated SMB/CIFS, NFS, FTP and HTTP file server. NASLite+ is intended primarily for use in a small business or home office network. It is capable of handling 50 or more workgroup users easily and efficiently even when running on modest hardware. By design, NASLite+ is a community workgroup server and does not support features such as user management, disk quotas or the ability to join domains. However, it is very easy to set-up, to administer and to use.
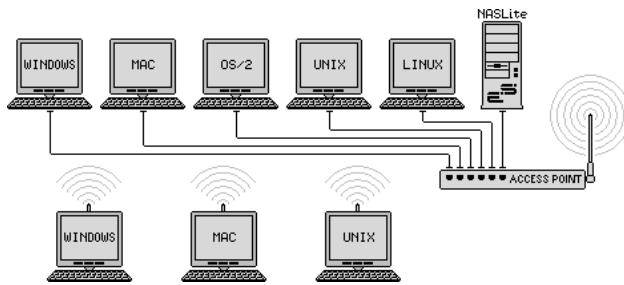
Typical Multi-OS Network Configuration

Why Use NASLite+?

NASLite+ is optimized to perform at maximum efficiency with minimum of hardware requirements. Designed with simplicity in mind, NASLite+ is compact, stable and very reliable. NASLite+ boots directly from a CD-ROM and runs entirely in RAM, thus ensuring consistent OS operation. NASLite+ offers the following features and benefits:

- Easy to operate and to administer
- Inexpensive to run and maintain
- Boots directly from a CD-ROM
- Remote administration through TELNET
- Simple configuration menu
- Stable and reliable
- SMB/CIFS, NFS, FTP and HTTP exported file systems
- BIOS independent fixed disk drive support
- S.M.A.R.T. support
- Large partition and file support

- Extremely compact in size (Runs in a 4MB RAM Disk)
- Low hardware requirements
- Wide range of PCI hardware support (ISA and EISA not supported)

NASLite+ is well suited for re-using older PCs that are still operational but are too limited or slow for use as desktop computers. In addition, NASLite+ enables older computers with BIOS limitations to use contemporary, large-capacity IDE fixed disk drives without the need for additional hardware.

As a network file server, NASLite+ may very well offer the highest possible storage capacity for the money. NASLite+ servers of 1 Terabyte or more of storage space can be built for about 500 dollars US.

For example, with NASLite+ you can take a retired Pentium 200MHz computer, install a couple of 250GB fixed disk drives and have a fast, reliable 500GB NASLite+ file server for a few dollars above the cost of the fixed disk drives.

NOTE: *NASLite+ supports only IDE fixed disk drives as storage media. Drives such as CD, DVD and Iomega-ZIP as well as SCSI, SATA, USB, or FireWire connected fixed disk drives are not supported as storage media.*

NOTE: *NASLite+ is fully compatible with floppy disk based NASLite file servers and storage disks are fully interchangeable.*

Getting NASLite+

NASLite+ CD-ROM or a downloadable CD-ROM ISO image is available for purchase from the Server Elements (www.serverelements.com) website.

NOTE: *NASLite+ is a commercial product and is not freely distributable. Please do not make or distribute illegal copies. Doing so is not only illegal, but undermines our efforts and further impedes our ability to develop the product.*

Basic Computer Requirements

NASLite+ is a network file server, so a fast computer is usually not necessary. Basic requirements are:

- 486DX or better processor

- PCI bus
- 32M or more of RAM
- 1 to 4 IDE fixed disk drives
- Bootable CD-ROM drive
- Conventional floppy disk drive
- PCI or on-board network interface adapter

NOTE: *It is possible to boot NASLite+ using a SCSI, USB, FireWire or other CD-ROM drive provided the BIOS supports booting from such a device. That leaves all 4 IDE ports for storage disks. The CD-ROM drive is used only to boot NASLite+. CD-ROM content cannot be exported to the network.*

NOTE: *A conventional floppy disk drive of any type can be used for NASLite+ configuration provided it is the primary floppy disk drive (DOS drive A: or Linux device /dev/fd0).*

In dedicated file servers, the performance is most often limited by the network speed. Fast processors will not improve performance and therefore are not required. A 200 MHz Pentium with 64M of RAM will be more than capable of servicing a typical small office. Additional RAM may be necessary if large-capacity fixed disks are used. For example, if 250GB fixed disks are used, 128M or more of RAM may be necessary for optimum performance.

Hardware Setup

If you are preparing a computer for conversion to a NASLite+ file server and wish to replace or add fixed disk drives, do this now and be sure the computer will boot with the new fixed disk drives installed. In addition, since NASLite+ boots from a CD-ROM, it is necessary to set the BIOS to boot from the CD-ROM drive and not a floppy or a fixed disk drive.

NOTE: *It's recommended that you set the BIOS IDE fixed disk drive configuration for all IDE fixed disk drives to "NOT INSTALLED" in order to avoid boot problems. NASLite+ does not use the BIOS to identify the available fixed disk drives. Computers with older BIOS may refuse to boot if unable to properly identify the installed fixed disk drives.*

To connect the NASLite+ server to the network, a PCI network interface is required. Many computers utilize a motherboard with a built-in or on-board PCI network interface and therefore will work fine. A general list of supported PCI network interface adapters is as follows:

- 3COM
- Adaptec Starfire / DuraLAN
- AMD PCnet32 / 8111
- Broadcom 4400
- Davicom
- DECchip
- Digi International RightSwitch
- DIGITAL
- EtherExpress
- HP PCLAN
- Mysom MTD-800 series
- National Semiconductor DP83810 series
- NE2000 compatible
- nForce
- RealTek
- Recal-Interlan
- SiS 900/7016
- SMC
- Sundance Alta
- TI ThunderLAN
- Tulip
- VIA Rhine
- Western Digital
- Winbond W89c840

NASLite+ provides built-in support for a number of common gigabit network interfaces. NASLite+ supports the following gigabit network interfaces:

- 3Com 3C985
- Alteon AceNIC
- Broadcom Tigon3
- D-Link DL2000-based
- Intel(R) PRO/1000
- Marvell Yukon Chipset
- National Semiconductor DP83820
- NetGear GA620
- Packet Engines Hamachi GNIC-II
- Packet Engines Yellowfin
- Realtek 8169
- SysKonnect SK-98xx

Initial Software Setup

For the initial NASLite+ software setup, you'll need to have a monitor and a keyboard connected to the computer. A clean, formatted floppy disk is also required and will be used to store the NASLite+ configuration settings.

NASLite+ does not need to be installed on a fixed disk like most operating systems. It boots directly from the CD-ROM and runs in a 4MB RAM Disk.

Initial NASLite+ configuration is summarized below:

1. Boot NASLite+
2. Supply License ID
3. Configure Network Settings
4. Change Administration Password
5. Save Configuration Settings
6. Reboot to Apply Configuration
7. Configure storage disks
8. Reboot to mount storage disks

Detailed explanation of each configuration step follows:

Step 1 – Boot NASLite+ - Start by booting the computer using the NASLite+ CD-ROM. **Do not insert the floppy disk in the floppy disk drive at this time.** A floppy disk that does not contain a valid configuration will disallow a login. After the boot sequence is complete, the initial login screen will be displayed.

At this stage of the configuration, NASLite+ is in Default Administration Mode. Synonymous to Factory Settings, Default Administration Mode is intended primarily to allow the administrator to configure the NASLite+ network settings, supply a valid License ID and save the configuration to a floppy disk. During Default Administration Mode, services are not started and fixed disk drives are not checked or mounted.


```
        NASLite+ (C) 2005 Tony Z. Tonchev (tzt@serverelements.com)
          Login as admin to access the NASLite+ Administration Menu.

> Checking System Resources ------------------------------ [  SUCCESSFUL  ]
> Configuring NASLite+ ----------------------------------- [  SUCCESSFUL  ]
> License Verification ----------------------------------- [ UNREGISTERED ]
> Mounting Storage Disk-1 -------------------------------- [   DISABLED   ]
> Mounting Storage Disk-2 -------------------------------- [   DISABLED   ]
> Mounting Storage Disk-3 -------------------------------- [   DISABLED   ]
> Mounting Storage Disk-4 -------------------------------- [   DISABLED   ]
> S.M.A.R.T. Status -------------------------------------- [   DISABLED   ]
> Launching Services ------------------------------------- [   DISABLED   ]
> Initializing Network ----------------------------------- [   DISABLED   ]
> Administration Mode ------------------------------------ [   DEFAULTS   ]


NASLite login: _
```

**NASLite+ Default Administration Mode
Console Login Screen**

The login name is **admin** (in lower case letters). During Default Administration Mode, the admin password is always **nas** (also in lower case letters). When you have successfully logged in, the NASLite+ Administration Utility Options Menu will be displayed. All configuration settings are done using this menu. During Default Administration Mode, all menu options are available with the exception of Configure Storage Disks (Option 4).


```
NASLite+ v1.2 - Administration Utility

OPTIONS MENU

    1 - Change Network Settings - ( 192.168.1.1 / 255.255.255.0 )
    2 - Change Name - ( NASLite )
    3 - Change Workgroup - ( WORKGROUP )
    4 - Configure Storage Disks
    5 - Change Password
    6 - Change Date and Time - ( Wed Jul 27 11:18:51 UTC 2005 )
    7 - Reboot
    8 - Shutdown
    9 - Save Configuration

    A - About
    L - License - ( 00000-00000-00000-00000-00000 )
    E - Exit

Select: >
```

NASLite+ Administration Utility Options Menu

Step 2 - Supply License ID – Starting with NASLite+ v1.2, a valid License ID is required in order to enable NAS functionality. A typical License ID consists or 5 sets of 5 alphanumeric characters and should be unique for each running copy of NASLite+. A unique license ID is supplied with each copy of NASLite+ at the time of purchase. You can enter a valid License ID by using License (Option L) of the Administration Utility Options Menu.

Step 3 - Configure Network Settings – NASLite+ network configuration consists of setting the IP Address, Server Name and Workgroup Name (Options 1, 2, and 3). Make sure that the IP address is unique and is in the same subnet as the rest of the local workgroup computers. The server name is what you will see when you browse the workgroup or network from your computer and should also be unique.

Step 4 - Change Administration Password – It is recommended that the default NASLite+ password be changed to something more effective than the Default Administration Mode password. Change the

admin password (Option 5) and save it (Option 9) to the NASLite+ configuration floppy disk.

Step 5 - Save Configuration Settings - The network settings as well as the administration password are stored on the NASLite+ configuration floppy disk, so when you have set the IP address, server name and workgroup name, and changed the administration password, the settings must be saved (Option 9) with the NASLite+ configuration floppy disk write enabled and in the floppy disk drive.

NOTE: *Once the configuration settings are saved, the configuration floppy disk must remain in the floppy disk drive. It is also a good idea to write-protect the configuration floppy disk in order to prevent inadvertent configuration changes.*

Step 6 – Reboot to Apply Configuration - To apply the new configuration settings the NASLite+ server must be rebooted (Option 7) with the newly created configuration floppy disk inserted in the floppy disk drive. Booting NASLite+ with custom configuration settings will launch all services and enable the storage fixed disk drive configuration (Option 4) in the NASLite+ Administration Utility Options Menu.

Now it is good to ensure that the network interface was detected and properly initialized. The `Initializing Network` status `[SUCCESSFUL]` is displayed, and the READY audible prompt generated (see NASLite+ as an Appliance), then the network interface is supported and ready.

NASLite+ Normal Administration Mode Console Login Screen

If NASLite+ fails to detect and initialize the network interface, NASLite+ generates the CHECK NETWORK audible prompt. In this case, the network interface may be damaged or not supported. A compatible, working network interface must be installed.

NOTE: *Previously configured storage drives or storage drives configured with a NASLite floppy disk version will be mounted and exported accordingly at this time. A* `[SUCCESSFUL]` *status will be displayed for all currently mounted drives. Be careful not to reconfigure these drives unintentionally in the next step.*

Step 7 - Configure Storage Disks – NASLite+ fixed disk drives need to be set up next. The Configure Storage Disks submenu (Option 4) provides the necessary storage disk management tools. Format Storage Disk (Option F) of the Configure Storage Disks submenu explains the process in detail. Formatting each fixed disk drive may take a few minutes, depending on the disk capacity.

NOTE: *During storage disk configuration, all data currently on the fixed disk will be lost. If you wish to preserve the data, make sure it's properly backed up before configuring the fixed disk for use as NASLite+ storage.*

Step 8 – Reboot to mount storage disks - To finalize the NASLite+ configuration and mount all newly configured storage disks, a final reboot is necessary. Reboot the NASLite+ server (Option 7) with the configuration floppy disk inserted in the floppy disk drive. Assuming all configuration settings are correct, the NASLite+ server should now be online and ready for use.

Remote Administration

NASLite+ can be administered remotely via TELNET. All administration options available via the console are also available remotely via TELNET. To confirm remote access, it is a good idea to log in to the NASLite+ server using TELNET from any computer on your network at this point. For example, to login via TELNET from Windows, follow these steps:

1. Click Start, then click Run.
2. Open a TELNET session by Typing telnet and a space and then type the IP address of

the NASLite+ server. For example: `telnet 192.168.1.1`, then click OK

3. You should get the NASLite+ login prompt. Login and you should see the NASLite+ Administration Utility Options Menu.
4. Log out (Option E).
5. Your TELNET window will close.

NOTE: *While in Default Administration Mode, the NASLite+ Administration Utility will not be accessible remotely via TELNET.*

Server Security

The storage made available by NASLite+ is not restricted in any way. As a community file server, any user capable of accessing the NASLite+ server via SMB/CIFS, NFS, FTP or HTTP can read and write openly. Only the NASLite+ Administration Utility is password protected in order to restrict unauthorized access to the Options Menu.

Using The SMB/CIFS Server

NASLite+ exports all storage disks to the local network via SMB/CIFS (Server Message Block)/ (Common Internet File System), commonly known as Microsoft Windows Networking. NASLite+ will export all installed and configured fixed disk drives available on the server computer as **Disk-1** through **Disk-4** respectively. These names are fixed and cannot be changed. All **Disk-X** shares are read/write enabled and are accessible by all local network and workgroup users. The **Disks** and **Info** shares are made available by default, and are read-only.

NASLite+ will appear as a member of the local workgroup when the Network Neighborhood is browsed. Accessing the NASLite+ storage drives is exactly the same as accessing remote windows shares. In addition to Windows, NASLite+ SMB/CIFS shares can be accessed by most operating systems including OS X and Linux.

Name △	Comment
Disk-1	NAS Disk-1 (Read / Write)
Disks	NAS Disks (Read Only)
Info	NAS Information (Read Only)

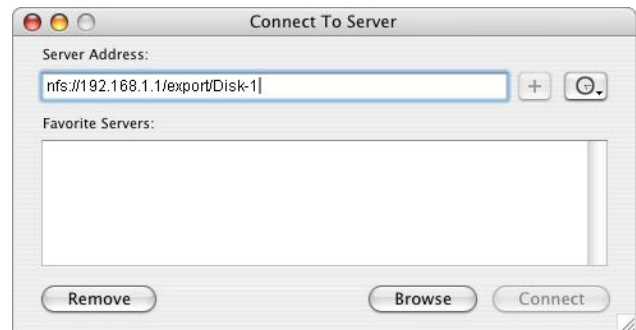**Typical NASLite+ Workgroup Shares**

Using The NFS Server.

NASLite+ exports all storage disks to the local network via NFS (Network File System). NASLite+ will name all installed and configured fixed disk drives available on the server computer as **/export/Disk-1** through **/export/Disk-4** respectively. These names are fixed and cannot be changed. All **/export/Disk-X** exports are read/write enabled and are accessible by all users. The **/export/Info** export is made available by default, and is read-only.

To connect to a NASLite+ export via UNIX, the **mount** command can be used. Connections from OS X or KDE however are more convenient using the available GUI facilities. All that is required is the appropriate server export address as illustrated in the OS X example shown below:

Most UNIX operating systems should readily support mounting of remote NFS exports. **Windows Services for UNIX** is required for Windows NT/2K/XP to mount NASLite+ NFS exports.

To determine which drives are available and exported by NASLite+, one can examine the **NFS Server Configuration (NFS Exports)** section of the Status Info **Server** page (see Status Info).

Connecting to NASLite+ via OS X

Using The FTP Server

NASLite+ exports all storage disks to the local network via FTP (File Transfer Protocol). NASLite+ will name all installed and configured fixed disk drives available on the server computer as **Disk-1** through **Disk-4** respectively. These names are fixed

Server Elements

and cannot be changed. All **Disk-X** folders are read/write enabled and are accessible by all users. The **Info** folder is made available by default, and is read-only.


Name ▲	Size	Type	Modified
Disk-1		File Folder	6/16/2004 8:51 AM
Disk-4		File Folder	6/23/2004 11:37 AM
Info		File Folder	6/23/2004 11:43 AM

Typical NASLite+ FTP Shared Folders

You will be able to connect to the NASLite+ server via any FTP client. For example assuming that your NASLite+ server IP address is set to 192.168.1.1, then entering `ftp://192.168.1.1` in the Windows Explorer's address bar will access the server contents. Since the server is read/write enabled, files and folders may be dragged-and-dropped to and from the NASLite+ server window.

Using The HTTP Server

The NASLite+ storage contents can be accessed using any web browser via HTTP (Hypertext Transfer Protocol). For example assuming that your NASLite+ server IP address is 192.168.1.1. Entering `http://192.168.1.1` in the browser's address bar can then access the server content inside the browser window. All NASLite+ storage contents are made available via HTTP as read only.
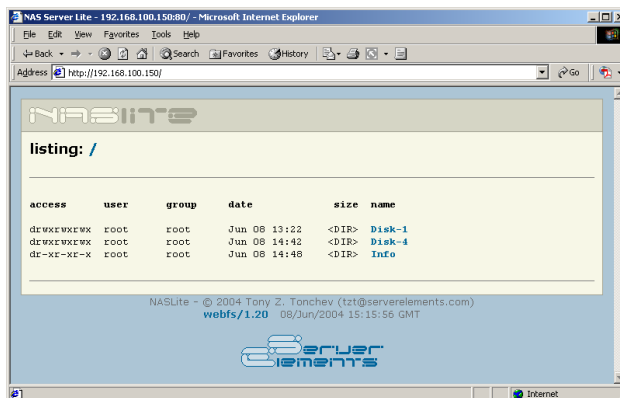
Typical NASLite+ HTTP Content

The NASLite+ HTTP server supports a complete set of mime types, making it the perfect solution for serving music files, digital images, scanned forms and documents, HTML files, PDF documents, movie files or any other content suitable for read-only intranet web distribution.

Disk Health and Monitoring

When the NASLite+ server boots, each fixed disk drive filesystem is identified and checked. If a filesystem is identified and maintenance is scheduled, NASLite+ automatically analyzes and attempts to fix any existing filesystem problems before storage is made available for use.

NOTE: *When a fixed disk drive filesystem is being checked, NASLite+ storage will not be available for use. The pending check may take anywhere from 1 to 20 or more minutes depending on the fixed disk drive size and contents. A pending check can be identified by observing the associated fixed disk drive activity LED shortly after booting NASLite+. The associated fixed disk drive activity LED will be continuously on for the duration of the check.*

On rare ocasions, NASLite+ will not be able to automatically repair a damaged filesystem. If this occurs, use the Configure Storage Disks submenu (Option 4). It provides the Check Storage Disk (Option C), necessary for manual filesystem check and repair. Checking each fixed disk drive filesystem may take a few minutes, depending on the disk capacity.

NASLite+ also monitors the health of the storage fixed disk drives using Self-Monitoring, Analysis and Reporting Technology (SMART) built into most modern ATA fixed disk drives. In many cases, NASLite+ will provide advanced warning of fixed disk drive degradation and failure. When NASLite+ first boots, it initiates a SMART Self-test for each one of the configured storage fixed disk drives.

Using the Configure Storage Disks submenu (Option 4), periodic SMART status monitoring can be disabled. When enabled, the SMART status of the configured storage fixed disk drives is checked every 5 minutes. The fixed disk drives SMART status can be viewed using the NASLite+ Status Info made available through the **Info** share.

In the event of approaching failure, with SMART status enabled, NASLite+ will begin generating a 5-

beep audible alarm every 5 minutes. At that time it is best to take the necessary precautions to remove important data from the affected disk.

Content Backup

NASLite+ does not provide a built-in backup. Backup of content residing on a NASLite+ server is best performed from another workgroup computer.

NASLite+ as an Appliance

NASLite+ is well suited for operation as a network appliance, remotely administered and without an attached monitor and keyboard. Remote administration can be performed from any computer on the same network via TELNET.

To compensate for the lack of visible indicators on the physical server, NASLite+ employs a number of audible prompts that indicate states and or conditions. The audible prompts are generated via the PC speaker, so no additional sound hardware is necessary.

AUDIBLE PROMPT	STATE
2 x **300**Hz **1** x **700**Hz	**READY** - Server is online and ready for use.
2 x **700**Hz **1** x **300**Hz	**SHUTDOWN** - Power may be shut down manually in 5 seconds.
5 x **200**Hz	**CHECK NETWORK** - Unable to detect or initialize network interface card.
3 x **700**Hz **3** x **300**Hz	**CHECK DISK** - Fixed disk drive fails overall SMART self-assessment.
5 x **700**Hz	**DEFAULT ADMINISTRATION MODE** – Server started without a configuration floppy disk.

NASLite+ Audible Prompts

NOTE: *In reference to the **NASLite+ Audible Prompts table**, the information provided in the AUDIBLE PROMPT column represents the number of beeps and their pitch. For example, when the NASLite+ server is ready for use, it will generate a READY prompt by sounding two 300Hz beeps followed by a single 700Hz beep.*

Administration Utility

The NASLite+ Administration Utility is a console-based menu-driven utility that can be accessed at the server computer via a locally connected monitor and keyboard, or remotely through TELNET. The NASLite+ Administration Utility menu options are as follows:
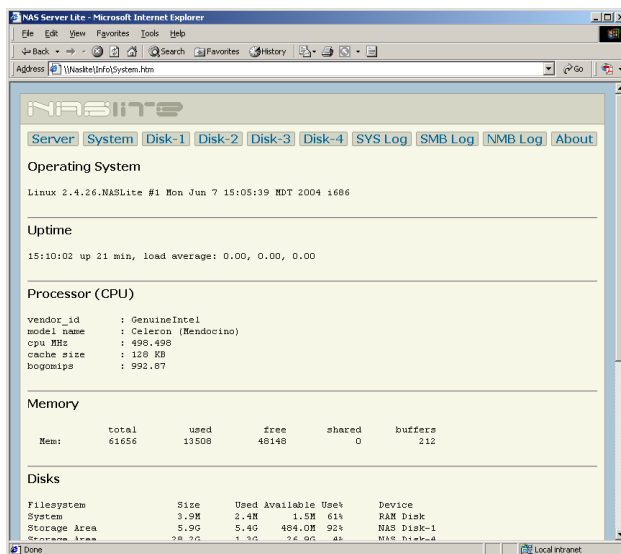
- **1 - Change Network Settings**
  Configure server IP address and netmask.

- **2 - Change Name**
  Set unique server name. The server name is what the NASLite+ server calls itself when participating as a member of a Windows workgroup.

- **3 - Change Workgroup**
  Set the name of the Windows workgroup this NASLite+ server will join.

- **4 - Configure Storage Disks**
  Format available fixed disk drives for use as NASLite+ storage. Manually check and repair a filesystem. Enable or disable S.M.A.R.T. Status feature. Configure Storage Disks (Option 4) is not available in Default Administration Mode.

- **5 - Change Password**
  Change the **admin** user password. During Default Administration Mode, the admin password is always **nas**.

- **6 - Change Date and Time**
  Set the NASLite+ computer date and time. Provided values must be in GMT time.

- **7 - Reboot**
  Reboots the NASLite+ server.

- **8 - Shutdown**
  Shuts down the NASLite+ server.

- **9 - Save Configuration**
  Saves network configuration settings to a NASLite+ configuration floppy disk.

- **A - About**
  Displays basic status information about the current NASLite+ state.

- **L - License**
  Set the NASLite+ License ID

- **E - Exit**
  Exits the NASLite+ Administration Utility Options Menu.

NOTE: *While in Default Administration Mode, the NASLite+ Administration Utility will not be accessible remotely via TELNET.*

Status Info

NASLite+ exports a special **Info** share for the purpose of providing server status information. The status information is made available via a number of HTML pages that are automatically updated every 5 minutes. To access the server status pages, click to view any of the HTML files from the Info share. Your default HTML browser will open the selected HTML page. At that time you can navigate between the individual status pages by using the provided link buttons.

Typical NASLite+ Status Info Page

The NASLite+ Info share offers the following status information pages:

- **Server** - Provides information about server network settings, lists recent server users and displays the server (NFS and Samba) configuration files.

- **System** - Displays information about the server OS, uptime, load, CPU, memory, fixed disk drive usage and network interface status.

- **Disk-1** - Displays Disk 1 initialization messages, hardware description and S.M.A.R.T. status information if applicable. Disk 1 is the primary (master) fixed disk drive on the primary IDE controller.

- **Disk-2** - Displays Disk 2 initialization messages, hardware description and S.M.A.R.T. status information if applicable. Disk 2 is the secondary (slave) fixed disk drive on the primary IDE controller.

- **Disk-3** - Displays Disk 3 initialization messages, hardware description and S.M.A.R.T. status information if applicable. Disk 3 is the primary (master) fixed disk drive on the secondary IDE controller.

- **Disk-4** - Displays Disk 4 initialization messages, hardware description and S.M.A.R.T. status information if applicable. Disk 4 is the secondary (slave) fixed disk drive on the secondary IDE controller.

- **SYS Log** – Displays the current system messages log file.

- **SMB Log** – Displays the current SMB/CIFS Server (smbd) log file.

- **NMB Log** - Displays the current NetBIOS Name Server (nmbd) log file.

- **About** – Contains general NASLite+ information.

Source Components

NASLite+ is built using a number of proprietary Server Elements components as well as one or more components of the following:

- **Linux Kernel**
  (www.kernel.org) - POSIX compliant Unix clone

- **Samba**
  (www.samba.org) - SMB/CIFS file services

- **nfs-utils**
  (http://sourceforge.net/projects/nfs/) - NFS utilities

- **vsftpd**
  (vsftpd.beasts.org) - FTP services

- **uClibc**
  (www.uclibc.org) - Compact C library

- **BusyBox**
  (www.busybox.net) - Compact Unix utilities

- **e2fsprogs**
  (e2fsprogs.sourceforge.net) - Second extended file system utilities

- **webfs**
  (www.bytesex.org) - Simple HTTP Server

- **smartmontools**
  (smartmontools.sourceforge.net) - S.M.A.R.T. utility toolset.

Source code for the GPL portions of NASLite+ can be found as a torrent or on the Server Elements website (www.serverelements.com).

Internet Resources

Additional information, the latest releases, as well as well-mediated user forums covering NASLite+ and related OS products can be found on the Server Elements (www.serverelements.com) website. In addition to this manual, the user forums are the best place for information regarding the use, administration and maintenance of your NASLite+ file server.

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