StorPool
DISTRIBUTED STORAGE

StorPool Storage

Deployment Guide for Equinix Metal

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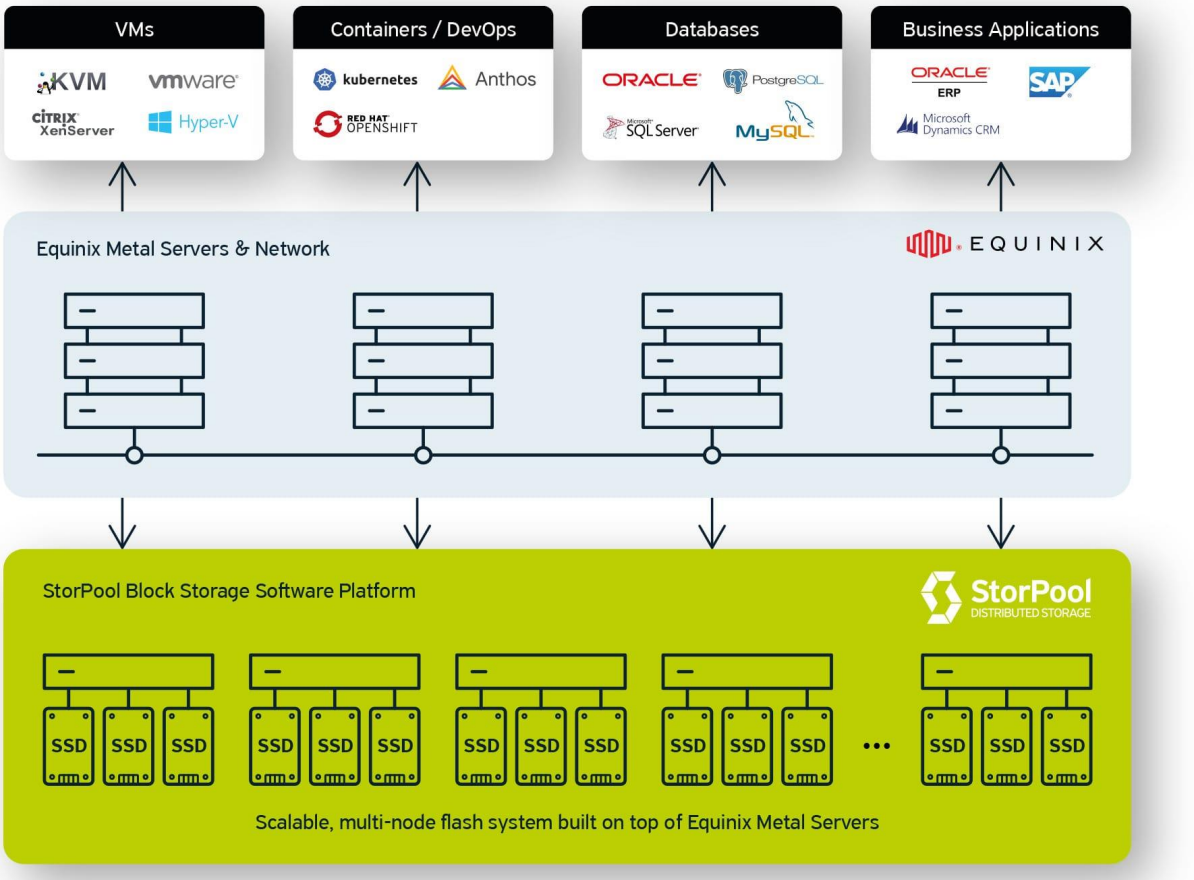
Overview

The current document provides details on how you can choose which Equinix Metal systems to use, and how to perform the initial configuration on these systems before deploying StorPool.

StorPool Storage is a software-defined storage solution that can be deployed on a cluster of standard servers. It turns the cluster into a high-performance, highly reliable enterprise block storage platform. This allows building applications that require highly available shared storage using Equinix Metal instances only, without the need for specialized hardware. In the model below, Equinix Metal servers are powering both the applications and the data storage platform serving the applications.



The StorPool block storage platform provides services using the iSCSI protocol over a standard Layer 2 network to other Equinix Metal servers to run the applications.

StorPool Storage can provide services to other Equinix Metal instances in the same Zone / Metro.

Planning

Choosing the type and number of servers to use should be based on the amount of storage you need.

Selecting servers

StorPool Storage cluster can be deployed on the following Equinix Metal instances:

Instance Type	CPU	RAM	Raw Storage capacity per node
m3.large.x86	1 x AMD EPYC 7502P 32 cores @ 2.5 GHz	256 GB	7.68 TB (2 x 3.84 TB NVMe)
m3.large.opt-c2s1	1 x AMD EPYC 7513 32 cores @ 2.6 GHz	256 GB	15.36 TB (4 x 3.84 TB NVMe)
m3.large.opt-c2m3s3	1 x AMD EPYC 7513 32 cores @ 2.6 GHz	512 GB	30.72 TB (8 x 3.84 TB NVMe)

Calculating the required storage capacity

StorPool provides two mechanisms for protecting data: replication and erasure coding. Depending on the selected redundancy scheme, the storage efficiency and the required raw capacity can be determined by the table below.

Redundancy scheme	Minimum number of storage nodes	Required raw Capacity
Replication x 3	3	Usable x 3.3
Erasure Coding 2+2	5	Usable x 2.4
Erasure Coding 4+2	7	Usable x 1.8
Erasure Coding 8+2	11	Usable x 1.5

For example, 7 storage nodes of type *m3.large.opt-c2s1* will provide `7 * 15.36 TB = 107.52 TB` raw storage capacity. When the *Erasure Coding 4+2* redundancy scheme is used, this will provide `107.52 TB / 1.8 = 59.73` TB usable storage capacity.

When calculating the required number of servers, please consider the minimum number of servers per instance type and per selected redundancy scheme.

Connectivity

The StorPool storage cluster needs two Layer 2 networks: back-end and front-end.

Back-end storage network

Is used by the storage nodes for synchronous replication. It is a Layer 2 VLAN network that should be enabled on all interfaces on all storage nodes.

Front-end storage network

Provides communication between the storage clients - for example, compute nodes and the storage cluster. It runs the iSCSI protocol.

This network is also a Layer 2 VLAN but has to use a different VLAN ID than the back-end storage network. It has to be enabled on all interfaces of all storage nodes, and all compute nodes that use this storage.

The front-end storage network is also used for access to StorPool API and the Web Dashboard.

IP addresses

While StorPool uses Layer-2 VLAN networks for both the front-end and the back-end storage networks, interfaces attached to these networks need to have IP addresses assigned.

Back-end storage network

On the back-end storage network, you need to allocate one IP address for each storage node. This network is usually used only within the cluster, so no other addresses are required. Also, you can select any IP prefix for it as long as it doesn't overlap with the other networks that can communicate with the storage cluster. This network doesn't need to have a gateway.

Front-end storage network

On the front-end storage network, you need to allocate the following IP addresses:

- One IP address per storage node for iSCSI sessions.
- One IP address per storage node for iSCSI monitoring purposes.
- One IP address for the iSCSI portal group
- One IP address for the StorPool API
- One IP address for the Web dashboard (optional)
- One IP address for each iSCSI initiator that needs to connect to the storage cluster.

The front-end network typically has a gateway that routes the traffic between the API, the Web dashboard, and the other networks.

Example

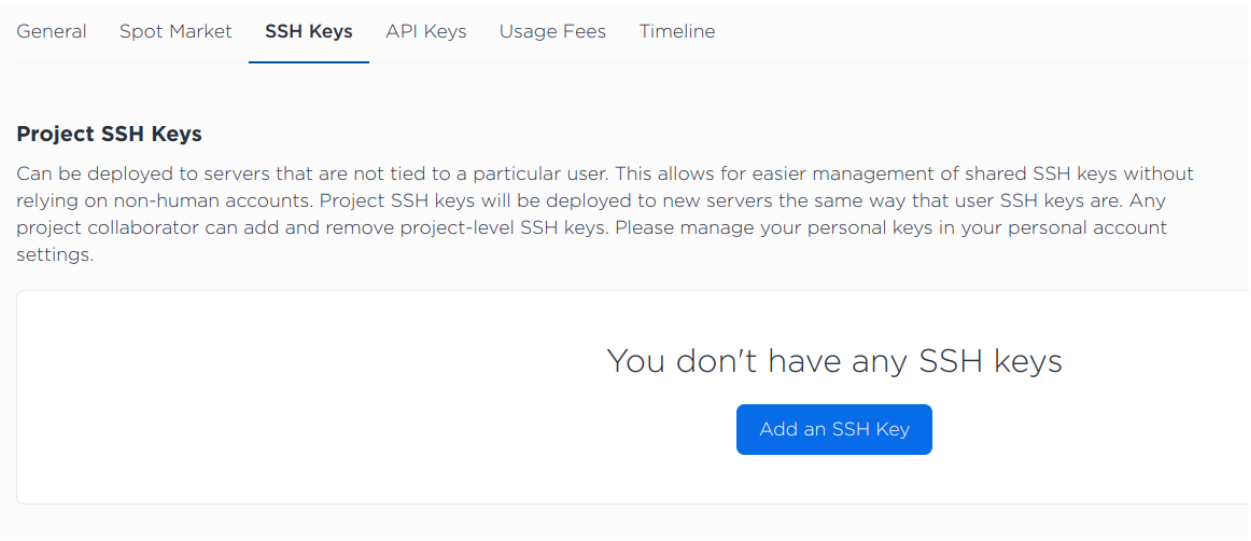
Below is an example of IP address planning for the back-end and front-end storage networks of a 3-node storage cluster and 20 iSCSI initiators.

Address	Description
10.100.1.0/24	**Back-end storage network**; VLAN 301
10.100.1.1	Storage node 1 backend interface
10.100.1.2	Storage node 2 backend interface
10.100.1.3	Storage node 3 backend interface
10.200.1.0/24	**Front-end storage network**; VLAN 501
10.200.1.1	Storage node 1, iSCSI monitoring
10.200.1.2	Storage node 2, iSCSI monitoring
10.200.1.3	Storage node 3, iSCSI monitoring
10.200.1.21	Storage node 1, iSCSI sessions
10.200.1.22	Storage node 2, iSCSI sessions
10.200.1.22	Storage node 3, iSCSI sessions
10.200.1.30	iSCSI portal group
10.200.1.31	StorPool API endpoint
10.200.1.32	StorPool Web Dashboard
10.200.1.101 … 10.200.1.120	iSCSI initiators 1 to 20
10.200.1.254	gateway

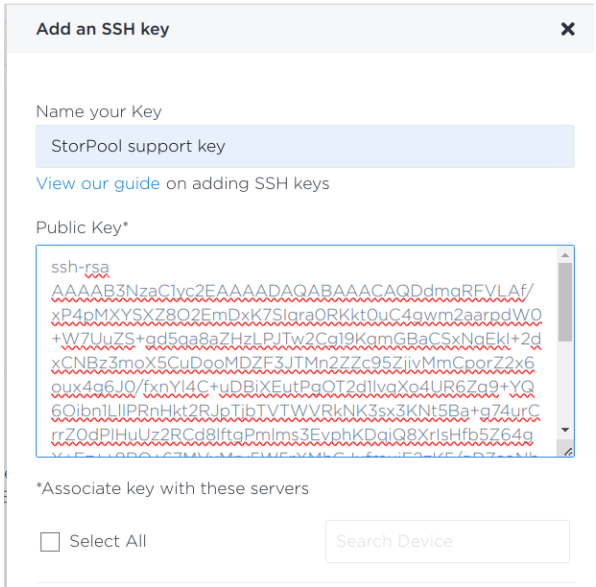
Creating a storage cluster

Enabling remote support

The StorPool support SSH key allows the StorPool Operations team to deploy and provide remote support for your cluster. To add the key:
1. In https://console.equinix.com/ go to your project, then *Project Settings* → *SSH Keys* and choose *Add an SSH Key*.



2. For name, enter "StorPool support key", or other appropriate name.
3. In the *Public key* field, enter the StorPool support public key. You can download it from https://vault.storpool.com/support-key.pub



4. Choose *Add SSH key* to save the changes.

Creating VLANs

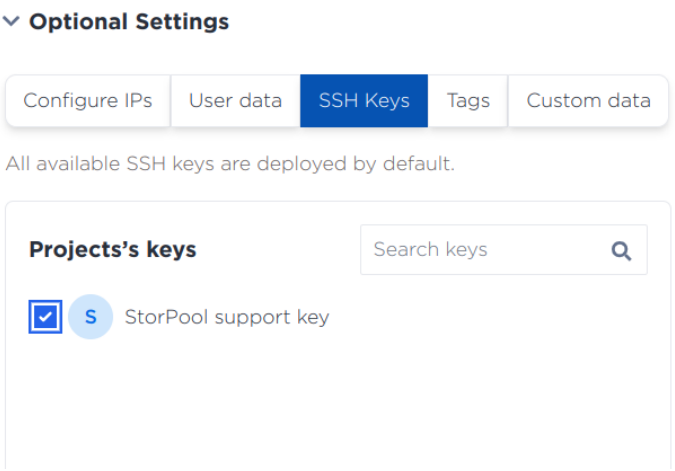
1. Go to *Networking* → *Layer 2 VLAN* and select + *Add VLAN*.

2. Select the Metro.
3. Enter a suitable name, for example, "StorPool iSCSI"
4. Select a VLAN ID, for example, 501.

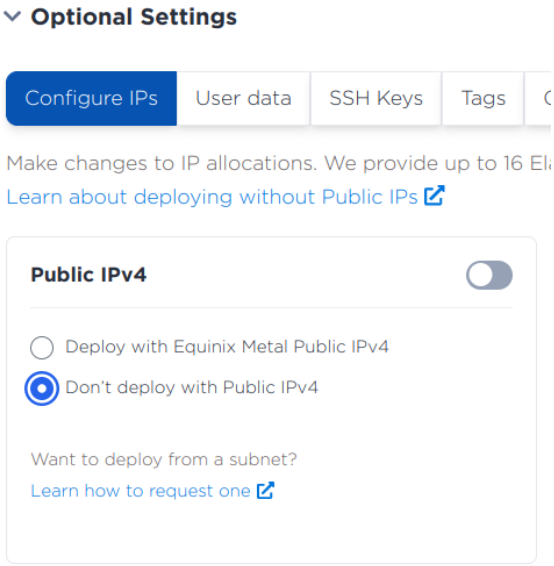
Repeat the same for the StorPool backend VLAN

Adding Servers

1. Go to *Bare Metal Servers* → *Manage Servers* and select + *New Server*.
2. Select the Metro.
3. For the server type, select one of the supported servers listed in the Planning section above.
4. Operating system: select *AlmaLinux 9*.
5. Select Number of servers: according to the planning.
6. For each server, give a meaningful hostname, for example "fra1-cl1-node1".
7. In *Optional Settings* → *SSH Keys* select the key you added earlier (in the example below: "StorPool support key").

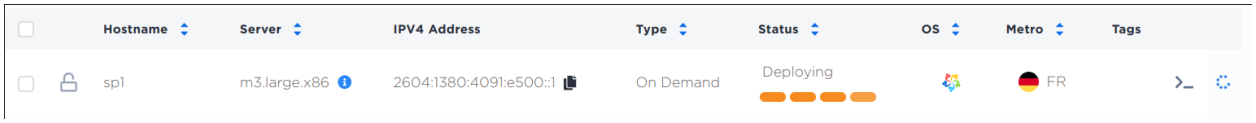


8. Storage servers don't need a public IP address to operate properly.
   If you don't need a public IP address on the server for management purposes, you can disable it in *Optional Settings → Configure IPs → Don't deploy with Public IPv4*.



9. Deploy the servers.

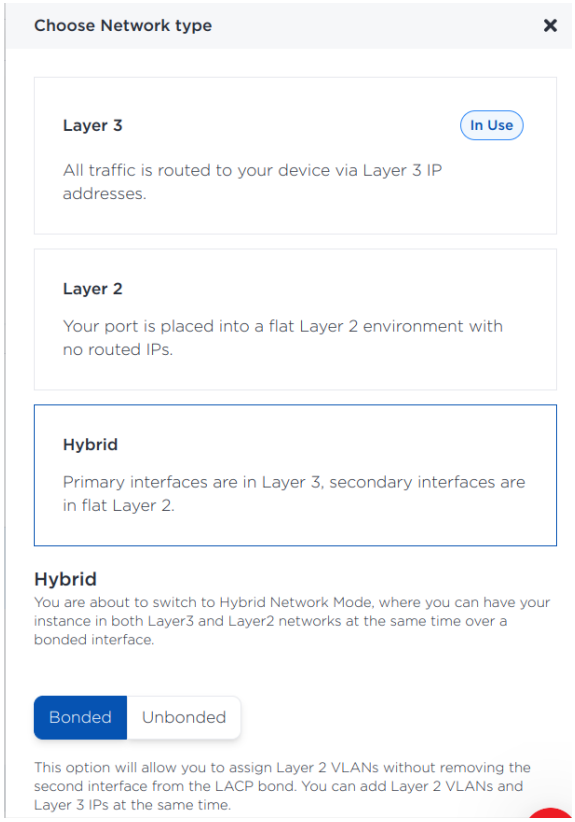
In a short while, the servers will be ready, and the status from "Deploying" will become "Running".



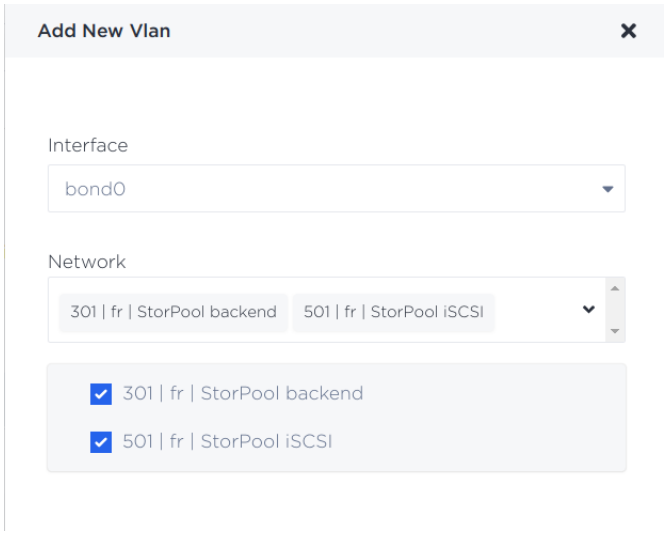
Activating VLANs

For each of the storage servers, activate the two VLANs:

1. Go to "Manage Servers", and select the server.
2. Go to *Network → Convert to other network type*. Then select "Hybrid" and "Bonded".



3. Go to *Network → Layer 2* and choose *Add New VLAN*.



4. Select Interface "bond0".
   For Network, select the two VLANs - "StorPool iSCSI" and "StorPool backend".
5. Press the *Add VLAN* button.

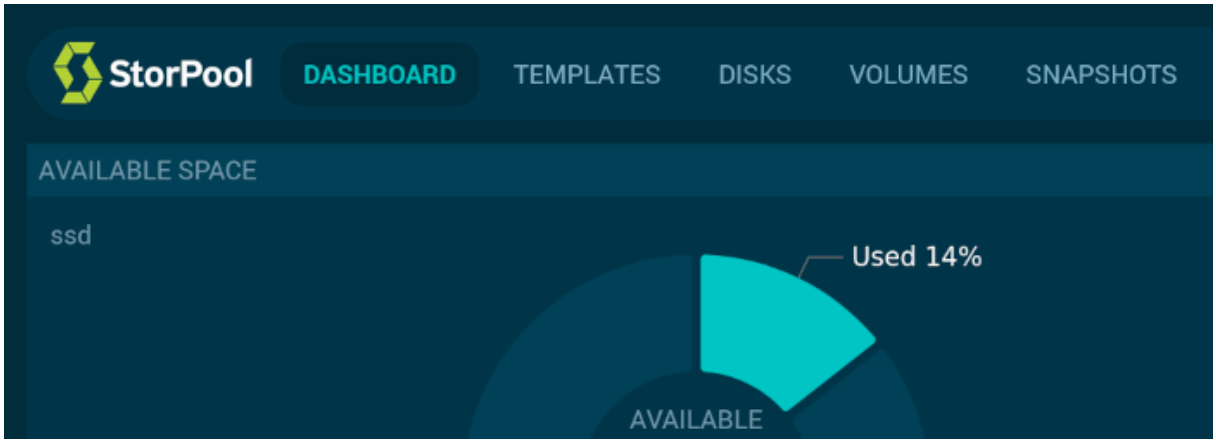
Installing StorPool

Contact StorPool support at support@storpool.com for the StorPool software and the next steps of installing and configuring it on the storage servers.

Accessing StorPool

Web interface

The easiest way to start using StorPool is the Web interface:



Here you can manage volumes, create volumes and snapshots, manage iSCSI connectivity, and so on. Contact StorPool for details on how to access the Web interface for your cluster.

API access

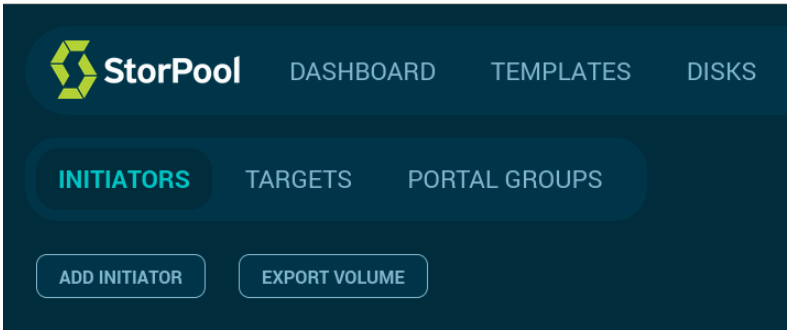
You can also create and use your own tools for managing the storage cluster. This can be achieved using StorPool's API. StorPool API is accessible at http://<api_endpoint>:81/. For details, see the API documentation.

Basic operations

Registering initiators

The StorPool volumes can be accessed using the iSCSI protocol.

Before starting to use the storage, the initiators have to be registered in the StorPool storage platform with their IQN. In the web interface, go to *iSCSI -> Initiators* and add the IQN of the initiator.



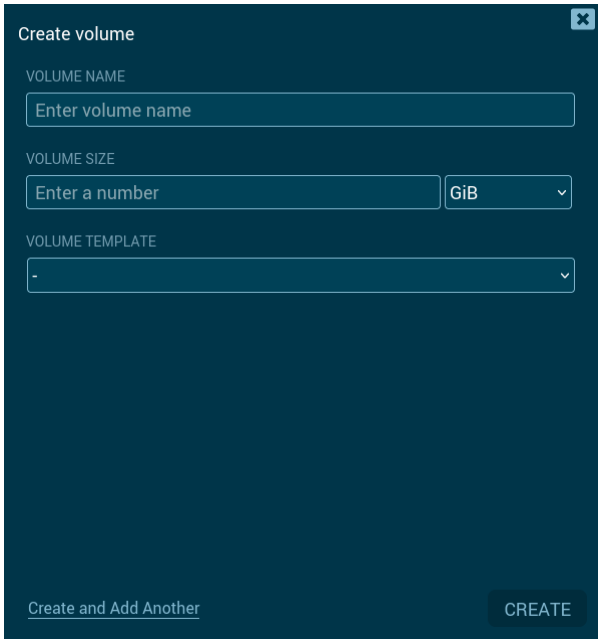
Hint: the IQN of the Linux initiators is stored in `/etc/iscsi/initiatorname.iscsi`. Remember to restart *iscsid* if you change the value.

Creating a Volume

Volumes and snapshots are the basic elements of the storage cluster:

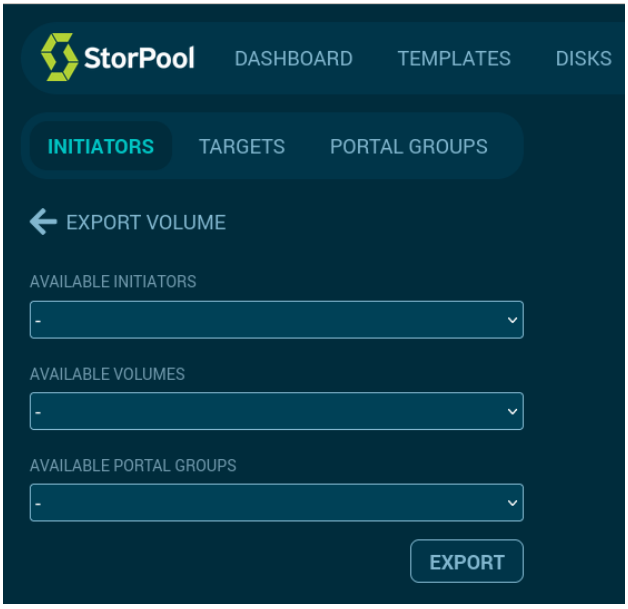
- Volumes are the basic service of the StorPool storage system. A volume always has a name and size. It can be read from and written to.
- Snapshots are read-only point-in-time images of volumes. They are created once and cannot be changed. They can be attached to hosts as read-only block devices.

You can create a volume in the Web interface:



Export Volume (LUN masking)

You use the Web interface to mark StorPool volumes as accessible to iSCSI initiators:



Select the volume, the portal group, and the initiators that will have access to this volume.