

L2K DATA STORAGE SERVER



1	Before you get started.....	5
1.1	Content of this package	5
1.2	System requirements	5
1.3	Supported clients	5
1.4	Supported network protocols.....	6
1.5	Supported network file protocols.....	6
1.6	Required tools	6
1.7	Safety precautions	6
1.7.1	Personal safety	6
1.7.2	Safety for your data	6
1.7.3	ESD precautions	6
2	Features.....	7
2.1	What is L2K Data Storage Server.....	7
2.2	Description of the functions	8
2.3	Why L2K Data Storage Server?.....	8
2.4	RAID types	9
3	Hardware installation	10
3.1	Getting ready	10
3.2	Installing L2K Data Storage Server	10
4	Configuration.....	12
4.1	The basic configuration of the Data Storage Server computer.....	12
4.2	First-time operation of L2K Data Storage Server.....	12
4.3	Logging into L2K Data Storage Server	13
4.4	Create Disk Array	15
4.5	Adding Disk Array	15
4.6	Creating L2K Data Storage Server shares	17
4.6.1	Access to Windows Shares	17
4.6.2	Access L2K Data Storage Server shares under Linux.....	22
4.7	Creating L2K Data Storage Server iSCSI targets volume.....	22
4.7.1	Configuring end user workstation	24
5	Descriptions of function.....	25
5.1	Functions of the console display.....	25
5.2	Functions of L2K Data Storage Server via browser access	27
5.2.1	SETUP	27
5.2.1.1	Network	27
5.2.1.2	Administrator.....	32
5.2.1.3	H/W RAID	36
5.2.1.4	S/W RAID.....	36
5.2.1.5	Fibre Channel	42
5.2.1.6	iSCSI Initiator.....	42
5.2.1.7	Hardware.....	44
5.2.1.8	GUI	47
5.2.2	CONFIGURATION.....	47
5.2.2.1	Volume manager	47
5.2.2.2	NAS settings	54
5.2.2.3	NAS resources	63
5.2.2.3.1	Shares	64
5.2.2.3.2	Users	71
5.2.2.3.3	Groups	74
5.2.2.4	iSCSI target manager.....	77
5.2.3	MAINTENANCE	81

5.2.3.1	Shutdown	81
5.2.3.2	Connections	82
5.2.3.3	Snapshot	83
5.2.3.4	Backup.....	85
5.2.3.4.1	Backup devices	85
5.2.3.4.2	Backup tasks	88
5.2.3.4.3	Data replication	91
5.2.3.5	Antivirus.....	94
5.2.3.6	Miscellaneous.....	96
5.2.3.7	Software update	98
5.2.4	STATUS.....	99
5.2.4.1	Network	99
5.2.4.2	Logical volume	100
5.2.4.3	Connections	101
5.2.4.4	Hardware.....	101
5.2.4.5	Tasks.....	106
5.2.4.6	S.M.A.R.T.	106
5.2.5	HELP.....	109
5.2.5.1	Software License.....	109
5.2.5.2	About L2K Data Storage Server	109
6	Troubleshooting Guide.....	111
7	Appendix A.....	114
8	Appendix B.....	116

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About

I2k iSCSI-R3 was produced in cooperation by LAB2000 d.o.o and Open-E GmbH.

- Before you get started

Congratulations on purchasing L2K Data Storage Server, the ideal solution for network-based storage management. This manual will assist you as you install and configure the hardware.

In order to quickly reach the desired configuration, please read the following pages thoroughly. The time invested is well spent - after all, you have purchased this solution for your invaluable data.

1.1 Content of this package

Before you begin installing L2K Data Storage Server, make sure that the package contains the following items:

- L2K Data Storage Server flash module,
- Quick Start brochure,
- A CD containing the manual (this document), brochures, images and additional information material,
- Source CD.

If something is missing, please contact your dealer.

1.2 System requirements

- x86-compatible PC
- CPU (2 GHz Pentium IV),
- at least 512 MB main memory,
- USB port,
- One or several suitable hard drives (SATA,SAS, SCSI, ATA),
- Optionally hardware Raid controller, Fibre Channel and iSCSI Storage.
- Network Interface Card (NIC),

L2K Data Storage Server contains its own operating system no additional software is required.

- **note** In order to generate maximum performance, we recommend using a network card with 1 Gb or more (multicards 1Gb/s recommended for bonding), as well as a processor with at least 3 GHz. If several computers are accessing the DSS system, we recommend 1024 MB main memory or more.

1.3 Supported clients

- Microsoft Windows (all versions)
- Linux
- Unix
- Mac OS 8.0, 9.0 and OS X

1.4 Supported network protocols

- TCP/IP
- NetBEUI
- SNMP

1.5 Supported network file protocols

- SMB / CIFS / Samba
- Apple Talk
- FTP/sFTP

1.6 Required tools

- Grounding strap or mat in order to avoid electrostatic discharge (ESD)
- Tools for opening the computer's enclosure (typically, a screwdriver)

1.7 Safety precautions

1.7.1 Personal safety

- **caution** High voltages may occur inside computer equipment. Before removing the enclosure, please turn off the power switch and disconnect the power cords.

1.7.2 Safety for your data

If you are not using new hard drives for operating L2K Data Storage Server, please backup all important data prior to installation. Adding a hard drive to L2K Data Storage Server goes hand in hand with complete formatting of the hard drive, which can possibly delete existing data.

1.7.3 ESD precautions

In order to avoid damage to your computer or to L2K Data Storage Server, please ensure you are grounded before opening the PC or the ESD package that contains L2K Data Storage Server. Using grounding straps or mats is the best way to ensure this safety. If you don't have grounding equipment handy, please make sure you are grounded before working with L2K Data Storage Server, for instance, by touching a heater.

- Avoid unnecessary touching of the components inside the PC,
- Please touch L2K Data Storage Server only on the edges.

2 Features

L2K Data Storage Server is an all-in-one IP-Storage OS offering NAS and iSCSI (target and initiator) functionality in a single application with excellent enhanced management and superior reliability to organizations of all sizes.

2.1 What is L2K Data Storage Server

NAS (Network Attached Storage) solutions are defined as storage systems that are directly hooked up to a network infrastructure. Also, they operate independently and do not have to be connected to a server via a controller or host adapter. The term "storage" here generally refers to all systems that either provide data storage or actually store or organize data. Currently, data storage is the most common and most widespread type of NAS systems.

NAS solutions are based on a separate operating system (and often also on special hardware), which operates independently from the servers on a network. Typically, this operating system is software that is optimized for providing data (file server).

NAS solutions allow users to add additional storage to existing networks quickly, easily, and cost-efficiently.

iSCSI (internet SCSI) is a protocol that encapsulates SCSI (Small Computer System Interface) commands and data in TCP/IP packets for linking storage devices with servers over common IP infrastructures. By using iSCSI, you can supply high performance SANs (Storage Area Networks) using standard IP networks like LAN, MAN, WAN or the Internet.

iSCSI solutions are based on a separate operating system and often also on a special hardware. Typically, this operating system allows operating iSCSI technology.

iSCSI solutions allow users to add additional disk devices to existing networks quickly, easily, and cost-efficiently.

iSCSI is a client-server architecture. Clients of an iSCSI interface are called "initiators". Initiators issue iSCSI "commands" to request services from components, logical units, of a server known as a "target". The "device server" on the logical unit accepts iSCSI commands and processes them.

L2K Data Storage Server provides a fast, reliable, and scalable platform for IP-Storage and combines the power of NAS & iSCSI in a single operating system. Whether your need is for file sharing, storage consolidation, backup and recovery, virtualization or replication, L2K Data Storage Server offers excellent price-to-performance ratio, enhanced manageability, and increased productivity. The flexible design of L2K Data Storage Server enables organizations of all sizes to create effective NAS and/or IP-SAN/iSCSI solutions that can adapt to and solve the simplest or most complex storage needs.

L2K Data Storage Server is built on the proven Open-E NAS-XSR and Open-E iSCSI family with all of its superior security, stability and management advantages, and is Open-E's fourth generation of IP-storage software.

L2K Data Storage Server adds new back-up capabilities, simplified setup and storage management, extensibility, and is specially tuned to provide optimal data-throughput and data protection for centralized storage. L2K DSS increases iSCSI target efficiency by supporting multiple iSCSI initiators on different volumes, without sacrificing NAS performance.

2.2 Description of the functions

Open-E NAS Data Storage Server is one of the easiest ways of implementing an NAS server and/or an iSCSI technology in your network. Through its simple architecture - in principal, it is a flash memory with an USB 2.0/1.1 port and L2K Data Storage Server as its operating system - L2K Data Storage Server can be used with all x86 PCs containing, USB ports, IDE controller and additional SATA Controller on your main board or hardware controller.

To begin working with L2K Data Storage Server, all you need to do is assign an IP address to the NAS server and/or iSCSI target - either automatically through an existing DHCP server or by assigning it manually. All other settings are handled via a web front-end which can be easily accessed through the IP address of L2K Data Storage Server using the encrypted https protocol.

L2K Data Storage Server allows users to create so-called shares (i.e., resources within a network that numerous users or user groups have certain access too). The access rights to the shares are controlled through the user and user group settings.

L2K Data Storage Server allows users of client stations to delegate disk devices and aggregation and form iSCSI Targets and their local mounting from any site in the network.

2.3 Why L2K Data Storage Server?

Often, storage in network environments is expanded the following way: File servers have to be shut down in order to install additional drives. In the next step, they need to be reconfigured. In is tedious work data often has to be copied manually onto larger drives, consuming a lot of time and money.

With L2K Data Storage Server, you can

- Add storage to your existing network quickly, easily, and most important, cost-efficiently.
- Consolidated storage and backups for multiple servers.
- Improve data availability and efficiency.
- Lower costs by centralizing storage management.
- iSCSI also simplifies the installation and on-going management of a SAN versus using Fibre Channel.

Expensive hardware is, therefore, no longer necessary. Take any computer - a new rack server or an old desktop PC with USB ports 2.0/1.1- and exchange the system drive for the L2K Data Storage Server USB flash module. To store data, L2K Data Storage Server uses IDE (ATA) and SATA hard drives, connected to ports on your main board or hardware RAID controller.

Additionally Data Storage Server support software RAID, so you can create software RAID over single hard drives or over existing hardware RAID.

For example, you can create software mirror over two hardware RAID5 for very high reliability.

Within a few minutes, you will have up to several hundred gigabytes available on your network - without much effort and any downtime.

2.4 RAID types

This manual is not intended to replace your RAID controller manual. But we want to provide you with an overview of common RAID types so that you can make an informed decision on which type to choose. Depending on whom you ask, RAID means either Redundant Array of Independent Disks or Redundant Array of Inexpensive Disks. Both are correct. In essence, you combine the capacity, speed and security of several disks into one.

RAID 0 forms one large hard disk by concatenating stripes from each member drive. Stripe size is configurable roughly between 64 KB and 1 MB. The result is a lightning-fast RAID, but with no added security. One failing drive may ruin the entire RAID.

RAID 1 mirrors hard drives. By writing identical data onto more than one drive, security is enhanced. A completely defective drive does not cause any loss of data. The drawback is reduced performance and capacity.

RAID 5 combines data striping from RAID 0 with parity checking, therefore combining speed and improved security. The loss of one drive is tolerable.

RAID 6 extends RAID 5 by adding an additional parity block, thus it uses block-level striping with two parity blocks distributed across all member disks. It was not one of the original RAID levels. The user capacity of a RAID 6 array is $N-2$, where N is the total number of drives in the array. RAID 6 does not have a performance penalty for read operations, but it does have a performance penalty on write operations due to the overhead associated with the additional parity calculations.

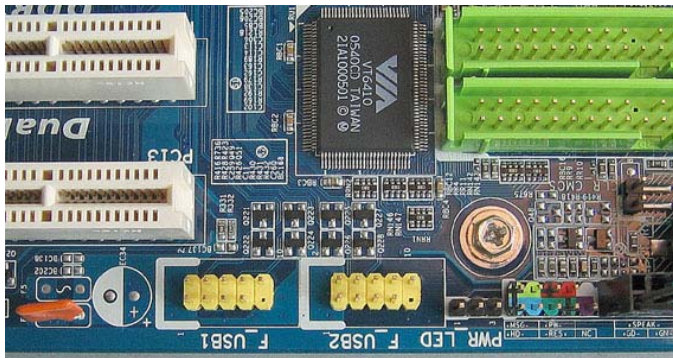
RAID 10 is a combination of RAID 1 and 0, hence the name. Data is written in a striped and mirrored configuration, providing high performance and robust security.

3 Hardware installation

3.1 Getting ready

Switch off the computer, remove the power supply, and open the PC's enclosure. In tower cases, the side parts often can be removed individually (on the backside of the enclosure you just need to remove a few screws). Many machines have U- or O shaped covers that have to be pulled off (either towards the front or the back). Should you need any assistance, please contact your dealer.

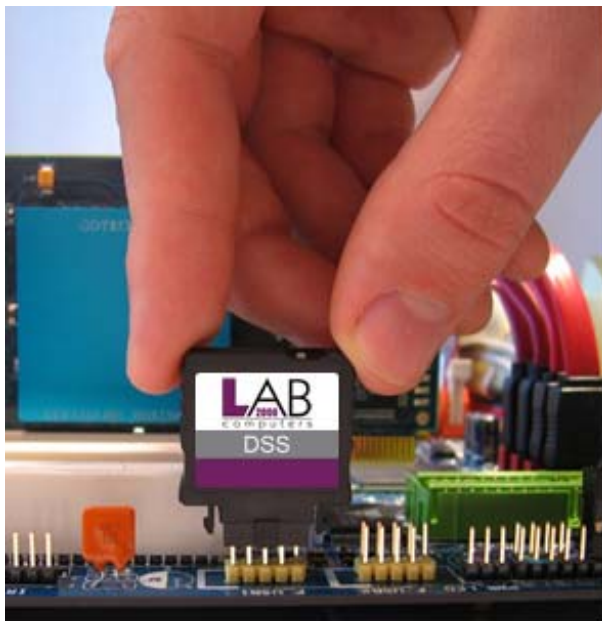
Now localize the USB connectors on your motherboard:



Every motherboard has at least two such ports. To install L2K Data Storage Server, you have to use one is existing.

3.2 Installing L2K Data Storage Server

If necessary, remove the flat band cable that connects your hard drive with the controller. L2K Data Storage Server should now carefully inserted into USB the connector. As USB ports can have a notch on one side, you can only insert the connector at the preset position (see photo).



That should conclude the installation! Before putting the enclosure on your computer again, do not forget to connect your hard drives to the IDE connector, SATA connector or to the SATA port on the RAID controller. If you have a CD or DVD drive, you can remove it, as L2K Data Storage Server does not support optical hard drives, but if you want to make an ISO update it is not necessary to remove the CD drives (see 5.2.3.7).

4 Configuration

4.1 The basic configuration of the Data Storage Server computer

Connect your keyboard and a monitor to the Data Storage Server computer. You will only need those devices for the basic configuration or extended maintenance configuration.

note You may have to change the function “Halt On: All Errors” in your PC's BIOS, so that the system starts even without the keyboard. The correct configuration is “Halt On: All But Keyboard.”

4.2 First-time operation of L2K Data Storage Server

Now start your system.



After booting is complete, L2K Data Storage Server will provide you with information on the current software version and the network settings:

```

Welcome to L2K Data Storage Server                               Press F1 for Help)
-----
Model:                L2K Data Storage Server
Version:              1.15.DB00000000.2553
Release date:        2007-02-05
S/N:                 0987004321

Network settings:
Interface 1:        eth0      IP: 192.168.0.220/255.255.255.0
Interface 2:        eth1      IP: 192.168.1.220/255.255.255.0

HTTPS settings:
port:               443
allow from:         all
  
```

If the network has a DHCP server, L2K Data Storage Server should gain access to the IP settings automatically. If that is the case, you can proceed at 4.3. If your network does not have a DHCP server, L2K Data Storage Server will start with the default settings: IP address 192.168.0.220 and subnet mask 255.255.255.0. You can change these values again by typing in the following key combination: left CTRL, left ALT and N. You can select a different IP address now. All other available functions on of the console will appear after pressing F1 key (see below).

```

-----Help-----
You can use below key sequences (C-means 'Left Ctrl',A-'Left Alt'):
C-A-N - to edit static IP addresses
C-A-P - to restore default factory administrator settings
C-A-I - to restore default network settings (IP, BONDING)
C-A-T - to run Console Tools
C-A-X - to run Extended Tools
C-A-W - to run Hardware Configuration
C-A-R - to run RAID Tools
C-A-F - to run Fibre Channel Tools
C-A-H - to display hardware and drivers info
F2    - to display all network interface
F5    - to refresh console info
C-A-S - to shutdown the system
-----
(100 %)
EXIT
-----

```

After a connection has been established, all settings can also be changed remotely via the web browser. If your network requires it, the address of the standard gateway and the broadcast address can be changed.

● **note** For additional information, please read the chapter “Functions of the console display”

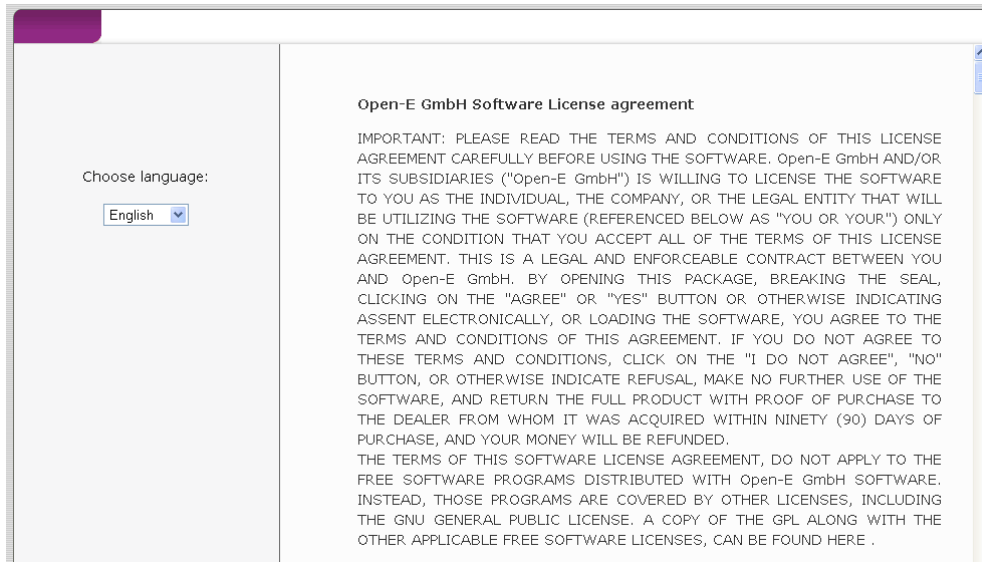
4.3 Logging into L2K Data Storage Server

You can establish a connection to L2K Data Storage Server from every network computer. To establish this connection, use a browser (e.g. Microsoft Internet Explorer) and enter the IP address or the name of the computer hosting the Data Storage Server R server into the URL entry line: <https://192.168.0.220> (standard address) or <https://dss> (this name can be changed in the installation of L2K Data Storage Server R).

● **note** For security reasons, L2K Data Storage Server uses the encrypted SSL protocol (https).

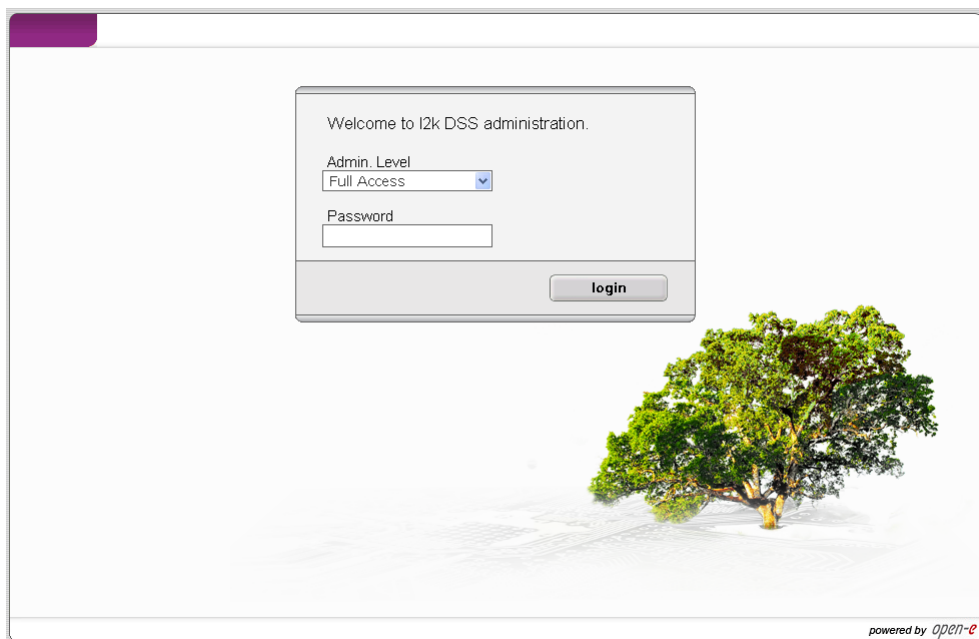
You will now be asked for verification of the encryption certification. Since L2K Data Storage Server does not allow for creating shares on the Internet but only on the Intranet, there is no need for global certification by an authorized body. You can accept the certificate for the session only, but also for all future use.

Now you have to accept the license in order to use the Open-E software and you can choose the language you want to use.



- **note** Page with the software agreement and available language option will be shown after first launching L2K Data Storage Server. Later you can change the language you can change using Language Settings, which are located in “server” through “setup”.

After accepting License agreement you can log into L2K Data Storage Server using the standard password “*l2k*” (this can be changed later). In order to start working, you can now set all parameters.



- **note** Password checking is case-sensitive. If you cannot log into L2K Data Storage Server, please check the status of the Shift and Caps Lock keys.
- **note** In case your web browser will show something different then expected, please delete the cache & cookies in settings menu of your web browser.

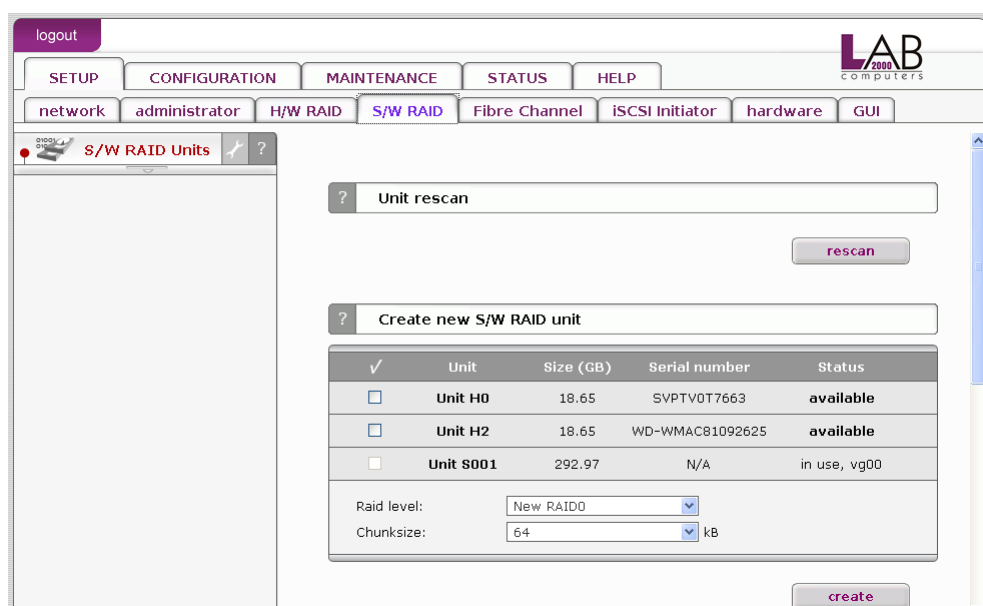
4.4 Create Disk Array

If system has Hardware RAID, please create RAID array in RAID controller setup. Please refer to the RAID controller manual. You do not have to install drivers or RAID array monitoring and maintenance software.

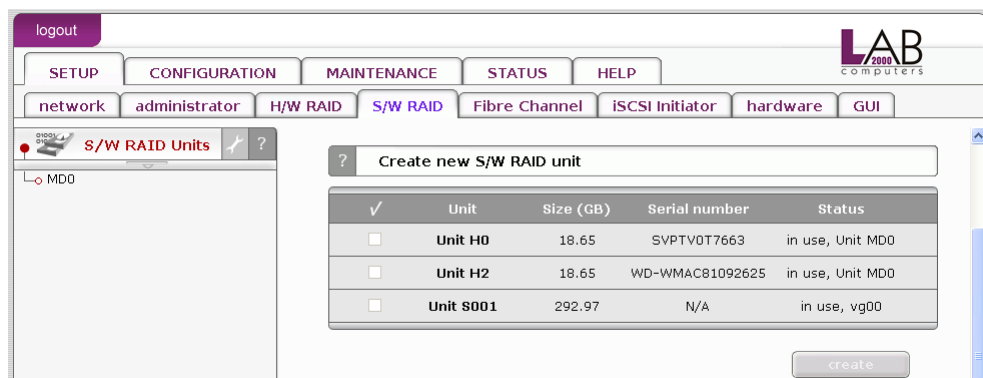
If system has only "on motherboard BIOS RAID", please do not use it. Such on motherboard RAID are not supported.

In case you want use software RAID with single drives or even with installed hardware RAIDs, please go to menu "SETUP" → "SW/RAID" first.

You will find the list of available units. A unit can be a single hard disk or disk arrays in case you have hardware RAID in the system. Software RAID can be created over a single hard disk or hardware disk arrays. To create a software RAID, please select units, choose the RAID level and click on "create" button.

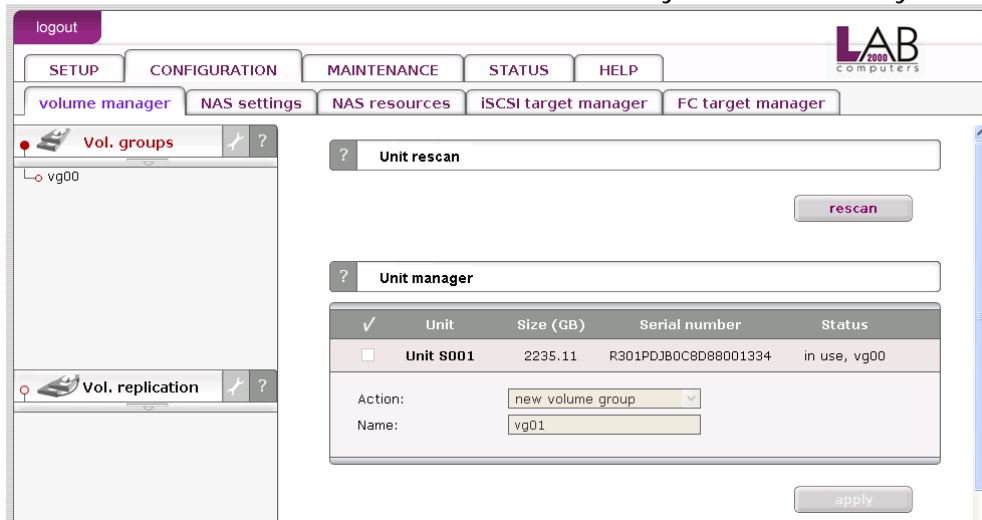


After clicking "create" button, the status will change to "in use" with additional information describing the kind of a disk array (e.g. MD0 is RAID 0)

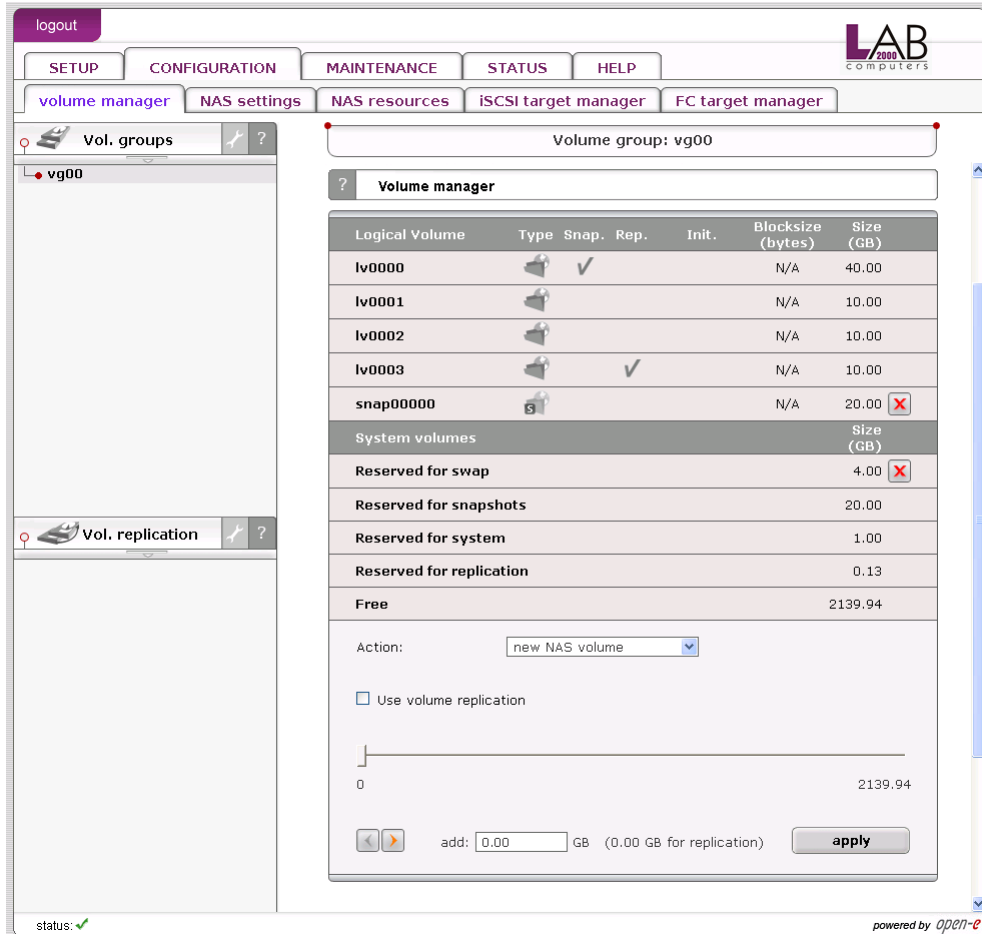


4.5 Adding Disk Array

- In the menu, please select the "CONFIGURATION" → "volume manager" and "Unit manager" function.
- You find a list of available drives/arrays (units) that can be used,
- While creating the "new volume group", the system adds selected units only. You can use default volume group name or change it. After creating, the page is reloaded and the "Status" field should show your drives/arrays as "in use",



- You can possibly to combine two (or more) units into one Volume Group. ext, by clicking on the right-hand side of the tree diagram on volume group name e.g. "vg00" and use function "Volume Manager" you can create new NAS volume and/or new iSCSI volume,
- If you want to use snapshot feature you should create snapshot volume.



Next, with use of function "Volume Manager" you can add disk volume to a new LV, or increase size of existing LV's (you can't decrease LV size). To set needed LV size just use scrollbar, next to which, on the right side is shown size available to use. This function can be also used to reserve disk space for swap, snapshots, system and replication.

4.6 Creating L2K Data Storage Server shares

In the menu, please select "CONFIGURATION" followed by "NAS settings." Here, you select the type of authentication. In smaller networks, this should be done via the used workgroup name, which has to correspond with the workgroup name of the client PC.

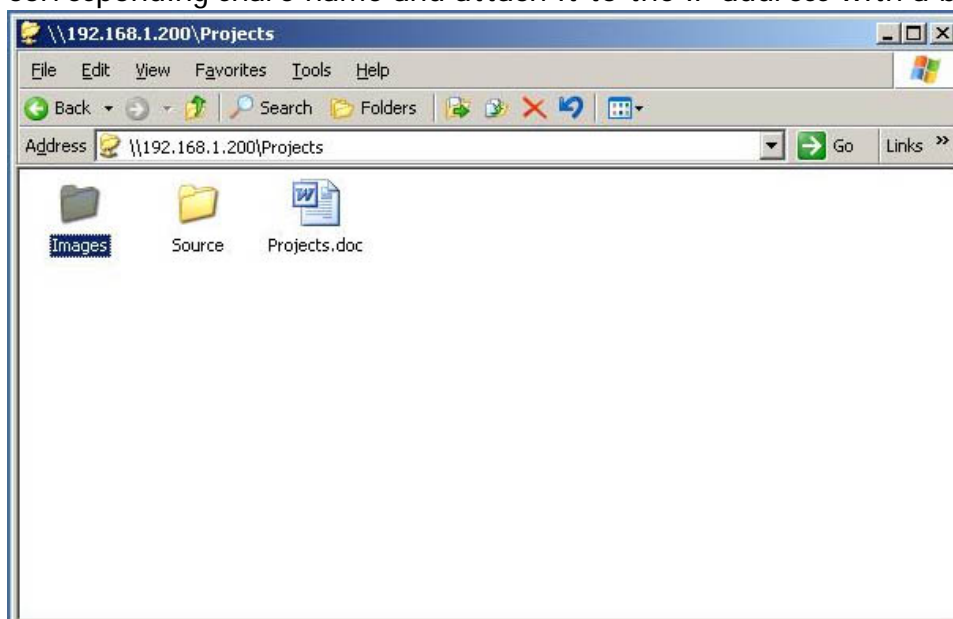
In the menu "CONFIGURATION" → "NAS Resources," select "Shares" on the right-hand side of the tree diagram. Now create the first share.

- **note** The workgroup/domain name that was configured in L2K Data Storage Server has to match with the network settings. Otherwise, the configured shares are not visible in the network environment.
- **note** If you made changes to the workgroup and server name in L2K Data Storage Server configuration, it can take some time until each workstation computer in the Windows network detects the new name.

4.6.1 Access to Windows Shares

The access to newly created shares is generated via the Windows Explorer. After entering the IP address of your L2K Data Storage Server (in this example \\192.168.1.200), all visible shares should be available immediately. Please keep in mind that sometimes it takes a few minutes for the new shares or changes to become accessible.

When accessing invisible shares, you need to know beforehand the corresponding share name and attach it to the IP address with a backslash (\\):



Open-E supports Windows ACL (Access Control List) for read, write and execute options, but based on the POSIX standard written by SGI.

Some examples how to use ACL (with ADS or PDC authentication):

1. Deny access to a Directory for every user (group):
 - a. Create a new folder or select one of your existing folders (you must be the owner or superuser to set ACL permissions)*
 - b. Go to the "directory properties" (right mouse click on the directory then choose "Properties")
 - c. Select a the "security" tab
 - d. Choose the group "Everyone"
 - e. Click the "Remove" button - only you and your group will have access to the selected directory **
 - f. Click the "Apply" button

Now only you have permissions to access this directory.

2. Allow full access for a group "WORK" to this Directory:
 - a. Make sure that the group WORK is created
 - b. In the security window click the "Add" button
 - c. Click the "Remove" button (point 1)
 - d. Select the group "WORK" (Advanced → Find Now will show you all users and groups) and click OK
 - e. Enable Full Control in the "Allow" column
 - f. Click the "Apply" button

3. Set "read only" permissions to the file for everyone:
 - a. Create a new file (you must be the owner or superuser to set permissions)*
 - b. Go to the permissions window
 - c. Select the "Everyone" group
 - d. Leave only a "read" permission in "Allow" column
 - e. Click the "Apply" button
 - f. Make the same for your group and yourself

Now the group "Everyone" has "read only" permissions to this file.

4. Changing the directory owner:
 - a. On Open-E web interface go to resources → shares
 - b. In the "Set Superuser" function select your user and restart connection (maintenance → shutdown → Function Connections reset) or wait about 15 minutes
 - c. Go to the directory/file properties (right mouse click → properties on the directory and click the "security" tab)
 - d. Click the "Advanced" button
 - e. Select the Owner tab
 - f. Click the "Other Users or Group" button and select the user that will be a new owner (Advanced → Find Now will show all users and groups), click OK***

- g. Select the user from the list and click OK and the "Apply" button
 - h. Click OK and re-open this window to refresh owner.
5. Allow a full access for the user "BIG BOSS" to this Directory
 - a. Make sure that the "BIG BOSS" exists
 - b. In the security window click the "Add" button
 - c. Select the user "BIG BOSS" (Advanced → Find Now will show you all users and groups) and click OK
 - d. Enable Full Control in the Allow column
 - e. Click the "Apply" button
 6. Allow "read" access for a group "COMPANY" to this directory
 - a. Make sure that the group "COMPANY" exists
 - b. In security window click the "Add" button
 - c. Select the group "COMPANY" (Advanced → Find Now will show you all users and groups) and click OK
 - d. Enable "Read & Execute" in the Allow column
 - e. Click the "Apply" button
 7. Make "read only" directory with a full access subdirectories for the group "ALL" (using inheriting permissions)
 - a. Create a folder "ROOT"
 - b. Go to the security window
 - c. Remove both "Everyone" and "Your" group
 - d. Click the "Advanced" button and then the "Add" button
 - e. Select the "ALL" group and click OK
 - f. Change "Apply onto" to "This folder only"
 - g. In permissions leave only "Traverse Folder / Execute File" and "List Folder / Read Data". Click OK
 - h. Click once again the "Add" button and add ALL group
 - i. This time select "Apply onto" to "Subfolders and files only" (this step will submit any inherited permissions)
 - j. Select "Full Control" and OK
 - k. Click "Apply" to save permissions.

With these settings users from the group "ALL" cannot remove the "ROOT" folder or make any changes to its contents. All new files/folders will be created based on the access given by inherited permissions.

Example:

 - file /ROOT/some_file.txt can be changed but can not be removed
 - directory /ROOT/directory can not be removed but a users from the group ALL can create folders and files in this directory.
 - file /ROOT/directory/my_file.txt can by removed and changed by the group ALL (if inherited permissions wasn't changed)
 8. Inherited permissions

If the file or directory has inherited permissions, all newly created subfolders will inherit the main folder permissions. All permissions can be changed. Please keep in mind that changing permissions in the main folder will trigger the same changes to the inherited permissions of any subfolder within.

9. UNIX Rights in Windows: Folders permissions

Permissions	--x	r--	-w-	r-x	rw-	-wx	rw-x
Traverse Folder / Execute File	√			√		√	√
List Folder / Read Data		√		√	√		√
Read Attributes	√	√		√	√	√	√
Read Extended Attributes		√		√	√		√
Create Files / Write Data			√		√	√	√
Create Folders / Append Data			√		√	√	√
Write Attributes			√		√	√	√
Write Extended Attributes			√		√	√	√
Delete Subfolders and Files							√
Delete							√
Read Permissions	√	√	√	√	√	√	√
Change Permissions							√
Take Ownership							√

Example application of ACL permission in a small company.

The company has 10 users

Name	Group	Position	Rights
Chris	Firma	Director	All rights for everything
Robert	Firma	Manager	All rights for everything besides Directors home directory
Jennifer	Firma	Secretary	Read access to "DOCUMENTS" directory
Clint	Firma Developers	Main Developer	Read and write to "DEVELOPERS" directory read and write to "CHANGES" directory
Brad	Firma Developers	Developer	Read in „DEVELOPERS“ Read and write in „Changes“
Johnny	Firma Developers	Developer	Read in „DEVELOPERS“ Read and write in „Changes“
Tom	Firma Developers	Developer	Read in „DEVELOPERS“ Read and write in „Changes“
John	Firma Graphics	Graphic Designer	Read in „GRAPHICS“ Read and write in „Changes“
Ben	Firma Graphics	Graphic Designer	Read in „GRAPHICS“ Read and write in „Changes“
Bill	Firma	Cleaner	Only access to his home directory

First create users and groups in Your Domain:

- Run Menu Start → Programs → Administrative Tools → Active Directory Users and Computers
- Right mouse click on your domain name and select New → User

- c. Enter all necessary fields to create user Chris.
- d. Create all users (back to point 2).
- e. Click with right mouse click on your domain name and select New → Group
- f. Create groups: Developers, Graphics, and Company.
- g. Add users to groups - right mouse click on group Developers. In Members tab click Add. Add users to groups (groups Company, Developers, Graphics)

Connection to windows domain:

- a. Go to L2K DSS Web interface "Configuration" → "NAS settings"
- b. Select ADS or PDC (depends on your system - if you have NT4 Domain or Windows 2003 (with no Kerberos**** fix) then select PDC, else select ADS).
- c. Enter your domain name - in PDC this will be the number IP and administrator password in ADS enter the full domain name (example. COMPANY.COM.DE).
- d. Enter your domain/Kerberos server IP
- e. Enter the name and password of an existing Administrator user account on your domain.
- f. Click the "Apply" button to join the domain.

Creation of shares and set permissions:

- a. Create a Company share (Open-E NAS web interface → Configuration → NAS Resources → Shares).
- b. Set permissions for all or select only Company groups.
- c. Go to share \\YOUR_NAS_SERVER_NAME\Company
- d. Create folders "WORK", "HOME" and "FORALL".
- e. Set permissions for the folder WORK - right mouse click → properties → security.
- f. Deny access for everyone (point 1), change the owner to Chris user (point 4) with a full access and add Robert with a full access.
- g. In the folder WORK create folders DEVELOPER, GRAPHIC, DOCUMENTS and CHANGES.
- h. Change the owner of the DEVELOPER directory to Clint (with full rights). Add group Developers with a "read only" access.
- i. Add group Graphics with a full access to the directory GRAPHIC.
- j. Change the owner of the CHANGES directory to Clint (with full rights). Add groups Graphics and Developers with full rights.
- k. Add a secretary to the DOCUMENTS directory with a "read only" access.
- l. In the home directory create own private directory for each user, change user (make that the owner and the directory name are the same). Remove an access for the Company group (point 1).
- m. Add the group Company with a full access to the directory "FOR ALL".

* If you use the SUPERUSER all files and directories will be created as a local ROOT user.

** New directories with no inherited permissions do not have ACL permissions at the beginning - they have only standard UNIX permissions 0777 (Windows 2003 shows - in a normal view in the

security window - every special permission. Windows 2000 does not show any permission in normal view - only in the advanced view). To enable ACL for this directory, first select "Full Access" for everyone and click the "Apply" button. Subsequently do the same for your group and your user. Subdirectories created in this directory should have ACL permissions inherited from the parent. If permissions are inherited then the "ALLOW" column is grey. To disable permission just use the "Deny" column.

If you change ACL permissions always check that a new set of permissions for one group does not interfere with permissions for the other user/groups or any connections between these accounts. Windows 2003 handles much better such changes than Windows 2000.

*** This function is available in Windows 2003 - in other Windows versions only your user can be selected.

**** Kerberos is a server for distributing security keys. Normally it is only on the domain but it can be on some external server. In Windows 2003 this server is ignoring specified key types, and authorization works only when entering IP not the DSS name.

4.6.2 Access L2K Data Storage Server shares under Linux

Please use following line to mount an NFS share:

- `mount -t nfs 192.168.0.220: /share/share_name /local_mount_point`
where:
192.168.0.220 is the L2K Data Storage Server IP

Please use following line to mount an SMB share:

In a shell:

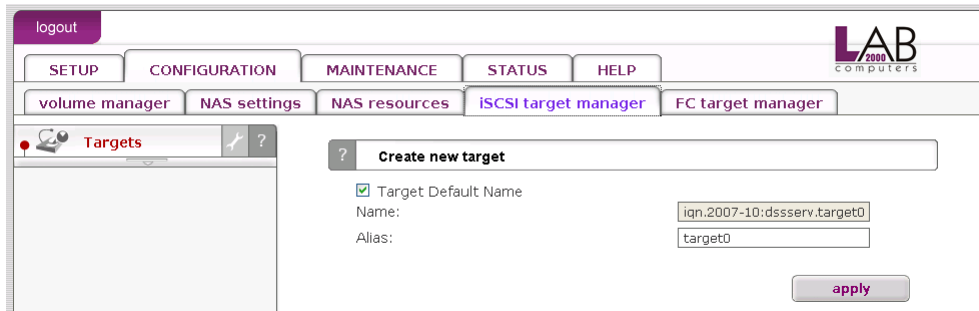
- `mount -t smbfs -o username=root,password=12345 //192.168.0.220/test /mnt-smb`
where 'test' is the share name

In X-windows:

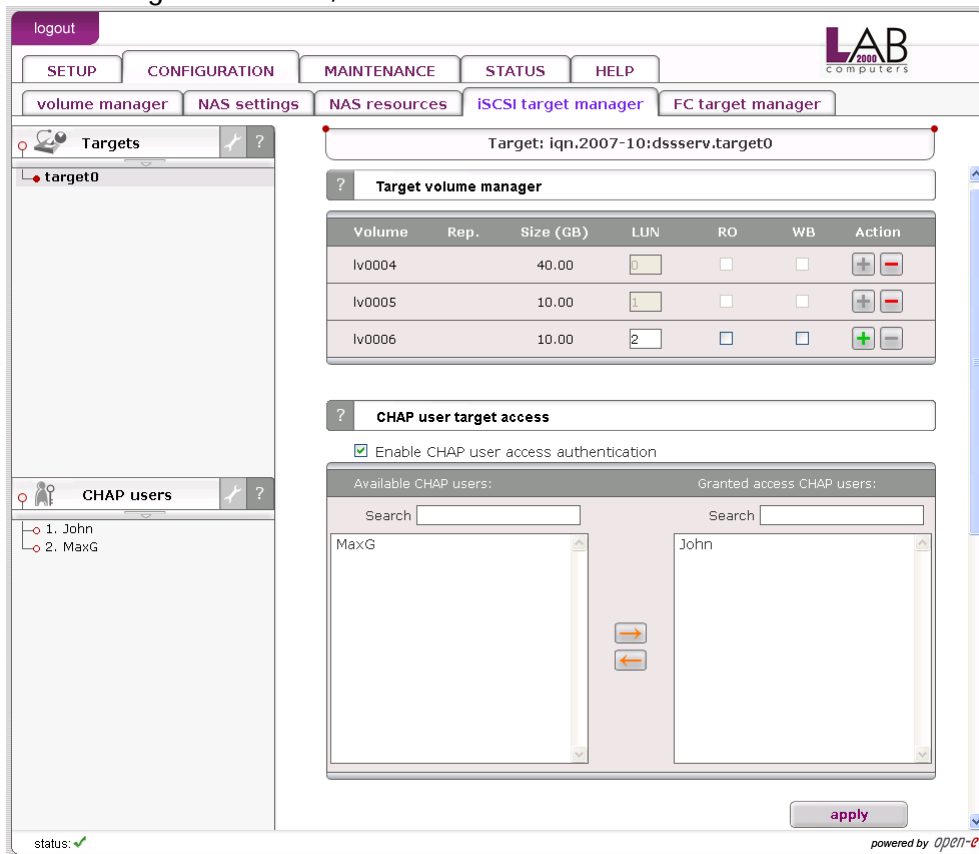
- `Smb://root@192.168.0.220/`

4.7 Creating L2K Data Storage Server iSCSI targets volume

After creating iSCSI volume (in 4.5) , please choose "CONFIGURATION" → "iSCSI target manager", in "Create new target" Function click "apply" button to create a new iSCSI target,



Next, in the diagram “Targets”, click on the previously created target name e.g. “target0” and in “Target volume manager” function click “add” button by the desired logical volume,



In “Target Volume Manager” Function, you can add “targets volumes” only in the premises of one vg0.

note Please create as many logical volumes, as many separate iSCSI volumes (LUNs) are required (in step 8).

If you create 5 logical volumes, you may create one target with 5 LUNs, or 5 targets with 1 LUN every, or 2 targets, where i.e. 3 LUNs belongs to first target and rest 2 LUNs belongs to the second one.

By clicking “CHAP users” on the branch, you can management the name and secure access to “logical volume” by giving CHAP user name and password (password must consist from 12 to 16 characters if you use Microsoft iSCSI Initiator).

4.7.1 Configuring end user workstation

For iSCSI technology to work correctly on end-user computers, you need to install iSCSI Initiator software (if it is not provided with the operating system). For Microsoft Windows 2000/XP/2003 systems, it is an option and the Microsoft iSCSI Initiator is available to download from the web.

Correct software configuration depends on installing individual "target volumes" by adding another disk letter in the system (in Windows XP and 2003) or as subfolder the same as with folders in UNIX system. All these functions are available via "administrative tools" → disks management.

How to connect iSCSI in Windows 2000/XP/2003:

- a. First, you have to install the iSCSI Initiator package. You must be logged in as administrator to install the Microsoft iSCSI Software Initiator package,
- b. Next, launch iSCSI Initiator software,
- c. If you set passwords on iSCSI and Target Access, on branch "General", click on "Secret", enter your passwords, and after entering each click "O.K." button (your passwords is "Target secret"),
- d. In branch: "Discovery" click button "Add", then enter your L2K Data Storage Server IP address,
- e. Next click "Advanced..." button, and mark "CHAP logon information", next give User name and Target secret and then two times click "O.K." button,
- f. In the branch "Targets" you will see name of available iSCSI targets e.g. "iqn.2006.10:dss.target0",
- g. Click "Log On" button, and if you entered password, you have to do the same as in point "e", then press "O.K." button, then the chosen target status will change for "Connected"
- h. Next choose settings → control panel → administrative tools → computer management → disk management,
- i. Now all available iSCSI TARGET drives will be displayed. In order to use them you have to format them and mount to the system as a next disk letter.

● **note** Microsoft iSCSI Initiator ver. 2.02 does not support dynamic disk. Target password must consist of minimum 12 and maximum 16 alphanumeric characters. Please read Manual and Release Notes of Microsoft iSCSI Initiator for more details, which you can also find on Microsoft website.

● **note** Please do not ignore time settings on L2K DSS iSCSI target and client station. Those settings must be the same. Time can be synchronized in the menu Web Interface "Setup" → "hardware" in Function "Set time"

5 Descriptions of function

5.1 Functions of the console display

While L2K Data Storage Server can be fully administered remotely through a secure Web interface, some of the functions you can access on the console. L2K Data Storage Server constantly displays following basic parameters:

- IP address
- Https settings

CTRL+ALT+n

If you press the left CTRL key + the left ALT key + n, you will be asked for the new IP address and the subnet mask. The DHCP server will be shut down.

CTRL+ALT+p

If you press the left CTRL key + the left ALT key + p, the access restrictions are lifted by entering the administrator password (in addition, there is a reset to the standard https port 443).

CTRL+ALT+i

By pressing a combination of left CTRL key, left ALT key and i, you can reset the original IP address (192.168.0.220) and BONDING. In this process, the DHCP server support is turned off.

CTRL+ALT+t

By pressing a combination of left CTRL key, left ALT key and t, you can run Console Tools. The menu will appear, with choice of following functions: Ping, DHCP Ping, Hardware info, Memory info, Time configuration, Language settings, Modify driver options, Console lock/unlock and Boot options.

CTRL+ALT+x

By pressing the left CTRL key, left ALT key and x, it will display extended tools.

CTRL+ALT+w

By pressing the left CTRL key, left ALT key and w, it will display hardware configuration.

CTRL+ALT+r

By pressing the left CTRL key, left ALT key and r, it will display to run RAID Tools

CTRL+ALT+f

By pressing the left CTRL key, left ALT key and f, it will display to run Fibre Channel Tools.

CTRL+ALT+h

By pressing the left CTRL key, left ALT key and h, it will display hardware and driver information.

F1, F2 and F5

Function key F1 is available to display help information while F5 will reset the console display to default. If you press F2 key all network interface will be displayed.

Shutting down and restarting

With Ctrl + ALT + DEL the L2K Data Storage Server host computer will be shut down and restart, while CTRL + ALT + S shut it down. Please be careful with this option when users are connected.

ESC menu

Boot menu is available by pressing ESC after POST (Power-on self-test) during the initial start of L2K Data Storage Server system. After pressing ESC, there will appear menu with possibility of launching DSS in different procedures of work or memory testing:

- DSS-Single - system launch with (kernel) for one CPU,
- DSS-SMP - system launch with (kernel) for more CPU's system,
- NAS-x86 - system launch with restrictions of 4GB RAM(this procedure should work on every unit with CPU better than 386 and with CPU C3),
- DSS-Single (Intel I/TA support) - system launch in procedure with one CPU,
- DSS-SMP (Intel I/TA support) - system launch in multiple-CPU,
- Memtest - after choosing this option , memory of the system, where L2K Data Storage Server is installed, will be tested, Apart from test, there are also available information about the memory itself and its settings,
- DSS-RESCUE_MODE - in this option only drivers which enables access to the net are loaded (if there is a need to connect using remote support).

5.2 Functions of L2K Data Storage Server via browser access

On the following pages, we will thoroughly describe every function of L2K Data Storage Server. The functions are divided by menu options, which are located at the top part of the screen.

5.2.1 SETUP

In this place you can manage network interfaces, administrator settings, hardware RAID controllers, create disk array using software RAID, Fibre Channel, iSCSI initiator, hardware and GUI settings.

5.2.1.1 Network

Here you can find tree containing network interfaces. Click on Interface name to see more information about selected interface.

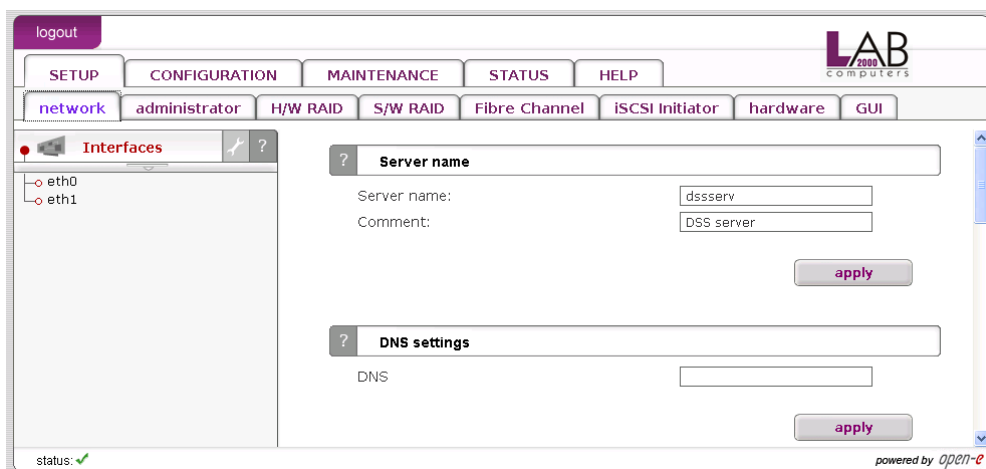
Function: Server name

Please enter server name to clearly identify your server.

In the field "Comment," please enter short description of your server.

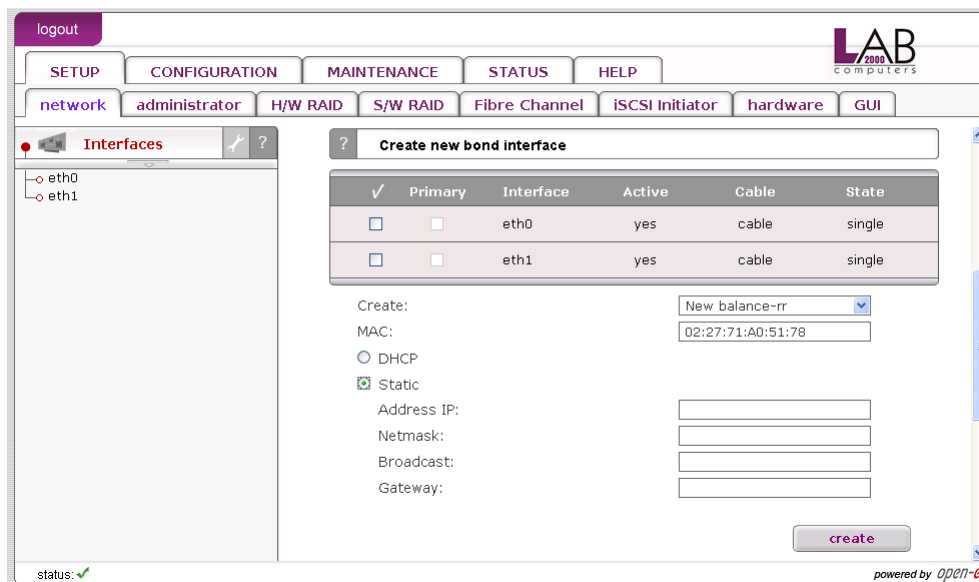
Server Name and Comment rules:

- Please make sure the server name is unique in your network.
- Select a server name that clearly identifies your new server.
- Please do not use spaces and special characters like: ~!@#\$%^&()+ []{}*;"',%|<>?/\='`_
- Server Name can not consist of digits only.
- Comment is not displayed in some systems.



Function: DNS settings

This function enables you to enter DNS addresses. Please use semicolons to separate addresses.



Function: Create new bond interface

Bonding allows for load-balancing or fail-over for the incoming and outgoing connections. Here you can create or edit bonding network interface.

In order to create bonding interface:

- select network interfaces from which you want to create a new bonding interface.
- select desired bonding mode from Create drop down menu.
- select dynamic (DHCP) or static configuration of network interface.
- if you want to dynamically get DNS address, select "get DNS".
- when using static configuration of network interface enter address IP, netmask, broadcast and gateway apply Create button, new bonding interface will be created now.

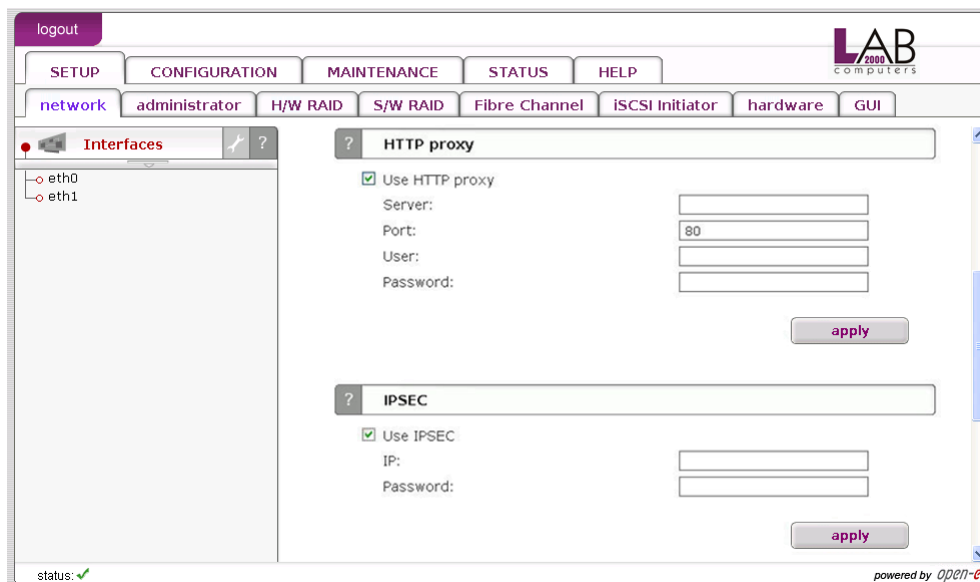
note In order to take advantage of bonding more than one Ethernet NIC needs to be plugged into the box.

Each network interface is described by following fields:

- Primary
A string (eth0, eth2, etc) specifying which slave is the primary device. The specified device will always be the active slave while it is available. Only when the primary is off-line will alternate devices be used. This is useful when one slave is preferred over another, e.g., when one slave has higher throughput than another. The primary option is only valid for active-backup mode.
- Interface
Network interface name.
- Cable
Shows if cable is connected to NIC.
- State
Describes state of the network interface. NIC can be in bonding state or single.

Bonding modes:

- **balance-rr**
Transmissions are received and sent out sequentially on each bonded slave interface. This mode provides fault tolerance and load balancing.
- **active-backup**
Only one slave in the bond is active. Another bonded slave interface is only used if the active bonded slave interface fails. This mode provides fault tolerance.
- **balance-xor**
Transmit based on [(source MAC address XOR'd with destination MAC address) modulo slave count]. This selects the same slave for each destination MAC address. This mode provides load balancing and fault tolerance. This mode provides fault tolerance and load balancing.
- **broadcast**
Transmits everything on all slave interfaces. This mode provides fault tolerance.
- **802.3ad**
IEEE 802.3ad Dynamic link aggregation. Creates aggregation groups that share the same speed and duplex settings. Utilizes all slaves in the active aggregator according to the 802.3ad specification. Requires a switch that supports IEEE 802.3ad Dynamic link aggregation.
- **balance-tlb**
Channel bonding that does not require any special switch support. The outgoing traffic is distributed according to the current load (computed relative to the speed) on each slave. Incoming traffic is received by the current slave. If the receiving slave fails, another slave takes over the MAC address of the failed receiving slave. This mode provides fault tolerance and load balancing.



Function: HTTP proxy

With this function you can enable or disable HTTP proxy.

To enable HTTP proxy:

- select "Use HTTP proxy"
- enter server name, port, user and password
- click "apply" button

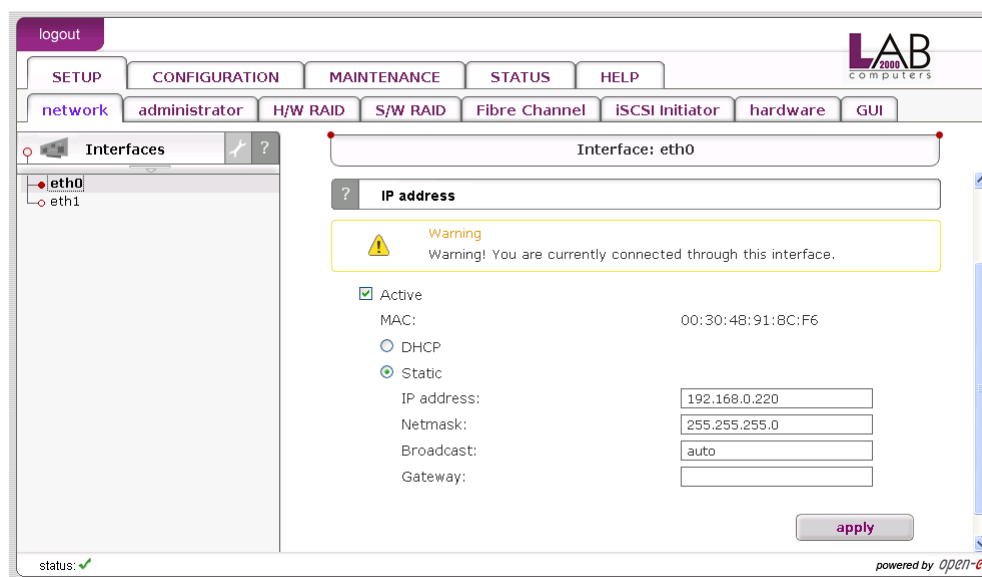
Function: IPSEC

IPSEC provides strong authentication and encryption for the connections. It makes nearly impossible to eavesdrop or forge the transmitted data. You can set IP address (optionally with a mask) of the clients that will be allowed to connect to the iSCSI target. You also must set the Password.

The Password cannot:

- contain spaces,
- be empty,
- contain ' " `

- **note** Encrypted data transmission imposes considerable overhead and depending on the amount data transmitted can impact the performance significantly.



Function: IP address

Here you can set TCP/IP parameters for selected NIC.

Activate

You can activate or deactivate network interface by setting this checkbox.

DHCP / Static.

You can use static or dynamic (DHCP) network interface configuration.

Get DNS

If you want to dynamically get DNS address, select "get DNS".

When using static configuration of network interface, enter:

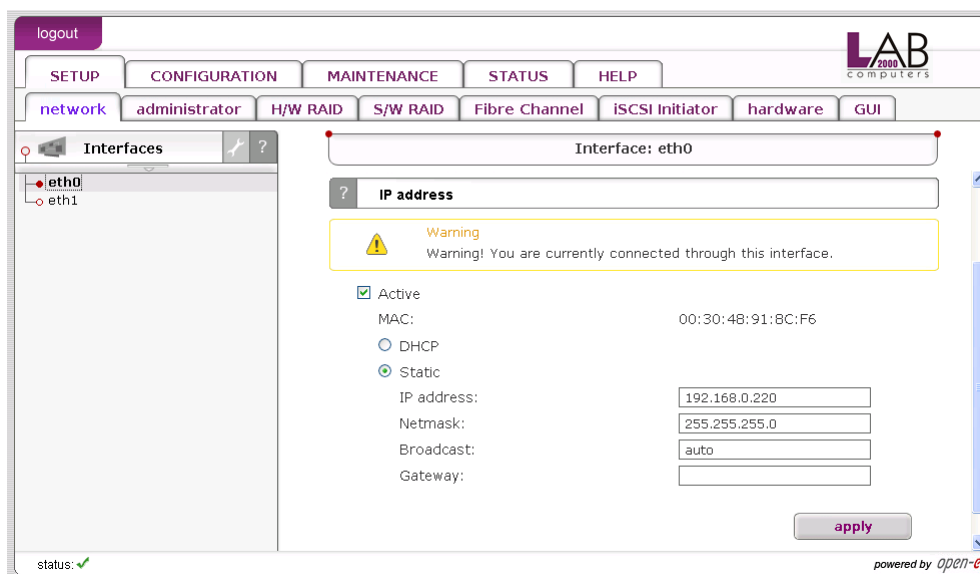
- address IP,
- netmask,
- broadcast,
- gateway.

If you set new IP address, during activation, you will lose your connection to the server and you will have to log in again. In the URL entry line of your browser, please enter the new IP address.

If you do not get access, please try the console to set new IP address. In order to access servers in another subnet, you need to enter the address of a router as Gateway.

note In case you use NTP server to maintain proper time & date, please make sure you have proper Gateway and DNS settings.

In case of creating bonding interface on left page will appear new branch "bond0". By clicking on the branch "bond0" you have the possibility of bonding's settings and removal (see below).



Function: Bond interface settings

Here you can edit a bonding network interface.

To remove network interface from bonding select it in field remove and click "apply" button. Bonding can be deactivated by setting of "Active" option. You can change bonding interface network configuration, you can use static or dynamic (DHCP) network configuration.

Each network interface that belongs to bonding interface is described by following fields:

Primary:

A string (eth0, eth2, etc) specifying which slave is the primary device. The specified device will always be the active slave while it is available. Only when the primary is off-line will alternate devices be used. This is useful when one slave is preferred over another, e.g., when one slave has higher throughput than another. The primary option is only valid for active-backup mode.

Interface:

Network interface name.

State:

Shows if NIC is connected.

Function: Remove bonding

Here you can remove a bonding interface.

5.2.1.2 Administrator

Function: Administrator access

Use this function to restrict access to the server administration.

Set port

You can change https port (default 443)

IP address

You can assign IP addresses (separated by a semicolon) that are granted to access the Server Web administration. This field left blank means no restriction.

Lock console without password

Disables access to the console (and LCD keys)

Lock console with password

To get access to the console (and LCD keys) you need to type password. Note that this password should be exactly 8 characters long and include only 1-4 digits.

Unlock console

Unrestricted access to the console

note Please exercise caution with this function if all computers in the network receive IP addresses via DHCP: current IP can be replaced by a new one after the lease ends. Please pay attention using Lock console feature - you will not be able to reset default administrator access from the console in case of any mistake setting IP address. To restore default settings you have to re-update software in the L2K Data Storage Server module or contact technical support.

Function: Administrator password

Using this function, you can change the passwords of the server administration accounts.

Enter password

Please enter your new password.

Confirm password

Please retype your new password.

Password cannot contain:

- characters: ' " `
- spaces.

The default password for each account is "l2k".

- **note** Password-checking is case-sensitive. For security reasons, the password you enter will not be displayed. Please check the status of the Shift and Shift Lock keys.

The screenshot shows a web interface for server administration. At the top, there is a navigation menu with tabs: SETUP, CONFIGURATION, MAINTENANCE, STATUS, and HELP. Below this, there is a sub-menu with tabs: network, administrator, H/W RAID, S/W RAID, Fibre Channel, iSCSI Initiator, hardware, and GUI. The main content area is titled "E-mail notification" and contains the following settings:

- Send errors
- Send test message
- E-mail account settings:**
 - E-mail:
 - Use authentication
 - Account name:
 - Password:
 - SMTP Server:
 - Hide advanced <<**
 - Port:
 - Encrypted
- Destination e-mail:**
 - Use default account e-mail
 - Others:

At the bottom of the form is an "apply" button. Below the form, there is a section for "SSL certificate authority" with a link to "Download SSL Certificate for your browser [SSLCert.crt](#)". The status bar at the bottom left says "status:" and the bottom right says "powered by open-e".

Function: E-mail notification

The server can send an e-mail notification to the administrator in case of significant events, critical errors, warnings, etc. To enable this feature check Send errors.

E-mail

E-mail from which notifications will be send.

Account name

Account name for e-mail from which notifications will be sent.

Password

Password for account name provided above.

SMTP server

SMTP server name.

Destination e-mail

Administrator e-mail address to which notifications will be sent.

Port

Port number for SMTP server.

If you want to send a test message, please check option Send test message.
If you want to have e-mail notifications encrypted, check option Encrypted.

Function: SLL certificate authority

To ensure the identity of the web administration tool by letting your web browser automatically check it whenever you connect for administration tasks, click the SSLCert.crt link to download and install the certificate into the certificate management system of your browser.

The screenshot displays the LAB2000 web administration interface. At the top, there is a navigation menu with tabs for 'logout', 'SETUP', 'CONFIGURATION', 'MAINTENANCE', 'STATUS', and 'HELP'. Below this, a secondary menu shows 'network', 'administrator', 'H/W RAID', 'S/W RAID', 'Fibre Channel', 'iSCSI Initiator', 'hardware', and 'GUI'. The main content area is divided into two sections:

- SNMP settings:** This section includes a checkbox for 'Use SNMP' (checked), radio buttons for 'Use SNMP v2' and 'Use SNMP v3' (v3 is selected), and input fields for 'Community:', 'Password:', 'Confirm password:', 'Contact:', and 'Location:'. An 'apply' button is located at the bottom right of this section.
- Remote console access:** This section includes a checkbox for 'Remote access set' (checked), and input fields for 'Allow IP:' (containing '192.168.1.5'), 'Set port:' (containing '22222'), 'Password:', and 'Confirm password:'. An 'apply' button is located at the bottom right of this section.

At the bottom left of the interface, there is a 'status:' label, and at the bottom right, it says 'powered by OPEN-E'.

Function: SNMP settings

This function enables you to change the access over the SNMP protocol in version 2 or 3.

With SNMP you can get a lot of information (usage of CPU, system load, memory info, ethernet traffic, running processes).

System location and system contact are only for your information, for example when you connect from SNMP client, you will see your location and name.

SNMP in version 3 has encrypted transmission and authentication by community and password.

SNMP in version 2 does not have encrypted transmission and authentication is only by community.

The community you are setting can be max up to 20 characters and password min 8 characters.

Links to SNMP clients:

- <http://www.muonics.com>
- <http://www.mg-soft.com>
- <http://www.adventnet.com>

Function: Remote access

Using this function, you can administrate console tools remotely by ssh protocol (secure shell). Default user is 'cli' and you cannot change it, but password can be change.

Allow IP

You can assign IP addresses (separated by a semicolon) that are granted to server remote access. The field left blank means no restriction.

Set port

Default port is 22222 for security reasons, because high ports are invisible for port scanners. You can change it only from range 1024-65535 except ports already used.

Password

Length of password is minimum 8 characters. Be sure to use strong passwords.

Confirm password

Please retype your new password.

Password cannot contain:

- characters: ' " ` ^ & \$ # [] \ | *
- spaces.

To connect to server from Linux/MacOSX systems use:

```
ssh -2 -p 22222 -l cli address_ip
```

where:

- option: -2 is a version of ssh protocol used for connection.
- option: -p is a port for Remote Access.
- option: -l is a user (In our product the user must be "cli").
- option: address_ip is a address of server you want to connect to.

You will be ask for a password you entered on server for Remote Access.

To connect to server from Microsoft Windows, download free ssh client Putty (www.putty.nl). Please follow step-by-step below in order to configure putty client:

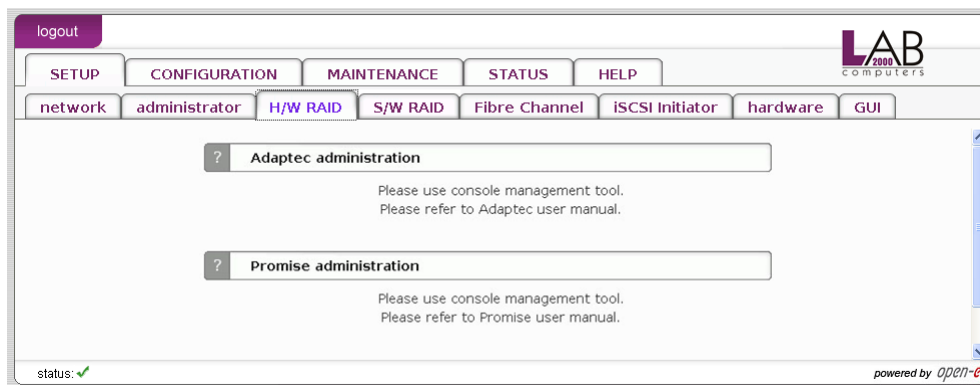
- In Host Name (or IP address) field please enter IP address of the server
- In Port field please enter the same port as in the server GUI (default 22222)
- In Protocol please choose SSH
- In Category: Connection -> Data -> Auto-login-username please enter: "cli"
- In Terminal -> Keyboard -> The Function Keys and keypad please select "VT100+"
- Go back to Category Session, enter session name in field Saved Sessions and click on "Save" button.
- Then click on new saved session, click "Open" and enter the "password". (In case you did not enter Auto-login-username, it will prompt for username, so please enter: "cli")

5.2.1.3 H/W RAID

Please note that the RAID controller should be supported by the L2K Data Storage Server.

Function: Adaptec administration

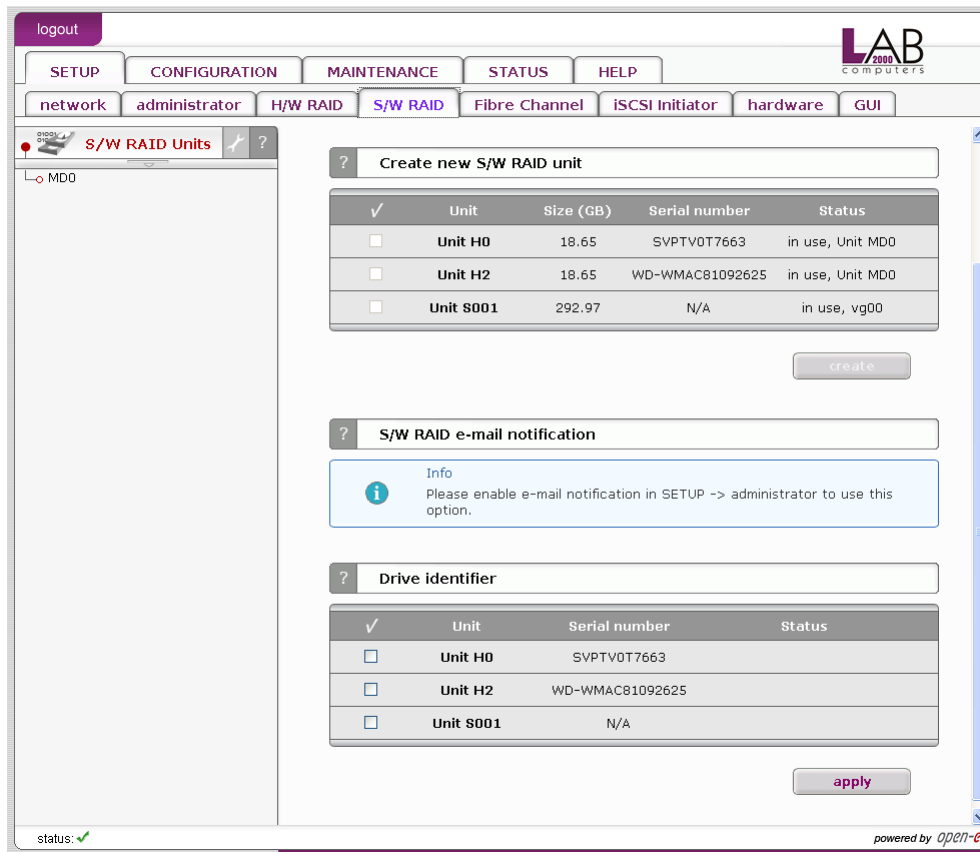
In case of controller Adaptec SCSI RAID series is installed, you can use command line tool AACLI in the console tools (press F1 on console to find out keyboard shortcuts).



5.2.1.4 S/W RAID

Function: Create new S/W RAID unit

In this function you can create software RAIDs from free (not used) units. If you want to create RAIDs from used units, you need first to delete content of units in console, be aware this would ERASE all data from units.



To create a RAID select units, then from ListBox select what type of RAID it will be, then select desired Chunk size. After setting all demanded parameters press Create button.

Allow to create degraded mode

It allows to create RAID1 with one unit, RAID5 with two units or RAID6 with three units, even if minimal number of units is not meet.

note Chunk size - its a minimal portion of data that is written at a time.

Available RAIDS:

RAID 0: it is stripe array and requires [minimum] 2 units. In RAID 0 you can set the Chunksize 4k ÷ 256k. The destination size of the RAID Array will be the sum of each drive size in array.

RAID 1: mirror array requires 2 units. Destination size will be equal: SINGLE) UNIT_SIZE, where (SINGLE) UNIT_SIZE is the size of the smallest unit in array.

RAID 5: stripe + parity algorithm array (required [minimum] 3 units - with the same capacity). You can choose from the ListBoxes: (layout) parity-algorithm [left/right] [symmetric/asymmetric]. DESTINATION SIZE: (NR_OF_UNITS-1)*(SINGLE)UNIT_SIZE, where (SINGLE) UNIT_SIZE is the size of the smallest unit in array.

The (layout) parity-algorithm in RAID 5 is described below.

RAID 5 (layout) parity-algorithm

It is possible to set one of four algorithms of placement data blocks and parity blocks in matrix. Our default option is left-symmetric, which is the best for large reads. Other recommended value is left-asymmetric.

- **note** Software RAID 5 is not a good choice for writing a lot of very small files!

Left-Asymmetric Algorithm

Unit S0	Unit S1	Unit S2	Unit S3
0	1	2	Parity
3	4	Parity	5
6	Parity	7	8
Parity	9	10	11
12	13	14	Parity

Right-Asymmetric Algorithm

Unit S0	Unit S1	Unit S2	Unit S3
Parity	0	1	2
3	Parity	4	5
6	7	Parity	8
9	10	11	Parity
Parity	12	13	14

Left-Symmetric Algorithm

Unit S0	Unit S1	Unit S2	Unit S3
0	1	2	Parity
4	5	Parity	3
8	Parity	6	7
Parity	9	10	11
12	13	14	Parity

Right-Symmetric Algorithm

Unit S0	Unit S1	Unit S2	Unit S3
Parity	0	1	2
5	Parity	3	4
7	8	Parity	6
9	10	11	Parity
Parity	12	13	14

RAID6: stripe + parity algorithm array (required, minimum 4 units - with the same capacity). You can choose from the ListBoxes: (layout)parity-algorithm [left/right] [symmetric/asymmetric].
 DESTINATION SIZE: (NR_OF_UNITS-2)*(SINGLE)UNIT_SIZE, where (SINGLE) UNIT_SIZE is the size of the smallest unit in array.

The (layout) parity-algorithm in RAID 6 is described below.

RAID 6 (layout) parity-algorithm

It is possible to set one from four algorithms of placement data blocks and parity blocks in matrix. Our default option is left-symmetric which the best is for large reads. Other recommended value is left-asymmetric.

Left-Asymmetric Algorithm

Unit S0	Unit S1	Unit S2	Unit S3
0	1	Parity	Parity
2	Parity	Parity	3
Parity	Parity	4	5
Parity	6	7	Parity
8	9	Parity	Parity

Right-Asymmetric Algorithm

Unit S0	Unit S1	Unit S2	Unit S3
Parity	Parity	0	1
2	Parity	Parity	3
4	5	Parity	Parity
Parity	6	7	Parity
8	9	Parity	Parity

Left-Symmetric Algorithm				Right-Symmetric Algorithm			
Unit S0	Unit S1	Unit S2	Unit S3	Unit S0	Unit S1	Unit S2	Unit S3
0	1	Parity	Parity	Parity	Parity	0	1
3	Parity	Parity	2	3	Parity	Parity	2
Parity	Parity	4	5	4	5	Parity	Parity
Parity	6	7	Parity	Parity	6	7	Parity
8	9	Parity	Parity	Parity	Parity	8	9

To remove RAID, if previously added to Volume Group please enter console Extended tools (press F1 on console to find out keyboard shortcuts) and first delete Volume Group of the RAID (Delete content of units function in Extended tools menu). Then the Remove button will be enabled. Otherwise simply press Remove button.

● **note** You can add spare units to RAID1, RAID5 and RAID6 arrays. Please remember that after creation of an RAID, in Function: 'Info' will be shown progress of Synchronization. Till end of this process all actions done on this array will be performed a bit slower.

● **note** If Units are connected through Fibre Channel with only one Storage or LUNS(under iSCSI) come from the same target, then its not recommended to create s/w raids on these Units, because this would slow down the system. If Units come from two different Storages or LUNS come from two different targets, then you can create s/w raids with no problem.

Function: S/W RAID e-mail notification

It is possible to send notification by e-mail about events on software RAID arrays (e.g. rebuild started, rebuild finished, span is active). In order to do so please check Send array events.

● **note** In order to Send array events you must enable "E-mail notification" in "setup" → "administrator".

Include resyncing/recovering progress

This enables informing about progress of resync/rebuild, if it's currently running. E-mail will be send for every 20 % done.

Include array status

Information about the status of event-related array will be added every event.

Function: Drive identifier

This function helps find disks in the cage of your NAS server. In case of hardware RAID installed, the whole RAID array is shown as a single drive. In this case you may not be able to determine which drive unit is which disk when using S.M.A.R.T. tool or hardware RAID management tool (depends on manufacturer of RAID controller).

When you click on "start" button then the appropriate disk will start reading and you can determine which disk is it by watching "disk-activity LEDs". For proper operation of this function there should be no other activity on hard drives.

- **note** Identification will stop automatically after one minute if you will not stop it before (by unsetting appropriate checkbox and applying form). Using this function during normal operation is not highly recommended and will cause of your server to slow down.

The screenshot shows the LAB2000 GUI for managing Software RAID. The main window is titled "Software RAID: MDO". It has a "Manager" section with a table of RAID units:

Unit	PR	F	R	ST	Serial number	Size (GB)
Unit H0	0	<input type="checkbox"/>	<input type="checkbox"/>	A *	SVPTV0T7663	18.65
Unit H2	1	<input type="checkbox"/>	<input type="checkbox"/>	A *	WD-WMAC81...	18.65

Below the table is an "apply" button. The "Info" section shows the following attributes:

attribute name	value
RAID LEVEL	RAID0
Creation time	Thu Nov 29 13:00:35 2007
Update time	Thu Nov 29 13:00:35 2007
Array size	37.29 GB
Chunk size	64K
State	clean

The "Remove software RAID unit" section has a "remove" button and the instruction: "Press 'remove' button to remove software RAID unit".

Function: Manager

In this function you can manage the RAID array.

Available operations:

RAID 0:

- construction of this RAID does not allow to manage it anyway. Every unit must not be Failed. If any would be the whole array would be destroyed.

RAID 1:

- To set unit as a Faulty one mark proper checkbox (in the column F) and click on Apply button.
- To delete any unit from an array mark proper checkbox (in the column R) and click on Remove button.

RAID 5:

- To set unit as a Faulty one mark proper checkbox (in the column F) and click on Apply button.

- To delete any unit from an array mark proper checkbox (in the column R) and click on Remove button.

RAID 6:

- To set unit as a Faulty one mark proper checkbox (in the column F) and click on Apply button.
- To delete any unit from an array mark proper checkbox (in the column R) and click on Remove button.

RAIDs notation:

- PR - priority in array - describes priority of unit that will be added to array if another is set to Faulty.
- F - faulty - unit can be turned off from array
- R - hot remove - unit can be removed from array without shutting down the system.
- ST - describes state of unit in array, which can be:
- A - This means that Unit is active in array
- * - Number of Unit that belongs to the array
- S - Spare or spare rebuilding - this means that unit is free and can be added to the array or is free and currently is rebuilding.

Limitations:

- There is no possibility to set any unit as faulty if the matrix is degraded or during resync/rebuild.
- While using RAID 1 and RAID 5 there is possibility to set only one disk from active as faulty. This regulation is not valid for Spare units in array.

● **note** Only one disk from Active in Array can be set as Faulty or Removed

Function: Info

From this function you can obtain information like Creation Time, RAID Level, Array and Device Size, Update Time and state.

● **note** During syncing or rebuilding of array it is recommended to preform as few disk operations as possible.
Status of syncing/rebuilding will be showed "live" - without need to refresh page manually.

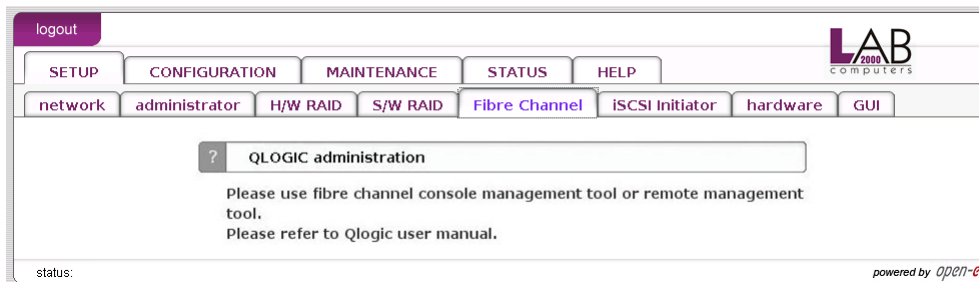
Function: Software RAID unit remove

This function allows you to remove Software RAID unit (MD[nr]).

● **note** This function is available only when no Logical Volume is created on appropriate MD[x] and unit is not resyncing.
If you want to remove software RAID unit with Logical Volume please use console *Extended tools* (*press F1 on console to find out keyboard shortcuts*) and remove Logical Volume first.

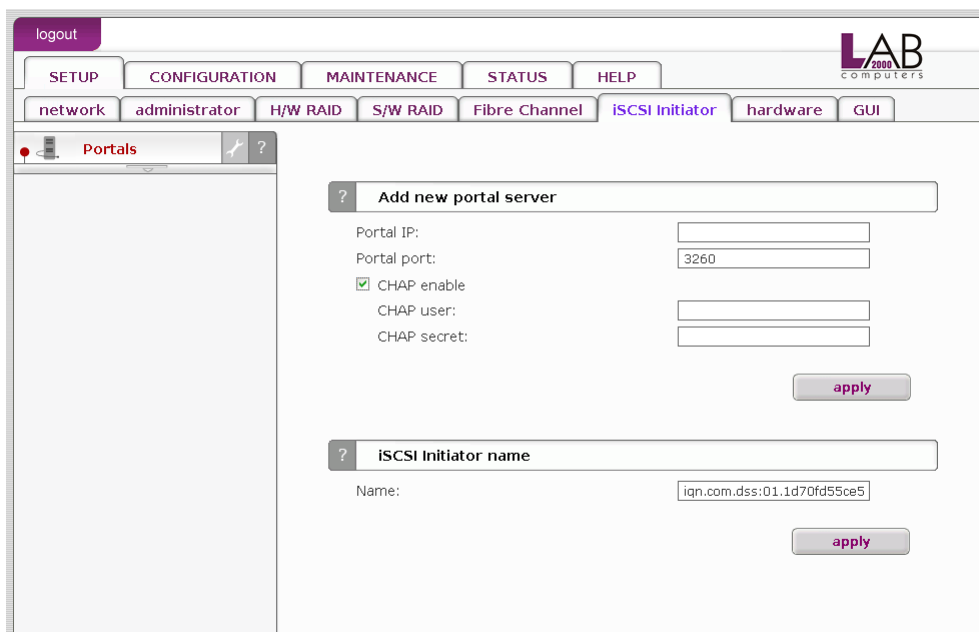
5.2.1.5 Fibre Channel

When a Fibre channel controller is detected you will find utilities and option specific to the hardware.



5.2.1.6 iSCSI Initiator

Here you can view list of all connected iSCSI server portals. Click on portal IP to manage portal targets or remove the portal.



Function: Create new portal server

With this function you can connect to remote iSCSI server and add it as New Portal Server. It will be visible in iSCSI Initiator on the left. You can use following options:

Portal IP:

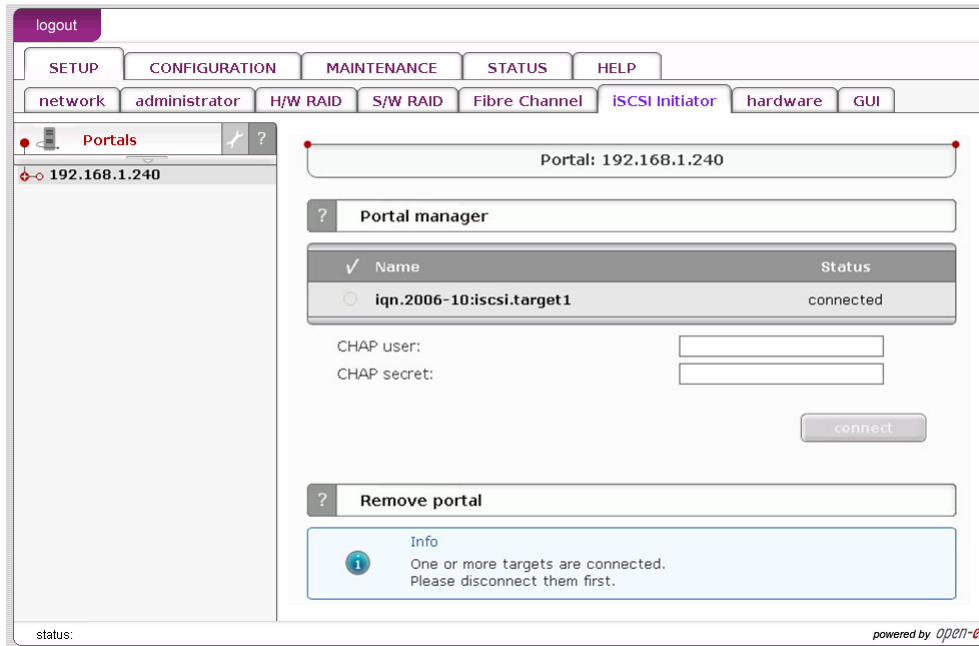
Please enter IP address of iSCSI server.

Portal Port

Enter Port on which iSCSI server runs(default 3260)

CHAP enable

If you want to enable CHAP user authentication please check box CHAP enable and enter CHAP user name and its secret.



Function: Portal manager

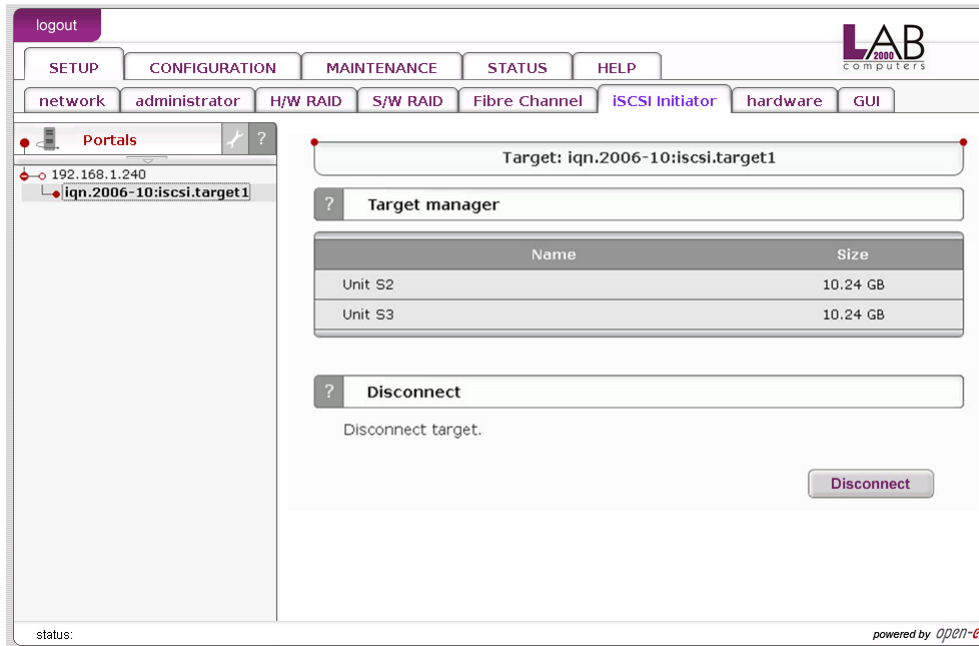
This function displays available targets from selected iSCSI Portal Server. In order to connect to iSCSI target, select its name and click button "connect". If authentication for target is enabled, then also enter target name and its secret. Connected targets will be available in server -> disk manger as Units. You can manage them and do the same operations as it would be local Units.

- **note** In order to disconnect from target, select its name in iSCSI Initiator tree and click "disconnect" button. To remove iSCSI Portal server, first you need to disconnect all targets from it.

Function: Remove portal

Here you can remove selected Portal Server.

- **note** You can only remove Portal Server if all its targets are disconnected from it. In order to disconnect a target from Portal Server, please select it from iSCSI initiator tree and click on "disconnect" button.



Function: Target manager

Here you can view connected targets name and its size. You can also disconnect target from Portal Server with function Disconnect.

Function: Disconnect

Here you can disconnect selected target from Portal Server.

- **note** You can only disconnect target from a Portal Server if volume group or S/W RAID unit does not exist. In another case please first remove a volume group or S/W RAID unit in console tools (*press F1 on console to find out keyboard shortcuts*).

5.2.1.7 Hardware

Function: UPS settings

In the UPS menu you can select an UPS device (Uninterrupted Power Supply). In the settings you can select the UPS model, cable type, connection port (serial port or USB) and the length of the time-out. The time-out defines the time between a power failure and the moment the system will shut down.

Single

Means, that the server is the only system attached to this UPS and that there is no action necessary to do remote shutdown for other systems in the network.

Master

Means, that the server is connected to the UPS and sends a signal through the network to shutdown other systems in the network.

Slave

Means, that the server is reacting on a "power down-signal" from an UPS master.

note When using SMART UPS with APC mode there are additional options:

Timeout - Battery Limit

This option enables substaining the system as long as battery holds(the system will shutdown when battery charge drops to 5% or when there are 3 minutes time to total discharge of battery)

Turn off UPS after system shutdown

This will turn off the UPS after time that is set by parameter Shutdown grace delay(SLEEP) in EEPROM of UPS.

The screenshot shows the LAB 2000 GUI with the following settings:

- UPS settings:**
 - Use UPS
 - Set UPS vendor: APC MGE
 - UPS mode: Single
 - UPS model: BackUPS
 - Cable type: simple
 - Port: com1
 - Timeout: 5 min.
- Time zone settings:**
 - NTP servers: zg1.ntp.carnet.hr
 - Continuous adjusting using NTP
 - Time zone: Europe/Zagreb

Buttons for 'apply' are present for both sections. The footer indicates 'status:' and 'powered by OPEN-E'.

Function: Time zone settings

This function allows to set NTP server settings.

Please choose a NTP server (Network Time Protocol: for more info: www.ntp.org) You may provide a fully qualified host name or IP address. Select time zone accordingly to your location.

There is also option **Continuous adjusting using NTP**, this will watch your system time and will correct it, if the difference between local time and server time has change. Setting this option on is specially recommended when using domains.

note Time setting is very important for proper work of the server. You must have set gateway and (in case of host name) DNS network settings.

Function: Set time

With this function you can set time and date:

Manual

Just type in time & date using following format: hh:mm:ss yyyy-mm-dd.

Use this PC time

It will pick up the time & date of the PC you run the web browser.

NTP server

It will pick up the time & date from NTP server. In this case please make sure you have Internet access and proper network setup, specially gateway and DNS. You can check proper Internet access using ping from the NAS console (press F1 on console to find out keyboard shortcuts). To use this option you must set correct NTP server in function Clock settings.

note Time setting is very important for proper work of the server.

Function: Power button settings

In this section you specify which action will be performed in case of power button is pressed

Options:

Reboot

Restart computer.

Halt

Power off computer.

None
No action.

Function: S.M.A.R.T. e-mail notification

This function allows you to check S.M.A.R.T. status of hard disks and send it to e-mail address.

S.M.A.R.T. (Self-Monitoring, Analysis, and Reporting Technology) is a monitoring system for computer hard disks to detect and report on various indicators of reliability, in the hope of anticipating failures.

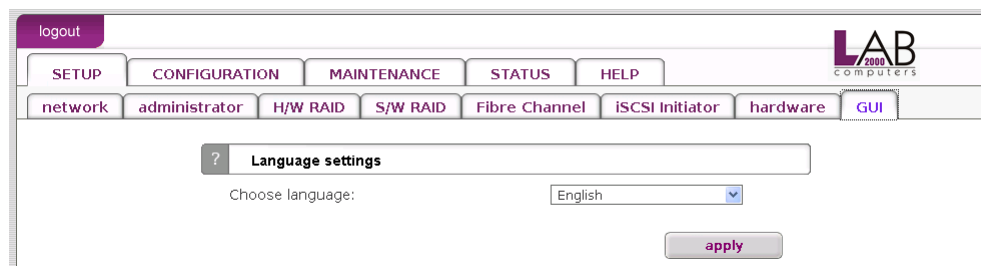
In order to enable S.M.A.R.T. e-mail notification, you have to:

- First enable E-mail notification function in setup -> administrator menu.
- Enable S.M.A.R.T. in Hardware configuration tool on console (*press F1 on console to find out keyboard shortcuts*).
- When S.M.A.R.T. is enabled you will see all detected hard drives with information about unit number, size and serial number.
- Select the checkbox of unit, from which you want to receive S.M.A.R.T. status and press "apply".
- If everything is ok, then status will be PASSED, in another case FAILED.

5.2.1.8 GUI

Function: Language settings

Select preferred language and press "apply" button.



5.2.2 CONFIGURATION

5.2.2.1 Volume manager

Function: Unit rescan

This function rescans your system for new units.

Function: Unit manager

This function enables you to manage physical storage devices - units (hard drives or raid-arrays). After adding a new unit you can define Logical Volume, swap, and space reserved for snapshot in Volume Manager function. Unit can be added only when it's not in use already.

Disk notations:

- S0,S1, ..., S[x] - every disk with S notation is one of SATA / JBOD / RAID units.
- H0,H1, ..., H[x] - units with H letter are IDE units.
- MD0,MD1, ..., MD[x] - this way are softRAIDs denoted.

note If the unit is already added, it can not be removed it in Web management. Units that are already used in a volume group can be made available again by using function Delete content of units under console (Ctrl+alt+x). Be aware that this will remove all data from a Unit !!!,

You can only use units with capacity greater than 5 GB, smaller units are not supported.

Function: Unit localizer

This function helps find disks in cage in your NAS server. If you connect hard drives to hardware RAID controller then you may not be able to determine which unit is which disk using S.M.A.R.T. tool or hardware RAID management tool (depends on manufacturer of RAID controller).

When you click on "start" button then appropriate disk will start reading and you can determine which disk is it by watching "disk-activity LEDs". For proper operation of this function there should be no other activity on hard drives.

note Localization will stop automatically after one minute if you will not stop it before (by unsetting appropriate checkbox and applying form). Using this function during normal operation is highly not recommended and will cause slowing down your server.

The screenshot shows the LAB2000 management interface. The top navigation bar includes 'logout', 'SETUP', 'CONFIGURATION', 'MAINTENANCE', 'STATUS', and 'HELP'. Below this are tabs for 'volume manager', 'NAS settings', 'NAS resources', 'iSCSI target manager', and 'FC target manager'. The main content area is divided into two sections: 'Vol. groups' and 'Vol. replication'. The 'Vol. groups' section shows a tree view with 'vg00' selected. The 'Vol. replication' section is currently empty. The 'Units assigned' section displays a table with the following data:

Unit	Serial number	Size (GB)
Unit S001	R301PDJB0C8D88001334	2235.11

The 'Volume manager' section displays a table with the following data:

Logical Volume	Type	Snap.	Rep.	Init.	Blocksize (bytes)	Size (GB)
lv0000					N/A	40.00
lv0001					N/A	10.00
lv0002					N/A	10.00
lv0003			✓		N/A	10.00
lv0004					N/A	40.00
lv0005					N/A	10.00
System volumes						Size (GB)
Reserved for swap						4.00
Reserved for snapshots						0.00
Reserved for system						1.00
Reserved for replication						0.13
Free						2109.94

Below the table, there is an 'Action:' dropdown menu set to 'new NAS volume' and a checkbox for 'Use volume replication' which is currently unchecked. The interface is powered by OPEN-E.

Function: Units assigned

In this function you can view physical units attached to this volume group.

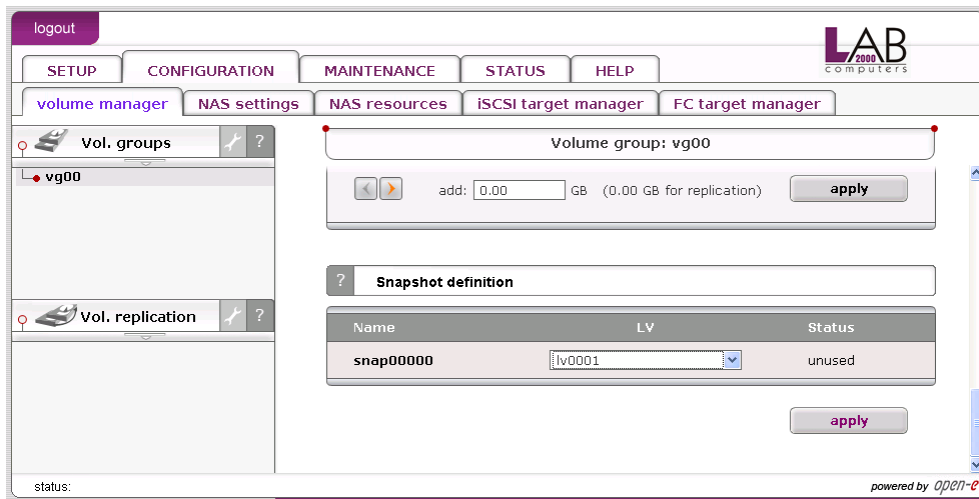
Function: Volume manager

This function allows:

- increasing existing and creating new NAS volume or new iSCSI volume,
- reserving disk space for swap,
- creating, expanding and deleting snapshots.

In order to add storage space to existing NAS volume or iSCSI volume, select "LV" from the dropdown menu. Use scroll bar to choose the size.

- **note** While adding each new Unit there will be 4 GB space reserved for swap (if there is no swap already created). Additionally there is 1 GB space reserved for system internal use.



Function: Snapshot definition

This function allows you to define parameters of every snapshot.

You can set:

- Logical Volume, which the snapshot will be taken for.
- Schedule the time of automatic creation of the snapshot, if inactive - only manual snapshot activation is possible.
- RO - the snapshot will be visible as a write protected disk.

The Snapshot function of the server enables the system administrator to freeze the data content of the volume at a certain time. From this moment on, the users work on a virtual data volume, all changes to the volume are stored in a different partition. The storage of all changes is independent of the file-system - it takes place on block-level. Only when the snapshot is deactivated / removed the changes are permanently transferred to the actual data volume. Snapshots can be activated/deactivated manually or automatically.

note Please be reasonable, when you are calculating the space reserved for snapshots. Please set as snapshot size as much space as you expect to change during active snapshot. E.g. when you are doing backup from snapshot which takes one hour please set this snapshot size to as much space that will be changed during one hour. The snapshot will become inactive if the content (data changed on Logical Volume) exceeds the snapshot capacity. You do not lose data in that case, just the dataset, which is virtual for the users at the moment, will be written to the data volume. The old dataset, which has been frozen with the snapshot, is not available any longer.

note When you define the schedule, use only as many snapshots in the same time as really needed. A large count of active snapshots can slow down the system considerably.

note Manual creating and removing of snapshots can be done in the SETUP → volume manager → vg[nr] → Function: Volume Manager.

How to access NAS snapshot

After snapshot has been created and activated, you can access it by following:

- Go to menu CONFIGURATION → NAS settings and select on which network protocol snapshots will be accessible. This need to be done only once. When creating access to snapshot on second time, this action is not necessary. You can activate access to snapshots on following protocols:
 - NFS,
 - SMB(Network neighborhood),
 - FTP,
 - AFP.
- Create a new share that will be assigned to previous activated snapshot,
- Go to menu CONFIGURATION → NAS resources,
- In function Create new share:
 - enter share name,
 - Use option Specified path and select snapshot that you want to have access to,
 - Click on apply button to create a share.
- Now you can start to explore your share(snapshot) using specified network protocol.

How to access iSCSI target snapshot

After snapshot for iSCSI target has been created and activated, you can access it by following:

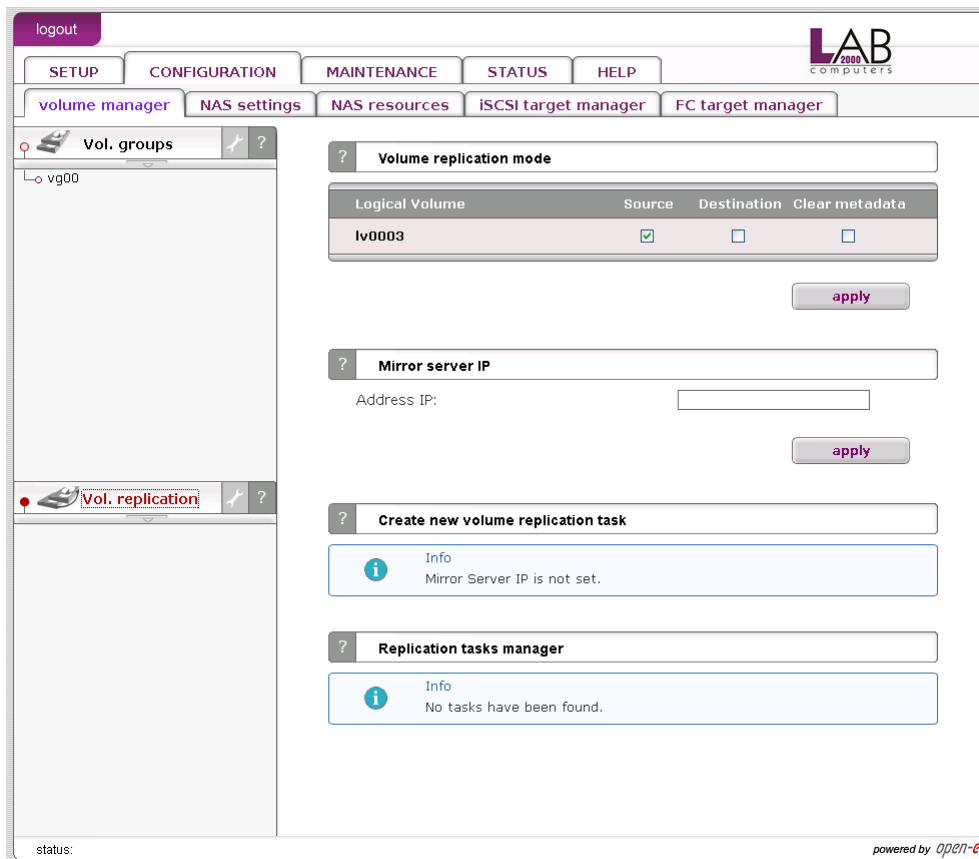
- Go to menu CONFIGURATION -> iSCSI target manager -> Targets -> [target_name],
- Use function Target volume manger, click on button "add" on the right side of snapshot you want to have access to. New LUN will be added to the target,
- Now you can connect with your iSCSI initiator and use your snapshot target,
- Example (Microsoft Windows environment). Please download Microsoft iSCSI Initiator and follow instructions,
- Start the software and add targets,
- Menu Target Portals and enter IP Address of Open-E Data Storage System and Socket (default 3260),
- In menu Available targets please "Log On" into already added target,
- Now your snapshot target will show up in your system and you can use it.

Function: Volume replication mode

Here you can set replication mode for every logical volume(with replication functionality). Volume can be in source(S) or destination (D) replication mode.

You can also clear the metadata (CM) of a volume. Metadata describes the data of the replication.

Clearing of metadata is required when you want to start the replication process from the beginning. Another case is when the data on source volume is inconsistent and you want to restore it from a destination volume. In such a case you need to change replication mode from the destination volume to source mode and the previous source to destination mode. Before starting a replication for new source and destination please clear the metadata from previous destination volume. When replication is complete the data on previous source volume will be consistent. If volume is set to destination replication mode then it will not be visible in iSCSI initiator.



Function: Mirror server IP

Here you can set IP address of mirror server. It need to be entered in order to define volume replication task.

Setting the IP address on destination server is for security reason. This will allow only granted IP address to send data to destination target

Function: Create new volume replication task

With this function you can create a volume replication task. Replication creates the same copy of data from source volume to destination volume in real time. This means that if you for example create a file on source volume then the same file will be created on the destination volume. Destination and source volumes need to be the same size in order to successfully made replication of volume. Replication can be made only between two mirror replication servers.

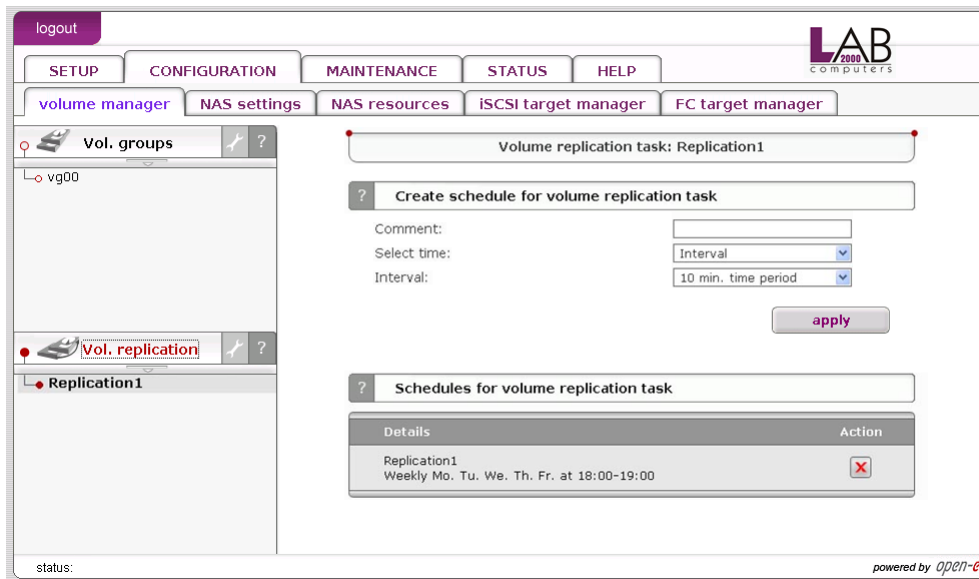
Here you only create replication tasks. Replication tasks can be enabled in function Replication Task Manager.

Please enter the task name, select source volume and the destination volume. Click "Create" button in order to create a replication task.

- **note** Volume replication process runs on randomly chosen ports from 12000-13999. These ports have to be open in firewalls as incoming and outgoing.

Function: Replication task manager

Here you can run, stop and delete previously created replication volume tasks. When replication task is running then you can't change replication mode for logical volume, delete the metadata or change the mirror server IP address. You need to stop the replication process first.



Function: Create schedule for volume replication task
Here you can create schedule for selected volume replication task.

Comment

You can enter comment for replication schedule.

Time select

You can start volume replication immediately by selecting "Now" from Time select drop down list or add to schedule.

Interval

Select time period that replication will be run.

Function: Schedules for volume replication task

Here you can manage all schedules created for selected volume replication task.

5.2.2.2 NAS settings

Function: Authentication method

The server administrator can choose one of following authentication method for users:

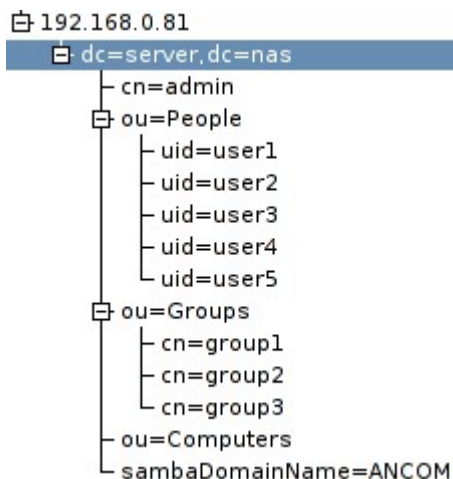
Workgroup (internal LDAP)

In this case you must create all users/groups accounts in resources menu. In the field Workgroup please enter your network workgroup name.

Workgroup (external LDAP)

In case of external LDAP (Lightweight Directory Access Protocol), the NAS server will use users/groups from external LDAP server. Please fill-in all fields accordingly. In advanced setting you can set Base DN, LDAP administrator DN (Distinguished Name) and LDAP administrator password. Base DN should looks like "dc=server,dc=nas" (DC - Domain Component), where "server" and "nas" can be set as they are set on remote LDAP server. In LDAP administrator DN you should set previously entered base DN with prefix like "cn=admin," (CN - Common Name). Users should be stored in Organization Unit (ou) "People", groups in "Groups", and computers in "Computers".

Sample organization can look like showed below:



Windows (PDC)

In this case NAS server will use Windows Primary Domain Controller user database for user authentication. This method can be used for NT4/2000/2003 servers. In case Windows 2000/2003 server run ADS native mode, please use Windows (ADS) method.

- note** In case of PDC server running under NT4, please use following procedure if you experience problem to get connection:
1. Run Server Manager program from Menu Start → Programs → Administrative Tools (Common) → Server Manager.
 2. From Server Manager menu select Computer → Add to Domain
WARNING: If NAS resource is already added, you must remove it.
 3. In Computer Name field enter NAS Server-Name (NetBIOS name).
 4. Click Add button Set Windows (PDC) in NAS.
 5. Next, in NAS server web administration: choose CONFIGURATION → NAS-Settings.
 6. Choose Windows (PDC) as Authentication method.
 7. In Server IP field enter NT server IP address.
 8. In Name & Password fields enter NT4 administrator account name and password
 9. Click apply button. WARNING: If connection fails, the next try you must restart from point 1.

Windows (ADS)

This option can be used for Windows 2000/2003 ADS servers:

- Please enter Realm name of your Windows 2000/2003 server.
- It can be found under Windows system by clicking right mouse button on My Computer and selecting Properties, then clicking tab Computer name, Realm name is the Domain name.
- The KDC IP address must be taken from the same system as the Realm.
- Enter administrator login and password.
- Click "apply" to connect to Windows (ADS) domain.
- Workgroup (NIS server)
- Please choose this option in case user want to use user/group database from Network Information Service server.

note

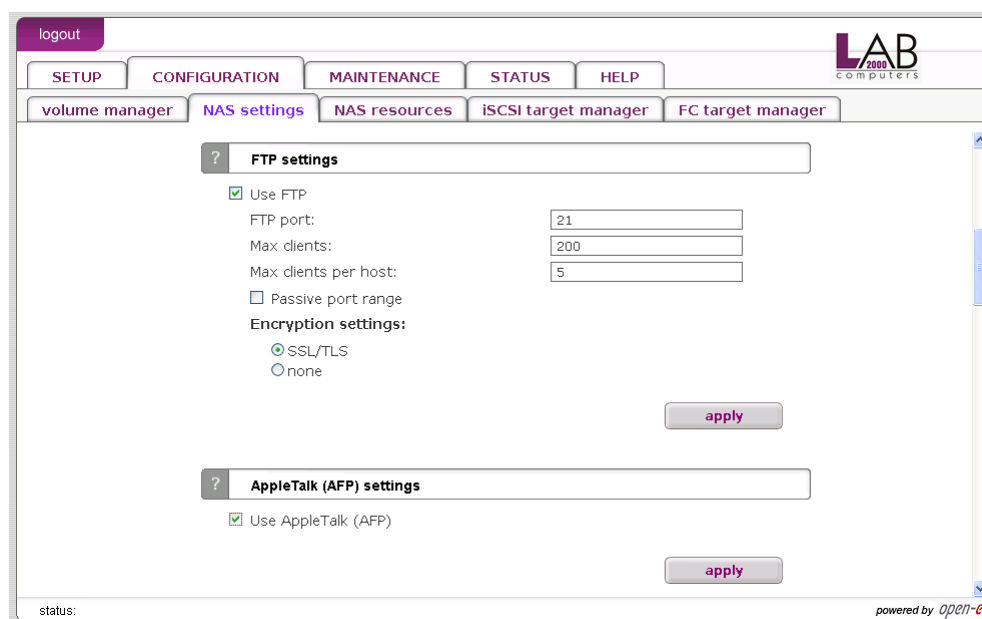
1. Workgroup name cannot begin/end with space and can not contain special characters like: ~!@#\$%^&()+[]{}*";'":.,%|<>?/\=``
2. Changing the authentication method may cost lost of ACL (Access Control Lists) In such a case please set users/groups access rights for every share and reset ACLs.
3. If smb authentication is enabled, please edit windows registry:
HKEY_LOCAL_MACHINE\SYSTEM\CurrentControlSet\Services\lanmanworkstation\parameters\ and change the value of the key Dword 'enableplaintextpassword' to '1' hexadecimally.

Function: NFS settings

Click use nfs to enable access to shares and/or snapshot via NFS.

Network File System (NFS) is a protocol for distributed file system which allows a computer to access files over a network as easily as if they were on its local disks.

- note** If host has entry in dns field but doesn't have reverse dns entry then connection to nfs will not work.



Function: FTP settings

To enable FTP services check use ftp.

FTP port

Provides port the FTP service is listening to.

Max Clients

Limits the total number concurrent ftp connections.

Max client per host

Limits the total number connections originating from a single host.

- note** The option to access Server via FTP (File Transfer Protocol) offers

additional flexibility, as users can access storage either from the Intranet or Internet. An FTP client is ideal (e.g., SmartFTP), but the Internet Explorer or a similar browser are also suitable.

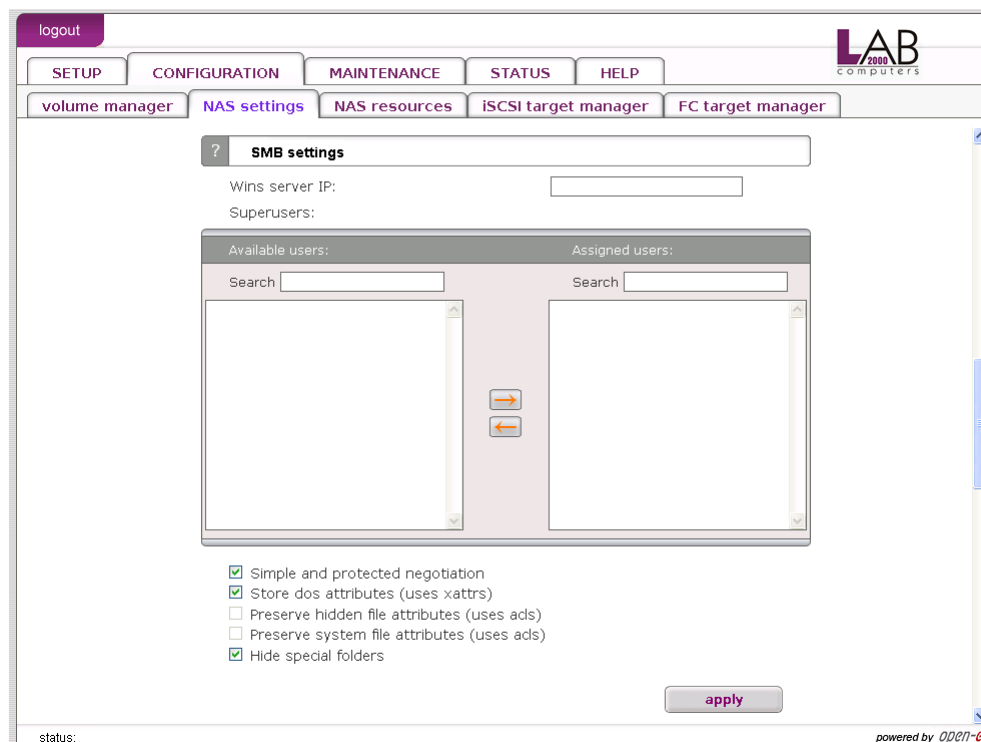
To establish a connection, the FTP client needs several pieces of data: IP address: 192.168.0.220 (this is the standard address) Port: 21 User: anonymous Password: 123. The allocation of access rights is done via the IP address of the PC currently in the process of accessing. A read access is, therefore, granted with these generally typical and anonymous login data. As a standard, server for FTP uses port 21, which can be changed in the configuration menu (If you use the Internet Explorer when accessing, you need to enter the following data into the entry line: ftp://192.168.0.220. You are not prompted to enter the user name and password, as the Internet Explorer first establishes as an anonymous connection. If you changed the FTP port, add this information to the entry line the following way: ftp://192.168.0.220:4711 (in this example, 4711 represents the new port number). In order to grant specific computers write access to the FTP area, enter the desired IP addresses into the line "IP address complete access"

Function: AppleTalk (AFP) Settings

Here you may activate the AppleTalk protocol in the network to access shares on the NAS Server.

How to use AppleTalk with the NAS server:

- In the setup → "NAS server" enable AppleTalk,
- In setup → "NAS resources" menu select a share that you want to be shared with AppleTalk,
- Enable AppleTalk for this share.



Function: SMB settings

This function allows you to edit SMB protocol specific parameters. There are several options you can change:

Wins server IP

If you have a WINS server on your network then you should set this to the WINS server's IP.

Superuser

Superuser is a user, who has permission to take ownership of folder and files which belong to other users. It can be useful when administrator want to change access right (ACL) for folder or file established by other users. To give superuser privilege to a user pick them up from the menu. Superuser privilege allows to modify, remove and add new files in the share, also to any files and directories that even those that the superuser has not got the ownership of.

Simple and protected negotiation

Simple and Protected Negotiation (SPNEGO) is a negotiation protocol. If you use PDA Device to access shares on NAS please uncheck it.

●note For connect to your PDA Device use netbiosname, not IP address.

Store dos attributes (uses xattrs)

This option enables preserving all MS-DOS attributes using Linux xattrs attributes. It cannot be set when you are using option Preserve hidden file attributes or Preserve system file attributes.

Preserve hidden file attributes and Preserve system file attributes (uses acls)

These options enable preserving of MS-DOS attributes: hidden and system. These attributes are mapped to x (EXECUTE) attributes for group and for others in Linux POSIX ACL. Windows ACL permissions are also mapped to Linux attributes. In order to avoid attribute mismatch, it is strongly recommended to disable these options. These cannot be set when you are using Store dos attributes option.

Hide special folders

This option hides special folders that are created by MAC OS/OSX systems. Thanks to this, users cant see MAC OS/OSX system files by SMB protocol.

MAC OS/OSX system files:

1. .DS_Store,
2. .AppleDouble,
3. Temporary Items Network,
4. Trash Folder,
5. TheFindByContentFolder,
6. TheVolumeSettingsFolder,
7. .AppleDesktop,
8. .AppleDB,
9. Icon?,
10. .Volumelcon.icns,
11. .FBIndex,
12. .FBClockFolder.

Synchronize UID and GID database with NIS server

This option allows synchronization UIDs/GIDs between NAS Server and NIS Domain. To have an properly working synchronization please fill: NIS serverdomain name, NIS server IP and Synchronize interval.

note Change of the acls and/or xattrs settings need to be accepted, because these changes can make the files will not be visible for user. Change of these settings is not recommended on servers that already have some data stored. If after changing of Preserve hidden file attributes (uses acls) and/or Preserve system file attributes (uses acls) files are not visible, user can use command that will remove hidden attribute from files : `attrib -S -H x:*. * /s /d` ,where: x - network drive.

Any change in SMB settings will disconnect users that are currently connected. These also need to be accepted by user, acceptance form will only appear if any user is connected to SMB. If user click "cancel" button settings will be saved but connection to SMB will not be reseted.

The screenshot shows a web-based configuration interface for a NAS system. At the top, there are navigation tabs: 'logout', 'SETUP', 'CONFIGURATION', 'MAINTENANCE', 'STATUS', and 'HELP'. Below these are sub-tabs: 'volume manager', 'NAS settings', 'NAS resources', 'iSCSI target manager', and 'FC target manager'. The 'NAS settings' sub-tab is active. The main content area is divided into two sections:

- Backup agent settings:** This section has a dropdown menu currently set to 'veritas'. Below it are input fields for 'Server IP:' (containing '192.168.0.55') and 'Directory pass:'. An 'apply' button is located to the right of these fields.
- Data replication agent:** This section has a checkbox labeled 'Enable Data replication Agent' which is checked. An 'apply' button is located below this section.

At the bottom left, there is a 'status:' label, and at the bottom right, it says 'powered by OPEN-E'.

Function: Backup agent settings

Here you can enable one of pre-installed backup agent (client). Currently, agents are supported:

- Veritas - Backup Exec,
- Dantz - Retroclient,
- CA - BrightStor.

If you enable the backup agent, your backup server will find the agent running on the NAS server and will use it for backup.

Alternatively, you can find and backup the NAS shares over the network neighborhood. But backup using an agent will be much faster.

Veritas:

Here you need to provide an IP address of a server running the Backup Exec. The "Directory Pass" is a password that the Backup Exec might prompt for.

Backup:

1. In Veritas Backup Exec set a user in the menu Network → Logon Account Management,
2. Next enter the password such as earlier provided in the NAS Server function "Backup client setting",
3. By choosing "Backup" a "Backup Job Properties" window will appear,
4. A list of network shares will be shown in that window,
5. By clicking on the "Remote Selections" branch, and next on "Unix Agents", a NAS server name will appear,
6. After clicking the server "NAS_server/logical volume", a window "Logon Account Selection" will be displayed where you need to choose the same user name as in the point "1".

● **note** In some settings, the window "Logon Account Selection" will not appear automatically. In this case you must right mouse click on the name "NAS_Server/share_volume", and then in the context menu choose "Connect As...". Only then the "Logon Account Selection" window will appear.

7. After choosing a user, the "Logical Volume" and NAS server shares will appear. By selecting the correct share and clicking the "Run Now" button, selected shares will be backed-up.

Restore:

1. By choosing "Restore", a "Restore Job Properties" window will appear.
2. On the left side of the window, in Properties → Source click "Selection", and the name of the NAS server which shares were earlier backed-up will be displayed.
3. Choose a folder you want to be restored from the correct backup file.
4. From the Source → Resource Credentials menu choose a user account for the NAS (NAS_server/share_volume) server and click the "Run Now" button.

● **hint** In order to use a Incremental method, choose it from the Setting → General → Backup Method menu. Please use method "Incremental - Using modified time" (Reset Archive bit - does not work on the XFS partition types).

BrightStor:

Allow IP or Network IP:

Please enter the Backup server's IP address in order to grant access to the NAS. If you leave this field empty, all BrightStor backup servers in the network will have access to the NAS server.

User:

By providing a user name, only this BrightStor user will have access to the NAS. If left empty, all users will be able to access the NAS server.

Before you'll start to backup your data, you have to configure device that backup will be made to and add your NAS server as source. Please follow these steps in order to complete it.

1. From menu bar chose Configuration, then Device configuration. Device configuration wizard will appear, it will help you to configure backup devices on your server.
2. Chose Windows Server and click button Next.
3. From options select File System Device and click Next.

4. Click on Add button, File System Device will be added to the list.
5. Click on Location field from newly created entry and select path that will be mapped to File System Device.
6. Click on Finish button to complete Device configuration wizard.
7. Click Exit to quit Device configuration.
8. The last thing to do is to format your newly created File System Device. In order to do it select Device from Quick start menu, select your newly created File System Device.
9. Click on Format button, format form will appear.
10. Enter media name and click OK to format media.

Configuration of NAS server:

1. From Quick start menu, select Backup.
2. From branch Source, select Unix/Linux Systems and click on it with right mouse button
3. Select Add Machine/Object. Add client form will appear.
4. Enter host name and IP address of your NAS server.
5. Click on button Add in order to add your NAS to the list.
6. Click on Close to quit Add Machine/Object form.

Backup:

1. From Quick start menu, select Backup.
2. From branch Source, select your NAS server volumes that you want to backup.
3. Click on Start button, Security and agent information form will appear.
4. Click on Agent button if you want to modify NAS server information
5. Click OK button, Submit job form will appear.
6. If you want to start backup process later make sure that Job Execution Time is properly set.
7. Enter job description, click OK to start backup process.

Restore:

1. From Quick start menu, select Restore.
2. From branch Source, select your NAS server volumes that you want to restore.
3. Click Start button and then OK, Submit job form will appear.
4. If you want to start backup process later make sure that Job Execution Time is properly set
5. Enter job description, click OK to start restore process.

Retroclient:

Configuration of NAS server:

1. From menu, select Configure, then click on Clients, Backup Clients form will appear.
2. Click on Add button, Add backup client form will appear.
3. Enter IP address of your NAS server and click on Add button, connection form will appear.
4. Enter password to connect to NAS server and click Ok. Password for Dantz Retroclient is set to "/2k". NAS server is now properly configured to work with Dantz Retroclient.

Creation of backup sets:

1. From menu, select Configure, then Backup sets, Backup sets form will appear.
2. Click on Create New button, Backup sets creation wizard will appear. Click on Next.
3. From backup media options, select File and click on Next.
4. Enter name and location where backup will be made. Click on Next.
5. Select backup set security and click Next.
6. Click on Finish button, Backup set creation process is completed.

Backup

1. From menu select Backup, then click on Backup button. Source selection form will appear.
2. Select NAS server volumes from which you want to make backup. Click on Ok.
3. Backup process form will appear, click on Backup to start backup process.

Restore

1. From menu select Restore, then click on Entire volume button.
2. Select source backup set from which you want to make restore process.
3. Select destination NAS server volume.
4. Click on Ok button, then click on Replace to begin restore process.
5. Password for Dantz Retroclient is set to "/2K".

Function: Data replication agent

This function enables the Data replication agent.

note This is necessary to replicate as destination share

The screenshot displays the Open-ES web interface with the 'NAS settings' tab selected. The 'Antivirus setup' section includes checkboxes for 'Use antivirus' and 'Use quarantine', both of which are checked. Below these is a 'Select share:' dropdown menu currently set to '<choose share>' and an 'apply' button. The 'Local backup settings' section includes a checked 'Use local backup' checkbox. It features a 'Select backup database location:' section with radio buttons for 'Default share on LV:' (selected) and 'Other share:'. The 'Default share on LV:' dropdown is set to 'lv0000', and the 'Other share:' dropdown is set to '<choose share>'. There are also checkboxes for 'Create database' (checked) and 'Move database' (unchecked), along with an 'apply' button. The interface includes a top navigation bar with 'logout', 'SETUP', 'CONFIGURATION', 'MAINTENANCE', 'STATUS', and 'HELP'. Below this is a sub-navigation bar with 'volume manager', 'NAS settings', 'NAS resources', 'iSCSI target manager', and 'FC target manager'. The 'LAB 2000 computers' logo is in the top right, and 'powered by open-es' is in the bottom right.

Function: Antivirus setup

This function provides Antivirus protection for your data. Antivirus scans the following file types:

- Archives and compressed files:
 - Zip,

- RAR (2.0),
 - Tar,
 - Gzip,
 - Bzip2,
 - MS OLE2,
 - MS Cabinet Files,
 - MS CHM (Compiled HTML),
 - MS SZDD compression format,
 - UPX (all versions),
 - FSG (1.3, 1.31, 1.33, 2.0),
 - Petite (2.x).
- Mail files,
 - MS Office document files,
 - executables files.

The feature quarantine allows you to choose, whether you want to move the infected files to default folder (quarantine_dir), automatically created in shares, or option manual which allows you to choose the place of quarantine, in previously created share (in example share named "Quarantine").

● **note** If there is no option "quarantine" you will be only informed about the infected file.

To verify the information about the infected files look in logs. You will get the info which files are infected and with what viruses.

Function: Local backup settings

This function enables local backup functionality.

Use default share on LV

With this option you can store database of all backups on default share on selected logical volume.

Use other share

With this option you can store database of all backups on selected share.

Move database

If this option is checked then existing backup database will be moved to selected share.

● **note** If selected share has any files other than the backup database files, then it will not be possible to create a backup database in that share. If you want to create a backup database in that share anyway, you have to first delete files from that share.

You can only move a backup data base between default share on logical volumes and between other shares. You cannot move a backup database from a default share on LV to other share.

5.2.2.3 NAS resources

Here, you can configure NAS resource operations. All that may be accomplished by using tree diagrams on the left side. This will help you manage all shares, users, user groups in a structured manner.

5.2.2.3.1 Shares

Here, all shares on your L2K Data Storage Server are listed. By clicking on "Shares," with Function "Create new share" you can define a new share or comment it (optional) or set the path. Organized below, you will find all existing shares, which you can edit with a simple click. With the exception of the name, you may alter all parameters. If, however, you must change a name, delete it and assign a new name.

Windows users will see the name of the share in the folders of their network environment when they click on the icon for the L2K DSS server. The comment is only visible if the users take a look at the share properties, or if shares are listed in detail.

The path represents the physical location of the data on the share volume of the L2K Data Storage Server. The user does not know this information. In order to simplify navigation through the directories, you can use the browser function.

The screenshot shows the 'Create new share' form in the DSS web interface. The form has the following fields and options:

- Name:** A text input field.
- Comment:** A text input field.
- Default path:** A radio button that is checked, followed by a dropdown menu showing '/lv0000/'.
- Specified path:** A radio button that is unchecked, followed by a text input field containing '/'. There is a small yellow highlight on this field.

An 'apply' button is located at the bottom right of the form.


Function: Create new share

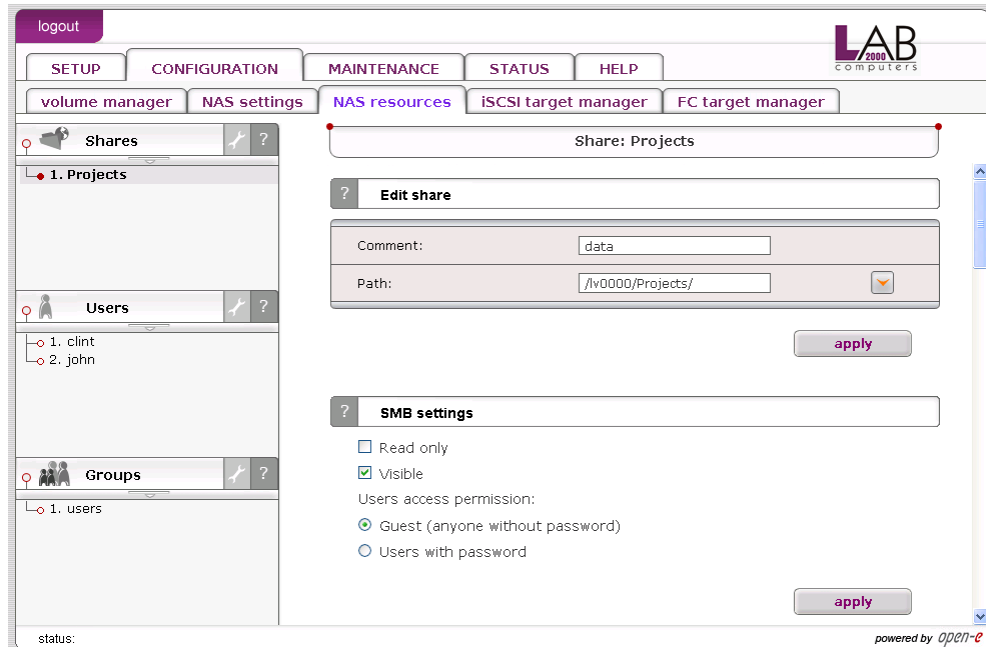
To create a share, enter the share name, comment (optional) and set the path. To use default path to share, leave the checkbox Default path checked. If you want to use specified path, please check the checkbox Specified path and select path to share.

- **note** Please do not use spaces and special characters like:
~!@#\$%^&()+[]{}*;*:"'.,%|<>?/\=`,
- **note** The workgroup/domain name that was configured in the NAS-R3 has to match with the network settings. Otherwise, the configured shares are not visible in the network environment. If you made changes to the workgroup and server name in the NAS configuration, it can take some time until each workstation computer in the Windows network detects the new name.

After clicking “create” button on left page, will appear the name of earlier established share, in this case “Projects”. Then by clicking on name “Project”, you will see all available functions helpful for setting the share:

Function: Edit share

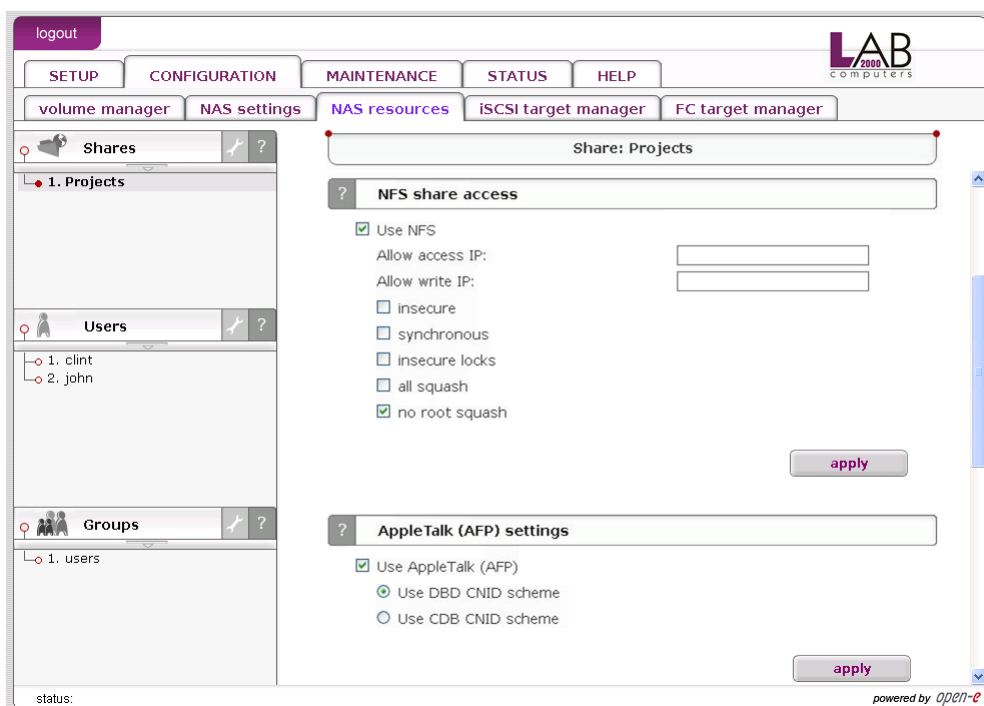
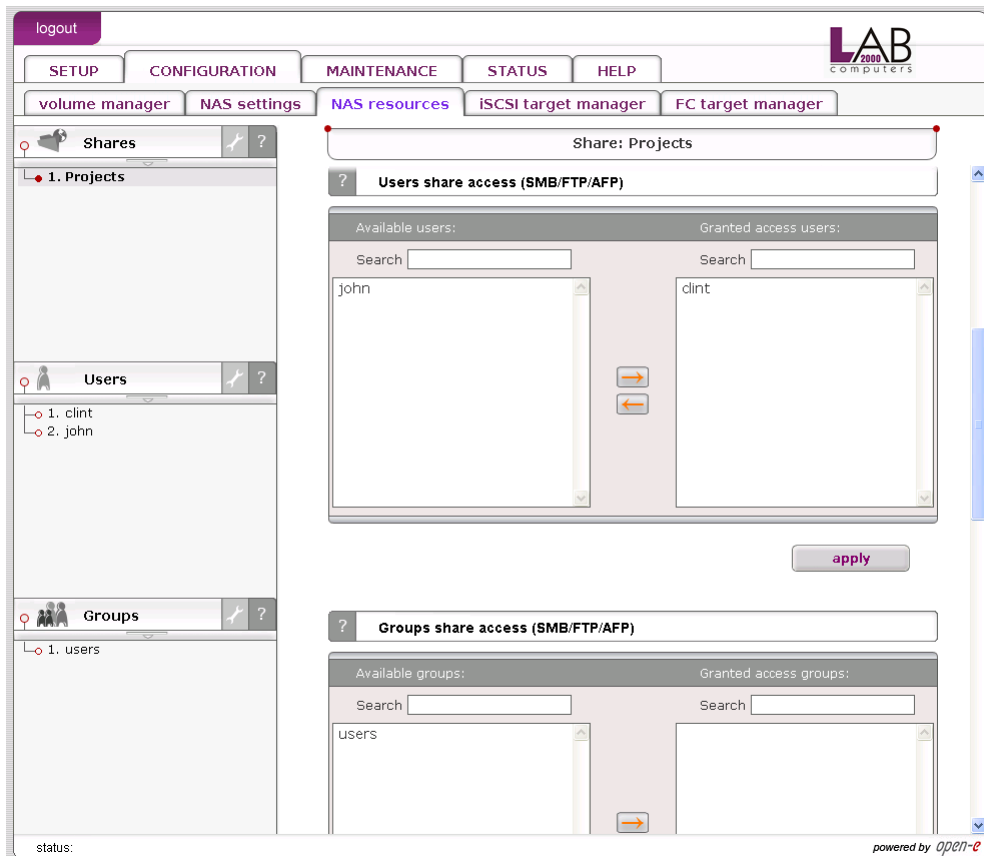
Here you can edit the path for a share, add or delete directories. You can also view files in directories by click on  button.



Function “SMB Settings”

This function allows you to change SMB protocol settings for this share. Please check Read only to restrict the access to read-only operation. Uncheck Visible to hide the share in the browse list. Select Guest to allow anonymous access to the share. Select Users with password to enforce user authentication.

In Functions “Users share access (SMB/FTP/AFP)” and “Groups share access (SMB/FTP/ASP)” you can set the access to the shares to available users and/or groups.



Function: "NFS share access"

Using this function you activate access to particular share via NFS. In order activate NFS on L2K DSS server, you must enable usage of NFS in menu "SETUP" → "NAS settings" in Function NFS settings.

In order to mount this share via NFS, please use following syntax:

- `mount -t nfs IP_addr:/share/share_name /local_mount_point`

note Word share is a key word and must be always added to the

syntax.

In order to mount a in synchronous mode please use:

- `mount -t nfs IP_addr:/share/share_name /local_mount_point -o sync`

In order to mount a share in asynchronous mode please use:

- `mount -t nfs IP_addr:/share/share_name /local_mount_point -o async`

When using synchronous mode, data is not stored in buffer, but transferred at once. In asynchronous mode the data is first stored in a buffer and then transferred.

You can use following NFS option fields:

Allow access IP

Please enter an IP or address range that is allowed to access NFS. You can enter single IP or multiple IP separated with semicolon or IP address range. IP addresses that will not be added to allow write list will have read only access.

Allow write IP

Please enter an IP or address range that is allowed to write to NFS. You can enter single IP or multiple IP separated with semicolon or IP address range.

insecure

Allows incoming connection to originate from ports > 1024

synchronous

When this option is enabled, local file system is waiting for the data to be written to the NAS server. NFS performance will be lowered, however it will ensure that the data will be written directly to the NAS server and will not be stored in the system cache.

insecure locks

Disables authorization of locking requests. Some NFS clients don't send credentials with lock requests, and hence work incorrectly with secure locks, in which case you can only lock world-readable files. If you have such clients you can use the insecure locks option.

all squash

Map all users id to nobody user and all groups id to nogroup group.

no root squash

Please select this option to grant user root from a client machine, the same level of access to the files on the NAS server. Otherwise user root from a client machine will be mapped to user nobody on the NAS server.

- **note** When you leave allow access IP and allow write IP fields blank, then all computers in subnet will have write access to NFS. When you set allow access and leave allow write IP field blank, then

specified computers will have read only access and none will have write access. When you set allow write IP without allow access IP, then specified IPs will have write access and all computers in the subnet will have read only access.

- xxx.xxx.xxx.xxx
- xxx.xxx.xxx.xxx;xxx.xxx.xxx.xxx;
- xxx.xxx.xxx.xxx/network_prefix_length.

If host has entry in DNS field but does not have reverse DNS entry then connection to nfs will not work.

Function: AppleTalk (AFP) Settings

Here you may activate the AppleTalk protocol in the network to access shares on the NAS Server.

How to use AppleTalk with the NAS server:

- In the "SETUP" → "NAS settings" enable AppleTalk,
- In "SETUP" → "NAS resources" menu select a share that you want to be shared with AppleTalk,
- Enable AppleTalk for this share.

"How to connect to the NAS AppleTalk server:"

In MAC OS 9:

- Open the Chooser (APPLE MENU → Chooser),
- Click on AppleShare,
- If the Server "NAS" does not appear in the fileserver list click "Server IP address" and enter the NAS server IP,
- Click "OK" and choose a login type. Enter a user name and password if you want to login as a specified user,
- From available options select shares that you want to mount,
- The icon of the mounted share will appear on the desktop,
- To open the share click on its icon,
- To unmount the share drop its icon onto the trash.

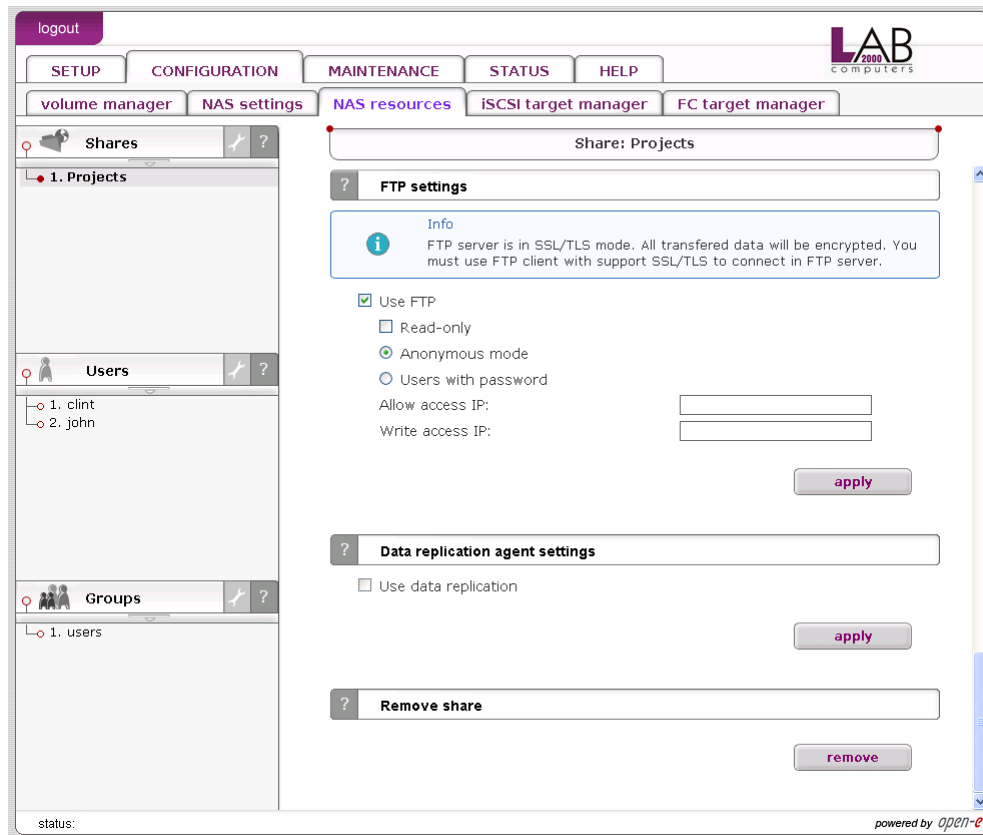
In MAC OSX 10.3:

- Click on the MAC HD, then Applications then Utilities,
- From the Directory Access check if AppleTalk is active; if not → activate it,
- If the server "NAS" does not appear in the Network list, open a web browser and enter the IP address of the AppleTalk server. `afp://192.168.1.3` (very important → `"afp://"`),
- Choose a login type. Enter a user name and password when you want to login as a specific user,
- If you can not log in, click on the Directory Access/Authentication and change the path to search for authentication information,
- From available shares select all you want to mount,
- The icon of any mounted share will appear on the desktop.

or second example is:

- Click on "Connect to server" from the Finder (GO submenu),
- Enter: `afp://address_ip`,

- You can add a link to the AFP server by clicking on the "+" sign. This adds a link to the computer in the Favorite Servers field,
- Choose a login type, enter a password if you want to login as a specific user,
- From available shares select all you want to mount,
- The icon of the mounted share will appear on the desktop.



Function: "FTP Settings"

You can enable FTP services for every share separately. You can choose :

- Anonymous,
- SFTP (Secure FTP).
- Selecting Anonymous mode will enable FTP sharing with anonymous user. For all IPs the access is set to READ+WRITE by default. To change that, activate *Allow access IP* and *Write access IP* options. Clicking apply will make the share available over FTP.
- To connect to this share a FTP client software is required - i.e. Internet Explorer has the FTP support. To connect from IE, when using Anonymous mode, please use following syntax:
- ftp://<DSS IP>/pub/, (e.g. ftp://192.168.0.220/pub/).

When using SFTP client, please use:

- ftp://<DSS IP>/share/, (e.g. ftp://192.168.0.220/share/).

Many FTP client programs need a user name and a password to establish connection. In the Anonymous mode the user name is "anonymous" and there is no password (empty field).

All anonymous shares are in the "share" folder. Any user connecting from the IP without a full access will see all shares but will not be able to see any directories that are prohibited.

For Anonymous login please use e-mail address as password.

● **note** Anonymous user will see only files and directories that he owns.

Selecting SFTP mode will enable secure FTP sharing with the user and password authorization. Only few FTP clients support SFTP, and even fewer SFTP clients support SSL/TLS encryptions.

Here is a list of the tested software:

- CoreFTP (Windows),
- FileZilla (Windows),
- IgloFTP (Windows and Linux),
- SSLFTP (Linux console client).

When SFTP is enabled, the user has the access to the share through the authorized user name and password.

● **note** If the NAS server uses Windows domain authorization then a short name of the domain must precede a user name - connected with a plus sign, i.e. "DOMAIN+Administrator".

To connect to a share via SFTP in the selected encryption, type in SFTP client NAS support SSL and TLS explicit encryption. All SFTP shares are in the "shares" folder. Users see only the allowed shares.

● **note** If you are unable to see any directories when connected to ftp server please make sure that you have rights to access any share over ftp. If still you cannot see any directories please change your ftp client to passive mode.

● **note** Most FTP clients have bookmarks allowing to set up IP, port home folder, etc. Suggested home folder for the Anonymous is "pub" and for SFTP is "shares".

Function: Data replication agent settings

This function allows you to set configuration for a data replication of the share. In order to enable replication for a share, check box Use data replication.

● **note** It is recommended to set Login name, Password and list of Allow access IPs that have access to the share, in another case everyone will have access to the share.

Function: Remove share

Click "remove" button to remove the share.

● **note** No data (directories and files) will be deleted on the logical volume. You can re-create deleted share any time. Just go to NAS resources menu, click on Shares (as you create new share), browse directories structure to find the folder you want to assign the share. Finally in the field Name please enter your share name and click on "apply" button. Now you will find again the deleted share in your network neighborhood.

5.2.2.3.2 Users

In the mode "Workgroup internal LDAP" the category "Users" serves as data entry mask for user accounts. In principal, the process is the same as when you create shares. Enter new users here and assign each of them a name and a password. For security reasons, you have to enter the passwords twice.

User name cannot:

- contain characters: ~ ! @ # \$ ^ & () + [] { } * ; : ' " . , ; % | < > ? / \ = ` ,
- begin or end with a space.
- Password cannot:
- contain characters: ' " ` ,
- spaces.

note If users forget their password, there is no way to retrieve it. You can only set a new password.

The screenshot shows the LAB 2000 web interface. The top navigation bar includes 'logout', 'SETUP', 'CONFIGURATION', 'MAINTENANCE', 'STATUS', and 'HELP'. Below this is a secondary menu with 'volume manager', 'NAS settings', 'NAS resources', 'iSCSI target manager', and 'FC target manager'. The main content area is divided into three sections: 'Shares', 'Users', and 'Groups'. The 'Users' section is currently selected and displays a 'Create new user' form with fields for 'Name:', 'Password:', and 'Confirm password:', followed by a 'create' button. Below this are two sections for 'UID mappings (upload/download)' and 'Quota for users (upload/download)', each containing instructions, a 'Warning' message, a 'Browse...' button, and 'upload' and 'download' buttons. The bottom of the interface shows a 'status:' field and a 'powered by open-e' logo.

Function: Create new user

To create user, enter name, password, retype password and press create button.

note User name cannot:

- contain characters: ~ ! @ # \$ ^ & () + [] { } * ; : ' " . , ; % | < > ? / \ = ` ,

- begin or end with a space.

Password cannot:

- contain characters: ' " ` ,
- spaces.

If users forget their password, there is no way to retrieve it. You can only set a new password.

Function: UID mappings (upload/download)

This function allows you to upload and download UIDs (users IDs).

Using this function you are able to change a lot of users ids at one time.

To upload UID:

- In resources menu create share settings (on lv00),
- Copy configuration file uid_mappings.csv (format:user_name;uid) into settings folder. This file should be in UTF-8 encoding,
- Press "upload" button to import uid mappings,
- If there will be some errors while importing uids please read uid_mappings_import.log file in settings share.

● **note** Warning: current uid mappings will be overwritten. Press "download" button to download uid_mappings.csv.

Function: Quota for users (upload/download)

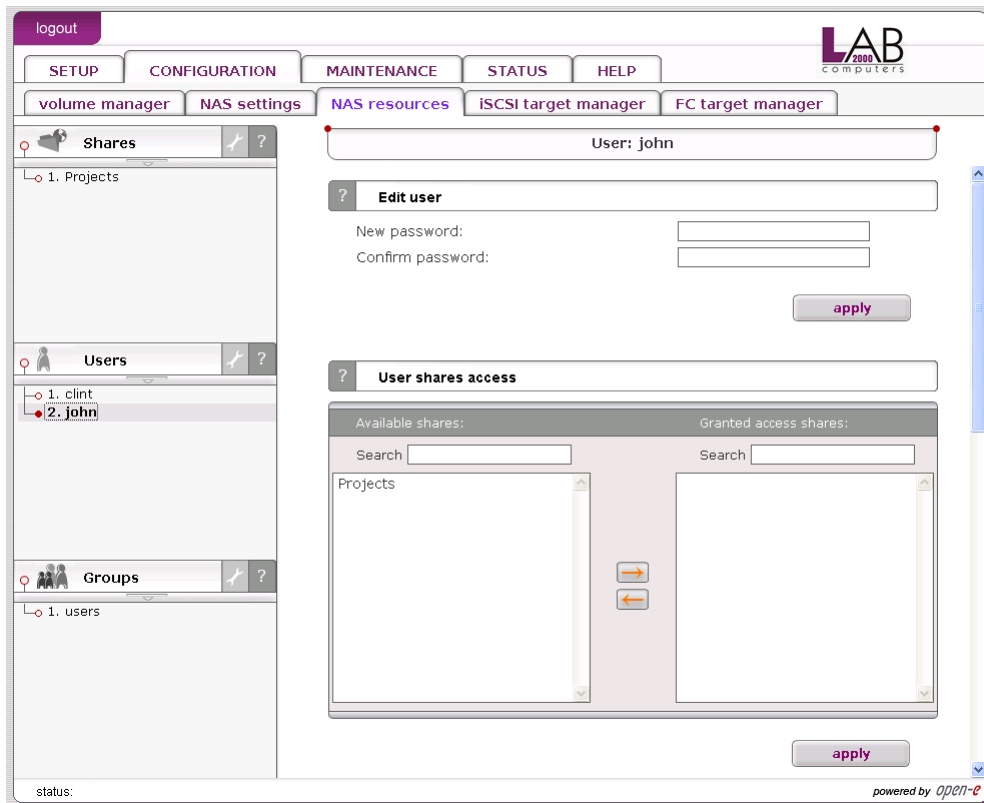
This function allows you to upload and download quota (users quota). Using this function you are able to change a lot of users quota at one time.

To upload quota

- In resources menu create share settings (on lv00),
- Copy configuration file quota_users.csv (encoding: UTF-8; format:user_name; hard_quota-in kbytes) into settings folder,
- Press the button to upload quota configurations for users,
- If there will be some errors while uploading quota please read quota_users_import.log in settings folder.

● **note** Warning: current settings will be overwritten. Press "export" to download quota_users.csv

Then by clicking on name e.g. "john", you will see all available functions helpful for setting the user:



Function: Edit user

To change user password enter and confirm password, and press "apply" button.

Password cannot:

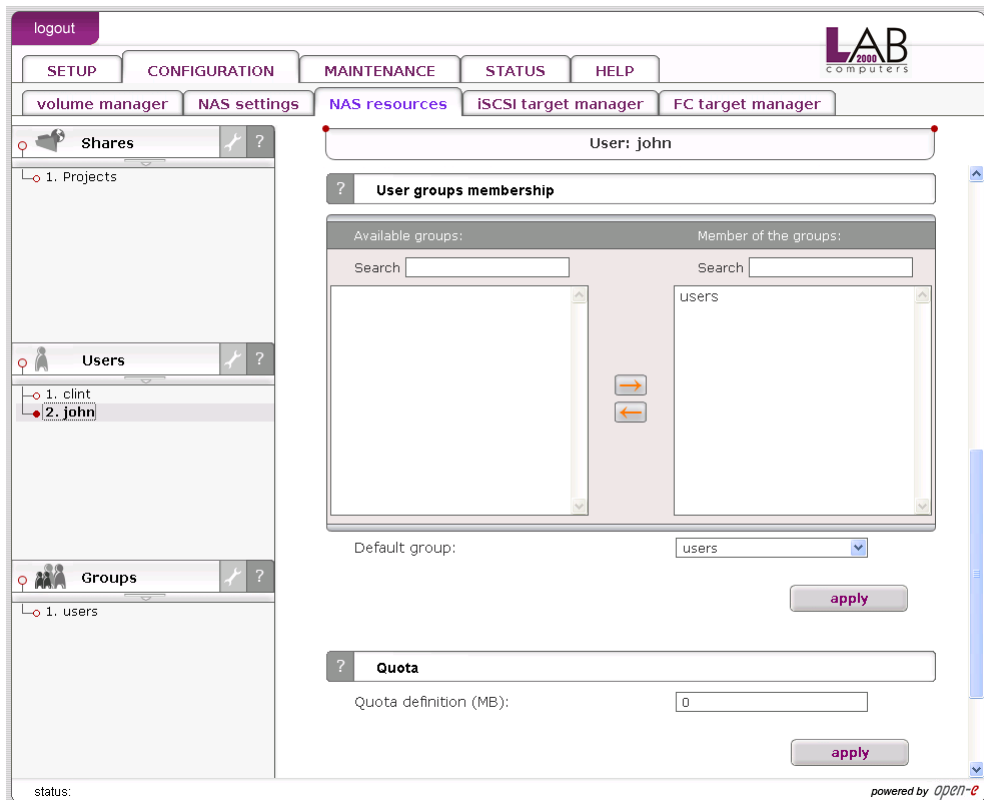
- contain characters: ' " ` ,
- spaces.

Function: Users share access

Add the users access to the shares by selecting the users and clicking the button. To remove access for users to the specified shares select the users and click the appropriate arrow button to remove them from the Granted access users list.



note You can use following keyboard keys in the lists (first set focus to desired list):

- Home: jump to the first,
- End: jump to the last,
- Shift + arrow key: for multi-select,
- letter key: jump to the first position starting with pressed key.



Function: Users group membership

While connected to local LDAP users and groups database this function allows you to view and change user groups membership.

To add user to a group or groups select group/groups on Available list and click on  button. To remove user from group or groups select them on Member of list and click on  button.

While connected to external users and groups database you are able to check which groups user is member of.

note You can use following keyboard keys in the lists (first set focus to desired list):

- Home: jump to the first,
- End: jump to the last,
- Shift + arrow key: for multi-select,
- letter key: jump to the first position starting with pressed key.

Function: Quota

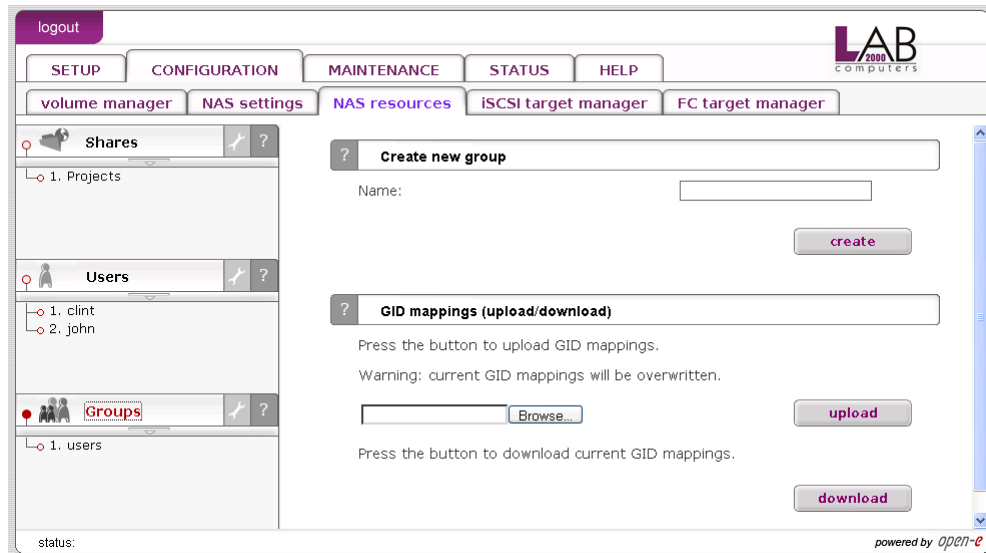
You can assign quota (limit) on amount of space a user is allowed to allocate on shares the user has access to. To remove any limitation the user has set quota to 0.

Function: Remove user

Click "remove" button to remove the user from the system. All the files the user has ownership of will be preserved.

In the mode “Workgroup internal LDAP,” you can define entire groups consisting of different users. In addition, you can assign these groups certain access rights. By clicking on “Groups,” a data entry mask opens up, allowing you to create a new group. Assigning the access rights is done the same way as for users (see 5.2.2.3.2).

In the modes “Workgroup (external LDAP)” and “Windows (PDC)” and “Windows (ADS)” the groups are automatically synchronized with the external server.



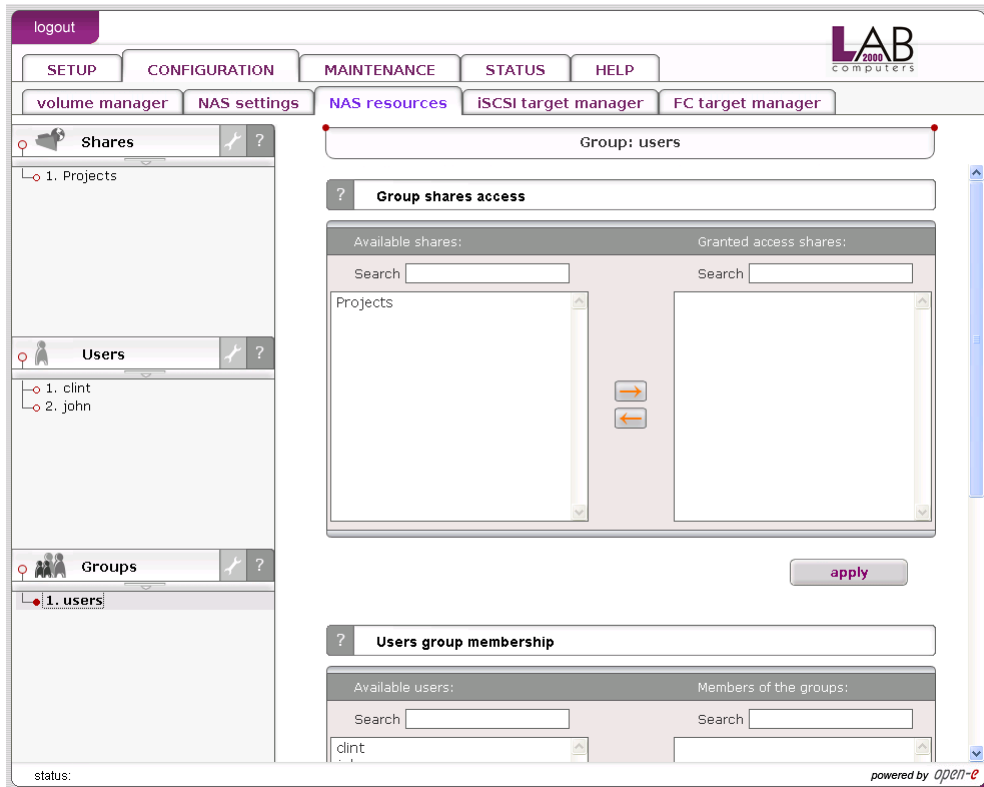
Function: Create new group

To create a group, enter the name and press create button.

note Group name cannot:

- contain characters: ~ ! @ # \$ ^ & () + [] { } * ; : ' " . , % | < > ? / \ = ` ,
- begin or end with a space.

Then by clicking on group name e.g. “administrators”, you will see all available functions helpful for setting the groups:



Function: GID mappings (upload/download)



This function allows you to upload and download GIDs (groups IDs). Using this function you are able to change a lot of groups IDs at one time.

To upload gids:

1. In resources menu create share settings (on lv00),
2. Copy configuration file `gid_mappings.csv` (format:group_name;gid) into settings folder. This file should be in UTF-8 encoding,
3. Press "upload" button to upload GID mappings,
4. If there will be some errors while importing GIDs please read `gid_mappings_import.log` file in settings share.

note Warning: current GID mappings will be overwritten. Press "download" button to download `gid_mappings.csv`.

Function: Group shares access



Here you can add the shares for this group, that has access to, by selecting the shares and clicking the button . To remove the access from this group, that has the specified shares, select the shares and click the button .

note You can use following keyboard keys in the lists (first set focus to desired list):

- "Home": jump to the first,
- "End": jump to the last,
- "Shift" + arrow key: for multi-select,
- "letter key": jump to the first position starting with pressed key.

Function: Users group membership

While connected to local LDAP users and groups database this function allows you to view and change user groups membership.

To assign users to this group, select users from "Available users" list and click on  button. To remove membership from a user select users from the Members list and click on  button.

While connected to external users and groups database you are able to check which users are members of this group.

Function: Remove group

Click "remove" button to remove the group.

5.2.2.4 iSCSI target manager

Function: Create new target


To create a target assign a name or leave the "Target Default Name" option checked.

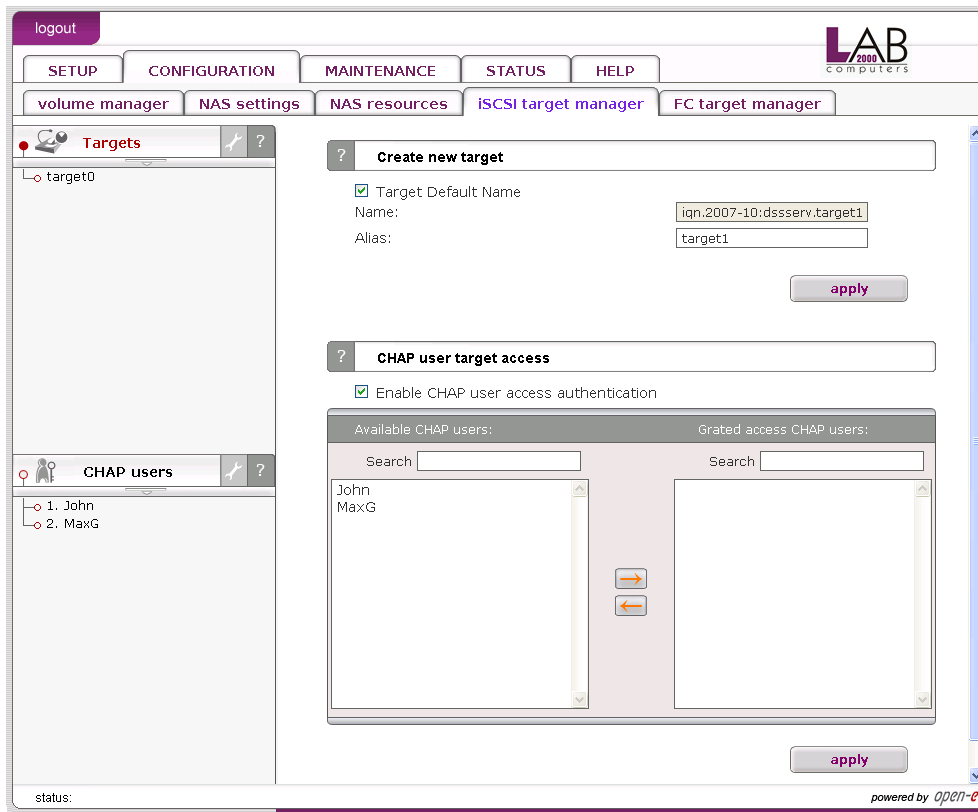
Name

Target name can contain alphanumeric characters: ' . ' ' : ' ' - '. A target name is considered case-insensitive. Every character entered will be converted to low-case. No spaces and no underscores are permitted.

Alias

Alias is a name, under which target will be visible in Targets tree. The same naming rules apply for alias as for name.

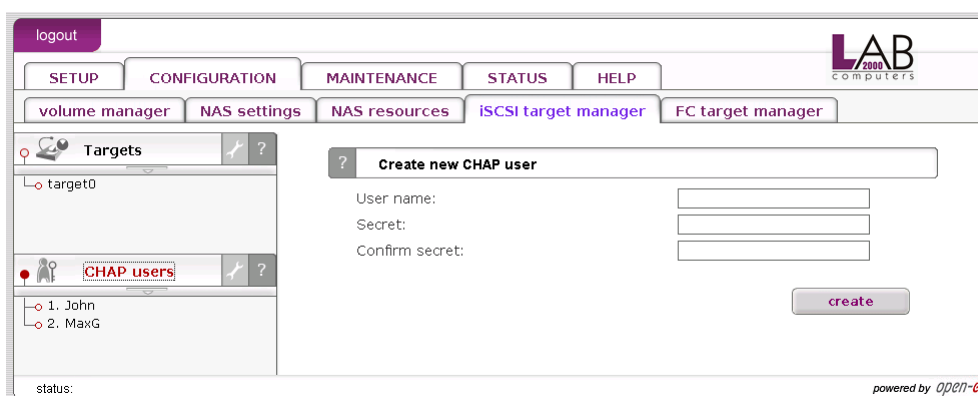
 **note** The server name will be used as a part of the default target name.



Function: CHAP user target access

Add CHAP users that are granted to access to this target.

- note** You can use following keyboard keys in the lists (first set focus to desired list):
- "Home": jump to the first,
 - "End": jump to the last,
 - "Shift" + arrow key: for multi-select,
 - "letter key": jump to the first position starting with pressed key.
- If you enable CHAP user access authentication but will not select any users to have access, then nobody will have access to the Target.



Function: Create new CHAP user

To create CHAP user enter name, password, retype password and press create button.

- note** CHAP user name cannot:
- contain characters: ~ ! @ # \$ ^ & () + [] { } * ; : ' " . , % | < > ? / \ = ` ,
 - begin or end with a space.
- Password cannot:
- contain characters: ' " ` ,
 - spaces,
- The length of the password must be within 12 - 16 characters.

If CHAP users forget their password, there is no way to retrieve it. You can only set a new password.

The screenshot shows the 'iSCSI target manager' interface. The target is 'iqn.2007-10:dsserv.target0'. Under 'Target volume manager', there is a table with columns: Volume, Rep., Size (GB), LUN, RO, WB, and Action. Two volumes are listed: lv0004 (40.00 GB, LUN 0) and lv0005 (10.00 GB, LUN 1). Below this, the 'CHAP user target access' section has a checked box for 'Enable CHAP user access authentication'. It features two search boxes and lists: 'Available CHAP users' (MaxG) and 'Granted access CHAP users' (John). An 'apply' button is at the bottom right.

Function: Target volume manager

This function allows manage free and already assigned volumes in a target.

To assign a volume to the target click the "Add" button associated with that volume. Similarly to remove already assigned volume from the target click "Remove".

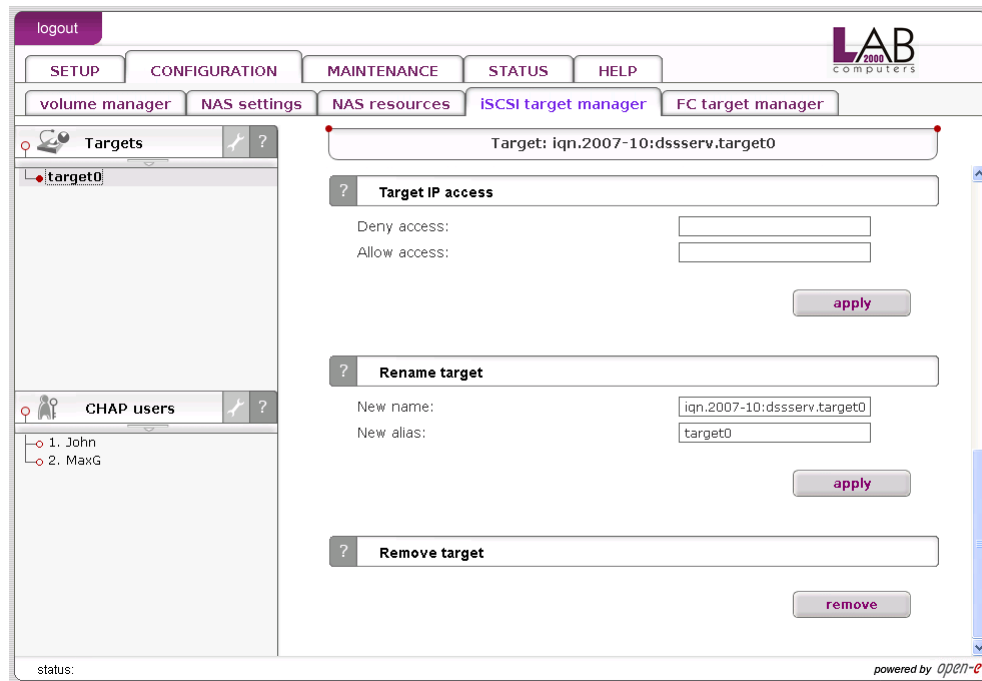
In certain circumstances you may need to adjust the LUN of the volume you are about to add. Normally, however, the LUN assignment is taken care of for you automatically. You should leave the default values. The RO option means Read Only, if it is turned on the LUN will be visible as a write protected disk.

To switch the RO option when it's disabled, you must first remove the volume from the target and then add it again setting the flag as desired.

Function: CHAP user target access

Add CHAP users that are granted to access to the Target Server.

- note** If you enable CHAP user access authentication but will not select any users to have access, then nobody will have access to the Target Server.



Function: Target IP access

You can assign network classes or specify individual IP addresses that are permitted or denied to access the target. Entries should be delimited by commas.

When no entries are present in Denied access or Allowed access fields everyone is permitted to access the target. Specifying at least one entry in Allowed access field excludes all the clients that do not match it from accessing the target.

When you specify at least one entry in Denied access field, every CHAP user or CHAP users from network class address are denied from accessing the target.

When you specify any IP address in Allowed access field, CHAP users from that address are allowed to access the target even if the same address has been specified in Denied access field.

If you enter only Allowed access field then Denied access field will be automatically entered with 0.0.0.0/0 entry.

- note** Please note that already active sessions to the target will persist regardless of the newly applied settings. You can ensure that the settings are forced immediately after you apply them by going to maintenance->shutdown->connection reset and resetting the

connections manually. Keep in mind that all the unsaved client data might be lost.

There is possibility of entering network class address in two ways:

- 192.168.2.0/255.255.255.0 - normal form,
- 192.168.2.0/24 - short form.

When you enter network class address in normal form, it will be automatically converted to short form.

Examples:

Denied access: 0.0.0.0/0

Allowed access: 192.168.2.30/0; 192.168.3.45

These settings deny access from every IP address or network class address, only addresses in Allowed access field are granted for accessing the target.

Denied access: 192.168.0.0/16

Allowed access: 192.168.2.30; 192.168.10.230; 192.168.30.0/24

These settings deny access to any IP addresses from network 192.168.0.0/16. Grant access for IP addresses 192.168.2.30, 192.168.10.230, all IP addresses from network 192.168.30.0/24 and all IP addresses that have not been denied in Denied access field.

Function: Rename target

Provide a new target name. A target name is considered case-insensitive. Every character entered will be converted to low-case.

Function: Remove target

This function removes all volumes from the target.

- **note** Please note that the data stored on the volumes are not automatically removed. You can assign the volumes to different targets and still see the data. Please remove the data prior to removing target in order to prevent leakage of sensitive or classified information.

5.2.3 MAINTENANCE

This page accessed with the Maintenance tab contains settings and functions pertaining to general management operations.

5.2.3.1 Shutdown

Function „System shutdown“

When using this function, you can shut down the L2K Data Storage Server. If any of your users are currently connected, you will be asked to confirm the

shutdown. If no users are connected, the process will be executed immediately without any delay.

note The L2K Data Storage Server can only be turned on again manually.

Function: Schedule for shutdown

This control allows you to specify a time for a scheduled system shutdown.

The screenshot shows the LAB 2000 web interface. At the top, there is a 'logout' button and a navigation menu with tabs: SETUP, CONFIGURATION, MAINTENANCE, STATUS, and HELP. Below this is a secondary menu with tabs: shutdown, connections, snapshot, backup, restore, antivirus, miscellaneous, and software update. The main content area is titled 'System shutdown' and contains a button labeled 'shutdown'. Below this is a section titled 'Create schedule for shutdown' which includes a 'Comment:' text input field, a list of days with checkboxes (Monday, Tuesday, Wednesday, Thursday, Friday, Saturday, Sunday), and a 'Start' time selector with two dropdown menus for hours and minutes. An 'apply' button is located at the bottom of this section. The footer of the interface shows 'status:' on the left and 'powered by open-e' on the right.

The screenshot shows the LAB 2000 web interface. At the top, there is a 'logout' button and a navigation menu with tabs: SETUP, CONFIGURATION, MAINTENANCE, STATUS, and HELP. Below this is a secondary menu with tabs: shutdown, connections, snapshot, backup, restore, antivirus, miscellaneous, and software update. The main content area is titled 'System restart' and contains a button labeled 'restart'. Below this is a section titled 'Create schedule for restart' which includes a 'Comment:' text input field, a list of days with checkboxes (Monday, Tuesday, Wednesday, Thursday, Friday, Saturday, Sunday), and a 'Start' time selector with two dropdown menus for hours and minutes. An 'apply' button is located at the bottom of this section. The footer of the interface shows 'status:' on the left and 'powered by open-e' on the right.

Function: System restart

This function allows you to restart your system.

Function: Schedule for restart

This control allows you to specify a time for a scheduled system restart will be taking place.

5.2.3.2 Connections

Function: NAS connections reset

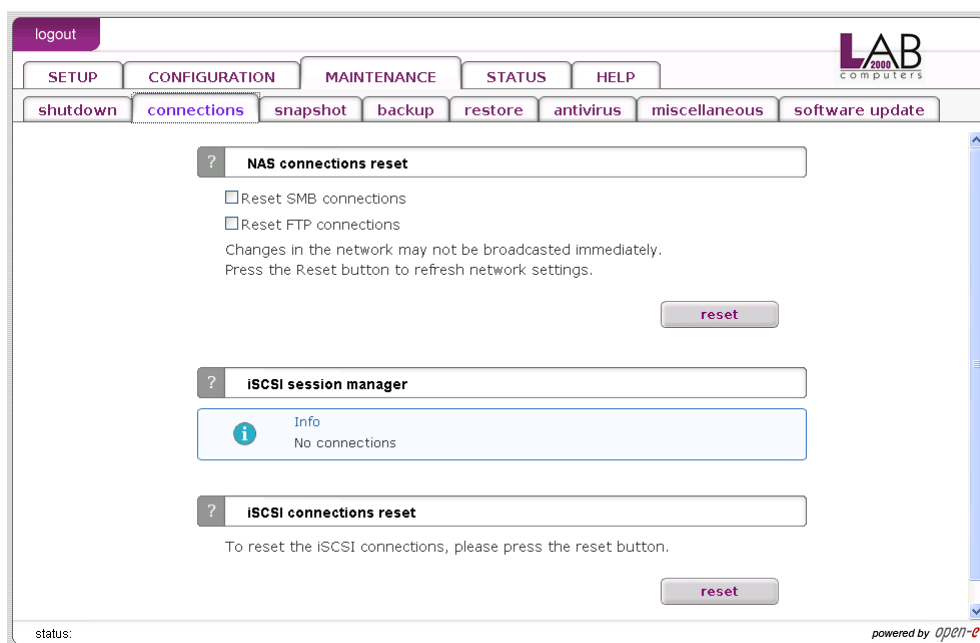
This function forces an immediate broadcast of changes to shares or access rights you have made over your network. It is dedicate for SMB and FTP connections. You can check or uncheck corresponding check boxes.

- **caution** This function disconnects all users connected to the shares on specified protocol, which may lead to data loss if any files are open.

Function: iSCSI session manager

This function presents current connections to iSCSI targets. You can find here information like: target name, IP address, CID (ID of connection) and SID (ID of the session).

- **note** You can cancel connection to iSCSI targets, but the initiator may automatically reestablish connection if it's enabled on initiator side. In order to block initiator from reconnecting to target you have to deny IP address in "SETUP" → iSCSI target manager → Targets → target[nr] → Function Target IP access.



Function: Connection reset

It might be necessary to restart the iSCSI daemon to inform client about specific setting changes, e.g. resize of the volumes.

- **caution** All current connections with iSCSI initiators will be terminated immediately. It may cause loss of unsaved data files.
- **note** If your client does not reestablish the connections automatically you will have to do it manually from the clients.

5.2.3.3 Snapshot

Function: Snapshot tasks

This function enables you to manually activate (start) or deactivate (stop) snapshots.

Activation of a snapshot is only possible for unscheduled snapshots (with inactive schedule setting).

note When logical volume is set as a destination replication mode and data are inconsistent then there might be problems while reading data from disks on iSCSI initiator.

The screenshot shows the 'Snapshot tasks' page in the LAB2000 web interface. The page title is 'Volume group: vg00'. Below the title, there is a section for 'Snapshot tasks' with a table:

Name	Start time	Action
snap00000	n/a	[Start] [Stop]

Below the table, the following details are shown:

- LV: lv0001
- Size: 20.00 GB
- Status: **in use/active**
- Usage: 0.00%

The interface also includes a sidebar with 'Snapshots' and 'vg00', and a top navigation bar with tabs for SETUP, CONFIGURATION, MAINTENANCE, STATUS, and HELP.

The screenshot shows the 'Snapshot info' page in the LAB2000 web interface. The page title is 'Snapshot: snap00000'. Below the title, there is a section for 'Snapshot info' with the following details:

- Name: snap00000
- Status: active
- Size: 10.00 GB
- LV: lv0000

Below the details, there is a section for 'Create schedule for snapshot task' with the following options:

- Comment: [Text input field]
- Monday Tuesday Wednesday Thursday Friday Saturday Sunday
- Start: [00] : [00]
- Stop: [] : []
- [apply] button

Below the schedule options, there is a section for 'Schedules for snapshot task' with the following details:

Details	Action
Weekly Mo. Tu. We. Th. Fr. at 18:10-19:00	[X]

The interface also includes a sidebar with 'Snapshots' and 'vg00', and a top navigation bar with tabs for SETUP, CONFIGURATION, MAINTENANCE, STATUS, and HELP.

Function: Snapshot info

Here you can see information for selected snapshot.

Name

Name of snapshot.

LV

Logical volume for which snapshot is assigned.

Status

Status of snapshot. Can be one of following:

Active

Snapshot is in active state.

Inactive

Snapshot is inactive, probable reason: overflow.

Unused

Snapshot is currently unused.

Size

Size of snapshot.

Function: Create schedule for snapshot task

Here you can create schedule for selected snapshot task.

Comment

You can enter comment for snapshot schedule.

Time select

You can start creating the snapshot immediately by selecting "Now" from Time select drop down list or add to schedule.

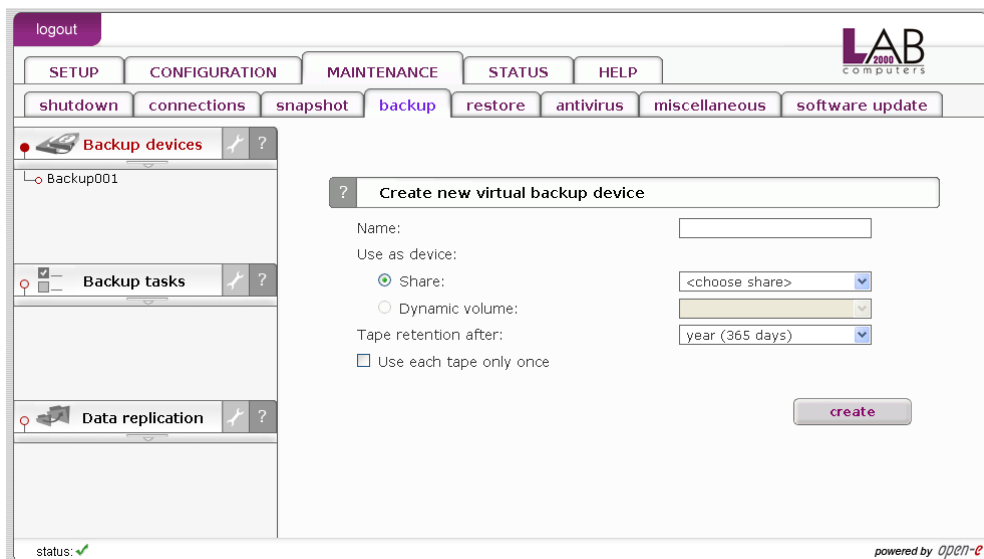
Interval

Select time period in which snapshot will be created.

5.2.3.4 Backup

5.2.3.4.1 Backup devices

Here you can view list of all backup devices. Click on device name to edit device settings, create new tape for the device, manage tapes or remove the device. In case when tape backup device (physical device) is connected, "Tape Drive" entry will appear on backup devices tree.

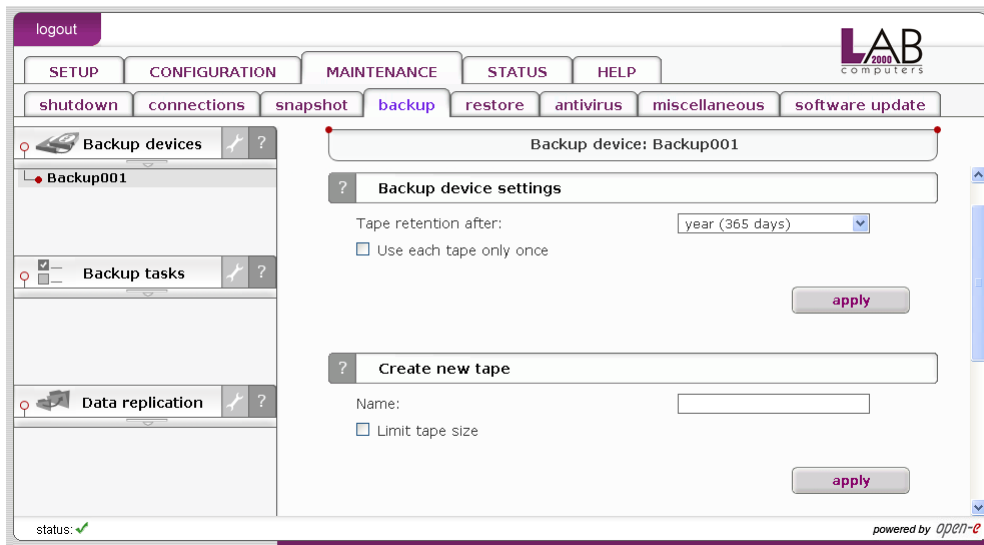


Function: Create new virtual backup device

Here you can create a new backup device, this device will be used as destination when making backups of your data. Please provide:

- Name for device,

- Select share for device,
 - Time retention of tape,
 - If you want to make one backup on one tape only, select option use each tape only once.
- Click "Create" button to create new backup device.



Function: Backup device settings

Here you can set settings for selected backup device.

Time retention of tape

Time after the tape will be rewritten from the beginning.

Use each tape only once

Means that each backup will be made on one tape only.

Function: Label new tape

With this function you can label new tape that will be used to make backup.

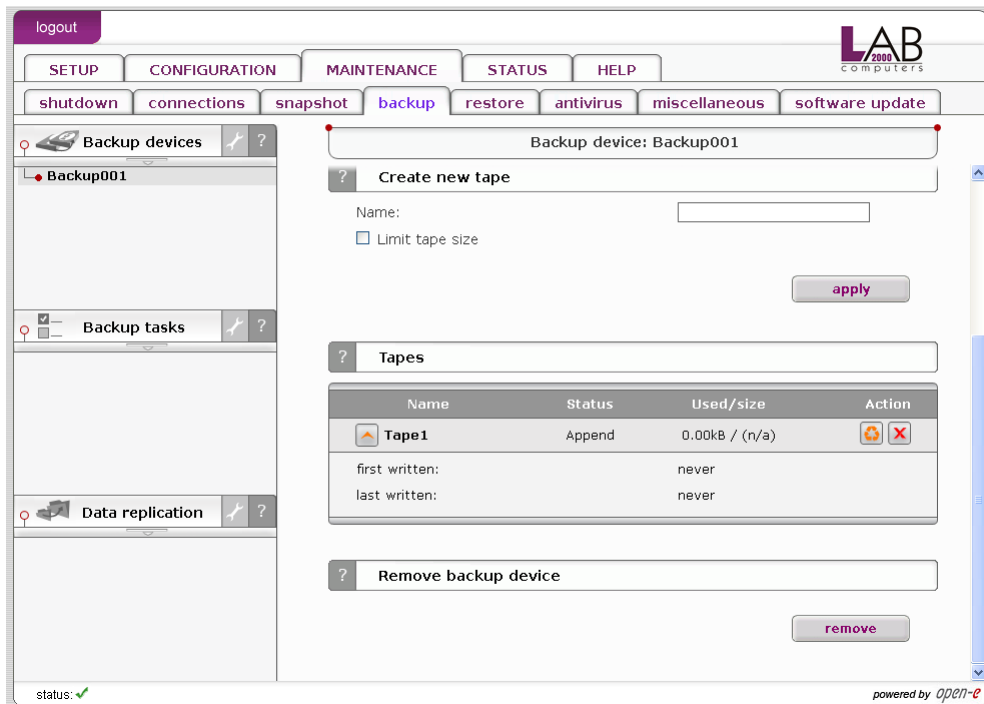
In order to label a new tape:

- enter tape name,
- select slot,
- optionally you can limit tape size,
- click "Apply".

note Make sure to insert tapes in to streamer device in proper order, otherwise tapes may have wrong slot number assigned after making backup.

Function: Remove backup device

This function removes selected backup device.



Function: Tapes

Here you can view information on all tapes used with selected backup device and manage them.

Function provides following information:

Name

Name of the tape.

Status

Status of the tape. Status can be one of following:

- Full - tape is full and will not be used for backup until retention time is over,
- Append - new backups will be written at the end of the tape,
- Recycle - the tape will be set to this state when tape status has been set to purged and there is no other appendable tapes available. Tape will be set for new write from the beginning of the tape(old data will be deleted),
- Purged - this status will show up when tape retention time is over(old data is still on tape),
- Error - tape will not be used because of errors on tape,
- Used - tape has been set as used once only and cannot be append any more,
- Busy - tape is actually used for backup write.

Used/size

Shows how many MB of data has been written to tape and how many MB of data can be written to that tape.

Action

Action that can be performed on tape:

- Show more info on tape,
- Manually set tape to purged status,
- Remove the tape.

Function: Tape tools

This function provides tools to manage your tape device.

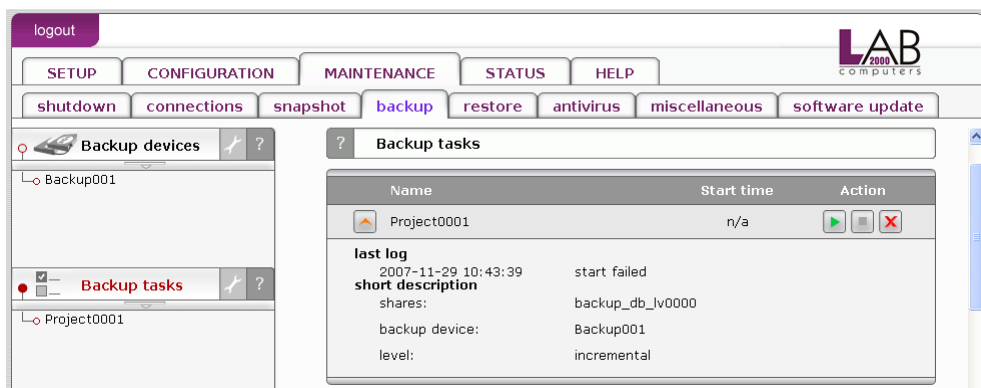
Tape tools:

- tape rewind,
- tape erase,
- tape unload / eject,
- tape load.

note When tape library device is connected then tape unload tool will appear. If streamer device is connected then tape eject tool will appear.

5.2.3.4.2 Backup tasks

Here you can view list of all created backup tasks. Click on backup task name to see more information about it.



Function: Backup task

Here you can view information on selected task.

Shares

List of shares that are used for backup.

Device

Backup device to which backup task is assigned.

LV

Logical volume that is used for backup device.

Snapshot

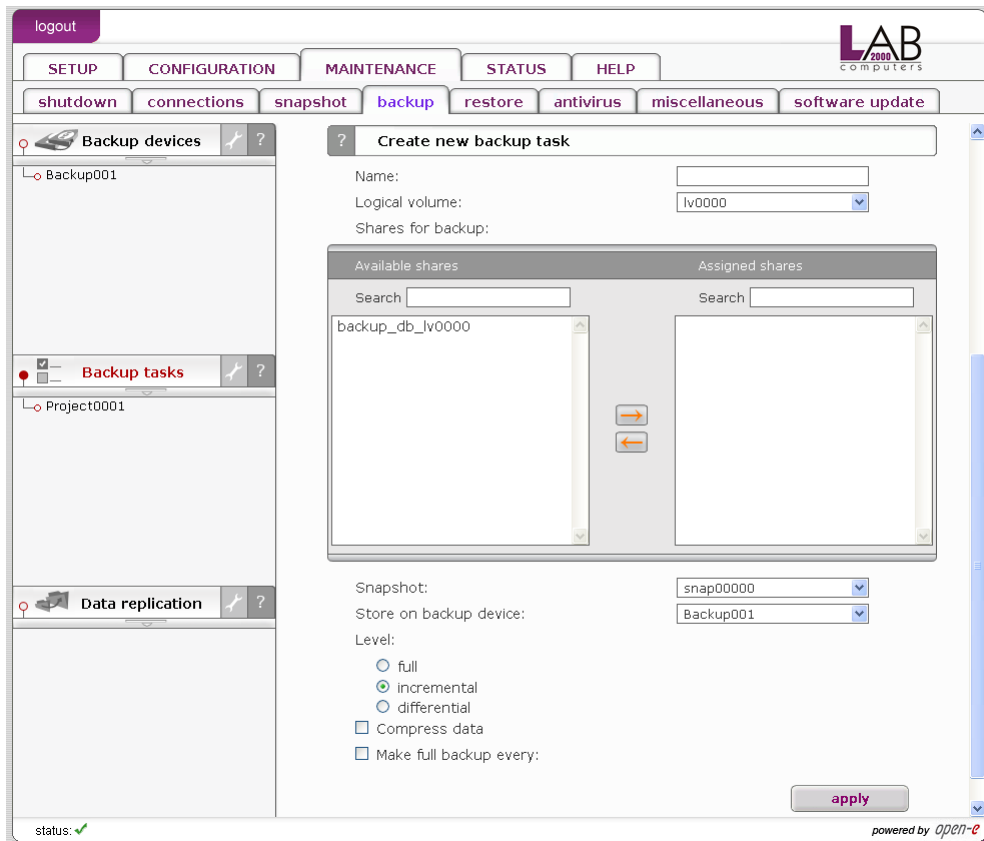
Snapshot that is used for backup task.

Level

Backup level used.

Compression

Compression info.



Function: Create new backup task

Here you can create new backup task.

In order to create backup task:

- Enter task name,
- Select Logical Volume,
- Select Shares for backup,
- Select Snapshot from which backup will be made,
- Select backup device on which backup will be made,
- Select backup level,
- If you want to compress data on backup, select option compress data,
- Select option unmount tape after backup to unmount tape after backup.

Backup levels:

Full

This will backup all your data.

Incremental

This will backup only new data.

Differential

This will backup all new data from last full backup.

The screenshot shows the LAB 2000 computers interface. The top navigation bar includes 'logout', 'SETUP', 'CONFIGURATION', 'MAINTENANCE', 'STATUS', and 'HELP'. Below this, there are sub-tabs: 'shutdown', 'connections', 'snapshot', 'backup', 'restore', 'antivirus', 'miscellaneous', and 'software update'. The 'backup' tab is active, showing a tree view on the left with 'Backup devices', 'Backup tasks', and 'Data replication'. Under 'Backup tasks', 'Project0001' is selected. The main area displays 'Backup task: Project0001' and a table of attributes.

Attribute	Value
Shares:	backup_db_lv0000
Device:	Backup001
LV:	lv0000
Snapshot:	snap00000
Level:	incremental
Compression:	off
Full backup every:	off

status: ✓ powered by open-e

Function: Schedules for backup task

Here you can see information on all schedules created for selected backup task. You can also delete any schedule by clicking "delete schedule" action button.

Function: Restore from backup

Here you can restore data from created backup.

In order to restore data from backup:

- select backup to restore,
- select share to which backup will be restored,
- select type of files overwrite,
- click "apply" button to begin restore process.

For every backup you view following backup info:

Files

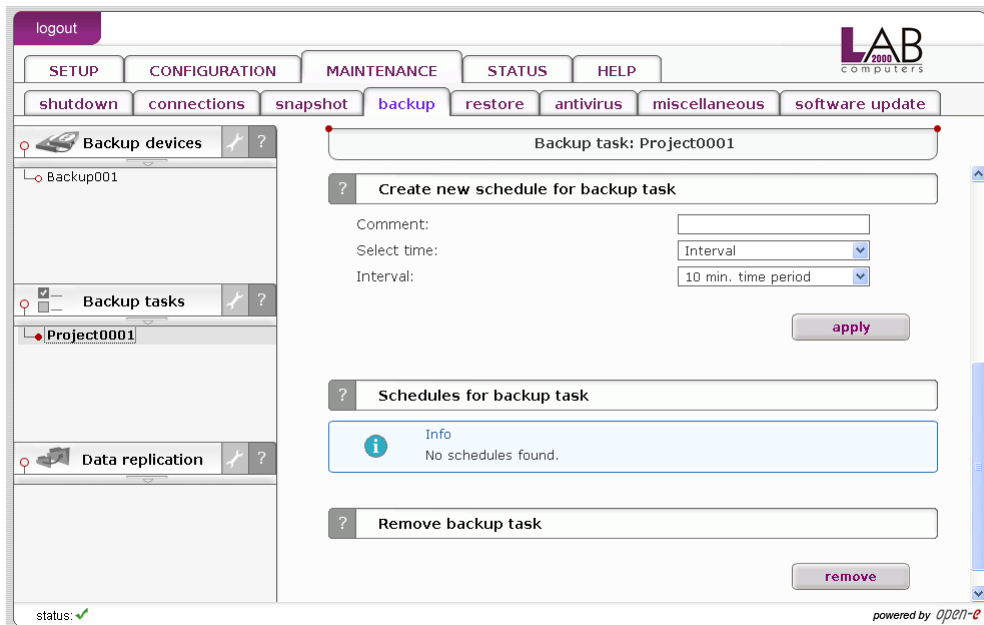
Number of backed up files.

Size

Total size of data in MB.

Required tape(s)

List of tapes required for backup restore.



5.2.3.4.3 Data replication

Here you can view list of all data replication tasks.

Function: Create new data replication task

This function allows you to create new data replication task. Data can be replicated as source or destination in the same time.

Task name

Please enter task name.

Source share

In order to set share as source, select it from the drop down list and enter Destination IP, where share will be replicated.

Snapshot

Snapshot assigned for data replication.

Destination share

Select destination share from the drop down list and enter destination agent login and password.

Dest. agent login

Enter destination agent login.

Dest. agent password

Destination agent password.

Log replication errors

Turn it on, if you want to log replication errors.

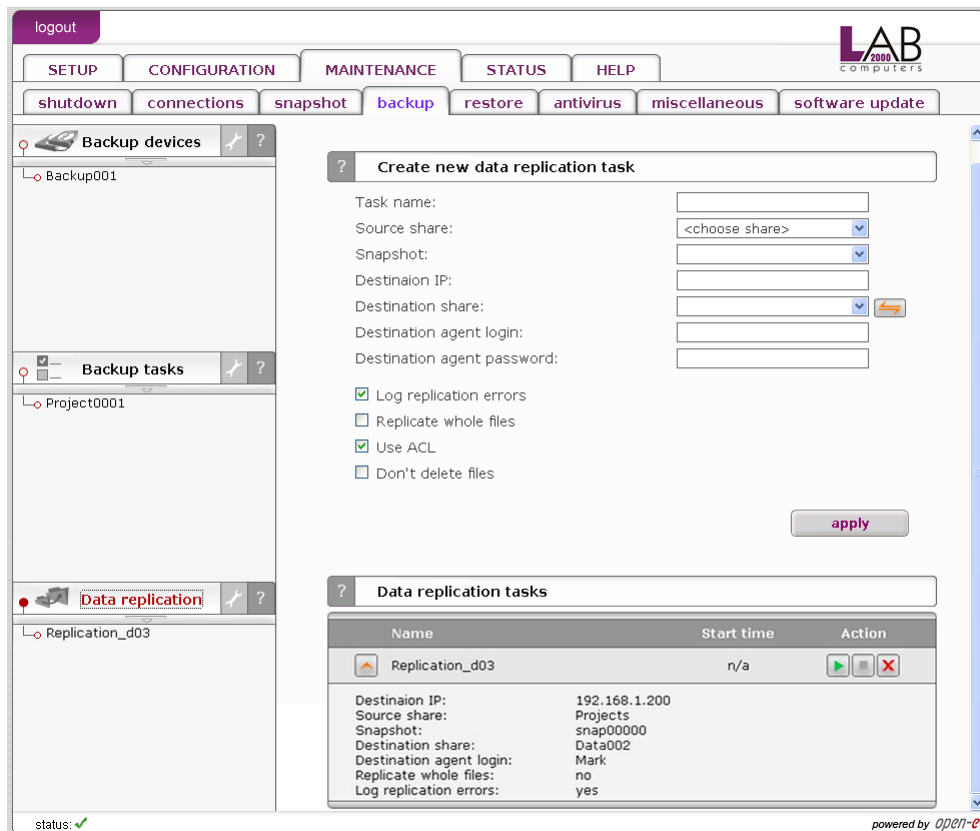
Replicate whole files

If this option is turn on, then all parts of a file will be replicated, if not only changed part of a file will be replicated. It's recommended to turn it on, if speed of network is faster then local partition write speed.

note In order to set share as a destination, one should enable Data replication agent in setup → NAS settings menu, then enable replication option for each share. There is no need to enable Data replication agent, if replication would be only set as source.

It's not possible to make data replication and backup in the same time. Backup has higher priority than data replication. Data replication will be stopped, if it has been setup in the same time with Backup, when using snapshots from the same Logical Volume. You will see snapshot error in Data replication status, because snapshots can not be used twice in a same time, if they are set to the same Logical Volume.

In order to make data replication over the internet you have to configure the firewall port to: 873.



Function: Data replication tasks

Here you can run, stop and delete previously created data replication tasks.

For every task you can view additional details:

- Destination IP,
- Source share,
- Snapshot,
- Destination share,
- Destination agent login,
- Replicate whole files info,
- Log replication errors info.

Function: Data replication task

Function shows information on selected data replication task.

You can view:

- Destination IP,
- Source share,
- Snapshot,
- Destination share,
- Log replication errors info,
- Replicate whole files info.

The screenshot displays the LAB2000 web interface. The top navigation bar includes 'logout', 'SETUP', 'CONFIGURATION', 'MAINTENANCE', 'STATUS', and 'HELP'. Below this, a secondary menu contains 'shutdown', 'connections', 'snapshot', 'backup', 'restore', 'antivirus', 'miscellaneous', and 'software update'. The main content area is titled 'Data replication task: Replication_d03'. It features a table with the following attributes and values:

Attribute	Value
Destination IP:	192.168.1.200
Source share:	Projects
Snapshot:	snap00000
Destination share:	Data002
Destination agent login:	Mark
Log replication errors:	Yes
Replicate whole files:	No

Below the table, there is a section for 'Create schedule for data replication task' with a 'Comment:' text field, a 'Select time:' dropdown menu set to 'Interval', and an 'Interval:' dropdown menu set to '10 min. time period'. An 'apply' button is located below these fields. At the bottom, a 'Schedule for data replication task' section shows a 'Details' table with the schedule 'Weekly Mo. Tu. We. Th. Fr. at 0:00-1:00' and an 'Action' column with a red 'X' icon. The interface also shows a sidebar with 'Backup devices' (Backup001), 'Backup tasks' (Project0001), and 'Data replication' (Replication_d03). The status bar at the bottom indicates 'status: ✓' and 'powered by open-e'.

Function: Create schedule for data replication task

Here you can create schedule for selected data replication task.

Comment

You can enter comment for replication schedule.

Time select

You can start replication immediately by selecting "Now" from Time select drop down list or add to schedule.

Interval

Select time period that replication will be run.

Function: Schedule for data replication task

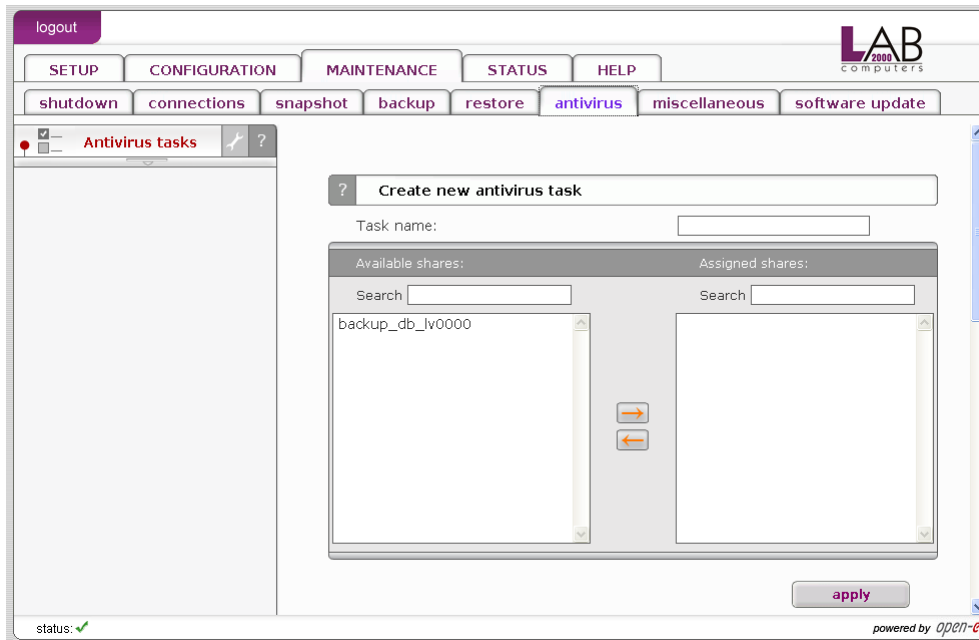
Here you can manage all schedules created for selected data replication task.

5.2.3.5 Antivirus

Function: Create new antivirus task

Here you can create a new antivirus scan task.

- Enter task name,
- Select shares for scan,
- Click "apply" to create a task.

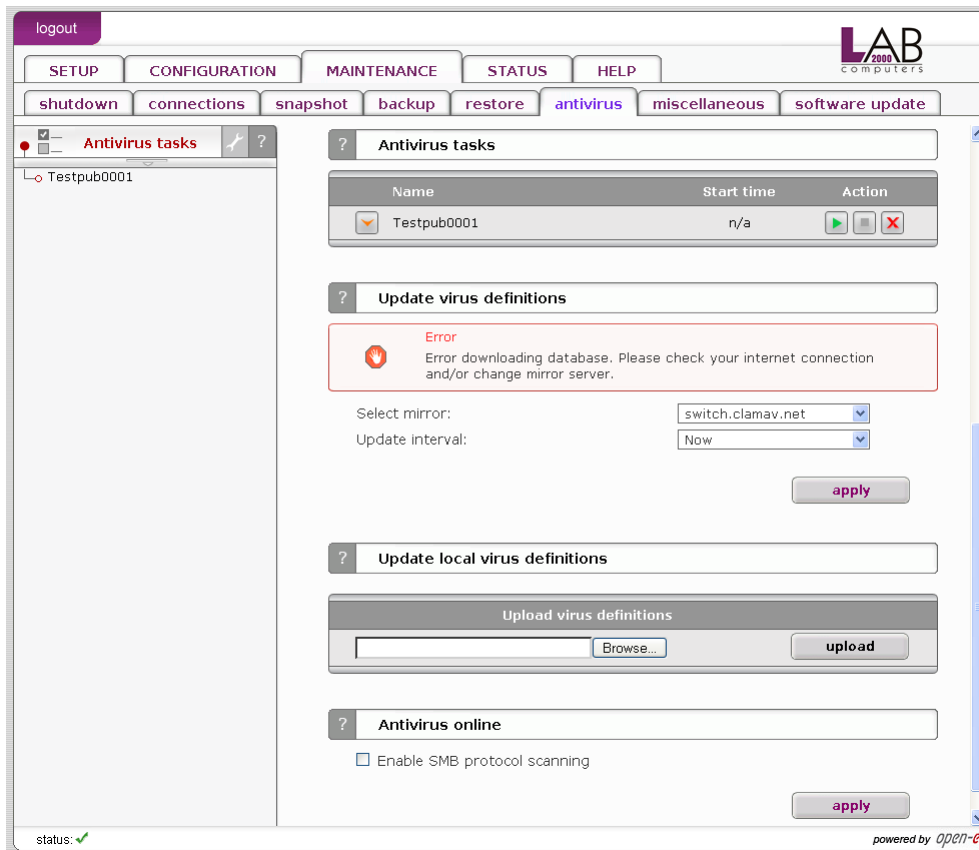


Function: Antivirus tasks

Here you can run, stop or delete desired antivirus task. All previously created tasks will be visible here.

Function: Update virus definitions

With this function you can update virus definitions. Select mirror from which definitions will be downloaded. Select when update should be made. If you select "now", update will be made instantly. In another case update will be made now and every selected time.



Function: Antivirus online

This function gives Antivirus online protection for your network protocols. Any files transferred on the server will be scanned. The feature Enable SMB protocol scanning allows scanning online files via SMB.

Options:

Move to quarantine

Allows moving infected files to quarantine share previously chose. Name of infected files will change with prefix vir- and randomly signs without extension.

Delete infected files

Allows automatically deleting infected files without warning!

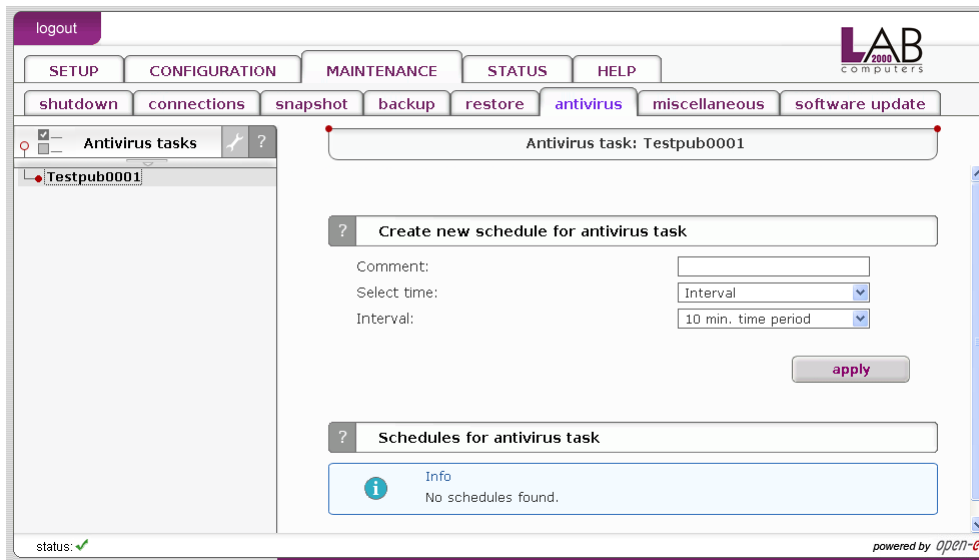
No action

Allows to choose no action on founded infected files.

Notify by messenger

Allows to get fast information about infected files by Windows Messenger (net send).

note To verify the information about the infected files look in logs. You will get the info which files are infected and with what viruses.



Function: Create new schedule for antivirus task

Here you can create new schedule for selected antivirus task.

Comment

You can enter comment for antivirus schedule.

Time select

You can start antivirus task immediately by selecting "Now" from Time select drop down list or add to schedule.

Interval

Scan will be made every "selected time". E.g. if you choose interval 1 h. - each one hour share will be scanned.

Weekly

Scan will be made in selected days at specified time.

Function: Schedules for antivirus task

Here you can manage all schedules created for selected antivirus task.

5.2.3.6 Miscellaneous

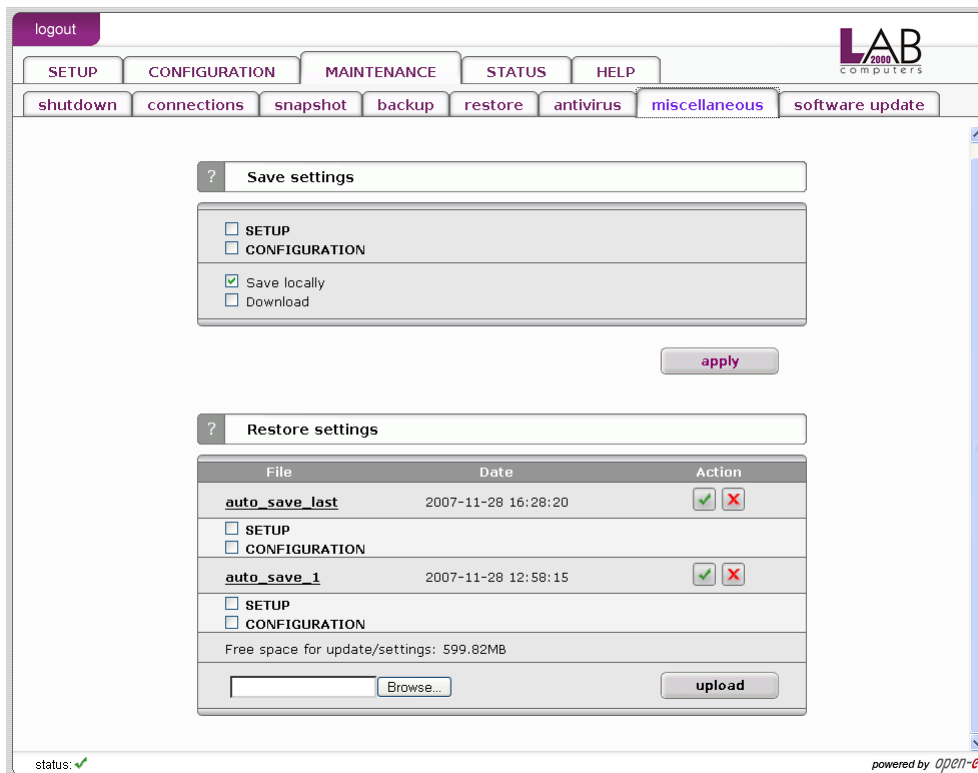
Function: Save settings

With this function you can store the configuration settings. You can save such setting as:

- Server setup,
- Network settings,
- Administrator setup,
- Hardware setup,
- Target settings,
- Users.

Select settings you want to store and click Apply. Settings can be saved locally on the server(it will be visible in function Restore setting) and/or

downloadable file. Each time you save settings locally, new entry will be created and during restoring you can select witch settings to restore. You can restore the settings using function Restore settings.



Function: Restore settings

With this function you can restore the configuration settings (previously saved). You can restore settings from files saved locally or upload configuration settings file (previously downloaded). For each entry you can see configuration file name, date of creation and actions that can be applied. By clicking Details action button you can select witch settings to restore. To restore settings click on Restore action button.

You can restore following settings:

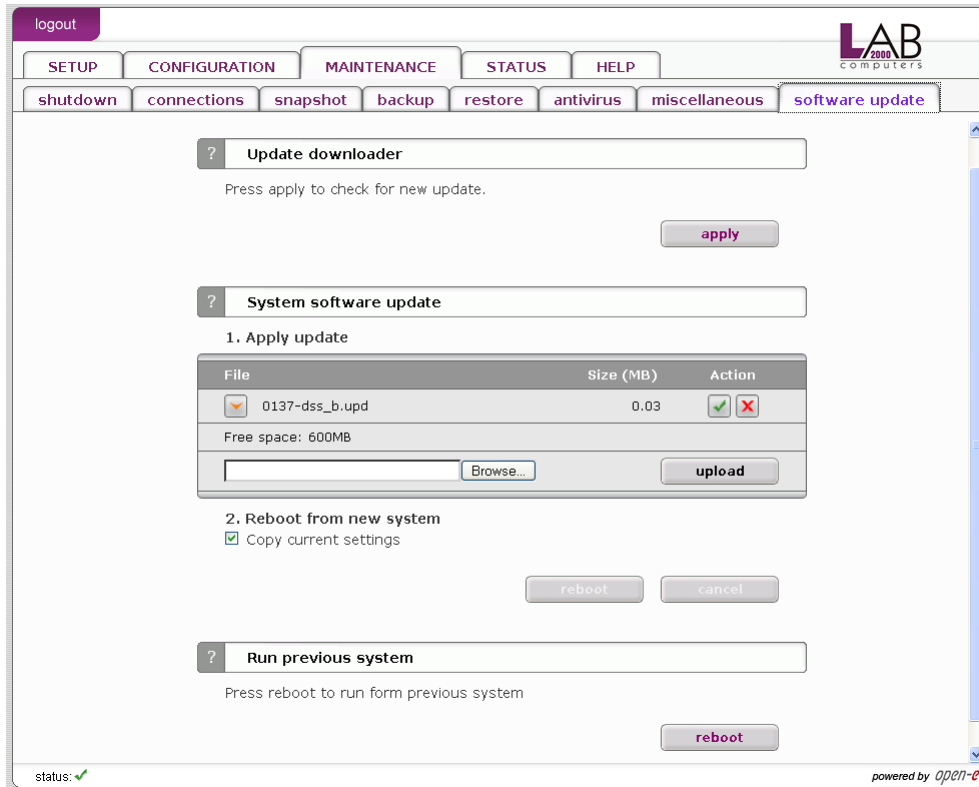
- Server setup,
- Network settings,
- Administrator setup,
- Hardware setup,
- Target settings,
- Users.

You can delete configuration settings file by clicking Delete action button. You can download configuration settings file by clicking its name. In order to upload configuration settings file (previously saved) browse a file name and click on Upload button.

You can save the settings using function Save settings.

5.2.3.7 Software update

This function allows you to update the system software. There are two ways of updating L2K DSS software.



Function: Update downloader

With this function you can check if there is new update available and download it.

In order to download a new update you need to be registered at www.open-e.com. You also have to remember to setup correct DNS and Gateway address in "SETUP" → "network" menu.

Function: System software update

This function allows you to update the system software.

When you upload update file you will see its name and size. With each update file you do following action:

- See release notes,
- Make update (Update button),
- Delete update file (Delete button).

After making update you can reboot system from new system with option Reboot from new system. If you want to copy current settings check option Copy current settings. Click button reboot to reboot from new system.

note Some updates need a system restart. In this case you will be informed about needed restart in confirmation message.

Function: Run previous system
With this function you can run previous system.

5.2.4 STATUS

This function provides a quick overview of the most important system parameters of your L2K Data Storage Server. The corresponding sub-functions are network, logical volume, connections, hardware, tasks and S.M.A.R.T.

5.2.4.1 Network

Function: Interfaces

Here you can view network interfaces info. In table you can see network interface name and IP address, DHCP information, cable status.

The screenshot shows the 'Interfaces' section of the LAB2000 web interface. The top navigation bar includes 'logout', 'SETUP', 'CONFIGURATION', 'MAINTENANCE', 'STATUS', and 'HELP'. Below this, there are tabs for 'network', 'logical volume', 'connections', 'system', 'hardware', 'tasks', and 'S.M.A.R.T.'. The 'Interfaces' section is active, showing a tree view on the left with 'eth0' and 'eth1'. The main content area displays a table of interfaces:

Name	IP address	DHCP	Active	Cable	State
eth0	192.168.0.220	off	yes	cable	single
eth1	192.168.1.220	off	yes	no cable	single

Below the table, there are sections for 'DNS info' (No DNS servers set) and 'HTTP proxy info' (HTTP proxy is off). The status bar at the bottom indicates 'status: ✓' and 'powered by OPEN-C'.

Function: DNS info

Here you can view network interfaces DNS information.

Function: HTTP proxy info

With this function you can view HTTP proxy information. You can see if proxy is enabled and which HTTP proxy IP address is assigned to it.

The screenshot shows the 'Interface info' section of the LAB2000 web interface. The top navigation bar is the same as in the previous screenshot. The 'Interface: eth0' section is active, showing a table of interface information:

MAC	00:30:48:74:18:3A
State	interface is on
Use DHCP	DHCP is off
IP address	192.168.0.220
Mask	255.255.255.0
Broadcast	auto
Gateway	none

The status bar at the bottom indicates 'status: ✓' and 'powered by OPEN-C'.

Function: Interfaces info

This function shows information about selected network interface. You can view here:

- MAC address,
- State,
- DHCP status,
- IP address,
- Mask,
- Broadcast address,
- Gateway address.

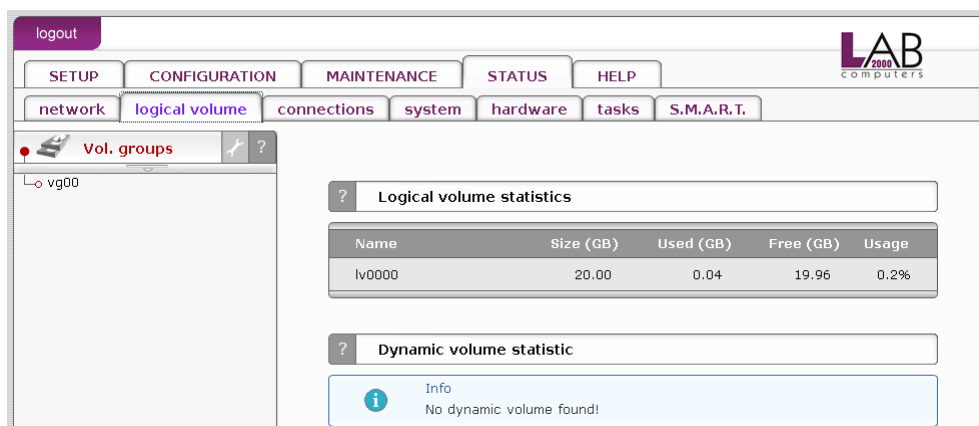
5.2.4.2 Logical volume

Function: Share volume statistics

This function contains statistical data on the share volume.

Function: Dynamic volume statistics

This function contains statistical data on the dynamic volume.



Function: Logical volume statistic

Here you can see information on selected share volume.

Function provides following information:

Usage

Percentage usage of space by share volume.

Size

Size of share volume.

Used

Current date usage of space on share volume.

Available

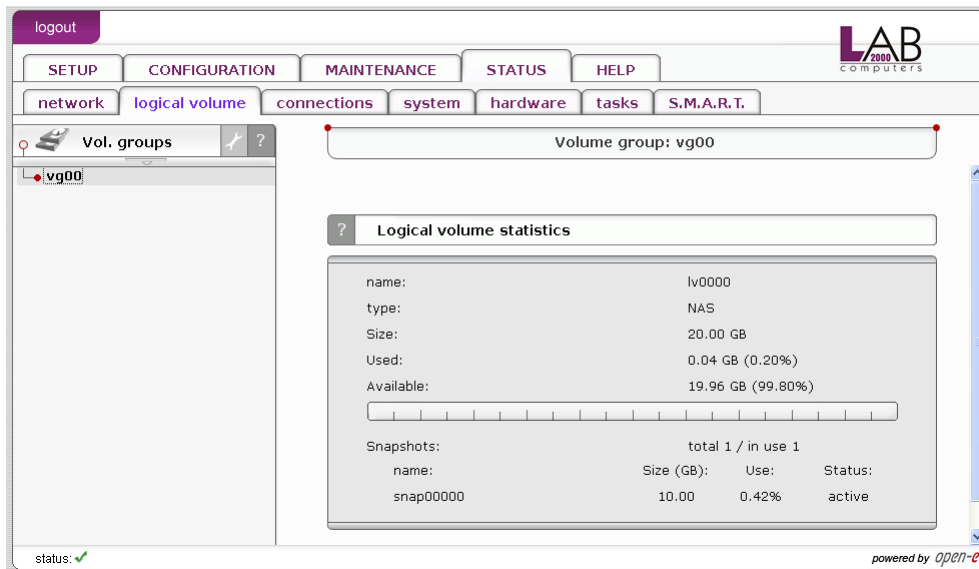
Available space on share volume.

Total snapshots

Number of all snapshots assigned to share volume.

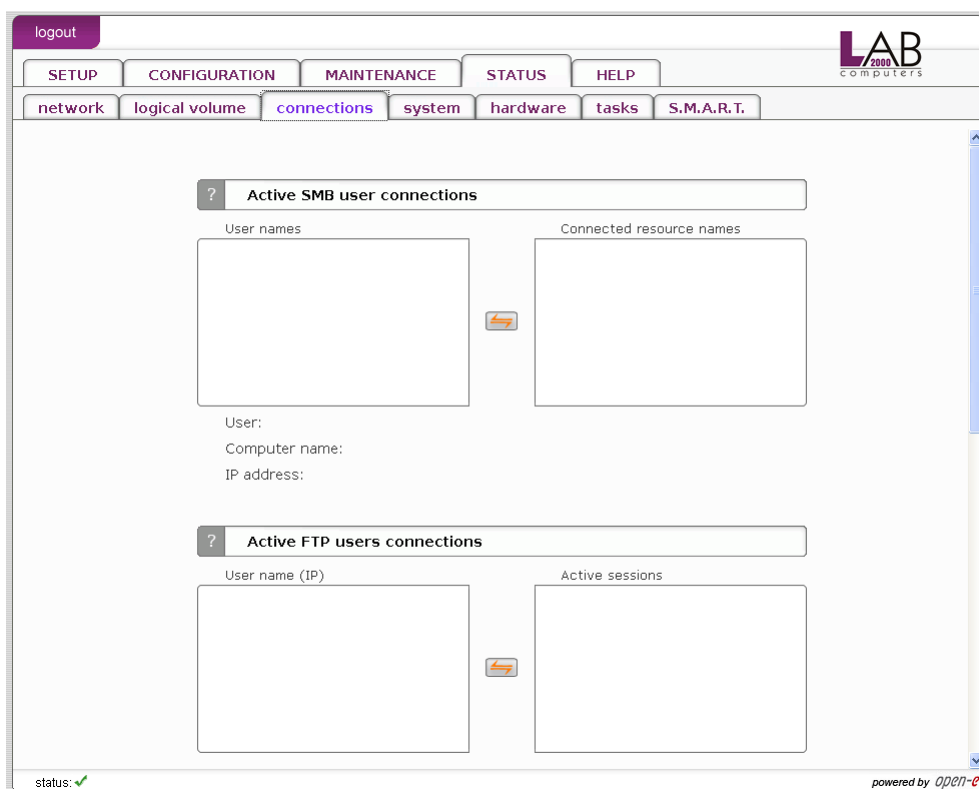
Snapshots active

Number of active snapshots.



5.2.4.3 Connections

This function displays what user connections are currently active.

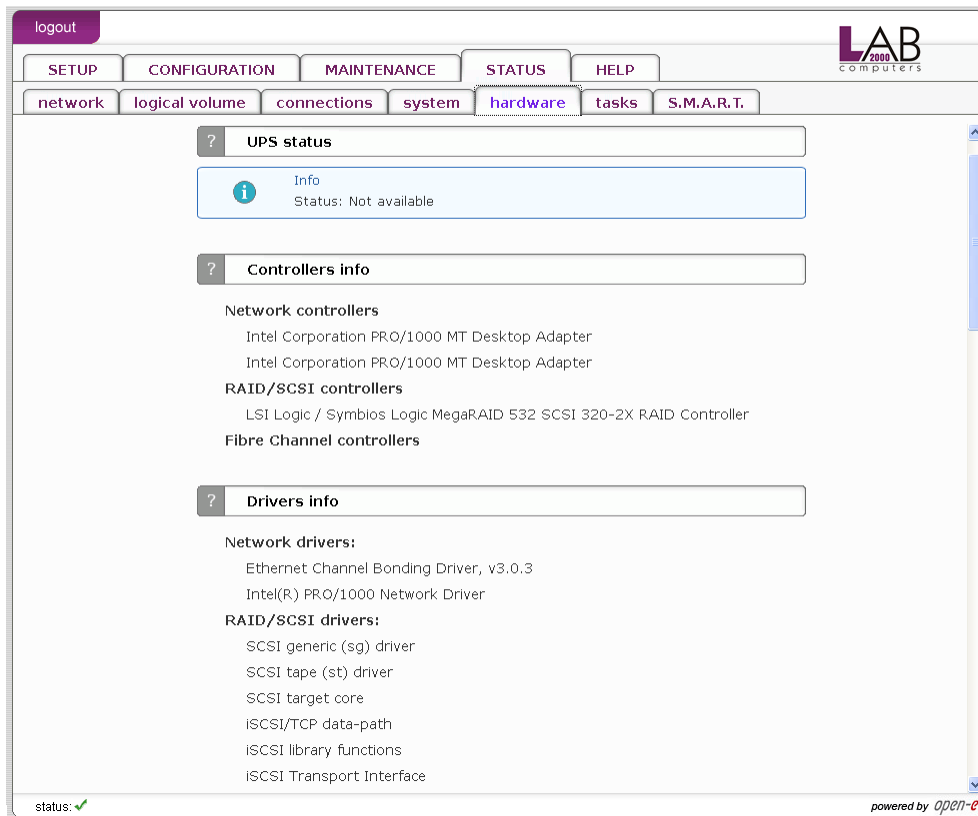


5.2.4.4 Hardware

The "Hardware" option provides you with information on UPS and network controllers and the drivers (e.g. network driver and RAID driver).

In addition, you may also download the latest L2K Data Storage Server log files or view specified or all log files without downloading in compressed

form. You can also check usage of memory (RAM) and (SWAP) and also hardware monitoring.



Function: Logs

This function lets downloading or removing the logs gathered during operation of the Server. In the logs all system information, which are needed for troubleshooting in case of problems can be found.

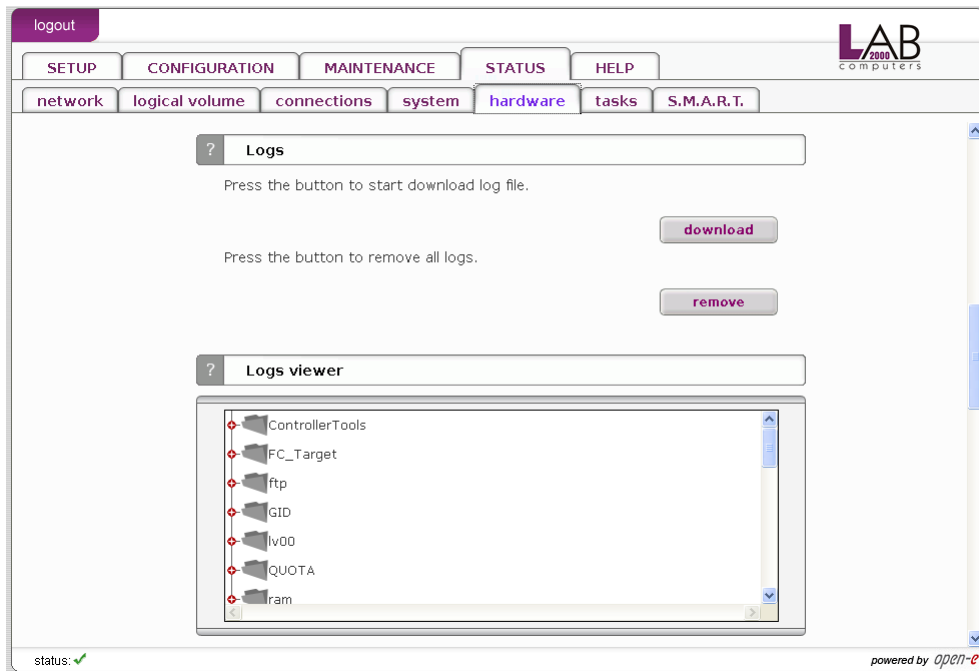
- **note** Recovery Information of the logical volume manager are also stored in the logs. It is recommended to download logs after creating the logical volumes and store them in a save place as source for logical volume and volume groups recovery in case of a critical hardware failure.
- **note** While generating the logs a simple speed test of the disks is done. When software Raid is used with a lot of single disks, this may take up to few minutes.

Function: Logs viewer

This function allows you to view specified log file without downloading all log files in compressed form.

To view a log file just click on name of that file. Depending of Web browser you use you may be asked to choose appropriate program to view specified log file.

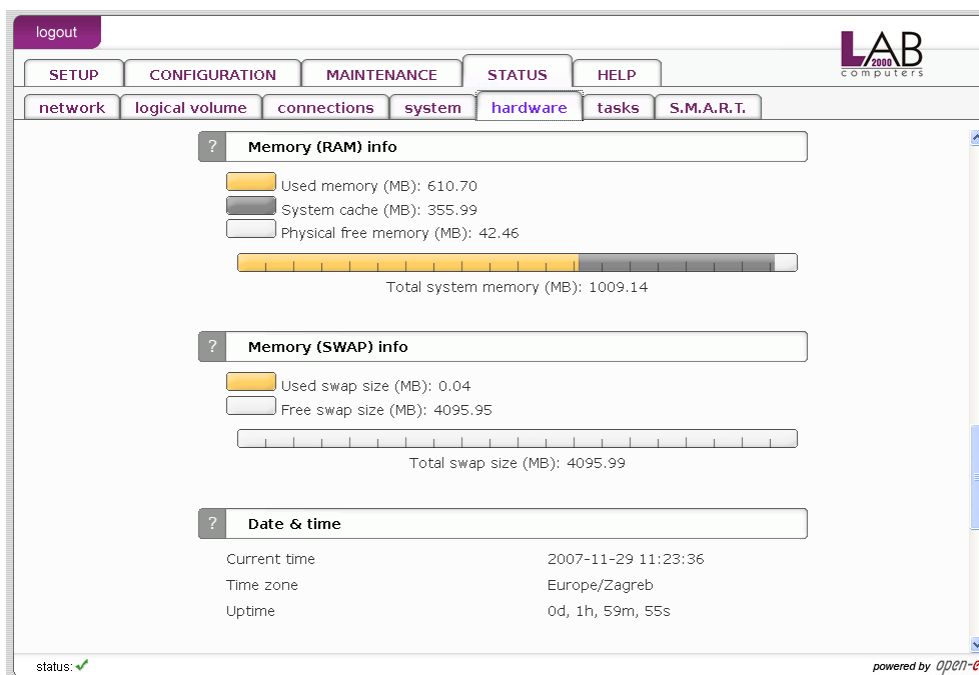
To change folder just click on the name.



Function: Memory (RAM) info

This function presents the current memory usage.

- **note** Memory allocated by system cache will be released when some application will require additional memory. If there is almost no free memory you can enable swap or install more memory modules.



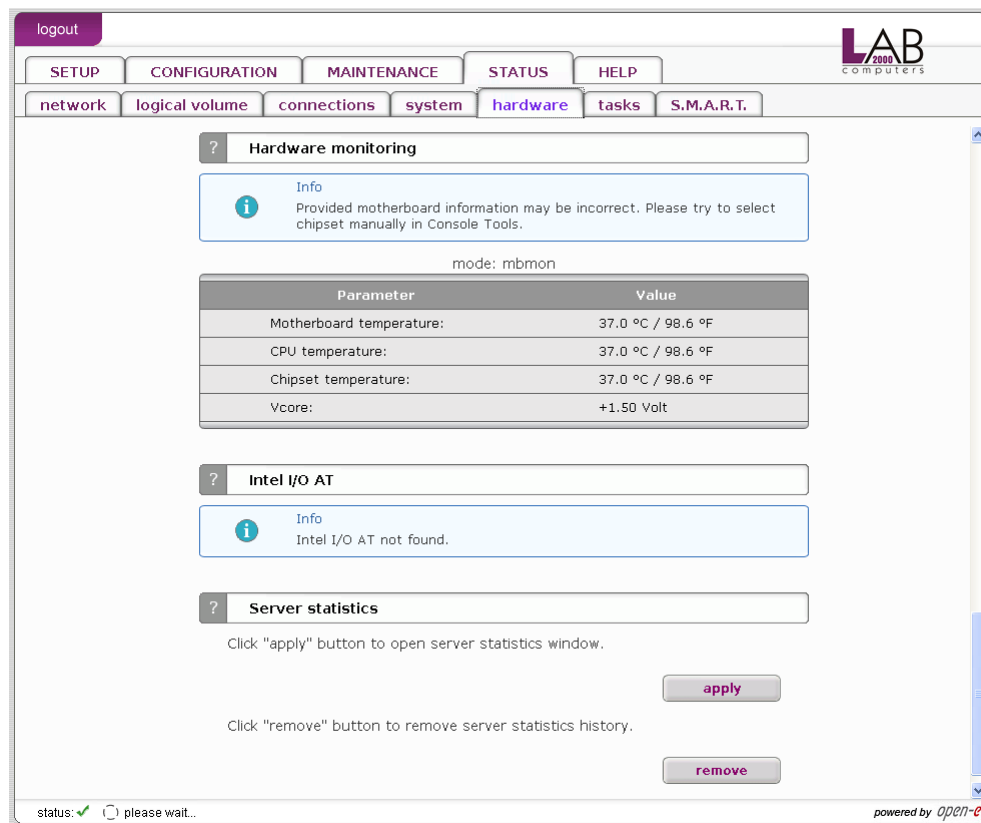
Function: Memory (SWAP) info

The memory (SWAP) info presents the current status of swap usage.

- **note** Swap is used to store memory areas on hard drives instead of RAM (Random access memory). Operating systems dumps memory area to swap when this area was not in use since a long time and there is a need to allocate some additional memory.

Function: Date & time

This function presents current date and time of your server.



Function: Hardware monitoring

This function monitors hardware. When using mbmon hardware mode you can find here information on following parameters:

- Motherboard temperature,
- CPU temperature,
- Chipset temperature,
- Vcore.

To enable Hardware monitoring you need to use Hardware Configuration tool on console and enable it in hardware options (*press F1 on console to find out keyboard shortcuts*).

Supported chipset family	
winbond	LM78/LM79, W83781D, W83782D, W83783S, W83627HF, W83697HF, AS99127F, ASB100
wl784	W83L784R, W83L785R, W83L785TS-S
via686	VT82C686A/B
it87	IT8705F, IT8712F
gl52	GL518SM, GL520SM
lm85	LM85, ADM1024, ADM1025, ADM1027, ADT7463, EMC6D10X
lm80	LM80
lm90	LM90, ADM1020, ADM1021, ADM1023
lm75	LM75

When using **xyratex** hardware mode you can find here information on following parameters:

- Disks status,
- Fans speed,
- Fan PWM,
- Power status,
- Fan status,
- Temperature.
-

When using **IPMI (sensors)** mode you information which you can see depends on motherboard. To be able to enable this mode you need to have motherboard with sensors management component that support access via IPMI.

When using **Intel SSR212 2U** mode you can find here information on following parameters:

- Power status,
- Memory Voltage,
- Voltage levels,
- Box Temperature,
- CPU Temperature,
- FAN speed.
-

When using **Intel SR2500ALLX** mode you can find here information on following parameters:

- Power status,
- Memory Voltage,
- Voltage levels,
- Box Temperature,
- CPU Temperature,
- FAN speed,
- Disks status.

When using **AOC-SAT2-MV8** mode you can find here information on following parameters:

- Unit - Displays unit name,
- Bay - Number of bay in which unit is inserted,
- Serial Number - Serial number of unit.
-

Function: Server statistics

Here you can open window with server statistics. Following statistics are available:

- System load,
- Memory,
- Uptime,
- Network.

5.2.4.5 Tasks

Here you can view statistical information on tasks from backup, data replication, volume replication, antivirus and snapshots.

The screenshot shows the LAB 2000 web interface. The top navigation bar includes 'logout', 'SETUP', 'CONFIGURATION', 'MAINTENANCE', 'STATUS', and 'HELP'. Below this, there are tabs for 'network', 'logical volume', 'connections', 'system', 'hardware', 'tasks', and 'S.M.A.R.T.'. The 'tasks' tab is active. On the left, a tree view shows 'Tasks' expanded to 'Snapshots'. The main content area is titled 'Tasks: Snapshots' and contains two sections: 'Running tasks' and 'Tasks log'.

Name	Type	Start time
snap00000	Snapshot	2007-11-29 10:24:04

Time	Name	Type	Status	Action
2007-11-29 10:24:15	snap00000	Snapshot	OK	Started

5.2.4.6 S.M.A.R.T.

Through the S.M.A.R.T. (Self-Monitoring, Analysis, and Reporting Technology) system, modern hard disk drives incorporate a suite of advanced diagnostics that monitor the internal operations of a drive and provide an early warning for many types of potential problems. When a potential problem is detected, the drive can be repaired or replaced before any data is lost or damaged.

Here you can find tree with hard drives for which you can view S.M.A.R.T. information.

It is possible to view information about separate hard drive or summary for all drives in the system.

To view S.M.A.R.T. information for a hard drive - please click on appropriate drive name.

To view summary please click on "all units"

The screenshot shows the LAB 2000 web interface. The top navigation bar includes 'logout', 'SETUP', 'CONFIGURATION', 'MAINTENANCE', 'STATUS', and 'HELP'. Below this, there are tabs for 'network', 'logical volume', 'connections', 'system', 'hardware', 'tasks', and 'S.M.A.R.T.'. The 'S.M.A.R.T.' tab is active. On the left, a tree view shows 'Units' expanded to 'Unit H0', 'Unit H2', and 'Unit S001'. The main content area is titled 'S.M.A.R.T. units health status' and contains a table of drive health.

Unit	Health status
Unit H0	PASSED
Unit H2	FAILED
Unit S001	S.M.A.R.T. Disabled

Function: S.M.A.R.T. units health status

This function allows you to check S.M.A.R.T. status of hard disks.

S.M.A.R.T. is a monitoring system for computer hard disks to detect and report on various indicators of reliability, in the hope of anticipating failures. To enable S.M.A.R.T. checks you need to use Hardware Configuration tool on console and enable it in Functionality options (press F1 on console to *find out keyboard shortcuts*).

The screenshot shows the LAB 2000 computers interface. The top navigation bar includes 'logout', 'SETUP', 'CONFIGURATION', 'MAINTENANCE', 'STATUS', and 'HELP'. Below this, there are tabs for 'network', 'logical volume', 'connections', 'system', 'hardware', 'tasks', and 'S.M.A.R.T.'. The 'S.M.A.R.T.' tab is active, showing 'Unit: H0'. The main content area displays 'S.M.A.R.T. info' with a 'PASSED' health status. Below this, several parameters are listed: Device Model (IC35L020AVER07-0), Serial Number (SVPTV0T7663), Firmware Version (ER20A46A), ATA Version is (5), and ATA Standard is (ATA/ATAPI-5 T13 1321D revision 1). A table of S.M.A.R.T. attributes is shown below, with columns for Attribute name, Min, Current, Worst, and Status.

Attribute name	Min	Current	Worst	Status
Raw Read Error Rate	060	098	098	ok
Throughput Performance	050	100	100	ok
Spin Up Time	024	119	119	ok
Start Stop Count	000	100	100	ok
Reallocated Sector Ct	005	021	021	ok
Seek Error Rate	067	100	100	ok
Seek Time Performance	020	136	136	ok
Power On Hours	000	100	100	ok
Spin Retry Count	060	100	100	ok
Power Cycle Count	000	100	100	ok

Function: S.M.A.R.T. info

This function allows you to view S.M.A.R.T. parameters which this disk is able to return.

In the upper part of this function you can see elementary parameters of hard drive such as device model or serial number. Below there is a table with S.M.A.R.T. attributes. In first column you will find an attribute name, in second - minimum threshold value of this parameter, then current value, next worst value and after the status.

- **note** If value of attribute have ever exceeded worst of this value then the status will be "failed".
If value of attribute is on the edge of worst value then the status can be "pre-failed".
On some hard drives part of attributes can be displayed as "Unknown_Attribute" - this can happen when producer of that hard drive have done some modifications in S.M.A.R.T. and this changes are not yet supported by our software.

Button "view errors" provide you ability to view S.M.A.R.T. log of that drive which is generated automatically.

logout

LAB2000 computers

SETUP CONFIGURATION MAINTENANCE STATUS HELP

network logical volume connections system hardware tasks S.M.A.R.T.

Units

- Unit H0
- Unit H2
- Unit S001

Unit: H2

Power Cycle Count	000	097	097	ok
Reallocated Event Count	000	187	187	ok
Current Pending Sector	000	200	001	ok
Offline Uncorrectable	000	200	200	ok
UDMA CRC Error Count	000	200	253	ok
Multi Zone Error Rate	051	200	200	ok

view errors...

S.M.A.R.T. test

Please select type of test and press START button.

Short test
 Long test

Results... Start Stop

status: ✓ powered by QDQ1-0

Function: S.M.A.R.T. test

This function allows you to perform short and long test of hard drive. You will be informed about progress of test.

After finish of test please click on "results" button to view test log.

Performing a test is not recommended during normal (daily) usage of that hard drive.

- **note** It can happen that on some motherboards and controllers S.M.A.R.T. tests will not work.

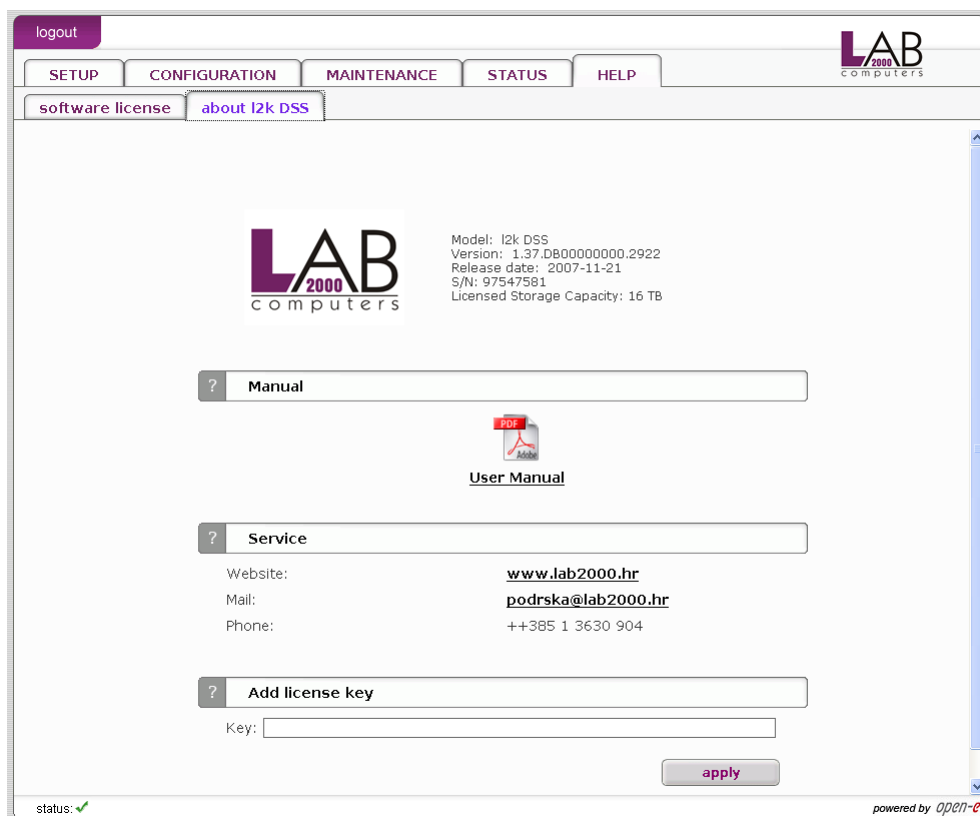
5.2.5 HELP

5.2.5.1 Software License

When accessing Help - "software License" you can read the license for software included in L2K Data Storage Server.



5.2.5.2 About L2K Data Storage Server



Function: Manual

You can download the manual here and print for fast reference.

- **note** In order to read the manual, you need a PDF viewer such as the Acrobat Reader (<http://www.adobe.com>).

Function: Service

Please have the following information available before contacting Technical Support team:

- Logs which you can download in menu: status → hardware → logs.
- Your software version which you can find in menu: help → about.

Function: Add license key

Here you can enter license key to expand functionality of server. For example you can add a license key for bigger capacity of storage volume.

You log out by closing the browser window.

6 Troubleshooting Guide

Here is a list of common error messages and their meanings as well as corresponding tips on how to resolve the underlying problem. If your error message is not listed here please contact Open-E's support and service team (see section "help" above). Our staff will help you find a solution.

Error: user already exists

There cannot be more than one user with the same name. You cannot create a user twice. Check your spelling. Remember, user names are not case-sensitive. You can check existing user names by expanding the tree diagram on the left.

Error: values are not valid

You have entered an invalid parameter. IP addresses have the form aaa.bbb.ccc.ddd: All four parameters range between 0 and 255 and are always separated by periods.

Error: resource already exists

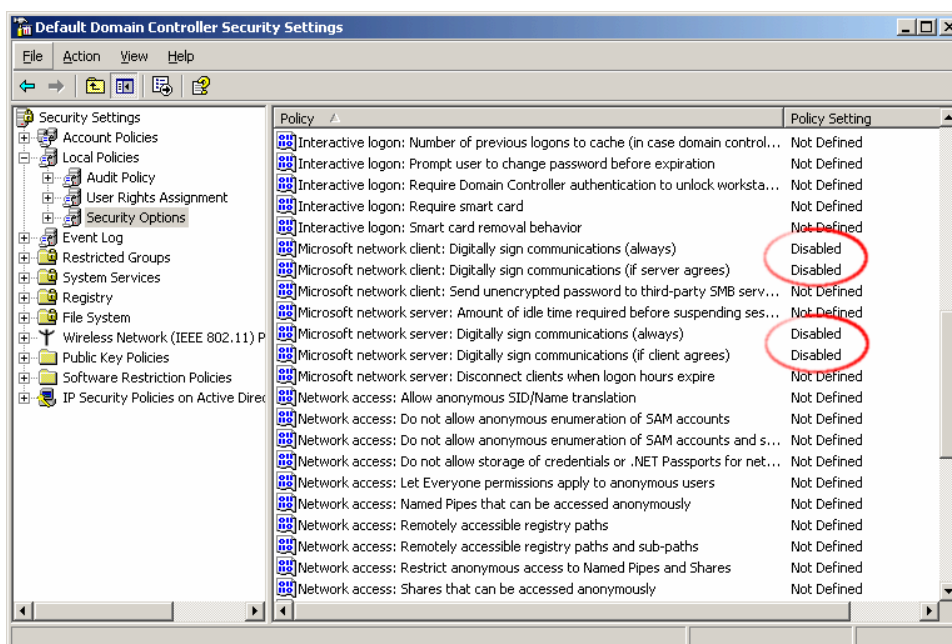
You cannot create more than one resource with the same name. You cannot create a resource twice. Check your spelling. Remember that resource names are not case-sensitive. You can check existing resource names by expanding the tree diagram to the left.

Error: passwords do not match

Make sure that you type the same password in each entry field. For safety reasons, the passwords are not displayed. Type slowly. Check the status of the Shift, Caps Lock, Control, and Alt-keys.

Error: L2K Data Storage Server cannot import the user database from a Windows Server 2003 domain.

In this case the following setting within the local security guideline may solve this problem:



Error: Update file not found

You instructed L2K DSS to perform a systems update, but did not supply a valid L2K DSS update file. Download the latest L2K DSS update file from the www.open-e.com Web site. Next, copy the upgrade file into your "update" folder (please spell upgrade lower case). Finally, select "update" from the menu.

Error: No share volume

You must create a volume for file sharing before you can create any resource shares or search for shares. Look into the "Getting Started" section of this manual for instructions on creating a share volume.

Error: No share volume to browse

You must create a volume for file sharing before you can browse it in order to create resource shares.

Error: Invalid user name!

User name cannot:

- (1) Contain characters: ~ ! @ # \$ ^ & () + [] { } * ; : ' " . , % | < > ? / \ = `
- (2) Begin or end with a space

The use of the SMB (Server Message Block) protocol from Windows, also known as CIFS or Samba, places some restrictions on the use of special characters. These restrictions have historical reasons, but are still binding today. User names must not contain any of the above mentioned characters.

Error: invalid user password

A user password cannot begin or end with a space.

Spaces are not legitimate characters at the beginning and end of a password. Maybe you inadvertently hit the space bar during password entry. Please reenter your password.

Error: invalid administrator password

Administrator password cannot begin or end with a space.

Spaces are not legitimate characters at the beginning and end of a password. Maybe you inadvertently hit the space bar during password entry. Reenter your password.

Error: invalid resource name

Resource name cannot:

- (1) Contain characters: * : " | < > ? / \ ` # \$ & () + ; ' .
- (2) Begin or end with a space

The use of the SMB (Server Message Block) protocol from Windows, also known as CIFS or Samba, lays some restrictions on the use of special characters. These restrictions have historical reasons, but are still binding today. Resource names cannot contain any of the above mentioned characters. Note that the list of invalid characters is slightly different than that for other name fields.

Error: invalid workgroup name

Workgroup name cannot:

- (1) Contain characters: ~ ! @ # \$ ^ & () + [] { } * ; : ' " . , % | < > ? / \ = `
- (2) Begin or end with a space

The use of the SMB (Server Message Block) protocol from Windows, also known as CIFS or Samba, lays some restrictions on the use of special characters. These restrictions have historical reasons, but are still binding today. Workgroup names cannot contain any of the characters listed above. Note that the list of invalid characters is slightly different than that for other name fields.

note The invalid characters for workgroup names are different than the ones for other fields.

Error: invalid server name

Server name cannot contain:

- (1) Characters: ~ ! @ # \$ ^ & () + [] { } * ; : ' " . , % | < > ? / \ = `
- (2) Spaces
- (3) Digits only

The use of the SMB (Server Message Block) protocol from Windows, also known as CIFS or Samba, lays some restrictions on the use of special characters. These restrictions have historical reasons, but are still binding today. Server names cannot contain any of the above mentioned characters. Note that the list of invalid characters is slightly different than that for other name fields. In addition, server names cannot be constructed from numbers only, they must contain alpha characters.

Error: invalid resource comment

Resource comment cannot be longer than 256 characters

Resource comments have a limit of 256 characters, a limit which cannot be exceeded. Use a shorter comment.

Error: invalid directory name

Directory name cannot:

- (1) Contain characters: * : " | < > ? / \ ` # \$ & () + ; ' .
- (2) Begin or end with a space

The internal operating system of L2K DSS does not allow certain characters to be used for directories. The above mentioned characters are invalid, just as trailing or leading spaces. Choose a different name.

7 Appendix A

Open-E Software License agreement

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Waiver

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This agreement constitutes the sole and exclusive agreement between the parties concerning the subject matter hereof.

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This agreement shall be governed by German law. You agree to jurisdiction and venue in the courts located in Munich, Germany for all claims, disputes and litigation arising under or related to this agreement.

8 Appendix B

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Version 2, June 1991

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Preamble

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