

napp-it cs
Client Server Edition

ZFS Storageserver GUI
for (m)any ZFS server

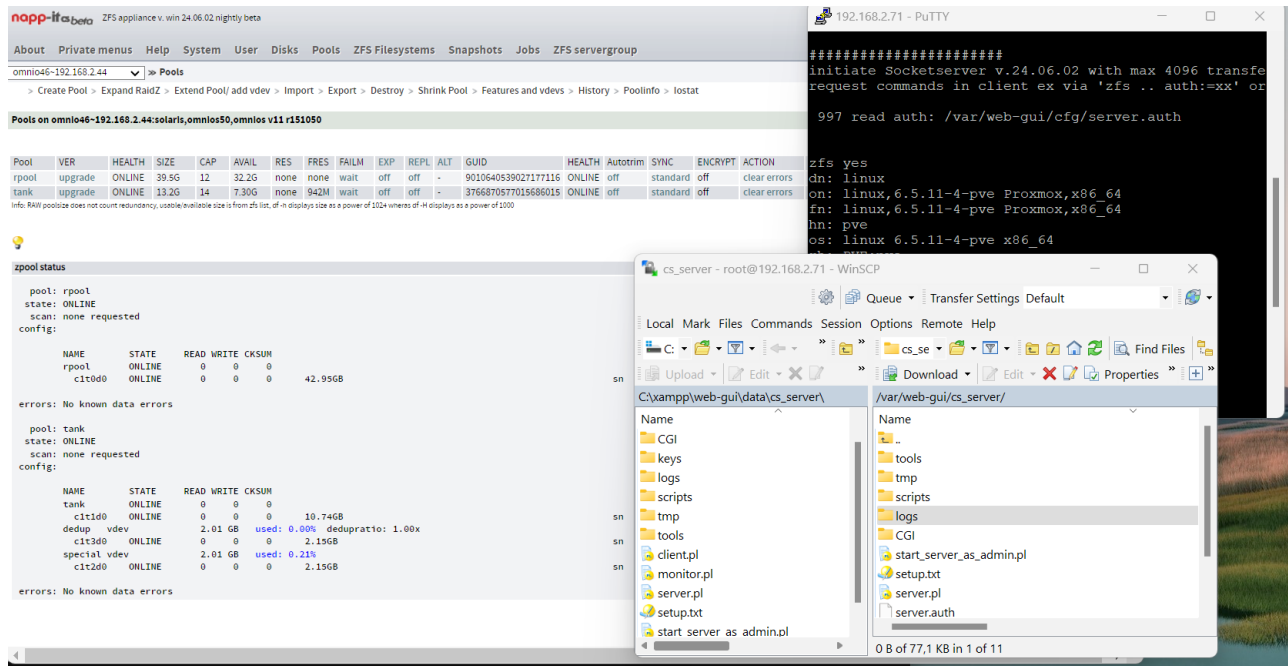
published: 2024-Jul-28 (c) napp-it.org

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Howto

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napp-it cs



napp-it cs with Putty and Winscp

About

Napp-it SE (Solaris Edition) is a webbased management tool for a ZFS server since the early days of ZFS on Sun Solaris, OpenSolaris and NexentaCore. Now Open-ZFS is available on BSD, Illumos (Solaris fork with OpenZFS), Linux, OSX and Windows (release candidates). Solaris 11.4 with native ZFS is still an option if you want superior stability and commercial support for next 10 years. This gives you ZFS with its unique features like superior raid concepts with Copy on Write, checksums, unlimited readonly snap views to your datastate with clone and data rollback, safe sync write despite fast rambased writecaches and encryption, compress and realtime dedup per filesystem on any OS. On Windows you can combine the original Windows SMB server with SMB direct that is not only quite the fastest one, but also the most „Windows compatible“ one especially regarding ACL permissions where only the Solaris kernelbased SMB server with NFSv4 ACL and direct support of Windows sid comes close. Combined with ZFS any OS can be now a dream team. This is why I ported the Solaris based napp-it web-gui for any OS.

Napp-it cs is the „Rosetta Stone“ of any mixed ZFS environment that allows central management of ZFS servergroups. You can manage any server via web-browser (focus on ZFS, native Solaris ZFS or Open-ZFS) or replicate ZFS filesystems between them (native Solaris ZFS cannot replicate to/from Open-ZFS). This includes low performance devices down to a low RAM ARM Raspberry.

Concept of napp-it cs:

Napp-it cs has three parts

1.) „Copy and Run“ web-gui (/xampp/web-gui, no installation required. The web-gui runs on Windows 10/11 or Server.

Simply download the Web-gui, start and connect from a webbrowser. Setup, Update or downgrade is a simple copy action. Open-ZFS on the Windows machine is optional. The web-gui includes an Apache webserver that can be used for encrypted transfers of commands and results and as keyserver to provide encryption keys for filesystems (keyparts or complete keys). Optionally you can use an external https server with a valid certificate for encrypted transfers of commands, results and keys.

When started on Windows, you can use napp-it cs as a webmanaged Windows based NAS appliance with support for Storage Spaces, SMB direct/RDMA, SMB Cluster and ZFS on Windows.

Napp-it cs is not restricted to NAS management on Windows. You can remotely manage nearly every ZFS NAS on any OS example Free-BSD 14, Illumos, Linux ex Proxmox, OSX, Solaris or Windows. with replication any to any.

2.) „Copy and Run“ cs_server for remote management of ZFS on BSD, Linux (Debian, Proxmox), Unix or Windows.

You find the cs_server on Windows in the `/xampp/web-gui/data` folder. There is no installation required, just upload the cs_server folder to `/var/web-gui` (or another location) and start via console as root:
`perl /var/web-gui/cs_server/start_server_as_admin.pl`. The cs_server app allows management of a remote ZFS server exact like the local one. The server app runs on nearly any server as you only need Perl and curl installed., Update or downgrade is a simple copy action to replace cs_server. Use the portable tools Putty for a remote console and WinSCP for upload/download or remote editing of files

3.) „Copy and Run“ cs_connect app for https servers W1/W2.

CS connect is a cgi application that allows encrypted https transfers of commands or results from and to your remote ZFS servers and is a possible location for keysplit for encrypted ZFS filesystems. Such a keysplit allows three keyparts locally and on up to two https servers. Not even a server admin has then access to the full key. This additionally allows HA access to encrypted filesystems as you just can unlock a filesystem even when one of the https servers is down. You find the cs_connect folder on Windows in the `/xampp/web-gui/data/wwwroot/cgi-bin/cs` folder. The cs_connect app runs locally on Windows and Apache or on your company or university webserver.

No installation required to run s_connect on your https server, just upload and start. (optional). For encrypted transfers of commands and results or key downloads, you can use the the web-gui Xampp https server with a self signed certificate. You can also use your public https webserver with a valid certificate instead. You can also use cs_connect for a keysplit for encrypted filesystems (3way keysplit, local/W1/W2) or high key availability 2way split (local/W* or W*/W*) where a filesystem can be unlocked when either W1 or W2 is up. Local keyfiles on a ZFS server are neither wanted nor needed.

Requirements:

Napp-it cs web-gui is based on an http(s) webserver with Perl and cgi for browser based ZFS management.

We decided to use Xampp portable on Windows for the web-gui as it offers a whole webserver suite with Apache, FileZilla ftp, Mail, MySQL, Perl, PHP and phpMyAdmin and it enables Windows as a ZFS server out of the box.. A physical or virtualized Windows machine should be available everywhere. Size can be minimized by deleting Xampp functions beside Apache and Perl. Napp-it cs is just the `/xampp/web-gui` folder below a default Xampp.

Napp-it cs_server (the software that runs on a ZFS server) needs Perl and curl. This is mostly part of a default OS installation on BSD, Illumos, Linux, OSX and Solaris. On Windows it is part of Xampp. As napp-it_cs are basically two small Perl scripts running in the background, resource and cpu requirement are extremely low. A 64bit CPU is recommended but this is due ZFS. Just copy cs_server to your server (manually via WinSCP or via web-download ex to `/var/web-gui`), edit settings like allowed ip, auth values for access or up/downloads

Napp-it cs_connect (the software that you can use on a public https webserver for encrypted transfers and key downloads) runs on a cgi-capable https webserver. This is a small Perl cgi script without any dependencies. Just upload, set to rwx and edit settings like Perl path, allowed ip and auth value for access.

Current state:

Release candidate with ZFS, Disk, Pool, vdev and snap management, Raid-Z expansion and draid
 Jobmanagement (snap, scrub, replication, reports, other)
 User and SMB Share management.

Platform for the web-gui (web-gui for local Windows NAS and remote ZFS servers)
 Windows 10/11/server

Platforms for cs_server (remote management)
 BSD (Free-BSD 14)
 Illumos (OmniOS/OpenIndiana/SmartOS) and Solaris
 Linux (Debian/Proxmox/Ubuntu), Intel and ARM
 OSX (Intel and ARM) and Windows

Platform for cs_connect (key download, encrypted data transfers)
 Any webserver that allows cgi (`/cgi-bin/cs/cs_connect.pl`), can be local web-gui or a public https server.

Software up/downgrade:

Just download a newer or older folder (web-gui, cs_server, cs_connect) and restart.
 If you only up/downgrade `/xampp/web-gui/data` all data is preserved,
 A online update/downgrade option in the web-gui is planned.

FAQ

Is napp-it cs free?

Yes, for private noncommercial homeuse.

Those who use it for work or outside noncommercial homeuse need a Pro version to pay for development.

If you already own napp-it SE complete:

You can use napp-it CS on same number of servers as you have napp-it SE keys.

With a single napp-it SE complete, you are allowed to manage a servergroup with three members.

Discuss:

<https://forums.servethehome.com/index.php?forums/solaris-nexenta-openindiana-and-napp-it.26/>

<https://www.reddit.com/r/zfs/comments/19dpz70>

1. Data structure

Web-gui

The whole Napp-it cs web-gui appliance software is in `c:\xampp\web-gui`.

No installation required, just copy this folder and start with a mouse right click as admin on `c:\xampp\web-gui\data\start_zfs_server_as_admin.bat`.

Within the web-gui folder, you find the following subfolders:

1. napp-it cs menus and scripts in

`c:\xampp\web-gui\data` napp-it menus and scripts of a napp-it release

To update/downgrade, just stop the web-gui, replace this folder and restart the web-gui

`c:\xampp\web-gui\data\menus` web-gui menus

2. napp-it global settings, common for any release

`c:\xampp\web-gui_log` napp-it settings, keys, members, passwords or jobs

`c:\xampp\web-gui\cfg` napp-it defaults

`c:\xampp\web-gui\tmp` napp-it tmp folder (cleared on napp-it cs startup)

3, private files (update/downgrade safe) in

`c:\xampp\web-gui_my`

`._my\wwwroot` -> data accessible via browser under /my

 -> individual html, logos, js or css files

`._my\menus` -> individual web-gui menus

 -> use numbers > 100 with a private menu ex 110_My settings

`._my_lib` -> individual language translations, menu settings or scripts

Start/Restart current version of napp-it cs as admin via

`C:\xampp\web-gui\data\start_zfs_gui_as_admin.bat`

This will (re)start the ZFS web-gui with the version of the data folder.

When you (re)start napp-it, it will

- kill running napp-it cs services

- configure Apache and napp-it

- stop/start Apache

- start socket.pl as a background server (to execute cli commands like zfs and zpool)

- start monitor.pl as a background task (for monitoring or preload data)

- start auto.pl as a background task for planned tasks without Windows settings)

This allows napp-it cs to be truly portable. You can use it as base for additional menus according to your needs or modify it with your look and feel without a reference to napp-it cs.

4. ./web-gui/cs_server (on Windows web-gui/data/cs_server

./web-gui/cs_server all files and folders for cs_server (cgi, tmp,keys) web-gui/cs_server
./web-gui/cfg folder for server.auth (must be same as in web-gui/_log/members)

If you use another folder instead web-gui, you need cfg at same level. ex desktop/cs_server and desktop/cfg

5. cs_connect

webfolder/cgi-bin/cs all files (script, tmp and keyfolder) below

2. Setup

2.1 Download Xampp.zip minimal with the napp-it cs web-gui

<https://www.napp-it.org/doc/downloads/xampp.zip> and unzip to c:\xampp

Start web-gui with a mouse right click on (as admin):
C:\xampp\web-gui\data\start_zfs-gui_as_admin.bat

-Open a Browser on Windows with adress [http\(s\)://localhost](http(s)://localhost)
or from a remote client with the ip adress of the web-gui You may need to open the firewall for remote access.

optionally:

download Xampp portable from <https://www.apachefriends.org/>
uncompress to c:\xampp and add the \xampp\web-gui folder,

Install newest Open-ZFS for Windows (if you want ZFS on Windows)
<https://github.com/openzfs/windows/openzfs/releases>

A online update/ downgrade option in napp-it is planned. Until then, simply stop the webserver and replace folder with a newer or older version. Restart napp-it cs web-gui or cs_server.

2.2 Setup napp-it cs (Serverapp for your managed BSD, Illumos, Linux OSX, Solaris or Windows ZFS servers)

Upload c:\xampp\web-gui\data\cs_server to /var/web-gui (WinSCP)
WinSCP portable, see „C:\xampp\web-gui\data\tools\portable apps“

or install server app online via (login as root and enter (BSD, Linux, Illumos, Solaris)
curl www.napp-it.org/nappitcs | perl

Edit settings (/var/web-guicfg/server.auth and /cs_server/server.pl).

After second run of curl download command, cs server ist (re)started) automatically.

or download folder cs_server and upload to our ZFS server (any location with default /var/web-gui)

You need a folder cfg at the same level like cs_server with a server.auth file (update independent from cs_server)

Start cs_server at console as root via perl /var/web-gui/cs_server/start_server_as_admin.pl

OS setup:

Free-BSD

Install Free-BSD 14, add curl

pkg install curl

SmartOS

Install SmartOS

pkgin update

pkgin install perl

pkgin install mc

ssh as root (Putty, WinSCP)

or download https://napp-it.org/doc/downloads/cs_server.zip

kill server.pl and monitor.pl, replace folder cs_server and restart the socketserver via

perl /var/web-gui/cs_server/start_server_as_admin.pl

current release: newest dev edition. https://napp-it.org/doc/downloads/napp-it_cs.zip
 newest dev edition. https://napp-it.org/doc/downloads/napp-it_cs_dev.zip

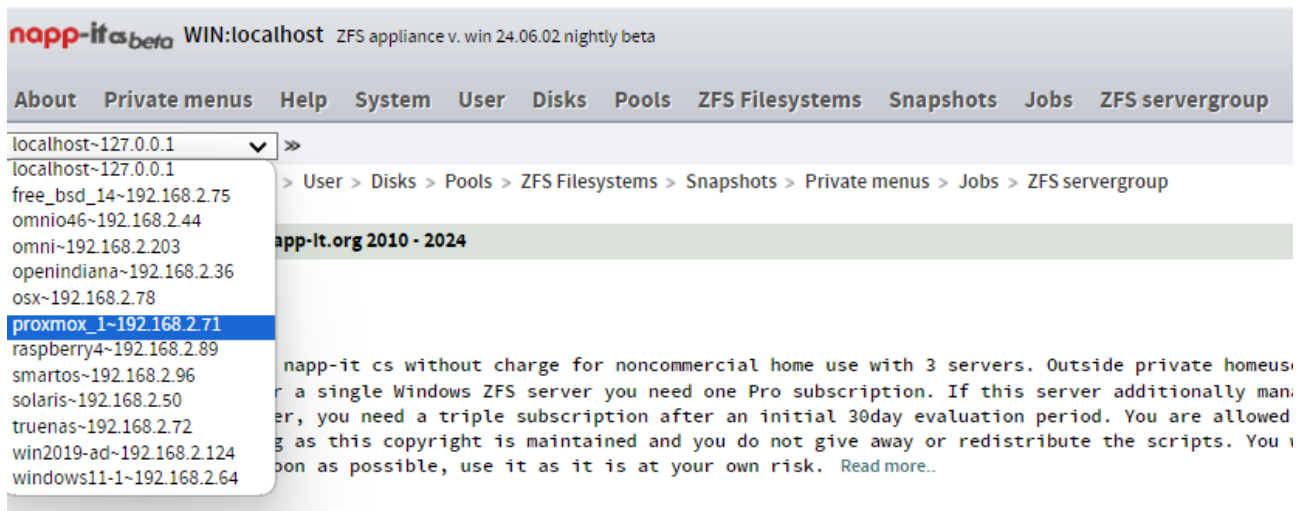
You can run napp-it cs on your Windows laptop or desktop or you can virtualize Windows under ESXi, Hyper-V or Proxmox

Not convinced?

Uninstall Open-ZFS and delete c:\xampp

3. ZFS Server groups

After an initial setup, you can manage only the local Windows machine ex with Open-ZFS on Windows. To manage another ZFS server you must



1. copy folder cs_server to this server
 via wget/curl download or download cs_server manually and upload to /var/web-gui.
 prefer /var/web-gui as destination folder but you can also use desktop ex on OSX
 Then edit server.auth (auth value) and server.pl (upload server, ip range) (auth must be a hex value (0-9a-f))

2. start cs_server there to allow remote management
 Either locally or via Putty: perl /var/web-gui/cs_server/start_server_as_admin.pl

3, add the ZFS server to your servergroup in napp-it vs menu „ZFS Servergroup“
 Add name ex proxmox01, ip and auth value for access (same as for cs_server)

You can now select this server in the top menu.
 All User or ZFS actions (Pool, Filesystem, Snap) are now related to this server.

For ZFS server operations, cs_server can be disabled.
 Napp-it cs is fully compatible with cli management via zfs or zpool command or local user or share management.

Restrictions:

OSX: user and share management locally only
 TrueNAS: manage locally as settings outside the TrueNAS gui can give problems.
 SmartOS: most OS settings like users and shares are temporary (smb anonymous share is ok)
 Proxmox: no restrictions but everything outside ZFS and basic user and SMB management should be in a VM

For a ZFS server as cs_member, prefer a 64bit CPU/OS and at least 4 GB RAM
 Without ZFS, even a 512 MB ARM appliance should be manageable via napp-it cs web-gui.

3.1 Manage ZFS servers remotely

Napp-it cs is a client-server application with the frontend web-gui for user interaction and a socketserver on any managed ZFS server that executes common zfs, zpool or any other OS command in the background with admin permissions. You can build a server group with nearly any ZFS server on BSD, Illumos (OmniOS, OpenIndiana, even SmartOS), Linux (mainly Debian/ Proxmox), OSX, Solaris or Windows that you can control via the napp-it cs web-gui.

Discuss at

<https://forums.servethehome.com/index.php?forums/solaris-nexenta-openindiana-and-napp-it.26/>

4. Main features

Job management

To execute jobs in auto modus, the auto service must run (started together with the web-gui)

Replication (from any to any, currently problems with Windows as source/destination)

create a replication job with a source and destination among members.

You can use a different snap retention policy for replications

Autosnap

create a snap job with a retention policy

Alerts and status reports

create a report job (status and/or alerts for any ZFS memberserver)

Other jobs

either as a simple command ex rsync or as a script.

User and shares

Add/ Delete users to use them for SMB shares

(Default shares allow anonymous guest access)

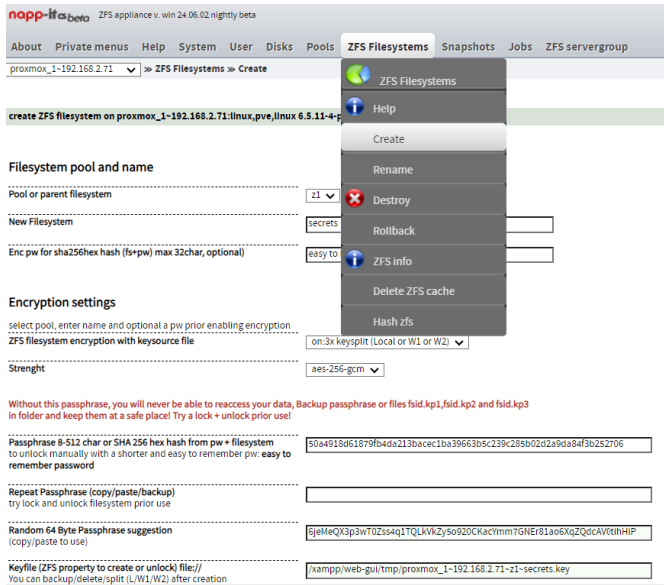
The screenshot shows the napp-it beta web interface. At the top, there's a navigation bar with 'About', 'Private menus', 'Help', 'System', 'User', 'Disks', 'Pools', 'ZFS Filesystems', 'Snapshots', 'Jobs', and 'ZFS servergroup'. The main content area is divided into several sections:

- User and SMB groups:** A table with columns for 'sel', 'name (disabled)', 'desc', 'uid', 'SID', 'idmap', and 'del'. It lists users like 'Local User', 'denise', 'me', 'napp-it', and 'Local SMB group'.
- Local Linux/ Unix Groups:** A table with columns for 'sel', 'name (disabled)', 'desc', 'guid', 'Windows SID', 'idmap', and 'del'. It lists groups like 'bb', 'cc', 'dd', 'other', 'root', 'staff', 'tz', 'xx', and an empty row for adding a new group.
- Local SMB Groups:** A table with columns for 'sel', 'name (disabled)', 'desc', 'gid', 'Windows SID', 'idmap', and 'del'. It lists groups like 'administrators', 'power users', and 'cc'.

A 'Private_menus' dropdown menu is open, showing options like 'contribute', 'ask user', 'ask user with autoselect', 'edit file', 'localization', 'manual', and 'data current'. The interface also includes a search filter 'local_nonsys' and various action buttons like '>>', '<<', and '+>'. The top right corner shows 'logout: admin | win | Cache | Debug'.

Encrypted filesystems

Create encrypted filesystems based on a key or password hash where the key is splitted in three parts.



Select your ZFS server, ex Proxmox
Open menu ZFS Filesystem > Create

Enter name of a new filesystem ex „secrets“
and an easy to remember password (optional, max 32char)

Then select encryption=on

This shows the key options with a sha256hex hash from
your pw + name of filesystem as default. You can also use
the key suggestion or enter your own passphrase
(more than 32 char to allow 3way key-split)

Enter the desired key twice (copy/paste)

Backup the key (now or later keyfile in web-gui_log/keys)
If you loose the key, there is no option to reaccess data.

Prior use, try a lock/unlock with keyparts, pw or key!!!

To unlock a filesystem, click on „unnavail“ in „ZFS Filesystems“



A click on unlock opens a menu with the default key-
location ex ./tmp/pool/secret.completekey. This key is
deleted after creation. If you simply press enter, cs server
searches the whole key or all 3 parts either locally
or on W1/W2. As an option you can enter the „easy to
remember password“ or the real key passphrase.

After creation of an encrypted filesystem, the local key on a ZFS server in the ./cs_server/tmp folder is deleted (Do not store whole keys on a server itself). You find the keys on your Windows web-gui in \xampp\web-gui_log\keys as a completekey and the three keyparts. Name of key is member~pool~filesystem.keypart 1-3 or .completekey. Backup at least the .completekey to a safe location. Try a lock/unlock with the keyfile and directly with the key.

Keysplit

If you simply press enter in the unlock menu, cs_server tries to find the completekey or the three keyparts either in the local keyfolder ./cs_server/keys or remotely from a https webserver W1 (web-gui or a public https server) or optionally W2 when configured in About > Settings or enforced in server.pl. On your web-gui, keys are in /xampp/web-gui_log/keys. On an external keyserver with cs_connect, keys (complete or parts) are in /cgi-bin/cs/keys. Access to a keyserver requires an auth key and should be ip restricted.

3 way keysplit

In such a configuration, place the first keypart in the local keyfolder, and the second and third part in the keyfolder on W1 and W2. Only If cs_server can load the missing keyparts from W1 and W2, it can unlock a filesystem.

2 way HA keysplit

In this configuration keypart 1 is in the local keyfolder and keypart 2 and 3 on W1 and W2. If W1 or W2 is up, cs_server can unlock a filesystem.

The idea behind:

Even if an attacker gets access to a ZFS server or a keyserver, he cannot unlock a filesystem as he needs access to both, in case of 3way split to all three machines as each server has only a part of the key. This even locks out a server admin. The 2way HA method is perfect if you want to ensure access even during webserver maintenance as you do not need to reconfigure anything. As the keyserver is only a small cgi script with keys as files on the keyserver there are no dependencies there.

As a fallback option, you can always unlock a filesystem with the password that you entered during creation (an option) or with the full key. Distribution of keys between local and W1/W2 keyfolders is a manual process under your control. Use WinSCP to upload, check or delete remote keys. As passphrase keys are printable characters you can send them via email or print them out to backup.

Security

Security is always a compromise between performance, easyness of handling and needed software components. This is an important aspect in a client server architecture where critical data like commands (zfs destroy ..), results (get *.config) or keys for encrypted filesystems are transferred over your network.

Napp-it cs adresses this on three levels.

1. all client server connections must be authenticated with an auth string (default a SHA256 hash)
2. all connections can be (and should be) ip restricted to allow only the web-gui (s) to access a server

Only very basic commands like on (are you up and what is your OS family and OS release) are remotely done under this restriction alone. All other commands, results and key transfers are additionally encrypted. To encrypt data transfers there are the two common options ssh server and https server. The complicated and critical part of encryption is done on server side with quite simple clients like your webbrowser or curl. As napp-it cs server should run after a simple copy action with an ultra low resource consumption on ZFS server side. To encrypt all transfers over https as this is what is already there in the web-gui.

Call me back

To avoid installation of a full featured https (or ssh) server with the needed regular key updates on any ZFS memberserver napp-it cs is using a „callback“ method where the web-gui tells the ZFS server „there is work for you under this file reference“. The ZFS server then loads the file reference via curl and https either from the local Xampp Apache webserver of the web-gui with usually a self signed certificate or a separate webserver ex a public webserver with a valid certificate. (Using an external https with a valid certificate increases security but lowers gui performance)

Keys for encrypted filesystems

Keys are splitted into three parts. A unlock command from the web-gui either sends a pw from which a key is generated, the „real“ key or a simple unlock request without key transfers via the callback https method. On a simple unlock request, a ZFS server tries to find all keyparts itself either locally or remote from one or two https servers (W1 and W2). This encrypts all key transfers and avoids local keys. Keysplit also avoids that an admin ex of a remote https server has access to keys.

Cache

Napp-it cs can cache results to increase performance if the same command is repeated or to deliver common results „read ahead“ up from the moment the web-gui contacts a ZFS server with the help of the monitor service on a server.

You can disable caching in the napp-it cs top menu (cache enable/disable)

Debug

If you are interested what napp-it is doing, you can enable debug mode in the top menu.

Napp-it cs then dispays communication details. and you can list the content of internal hashed lik %zfs, %disks and %current where napp-it has collected all needed information prior processing an action.

If you are interested what a server is doing

Open a Putty console and (re)start cs_server

```
#####
Initiate Socketserver v.24.06.02 with max 4096 transfers in a cmd shell
Request commands in client ex via 'zfs .. auth:=xx' or 'getdisks auth:=xx'

97 read auth: /var/web-gui/data/cfg/server.auth

s yes
s solaris
s solaris,OmniOS v11 r151050
s solaris,OmniOS v11 r151050
s omnios50
s omnios v11 r151050
s OMN:omnios50
s OMN:omnios50,omnios v11 r151050
s /var/web-gui/data/cs_server/tools/nc/sol/nc -b 131072
s smb/server
s ch: e530..

neout: 90
k connections: 25
```

For the local Windows Web-GUI

In the taskbar you find an icon with 4 red points. If you click on it it opens three cmd Windows with the background services server (local cs_server), monitor (local monitor service) and auto (task services)

Monitor jobs

Open a powershell admin terminal in Windows and start a job via (powershell allows /) ex
`\xampp\perl\bin\perl C:\xampp\web-gui\data\menus_lib\windows\scripts\job-report.pl run_123456`
 (replace 123456 with real jobid)

About Windows Storage Spaces

Windows Storage Spaces can be very confusing, mostly because of the different Windows tools where each only offers a limited set of options, the need to learn Powershell for proper settings and a very inconsistent way of naming between Docs, tools and Powershell commands.

I try to use the following:

1. Physical Disks are HD, SSD, NVMe.

Powershell also lists virtual disks with the `get-physicaldisk` command

2. Virtual Disks are those based on a file (.vhdx)

In the docs, Storage Spaces are also often named virtual disks (very confusing)

3. Volumes and Partitions

This is what you see in Explorer, ex a NTFS, ReFS or ZFS disk, usually with a driveletter

4. Storage Pool

This is a blackbox where you throw in your physical disks.

In the docs use of this term is often mixed with Storage Space

5. Storage Space

This is a Virtual Device that is treated like a disk as you can place partitions on them.

Redundancy is defined here (not on Pool or Disk level)

In the docs, Storage Spaces are also often named virtual disks (very confusing)

6. SMB Storage Cluster

This is a setup with a whole node treated like a physical disk. Connectivity is over SMB via vhdx files

This setup works with Windows 10/11 and Server. Windows Server adds SMB Direct/RDMA

This is different to Microsoft S2D Cluster which is Windows Server only.

Compatibility

of napp-it cs with napp-it SE (Solaris edition)

You can add a napp-it SE (Illumos, Linux, Solaris) as a memberserver in napp-it cs.

If you want to continue napp-it replications in napp-it cs, create the jobs there newly with same source, destination and jobid.

Settings

Basic settings in menu About > Settings

Admin and Operator password

Language

Management allowed from

Grouping allowed from

Swap remote adress

Use win

Restrict clients from web-gui access

currently not used

If you use a nat vpn, napp-it detects the vpn ip

instead the real remote client. Swap can override this

Webserver and Encryption settings

Upserver	no value: callback disabled for requests < 4k „ip“: use calling ip (web-gui) for callback „www.server.com“: use this external server for callback
keylocation:	always /xampp/web-gui/_log/keys
W1 (first webserver for keypart download)	always localhost Apache
W2 (second webserver)	ex: www.server.com
access_id for upsrv/ W2 access	always /xampp/web-gui/_log/members/localhost~127.0.0.1.txt
restrict keyserver access	enter ip or range for zfs server that are allowed to download keys ex 192.168.2.
enable local keyserver	enable/disable keyserver

Upserv, W1,W2, allowed ip can enforced differently in server.pl or in cs_connect.pl

Notification settings

email or push data

Hide disks

these disks cannot be selected ex in Pool > Create/Add

FAQ

Helpful tools

It is helpful if you use WinSCP or Putty on Windows to access a ZFS server remotely.

On a ZFS server it is a good idea to install smartmontools and midnight commande as a local console filemanager

Can I use more than one web-gui machine to manage my ZFS servers

(ex. IT department and lokal workgroup) or in a redundant setup

Yes, this is possible. You must sync settings (About > Settings) and members and splitted keyfiles must be distributed.in a way to allow a ZFS server to find them. Also care that an ip range is allowed in your servers not only a sinlge ip. Easiest way is to simply backup the xampp folder. You can start on any other Windows after a simple copy to c:\.

Is Open-ZFS on OSX or Windows stable?

Open-ZFS on OSX or Windows has release candidate state, this means beta. But as the underlying Open-ZFS is the same as on BSD or Linux, data security on a ZFS pool should be similar. Problems are more related to OSX or Windows integration or performance.

For a production server with Open-ZFS, currently prefer ZFS on BSD or Linux or the Solaris fork Illumos especially OmniOS that use Open-ZFS as upstream but integrates newer features only after additional tests has a proven stability with a ultra low issue rate. Best ZFS stability still has native ZFS from Oracle but this is not free nor compatible with Open-ZFS.

Is napp-it cs for Windows free

Yes, for noncommercial homeuse. If you use it outside private homeuse you need a commercial Pro licence that includes updates and support. You can order single server or multiserver Pro subscriptions on an annual base or with a rebate for several years or perpetual.

Commercial users can request a quotation for a napp-it Pro subscription (this includes napp-it and napp-it cs) (valid per server, per servernumber or per location): https://www.napp-it.org/extensions/quotation_en.html

Can I modify or redistribute napp-it

Yes for inhouse use. If you want to redistribute or sell you need a licence agreement.

Can I redistribute my own menus and functions that run under napp-it

Yes without any restrictions. If you want to include napp-it, ask for a redistribution licence.

Can I sell or configure servers with preconfigured napp-it

Yes, unless your customer has a Pro license for every server.

Ask for a reseller discount (depend on numbers).

Can I sublicense napp-it to distribute it under my own brand or exclusively for a region?

Yes, ask fo a redistribution license. Costs depend on estimated numbers.

