Lightning Node Management

//Bastian & Marcel
//Swiss Bitcoin Conference
//27.04.2024

lipa

Why LN?

LN Infrastructure

Cloud-Hosting

Self-hosting

Native Hardware

Proxmox Hypervisor

LN Software

LN OS

Node Mngmt

LNDg

LN NodeTypes

LN Metrics

LN Services

Hi Plebs!

Bastian F.

Co-Founder & CIO

lipa

Die Schweizer App für bargeldloses Bezahlen mit Bitcoin.

Marcel R.

muraschal.io

ALPA.one
BITCOIN AT CORE ⚡ LIGHTNING AT HEART

ZVV

Bitcoin Association Switzerland

...mining Fiat & stacking Sats.

About lipa

Bitcoin payment provider
Make Bitcoin accessible
Fair payments

Node Types

Merchant Node

- inbound liquidity
- connectivity

Routing Node

- general liquidity
- connectivity
- peer slection

Spending Node*

- outbound liquidity
- peer selection

*the Pleb Node

LN Metrics

Betweeness
centrality rank

...measures how many shortest paths a node sits in between any two other nodes.

Higher ranking nodes tend to be in more shortest paths between other nodes and are thus more likely to be in a potential route.

Hubness
centrality rank

...is a node's influence in the network.

Higher ranking nodes tend to have more channels, and are also connected to other high ranking nodes who themselves have many channels.

Closeness/hopness
centrality rank

...measures the distance from a node to any other in the network.

Higher ranking nodes have to make fewer hops to reach any other node on the network.

Liquidity

...is necessary to manage routing and transactions.

Uptime

the longer the node (and its'channels) is active and reachable,
the more likely it is seen as reliable.

Network Connectivity

the lower the latency or higher the responsiveness of a node,
the more likley it is used for routing/payment transactions.

› Tor is counter productive
› VPS cumbersome

LN Services

Ring of Fire

Circularly connected nodes with selected participants enhancing network strength, where nodes benefit from the connectivity of other participants.

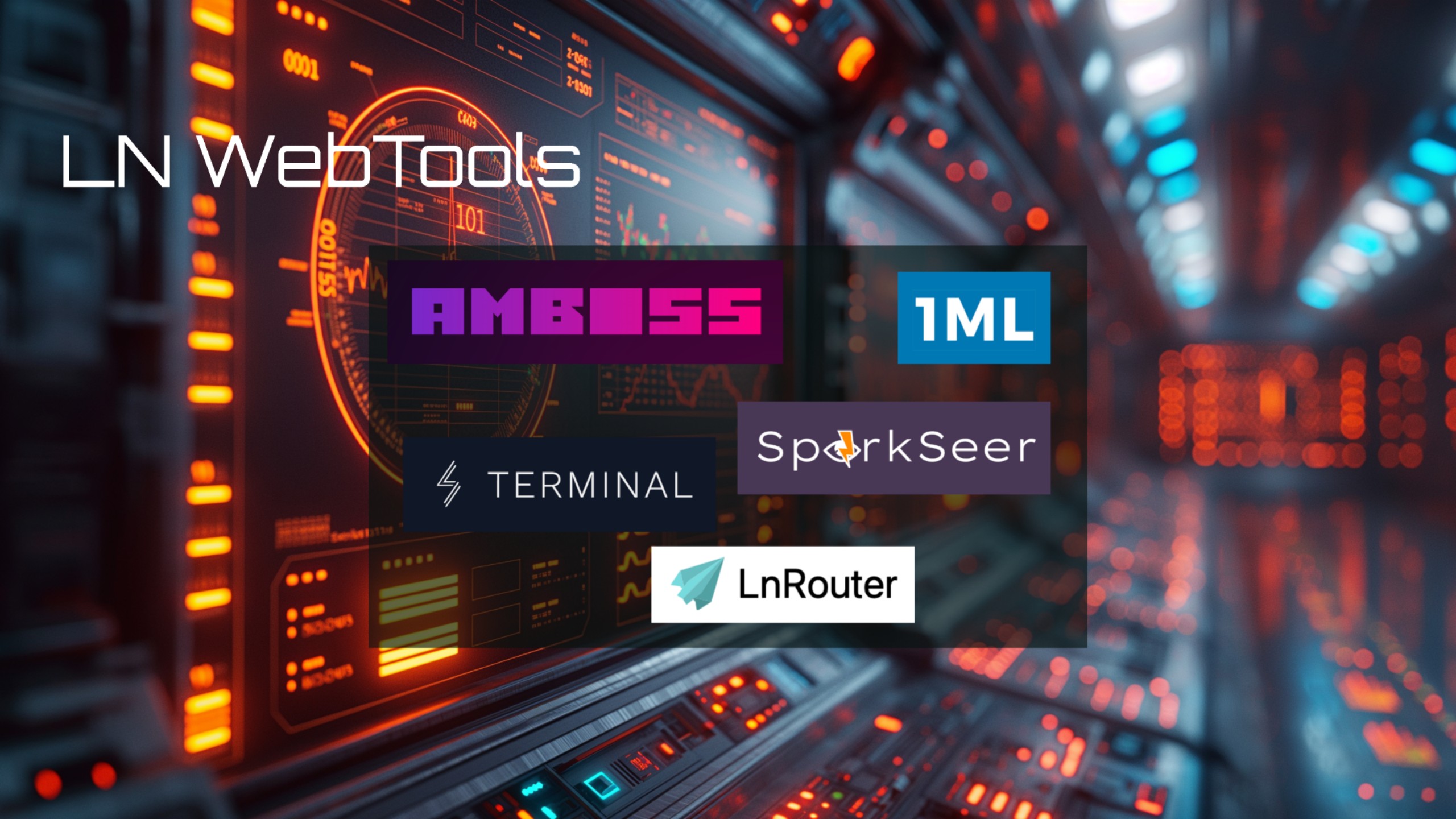
Circular Rebalancing

Allows for the movement of liquidity between channels to maintain balance and optimize network flow.

Swaps

Facilitates the movement of liquidity from on-chain to off-chain and vice versa, enabling flexible management of resources across different layers.

lightning network+ | Loop | Deezy | bolt.observer | Boltz | HYDRA Liquidity Automation | MAGMA Lightning Marketplace


LN WebTools
AMBOSS
1ML
TERMINAL
SparkSeer
LnRouter

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Why LN?

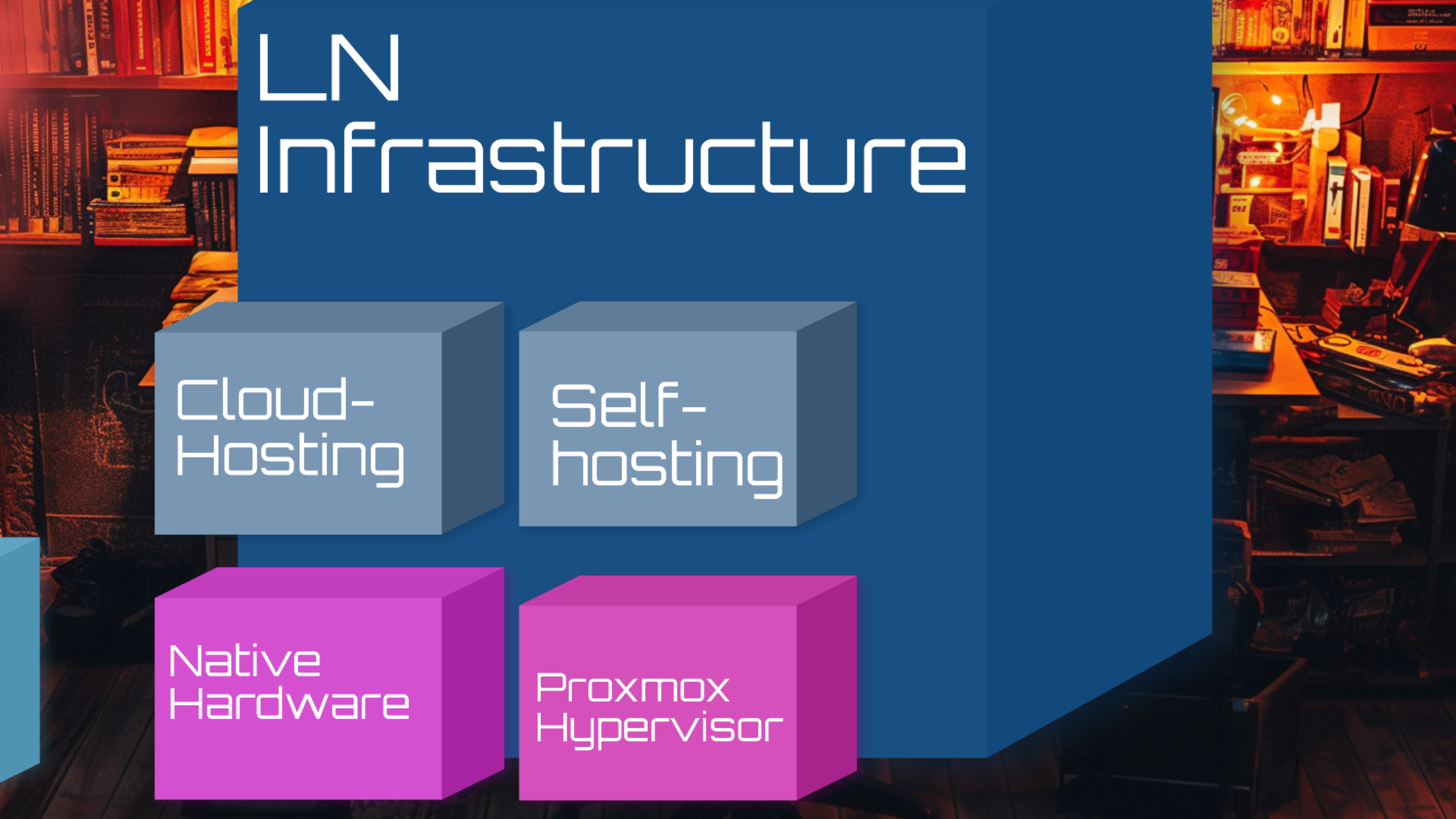
Be your own bank: Enjoy complete independence from third parties.

Bitcoin Layer 1 high-fee environment: Due to rising transaction costs on the blockchain, L1 is becoming less attractive for microtransactions.

Importance of Layer 2: If Bitcoin is what we all believe it to be, L2 will be necessary. LN is currently the most promising L2 solution.

Steep learning curve: Building technical expertise in areas such as Unix, network technologies, storage, backup, and hardware is substantial.

Joy and community: Operating a Lightning Node is not only fun but also strengthens ties to the Bitcoin community. Plebs4Plebs.


LN
Infrastructure
Cloud-
Hosting
Self-
hosting
Native
Hardware
Proxmox
Hypervisor

LN Infrastructure

Resource requirements for a Bitcoin Lightning Node:

Storage: At least 570GB for the non-pruned Bitcoin blockchain plus the LN software stack.
Total ~ 800 GB.
Processor: 2-4 CPU cores (e.g., RPi5 4x 2.4 GHz).
Memory: At least 8 GB RAM.

The decision to self-host or use cloud services for a LN node depends on several factors:

- Security requirements.
- Operational costs.
- Reliability and availability.
- Technical skills.

Cloudhosting

Scalability: Easily scalable to meet increasing demands without the need to invest in new hardware physically.

Availability: High availability through professional data centers. Reduces concerns about power outages or internet disruptions.

Maintenance and security: Maintenance, updates, and security measures are often handled by the provider, reducing technical effort.

Cost efficiency: Potentially lower initial investment as there's no need to purchase own hardware. However, ongoing costs may be higher.

"The cloud is just someone else's computer!"

Selfhosting

Control: Full control over all hardware and infrastructure hosted directly in one's own home. This allows complete authority over all operational aspects.

Costs: No ongoing rental fees for using external servers. Although initial investments in hardware are required, there are no additional ongoing fees.

Security and privacy: Increased security through physical possession of data. Privacy is more assured since no information needs to be stored on external servers.

Technical requirements: Setup and maintenance require technical expertise. Responsibility for maintaining security and conducting regular updates lies with the operator.

Native Hardware

Raspberry Pi (minimal solution):
Cost-effective, low energy consumption, easy to set up.

Laptop with (dual) SSD and integrated UPS:
Mobility, built-in power failure protection, enhanced data security through dual SSD.

x86 Linux PC with RAID system:
Higher performance, improved data integrity and fault tolerance through RAID.


GET SHIT DONE
der bitcoin standard
LIGHTNING NETWORK
Joomla!
Contao 3
Word
Press 3
jQuery
PHP 5.4 & MySQL 5.5
ZGB OR
Social Boom!
Steve Jobs
iPhone SDK
XSLT
DALIO

Proxmox Hypervisor

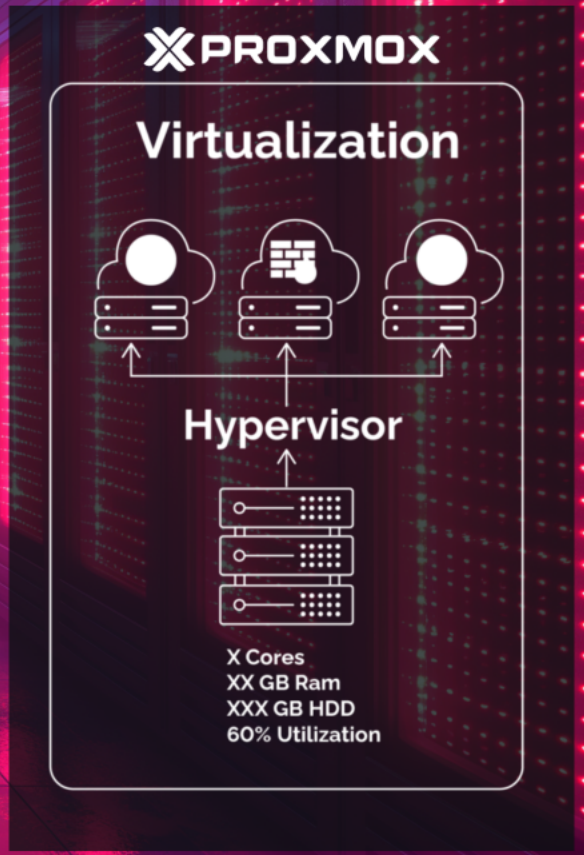
A Type-1 hypervisor based on Debian that enables robust server virtualization directly on the hardware. With a user-friendly web interface, Proxmox facilitates the setup and control of x86 virtualizations.

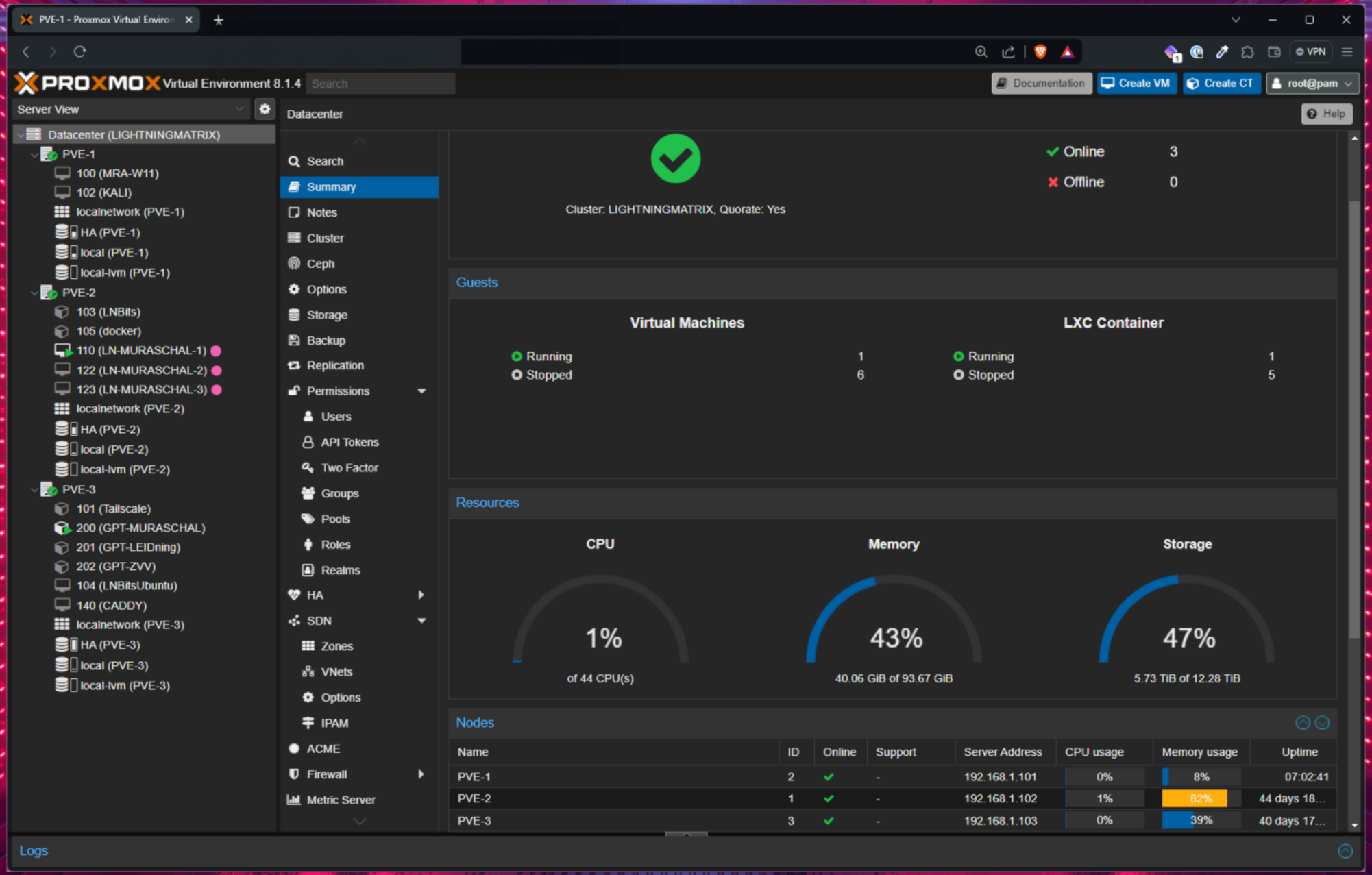
High Availability: Supports clustering for continuous availability, crucial for constant network connections of Lightning Nodes.

Live Migration: Allows seamless relocation of VMs between servers without downtime, enhancing flexibility during maintenance.

Automated Backup: Integrated tools for secure, automatic backups of VMs, essential for the recovery and data integrity of Lightning Nodes.

Provides high stability and ease of use, essential for the reliable operation of Lightning Nodes.

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Create CT
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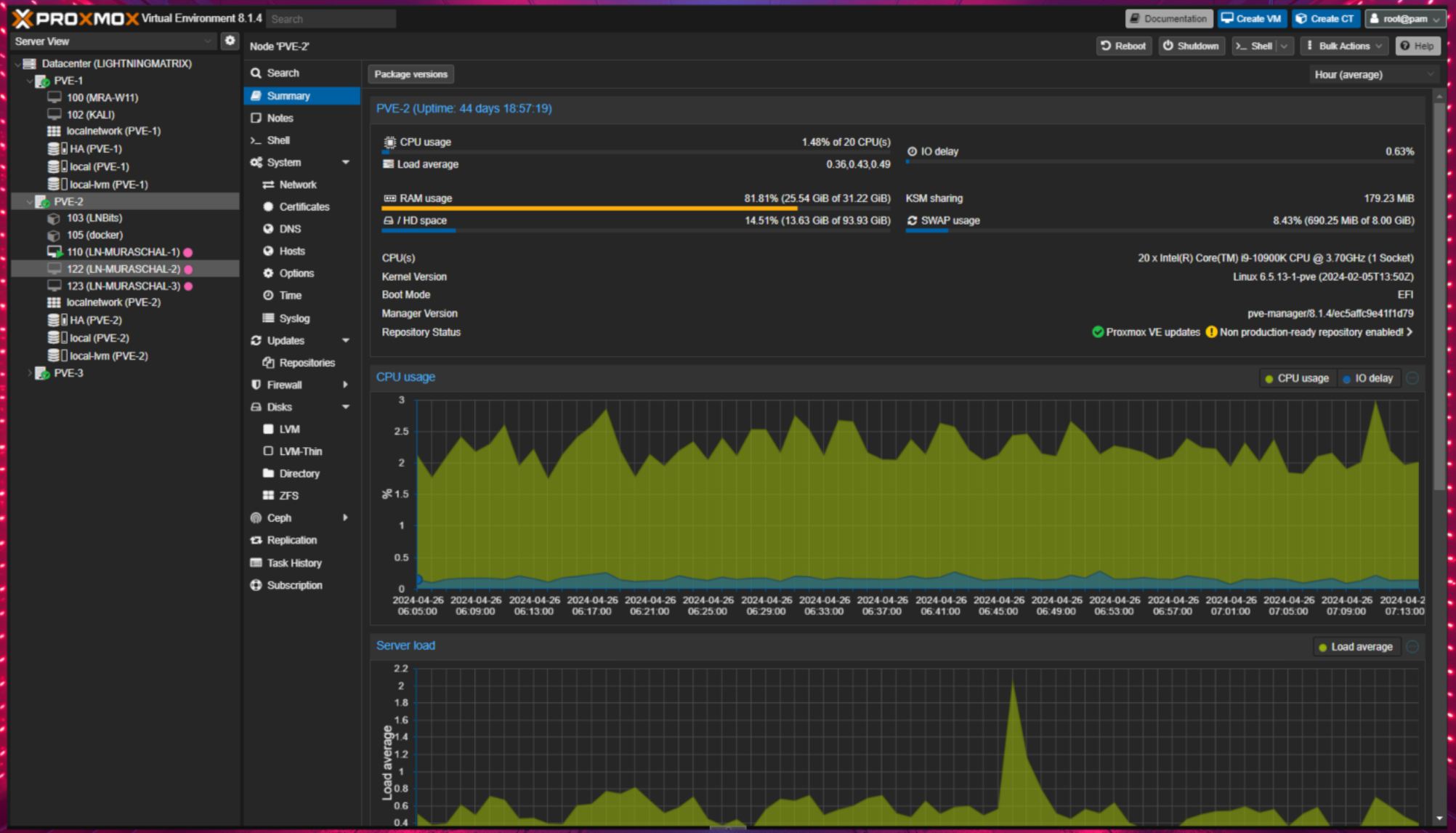
Metric Server
Cluster: LIGHTNINGMATRIX, Quorate: Yes
Online 3
Offline 0
Guests
Virtual Machines
Running 1
Stopped 6
LXC Container
Running 1
Stopped 5
Resources
CPU
1%
of 44 CPU(s)
Memory
43%
40.06 GiB of 93.67 GiB
Storage
47%
5.73 TiB of 12.28 TiB
Nodes
Name ID Online Support Server Address CPU usage Memory usage Uptime
PVE-1 2 - 192.168.1.101 0% 8% 07:02:41
PVE-2 1 - 192.168.1.102 1% 82% 44 days 18...
PVE-3 3 - 192.168.1.103 0% 39% 40 days 17...
Logs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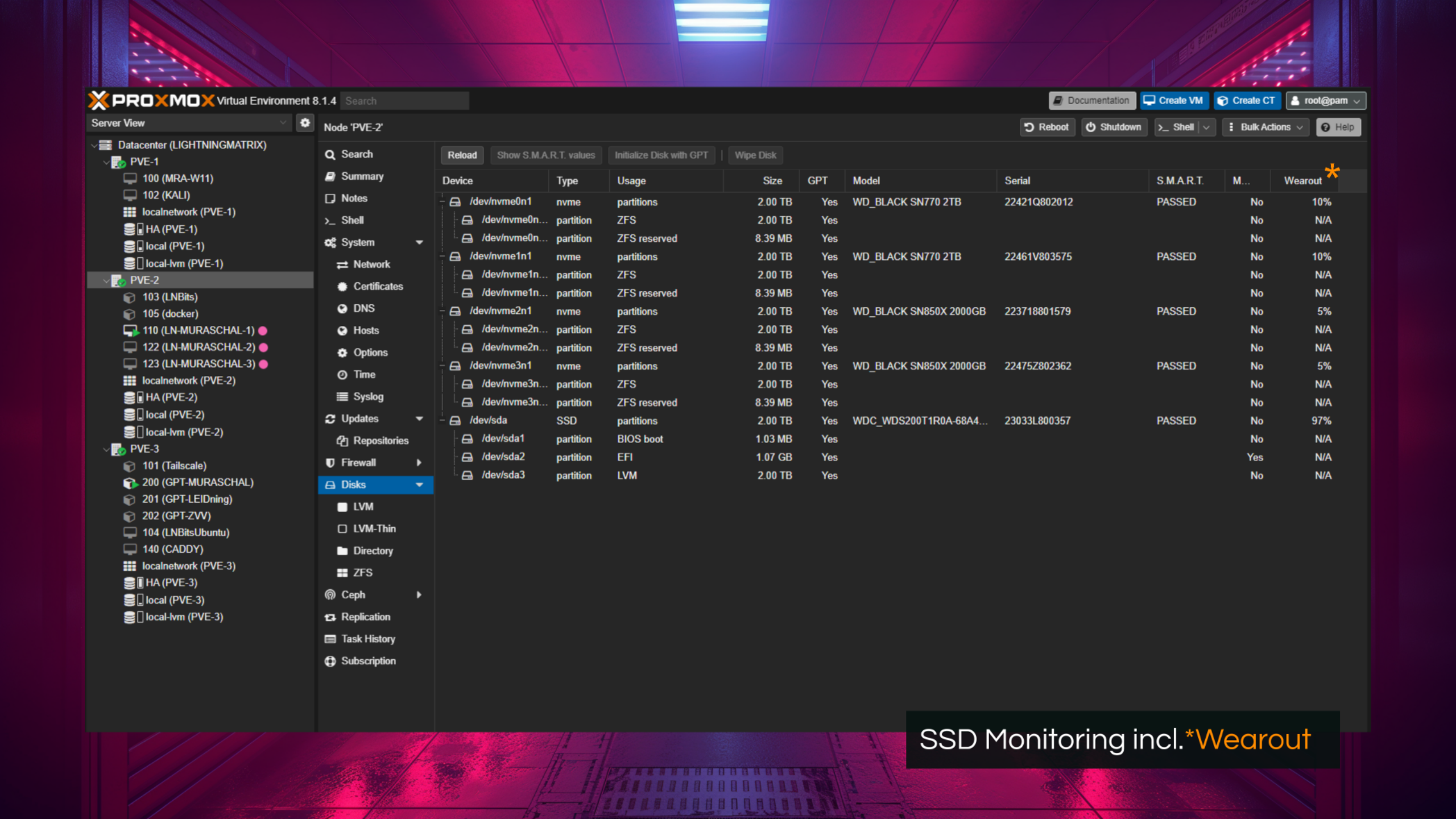
Directory
ZFS
Ceph
Replication
Task History
Subscription
Package versions
Hour (average)
PVE-2 (Uptime: 44 days 18:57:19)
CPU usage
1.48% of 20 CPU(s)
Load average
0.36,0.43,0.49
IO delay
0.63%
RAM usage
81.81% (25.54 GiB of 31.22 GiB)
/ HD space
14.51% (13.63 GiB of 93.93 GiB)
KSM sharing
179.23 MiB
SWAP usage
8.43% (690.25 MiB of 8.00 GiB)
CPU(s)
20 x Intel(R) Core(TM) i9-10900K CPU @ 3.70GHz (1 Socket)
Kernel Version
Linux 6.5.13-1-pve (2024-02-05T13:50Z)
Boot Mode
EFI
Manager Version
pve-manager/8.1.4/ec5affc9e41f1d79
Repository Status
Proxmox VE updates
Non production-ready repository enabled!
CPU usage
CPU usage
IO delay
%
3
2.5
2
1.5
1
0.5
0
2024-04-26 06:05:00
2024-04-26 06:09:00
2024-04-26 06:13:00
2024-04-26 06:17:00
2024-04-26 06:21:00
2024-04-26 06:25:00
2024-04-26 06:29:00
2024-04-26 06:33:00
2024-04-26 06:37:00
2024-04-26 06:41:00
2024-04-26 06:45:00
2024-04-26 06:49:00
2024-04-26 06:53:00
2024-04-26 06:57:00
2024-04-26 07:01:00
2024-04-26 07:05:00
2024-04-26 07:09:00
2024-04-26 07:13:00
Server load
Load average
Load average
2.2
2
1.8
1.6
1.4
1.2
1
0.8
0.6
0.4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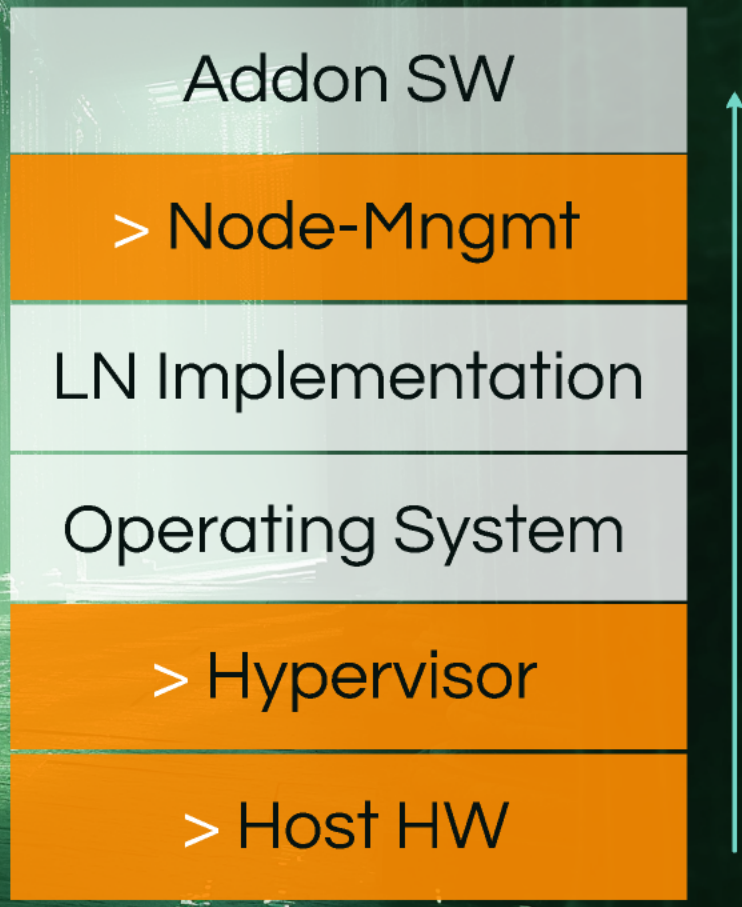
Initialize Disk with GPT
Wipe Disk
Device
Type
Usage
Size
GPT
Model
Serial
S.M.A.R.T.
M...
Wearout *
/dev/nvme0n1 nvme partitions 2.00 TB Yes WD_BLACK SN770 2TB 22421Q802012 PASSED No 10%
/dev/nvme0n... partition ZFS 2.00 TB Yes No N/A
/dev/nvme0n... partition ZFS reserved 8.39 MB Yes No N/A
/dev/nvme1n1 nvme partitions 2.00 TB Yes WD_BLACK SN770 2TB 22461V803575 PASSED No 10%
/dev/nvme1n... partition ZFS 2.00 TB Yes No N/A
/dev/nvme1n... partition ZFS reserved 8.39 MB Yes No N/A
/dev/nvme2n1 nvme partitions 2.00 TB Yes WD_BLACK SN850X 2000GB 223718801579 PASSED No 5%
/dev/nvme2n... partition ZFS 2.00 TB Yes No N/A
/dev/nvme2n... partition ZFS reserved 8.39 MB Yes No N/A
/dev/nvme3n1 nvme partitions 2.00 TB Yes WD_BLACK SN850X 2000GB 22475Z802362 PASSED No 5%
/dev/nvme3n... partition ZFS 2.00 TB Yes No N/A
/dev/nvme3n... partition ZFS reserved 8.39 MB Yes No N/A
/dev/sda SSD partitions 2.00 TB Yes WDC_WDS200T1R0A-68A4... 23033L800357 PASSED No 97%
/dev/sda1 partition BIOS boot 1.03 MB Yes No N/A
/dev/sda2 partition EFI 1.07 GB Yes Yes N/A
/dev/sda3 partition LVM 2.00 TB Yes No N/A
SSD Monitoring incl.*Wearout


LN
Software
LN
OS
Node
Mngmt
LNDg

LN Software

The software components of a Bitcoin Lightning Node are essential for smooth and secure operation within the Lightning Network.

This software includes not only the operating system and node management tools but also the specific applications required to manage blockchain data and conduct transactions.



LN OS / Guides

Linux (Debian, Ubuntu): Stable and widely used.

Raspiblitz: Quick setup, optimized for Raspberry Pi.

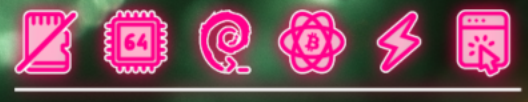
Raspibolt: Step-by-step guide for Raspberry Pi.

Minibolt: Designed for x86 PCs, suitable for Proxmox environments.

RASPI BLITZ

RaspiBolt

Bitcoin & Lightning Node



MINIBOLT

BITCOIN & LIGHTNING NODE

ON A PERSONAL COMPUTER

LN Node Management Tools

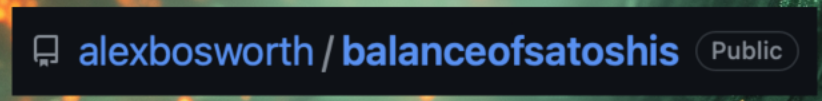
LND: Extensive community support; leading node software.

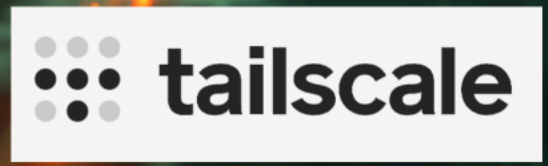
RTL (Ride The Lightning): Comprehensive web interface solution for managing Lightning Nodes.

BOS (Balance of Satoshis): Channel and batch openings, and rebalancing; includes Telegram Bot API.

TunnelSats: Combines Tor and Clearnet for secure hybrid operation.

Tailscale: Peer-to-peer VPN connections, ideal for secure and straightforward remote management.





LNDg

cryptosharks131 / lndg Public

LNDg is an expert dashboard tool specifically designed for managing and optimizing Lightning Network channels. It provides a comprehensive interface and powerful features for efficient control and monitoring of Lightning Nodes.

Channel Management: Manages payment channels.

Rebalancing: Supports active rebalancing of channels to optimally distribute liquidity and minimize payment failures.

Auto Fee Adjustment: Integrates automatic fee adjustment capabilities to dynamically modify channel fees based on network conditions.

Performance Monitoring: Offers real-time data and analytics on the performance of the node and its channels.

muraschal.io | 03c62e9a4264effa6550dbbddf6db0e49f171ccb8ed4a2150b885732b7d63acd3a

LND | bitcoin-mainnet | 840946 #000000000000000000014a717eb0b962faad1652bc4ff757e76bb6748a09942b

Public Capacity: 310.000.000 | Active Channels: 43 / 43 | Peers: 44 | DB Size: 9.2 GB | Total States Updates: 36.839.499 | Sign a message

Addresses:

Unconfirmed: 0	Limbo: 0	Pending HTLCs: 10	New Onchain Address | Legacy
Onchain fees	Cost	Profit/Outbound	Outbound Utilization
0	134%	-0ppm -0ppm	2,5%
0	102%	-0ppm -0ppm	11,2%

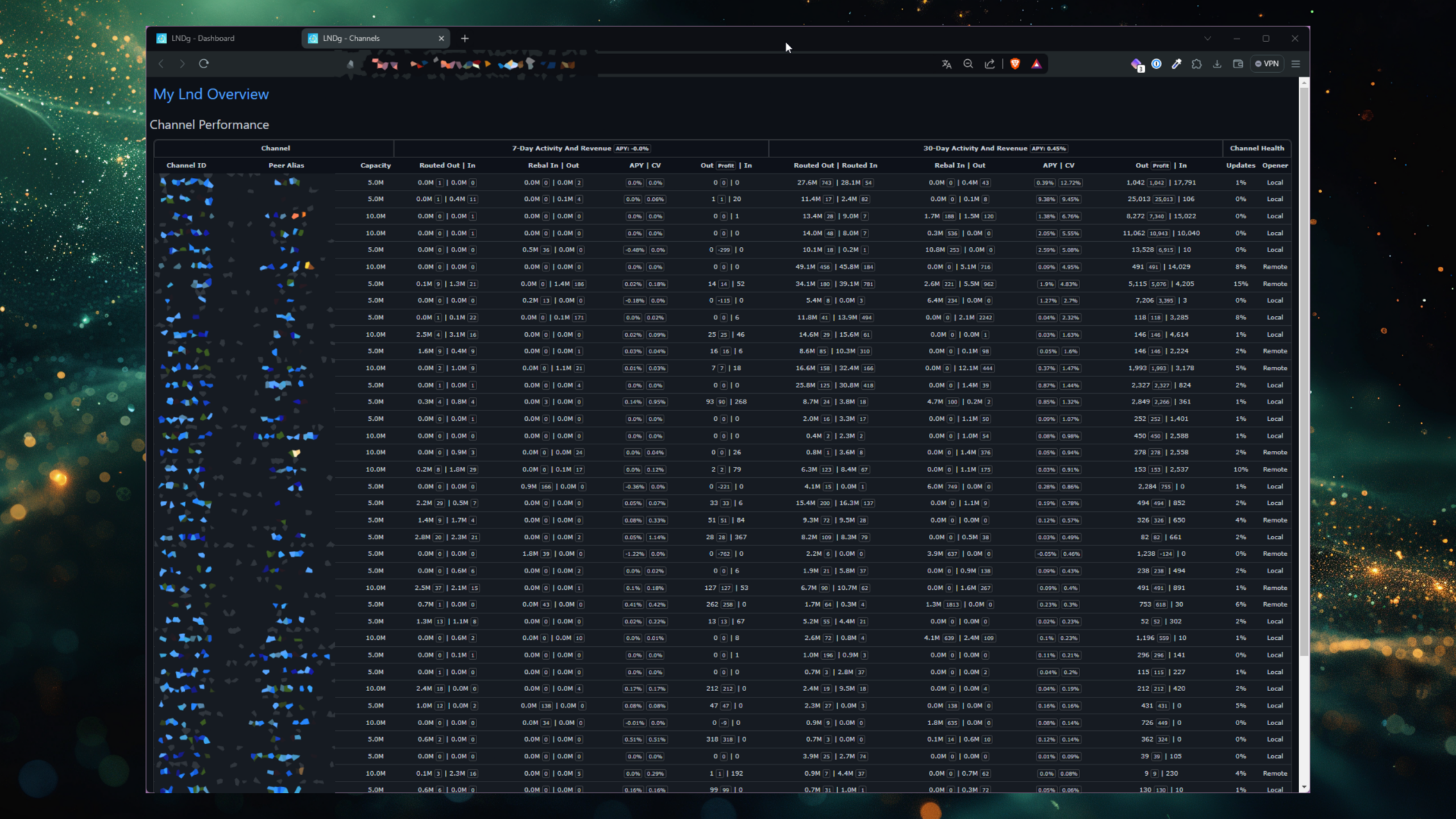
P&L | Closures | New Peers | Peer Events | AR Actions | Fee Rates | Autopilot | Fee Log | Channel Performance | Keysends | Rebalancing | Towers | Batching | Trades | Advanced Settings | Logs

Active Channels

Channel ID	Peer Alias	Outbound Liquidity	Capacity	Inbound Liquidity	Unsettled	oRate	oBase	o1D	i1D	o7D	i7D	iRate	iBase	oTarget%	iTarget%	AR
		2.051.544 41%	5.000.000	2.919.695 58%	0	535 ppm	0	0.00M 0	0.00M 0	0.00M 0	0.00M 0	50	0	100	50	Enable
		4.990.305 49%	10.000.000	4.980.934 49%	0	485 ppm	0	0.00M 0	0.00M 0	0.00M 0	0.68M 2	90	0	50	50	Enable
		2.677.595 53%	5.000.000	2.266.604 45%	0	165 ppm	0	0.00M 0	0.00M 0	0.60M 6	0.00M 0	223	1.000	50	50	Enable
		3.159.419 63%	5.000.000	1.807.520 36%	160.035 1	15 ppm	0	0.16M 8	0.30M 4	2.25M 29	0.50M 7	255	0	50	50	Enable
		3.350.285 67%	5.000.000	1.636.140 32%	0	35 ppm	0	1.21M 7	0.00M 0	1.46M 9	1.72M 4	345	0	100	50	Enable
		6.897.089 68%	10.000.000	3.074.150 30%	0	820 ppm	1.000	0.00M 0	0.00M 0	0.00M 0	0.01M 1	500	0	100	50	Enable
		7.040.090 70%	10.000.000	2.931.149 29%	0	930 ppm	0	0.00M 0	0.00M 0	0.00M 0	0.00M 0	900	0	75	50	Enable
		3.567.182 71%	5.000.000	1.428.478 28%	317.813 2	10 ppm	0	0.02M 1	0.13M 5	1.62M 9	0.47M 9	50	0	50	50	Enable
		7.236.549 72%	10.000.000	2.720.640 27%	0	50 ppm	0	1.74M 26	0.00M 0	2.56M 37	2.12M 15	225	1.000	1	100	Enable
		7.349.296 73%	10.000.000	2.621.943 26%	0	85 ppm	0	0.01M 3	0.00M 0	2.50M 18	0.00M 0	1.500	0	50	50	Enable
		15.110.689 75%	20.000.000	4.885.181 24%	153.160 1	20 ppm	0	0.15M 7	0.00M 0	0.87M 19	0.00M 0	221	0	50	50	Enable
		3.793.674 75%	5.000.000	1.177.565 23%	0	10 ppm	0	0.00M 0	0.01M 1	0.00M 0	0.10M 3	2.175	1.000	50	50	Enable
		7.779.977 77%	10.000.000	2.191.262 21%	0	10 ppm	0	0.00M 0	0.00M 0	0.01M 1	0.00M 0	598	0	50	50	Enable
		4.015.638 80%	5.000.000	955.601 19%	0	10 ppm	0	0.65M 6	0.00M 0	1.36M 13	1.11M 8	500	0	50	50	Enable
		8.146.860 81%	10.000.000	1.824.379 18%	0	230 ppm	0	0.00M 0	0.00M 0	0.00M 0	0.92M 3	525	0	50	50	Enable
		8.395.809 83%	10.000.000	1.575.430 15%	0	10 ppm	0	0.00M 0	0.00M 0	2.58M 4	3.10M 16	994	0	50	50	Enable
		4.243.270 84%	5.000.000	727.969 14%	0	120 ppm	0	0.00M 0	0.00M 0	0.00M 0	0.60M 6	1.500	0	50	60	Enable
		8.525.986 85%	10.000.000	1.460.443 14%	0	10 ppm	0	0.02M 3	0.87M 12	0.28M 8	1.83M 29	103	0	50	50	Enable
		4.427.257 88%	5.000.000	535.382 10%	237.827 2	10 ppm	0	0.02M 1	2.04M 15	2.82M 20	2.36M 21	21	0	1	50	Enable
		4.517.214 90%	5.000.000	454.025 9%	0	10 ppm	0	0.00M 0	0.00M 0	0.00M 0	0.00M 0	50	0	50	50	Enable

Last Payments Routed

Timestamp	Channel In Id	Channel In Alias	Amount In	Amount Out	Channel Out Alias	Channel Out Id	Fees Earned	PPM Earned
an hour ago	830117x2327x1	zvv.ch	5.000	5.000 +0	speedupln.com	816297x3218x0	0,45	90



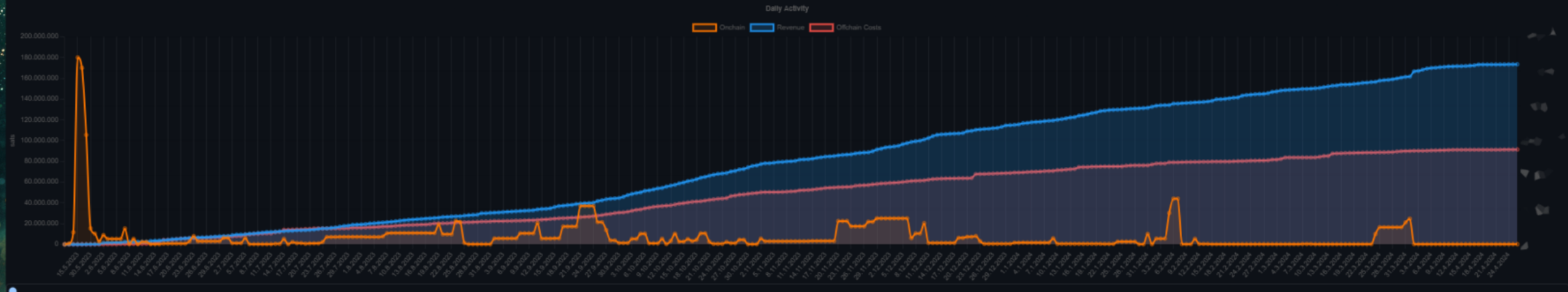
Channel			7-Day Activity And Revenue APY: -0.0%				30-Day Activity And Revenue APY: 0.45%				Channel Health	
Channel ID	Peer Alias	Capacity	Routed Out | In	Rebal In | Out	APY | CV	Out Profit | In	Routed Out | Routed In	Rebal In | Out	APY | CV	Out Profit | In	Updates	Opener
		5.0M	0.0M 1 | 0.0M 0	0.0M 0 | 0.0M 2	0.0% 0.0%	0 0 | 0	27.6M 743 | 28.1M 54	0.0M 0 | 0.4M 43	0.39% 12.72%	1,042 1,042 | 17,791	1%	Local
		5.0M	0.0M 1 | 0.4M 11	0.0M 0 | 0.1M 4	0.0% 0.06%	1 1 | 20	11.4M 17 | 2.4M 82	0.0M 0 | 0.1M 8	9.38% 9.45%	25,013 25,013 | 106	0%	Local
		10.0M	0.0M 0 | 0.0M 1	0.0M 0 | 0.0M 0	0.0% 0.0%	0 0 | 1	13.4M 28 | 9.0M 7	1.7M 188 | 1.5M 120	1.38% 6.76%	8,272 7,340 | 15,022	0%	Local
		10.0M	0.0M 0 | 0.0M 1	0.0M 0 | 0.0M 0	0.0% 0.0%	0 0 | 0	14.0M 48 | 8.0M 7	0.3M 536 | 0.0M 0	2.05% 5.55%	11,062 10,943 | 10,040	0%	Local
		5.0M	0.0M 0 | 0.0M 0	0.5M 36 | 0.0M 0	-0.48% 0.0%	0 -299 | 0	10.1M 18 | 0.2M 1	10.8M 253 | 0.0M 0	2.59% 5.08%	13,528 6,915 | 10	0%	Local
		10.0M	0.0M 0 | 0.0M 0	0.0M 0 | 0.0M 0	0.0% 0.0%	0 0 | 0	49.1M 456 | 45.8M 184	0.0M 0 | 5.1M 716	0.09% 4.95%	491 491 | 14,029	8%	Remote
		5.0M	0.1M 9 | 1.3M 21	0.0M 0 | 1.4M 186	0.02% 0.18%	14 14 | 52	34.1M 180 | 39.1M 781	2.6M 221 | 5.5M 962	1.9% 4.83%	5,115 5,076 | 4,205	15%	Remote
		5.0M	0.0M 0 | 0.0M 0	0.2M 13 | 0.0M 0	-0.18% 0.0%	0 -115 | 0	5.4M 8 | 0.0M 3	6.4M 234 | 0.0M 0	1.27% 2.7%	7,206 3,395 | 3	0%	Local
		5.0M	0.0M 1 | 0.1M 22	0.0M 0 | 0.1M 171	0.0% 0.02%	0 0 | 6	11.8M 41 | 13.9M 494	0.0M 0 | 2.1M 2242	0.04% 2.32%	118 118 | 3,285	8%	Local
		10.0M	2.5M 4 | 3.1M 16	0.0M 0 | 0.0M 0	0.02% 0.09%	25 25 | 46	14.6M 29 | 15.6M 61	0.0M 0 | 0.0M 1	0.03% 1.63%	146 146 | 4,614	1%	Local
		5.0M	1.6M 9 | 0.4M 9	0.0M 0 | 0.0M 1	0.03% 0.04%	16 16 | 6	8.6M 85 | 10.3M 310	0.0M 0 | 0.1M 98	0.05% 1.6%	146 146 | 2,224	2%	Remote
		10.0M	0.0M 2 | 1.0M 9	0.0M 0 | 1.1M 21	0.01% 0.03%	7 7 | 18	16.6M 158 | 32.4M 166	0.0M 0 | 12.1M 444	0.37% 1.47%	1,993 1,993 | 3,178	5%	Remote
		5.0M	0.0M 1 | 0.0M 1	0.0M 0 | 0.0M 4	0.0% 0.0%	0 0 | 0	25.8M 125 | 30.8M 418	0.0M 0 | 1.4M 39	0.87% 1.44%	2,327 2,327 | 824	2%	Local
		5.0M	0.3M 4 | 0.8M 4	0.0M 3 | 0.0M 0	0.14% 0.95%	93 90 | 268	8.7M 24 | 3.8M 18	4.7M 100 | 0.2M 2	0.85% 1.32%	2,849 2,266 | 361	1%	Local
		5.0M	0.0M 0 | 0.0M 1	0.0M 0 | 0.0M 0	0.0% 0.0%	0 0 | 0	2.0M 16 | 3.3M 17	0.0M 0 | 1.1M 50	0.09% 1.07%	252 252 | 1,401	1%	Local
		10.0M	0.0M 0 | 0.0M 0	0.0M 0 | 0.0M 0	0.0% 0.0%	0 0 | 0	0.4M 2 | 2.3M 2	0.0M 0 | 1.0M 54	0.08% 0.98%	450 450 | 2,588	1%	Local
		10.0M	0.0M 0 | 0.9M 3	0.0M 0 | 0.0M 24	0.0% 0.04%	0 0 | 26	0.8M 1 | 3.6M 8	0.0M 0 | 1.4M 376	0.05% 0.94%	278 278 | 2,558	2%	Remote
		10.0M	0.2M 8 | 1.8M 29	0.0M 0 | 0.1M 17	0.0% 0.12%	2 2 | 79	6.3M 123 | 8.4M 67	0.0M 0 | 1.1M 175	0.03% 0.91%	153 153 | 2,537	10%	Remote
		5.0M	0.0M 0 | 0.0M 0	0.9M 166 | 0.0M 0	-0.36% 0.0%	0 -221 | 0	4.1M 15 | 0.0M 1	6.0M 749 | 0.0M 0	0.28% 0.86%	2,284 755 | 0	1%	Local
		5.0M	2.2M 29 | 0.5M 7	0.0M 0 | 0.0M 0	0.05% 0.07%	33 33 | 6	15.4M 200 | 16.3M 137	0.0M 0 | 1.1M 9	0.19% 0.78%	494 494 | 852	2%	Local
		5.0M	1.4M 9 | 1.7M 4	0.0M 0 | 0.0M 0	0.08% 0.33%	51 51 | 84	9.3M 72 | 9.5M 28	0.0M 0 | 0.0M 0	0.12% 0.57%	326 326 | 650	4%	Remote
		5.0M	2.8M 20 | 2.3M 21	0.0M 0 | 0.0M 2	0.05% 1.14%	28 28 | 367	8.2M 109 | 8.3M 79	0.0M 0 | 0.5M 38	0.03% 0.49%	82 82 | 661	2%	Local
		5.0M	0.0M 0 | 0.0M 0	1.8M 39 | 0.0M 0	-1.22% 0.0%	0 -762 | 0	2.2M 6 | 0.0M 0	3.9M 637 | 0.0M 0	-0.05% 0.46%	1,238 -124 | 0	0%	Remote
		5.0M	0.0M 0 | 0.6M 6	0.0M 0 | 0.0M 2	0.0% 0.02%	0 0 | 6	1.9M 21 | 5.8M 37	0.0M 0 | 0.9M 138	0.09% 0.43%	238 238 | 494	2%	Local
		10.0M	2.5M 37 | 2.1M 15	0.0M 0 | 0.0M 1	0.1% 0.18%	127 127 | 53	6.7M 90 | 10.7M 62	0.0M 0 | 1.6M 267	0.09% 0.4%	491 491 | 891	1%	Remote
		5.0M	0.7M 1 | 0.0M 0	0.0M 43 | 0.0M 0	0.41% 0.42%	262 258 | 0	1.7M 64 | 0.3M 4	1.3M 1813 | 0.0M 0	0.23% 0.3%	753 618 | 30	6%	Remote
		5.0M	1.3M 13 | 1.1M 8	0.0M 0 | 0.0M 0	0.02% 0.22%	13 13 | 67	5.2M 55 | 4.4M 21	0.0M 0 | 0.0M 0	0.02% 0.23%	52 52 | 302	2%	Local
		10.0M	0.0M 0 | 0.6M 2	0.0M 0 | 0.0M 10	0.0% 0.01%	0 0 | 8	2.6M 72 | 0.8M 4	4.1M 639 | 2.4M 109	0.1% 0.23%	1,196 559 | 10	1%	Local
		5.0M	0.0M 0 | 0.1M 1	0.0M 0 | 0.0M 0	0.0% 0.0%	0 0 | 1	1.0M 196 | 0.9M 3	0.0M 0 | 0.0M 0	0.11% 0.21%	296 296 | 141	0%	Local
		5.0M	0.0M 1 | 0.0M 0	0.0M 0 | 0.0M 0	0.0% 0.0%	0 0 | 0	0.7M 3 | 2.8M 37	0.0M 0 | 0.0M 2	0.04% 0.2%	115 115 | 227	1%	Local
		10.0M	2.4M 18 | 0.0M 0	0.0M 0 | 0.0M 4	0.17% 0.17%	212 212 | 0	2.4M 19 | 9.5M 18	0.0M 0 | 0.0M 4	0.04% 0.19%	212 212 | 420	2%	Local
		5.0M	1.0M 12 | 0.0M 2	0.0M 138 | 0.0M 0	0.08% 0.08%	47 47 | 0	2.3M 27 | 0.0M 3	0.0M 138 | 0.0M 0	0.16% 0.16%	431 431 | 0	5%	Local
		10.0M	0.0M 0 | 0.0M 0	0.0M 34 | 0.0M 0	-0.01% 0.0%	0 -9 | 0	0.9M 9 | 0.0M 0	1.8M 635 | 0.0M 0	0.08% 0.14%	726 449 | 0	0%	Local
		5.0M	0.6M 2 | 0.0M 0	0.0M 0 | 0.0M 0	0.51% 0.51%	318 318 | 0	0.7M 3 | 0.0M 0	0.1M 14 | 0.6M 10	0.12% 0.14%	362 324 | 0	0%	Local
		5.0M	0.0M 0 | 0.0M 0	0.0M 0 | 0.0M 0	0.0% 0.0%	0 0 | 0	3.9M 25 | 2.7M 74	0.0M 0 | 0.0M 0	0.01% 0.09%	39 39 | 105	0%	Local
		10.0M	0.1M 3 | 2.3M 16	0.0M 0 | 0.0M 5	0.0% 0.29%	1 1 | 192	0.9M 7 | 4.4M 37	0.0M 0 | 0.7M 62	0.0% 0.08%	9 9 | 230	4%	Remote
		5.0M	0.6M 6 | 0.0M 0	0.0M 0 | 0.0M 0	0.16% 0.16%	99 99 | 0	0.7M 31 | 1.0M 1	0.0M 0 | 0.3M 72	0.05% 0.06%	130 130 | 10	1%	Local

My Lnd Overview

P&L Statement For muraschal.io

03c62e9a4264effa6550dbbddf6db0e49f171ccb8ed4a2150b885732b7d63acd3a

Step > 0.01 %



Line Item	1 Day	7 Day	30 Day	90 Day	Lifetime
Payments Routed					
Value Routed					
Revenue Earned					
Onchain Costs					
Offchain Costs					
Percent Cost					
Profits					

Light Theme

LNDg v1.8.0

Logout

Lightning Node Management

//Bastian & Marcel
//Swiss Bitcoin Conference
//27.04.2024

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Why LN?

LN Infrastructure

Cloud-Hosting

Self-hosting

Native Hardware

Proxmox Hypervisor

LN Software

LN OS

Node Mngmt

LNDg

LN NodeTypes

LN Metrics

LN Services

Lightning Node Management

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Stack Sats
and open
Channels!